

**BASEBALL**  
**MANITOBA**



# FACILITY MAINTENANCE MANUAL

*FOR BASEBALL DIAMONDS*

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This manual includes information on planning, building, and maintaining a ball diamond. Please visit our website for more information - [www.baseballmanitoba.ca](http://www.baseballmanitoba.ca)

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# ACKNOWLEDGEMENTS

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## SEVERAL RESOURCES WERE USED IN CREATING THIS RESOURCE AND THEY WERE:

Baseball Tomorrow - “Baseball Field Maintenance”

West Development Corporation - “Baseball Maintenance Procedure”

Softball Canada - “Softball Field Maintenance from the Ground Up”

Amateur Softball Association of America - “Softball Field and Complex Specification Guide”

Alberta: Tourism, Parks, and Recreation - “Ball Diamonds”

International Baseball Association - “Facility Construction Handbook”

USA Baseball (United States Baseball Federation) - “A Baseball Facility: It’s Construction and Care”

AQLM Website - <https://www.guides-sports-loisirs.ca/terrains-de-balle/a-propos>

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# PLANNING A BALL DIAMOND

## INTRODUCTION

A proper plan can help streamline project management. Professional presentations can be made to obtain grants and gifts. You can predetermine every phase and the resources you'll need to carry each out. Bottlenecks can also be preempted and dealt with more effectively if there is a plan of action. The action checklist on this page can help with the planning of your project.

Use the planning checklist by working through each step. You'll probably want to change and add to the checklist to make it fit your own project perfectly.

Finally, use the checklist later for going over the project after it is done to evaluate how the job went and how you might do it differently the next time.

You may be able to pass what you learn along to other groups someday- advice from someone with first hand experience is invaluable on a job like this.

FACILITY PLANNING CHECKLIST			
ITEM	TASK		STATUS
	Who Should be Involved		
	Facility Design		
		Needs/Wants Checklist	
		Levels of Play	
		Field Usage	
	Budget		
	Revenue Generation Plan		
	Site Selection		
		Evaluation Goals	



## WHO SHOULD BE INVOLVED

Planning and building a baseball diamond is a major community effort. Everyone who will be involved - individuals, groups, associations - in any aspect of the project should be involved right from the beginning. This will ensure their needs will be met, there will be good communication, and the project will be managed effectively.

You will probably find your project will go ahead best if you form a committee from the members of your group who will perform key tasks and who are willing to commit the time to see the job through from start to finish. Your committee should hold regular meetings, keep proper records, and keep the ball rolling, especially in the early phases of planning when most of the work happens in meetings. Representatives of the other community groups can often be quite helpful in planning a ball diamond.

Here are some groups which often participate in planning these projects:

- Community Association
- Service Clubs
- Local Baseball Associations
- Local Recreation Administration
- Parks Maintenance
- Local School Boards
- Local Merchants

Plan to involve people in your community with special skills that they could contribute to planning the construction of a ball diamond. These might include:

- Local Recreational Association
- Parks Maintenance
- Surveyors
- Landscape Architects
- Engineers (for upscale facilities)
- Volunteers/Service Clubs

Contact as many interested groups as possible to determine how they can help get the job done.

## KNOW YOUR NEEDS/FACILITY DESIGN

Be clear about what your facility needs are, and which are things you merely want and which could be considered options or extras. Keep your needs and wants separate when planning your budget and allocating other resources so you can make an informed decision about what the final scope of the project will be.

Determine the levels of play to be used at your facility. Different levels of play have requirements that need to be checked. For example, in Manitoba, competitive senior level diamonds may require a full range of upscale elements - bleachers, lighting,

dugouts, concession - while fields to be used for Rally Cap may require less features. Community pick-up slo-pitch leagues, slo-pitch tournaments, organized youth baseball and softball leagues, senior ball teams, and major tournaments each have unique needs.

Determine how much use will these groups have for a diamond. A diamond used every day in the summer, for example, should be constructed to standards higher than a diamond used once a week. The frequency and level of use will affect your maintenance budget as well. For example, tournaments may require Infield maintenance several times a day.

## BUDGET

Determine your budget before beginning the project. This will include initial capital costs and reoccurring maintenance costs. Once you know the facility design, allow for the cost of a yearly maintenance plan. Don't try to build an expensive facility if your maintenance budget will be insufficient.

Include volunteer time and equipment donations as part of the budget.

If your group can't afford to complete the whole project at once, phase it over several years, perhaps looking after your needs at the outset and adding wants later. Have a contingency plan from the start which will permit new people to assume the project and see it through to its completion if required.

Remember, rental of the facility, admission fees, and profits from concessions can offset construction and maintenance costs. Make a cash flow projection during the planning stages.

## REVENUE GENERATION PLAN

Community facilities are usually built by community groups. You may be able to obtain assistance from the local municipality and the provincial government. The facility may be provided free of charge on occasion but, generally, a nominal fee is charged.

Out-of-town groups usually pay a rental fee and clean-up fees, and your group may charge fees for events where there is a charge to the public. Fees should be based on length of use, lighting, concession use, security, preparation, and maintenance and clean up time. For example, lighting is usually charged for in addition to basic rental and damage deposit may be required to ensure proper clean-up after use.

Concession rights are usually leased for a flat fee or percentage of gross sales for a specified period. Commercial firms specializing in such concessions will undertake such leases. Your community group may want to operate the concession and direct the profits into maintenance and upkeep of the diamonds.

Most cities and towns have policies regarding the use and rental of various facilities including ball diamonds. They will usually share this information to help you establish your own fee structure.







## SITE SELECTION

Where you locate your ball diamond can determine how well it serves the needs of your players and spectators. Such factors as visibility, ease of access and nearby facilities, parking, washrooms, and concessions, for example, will affect your diamond's use and revenues.

There are several elements to evaluate when considering a site for your ball field. If you have a choice of several sites, use these criteria to help you make the best selection.

### **1) AVAILABLE LAND**

Look around your community for suitable sites. Private land may cost more than public lands, however, a private landowner may donate land for your site or lease it to you for a nominal fee.

If the site is municipally owned, determine the use for the land. Check the zoning for the site you are considering. Certain land uses are not permitted in certain areas. Also, your site may be zoned for other uses. To change zoning, you or a representative of your group may have to apply to local elected council or planning board for the required by-law amendment.

### **2) AVAILABLE FUNDS**

Different sites will have different price tags attached to them beyond mere purchase or lease. These costs, which will be part of your budget, include:

- Acquisitions - Purchase or Lease
- Yearly Taxes
- Development costs for each site
- Maintenance Costs

### **3) SIZE OF SITE**

Check the dimensions of the site. It should be roughly square to suit a ball diamond. Consider your future needs as well. Again, such extras as parking, concessions, and washrooms will increase your site size and your budget.

### **4) TOPOGRAPHY**

Examine all sites with a critical eye. Examine all topographic features. A fairly flat site will minimize grading costs. Good natural drainage can lower total construction costs. Note any pools and puddles on site; they indicate poor drainage or heavy soils which do not drain well and become very hard when dry.

### **5) ACCESSIBILITY**

Make your site user friendly - accessible to the groups who will use it. For instance, if

you plan on local or community use, you might allow for pedestrian and bicycle routes so spectators and players can reach the sites easily and safely. If you provide bike paths, you should also provide bike stands. You may also need directional signs along local roads and paths to guide people from outside your community.

### **6) ADJACENT USES**

Sharing nearby recreation facilities, school playing fields, a field house, a swimming pool or community recreation complex can reduce your construction and maintenance costs. Locating your ball diamond near such supports can also raise your overall revenues.

If you plan to host tournaments, having camping and picnicking facilities nearby is a plus. Existing public washrooms associated with such facilities can reduce your capital costs. Nearby parking is also an asset as it can reduce street congestion.

Consider your diamond's type of play and the impact it will have on your neighbors. Heavy traffic, noise, and concession litter can upset residential landowners.

### **7) ORIENTATION**

Orientation refers to the direction of the line from home plate to second base. Orient your field taking into account the time of day in which play will most often occur. Most play takes place in the evening or late afternoon and most fields should be oriented, so the sun doesn't interfere with play. Orient the field so that the sun does not shine directly in the players' eyes, whether they are at bat or in the field. The preferred orientation is NNE.

### **8) UTILITIES**

Consider the proximity of electricity, water and gas if your diamond is to be upscale (that is, including such extras as parking, bleachers, concessions, etc.) or if you plan for night games, tournament or future expansion.

### **9) MULTI-USE POSSIBILITIES**

Where the amount of space available is restricted, you may have to allow other uses to overlap. Multi-use can allow you to share your costs but is not always desirable. For example, outfields are suitable for soccer or football, but infields are suited for no other purpose. A diamond should be laid out in such a way that the infield is used only for baseball.

### **10) SAFETY**

When choosing your site, think about where baseballs could go. Balls rolling into busy streets could cause accidents. Balls can also break windows and dent the hoods of cars parked nearby. Also, consider the safety of players chasing balls-fair and foul. Make sure the field is free of obstructions that could cause player injuries.



**11) TOURNAMENT PLAY**

If you plan to hold major tournaments, you will require upscale options for field(s) and facilities. Construction cost will be high. You may need:

- A large site to accommodate bleachers, concessions, parking (including special bus parking) a club house and washrooms
- Fencing all around the field(s) not only to contain the play, but to ensure only paying fans gain access to the games
- Good natural or man-made drainage to allow play after rainfalls
- Dugouts, bull pen, and shower facilities to enhance player comfort and safety;
- Bleachers for the crowd
- Concessions and washrooms
- A Scoreboard so the crowd can keep track of the action

Your site will have to be easily accessible from major traffic routes for the benefit of out-of-town players and fans. Again, It should be located away from residential areas, and oriented to accommodate evening play.

**BUILDING A BALL DIAMOND**

**INTRODUCTION**

With your plan complete, an important decision is who will build the facility. The project could be constructed by the association or community group that developed the plan or could be sourced out to a landscape designer and a contractor that will handle all aspects of the construction. The professionals chosen for the project will need to be fluent in all aspects of facility design. If the association or community group is taking on the project, they will need to understand all local regulations and specifications. The following checklist outlines the critical items for the build portion of the project.

**FACILITY CONSTRUCTION CHECKLIST**

This checklist can be used to track a community managed project, or to review with a contractor for completeness of their plan.

FACILITY CONSTRUCTION CHECKLIST			
ITEM	TASK		STATUS
	Identify Prime Contractor		
	Rough Layout		
	Grading and Drainage		
	Subsurface Drainage		
	Infield		
		Layout	
		Surfaces	
	Topsoil		
	Turf		
	Structures	Backstop	
		Player Benches	
	Options		





These guidelines are approximate, and you can vary the angles given by a few degrees to suit your particular needs. In orienting your field, also consider the direction of prevailing winds, local weather conditions, surrounding buildings, surrounding land uses, and specific conditions of your site.

Roughly determine the positions of the home plate, the bases and the pitcher's mound, and mark them with stakes. These markers are for determining the area to be cleared and will be lost during construction.

**GRADING AND DRAINAGE**

Another area where the use of professionals can avoid future issues. The site should be graded to create good, but not excessive, surface water drainage. Too much drainage will result in a hard, dry and dusty playing surface; too little in a wet soft playing surface

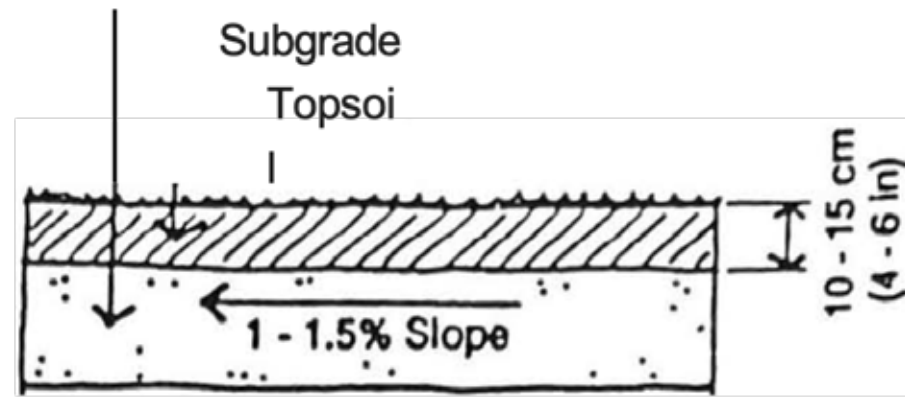


Figure 4. General Grading in Turf Areas

The optimum grade for drainage is 1 to 1.5 per cent, that is a drop of 1 to 1.5 units in elevation per 100 units of length (measured in centimetres, metres or feet). The existing land will determine the direction of drainage. The three most common drainage patterns are shown below.

There are three methods for grading infields. Choose the method most suitable for you based on:

- Site conditions
- Type of existing soil
- Availability of drainage water disposal
- Designed drying speed
- Available funds

Whichever drainage method you choose, it is important to know where the drained water will go. Don't flood adjacent land, disrupt natural drainage patterns, or overload storm drains.

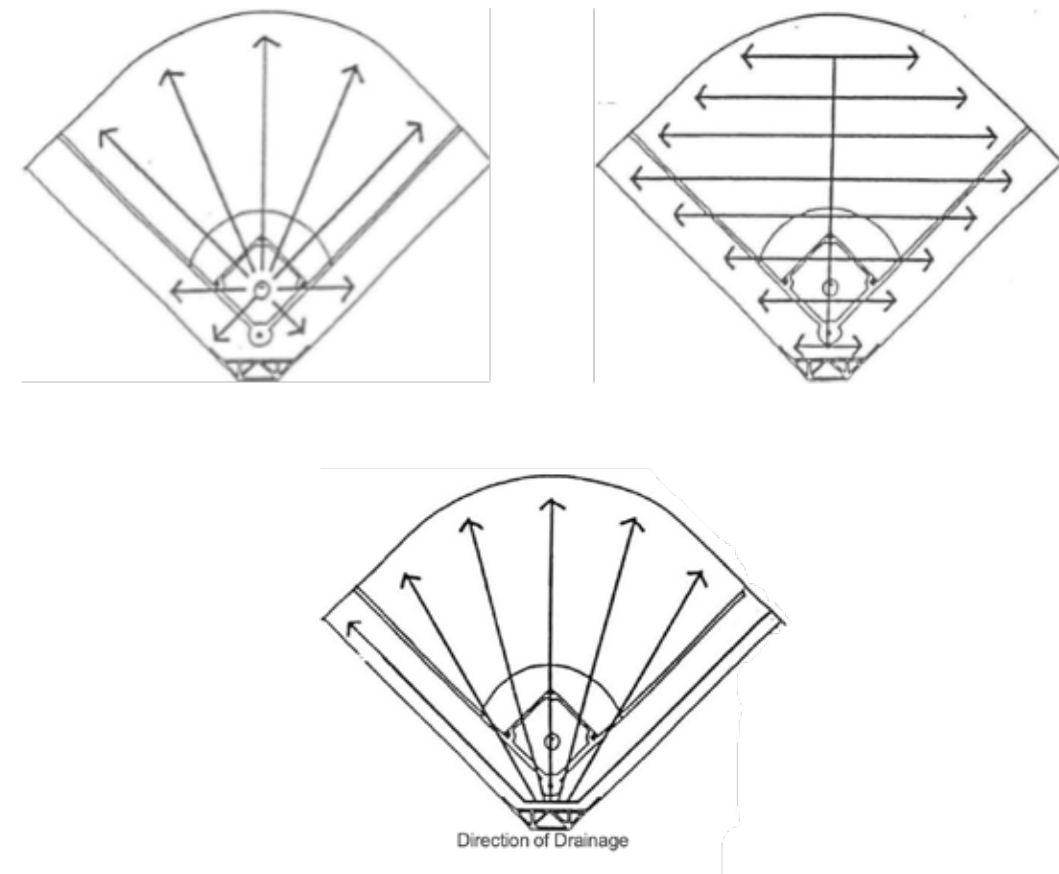


Figure 5. Common Drainage Patterns for Ball Diamonds





**I. METHOD A - FOR A WELL-DRAINED SITE**

Infield and Outfield: Remove and stockpile topsoil. Select the preferred drainage pattern and grade and pack the subsoil. Apply 10-15 cm (4 Inches) of topsoil or other surface material. Refer to Infield Surfaces for information on finishing the infield.

