

2019



1.877.442.7878



Har-Tru
Maintenance Manual

TABLE OF CONTENTS

Section 1	Court Evaluation & Season Preparation	5-18
a.	Perimeter Curbing	6
b.	Court Surface	7-11
c.	Fencing	12
d.	Court Lines	12-13
e.	Net Post & Net Installation	14-15
f.	Windscreen	16
g.	Miscellaneous Court Amenities	17
Section 2	Watering Har-Tru Courts	19-21
Section 3	Chemical Use	23-25
Section 4	Weed Control	27-29
Section 5	Court Equipment	31-33
Section 6	Daily Maintenance	36-37
a.	Morning	
b.	Mid-Day	
c.	Evening	
Section 7	Periodic Maintenance	39-42
Section 8	End of Season Maintenance	43-44
Section 9	Miscellaneous Maintenance Practices	45-46
Section 10	Budget Planning	47-50
Section 11	Budget Planning	51-55



Har-Tru Court Maintenance

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



Har-Tru clay court surface is a mixture of several different sizes of stone which are crushed and passes through screens to get the right formulation. A binder or gypsum is added to this mixture to aid in initial court construction. The binder helps the surface set up quickly as water activates this additive and aids in holding the surface together for quicker compaction during construction. The binder or gypsum is only temporary and will dissipate out of the court as rain and watering washes this substance clear. By this time the surfaces natural process of compacting and seating has taken place.

Har-Tru clay court surface changes over time. The courts are built on a slope that is 1" in every 24-30'. This amount of slope allows a balance of water run-off as well as penetration into the surface. When the courts have the right amount of slope, this balance promotes the right amount of surface moisture. The water that is retained makes its way to the base of the court. During the day, through capillary action, moisture stored in the base is drawn up to the surface.

Har-Tru clay court surface is applied at a thickness of 1" during construction, according to ASBA specifications. Over time, the surfaces thickness changes as the surface on the high side of the court migrates to the low side of the court. This is a natural process through rain and watering of the courts. The Har-Tru surface then becomes thinner on the high side of the courts and thicker on the low side of the courts.

Har-Tru clay court surface changes naturally. The natural process of rain, wind and irrigating the courts constantly move the finer particles of surface material from the high side of the courts to the low side of the courts. These finer particles are constantly created as playing and rolling the courts grind down the larger particles making finer ones. An over abundance of finer particles can make the courts surface harder as they tend to compact more.

Har-Tru clay court surfaces need to be reconditioned annually. 1-2 tons of fresh surface material is added to the surface to refresh the surface and eliminate low spots on the court. This process also adds some thickness back to the surface to help replenish surface loss due to surface migration.

Har-Tru clay court surfaces also needs refreshing over longer periods of time. As stone particles breakdown from everyday play and maintenance, the finer particles are washed to the lower side of the court. The high side of the court becomes thinner and the low side of the court becomes thicker, but this thicker surface on the low side is made up of surface material that is not within spec. Water penetration is slower, the surface gets harder and the areas of the court may see some base material or stone screenings heave to the top of the surface as the surface becomes thinner. At this stage of the courts life, it will be necessary to put a surface lift on the court. A lift consists of adding surface material to get the surface back at 1" thick as well as refreshing the court with surface that is back into spec with the right blend of stone particles. A complete 1" lift is done best and most consistently using laser guided equipment. This process should be considered every 10-15 years.



Section 1

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.

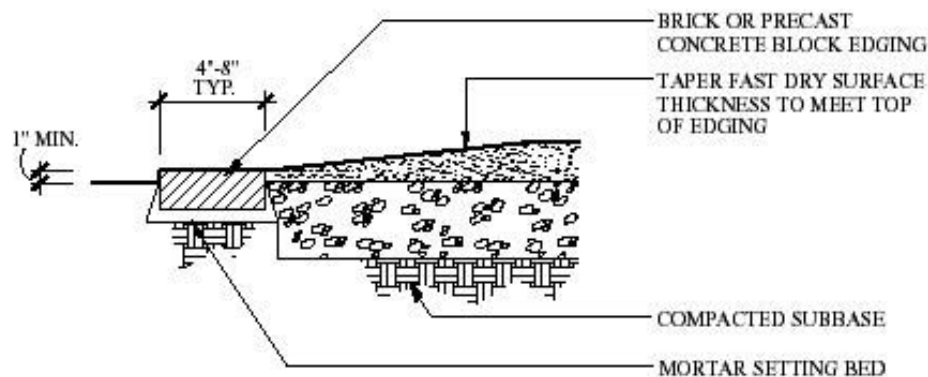


Illustration 1

B. COURT SURFACE

Inspect the Har-Tru surface, looking for high and low spots usually found in high traffic areas such as 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 scrape down and 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 a 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 with Top-dressing the 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. Topdress 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. HydroBlend is also used on ClayTech courts.

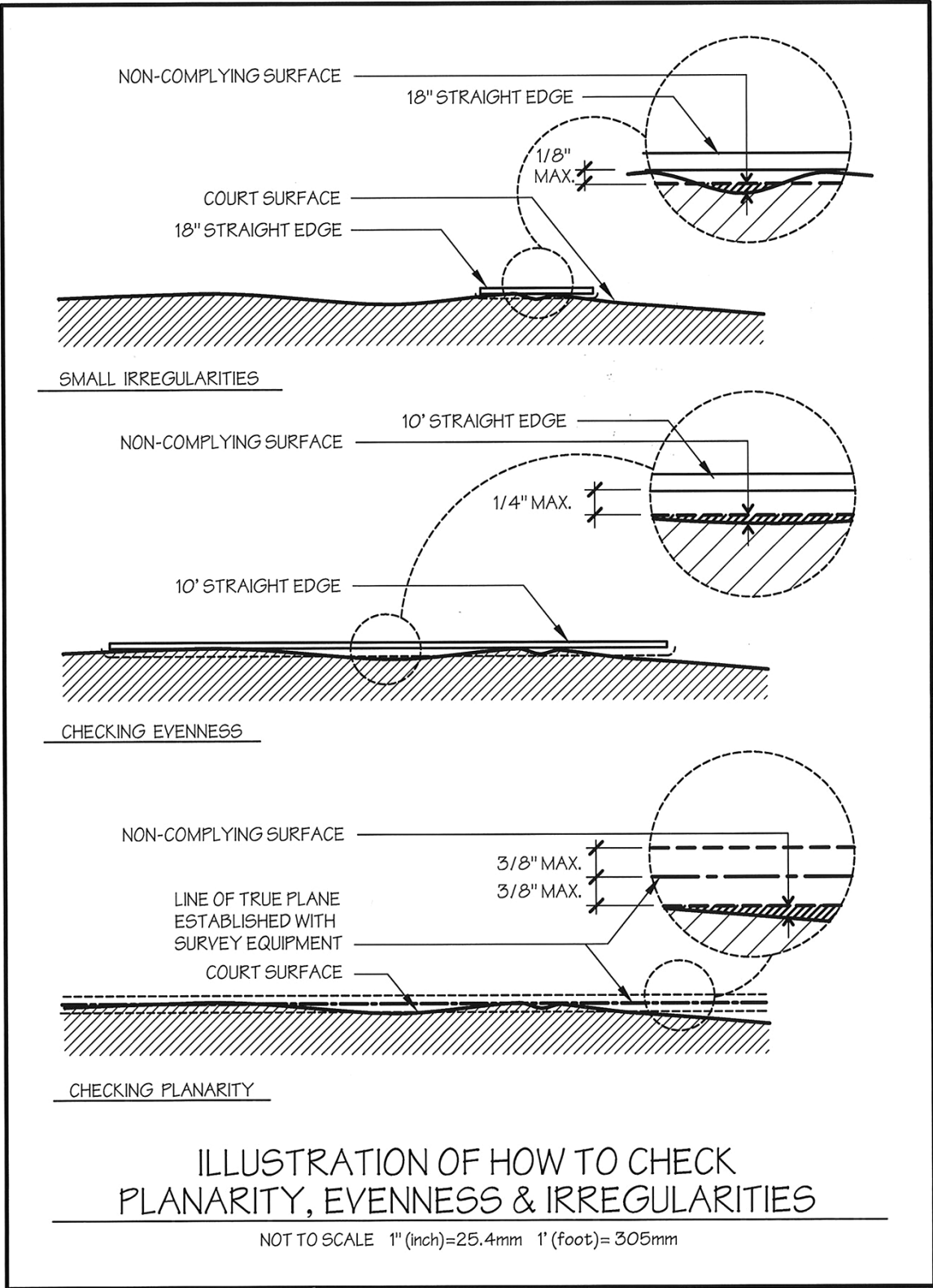


Illustration 2

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.

