RESTORING AN URBAN LEGEND

COBB’S CREEK GOLF COURSE

Eamon Sullivan
Restoring an Urban Legend
Cobb’s Creek Golf Course

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Abstract

Cobb’s Creek Golf Course was built in 1916 in West Philadelphia. After a large grass roots movement renowned architect Hugh Wilson with the help of George Crump, AW Tillinghast, HB Smith and William Flynn were commissioned to design a course within Fairmont Park. The course was established as a place for the public to compete and learn golf. The collaboration by the world’s finest golf course architects led to the most popular public golf course in the United States.

Time has taken its toll on Cobb’s Cree GC. The course has lost its character, large fairways were lost to overgrown trees, bold green designs were washed away by flooding, and poor management led to the abandonment of historic clubhouses. The course today finds itself in a downward spiral teetering on disaster.

The vision for its restoration will tap into its roots and its original character. A form of forensic architecture will be used to redefine the lost character. This vision includes plans for golf restoration, sustainable stream restoration, sustainable maintenance techniques and new ways to reenergize golf within Philadelphia.

This is a very unique project which delicately balances historical restoration with sustainability.
Introduction
Project Intent

Cobb’s Creek Golf Course is very near to my heart. I owe my passion for golf and golf course architecture and landscape architecture to it. I grew up playing this course since I was 5 years old yet every time I play I notice something new. This is the sign of a truly special golf course.

I’m pursuing this project to develop my skills as a landscape architect and more importantly develop a vision for the future of Cobb’s Creek. Without a vision it is my fear that this gem will be lost.
The idea for Cobb's Creek was started by Philadelphian native and master golf architect, AW Tillinghast in 1909. He led the movement for starting one of the first intercity public golf courses in the United States. After years of guest columns in the Philadelphia Bulletin calling for a public golf course the city finally gave in.

The city commissioned Philadelphian native, Hugh Wilson, to find property within the Fairmount Parks that would be well suited for a golf course. Hugh Wilson was fresh off his design of the Merion Cricket Club (now Merion Golf Club) just 3 miles away in Ardmore. Wilson spent 6 months on the today's Cobb's Creek laying out holes. The golf course was laid on the land working with the site's unique features and hazards.

The course was designed with few bunkers, unique greens and with great variety. Wilson receives credit for the design but he had plenty of help from renowned Philadelphian architects. George Crump of Pine Valley, HB Smith of Huntington Valley, William Flynn the superintendent of Merion Cricket Club, all came to collaborate on the "best public golf course in the world." This amount of collaboration was commonplace during the times, but the amount of talent on one design was rare. Cobb's Creek Golf Course is invaluable to the history of public golf in America and to the history of classical golf course design. There are few public courses in the nation which have such a pedigree.
Within the first year of opening, the club saw nearly 100,000 rounds of golf and was praised for being a difficult test of golf for all who played. It soon became the gem of the Philadelphia's Fairmount Park System. To accommodate golfers, a beautiful clubhouse was constructed to provide views of the course. A barn was refinished to become a reception hall and locker room.

The popularity of the Cobb’s Creek Golf Course was due to its splendid design, challenge, great playability and the reasonable rates for membership.
The Cobb’s Creek Golf Course of today has been subjected to many different stresses. Environmental stresses, poor management and ownership changes have led to the Cobb’s Creek of today. The course has lost its character, large fairways were lost to overgrown trees, bold green designs were washed away by flooding, and poor management led to the abandonment of historic clubhouses. The course today finds itself in a downward spiral teetering on disaster.

Rapid growth upstream has led to increased environmental pressures on the creek system, leading to catastrophic flooding, the degradation of water, and drastically increased water flow. Flooding is a major issue, today 7 of the 36 holes lie within a growing flood zone. Flooding is putting some of the most interesting parts of the course at risk.

The Cobb’s Creek of today is the result of 100 years of mismanagement. Crowded fairways abysmal bunkers and tiny fairways all are the result of poor management. It is not the fault of anyone organization rather the lack of a unified vision for the course. Cobb’s Creek of today does not need millions of dollars, it needs a new vision.
Vision

Philadelphia is one of the top cities in the country for golf. Merion Golf Club, Pine Valley Golf Club, and Aronomink Golf Club are all within the shadows of Philadelphia. Private golf continues to flourish but public golf within Philadelphia is slowly dying. This is due in part to the lack of any easily accessible, fun and challenging course within the city. My vision is to restore Cobb’s Creek GC so that it will challenge any golf course in the area and any public golf course in the country.

