

2019



1.877.442.7878

Indoor Har-Tru
Maintenance Manual

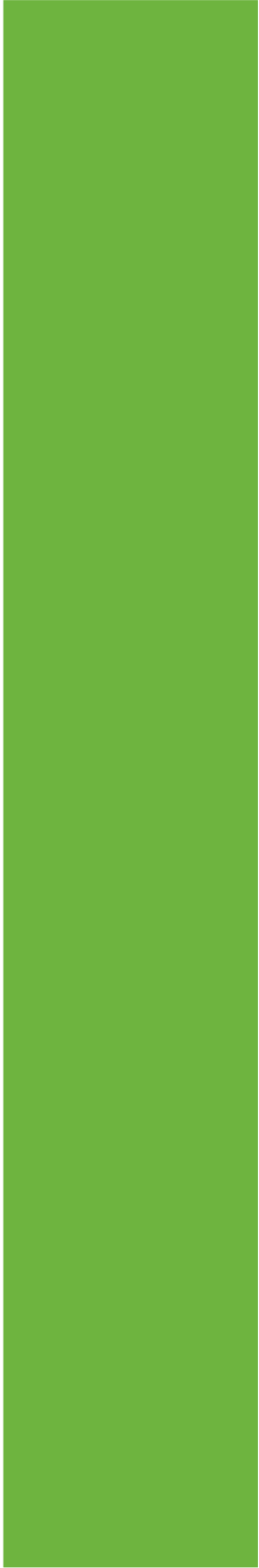


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Indoor Har-Tru Court Maintenance

Har-Tru brand clay courts can give years of great play. Understanding your tennis courts maintenance needs will be key to your courts continuing success.

Section 1

Indoor Court Introduction

Indoor Clay Court Introduction

Har-Tru clay courts indoors or in a bubble for the winter act very differently than clay courts outdoors. These courts are not subjected to natural weather conditions such as rainfall, wind or freeze/thaw. Because the courts do not experience rainfall, the finer particles that are generated by normal play and the grinding of surface particle, are not able to migrate off of an indoor court. Finer particles compact tighter than larger particles so the surface will tend to be more compacted and harder. The freeze/thaw process that happens on outdoors courts expands the surface upward during a freeze and naturally de-compacts the surface which is left loose after the court thaws. Indoor courts do not go through this freeze/thaw process so there is no natural way for the compacted surface to loosen.

Indoor and bubbled Har-Tru courts exist in a controlled environment, free from rain, wind and freezing & thawing. Evaporation rates are typically very low and hours of use are typically very high. Consequently, indoor Har-Tru courts present a different set of maintenance challenges than their outdoor counterparts, and a discussion of these challenges up front helps frame the maintenance recommendations that follow in this manual. Har-Tru clay courts that are indoors or bubbled will need special attention to the following.

- Surface Compaction
- Irrigation
- Humidity

A. Surface Compaction

Severe compaction in the Har-Tru surface occurs indoors because of extremely high use and because of the lack of winterization; rain/evaporation and freeze/thaw cycles that keep outdoor courts soft. This compaction creates a surface that is bald, slippery and difficult to irrigate. Compaction occurs when the loose surface material gets ground down into extremely fine particles that come to rest on the court surface. These “fines” cement together, creating a thin surface layer that is extremely hard and nearly impervious. Water contributes to the cementing, and if the water has a high salts content, it likely exacerbates the problem.



Photo 1: Top 1/16" Compacted



Photo 2: Bald Top Surface



Photo 3: Good Surface Below Compaction



Photo 4: Magnified View of Compaction

Consistent use of aggressive grooming tools daily using scarification tools and the addition of Coarse Blend periodically will help to keep courts safe, but unless the fines generated during the season are removed the problems will not be resolved. Pictures illustrate a compacted surface.

B. Irrigation

It may be difficult to maintain an appropriate amount of water in the surface profile of an indoor court. A dry court surface is extremely hard and slippery but with slow evaporation rate indoors, flooding the courts with too much water is also a real concern. Adding to the challenges is the fact that the external temperature and relative humidity have an impact. A truly cold dry winter day in the northeast can dry courts out faster than even the hottest days in the southeast.

Strategies for maintaining water in the profile without over-wetting the court are difficult to come by for several reasons. The first is that surface compaction in most cases keeps the water from penetrating into the court surface. Instead the water pools on top and the court rapidly becomes too flooded to continue watering. The second challenge is scheduling time to water. Playing schedules are so busy that in most cases, the only time is usually between 11pm and 6 am. Most are watered by hand with a hose and this is slow and time consuming. One solution is to keep the court surface soft so water penetrates easily. Strategies for accomplishing this were discussed previously. Another solution, though not available to many facilities because of hours of use, is to water frequently for very short durations. Watering every 3-4 hours for 2-3 minutes just to keep the dust down is an example of this. This solution is short term because unless water truly penetrates down in to the surface, it will get harder and harder.

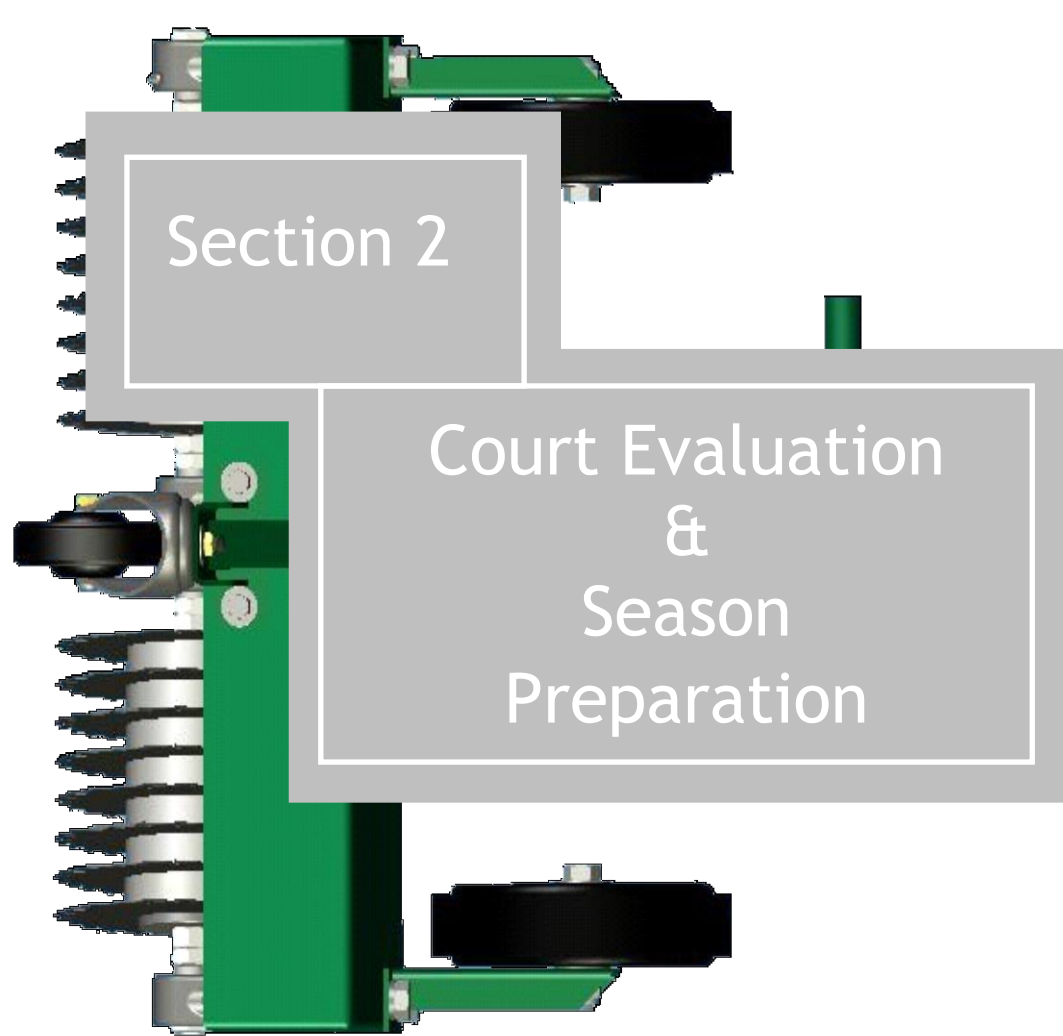
Sub-surface irrigation, when properly regulated, has been used effectively indoors to keep the courts soft and uniformly wet. Water itself tends to soften courts and when it is being fed from below, this process occurs during every watering cycle.

C. Humidity

Whether the indoor courts are in a permanent structure or an air structure, controlling humidity levels is vital to make the playing environment safe and pleasant. Simultaneously trying to keep the court surface wet and the air dry is a bit of a task. When the relative humidity is greater than 65%, condensation occurs more frequently, causing mold and mildew to start growing. Too much humidity also results in the "fines" clinging to tennis balls making them dirty and heavy.

D. Indoor Environment

An indoor facility should have an HVAC (Heating, Ventilation and Air Conditioning) system capable of changing the air within the structure 1-4 times per hour. In the winter the temperature should be maintained at 55 to 62 degrees Fahrenheit. In the summer the temperature should be maintained approximately 10 to 15 degrees Fahrenheit below the outside temperature with 55%-60% humidity.



Section 2

Court Evaluation
&
Season
Preparation

Court Evaluation & Season Preparation

Evaluate tennis court conditions in terms of preventative maintenance. Identify and correct potential problems before playing season begins. Inspect all aspects of the court as described in this section.

A. PERIMETER CURBING

1. Inspect obstructions along court perimeter that may affect surface drainage, especially on the low side of the court. Clay courts are built with the surface $\frac{1}{2}$ " higher than the court curbing on the low end of a court with the surface tapered down flush with the top of the curb. This allows for the water to run-off naturally and consistently.
2. Remove build-up of surface material from top of curbing. If surface material has built up higher than the curb on the low end of the court, taper the surface back about 18" and make the surface even with the top of curb. This will allow for proper water run-off to occur.
3. Inspect and repair curbing where necessary. A good curb system is very important to a clay tennis court as it acts as a foundation holding the courts base and surface together. When curbing collapses or becomes weak, the surface is in danger of losing its integrity and may start to erode out.

ASBA Specification: 3.0 Perimeter Edging

An edging of brick or block set in cement mortar, treated wood timber or concrete should be installed around the entire perimeter of the court area. The finished curb elevation should be $\frac{1}{2}$ " below the finished court surface, after compaction, and the court surface should be tapered from approximately 2' out to meet the top of the edging.

