SAPCA

SPORTS AND PLAY CONSTRUCTION ASSOCIATION

# The SAPCA Code of Practice for the Construction and Maintenance of Athletics Tracks

www.sapca.org.uk

The Sports and Play Construction Association

All rights reserved. No part of this publication may be reproduced in any form or by any means without the prior permission of the Sports and Play Construction Association (SAPCA) and UK Athletics (UKA).

October 2021, (4th Edition)

ISBN: 978-1-907391-12-5

The Sports and Play Construction Association (SAPCA) holds the copyright to this Code of Practice and any future amendments should be addressed to them at:

The Sports and Play Construction Association
The Hexangle
Stoneleigh Park
Warwickshire
CV8 2LG.

All rights reserved. No part of this publication may be reproduced in any form or by any means without the prior permission of the Publisher.

Disclaimer

SAPCA and UK Athletics (UKA) do not accept any liability for the design or construction of any facilities, or the actions of any contractors employed, as a result of, or in connection with, any information provided in this publication.

Some sport surface system/products and designs, available to potential clients may be covered by Patents; clients should ensure that the use of similar products does not infringe any patents held by manufacturers or installers. SAPCA does not accept any liability for choice of surfacing systems infringing any current or future patents.

## Contents

**Foreword** ..... 13

**Notes to be Read in Conjunction with the Code of Practice** ..... 14

**Sources of Further Information** ..... 16

**The Sports and Play Construction Association (SAPCA)** ..... 17

**SAPCA's Aims and Objectives** ..... 17

**Helping you make better choices** ..... 17

**Further information** ..... 18

**UK Athletics (UKA)** ..... 18

**Purpose** ..... 19

**Getting started** ..... 20

**Intended Use** ..... 20

**Facility Concept** ..... 21

**Geographic Considerations** ..... 21

**Scope of the Project** ..... 21

**Budgeting** ..... 21

**Introduction** ..... 22

**Section One: General Construction Requirements** ..... 25

**1.1 Design Considerations** ..... 25

1.1.1 Access and Participation for All ..... 25

1.1.2 Designing for Accessibility ..... 25

1.1.3 General Arrangement and Layout ..... 25

1.1.4 A new generation of innovative facilities ..... 25

Copyright © SAPCA

1.1.5 Setting out a Standard 400m Track....26
1.1.6 Gradients....27
1.1.7 Orientation....28
1.1.8 Obstructions....28
1.1.9 Steeplechase Widening....28
1.1.10 Requirements for Jumping Events....31
1.1.10.1 Long Jump / Triple Jump....31
1.1.10.2 High Jump....32
1.1.10.3 Pole Vault....32
1.1.11 Requirements for Throwing Events....33
1.1.11.1 Javelin....33
1.1.11.2 Hammer and Discus....33
1.1.11.3 Shot Put....34
1.1.11.4 Provision for Disabled Athletes....34
1.1.11.5 Throwing Cages....34
1.1.11.6 Track Layouts....36
**1.2 Earthworks....38**
1.2.1 General....38
1.2.2 Information Gathering....38
1.2.3 Site Levelling and the Formation....39
1.2.4 Slope Stability....40
**1.3 Weedkilling....40**
**1.4 Drainage and Water Management....41**
**1.5 Ducts....43**

Copyright © SAPCA

**1.6 Sub-Base ..... 44**

**1.7 Perimeter Edging ..... 45**

**1.8 Base Construction ..... 45**

**1.9 Synthetic Surfaces ..... 46**

1.9.1 Prefabricated Systems ..... 46

1.9.2 Solid PU Tracks ..... 47

1.9.3 Sandwich Systems ..... 48

1.9.4 Porous PU Tracks ..... 48

1.9.5 Thickness ..... 49

**1.10 Testing ..... 49**

1.10.1 TrackMark Certification Procedure ..... 52

1.10.1.1 How long does accreditation last? ..... 52

1.10.1.2 What does the process involve? ..... 53

1.10.1.3 Benefits of TrackMark ..... 53

**1.12 Fencing (optional, not a World Athletics or UKA requirement) ..... 53**

1.10.2 Boundary Fencing ..... 53

1.10.2.1 Height ..... 53

1.10.2.2 Access ..... 53

1.10.2.3 Materials ..... 54

1.10.2.4 Chainlink ..... 54

1.10.2.5 Weldmesh Rolls ..... 54

1.10.2.6 Weldmesh Panels and Proprietary Systems ..... 54

1.10.2.7 Gates ..... 55

1.10.3 External Trackside Fence ..... 55

Copyright © SAPCA

**Section Two: Maintenance ..... 57**

**1.11 Maintenance of Synthetic Surfaces ..... 57**

1.11.1 Introduction ..... 57

1.11.2 What Maintenance and Why ..... 57

1.11.3 Keeping the Surface Clean ..... 57

1.11.4 Access over the Track ..... 59

1.11.5 Spreading the Wear ..... 60

1.11.6 Central Area ..... 60

**1.12 Maintenance and Storage of Equipment ..... 60**

1.12.1 Equipment for Track Events ..... 61

1.12.1.1 Track Kerbing ..... 61

1.12.1.2 Starting Blocks ..... 61

1.12.1.3 Track Judges, Timekeepers Stands and Starters' Stands ..... 61

1.12.1.4 Microphones, Amplifiers, Loudspeakers and Electrical Equipment ..... 61

1.12.1.5 Hurdles ..... 62

1.12.1.6 Steeplechase Hurdles ..... 62

1.12.2 Equipment for Field Events ..... 62

1.12.2.1 Pole Vault Landing Area ..... 62

1.12.2.2 Stands ..... 62

1.12.2.3 Bars ..... 63

1.12.2.4 Vaulting Poles ..... 63

1.12.2.5 High Jump Landing Area ..... 63

1.12.2.6 Stands ..... 63

Copyright © SAPCA

1.12.2.7 Cover ..... 63
1.12.2.8 Long Jump/Triple Jump ..... 63
1.12.2.9 Sand ..... 63
1.12.2.10 Javelin ..... 64
1.12.2.11 Shot ..... 64
1.12.2.12 Discus ..... 64
1.12.2.13 Hammer ..... 64
1.12.2.14 Discus/Hammer Cages ..... 64
1.12.2.15 Scoreboards ..... 64
1.12.2.16 Trolleys ..... 65
1.12.2.17 Scales ..... 65
1.12.2.18 Measuring Tapes ..... 65
1.12.2.19 Clocks ..... 65
1.12.2.20 Wind Gauges ..... 65
1.12.2.21 Referee's Kit ..... 65
1.12.3 Storage ..... 66
1.12.3.1 Microphones etc ..... 66
1.12.3.2 Hurdles ..... 66
1.12.3.3 Steeplechase Hurdles ..... 66
1.12.3.4 Pole Vault Landing Area ..... 66
1.12.3.5 Pole Vault Uprights ..... 66
1.12.3.6 Cross Bars ..... 66
1.12.3.7 Vaulting Poles ..... 66

Copyright © SAPCA

1.12.3.8 High Jump Landing Area ....66
1.12.3.9 Stands ....66
1.12.3.10 Plasticine No-Jump Indicators ....67
1.12.3.11 Rakes ....67
1.12.3.12 Javelins ....67
1.12.3.13 Shots ....67
1.12.3.14 Discus ....67
1.12.3.15 Hammers ....67
1.12.3.16 Scoreboards ....67
1.12.3.17 Measuring Tapes ....67
1.12.3.18 Clocks ....67
1.12.3.19 Wind Gauges ....68
1.12.3.20 Scales ....68
1.12.3.21 Referee's Kit ....68

**Appendix 1: Construction of Concentric Circles ....69**

**1.13 Introduction ....70**

**1.14 Circle Construction ....70**

1.14.1 Setting Out ....70
1.14.2 Excavation ....71
1.14.2.1 Excavation Safety ....71
1.14.2.2 Excavation Depth ....71
1.14.2.3 Construction Method One - Solid Slab ....72
1.14.2.4 Construction Method Two - Slab With Sub Base ....72

Copyright © SAPCA

1.14.3 Drain Holes ..... 72
1.14.4 Sub Base ..... 73
1.14.5 Shuttering ..... 73
1.14.6 Precautions When Using Cement ..... 74
1.14.7 Ready Mix Concrete ..... 74
1.14.7.1 Concrete Strength ..... 75
1.14.7.2 Concrete Slump Test ..... 75
1.14.8 Mixing On Site ..... 76
1.14.9 Granolithic Throwing Surface ..... 76
**1.15 Circle Surface Finishing ..... 77**
1.15.1 Finishing ..... 77
1.15.2 Etching the Surface ..... 78
1.15.2.1 Safety Precautions for Using Acid ..... 79
**1.16 Replacing Circle Surface ..... 79**
1.16.1 Removing Old Surface ..... 79
1.16.2 Surface Construction ..... 79
1.16.3 Minor Repairs ..... 80
**1.17 Appendix A: Procedure for Laying the Circle ..... 84**
**Appendix 2: Provision for Disabled Athletes ..... 85**
**1.18 System 1: World Athletics System Primarily Used in Major International Championships ..... 86**
**1.19 System 2: Other Competition Levels and Training ..... 87**
**1.20 Construction of Foundations ..... 92**
1.20.1 Indoors ..... 92
1.20.1.1 New Build ..... 92

Copyright © SAPCA

1.20.1.2 Existing Build ..... 92
1.20.2 Outdoors ..... 92
1.20.2.1 New Build ..... 92
1.20.2.2 Existing Build ..... 92
1.20.2.3 The Layout ..... 92
**1.21 Appendix 2: Equipment List for 8 Lane Track ..... 93**
**Jumping Equipment** ..... 94
**Throwing Equipment** ..... 95
**Discus** ..... 95
**Javelin** ..... 95
**Shot** ..... 96
**Hammer** ..... 96
**Measuring Equipment** ..... 97
**Miscellaneous** ..... 97
**Equipment for Disabled Athletes** ..... 98
**Appendix 3: Track Markings ..... 99**
**Appendix 4: Non-traditional track designs ..... 101**

Copyright © SAPCA

## List of Figures

Figure 1 Dimensions of a standard 400-metre, six-lane track, with radius 36.5m .....26

Figure 2 Steeplechase widening on inside of bend of six-lane track.....28

Figure 3 Steeplechase widening on outside of bend of six-lane track.....29

Figure 4 Plan and cross-section of water jump.....30

Figure 5 Long jump / triple jump facility .....31

Figure 6 Cross-section of throwing circle construction.....34

Figure 7 UKA cage specifications for hammer or discus using concentric circles .....35

Figure 8 Layout for six-lane club track.....36

Figure 9 Layout for eight-lane competition track.....37

Figure 10 Typical cross-section of track (porous and sandwich systems).....42

Figure 11 Typical cross-section of track (solid system) .....43

Figure 12 Diagrammatic cross-section of a prefabricated system .....47

Figure 13 Diagrammatic cross-section of solid system.....47

Figure 14 Diagrammatic cross-section of sandwich system .....48

Figure 15 Diagrammatic cross-section of porous system .....49

Figure 16 Pedestrian barrier details .....56

Figure 17 Wheelchair anchorages at throwing circles for shot and discus.....86

Figure 18 details of a ringbolt and sleeve.....88

Figure 19 details of distance positions of bolts .....89

Figure 20 Locations of anchor points .....90

Copyright © SAPCA

## List of Tables

Table 1 Construction of an Athletics Track Project .....

Table 2 The limits from World Athletics and UK for the performance tests highlighted. .....

Table 3 TrackMark Units - Overview .....

Table 4 Specimen maintenance schedule for a polymeric athletics track .....

Copyright © SAPCA

## Foreword

SAPCA and UKA have produced this document to provide prospective buyers and specifiers with guidance on the basic construction requirements and specifications currently employed in building athletics tracks and associated facilities. The standards outlined throughout the document have been recognised and supported as the minimum standard level for the construction of athletics facilities in the UK.

The document calls on the experience of SAPCA's member companies and UKA who have constructed and advised on a wide range of installations for a variety of clients over many years. In addition, the requirements of World Athletics and UKA (Rules and regulations) have been recognised in the preparation of this document. UKA/England Athletics have been represented on the working group that has prepared this Code of Practice, which attempts to reflect the accepted best practice in the UK marketplace and to set a standard that is in the best interest of the sport in the UK.

Whilst it is not necessarily intended that this document should become part of a contract, it is hoped that it will prove useful in the selection of an appropriate system and surface, provide guidance to clubs and specifiers, and form a useful reference in the design and construction process.

It is recognised, however, that most athletics projects in the UK will be for the renovation or upgrading of existing tracks and facilities. In these instances, it may not always be feasible to adhere strictly to the guidance in relation to layout and detailed design. It is recommended that advice should always be sought from UKA to ensure that acceptable solutions can be achieved.

SAPCA and the National Governing Body recommend that experienced, professional consultants be appointed to provide the necessary level of expertise in designing and detailing sports facilities and ensuring compliance with all the current legislation.

The drawings and technical information in this Code of Practice are intended to provide clarification of the design and construction concepts discussed in the text. They are meant to represent generic solutions, typical of those used in the design and construction of tracks. Each drawing represents only a single option to address the needs described in the text. In every case, there are other ways to achieve the design intent. In addition, readers of this Code of Practice are cautioned that site conditions can vary widely. Local climates, availability of materials and site engineering requirements make the development of universal construction details virtually impossible.

It should also be noted that it is not a requirement for every track to be certified to World Athletics standards.

Copyright © SAPCA

## Notes to be Read in Conjunction with the Code of Practice

This Code of Practice is intended for use by sports surfacing contractors, sports facility design professionals and athletics facility purchasers and owners. The Code of Practice should not be used as a substitute for carrying out appropriate surveys and obtaining professional advice in individual circumstances. Although the Code of Practice has been produced by reference to facilities constructed under normal climatic conditions in the United Kingdom, SAPCA cannot accept any responsibility whatsoever for any loss, damage or injury whatsoever arising from reliance on the specifications within the Code of Practice.

The Code of Practice provides a minimum standard of specification and proficiency which Builder members of SAPCA are committed to meet. As guideline specifications, however, these do not supersede a reasonable interpretation of the specification and terms of contract applying in each contract. For individual projects, variations in climate, soil conditions, topography and other site-specific conditions may necessitate standards of specification greater than those recommended within the Code of Practice.

Parties not experienced in synthetic sports surfacing construction are strongly advised to consult qualified consultants and contractors with experience of track construction. SAPCA and Governing body can provide details of experienced track building consultants and contractors.

In accordance with common practice within the construction industry (as used in BS EN 13108 Part 1 for Asphaltic Concretes and PD6691), the depth of any individual construction layer is specified within the Code of Practice as the nominal compacted depth. The nominal depth can be regarded as the design depth of a layer of construction within a track system.

In the interests of clarity and consistency, especially indoor tracks, the minimum compacted depth is also specified, to define the tolerance on the design depth that is considered acceptable. It is intended that the consistent use together of the term's nominal compacted depth and minimum compacted depth, by consultants and contractors alike, will help to avoid any confusion when competitive quotations are being examined.

The information contained within the Code of Practice, whilst accurate at the time of publication, may be subject to change at a future date. Due to changing technology, new developments in construction methods, and the changing requirements of the sport's governing bodies, revisions to the recommendations are likely, and only the most recent edition of the Code of Practice should therefore be used.

SAPCA and UKA will permanently keep under review the use of the Code of Practice and will consider any suggestions for amendment. Suggestions should be addressed to either the Chief Executive of SAPCA and/or the Governing Body Facilities Officer. Revision to the Code of Practice will be made when it is considered appropriate.

Since many of the processes used in constructing sports and play facilities are highly susceptible to weather and atmospheric changes both indoor and outdoor. It is advisable to check with the specialist contractor as to the most suitable time of year for the installation of his proprietary product.

Copyright © SAPCA

Many planning authorities now publish very specific local planning requirements in the form of framework documents and development plans; these will include requirements for many types of outdoor sports facilities. The design of most elements of a sports and play surface is likely to come under scrutiny, such as fencing, floodlighting, hard surfaces areas, landscaping, planting and drainage. It is essential that the designer of a facility has the experience and knowledge to undertake a full design at planning stage. They are likely to have to prove that the design meets all the requirements and may have to submit calculations to prove compliance.

The Construction Design and Management Regulations 2015 require that a CDM coordinator be employed during the design, specification, tendering and construction phases of any construction project that employs over a certain number of personnel or runs for more than a certain length of time. The CDM coordinator's role is that of ensuring all Health and Safety paperwork is in place, that it meets the minimum requirements of the regulations, and all paperwork is passed to the client, the designer and the contractor when required. It is the client's duty to ensure that a CDM coordinator is employed for the project and that they have full knowledge of their own responsibilities under the regulations.

The handling of synthetic materials that can have toxic properties should be covered by the COSHH Regulations (Control of Substances Hazardous to Health) and the contractor should provide Risk Assessments, Method Statements etc. to cover these regulations from a health and safety viewpoint.

Other issues such as disposal of the old track surfacing; ventilation when installing indoors and identification of which materials are toxic, should all be addressed by CDM, COSHH regulations.

Copyright © SAPCA

## Sources of Further Information

Please Note: Users of the Code of Practice are advised to ensure that they are fully aware of any further technical requirements or criteria which may be imposed by a specific funding body for individual facility development projects.

- SAPCA
- UK Athletics (UKA)
- World Athletics Track and Field Facilities Manual
- Sport England Design Guidance Notes
- Sport Scotland
- Sport Northern Ireland
- Sport Wales
- Mineral Products Association

Copyright © SAPCA

## The Sports and Play Construction Association (SAPCA)

As the recognised UK trade association, SAPCA fosters excellence, professionalism and continuous improvement throughout the sports and play construction industry, ensuring provision of high-quality facilities necessary for the success of British sport.

### SAPCA's Aims and Objectives

- To promote high standards of design, construction and workmanship for sports facilities in the UK.
- To regulate the industry through the vetting and monitoring of SAPCA members.
- To participate fully in the development of British, European and other standards for the construction and performance of sports facilities, for all levels of play.
- To liaise closely with the governing bodies of sport, both nationally and internationally.
- To encourage the use of new technology in the design and construction of sports facilities.
- To provide and support training and education for the industry's workforce.
- To provide a strong voice for the sports construction industry in the UK.

### Helping you make better choices

- Added peace of mind - Browse SAPCA members to find the right contractors for your project, all verified to strict membership criteria.
- Flexible solutions - Get support how you want it: browse our online resources or speak to our team.
- Expert support and guidance - From funding and design, through to product specification and maintenance support, we're with you every step of the way.
- An impartial voice - Things don't always go to plan. We offer impartial mediation and technical support if your project doesn't meet expectations.

Copyright © SAPCA

## Further information

The SAPCA website (www.sapca.org.uk) provides a wealth of valuable information for anyone involved in the development of sports facilities.

SAPCA operates through its own full-time administration. For further information, including a list of members, please contact SAPCA at the headquarters address below.

The Sports and Play Construction Association
The Hexangle
Stoneleigh Park
Warwickshire
CV8 2LG

Telephone: 024 7641 6316
E-mail: info@sapca.org.uk
Web: www.sapca.org.uk

## UK Athletics (UKA)

UKA is the Governing Body for Athletics in Great Britain and Northern Ireland and is recognised as such World Athletics. UKA works with its partners – Governing Bodies and Sports Councils in the four home countries – to develop programmes and policies that are then delivered by the partner organisations.

UKA is responsible for the TrackMark certification programme throughout the UK. View here.

UK Athletics
Athletics House,
Alexander Stadium
Walsall Road
Perry Barr
Birmingham
B42 2BE

Telephone: 0121 713 8400
Email: information@ukathletics.org.uk
Web: www.ukathletics.net

Copyright © SAPCA

## Purpose

The purpose of this Code of Practice is to promote quality design, construction, maintenance and repair & refurbishment of outdoor track & field athletics facilities.

The document draws on the experience of SAPCA's member companies and UK Athletics (UKA) personnel who have constructed and advised on a wide range of installations for a variety of clients over many years. In addition, the requirements of UKA's TrackMark facility accreditation scheme have been embedded within the code to ensure that any new facilities or facility refurbishments meet the minimum requirements of UK Athletics.

Athletics track installation is a highly specialised area and UKA recommends that experienced SAPCA members are appointed to provide the necessary level of expertise in designing and constructing athletics facilities, overseeing inspections during installation, and ensuring compliance with all current standards and best practice.

Copyright © SAPCA

## Getting started

For most major projects the facility owner/operator should look to involve suitably experienced people/companies on the project planning team:

A member of SAPCA's Professional Services Group with experience in track construction

The relevant UKA/Home Nation Facility Manager

An experienced facility manager (where applicable)

Equally important is representation from local athletics stakeholders: clubs, coaches and athletes along with other potential users of the site (other sports or other members of the community). Their input at the planning stage will help ensure that, once constructed, the facility will operate at the optimum level to ensure that both athletics and spectators can enjoy their experience. It is also beneficial to include personnel who will ultimately be responsible for maintaining the facility to ensure that the need for regular maintenance is factored into the planning and management of the facility.

For facilities that are being developed or adapted for regional use and/or higher levels of competition, it is essential that the National Governing Body is engaged at the earliest time:

- UK Athletics (UKA)
- England Athletics
- Scottish Athletics
- Welsh Athletics
- Athletics Northern Ireland

Some facilities will need to meet the requirements of more than one organisation so the national governing body will be able to advise on specific requirements for competitive events. Issues such as number of lanes, number and location of runways, number and location of throwing event areas and support facilities for competitors, officials and spectators are important considerations which need to be considered at the design and planning stage.

Every athletic facility project is unique and therefore it is important that the client and their design team works closely with the governing body to consider the following factors:

### Intended Use

SAPCA and UKA are keen to highlight to facility designers, operators and managers of the need to ensure that athletics tracks should be designed to be applicable to the level of usage and potential competition. A World Athletics compliant track is not required for a community facility,

Copyright © SAPCA

however, in the same way a national level competition could not be held at a venue which had not been designed for this purpose.

## Facility Concept

Clearly the facility should be designed for its intended purpose(s) and therefore the construction should comply with the relevant World Athletics or UKA standards. That said, budgets, procurement requirements, surface choices, layout, landscaping and additional amenities to be included will vary from one project to another. Therefore, the site-specific design should be the most suitable possible to encompass the needs of that facility.

## Geographic Considerations

Local climate will potentially affect both the construction and use of the facility. Parameters such as the depth of base construction, footings, orientation, availability of materials, need for certain additional amenities should all be considered in the development of the design of the track and its associated facilities.

## Scope of the Project

Determining the location of the facility is key to the development, however, defining the need for additional facilities such as floodlighting, spectator area/seating, changing rooms and toilets, parking, café/refreshment areas, and storage and maintenance facilities should also be considered.

A good facility begins with a well-defined and well-designed concept, on a site large enough and with suitable ground conditions for that design. Beyond that consideration should also be given to other whether other amenities and infrastructure are required, dependant on the projected user numbers and potential competition requirements for the facility. Finally, landscaping and other site aesthetics should also be considered to ensure that the facility is designed and constructed in such a way as to harmonise with its local environment. Trees and shrubs, access paths, ground elevations, etc. should not interfere with the layout, participants use of the facility or the spectators' ability to view activities.

