

Tract on the Construction of the Grass Tennis Lawn

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Tennis belongs to the individualistic past - a hero, or at most a pair of friends or lovers,
against the world.

~Jacques Barzun

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laudamus adoramus te Domine Deus

I. Origins

Sports historians tend to agree that much of the credit due to shaping the contemporary version of tennis is owed to Major Walter Clopton Wingfield who patented his version of the game, to be played on a lawn, in 1873.¹ In August of 1885 “The New York Times” reported on a ten year retrospective of the origins of “Lawn Tennis” citing the home of Colonel Naylor Leyland of Her Majesty’s Body Guard as the first organized match of “Sphairistiké” (hearkening back to an ancient Greek variation of the game). The initial competitors appear to have been scoffed at by serious cricketers and racket enthusiasts, according to the “Times” report (“New York Times” 1885). Garnering a thronging attraction and steady popularity, the game was further organized and sanctioned at the All England Club or Wimbledon. Three of four major tennis championships were originally played on grass, while only one remains. In 1974 the U.S. Open moved off of grass, upon which it had been played since 1920, to clay at the West Side Tennis Club in Forest Hills, Queens, New York. Grass was the surface of choice for the Australian Open from its colonial beginnings in 1905 stretching all the way to 1987 when green sward was replaced by Rebound Ace, a polyurethane/fiberglass surface layered upon asphalt or concrete.² The French Open has always been played upon a sand or clay surface. The move from Leyland’s lawn to a larger, more public venue at Wimbledon seems to exemplify an enduring trend in the game whereby the rules continue to expand and the commercialization (i.e. Rolex, Mercedes, Credit Agricole, Lacoste and many other luxury brands and finance houses) of matches played by young athletes who earn increasingly large sums has reached bawdy depths sinking to what seemed to be a nadir in the 1980s when Andre Agassi minced across court and screen claiming, “Image is everything.” The association of tennis with those of means and those who put Agassi’s words to practice may hold true to a large extent. Given that one of the game’s derivations extends back to the late middle ages courts of French monarchs³, tennis has been a fascination of many of the West’s leading families and administrations including King Henry VIII, the Theodore Roosevelt White House, of course the Kennedys established a court on their Hyannis Port property, the Astor family, the Papal court has maintained some form of tennis court since the 1500s⁴, in addition to the nouveau riche from Palm Beach to Boca Raton (merely drive along A-1A and the Intercoastal to witness the neatly placed courts that embellish the properties between the road and the yachts). Save for the recent sweeping influence of the Williams sisters on the urban youth and fan base, especially in South Central Los Angeles, the game’s appeal fails to defy its longtime home on the property of nobility, in the members-only racquet clubs, and the Bushwoods of America. “Tract on the Construction of the Grass Tennis Lawn” seeks to propose, in the most simple of fashions, a labor-intensive possibility for bringing a bit of Brahmin to properties, should the proprietors be so privileged as to be able to spare a flat plot and devote the commensurate solitude necessary for such an endeavor.

Against the world – does a better reason exist for manipulating the earth to aid drainage and for cultivating the proper fescue? The construction of a lawn tennis court,

¹ STRI (2000)

² Rebound Ace spec sheet retrieved from reboundace.com.au

³ Dumas references “paume” in *The Three Musketeers*

⁴ <http://www.real-tennis.nl/?page=VaticanCourt>. The author viewed the papal tennis court on a trip to the Vatican in August, 2006.

if done to contemporary expectations, is like building an expansive putting green. The same care and conditions are necessary to engender a surface for heroes and lovers. To avoid bad hops and too great a home court advantage, the sub surfaces required to ensure a smooth, packed surface are even more extensive than Pax Romana road construction and the project requires the precision and wherewithal of a Roman engineer coupled with the labor expectations of an Egyptian slave. If sailing is standing in a cold shower tearing up hundred dollar bills⁵, then maintaining a grass tennis court is fully supplying and outfitting a little league each baseball season and then watching them play. Be prepared to absorb high costs and extend profound patience.