If additional drainage is required, the baselines can be excavated to a depth of 40 cm (16 inches) and a width of 45 cm (18 inches). The trench should be filled with crushed gravel to the subsoil level and then covered with surface material. This is effective if the subsoil is sandy.

**II. METHOD B - FOR A FAIRLY DRAINED SITE**

Infield and Baselines: Remove and stockpile the topsoil. Excavate to a total depth of 30-35 cm (12-14 inches). Select the appropriate drainage pattern and rake and pack the subsoil. Then place and pack 20 cm (8 inches) of sand. On top of this, place 10-15 cm (4 Inches) of topsoil or surfacing.

Outfield: Use Method A to prepare the outfield.

**III. METHOD C - FOR A POORLY DRAINED SITE**

(Also, for an upscale site to provide very rapid drying)

Infield and Baselines: remove and stockpile topsoil. Excavate to a depth of 76-81 cm (30-32 inches). Design a drainage pattern, and grade and pack the subsoil. Place the following materials on top in order:

- 30 cm (12 inches) coarse gravel
- 30 cm (12 inches) fine gravel
- 5 cm (2 inches) coarse sand packed; and
- 10-15 cm (4 inches) topsoil or surfacing

Outfield: Use Method A to prepare the outfield.

**SUBSURFACE DRAINAGE**

Most fields will be suitably drained if one of the three methods outlined is used. However, if your site is damp, if the soil is composed of very heavy clay, or if you require exceptionally fast drainage, you can augment your drainage with underground drainpipes.

Perforated drainpipes are made of porous clay or plastic piping with small holes in it. They should be installed according to the drainage pattern established for the field. Someone experienced with the installation of drainage systems should ensure no water will sit in low points.

The pipes should be wrapped in a filter fabric to prevent them filling with sand or silt. The pipes are then placed in a trench and surrounded by a porous material such as sand or gravel before backfilling. The water from the pipes should be directed to a pit, local storm sewers or some other approved area.

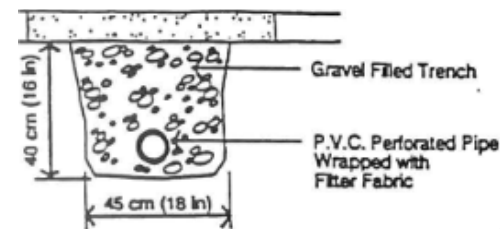


Figure 6. Subsurface Drainage with Perforated Pipe

**INFIELD LAYOUT**

The infield should be roughed out before developing the drainage pattern. Experienced professionals with surveying experience should be enlisted to help.

- 1) Locate home plate. Drive a large iron spike into the ground. This is where the point of home plate will rest.
- 2) Measure out the distance to second base along the orientation of the field. Drive a spike into the ground, determine the distance from home plate to second base, multiply the base line distance by itself, double it, and take the square root. (See Appendix I).
- 3) Measure the exact distance of the base line from the two established points towards first base. Where the two measurements intersect is first base. Again, drive a spike into the ground to mark the spot.
- 4) Repeat Step 3 for third base and mark with a spike. For the location of the bases with respect to base spikes, refer to Bases.
- 5) Measure the distance between first and third bases. The distance should be the same as the distance between home plate and second base. Check all your measurements and place permanent fasteners for the bases and home plate.

Traditionally, the skinned or dirt portion of the infield is limited to the baselines—the outfield and central infield are grassed. However, more and more community diamonds have full dirt infields which are easier to maintain using machinery. There is also less turf to maintain on a diamond with a skinned infield.

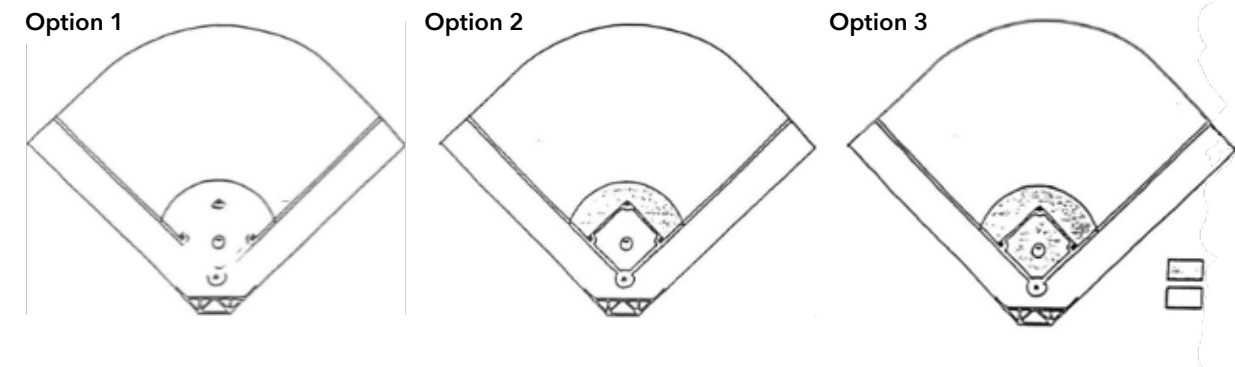


Figure 7. Three Options for Skinned Infield Patterns

There are three options for skinning the infield:

- Option 1 - Skinned base areas, plate area and pitcher's mound.
- Option 2 - Skinned base paths, base areas, pitcher's mound with a skinned arc in the outfield; and
- Option 3 - Fully skinned infield.

The base paths are 1.8m (6 feet) wide. The base areas are circles with a 4 m (13 foot) radius. The full area of the pitcher's mound is skinned. The radius for a skinned arc in the outfield is 29 m (95 feet) from the centre of the pitcher's mound.

**INFIELD SURFACES**

The surface material for a skinned infield is a mixture of sand, silt and clay in about equal proportions, this surface drains well and can be maintained with a float. Assess your Infield using the following criteria.

If puddles persist after a rain, the soil is clay. If the soil cracks when drying, it has a high clay content. If packed tightly or becomes very hard, the soil has a high clay or silt content. If it packs as hard as concrete, it may be a mixture of clay and fine sand.

If it is too powdery or loose, causing players to sink in, or if the ball easily dies during play, the soil may be composed of too much sand or organic matter.

Determine, also, if the soil is firm but workable, and if it is free of gravel and pebbles.

**Important! Too hard a surface can injure players, as can too soft a surface. Also, a soft surface will slow play down.**

Base paths should have some peat moss added to make a spongy, firm texture for running. The areas around the bases and home plate should have a little extra sand for sliding, as well as clay to give players firm footing for digging in and taking off.

Use a workable clay on the pitcher’s mound to provide good firm footing. A high clay-sand mixture provides this quality. Shale may also be used.

**TOPSOIL**

**Good** soil is vital to your playing area. It must not only support the grass by providing water and nutrients, but it must also support the game by providing firm, dry playing surface with resists compaction and muddying. Soil may be composed of any combination of sand, silt, and clay. It may also contain gravel and some larger rocks.

Each site has its own combination of soils, subsoils, climate, and topography with must be analyzed for proper playing field drainage.

**Sandy soils** have low water holding capacity but are well drained and aerated. They are also often dusty when dry.

**Silty soils** have very tiny pores which retard air and water movement. Silty soils have a very high-water holding capacity.

**Clay soils** swell when wet, shrink as they dry and are very sticky. They hold water but are poorly aerated and are easily compacted and become hard when dry.

Soil types vary greatly across Manitoba even over short distances. A good topsoil is usually composed of a mixture of sand, silt, clay, and organic material.

The subsoil is also composed of the same materials. Good subsoils for baseball fields are permeable, having high sand and gravel content. Poor subsoil has high clay or silt content and require drainage as noted above.

**AMENDING YOUR TOPSOIL**

An ideal topsoil for your ball diamond is a coarse-grained sandy material composed of a uniform mix of varying size materials and 15 to 20 per cent organic matter. You can enhance existing topsoil by adding coarse sand, peat moss or sawdust.

Clay and slit soil can be mixed with coarse sand to improve drainage and resist compaction. Do not use fine sand as this tends to make the clay harden into a concrete-like mass. Very sandy soils can be mixed with peat moss or sawdust or even well rotted manure to improve water retention and nutrient storage required to produce a healthy turf.

If you cannot obtain the equipment to mix the topsoil, spread the topsoil and amendments in alternating layers 2.5-5 cm (1-2 Inches) thick, and rototill thoroughly, then spread the soil evenly and roll.

**Topsoil Placement**

Once the infield has been laid out, spread topsoil over the area that will be seeded or sodded. Place the amended topsoil to a depth of 10-15 cm (4-6 Inches), level and roll.

**TURF**

The area of turf you have on the field depends on the field’s layout. If you have a fully skinned Infield only the outfield will be composed of grass. The type of grass you choose for the turf depends upon your location in Manitoba and the availability of water for irrigation.

Generally, a hardy turf grass mix (like a playground mix) developed for high traffic areas should be chosen. Check with such local turf managers as municipal recreation departments or golf clubs or your District Agriculturalist, for information on good mixtures for your area.



**SEED MIXES**

The following mixtures are guidelines only. Check with local turf managers for your area. Use only certified Canada #1 Seed Varieties.

<b>CONDITIONS</b>	<b>KENTUCKY BLUEGRASS</b>	<b>CRESTED WHEAT GRASS</b>	<b>CREEPING RED FESCUE</b>
Little available water: no irrigation, spotty rain		100%	
Lots of water available, irrigation or rain	40%		60%
Water available, but drought periods	40%	20%	20%
Substantial water, short growing season			100%

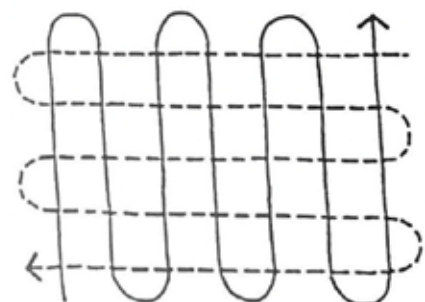
**SEEDING**

After the subsoil has been graded and packed and 10-15 cm (4-6 Inches) of dry topsoil has been spread over the area, harrow the soil to remove all stones, sticks and debris. Starter fertilizer can be applied and worked in during the harrowing. Float and level the field to ensure it will drain according to plan.

Apply the seed at the rate set out by the supplier, generally, 110kg/ha (100 lb per acre). Seeding should take place in the fall before freezing up or early spring. Seed half the prescribed seed in one direction and the other half at right angles to the first direction. This ensures good coverage.

Once the ground is seeded, float and roll the seeded areas. Water the sown area with enough water to penetrate 5 cm (2 inches). A fine layer of peat moss can be spread over the area to retain moisture in the soil where required. Keep the soil moist to encourage growth.

Fence the sown area to keep all traffic off for it at least one full growing season, this ensures a well established turf. Check the area periodically, and rake and re-seed all areas which have not filled in.



**Figure 8. Seeding and Fertilizing Patterns**

**SODDING**

Prepare a sod be the same as for seeding. If the sod is dry, water well before laying, to prevent further drying.

Lay the sod with tightly butted staggered joints. Once the sod is laid, roll with a heavy roller to ensure good contact with the soil. Water the sodded areas with enough water to penetrate 5 cm (<2 Inches). Check the joints and fill open joints with top dressing.

**Backstop**

Note the regulation distances between home plate and the backstop check these requirements in **Appendix III**.

**Player's Benches**

Players' benches (one for each team) should be considered a necessity for most ball diamonds. They cost less than a dugout but provide much needed area for the teams to sit. The dimensions section gives proper locations for players' benches or dugouts according to each diamond type. Benches can be made of wood or aluminum, but wood is more comfortable.

**UPSCALE OPTIONS**

In addition to the basic ball diamond construction, the following are options that may be added for a better field of play and preparation for tournaments.

**Shale Infield**

Skinned infields can be surfaced with shale. Shale drains quickly and does not promote the growth of grass or weeds.

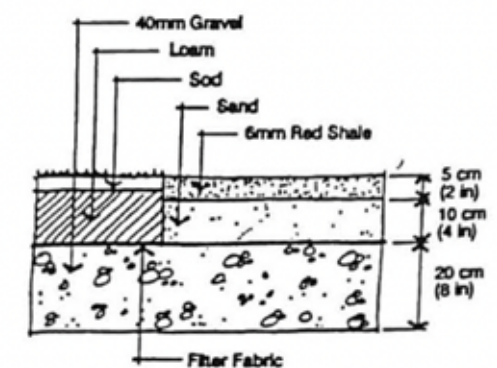
Crushed and sifted shale is mixed with a maximum of 40 per cent clay and laid 5 to 10 cm (2 to 4 inches) deep and packed.

The advantages of these surfaces include:

- Good compaction
- Good bounce on the ball
- Good traction for players
- Fast drainage after a rain
- No support for vegetation

The disadvantages include:

- Higher initial cost
- Surface can become dry and very hard
- Surface abrasion to skin and clothes
- More maintenance and frequent rolling is required



**Figure 9. Shale Infield**

**DUGOUTS**

Dugouts improve visibility for the fans and provide protection for the players. Some of the best spectator seats are located behind the players' benches.

Dugouts can be made of wood, steel or concrete but concrete is usually the material of choice, as it is less susceptible to vandalism and causes fewer maintenance problems. Dugouts should be connected to a drainage system.

**FENCING**

Fencing protects spectators from errant balls and keeps the ball in the field of play and may be a requirement for tournaments or higher levels of play.

The typical fence is made of 1.2 m (4 foot) chain link erected around the perimeter of the field. The precise location of the fence is noted in Appendix III. The fence should be on the playing field side of the fence posts.

**WARNING TRACK**

Warning tracks signal players when they are getting close to a fence, for example, when a fielder is backing up to catch a fly ball. Warning tracks are an important safety feature for fields that have fences along the outfield boundary. The track should be about 2 m (6.5 feet) wide to give a running player enough time to stop.

The warning track should be made of the same material as the skinned infield. The track should also be level with the playing surface and maintain the drainage pattern of the field.



Figure 10. Warning Track

**BLEACHERS**

The level of play determines the number of seats required to accommodate the fans. If you are planning a tournament or championship ball, determine your seating needs and, accordingly, build suitable seating. Bleachers are very expensive, so consider your needs carefully.

Seating can be made out of wood, aluminum, steel, plastic or concrete. In choosing the kind and size of bleachers consider durability of material, cost, ability to withstand extreme weather conditions, comfort, safety and ease of repair. Wooden bleachers with steel frames are relatively inexpensive and easy to repair. Treated wood is quite

durable and, as wood is a poor conductor, the seats don't become too hot or too cold.

Bleachers can be portable, permitting use at other events. Portable bleachers accommodate many spectators and can be stored securely after each season.

Bleachers are best placed behind home plate and along the first and third base lines.

**SCOREBOARD**

A scoreboard makes a welcome addition to your field, allowing everyone to read the score and keep track of the game.

The scoreboard should be in left or right centre field. A scoreboard in dead centre field interferes with the batter's background.

**IRRIGATION SYSTEM**

Keeping a thick, hardy turf on an outfield required a great deal of effort. You may spend considerable time and effort designing and building a field that will drain quickly after rainfall, but playable grass needs a lot of water. Irrigation systems can reduce turf maintenance costs by providing the field with a measured amount of water on a regular basis at a time when it will do the most good. Again, the type of system you install depends upon your needs and your budget.

Systems range from hoses and stand pipes to fully automatic sprinklers which regularly apply a measured amount of water. Many of the irrigation systems require underground pipes or hoses. These are most easily installed during construction of the ball diamond. There should be no sprinkler heads on the playing field as they constitute a major hazard to players. Sprinkler heads should be placed around the perimeter of the field. There are a variety of pipes-polyethylene, PVC, etc.-and sprinkler heads-plastic, brass, combination-which can be used. Consult a professional for advice.

General, irrigation contractors will visit your site, assess your needs, design your system, and estimate costs as part of their service.

Irrigation systems require maintenance. The lines must be blown out every fall to prevent the pipes from freezing and rupturing.

**PUBLIC ADDRESS SYSTEM**

A public address system can improve the experience for fans by allowing sound to be broadcast during the games



## WASHROOMS AND CONCESSION STAND

Permanent washrooms may be constructed to improve the site. Washrooms of some design may be required for tournaments.

A concession stand can be a welcome addition. It can generate revenues for your field or for local service clubs or community groups. Check with your local board of health for any requirements regarding food service.