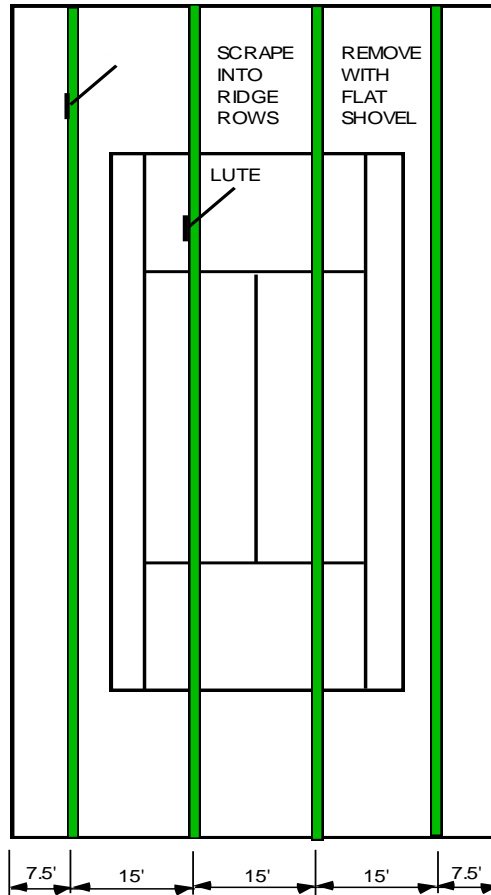
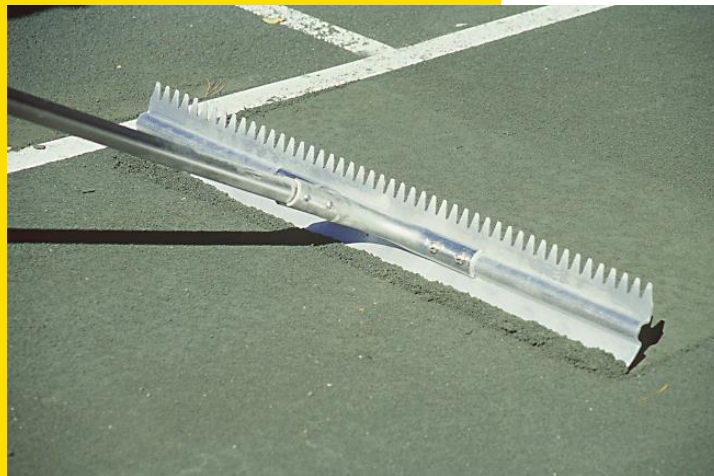


Illustration 3

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. Fill the hole with new surface material to approximately ¼" above the surface grade.
4. Compact the patch area while it is dry with a tamper.
5. Level and scrape off excess material with a hand lute.
6. Water thoroughly but not directly. Water should be applied next to the patch and allowed to roll over it. This will allow the patch to absorb water without being damaged. Allow to set overnight and roll in the morning using a hand roller.

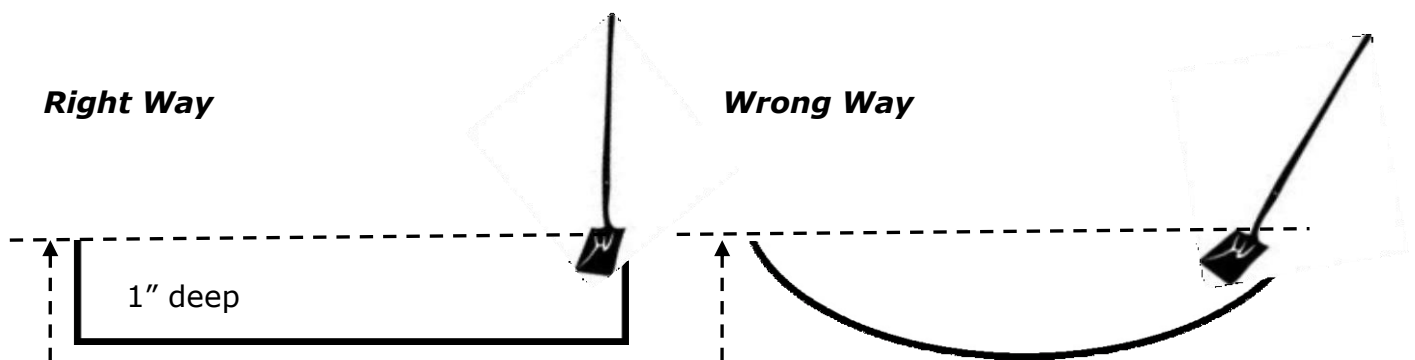


Illustration 4



Step 1



Step 2



Step 3



Step 4

C. FENCING

Inspect court fencing and make sure,

1. Bottom, Intermediate and Top Rails are secured at the proper height above the court surface and evenly parallel around the court.
2. Line, Corner and Terminal Posts are plumb and vertical with End Caps in place and secure.
3. Fencing Fabric evenly stretched and secured to the upright posts. Height of fence bottom approximately $\frac{3}{4}$ " above the court surface.
4. Bottom Tension Wire should be tied to fence bottom with "hog rings" spaced every 24 inches.
5. Gate Frame tension bars, Post Hinges and Latching Devices should be inspected and secured.

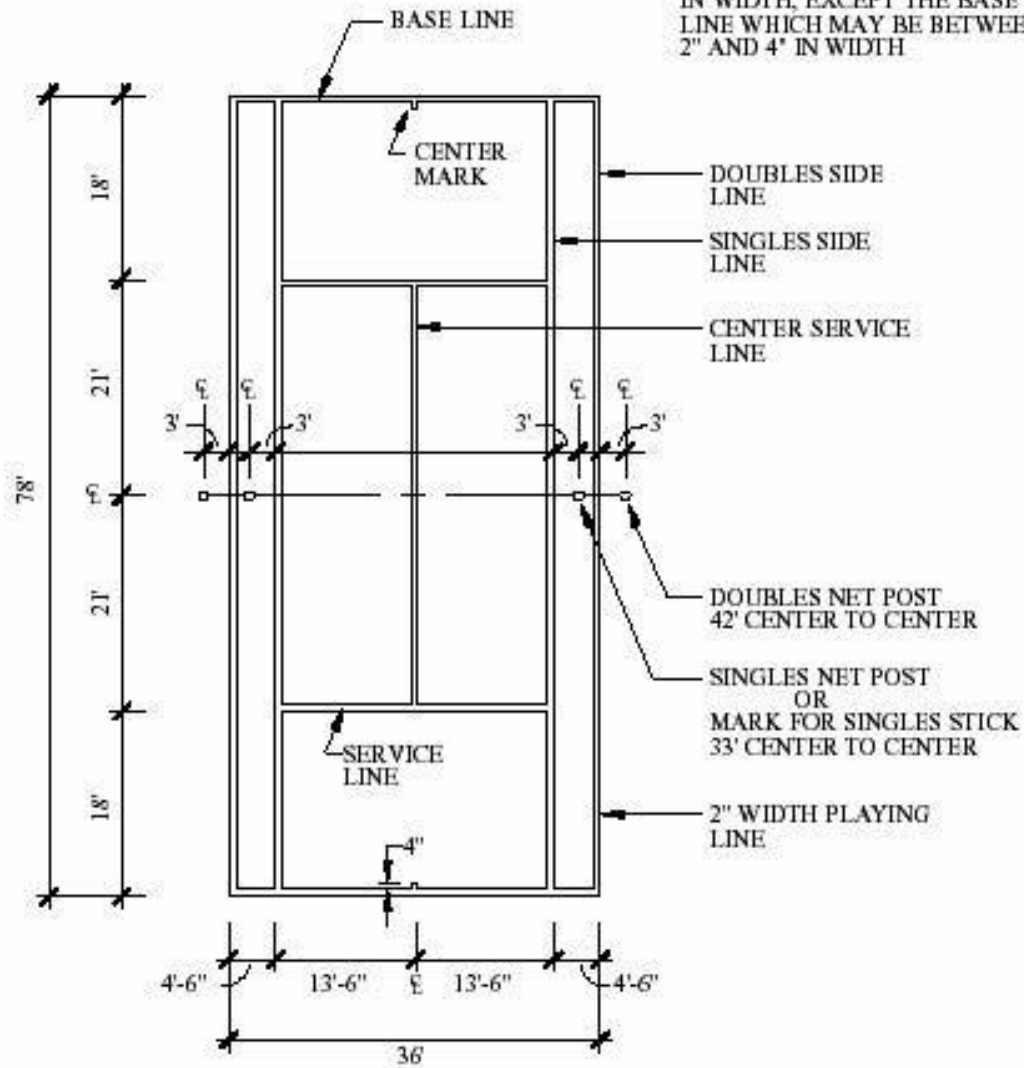
D. COURT LINES

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. Har-Tru Line 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 $\frac{1}{8}$ " 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