## Budgeting

Developing a budget is probably the most difficult step in the construction process. In order to make informed decisions, an owner should have a clear sense of priorities. Working within a budget involves considering various alternatives and making choices. Knowledge of what factors are most important to the planned facility and a desire to seek creative solutions can result in a quality project built at a reasonable cost.

The project budget should consider all aspects of the development of the facility and not simply focus on the actual cost of constructing the track and associated field event facilities. The following checklist should be costed in order to be able to deliver the project.

Feasibility study

Copyright © SAPCA

- Site acquisition
- Outline and detailed design fees
- Permits
- Site investigation
- Tendering of the project
- Site preparation
- Drainage system
- Site utilities
- Track/surface construction (baseworks, surface construction, line marking if required)
- Central infield and field event facilities
- Fencing
- Construction of ancillary facilities (service buildings, spectator areas, parking, etc.)
- Landscaping

## Introduction

From the first considerations regarding the construction of an athletics track through to the final completion, a clear understanding is required of the process. The processes and decisions that need to be made can be complex and will depend upon many contributing factors.

This code of practice has been split up into two main sections that cover the construction and maintenance requirements associated with athletics tracks.

The first section focuses on construction requirements that should be considered during the construction phase of an athletics track:

- General Design Considerations
- Earthworks
- Drainage
- Sub-base Construction
- Base Construction

Copyright © SAPCA

- Types of Synthetic Surfaces
- Testing
- Fencing

The second section of this document focuses on the maintenance requirements for the track itself and equipment associated with the track and field events. Maintenance procedures are detailed for the track along with the benefits they will bring to the life expectancy and performance of the track. The maintenance and storage of equipment for both track and field events are also included.

The technical guidance within this code practice provides a detailed approach to how an athletics track is constructed. The diagram on the following page is designed to help potential clients make the correct decisions at the right times by looking at the ideal routes a project may take from proposal to completion and the information required at each stage.

In addition, a third section of the document is currently under development to offer advice and guidance around the renovation and resurfacing of tracks. Due to the existing stock of athletics tracks in the UK, UKA estimates that 90% of facility projects undertaken involve the renovation or resurfacing of an existing track.

Copyright © SAPCA

*Table 1 Construction of an Athletics Track Project*

| | |
|---|---|
| Project Brief | This phase reviews the project brief and considers factors such as location, usage, funding, procurement, and project management. |
| Project feasibility | This phase can include the development of a business plan, planning application and if required funding applications. A consultant can be appointed during this phase if required, this will normally be for a large project. |
| Site investigation | Prior to the design phase a detailed site investigation is required. This includes topographical, geotechnical, electrical and drainage surveys. This may not all be necessary on a small project. |
| Design specification | This phase includes the production of full design specifications and technical drawings. |
| Appointment of contractor | In this phase a review of submissions is undertaken. This includes evaluation and contractor selection. |
| Construction period | This phase includes the construction of the facility. If required, independent quality control is undertaken to assess build quality and design specification conformity. |
| Project completion | This phase includes handover of the completed project. If required, performance testing may be undertaken to ensure compliance. A maintenance regime should be provided by the installer. |

Copyright © SAPCA

# Section One: General Construction Requirements

## 1.1 Design Considerations

### 1.1.1 Access and Participation for All

All sports facilities must be designed to allow everyone to participate. Access and participation audits are an essential part of the design process. Decisions made by the design team, client and users will fundamentally affect the accessibility of the facility or building. Effective and carefully considered management of the facilities is essential to allow access and participation for everyone.

The design and management audit of athletics facilities should be split into two sections.

### 1.1.2 Designing for Accessibility

General accessibility guidance is widely available and covers many aspects of building design including car parking, routes to and around the building, ramps and steps, entrances and reception areas, door widths, circulation spaces, floor/wall surface colour and texture, lifts, toilet provision, counters, signage, telephones, alarms, lighting and acoustics.

For further information on providing people with disabilities with full access to sports facilities, refer to Sport England Design Guidance Note “Access for Disabled People”.

### 1.1.3 General Arrangement and Layout

In the United Kingdom it is usual for the infield area of an athletics track to be used for football, rugby, hockey and in some cases American football. The dimensions of the standard track will accommodate either game as well as the requirement for the athletics field events of javelin; discus, hammer, shot etc. Wherever possible, a new six-lane track will be constructed to the standard dimensions in Figure 1.

For operational ease in community settings, UKA/EA have a preference for the throwing event facilities to be located external to the track where space allows.

### 1.1.4 A new generation of innovative facilities

SAPCA is aware that at the time of publication, UKA facility strategy states that there are enough standard 400m tracks to service demand and that maintenance of existing stock is a priority. England and Scotland strategy is to promote lower cost, innovative community athletics/multi-sport solutions including compact athletics facilities, MiniTracks and rubber surface jogging/running/activity loops. Further design details can be found in the Appendix of this document.

*Note: The major benefit of innovative facilities is that they can be developed to fit budgetary and spatial requirements and designed to meet the needs of the local community and multiple sports users.*

Copyright © SAPCA

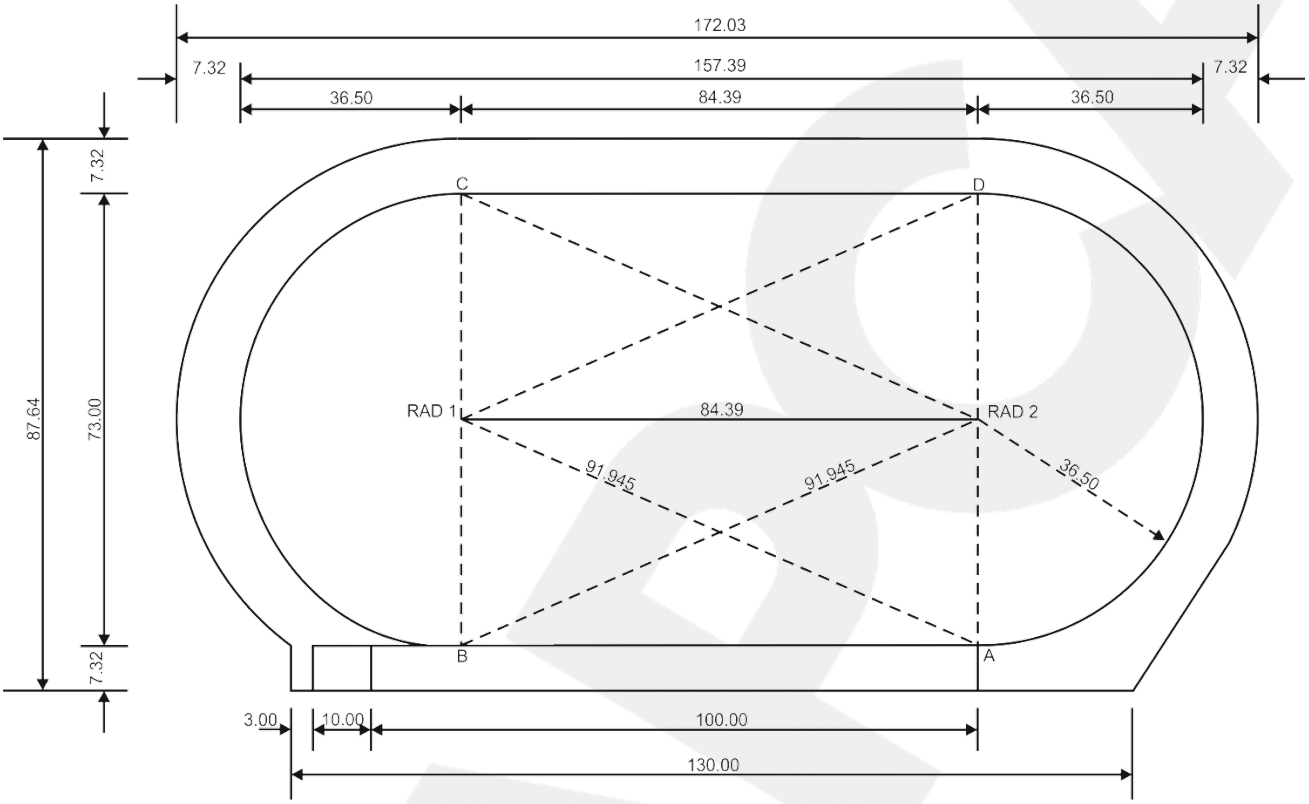



*Figure 1 Dimensions of a standard 400-metre, six-lane track, with radius 36.5m*

The area of land required for a six-lane facility with field events, illustrated in Figure 1, will be not less than 180m long by 110m wide, on level ground. This is to allow for events to be placed external to the track which include water jump, long and triple jump and pole vault. A safety run off area is also included in the measurement. Milling areas, spectator provision, cut banks, landscaping etc. will increase these dimensional requirements.

Consideration must be given to the availability of services such as: outlet for surface water drainage, mains water for filling water jump and for track maintenance, electrical power for floodlights, and other relevant services. It is important that all new legislation is covered both locally and nationally to ensure planning regulations are met.

### 1.1.5 Setting out a Standard 400m Track

The inside and outside kerb lines of a standard six-lane, 400-metre track are established using the dimensions illustrated in Figure 1. It is essential that the tangent points A, B, C and D and also the centres of radii, RAD 1 and RAD 2, are permanently located for ease of checking the length of the running line and re-marking the track in future years. These locations will also aid in the certification which is required every 5 years.

Copyright © SAPCA

These dimensions allow for a theoretical running line (measurement line) at a distance of 300mm from the inside kerb. The running line (measurement line) of each of the other lanes is assumed to be on a theoretical line at a distance of 200mm from the outer edge of the adjacent inside lane.

The required dimensional accuracy of the setting out is as follows:

- 84.39m ± 0.005m for each of the two straights
- 36.50m ± 0.005m for the radius of the semicircle, taken at 12 points on each semicircle

The net effect of these dimensional tolerances must not result in a measurement, on the running line, which is less than 400.0m or greater than 400.04m.

The alignment of the kerb on the straights should have no deviations greater than 0.01m.

All these dimensions are taken to the outside edge of the inner track border.

It must be noted that if jumping facilities are positioned externally to the track then additional space is required. For long and triple jumps, the dimensional width is 5m, and for pole vault a further 10m is required.

The size of the inside kerb should be between 50mm and 250mm in width and 50mm and 65mm in height, measured from the track surface. The preferred design of inside kerb is a demountable version, fixed to the track surface on the inside lane line of lane No 1.

Though the World Athletics Track and Field Manual specifies the above detail of a raised border on the internal edge of the track, UKA Rules for Competition, Rule 108, allows the internal edge of the track to be marked with a white line 50mm wide with no raised border. It is a requirement, however, that for Championship events (whether National, Territorial or County) and for any record to be accepted, the inside edge of the track must have a raised internal border or be adequately flagged or coned to prevent any competitor running on the line itself on the bends. For any performance to be accepted under World Athletics rules a raised border is required.

With raised border or no border, it follows, therefore, that the track must be set out and measured in the standard geometry as if the running line is at 300mm from the painted line with a standard track radius of 36.50m to the white line.

At track facilities, where vandalism and security is a problem, this allows the track owner/manager to dispense with an expensive internal, demountable kerb. In this case the client must be advised that the use of cones or flags on the bends is essential for Championship events (whether National, Territorial or County) as stated above**.**

### 1.1.6 Gradients

The inside kerb line on a standard track must be laid at the same horizontal level throughout the circuit. The inclination in the running direction shall not exceed 0.1% (1:1000) downwards and the lateral inclination (cross-fall) shall not exceed 1.0% (1:100) inwards (towards the infield).

Copyright © SAPCA

### 1.1.7 Orientation

The best orientation of any facility will depend on the characteristics of the chosen site. In an ideal situation the straights should run north south to minimise the effect of low sun in competitors' eyes in the evenings. In the UK, on exposed sites, wind can be a greater problem than sun and the preferred orientation in these situations is with the straights running parallel to the prevailing wind.

### 1.1.8 Obstructions

In the interests of the safety of the athletes it is recommended that the track has an internal and external peripheral zone that is free of all obstructions such as floodlighting columns, fences, etc. This zone should be at least 1.00m wide, both inside and outside when measured from the infield edge of the inside lane line and the outside edge of the outside lane line.

### 1.1.9 Steeplechase Widening

The steeplechase event is run on the standard track and requires the addition of a water jump to the standard layout in Figure 1. The standard track layout is adapted by widening the track at the second bend. This widening may take place either inside lane one (Figure 2) or outside the outside lane (Figure 3).

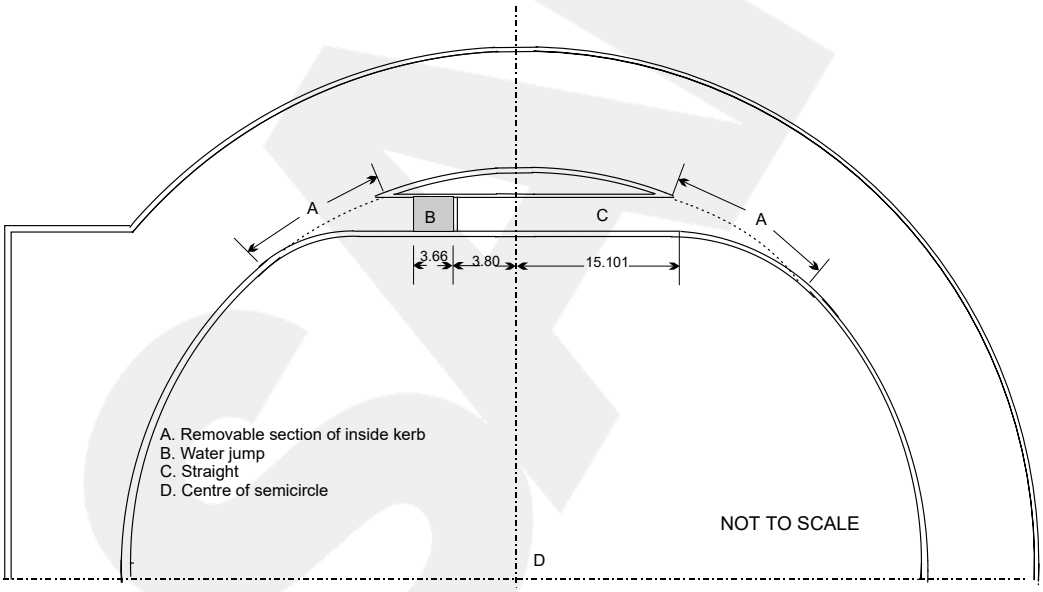



*Figure 2 Steeplechase widening on inside of bend of six-lane track*

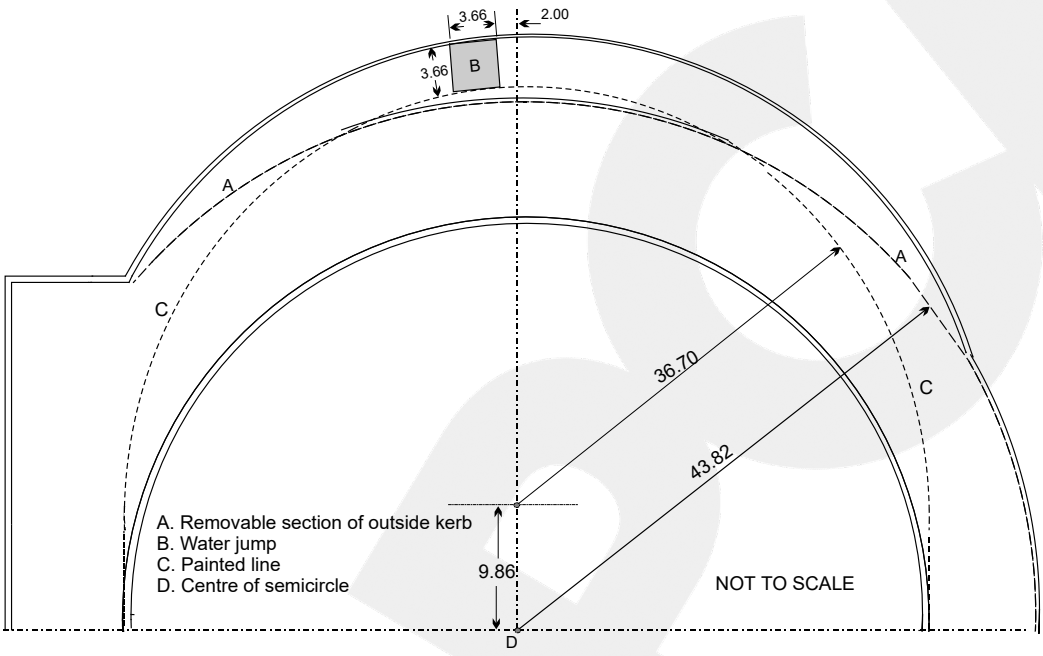



*Figure 3 Steeplechase widening on outside of bend of six-lane track*

The water jump structure incorporates a hurdle of 0.914m height for men and 0.762m height for women. The length, on the running line, is 3.66m. The width is a standard 3.66m (3No lanes) and the maximum depth is 0.70m (see Figure 4). The top of the water jump pit should be level and the crossfall of the adjoining synthetic surface should be adjusted to provide a smooth transition. The water supply for the jump must conform to EU law.

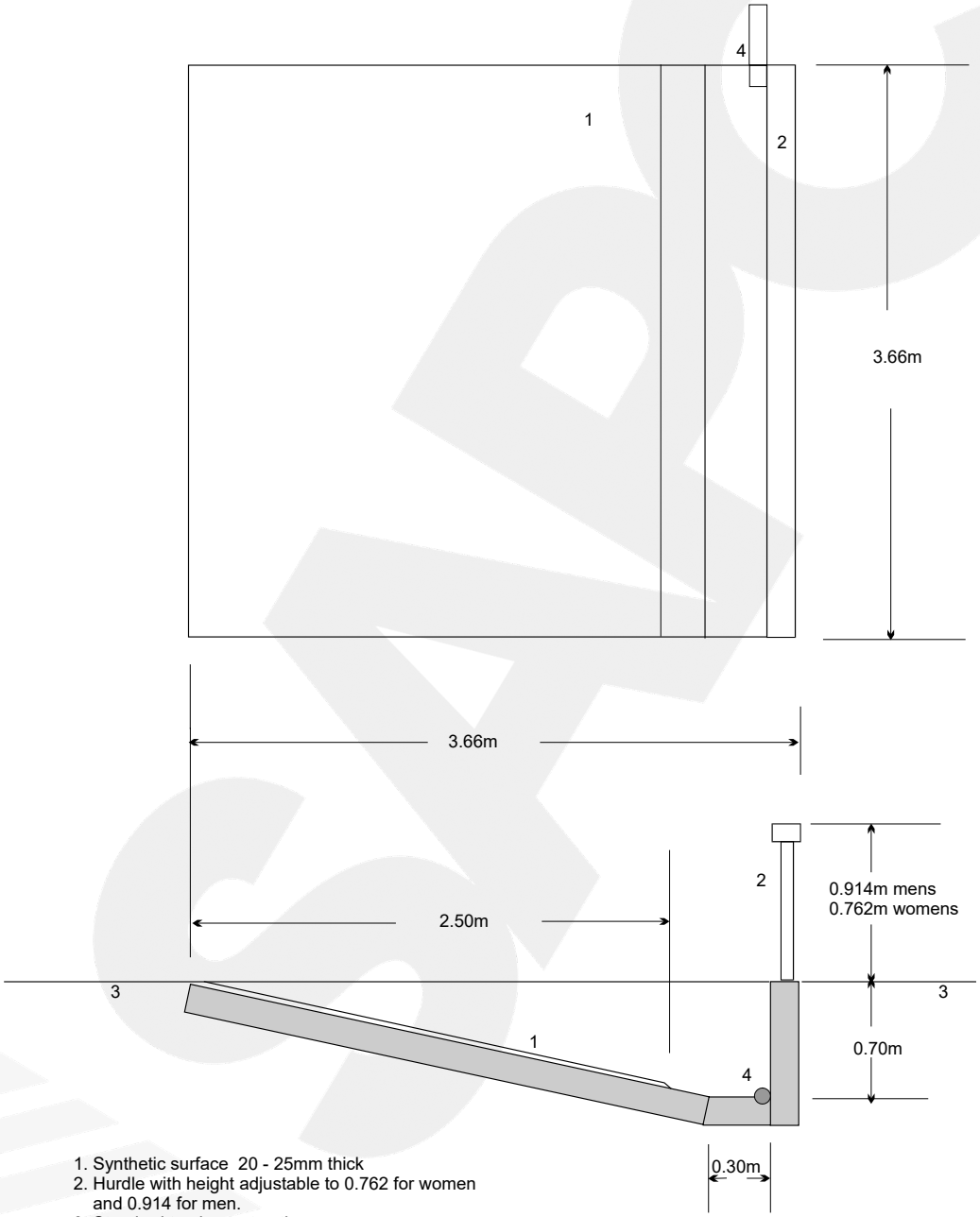



*Figure 4 Plan and cross-section of water jump*

### 1.1.10 Requirements for Jumping Events

#### 1.1.10.1 Long Jump / Triple Jump

The runway for the long/triple jump should be 1.22m wide and a minimum of 40.00 m long, measured from the take-off board position farthest from the pit. It should be marked with white lines 50mm wide down each side. The maximum gradients on the runway are the same as for the standard track – see Section 1.1.3. There may be extra thickness of surface material in the area where athletes land during the phases of a triple jump.

Take-off boards are incorporated into the runway, flush with the finished surface, at distances from the start of the landing area of:

- Long jump – between 1.00 and 3.00m, depending on standard of competition.
- Triple jump – 9.00m, 11.00m and 13.00m (see Figure 5). If required, an additional position at 7.00m may be painted on the surface.

The take-off boards will consist of proprietary designs that allow for interchangeable use of the take-off board with blanking boards surfaced in the same material as the runway. Each board should be numbered, and the orientation marked. The take-off and blanking boards should be adjustable in height to avoid trip edges and should have a maximum gap of 3mm around the board when installed in the runway.

The landing area will have an overall length of between 7.00m and 9.00m with a minimum distance of 10.00m from the long jump take-off board to the far end of the landing area. The width of the landing area will be 2.75m minimum unless a double runway. The edging units of the landing area must have permanent, soft, rounded tops with no sharp edges. **There must be no obstructions within the area 12m beyond the centre of the long and triple jump take-off boards and 1m from the edge of the sand pit.**

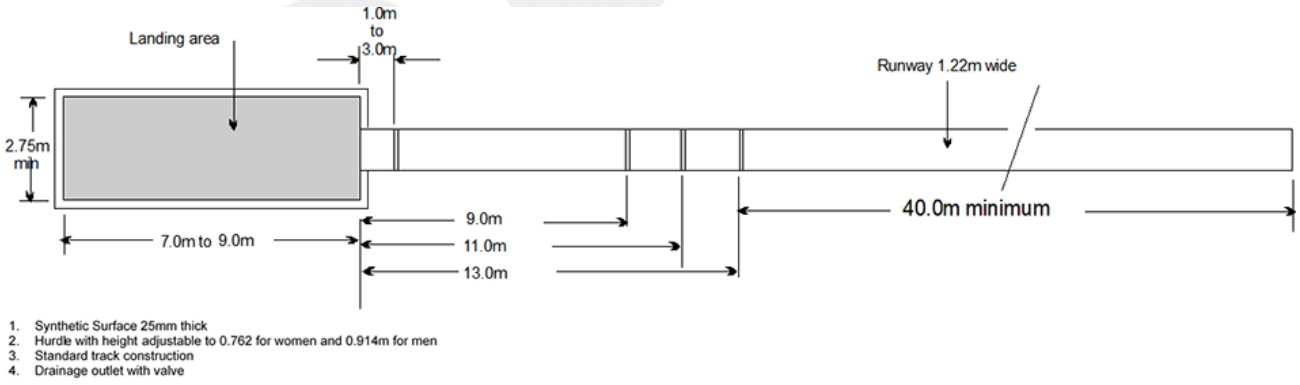



*Figure 5 Long jump / triple jump facility*

The sand depth in the landing area should not be less than 300mm throughout the whole landing area. The sand should be washed and free from impurities and should be of rounded particle

shape with a grain size in the range 0.125 – 0.8mm. Provision should be made to allow the pit of the landing area to drain into the general track drainage system. The base of the pit should incorporate a foundation that will make it easy to maintain and remove the sand (e.g. concrete slabs).