My vision is to make Cobb’s Creek the center for all golf in Philadelphia. A place where private members can come compete with the best of the public golfers. A place where public and private golfers can come together to teach and share their time with young intercity golfers. My vision is to create a place where people who love golf can come share in the history of Cobb’s Creek Golf Course.
Members of Philadelphia Golf Association Meeting to Discuss the Opening of Cobb’s Creek GC
Program

The program for the Cobb’s Creek Golf Course Revitalization and Restoration is driven by the same principles that lead to its creation.

Cobb’s Creek was created in a time where very few public golf courses existed. The founders of Cobb’s Creek wanted to create a place where golfers of all backgrounds could play. The founders also set forth that Cobb’s Creek should create an environment that facilitated learning.

As well as learning and serving as a test for new golfers, Cobb’s Creek was developed as a place where the best of Philadelphia could test their skills. Over the last 100 years Cobb’s Creek has seen large tournaments and some of the best amateurs walk its fairways.

The program for Cobb’s Creek should focus on new golf development, teaching the fundamentals of golf, and providing a fun and challenging course for all skill levels.

By creating a strong program that focuses on the main principles of the foundation of Cobb’s Creek the course can flourish once again.
Program Elements

**Golf**
- 18 Hole Restoration of Olde Course
- 9 Hole Redesign of Karakung Course
- Full Size Driving Range
- Practice Green
- Short Game Area

**Practice and Learning Facilities**
- Par 3 Learning Course
- Teaching Driving Range
- Practice Green
- Educational Center

**Golf Course Facilities**
- Restore Gathering Areas around Clubhouse
- Restore Existing Halfway House
Project Goals

Outlined below are goals to restore and revitalize the Cobb's Creek Golf Course.

GOAL 1: RESTORE ORIGINAL CHARACTER OF COBB'S CREEK GOLF COURSE

- Reinstate original strategies and use original layout as guide for restoration
- Develop golf course focused on pure golf
- Restore natural aesthetics and accent the natural beauty of the site
- Create strong visual connections through the golf course.
- Create a unified experience from entry drive to clubhouse and from practice facility to the first tee

GOAL 2: REDESIGN KARAKUNG GOLF COURSE TO EMPHASIZE THE PRINCIPLES OF CLASSICAL GOLF COURSE ARCHITECTURE.

- Reassess current golf course layout
- Focus on minimalist design, placing holes on the land
- Avoid routing in areas that cannot provide long term viability
- Emphasize variety, in terrain, length, and natural aesthetics

GOAL 3: CREATE SUSTAINABLE MAINTENANCE PLAN FOR THE LONG TERM VIABILITY OF COBB’S CREEK GOLF COURSE.

- Prioritize maintenance areas
- Develop plan that balances playability with affordability
- Develop list of site specific turf selections
- Develop plan to reduce irrigation outputs
Goal 4: Restore and Protect Cobb’s Creek without compromising golf strategy.

- Provide solution for stream erosion
- Provide buffer to golf course
- Restore lost habitats
- Protect environmentally sensitive areas
Case Studies
Pasatiempo Golf Club

Alister MacKenzie designed Pasatiempo to highlight the beauty of the Santa Cruz Mountains. With nature as his guide, the layout moved through sloping terrain with dramatic views at every turn. Pasatiempo was designed for those that simply enjoyed golf.

Advancements in agronomy, available resources, and increased in televised golf events, lush green golf courses became the status quo. Luxurious golf resorts pressured superintendents to keep golf courses green at all costs. Millions of gallons of water were used to keep golf courses a lush green. After 10 years of drought and increased water regulations in California, Pasatiempo Golf Course was forced to rethink the way they used water.

Renaissance Golf and Paul Chojnacky, golf course superintendent, wanted to bring the course back to how Alister MacKenzie had envisioned it. MacKenzie had envisioned Pasatiempo as a California golf course that was deeply rooted in the surrounding context, creating a very unique sense of place. To accomplish this Renaissance Golf used photos to restore

The result:

• **CHARACTER.** A reinstatement of Pasatiempo's California character.
• **TURF REDUCTION.** Replaced 32 irrigated acres with non-irrigated native grasses.
• **WATER.** The renovation saved 17 million gallons of water annually.
• **FIRM, FAST FAIRWAYS.** Reduction of water allows more creative shot making.
Los Angeles Country Club: North Course

Los Angeles Country Club's North Course, is a timeless gem that exemplifies the Golden Age of Golf Course Architecture. When George Thomas designed the North Course he wanted to create a course that strongly represented the "soul of the game". Thomas saw the "soul" of golf as a makeup of variety, natural aesthetics and bold strategy, the North course is just that. The routing found on the North Course is as unique as the gorges and mountains that it overlooks. The routing is a combination of demanding and exciting golf and spectacular views.