E. 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.

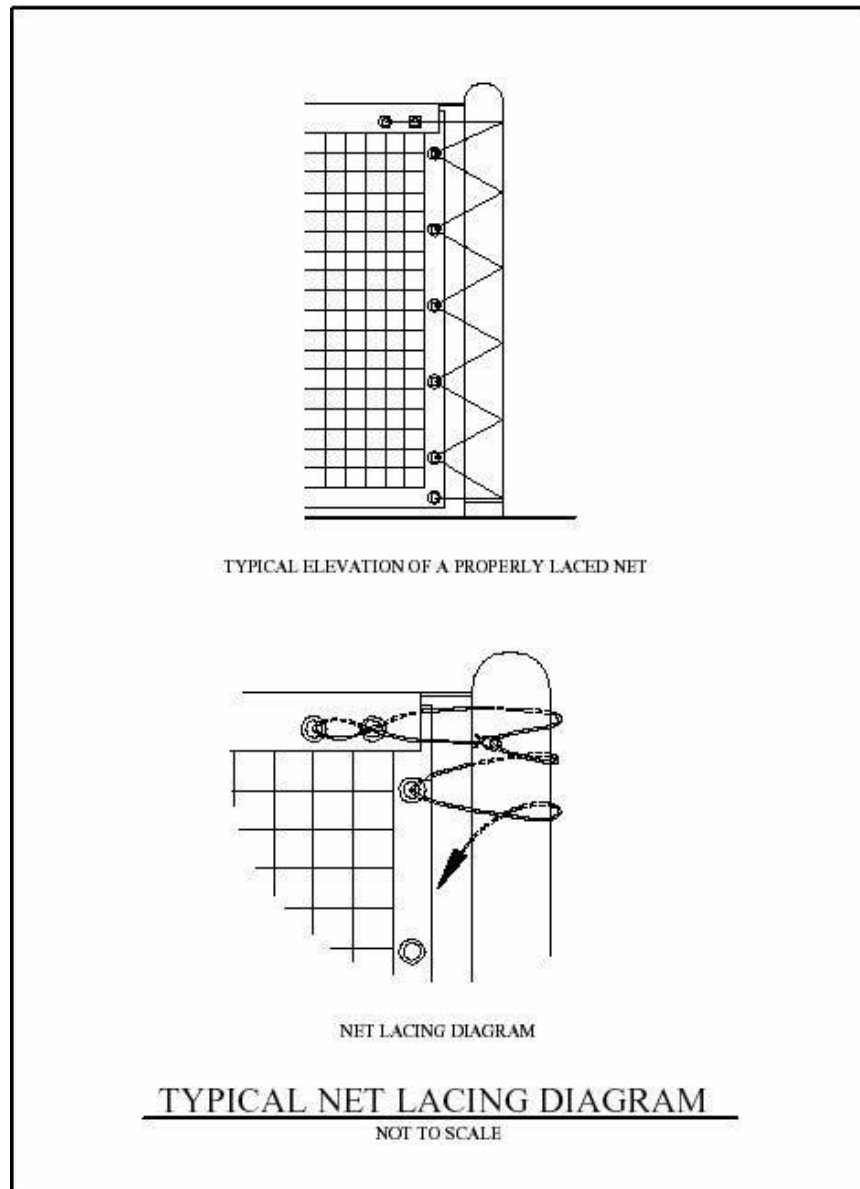
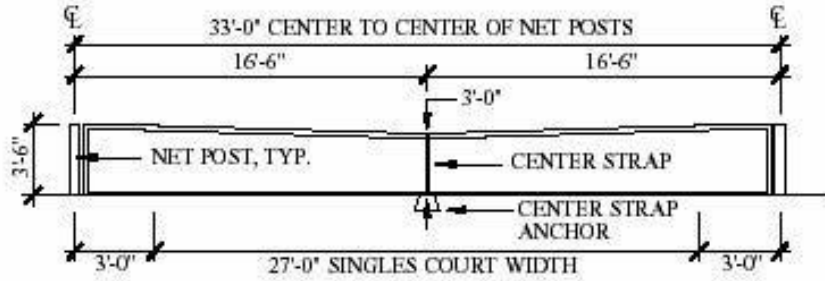
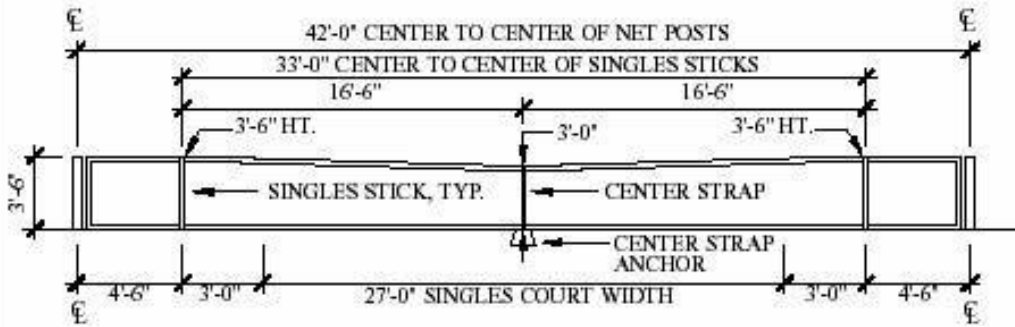


Illustration 6

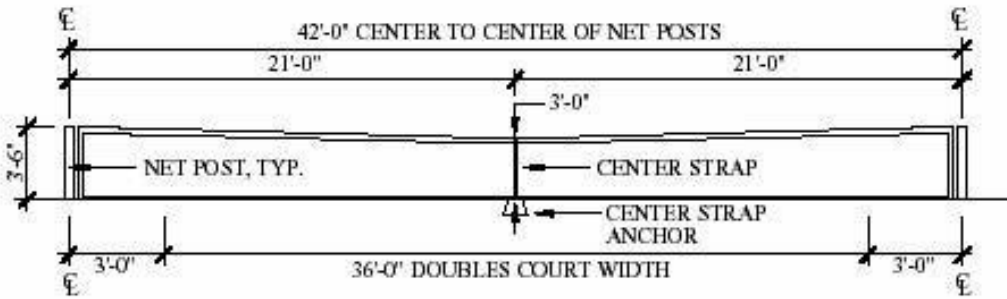
NOTE:
 THE NET SHOULD BE INSTALLED
 WITH A RECOMMENDED TENSION OF
 450 LBS. FOR RECREATIONAL COURTS
 & 550 LBS. FOR PROFESSIONAL COURTS



SINGLES NET



DOUBLES NET W/SINGLES STICKS



DOUBLES NET

TYPICAL TENNIS NET ELEVATIONS

NOT TO SCALE

31NETELEV.AVL.03B

Illustration 8

F. WINDSCREEN

Inspect Windscreen for holes and frayed areas. Windscreen can fade and become worn after a few seasons. We recommend to replace windscreen every 3-5 years or as needed due to worn and faded appearance. Use ty-wraps, plastic snaps and fasteners where necessary to attach the Windscreen to the fence.

Note: When replacing and re-ordering Windscreen, make sure to supply the correct measurements needed. Wind screen is usually made-to-order to fit your particular needs.

G. MISCELLANEOUS COURT AMENITIES



Court Seating

Court Seating comes in many forms 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.



H. WATER COOLER MAINTENANCE

Water Coolers should be cleaned and sanitized before the beginning of each day and fresh water re-filled daily. 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.



Top Dressing

Top dressing is the process of adding new material to an existing court. A court is built with 40 tons of Har-Tru, which amounts to a 1" surface. Studying surface loss over time has shown that over the course of a playing season a court loses 1-4 tons of Har-Tru, depending on the environment, the amount of play and the irrigation system. While losing 1/10th of an inch seems fairly innocuous, in just two seasons it is possible to lose 1/4" of your original court. Reducing the depth of your court will cause it to dry out faster and will allow stone from the base layers to start working its way onto the surface, creating bad bounces. And it is vastly simpler to add 1-4 tons a year than it is to add greater amounts as heavy top dressings are difficult to do while maintaining the grade of the court. So top dress annually to lengthen the life of your court.

Steps to Top Dressing

1. Pull up Court Lines and clean court of debris
2. Roll until the court is firm (if necessary)
3. Scrape court and remove excess Har-Tru
4. Thoroughly scrape and clean the edges of the court
5. Scarify and level the court surface
6. Patch low areas
7. Top dress, water and roll
8. Lay Court Lines and roll



Section 2

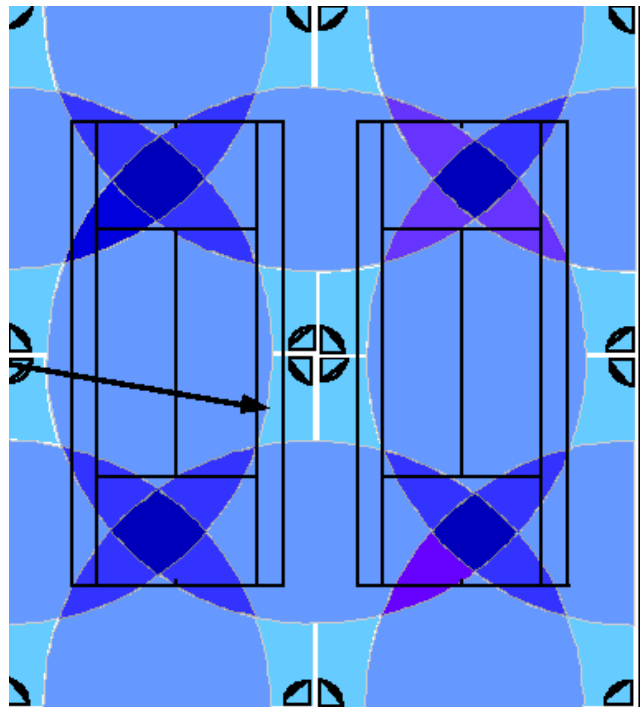
Irrigation System

WATERING HAR-TRU COURTS

The objective is to water the courts thoroughly and uniformly, saturating the court's surface and base. The ideal amount of water would be for the court to stay moist until the next maintenance period. The ideal time to water the Har-Tru courts is typically between 12:00AM through 3:00AM, determined by observation. Mid-day watering will be necessary during summer months usually for 5-10 minutes.

