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GOLF COURSE DESIGN
reclaiming strategic design and providing community greenspace

ball state university
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A vast majority of golf courses in the United States provide open space for golfers only. The US has more than 17,000 golf courses, roughly equaling the area of Delaware and Rhode Island combined (source). The game of golf has moved away from traditional strategic design to various other styles that promote unnecessary club and ball technology and course length. The shear amount of land being consumed by golf courses appears to be too great, considering they only serve as open space for 25.4 million Americans, which is the number of Americans 18 years or older who have played a round in the past 12 months (www.ngf.com). As a landscape designer, these factors pose many challenges, but provide an opportunity to provide multi-use open space for a broader community, and refer back to strategic design theory to strengthen the tradition of the game.

Landscape Architects have been present on golf course design teams for most of the 20th century, particularly since the 1950’s. This study attempts to understand principles of successful open space design and merge them with golf course design. Several model projects including the old course at St. Andrews, Scotland and the Campen Course at Purdue University will aid in demonstrating aspects of successful golf course design.

The project site, Riverside Golf Course, in Indianapolis, Indiana is a 150 acre, 18 hole golf course leased by the city of Indianapolis to RN Thompson Golf Company. Riverside is north of 30th street and on the west side of the White River. The White River Greenway is also adjacent to the
east. The golf course is a basic “freeway” design with little topographic character other than the ridgeline that leads to the last four holes.

The masterplan for Riverside Golf Course is intended to meet three goals. The first, improve the course layout through principles of strategic golf course design. The second is to provide opportunities for active and passive recreation in harmony with golf activity. Also. the masterplan attempts to improve site facilities function and appearance. The proposed site includes a new course layout, but attempts to utilize as many existing site features as possible to minimize environmental impacts. Strategic design principles are apparent on every hole including the new par four eighteenth hole, which provides a great finish and a great view from the clubhouse. The clubhouse and surrounding area attempts to organize the golfing experience so golfers are treated to great views and easy movement from their cars to the first tee. The clubhouse features a pro shop, snack bar, meeting hall and second level restaurant. The maintenance area has been consolidated and screened from the view of patrons. Riverside will also be a place for activity during the winter with “sledding on the 13th” and cross-country skiing on the cart paths and on-site trails. A lookout tower with access from the White River Greenway is located in a woodland area that provides great views and a harmonious separation between pedestrians and golfers.
Choosing golf course architecture for my comprehensive project was an easy choice. I love the game of golf. Golf is the only game where you use your mind, body, and the landscape to compete.

This study will be significant to several entities. This study will not only be an addition to the world of golf course design, but the profession of landscape architecture. Others will be able to evaluate the contents, use ideas of value, and produce a study that corrects areas of weakness and builds on areas of positive ideas. This study will be a model for students of Landscape Architecture. Golf Course Architecture, those in the field of golf course construction and maintenance, golf course owners, and amateur and professional golfers interested in the opposite side of the game of golf. This study is also a chance to showcase my understanding for a need to question everything I know about golf course architecture and evaluate that knowledge in an attempt to make a positive impact on the game of golf.

This thesis study will not only be the culmination and completion of my requirements for a bachelor’s degree in Landscape Architecture, but it will serve as a stepping-stone in my development as a Landscape Architect. This study is an attempt to combine all the skills I have gained as a student of Landscape Architecture and use them in a comprehensive study that will lead to a complex and detailed master plan.

Golf course architecture is a complex area of professional practice. This study will address golf course architecture in two ways:
from the perspective of a design related practice, which encompasses many considerations including land use and from the perspective of a sport, which requires proper function and enjoyment by the user.

These realms of study in the world of golf course architecture require my thesis to define aspects of the game of golf and golf course design, question the relevance and necessities that are involved, and consider ways to improve golf course architecture for everyone that is affected by a golf course. This thesis will also attempt to find a balance between the playability of a golf course and the second use of the landscape by people from the surrounding community. This study will require analysis and the implementation on new ideas that are potentially beneficial, but also realistically impossible in some cases. I hope that my data collection, analysis, and eventual master-planning product will result in the breakdown of some conventional thought involving golf course architecture. In turn, others may improve upon my ideas and advance golf course architecture in a positive direction for all who are impacted by the game of golf.
Golf is a game that has evolved over the centuries. Modern golf finds its deepest roots in 1400’s Scotland, but games similar to golf can be traced all the way back to the Romans. The Romans played a game called Paganica and Italians played Pall Mall in later centuries. Farther north in Europe a game called Chole was played in Belgium and France. The game most closely related to early golf in Scotland was Kolven, which was played just across the English Channel in the Netherlands. All of these ancient games faded away with time, but the Scottish game has lived on and spread around the world with rapid success in the twentieth century (Graves 3).