There are a variety of designs you can consider but basically you can choose either a permanent or portable structure. The portable facility can be a tent, a plywood structure or a trailer and can be used in a variety of community events.

## LIGHTING

Tournaments and fall play-offs often carry on late into the evening. Consult with a lighting engineer to plan adequate field illumination.

Lighting should illuminate a field well enough for play. Lighting levels should cast 320 to 540 lx (about 30 to 50 foot candles) on the infield and 215 to 320 lx (20 to 30 foot candles) on the outfield.

Five major types of lights with various advantages and disadvantages are available for outdoor lighting:

- 1) Incandescent: low initial cost; and low efficiency short life, frequent replacement
- 2) Tungsten-Halogen (Quartz-Iodine): slightly better efficiency than Incandescent; high power bill; and best output-maintenance vs life span.
- 3) High-Pressure Mercury: Very long-life expectancy; more efficient than quartz-Iodine; not as good as other high intensity discharge lamps: and life may be longer than needed.
- 4) High-Pressure Sodium: very efficient, difficult to design practical floodlights to take full advantage of basic efficiency; and produces a golden-white colour.
- 5) High-Pressure Metal Halide: produces good colour balance; and four times more efficient than incandescent.

When designing your field's lighting, take care to reduce glare, to aim the light to avoid direct light in the eyes of the players, and to illuminate the field evenly.

Floodlights should cover as large an area as possible, while maintaining good illumination on the field. If savings must be made, it is better to sacrifice the number of lights than reduce the mounting height.

## OTHER CONSIDERATIONS

Some further upgrades can be selected for your facility:

- Bull Pen - enclosed warm-up area for pitchers
- Batting Cage - wire mesh cage eliminates foul balls during warmup
- Scorekeeper's Box - an elevated enclosed structure where the official score keeper can see the game and keep score
- Clubhouse or Field House - place for the players to shower and change after a game



# MAINTAINING A BALL DIAMOND

## INTRODUCTION

A regular maintenance program will protect your capital investment. Ongoing and regular maintenance can save costly repairs by catching minor problems before they become major expenses. A well-kept field attracts audiences. The condition of the field has a direct impact on player safety. A field in good repair and condition is less likely to be vandalized.

A relatively small investment in maintenance can result in large saving in capital.

### PRE-SEASON: SPRING

Winter takes its toll on the playing field. Frost heaves, turf damage, litter, water damage and the like can leave a field in rough spring shape. Assign manpower early in the season to clean up and repair the field in the time for the first spring baseball game.

#### SPRING CLEAN-UP CHECKLIST

- Check backstop and benches for damage
- Repair benches, backstops, signs, bleachers
- Paint as required
- Clean up general debris
- Fill and float infield
- Rake and dethatch turf
- Mow turf
- Aerate
- Fertilize
- Reset home plate and pitchers mound
- Edge between turf and dirt infield and along warning track

### POST-SEASON: FALL

Closing down the playing field properly can save on spring start-up repairs. Your maintenance crew or a group of volunteers can carry out the entire fall maintenance program on your ball diamond in one or two days following the last game of the season.

Time your yearly or seasonal manpower requirements to conduct thorough year-end maintenance.

#### FALL CLEAN-UP CHECKLIST

- Check backstop and benches for damage
- Aerate turf
- Fertilize

- Top-dress and fertilize
- Clean up debris
- Check for damage to backstop, benches and other structures
- Mow and rake
- Water (as required)
- Blow out Irrigation system (where required)
- Remove and store equipment
- Provide fencing to control winter traffic (where required)

To protect your turf and Infield, do not allow winter traffic through the playing field. Block access to the field with adequate fencing. Do not fertilize the turf until mid-August and stop watering in early September to permit the grass to go dormant. If the fall has been dry a good soaking in late October when there is no chance of further growth will prevent winter drying. The last mowing should leave the grass about 5 cm (2 inches) high to protect the crowns. If the grass is too long it will mat under the weight of the snow be damaged by smothering, leaving it susceptible to disease.

## SEASONAL MAINTENANCE

Attention to seasonal maintenance activities-fertilizing, aerating, topdressing, reseeding or re-sodding-will keep your turf in top shape year after year.

### FERTILIZING

A healthy strong turf will withstand disease and pests, and the heavy use expected of it. Fertilization provides the nutrients required to produce healthy turf. The rate of application and type of fertilizer should be determined by a soil analysis. Remember, an improperly applied or incorrect fertilizer can weaken or destroy your turf.

The following is an overview of fertilizer use.

1. For newly seeded areas use a 6-12-12 mixture to encourage strong root growth.
2. On established turf, use 26-13-0 in the spring to encourage root growth and greener grass. Apply late in the fall (October) after the grass has gone dormant. Remember to maintain a consistent timetable for fertilizer application to prevent over-fertilization. A second application may be made in early July.
3. Use a high nitrogen fertilizer like 21-0-0 to encourage green turf.
4. Apply the fertilizer evenly over the turf when the humidity is low, and the grass is dry. Water immediately to wash the granules into the soil and off the leaves. Fertilizer stuck to a grass blade draws moisture from the plant and can kill the leaves. New foliage will have to grow from the base.



**AERATING**

Aerating reduces the compaction of the soil so moisture, air and nutrients can get to the grass roots.

Aerate when there is poor water penetration in areas where there is heavy traffic. The turf will be weak, thin, and growing poorly, Aeration should be done in the spring or fall using a mechanical aerator. This device removes small soil cores with tines or spoons and leaves them on the surface. Water the soil thoroughly 48 hours before aeration. Badly compacted soil may require several slow soakings for the aerator to penetrate sufficiently-about 5 cm (2 Inches).

Do not overlap passes when aerating. Leave about 10 cm (4 Inches) between rows. The cores can be left on the surface and broken up with a steel mat or raked into wind rows and hauled away.

When you've completed the aeration, apply a properly mixed topdressing fertilizer. this is also a good time to apply herbicides and insecticides, and to reseed dead patches.

**TOPDRESSING**

Topdressing is usually applied in the spring to level out uneven, pitted turf and can be part of an aeration program. The material is usually a mixture of sand and organic material and may contain fertilizer. When applying topdressing during your aeration program, spread it evenly over the grass. You can use topdressing to fill in small depressions.

Never apply more than 2 cm (0.75 inches) in order to keep it from smothering the grass. Deep depressions can be filled in gradually over the summer, or filled and reseeded or re-sodded.

Once you've applied the topdressing, level the field with a steel drag mat.

Topdressing Mixture	Soil Types	Heavy Clay Loam	Heavy Loam	Loam	High Organic Loam	Sandy Loam	Very Sandy Loam
Sand		2	2	1	1	1	1
Peat		2	1	1	1	2	2
Loam		1	1	1	2	2	3

**Figure 11. Topdressing mixture ratios**

**RESEEDING**

Reseed to repair dead patches of turf, to replace a whole field, or to thicken up a sparse grass cover. Grass takes about one month to establish itself and another month or longer before it is strong enough to be played upon. Reseed in the fall or spring, but never during summer when the field is open for play.

If you are repairing dead patches or a whole field, prepare a seed bed, following the directions for your seed mix. Be sure to level the area so that it matches the surrounding grade. Apply an appropriate fertilizer, then seed, rake, and **water the area well.**

To seed over existing turf, thoroughly aerate the field, then seed. Add 1.25-2.5cm (0.5-1 inch) of topdressing or peat, the seed again. Drag and roll the field lightly. Adjust the amount of seed used for reseeding to the percentage of old grass remaining. Water well.

**RESODDING**

Sod is an excellent means to repair small bare patches, but it takes a full two months to bind to the under surface. It is best to lay new sod in the fall. Be sure to keep the area fenced until early summer.

Before laying down new sod, remove the old sod. Prepare the soil and level using additional loam. A 1.25 cm (0.5 inch) layer of peat moss should be added and leveled before the sod is placed. After the sod is placed, roll out the new sod, and water is thoroughly. Fill the cracks between the sod with loam.

**DAY-TO-DAY MAINTENANCE**

Once the field is ready for play, several on-going tasks can ensure that it remains usable throughout the season. These tasks are usually performed on a weekly basis, but heavy use or tournament play demands that these tasks be performed daily.

There are a couple of key steps you can take to minimize turf damage:

1. Use fields as little as possible when wet.
2. Rotate play areas.
3. Allow turf to recover in Spring before starting practicing.

**SPOT MAINTENANCE**

Take the time to repair and replace divots and damaged turf daily. Lightly top-dress these damaged areas with a mixture of topsoil and seed. Then lightly level the area with the back of a garden or landscape rake, it is very simple, not time consuming, and if done on a regular basis, it will insure consistent, safe playing surface.

**WEEKLY MAINTENANCE CHECKLIST**

- Safety check for broken glass or other dangerous objects on the field
- Repair holes in backstops and fences
- Repair holes and humps In the Infield and outfield
- Check players’ benches for damage
- Check for potentially dangerous objects such as home plate and pitcher’s rubber
- Clean home plate and replace or repair as required
- Clean up litter around the backstop and players’ benches
- Remove build-up of dirt around bases
- Check signs and replace as required
- Mow as required
- Trim grass around backstops, fences and benches
- Rake and level infield, especially baselines, home plate, batter’s box and pitcher’s mound

**Note:** Conduct checklist daily during tournaments and special events

**EQUIPMENT**

Here is a checklist of equipment essential to the maintenance of your field. Most of It Is common turf maintenance equipment that is readily available. Remember, if a piece of equipment is only used once or twice a year, It is probably cheaper to rent than to own.

**MAINTENANCE EQUIPMENT CHECKLIST**

- Drags
- Wheelbarrows
- Line marker
- Shovel
- Batter’s and catcher’s box outline frames
- Broom
- Roller
- Rakes
- Lawn mower

**Other equipment that will help improve field conditions**

- Line through
- Aerator
- Watering equipment
- Spiker
- Paddie
- Tractor
- Tape measure
- Tamper
- Fertilizer spreader
- Edge cutter
- Field Marker
- Rototiller
- Grader

**TURF MAINTENANCE**

Healthy turf is essential in providing athletes with a safe playing surface. Because of the various climates and types of grasses throughout the country, it is difficult to present a specific turf maintenance program for every coach and grounds keeper. A local University extension agent should be contacted for specific instructions.

The following procedures are to help establish and maintain healthy turf and safe playing conditions for the upcoming seasons. It takes hard work, dedication and constant attention to weather and field conditions. Such efforts are demanding, but by doing so, athletes are provided with the safest, most playable turf surface.

**Recommended Equipment:**

- Reel-type mower (if available)
- Rotary spreader
- Silt seeder (if available)
- Soil for topdressing
- Fertilizer
- Hopper-type top dresser
- Core aerator
- Grass seed
- Fungicides and herbicides





**SOIL AMENDMENTS**

It takes practice to prepare the proper surface mixture for the skinned infield. The surface must have enough sand for the water to drain quickly and not become sticky when wet or too hard when dry. The mixture also requires some clay to bind the sand together to keep the surface from shifting and blowing away (see **Dust Control**). Scarify the Infield, add the material and drag the Infield.

**SPRING**

Depending on your region, March is usually the best time to start turf maintenance.

**Step 1: Aerification**

Soil compaction is one of the most common causes of weak turf on athletic fields. It's caused by soil particles being squeezed together by high traffic. Compaction reduces the rate of movement of air and water through the soil. This prevents grass roots from functioning normally, so they become shallow and eventually die. The result is weak turf with little density and is more subject to injury. Aerification on a regular basis will help combat such problems.

- 1) Once field is dry enough, core aerify in two directions - diagonally, creating an X pattern.
- 2) Allow the plugs to dry about half a day, but **do not** remove. On days with high heat, the cores can dry out within a few hours. It is recommended to avoid aerifying on days over 26 degrees celsius (80 degrees fahrenheit). This is because of the intense evaporation when so many "plugs" are pulled from the ground. If it is unavoidable, irrigate immediately after these steps are completed.
- 3) Because broken up cores or "plugs" are excellent topdressing materials and help control thatch, cores are not removed from the field. Break up cores with the use of a vertical mower or a matt drag.

**Step 2: Topdressing**

Aerification is followed by topdressing. One purpose of topdressing is to smooth the surface just as they do on golf greens. There are many schools of thought on which topdressings to use. At a minimum, top-dress with sand.

Top-dress turf areas with soil amendment at a minimum rate of 6 tons per grassed acre. This should be accomplished by the use of a hopper-type topdresser, or a properly calibrated rotary spreader. If a large hopper-type topdresser is out of the budget, one can often be borrowed from a local golf course, or one could be rented. This is true for almost all the large equipment mentioned here.

Topdressing application rates for sand vary from region to region depending on turf type, etc. It is recommended to contact a local extension agent for specific quantity and timing.

**Step 3: Seeding**

After the topdressing is applied, seeding should follow. Don't skimp on grass seed, make sure it is certified. Your local extension agent will recommend the best blends for your area. In most regions, excluding warm climate regions, Bluegrass is the base grass for athletic fields. In warm regions, Bermuda grasses are more predominant. When seeding in any region, it is wise not to use just one grass.

For example, It works well to blend Rye grass with Bluegrass. Not only is Rye quick to germinate, but by being added to Bluegrass, it reduces the risk of a disease eliminating an entire field of turf. If a disease infests the Bluegrass, the Rye grass is still able to flourish.

Application rates vary, but in general spread seed mix at a rate of 5 to 6 pounds per 1000 square feet. This should be done with a slit seeder. A properly calibrated rotary spreader can be used as well. It is essential to replenish the turf with proper seeding. In heavy traffic area, an extra 1 to 2 pounds per 1000 square feet can be added to promote thicker grass growth in a shorter amount of time.

It is important to realize that seed will not germinate if the soil temperature is less than 13 degrees celsius (55 degrees fahrenheit).

**Step 4: Dragging**

Now that the field has been aerated, the cores have been broken up, a topdressing application has been completed and seeding has been done, these materials must be blended and forced into the aerification holes for maximum benefits. This is best accomplished by dragging the field.

Slowly drag the entire field with a matt drag. This forces the materials into the aerification holes and the turf.

**Step 5: Fungicide Application**

If budget permits, a fungicide should be applied. This will act as insurance for the seed that has just been laid. Contact a local extension agent for the fungicide is best to use in your region.

**Step 6: Fertilization**

After the above process has been completed, it is necessary to fertilize. As previously mentioned, you should have your soil tested to determine proper types and amounts of fertilizer. There are three major components to fertilizer. The amount of each component varies by region, season, etc.

- Nitrogen** - For color and growth
- Phosphorus** - For root growth
- Potassium** - To make plants hardier

In this case, a starter fertilizer is recommended to get the seed to start growing faster. Typically, one bag covers 1/4 acre, so apply accordingly.

### **Step 7: Irrigation**

Irrigation must immediately follow. Water is essential to healthy turf. To water, wet the entire field, but do not soak the field to where puddling may occur. New seed must be kept moist without puddling. If puddling occurs, the seed will form rings and cause inconsistent growth. It is only important to keep the soil damp, but this must be done daily.

Maintaining a balance between enough water for good turf maintenance and a dry playing surface requires some experience. The moisture requirements of playing fields vary, depending upon soil composition, wind, temperature and amount of rainfall.

#### Frequency

The field should be watered when the top 2.5 cm (1 inch) of soil is dry. Let the soil dry out so oxygen can get to the plant roots. Continually soaked grass roots are susceptible to disease and lead to weak turf. Water before the grass wilts and discolours. Check with local turf managers, such as golf course operators, for information on frequency of watering in your area. For the strongest, most durable turf, it is important to know proper watering patterns. On established turf, it is best to heavily water the field every 5 to 7 days, rather than lightly watering everyday. This is because when soil is soaked deeply, the root level is usually dry within a day or two, but the deeper soil is still moist. Therefore for the next several days, turf roots must seek water deeper in the soil. Because this promotes a deeper root system, stronger turf is the result.

#### When to Water:

Water should be done in the early morning when evaporation is low and water can soak into the soil. Evening and night watering encourages pests and diseases as the turf stays wet all night. Irrigation systems with timers can be set to begin watering at dawn. If the field is used mornings, evening watering is second best. Remember to pay attention to the weather. If there is high heat, more frequent waterings may be needed. If rain is in the forecast, less frequent waterings may be needed. Do not water on a time schedule!