In the last 90 years Thomas' original design has evolved. Original bunkers and hazards had been filled or moved, green sizes shifted, fairways shrunk and trees pressed into the playing areas. The North Course had lost the "soul" that made it great. In 2005 the Greens Committee wanted to bring the "soul" back to the North Course. So they enlisted master architect Gil Hanse to lead the renovation.

Gil Hanse and his team used photos from the 1930's to guide their effort. Hanse in many instances had to use a form of forensic architecture to find critical missing green space and bunkers. The restoration included the rerouting of 3 holes, including the famous 17th. The restoration of these holes was critical to the integrity of the original design. Tree and rough removal along with the addition of tall fescue and natural hazards brought back the rough and rugged look that epitomizes the "soul of the game".

The result:

- **Tree Removal.** Open up views, play and ease agronomic stress.
- **Bunker Restoration.** Bunkers restored, eliminated or reshaped based on photos from 1930's.
- **Increased fairway widths.** To offer more strategic options from tee to green.
- **Greens Restored.** Greens brought back to current shape and size.
Cobb's Creek Golf Course Restoration and Revitalization

before

after

before

after

before

after
Pinehurst Resort: No. 2

Pinehurst No. 2, is one of the world's most celebrated golf courses. It has served as the site of more single golf championships that any golf course in the states. It opened in 1907, No. 2 was designed by Donald Ross, who called it "the fairest test of championship golf I have ever designed." No. 2 is best known for its crowned, undulating greens which are hailed worldwide.

An urge for championship play spread across the US like a virus. Players wanted skinny fairways, thick rough and slick greens, for most courses this destroyed sense of place and creativity of players. Pinehurst fell victim to this mindset. Losing its wide fairways, raw bunkers and natural hazards.

In 2010 renowned architects Coore and Crenshaw were commissioned to bring Pinehurst back to what Donald Ross had envisioned, a course that balanced strategy, skill and creativity in a natural setting. Coore and Crenshaw wanted "uncover not recover" and "reinstate the character" that Donald Ross had left. Historic photos from the 1940's were used to uncover missing bunkers, playing surfaces and adjust.

The result:

- **Increased Fairway Widths.** To offer more strategic options from tee to green.
- **Replacement of Rough.** Removal of 35 acres of rough and replaced with areas that better emulate nature, a combination of wire grass, hardpan sand, and pine straw.
- **Smart Irrigation.** Reduction of irrigation heads from 450 to 1,100.
- **Bunker Restoration.** Bunkers restored, eliminated or reshaped based on photos from 1940's.
Somerset Hills Country Club is a timeless golf course with a charming character that leaves members wanting more. The course is a true throwback to a time where architects were interested in finding the best routing and best variety of shots instead of leaving their trademark. Variety is the key to Somerset Hills: variety of terrain, variety of length, variety of approach shots and variety of greens.

Somerset Hills Country Club had noticed that the golf course was slowly slipping away from what AW Tillinghast had envisioned. Greens had shrunk, losing hole locations, fairways had narrowed, losing angles and low profile tees were replaced by "cake box" tees. The membership realized that the course needed to be brought back closer to the original design so they called commissioned Renaissance Golf.

Before Renaissance Golf began work on the course, they wanted the membership to outline a basic framework for the renovation. The framework was simple it called to:

- Preserve the integrity of the golf course.
- Restore critical design features.
- Improve efficient maintenance of the course and its surroundings.

To accomplish this Renaissance Golf wanted to restore strategy by widening fairways, enlarging greens sizes and adjusting hazards. One of the focuses of the renovation was to improve the green surrounds. Renaissance worked hand in hand with the superintendent to improve the aesthetics and efficiency of the course by bringing in fine fescue around the rough.
The Resort at the Mountain

The Resort at the Mountain is located in the western foothills of Mount Hood. A 27 hole golf course spans breath taking natural features, the Salmon River and Mount Hood. The Salmon River is known for its diverse wildlife habitat, especially the Coho Salmon. Significant flooding in 1996 and 1999 have created significant erosion, resulting in a lateral migration of the river. This presented a problem for the golf course and its playability as well as the viability of the river.

