THE CONSTRUCTION OF RUGBY AND WINCHESTER FIVES COURTS

GUIDANCE NOTES and SPECIFICATION
February 2017

1. Introduction

This document has been prepared to assist designers, constructors and re-furbishers of Rugby Fives courts.

2. Specialist advice

Building work, and in particular the design and procurement process for all related work, is a specialised process requiring expert, specialist advice.

2.1. New court development

For all new court development projects, it is strongly recommended, that a specialist team, comprising architectural, structural, quantity surveying, building services, and project management expertise, is appointed to ensure that the design, procurement, financial control and contractual processes for the project are completed correctly and satisfactorily. In such cases, the actual construction work would be undertaken by a separate building contractor.

2.2. Refurbishment

It is recommended that specialist advice is sought, to ensure that any refurbishment works are completed satisfactorily.

For small individual works such as patching the walls, repainting work, or replacing doors, roofs, lighting, etc., it is possible for this work to be carried out directly by a specialist contractor, who uses his expertise to determine the extent of the required work and how it should be undertaken, and to ensure it has been completed satisfactorily.

For major refurbishment projects in which a number of different trades are involved, it is recommended that procedures outlined in clause 2.1 are adopted.

2.3. Acceptance of work

It is recommended that, before any work is officially accepted, and prior to the release of any monies for payment for claimed completion of work, the works in question are inspected, wherever possible, by a suitably qualified representative of the client, to ensure that they have been completed properly and satisfactorily, and in accordance with any contract documentation.

3. Alternatives

The materials and method of installation and construction detailed in these notes are included for guidance purposes only.

The final design and methodology of construction, and the use of any alternative products employed on any new build or refurbishment project, must rest with the client, design team and contractor for that particular scheme.

4. Statement of Warranty

It is recommended that a statement of warranty, covering all aspects of the work, is obtained upon completion of the project..

5. Dimensions.

5.1. Standard Courts

Rugby Fives Courts

The clear internal measured dimensions of the playing area of a standard Rugby Fives court are:

Length of court	8.534 metres (28 feet)
Width of court	5.486 metres (18 feet)
Height of front wall	4.572 metres (15 feet)
Height of rear wall	1.473 metres (4 feet 10 inches)
Height of side walls	
First 3.6576 metres (12 feet) from front wall	4.5720 metres (15 feet)
then sloping down to 1.473 metres (4 feet 10 inches) at the rear wall.	

An illustration is attached in appendix 1 together with details of the raised viewing area in appendix 2 and finally, appendix 3 which relates to the rendering of the back wall when constructed using masonry to ensure that the surface is playable to the top. These dimensions have been very carefully chosen to ensure optimal viewing and communication between players and coaches/spectators. More information is available on request.

Glass backed courts may be more suitable to match the floor levels within a general sports facility — but at additional cost.

Winchester Fives Courts

The Winchester Fives court is identical to the Rugby Fives court described above with the following exception: Although the width at the front of the court is the same (18 feet), the left hand wall contains a buttress located 9 feet 10 inches from the front wall at which point the wall projects at an angle of 135 degrees for 9 and ¾ inches. The narrowed left hand wall then continues to the back of the court. This is illustrated in appendix 4.

5.2. Other related dimensions

Height of the top of the board from floor.	0.7620 metres (2 feet 6 inches)
Projection of board from front wall	0.025 metres (1 inch)
Height of board (top to bottom)	0.150 metres (6 inches) – approx.
Breadth of play-line bordering the height of the walls – may be required if there is no contrast between the playing/non playing surfaces	0.0051 metres (2 inches) – approx.
Clearance height from play line to underside of light fitting, or other similar obstruction.	
At the front of the court	0.3 metres
In the middle of the court	1 metres
At the back of the court	3 metres

6. Colouration and Visual Texture

The following colours are described using the RGB (Red, Green, Blue) system which can be viewed at many web-sites including http://html-color-codes.info/

The recommended colours for a Rugby Fives court are;

	Description	RGB System
Front and side wall	Slate Grey	979797
Rear wall (masonry)	Slate Grey	979797
Door (wood)	Slate Grey	979797
Floor	Red Oxide	9A3619
Board and play- line	Signal red	
Wall beneath board	Slate Grey	979797
Wall above play-line	Off-white	
Ceiling	Off-white	

These colours ensure a good level of contrast between the white ball, floor and wall. Achieving these exact colours can be difficult but this is not critical. The aim is to choose shades that are not too light or too dark. Darker shades would make the courts look unappealing while lighter shades would lack contrast with the ball. Light reds look good in small patches but are unpleasant and distract players and spectators when applied over large areas. Natural/Earth colours are preferred and chosen here.