Best Sprinkler Configuration

A sprinkler system made up of 8 heads is the ideal configuration for delivering a consistent water pattern.



Recommended Sprinkler Heads For Har-Tru Clay Courts

Signature brand:

- # 6005
- # 6503
- # 6505
- # 7500
- # 7503
-

Rainbird brand:

- # 5505S
- # 7005S
- # 8005S
- Falcon F4FC/PCSS
- Falcon F4Fc/PCSSHs

Hunter brand:

- # I2004SS
- # I2504SS
- # I2504SSHs
- # I4004SS
- # I4004SSHs

IRRIGATION SYSTEM

Inspect irrigation system equipment.

Equipment

Condition

<u>Equipment</u>	<u>Condition</u>
Controller	
Risers	
Sprinkler Heads	
Valves	
Valve Boxes/Lids	

Activating the irrigation system is a two step process, inspection of main feed lines and inspection of the zone valves and sprinkler heads.

1. Determine if any breaks exist in the irrigation lines leading to the tennis courts by activating the main supply line while keeping the zone control valve to the courts turned off. Ensure that the pressure booster pump is not operating during this process. If a leak does exist, the water will be forced up to the surface in a very short time and a repair can be made.
2. Test and adjust the performance of each sprinkler head.

Note: Make sure to review and adjust each sprinkler head periodically as they do get misaligned. Providing consistent water coverage to the clay courts is very important. Courts that do not receive consistent moisture will dry and the integrity of the courts will fail.

Sprinkler Head Placement

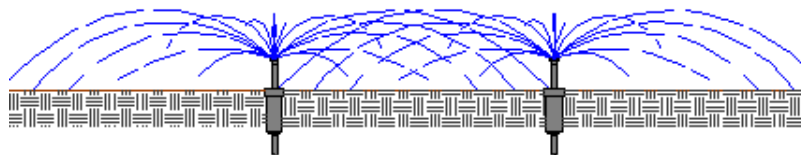
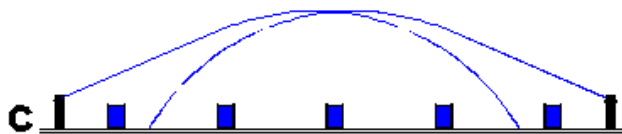
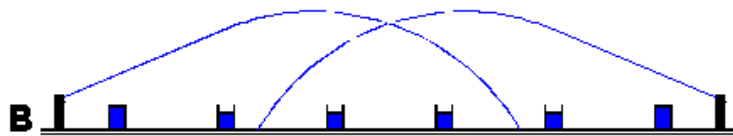
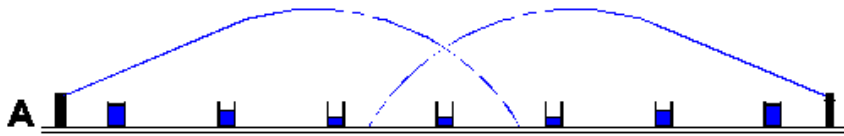
The illustration below shows 3 examples of Sprinkler head coverage.

Example A - Shows the sprinklers streams barely overlapping. Much more water is falling in the cups next to the sprinkler heads but the middle 3 cups are only getting $\frac{1}{2}$ the water of the cups next to the sprinkler heads.

What's wrong with this system? If you watered long enough to get the middle of the courts watered, you would end up with an overabundance of water closer to the sprinkler heads.

Example B - Shows that moving the sprinklers closer together has evened up the amount of water a bit more. However the areas near heads are still getting 25% more water than the other areas.

Example C - Shows almost head-to-head spacing. The cups are almost all uniformly full. This illustration shows that sprinkler head spacing should give you head to head coverage.



"HEAD-TO-HEAD COVERAGE"
 THE WATER FROM ONE SPRINKLER
 GOES ALL THE WAY TO THE NEXT
 SPRINKLER

Section 3

Chemical Use





Application:

Apply 2 bags per court once every 1-2 weeks or as desired. Geographic location will dictate how often to apply this product. Northern states will need to use less than southern states.

Magnesium Chloride is a great way to supplement your courts moisture needs.



Application:

Spray directly on the moss growth, only where needed. Moss Buster kills on contact and is not an inhibitor.

Moss Buster is an all natural product and safe for the environment.



Application:

Introduce Cutrine to the HydroCourt system by pouring into HydroCourt control boxes at a rate of 8 oz. per box. This should be repeated every 4 months.



Application:

Use the Lawn Wheelie to spray Round-Up Pro directly on broadleaf weeds.

CHEMICAL USE

Magnesium Chloride

Damp tennis court surfaces provide ideal playing conditions as well as protection from wind erosion on clay. Magnesium Chloride is an excellent tennis court conditioning product that eliminates the need for constant watering of tennis courts or the application of other conditioning chemicals. It's use creates a long lasting damp surface that provides consistent playing conditions.

Calcium Chloride

Calcium Chloride is also a great product to use and the end result is very similar to that of Magnesium Chloride.

Moss Buster

Moss Buster can be used to eliminate existing moss growth on a Har-Tru clay court and is safe for use on sub-irrigated courts as well. Moss Buster desiccates all types of moss and is an all natural product. This product eliminates existing growth but is not a pre-emergent which prevents growth from starting.

Cutrine Algaecide

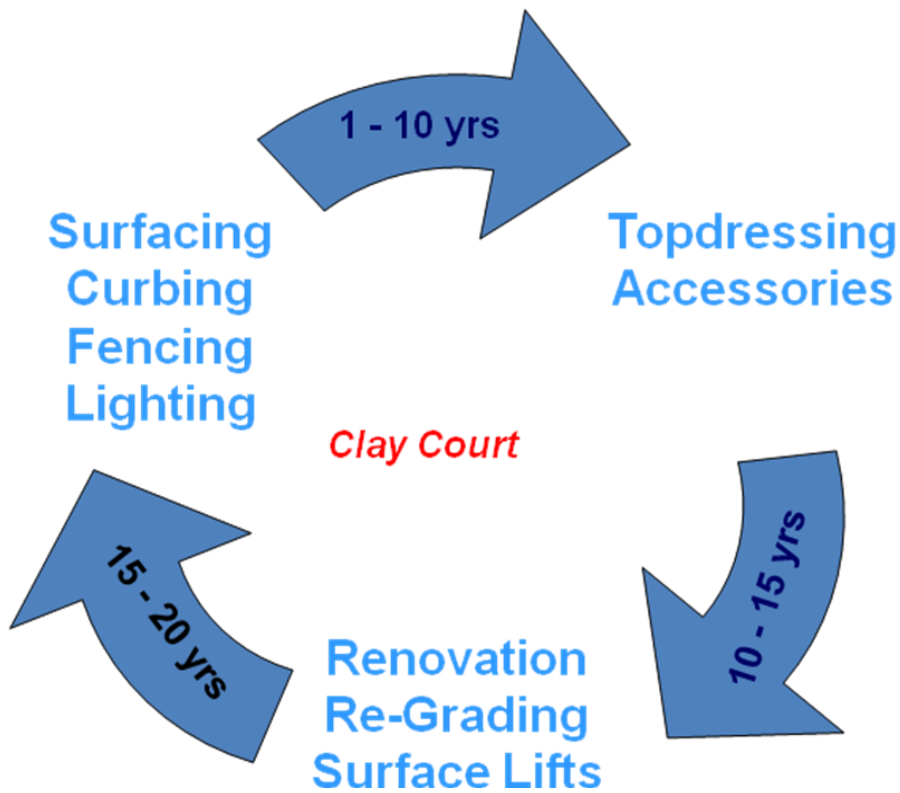
Cutrine liquid algaecide can be used in sub-irrigated tennis court systems and is introduced in the water control boxes. The application rate is 8 oz. per each water control box per application. Applications should be made every 4 months to prevent algae from establishing itself. The recommendation is for 1 gallon of cutrine per court per year to deliver the best algae control available. This product works best as a preventative.

