THE MILLENNIUM COURT DETAIL
THE WELLINGTON COURT DETAIL
CONCLUSIONS ON THE FLOOR AND WALLS
CONSTRUCTION ISSUE NOTES FOR A NEW COURT.

The Millennium Court Detail.

The Specification of the Millennium Court at the Burroughs Club Middlesex University.

Introduction.

The Millennium Court, known in Tennis as “The Burroughs” when it was opened, is now known as Middlesex University Real Tennis Club. It is still a remarkable marriage of brilliant concept and design. At its heart was my original “design philosophy” which I pursued throughout the entire building project. I was the hands-on inspiration who influenced the project through every stage of its construction. The finished court retains the best features of more traditional courts whilst, at the same time, introducing modern materials and technology. Crucial to this achievement was the appointment of the architect Ian Sharratt of Pringle Richards Sharratt. PRS grew out of Michael Hopkins and Partners.

The Design Philosophy.

The design philosophy behind the 19th. century and earlier courts was to build using the most up to date materials available at the time. The construction of the Millennium Court was based on that same approach, namely to utilize state of the art materials combined with creative thinking. Five examples of this philosophy were the introduction of a translucent wall system for managing natural light, known as Kalwall, the development of a new real tennis wall surface, a high-density floor, a revolutionary design for supporting the penthouse and glare free artificial lighting to produce very high light levels at floor level; approximately 1500 lux at floor level, later to 1000 lux.

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1.Dimensions.

Measurements and setting out of the tambour, see section 10.

Greatest internal length including penthouses	110'	
Greatest internal width including service penthouse	38' 6"	
Overall footprint required approximately	112' * 40' 6"	
Length of floor	96'	29261 mm.
Breadth of floor at dedans wall	31' 6"	9601 mm.
Breadth of wall at grille wall	30'	9127 mm.
Play line at sides	18'	5486 mm.
Play line at ends	24'	7315 mm.
Length of hypoteneuse of penthouse. Angle 27 degrees.	7' 10.5"	2400 mm
Height of penthouse from floor to upper edge (main wall)	10' 9"	3276 mm
Height of penthouse from floor to upper edge bandeau	7'2"	2183 mm.
Height of penthouse from floor to lower edge bandeau	7'	2133 mm.
Width of penthouse over galleries, grille and dedans	7'	2133 mm.
Height floor to lower edge of galleries, grille and dedans	3'8"	1118 mm.
Thickness of bandeau therefore	2"	50 mm.
Width of dedans opening	21' 6"	6552 mm.
Length of wall, dedans to main wall	4'6"	1372 mm.
Length of wall dedans to service wall	5' 6"	1676 mm.
Width of grille	3'	914 mm.
Length of service wall from dedans wall to last gallery	16'	4877 mm.
Length of service wall from grille wall to winning gallery	16'	4877 mm.
Length of last, second, hazard second and winning galleries	9'8"	2946 mm.
Length of the door and hazard door galleries	3'5"	1042 mm.
Length of first and hazard first galleries	5'5"	1651 mm.
Length of line and hazard line opening combined	7'8"	2337 mm.
Height of net at post	5'2"	1575 mm.
Net post set back from edge of service wall	1'9"	533 mm.
Height of net at main wall	5'	1524 mm.
Length leading edge of tambour to grille wall		4115 mm.
Pass line from half court line	7'2"	2184 mm.
Service line from grille wall	21'	6401 mm.
Posts diameter	1"	25.4 mm.
Thickness of penthouse walls and main wall	1'	300 mm.

2. The Floor

Objective: To establish a floor that will come close to the same density and surface tension as the walls, which will produce the same speed as the walls thus keeping the play consistent.

The starting point in addressing the whole question of the floor was the Bickley cementitious method statement from the 19th. century patent. The original Bickley patent primary objective was to produce floors and walls that would help to reduce water ingress and condensation. The Bickley formula was dependent on very slow curing. The play that resulted from this has become a marker for a good floor.

a. Specification.