Golf emerged on the coasts of Scotland because of several climactic and environmental conditions that suited the game well. The vegetation along the Scottish coasts was primarily coarse grass in sandy soils that drained well. This grass was bent grass and fescue, which was able to support a boxwood ball and later the “featherie” ball. Grazing animals kept the grass at lengths suitable for the early game. Golf was also well suited on these coastal lands because they were public lands, which allowed for free play. These coastal lands had few trees and no significant bodies of water such as ponds that might have discouraged players (4). Early hazards were created by the natural behavior of livestock and grazing animals. Strong winds forced these animals behind small hills, which were known as hillocks, where they would gather and trample the grasses. This repeated action caused grasses to die out and left exposed sand. These were the
earliest forms of sand bunkers, as we know them today. Another significant climatic factor that allowed golf to prosper in Scotland is the northern latitude. Sunlight well into the evening allowed golfers to play for extended periods.

The previous factors allowed golf to flourish in Scotland, but other factors led to its spread all over the British Isles. When the game began in the 1400's it was played in a completely natural setting without any land manipulation. When the game became more popular and began to spread, it moved down the coast of Scotland into England and headed towards London. Golf was being played in areas near Dublin and London by the 1600's. The game was still played on natural lands along the coast because golf course design did not exist, as we know it today. The development of the British Railways system allowed the game to spread to more players and spectators. The popularity of golf in Britain continued to grow, which increased the need for lands to play the game. By the time golf was strongly established in the late 19th century near London, the game was beginning to move inland. The Heathlands, which has more clay in the soil than along the coast, was the first area where golf required the land to be manipulated. This marked the beginning of modern golf course architecture.

Golf had become a very popular game in Great Britain and so its spread to North America was imminent. The game reached Canada in 1872 and then the United States about a decade later. Golf caught on quickly in
the US and by 1900 there were more golf courses in the US than in Britain. Scottish golfers and designers designed many of the first golf courses in the US, but they lacked the character of British courses (Graves 5).

The game truly exploded in the US when amateur Francis Quinet of the US defeated British professionals Vardon and Ray in the 1913 US Open. This event was also the beginning of American leadership in worldwide golf trends (Graves 5). The Roaring Twenties fostered further golf expansion. Funds were widely available for golf course development and real estate prices were low. Availability of funds also meant better designs across the country.

The prosperity of golf in the 1920's dramatically slowed when the Great Depression began in 1929 and continued through the 1930's. World War II also slowed the expansion of golf. It is estimated that between 1930 and the end of World War II, 1,000 new courses were built (6). This figure is deceiving because many other established courses were forced to close down. In fact, when the economic stagnation of the Great Depression and World War II ended in 1953, there were fewer golf courses open and functioning than there were in 1929.

Prosperity returned to the American economy in the 1950's, which became a decade of great expansion for golf. In fact, expansion was steady throughout the 20th century except for the mid 1970's when the oil embargo slowed the US economy and a few years of the 1980's (approximately 1974
- 1982). Expansion rapidly took off after the Korean War. This era is often referred to as the Age of Robert Trent Jones. Jones was the golf course architect of more than 400 golf courses worldwide. Another dominant figure of golf in the second half of the 20th century is Pete Dye. Some might say that when the Age of Robert Trent Jones ended, the Age of Pete Dye began (Graves 8).
Golf course architect Michael Hurdzan defines a golf course as a “spatial arrangement of holes on a tract of land with clearly designated starting points called tees and specific finishing points of four and one-quarter inch holes cut in the ground” (3). The links of Scotland in the 1400’s were laid out, which means there was no modification to the land. Centuries later when golf made its way inland in Britain, course were built, referring to the modification of land to make it suitable for golf. Eventually the term design replaced the term built, which means that golf courses became preconceived plans. A designed course could be sited on land that would traditionally not be used for golf. The Heathlands near London was the first site of modern design. Golf course design, which was coined because of the actions in the Heathlands, can be defined as the “theory and planning required to modify terrain and soil to accommodate the game of golf” (3).