The following illustrates the wall and floor colours:

It is very desirable that the floors but particularly the walls should have visual texture – a subtle variation in colour or shade over the surface. There are two reasons for this:

- It allows the surfaces to remain attractive without showing accumulated scuff marks.
- It enables the players to judge their own position and that of the ball relative to the playing surfaces.

Visual texture is difficult to achieve using paints but can be achieved with wall renders and floor toppings containing particles. It can also be achieved by staining. In the event that plain paint is used then it will take several months for the ball and scuff marks to appear to provide the required visual features.

7. Building Orientation, Roof-lights and Windows

Courts must be designed so that direct sunlight cannot enter any part of the court to avoid glare which would adversely affect play.

8. Masonry and Concrete Walls

All external and internal masonry walls used as part of a court should be constructed to ensure that they can withstand the full weight of an adult male bumping into them.

Experience with different materials has allowed them to be categorised according to their acceptability – however, the nature and thickness of the wall render could affect this:

Bricks - **Good**
Medium density (concrete) blocks (similar density to bricks; 1590 Kg/M^3) – **Good**
Cast concrete construction **- Good**
Breeze blocks – **Poor**, hollow sound when ball hits wall and may affect bounce.

9. Internal court-side rendering

The rendering to a court wall playing surface is of central importance. Court wall playing surfaces must be:

- Very true/flat
- Durable
- Hard
- Smooth
- Matt finish

Only a highly recommended contractor, employing long established craftsmen, should be entrusted with the work of rendering the playing surfaces of masonry walls. The contractor appointed to undertake the work should be fully familiar with the detailed, stringent requirements necessary for the satisfactory, and acceptable, completion of this element of the work.

Rendering systems that have been successfully employed in the past;

- Two very comprehensively keyed undercoats of 1 part cement and 3 parts well washed sharp sand, the first coat being 10mm thick and roughed up to receive a second coat 7mm thick, followed by a finishing coat of Keenes cement containing the required colouring materials, which must be well "worked", in order to obtain the required smooth finish.
- This new court rendering system provides the appropriate physical and visual properties:
    - Armourcoat - fives render grey

(Armourcoat Ltd., Morewood Close, Sevenoaks, Kent, TN13 2HU - www.armourcoat.com)

It is recommended that the contractor be required to provide a sample demonstrating the finished product. The customer should approve this sample and it should be kept intact until the rendering has been completed. The contract should state that the wall qualities will be as the agreed sample — thus the characteristics of the completed work and sample can be compared in case of quality concerns or disputes. Clearly, this sample may be a recent application of the product to another building.

A drawing of the relationship between the wall render and floor topping is shown in Appendix 6. It shows the necessity to have an expansion gap to prevent overstressing and cracking of the wall render through floor thermal expansion.

Note that cast concrete panels can be produced with smooth surfaces such that there is no necessity to render them. A suitable method is required to provide the correct wall colouring – this might involve the addition of a paint layer or stain – see section 15.

10. Glass walls and doors

Glass back-walls and doors have proved successful in previous installations, although, this would normally be a more expensive option than having a masonry back wall.

The lower 610mm (approximately) of all glass panels and doors, should have black lines screen printed (3mm wide) on the playing side of the glass. Squash courts include white lines to contrast with the black ball, Fives courts require black lines to contrast with the white ball.

An acceptable glass walling system is as follows:

Ellis Pearson Glass Back Walls from:

Prospec International Limited,
P.O. Box 48,
Canklow Meadows Estate,
West Bawtry Road,
Rotherham. S60 2XP.
Tel: 01709 377147.

11. Floors

The topping of a court floor is of central importance, requiring:

- great durability to allow a long life without maintenance
- high resilience to ensure a good bounce (coefficient of restitution)
- level, true, smooth and uniform to ensure a true bounce

- sufficiently grippy to avoid slipping but:
- sufficiently slippery to avoid ankle and leg injuries
- matt finish to avoid reflections
- free from efflorescence (salts in mortar forming chalky substance on the surface), laitance (accumulation of fine particles on the surface) and uncrazed.

Only a highly recommended firm, employing long established craftsmen, should be entrusted with the topping of the floors. The contractor appointed to undertake the work should be fully familiar with the detailed, stringent requirements necessary for the satisfactory, and acceptable, completion of this element of the work.

Floors will generally be of a concrete slab construction with the addition of a topping.

The topping should ideally be of a concrete style – meaning, hard (usually ceramic) particles supported by a binder.