#### Rate of Application:

Water should be applied only as fast as the soil can absorb it. A long, gentle watering will allow the water to seep down and encourage deep root growth and healthier grass. Watch your turf when watering. If you have a standing puddle, you are probably applying water too fast.

In fields where drainage systems are in place, water more frequently.

Once seeds germinate and establish turf, it is best to soak the field when watering, but irrigate much less often.

### **Step 8: Spot Seeding**

Spot seeding is important after the germination of the seed.

After 1 to 1 1/2 weeks, the seed should germinate. It's essential to spot seed any areas where there is thin growth caused by inconsistent watering patterns or thunderstorms.

- 1) Lightly rake any area with thin growth to loosen the soil.
- 2) Spread seed to areas of thin growth.

Remember to continue the same irrigation pattern of frequent, light waterings until there is established turf covering the field.

### **Step 9: Mowing**

Once the turf has grown to 2 to 3 inches, it is time to mow. No more than 1/3 of the grass blades should be removed by mowing. The recommended maintained height of the Bluegrass type athletic turf is 2 to 2 1/2 inches, while Bermuda type grasses is 1 to 1 1/4 inches. Keep most upright grasses to a mowed height of 3.5-4cm (1.5-2 inches). This usually means cutting the grass every 4-10 days, depending upon the weather. Cutting to this height will allow the turf to ward off insects and disease. It will also require less water and maintenance. In most cases, the outfield and infield grass can be kept at the same height.

- 1) It is important to sharpen the mower blades as often as possible, optimally once per week. This cannot be overlooked. Poorly sharpened mower blades can be extremely damaging to the turf, causing the grass to be ripped instead of being sheered. The jagged edges of ripped turf attract disease and insects along with leaving the grass with torn edges which can cause the turf to lose water more rapidly.
- 2) Another important mowing factor is the direction of the cut. At every mowing, the cutting pattern should be alternated. This allows for consistent mowing height for all grass blades and prevents the mower from creating ruts in the turf. It is also aesthetically pleasing. See Appendix V for different patterns.
- 3) It is also important never to mow when the field is wet. This causes compaction of the field, which is damaging to the plant and can cause ruts in a wet field. In addition, wet clippings stick to the blades, mash under the wheels of the mower, and create a potential danger to the operator. If it is unavoidable to mow your field when it is wet, it is essential that the field is aerified once it dries.

**HINT:** Always keep your players off wet turf if possible.

There are five mowing patterns to use on your outfield and your Infield:

Outfield:

- 1) Up and down parallel to the right field foul line.
- 2) Up and down parallel to the left field foul line.
- 3) From second base to center field, back and forth.
- 4) From foul pole to foul pole, back and forth.
- 5) Half circles, same contour as the skinned Infield outer edge.

Infield:

- 1) Same as #1 above.
- 2) Same as #2 above.
- 3) Home plate to second base, back and forth.
- 4) Third base to first base, back and forth.
- 5) Circle mound (clockwise and counter-clockwise)

**Step 10: Strengthening Turf**

After 6 to 8 weeks of growth, it is important to feed the plant again with a fertilizer that is high in Potash. The Potash will feed the turf Potassium. This will help turf withstand drought, heat, and heavy traffic. The result will be stronger and more rigid turf.

Follow these steps:

- 1) Aerification:
  - a) Aerify in two directions. This will open up the turf.
  - b) Allow the cores to dry for half a day. Be aware of the heat.  
Remember, the cores can dry out in only a few hours of high heat.
  - c) Break the cores up with a vertical mower or drag matt.
- 2) Top-dress entire area.
- 3) Slowly drag the entire field with a matt drag. This will force materials into the aerification holes and turf.
- 4) Feed the turf with a fertilizer high in Potash. This will continue to help strengthen the new turf. Consult a local extension agent for recommendations.
- 5) Spot seed in some of the weaker areas. This can be done with a rotary spreader.

**Step 11: Herbicide Application**

Now is a good time to give your turf an application of herbicide. Herbicide treatment will prevent weeds from being a problem in your turf areas. Contact a local extension agent for recommendations.

**Step 12: Irrigation**

At this point the irrigation pattern should be long, infrequent waterings. Frequent watering that does not soak the soil causes roots to stay near the surface, making them weak.

**WEED AND DISEASE CONTROL**

A well-established, strong, and vigorous turf is rarely subject to serious weed or disease problems. However, if a problem develops and does not respond to a simple solution, it is recommended that you consult a professional turf manager or gardener. Municipalities in Manitoba must use licensed specialists to apply herbicides and pesticides.

Broad-leafed Weeds

Dandelions, plantain, chickweed and clover will appear just after your first application of fertilizer. If you have a small problem, digging out the weeds will suffice. However, if the infestation is serious, spray the area with an appropriate herbicide. Spray early in the season when the young weeds are growing vigorously. Do not spray the new grass for the first four weeks after germination.

Snow Mould

Snow mould is a fungus that is active only under the snow in winter. The mould produces web-like patches on the grass and can devastate a playing field. To prevent snow mould, rake and dethatch the area to remove dead organic matter on which the mould thrives. If you have an infestation consult a turf professional.

Fairy Rings

Fairy rings are circles or crescent-shaped areas of fungus growth often marked by dark green or dead grass. The circles are often ringed by mushroom growth in wet weather. The underground growth forms a dense mat of root-like, fine white hairs. They grow so thickly that water cannot penetrate the root zone. The grass dies inside the area encircled by the ring.

If a circular or semi-circular patch of dark green grass appears, use a garden fork to make holes 25 cm (10 inches) deep and 15 cm (6 inches) apart throughout the ring and 30 cm (12 inches) beyond the edge of the circle. Saturate the ring to get enough water through the mat to the grass roots. Repeat the watering process every second day for at least a month.

If the grass dies, it will be necessary to remove the fungus. Dig out all the soil at least 30 cm (12 inches) deep and 40 cm (16 inches) beyond the edge of the ring and dispose of it. Replace the soil and reseed or resod the area.



**SUMMER**

June/July: During the months of June and July it is important to just water and mow the turf consistently. Remember to pay attention to the weather.

August: It is now time to prepare the turf for the most strenuous part of the year. Football, Soccer and many other sports are starting at this time. Therefore, It is Important to “beef up” the turf with aerification and a fertilization.

Step 1: Aerification

On the 1st of August it is necessary to aerify your field again in preparation for fertilization. Being so far into the summer, be alert to high heat. Break up cores with a vertical mower or a matt drag.

Step 2: Fertilization

Fertilize with a fertilizer high in Potash (An example is 16-4-20). Cut down on the Phosphorous at this point. Contact a local extension agent for a recommendation.

Step 3: Topdressing

- 1) If budget permits, now is the time to do another topdressing with TURFACE. If the entire turf areas cannot be done, at least top dress the high traffic areas.
- 2) Drag the field with a drag mat to force materials into the aerification holes.

Step 4: Fungicide and Insecticide Application

At this time of the year, turf is most vulnerable to fungus and insects. It is important to look out for signs of fungus and react as quickly as possible.

- 1) Apply fungicide to protect your turf from any fungus.
- 2) As a preventative step, an Insecticide should be applied to ward off unwelcome Insects that can greatly damage the turf.

**FALL**

Step 1: Aerification

Now that practices and games have started, aerification and fertilization has become essential. Throughout the season, It is best to aerify every 2-3 weeks. This will help fight compaction caused by the tremendous traffic the field receives at this time.

Step 2: Fertilization

By the second or third week in September, your field is ready for another application of fertilizer that is high in Potash (or potassium).

Fertilize turf In conjunction with one of your frequent aerifications. This will help keep the turf strong under constant abuse.

**DAILY MAINTENANCE PRACTICES**

The following steps outline a daily maintenance routine that, if followed, will provide the safest, most playable sports field for athletes. Also, this short daily routine will keep the field manageable and will eliminate the struggles of field maintenance. A little dedication is all it takes to significantly improve the condition of a problem sports field.

Maintenance should be performed immediately following field use, leaving it in good condition for the next day. Your field should be in the same shape for practice as for games. Inconsistencies can lead to errors, and you lose the home field advantage.

A key to success is getting others involved in maintaining the field. As the saying goes, “Many hands do light work. Assign each player certain responsibilities that he/she must accomplish every day. Give parents incentives to participate in the field’s maintenance. Be creative. The more people involved; the more work will get done to the field.

Walk the Field

This is the single most important step in a daily maintenance routine when it comes to the safety of athletes. It is essential for a field manager to be aware of such hazards and minimize the risk of injury to players.

Slowly walk the entire field before every practice or game. In doing so, look for the following hazards:

- Large stones in the skinned areas and base paths
- Sprinkler heads that have not retracted
- Burrows or other holes in the turf
- Damaged fencing
- Loose Base Anchors

Another hazard that is, unfortunately, becoming more prominent is vandalism.

**SKINNED AREA MAINTENANCE**

Generally, ball diamonds have a dirt or skinned infield. This is where the action takes place. Give special attention to the infield area. This includes home plate, pitcher’s mound, baselines and base paths.

These simple steps will keep an infield playing surface safe, playable and manageable.





Recommended Equipment

- Matt drag
- Broom
- Hose with water access
- Nail drag
- Landscape rake

Step 1 Water the Infield

Water is important to the skinned areas. Water will keep the infield moist, providing many benefits. You do not want your clay mix to dry and breakdown. The moisture keeps the field soft and will also prevent wind erosion. A moist infield is more playable and easier to maintain. You can control dust by sprinkling the diamond shortly before play. Calcium chloride will reduce dust but will damage leather and is toxic to the skin and eyes. Calcined clay, known commercially as Surface or Terra Green is a granular material which can hold its own weight in water without getting soft or mushy. It can be mixed with soil to improve texture and reduce dust. Simulate a rain shower as you water the field, holding the nozzle high in the air.

**HINT:** Water in the morning, depending on the weather, before games, provides enough time for partial dry down. Nail drag and matt drag before games when field is damp.

Step 2: Drag

The infield should be dragged daily. This process will keep the skinned playing surface loose, level and consistent. Keeping the playing surface firm and smooth is an essential part of infield maintenance. To smooth the surface, break up clay lumps and expose rocks and stones, pull a steel drag over the infield surface. You can also fluff up compacted soil and improve drainage this way. There is no one way to drag an infield, but there are key rules to follow.

- 1) It is important to remove all bases before dragging, if not removed it will create a high spot where the bases are. It is also important to drag the field slowly. Dragging the field quickly can cause loss of materials as well as an uneven surface. To begin, slowly drag around the perimeter of the skinned area before starting the dragging pattern. It is important to leave at least a 6" buffer between the drag and the edge of the turf while dragging. This will prevent materials from building up in the turf edges. With a rake, scarify the 6" area missed by a drag.
- 2) Alternate starting and stopping points every day. Otherwise, you will create low areas on your field that lead to puddles. Spread the small pile of dirt that has accumulated on the drag evenly with a rake.

**NAIL DRAGGING**

After rainfall or heavy use, scarify the skinned infield with a nail drag to loosen compacted surface material. Grade to level high spots and fill depressions and drag to level the surface.



If you don't have a nail drag, build one. This is the best kept secret of major league baseball and is very affordable to build (**See Appendix IV**)

**HINT:** Moisten with water before nail dragging, field should be damp.

A nail drag should be used as often as possible, at least once a week. It keeps the soil to 1/4" to 1/2" loose and friable. Not only does it make the field safer by relieving compaction but makes it easier to maintain.

You should not need to put weight on your nail drag unless you have bad compaction problems.

**MATT DRAGGING**

Matt dragging will smooth the playing surface. Following nail dragging and on a daily basis, matt drag your field with a rigid drag that has a leveling bar on the front.

Flexible drags have a habit of dipping into low areas and doing little to level the field. A rigid drag digs in the low spots and makes your field level.

A rigid drag is easy to make. Take a flexible drag and turn it sideways. Notice that it can't be rolled in this direction. Take a 2" x 4" and attach to the "new" front. Put eye bolts on each end of the 2" x 4" and attach rope or chain. The 2" x 4" will act as leveling bar.

Step 3: Sweep Infield Edges

Heavy use and rainfall pushes the surface material of the skinned area onto the turf. Sweeping the infield edges will prevent materials from building up in the edges of the turf and causing a "lip" to form. To do this, take a broom or rake and sweep all loose materials lying in the turf back onto the skinned surface. Then remove any grass that is swept onto the infield with a rake. If more than one person does this task it should not take any longer than a few minutes. The efforts will be worthwhile.

Step 4: Edge the Infield Turf

Another important step in proper maintenance of the infield is edging. Not only is a good clean edge important in maintaining accurate base lines as it keeps the grass from encroaching on the skinned surface, but it makes your field look good. Edging can be done with string and a gas-powered edger or a spade. Once this is done, maintenance is easy. Follow these steps:

- 1) Place pegs as shown in the diagram.
- 2) Run a string between first and second base. The string should be on the outfield side of first base and run across the middle of second base.
- 3) Measure 36 inches from string toward the infield grass. Place pegs at each end of the infield grass and move string over to these pegs. This line represents the edge of your infield grass.



4) Cut along edge.

5) Repeat the same steps on the remaining base lines.

Step 5: Rake the Base Lines

To achieve the same benefits of dragging, use a landscape rake to scarify the base paths. This should be done lengthwise instead of side-to-side. Side-to-side raking will push loose materials into the turf.

**“LIP” OR BUILD-UP REMOVAL**

As mentioned previously, the edges of turf must be maintained by eliminating all infield materials that have either blown or been pushed into the grass. If these materials are neglected, a hazardous lip can form over time. Because such a hazard is a risk to an athlete’s safety, a “lip” must be eliminated.

Recommended Equipment

- Sod cutter
- Garden Rake
- Topdressing (soil, seed)

- 1) Use a sod cutter to remove all turf covering this raised area. Make sure to save and protect this freshly cut sod because it will be placed back to its original location.
- 2) After turf has been removed, eliminate all built-up materials until this area is on an even plane with the infield and the outfield surfaces.
- 3) Once leveled, return sod to its original location.
- 4) Top-dress any damaged area or exposed soil. Level the topdressing with a garden rake.
- 5) Lightly water daily until the grass takes to the soil. Once turf has taken to the soil, water less frequently but with increased volume.

Build-up Prevention at the Pitcher’s Mound

- 1) Create a channel at the edge of the pitcher’s mound with an edger or a spade. This channel should be made around the circumference of the mound. Once made, this channel should be maintained on a regular basis.
- 2) If possible, cover the pitcher’s mound. A tarp for the mound would eliminate this problem completely. Covering the mound will protect the turf from run-off and will keep the mound moist and firm regardless of the climate.



**LINE MARKING**

A variety of materials can be used to establish the playing lines on the field. Hydrated lime has been used extensively in the past, however, talc, chalk and gypsum are now being used because they don’t burn as lime does. Latex paint has also been used successfully. It is quick and easy to apply, is easier to see and lasts longer.

Place permanent markers at the ends of the foul lines. Even if the lines become obscured by play, umpires will be able to determine the foul lines and make good calls. The line is often marked by killing the turf with a non-selective herbicide or by over-fertilizing, then painting. Even if the paint wears thin, the line of dead vegetation is visible. The paint mixture is typically a combination of a non-selective herbicide, paint and water. A suitable mixture is 59 cc (2 ounces) of Roundup, 20 L (5 gallons) of Latex paint and 40 L (10 gallons) of water. Use caution because the herbicide or fertilizer can leach into the surrounding grass and make the line much wider than anticipated. Correctly achieved, the result is long lasting and, in some cases, permanent.

To mark the lines, a large spike should be placed at the apex of home plate, the point from which you laid out the field, and cords should run down the first and third base lines to the foul line poles. A line marker is then rolled over the string. A frame can be used to mark the catcher’s and batter’s boxes. All other markings can be put on with a tape measure. Remember, crisp, clean, neat lines make a field look ready for play. The dimensions and locations of the various lines are noted in [Appendix III](#).

Maintain the lines as required. The lines will wear out through use and get washed away by rain. It is especially important to have well marked lines for league, tournament, and championship play. Some additional line marking tips are included under [Maintaining a Ball Diamond](#).

Whichever method you use, try to keep the playing surface level and smooth. You do not want the ball in play to be affected by the foul lines.

**CARING FOR THE BASES, THE PITCHERS MOUND AND BATTERS BOX**

Home plate is marked by a five-sided slab of whitened rubber fixed in the ground with anchor spikes level with the playing surface. The edges of the rubber are beveled. Home plate is the same size for all levels of play.