II. Choosing a Location

The location of the grass tennis surface should be property that is free from troublesome neighbors, well in-hand at the initiation (as in free from large liens), and free from any sort of unsettled claims by relatives. Once the property is securely financed and safe-guarded against the aforementioned, it is time to consider whether or not a North to South positioning of a large enough parcel of the property may be devoted to excavation. Contact the Astronomical Applications Department (they contribute intelligence to large scale military assaults and slightly smaller projects) of the United States Navy in order to accurately calculate sun-azimuths at your precise location. They are freely available for civilian projects at this point in time. The true North derivation should not exceed 15 degrees according to the Maharashtra State Lawn Tennis Association. After determining accurate azimuths as they apply to the specific locale, contact the civil authorities for the requisite permits. There are some bureaucratic advantages to developing a grass tennis surface in many areas as the local permit granting authorities may either be baffled by such a request or may simply consider the project a mere landscaping or lawn enhancement, obviating the need of a special permit, especially when opting out of excavation and herringbone drainage systems. It may be wise to avoid drawing any unwanted attention to the construction zone, especially for future lawn tennis projects in a particular locale. If possible avoid property lines for the construction as these are often disputed and miscalculated. Imagine if the owner of the bordering property had some claim to your tennis court. Neighbors can also prove to be hazardous to the construction as noise complaints could potentially pose curfew limitations on night play or worse. A gentleman in England commented about the noise complaints levied by troublesome neighbors who sought to entirely prevent him from continuing to play on his established backyard tennis court.⁶ If you are anywhere near a bird sanctuary, you may consider installing a hard court surface since militant protection of the seeding process may incur significant jail time.

Ensure that the planned area has the potential to drain quickly as grass tennis surfaces are quickly mused⁷ by playing on the court while there is any amount of wetness on the grass. Choosing an area that is only partially exposed to the sun may

⁵ William F. Buckley from Miles Gone By

⁶ Davidkemptennisdkt.com

⁷ A favorite word of Cliff Arnold

be advantageous as the sward may become dry during the hot months and therefore prove more difficult to maintain the right amount of hydration. Make sure that the location can be plumbed so as to be easily accessible to a hose or piped for subsurface hydration if preferred. Although sub-surface hydration is ideal for club and championship use, investing significant resources into automatic pop-up sprinklers will undoubtedly reduce maintenance time in the long run.

I recommend, when planning the plane upon which the tennis surface will be established, clearing enough of a plane to allow for wide sweeps of an industrial, professional style golf course mower. This means that there needs to be plenty of space for the mower to make turns without the threat of collisions with large rocks, concrete walls, or other potentially damaging detritus like crushed oyster drives popular in Northern Virginia, Potomac, Maryland, and various Bahamian estates. You may also want to keep your courts away from nearby fairways. In the event that the lawn tennis surface is near a fairway, you might have trouble with golf hacks hitting errant balls onto the court and then playing the ball where it lies, thus causing damaging divots that could prove disastrous to the tennis surface. You should never be known to be living next to a golf course anyway.

Before committing to a particular location, it is absolutely necessary to conduct a thorough research of utility lines including gas, electrical, cable, water, and sewage. Excavation without regard to utility lines may pose inconveniences to neighbors, cities, and significant property damage may result from breaking water lines, setting back construction weeks or months. This may require soliciting the assistance of each individual company or authority

The Sports Turf Research Institute working in close collaboration with the All England Lawn Tennis Club, recommends a gradient spectrum of 0.83% to 1% while tourney surfaces should not exceed a maximum of 0.83% and garden or backyard swards should not go beyond 1% while the gradient should lay across the line of play and be uniform throughout. Uniformity and consistency are the cornerstones of good lawn tennis surfaces as players are easily confounded by inconsistencies, ribbing, and washboarding.⁸ Reduction of these grass mowing problems can be helped by ensuring the initial construction, grading and leveling of the playing surface is as even as possible. If the proprietor of the lawn tennis court is either unable to perform the work himself or if he is unable to be physically present during the actual leveling process, then it will be crucial to rely upon a personally selected foreman or consigliere to oversee movement of the earthworks, existing soil base, and excavation process if necessary.

III. Preparing the Land

Unless your parcel is already perfectly flat, the former owner had an established croquet court, or God prepared the land in such a fashion from the outset, you must either purchase land clearing equipment or contract someone to flatten the land. Unfortunately, once the land is flattened, excavation is necessary to construct the sub-surfaces and drainage to swales. If you are fortunate enough to consult a landscape architect, make sure that you have prepared for the meetings with proposed

⁸ STRI (2000) see glossary

lists of materials, drainage routes, and preferably aerial photographs of the land to be manipulated. The engineer will most likely serve as an expert reference on where to accumulate materials, especially if the sub-surface minerals are non-native. Beware of introducing non-native, organic materials to your property as this could have potentially disastrous outcomes if your plan is other than divinely inspired.