The closest modern equivalent is a power floated floor using a C40/45 strength with or without reinforcement for crack control, A393 mesh plus re-enforcement fibres plus a 450mm substrate ground slab; a minimum thickness of 200mm (allows for heating pipes.) The floor was poured but we entered an emergency situation. That was because there was what is known as a flash set which meant we were unable to float the floor and bring the fines to the surface. The court has a heated floor.

Experience taught us that power floating, without extreme diligence is a dangerous business.

The remedy was to diamond cut the floor to a flat surface and to apply a material known as Methacrylite. Then to add to the finished layer a polyurethane seal to achieve the right surface. It was too fast so we cut back again, re-applied the Methacrylite and then used 150 grit nylon pads with soapy water. That did the trick. The topping is really thin, it settles as thin as clingfilm so the concrete can really perform, unlike a paint surface would do.

b. The Floor Lines and Court Markings.

Philosophy.

To reduce the amount of "foreign" material on the walls and floor in areas that might affect the play.

The chase and other lines on the floor are 38mm. in breadth. 3m Type 471 tape was used.

Blue chase lines are best on a grey or dark floor except last gallery, second gallery and the service box at the Hazard end. These are different but service related lines have a unique red colour. There is an half court line from the grille wall to the service line in blue.

The yard chase lines, the gallery chase lines and the service line on the floor run all across the court. The half yard chase lines on the floor are 2'6" long at the main wall and gallery wall. All 2'6" lines are set at equal distances between the respective long lines which run across the court, i.e. the 2'6" line between the door and 2nd gallery is set centrally between the two. On the walls 14" from the floor are figures 245mm high with the numbers 1-6. There is a monogram over the half court line at each end. There are no monograms above the net on the main wall, on the battery or main wall above the service line.

On the Service side:

The last gallery line is 1 yard from 6.
2nd. gallery line bisects the gallery.
Door line bisects the door.
1st. gallery line bisects the gallery.

On the Hazard side:

Winning gallery/Service line is 21' from grille wall.
2nd. gallery line is 1 yard from 2 which is 1 yard from 1 which is 1 yard from service line.
Door line bisects the gallery.
1st. gallery line bisects the gallery.

The lines are taped on using 3M 471 tape. The numbers and letters on the walls can also be applied using laser cut vinyl sheets to the typeface of your choice. The Middlesex court uses Swiss 721 outline typeface to reduce the area taken up by “foreign” material.

3. The Interior Walls and Partitions.

These are built from re-enforced concrete to the same thickness and specification as the Main wall. (The main wall is 300mm thick.) This ensures that all the walls will play with the same relationship to the floor.

4. The Main and outer Walls.

The Main Wall built from re-enforced concrete does not have expansion joints except at the end where the main wall meets the upper dedans wall. It is as fast as the floor but so that a boast seems to gather and not to lose pace off the wall; the angle is narrow rather than square. The outer walls are all 300mm re-enforced C40 concrete.

5. The Grille.

The back of the grille is 1ft. behind the surface edge of the Grille wall.

6. The Galleries.

The galleries are divided by metal posts with side nets. Here it was felt that although thick wood posts are most attractive, they are not as safe as metal posts of a smaller diameter. The posts are not set back excessively from the face of the galleries. Behind the ledges are the trays 2" deep by 9" wide.

7. The Dedans

The dedans opening is much the same as the galleries with acute inner end faces but with a different form of tray made from netting with a loose structure and base. This enables one to determine a force being in or out when it ricochets from the bandeau, (down, back and out).

8. The Penthouses.

The choice of angle is one of preference. Penthouses vary, although the majority fall between 25.5 and 27.5 degrees. Steeper penthouses will benefit certain kinds of serves, as will shallow penthouses. It is often considered that steeper penthouses give serves which are more difficult to return, the ball coming off more severely and therefore giving a greater advantage to the server. Shallow penthouses give serves which are easier for the receiver to return. We have opted for 27.28 degrees on the steeper side at Middlesex.