The plate is located so that the apex is touching the point where the first and third base lines intersect - the point from where all measurements for the field are taken. The widest part of the plate faces the pitcher. The plate is available from most sporting goods suppliers.



**BASES**

They are canvas or vinyl bags, 38.10 cm (15 inches) square and not more than 12.70 cm (5 inches) thick. The bases must be securely fastened in position.

Locate first and third bases within the angle formed by the base lines. Position second base directly on the centre of the point created by the intersection of the baselines.

One and two-peg systems

The two most popular types of bases are the one and two-peg made of canvas or vinyl. These bases are fairly durable, easy to install, portable and relatively inexpensive. The pegs are forced into the ground to keep the base anchored. Straps from the base are placed through the hook that remains slightly above ground to secure the base in the correct position.

Pole-Insert

These bases are more expensive than the peg models, and while requiring more work in initial installation are safer for players and easy to put in place once the anchor is installed. The base itself has a metal sleeve which is inserted into a receptacle that has been permanently anchored into the ground. When installing the anchor make sure it is located at the recommended depth by the manufacturer. Improper installation can result in the base sitting too high and the anchor being caught when the field is dragged.

**PITCHER'S CIRCLE**

Baseball uses a rectangular rubber plate 60.96 cm {24 inches} x 15.24 cm {6 inches} anchored in the ground 46 cm {18 inches} behind the centre of the Pitcher's Circle. The distance from home plate to the pitcher's plate varies between divisions. Check the charts in Appendix III for the measurements you should use to locate your plate.

Depending on the age category, the mound height and circle size varies, but the pitcher's circle is elevated no more than 25 cm (10 inches). The top of the mound is level for an area 46 cm (18 inches) on either side and 15 cm (6 inches) in front and 56 cm (22 inches) behind the rubber. The front must slope from a point 15 cm {6 inches} in front of the rubber to a point 1.83 m {6 feet} towards home plate to a uniform 2.54 cm per 30 cm (1 inch per 1 foot).

Recommended Equipment

- Packing clay
- Tamp
- Water can {filled}
- Tarp
- Pick
- Broom Landscape rake

Pitcher's Circle Size by Age Group:

- 11U & 13U .....6"
- 15U .....8"
- 18U and up .....10"

Mound Repair

The pitcher's rubber should be flush with the soil surface. Fill in and smooth holes, indentations, and irregularities. Keep an eye on the height of the mound. Over the years, the addition of soil, grading, smoothing, and filling can change the height. Because of the abuse a pitcher's mound takes, it must be repaired every day. This simple process should only take a few minutes at the end of the day.

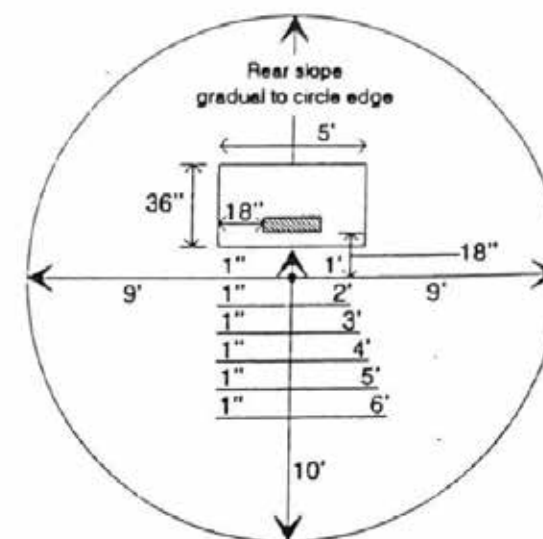
- 1) Begin by sweeping dry, loose material off worn areas and remove from the mound {do not sweep into the grass}.
- 2) Loosen these worn areas with a pick in preparation to add new packing clay.
- 3) Now water the loosened areas lightly and add packing clay.
- 4) Tamp new materials until firm.
- 5) Once firm, lightly moisten these areas again.
- 6) Use your rake to pull dry material over wet material.
- 7) Lightly rake, moisten mound and cover with a tarp.

**RECONSTRUCTING THE BASEBALL PITCHERS MOUND**

The pitcher's mound required most attention on your field. A properly built and maintained mound will help prevent injuries to your pitcher and will give you a home field advantage.

The mound for grassroot through major league is a circle that is eighteen feet in diameter and ten inches higher than home plate.

The pitcher's mound is constructed using packing clay on the front half of the mound and infield clay on the back portion. There is no reason to buy commercial packing clay. Get unfired clay from a brickyard. Moisten the clay down in a wheelbarrow to a damp, soft consistency. Keep covered with a wet towel when not in use.



**Figure 12. Baseball mound dimensions**

**THE FOLLOWING STEPS WILL HELP YOU TO RECONSTRUCT THE PITCHER'S MOUND:**

Recommended Equipment and Materials

- Square-faced shovel or spade
- Tamp
- Ten-foot 2" x 4"
- Frame for plateau reconstruction
- 100-foot tape measure
- Landscape rake
- Four-sided rubber
- Pick
- Two-foot carpenters level
- Four-foot 2" x 4"
- Wheelbarrow
- Large nail or spike
- Damp packing clay
- Carpenters square

Step 1: Obtain proper distance, alignment and height

The front of the pitcher's rubber should measure 60 feet 6 inches from the apex of home plate and the top of the rubber must be 10 inches higher than home plate.

- 1) The pitcher's rubber is 24 inches long. Take a pencil and mark a line down the centre.
- 2) Take a string from the apex of home plate and extend it to the second base peg.
- 3) Measure 60 feet 6 inches from the tip of home plate and sink a spike. This marks the front of the rubber.
- 4) Take a transit level and obtain a reading off home plate. The top of the pitching rubber must be 10" above home plate. Build or reduce the height of the mound.
- 5) Square the rubber into position by taking a measuring tape and measure from the front left corner of home plate to the front left corner of the pitcher's rubber. Do the same on the right side. When these two measurements are the same distance, the rubber will be squared. Make sure that the rubber measures 12 inches on each side of the anchored spike.

**HINT:** If building a mound from scratch, it is a good idea to place a solid concrete block under the rubber to keep it from shifting.

Step 2: Replace or Turn Rubber

If your measurements are set and you are replacing the rubber, follow these simple steps:

- 1) With a pick, dig out the front of the pitching rubber while leaving the rear and sides intact.
- 2) Rake away material and remove from the pitcher's mound.
- 3) After the front is completely exposed, pry the rubber out of the mound with a pick.

**HINT:** Follow these steps in a slow controlled manner so as not to break down the rear and side walls supporting the rubber. These walls are important because they clearly mark where the new rubber should be placed, and they provide immediate support for the new rubber.

- 4) Level the surface of the foundation in which the new rubber will be placed.
- 5) Spread a small amount of damp packing clay in the foundation.
- 6) Place new rubber into existing foundation.
- 7) With a carpenter's level, level the rubber from side to side, as well as front to back.
- 8) Carefully refill the front wall of the rubber with damp packing clay.
- 9) Add packing clay to the sides and rear to replace lost materials.
- 10) Lightly tamp the new material to compact the clay to hold the new rubber in place.

Step 3: The Collar of the Pitcher's Mound

Once your pitching rubber is in place, it is important to establish a good outline of the pitcher's mound. The following steps will provide proper dimensions and an easy way to get your 9-foot radius. The diagram on page 45 provides clear dimensions of the pitcher's mound:

- 1) Measure out exactly 18 inches from the front of the pitcher's rubber and drive a spike. This should be in line with the exact center of the rubber. This is the center of the mound.
- 2) Attach a string to the spike and measure out exactly 9 feet from the spike.
- 3) Keeping the string taut, circle the mound marking the outline. The diameter of the outline should be exactly 18 feet.
- 4) With an edger or a spade, follow the outline and eliminate turf to establish a permanent boundary for the mound. This prevents clay from washing into the turf.

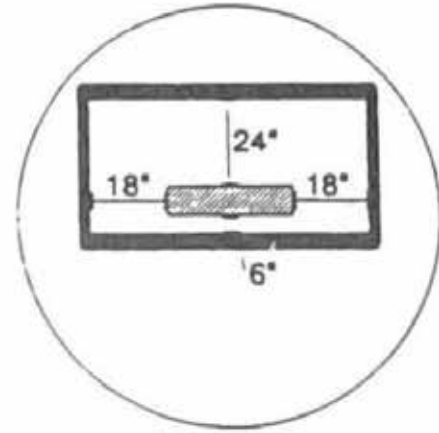
Step 4: Build the Pitcher's Plateau

The pitcher's mound is not supposed to be built up like a peak, but rather it should slope up to a firm and level plateau. This provides a pitcher with a firm, safe playing surface. The plateau should be level with the top of the rubber and measure 5 feet x 3 feet.





- 1) Place the plateau frame (The plateau frame is made with 2 x 6" boards and the Inside measurements and 5' x 3') on the pitcher's mound as the following diagram illustrates:

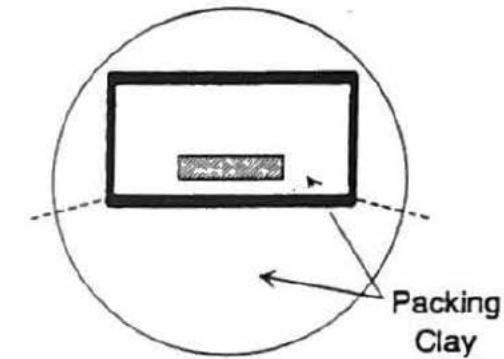


**Figure 13. Plateau frame**

- 2) Assure exact measurement. The Inside frame should be positioned 6 inches in front of the rubber, 24 Inches In the back of the rubber and 18 Inches on each side of the rubber.
- 3) Trace the inside frame of the box in the clay with a nail.
- 4) Carefully remove the frame from the mound.
- 5) With a pick, loosen existing soil within the outline and break up clumps with a square-faced shovel or a spade, make sure the edges of the outline are properly loosened as well.
- 6) Return frame and re-measure for accuracy.
- 7) Once frame is in place, add packing clay to entire loosened area Inside the frame.
- 8) Level material to avoid inconsistency.
- 9) Have one person hold the frame in place with the weight of his/her foot, lightly tamp materials until firm. It is important to be extremely careful tamping the front of the plateau because the tamp is on top of the pitching rubber.
- 10) Once new material is completely tamped and firmed, slowly remove the plateau frame. It is Important to go slow to avoid breaking edges.

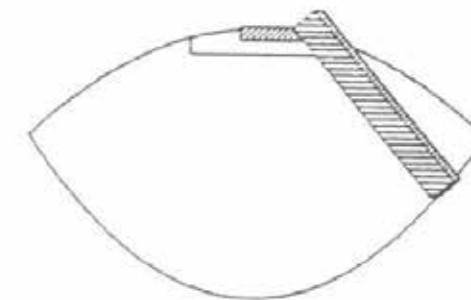
### Step 5: Constructing the Slope

Because of the risk of injury, It is important to give a pitcher a firm consistent landing area on which to complete a pitch. It is also important for moves to any of the bases. If the pitcher's mound is at its proper height, the slope from the edge of the plateau to the edge of the mound should drop one inch for every foot of measurement. This slope can be accomplished as follows.



**Figure 14. Packing Clay**

- 1) Use a large nail or spike to outline the landing area. This should start from the front corners of the rubber.
- 2) With a pick loosen existing clay so that new packing clay will be able to bond to it.
- 3) Break up clumps with a square-faced shovel or remove with a rake.
- 4) Place the four foot 2" x 4" on top of the rubber and extend it to the right edge of the plateau. The board should run parallel to the rubber making sure the four inch side of the board is resting on the surface.
- 5) Place the ten foot 2" x 4" along the right outline of the landing area. The top of the board should rest on the four foot 2 x 4" and the bottom on the board should rest at the base of the mound at the edge of the turf. Be sure that the board is turned on its side so its two inch side is supported by the mound. The following will illustrate:



**Figure 15. Using the board**

- 6) Bring a wheelbarrow of packing clay and dump it to the left of the ten foot 2" x 4"
- 7) Spread materials along the length of the board. Move any substantial excess away from the board because it will cause too much buildup, making the board too heavy to move. Another person will be needed at this point. One person will be required to handle the top of the ten-foot board near the pitcher's rubber, while another person will need to handle the bottom of the board at the base of the mound.
- 8) In a slow, controlled motion, begin moving the board in a short sawing motion, sliding the board up and down over the four-foot board. It is important to keep the ten-foot board on the four foot board to avoid damaging the edges of the plateau.
- 9) Continue the short sawing motion as you slowly move the board in a clockwise motion to the other side of the outlines landing area. As you are moving the board you may experience some low spots in the surface. Stop, move the board to the right of that low spot. Bring the packing clay to the board in front of the low spot. Begin sawing motion again and continue forward. Once the entire landing area has been conditioned through this process, lightly tamp the same area for added firmness.
- 10) To condition the remainder of the mound, follow the above steps and continue around the mound to completion. It is not necessary to use packing clay for the remainder of the mound. Clay from your infield mix will be adequate.

Step 6: Condition the Pitcher's Mound

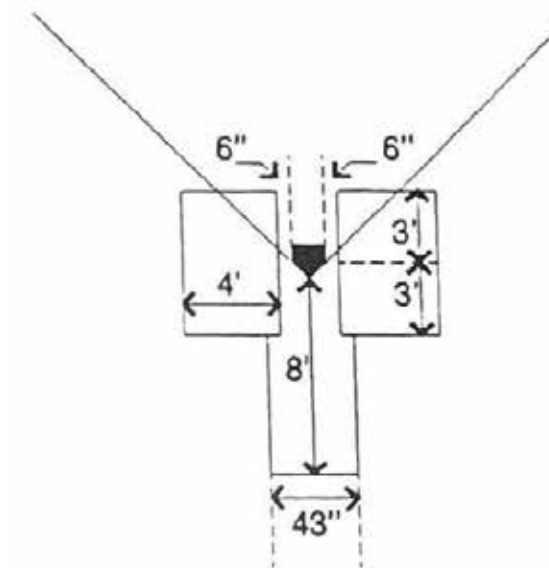
- 1) Once the entire mound has been rebuilt, spread one or two bags of TURFACE Regular to lightly cover the mound. This can be done with a landscape rake. The TURFACE helps keep the pitcher's mound moist without being slippery.
- 2) Lightly moisten the mound.
- 3) Roll the mound with roller, if available.
- 4) Cover the mound with a tarp. A tarp is essential to prevent your mound from drying out and from washing into turf.

**HINT:** Your bullpen mounds should be cared for in the same manner as the field mound. Otherwise, the pitcher's timing and safety are affected.

**BATTERS BOX AND CATCHERS BOX REPAIR**

The batter steps up to the plate, scuffing and digging in, trying to find the perfect stance for the homer. This takes its toll during the game and, by the end, the area around the plate can become well worked over-. As a result, the batter's box and the catcher's box are heavily worn areas. These areas must remain firm. To fix the holes, follow the same easy steps as those to repair the pitcher's mound. And remember, the entire batter's box must be firm and level when the repair is complete. The plate should be flush with the soil surface. Cover your box with a tarp.

**HOME PLATE REPLACEMENT AND RECONSTRUCTION**



**Figure 16. Catchers and batters box**

The home plate area experiences very high traffic. An improperly maintained home plate area results in bad ball hops and injuries. Because of the abuse caused by such high traffic, this area must be properly prepared. If home plate is worn, now may be the best time to replace it.

The home plate area is a circle with a 26 foot diameter. The base paths, batters box and catchers box should be completely level with home plate. Packing clay should be used in the batters box and catchers box.

Recommended Equipment and Materials

- Square-faced shovel or spade
- Tamp
- Pick
- Packing clay
- Home Plate
- Two-foot carpenters level

The following steps are similar to those in replacing the Pitching Rubber.

- 1) To start, take a long nail and place it in the ground at the apex of home plate. This will act as a reference guide when dropping the new plate into the existing foundation.
- 2) With a pick, dig out in front of the plate, exposing the entire front of the plate.
- 3) Dig out one side of the plate in a similar manner.
- 4) A person should support the back edges by standing with their feet apart at the point of home plate (See Diagram below), slowly and carefully pry out the plate from the front. This should leave three supporting walls in tact. Remove feet so you don't collapse walls.