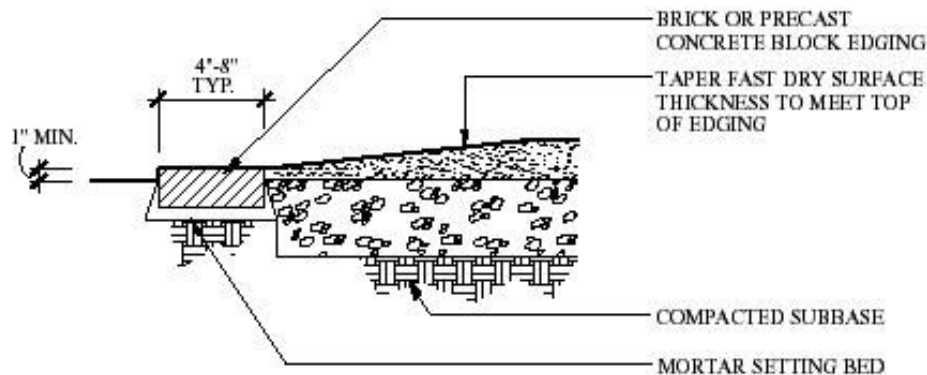


Illustration 1

B. COURT SURFACE

Inspect the Har-Tru surface, looking for high and low spots usually found in areas that receive allot of play such as around the base line. You can stretch mason's line over the court to find these low spots. Once you have located all of the low spots, you will need to patch these areas before top dressing the entire court (Follow step 6 below).

You will also want to check the average surface depth in several areas on the court. The following chart illustrates Har-Tru required for reconditioning and maintaining a surface thickness of 1".

<u>Average Depth</u>	<u>Surfacing Required per Court</u>
1"	2 Tons
3/4"	10 Tons
1/2"	20 Ton Lift
1/4"	30 Ton Lift

When the average depth equals 3/4" to 1", up to 5 tons, in 1 ton applications can be made each spring and fall until the average depth equals 1". When the average depth equals less than 1/2", a laser lift will provide the most precise method available for resurfacing at Har-Tru tennis court. A laser lift usually will need to occur around every 10 to 15 years on a clay court.

Once low spots and surface depth have been discovered, proceed to Top-dressing or surface reconditioning the Har-Tru clay court. This procedure should take place annually before the playing season. The main objective here is to remove and replace worn and weathered surface material while maintaining the properly established slope of your Har-Tru court. The requirements for quality control will be met when reconditioning is accomplished properly and in the following sequence:

1. Ensure that the court surface is firm enough to accommodate foot and light equipment traffic before beginning reconditioning.
2. Remove foreign debris such as branches, leaves, and weeds from the Har-Tru surface. Use a Lute/Scarifier and a plastic grain shovel.
3. Brush and roll Har-Tru surface until smooth and firm.
4. Lute into piles and remove the "dead material" from the Har-Tru surface. The "dead material" is loose Har-Tru material that has fallen out of gradation as a result of wind, water erosion and tennis play. This portion of the Har-Tru material will appear lighter in color and is the larger particle sizes of the mixture. **See *Illustration 3.***
5. Brush Har-Tru surface repeatedly to re-distribute and re-level the remaining Har-Tru.
6. Identify and patch low areas of court surface. Areas immediately behind and in front of baselines where most play takes place, may need of particular attention. These areas are identified by stretching a mason's line over the court and marking the perimeter of the low areas. New Har-Tru can then be applied and leveled with the straight edge of the Lee Drag Brush/Lute or an aluminum extension ladder.

7. Hand lute alley, center, base and service line areas with new Har-Tru dressing to fill old nail holes and level surface prior to topdressing.
8. Top-dress court surface uniformly with Har-Tru using the Tru-Flow spreader. Follow instructions on the Har-Tru bag. Apply no more than one ton per application.
9. Immediately begin brushing new Har-Tru topdressing before moisture migrates up from beneath existing surface. Court surface may have an amount of moisture that requires immediate brushing after each pass of the topdressing spreader. Better results are obtained when working with a surface that is as dry as possible during reconditioning, followed by a light overhead watering, a waiting period and then rolling.
10. Water-in new Har-Tru surfacing by hand with a "gentle shower" type nozzle.
11. Stay off newly resurfaced court until firm. Allow Har-Tru topdressing to absorb moisture and become firm.
12. Continue the smoothing and leveling Har-Tru by slowly brushing in two directions making wide turns at the end of each run.
13. Roll in a back and forth method without turning sharply.
14. Continue alternating steps 12 & 13 until the desired results of smoothness and firmness are achieved.
15. Har-Tru surface should be in playable condition before proceeding with final tennis court preparation.

SURFACE MATERIAL CHOICES



Har-Tru Surface Material – Packaged in 50 & 80 lb bags. This product is used on courts with above ground irrigation systems. It has a blend of surface and binder which helps to firm up courts quickly after construction. It can be used to top-dress as well as patching.



Har-Tru Coarse Blend – This product is a mixture of larger size particles designed to promote sliding on Har-Tru courts and Sub-irrigated courts. Use this product when more slide is desirable.



HydroBlend Surface Material – This product is used on sub-irrigated courts such as HydroCourts. This surface material has no binder such as in the regular Har-Tru material. HydroBlend is also used on ClayTech courts.

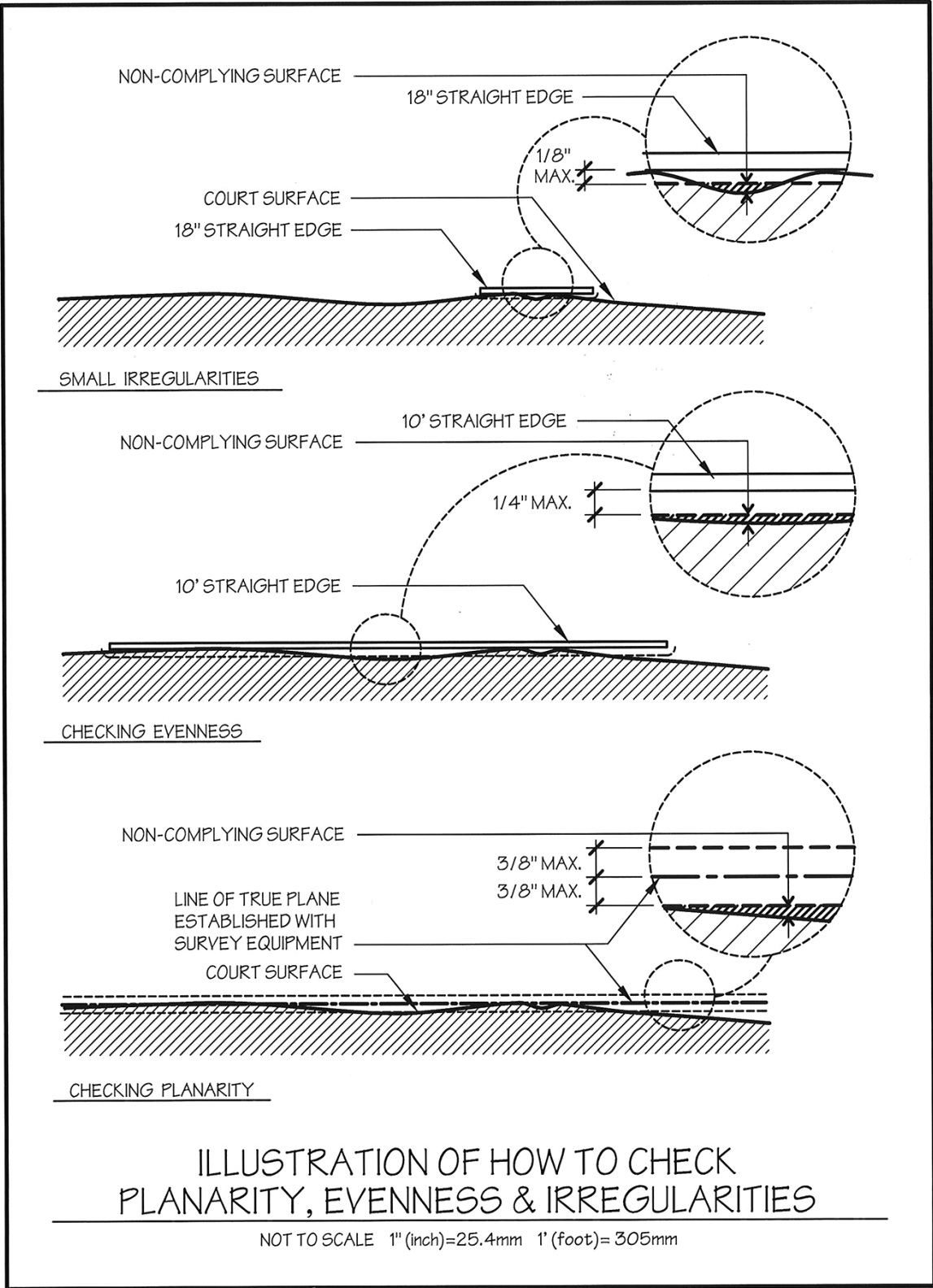


Illustration 2

REMOVING LOOSE MATERIAL

Scrape the dead material into ridge rows. Then remove with a flat shovel and wheel barrel or cart.

Note: Do not dig into the surface with the lute. The goal here is to remove the dead material loose on top of surface.