The following, which do not conform to this standard, have been used in some installations:

- Epoxy on concrete – a little too grippy, but **acceptable**
- Polyurethane on concrete – too slippery and **unacceptable**
- Plastic coatings (e.g. Polyurethane as above) with non-slip ceramic particles distributed over the surface – leads to injuries/scuffs when new and soon wears down to become slippery requiring a continuous cycle of expensive maintenance – **unacceptable**

Note: Coatings, including paints, added to concrete floors without vapour barriers can allow the build up of water pressure which causes the coating to de-laminate. Undercoats are usually required to consolidate the concrete and add strength so that bubbles do not appear.

The following are recommended toppings:

- 50mm minimum thickness granolithic (fine aggregate such as granite or other **hard wearing** rock) finishing screed, laid on the concrete slab immediately after casting and coated with a bonding agent. The granolithic screed should be composed of 2 parts of red granite chippings to pass mesh 2 to mesh 5, graded to dust, red colouring, and hardening agent. The chippings must not under any circumstances be simply a topping to an ordinary screed, but must penetrate the full depth. The non-slip characteristics of the floor can be given by adding a liberal proportion of carborundum dust to the mix when trowelling. For convenience of working, the court may be divided into four or six bays, but great care must be taken to secure a constant level surface of +2/- 2mm tolerance, over the whole playing area. Expansion joints should be provided at all wall-floor junctures. On no account should any post-set joint grinding or other corrective measures be tolerated.
- RESDEV Pumadur MD. Red.
    - Note: this has an SRV (Slip Resistance Value) of 60/65 (Dry, Refer to BS7932)
- A power floated fibre reinforced concrete screed can provide a good surface but needs to be stained – see section 15.

12. Doors

It is important that the doors should be of rigid construction and have minimal steps and gaps to

avoid untrue bounces. They are also required to have a long life; with this is mind the following applies:

- The construction of the doors and supports must be substantial and strong to prevent damage when hit by the ball or whilst bearing the weight of an adult bumping into them.
- They should be hinged so that they open inwards
- They should be located in the centre of the back wall
- They must provide a true bounce across their entire playing surface and so avoid the dead bounce that is sometimes provided by hollow doors. Note: Through testing and experience is has been determined that a solid 30 minute (44mm thick) fire-door is acceptable.
- The door jambs must be securely fixed such that the front surface is parallel to the existing wall and the top of the door and door jamb are the same height as the wall.
- The hinges must be of a concealed type so that they do not provide bumps projecting into the courts such as the following: manufacturer – Häfele, type 'Soss' hinges, nickel-plated steel links (e.g. 1999 catalogue number 341.07.772 for 41 to 45mm thick doors).
- Bearing in mind the requirement for long life, rugged construction and the possibility of a child swinging on the door, three hinges are recommended for each door.
- The doors are to be mounted to minimise the steps and gaps.
- There may be a gap under the door to allow for the door to settle on its hinges whilst avoiding contact with the floor. Gaps of approximately 0.25" (but no more than 0.5") are acceptable – being small enough to ensure that the ball will have a true bounce.
- The doors should have no latches but require substantial catches to inhibit the doors from opening during play. These catches may be of the steel roller/ball or spring loaded twin roller type and should be mounted towards the top of the door.
- The tops of the doors are sufficiently low that they can be opened from within the courts by pulling the top of the door. Hence, no door handle is required. However, if for architectural reasons, a door handle be required:
    - They must be be fitted with a flush ring-pull handle and latch set.

The following show a flush door handle:

- The doors will be pushed open from outside and so a kick guard is required to prevent unsightly damage.

Appendix 7 illustrates an acceptable design for the door.

13. Board

The boards should be:

- Made of wood.
    - The choice of wood must ensure that they do not dent when hit by the ball which can be achieve by a good quality soft wood

- Include chamfered or pencil rounded edges to avoid injury to players and damage to the board when hit by the ball
- Be mounted off the wall using thin washers/spacers to ensure that they make a distinctive noise when hit by the ball in order to indicate that the ball is out

14. Play Line

The play line marks the upper extent of the play area and should:

- Include a physical discontinuity so that balls hitting the edge that marks the "out of play" position bounce differently from those that hit the adjacent wall
    - A discontinuity between the rendered playing surface and the out-of-play wall can be used – for example 15mm of rendering against the plain wall. A metal edging bead can be used to help define the extent of the rendering.
    - A 50mm concave style play line can be included in the rendering to the court walls, bordering the top of the playing surface, and the area above which does not form a part of the play zone. The "groove" typically slopes inwards by 30 degrees.
    - A thin wooden or plastic batten can be connected (screwed of glued) to the wall – preferably red.
- A 50mm wide play line can be painted onto the walls in order to define the out-of-play areas but this is **not preferred** as it can be difficult to judge if a shot is "in" or "out" and because paint usually degrades and peels with age.