Before golf course architecture was an acceptable practice, the game was played for nearly 400 years on land that was “laid out”. These coastal golf courses consisting of sandy rolling terrain covered with fine grasses and trampled sand hazards, were typically nine holes and required one or two golf clubs and a boxwood ball. Significant functions of these courses included holes that cross over each other and teeing the ball within one club length of the previous hole, which resulted in slow play and the eventual invention of the teeing area. When more people began playing the game,
designated hole areas (modern greens) were sited and corridors from hole area to hole area were formed. A routing plan was laid out by cataloguing natural features.

Inland golf brought forth the idea of “building” golf courses. There were no charges to play on these golf courses; therefore limited funds were available for earthwork. The extent to which earthwork was performed was mules and horses pulling slip scoops and men working with shovels and wheelbarrows.

There are three significant early British professionals and greenkeepers who worked with golf course layouts before the era of true course design. They are Allan Robertson (1815-1859), Tom Morris (1821-1908), and Tom Dunn (1849-1902). Robertson worked at St. Andrews and is credited with the 17th hole, the Road Hole. He also laid out the links at Carnoustie. Robertson’s contributions to golf course design are double greens and widening fairways. Tom Morris, or “Old Tom”, who was Robertson’s understudy, did more work at St. Andrews. Morris is also credited with laying out several other British courses. Tom Dunn, who was the most active professional of the late 1800’s, lay out and built many new inland courses, which attracted more players to the game. It should be noted that at this time, golf on the coast was still preferred despite the growing popularity inland (Graves 4).
Eventually golf courses were not just “laid out” and “built” but they were “designed”. Modern golf course architecture began in the late 1800’s at the Heathlands near London where significant earthwork took place. Many inland courses were also sculpted and designed on converted fields of clay soil. Some of the significant British designers from this era include Willie Park Jr., H.S. Colt, W.H. Fowler, and J.F. Abercromby.

The pioneering figure of modern golf course architecture in the United States is Charles Blair MacDonald. MacDonald, who studied design at the University of St. Andrews in his native Scotland, designed several golf courses in the Chicago area in the 1890’s. In 1892, he designed nine holes at Belmont for the Chicago Golf Club and added another nine holes the following year. In 1911, MacDonald designed the National Golf Links on Long Island, NY, which raised design standards and inspired many to rebuild existing courses. MacDonald is credited with coining the term “golf architect” and is considered the father of American golf course architecture.

With the latter background of golf course architecture established, it is crucial to discuss and understand the evolution of golf design in terms of play. Since golf became a substantial sport in America in the early 1900’s, especially the 1920’s, there have been three strategies of golf hole design and one offshoot strategy in the 1950’s. These strategies or classes of design are penal, heroic, and strategic. Freeway design is a class created


golf course design history
out of overpopulation of the game in the 1950's.

Penal design is characterized by penalizing all imperfect play. In penal design, unnatural hazards on the ground, usually resembling small rockwork, are directly in the line between the teeing area and the hole. When golfers used the "featherie" ball, which had a significantly lower flight trajectory than modern balls and carried an average of 140 yards, the crude fairway hazards of penal design demanded a perfect shot. The "gutty" ball in 1902 and the "wound" ball in 1945, which made it possible to hit over the hazards that penal design presented, replaced the "featherie". Instead of changing design styles, designers adjusted the placement of hazards to accommodate for the advances in ball technology. The greens of penal design are often small, flat, and surrounded by a ring of sand, water or taller grasses. In penal design the player must carry the ball over a hazard in front of the green and avoid any of the previously mentioned hazards around the green. This design leaves little room for error.