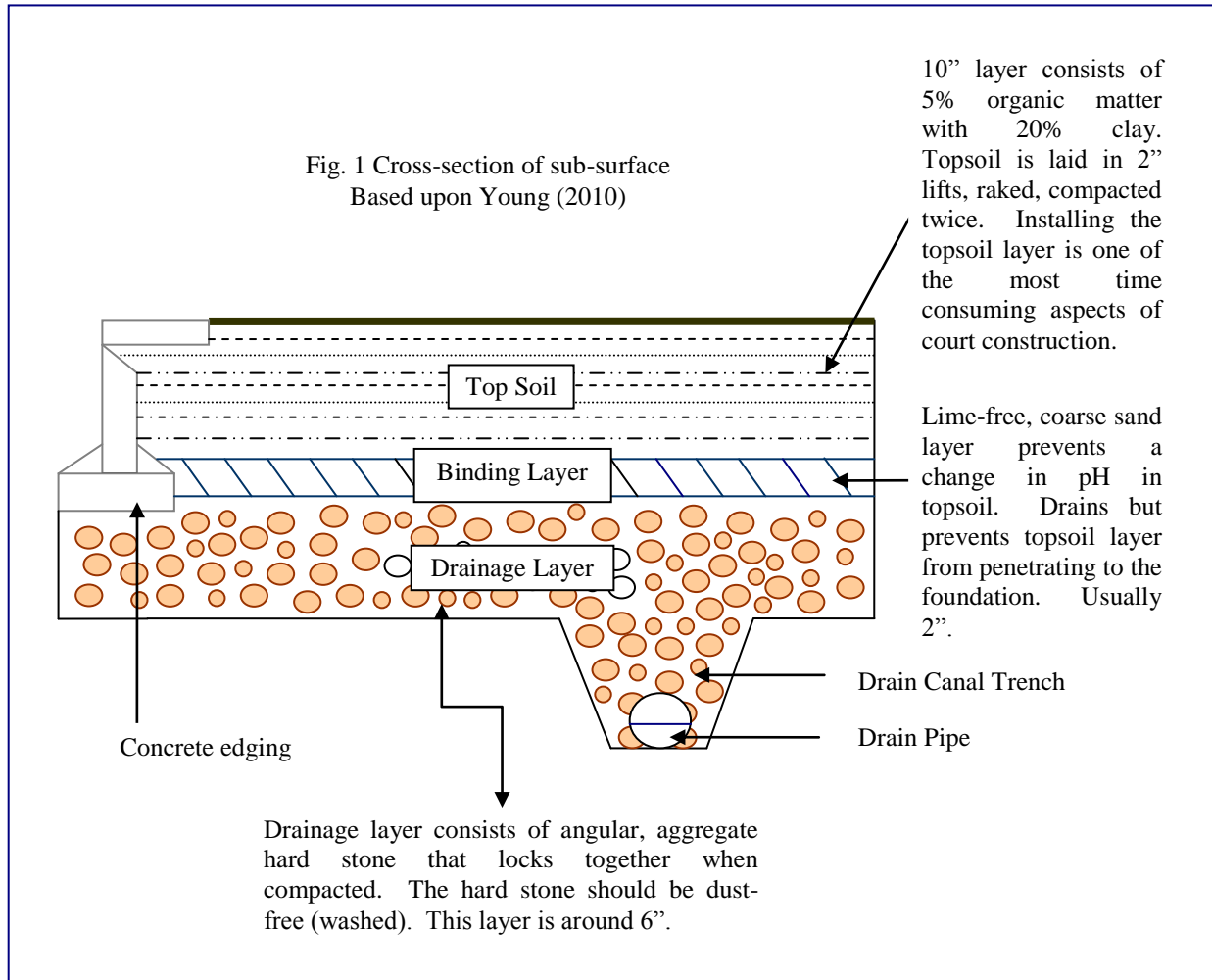
Conditions affecting the construction and timeline include weather, temperature, and precipitation. Both weigh heavily in the establishment of the construction phase as dry weather may lead to difficulties in cultivating clay laden soils whereas overly wet conditions may lead to compaction, mud, and slurry, which prolong the process and may damage the soil. High temperatures may contribute to drought and irrigation will be necessary to counter the drying up of grass seeds and laborers will not be as productive as necessary within the typical budgeted allowances. Construction during high temperatures may result in reduced grass coverage and increased weed growth.⁹

Excavation of the existing grounds requires equipment large and efficient enough to provide for about a 16" depth. The importation of topsoil may be necessary if the existing soil makeup is unsatisfactory. The existing grounds need to be tested in order to assess the need for pipe drainage in the subsurface.