Provision for horizontal jumps may include double width run-ups with double width pits or adjacent pits and run ups

It is advisable to provide some form of cover over the landing area that will retain the sand in windy conditions and help prevent contamination when the facility is not in use. Peripheral sand traps with a rubber grillage cover will also help to stop the migration of sand on to the track in windy conditions.

It is permissible to construct a landing area at each end of a runway to take account of variations in wind direction. In this case the take-off boards must be replicated at each end and the overall length of the runway should not be less than 58.00m. For location see Figure 9.

### 1.1.10.2 High Jump

The runway for the high jump should be a semicircle of at least 20.00m radius with provision for a landing area located at the midpoint along the straight edge. The minimum size of the landing area is 5.00m x 3.00m.

The high jump runway is normally located in the internal sector at one of the bends (see Figure 9), or a runway may be provided at both ends. The oval track may be used as part of the runway if the inside kerb is removable and there is no difference in level between the track and runway area.

The take-off area should use similar material as the circular track. However, in order to shed surface water from this runway, it is usual to create a fall on the finished surface, which should be no more than 1:250 away from the centre of the landing area.

### 1.1.10.3 Pole Vault

The runway for the pole vault should be 1.22m wide and a minimum of 40.00m long measured from the 'O' line. The runway should be marked with white lines 50mm wide down each side. The maximum gradients are the same as for the standard.

A box for inserting the pole is mounted, flush with the surface, at the end of the runway. The box should be 1 metre in length, measured along the inside of the bottom of the box, 600mm in width, at the front end, tapering to 150mm in width at the bottom of the stop-board, where it should be 200mm in depth. The box should be constructed such that the sides slope outwards and end next to the stop-board at an angle of approximately 120 degrees to the base.

The rear inside edge of the box is the 'O' line which should be marked with a white line 10mm wide extending beyond the width of the uprights. Pole vault boxes are normally manufactured with steel covers, which should then be covered in the same material as the runway surface. Drainage

Copyright © SAPCA

should be provided to ensure that the box does not collect surface water (see Appendix 6 alternative specification for Indoor).

The landing area should have a minimum size of 6.00m x 5.00m. To allow for variations in wind direction, it is advisable either to provide landing areas at both ends of a runway (Figure 9) or to construct two pole vault runways, in opposing directions, sharing a common landing area (Figure 9). This is a requirement for a track to achieve full UKA Certification.

For safety reasons, the surroundings of the landing area must be either grass, a synthetic track surface or be covered with an impact absorbing material for a critical fall height of 1.5m. They must measure 5m from the centre of the box to the front and sides and 7m to the rear. There must be no obstructions within 1m of any runway or landing area.

### 1.1.11 Requirements for Throwing Events

#### 1.1.11.1 Javelin

The runway for the javelin event should be between 30.00m and 36.50m long and 4.00m wide. The runway should be marked with white lines 50mm wide down each side. The maximum gradients on the runway are the same as for the standard track.

The javelin runway is normally surfaced in the same material as the track, and the track may be used as part of the runway if the kerb is removable.

A throwing arc is painted on the surface at the end of the runway with a line width of 70mm. The arc should have a radius of 8.00m and the centre point should be permanently marked, e.g., with a metal tube with a synthetic plug.

Because of the stress imposed on the surfacing material at the end of the runway, it is advisable to increase the depth of the surfacing layer to 25mm and, in the case of a porous system, strengthen the material over the final 5.00m.

To take account of varying wind directions it is advisable to install a javelin runway at each end of the track. It is also possible to combine the javelin runway with the high jump fan. See Figures 9 and 10.

#### 1.1.11.2 Hammer and Discus

The facilities for hammer and discus are similar in that the requirement is for a concrete throwing circle, (see Appendix 1 for detailed specification for construction) surrounded by a protective throwing cage, with an appropriate landing sector. For locations see Figures 9 and 10.

The diameter of the circle should be 2.135m for hammer and 2.50m for discus.

A centre mark must be installed using a 4mm-diameter tube with plug.

Drainage should be provided by inserting tubes through the concrete slab into the stone base layer, which, in turn, must be connected to the track drainage system.

Copyright © SAPCA

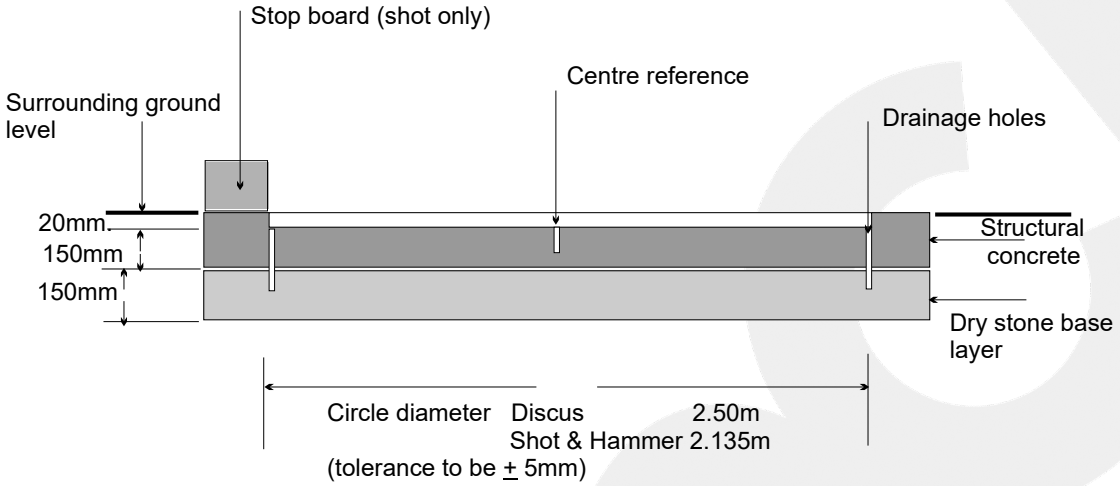



*Figure 6 Cross-section of throwing circle construction*

### 1.1.11.3 Shot Put

The dimensions of the shot put circle are the same as those for the hammer in Section 1.1.8.2, i.e. a circle diameter of 2.135m. The construction of the shot put circle is the same as the hammer and discus with the addition of a stop board. This stop board is made of wood or other suitable material and is curved to suit the radius of the circle. The stop board should be 1.20m long, 112mm thick and 100mm high (+ or – 2mm.), painted white. The stop board must be firmly fixed to the concrete surround of the steel ring, positioned centrally on the landing sector and flush with the inside of the steel ring. For locations see Figures 9 and 10.

### 1.1.11.4 Provision for Disabled Athletes

Provision should be made to accommodate disabled athletes in wheelchairs by installing fixing points at the appropriate throwing circles. Details of these can be found in Appendix 2.

### 1.1.11.5 Throwing Cages

The correct layout, location and erection of protective cages for discus and hammer events are essential to ensure safety of the competitors, officials and spectators. The preferred location is near the 1500m start, although the cage may be centrally located.

The minimum height of the netting for hammer is 7.0m with 9.0m gates and for discus alone, 4.0m.

Two moveable netting panels, 2.0m wide and at least 9.0m high should be provided at the front of the cage. These panels are constructed as ‘gates’ to the cage and must be able to open and close to suit left, or right, handed throwers.

Copyright © SAPCA

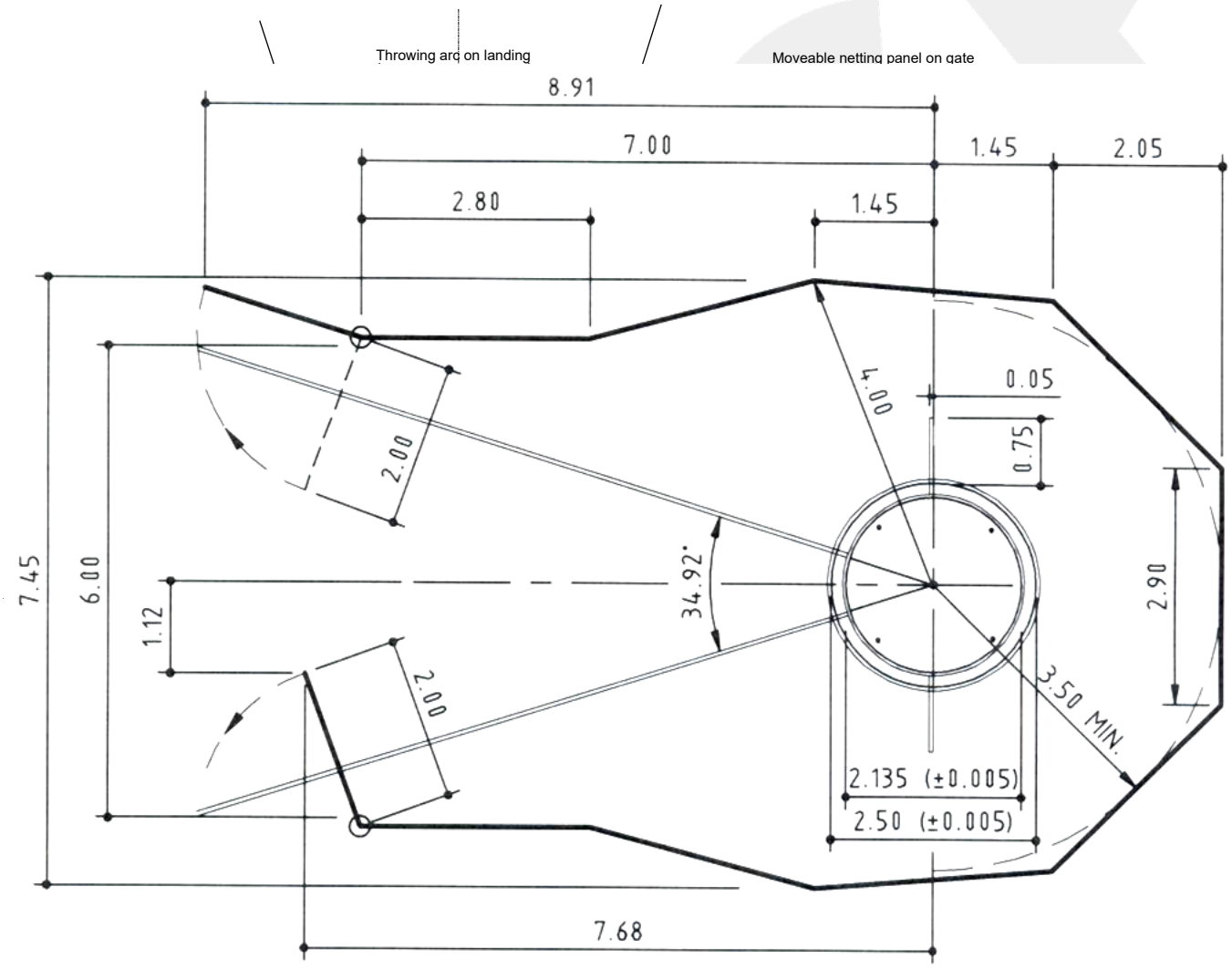
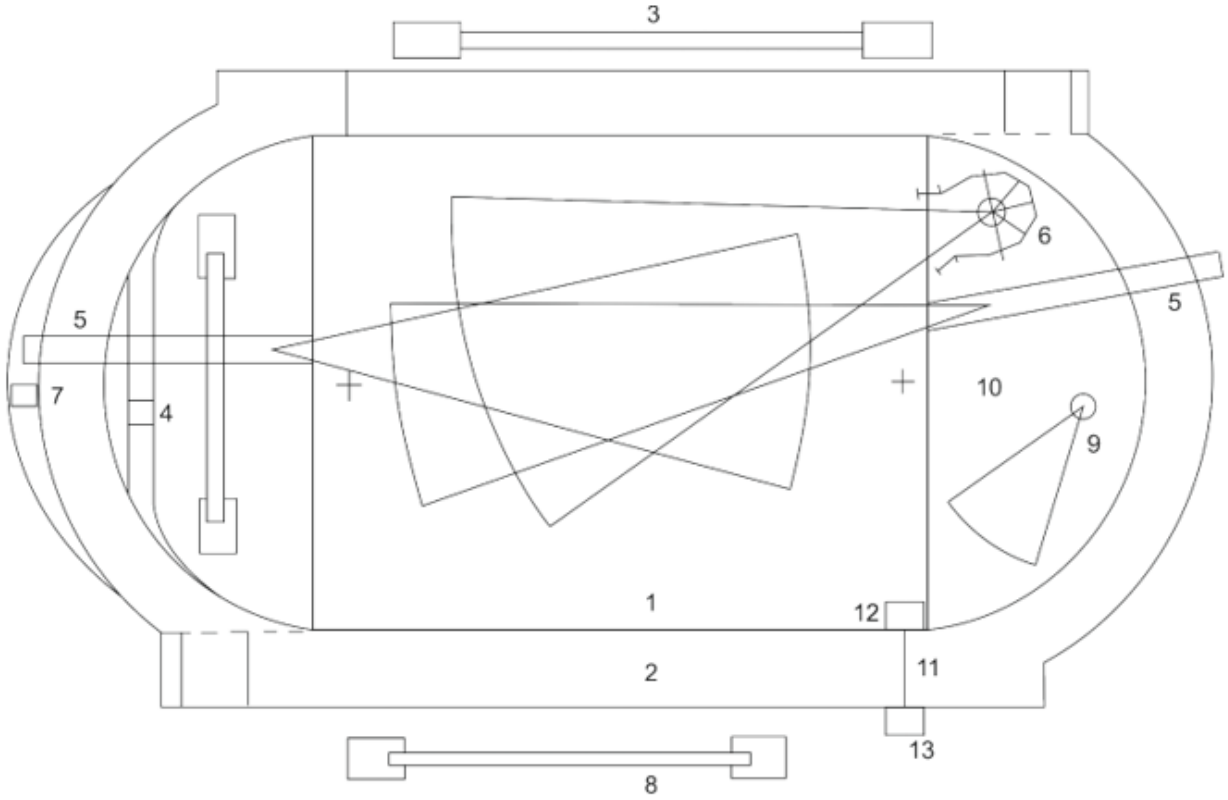



*Figure 7 UKA cage specifications for hammer or discus using concentric circles*

The cage is to ensure the spectators', officials' and athletes' safety. Provided that it meets all requirements, any form of cage design and construction can be used. Provisions need to be made to be able to stop a hammer, minimise any rebounding effects to protect the athlete and prevent a hammer forcing its way through any joint in the cage.

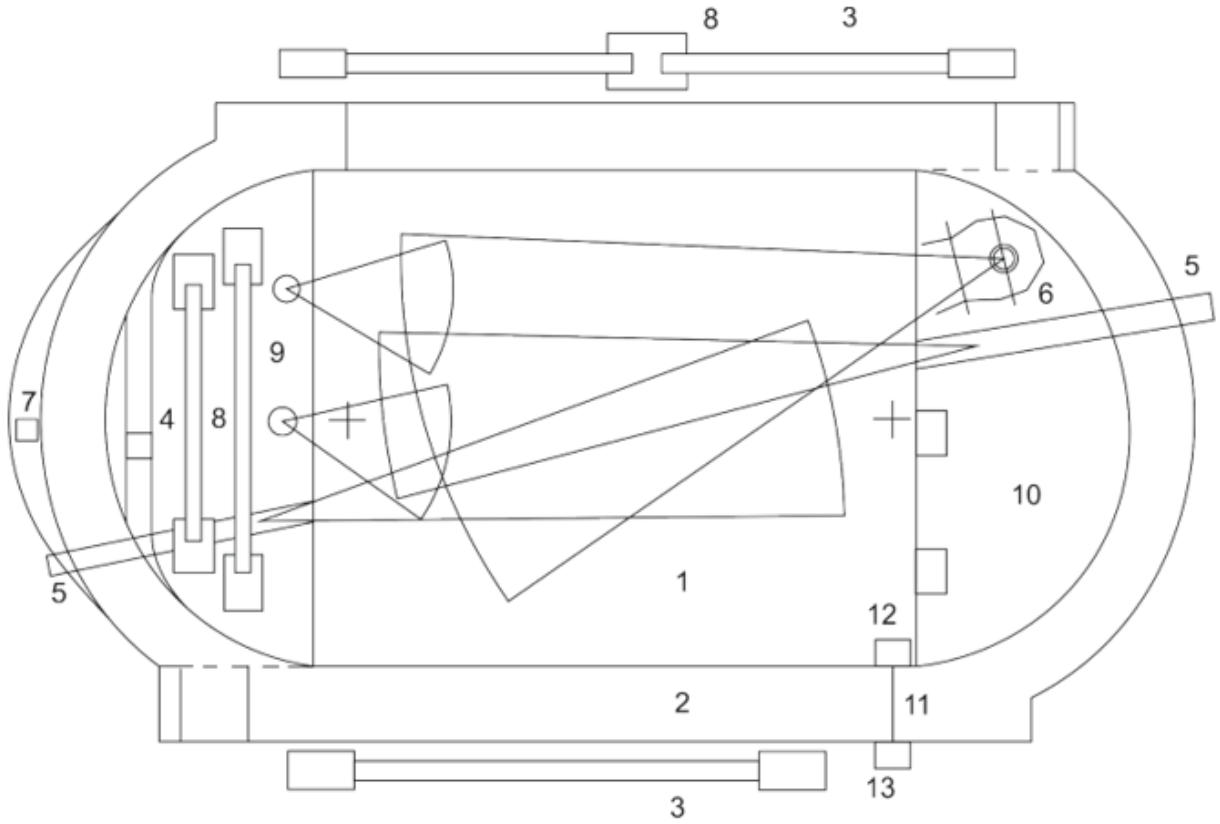
Copyright © SAPCA

### 1.1.11.6 Track Layouts




| | | | |
|---|---|---|---|
| 1 | Internal pitch | 8 | Pole vault landing areas |
| 2 | Standard track | 9 | Shot put facility |
| 3 | Long/triple jump facility | 10 | High jump runway |
| 4 | Internal water jump for steeplechase | 11 | Finish line |
| 5 | Javelin runway | 12 | Judge/timekeepers stand |
| 6 | Combined throws cage | 13 | Hardstand for photo finish |
| 7 | Alternative water jump position | | |

*Figure 8 Layout for six-lane club track*




| | | | |
|---|---|---|---|
| 1 | Internal pitch | 8 | Pole vault landing areas |
| 2 | Standard track | 9 | Shot put facility |
| 3 | Long/triple jump facility | 10 | High jump runway |
| 4 | Internal water jump for steeplechase | 11 | Finish line |
| 5 | Javelin runway | 12 | Judge/timekeepers stand |
| 6 | Combined throws cage | 13 | Hardstand for photo finish |
| 7 | Alternative water jump position | | |

*Figure 9 Layout for eight-lane competition track*

For further information on layouts or any other aspect of track regulation, contact UKA.

Copyright © SAPCA

## 1.2 Earthworks

### 1.2.1 General

The greatest risks and uncertainty arise from site ground conditions. The earthworks design therefore needs careful attention before starting construction. The extent of earthworks depends on ground conditions and site topography. Tracks are laid to very flat gradients, so sloping sites will require more extensive earthworks than relatively flat ones. The cheapest option will be the one that produces the least amount of spoil or minimises the amount of imported stone. The most expensive tasks are transporting earthworks materials to and from site and the disposal of surplus materials.

### 1.2.2 Information Gathering

To confirm the scope of earthworks, you need the following information:

- Topographic survey
- Site investigation

To establish how the track will fit into the site, you need an accurate survey that should include the following information:

- Detailed levels across the site
- Site boundaries and existing fences
- Existing trees together with their species, height, and roots
- Surface features relating to drainage and services such as ditches, manhole covers and overhead lines. Any manhole covers should be lifted, and the purpose, contents and depths of holes recorded
- Any other features such as roads and buildings and rights of way

Whether you intend to use a traditional or a Design and Build contract, the designer needs this information to clarify the site constraints and determine earthworks quantities.

A site investigation involves examining the underlying ground conditions and this is vital for earthworks design. For Design and Build contracts, a quality site investigation must be included in the Tender Documents to enable a realistic design to be produced. Without one, there is a real risk of cost over-runs as a result of finding unforeseen ground conditions.

Copyright © SAPCA

The scope of the site investigation depends on site conditions and should include examining and sampling the ground conditions on site together with laboratory testing. The information requirements will include the following:

- Ground strength
- Groundwater level
- Topsoil thickness
- Soil particle grading (for coarse-grained soils)
- Soil plasticity indices (for fine-graded soils). Soil plasticity index is a measure of soil clay content which is vital to assessing shrinkage potential
- An engineering description of the ground
- A historical desk study of the site

For more difficult sites such as river flood plains, steeply sloping sites, derelict sites or waterlogged sites, more extensive site investigation and possible piling may be required. Again, you need professional and site-specific advice.

### 1.2.3 Site Levelling and the Formation

Tracks need to be founded on competent ground. Topsoil, turf and vegetation are not suitable and therefore must be stripped from the site. Topsoil can be re-used for landscaping or spectator mounds if space allows.

The ‘formation’ is the level ground on which the track construction is built. It is preferable that the formation is natural ground because soil is usually stronger when it is undisturbed. Relatively flat sites can be excavated down to natural ground (‘cut to solid’) without producing large volumes of spoil.

The central area, within the track kerb, is normally grassed to act as a landing area for the throwing events and possibly as a football field. The finished level of this area must be at the same finished level as the track surface, though it may be ‘crowned’ to facilitate surface-water run-off.

Cutting to solid will be less practical for steeper sites because much more soil has to be excavated. If excavated soil cannot be used elsewhere on site, it has to be transported to a tip, which is very expensive. In these situations, re-using excavated soil as fill to build up the formation (‘cut and fill’) is much cheaper. However, re-used soil has to be compacted by mechanical plant to obtain adequate strength and density. Compacted strength and density depend on the type of soil, its water content and the amount of compactive effort applied. If filling is required and there is no source of suitable soil on site, it will be necessary to import suitable granular fill material. All filling should be carried out in layers not exceeding 150mm thickness, and each layer should be compacted to the Highways Specification standard before the next is spread.

Copyright © SAPCA

The formation should be treated as part of the finished track. It is vulnerable to softening in wet weather and therefore has to be covered as soon as possible. Any soft spots in the formation must be dug out and replaced with imported crushed rock, such as that used for the sub-base. The finished formation should be trimmed to a tolerance of ±25mm.