Round-Up Pro

Round-up ProDry herbicide is sold for the control of broadleaf weeds. This product kills weeds on contact and is not considered a pre-emergent. Use the Lawn Wheelie to apply to tennis courts.

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 4

Weed Control



WEED CONTROL – USING HERBISIDES

The main objective of herbicide use is to apply the proper chemical in a correct manner to achieve an adequate level of weed control. Weed growth may become a problem on those areas of the tennis court where the least amount of traffic occurs, around the inside perimeters and along the net line.

A basic understanding of herbicides is essential before making any decisions involving the purchase, mixing and application of an herbicide. Always contact your local agricultural extension office for the latest regulations and recommendations.

Herbicides fall into 2 general categories: Pre-emergent and Post-emergent.

1. A **Pre-emergent** herbicide provides a measure of weed control by forming a “chemical barrier” that interferes with the germination process of a weed seed. The weed seed actually germinates, absorbs the chemical through the emerging root, and then dies.
2. A **Post-emergent** herbicide provides a measure of weed control if applied properly over the leaf surface. The chemical is absorbed by the leaves and in most cases translocated throughout parts of the plant before the weed dies. Post-emergent herbicides are classified as either **SELECTIVE**, meaning that they control only certain broadleaf weeds, or **NON-SELECTIVE**, meaning that they control everything that they are applied to.
3. A **combination** of both pre-emergent and post-emergent herbicides can be employed to control existing weeds and weeds that have not yet germinated. **However**, only certain herbicides are compatible; meaning they can be safely mixed together. Roundup and Surflan are examples of compatible herbicides.
4. **Always** read and follow the instructions on the herbicide label before use. Always consult with your local county extension agent for advice on any weed problem.
5. The **method** of herbicide application is the key to quality control. Maintain constant pressure, agitation, and a constant walking pace. Keep the spray nozzle at a constant height above the ground. This method ensures that an **evenly distributed** band width of chemical has been applied correctly.

WEED CONTROL – NATURALLY

Controlling weeds and other organic growths on a tennis court should be a priority throughout the life of a tennis court. Weeds, algae and moss can damage the courts surface and base and could cause safety hazards on the court.

One of the best and most consistent ways to control weeds, algae and moss growth is surface agitation. Surface agitation should be the first step to preventing these growths. Consistent and daily surface brushing and scarifying will help to prevent and eliminate weed, algae and moss.

If you notice, usually an infestation gets its start around the perimeter of the court or at the net line. These are areas of the court that gets the least amount of brushing and surface agitation during the maintenance process. Always make sure to brush these areas the same as you would the playing areas. Remove the court seating and other obstacles in order to ensure complete court agitation. Remove the net periodically and brush or lute the center of the tennis court periodically to prevent or eliminate growth.

Other causes of infestation could be pulling water from a pond or a water source that is high in algae content. Without a filtering system, algae is being delivered to the courts through the water supply. Gas cutting mowers and even wind can introduce weed seeds & spores to the tennis court. The result of these seeds blowing on the court is usually seen around the fence line where the surface is never agitated.

Include in your daily maintenance regiment, consistent surface agitation around the perimeter of the court as well as under court seating and around the net for a more natural way to combat weed, algae and moss infestations. If an infestation occurs and agitation alone does not eliminate the problem, then consider using a herbicide.

The following is a list of tools used for surface grooming as well as surface agitation:

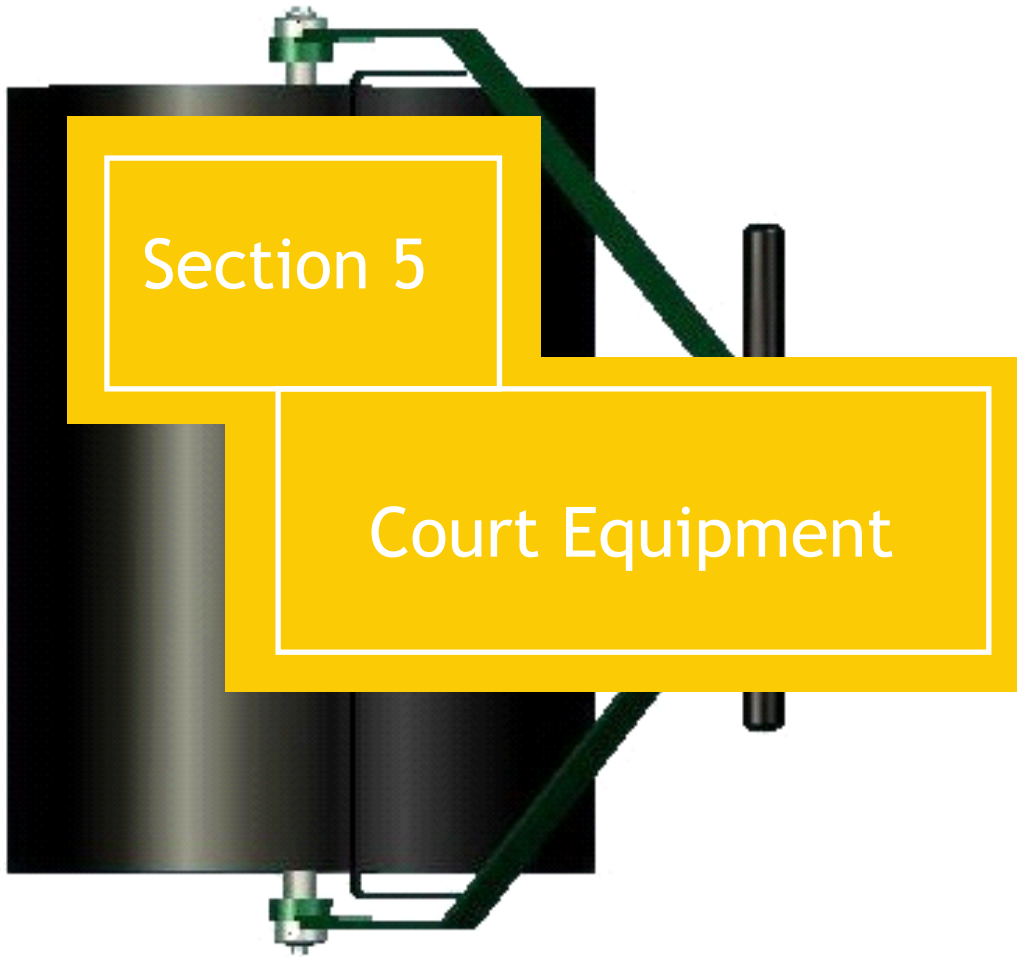
- Drag Brushes – Daily grooming and light surface agitation.
- Steel Drag Brushes – for more intense grooming and surface agitation.
- Hand Lute Scarifier – Provides surface agitation using a rigid blade with teeth, also has a smooth edge for pulling and gathering loose dead material.
- Court Rake – Designed to loosen and groom the court surface with narrow spring steel teeth.
- Court Devil – Uses saw blades to agitate and scarify the surface.
- Tow Scarifier – 48" wide use for full court scarification.

Note: All tools and scarifying equipment have a limited surface penetration of no more than 1/16" to 1/32". This amount of scarification will not damage the integrity of the courts surface.

Har-Tru clay courts can develop weed, algae or moss growth in many different stages of infestation. Sometimes infestations can occur quickly and seem to be apparent overnight. In fact it happens over time and sometimes not noticeable until the growth is established. Surface agitation is the best cure and preventative for most potential infestations. Using scarification tools to best suit your situation will be important. Less aggressive tools such as lutes, metal brushes and rakes are a great way for everyday use to prevent growths from occurring. When more aggressive scarification is needed, Court Devils and the Tow Scarifier is the answer. Weed, algae and moss control can be done naturally if done consistently through a good maintenance plan.



Sometimes infestations happen. You will need to scrape off the algae and moss from the surface. It will be important to remove these scrapings from the court. Do not brush these scrapings throughout the court as this will cause the spores to spread and establish themselves in other areas of the court.



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.

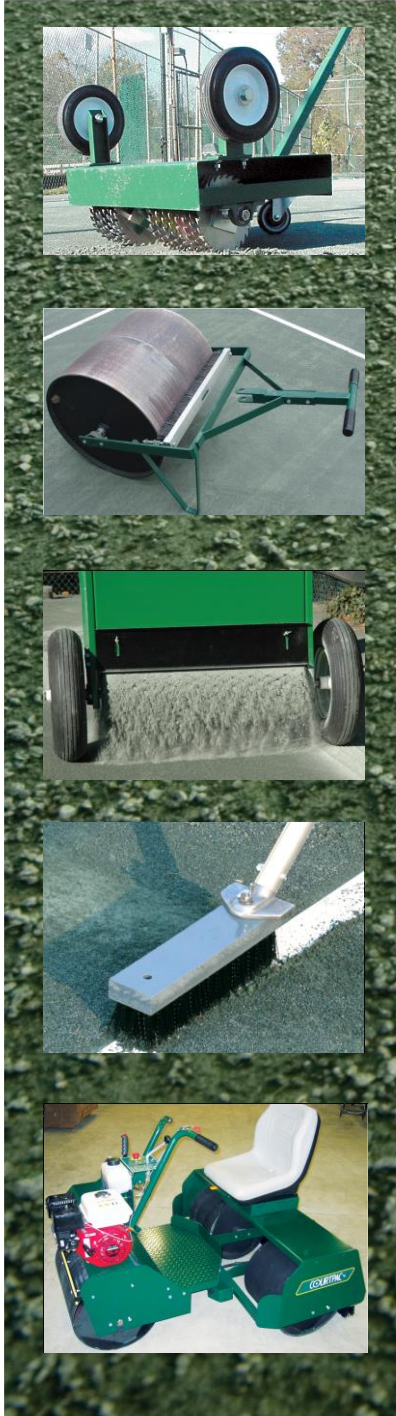
Har-Tru Gator Rakes: Having a Gator Rake on hand will be essential in cases where the surface will need a deeper scarification. There are hand and tow models available.