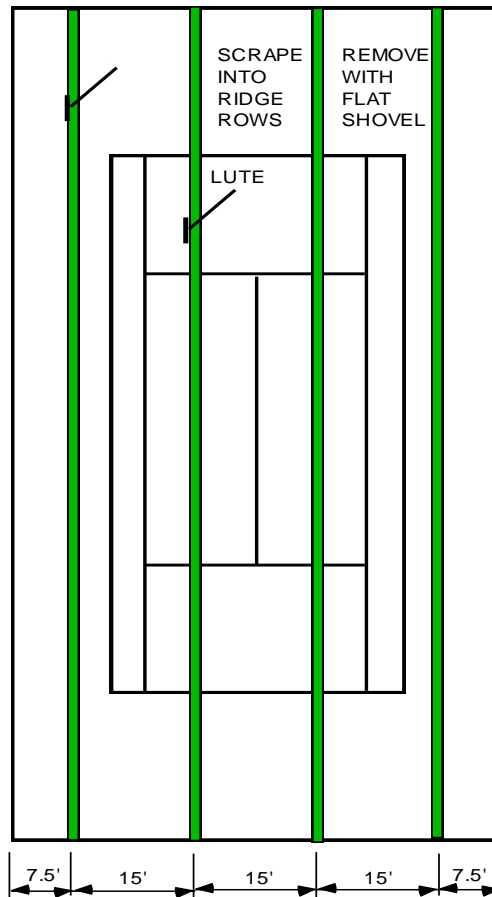
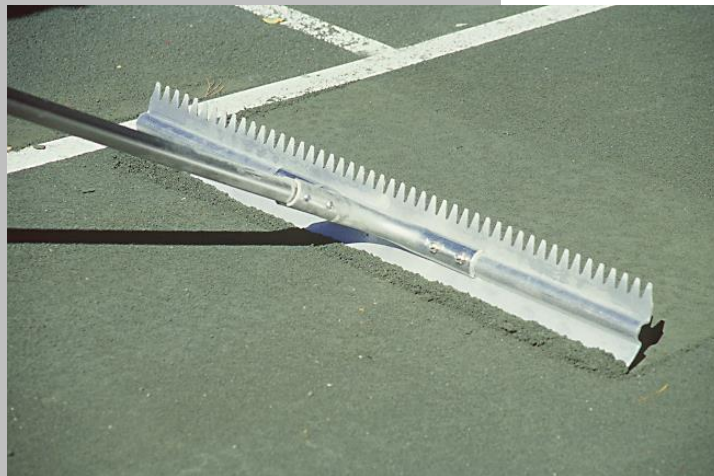


Illustration 3

Periodic
Court
Scraping



PATCHING

Patching divots, holes or areas that no longer bond, will be necessary at times. Follow these procedures for a long lasting solution.

1. Locate and mark out the area in need of patching.
2. Cut out 1" below the surface. Make sure to square up the walls of the hole to ensure that the new surface will not push out.
3. Make sure to scarify the bottom of the hole as well.
4. Fill the hole with new surface material to approximately $\frac{1}{4}$ " above the surface grade.
5. Compact the patch area while it is dry with a tamper.
6. Level and scrape off excess material with a hand lute.
7. Water and roll the patch using a hand roller.

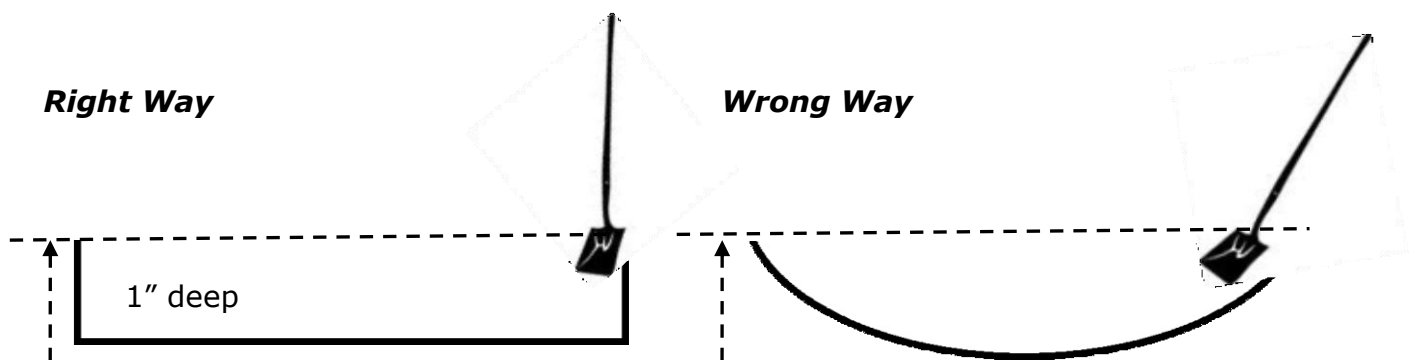


Illustration 4



Step 1



Step 2



Step 3



Step 4

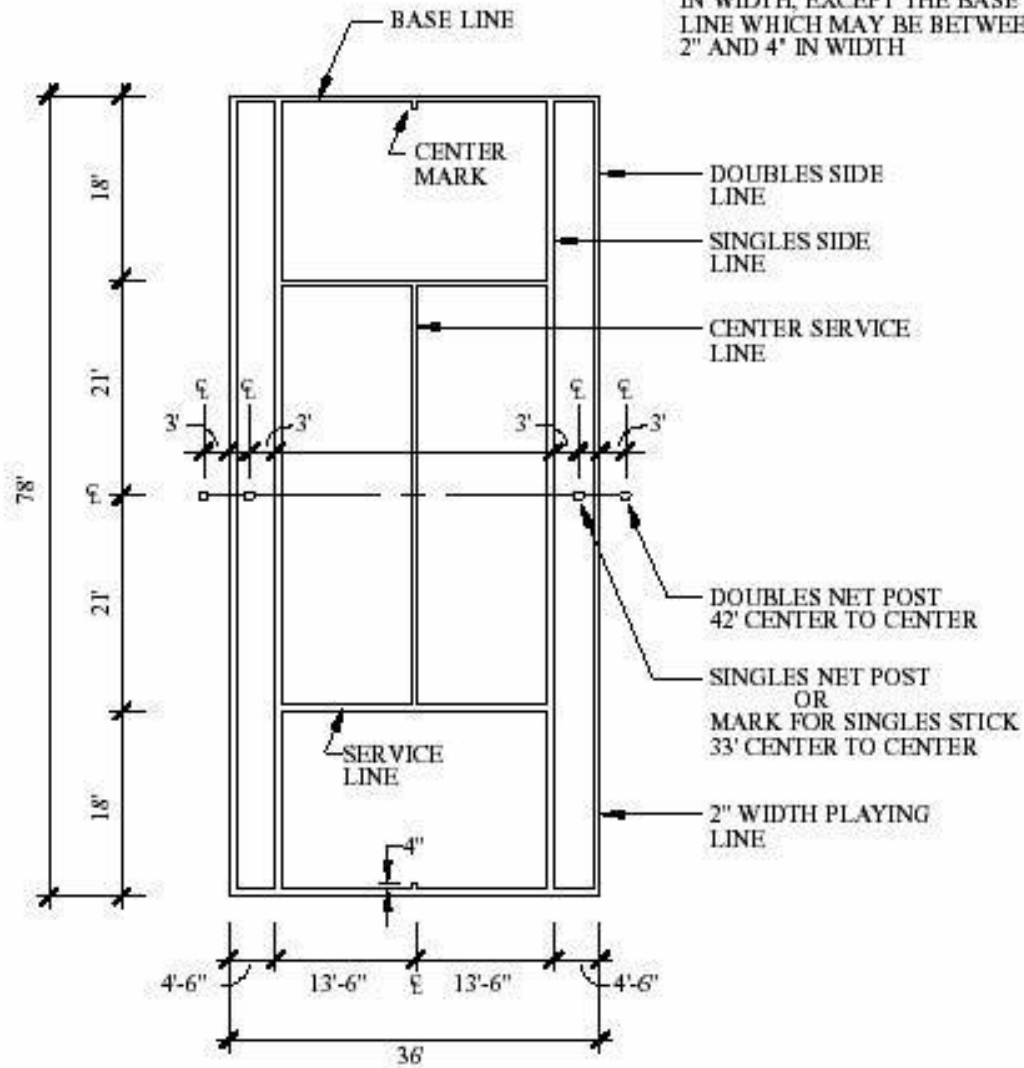
C. COURT LINES

Install new Court Lines after the surface has been top-dressed by following these instructions. See Illustration 5.

1. Measure for line tape layout:
 - a. If using more than one measuring tape, ensure both tapes have been compared side by side for synchronization. Improper corner locations will result from use of unsynchronized tapes.
 - b. Lee Speed Cables may reduce set-up time by at least 50%.
2. Install line tapes. Proper use of a speed-winder chalk-line ensures a clean snap and a straight line to layout line tapes. Follow the instructions included with tapes. Be sure to leave nail heads 1/8" above tape surface. Nailing heads down to the tape results in "hammer-head" depressions, which hold Har-Tru material around each nail rendering an unsightly appearance.
3. Roll nail heads down to tape surface slowly and carefully. Roller should always travel forward, in a straight line with the direction of line tape and should never make a turn until off the tape surface.

Court Line Tapes should be removed each year prior to topdressing and replaced after topdressing is complete. This prevents surface buildup around the lines during the season.

NOTES:
 ALL DIMENSIONS ARE TO THE OUTSIDE EDGE OF LINES.
 ALL PLAYING LINES ARE 2" IN WIDTH, EXCEPT THE BASE LINE WHICH MAY BE BETWEEN 2" AND 4" IN WIDTH



TENNIS COURT PLAYING LINE LAYOUT PLAN

NOT TO SCALE

2PLINES.AVL.03

Illustration 5

D. NET POST & NET INSTALLATION

1. Remove net post foundation hole caps or protective covers. Remove foreign debris that may have fallen down into the net post holes.
2. Re-install net posts.
3. Install tennis net. Attention to details such as correct lacing and the tightness of the net against the net poles makes for a clean fitting net.
4. If necessary, remove Har-Tru material from inside net Center Anchor.
5. Attach the Center Strap around the net and hook into Center Anchor.
6. Adjust the Center Strap to ensure that the net is 36" from surface to top of net.