The penthouse hypotenuse is set at 1.1252 of the adjacent dimensions (27.28 degrees). The whole construction of the penthouse was very important. In order to get a completely even penthouse, we have used an inverted steel T section above the ledges, but with a square timber section mounted horizontally on the outer wall upon which the rafters rest. The rafters are then resting on shims until the correct angle is achieved all along the penthouse. We have opted for 50mm thick section consisting of 25mm ply boarding with 25mm * 200mm Maranti boards over the top. Maranti is very stable. The inverted T section requires a back post so the weight is evenly spread. The front post we have opted for is steel 25mm in keeping with the clean lined appearance of the court. In a more traditional court this can be a wooden post, but if it is round it will be less safe.

9. The Marker's Box.

The prevailing wisdom was that there shouldn't be a marker's box as such. The entry to the court should be made of netting rather than timber so that the spectators' view from the side galleries is not interrupted and the marker is not at risk from ricocheting.

10. The Tambour.

The angle and position of the tambour is one of personal choice. At Middlesex we have chosen to set the tambour to enable more balls to be retrievable at the Grille wall corner with the battery wall. It is important that the tambour does not play too square. Millennium Court dimensions: tambour face (hypotenuse) 753mm long, adjacent length 460mm (floor width 460mm shorter at the edge of tambour, compared to the width where the tambour meets main wall. The angle is 51.7 degrees.

11. The Basket and Trough under the Net.

Below the net is a gutter sufficient to enable the balls to remain in place until they are required to replenish the basket, which fits into a hole at the net post end of the gutter. I prefer to put the basket at the end so that one can "walk in the balls" along the trough. This trough can be 3 1/2" deep with sloping sides, 24" wide so as to enable a comfortable walk! The baskets hold 60-70 balls.

12. The Bandeau.

This is made of wood and runs along the bottom of the three penthouses. The Millennium court uses a hidden steel T section to keep the bandeau straight. The bandeau is 50mm (2") in height. The omission of a face to the bandeau, in favour of a straight sharp edge does mean a ball is up or in a gallery, but it takes out the bandeau from the game altogether, which I don’t agree with.

13. The Net and Netting.

The post to which the net is fixed is set back 1’9” from the side of the court. This is safer for the marker. The net is fixed to the post at a height of 5 ft 2”, it slopes down to 3 ft. in the centre, and up to 5 ft. at the main wall, to which it is fixed by a hook. An elasticated strap runs through the netting to the floor where another hook is placed. There is a recess in the Main Wall for the net to sit. Hooks can also be placed vertically up the main wall to keep the end of the net in position as well. The general netting needs to be of a strong and close weave, 45mm squares. The side gallery netting can be held in place by the use of elasticated straps positioned vertically behind the posts and at the back of the trays so as to thread through the back netting of the galleries. This then forms a sealed collection area. The netting must be strong enough to protect spectators in both the dedans and the penthouse corridor.

14. The Play Line.

The Play Line is 18ft. at sides 24 ft. at ends. The ends at 24 feet run 7 feet long i.e. drop to 18 feet in line with the dedans and grille penthouses. There should be a 9 in. strip of wood laid proud. If it is laid flush then it becomes more difficult to determine whether the ball is in play.

15. The wall finishes.

The Armourcoat Real Tennis Plaster was extremely tough and has not cracked or splintered. The Armourcoat has a resistance of 75 newtons per square mm. The edges of the galleries were rounded. But because of a 5-degree slope-away, the ledges have proved to be vulnerable to racquet strike. The Armourcoat process involved up to 5 layers. It was a monolithic application process. The amount of trowelling of the final wearing coats determined the surface tension and degree of polish the walls would take. The leading edges of the ledges and reveals to the gallery openings were set at a 10mm radius and this is not sufficient to avoid chipping. A 25mm radius would have been far better but this will produce some erratic bounces! It is very important that there is a “cushion/shock absorbing material” between the base of the gallery posts and the Armourcoat, so as to avoid hair line cracking as a result of ball impact on the posts.