### 1.2.4 Slope Stability

In general, steep cutting into slopes brings a risk of landslip. A landslip is a mass movement of sloping ground. Landslips cause widespread damage and can be dangerous. They may occur immediately or much later and can be a long-term danger. Not all slopes are unstable and landslip hazard can be avoided by using correct techniques. If you need to cut into steep slopes to make the track fit the site, specialist advice is essential.

Cuttings into stable ground should be made as shallow as possible to allow ease of maintenance. Allowable cut angles will be site-specific.

Depending on site constraints, there should be minimum 1m margin from the line of the track surround-fence to the edge of any embankment.

## 1.3 Weedkilling

Following excavation and levelling, the site should be treated with an appropriate residual herbicide. Application should be by a competent person trained in accordance with Health and Safety regulations.

It is not possible to guarantee total prevention of future weed growth. To do so would necessitate the use of herbicides of such toxicity, or in such quantity, as to constitute a danger to humans and wildlife.

Japanese knotweed has a large underground network of small roots. To eradicate the plant, you must consult a specialist weedkilling contractor.

Copyright © SAPCA

## 1.4 Drainage and Water Management

A suitable drainage scheme and water management programme should be installed which will:

- Ensure that all surface water is removed from the site at a rate which will safeguard against surface flooding occurring.
- Ensure that the rate of track runoff after heavy rain during competition meets the requirements of UKA and World Athletics that all water has gone within 30 minutes.
- Ensure that the general rate of runoff meets Local Water Authority regulations that prevent overloading local networks; this may require installation of attenuation tanks within the track footprint.
- Ensure the attenuation system can be used for water harvesting to save water and reduce water costs for irrigation.
- Consider the use of Sustainable Urban Drainage Systems – SUDS if planning approvals state that control of surface water into local sewers.
- Not allow excess water to remain present in the construction which might result in a reduction of the load bearing capacity of the formation or in any frost damage to the construction.
- Protect the installation from the effects of ground or surface water from the surrounding areas.

Lateral drains may be incorporated beneath the infield area of the track, the centres of which shall be determined by the composition of the subsoil and the designed infiltration rate. Centres usually range from 5m to 15m. The ends of lateral drains should be capped to prevent contamination, and connectors should be used when joining lateral drains to collector drains.

Collector drains should be located on the inside of the internal perimeter edging. The purpose of the collector drain is to ensure that the formation of the track construction is adequately drained, to gather the surface water from the lateral drains below the infield area and to collect any water from the running surface of the track. Silt/inspection chambers should be provided at the tangent points of the track to allow maintenance of the system.

Commonly, the run-off from the track surface is collected by an additional collector drain, located on the inside of the internal kerb. This may be open or closed in construction and should discharge into the main collector drain at appropriate locations. (See Figures 10 and 11)

The diameter of the pipes will depend on the catchment area being drained and on the gradient of the pipe run. This gradient should not be less than 0.3% (1:300).

Field events should be catered for in the drainage layout by taking individual pipe runs to the water jump, landing areas, runways, including take-off boards, throwing circles, etc. Connections to the collector drain from the field event areas should preferably be made within the silt traps.

Copyright © SAPCA

External perimeter drains (which may also act as collector drains) must be installed at the toe of any embankments to prevent run-off from surrounding areas. Silt/inspection chambers should be constructed where perimeter/collection drains change direction, and the provision of rodding eyes should be included at the head of collector drain runs for ease of access for maintenance.

Drains usually consist of perforated plastic pipes, bedded on, and backfilled with, clean stone. No drains should have less than 150mm cover over the top of the pipe, and no drain should be laid to a fall of less than 0.3% (1:300) unless advised by manufacturers' instructions. In certain sub-soils where silting-up may be a problem, geotextile membrane may be used to line the trench prior to backfilling.

All drain tracks that cross the track construction should be backfilled using lean-mix concrete below the formation level of the track.

The installation of an athletic facility may disturb and render ineffective any existing land drainage. Where existing land drains are severed, they should be connected into the new perimeter drain.

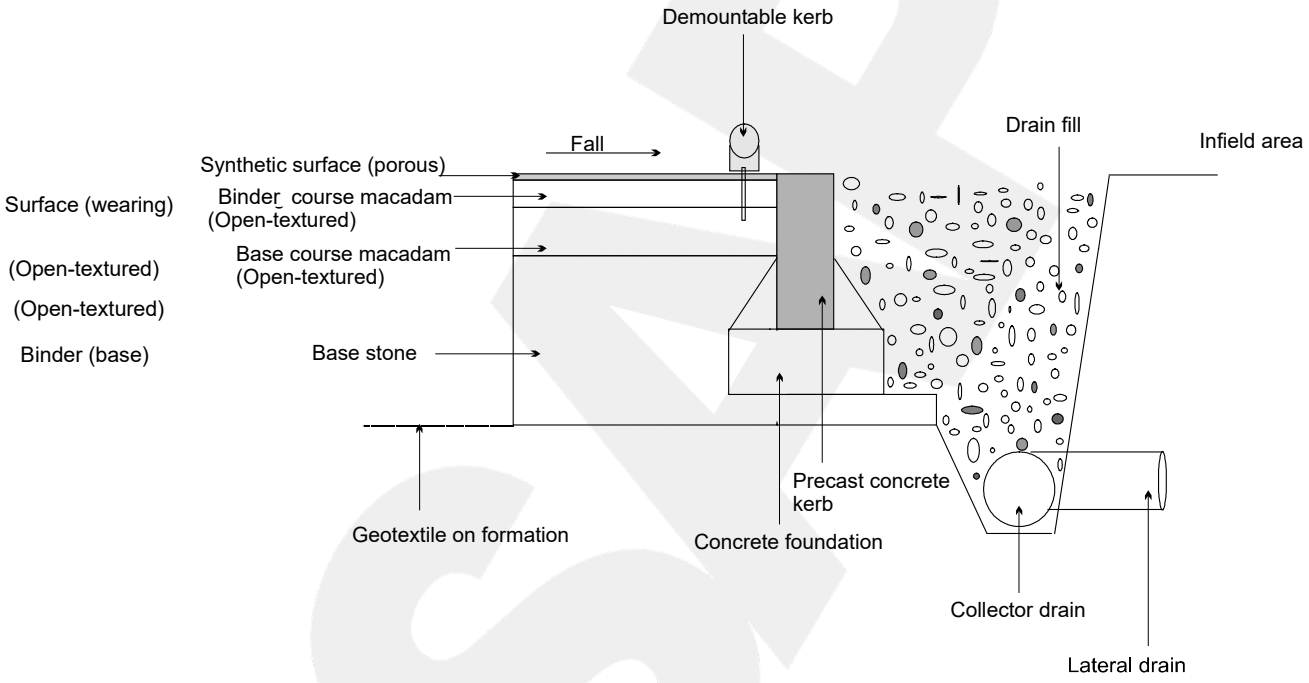



*Figure 10 Typical cross-section of track (porous and sandwich systems)*

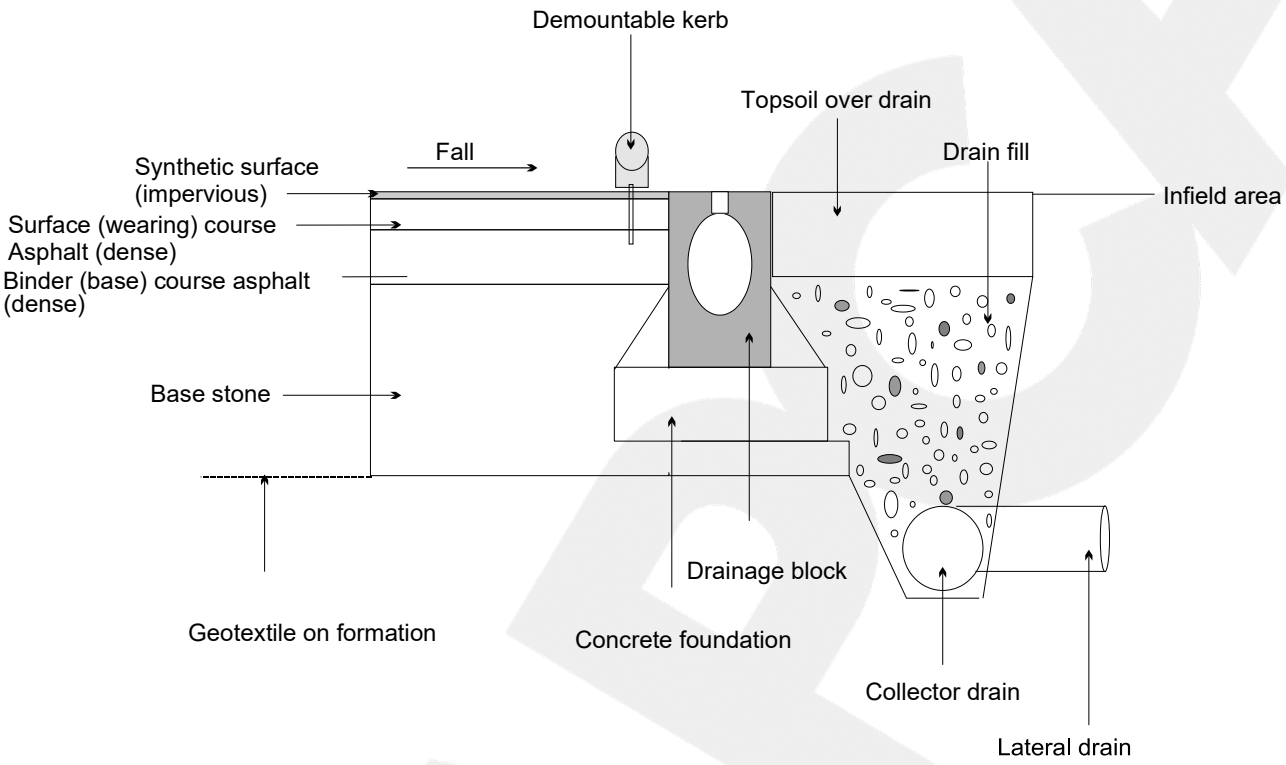



*Figure 11 Typical cross-section of track (solid system)*

*Note: The drainage detail for the solid system in Figure 11 should also be used when a sandwich system is specified.*

## 1.5 Ducts

It is advisable that ducts be provided below the track construction for future connection of services such as water, power, public address, timing systems, etc. This provision will avoid future excavation of the track surface. These ducts should cross from the outside of the outside kerb

Copyright © SAPCA

line to the inside of the internal collector drain at the finishing line and at each tangent point of the track. Inspection chambers should be provided where the ducts terminate. Drawstrings should be installed in all ducts during the construction phase the size and number of ducts will be decided by the owner/user of the track. All track crossings should be backfilled with lean-mix concrete below the formation level of the track construction. All manholes need to be drainable and also properly sealed.

## 1.6 Sub-Base

The primary design requirement of the sub-base layer is structural, to protect the weaker formation soil from excessive loads that may lead to deformation and instability. The sub-base layer may also be used for through drainage of surface water (for which it must be sufficiently porous) and storage and attenuation purposes. The selection of an appropriate thickness of sub-base is predicated by the design and construction methods utilised.

The sub-base to a new track, including field-event areas, should be designed to meet the following criteria:

- Provide adequate internal stability and load-bearing capacity in conjunction with the formation- during both construction and in the long-term to support surface applied loads without excessive deformation or permanent damage. This should include protection of the (weaker) formation soils beneath.
- Provide adequate stability to resist the effects of swelling, shrinkage or freezing in the formation soils.
- Provide adequate storage of infiltrating surface water when required as part of the drainage design.
- If the formation soils are frost susceptible limit the likelihood of frost penetrating to them.

The sub-base should be designed and constructed in accordance with the *SAPCA Code of Practice for the Design, Specification and Testing of Bases for Synthetic Sports Areas (2020)*. The sub-base should be constructed using hard, clean crushed frost-resistant aggregates. The grading of the sub-base material must be such as to provide stability but at the same time remain porous. The material should be laid in layers not exceeding 150mm, each layer being compacted before the next is laid. In the UK historically the nominal compacted thickness of sub-base stone would be not less than 300mm, however, track design should be based on a site-specific investigation report. Upon completion there should be no detectable movement under the roller. The surface level tolerance should be within ±10mm of the design level, and when checked with a 4m straight edge there should be no deviation greater than 10mm.

Depending on the type and condition of soil, it may be necessary to install a geotextile membrane on the formation prior to sub-base installation in order to prevent contamination from the sub-grade.

Copyright © SAPCA

To support the loads imposed on the track construction by maintenance equipment servicing the internal pitch areas, it may be necessary to provide an increased depth of base stone to strengthen the base at specific access points. These access points should be identified when the track is complete.

## 1.7 Perimeter Edging

A perimeter edging is normally installed to contain the synthetic surface and, in the case of the inside kerb, define the measured length of the track. (Section 1.1.2) Pre-cast concrete kerbs or precast drainage blocks are usually used. Whichever detail is chosen it must be firmly bedded in concrete and be laid to a line and level tolerance compatible with Section 1.1.2.

## 1.8 Base Construction

The structural base of the track is conventionally constructed using porous asphalt in a two-layer system. In the case of a porous track (see Section 1.9.4) or sandwich track (section 1.9.3), the asphalt would be open-textured and in the case of a solid system (Sections 1.9.2) the asphalt would be of a dense grading and specification. To meet the stringent requirements of compaction and surface tolerances, the asphalt base layers are normally installed using conventional road surfacing plant and equipment.

Where the base is designed to drain vertically the asphalt should comply with BS EN 13108-7. Where the base is not required to drain vertically (i.e. the base is impervious) the asphalt should comply with BS EN 13108-1.

The bitumen used in the asphalt mix should be Class 60-70 or Class 80-100, depending on the climatic region and local conditions and be in accordance with BS EN 12591. The bitumen content should be between 3.4 and 4% and be in accordance with BS EN 12591. Asphalt specifications for a porous construction should be:

An open-textured binder (base) course consisting of a minimum of 40mm, nominal compacted thickness, of 14mm or 20mm nominal-sized aggregate, plus an open-textured binder course consisting of a minimum of 25mm, nominal compacted thickness, of 10mm nominal-sized aggregate.

This asphalt specification should also be used when constructing new sandwich system tracks

For solid PU construction the specification should be:

A dense binder (base) course consisting of a minimum of 40mm, nominal compacted thickness, of 14mm or 20mm nominal-sized aggregate, plus a dense binder course consisting of a minimum of 25mm, nominal compacted thickness, of 6mm nominal-sized aggregate.

The surface tolerance required on the surface (wearing) course material is 6mm under a 4m straight edge. Care must be taken at adjacent paving bay joints to ensure that no lips or edges are left. Where prefabricated systems are to be installed as the final surface, finer tolerances may well be applied of 3mm under a 4m straight edge.

Copyright © SAPCA

## 1.9 Synthetic Surfaces

In the UK, there are four generic types of synthetic track surface in use:

- Prefabricated systems, manufactured off site, normally impervious
- Solid PU (polyurethane) tracks which are impervious to water
- Sandwich systems incorporating a solid PU surface over a porous base
- Porous PU tracks which allow the through passage of water

The choice of surfacing system will depend on the primary use of the track and field facility and the budget available. If the ambition is to stage major national or international meetings on the track, a solid system would normally be specified. If the budget will not run to this system, then the sandwich system is an acceptable alternative. For most tracks used by club, school and college athletes, porous systems provide an acceptable solution.

The choice of consultant, installer and system should be carefully considered with examination of previous reference installations, both recent and after some years of use. SAPCA will provide a list of members of the Track and Pitch Group, who are subject to rigorous vetting to achieve membership.

The durability of the track system is substantially dependent on the quality of the rubber and polymeric materials incorporated in the construction. These materials are only available from a limited number of manufacturers worldwide, and the sources of any proposed materials should be checked as being from a supplier of known reputation and quality within the SAPCA list. World Athletics has a system of product certification for synthetic surfacing products.

All except the prefabricated systems utilise a combination of polyurethane resins and rubber granules, mixed on site and spread on to the asphalt base to provide the running surface.

### 1.9.1 Prefabricated Systems

Prefabricated systems use factory-produced sheet materials based on rubber-type compounds. These sheet materials are usually impervious and have the advantages of consistency in resilience and thickness achieved during manufacture. Since the thickness of the surfacing layer cannot be adjusted on site to accommodate irregularities below, the base layer of dense asphalt must be engineered to a very fine tolerance. These materials tend to be longer lasting and have lower maintenance costs; likewise, they retain their performance throughout the life of the material. There are also environmental issues that may allow prefabricated systems to be reused if they need to be removed.

The adhesive bond between the prefabricated surface layer and the engineered base is crucial to the performance of this system.

Copyright © SAPCA

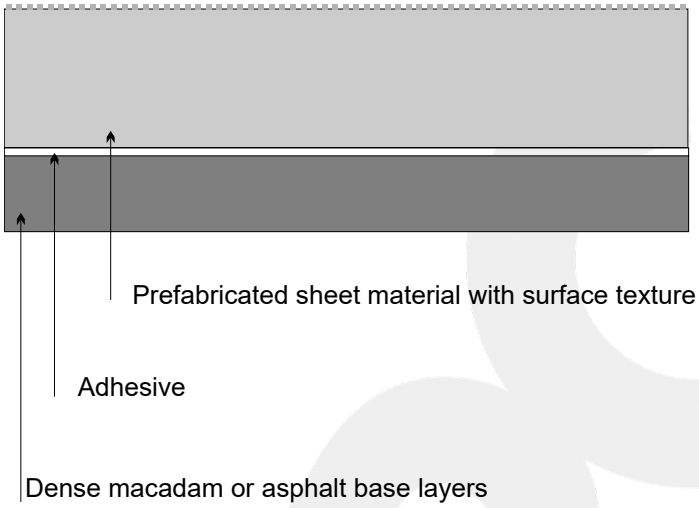



*Figure 12 Diagrammatic cross-section of a prefabricated system*

### 1.9.2 Solid PU Tracks

The solid PU systems are classified as 'cast elastomers' and incorporate rubber granules in a matrix of two-part polyurethane resin. This material is mixed and cast in-situ to form an impervious resilient system. The overall thickness may be achieved in more than one pass and the surface is commonly given a textured finish by the application of coloured EPDM rubber granules on to the uncured base material. After final cure, the excess granules are removed to leave the finished running surface. As the solid PU surface is impervious, great care and expertise is required to ensure that surface water does not remain on the completed track after heavy rain.

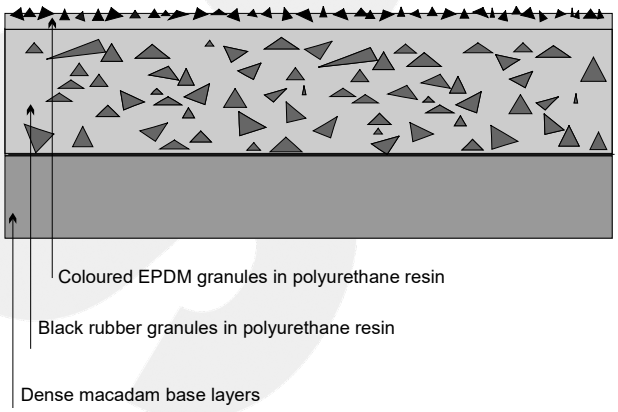



*Figure 13 Diagrammatic cross-section of solid system*

### 1.9.3 Sandwich Systems

By its nature, the solid PU system is a very expensive surface to construct, due to the high percentage of two-part polyurethane in the construction. In the sandwich system this cost is reduced by installing a base mat of bound rubber granules, as in the porous PU system (Section 1.9.4) and sealing this with a thin layer of the cast elastomer material as in the solid PU system. The surface texture is achieved by applying rubber granules to the uncured surface as in Section 1.9.2. This system provides a solid PU surface at a much-reduced cost, though some of the advantages of the solid system may be lost, particularly on resurfacing.

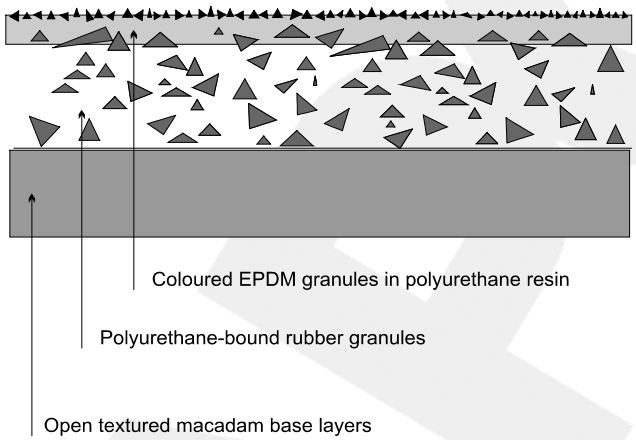



*Figure 14 Diagrammatic cross-section of sandwich system*

### 1.9.4 Porous PU Tracks

The most popular synthetic track system in the UK is the porous PU type, which incorporates a base mat of polyurethane-bound rubber granules and a finishing layer of spray-applied coloured EPDM granules in a polyurethane matrix. The top ‘structure coat’ provides the traction properties of the surface whilst strengthening the base mat and providing protection from the impact of ultra-violet. The polyurethane resins used in these systems are known as ‘moisture cure’, as opposed to the two-part cure of the ‘cast elastomer’ systems. The nature of the construction methods ensures that the system remains porous, which is a great advantage in the UK climate.

Copyright © SAPCA

This construction is not as robust as the solid PU systems, but re-texturing at the appropriate time can ensure an extended lifespan. In the areas of high wear, such as sprint starts and long jump and high jump take-offs, it is possible to strengthen the porous system locally by 'grouting' the pores of the base layer with the cast polymer materials.

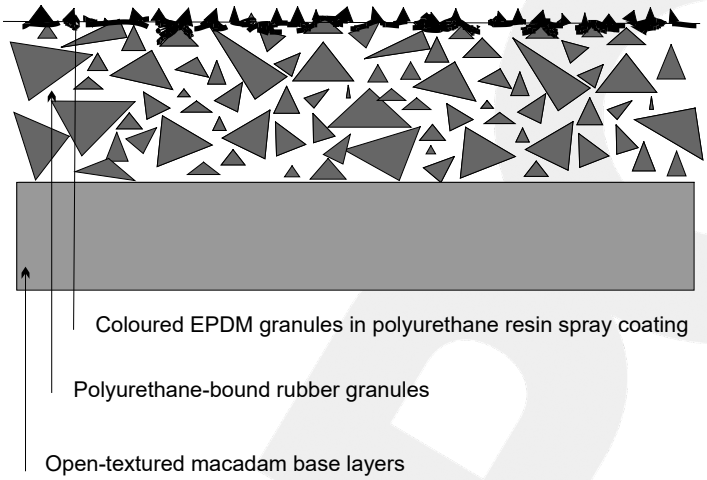



*Figure 15 Diagrammatic cross-section of porous system*

**All PU systems have environmental issues when they reach the end of their life if they are not being recycled.**

### 1.9.5 Thickness

Upon completion of the track, the synthetic surface must be an average of at least 12mm thick, with no areas less than 10mm. Where the thickness of the track system is disputed, measurements should be taken in accordance with the method laid down by the World Athletics.