One of the great penal designers was the father of American golf course architecture, Charles Blair MacDonald. He copied many of the great holes of Britain including the Redan, the Road Hole, the Postage Stamp, and the Cardinal. These classic holes were hard to copy because they were noted for their greatness due to the topography that naturally helped to create them. Many in the world of golf course architecture would have pointed this out as the reason for inland golf being poor (Hurdzan 9).
Those who rejected penal design were the “thinkers” of golf course architecture and advocated strategic design (9). These designers, who were led by British architect H.S. Colt, removed hazards along the path from the tee to the hole. They felt this would allow for less skilled golfers to enjoy the game as well. This did not take away the challenge though because increasingly higher ball flights sometimes resulted in hooking and slicing the ball near these newly placed hazards. Those who agreed with the design philosophy of strategic design sought sound and basic design principles in St. Andrews. Based on intensive study of St. Andrews from the 1890’s through the 1920’s, strategic designers set out to provide alternate routes from tee to green. Instead of having to make the perfect shot as in penal design, the player can create a strategy to avoid the hazards based on his strengths and weaknesses. For example, a drive from the tee that flirts with danger and succeeds would lead to an easier second shot into the green. Strategic design produces a “collage of risks and rewards” (Hurdzan 9). The strategic design philosophy also produced the challenge of emulating St. Andrews at a reasonable cost.

Heroic design is somewhat of a mix between penal and strategic design. The golfer is presented with a blatant hazard from the tee, but can choose how to handle the hazard based on his strengths and weaknesses. A perfect example of this design is the 18th hole at Pebble Beach. The hole doglegs left around the ocean, forcing the golfer to decide how much of
the water he wants his ball to travel over. The longer shot or the shot that
hugs the edge of the water more closely will have a better second shot to the
green. The 18th at Pebble Beach shows how the more risk taken, the greater
the reward in heroic design. The obvious problem with this design is that
players with more distance off the tee will be at an advantage. Hurdzan also
points out that this design style became too repetitious (15).

Another design style is “freeway” design, which is not as much a
philosophy as it is a product of the times. “Freeway” design was a result of
the post-WWII and Korean War popularity in golf. In the 1950’s, golf was
becoming “overpopulated” (15) in the US. The demand for golf courses
was phenomenal and there were too few golf course architects to supply
that demand, which resulted in the quick and hasty design of “freeway” golf
courses. “Freeway” golf courses are those that lack surface expression and
terrain. These courses’ holes are designed based on a straight corridor from
tee to hole that is lined by some sort of defining vegetation (often marking
distance to the hole). These holes had square tee boxes, round greens, and
“expressionless” bunkers (15). The goal of “freeway” design was to move
as many golfers through the course as quickly as possible. Developers also
wanted minimum design and maintenance costs, which severely affected
the course’s function. For example, the distance from a green’s edge to a
sand bunker would be determined by the width of a mower. This sounds like
a novel idea, but it does not allow for much creativity in design. Another
negative is that the only ways to distinguish skill through “freeway” design is to add length to a hole or create tricky putting surfaces (17). Hurdzan describes these courses as “lifeless, providing a venue for the game without any semblance of its soul” (17). Designers who did not advocate this type of design were too busy to oppose it (18).

The evolution of design styles and theories is so important to modern golf course architects and so is the evolution of specific golf course features. A basic premise in analyzing golf course features is that the game began centuries ago using existing topography and vegetation, but the game has been forced to take design control in order to satisfy the demand for golf facilities.

The evolution of the tee, green, and bunker is a crucial discussion. On the first links of Scotland the greens and sand bunkers were formed from livestock grazing and trampling vegetation behind small hills or “hillocks”. Today’s greens are formed by the buildup of soil, which creates plateau areas that are rolled for smoothness and top-dressed yearly. Until 1875 there was no designated tee area. The player would tee the ball with a handful of soil within a club’s length of the previous hole. Teeing grounds have been given their own area since. Safety and time have forced teeing areas to become larger and more separated from the previous hole. Many teeing areas were artificial until the 1920’s when it was discovered that maintaining an area of turf was easier in larger plots.
Today a hole typically has several teeing areas for degree of player skill and gender. Livestock trampling vegetation, which exposed sandy soils, formed Scottish link bunkers. Many of today’s bunkers are sculpted into specific forms and stabilized by wooden bulkheads, railroad ties, and sod revetments. Golf course architects such as Willie Park Jr., H.S. Colt, Stanley Thompson, and Robert Trent Jones introduced dramatic bunkers. Pots bunkers, a deep form of sand hazard, are a distinctive feature of many British courses, disappeared well into the 20th century, but have been revived by Pete Dye.