The upper walls above the play line are constructed from Kalwall, a translucent panel wall system that allows light to penetrate the building on all four sides and reduces the need for artificial lighting during the daytime. It can also be used as a roofing material.

16. Lighting.

The best light is natural so a translucent wall system was used for as much of the non-playing surfaces as possible, (certainly all the vertical surfaces above the play line). Artificial lighting using LEDs produce an average of at least 950 lux at floor level at the end of the life of the bulbs. The lights are ideally located within the roof structure. There is considerable light level loss between the light position and the floor, so the calculations took the angle/distance and colour of the walls and floor into account. The light entering through the glazed units at the Millennium court is diffused by internal membranes that transmit light, up and off the roof as well as straight through. They are used for managing sunlight.

The most important factor in managing natural or artificial light is that it is evenly spread in the court. With natural light, a translucent wall system diffuses the light to achieve a very even spread. Artificial light is more difficult to manage, however, only when the lux level drops to 1/3rd is the difference more noticeable, especially in the corners.

17. CCTV/Video recording.

The Millennium court uses 5 cameras for recording matches and/or coaching sessions. The DV recorders are broadcast quality. Positions vary but at least one camera should be located at 24 feet looking into the court using a fish eye lens. The system was later replaced by the university for academic research.

18. Colour choices.

This is an important area to consider. At Middlesex we have opted to preserve the spatial qualities of the court and thus reduced the rainbow image that multi coloured courts tend to evoke. The Millennium Court has blue walls with a blue/grey floor. As much as I like the two-tone floor at Queen’s (I suggested the green winning area), set against blue or green walls it is too much colour. Against black it’s OK, but with green or blue walls the floor should not contrast too severely. Before TV gets in on what they would like, it is important to decide what the day to day priorities of the members are. What may be lovely for members may not be the preferred choice for TV. However, most TV companies can cope with most colours. Only red and white tend to be “bleeders.”

19. The Professionals Area.

The location of this area is an important consideration in the success of any club. Design detailing is one of choice, but ergonomics and knowledge of the professionals' working practices are essential.

20. Ventilation.

Middlesex uses electric opening roof lights and a vented door system under the Grille on the outer wall. This can change the air 1.5 times an hour.

21. Credits and Contractors.

Architect: Pringle Richards Sharratt. (Ian Sharratt)
Structural Engineer: Copp and Wilson.
M+E: Battle McCarthy.
Quantity Surveyors: Dobson White Boulcott
Main Contractor: James Longley & Co.

Rooflight by Vitral UK.
Kalwall translucent panel system by Stoakes Systems.
Kal-Zip aluminium roof by Hoogovens Aluminium Building Systems.
Sto external render from CCS Scotseal.
Plasterboard, plaster and ceilings by British Gypsum.
Court walls by Armourcoat.
Glazed doors/screens by Fendor Hansen.
Timber furniture by Luke Hughes & Company.
Court netting by Edwards Sports.

The Wellington Court Detail.

The difference between the two courts is significant in appearance but hopefully not in consistency and pleasure.

I came on board after planning consent was agreed so here are a few pointers as to the differences.

The height is less than at Middlesex, however, it has a thirty-degree pitched roof where the eaves come down to the upper play line, so it is still acceptable for high serves.

The court dimensions are the same give or take millimetres and the tambour angle is identical. However, the tambour plays squarer than Middlesex.

The lessons I learned from Middlesex were principally to deal with the ledges. We aimed to give Wellington a much more traditional feel, as well as eliminating the tiny dents to the walls that are caused by exposed racquet strings on the frames. They haven't affected the play but I was keen to keep a perfectly smooth surface. We started the wall construction by adopting a civil engineering approach, which involved forty-four trucks pouring all the external walls in one day, which took fifteen hours! There was a trade off in getting dense walls that are poured with the ability to round off the ledges, because modern concreting prohibits the labour-intensive approaches that we see on older courts where they could get a decent radii with labour intensive trowelling, hence we ended up with wooden ledge capping, which also offered that traditional feel that the other donors had expressed a desire for.