15. Colouration

Colouration of the playing surfaces of new rendered courts should preferably be achieved by the addition of a colouring agent into the finishing coat/layer of a particular surface. This provides a robust surface with long life.

Poor experience exists of painted walls and floors that subsequently peel or wear making the facility look dilapidated and hindering the players due to the visual disturbance.

However, where considered appropriate, the wall and door playing surfaces may be painted but the contractor must be a reputable specialist:

- Typically, the paints will be epoxy or polyurethane based and require special surface preparation and application.
- Prior to painting, all surfaces must be examined, and where necessary, repairs to the render undertaken. This is to ensure that they are smooth, and free of all irregularities.
- Previous layers of paint may need to be removed before proceeding
- The paint system must provide a matt appearance

Cast concrete walls and concrete floors may be stained using the following product or similar:

Walls: Adseal Solid Colour Stain, light grey 275, 2-coats plus suitable polyurethane, epoxy or acrylic sealer
Floors: Adseal Solid Colour Stain, Terracotta 244, two coats plus suitable polyurethane, epoxy or acrylic sealer

The surfaces must be completely cleaned to remove any dirt or grease or previous paints and then acid etched to open up the surface for staining.

Adseal Colour Stain is not a paint. The staining nano-particles penetrate the pores of the concrete and coat the surface, this cures and, after two coats, this is sealed in. It will never wear away until the concrete itself has been worn away. It will never peal.

16. Lighting

Lighting must be designed to illuminate the space, rather than the walls, so that a white Fives ball can be seen against the contrasting walls and floor.

Average lighting level: > 300 lux, measured 1 metre above the floor
The lamps are assumed to be LED and so a minimal level of degradation is assumed meaning that a maintenance factor of 1.0 is assumed.
Minimum/Average lux: > 0.7
Minimum/Maximum lux: > 0.6
Light colour: Daylight rendering

All lighting fittings must:

- Be fully protected and be able to withstand damage caused by being hit by a fives ball, or heavier balls
    - Ordinary office light fittings with light weight cages are unacceptable
- Be manufactured to ensure that balls cannot become lodged in or on them
- Resistant to corrosion.

Acceptable lighting fixtures include:

NYC Greenland, twin LED fitting, 7900 lumens, NGN7900/2/750

Lighting to a court should be independently switched.

A suitable lighting scheme is shown in Appendix 5 but this needs double checking by a Lighting Engineer.

17. Ventilation and Condensation

All roofed but outdoor courts suffer from condensation following sudden increases in ambient temperatures. This makes the walls and floors wet and the courts temporarily unplayable. The warm ambient air comes into contact with the cold surfaces, the air is locally cooled and its ability to hold water is reduced which drives the relative humidity towards 100%. When 100% humidity is reached the excess moisture is deposited onto the surfaces. Once the courts have reached the higher ambient temperature then the accumulation of condensation ceases and they begin to dry.

Condensation can be eliminated in these situations by enclosing the open end of the court complex and installing either dehumidifiers or background heating.

The months during which condensation is a problem on open courts extends from the beginning of October to the end of March. However, the inclusion of an enclosure with minimal ventilation greatly reduces the problem without additional measures and so protection is required from the start of November to the end of February.

Ventilation: Standard ventilation requirements recommend a number of air changes per hour but fives courts are generally not occupied continuously and the volume is very large and this leads to unnecessarily excessive ventilation. Consequently, the number of air changes should be minimised when unoccupied. This can be achieved using windows or louvres that can be opened and closed as required. The roof will never be hermetically sealed and so will inevitably provide a low level of background ventilation. Excess permanent ventilation requires excess heating or dehumidification and high energy use.

Heating Option: Courts should have permanent background heating to keep the playing surfaces above approximately 10 C. The ideal temperature for playing fives is no hotter than 16 C but a lower temperature is perfectly acceptable. Heating the courts will be the more expensive option due to higher energy use.

Dehumidification Option: A desiccant type dehumidifier is required to ensure that the relative humidity within the courts is kept below approximately 80%. Mechanical/refrigeration dehumidifiers are not suitable as their capacity to remove water from the atmosphere is greatly reduced at low temperatures making them ineffective in unheated facilities.

The following unit has been shown to be effective in keeping two courts free of condensation without any background heating:

ECOAIR DD322FW SIMPLE, 10L per day, Desiccant Dehumidifier With Rotary Humidistat

It is necessary to fit the permanent drain provided to direct the water outside the courts.