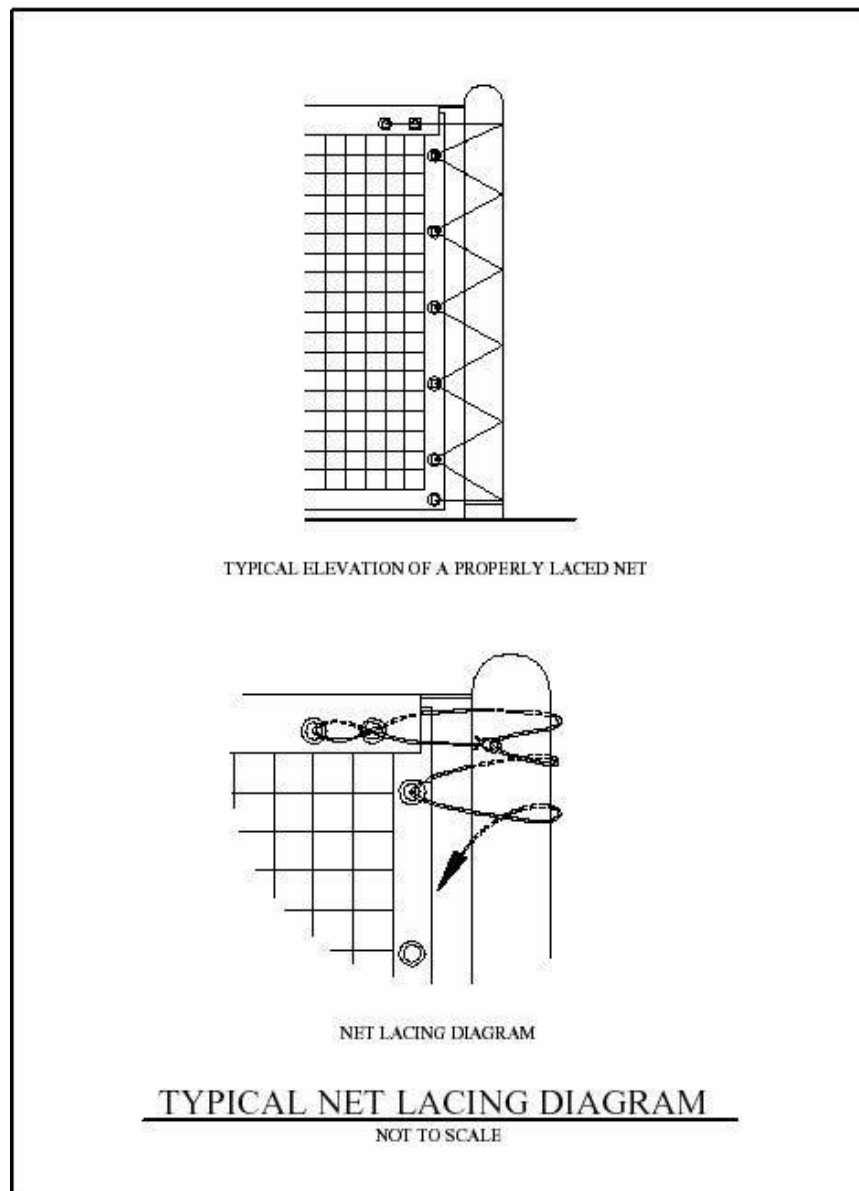
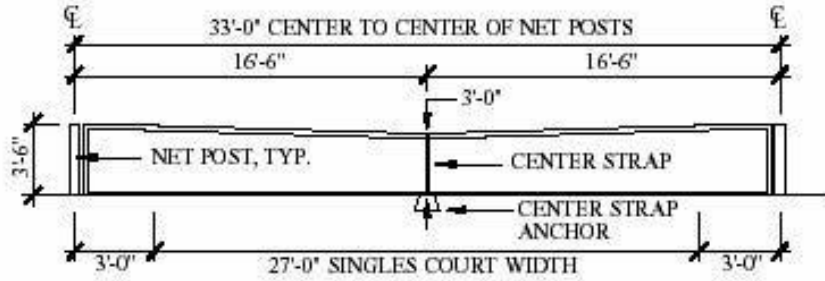
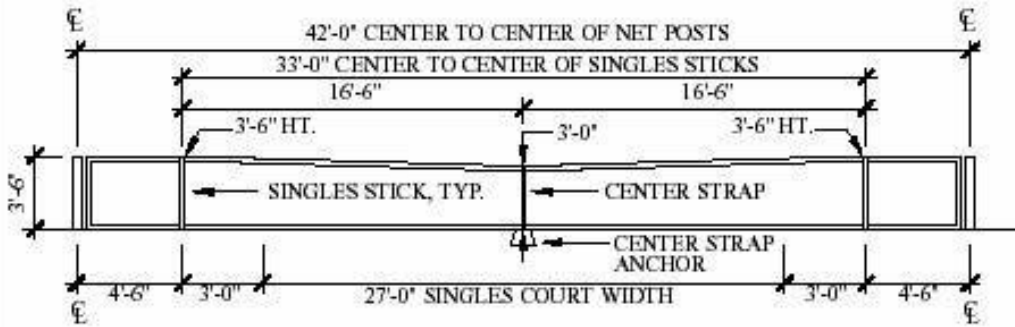


Illustration 6

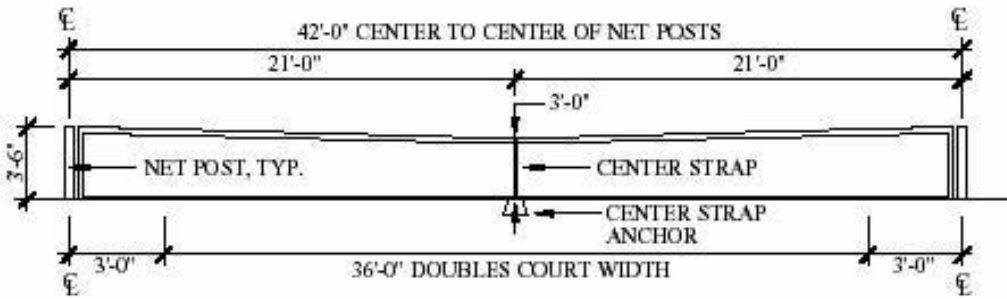
NOTE:
 THE NET SHOULD BE INSTALLED
 WITH A RECOMMENDED TENSION OF
 450 LBS. FOR RECREATIONAL COURTS
 & 550 LBS. FOR PROFESSIONAL COURTS



SINGLES NET



DOUBLES NET W/SINGLES STICKS



DOUBLES NET

TYPICAL TENNIS NET ELEVATIONS

NOT TO SCALE

31NETELEV.AVL.03B

Illustration 8

E. Miscellaneous Court Amenities

Court Seating

Court Seating comes in many variety of shapes and styles. Inspecting court seating should be done periodically to provide safe and comfortable court seating.

Court Clock

Having a Clock on court and in view is a great way for players to be aware of time when scheduling is important.



Court Curtains

Indoor facilities use Backdrop curtains or Perimeter Curtains for multiple reasons which include using the curtains as a background so that players can see the ball, the curtains keep the tennis balls within the perimeter of the courts and they also keep distractions at a minimum as players are going to and from other courts within the facility. The curtains should be at a minimum of 10' high however they can be as high as the wall. They are normally made of vinyl fabric and should meet Federal, NFPA, UL and applicable local fire code requirements.

Indoor curtains can be installed ½" to 2" above the surface or can be installed with the curtains laying on the surface which helps to contain the balls, however the curtains will get more wear when in contact with the surface. If the curtains are installed with contact with the surface, there should be no more than 1" of curtain on the surface to avoid a possible hazard to players if they step on the fabric and fall.

F. WATER COOLER MAINTENANCE

Water Coolers should be cleaned and sanitized before the beginning of each day and fresh water re-filled daily. The water source should come from a spigot and not from a rubber hose. Take special precautions to eliminate bacteria from establishing itself on or in the Water Cooler. See article on Water Cooler Safety below.

PREVENTING BACTERIA IN WATER COOLERS

Each year, clubs across the country incur general liability claims from patrons who become ill from drinking contaminated water on the course. The source of the contamination is usually bacteria growing inside and outside of water coolers. Many times course workers in charge of refilling water coolers do not empty existing water before adding fresh water. The result is diluted chlorine levels inside the cooler. Over time, bacteria will begin to grow and contaminate the water. Once the bacteria begin to grow, simply adding fresh water each day will not eliminate exposure.

The Problem Area

When chlorine levels are low, bacteria will usually start to grow on the spigot outside the cooler because it is exposed to sunlight and stays relatively moist. Once this happens, fresh water coming through the spigot becomes contaminated water.

Risk Management Controls

The good news; it is quite simple to eliminate the bacteria and ensure it doesn't return. Management should develop and implement a policy of emptying existing water in coolers before adding fresh water. Also, a procedure should be developed and implemented requiring employees to disinfect coolers daily during hot summer months. Finally, employees should be performing visual inspections of the spigot to ensure bacteria are **not forming**.

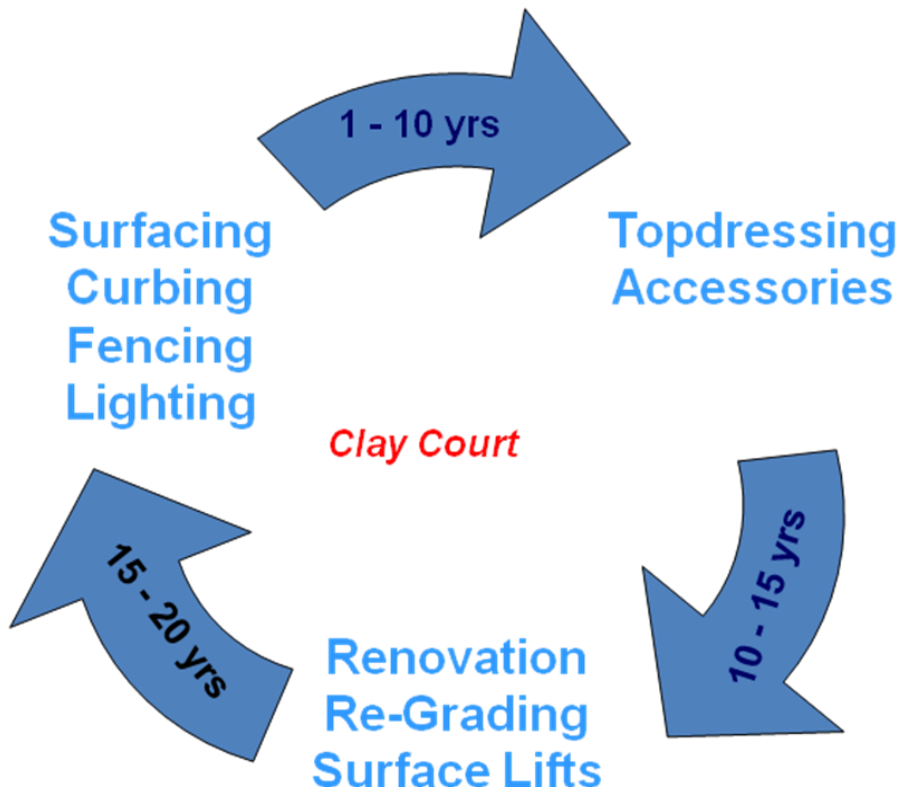
Disinfecting: To be sure bacteria does not develop or to kill existing bacteria, mix a solution of 10% chlorine or household bleach with 90% water and fill spray bottles with the solution. Next, implement the following procedure:

- Empty the remaining water in the cooler
- Spray the inside of the cooler and the outside spigot with the solution
- Allow the solution to act for at least **1** minute
- Thoroughly rinse the cooler
- Refill the cooler with fresh water

Spraying the solution will not leave an overly bad taste or smell. Nevertheless, the cooler should be properly rinsed before adding fresh water.