<u>The walls are very dense and at the time of writing the court is playing in. We applied a water-based version of PVA which has given us the right amount of follow through, consistent with the floor. In a year or so we will assess whether or not to re-apply another coat. It is rollered on and can be done in a day and playable in 24 hours.</u>

The walls at Wellington are C40 concrete, with a cement surface, again 300mm thick as per Middlesex.

The Wellington floor was a marathon as was the Middlesex floor, but for different reasons. At Middlesex the intention was for a floated floor, but there was a flash set of the concrete at one end so we ended up with an emergency situation. As it turned out, the final surface was very good and has a methacrylate finish. At Wellington, having learned from the mistakes at Middlesex, we were much more diligent. We floated the concrete but without any influence on how long it would take to see the concrete go off. What this involved was pouring the wet concrete, waiting for hours then making passes with floating machines then waiting again and repeating the process until the concrete reached a point where it would just start to look as if it would polish but not letting it get that far i.e. like a matt finish, then stopping and keeping one's fingers crossed! That end game is as close to a Bickley floor as one can achieve.

In December 2016 we decided to grind the floor down to expose the aggregate and then to polish it with different grades to produce a faster surface and to level it out everywhere, then to apply an invisible seal with a very fine molecular structure. This approach enabled us to get the speed we wanted by choosing when to stop the polishing at say grade 400 or 800. Rob Fahey came in to help with the process. It isn't without understanding that in a year's time the floor characteristic will change as it picks up scuffs, lanolin from the balls and general extra residues! We can only pray we have laid the right foundation for a great floor for hundreds of years.

At this point I want to make a very important observation for anyone wanting a perfect floor using concrete.

In order to control the outcome, it is necessary to float first, but if the finish isn't perfect, grind the floor, then polish in stages starting with the roughest say 50, 100, 150, 200, 400 and 800 if necessary. The obvious point here is that having exposed aggregate in appearance means choosing the aggregate mix carefully. If one wants a monolithic colour such as a grey floor, use grey aggregate throughout, not with brown mixed in. Under no circumstances should flint be in the mix.

If after pouring a floor there are cracks appearing, these can be filled using resin before the grinding process. This cracking, as happened at Wellington was due to the concrete being too wet, which means controlling the process very carefully.

Appropro the lines, we settled on 38mm wide lines painted with road paint, very matt and hard wearing. The overall turquoise colour is a school colour, the last gallery line, the school brown and the second gallery line and service box lines are in white.

The penthouse is two inches wider than at Middlesex and we have noticed that underarm twists off the sidewall often catch the last two inches of the penthouse which is one of its nice characteristics. It is also very conducive to high serves, holding superbly, dropping in the corner and railroads cutting back are a dream!

The density of the walls is higher because there is no additional plaster based (Middlesex) Armourcoat, the solid concrete being the final playing surface. One other very pleasing effect of playing straight onto concrete, so thick as it is, is the sound of cracking like bullets being fired!

We have also designed an Iroko penthouse, as opposed to the lighter Maranti at Middlesex, with twin wooden posts for each gallery opening, the design a throwback to a cloister pillar, together with sloping reveals and ledges. The twin posts at each gallery also have a hidden purpose. They hold up a steel inverted T section beam that runs through the base of the bandeau which serves to keep the penthouse straight for hundreds of years, the same design as at Middlesex.

The wooden areas of the court have a three-coat surface using Tung oil.

To overcome the issue of ricocheting with round posts, the design uses square posts on small plates top and bottom, but the posts have forty-five-degree edges. This will reduce odd kicks off the posts. The spacing between the front and rear posts is set at sixty millimetres so balls cannot pass in between. It also means that the net dividers only come up to the rear of the back posts, again a 60mm gap, keeping the whole ledge to bandeau very clean from a visual point of view.

