Golf Course Design Study Guide

The Process:

5 phases:
- **Initial site analysis** 4-6 months  Selecting a Site
- **Through design** 6-18 months  Produce Design Plans
- **Development** 12-18 months  Build the Course
- **Grow In** 3-10 months  Wait for Grass to Grow In
- **Maintenance** Ongoing  Continuous Monitoring

- Process takes an average of 2 ½ years.

**Phase 1: Site Analysis:  4-6 months**
The purpose of a site analysis is to determine if a piece of land meets all the important criteria before the design begins.

- **Three Categories**
  - **Environmental Conditions**
    - Architects must ask several questions about environmental conditions of the site, including questions that relate to the land, the climate, and surrounding environment.
  - **Utilities**
    - They also ask questions about the availability of utilities such as water, power, gas, and phone lines.
  - **The Political Situation**
    - They must learn about the area’s zoning, covenants, environmental regulations, or historical designations.

* minimum size is 120 acres for the golf course and 40 acres for the surroundings.

**Phase 2: Design:  6-18 months**
The design is accomplished through a series of increasingly detailed design and construction planning documents.

1. **Base Map**
   - The base map acts as the starting point.
   - Includes property lines, topo maps, restricted areas, underground utilities, right-of-ways, structures, historical sites, and environmental resource areas such as wetlands and wildlife habitat.

2. **Routing Plan**
   - Also referred to as a schematic that shows a preliminary golf course layout.
     - First, a possible **clubhouse location** is identified. 4-5 acres.
     - Then, a **practice range or golf learning facility** site is identified. 12-35 acres.
Then, possible **tee and green locations** near the clubhouse for starging and finishing holes.

- A simplified method of showing possible **centerlines or play line** of holes.

3. **Concept Plan**
   - Provides a visual image of how the course will look when it is complete.
     - Shows the shape, size, and form of each feature- bunkers, tees, greens, and hazards.
     - An architect usually creates 2 to 3 plans to review.

4. **Construction Drawings**
   - These detailed drawings are used to guide the building of the golf course.
     - Plans for **irrigation, grading, landscaping, and course features**.
     - Usually 40 to 50 pages.

**Phase 3: Development: 12-18 months**
Involves putting the work out for bid, with several contractors competing for the project. The contractor is selected based on a combination of experience, references, and price.

1. **Staking**
   - The first step is to stake the routing plan onto the site, including tees, greens, and centerlines.
   - Done by a surveying company.

2. **Clearing**
   - Unwanted trees and shrubs are removed from the proposed site.

3. **Rough Grading and Major Drainage**
   - Areas are cut and filled to create the necessary foundation for the course and to ensure proper surface drainage.

4. **Feature Construction and Minor Drainage**
   - Final subtle shaping of the land occurs, and finished drainage features are installed.

5. **Irrigation**
   - Once of most important steps is the installation fo the irrigation system

6. **Finish Grading and Planing Preparation**
   - At this point, tees, bunkers, and greens are constructed and must be prepared for planning.

7. **Planting**
   - Usually the tees and green are planted first, then fairways, and finally roughs and out of play areas.

**Phase 4: Grow-In: 3-10 months**
Grow-in can take anywhere form 3-10 months depending on the climate and weather.

**Phase 5: Maintenance: Ongoing**
Even with a top-notch maintenance program, the course will eventually need some type of redesign or renovation.
- The phase never ends.
The Team:

Core Team:

- The architect, contractor, and superintendent make up the primary working team throughout the design and development process.
- The architect is ideally hired from the beginning, and oversees the entire project.
- The superintendent should be brought in as early as possible to participate and review all design documents.
- The contractor is usually brought in at the beginning of the development phase.

The golf professional can contribute a great deal to the process and most closely works with the superintendent.

Extended Team:
An extended team is usually a group of specialists involved periodically throughout the project.

Phase 1: Site Analysis
- Environmentalists, land planners, hydrologists, archeologists, archeologists, legal counsel, and financial advisor.

Phase 2: Design
- Building architect, Interior designers, Landscape architect, publicists

Phase 3: Development
- Heavy equipment operators, concrete purers, bricklayers, irrigation specialists

Phase 4: Grow-In
- Superintendent and staff

Phase 5: Maintenance
- Superintendent and staff maintain and monitor the course.

Design Considerations:
It’s not just about form - course layout, lines of play, and contours - it is also about function – drainage, safety, and traffic flow.

Designing for Function:
The golf course architect typically begins with function and follows by form.

Form always follows function.
3 critical functional design considerations:
- Drainage
- Traffic control
- Safety
Drainage:
Optimal drainage is obtained by maintaining a balance between water retention and water drainage.

2 types of drainage: Surface drainage and Subsurface drainage
- Surface drainage – the slope and shape of the land is primarily a function of the land’s topography.
- Subsurface drainage – the internal drainage of the soil is primarily a function of soil content.