Har-Tru clay courts go through a cycle. Below is an illustration of this cycle. Knowing what part of the cycle your court is in and following good maintenance procedures will ensure your courts consistent play ability as well as longevity.

COURT LIFE CYCLE



Section 3

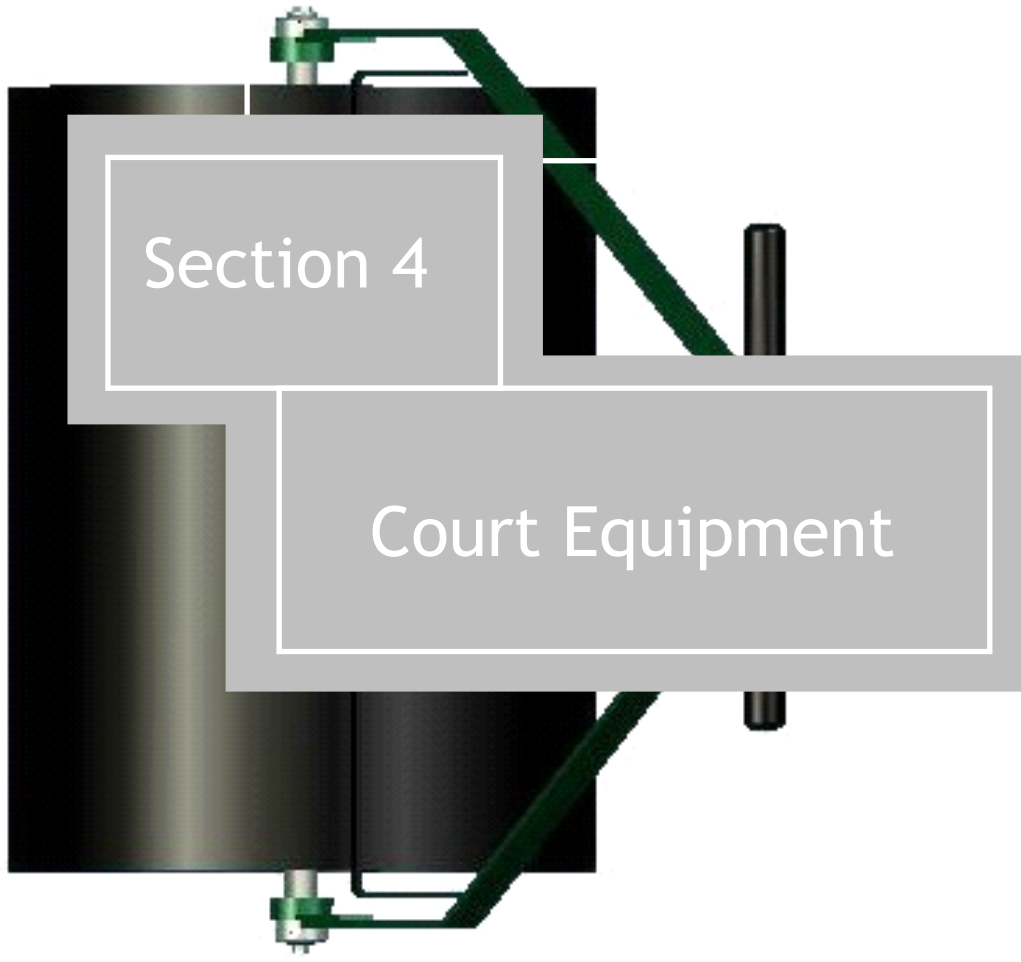
Irrigation System

WATERING HAR-TRU COURTS

The objective is to water the indoor courts thoroughly and uniformly, saturating the court's surface. On an indoor court water keeps the dust down, reduces or minimizes compaction and improves traction. The more water that can be applied to the Har-Tru surface, the better the court will play. That being said, evaporation rates indoors are very low and care must be taken not to over water for two reasons. One is that the court simply will not dry and will be unplayable. Two is that too much water will cause humidity levels within the structure to rise to unsafe levels. Playing on a surface that has too much moisture will also increase the level of compaction.

Structures that have the capability to move air across the court, whether via air conditioning, dehumidifier or ventilation, typically have greater room for error and can apply water more liberally. Develop an understanding for your facility's air handling systems and apply water with care. Apply as much water as possible daily while keeping humidity levels within the structure below 65%

Facilities with sub-surface irrigation are typically able to get more water into the profile of the court as they are not restricted by the surface puddling that occurs during above ground watering. Good record keeping and a complete understanding of how the system works is necessary to avoid getting the courts too wet.



Section 4

Court Equipment

BASIC TOOLS & EQUIPMENT

Having the correct tools and equipment to maintain your Har-Tru courts is very important in providing a consistent playing surface. The following is a list of basic tools and equipment that is necessary for a consistent maintenance program.



Drag Brush: Drag Brushes are important to have on the courts as they provide grooming and keep the surface consistent. Bristles can be replaced as they wear without replacing the whole brush.

Line Sweepers: Line Masters are a great tool to keep your Har-Tru surface material off of court lines. The circular brush should be replaced periodically to ensure good consistent brushing.

Aussie Clean Sweeps: The Aussies are designed to pick up debris that falls on the courts such as pine needles, leaves etc. The Aussie is also used in place of brushing when you want a less aggressive surface groom and creates less surface drying.

Lutes: Having a couple of lutes available for use will be necessary when you want to periodically scrape up loose and dead material from the courts, in need of a light scarifying and conducting patch and repairs on the surface. Replace the blades as they wear down and become less agitating to the court.

Gator Rakes: Having a Gator Rake on hand will be essential in cases where the surface will need a deeper scarification.

Steel Bristle Drag Brush: Having a Steel Bristle Drag Brush on hand will also be necessary when you want a less aggressive scarification than with the court rake however using the Steel Bristle Drag Brushes when the surface is too damp will cause surface material to cake on the bristles and drop off. Use the brush when surface is less moist.

Rollers: Having a reliable roller will be very important in maintaining Har-Tru tennis courts. Performing preventative maintenance on your equipment will ensure longevity and consistent results. See Owner's Manual for preventative maintenance schedules.

SPECIALIZED TOOLS & EQUIPMENT

Specialized tools may be necessary to complete your arsenal of tools. Knowing what tools are available will help to maintain a high standard in maintenance practices.



Court Devils: Har-Tru Court Devils come in 2 different sizes, a tow model and a hand model. Use the Court Devil when a more aggressive surface agitation is needed due to surface over-compaction or weed, algae and moss growth occurs.



Hand Rollers: Har-Tru Hand Rollers come in 2 sizes, 24" and 18". Both rollers can be filled with water for added weight. These court rollers are perfect for touch-up work around court edges and patching low spots.



Spreaders: Tru-Flow Spreaders come in 3 different sizes, 24", 36" & 54". These spreaders can be used when annual top-dressing occurs or whenever the need to drop Har-Tru surface material consistently.



Line Scrub: The Har-Tru Line Scrub is a great tool for cleaning court lines when a more aggressive brushing is necessary.



Tow Scarifier: The Tow Scarifier is designed to give a deeper scarification without damaging the integrity of the court's surface.



Power Rollers: Har-Tru Power Rollers come in a variety of forms. Court Pac, Court Pac Pro and Tow Rollers make rolling Har-Tru tennis courts safe, fast and easy. Choose Har-Tru brand equipment for all of your maintenance needs.



Section 5

Daily Maintenance



STEP 1
Brush Courts



STEP 2
Repair
divots & low
spots



STEP 3
Clean Lines



STEP 4
Hand water
courts

DAILY MAINTENANCE

Your daily maintenance routines keep the courts in optimal playing condition. At the same time, effective daily practices will reduce the amount of periodic and annual maintenance that is required.

MORNING

1. Inspect Har-Tru surface for minor scuffing. If baseline areas require divot repair, lute and re-dress as necessary.
2. Inspect tapes and nails for lifting or shifting.
3. Groom surface with a Gator Rake or a Drag Brush. Make wide turns with the Drag Brush to avoid accumulation of Har-Tru material. Indoor courts can and should be groomed as often as the playing schedule allow, using aggressive grooming tools such as the Steel Drag Brush and the Gator Rake. Aggressive tools help scarify while sweeping. This increases the amount of loose granular material improving traction, and keeps the top surface layer porous allowing water to penetrate. Adding weight to the Steel Drag Brush and Gator Rake increases effectiveness, but may decrease the life of the tool.
4. After grooming, the court should be inspected for areas that are devoid of surface or particularly slippery under foot, and for any spots that need to be repaired. These areas should be scarified using the serrated edge of a Lute Scarifier. Scratching up bald areas will increase sliding material and improve traction. Scratching up sections that need repair will take out the high spots and fill in the low. If hand scarifying fails to produce the desired results, application of some Coarse Blend or some patching may be necessary (See Periodic Maintenance).
5. Sweep the line tapes. Ensure the line tape area beneath the net has been swept. Use a Line Scrub to remove surface material that adheres to the line tape.
6. Rolling – Indoor Har-Tru courts do not require rolling. The surface gets compacted by repeated, high volume use and does not undergo any of the environmental or weathering changes that loosen it up.
7. Ensure that the net and center strap is set correctly.
8. Clean benches, coolers, cooler stands, etc.
9. Wash out the Tennie Two-Step on a daily basis if possible.
10. Inspect Court Curtains for tears or wear and replace and clean as needed.
11. Ensure Line Sweeper, Aussie Clean Sweep, Gator Rake and Drag Brush are stored properly and do not pose a hazard to players.

MID-DAY

Mid-day maintenance keeps the court looking and playing as well during late afternoon as it plays in the morning. The ideal situation would be for maintenance time to be scheduled so courts could be brushed, lines swept and the surface watered properly. The moisture level in the court profile should remain adequate until the next maintenance period.

EVENING

Adequate brushing and thorough watering will ensure quality playing conditions the following day.

1. Brush in alternate directions, particularly around baseline areas to smooth surface prior to watering. Alternate direction of brushing on a nightly basis.
2. Water the court in a "cycling method" to accomplish a thorough watering during the course of an evening with as little run-off of water as possible. Proper timing of watering cycles is best determined by observation. The ideal situation would be for the court profile to retain adequate moisture until the next maintenance period.