The Iroko carries on down the inner reveals at each end of the openings as well as along the ledges. The reveals and ledges are given a five-degree slope backwards (reveals) and downwards (ledges) to encourage balls to enter the galleries. The other reason for applying wooden ledges was to enhance the traditional feel and to give the concreters a straight line to work to, which also meant not having to work a rounded edge to the concrete. This was more an aesthetic decision than one of expediency.

<u>The angle of the penthouse has reverted to twenty-six degrees not twenty-seven point two eight! The laser datum point was set at the winning gallery.</u>

The tambour has also turned out to be very successful, good shots to it from most positions on the service side not making hazard chases. High main wall to tambour shots don’t give an unfair advantage creeping back along the Grille wall, another good result.

A small word about a netting invention and the trays. The dedans tray follows the same design as the Queen’s Club courts, sloping tray floors. The side galleries have a ball well in the last gallery and drinks wells in the first and hazard first galleries.

The dedans net has a marker’s net box built into the back net to enable a marker to lean over and see better than half a yard. It works really well.

Conclusions on the floor and walls.

For any future court construction, I have definite views on the best way forward.

The Floor.

A concrete float, followed by grinding and polishing to achieve the required speed.

The Walls.

Build the walls out of poured concrete (C40) 5-meter sections, one at a time, side by side, then scabble the surface for preparation of an Armourcoat cementitious surface application with a newton strength of 150 per square mm.

PROBABLY THE MOST IMPORTANT CONSIDERATION IN ANY TYPE OF CONSTRUCTION IS WITH REGARD TO THE SPRINGBOARD EFFECT OF THE WALLS, WHICH LEADS TO THE WAY THE BALL COMES OFF. THERE IS A MATHEMATICAL “COEFFICIENT OF RESTITUTION” WHICH MEASURES HOW TWO THINGS BEHAVE ON IMPACT. IN ESSENCE, THE USE OF THICK DENSE CONCRETE WAS TO MINIMISE THE SPRINGBOARD EFFECT. THE ENERGY IN THE BALL DOES ALL THE WORK.

Construction Issue Notes for a New Court.

Pre-amble.

These notes are the result of lessons learned in the construction of the Middlesex University and Wellington courts. There are certain assumptions made as to the overall construction design so by no means is this a definitive document. Marks with a “D” are for desirable and an “E” as essential.

General Layout.

The traffic flow for players will be between changing rooms, lounge areas, the pro room and the court. The real tennis professionals’ working area must be in an area where the pros can interact with all visitors to the court, an essential ingredient for a successful club. “E.” Given a new court may well be in a school, there may be external members and thus two elements to the club.

At Wellington the students have no need of changing rooms within the court as they have their own facilities and that of the overall sports club.

However, sufficient thought needs to go into the proximity and quality of changing and toilet areas for the external members. “E.”

Overall court dimensions.

A major consideration prior to planning needs a focus not only on the footprint but on the overall height of the roof, in particular where the eaves meet the side-walls. Cross beams will affect this calculation. At Middlesex there is a curved roof with very small ties across the court between the eaves. The curved roof beams meet the walls at roughly 30 feet from FFL. At Wellington the roof beams meet at 25 feet but there are no cross beams. My preference is for 30 feet regardless. “D.”

Wall Construction.

Concrete.

Concreters in the UK are notoriously bad compared to the Europeans! The efforts we went to, to achieve sample walls were completely wasted as the attempt at civil engineering, which Beards went for, was a complete disaster. Pouring in one day with 44 trucks was a huge mistake. We didn’t get good results and chased our tail ever since.

All the walls are constructed using 300mm C40 concrete. This means that there are no expansion joints between the corners, none on the main wall at all! The structural engineers won’t like it because they like to work with much larger tolerances, but Middlesex and Wellington have proved my point. All that you will get if C40/45 is used, is hairlines at shuttering points. This will also translate through the Armourcoat. It isn’t a problem. Copp & Wilson were the structural engineers at Middlesex, Hydrock at Wellington.

So the way forward is the way I built Middlesex. “E.” That is shuttering in 5-meter sections all the way up where possible, then moving onto the next section. When all the concrete is poured, scabble back to Armourcoat’s requirement “E.”