Surface Drainage:
- Most architects try to use the natural slope of the land to avoid spending excessive time and money altering the natural landscape.
- At least to some extent, the surface drainage will need to be altered.
- This is accomplished by the use of rough grading and finish grading.
- Cool Season Grasses – 2% slope
- Warm Season Grass – 3% slope

Subsurface Drainage:
Subsurface drainage systems are typically used in courses area that require the highest maintenance, such as greens and tees.
- Soil Amendment. Existing soils are altered. Adding special amendments (sand, organic matter) to the existing soil.
- Construction of drainage Systems. Construct an underground drainage system of pipes to carry away excess water. Combination of pipes below ground that drain into a stream, lake, or dry well.

Drainage for Roughs, Fairways, Tees, and Greens *** (Look at chart)
- Even with an ideal site with good natural drainage, additional drainage will have to be added for greens.

Guidelines for Construction of Greens
- Use layered soils in combination of course and fine textures to ensure a balance between retention and drainage.
- Use scientifically analyzed soil (root zone mixture). This “soil” must be idea. Samples are taken to make sure each green is suitable for turfgrass. Test texture and pH as well as other characteristics.

***Although nearly all-new golf course greens are built using the more modern methods, it is still estimated that 70% of greens are constructed without layering or special root zone mixes.
Modern Methods of Greens Construction
- The California method and the USGA method are the most commonly used in the U.S.

California Greens Construction Method: Where rapid drainage is desired. It is simple to build, less costly, and less complex in its operation compared to the USGA method.

USGA Greens Method: Is probably the most well-known in the U.S.

Topsoil Greens Construction Method: Usually found on older courses or ones built with low budgets, use native topsoil for greens construction instead of sand. These greens need more aeration and more precise water applications, and react more slowly to weather changes. Makes is more difficult to grow good grass.

Traffic Control
Routing tee markers and rotating cups are two critical course management practices used to control golf course traffic.

Tees
Guidelines:
- Tees should be at least 6,000 square feet.
- Must be able to support all playing abilities.
- 5 tee systems on each hole are becoming more common.
- 1st and 10th tee must be bigger to support additional practice swings.
- Par 3’s must be larger due to iron play.
- 1st, 10th, and par 3’s usually average 8,000 square feet or more.

Greens:
Guidelines:
- Size of greens should range from 5,000 – 8,000 square feet.
- 12–15 foot collar around the perimeter of the green where no cups should be placed.
- Minimum of 15 feet between cup placements.
- 12–20 areas for cup placements.
- Each of these areas should be designed with a radius of three feet around the cup and no slope changes.

Safety
- To minimize the possibility of a mishap, architects design the parameters of a hole based on “predictable playing areas.”
- The architect calculates predictable playing areas based on typical playing patterns, shot distances, and shot angles.
- Many factors – wind, topo., vegetation, etc. – can lead to mishaps, despite safety guidelines and measures.

Guidelines:
- Landing areas (the most predictable landing place for the shot) should be offset if possible.
- Landing areas should be 200-250 feet at minimum (wider in open areas where there are no trees to act as a buffer).
- Adjacent tees and greens should be 100 feet apart at the boarders, 200 feet from the center points.
- Bunkers, ponds, mounds, and trees can be used as buffers when holes are close together.
- Holes should be routed clockwise to allow golfers to slice into the course, not out of bounds.

Other Functional Design Considerations:

Access: Make golf courses accessible to all players, including the physically challenged.

Seasonal or Event Use: Who is going to use the golf course and in which seasons of the year?

Housing: There will be numerous functional (and form) considerations (sitting of houses along fairways, utilities, additional drainage factors, streets and traffic, etc.).

Environment: A well-designed course is not only compatible with the environment, it actually enhances its surroundings.

Renovating for Function:
Increase traffic and lower mowing heights require innovative and increasingly sophisticated design methods. Renovation can result in decreased maintenance, increased safety, and improved environmental compatibility.

Increase Functionality and Decrease Maintenance:
- Increase the area of greens or tees in order to handle high-volume traffic.
- Improve drainage to max. open times.
- Upgrade irrigation.

Increase Safety:
- Change orientation or distance between holes to decrease risk.
- Add additional buffers – tees, mounds, or screens.

Improve Environmental Compatibility:
- Install more efficient irrigation systems.
- Improve the area for wildlife habitat.

Respond to Natural Evolution of the Course:
- Even the well-designed greens, over time, compaction will eventually result from high volumes of traffic. As a result, redesign and renovation may be necessary.

Designing for Form:

Although an architect may spend as much as 80% of his or her time designing for function – making sure the course is reasonable to maintain and safe to play – it is for the course’s form that the architect is usually heralded.

It is the course’s form – its look, its feel, how it plays – that keeps your customers coming back for more.

Three major categories of form-related design:
- The experience
- Playing characteristics
- Aesthetics

Entire recreational experience
The architect is concerned with the golfer’s entire experience, NOT just what happens while playing the course itself.

Five Phases:
1. Anticipation
2. Arrival
3. Participation
4. Cool down
5. Memory

Designing for Play:

Designing the course: The architect considers course layout, size, character, and style.