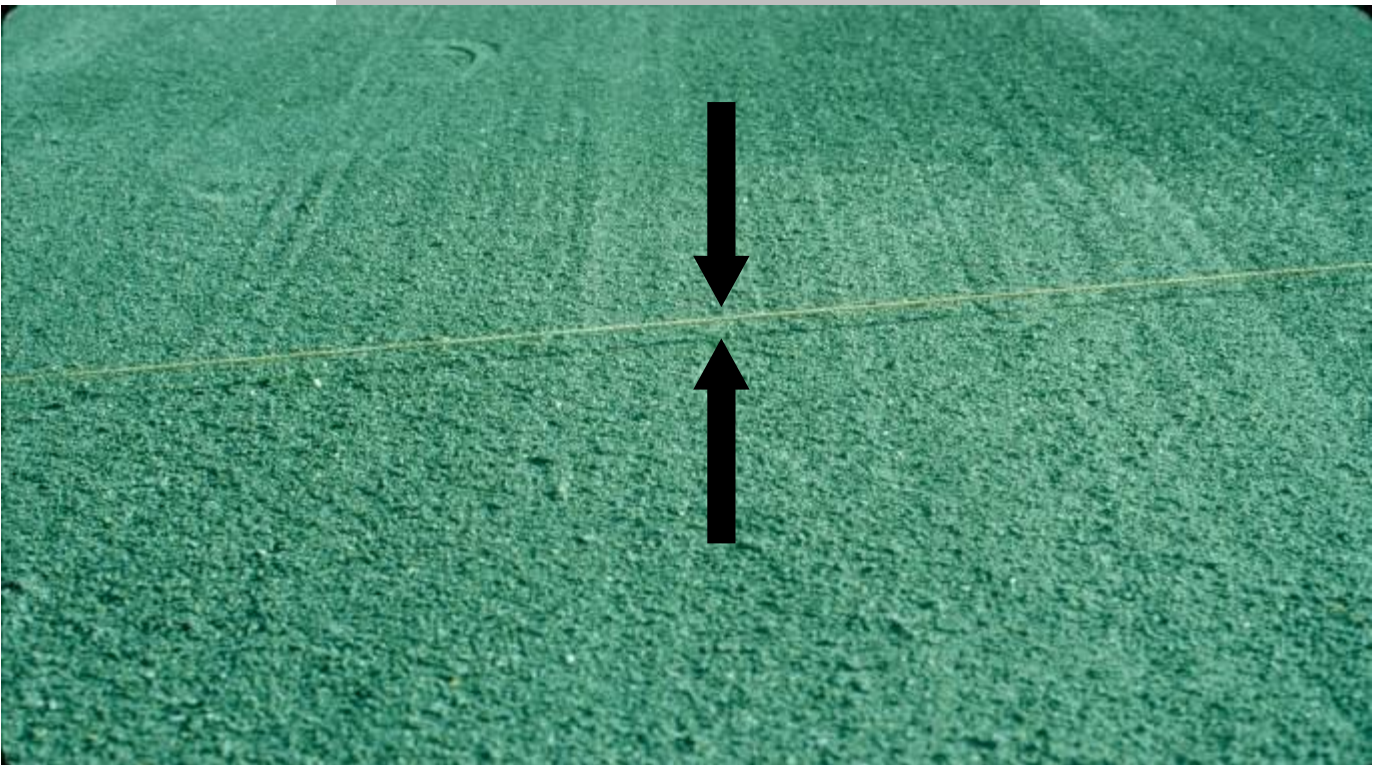


Section 6

Periodic Maintenance



Checking Planarity



PERIODIC MAINTENANCE

Periodic Maintenance is performed to keep problems small and manageable and to ensure the court performs at its best. For an indoor court includes scarification, patching and the application of Coarse Blend.

A. Scarification

Surface compaction is essential to keeping the courts performing well. Scarifying keeps the court soft, increases loose granular sliding material and allows water to penetrate more freely.

Although using aggressive tools for daily maintenance helps with surface compaction, weekly scarification with heavier, more aggressive tools is recommended. These tools should be pulled across the court in multiple directions with the focus being on the low play areas where less foot traffic occurs. These areas, typically the center of no man's land and the doubles alley's are locations where ground up fines tend to settle and lock in place. Often these areas will be notably higher than other sections of the court. Weight can be added as necessary to increase effectiveness. The goal is to break up the 1/16" to 1/32" of the court surface. Scrape it into piles and remove it.

Once the court is scarified and the top layer is removed, the court should be swept in two directions using the Steel Drag Brush or Court Rake. Water the courts directly after the above is complete.

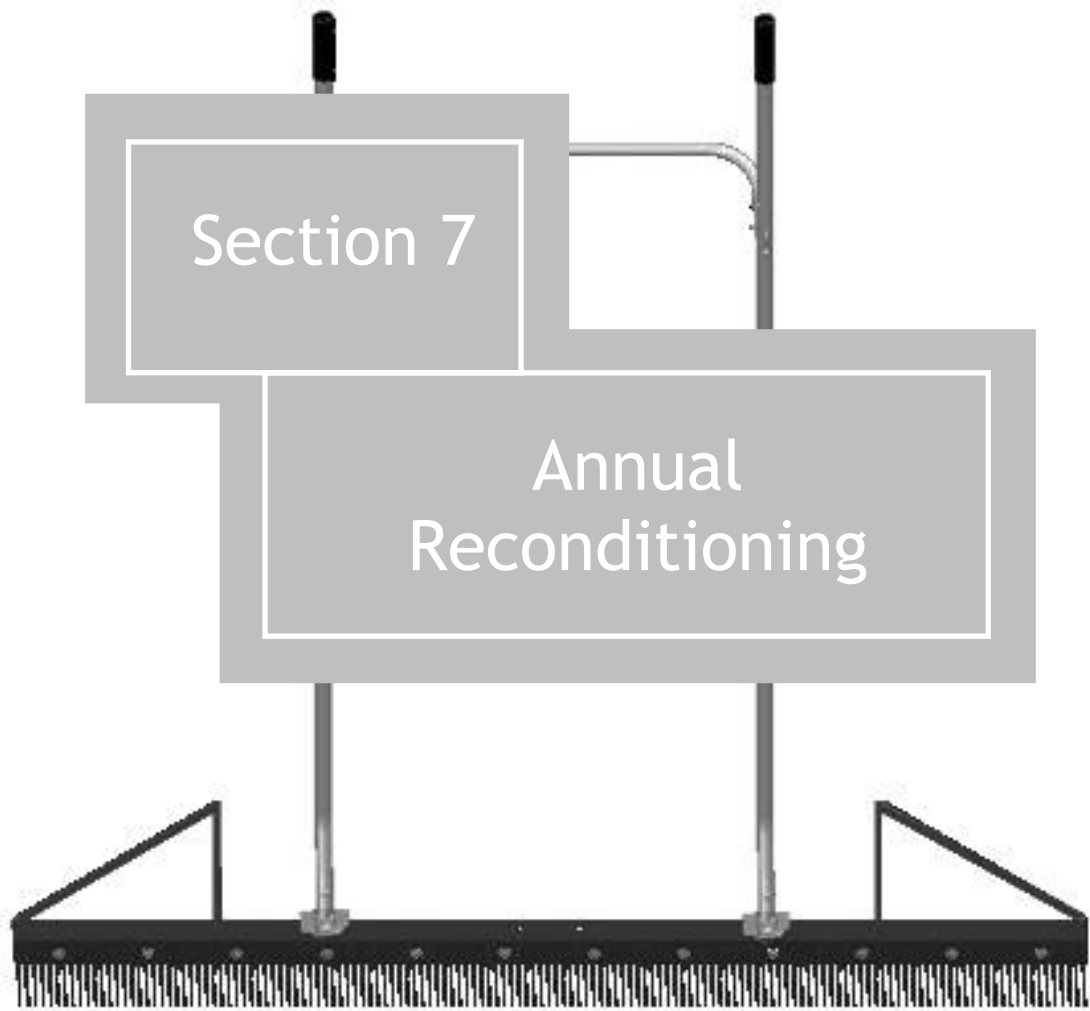
B. Application of Coarse Blend

Coarse Blend is Har-Tru with lower dust content. It consists of the larger, coarser size particles that when applied to the court surface, increase traction and scarifies the surface during play. An application of one bag per court per week throughout the indoor playing season is recommended. It can be applied with a broadcast spreader or cast out by hand with a shovel.

During the playing Season, bald areas often develop where the surface has become compacted and the sliding material has been pushed away. Apply Coarse Blend to these areas in small amounts and distribute it with the flat edge of the Lute/Scarifier. This will provide better traction and sliding capability and also help loosen these areas up. A one court application will take 10-20 minutes depending on the condition of the court and the method of application.

C. Patching

Due to the high volume of doubles play, the area of the court just behind the baseline and the tracks where players serve and volley for doubles, tend to get worn down. These areas of the playing surface should be inspected weekly and patched as needed. History has shown that frequent thin patches set up more effectively and require fewer repairs. Patching indoors can be tricky because it is hard to get the patch to adhere to the compacted court surface and there is rarely much time to let the patch set up before players are back on the court. If possible, the court should be shut down about 3pm and should be dry. The affected area should be thoroughly cleaned of old material and ball fuzz using a brush and scarified to a minimum depth of 1/16" using any or all of the scarification tools. New Har-Tru should be opened and dumped onto the court surface and spread evenly with a long straight edge, such as an extension ladder, to fill in all low spots. Once complete, the patch should be hand watered just enough to activate the binder but not so much as to puddle. Let the surface dry a little and roll by hand. The patch should be watered and rolled again 2 or 3 more times that day. The court can be reopened for play the next morning at the normal time. (**NOTE:** Only regular Har-Tru should be used for patching. Coarse Blend will not work.) Patching areas will tend to be softer than the rest of the court and will get damaged during play. Touch the patch up by lightly hand scarifying.



Annual Reconditioning

Annual reconditioning is performed to preserve the life of the court and to improve playability. It includes removing all of the old, worn Har-Tru, ball fuzz and debris that accumulate during the season of play, patching low spots and adding new material as needed.

A. Cleaning the Court Surface

If replacing the marking tapes, begin by removing all line tapes and nails from the court surface (**NOTE:** Line Tapes may not need to be replaced every season. Monitor the wear of the pattern on the Line Tape surface. When worn, the line Tape will become slippery and will need to be replaced). Using a power brush or push broom, sweep all loose surface material and debris into piles and remove it with a flat bottom shovel and wheelbarrow or cart.