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 is available. This equipment is used 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 and Top-Dressers 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.

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.

COURT EQUIPMENT

Inspect condition of the following equipment:

<u>Equipment</u>	<u>Condition</u>
Center Strap Anchors	
Center Straps and Hooks	
Court Numbers	
Drag Brushes	
Line Scrub	
Line Sweepers	
Line Tapes	
Lute Scarifiers	
Nails	
Nets	
Net Posts	
Net Post Reels	
Rollers	
Roller Brushes	
Roller Scrapers	
Tennie Two-Step	
Tidi-Court	
Windscreens	
Fasteners	
Ty-Wraps	
Plastic Snaps	



Section 6

Daily Maintenance



STEP 1
Brush Courts



STEP 2
Sweep Lines



STEP 3
Water Courts



STEP 4
Roll Courts
If Necessary

DAILY MAINTENANCE

MORNING

1. Inspect Har-Tru surface for minor scuffing. If baseline areas require divot repair, lute and re-dress as necessary.
2. Remove any weed growth problems and foreign debris from the surface.
3. Inspect tapes and nails for lifting or shifting.
4. Groom surface with an Aussie Clean Sweep, Court Rake or a Drag Brush. Make wide turns with the Drag Brush to avoid accumulation of Har-Tru material. The Aussie Clean Sweep serves a dual purpose; as a smoothing/leveling tool (with teeth in the up position) and a debris remover (with teeth in the down position).
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. Roll the surface if necessary. Make wide turns. Avoid twisting and turning motions that cause surface damage.
7. Sweep the tape lines after the surface has been rolled for a cleaner looking line (optional).
8. Ensure that the net and center strap is set correctly.
9. Clean benches, coolers, cooler stands, ect. If these items are kept on-court during the season, move them and groom the surface below on a regular basis.
10. Wash out the Tennie Two-Step on a daily basis if possible.
11. Inspect Windscreens.
12. Ensure Line Sweeper, Aussie Clean Sweep, Court 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.

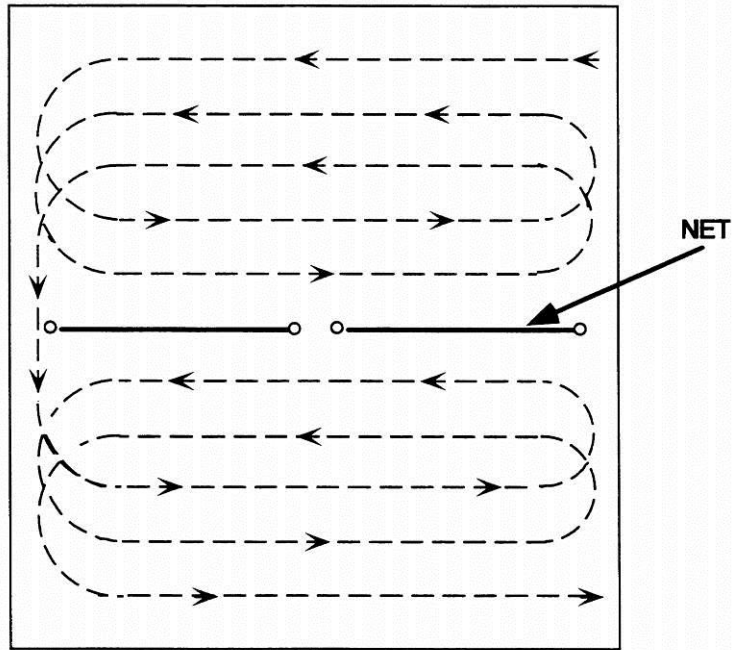
EVENING

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.

TECHNIQUE FOR "QUICK CONTINUOUS" ROLLING

Example of rolling
several courts
without removing nets.