Course Layout:
- To maximize speed of play and to preserve safety, the course layout should facilitate a smooth and natural traffic flow from hole to hole.
- At no point should the golfer be forced to walk back against the flow of traffic.
- Three types of Layouts
  o Core Course
  o Single Fairway
  o Double Fairway.
Size:
- At bare minimum an 18-hole golf course needs 120 acres, exclusive of ravines and ridges, just to provide the necessary playing area.

Character:
- Whatever the character of the golf course, the character of the course layout should be memorable, and in some way inspire the golfer to return.

Style:
- Style is a function of the placement of hazards, number of trees, size of greens, and width of fairways.
- Although most courses are a mixture of different hole styles, a course is usually classified by the hole style that is most prevalent on the course.

Designing Each Hole:
- In designing each individual hole, the architect strives to provide challenge, fairness, and variety.

Provide Challenge
- Each hole provides the golfer with the right amount of challenge.

Provide Fairness
- Most architects consider optical illusions or distorted perspectives to be unfair and try to avoid them whenever possible.
- A hole should not favor the quirks of a particular swing.
- It should not punish hooks and reward slices – rather, it should punish hooks and slices equally.

Provide Variety
- Strives to create variety from hole to hole to create an interesting playing experience.

Hole Style — 3 Categories – strategic, heroic, or penal.

Strategic: The strategic hole might be considered the “thinking person’s hole.” This style provides an interesting mental challenge because it offers a variety of possible ways to negotiate the hole.

Heroic: Requires extraordinary maneuvers. Extraordinary execution of difficult shot – perhaps an extra long tee shot or a drive close to the edge of a hazard – makes you a hero.

Penal: Penal design is not very forgiving since it leaves little room for error.
**Freeway:** The freeway design is a simple linear arrangement of features and hazards. Although this is not a particularly interesting hole style, the design effort is minimal and the hole can be easily mass-produced.

**Designing Each Feature:**
Each course element must be considered in the design of a hole. The combination of these elements gives each hole its unique look and feel. The architect must consider size, shape, and contours.

**Tees:**
- Golfer should be able to view the entire hole from the tee-off position. Blind corners or hidden landing areas are considered unfair and unsafe.
- Each set of tee markers should provide variety in length and an angle to the target area that matches the ability of golfers using that tee.
- Tee’s contour should direct the golfer toward the intended line of play.
- Tees should be wide enough to provide flexibility in tee-maker location.

**Hazards:**
- Hazards are primarily used to direct play, and provide depth perception, variety, and challenge.
- Natural features are often integrated into the design as hazards.
- The placement of hazards often lets the architect’s personality show.

**Greens:**
- Greens should be large enough and visible enough to provide a fair target area.
- Greens must hold a well-played approach shot.
- Greens should vary in shape, size, and contours.
- Greens should strike a balance between a good challenge and an overly frustrating experience.

**Designing for Aesthetics:**
Along with the way a course “plays,” a golfer is greatly influenced by the course’s aesthetics – the “look and feel” of the course.

**Building on Nature**
- Use natural features as part of the game, such as rock outcroppings for hazards or, when possible, leave natural mounds in place.
- Orient tees to spectacular views.

**Using Variety and Contrast**
- Vary the size and shape of the tees.
- Vary the size, shape, and contours of the greens.
- Vary the shape, size, and placement of bunkers and hazards.
Choosing Elements for Their Unique Effects
- Water can be both intimidating, as a hazard, and calming, as a reflective surface.
- Sand tends to provide contrast, accent, and emphasis.
- Trees act to frame golf holes and target areas.
- Waste areas provide contrast in turf color, texture, and height.

Renovating for Form:
- Evolution of the “Living” Golf Course
- Evolution of Golf Technology
- Changing Markets

Design and the Environment:
USGA, ASGCA, GCSAA joined together to promote the creation of golf courses that enhance the environment rather than harm it.

Environmental Awareness:
Design Strategies to Increase Environmental Compatibility:

1. **Careful Site Selection:** the land should be investigated for a variety of perspectives to determine its suitability as a future golf course site.
2. **Judicious Alteration of Natural Surroundings:** Rather than performing massive land alteration to change the character of the land, the design should build on the area’s natural surroundings and distinctive beauty.
3. **Design for Decrease Maintenance:** Healthy turfgrass requires less intensive maintenance. This may mean reduced use of pesticides, fertilizers, and water.
   a. Well Drained Greens
   b. Adequate Size for High-Traffic Areas
   c. Use of Native Vegetation
   d. Use of Hybrid Turfgrasses
4. **Conscientious Use of Natural Resources:** Modern Day techniques are being used to help conserve natural resources.
   a. Alternative Water Sources
   b. Weather Stations
   c. Computerized Irrigation Systems
   d. Technological Innovations
5. **Providing Wildlife Habitat and Land Preserves:** Programs that increase the benefit that golf courses provide for the surrounding community.
6. **Monitoring and Research**