Most surfaces will require the installation of a drainage system. In cases where tennis is to be played upon a shallow soil over limestone or chalk, it may be unnecessary to install a grid or herringbone pipe drainage system. Assuming that the playing surface needs to be adequately drained, perforated, flexible plastic pipe is a suitable material to place in a herringbone pattern within the rocky sub-surface. STRI recommends hard, uniform limestone between 5-10mm, washed of dust for the bottom sub-surface layer.

⁹ STRI (2000)

Fig. 1 illustrates the cross section of the sub-surface.



IV. Seeding and Turfing

Constructing and then successfully maintaining a grass playing court are subjects that have received very little attention in terms of research and thus much of what is practiced is the result of observations and experiences.

~J. Perris¹⁰

Both processes of establishing the sward require precision and finesse. The seeding process involves spreading grass seed manually. The Wimbledon groundsmen recommend spreading the seed in transverse directions to provide uniformity and to minimize missing areas of the tennis lawn, which, in the event of seed vacancies, could take months to catch up.¹¹ Turfing, or importing sod for the purposes of laying already growing grass requires an increased amount of conditions than the simpler

¹⁰ STRI (2000)

¹¹ ibid

seeding process. The Sports Turf Research Institute lists the following conditions¹²:

1. Correctly chosen cultivars (landscape and meadow turf is not suitable)
2. Turf needs to be nearly weed-free
3. The sod's native soil needs to be close to the topsoil on the tennis lawn
4. Sod needs to be cut thin with less than 15mm of soil attached
5. The turf should not be excessively fibrous
6. The sod cannot be stacked and needs to be laid soon after it is cut from the source
7. The turf bed must not become over-compacted.

Cultivation of the lawn surface should take place in drier months, between late April and late August.

V. Selection of Grasses

My view is that, generally, a good tennis court could make a good lawn but that the reverse does not hold true.

~A.J. Newell

Newell (2000) distinguishes between three types of grass tennis court, which form a spectrum for construction, drainage, maintenance, and grass requirements. The "garden" court, or one which is in the amateur's backyard, has lower minimal requirements for upkeep, while the club court has increasingly more maintenance requirements as a result of higher usage and the demands of annual-dues paying members. The championship or tournament grass tennis lawn demands the highest standards of all facets of construction and maintenance as so much rests in the balance of the consistency of play while the reputation of the venue is at stake. There are many options for grass selection, but it seems that as time and research evolve, stronger cultivars emerge as the strongest, most durable, and easy to maintain. That said, the geographical location of the tennis lawn plays a crucial role in determining the most appropriate blades.

Much of the discussion of the below mentioned grass types was funded by the All England Lawn Tennis Club.¹³

Bentgrasses (*Agrostis* spp.)

Three types of bentgrass include *A. castellana*, *A. tenuis*, and *A. stolonifera*.

Bentgrasses are among the most expensive amenity grasses. Creeping bentgrasses produce stems that spread over the surface of the soil while browntop bents produce rhizomes, as

opposed to stolons, which creep below the surface of the soil. The strengths of *Agrostis* are not necessarily relevant to tennis as bentgrasses tend to put on growth through the winter and maintain color. Bentgrasses are somewhat less tolerant of the intense use of a tennis surface.

Red Fescues (*Festuca rubra* L.)

¹² *ibid*

¹³ STRI (2000).

Three types of red fescue include Chewings, slender creeping, and strong creeping varieties. For lawn tennis, the slender creeping fescues out-perform the other two varieties due to their endurance under intensive court use. However, Chewings and strong creeping are more drought tolerant. The Chewings fescue may be more useful for garden tennis courts due to their low maintenance where the court is used less intensively. Red fescues are prone to dollar spot and red thread disease. These diseases can be countered with the increased application of fertilizer.

Perennial Ryegrass (*Lolium perenne* L.)