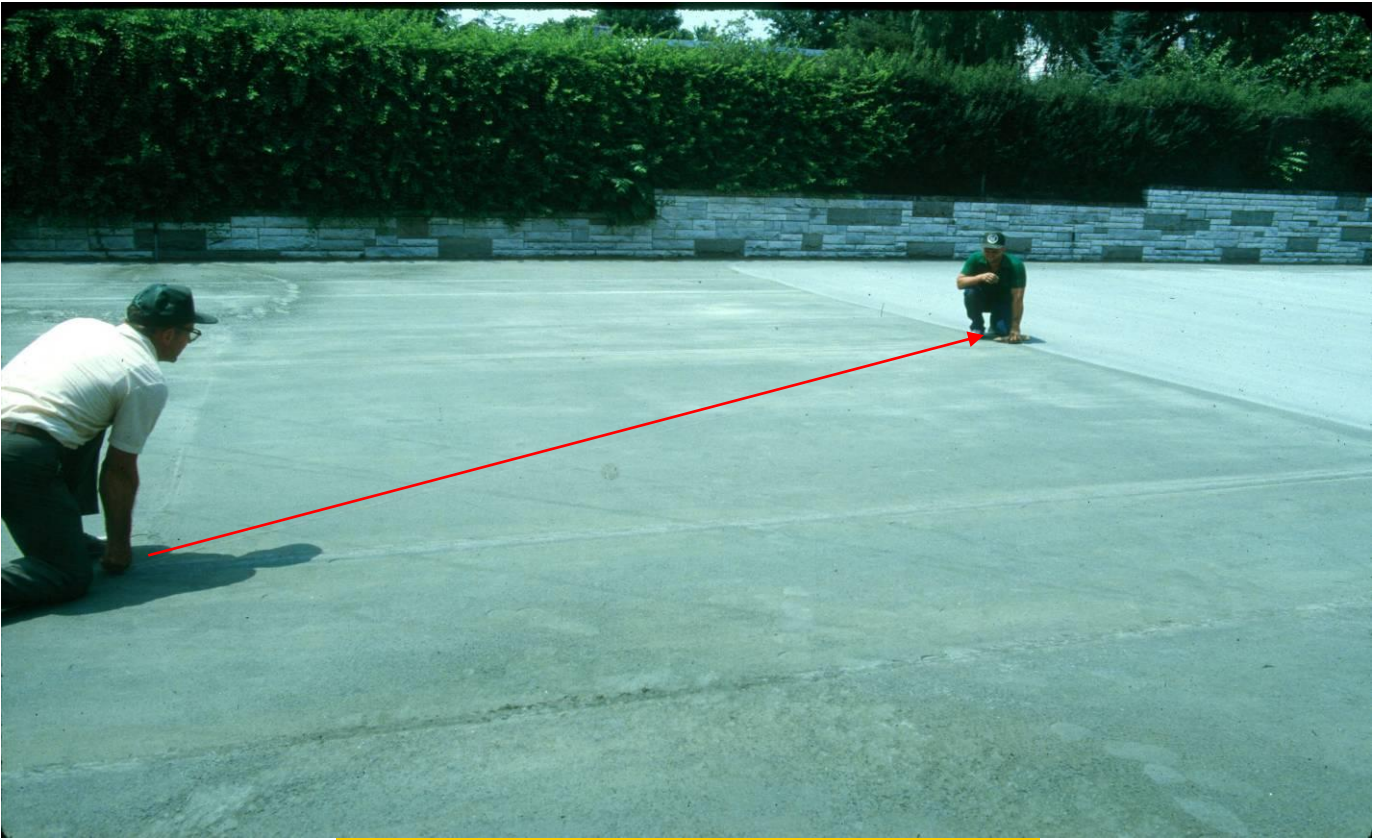


HAR-TRU 101

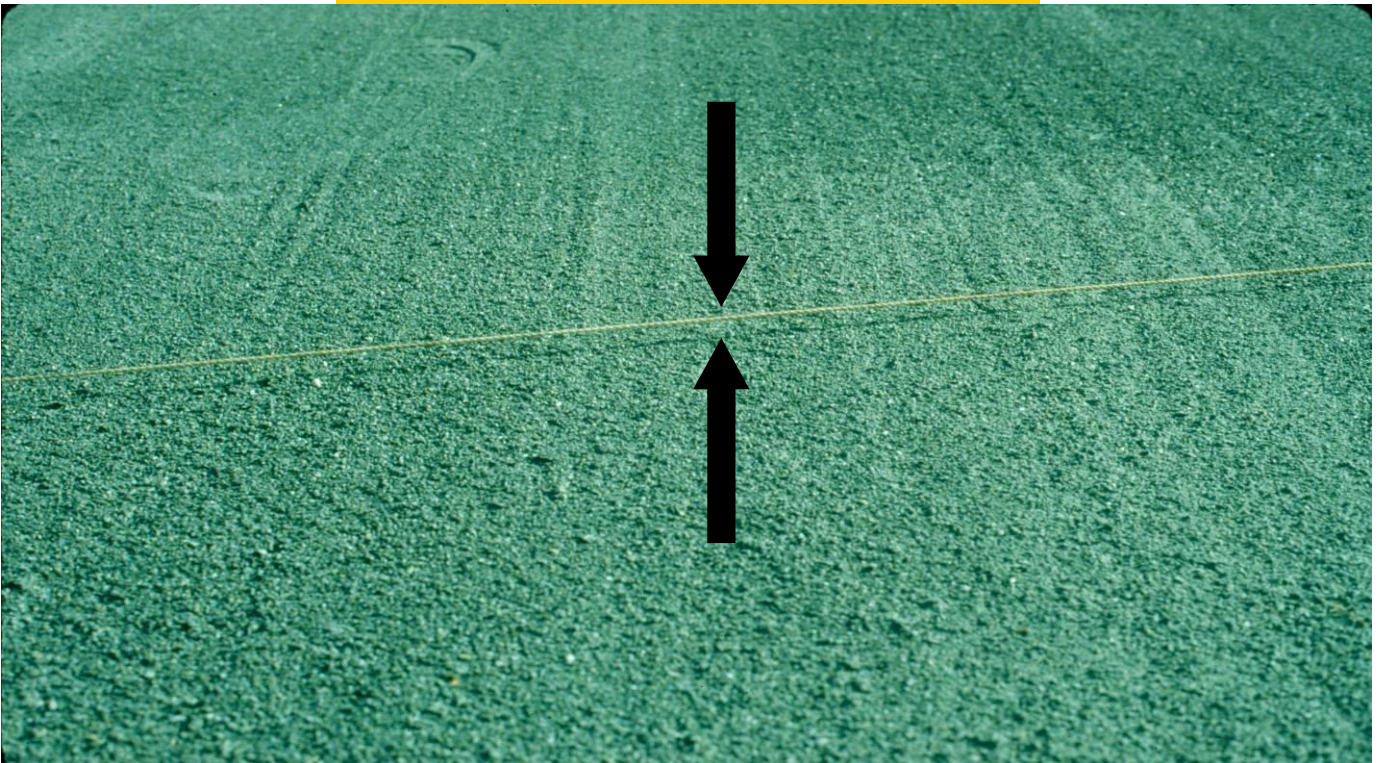
Section 7

Periodic Maintenance





Checking Planarity



PERIODIC MAINTENANCE

1. Inspect court surface material for any build-up to be removed; particularly along the net-line.
2. Inspect the court surface for weed growth. Algae control is best achieved by following these guidelines:
 - a. Agitate low traffic areas on the court periodically. Use the Court Rake, Lute/Scarifier, Steel Bristle Drag Brush, Court Devil or the Lee Tow Scarifier.
 - b. Stay on top of growth problems by regular observation and **preventive** maintenance practices such as frequent surface agitation.
 - c. **Consult** your local county agricultural cooperative extension agent prior to the purchase and application of any chemicals.
 - d. **Always** read the entire chemical label and follow any safety precautions prior to application.
3. Periodic leveling/smoothing of the court surface may be required, particularly in areas of heavy play. The best time of the day for smoothing the surface is during the afternoon when the surface is drier, just before turning on the watering cycle. Use a regular or Steel Bristle Drag Brush.
4. Periodic observation of the irrigation heads while irrigation system is running is the best preventive measure to ensure thorough and even water distribution.

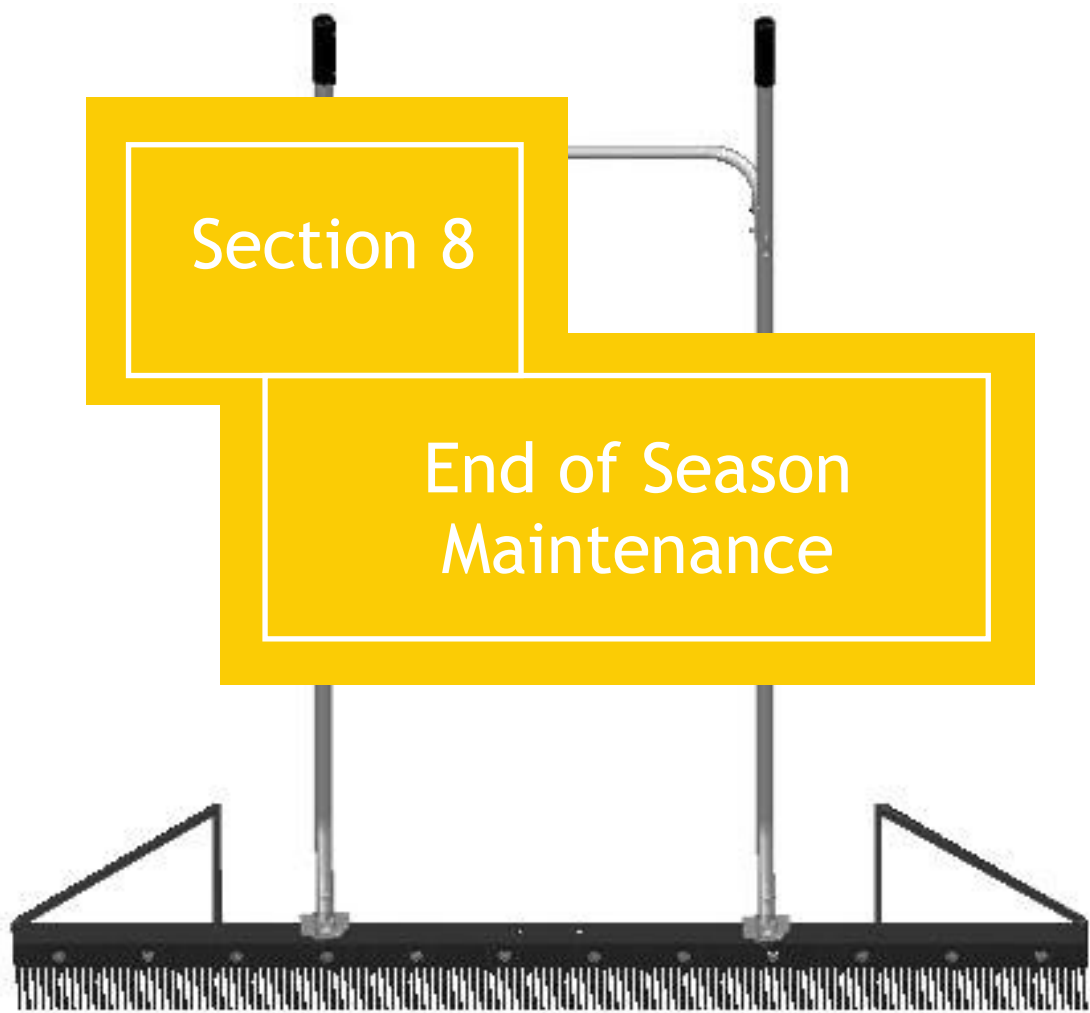
Freeze/Thaw Effect of Har-Tru Courts

Frost occurs in the Har-Tru clay court surface profile when water in the surface freezes. Depending on the extent of the freezing weather, frost may extend through the entire 1" thickness of Har-Tru. When sunlight and higher temperature reach the frozen surface the following morning, these ice crystals will begin to melt from the top of the surface downward through the profile.

It may take several hours for all ice crystals to melt in the profile. While these ice crystals are melting, water will form on top of the surface and form puddles until the entire surface below begins to thaw. Once the profile has thawed completely the water will drain through the profile.

Until the entire profile has thawed and the water has drained back down into the profile, the surface may be too wet for maintenance practices and for tennis play. We recommend everyone stay off the surface until it is playable and workable since any traffic on a wet surface may compromise the quality of that surface. If players or court maintenance staff enters the playing area before this drying cycle is complete, minor damage to the surface can occur.

To repair the indentations (footprints, roller marks, etc.) caused by entering the playing area too quickly, use standard patching techniques or call Har-Tru Sports or your local Har-Tru Clay Court material distributor for guidance.