At areas of high impact, such as the end of the javelin runway, the water jump landing area, the high jump take-off and the area between the triple jump take-off board and landing area, and pole vault it is advisable to increase and reinforce the depth of the synthetic material to 20mm by adjusting the level of the base. The water jump landing area should be 25mm. See Figure 4 and Section 1.1.6.

## 1.10 Testing

All reputable installers of synthetic systems for athletics will have recent test data on the surfaces they offer. These tests will have been carried out by an independent test laboratory on samples of the surface material or in situ on tracks laid by the installer. These tests are designed to establish the durability of the surfacing system and its suitability, in performance terms, as a surface for athletics, over a period of time. In the UK, tracks are subject to a harsh climatic environment, with a wide temperature range, and all track surfaces must be designed to cope with the damage inflicted by spikes, for which limits on spike length are required.

Copyright © SAPCA

The test criteria for track surfaces fall into two categories:

A. Tests carried out by inspecting the final installation:

1. Imperfections such as bubbles, cracks, delamination etc
2. Colour uniformity
3. Drainage of the surface after rain
4. Flatness, i.e., surface level tolerance
5. Thickness of the surfacing layer throughout the facility

B. Tests carried out on the surface material either on site or in the lab:

1. Force reduction, i.e., the reduction in impact force caused by the surface
2. Modified Vertical Deformation, i.e., the degree of deformation of the surface under impact
3. Friction, the determination of potential slip between shoe and surface
4. Tensile properties, i.e., the strength of the surfacing material in tension

The World Athletics limits for these performance tests are included in Table 1 below. The table also proposes appropriate test limits for the club/school/college standard of track in the UK.

Where a new track is being constructed for National or International competition, within the UK, World Athletics limits should be adopted.

For further information on test methods and further detail on the acceptable limits, the current World Athletics Track and Field Facilities Manual should be consulted. Information on independent test houses with appropriate experience can be obtained from SAPCA or UKA.

Copyright © SAPCA

*Table 2 The limits from World Athletics and UK for the performance tests highlighted.*

| Test | World Athletics and UK Limits | |
|---|---|---|
| **A** | | |
| 1. Imperfections | No serious imperfections | |
| 2. Colour | Methuen Handbook / BS 4800\5252 | |
| 3. Drainage | No surface water after 20 min | |
| 4. Flatness | This phase includes the construction of the facility. If required, independent quality control is undertaken to assess build quality and design specification conformity. | |
| 5. Thickness | This phase includes handover of the completed project. If required, performance testing may be undertaken to ensure compliance. A maintenance regime should be provided by the installer. | |
| **B** | | |
| 1. Force reduction | 35% to 50% between 10°C and 40°C | |
| 2. Modified deformation | 0.6 to 2.2mm between 10°C and 40°C | |
| 3. Friction | Not less than 0.5 when wet | |
| 4. Tensile properties | Tensile strength | 0.5 MPa for solid |
| | | 0.4 MPa for porous system |
| | Elongation at break not less than 40% | |

*Note: Within the prescribed range of acceptable values for Force Reduction, it is recommended that track values should be defined, those built primarily for competition, are designed at the lower end of the range, whereas tracks intended primarily for training and the use of young athletes, be designed at the higher end of the range.*

Copyright © SAPCA

### 1.10.1 TrackMark Certification Procedure

TrackMark is UK Athletics' minimum standards scheme for Track & Field Athletics facilities.

TrackMark was developed in consultation with track operators, track and field athletics clubs and National Sports Councils and is an accreditation process that utilises a simple web-based portal.

A venue that achieves TrackMark accreditation will be recognised by UKA as having well managed, compliant facilities that are accessible to participants of all abilities.

TrackMark is broken down into six units and is open to any facility that has track and/or field facilities.

*Table 3 TrackMark Units - Overview*

| Ref: | Accreditation | Assessment |
|---|---|---|
| Unit 1 | Track | Track layout/track surface condition inspection |
| Unit 2 | Field | Field event layout, throws and jumps facilities including safety equipment including throws cages & landing beds, disability provision (throws fixings) |
| Unit 3 | Ancillary | Toilets, changing rooms, car parking, storage, clubroom/social areas, multi-purpose rooms. (All ancillary facilities must be accessible to all users) |
| Unit 4 | Operations | Staff/volunteer training, maintenance/inspection regimes, safety management |
| Unit 5 | Floodlighting | Track and infield floodlighting compliance |
| Unit 6 | Competition | Track: Valid measurement and levels survey for all track events<br>Field: Valid measurement and levels survey for all field events |

#### 1.10.1.1 How long does accreditation last?

TrackMark accreditation lasts for a period of 3 years after which time facilities need to go through a reaccreditation process.

Copyright © SAPCA

#### 1.10.1.2 What does the process involve?

In working towards achieving accreditation in TrackMark units, venues are required to answer simple online questions and upload supporting evidence. Submitted responses and evidence is then reviewed by UKAs Facilities Team who check that venues achieve minimum standards.

#### 1.10.1.3 Benefits of TrackMark

- TrackMark accreditation is a simple unit-based accreditation process that facility operators can use to demonstrate to hirers, athletes, officials, coaches, and parents that their venue is well managed, well maintained, and accessible to all users
- TrackMark demonstrates that track & field facilities meet the minimum standards of provision stipulated by the National Governing Body for Athletics in the UK
- TrackMark provides facility owners and operators with independent, professional condition surveys to prevent unplanned major expenditure and help support medium- and long-term planning and investment to maintain standards and protect the long-term future of track and field facilities in the UK.
- TrackMark reports are used as critical supporting evidence to capital funding applications
- TrackMark accredited venues help to support athletics clubs to attract more members and support sustainable athletics clubs and facilities

## 1.12 Fencing (optional, not a World Athletics or UKA requirement)

### 1.10.2 Boundary Fencing

The choice of surround fencing is usually dictated by site constraints, access considerations and budget. The main function a boundary fence should fulfil is to restrict access to the athletics area.

Each site will have its own specific requirements in terms of design and available budget. A good contractor should be able to demonstrate a variety of options and advise on the advantages and disadvantages of each system. The following guideline requirements apply generally:

#### 1.10.2.1 Height

The maximum/minimum height of fencing is usually determined by the track location in relation to surrounding properties and local planning requirements.

#### 1.10.2.2 Access

Entry into the athletics area will be required by competitors, coaches, spectators and maintenance machinery. One double gate is therefore a minimum requirement. Additional pedestrian gates to be provided as required.

Copyright © SAPCA

### 1.10.2.3 Materials

There are three basic types of cladding:

- Chainlink
- Weldmesh rolls
- Weldmesh panels and proprietary systems

The support steelwork specification will depend on the gauge of fencing. Below is a minimum specification, but each site must be considered separately, taking into account ground conditions and exposure.

### 1.10.2.4 Chainlink

For a heavy duty 2.75m high fence chainlink netting should be plastic-coated with a galvanised core, 50mm x 50mm mesh x 4.75mm/3.55mm gauge. It should be secured with straining wires, using galvanised winders, stretcher bars, nuts and bolts and supporters. The above netting should be supported on 5 no. line wires the top 3 no. to be plastic-coated galvanised core 4.75mm/3.55mm gauge straining wires, and the bottom two-line wires should be 4m-diameter galvanised multi-strand straining wires are to be used. Netting is to be attached to the straining wires by a suitable, secure and safe method of tying or clipping, 5 no. per line per metre. All track-side netting is to be fitted on inner face of posts. Site boundary fencing should be fixed on the outside of the posts.

Corner, gate and straining posts to be a minimum RHS posts 60mm x 60m x 3.0mm RHS with steel base plates. Intermediate posts to be RHS posts 50mm x 50mm x 3.0mm also with steel base plates. All posts should be set in concrete of 760mm minimum depth.

It should be noted that even with strict supervision of the installation, chainlink fencing is prone to distortion by people resting against the fence or by ball impact.

### 1.10.2.5 Weldmesh Rolls

Corner posts and strainer posts to be 60mm x 60mm x 3mm RHS complete with 2No full-height diagonal struts each with a single cross stay. All intermediate posts to be 50mm x 50mm x 3mm RHS. All posts to be set in concrete of 760mm minimum depth and 450 x 450mm on plan.

All support steelwork to be hot-dip galvanised. Fencing to be fixed to inside edge and consist of 50mm x 50mm x 3mm galvanised weldmesh. Mesh to be supported on 5No high-tensile line wires secured with stainless-steel anchor clips, 5 No. per line per metre.

### 1.10.2.6 Weldmesh Panels and Proprietary Systems

For weldmesh panels, supports as above but minimum panel thickness will be 4mm and panels usually powder-coated.

Copyright © SAPCA

Manufacturers' specifications should be consulted for proprietary systems.

#### 1.10.2.7 Gates

All gates should open outwards for the safety of athletes.

Single gates to be 1.2m wide by 2.05m high with lintel panel above.

Double gates to be 3.0m wide by 2.5m high with removable lintel panel above for ease of access with soccer goals. All gates to be fully in-filled with chainlink or weldmesh with a suitable locking mechanism. Hanging and clapping posts should be 60mm x 60mm x 3mm RHS with side struts.

All fixing bolts should be assembled with heads inside and bolts trimmed to within 6mm of the nut. Trimmed ends should be burred and treated.

### 1.10.3 External Trackside Fence

A 1.20m-high pedestrian barrier erected externally around the track, parallel to the outside kerb line, provides further security to the athletes and gives spectators a leaning rail at trackside.

This fence should not be located closer than 1.00m to the outside of the external kerb line (see Section 1.1.5).

A suitable barrier may be constructed from 2.0m-wide prefabricated galvanised steel panels consisting of a frame fabricated from 50mm x 30mm RHS with galvanised steel in-fill bars of 12mm diameter (see Figure 17). Adjacent panels are bolted together using 2No M10 x 75mm galvanised nuts, bolts and washers.

Support legs should be set in concrete to a minimum thickness of 150mm on all sides.

Copyright © SAPCA

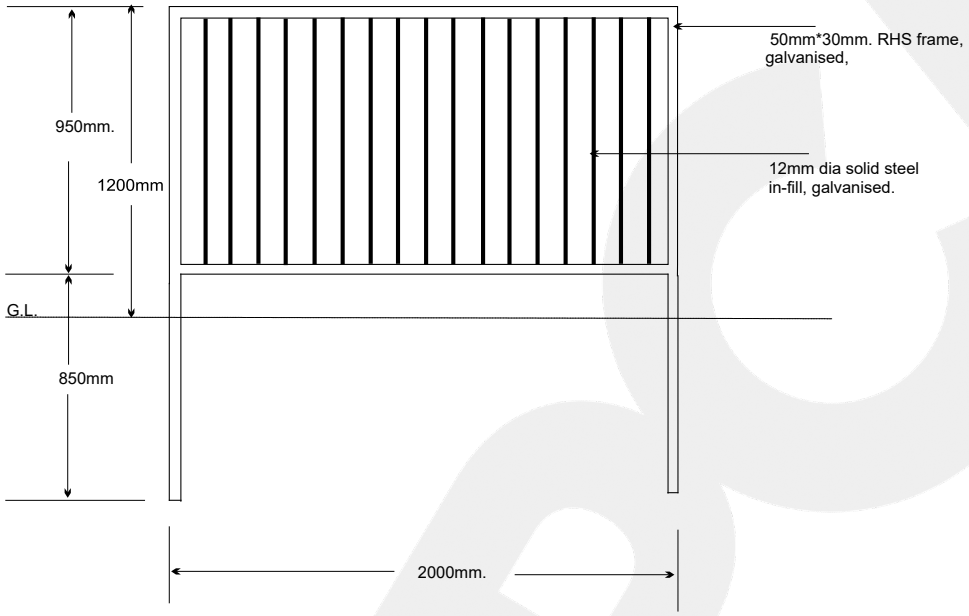



*Figure 16 Pedestrian barrier details*

# Section Two: Maintenance

## 1.11 Maintenance of Synthetic Surfaces

### 1.11.1 Introduction

The maintenance procedures outlined in the following section are general guidelines. Advice must be taken from the installer or manufacturer of the synthetic surface.

By their nature, polymeric surfaces are extremely durable, being designed to satisfy arduous performance test criteria whilst withstanding constant spike use in climates varying from the Arctic to the Equator.

There is no such thing as a 'maintenance free' sports surface and all polymeric track surfaces will require a modest degree of maintenance. The basic maintenance is of vital importance if the surface is to retain its appearance, be consistent in performance, safe for the athlete to run and jump on and to be long lasting. The installer's guarantee will usually be conditional on the recommended maintenance requirements being carried out with reasonable diligence.

### 1.11.2 What Maintenance and Why

Maintenance procedures are designed to ensure that:

- The track surface is kept clean
- The track surface is safe for all standards of user
- In the case of the porous system, the free drainage of surface water is maintained throughout the life of the track
- The facility looks attractive and well-kept at all times

These objectives are achieved by:

- Sweeping leaves and other detritus from the surface especially grass cuttings
- Washing/cleaning the surface to remove contaminants such as grime, algae, moss, sand etc.
- Applying prophylactic treatments of moss-killer and/or algaecide
- Periodically removing weed growth from the perimeter kerb lines

### 1.11.3 Keeping the Surface Clean

Leaves, tree flowers, pine needles and other detritus should not be allowed to remain on the surface for any length of time. If this does happen, they rapidly rot down, forming a contaminated

Copyright © SAPCA

'skin' on the surface and providing a growing medium for algae and moss. Tracks located adjacent to motorways and other busy roads, industrial sites and where tree deposits and bird droppings are likely are especially vulnerable.

A mechanical leaf-sweeper or vacuum cleaner is ideal for removing vegetable matter and other rubbish. Restricted areas may have to be undertaken by hand. The equipment should be well maintained and carefully operated to avoid contamination of, or physical damage to, the surface. Spillage of fuel or lubricating oil may also damage the surface, so great care should be taken to ensure that the equipment remains in good mechanical order. Advice must be taken from the installer when choosing maintenance equipment.

At least once a year it is advisable to wash the surface with high-pressure jetting apparatus. There are many varieties of high-pressure washer available for purchase or hire. These can range from a simple hand-held lance through to a tractor mounted version. The higher the capacity of the machine, the quicker the operation will be completed. A high pressure scrubber, incorporating a vacuum, should, ideally, be used to clean the entire track and run ups about every two years.

*Table 4 Specimen maintenance schedule for a polymeric athletics track*

| Action | Frequency |
|---|---|
| Use of sweeper to remove surface detritus | As required but at least every two weeks. |
| Use of lance on H.P. washer, to clear sand, mud, etc. from runways | As required, after use |
| Use of H.P. scrubber for complete deep-clean of track and runways | At least every two years |
| Re-texturing of heavily worn areas | As they occur |
| Centre area grass cutting (cuttings to be boxed) | As required |
| Cleaning of drains | At least once per year or more often if required |
| Repainting of lines | As required |

Polymeric surfaces can withstand pressures up to 2000 p.s.i. without suffering damage to the structure. Many commercial washers allow for carefully metered quantities of detergent and fungal

Copyright © SAPCA

inhibitors to be added to the water. These chemicals will help to prevent moss and algae from invading the surface.

In the case of porous systems, it may be necessary to retexture lanes 1 and 2 and areas of heavy wear, such as sprint starts, after approximately 5 years of use. Deep cleaning should always precede retexturing. Complete retexturing may not be essential but worn areas must be dealt with. Owners are advised to record track usage. Excessive use of inside lanes and home straight normally indicates poor track management.

A revenue budget should be established by the operator to cover all of the above issues. In the event that the track is maintained to the standards shown above and is sensibly managed (see below) at least 10 years will pass before full retexturing is necessary. A separate account should be established to cover this.

There may be benefits in terms of savings in entering into a long-term contract with specialist track cleaners to carry out the deep cleaning requirements.

The frequencies shown in Table 2 are the minimum required to maintain the life of the track surface for about 10 years. Regular surface inspections should take place and the frequencies of maintenance increased accordingly. Failure to carry out basic maintenance and retexturing will shorten the life of the track and may well result in early replacement at approximately two and a half times of the cost of retexturing.

### 1.11.4 Access over the Track

At all track venues, both pedestrians and maintenance machinery require regular access to the central grassed area.

It is essential to provide protection for the track surface at regular pedestrian crossing points, e.g. from the dressing room on to a central pitch. This protection could take the form of roll-out matting to ensure that mud from boots does not contaminate the track surface. When the central infield is being used for pitch sports care should be taken if they leave the grassed area to retrieve the ball and if required localised cleaning of the surface should be carried out.

Plywood or similar sheeting should be used to allow access to the central area for grass cutting machines etc. The load imposed by such a machine must not exceed 1500kg.Tracks should have a specially designated crossing point to allow heavy items of plant such as lorries, forklifts etc access to the central area. This extra loading is catered for by increasing the strength of the track base-works at the time of construction. Protection of the track surface is required at these locations.

Whenever small or large machines cross the track the demountable kerb must be removed at the appropriate position. The track manager should always brief visiting drivers of machines, so they are fully aware of the procedure to be followed.

Copyright © SAPCA

### 1.11.5 Spreading the Wear

The inside lane(s) of a track, along with the start areas, horizontal and vertical jumps runways, are subjected to an increased amount of wear compared with the outside lanes of the circuit. For this reason, it will extend the useful life of the facility if athletes use these areas as little as possible in training. This 'athlete management' can be achieved by such measures as:

- Coning or gating the inside lanes so that their use is restricted to competitions
- Spreading training use over both straights so that training for sprints and hurdles is spread evenly between the home and back straights
- Moving the high jump bed to different parts of the fan so that the athletes do not always take off from the same spot. Specialist high jumpers wearing 9mm spikes should, however, only take off from the specially strengthened area of the fan
- Using roll out run ups for the horizontal jumps
- Covering the take-off area in pole vault with suitable rubber for training

It is essential that spikes of the correct length should be used. These will not exceed 6mm except at the specially strengthened javelin and high jump areas where 9mm is permissible. It must also be noted that individual tracks may have their own rules with regard to spike length.

Although the polymeric materials are highly resistant to damage, point loads from sports equipment etc. should be avoided; otherwise, localised damage to the track surface will occur.

### 1.11.6 Central Area

The regular maintenance of the central area, i.e. grass cutting, fertilising, weedkilling, etc., must be carried out with care and consideration of the synthetic track surface.

- All grass clippings should be boxed (collected) and removed from site
- Drift from sprayed fertiliser should not be allowed to reach the track
- The mowing machines should not be allowed to turn on the track surface
- The access route over the track and on to the synthetic surface should be clearly marked and some form of protection on the surface during access and egress. Oil based liquids and other fluids are damaging to track surfacing.

## 1.12 Maintenance and Storage of Equipment

The life span of track and field facilities depends on regular maintenance. Lack of maintenance leads to deterioration and is costly to rectify.

Copyright © SAPCA

Authorities responsible for annual budgets must make adequate provision for the cost of necessary maintenance which should include cleaning, renovation and replacement of worn-out equipment.

All tracks must maintain an up-to-date Risk Assessment policy and maintenance manual which should be available for inspection if required. This should include evidence of regular staff training concerning the practical maintenance and upkeep of all equipment.

### 1.12.1 Equipment for Track Events

#### 1.12.1.1 Track Kerbing

This should be checked regularly for damage. Plastic kerbing is susceptible to cracking as a result of UV light degradation. The sections that are removable for the high jump and steeplechase should have the fastenings and bolts lightly oiled if made from steel. If, when removed, brackets and pins are also removed, then care should be taken to ensure that no debris in the form of surface crumb etc. falls into the holes and hinders the replacement of kerbing. Kerbing when removed for this purpose should be placed so as not to cause a hazard to other users. The remaining kerbing should be visually checked to ensure that it is secure and undamaged. Any damaged joining brackets or kerbing should be repaired or exchanged at earliest opportunity.

It is a good policy to ensure that vehicles going onto the grass always enter and leave through a section where the kerb has been removed. This avoids damage to the kerbing by trucks and gang mowers.

#### 1.12.1.2 Starting Blocks

These should have the foot plate surface checked. Replacement pads are available and are fitted by screws or by means of contact adhesive according to design. Check that all the fixing spikes are present and straight. Please note that research has shown that, for starting blocks, the ideal length of spike to ensure stability is 11mm. The use of 6mm or 7mm spikes is likely to result in the blocks slipping during use and thereby causing damage to the track and injury to the athlete. (These shorter spikes are suitable for shoes but not for starting blocks). Check foot plate fittings and lightly oil any moving parts.

#### 1.12.1.3 Track Judges, Timekeepers Stands and Starters' Stands

These need little maintenance. Oil any wheels and check the metalwork and platforms – particularly the welding joins to ensure that stands are safe to use. If necessary repaint periodically.

#### 1.12.1.4 Microphones, Amplifiers, Loudspeakers and Electrical Equipment

Check cables for damage and charge batteries. Check that any underground photo-finish cables have watertight ends – any screw on caps should be greased or lightly oiled.

Copyright © SAPCA

#### 1.12.1.5 Hurdles

Check regularly for splitting or damaged top boards. Plastic top boards whilst durable can be very dangerous to athletes if spikes leave a sharp spur on the upper surface. A little oil should be put on the bottoms or clips for height adjustment and on the sliding weights. Check that all weights have their mechanism for ease of movement and locking in place. The sliding tubes should be wiped with a lightly oiled cloth or sprayed with Mr Sheen type polish.

#### 1.12.1.6 Steeplechase Hurdles

Check tops regularly for splinters or other damage – if damaged either replace or turn upside down until damage can be repaired. Ensure that legs are fixed securely to tops and are vertical. If adjustable hurdles for height, then ensure that mechanism for securing at correct height is working correctly. If there is an adjustable and moveable water jump, then periodically check that all parts are greased or lightly oiled and that any 'drop in' spacers are easy to put in and take out.

### 1.12.2 Equipment for Field Events

#### 1.12.2.1 Pole Vault Landing Area

Check that all fastenings are intact. Look at the clips and buckles, and especially make sure that the internal fastenings are secure, and all the units are held firmly together. Does the wear sheet fit and is it fastened to the base units? Look for depressions in the foam – a sign that the foam is deteriorating. If using pallets, ensure that they do not protrude at any point and that the sides facing the vault are solid faced so that a pole or athlete's foot cannot go under the pallet.

Take-off box. Keep box painted matt white to assist sighting. If the take-off box has drain holes, clear them out to assist drainage. Check that, if an insert piece is required at the front of the box, it fits securely prior to each use.

#### 1.12.2.2 Stands

Check that nuts and bolts are tight and that stands are vertical when in use. Lightly oil the base carriage wheels and sliders. Check that the sliders have cast sleeves in them and that the castings are complete. Check the tension on the tape – this works on friction between pulleys and the tape. DO NOT oil the tape or winding mechanism since this will cause the tape to slip. If the winding handle slips, tighten the tension adjustment at the top of the stands by a quarter turn only and try again. Do not over tighten. If winding is tight, loosen the adjustment a quarter turn. If the tape 'grinds' on winding it is likely that the winch pulleys are damaged, and the tape may break – usually this requires servicing by the manufacturer. Check that the base rails are not bent – lubricate with light oil and check that the bar support pegs are not bent or loose. Check that support arms are not loose and if there is vertical movement then adjust pulleys on outside of stand to restrict this movement. With some modern stands which are fixed in the ground with adjustment forward and backward at the top of the stand adjustment and care is similar to that for raising the bar.

Copyright © SAPCA

#### 1.12.2.3 Bars

These need to be checked for splitting at the ends and in the centre.