**Figure 17. Supporting Plate**

- 5) Once the plate is removed, eliminate any excess material in or surrounding the hole.
- 6) Take some packing clay and spread and level it in the base of the foundation.
- 7) Place new home plate into existing foundation.
- 8) For proper accuracy, use a carpenter's level and a tamp to level the plate from front to back and side to side.
- 9) Once the plate is leveled, fill all voids surrounding the plate with prepared packing clay.
- 10) Lightly tamp the new material so it will firm up and bond with the existing soil.
- 11) Make sure the batter's box and the catcher's box are built up to where they are perfectly level with the top of the plate. If home plate is elevated, even by the slightest amount, it can be a safety hazard. Leveling can be accomplished by adding clay, smoothing with the ten foot 2" x 4" placed on top of home plate and then lightly tamping.

**HINT:** Many times a home plate is anchored with a cement anchor or a wooden base. This provides added security from home plate movement and makes replacement easier. Consult a base company for way to accomplish this.

## ECONOMIC FEASIBILITY STUDY FOR MULTIPLE DIAMOND FACILITIES

After determining that a definite need exists, you will have justification to proceed with a study to analyze the costs involved. This study will be very important to the welfare of your facility and should be done with a great deal of careful evaluation. The results of such a study will help you to determine budget limitations. Your consultant should take the lead in setting up guidelines for this study; however, it is important for you to contribute pertinent goals, ideas, and information to make the data as complete and realistic as possible.

Of necessity, it is quite probable that assumptions will have to be made at this stage since the programming of specific space is a step away. If a site is not readily available, it must be assumed that you will need a certain number of acres to accommodate the size and number of fields that will be cost effective. If one or several sites are being considered they must be analyzed for; location, accessibility, statutory requirements (zoning, etc.), physical characteristics (usability and drainage), existing utility type, quality and capacity of support facilities. The support facilities, at this stage, may be assumed to be the minimums required by the local codes or building ordinances. If your goal or facility dictates a higher or lower standard, then use what you know will be needed to determine costs at this stage. A general checklist of items to be addressed in the feasibility study is as follows: Add or remove items to fit specific individual circumstances:

- 1) Land Costs
  - a. Purchase Cost
  - b. Legal Procedures (rezoning, etc.)
  - c. Development Cost
- 2) Field Installation Costs
  - a. Initial Construction
    1. Team Dugouts
    2. Team Warm-up Areas
  - b. Maintenance and Equipment
  - c. Lighting (Inlet and Operational)
- 3) Support Facility Costs
  - a. Parking
  - b. Seating
  - c. Press Box
  - d. Ticket Sales
  - e. Toilets
  - f. Team Facilities
  - g. Concessions and Storage
  - h. Maintenance (General)
  - i. General Sales Area
  - j. First Aid
  - k. Storage
  - l. Meeting Room(s)
- 4) Miscellaneous Project Costs
  - a. Scoreboard
  - b. Sound Amplification System



- c. Signage
  - d. Inter-Communication System (telephones)
  - e. landscaping
  - f. Contingencies
- 5) Consultant Fees
- a. Attorneys
  - b. Surveyors (Boundary and Topographic Survey)
  - c. Planners, Architects and Engineers
- 6) Financing Costs
- a. Types of Loans (Availability)
  - b. Lending Institutions Proximity and Congeniality
- 7) Revenue (Income)
- a. Facility Rentals
  - b. Player(Team Fees
  - c. Concession Sales
  - d. General Sales
  - e. Parking Fees or Leases

In terms of project costs, it is important to evaluate long term operational expenses as well as initial land construction costs. Again, assumptions may be necessary.

#### **PROGRAMMING THE FACILITY SITE**

As affirmative results of the need and feasibility studies become evident, the next step is to organize these results into descriptions of open areas, as well as the spaces to be enclosed. You are now ready to express the fruits of your initial labors in feasible terms of (1) what you want to build, (2) where you want to build, (3) how many, (4) what size, and (5) functional operations. You may not be able to address all the details on necessary sizes and functional relationships. If this is the situation, your planning consultant will be a valuable aid with suggestions to fill these voids. You may also rely on his expertise to organize your program requirements into its final form.

With a well-defined Facilities Program and Certified Boundary (Topographic land Survey of the site, you are now prepared to enter into the Planning and design Phases with your architect. If your Feasibility Study dictates building in phases it would be wise for the architect to develop a Master Plan, so that Initial construction will not be a restraint for future phases. When the Master Plan is complete, the architect will address your facilities in the following logical design and construction phases.

Schematic phase  
Design development phase  
Construction document phase  
Bidding or negotiation phase  
Construction phase

It is important to allow adequate time in the first two phases of planning and development to insure that your facility will be the best it can possibly be.

#### **FACILITY DESIGN AND SIZE**

##### The site plan.

The site plan is the configuration of the facility to meet the restraints of the parcel of the land. It is impossible to plan or discuss each configuration of land, therefore, complexes of 4-5-6-8 and 10 are shown along with the necessary acreage for the number of diamonds plus parking, building, and open space.

##### Configuration of the Facility.

The first consideration in developing the site plan is the number of fields. Most facilities are planned backwards - the parcel dictates the number of fields. The intended uses, budget, diamond, and other preliminary issues must be answered prior to turning the project over to an architect to draft the site plan.

After determining the number of fields you desire, they must be laid out on the parcel of land utilizing the following objectives:

- Convenience of Pedestrian Flow
- Convenience of Parking
- Minimize The Cost of Construction
- Maximize Revenues
- Create an Attractive Facility

The wagon wheel configuration meets all these requirements when building four fields. The pedestrian flow in a wagon wheel is excellent. All persons can enter through one gate which can be a revenue source. Then they can be directed to the center of the complex. The main walkway can serve as an additional revenue source, and the center of the wheel provides a natural meeting place through which nearly everyone must pass. The wagon wheel pedestrian flow results in the highest use of revenue sources and its semetry is orderly and pleasing. The wagon wheel brings the home plates as close to the concessions as possible maximizing impulse sales and required six of the eight participation teams to walk through the concessions both entering and exiting the facility.

The "square corners" and proper alignment of the foul lines make the facility look orderly. Landscaping can be concentrated in the main walkway giving the impression of more landscaping than is present.

Where the wagon wheel stands out is in the cost of construction. The central concessions building can service all four fields, and only one main gate is required, but most importantly is the efficiency of the lighting system. With the six-pole system, four of the poles are used for more than one field. This results in immediate savings. Additionally, very little wasted space is lit, making use of the lights. As lighting and buildings are typically over half the cost of the facility, efficient use of these assets is a very high consideration.



Items that are required in a complex development Include:

- Asphalt (walkways)
- Backstops
- Batting Cages
- Bleachers
- Playground Equipment
- Dugouts
- Fencing
- Grading
- Turf
- Landscaping
- Lighting/Electrical
- Parking Lot
- Sprinkler System
- Other Field Equipment
- Scoreboards
- Warning Tracks
- Buildings
- Infields

#### **FIELD NECESSITIES**

##### A. Itemized Checklist (order not Intended)

- 1) Backstops
- 2) Dugouts
- 3) Sideline Fences
- 4) Outfield Fences
- 5) Foul Poles
- 6) Bleachers
- 7) Scoreboards
- 8) Lights
- 9) Grass
- 10) Bases and Plates
- 11) Walkways
- 12) Infield Material
- 13) Signage
- 14) Playground Area
- 15) Trash Receptacles

##### B. Field Dimensions to consider

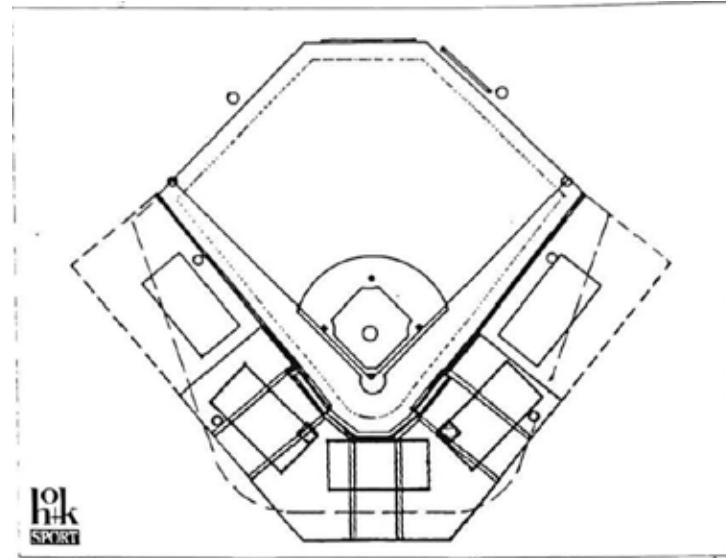
- 1) Home Plate to Backstop
- 2) Pitcher's Plate
- 3) Bases (15" x 15" x 3")
- 4) Outfield Fences Distance
- 5) Distance Between Fields (Wheel)
- 6) Foul lines to Side Fences
- 7) Center Core Area
- 8) Walkways to Fields
- 9) Parking Lot Size
- 10) Player's Benches

#### C. Field Maintenance Equipment

- 1) Tractor with Front Loader
- 2) Tractor Mount Mower(s)
- 3) Hand Mower(s)
- 4) Weed Eaters
- 5) Tractor Mount Grader Blade
- 6) York Rake and Field Drag
- 7) Tractor Mount Seeder
- 8) Tractor Mount Aerator



# PHASES OF FACILITY DEVELOPMENT



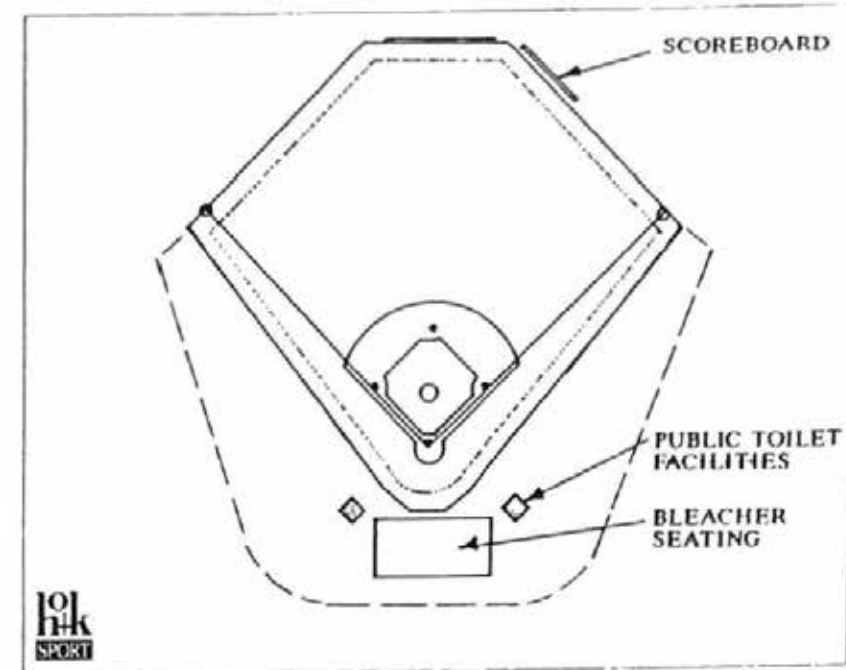
## Project Phasing

In developing a baseball program and a facility in which to play the game, it may be necessary to spread the cost of construction over several years. If the project site is carefully chosen and each phase of the construction is planned with foresight, a first-rate baseball facility can develop from a very basic beginning. The total cost of a phased development is usually higher than the cost of an initial comprehensive development.

The diagrams that follow illustrate a suggested four stage development program beginning with only those facilities needed to play the game of baseball.

## Phase One

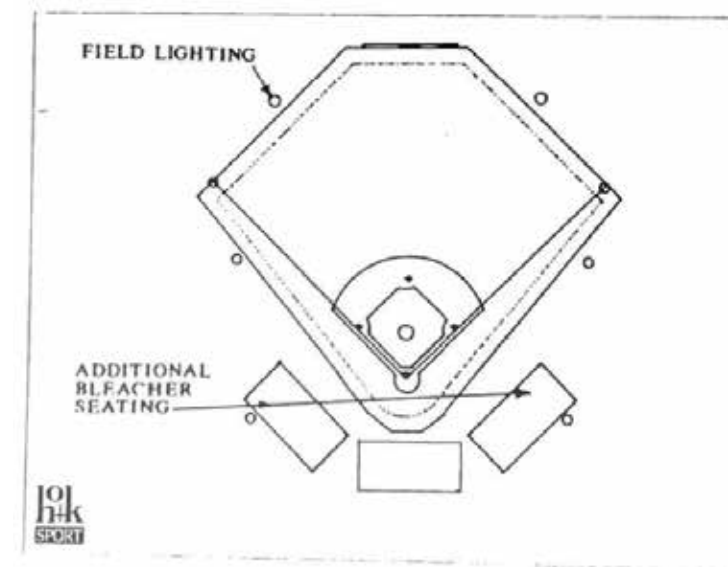
- Playing Field
- Backstop
- Batter's Eye
- Team Benches



## Phase Two

- Outfield Fence
- Scoreboard
- Foul Ball Poles
- Spectator Seating and Toilets
- Perimeter Security Fence - optional but recommended to secure the facility and control access.

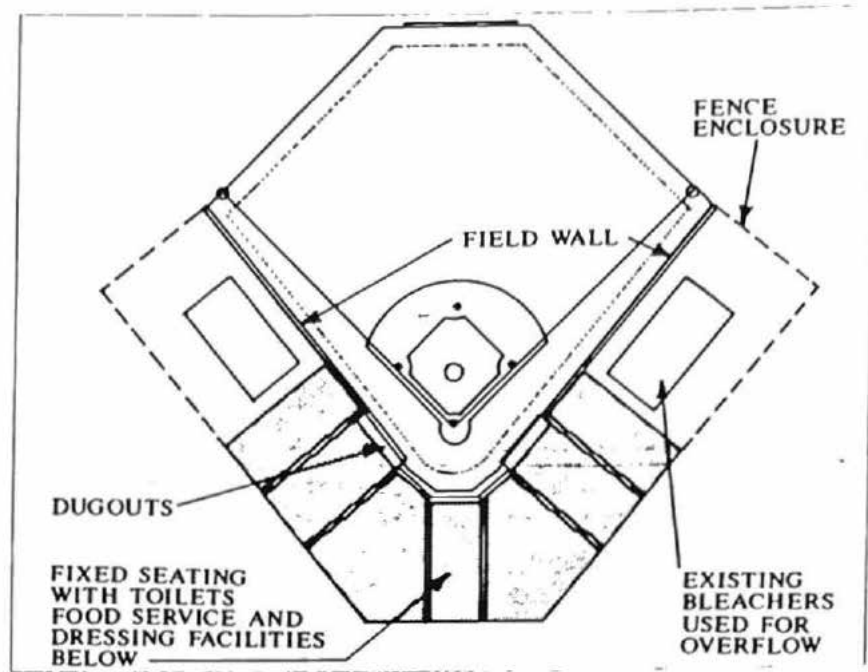
Permanent restroom building should be designed with future construction in mind so that water, sewer, and electrical utilities will not be disturbed in later phases.