END OF SEASON MAINTENANCE

1. Tennis Nets: Remove and attach a tag noting any repairs needed.
2. Windscreens: Inspect for needed repairs, label for easy relocation next season and fold neatly for storage in a plastic bag. Wait until the windscreen is dry (afternoon) before removing. Fence maintenance during the "off-season" can be accomplished much easier without the windscreens hanging on the fence.
3. Net posts: Remove and inspect for repairs.
4. Cover net postholes to prevent water, surface material and debris from entering during the off-season.
5. Remove the tapes and nails. Ensure all nails have been removed from the court surface.
6. Coolers: Wash inside and out. Repair spouts if necessary.
7. Benches: Wash, repair and paint if necessary.
8. Line Sweepers, Drag Brushes and other accessories: Wash clean, inspect for repairs and hang properly to protect the bristles.
9. Roller: Consult owner's manual for proper servicing.
10. Aussie Clean Sweep: Wash clean, inspect for repairs and hang to protect rubber matting.

END OF SEASON HAR-TRU SURFACE MAINTENANCE

1. Brush and roll repeatedly to fill in and compact old nail holes.
2. Covering court surface with a nylon reinforced plastic cover for the winter months reduces the amount of reconditioning required the following spring.

Section 9

Miscellaneous Maintenance Practices

FALL SURFACE RECONDITIONING

Fall surface reconditioning is increasing in popularity because the tennis courts can be opened earlier in the spring when demand for play is strong and time available for reconditioning is short, particularly during a wet spring. The maintenance staff is under less time constraint in the fall, allowing for better quality control in providing a superior playing surface. More time is available for other important (and often postponed) spring maintenance duties around the tennis court. Fall weather patterns are more stable & predictable for reconditioning. Initial expense to purchase a tennis court cover is justified considering the life of the cover, benefits to the players and increased productivity of the maintenance staff.

WINTERIZING THE IRRIGATION SYSTEM

1. Turn off main water supply.
2. Ensure manual valves at base of sprinkler heads are open.
3. With an air compressor, blow out the irrigation lines by activating each zone separately for approximately 5 minutes, do not exceed 60 psi. Open each zone valve box cover and inspect valves for any needed repairs while the system is being blown out.
4. Repeat step 3 until all water has been blown through the system.
5. Remove any debris from inside the valve boxes.
6. Replace valve box lids.
7. Note any repairs or improvements needed for the system before the next season

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 10

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
Windscreens	Windscreens should be replaced every 3-5 years or as they start to fade, discolor and get brittle.	Now & 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 build up 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

Maintenance Training	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 Har-Tru Sports for more information.	Annually
----------------------	--	----------

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			
Har-Tru			
Line Scrub			
Line Sweepers			
Line Tapes			
Lute Scarifier			
MAG			
Maintenance DVD			
Maintenance Video			
Nails			
NDS Drainage			
Nets			
Net Posts & Reels			
Roller			
Roller Cover			
Scarifier			
Sprinkler Heads			
Squeegee			
Tape Stretcher			
Tennie Two-Step			
Tidi-Court			
Tru-Flow Spreader			
Windscreens			
Fasteners			
Ty-Wraps			
Plastic Snaps			
Other			

Section 11

Consulting Services

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:

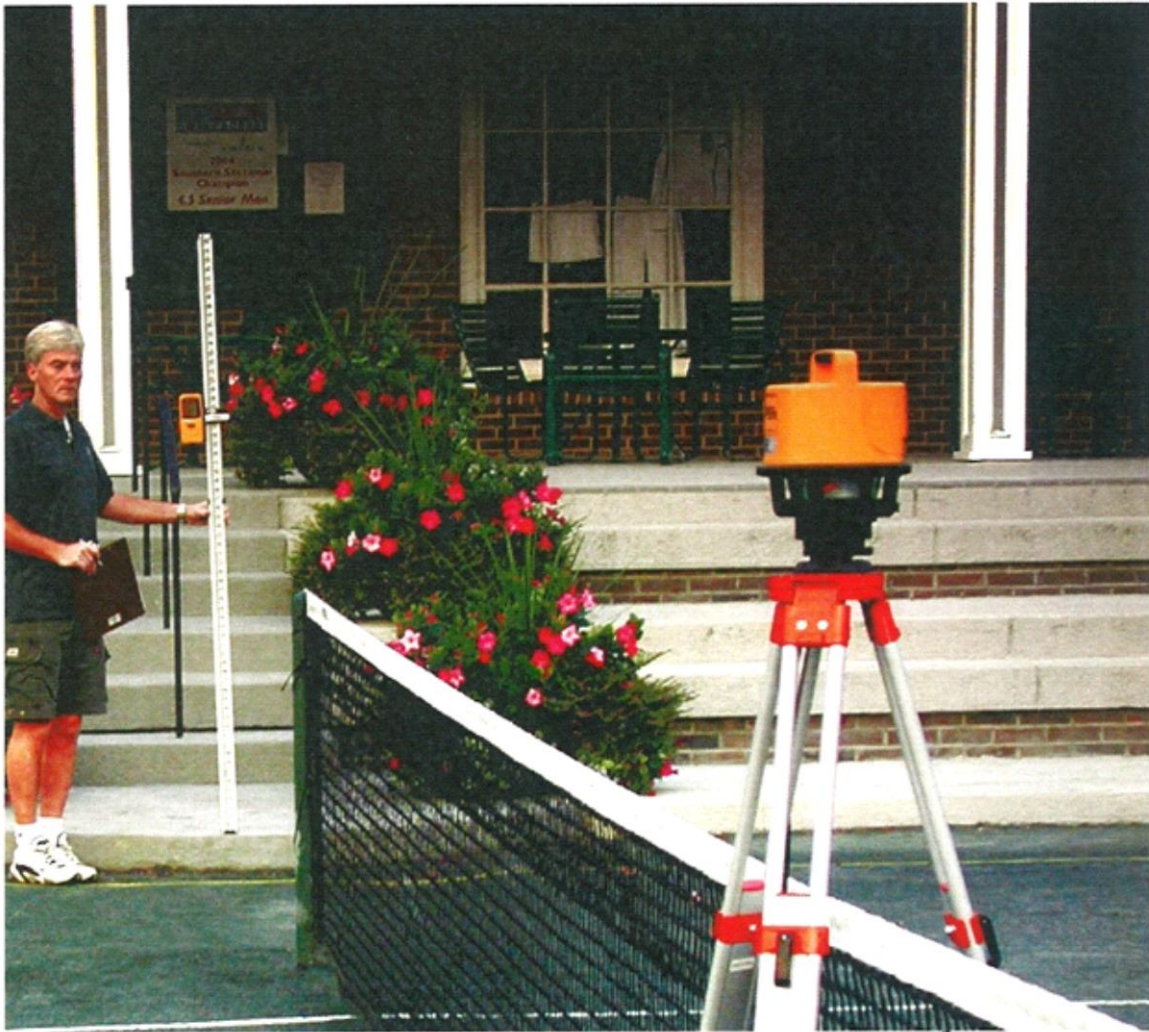
Ed Montecalvo

Consulting Services Manager
434.327.1524 direct line
emontecalvo@hartru.com

Roy Hey

Product Specialist / Consultant
434.327.1532 direct line
rhey@hartru.com

2200 Old Ivy Road . Suite 100 . Charlottesville, VA 22903
1.877.442.7878 . www.HarTru.com . support@HarTru.com



A PASSION FOR THE COURT
ATTRACTS PASSIONATE PLAYERS



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.

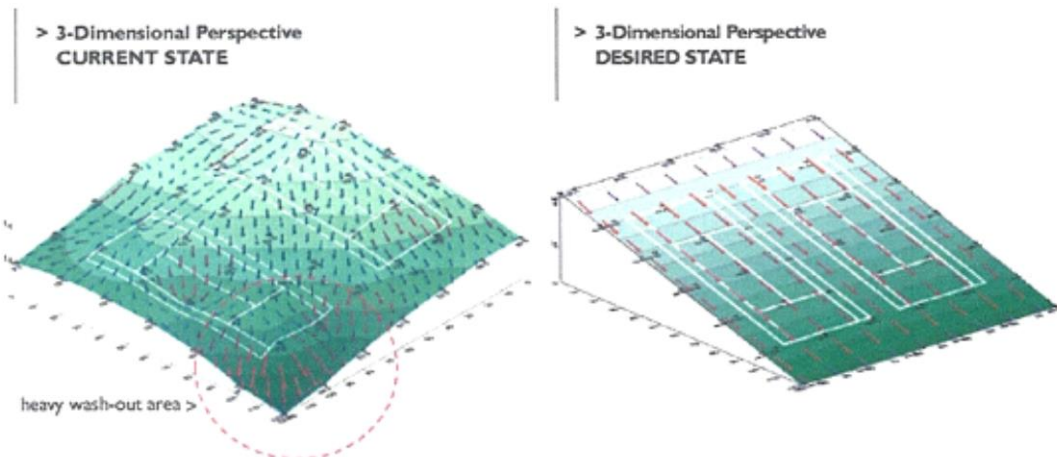
COURT ANALYSIS SURVEY

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.





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, LLC
2200 Old Ivy Road, Suite 100
Charlottesville, VA 22903
877-4-HAR-TRU • fax 434-971-6995
www.hartru.com