#### 1.12.2.4 Vaulting Poles

These are usually athlete owned and they are their responsibility. If provision is made there should be a locked store that retains the poles in a flat position.

#### 1.12.2.5 High Jump Landing Area

Check that all fastenings are intact. Look at the clips and buckles, and especially make sure that the internal fastenings are secure and all the units are held firmly together. Does the wear sheet fit and is it fastened to the base units? Look for depressions in the foam – a sign that the foam is deteriorating. If using pallets, ensure that they do not protrude at any point and that the sides facing the jump are solid-faced so that an athlete's foot cannot go under the pallet.

#### 1.12.2.6 Stands

Oil any wheels on the stands. Check the tightness of any bolts on the stand base and the uprights. Lightly oil the uprights or use Mr Sheen type polish. Oil the screw threads of the sliders and check that the bar-support is both tight and straight.

#### 1.12.2.7 Cover

Oil the wheels, jacking points (if any) and the hinges. Check that any locking mechanism is working correctly.

#### 1.12.2.8 Long Jump/Triple Jump

Lift the take-off and blanking boards and oil or grease any adjusters in the trough (if any) and underneath the boards. If fitted ensure that any lateral movement adjusters are also oiled or greased. Check that no jump indicators fit securely and are not bent. Ensure that plasticine is complete and maintained in good condition. Remove any sand from underneath the no jump indicator. If necessary, adjust the blanking and take-off board's level with surface of runway. Check periodically that surrounding turf does not encroach on to runways.

#### 1.12.2.9 Sand

Check the sand for undesirable materials such as stones, paper, glass, animal mess etc. If necessary, dig over to a minimum depth of 300mm and rake level. Also check sufficient sand is present in the pits. Check the availability of a watering can. Dampen the head of wooden rakes before use. Periodically, if open to the elements and animals, it may be necessary to disinfect or change the sand. If covers are provided make sure they cover the whole pit and are secured down, especially at the corners.

Copyright © SAPCA

#### 1.12.2.10 Javelin

Check for straightness, especially the tail end. Check that the grip cords are not frayed or unwinding. If possible, check length, weight and centre of gravity because the tips wear due to ground conditions and alter the specifications. After use, wipe with a damp cloth to clean off dirt and finish with a dry cloth, particularly on the grip, if it is wet.

#### 1.12.2.11 Shot

Often new implements are covered with a glossy paint – to avoid possible damage to athlete's fingers due to the implement slipping the gloss should be rubbed off the surface. After use wipe over with a cloth to remove dirt, then wipe with a dry cloth. Check for correct weight, since shots do lose weight with use –particularly if ground is full of grit or stones.

#### 1.12.2.12 Discus

Wipe with a damp cloth after use to remove dirt and then with a dry cloth. Check the side plates for a flush and tight fit, and the rim for splits and deep dents. Damaged side plates should be replaced. If there is sufficient weight in the implement, then dents in the rim may be filed or smoothed out – this however must be done in such a way as not to end up with a very flat section but must be evened out over a section of the rim. Centre plates, if fitted, may be removed and straightened if they become proud of the body. If the discus develops a 'rattling' noise it is necessary to take the implement apart and extend the spring inside.

#### 1.12.2.13 Hammer

Wipe with a damp cloth to remove mud (it may be necessary to use a brush to clean around the swivel) and then dry with a dry cloth. Check that the swivel is moving freely, oil it, and if stiff, use WD 40. If swivel can be depressed into the head and no resistance is felt, then swivel is damaged and should be replaced. If springy resistance can be felt, then it is good. Check the wires are not damaged and badly bent. Check the handles for cracks (replace if damaged). Check overall weight of implements: the handles come in different weights so they may need changing to meet specification.

#### 1.12.2.14 Discus/Hammer Cages

Grease hinges, oil pulleys and check hauling ropes for fraying. Check nets for holes and if it does not affect the overall strength then tie together. Ensure that there is sufficient netting steel or fibre at the bottom to fold over and seal the cage, particularly in a wind. Check movement, bolt holes and ease of movement of gates and lubricate any moving parts. Check warning notices and boundary ropes with regard to Health and Safety of throwing area.

#### 1.12.2.15 Scoreboards

Oil wheels if any, dry the shuttered number boards, and check they are working correctly. If they get water inside, they stick. Check any welding joins for cracks.

Copyright © SAPCA

#### 1.12.2.16 Trolleys

Oil wheels and swivels. Check any welding joins for cracks.

#### 1.12.2.17 Scales

For electronic scales keep battery charged. For balance scales check that there is a complete set of weights (especially small ones which should be kept in a box). Recalibrate annually or as necessary.

#### 1.12.2.18 Measuring Tapes

Oil the spindle of the winding handle and check that the tape is not twisted. Check the zero end for wear. Periodically unwind completely and wipe clean with a damp cloth before drying.

#### 1.12.2.19 Clocks

Check for working – replace battery annually. It might be necessary from time to time to re attach 'hand' to spindle.

#### 1.12.2.20 Wind Gauges

Oil screws on the tripods (if made from steel) and check thread in under-body of gauge. Check that gauge works and that the annual calibration is still valid. Replace battery as necessary. If blades are touching the body, then need to be replaced by the manufacturer.

#### 1.12.2.21 Referee's Kit

Check that all parts are present. Lightly oil the steel tape and micrometer gauge.

Sensible spares to stock:

- Hurdle top bars, clips and buttons
- Pole vault bar supports, runway castings, bar support castings (if appropriate)
- Long Jump plasticine and no-jump indicator boards
- Hammer wires of different lengths, handles of different lengths and weights to suit different heads
- Cages – cable ties to repair nets
- Cross Bars for High Jump and Pole Vault

Copyright © SAPCA

### 1.12.3 Storage

#### 1.12.3.1 Microphones etc

Wrapped up and in box on shelves out of harm's way. Cables to be coiled neatly. Keep dry.

#### 1.12.3.2 Hurdles

On a trolley or stacked normal way up in sets of 10.

#### 1.12.3.3 Steeplechase Hurdles

If it is impractical to take indoors after each use, then they should be stored with feet off the grass and preferably on a small stand to avoid water damage.

#### 1.12.3.4 Pole Vault Landing Area

Keep base units out of lying water – if possible, on a base or pallets under a metal cover.

#### 1.12.3.5 Pole Vault Uprights

If possible, store upright. If not, then support at both ends and in the middle. If stored inside, then store sections on their side with wear cover neatly rolled up. Periodically release slightly the tape tension.

#### 1.12.3.6 Cross Bars

Store on hooks supported in the middle and at the ends or neatly on racks.

#### 1.12.3.7 Vaulting Poles

Although personal equipment, if provision is required, they should be kept in the original cardboard tubes or in plastic water pipes. Store horizontal and supported at each end and in the middle.

#### 1.12.3.8 High Jump Landing Area

Keep base units out of lying water – if possible, on a base or pallets under a metal cover. If stored inside, then store the sections on their side with wear cover neatly rolled up.

#### 1.12.3.9 Stands

Store upright. Alternatively store horizontally supported at ends and in the centre. It is acceptable to store on landing area under the metal cover if this is large enough.

Copyright © SAPCA

#### 1.12.3.10 Plasticine No-Jump Indicators

- Plasticine should be in a sealed bag and kept reasonably warm (20°C).
- The bases should be stored upright if possible.

#### 1.12.3.11 Rakes

Brush clean after use and store safely upright.

#### 1.12.3.12 Javelins

Keep upright – preferably in a rack with points resting on a soft surface (wood is acceptable). Do not use plain metal Terry Spring Clips as this can damage the javelin paint. Keep javelins of the same weight together. The rack should be in a warm, dry area. Keep training and competition javelins separate.

#### 1.12.3.13 Shots

Store in a warm dry place on a wooden rack if possible. Otherwise keep shot of the same weight together and clearly marked. Keep competition and training shots separate. (It is not easy to distinguish used training shots from competition shots without weighing and measuring).

#### 1.12.3.14 Discus

Store in a warm dry place on a wooden rack if possible, preferably edge on, the wood will not damage the side plates. Keep discus of the same weight together. Keep training and competition implements separate

#### 1.12.3.15 Hammers

Store in a warm dry place on a rack – hanging from handles to keep wires extended. Keep hammers of the same weight together and keep training and competition implements separate.

#### 1.12.3.16 Scoreboards

Keep upright and assembled, if possible, otherwise remove top from base and store upside down.

#### 1.12.3.17 Measuring Tapes

Store open-reel tapes on a hanging rack and cased tapes in a box with each length separate.

#### 1.12.3.18 Clocks

Store assembled, if sufficient space, otherwise store on a rack with clock faces to each other to avoid accidental damage.

Copyright © SAPCA

#### 1.12.3.19 Wind Gauges

Store in the original box.

#### 1.12.3.20 Scales

Store in their original box – on work bench.

#### 1.12.3.21 Referee's Kit

Keep in box in a secure place. Keep small weights in a small box.

Copyright © SAPCA

## Appendix 1: Construction of Concentric Circles

UNITED KINGDOM ATHLETICS

# Procedure for Construction of Hammer / Discus Concentric Circles

| Date | Rev | Prepared by |
|---|---|---|
| 12/07/09 | 1 | David Smith |

## 1.13 Introduction

This procedure has been written to provide guidance on the required standard for the construction of Concentric Hammer / Discus throwing Circles in the UK.

Historically throwing circles have been constructed of standard concrete mix which has been the same as the mix used to set the throwing rim. This has ultimately led to a wide range of differing throwing surfaces which has created problems for throwers when dry as they are too grippy and when the top surface has been worn shiny pebbles are exposed causing the circle to become slippery and lethal when wet.

Poor circle quality produces substandard performance but also increases risk of athletes falling and injuring themselves, aborted throws increasing risk to officials, and long term skeletal joint damage caused by the increased torque produced on knees, hips and lower back of the athletes.

To ensure heavy throw athletes are given the best opportunity to perform at the highest level this standard should be followed for new and replacement throwing circles.

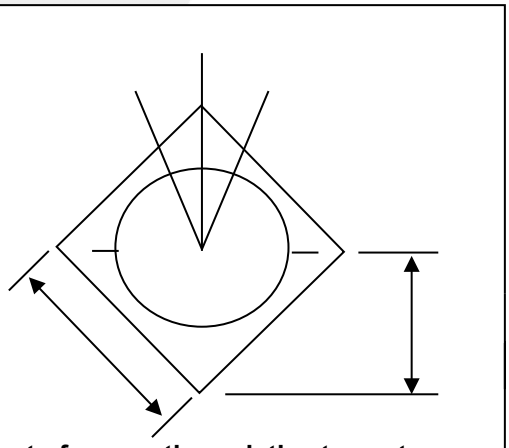
## 1.14 Circle Construction

### 1.14.1 Setting Out

The preferred method adopted by many track construction teams is to mount the circle within a square hole. This provides an easy method of aligning and shuttering the hole in preparation for pouring the concrete.

The corners of the square should be aligned through the centre line of the sector this also forms the centre line of the circle perpendicular to the centre line of the sector on which the boundary lines marking the front half of the circle can be painted.

The size of the square hole should be 2.8 m minimum across the sides this allows for 25mm shuttering boards and maintains 100mm distance between the rim of the circle and the edge of the concrete at its minimum points.



**Layout of excavation relative to sector**

Mark the four corners of the square using wooden pegs and lay the rim within the marked off area. Check the distance from the centre of the circle to where the net of the cage will hang; there should be 3.5m between the centre of the circle and the net around the back half of the circle. Check there is sufficient distance between the cage and the track if the cage is not yet installed. There should be minimum 3 m between the net of the cage and the edge of the track to allow free access around the back of the cage during competition.

Copyright © SAPCA

Run a string line into the centre of the field from the centre of the circle and ensure the sector alignment is correct if necessary, use the 20 x 20 x 12 rule (measured from the centre of the circle) to mark out a sector using wooden pegs.

It is essential to mark the centre line of the sector with wooden stakes at the back and front of the circle and again either side of the circle aligning with the other corners of the square and perpendicular to the centre line of the sector. These stakes should be located well clear of the excavation (2 to 5m) to allow alignment of the shuttering and the mounting of the circle rim once the excavation is complete. Hammer a single clout head nail in the top of the stake aligned with the sector centre line. This will be used to attach a string line for alignment of the shuttering later.

Once the alignment of the circle has been checked prepare to excavate the hole.

### 1.14.2 Excavation

#### 1.14.2.1 Excavation Safety

If digging on an established ground an underground services check may be required to establish if there are any services such as water, lighting cables, communication cables for the public address system, sewers or land drains that may run through the excavation. Drawings of the underground services are normally held with the facility or the city architect department if council owned.

Most services will be buried below the excavation depth of the circle but if pipes or cables are unearthed during the excavation it should be brought to the attention of the project or stadium management for further investigation by a competent person.

#### 1.14.2.2 Excavation Depth

The excavation depth depends on the consolidation of the ground on which the circle is to be built and the method of slab construction used.

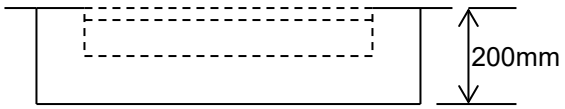
There are basically two methods of construction of the slab.

Copyright © SAPCA

### 1.14.2.3 Construction Method One - Solid Slab

A thicker slab of concrete is poured straight onto the earth base of the excavation or a base of minimal consolidated base coat. This is favoured by building contractors who utilize ready mix concrete as it is quick and easy to complete. The problem for the maintenance of the circle is that there are no drain holes in the circle and no soak away formed by the hardcore base. Water will not naturally drain from the throwing surface and increases the risk of standing water during training and competitions if raining and also increases the risk of frost damage to the surface from frozen water in the winter months.

**Method 1 – Drawing shows depth of excavation and concrete**

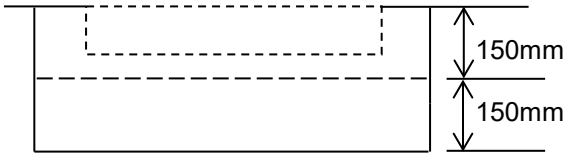



*Note. Where the base of the excavation is not consolidated, either wet and boggy or friable loamy soil, further excavation is required until a solid surface is achieved and the hole backfilled with consolidated sub base hardcore until the required concrete depth is achieved.*

### 1.14.2.4 Construction Method Two - Slab With Sub Base

A slightly deeper hole is dug until consolidated earth is reached this is then back filled with hardcore to form the foundation on which the concrete circle is laid. This allows for drainage holes to be inserted into the circle permitting surface water to drain naturally through the sub base. Drainage holes also present a problem if allowed to become blocked with grass and debris as the water will not drain from the surface.

**Method 2 – Drawing shows depth of excavation.**
½ the excavation depth will be backfilled with compacted hardcore




### 1.14.3 Drain Holes

If the surface of the circle is constructed of granolithic concrete there is little change in coefficient of friction between wet and dry surface and the finished surface is hard wearing and frost resistant.

A decision to fit drain holes is to be taken with the user and the constructor.

Drainage holes if possible are best tied into a land drain if there is one located in the close vicinity to the circle. The holes should be placed at the edge of the circle and away from the start and finish positions of the throw. The best location for the drain holes is adjacent the lines that mark the back and front of the circle. The drain holes should be formed out of none metallic material. 25mm round electrical conduit is suitable for this duty. Drain pipes should be located into the sub base before pouring the concrete. It is best if a small hole is made in the sub base and filled with

Copyright © SAPCA

pea gravel to assist with the soak away action if not tied into a land drain. This area around the drainpipe should be covered over with plastic before pouring the concrete as the concrete slurry will seep through the pea gravel mix and block the pipes.

### 1.14.4 Sub Base

Using construction method two a sub base is required to form a foundation on which to lay the concrete slab.

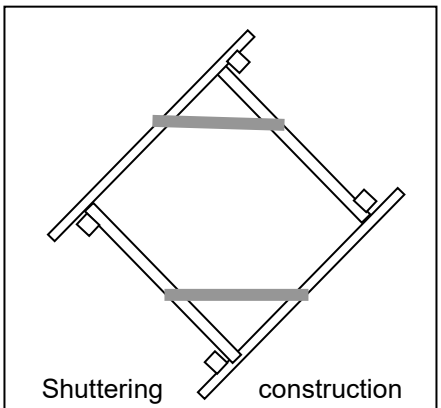
This consists of hardcore (crushed bricks, concrete or stone) compacted with a “Wacker” or vibrating plate compactor and then topped with a layer of sharp sand or ballast – called blinding – to fill any gaps and stop the cement matrix seeping into any voids in the sub base structure.

In constructing the sub base, it is important that the specified density be achieved to avoid any subsequent problems associated with consolidation and non-uniform support. Sub base should be placed in uniform layers, generally not exceeding 150mm. To achieve the minimum 150mm depth it is recommended that the hardcore should be applied in two layers and the first layer consolidated down using the Wacker before applying the second layer.

Before tipping in the first course of hardcore it is recommended that wooden stakes are driven into the ground the top of which should be at the sub base hardcore finish level. The wooden stakes should be at the sides of the excavation such that they will not interfere with the operation of the wacker plate. These stakes may be removed when the finished depth of sub base is achieved.

### 1.14.5 Shuttering

Shuttering for circle should be constructed using solid planks of wood. This provides a clean edge to tarmac or pave up to once the shuttering is removed. Two lengths of the timber should be cut to 2.7m in length and two lengths should be slightly longer around 2.8m. The 2.7m planks can then be nailed inside the longer planks leaving a slight overhang at each end of the longer planks. This allows for a stake to be driven into the ground in the corner to provide a solid fixing and a stable shuttering. Ensure the shuttering is square before mounting in the hole. This can be achieved using the 3:4:5 rule. Measure from one corner 90cm and mark the top edge of the shuttering. Measure from the same corner along the adjoining plank 120cm the distance between the two marks across the diagonal should be 150cm. Adjust the box until this is achieved. Nail a lathe across the corners to hold the box square. Leave the nail heads protruding slightly to allow easy removal once the shuttering is located in position. A further check of squareness can be achieved by measuring corner to corner across the diagonal; these two lengths should be the same distance approx 3.82m.



Shuttering construction showing corner stakes and diagonal temporary supports

Copyright © SAPCA

Locate the shuttering in the hole and check the alignment with a string line using the centre line markers that were installed prior to the excavation of the hole. Drive in the four corner stakes that will support the shuttering once satisfied that the alignment with the sector centre line is correct.

Using a spirit Level and the edge of a straight plank of wood ensure that the finish level of the circle shuttering is slightly higher than the surrounding ground and allow for fall away from the circle if the surrounding area is to be asphalt or finished with rubber track material. This will stop the water running back and pooling in the finished circle. Fall around the circle should be around 1:40 within the cage area as this will avoid standing water and reduce the risk of the net rotting from laying in pools of water when lowered. The fall may go down to a minimum of 1:80 but any lesser ratio of fall and you will run the risk of pools of water forming around the circle and water running back into the circle from the surrounding area.

Secure the shuttering to the corner stakes using screws, as nailing the shuttering may damage the alignment. Supplementary stakes may be required at the centre of each board to provide extra support.

Once the shuttering is installed and fastened to the stakes, the lathes used to ensure the shuttering shape was maintained may be removed using a claw hammer or other suitable tool.

Once the shuttering is secured in place re-check the excavation depth or depth to the finish level of the sub base, adjust depth where necessary.

### 1.14.6 Precautions When Using Cement

Contact with wet cement can damage skin and/or eyes. Always wear protective gloves before handling, and avoid contact with the eyes, or uncovered skin.

### 1.14.7 Ready Mix Concrete

When ordering ready mix concrete there are a few items to note

- The strength of the concrete
- How much water is in the mix (the Slump)
- The size of the aggregate
- Amount required

Ready mixed concrete is preferable for quantities of 1m³ or greater. By mixing each delivery in one operation, the batch-plants can guarantee the strength and slump (a measure of how 'wet' a concrete is), ensuring that all the concrete cures to the same uniform strength, and that the ratio of fines to aggregates is correct. The only drawback to ready-mix is that it may start to set before it can all be used.

Copyright © SAPCA

There are two sources of ready mixed concrete. Firstly, the national concrete companies with local depots that delivers and discharges, such as Tilcon Trumix, RMC and Pioneer. These companies will supply a given quantity of concrete of guaranteed strength and leave you to do the hard work. They will deliver any quantity you require, from 1 m³ upwards, in multiples of half cubic meters. Many will offer free, technical advice - look in Yellow Pages for local companies.

*Note. Ready-mixed concrete is sold by volume (m³) and not by weight. The concrete wagons usually carry 6m³, or sometimes 8m³, and you may be charged £20-£25 for each cubic meter not carried.*

There are also 'mix and move' contractors, who mix the quantity of concrete you require on their specially adapted wagons, and then barrow, or pump, the concrete to exactly where you require it. This concrete may not meet the quality standards required of the larger national contractors but will be ok for the circle base construction. Expect to pay more per m³ than the delivered ready-mix, but then, they are doing a lot of the hard work for you! These contractors can also be found in Yellow Pages or the Thomson Local.

### 1.14.7.1 Concrete Strength

When ordering concrete, you may be advised by the technical staff to order a prescribed mix, such as C20P or a special-purpose mix, such as PAV200 for hard standings and drives. Concrete is graded in strength using a system based on the compressive strength after 28 days of curing. This generates a value in Newtons per square millimeter (N/mm²) which results in mixes being referred to as, for example, C7.5 or C20, which means that a particular mix will achieve a minimum compressive strength of 7.5N/mm² or 20N/mm² after the 28 day curing period. Weaker, bedding concretes are Class 7.5, or

C7.5. Strength grade increases up to very strong, C40 concretes for civil engineering purposes. For throwing circle base construction, a C20 mix is usually adequate. This is roughly equivalent to a 4:2:1 mix.

It's also worth noting that the new European standards introduced on 1 December 2003 complicate the simple strength classification described above, but the "older" spec terms will continue to be understood by the trade for many years to come.

### 1.14.7.2 Concrete Slump Test

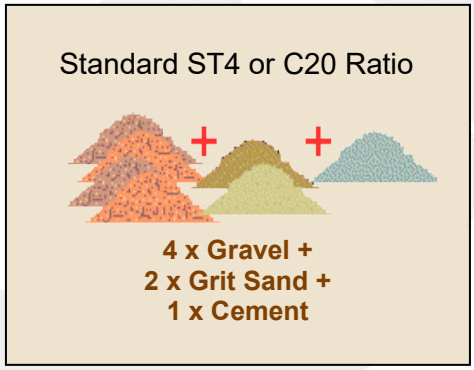
You will also need to specify how 'wet' you want the concrete to be when delivered. 'Wetness' is measured in mm of slump; that is, how far a given measure of the concrete will slump or slip in a cone test. For the base of the circle a 50mm slump should be fine. A 100mm slump will give a pourable, sloppy concrete. This will require extra time to allow the base coat to set before the throwing surface can be applied. Delivery wagons usually carry extra water on board that can be added to the mix if it is too dry or stiff. If the concrete is too wet, you're stuck with it!

*Note. The addition of too much water to a designated mix can weaken the end-strength - try to order the correct 'slump', so that the batch plant can guarantee 28-day strength.*

Copyright © SAPCA

### 1.14.8 Mixing On Site

Small quantities of concrete can be mixed on site. Generally speaking, if more than 2m³ of concrete is required, it is recommended that it is brought in as Ready Mix. If 1m³ or less is required, it will usually be mixed on site; for quantities between 1m³ and 2m³, the site conditions, access and cost will be weighed-up and a decision made on the mixing method (see table for circle construction quantities).