There are 75 variations of perennial grass today and it has a long history of being cultivated in England. Perennial ryegrass tends to be more wear tolerant than most red fescue cultivars. Perennial ryegrass grows within three days of seeding and needs to be mown within two weeks of seeding. Its high growth rate makes it high maintenance. Perennial ryegrass copes well with rolling and may be used to increase the durability of high-use areas such as the baseline. Perennial ryegrass is prone to red thread.

Smooth-Stalked Meadow Grass (*Poa pretensis* L.)

This cultivar is on par with perennial ryegrass for durability yet it is slow to grow and establish. This meadow grass may produce more thatch than other grasses, which increases its maintenance needs. Groundsmen's ongoing concerns that this species is less tolerant of heavy rolling and seem to discourage use of smooth-stalked meadow grass.

Yorkshire fog (*Holcus lanatus* L.)

A weedgrass that often invades maintained turf and will form patches. It has a tendency for dew to stick in heavy amounts and is distinctive in its fleshy color. This weedgrass is prone to rust diseases in autumn.

Cocksfoot (*Dactylis glomerata* L.)

Coarse grass which is light green in color. This is an unsightly grass and can be eradicated or kept in check through close mowing and scarification.

Newell recommends the following consistency for garden courts:

- 40% Chewings fescue
- 40% slender creeping red fescue
- 20% browntop bent
- At a rate of 35g/m²

Courts with more intensive usage:

- 65% perennial ryegrass
- 35% slender creeping red fescue

VI. Fertilizer Analysis

Soils contain large reserves of nutrients but in the context of fine turf where there is regular mowing and the clippings are removed nutrients are removed faster than they

can be replenished from soil reserves. It is principally to make up for this nutrient removal in the grass clippings that we must supply additional nutrients in the form of fertilizer.

~P.M. Canaway

Canaway, former chief executive of STRI, indicates three principal grass nutrients: Nitrogen (N), Potassium (K), and Phosphorus (P). Potassium and Phosphorus are often referred to and labeled as Potash and Phosphate respectively. Nitrogen is considered the most important plant nutrient for turf culture as it regulates growth rate, shoot density, and root growth. Nitrogen has a significant impact on the tennis sward as it effects playing quality and durability. Canaway cites the importance of striking a balance with the amount of Nitrogen used in fertilizer as an increased amount reduces ball bounce and increases slipperiness. Potassium is also removed in considerable amounts through mowing. Grass may typically sustain large amounts of Potash without exhibiting any adverse effects on the playing quality of the turf.¹⁴ Phosphorus is considered an important nutrient due to its role in energy transfer. Canaway suggests that after an application of fertilizer containing phosphate, the soil may contain a surplus supply of the nutrient, which may preclude its need in future fertilizer applications. Other important nutrients include Iron, Magnesium, and Micronutrients (zinc, copper, and manganese). Iron may enhance the green color of the grass, although, technically, the soil will likely provide the necessary iron for grass growth.

Soil pH (testing alkalinity and acidity)

Acidic < pH 6.0 < Alkaline

If the pH level of the soil decreases as a result of Nitrogen infused fertilizing, over the course of years, resulting in decreased grass growth, it may be necessary to apply lime to the sward. Canaway warns of the detriments of swift pH up-ticks, which may result in increased worm activity and weed growth.¹⁵ Canaway writes,

The nutrient content of both straight and compound fertilizers is expressed as a percentage of the nutrient concerned. For phosphorus and potassium, the analysis usually given on bags in the UK is expressed as P₂O₅ (phosphorus pentoxide) and K₂O (potassium oxide) respectively. Thus a fertilizer whose analysis is given as 12:6:6 contains 12% N, 6% P₂O₅ and 6% K₂O (2000, STRI, p. 49).

Canaway also notes that occasionally fertilizer analyses may be given as a % P and a % K and to convert one figure to the other multiply % P by 2.29 to calculate % P₂O and multiply % K by 1.2 to calculate % K₂O. Magnesium in fertilizers is expressed as its oxide, MgO. To convert % Mg to % MgO multiply by 1.66.

Optional fertilizers, along more traditional lines include composted seaweed in

¹⁴ STRI (2000)

¹⁵ *ibid*

locales near saltwater and dried blood, hoof and horn meal are traditional lawn tennis fertilizers, all containing nearly 14% Nitrogen.

When considering how much fertilizer to apply, a club or tournament court may need about 10 g/m^2 in order to help sustain the surface with increased play whereas garden courts may need only 5 g/m^2 applied two or three times. An annual dressing of K_2O between 4 and 8 g/m^2 is recommended as determined by the loss of Potash in clippings.