The Armourcoat finish at Middlesex is gypsum (plaster) based, with a newton strength of 75 per sq mm. It hasn’t affected the play but there are two problems with it. Firstly the exposed string on the racquet frames which are about 1mm do dent the surface in a couple of areas. Secondly, because the armourcoat wraps around the ledges to a 5 degree slope away, there isn’t sufficient meat to prevent substantial chipping away, all along the gallery ledges. Iroko cappings/ledges would solve this problem and using more resin between last/winning and the corners would deal with the indentations.

My preference would be to stay with the gypsum based Armourcoat as opposed to the cementitious Armourcoat.

Colour: Wellington is perfect. So is Middlesex. Very different shades. One close to periwinkle the other to a sky blue with a grey hue. Blue is the right spectrum as the contrast with the yellow ball is best (apart from black walls which are too oppressive.)

The Floor.

Concrete is the preference and heated to boot. There must be two halves to the floor because there needs to be a trough under the net. There must be a 12-15mm expansion joint around the perimeter of each half of the court floor area. (This assumes the float is between the walls and not underneath!) I would not only use C40/45 but also re-enforcement added such as fibres as well as steels. When the float starts it needs to go to a point where it starts to polish. This isn’t an exact science, to get a perfect floor after the float. It will be hit and miss which is why a stage 2 has to be anticipated. This involves using PWM equipment to firstly grind the floor, then using polishing at 50 grade, then 100, 200, 400 and only 800 if necessary. At Wellington we ground and polished to 400 and the floor is wonderful. “E.”

A word therefore about the aggregate. If the float is successful, you will see a monolithic colour determined by the aggregate mix, where all the fines have come to the surface. But given the chances of the float being the finished product are low, you need the mix to be as even in colour as possible. It will probably mean adding colour to the mix. Under no circumstances should flint or other non-grindable material be used.

If a Bickley colour is a preferred option, meaning colour has to be introduced, different contractors will suggest different methods of applying colour. These options have to be considered in the light of having to possibly grind to level before polishing. The amount of colour penetration is the consideration.

The ultimate objective is to see a well cut ball come through off the bounce without it “holding” and then, with most of the cut left on the ball, it will cut down off the back wall. If the floor “grabs” the ball, it will take off a lot of backspin, holding at the same time and then when it hits the back wall it won’t cut down as well.

There is an assumption that the smoother the floor or more polished it is, the more the ball will come through. This is not necessarily the case. Its about the surface tension, i.e. how grippy the floor is. One can have a matt floor or a polished floor, they may play counter intuitively. At the end of the day, to speed up a floor is to wait for body fat to accumulate over a few years or to experiment by washing with “buttered” water, i.e. to put a thin layer of “fat” on the surface with repeated washing. Years ago, with a floor too fast, we did the same thing by washing it with coca cola to slow it down!

The lines can be of road paint and the whole floor can then be “sealed” using a nano tech sealer with a very fine molecular structure. This micro porous product is absorbed into the concrete to stop it dusting. We used a company called Safetech. It isn’t a semi-topographical or topographical seal and you won’t see it as a surface seal. The finish is a semi-matt/silky finish, not a glossy finish.

The sealing of the floor has to compatible with the finished floor, whether colour is applied or otherwise, contractors have to talk to each other!

Colour: Grey/brown stone aggregate. Note: If one chooses to grind and polish aggregate, choose aggregate where all the constituents are of the same colour.

The Tambour.