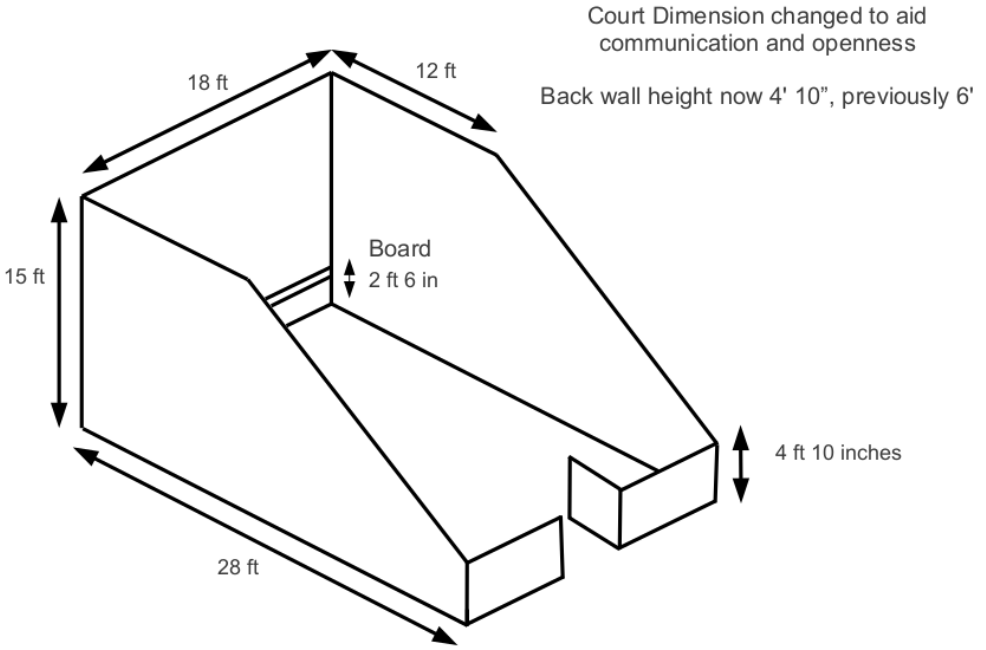
The electrical cost of running this unit on the indicated setting is approximately £80 per year and so this represents a significantly lower cost than heating.

18. Electrical power

Power socket outlets should be provided local to a court, in order to facilitate cleaning and dehumidification etc.