Although concrete can be mixed by hand, on boards or in a wheelbarrow, it is much, much easier to use a powered mixer, and a more regular, consistent mix will be achieved. Mixing more than ¼m³ by hand is hard work - 0.25m³ of fresh, unset concrete weighs in at around two-thirds of a tonne, and that two-thirds of a tonne will need to be turned over at least 5 times to ensure all the ingredients, the sand, cement, gravel and water, are thoroughly mixed. Two-thirds of a tonne lifted and turned 5 times comes in at over 3 tonnes and that's a minimum figure!

ST4 is a medium-strength mix equivalent to a C20 mix.

Sand and gravel mix are supplied by most builders' merchants in 15 - 25 Kg bags or 1 m3 sacks this mixture is known as 'ballast'. This sand gravel mix is normally sold in ratio to provide a C20 mix (4 parts gravel: 2 parts grit sand) when mixed with one part cement.

6 parts of ballast mix to 1 part cement provides a C20 strength concrete. This can be made stronger if a 5:1 ratio is used. Mix all these dry aggregates together before adding any water.

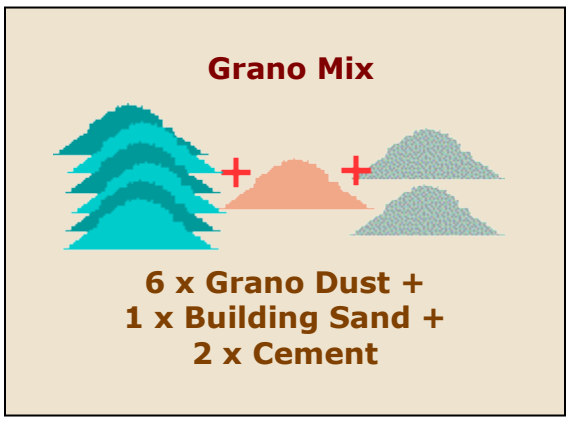
The finished mix should be wet, but firm, not sloppy. Use a bucket or similar to measure out the quantities, this is a bit more time consuming but provides a consistent mix.

### 1.14.9 Granolithic Throwing Surface

Granolithic concrete is a fine-grade concrete. It is used extensively in the construction industry, for making up small areas of concrete and for benching in sewers and manholes, where it's hard-wearing properties, its ability to be applied thinly (as thin as 6mm in certain conditions) and its low cost make it a popular and resilient surface.

This granite concrete material forms a hard-wearing surface that can be used to construct the circle throwing surface. Use of this material allows for easy repair and surface dressing should the concrete matrix become worn.

Copyright © SAPCA




Known as 'Grano' in the trade, it is composed of a fine, hard aggregate, often, but not exclusively granite. To this is added a small amount of sand, and ordinary portland cement.

Mix together 6 units of Grano with 1 unit of sand and 2 units of the cement. Mix dry, as above, before adding water, strengthening agents and dyes can be added as required. It can be mixed by hand or in a mixer.

The finished mix should be able to flow in the mixer but should not be too wet as this reduces the final strength. If the mix is too stiff it is difficult to level in the circle area.

The mixed Grano should be placed with a trowel, or spade for larger quantities, and smoothed with a steel float. The small quantity of sand increases the amount of matrix (known as 'fat') available to create a very smooth surface.

Once the circle area has been generally smoothed it should be allowed to stand until the concrete mix has stopped bleeding (water coming to the surface). Once the surface has gone off to the point where the mix does not stick to the palm of the hand when placed on the surface it is ready for finishing (see Section 3.2).

## 1.15 Circle Surface Finishing

### 1.15.1 Finishing

Many of the problems associated with the performance of concrete throwing circles are caused by poor finishing procedures. During the compacting, levelling and floating of the circle surface, a layer of cement-rich mortar is inevitably brought to the surface. This surface laitance should not be allowed to become too thick by excessive working of over-wet concrete. A slab with a thick layer of surface laitance will wear rapidly, possibly craze, and dust badly. The use of fully compacted, low-slump concrete followed by the floating and trowelling operations at the correct times will avoid the production of an excessively thick layer of laitance, and result in a durable circle surface.

It is essential in the direct finishing of throwing circles that no floating or trowelling operations be commenced while bleed water continues to rise or remains on the surface. The incorporation of bleed water into the surface layer will significantly increase the water-cement ratio of the concrete in that surface layer, resulting in a weakened surface prone to dusting.

The use of a mixture of cement and stone dust (known as driers) to absorb bleed water will also produce a very poor wearing surface, and this practice should not be permitted in the finishing of the circle surface.

Copyright © SAPCA

Once the surface has stopped bleeding and the concrete mix does not stick to the palm of the hand when placed on the surface then finishing can commence. Once the mix starts to harden it will occur very quickly and will be then difficult to finish. Keep a careful eye on the surface following initial laying.

The surface of the circle should be finished with a steel float to an almost polished marble finish, this will ensure the surface lattice is well compacted and surface air concrete ratio is reduced to a minimum, leaving a hard, durable, frost resistant surface that should provide many years of pleasure.

A practical test to check the readiness for each trowelling operation is to press the palm of the hand onto the concrete surface. If mortar sticks to the palm when the hand is taken away from the surface, the concrete is not yet ready for trowelling.

**Picture shows how the top surface is removed with acid to reveal finished throwing surface. Top section of the photo shows the small granite chips exposed following single acid wash**

*Note. The finishing of a circle should not be rushed as the final trowelling of the surface may be 0.5 to 1 hour after setting the final surface (depending on the weather conditions). Ensure allowance is built into the contract or find someone who is competent to complete the work once the circle is laid. Most contractors are on a job and finish and will trowel it off to any finish if there is a chance of getting the next job finished in the day.*

### 1.15.2 Etching the Surface

A polished marble finish is obviously not suitable for throwing off as the friction coefficient is too low.

*Note. The circle should be allowed to harden for 2 – 4 weeks before carrying out this procedure depending on drying conditions*

Using brick and mortar cleaner (hydrochloric acid based), which can be purchased from most builders' merchants the surface of the circle can be etched to give the desired traction surface for throwing.

Pour splashes (100 – 150mm in diameter) of acid across the surface of the circle and using an old rag evenly distribute the acid over the throwing surface. The circle surface will fizz and emit rotten egg smell as the acid reacts with the lime in the cement.

Leave the surface fizzing for around 20 -30 seconds or until the fizzing has stopped rinse the circle with cold water. Any remaining acid is diluted or quickly neutralizes with the cement lime.

Copyright © SAPCA

If in doubt of how much to use, have a practice in an area of the circle not used by the throwers or take advise from someone in the building trade, as they use this product on a regular basis and are familiar with the hazards and precautions.

Give the circle a good brushing and use for a couple of weeks. If the surface is too quick give it another quick acid wash until the desired surface is achieved. Once the dark gray granite chips start to show further acid washing is not normally required.

#### 1.15.2.1 Safety Precautions for Using Acid

- Ensure the manufacturer's safety guidelines are followed
- Wear protective overalls or old clothing
- Wear eye protection
- Wear rubber gloves – a pair of domestic rubber gloves sold in supermarkets are ok – rinse well or dispose of after use

Before starting this work position a bucket of water adjacent to the circle to be used in emergency to quickly remove any splashes to the skin or clothing.

## 1.16 Replacing Circle Surface

### 1.16.1 Removing Old Surface

If the circle structure is of solid construction and there is substantial support around the outside of the circle, then the centre concrete may be removed to a depth of 80mm, and the surface replaced.

The inner concrete is likely to be very hard if it has been down for a few years.

The best method of removal is to hire a hydraulic concrete breaker similar to the one shown in the photograph.

Follow the tool hire companies recommended safety precautions including protective footwear, goggles and hearing protection.

Work from the middle and nibble away at the concrete – Do not drive the breaker deep into the concrete in one go as you run the risk of cracking the slab.

### 1.16.2 Surface Construction

Once the required depth has been achieved brush out the dust and debris from the removal operation. Take your time to remove as much as you can as this will provide a solid bond for the new surface.

Copyright © SAPCA

Soak the surface of the base concrete with water and allow to soak in. Brush any remaining puddles around until there is no standing water. Coat the wetted surface with a proprietary bonding agent or diluted external PVA glue.

Mix sufficient C20 concrete mix to level the surface to 40mm below the top of the rim (See table)

Once the C20 mix has stopped bleeding, mix and apply the granolithic topcoat (see Procedure for Laying Circle). The granolithic mix can be used to complete all this work in one go but will be more expensive.

### 1.16.3 Minor Repairs

Minor repairs can be carried out to the throwing surface using Granolithic concrete.

Using a hammer and cold chisel remove the damaged area to a depth of around 25mm. This will allow good bonding and provide a longer lasting repair.

Mix an amount of granolithic concrete mix enough to effect the repair. If the damage area is not large, then remove the larger granite chips by hand from the Granodust to be used in the mix before adding the water.

Apply a coat of proprietary concrete bonding agent to the damaged surface, there should be no puddles of bonding agent left in the hole. Avoid getting bonding agent on the throwing surface as this will make the area slippery when wet.

Using a steel float apply the Grano mix to the damaged area. Leave until surface water has dispersed and then polish off the repair area with a steel float. If it is a hot day do not allow the mix to dry too quickly by covering the area with damp cardboard or cloth.

Allow a week to harden and then etch the surface of the repair with acid (see above).

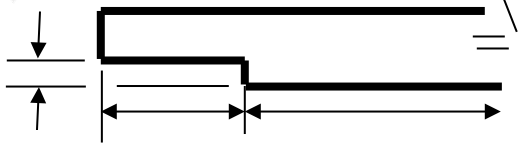
Copyright © SAPCA

## Appendix One, Equipment Required

| Item Description | No's | Use |
|---|---|---|
| Shovel | 1 | General removal of rubble |
| Spades | 2 | Excavation of the hole (as above). Excavator may be used for the removal of soil |
| Steel Float | 1 | Required for finishing the circle surface and levelling |
| Wheelbarrow | 1 | Required to hump stuff about. May require two if getting ready mix |
| Claw Hammer | 1 | Knocking nails in and removing them when you have knocked in the wrong place |
| Cross head Screwdriver | | Screw in the screws and used as a spike for marking out the sector |
| String line | 2 | One for aligning the sector and the other for aligning the perpendicular centre line across the centre of the circle |
| 30m tape | 3 | 3 tapes makes it easy for marking out the sector at 20 x 20 x 12 – you can manage with three people by pinning the two ends of two tapes at the proposed centre of the circle with the screw driver. Tapes run out to 20m. Use the third tape pulled out to 12m to form the base of the triangle. The person that uses the second shovel can order the people on the ends of the tapes about until the desired position of the sector is found |
| 5m tape | 1 | General measuring during construction work |
| Hand saw | 1 | Used to adapt the bits of wood to fit |
| Pencil | 2 | One to use and the other spare because you always lose one |
| Knife | 1 | Sharpen pencil |
| Buckets | 2 | You always need water – one old bucket to be used for measuring the aggregate |
| 3' Spirit level | 1 | To check the level of the shuttering and circle rim when installing. |
| Cement mixer | 1 | For doing the hard work |

Copyright © SAPCA

## Appendix One, Materials Required

| Item Description | No's | Use |
|---|---|---|
| 4" flat head nails | 16 | 4 nails required to knock in the top of the stakes used to mark the centre lines of sector and centre line of circle<br>8 to be used for constructing the shuttering<br>4 to be used to maintain the alignment of the shuttering |
| 2 1/2" No. 10 cross head wood screws | 20 | To secure the shuttering to the ground stakes |
| 25 x 100mm x 2.4 m timber | 2 | Shuttering internal side panels |
| 25 x 100mm x 2.6 m timber | 2 | Shuttering external side panels |
| 25 x 20mm x 1m Wooden lathes | 3 | 2 Used to maintain the shape of the shuttering + spare as it may not be right first time |
| 50 x 50 x 600mm stakes | 8 | Used to secure the shuttering timber 1 in each corner and an extra one available for each side |
| 50 x 50 x 300mm stakes | 4 | Centre line markers – to be placed 2 – 5m from the edge of the excavation |
| 50 x 150mm x 3m Wooden Baton | 1 | Allow the centre of the circle to be reached during skimming |
| House Bricks | 5 | Two to rest the wooden baton on during skimming, Two extra bricks in case the tradesman is overweight and one brick is not high enough – |
| Plastic or Plywood sufficient for a 4m x 4m area | 1 | To be laid on the ground either to protect from the dumping of the ready mix or used to protect the mixing area |
| Throwing circle discus rim | 1 | |
| 25mm plastic conduit | 1m | To be used for drain holes if desired |
| Water supply | 1 | Used for mixing the cement and making juice on a hot day and a brew of tea if there is a kettle handy |
| Wacker Plate | 1 | Consolidate the sub base |
| Tamping plank | 1 | Plank of wood 2.7m for levelling circle. Check for straightness of the plank by lining up the eye along the length of the plank. The plank should have the appearance of a squashed T by cutting a piece off each end 20mm deep and 150mm long  |

Copyright © SAPCA

## Appendix One, Concrete Volumes and Ingredient Weights

| **Method One** | **Volume** | |
|---|---|---|
| C20 Concrete | (2.7m x 2.7m x Depth 0.21m) – (Granolithic mix and rim depth)<br>= 1.53 m3 – (2.5 / 2)2 π x 0.06m<br>= 1.44m3 | 1.44m31m3 of concrete requires<br>2592 kg ballast<br>504 kg of cement |
| **Method Two** | | |
| Hardcore | | 1500Kg chalk or crushed concrete |
| C20 Concrete | (2.7m x 2.7m x Depth 0.16m) – (Granolithic mix and rim depth)<br>= 1.17 m3 – (2.5 / 2)2 π x 0.06m<br>= 1.08m3 | 1.08m3 of concrete requires<br>1944 kg of ballast<br>378 kg of cement |
| Throwing Surface | | |
| Granolithic Concrete<br>40mm thick | (2.5 / 2)2 π x 0.04m<br>= 0.2m3 | 0.2 m3 of Granolithic mix<br>286 kg of Granodust<br>48 kg of Sharp Sand<br>96 kg of cement |
| Circle Repair | | |
| Following removal of 80mm depth of concrete from within the rim of the circle a 40mm base coat of C20 concrete will be laid before laying the Granolithic surface as above | (2.5 / 2)2 π x 0.04m<br>= 0.2m3 | 0.2m3 of concrete requires<br>360 kg of ballast<br>70 kg of cement |

Copyright © SAPCA

## 1.17 Appendix A: Procedure for Laying the Circle

1. Set out the circle following details in section 2.1 of this procedure.
2. Construct the shuttering box as detailed in section 2.5 of this procedure.
3. Lay the box in the proposed circle position and align with the sting lines.
4. Mark the limits of the excavation.
5. Remove the string lines and the shuttering box.
6. Excavate the hole to the required depth.
7. Install shuttering as detailed in section 2.5 to desired finished level check the fall away from the circle to the surrounding ground.
8. Verify correct orientation with sector using string lines.
9. If ground is solid and method 2 (thinner concrete on sub-base) is used tip hardcore into excavation and consolidate down using Wacker plate. Carry out this operation in two layers for best effect.
10. Place C20 concrete (either ready mix or as per hand mix see section 2.8) in the excavation to a level such that the rim of the circle is just above the finished shuttering level 6mm max.
11. Install the rim into the centre of the square shuttering check for level using a straight piece of wood and the spirit level – check in several orientations.
12. Continue to fill the perimeter between the shuttering and the circle rim.
13. Fill the centre area of the circle to within 60mm of the top of the rim of the circle.
14. Float off the area between the shuttering and the rim of the circle. If the rim is left a few mm proud of the shuttering this forms a fall away from the circle and reduces the damage to the perimeter concrete when levelling the centre.
15. Leave the centre of the circle a short while to stop bleeding water. Roughen the surface slightly to provide a better bond with the granolithic mix.
16. Lay the granolithic mix in the centre of the circle until the level is approximately 20mm from the top of the rim. Roughly level the mix with the steel float.
17. Using the notched tamping plank steadily work the mix with and up and down action to consolidate the surface and a rotational sawing action to set the correct level fill any low spots and gently re-tamp to get consistent level. Do not over tamp as you run the risk of forcing the rim further into the base mix.
18. When an even level has been achieved smooth over the surface to provide a flat finish. Do not work hard with the trowel at this time (see section 3.1).
19. Leave the centre circle until you can touch the surface with the palm of your hand and the surface fat does not stick to your hand. Using the wooden baton to allow access to the centre of the circle trowel the surface to a shiny finish using the steel float. If water comes to the surface leave the surface longer before retrying.
20. Cover the surface from rain or direct sunlight. Leave covered for a couple of days. Leave the surface a further three weeks to harden before etching with acid (see section 3.2) in preparation for use.

Copyright © SAPCA

## Appendix 2: Provision for Disabled Athletes

Provision should be made to accommodate disabled athletes in wheelchairs by installing fixing points at the appropriate throwing circles.

Copyright © SAPCA

## 1.18 System 1: World Athletics System Primarily Used in Major International Championships

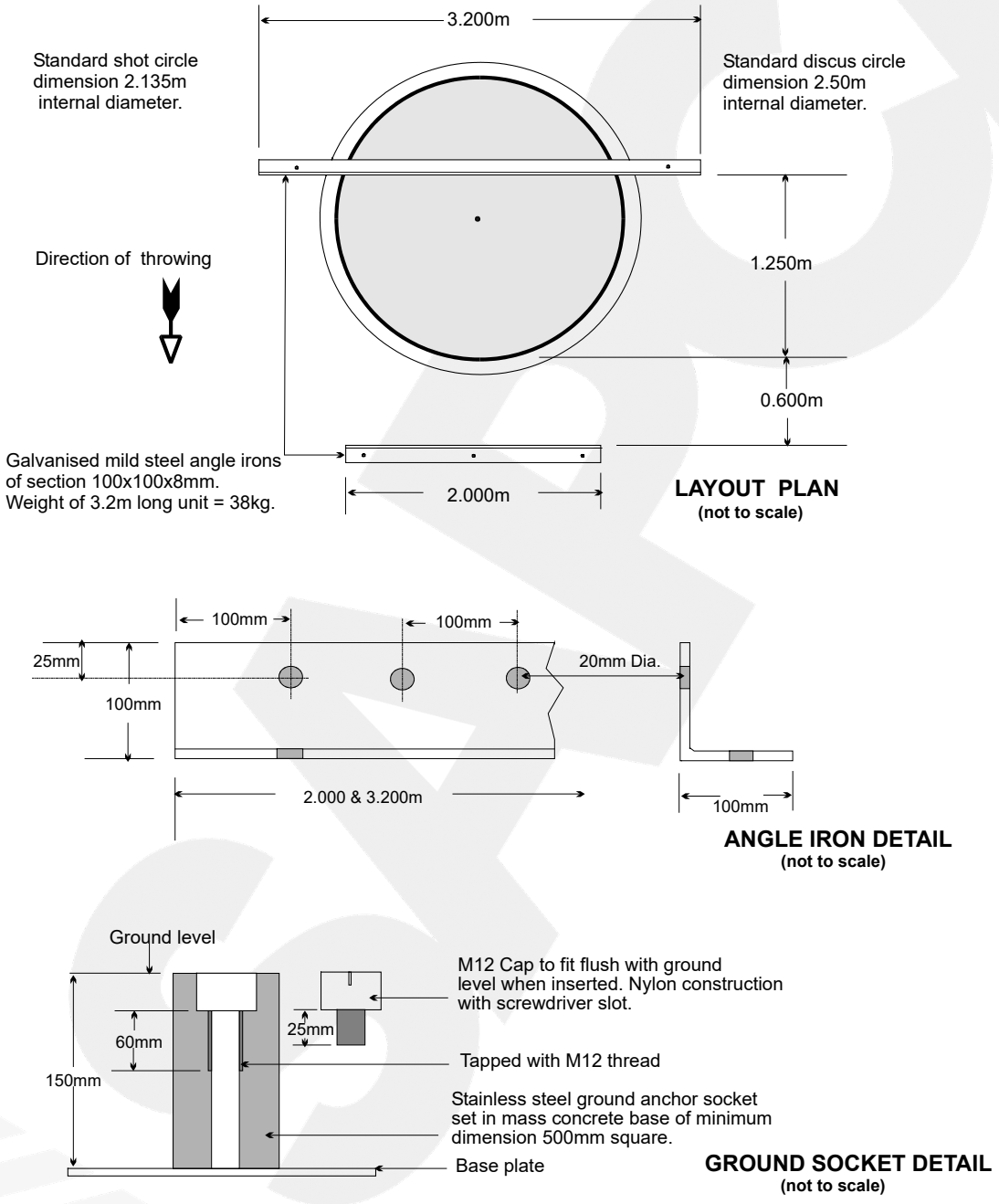



*Figure 17 Wheelchair anchorages at throwing circles for shot and discus*

## 1.19 System 2: Other Competition Levels and Training

### Ground Anchor Points

Ground anchors for throws circles consist of three parts:

- The ringbolt – made of steel
- The buried sleeve – made of steel, into which the ring bolt screws
    - The ring bolt and sleeve should be made or stainless steel to prevent rusting.
- The concrete foundation – the most important of the three