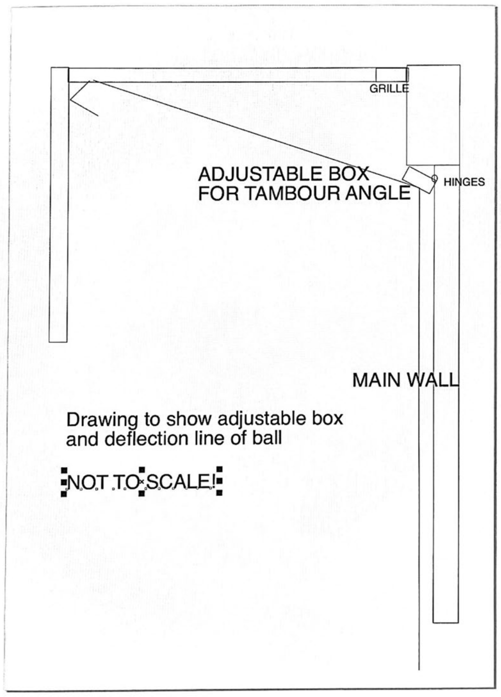
The tambour section at Wellington is 51.7 degrees but I would revert to 53 degrees. The dimensions such as adjacent, hypotenuse and opposite will also be influenced by the actual width of the floor at the Grille wall and the distance between the leading edge of the tambour back to the Grille opening. “E.”

If the breadth of the grille wall is 9127, the width of wall at dedans wall 9601, the length from the Grille opening to the leading edge of the tambour 4115, then the adjacent of the tambour is 474, the opposite side 629 and the hypotenuse 787. This achieves 53 degrees within the triangle.

PLH has devised a method by which future builders could benefit.

Construct a rectangular box frame with a “tambour face” made out of plywood with an Armourcoat surface or similar with a surface tension most closely associated with the rest of the court. The frame can be made from 4*2” and the box dimensions can be about 300mm deep * 800mm wide (the tambour face) * 2 meters high. Fixing two door hinges to the main wall and box frame allows it to be turned to various angles but making sure to keep the face vertical. It can then be moved to different angles and held in place at floor level with a couple of heavy weights to hold the frame in place. You then draw a line on the floor and build the tambour parallel to the preferred position. It is important to consider the distance of the test face from the eventual tambour face when judging the "line to the grille wall."

On the question of the deflection line, there are two issues to overcome, one to avoid making hazards from cross court good shots and the second to avoid the ball tracking back along the grille wall. My preference would be for the ball to strike the grille wall close to the corner with the battery wall, then the battery wall and off so that the player simply turns to play the ball as if returning serve without turning. (This assumes the ball has been driven down the main wall.)



The Penthouses.

The angle of the penthouses must be 26 degrees. Construction should be on rafters with 25mm ply boarding topped with tongue and grooved Iroko wood. The 26-degree datum point should be set first above the winning gallery. The penthouses are supported with an inverted steel T section, supported front and back with Iroko posts at the gallery intersections. See Wellington. “E.” As far as the finish to the Iroko is concerned, the roofs just need sanding with 250 grit and left alone. The reveals, ledges and posts can be sealed but the jury is out on whether to use tung oil or a matt seal because we need to clean off the white lanolin residues from the balls, which with an oiled surface is difficult. In terms of overall thinking, the sloping roofs are joinery, however the approach to the remaining timber areas should be that of cabinet making. “E.” It is also absolutely essential, that the construction of all areas, especially the posts, are to withstand intense pounding by the balls. Screwing and gluing has to be of the toughest imaginable - PVA isn’t strong enough.

The Net Post.

The net post at Wellington is very good, however, instead of using a hook with nuts I would use a ratchet in its place to make tightening the rope much easier. “D.”

Lighting.

The lighting should be downlighters mounted only above the footprint of the floor, not above the penthouses. Minimum lux level at floor level 1000 lux. The Wellington court utilizes LEDs over the footprint of the floor. When downlighters are positioned above the penthouses, it creates a shadow line on the floor along the penthouse sections. Uplighters would require a much larger number of units plus a soffit or flat roof section within the court to reflect the light. The much higher capital cost of uplighters can be saved and applied elsewhere in a court’s development.

Ventilation.

Wellington uses vents and electrically operated windows at high level to vent the court. Middlesex uses a large vent in the outer wall behind the Grille, coupled with roof windows that provide a draught to change the air. It is highly efficient. Any new court would be best advised to put in a door size vent panel behind the grille on an outer wall and to incorporate high level windows.