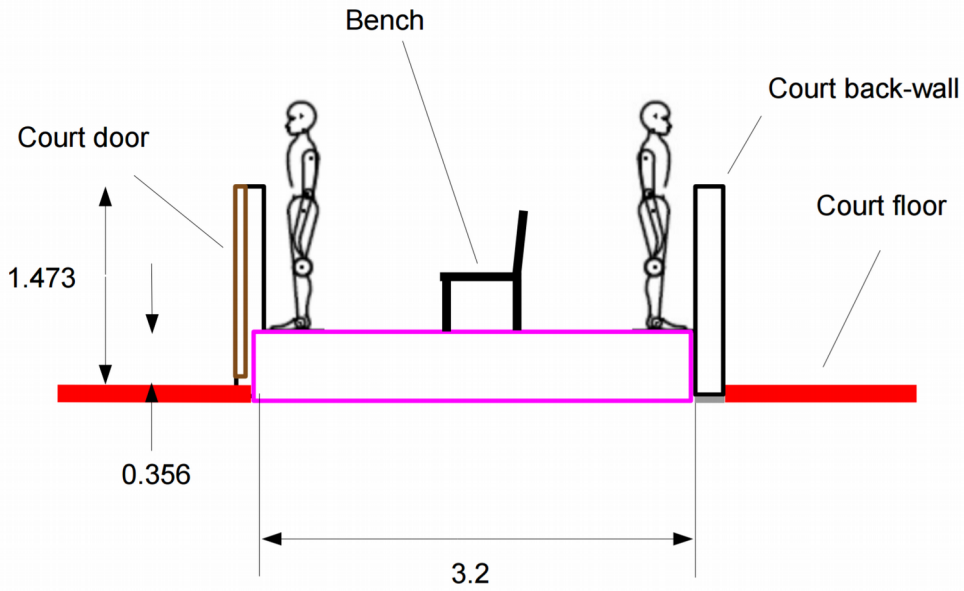
Appendix 1

Specified Dimensions for Rugby Fives Courts



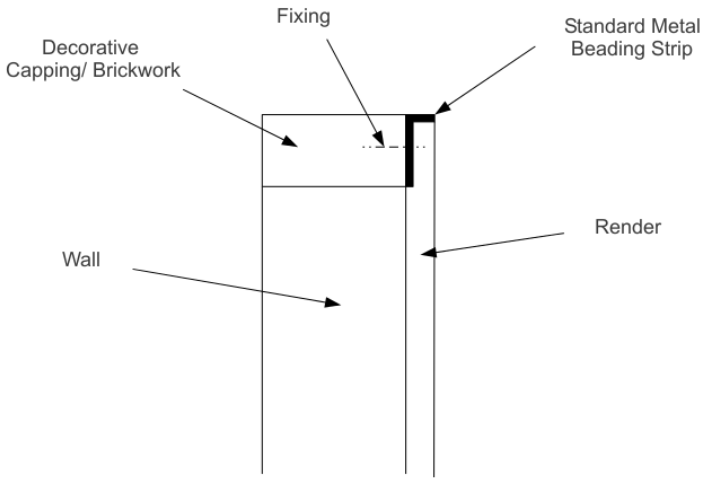
Appendix 2

Cross-Section showing viewing platform and bench



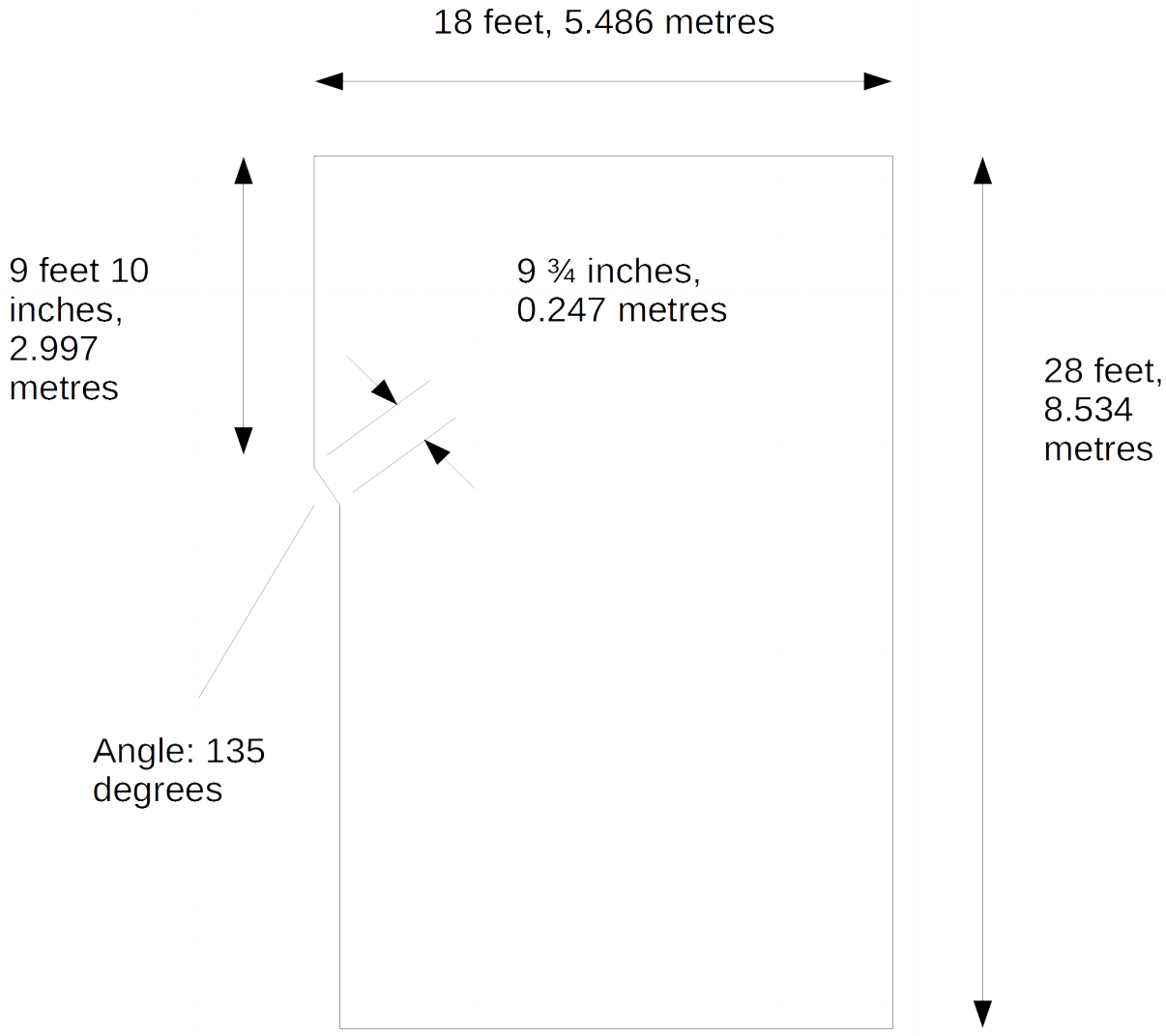
Appendix 3
Applies to masonry walls

Suggested Detail for Top of Back Wall



Appendix 4

Winchester Fives Court Dimensions

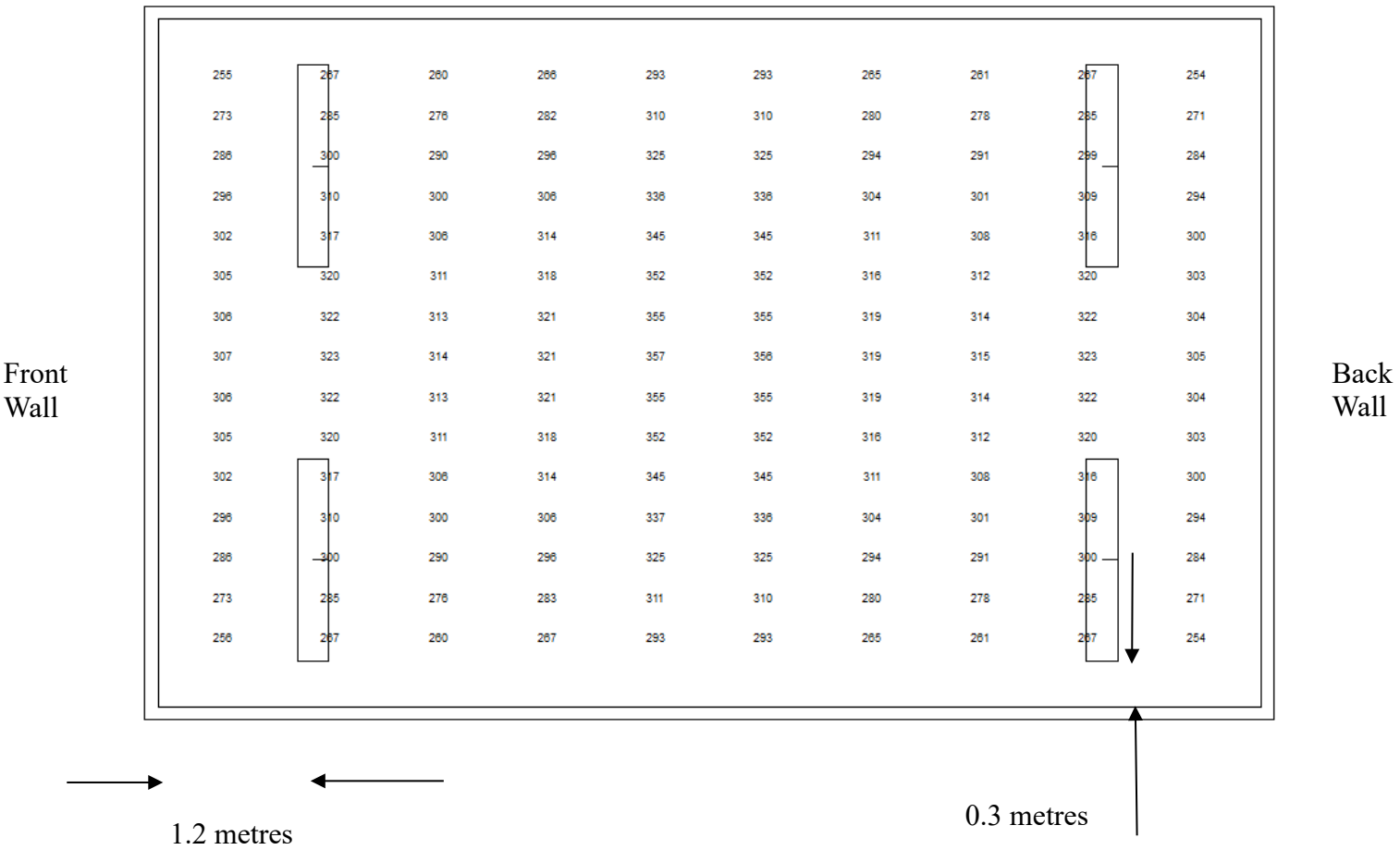


Lighting Scheme

Appendix 5

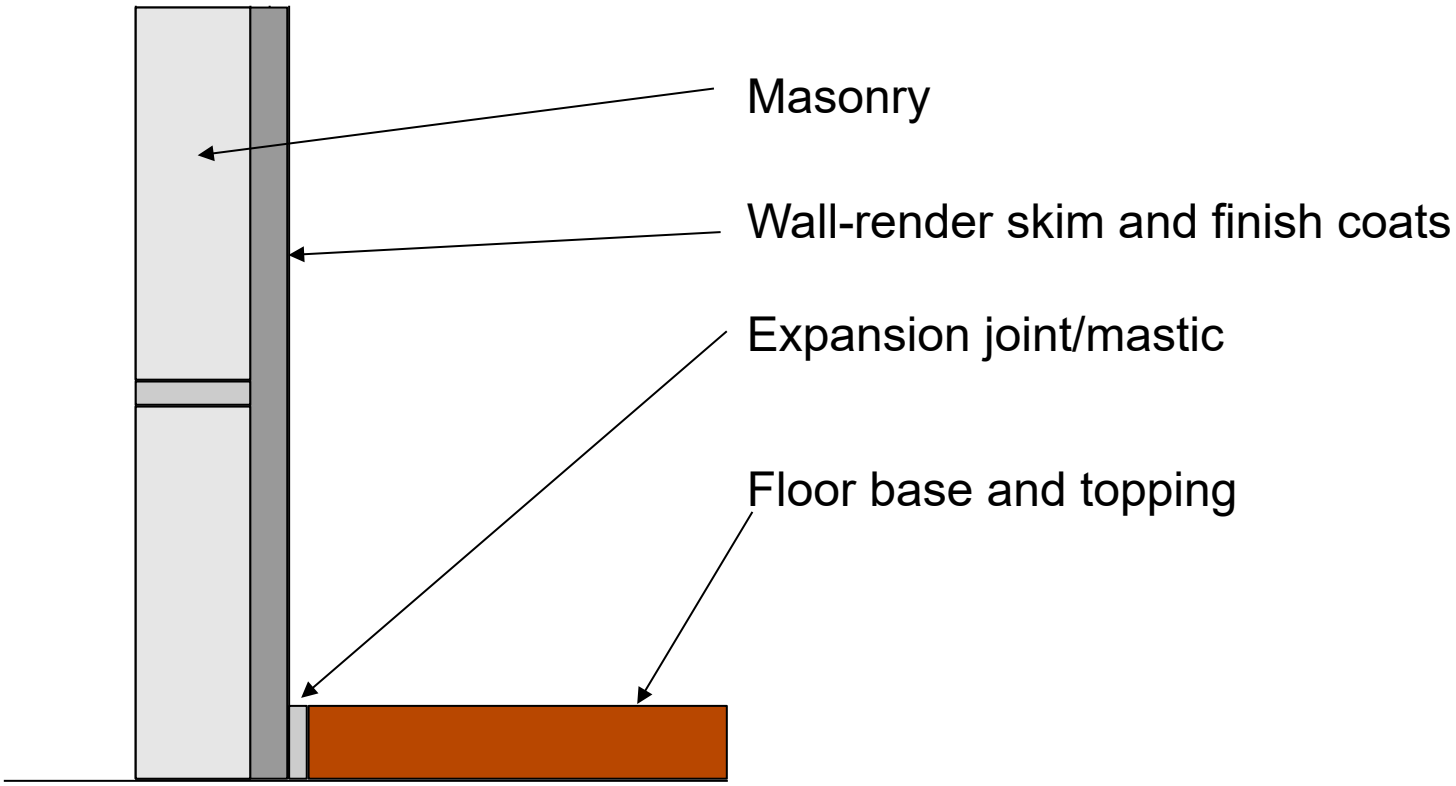
- **4 fittings**
- Lights fitted hung to 4.7 metres above floor
- NVC Greenland, twin LED fitting, 7900 lumens, NGN7900/LED/2/750 (or similar)
- these fittings are LED powered and enclosed so will not significantly dim with age through accumulation of dirt or degradation
- fittings fully protected from chemical degradation
- they are sufficiently robust and will not be damaged by being hit with a fives ball
- fittings hung HORIZONTALLY – not connected to a sloping roof
- Average light > 300 lux, min/average = 0.8, min/max = 0.7
- One fitting per court should have the emergency lighting function
- light fittings in the viewing area should be avoided to prevent shadows within the court – light levels from the court fittings provide sufficient light levels for viewing

IMPORTANT NOTES - If the fittings:
- are placed further away from the corners or walls then the light levels in those locations will be unacceptably dim.
- are connected to a sloping roof then the fitting reflectors will point the light away from one of the walls and corners leading to unacceptably dim areas.
- are hung higher then the light level at playing level will be lower and could be unacceptable



Appendix 6

Typical Details of Wall Render and Floor



Appendix 7

Details of Doors