Caution: The use of dust masks while top dressing indoors is highly recommended. Every attempt should be made to ventilate the area as well. Use of gasoline or diesel equipment produces carbon monoxide that must be ventilated completely during emission. Use of a carbon monoxide detector is required for safety.

B. Deep Scarification

The objective of deep scarification is to penetrate a minimum of ¼" into the court surface to loosen it up. Deep scarification should be performed after fines have been removed as described above. Add weight to a Court Devil or Tow Scarifier and make multiple passes in all different directions until surface penetration of ½" is achieved. Then drag the court with an Aussie Clean Sweep to redistribute and level the loosened surface. The leveled surface may need to be rolled if the surface has broken up into clumps.

C. Application of New Material

Indoor courts experiences very little surface erosion. Most of that erosion comes from tracking Har-Tru off of the court in the soles of shoes. It is estimated that less than ½ ton of Har-Tru surface material is lost during the playing season. Therefore it is not necessary to add large quantities of Har-Tru each season.

The first step is to assess the surface depth on the court. Perform core tests in four locations across the court and average the numbers together to get the average surface depth. Be sure to check the high wear areas just behind the baseline as those spots typically wear faster than the rest of the court.

Assuming the average surface depth is 7/8" or greater, no new Har-Tru needs to be added. Instead, an application of 6 bags of Coarse Blend per court is recommended. It can be applied with a drop spreader and brushed out using a Steel Bristle Drag Brush or Aussie Clean Sweep.

Any patching that needs to be done should be done after scarification and before surface application. See Patching section of the manual for instructions. After patching and applying new material, the entire surface should be watered thoroughly by hand. Once the surface dries, new Line Tapes can be installed.

D. Continuing Education

Several educational aids are available for staff training; the General Maintenance Outline for Har-Tru Tennis Courts, the Maintenance Video, the maintenance DVD and other resources. Visit our web-site at www.har-tru.com for additional information. These products are ideal for keeping your staff informed, on a regular basis about the most efficient methods of Har-Tru tennis court maintenance.

Section 8

Long Term
Renovation

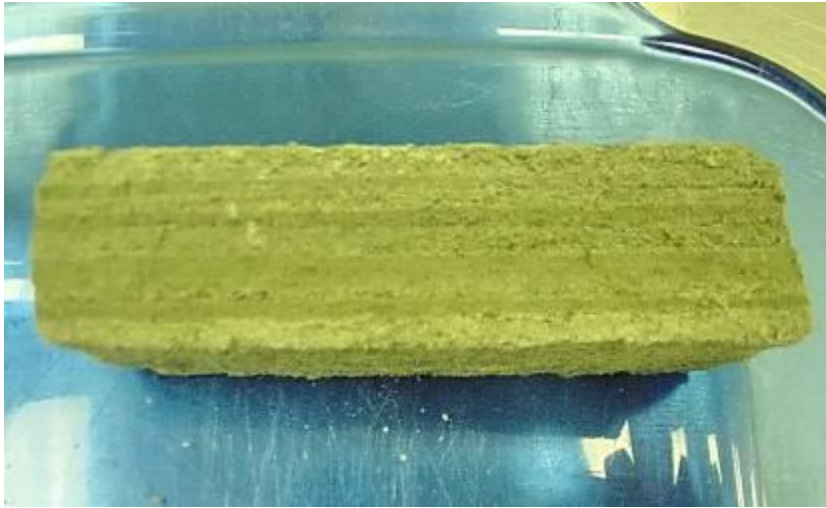


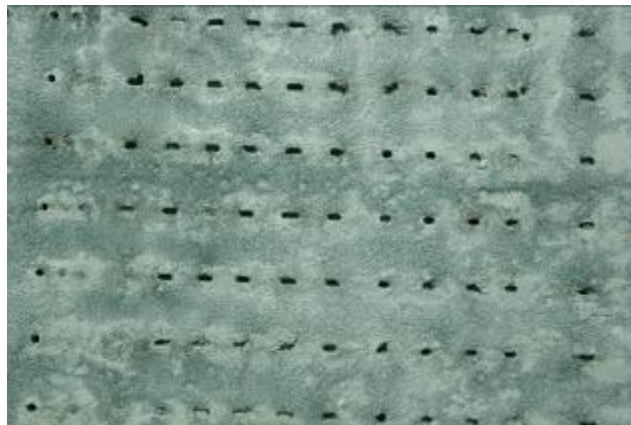
Photo 5 Har-Tru Surface Layering



Photo 6



Photo 7



42 Photo 8

Long Term Renovation of Courts

Over a period of years, an indoor Har-Tru court will end up with successive layers of cemented fine particles covered with layers of new Har-Tru. This layering significantly reduces permeability and makes managing both surface hydration and hydration & humidity levels very difficult. Additionally, effective scarification becomes tougher. Aggressive grooming tools, Coarse Blend and heavy duty scarifiers are no longer effective in improving playing conditions. The only answer is to keep adding more and more Har-Tru. At this time it is time to consider a total court re-work.

Several techniques are currently used to counteract the negative effects of the compaction. They are procedures that may require the assistance of an outside professional and it is recommended that clubs consult Har-Tru and their local contractors.

These procedures include,

A. Aerification - The Toro Hydroject (photo 6) and the DriJect (photo 7) are two pieces of equipment that were invented for use on golf courses and have been applied successfully on indoor courts. These machines shoot highly pressurized jets of water, about the size of a pencil lead, down into the court surface (photo 8). In the process they create lateral fractures in the surface. These holes and lateral fractures open space for water to travel through the profile, loosening and softening it up.

This procedure is typically conducted several weeks before the indoor playing season begins. Multiple passes are made with the machine across the court surface. After the holes are drilled, they are filled with Coarse Blend and then the courts are flooded.

A big advantage of this procedure is that the Line Tapes do not need to be removed and it takes only a couple of days to conduct, with minimal surface disruption. As a result, many facilities are choosing to have this done annually as a preventative measure rather than waiting until the court becomes very hard and impermeable.

A big advantage of this procedure is that the Line Tapes do not need to be removed and it takes only a couple of days to conduct, with minimal surface disruption. As a result, many facilities are choosing to have this done annually as a preventative measure rather than waiting until the court becomes very hard and impermeable. The disadvantage of the procedure is that depending on the level of compaction, the machine may not achieve very deep penetration and the process may need to be repeated more than once. Fortunately, the effects of aerification is cumulative and compaction is lessened with each time it is performed.



Photo 9



Photo 10



Photo 11



Photo 12

B. Deep Scarification

Tennis court contractors with a laser grader have a box blade with teeth on it that they can use to tear up hardened surfaces. The laser can be set to a controlled depth to avoid getting into the stone base below. Once broken, the surface can be re-graded flat and the facility is left with a court that is almost like new.

The advantages of this technique are that it is quick and accurate. The disadvantage is that some courts are so hard that the teeth cannot penetrate. Even if they can penetrate, the surface typically comes up in chunks and these have to be eliminated before the surface can be re-graded effectively. Also, this procedure does not remove all the fines generated during the playing season or over many playing seasons. This means that the material being reused is out of specification and will tend to compact too much and be less permeable than new Har-Tru. If the courts are very old, removal of the existing surface material and applying 1" of new Har-Tru is recommended.

C. Milling Machine

The Milling Machine (photos 9-11) and the Asphalt Grinder (photo 12) are specialized pieces of equipment that can be used to mill the surface into powder. They can be operated with a tractor and the depth can be controlled automatically with a laser. There are several types of machines from Asphalt Grinders to pulverizers that have been used to varying degrees of success.

The advantage of using these machines is they are most effective at breaking up the old Har-Tru and making the court almost like new. The disadvantage is the process requires specialized equipment, more time and typically costs more. Also, as above, this procedure does not remove all the fines generated during the playing season or over many playing seasons. This means that the material being reused is out of specification and will tend to compact too much and be less permeable than new Har-Tru. If the courts are very old, removal of the existing surface material and applying 1" of new Har-Tru is recommended.

Section 9

Budget Planning

5 YEAR BUDGET MAINTENANCE PLAN

The following includes a list of goals and time tables based on the Court Analysis Survey. These timetables can be used in budgeting for short and long term projects.

Subject	Description	Schedule
Laser Grading & 1" lift	Laser grading should be considered every 10-15 years.	Every 10-15 years
Top-Dress	Topdressing is necessary for each annual opening. 1-2 tons of Har-Tru per court should be applied with each top-dress.	Annually
Line Tape replacement	Line Tapes should be pulled up prior to top dressing. This will ensure that lines are straight, tight and have no surface material buildup on either side of line tapes during the playing season.	Annually
Back Drop Curtains	Back Drop Curtains should be replaced every 3-5 years or as they start to fade, discolor and get brittle.	3-5 years
Fencing-Hard Courts	Fencing should be painted or replaced as needed. Keeping this project in a cycle will help to eliminate a buildup of high budgetary costs.	As Needed
Tools & Equipment	Keeping Brushes and Hand tools in good working condition is essential for great Har-Tru courts. Replacing worn brushes, lute blades etc. will keep the tools working properly.	Drag Brushes, Line Masters Lutes Aussie's
Roller	Having a reliable roller on site will be important to ensure the best possible courts. Preventative maintenance will ensure reliable equipment.	Grease annually & perform scheduled Preventative Maintenance
Amenities	Nets, Net Posts, Coolers, Benches, etc. should be replaced as needed.	As Needed

<p>Maintenance Training</p>	<p>Properly maintained Har-Tru courts ensure court longevity and consistent playability which can really affect a facility’s bottom line. Making sure the maintenance crew is sufficiently trained is key. We offer information on our website that can provide the training and knowledge needed. Attending maintenance seminars gives a Maintenance Employee an opportunity to learn about best practices and to meet others in the same industry. They get hands on training both in a classroom setting and out on the court. Please contact Lee Tennis for more information.</p>	<p>Annually</p>
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STAFFING RECOMMENDATIONS

The following are staffing recommendations for daily maintenance of clay tennis courts.

Har-Tru

We recommend 45-60 minutes per court each day. There are variables each day, week, month and annually. This staffing recommendation is an average figure meant to help to determine staffing needs for the maintenance of Har-Tru Clay tennis courts.

SUB-IRRIGATED

We recommend 20-30 minutes per court per day. There are variables each day, week, month and annually. This staffing recommendation is an average figure meant to help to determine staffing needs for the maintenance of Sub-irrigated tennis courts.