Equation for application:

Divide % N represented in the fertilizer into 100 and then multiply the product by the desired rate of N.

Example: 14:0:7 product, $100/14=7.14 \times 4 \text{ g/m}^2 = 28.6 \text{ g/m}^2$.

Canaway's encouragement of future research: "No research has been undertaken specifically on the nutrient requirements of lawn tennis surfaces and therefore would be a fruitful area for investigation."

Glossary

Aeration: exposure of sub-surface soil to air in order to alleviate compaction, increase root growth, and increase drainage

Azimuth: the angle of horizontal deviation, measured clockwise, of a bearing from a standard direction, as from north or south

Brahmin: (New England) a person usually from an old, respected family who, because of wealth and social position, wields considerable social, economic, and political power

Chewing: a mowing fault whereby the cylinder and bottom blade of the mower are not set correctly and the grass is ripped rather than clean-cut

Chewings fescue: *festuca rubra commutata*; hardy, fine-leaved variety of fescue; grown in the U.S. and New Zealand as lawn grass

Compaction: the consolidation of sediments below the grass typically occurring during the rolling process, mowing, and at heavily used areas of the court (service line)

Compound Fertilizer: fertilizer containing more than one nutrient

Cultivar: culti(vated) var(iety)

Evapo-transpiration: the process by which water flows through the soil to the grass

Fescue: *festuca*; a blade of grass

Rhizome: a rootlike, subterranean stem that produces roots below and sends up shoots progressively from the upper surface

Ribbing: an adverse effect of cutting grass that is too long for the mower setting

Scalping: occurs when the mower is set too low for contours in the playing surface

Scarification: removal of unwanted fibrous growth at the base of the sward

Sphairistiké: Greek for skilled ball playing; lawn tennis

Stolon: a prostrate stem that produces new leaves from buds

Straight Fertilizer: fertilizer containing a single nutrient

Swale: a low place in a tract of land

Sward: grassy surface of land; turf

Tine: A sharp projecting point or prong used for aeration

Turfing: laying imported sod

Washboarding: occurring on undulating ground where continuous mowing in the same direction exacerbates the effects of undulation

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Places to Play Lawn Tennis

Note: Although this list is not intended to be exhaustive of universal possibilities, it may offer some help for the player-searcher. Some establishments may charge fees while some may require an invitation.

United States of America & Canada

All Iowa Tennis Club
2667 240th Street
Charles City, Iowa 50616

International Tennis Hall of Fame
194 Bellevue Avenue
Newport, Rhode Island 02840

West Side Tennis Club, Forest Hills
1 Tennis Place
Flushing, New York 11375

Orange Lawn Tennis Club
305 North Ridgewood Drive
South Orange, New Jersey 07079

Longwood Cricket Club
564 Hammond Street
Chestnut Hill, Massachusetts 02467

Rockaway Hunting Club
615 Ocean Avenue
Lawrence, New York 1159

Seabright Lawn Tennis and Cricket Club
5 Tennis Court Lane
Rumson, New Jersey 07760

Philadelphia Cricket Club
415 West Willow Grove Avenue
Philadelphia, Pennsylvania 19118

Piping Rock Tennis Club
150 Piping Rock Road
Locust Valley, New York 11560

South Cowichan Lawn Tennis Club
2290 Cowichan Bay Road

Cowichan Bay, British Columbia V9L 3Y1

Desert Highlands Tennis
10040 East Happy Valley Road
Scottsdale, AZ 85255

Wimble-DON
Grace Street
Baker City, Oregon

JW Marriott Desert Springs Resort
74-855 Country Club Drive
Palm Desert, California 92260

Crandon Tennis Center
7300 Crandon Boulevard
Key Biscayne, FL

England

All England Lawn Tennis Club
Church Road
Wimbledon
London, United Kingdom SW19 5AE

Marylebone Cricket Club
Lord's Cricket Ground
St. John's Wood
London, United Kingdom NW8 8QN

Continental Europe

British Embassy in Paris
35 rue de Faubourg St Honoré 75363
Paris, France Cedex 08



(Photo courtesy of *Huffington Post*)

Astor Court, pictured here, is an indoor clay court, and a recommended alternative to a lawn tennis surface, especially if year round maintenance becomes problematic.