The green or putting surface is a feature of the golf course that requires additional discussion. Greens were originally grazed areas, and then modern techniques such as rolling, top-dressing, and mowing have been implemented to maintain putting surfaces. The mowing of greens began in the late 1800’s, which was the result of Edwin Bipping of England inventing a turf mower in 1835. Green maintenance technology was advanced by several men including Martin Sutton of England, who ran a research and development center called Sutton’s Grass Station (1835). Many land-grant universities conducted research in the United States in the late 1800’s. In the 1920’s putting surfaces became smoother with the invention of the multi-blade mower. Other significant events in turfgrass science history are the formation of the Greenkeeper Association in Britain (1912) and the United States Golf Association’s (USGA) formation of the
“Green Section” (1920). Post-WWII developments in the care of greens were automatic irrigation systems and several technological advances in maintenance. In 1936 Edward Stimpson invented the stimpeter, which was a device used to calculate green speeds.

Discussion of the fairway is also significant. As in the case of tees and greens, fairways were originally the vegetation that naturally appeared on the link. Today, fairways are turfgrass systems that require maintenance and special attention. Perhaps the most significant area of fairway discussion is the actual type of turf. There are many cultivars used on fairways today, including bentgrass, bluegrass, ryegrass, and fescues. A notable bentgrass is Penncross Creeping Bentgrass, which was developed in the 1950’s by H. Burton Musser. A notable bermudagrass is the fine-bladed bermudagrass developed by Glen W. Burton.
“Freeway” Design
Hole 1 - Existing (left)

Design that lacks surface expression and terrain. Holes are based on a straight corridor from tee to green, which is lined by some sort of vegetation (often marking distances).

Strategic Design
Hole 1 - Conceptual (right)

Design not requiring a perfect shot every time. Allows players to create a strategy for avoiding hazards based on his / her strengths and weaknesses.

“freeway” vs. strategic
St. Andrews, which is widely considered to be the Mecca of the
golf world, should probably be a case study for anyone who is exploring
the world of golf course design. For the most part, the style of golf played
today originated at St. Andrews in the 1400’s. Golf has been played as a
strategic game at St. Andrews for approximately 600 years. This notion
of strategy as a result of using the natural landscape is the true essence of
golf.

The Old Course at St. Andrews is located on the east coast of
Scotland in the county of Fife. The Old Course is accompanied by four
newer 18-hole courses and one 9-hole course for children and beginners.
St. Andrews began in the 1400’s as a totally natural course, using existing
terrain without human manipulation. Today the course is slightly different,
but maintains a truly genuine natural feel and remains a challenge for
amateur and professional golfers. Golf course architects who have shaped
St. Andrews throughout its history are Daw Anderson (1850’s), Old Tom
Morris (1860’s – 1900), and Dr. Alister McKenzie (1930’s).

Because St. Andrews is situated along the east coast of Scotland, it
is mostly open to strong winds. The course also features 112 bunkers and
large double greens that sometimes bring about putts of up to 100 yards.
These features allow golf to thrive as a game of strategy at St. Andrews.
The placement of a shot often depends on factors such as strong winds and
the real possibility of putt so long; it would be better broken into a pitch shot
and one putt.

case study - St. Andrews
There are several pieces of St. Andrews history worthy of mention, which can be found at the St. Andrews website (www.standrews.org.uk). Surprisingly, the Old Course was once 22 holes instead of 18. In the course’s earliest days, golfers would play to the same holes on the front and back portions of the course (or, out and in as it is often referred). It was decided that the first four holes and last four holes were too short, so they were combined so that the course was 18 holes. Interestingly, golf at St. Andrews was becoming so popular in Scotland that King James II had to ban the sport because his army was playing too much golf and neglecting their practice of archery. In the early 1800’s the bankrupt Town Council of St. Andrews was forced to sell the links to rabbit farmers, but the links were saved for golfers by James Cheape in 1821 when he bought the property. The popularity of golf in the 1800’s was so enormous, course officials were forced to charge single greens into double greens so that play would be quicker and the course could accommodate more golfers. The out holes were marked by white flags while the in holes were indicated by red flags. The first British Open Championship was played on the Old Course at St. Andrews in 1873. The Royal and Ancient Golf Club, which was founded in 1754 (formerly the Society of St. Andrews Golfers), was the first club of its type in the world. It now serves as a governing body for the game of golf alongside the United States Golf Association (USGA). Finally, in 1974 through an Act of Parliament, the St. Andrews Links Trust was created to
continue its status as a public golfing facility.

The Old Course measures 6566 yards in length from the medal tees. Par for the course is a typical 72 and the course features 3 par 3’s, 14 par 4’s, and 2 par 5’s, which also a typical distribution of holes. The course rating is 71.2 and the slope rating is 128.