TENNIS COURT MAINTENANCE BUDGET WORKSHEET

<u>Inventory</u>	<u>Condition</u>	<u>Needed</u>	<u>Budget</u>
Aussie Clean Sweep			
Benches			
Center Strap Anchor			
Center Strap/Hook			
Coolers & Stands			
Court Layout Cables			
Court Numbers			
Drag Brush			
Line Scrub			
Line Sweepers			
Line Tapes			
Lute Scarifier			
MAG / Calcium			
Maintenance DVD			
Nails			
Nets			
Net Posts & Reels			
Roller			
Roller Cover			
Gator Rake			
Tape Stretcher			
Tennie-Two-Step			
Tidi-Court			
Tru-Flow Spreader			
Windscreens			
Fasteners			
Ty-Wraps			
Plastic Snaps			
HydroBlend			
Coarse Blend			
Har-Tru			
Other			

Section 10

Court Characteristics



Photo 13: The Clegg Hammer is used to measure surface stiffness

Court Characteristic Tools

A. Indoor Parameters

Har-Tru is in the process of developing parameters around what makes an optimal Har-Tru tennis court. The goal is to provide a range for the variables that create the best playing conditions. A facility will be able to use these parameters for guidance and comparative purposes. It is a work in progress. You can stay up to date by becoming an active member of the Indoor Clay Court Community Forum on our website, www.hartru.com.

B. Surface Stiffness / Compaction

Har-Tru has been using a piece of equipment called a Clegg hammer to establish a measure of how hard a court is. We have now used this tool for a couple of years on dozens of courts, some multiple times. We have correlated readings with a subjective observation of the softness and traction. Additionally, we have compared readings from facility to facility, indoors to outdoors, from court to court and even from one location on the court surface to another. These readings have given us a sense for what is too hard and what is too soft. It has also allowed us to understand which areas of a court are most susceptible to hardening. We feel fairly confident that this is an acceptable tool for measuring hardness and we continue to test courts and build a data bank. We will also be trying to conduct play testing and correlate readings with player observations.

C. Traction

To Be Determined – This parameter will help clubs understand if their courts are too slippery or do not allow enough slide.

D. Surface Hydration

To Be Determined – This Parameter will allow facilities to discern whether there is a desirable amount of water in the surface profile.

Conclusion

Prevailing wisdom has it that Har-Tru courts perform too poorly in an indoor environment to bother installing them. Perhaps by understanding what is happening and clearly outlining a proactive approach to handling the challenges associated with indoor clay courts, this manual will help to dispel that sentiment. We have a tennis population that is rapidly aging and needs the soft sliding characteristics of Har-Tru, both indoors and out, to be able to play the game of tennis for life.

One observation in closing – facilities with continuity in their maintenance personnel and facilities that keep detailed records always have the best performing courts. This is true regardless of the age of the courts, the type of structure they are under, the irrigation system, or the air handling system in place. Keep detailed records of temperature and humidity, amounts of water applied, times spent on the different maintenance procedures, dates and amounts for when material was added, and records of when parts were replaced on tools and equipment. These records, along with a person who understands what they mean, are likely the most important ingredient for having a successful indoor clay court facility.

A true passion for tennis extends well beyond just the game itself.

At Har-Tru, we're fanatical about ensuring that your facility can provide an unbeatable and complete tennis experience. With us, you don't just play to win—you play for life. To learn how we can help you provide the best game possible, please contact:

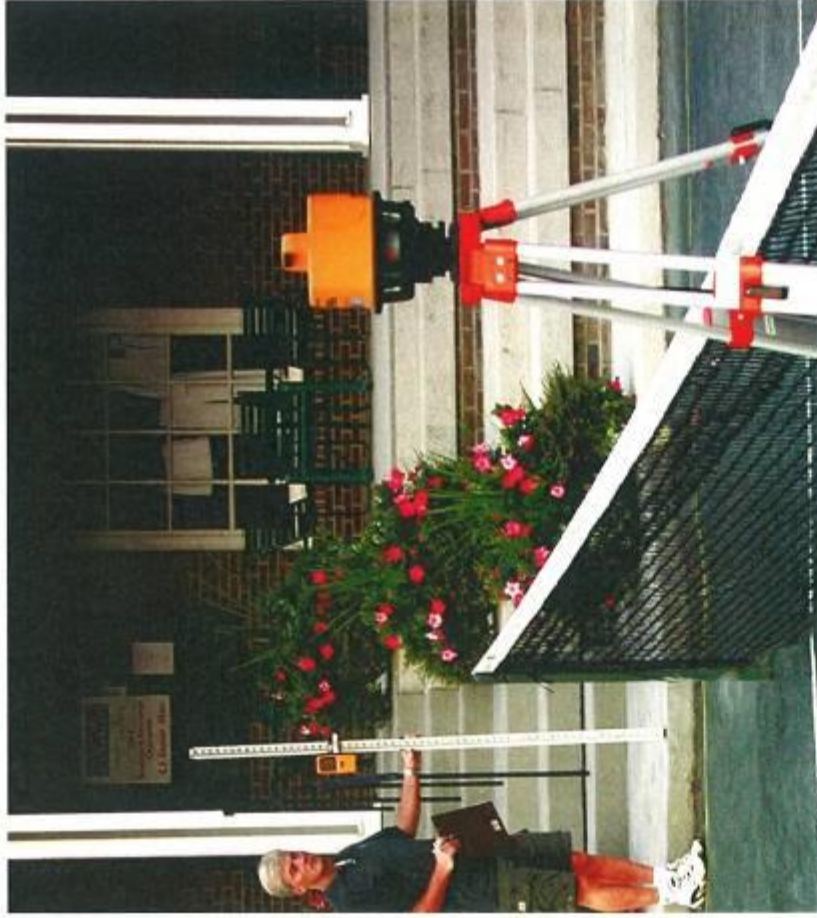
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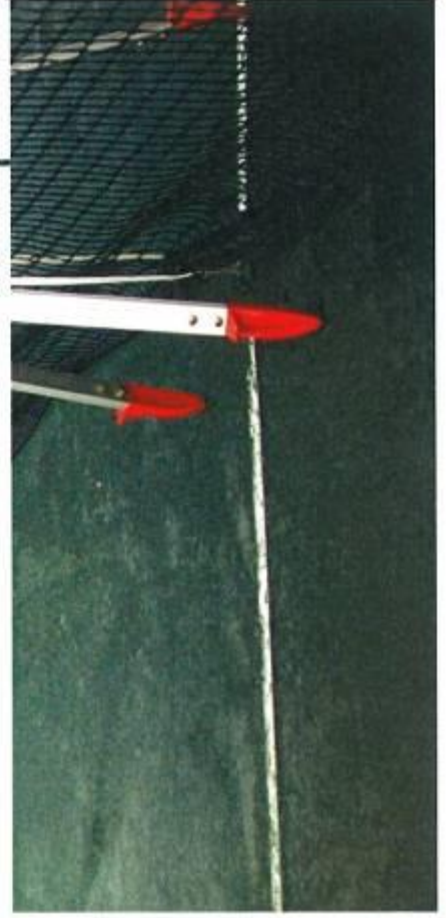
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A PASSION FOR THE COURT
ATTRACTS PASSIONATE PLAYERS





When you want complete confidence for installing, improving, upgrading and maintaining your tennis courts, turn to Har-Tru® Consulting.

Har-Tru looks well beyond the court surface to design an all-inclusive plan for creating the most compelling tennis experience possible, drawing on our 100 combined years of clay court expertise. Clients use these services:

- > For construction and maintenance guidance prior to facility renovations or new construction
- > To identify capital improvement needs for long-term planning and budgeting
- > To investigate the possibility of converting hard courts to clay courts

In addition, we can provide tailored maintenance programs and on-site training for your staff, adapted for your particular facility's needs.



Har-Tru Consulting offers the following options:

HAR-TRU MAINTENANCE TRAINING AND CERTIFICATION

A two-day certification seminar that will train your staff in every single aspect of effective and efficient court upkeep and construction, from irrigation to fencing to weed control and regular reconditioning. Certificates will be awarded to participants.

IRRIGATION SYSTEM DESIGN AND MAINTENANCE

A survey that identifies your current water system, how it operates, and how enhancements can be made—including recommendations on how to improve operating pressure, gallons-per-minute, general system components, and effective coverage.

OWNER'S REPRESENTATIVE CONSULTING

Our consulting service can be invaluable during the critical stages of construction, rebuilding and reconditioning. We can help you convert your old hard courts to Har-Tru, ClayTech® or HydroCourt surfaces. In addition, we can assist in developing a long-term plan for success, from court selection to installation and beyond.

ONE-DAY FACILITY VISIT

During our one-day facility visit, we'll inspect your courts and consult with you to identify opportunities around spring reconditioning, court opening, daily and periodic maintenance, annual budgeting and control of operating expenses.

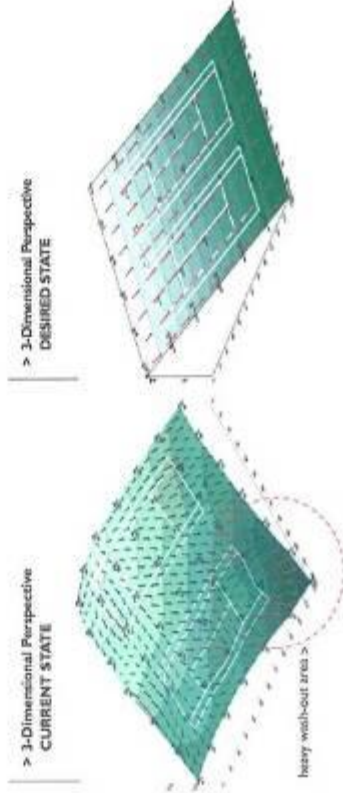
COURT ANALYSIS SURVEY

Har-Tru consultants will check your courts for proper slope, survey court thickness and base material, and examine your equipment, amenities and irrigation system.

LIGHTING ANALYSIS SURVEY

We offer a full lighting analysis service, including system design, installation and maintenance. We analyze your existing lighting system, generating a photometric map that illustrates how improvements can be made—from changing bulbs to installing the latest energy-efficient light fixtures.

The information gathered for the Court Analysis Survey (CAS) and Lighting Analysis Survey (LAS) is put into a bound, full-color, easy-to-read report—complete with photos, charts and computer-generated drawings specific to the facility being analyzed. Har-Tru personnel can also present the CAS and LAS information to a club's board of directors, resort management, tennis committee, members or other groups of interest.



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