Copyright © SAPCA

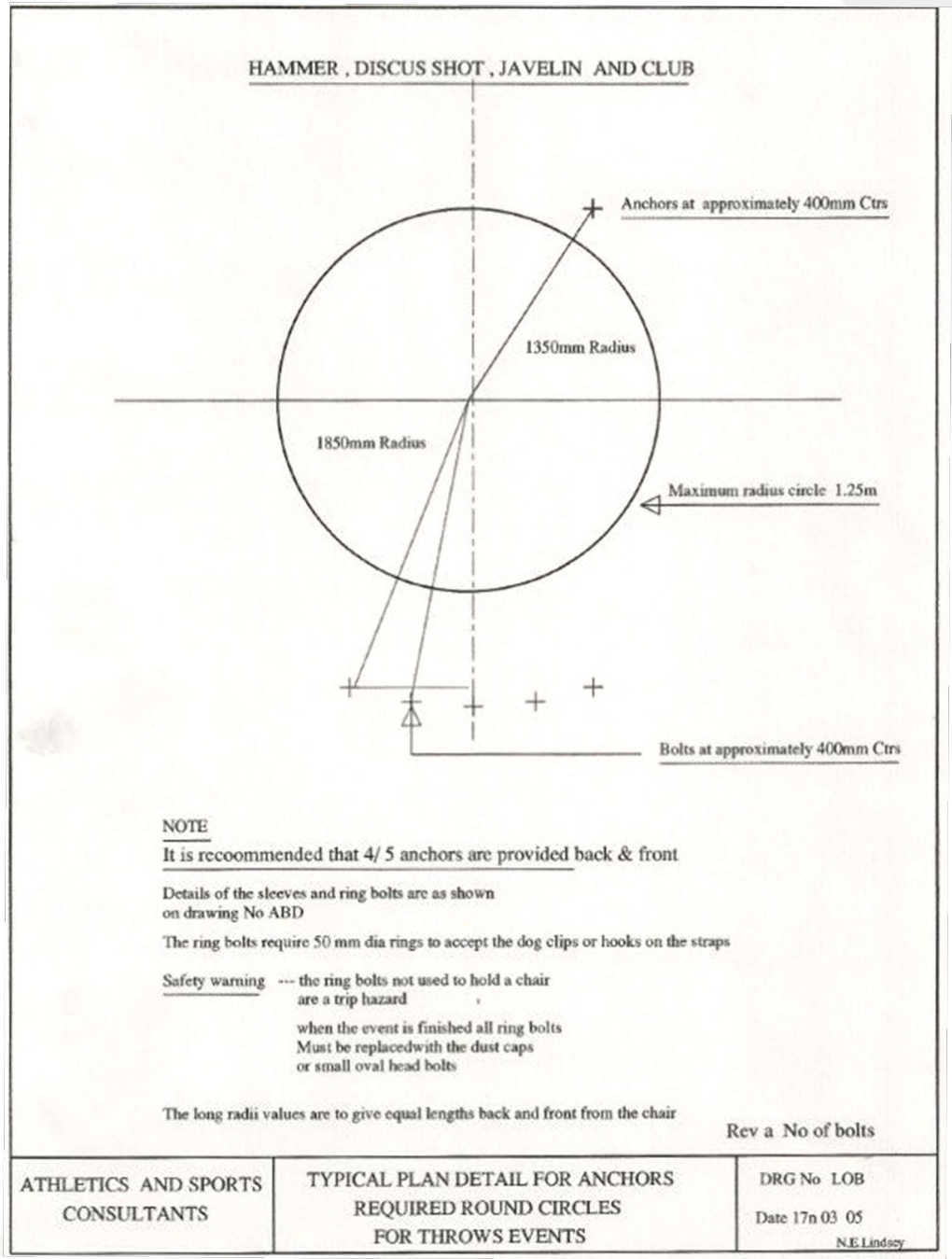



*Figure 18 details of a ringbolt and sleeve*

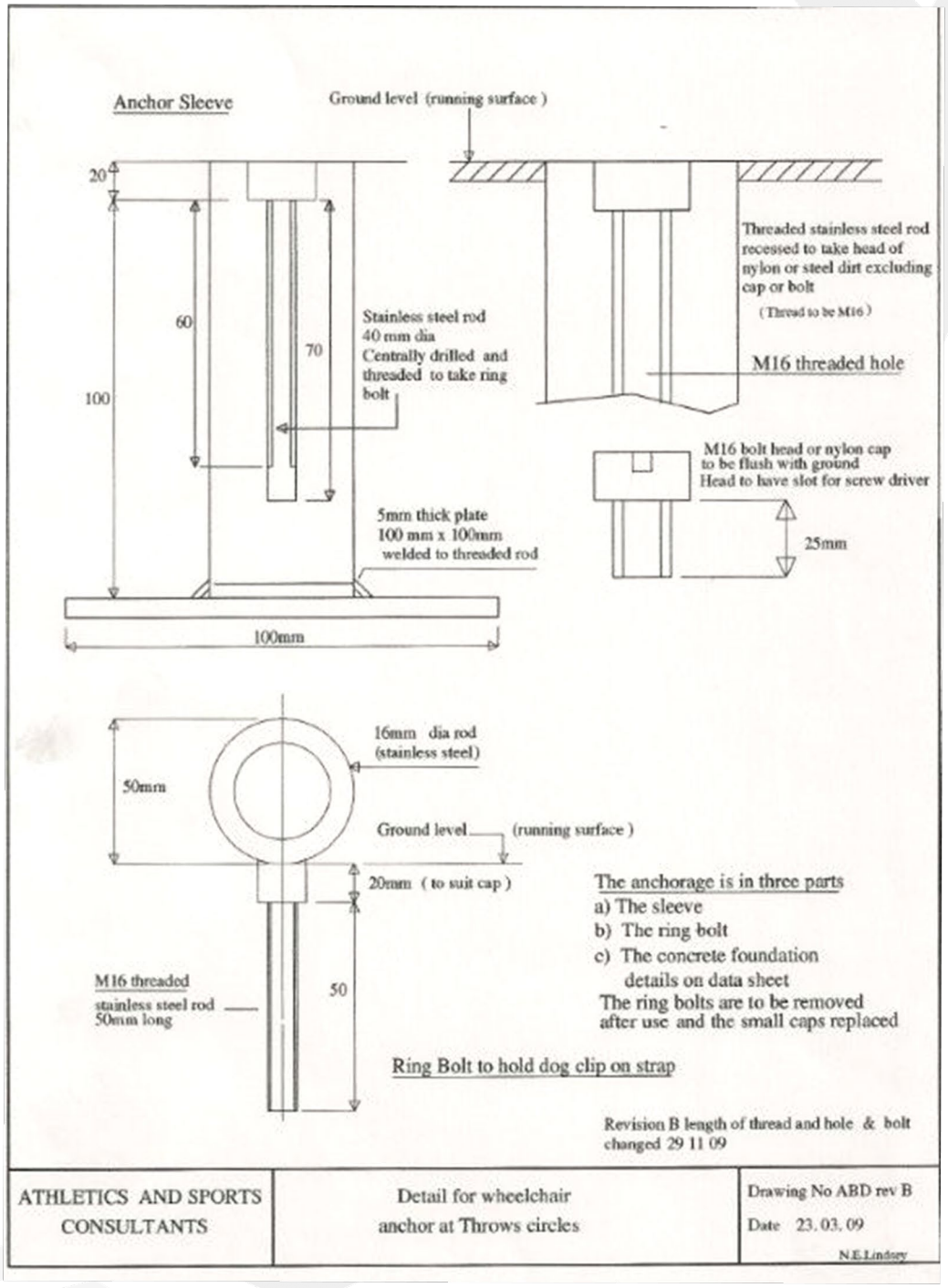



*Figure 19 details of distance positions of bolts*

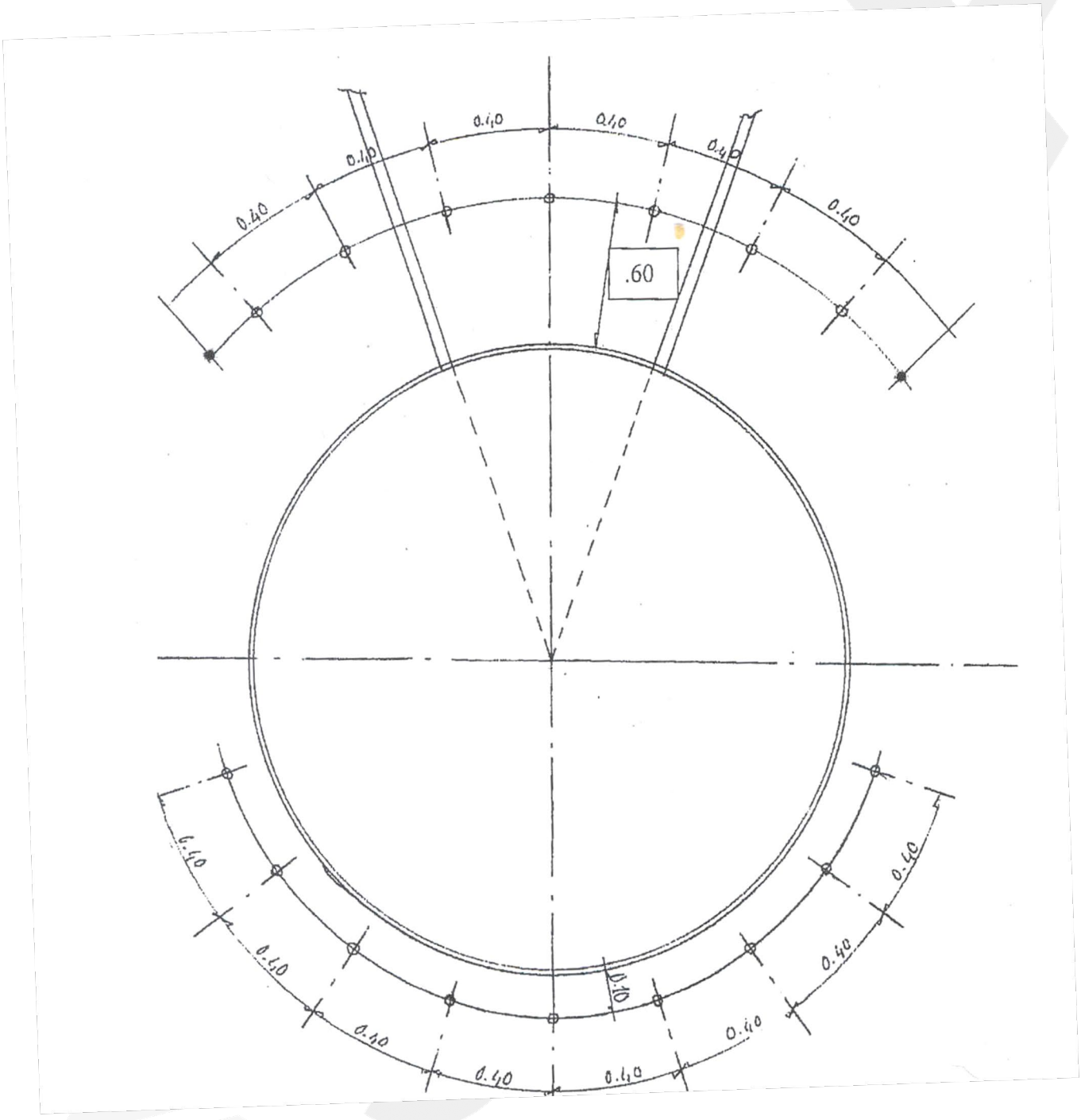



*Figure 20 Locations of anchor points*

Notes for the locations of anchor points

- There are different set ups and positioning for frames depending on the athlete's classification, the event and personal preference. Hence the increased number of anchor points on the drawing, to cover best all possibilities.
- The frame is usually placed as close as possible to the front of the circle, hence the larger distance of the holes from the front of the circle. The holes at the rear of the circle should be as close as possible to the circle, obviously without damaging the circle. The straps need to be anchored some distance from the frame, but not too far. The centring in the vector of the front middle hole is important for some athletes.
- Depending on the surface the bolt hole needs to be laid deeply, the forces exerted by some of the more powerful, experienced and less disabled throwers against straps is enormous. The depth of the thread for the eye bolt also needs to be deep enough to ensure safe anchorage. (Approx. 6 inches)
- The threaded eye bolt needs to be at least 50mm (internal diameter), to enable the large hooks used to attach.
- Caps should be provided to prevent dirt and grit from clogging the bolt holes.
- There should be an equal number of holes to the front and back of the circle to provide greater versatility.
- Ideally there should be 9 anchor points back and front to give greater versatility. The anchor points should be .40 apart (The critical factor is that they should be placed at equal distances from each other) and at the front :60from the rim of the circle and as close as is feasible at the back. Care needs to be taken that the anchor points are not too close to lead to the circle being damaged.

Copyright © SAPCA

## 1.20 Construction of Foundations

### 1.20.1 Indoors

#### 1.20.1.1 New Build

The sleeve can be cast directly into the concrete floor slab (it must be wired to the reinforcement to prevent movement when the concrete is poured)

Floors of asphalt on a rubber base must have concrete pads built into the sub base.

#### 1.20.1.2 Existing Build

Providing the concrete floor is thick enough (at least 150mm) holes may be drilled into the floor and the sleeves without plates can be grouted in using resin bonded concrete.

It is essential that the slab is thick enough so that the water membrane under will not be damaged. Checks need to be made with the original architects or local government officers.

The holes must be vertical and the screw in caps must be level with the ground surface.

### 1.20.2 Outdoors

#### 1.20.2.1 New Build

The base of the circle can be extended to accommodate the number of anchor points and their disposition. The sleeves are simply cast into the slab in a vertical position. The sleeves must be protected against grout running in to the holes. They should be at least 300mm. from the edge of the concrete.

#### 1.20.2.2 Existing Build

If the existing circle is on concrete with insufficient space for fixing points, whenever possible all available information regarding the original circle design should be checked. Trial holes can be dug to check the foundations and new foundations should be 300mm. square and 600mm. deep and the sleeves with base plates should be cast into the wet medium grade concrete.

*Note. The concrete in all foundations, individual slabs or strips, should have a low water cement ratio (0.45) and must be well compacted using a hand tamper rod or vibrator. The concrete must be allowed to harden and to develop strength protected from rain and frost for 3 days. In hot weather it should be covered with wet sacking to prevent rapid drying out.*

#### 1.20.2.3 The Layout

The number of anchor points back and front may vary. A greater number of points will add flexibility as throwing frames are not standard in shape or size. However additional points will increase costs. In general, 4-5 fixing points back and front would be the minimum requirement.

Copyright © SAPCA

## 1.21 Appendix 2: Equipment List for 8 Lane Track

The list below is comprehensive but does include some items that are not essential. Clients intending to purchase equipment should consult UKA to decide which items are appropriate and which are unnecessary. At those venues where it is intended to host competitions under World Athletics Rules, it may be necessary to provide equipment which as a World Athletics product certificate. Please talk to UKA to determine whether or not this is the case.

Where it is intended to host competitions under UKA Rules (most tracks) all equipment used must conform to the UKA Rules for Competition in force at the time of the competition.

The outdoor list below is a comprehensive requirement for an eight-lane track, however, the precise requirement for any facility will depend on the level of competition and training taking place on the track in question. In most cases the requirement is likely to be less than this total list.

8 sets competition starting blocks

8 sets training starting blocks

30 no spare starting block pins

20 no spare hurdle tops

2 no multipurpose trolleys

1 no. starting block trolley

2 sets of 8-relay batons (8 senior, 8 junior)

100 no. competition hurdles

50 no. training hurdles

8 pairs yellow/white umpires' flags

8 no. lane markers boxes nos. 1 to 8

1 no. starter's rostrum

1 no. lap scoreboard and bell

1 no. 8 lane staggered start system

2 no. judges' stands

4 no. boxes of ammunition

4 no. 30 hurdle trolleys

4 no. 4m steeplechase hurdles (adjustable height)

1 no. 5m steeplechase hurdle (adjustable height)

1 no. winners' rostrum

2 no. digital wind gauges

50 no. red/white marker cones

Copyright © SAPCA

2 no. starters' clapperboards

1 no. hurdle height gauge

2 pairs finishing posts c/w sockets

6 no gym benches

**Jumping Equipment**

5 pairs sighting boards

12 no. plasticine packs

2 no. plasticine rollers

2 sets long jump/triple jump runway markers

2 pairs lifting hooks

4 no. wooden sandpit covers

2 no. sandpit spades

5 no. rakes

5 no brooms

2 no. sandpit shovels

5 no. galvanised watering can

2 no. set competition high jump stands

1 no. set training high jump stands

5 no. competition high jump crossbars

6 no. training high jump crossbars

2 no. flexibars

1 no. high jump landing area 5.00m x 3.00m x 0.65m minimum

1 no. high jump landing area platform

1 no. high jump wheel-away cover (galvanised steel)

1 no. high jump height gauge

2 sets competition pole vault stands

1 set training pole vault stands

5 no. competition pole vault crossbars

5 no. training pole vault crossbars

2 no. flexibars

2 no. pole vault landing area 7.50m x 5.00m x 0.80m minimum

Copyright © SAPCA

1 no. pole vault landing area platform

1 no. pole vault pole rack

vaulting poles – various sizes if required

1 no. measuring device

1 no. metal landing area cover

3 no. windsocks on stands

1 pair bar lifters for pole vault

### Throwing Equipment

#### Discus

10 no. 2kg competition discs

10 no. 1.75kg competition discs

10 no. 1.50kg competition discs

5 no. 1.25kg competition discs

10 no. 1.00kg competition discs

6 no. 0.75kg competition discs

8 no. 2kg training discs

8 no. 1.75kg training discs

8 no. 1.50kg training discs

8 no. 1.25kg training discs

12 no. 1.00kg training discs

8 no. 0.75kg training discs

12 no. wheel-away discus trolley

1 no. chalk bowl

#### Javelin

12 no. competition 800g javelins

6 no. competition 700g javelins

12 no. competition 600g javelins

6 no. competition 500g javelins

6 no. competition 400g javelins

12 no. training 800g javelins

6 no. training 700g javelins

Copyright © SAPCA

12 no. training 600g javelins
6 no. training 500g javelins
6 no. training 400g javelins
1 no. wheelaway javelin stand
1 no. chalk bowl

**Shot**

10 no. 7.26kg competition shot
10 no. 6.00kg competition shot
10 no. 5.00kg competition shot
10 no. 4.00kg competition shot
5 no. 3.25kg competition shot
3 no. 3.00kg competition shot
8 no. 7.26kg training shot
6 no. 6.00kg training shot
6 no. 5.00kg training shot
8 no. 4.00kg training shot
6 no. 3.25kg training shot
3 no. 3.00kg training shot
2 no. wheelaway shot stands
9 pairs distance markers
2no. spare stop boards
1 no. chalk bowl

**Hammer**

1 no. hammer length gauge
8 no. 7.26kg competition hammers
10 no. 6.00kg competition hammers
10 no. 5.00kg competition hammers
10 no. 4.00kg competition hammers
5 no. 3.00kg competition hammers
10 no. 7.26kg training hammers
6 no. 6.00kg training hammers
6 no. 5.00kg training hammers

Copyright © SAPCA

8 no. 4.00kg training hammers
6 no. 3.00kg training hammers
1 no. wheelaway hammer stand
10 no. spare wires
5 no. spare handles
10 no. special weight hammers
10 no. chain hammers
10 no. 1kg training hammers
10 pairs red/white judges flags
5 no. wheelaway scoreboards
3 no. warning horns
100 no. pig tail stakes
3 no. 220m reels of 8mm polypropylene rope
4 no. brooms
9 pairs distance marker boxes for jav./discus/hammer
2 no. loud hailers
1 no. concentric circle inset

### Measuring Equipment

1 no. referee's kit
10 no. measuring spikes
3 no. 100m fibreglass tapes
4 no. 50m fibreglass tapes
4 no. 30m fibreglass tapes
4 no. 20m fibreglass tapes
1 no. 20m steel tape
1 no. 30m steel tape

### Miscellaneous

Field Event Scoreboards x 6
Chalk
Red white flags x 10 sets

Copyright © SAPCA

Green flags x 4

Time elapsed clock x 4

Multi markers x 1 set

Automatic timing system

### Equipment for Disabled Athletes

1 no. 2.00kg shot

1 no. 397gr club

Copyright © SAPCA

## Appendix 3: Track Markings

| | |
|---|---|
| | **General:** |
| | Lane Lines |
| | Finish Line |
| | Photo finish grid |
| | Break line |
| | Lane numerals (start and finish sprint straight) |
| | **Start lines for:** |
| | 50m (schools) * |
| | 60m (schools) * |
| | 70m (schools) * |
| | 75m |
| | 80m |
| | 100m |
| | 110m |
| | **Staggered start lines for:** |
| | 150m * |
| | 200m |
| | 300m |
| | 400m |
| | 800m |
| | Curved starts lines for: |
| | 800M |
| | 1,000m |
| | 1,500m |
| | 1 Mile (include 440y, 880y, 1320y marks on inside of kerb) |
| | 1,500m Steeplechase |
| | 2,000m Steeplechase |
| | 3,000m Steeplechase |
| | 3,000m |
| | 5,000m |
| | 10,000m |
| | **Hurdle Position marker lines for:** |
| | 60m * |
| | 70m * |
| | 75m |
| | 80m |
| | 100m |
| | 110m |
| | 400m |

Copyright © SAPCA

| | |
|---|---|
| | Steeplechase |
| | **Relay zones and acceleration marks for:** |
| | 4x100m Relay |
| | 4x400m Relay |

These markings represent the total recommendation for UKA competition, but the individual user groups should be consulted with regard to the need for the events marked *

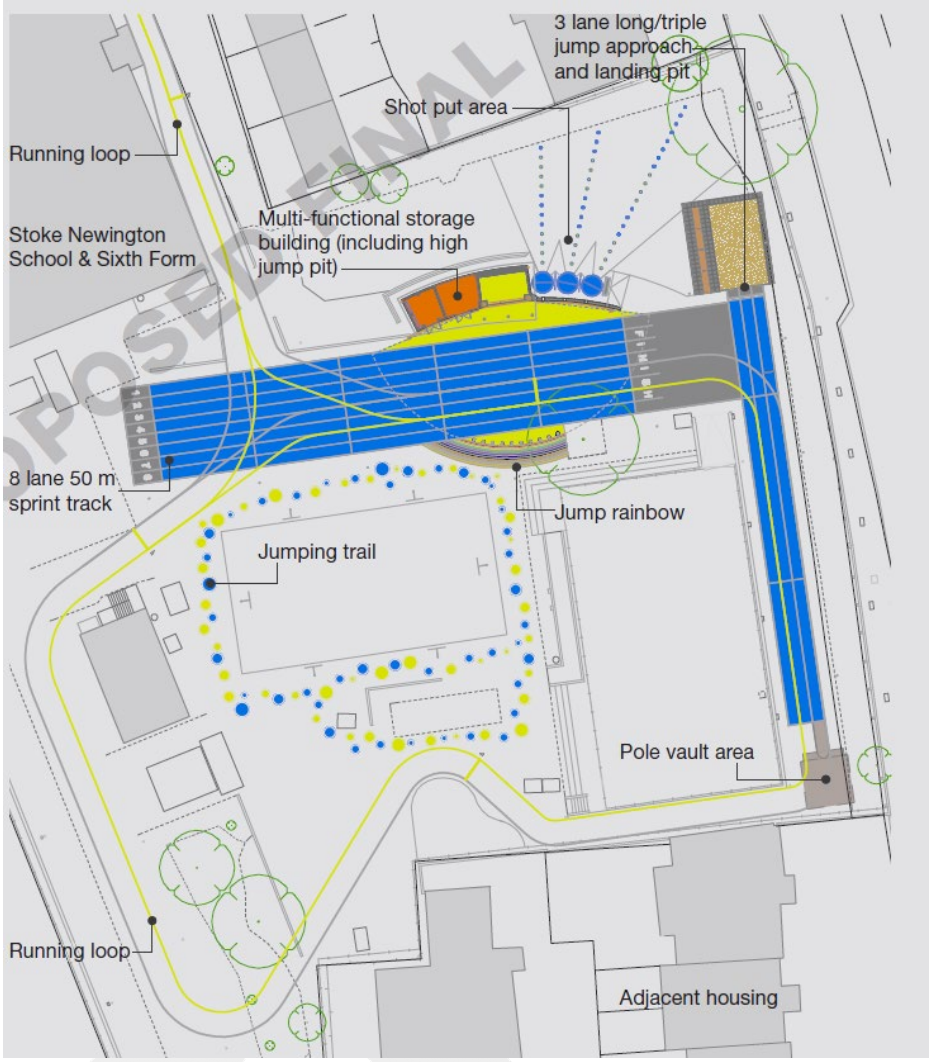
The marking for the barriers is the same for all steeplechase events but their precise location will depend on whether the water jump is located inside or outside the track.

The detail of all markings can be found in the current copy of UKA rules for competition.

Copyright © SAPCA

## Appendix 4: Non-traditional track designs

**Compact Athletics Facility**




**Running loop**

**Multi-use facility**

Copyright © SAPCA