The Old Course, as previously mentioned, was originally a natural course design, but humans have manipulated it over the years to accommodate frequent play. Despite this intervention, the golf course still demands that a player use a specific strategy. Each golfer is faced with decisions throughout the course that will force him or her to evaluate the course conditions, his or her strengths and weaknesses, the opponent’s strengths and weaknesses, and possible outcomes of club selection and shot type selection. The third hole, xxx, exemplifies St. Andrews’ premise of strategy. The further right your tee shot is, the better angle you have to the green, but there is the risk of driving the ball into several bunkers. In this case a player who does not drive as accurately as others might not aim as far right on the tee shot and then place the approach shot short of the green as to avoid a very long putt. Similarly on the fifth hole, xxx, depending on the placement of the pin, it might be better to rely on a pitch shot to avoid a very long putt. This all depends on the strengths of individual players. A player that is more accurate with irons than with a pitching or sand wedge might not want to go for the pin instead of relying on a weaker part of his
or her game, the short game. Perhaps the most perfect example of the need for strategy at the Old Course is the sixteenth hole, Corner of the Dyke. Placing the tee shot left of Principal’s Nose Bunker, which is visible at 180 yards, is safe, but leads to a greater threat of bunkers on the approach shot. Placing the tee shot to the right of Principal’s Nose Bunker provides a less hazardous and open approach shot, but poses the risk of going in the bunker or out of bounds. The more accurate player might place his or her tee shot to the right, while the player with a better sand and putting game might go to the left to avoid the risk of the bunker and the one stroke penalty for driving the ball out of bounds. Perhaps one the world’s most famous golf holes is the seventeenth at the Old Course, Road Hole. The Road Bunker in the front and an actual road in the back border Road Hole’s green. Also, the hole’s length plays like a par five instead of its actual par of four. The combination of these factors forces the player to make some decisions on the approach shot. If the accuracy of the long second shot is off, the player could be faced with a very difficult sand play or a shot from the road. If the second shot is accurate, the player could have a chance for eagle. A player who is less accurate in situations of long distances might opt to put the second shot near the green in a safe spot and pitch onto the green for a chance at a birdie. Either way, the Road Hole is a perfect example of how strategy is the basis for play at the Old Course.
The Old Course' layout has several strengths that make it a good basis for golf course design anywhere. First, the original intention of playing to the same holes out and in minimizes the amount of land used by the course. Second, the naturalistic layout forces players to use strategy. Strategy, as previously mentioned, is so important because it is the original intention of the game of golf. Unfortunately in today's game in the United States, the distance of each shot greatly overshadows the strategy of shot placement and the consideration of personal strengths and weaknesses. At the Old Course a golfer must be able to drive the ball a reasonable distance and use strategy to his or her advantage at the same time. The Old Course forces the player to decide on a placement of the tee and approach shots because of the location of bunkers, out of bounds areas, and the large size of the greens. The Old Course at St. Andrews is a great example of how a golf course can remain within its original boundaries and still be challenging. The principle of strategy is not necessarily benefited by ball and club technology, which is unfortunately driving a majority of golf course design in the United States.

case study - st. andrews
The Kampen Course is located in West Lafayette, Indiana at the Birck Boilermaker Golf Complex, which is owned and operated by Purdue University. The Kampen Course, which was known as the North Course prior to its redesign by famous golf course architect Pete Dye in 1998, is an excellent example of how golf course design, scientific research, environmental impact concern, and sustainable thinking can be combined to produce what is essentially a land lab that also serves the needs of golfers. It is this unique combination of functions that drew Pete Dye into the project, which he contributed to for a charge of one dollar.

The Kampen Course is a par 72 course with four sets of tees ranging from 5,205 yards to 7,333 yards. The white tees total 6,777 yards with a course rating of 73.3 and a slope rating of 138. The fairways, tees, and greens are bentgrass. Other course features include tall heather rough areas, large vegetated waste bunkers, pot bunkers and an environmental conservation area that features 15 acres of man-made wetlands that surrounds a natural bog (www.purdue.edu).

The Kampen Course is probably the most unique collegiate golf course in the United States because of its various functions to various groups of people (www.news.uns.purdue.edu). The course serves golfers, scientific researchers, wildlife, adjacent community developments, and those visiting for educational purposes. The course houses the William Daniel Turfgrass Research and Diagnostics Center for Education. Purdue University is

case study - kampen course
using the course as a land lab where they are studying environmental and agronomic problems associated with urban America.