## Phase Three

- Field Lighting
- Additional Bleacher Seating





**Phase Four**

- Permanent Grandstand
- Changing Rooms for Teams and Officials
- Medical Treatment Room
- Technical Control Room,
- Media Facilities
- Food Service

# APPENDIX I

**HOME PLATE TO SECOND BASE DISTANCES**

Base Line	Home plate to second base
13.7 m (45 feet)	19.38 m (63 feet, 8 Inches)
15.2 m (50 feet)	21.5 m (70 feet, 8 3/8 Inches)
16.8 m (55 feet)	23.76 m (77 feet 9 3/8 Inches)
18.29 m (60 feet)	25.87 m (84 feet, 10 1/4 Inches)
19.81 m (65 feet)	28.02 m (91 feet, 11 Inches)
21.34 m (70 feet)	30.18 m (99 feet)
24.38 m (80 feet)	34.48 m (113, 1 1/2 Inches)
27.43 m (90 feet)	38.79 m (127 feet, 3 3/8 Inches)



# APPENDIX II

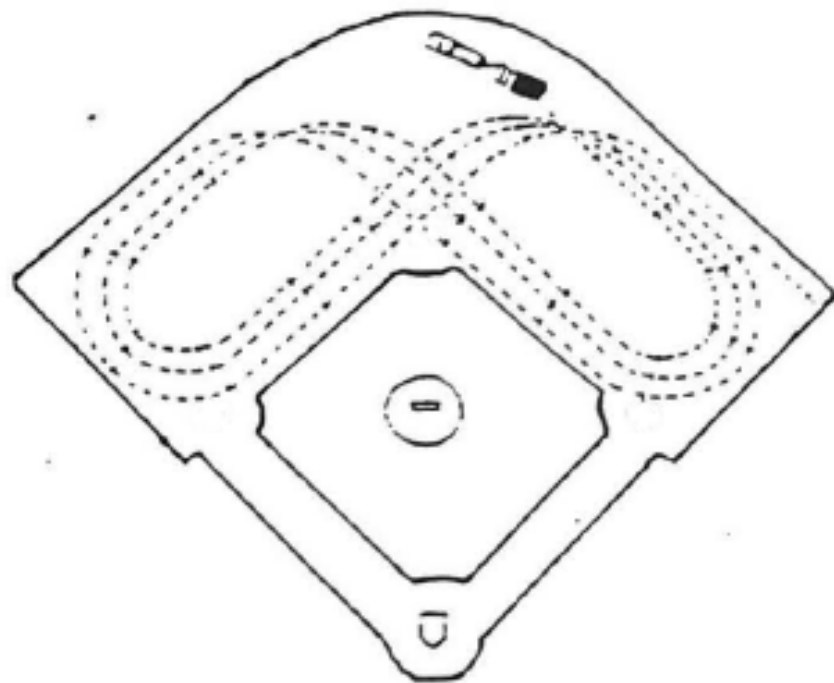
## DRAGGING THE INFIELD - TECHNIQUE

- 1) Remove first, second and third bases (ROTATE BASES WEEKLY)
- 2) Water down area for dust control
- 3) Drag Infield In three steps
- 4) Repair pitchers mound
- 5) Mark all foul lines, batters box, etc.
- 6) Replace bases
- 7) Drag warning track (if applicable)

Baseball infield maintenance can be done very easily and quickly if proper maintenance procedures are followed. There are normally 3 steps to doing Infield maintenance to the playing field.

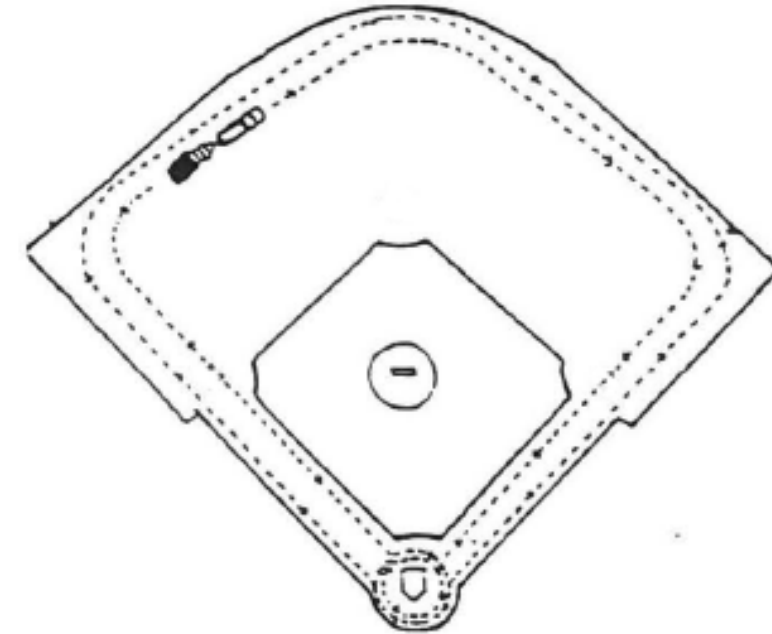
### I) ELLIPTICAL "8" PATTERN

Starting at the outside edge of the infield, drive an elliptical 8 pattern crossing over at 2nd base, moving along the inside edge. Overlap the pattern in towards the middle of the infield, until the full playing area has been covered.



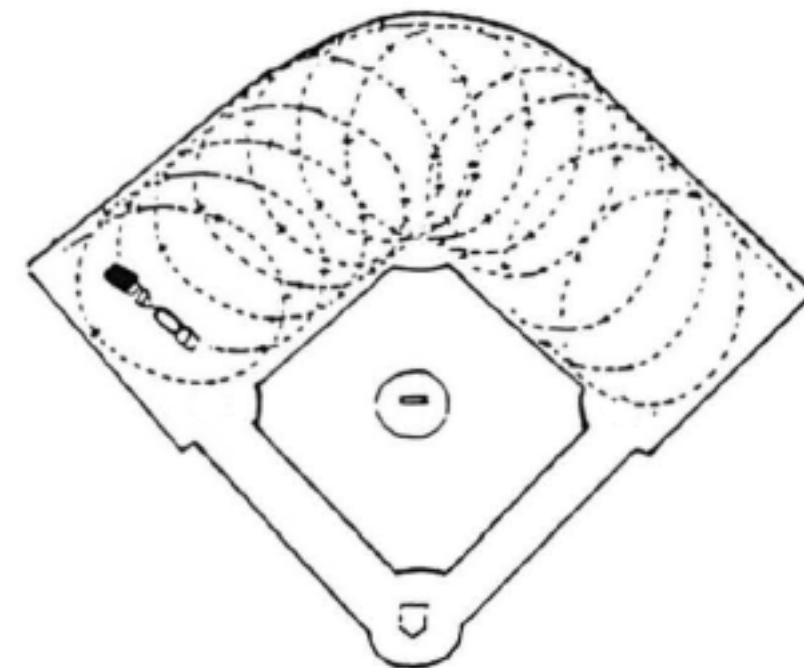
### II) HOME PLATE AND BASE PATH GROOMING

Move to the outside edge and line up for a straight pass down the base path to home plate. Do not start to turn until the drag has entered in to the home area circle. Drag around the home area circle twice, exit up the opposite base path. Turn around and repeat the procedure.



### III) CIRCULAR EGG PATTERN

As you exit from the base path stay to the outside edge and start the final groom pattern. This is an egg-shaped, overlapping circle pattern that goes the full length of the Infield. When you finish with the grooming pattern, stop at the outside edge of the Infield and pick up the drag. Rake level any material left on the playing field.





# APPENDIX III

## FIELD DIMENSIONS AS PER BASEBALL CANADA'S STANDARDS

Age	Pitch Distance	Base Distance	Mound Height
Senior	60'-6"	90'	10"
22U	60'-6"	90'	10"
18U	60'-6"	90'	10"
15U	54'	80'	8"
13U	48'	70'	6"
11U	44'	70'	6"
9U	N/A	60'	N/A

## SUGGESTED SPACE DIMENSIONS AS PER THE "BASEBALL FIELD MAINTENANCE - A GENERAL GUIDE FOR FIELDS OF ALL LEVELS - PAGES 23-26":

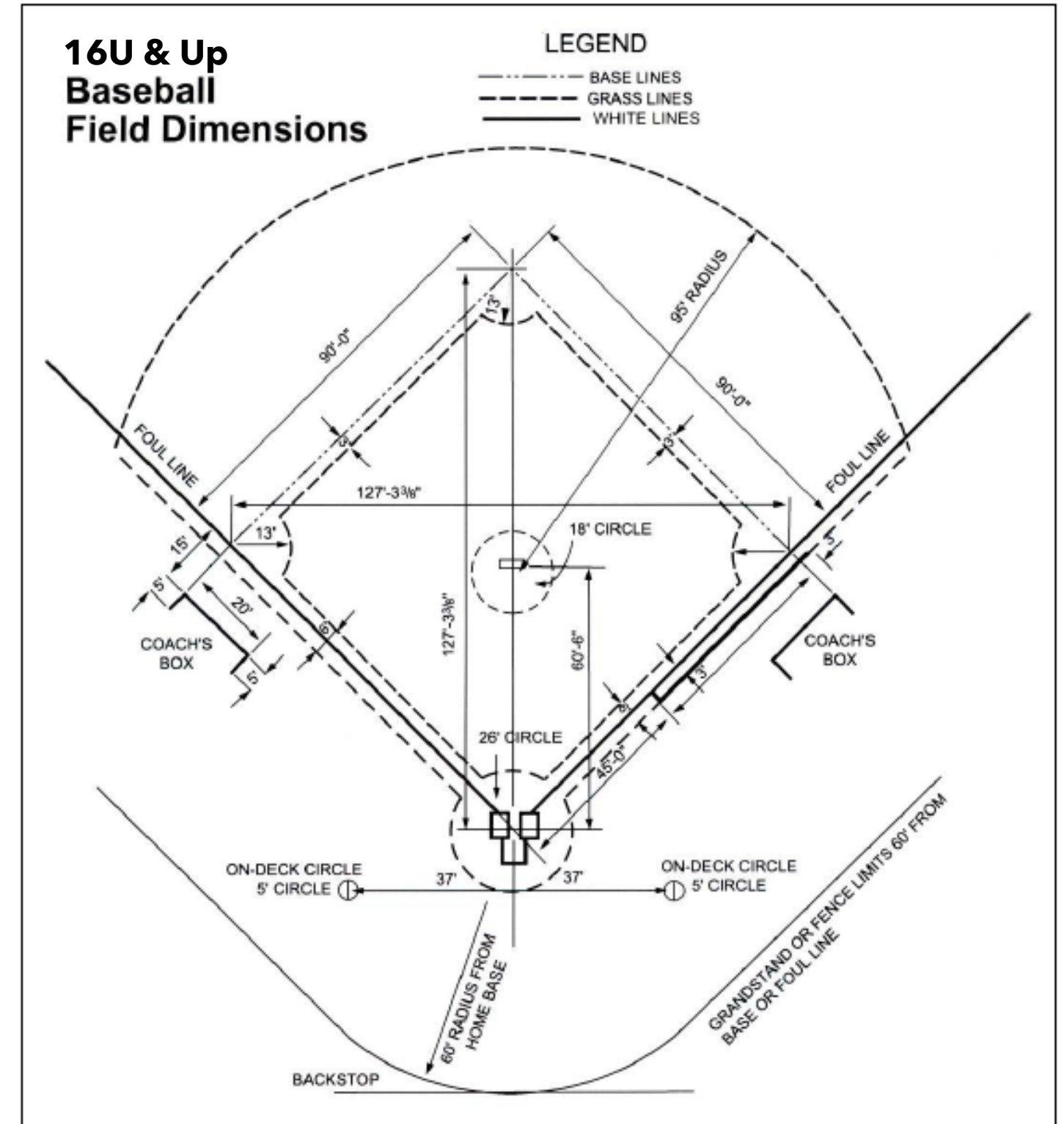
Field Dimension	Age Group	Space Requirement
Regulation baseball (90 ft. bases)	16U & 18U	110,000 sq. ft.
Regulation baseball (90 ft. bases)	13-15 year olds	90,000 sq. ft.
Youth baseball (60 ft. bases)	12 and under	60,000 sq. ft.

## FENCE DIMENSION RECOMMENDATIONS AS PER BASEBALL CANADA'S STANDARDS

11U	13U	15U
<u>Left &amp; Right foul lines:</u> 180 feet min. (suggested 200 ft.)	<u>Left &amp; Right foul lines:</u> 200-ft. min. (suggested 225 ft.)	<u>Left &amp; Right foul lines:</u> 245 ft. min. (suggested 270 ft.)
<u>Centre Field:</u> 200 feet min. (suggested 225 ft.)	<u>Centre Field:</u> 225- ft. min. (suggested 260 ft.)	<u>Centre Field:</u> 280 ft. min. (suggested 300 ft.)

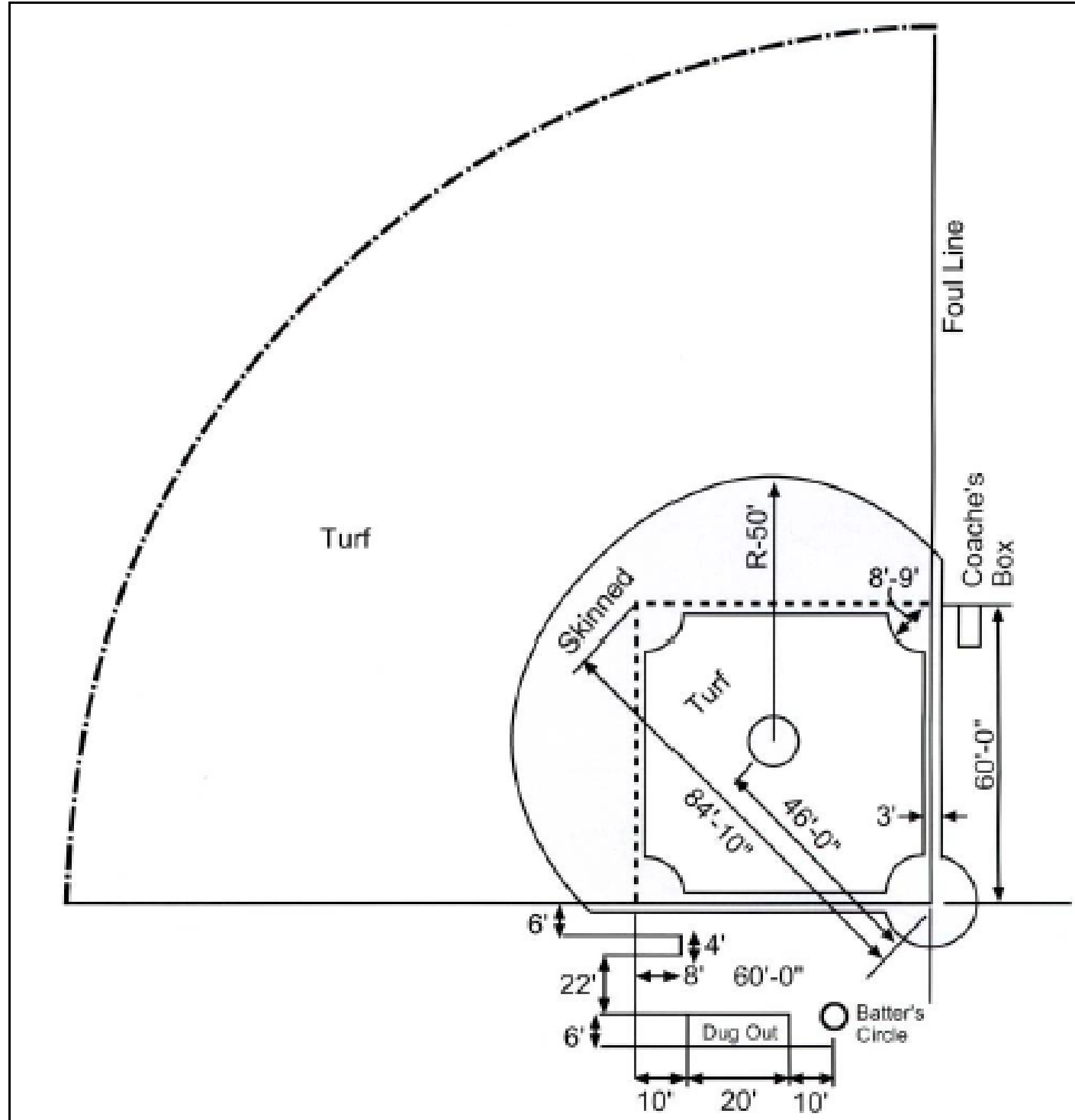
## DIAGRAMS OF FIELD LAYOUTS

### REGULATION BASEBALL FIELD



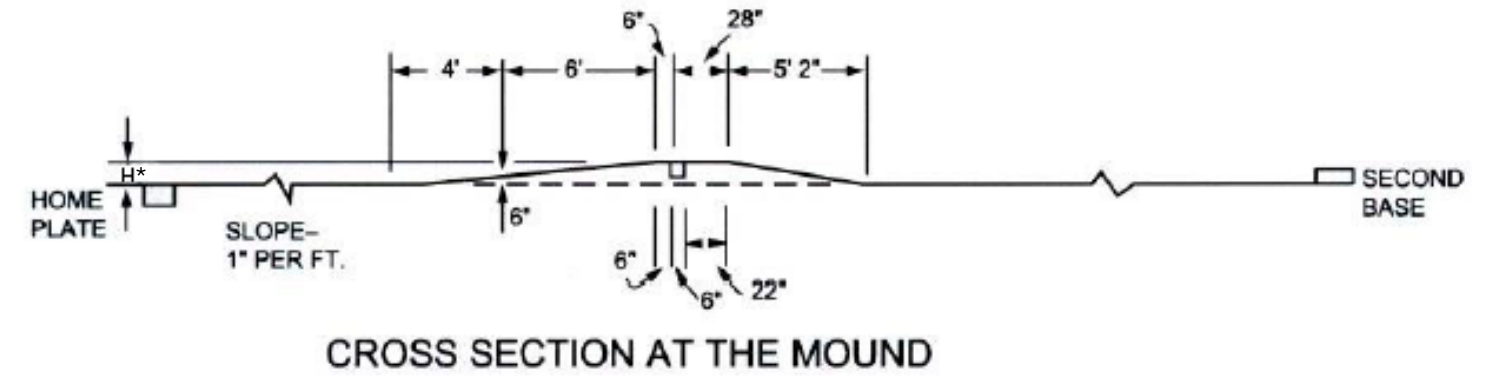
## DIAGRAMS OF FIELD LAYOUTS

### YOUTH BASEBALL FIELD



## DIAGRAMS OF FIELD LAYOUTS

### BASEBALL PITCHER'S MOUND



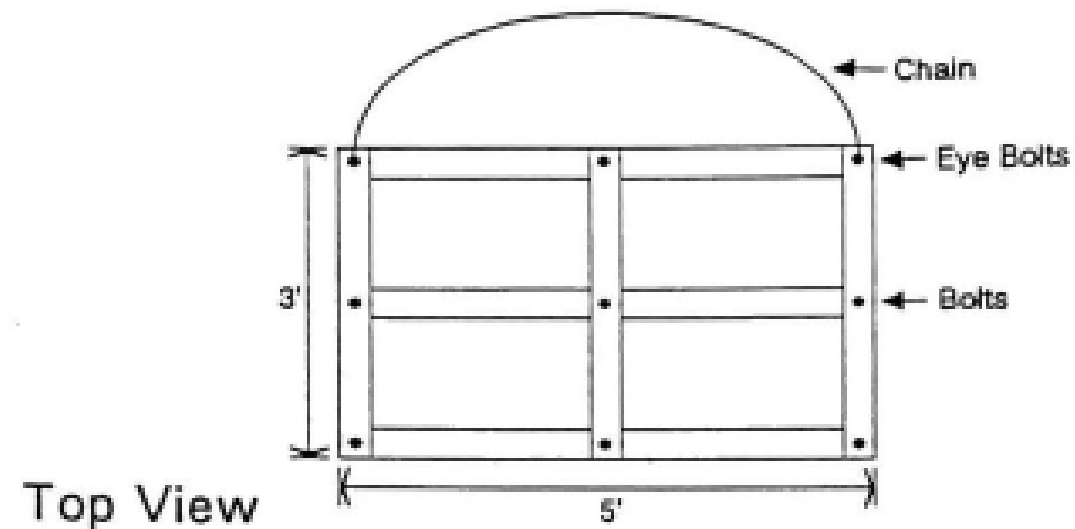
\*Mound height differs depending on age group. Please see the chart below for more information.

Age	Mound Height
Senior	10"
22U	10"
18U	10"
15U	8"
13U	6"
11U	6"
9U	N/A

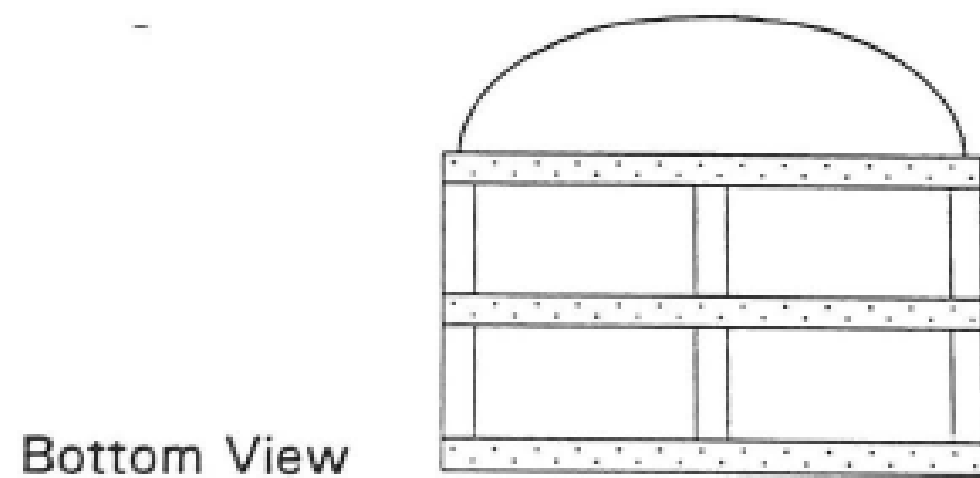


# APPENDIX IV

## NAIL DRAG CONSTRUCTION



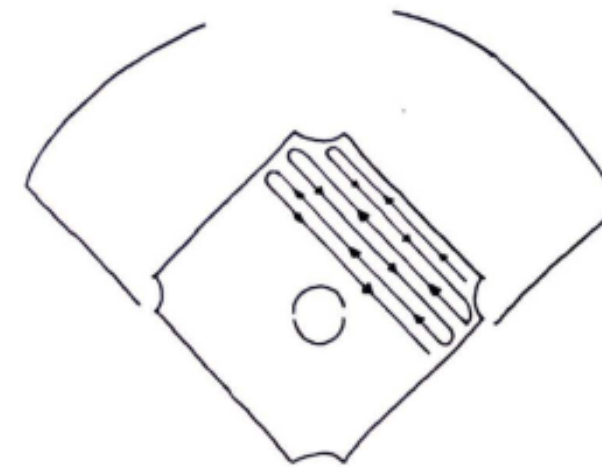
Made with 2"x4"  
 Use 1"x4" to cover 2"x4" on top to hold in nails  
 Pre-drill straight holes for nails  
 Use 40 pennie nails



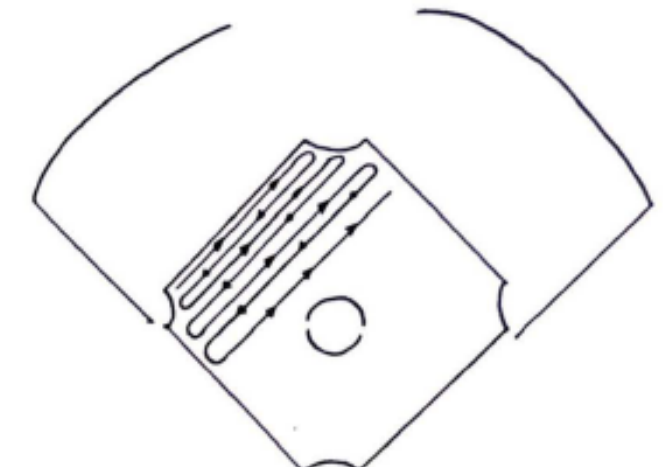
Stagger Nails 1 3/4" apart - 2 rows in each board

# APPENDIX V

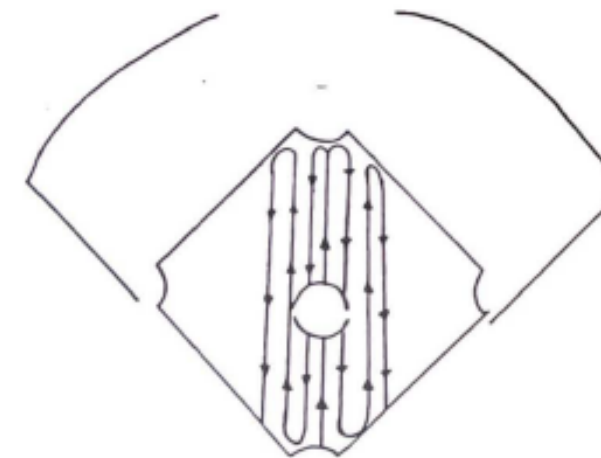
## INFIELD MOWING TECHNIQUES



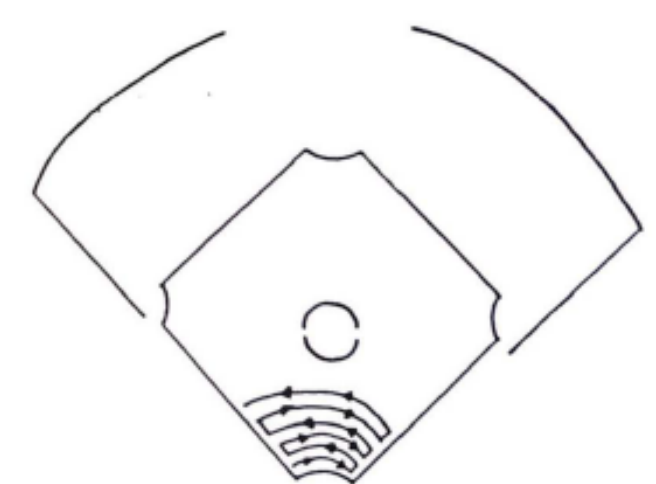
1) Parallel to right field line



2) Parallel to left field line



3) Home to second, back and forth



4) Third to first, back and forth



# APPENDIX V

## INFIELD MOWING TECHNIQUES

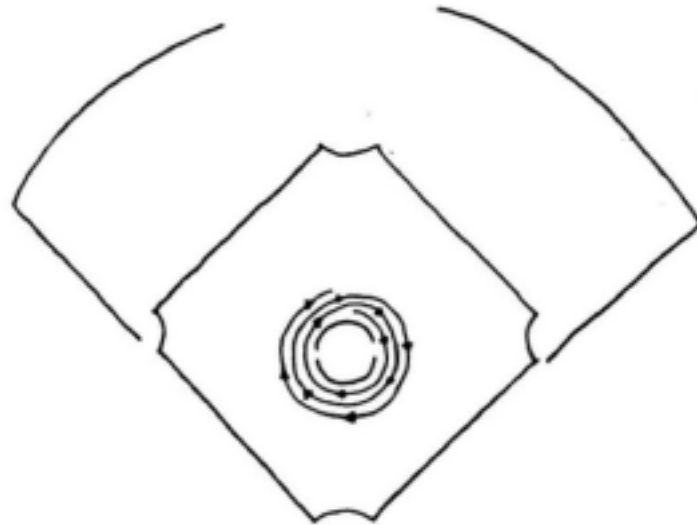


Figure 11.

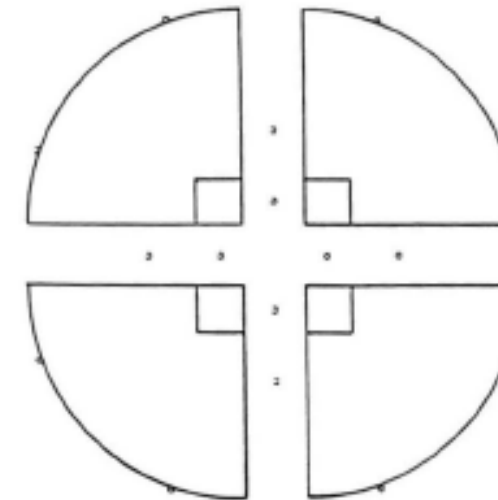
5) Circle mount (clockwise and counter-clockwise)

# APPENDIX VI

## MULTIPLE FACILITY DESIGNS

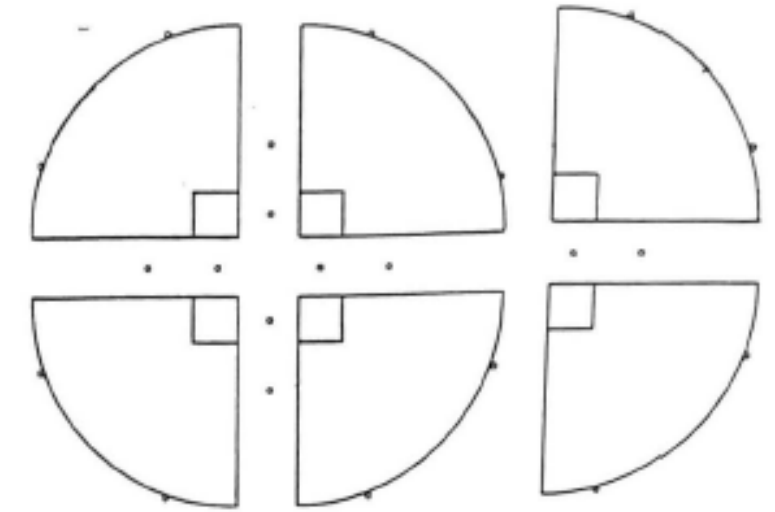
A. FOURPLEX (Four Fields)  
"Wagon Wheel"

Average Acres: 18-20



C. SIXPLEX (Six Fields)

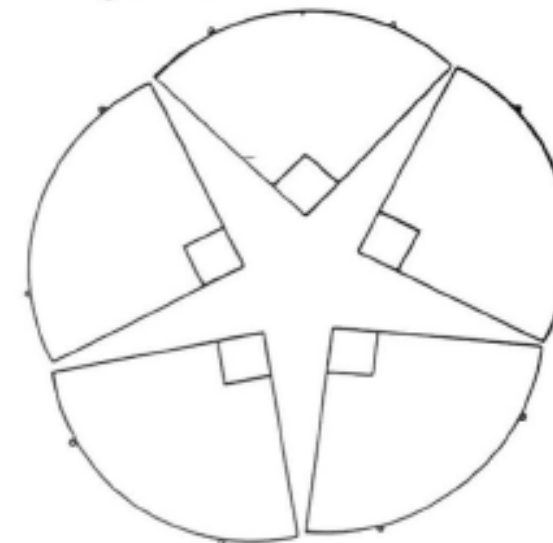
Average Acres: 28-30



Shown below is a five-diamond complex, also called a wagon wheel. With five fields, certainly more teams and players are scheduled daily for leagues and weekends for tournaments. A five-diamond wagon wheel is shown below.

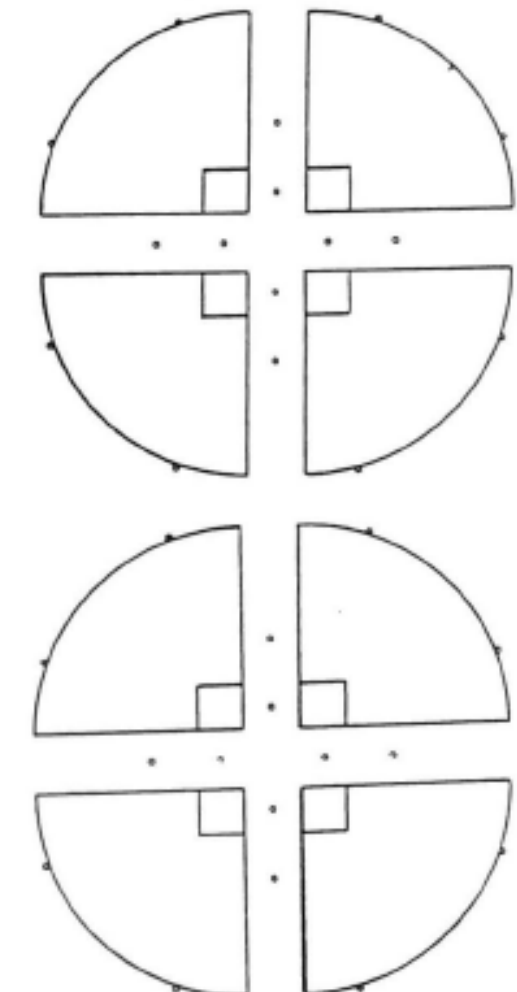
B. FIVEPLEX (Five Fields)  
"Wagon Wheel"

Average Acres: 23-25



D. EIGHTPLEX (Eight Fields)

Average Acres: 36-40





**BASEBALL**  
**MANITOBA**



# FACILITY MAINTENANCE MANUAL

*FOR BASEBALL DIAMONDS*

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This manual includes information on planning, building, and maintaining a ball diamond. Please visit our website for more information - [www.baseballmanitoba.ca](http://www.baseballmanitoba.ca)

*2024 EDITION*