There are four primary research projects being simultaneously conducted on the Kampen Course. The first project is testing the effectiveness of golf courses as surface water filterers. Most course filter on-site surface runoff in some way, but this course intends to filter surface water from an adjacent four-lane highway and business and residential development across the highway. Researchers are attempting to see what happens when the surface runoff from these developed areas and surface runoff from the golf course is filtered by 15 acres of man-made wetlands as they approach Celery Bog. A portion of the water is then taken out of the bog to irrigate the course, which in turn allows the water to be filtered even further.

Another research project involves turfgrass. Stations are set up throughout the course so that Purdue scientist and students can evaluate the performance and effectiveness of several bentgrass cultivars. The seventh hole of the course essentially has two fairways, one for research and one for golf play. Testing will be done on both fairways and the results will be compared.

The third research project aims to improve the survival of new trees in areas of new development. Most new developments, whether it is a golf course, a residential subdivision, or an urban plaza, destroy existing trees
forcing new trees to be planted. These new trees typically have problems
due to soil compaction and the removal of topsoil during development.
The Kampen Course has 1,300 new trees including species such as green
ash, pin oak, sugar maple, sweet gum, and tulip poplar. Researchers are
observing how these species react to certain planting methods and the initial
shock of replanting.

Another research project at the Kampen Course is a cooperative
with the USGA involving greens. The practice green is not only functional
for golfers, but the 18 test spots throughout provide scientists with research
data on bentgrass cultivars. This practice green is one of 13 the USGA is
gaining information from around the country.

The most impressive aspect of the Kampen Course is that all the
sustainable efforts and research projects are supported well by Pete Dye’s
design. The par three, second hole, which measures 151 yards, has water
on the right, sand in front of the green, and deep bluegrass rough to the left.
The large waste bunker, which is an area of unraked sand intended to help
water percolate into the ground faster (Graves 102), in front of the green
has grasses (approximately 12-24 inches in height) mixed in as well to help
with percolation. This idea is carried out in large waste bunkers throughout
the course. Other positives of the Kampen Course design include good
views across the waste bunker areas, challenging hole layout, and a variety
of hazard types.

case study - kampen course
Dye's design allows for normal play while giving opportunities for research and environmental planning, but certain aspects of the design will give this thesis project issues to consider when master planning. Some holes, like the sixth hole, seem to promote heroic design, which has been mentioned earlier. This will benefit players with more length off the tee and possible promote the lengthening of the hole as equipment technology improves. Another concern is that some of the water features do not seem to pose much of a hazard for golfers. This seems to be true on the fifth hole where the adjacent pond only comes into play if the player has an extremely bad hook.
Books


Hurdzan’s book is intended to be a comprehensive knowledge base for anything related to golf course design, construction, and restoration. This is an excellent source for any of those categories. I used this source for information pertaining to the history of golf and the history of golf course architecture and the many theories associated. I would highly recommend Hurdzan’s book.


Graves and Cornish’s book and Michael Hurdzan’s book have many similarities. This particular book has better hand illustrations and diagrams describing concepts in golf course architecture. This book was my main source for strategic design information. The Hurdzan book is perhaps more illustrative as far as photos of golf courses. I used this source for information pertaining to golf history and golf course architecture history. I would recommend Graves and Cornish’s book.
Online Resources

<www.indygolf.com>
This is a website intended to help golfers find courses to play. It provides a lot of great detailed information about each course. I used this website for some general information about Riverside Golf Course.

<www.news.uns.purdue.edu>
This website housed an article about the Kampen Course at Purdue University. The article described the multi-functional traits of the course. I used this article for a basis to evaluate the Kampen Course in my case studies section. The article was very helpful in my understanding of all the various activity at the Kampen Course.

<www.purdue.edu/athletics/golf>
This is the official website of Purdue University. I accessed this website to find out some general information about the Kampen Course. The website was very helpful because it provides photos of each hole, a hole layout plan, and a written description.
www.standrews.org.uk

This is the official website of the links at St. Andrews, Scotland. This website provided me with very good information on the Old Course. The website has detailed hole plans and course layout plans. There is information on the history of the course and general information about playing the course. This website was very helpful especially because there were detailed written descriptions about each golf hole on the Old Course.

<www.usga.org>

The United States Golf Association (USGA) website houses information on the USGA, golf history, environmental concerns and golf course architecture, golf equipment technology, and several other golf related topics. I used this website for information on the environmental effects of golf course design, the history of the USGA, and links to other information regarding golf course architecture. I highly recommend this website to anyone looking for any kind of information on golf.
greater indianapolis

central indianapolis

riverside golf course location
counter clockwise

clubhouse / first and tenth tees / putting green

ridge area

ridge area / flat topography from White River Parkway

White River (typical greenway view)

ridge area from cart path on hole 13
Rationale for Site Selection

- Accessible (3 hours or less from Muncie)
- Existing golf course (improve existing vs. more land consumption)
- Urban site (large community use is a great opportunity)
- Golf course needs (based on guidelines from Robert Graves)
  - Acreage: minimum of 150 acres (ideally 180-200 acres)
  - Adjacent water feature
  - Well drained soils
  - Longest property dimensions running North and South
  - Site that poses a challenge and opportunities for non-conventional design / use ideas

Opportunities and Constraints

Opportunities

- Dense urban context provides opportunity for visitors other than golfers
- A connection to the White River Greenway to the east
- Inability to expand creates opportunity for strategic design (distance not an option)

Constraints

- Public golf course; therefore speed of play is very important
- Accessibility from multiple sides creates concern for intrusion of golf
- Inability to expand creates constraint for re-routing holes
Riverside Golf Course is an 18-hole course in Indianapolis, Indiana. The course, which is the city's oldest, opened in 1901 and has remained open until today. The course is operated by R.N. Thompson Company who leases the property from the city of Indianapolis. Riverside Golf Course (3502 White River Parkway, Indianapolis, IN, 46222 – 317.327.7300) is located between 38th Street and 30th Street along the western banks of the White River.

Riverside Golf Course is an example of penal / freeway design. There is little topography change on a vast majority of the course although part of the back nine holes are situated on a bluff above the rest of the course. This elevation change only creates dramatic topography on hole #13, which is nicknamed Old Smokey. The approach shot on this hole is very challenging because the green is so elevated from the fairway. Riverside has tree-lined fairways and small greens. Most trees, which there is a good variety of, are mature and very large. There are several non-play areas on the site that have potential for other uses. The fairways are bluegrass, while the greens are bentgrass. The course has little existing water and few sand hazards. Most penalty strokes result from the out of bounds zones. The onsite water is collected in drains and piped to the few detention ponds on the course. Riverside uses standard golf carts that run along either paved paths or crushed stone paths. Riverside offers three teeing stations on each hole. They use red, white, and blue tees. Par on each side is 36 for a total
of 72 (par on the front is 37 for ladies making the total 73). The yardage ranges from 5,277 (red tees) to 6,281 (blue tees). Riverside has a pro-shop, concession stand and provides services for outings and leagues. The head golf professional is David Wayne Miner and the course superintendent is David Stiles.

Riverside Golf Course had a very complex context. North of the site is a wetland area that borders the exit ramps for Interstate 65. Across Interstate 65 is the Riverside Golf Academy, which is an indoor/outdoor golf practice facility. To the Northwest of the course are the Major Taylor Velodrome and an Indianapolis Parks skate park. To the west of the site is residential neighborhoods and Marion College. To the south is Coffin Golf Course, which is also a municipal course operated by R.N. Thompson. Well-known golf course architect Tim Liddy redesigned Coffin in 1995. To the southeast of Riverside is Riverside Park and South Grove Golf Course, which is yet another municipal course. Riverside Park has active recreation fields for baseball and other sports and passive open space as well. The White River Greenway runs along the White River and White River Parkway to the east of Riverside. The greenway continues north and south of the site for several miles. The greenway crosses over the 30th Street Bridge, which is a very attractive structure, to run along the eastern boundary of the site. Near the 30th Street bridge is an outdoor events building and removable marina. A unique part of Riverside’s immediate site is a soapbox derby track on the
southern edge of the site. Access to the track comes from 30th Street on the southwest corner of the property and from White River Parkway along the southeast portion of the site. Across the White River to the east of the site is a newly developed residential area that includes single-family homes and town homes. A portion of an old canal is to the northeast of Riverside as well.
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riverside golf course data