The golf course worked hand in hand with the US Forestry Department as well as Oregon Fish and Wildlife to restore the Salmon River. The project aimed to provide an intelligent solution for stream erosion. They developed an installment of rip rap walls, logjams, and boulder bank revetment along the damaged stream bank. This solution was a "win win win", it provided more habitat for the Coho Salmon, diverted and slowed erosion, and enhanced the aesthetics of the river.

The result:

- **Habitat.** Increased habitat quality habitat for Coho Salmon and other wildlife.
- **Erosion Control.** Reduced lateral migration of banks towards golf course.
- **Water Quality.** Improved water quality.
- **Amenities.** The resort added a managed fishing program due to the abundance of salmon.
Design and Technology

Since golf was first played in the pastures of Scotland by shepherds some 600 years ago, technology and design were influencing one another. As courses evolved so did the technology. The appearance of new balls and new clubs made architects rethink and adjust designs and routings to keep the game challenging.

Cobb’s Creek Golf Course yardage remains very similar to day that it first opened in 1917. When comparing the technology of 1917 to today, there is no comparison. Golf technology in 1917 was fairly dry, a set loft for cast iron club heads and a wooden(hickory) shaft. Golf technology today is a science, involving hi-tech machines, carbon fiber and precious metals.

The challenge that once existed on Cobb’s Creek needs to be brought back. In order to make the course exciting and enjoyable for all golfers, length should be added to the course. The goal of adding length is not to challenge Tiger Woods but rather to let the average Joe play the course the way Hugh Wilson intended.

**Typical Set in 1917**

- Brassie: 220 yards
- Mid Iron: 175 yards
- Mashie: 150 yards
- Mashie Niblick: 125 yards
- Niblick: 100 yards
- Putter
When Cobb’s Creek was rerouted during the 1940’s to make room for military outpost in the western part of the site. Holes were shifted and squeezed to provide a golfer with 18 holes. After the rerouting golfers were forced to move away from the routing they loved. Most of the golfers who have been playing the course for many years wanted to stick to the original layout. So golfers would play and ignore the new layout for the original, making golf at times very dangerous.

White Pines and an assortment of evergreens were brought in to block old angles and disrupt the play to the original layout. The trees are spaced evenly, making it easy to distinguish planted from natural occurring trees. Behind these beautiful pines lies the original layout to a once beautiful golf course.
Components of a Golden Age Golf Course
Greens

“Putting greens are to golf courses what faces are to portraits” - C.B. MacDonald

Putting greens are the main components of great golf courses. The majority of play is spent on the putting greens, so it is vital to make them interesting and fun. A properly designed green should reward shots that have taken on more risk and penalize those that have not.

Golden Age design calls for greens that seamlessly blend into the surrounding landscape and should be difficult to distinguish between green and approach. Greens should allow for a variety of shots to be played, calling for wide green entrances with little obstruction around them. These entrances should be composed of firm, low cut grass that exposes natural undulations making shots played along the ground difficult to judge. The size of putting greens is also an important factor, and can be determined by how drastically play is influenced around the green.
Fairways and Rough

Wide fairways are a critical part of golf as, they create interest and strategy. The 20 yard wide fairways at Cobb’s Creek are difficult to hit and destroy the strategy that Wilson had intended. The narrow fairways take the fun out of playing golf. Fairways should maintain 50-60 yards at the landing area to allow for strategy from the tee. By strategically widening fairways throughout Cobb’s Creek, this will renew and restore strategy.

In the case of Cobb’s Creek, smaller fairways are in place due to financial restrictions. Fairways width should not be restricted based on finances, instead expand fairways and reduce the standard of maintenance on fairways. Fairways do not need to be green instead they should play fast and firm and as close to the links of the British Isles as possible.

Rough areas should act as a half stroke penalty for players that hit into it. It is too often that golf courses suffer from superintendents that try to impress golfers with high thick rough. Rough that is too high and thick is a nuisance for players and slows the speed of play dramatically.

Secondary rough areas should consist of sparsely seeded high grass areas to serve as a penalty for poorly struck shots, frame holes and add to the aesthetics of the golf course. These areas should seam as a severe penalty from the tee, but a player should easily be able to find his ball once hit into.
Small Narrow fairways are often found in Penal school of design. These narrow fairways reward the long straight hitter and remove creativity and drastically reduce strategy.

Wide fairways are a standard on Golden Age Golf Courses. These wide fairways are the lifeline to strategy, creativity and fun. Large fairways provide a challenge for every skill set and reward strategy.
Tees

Tees are a crucial element of golf course design. The tee is the beginning point of every hole and makes an immediate impression on the golfer. Cobb’s Creek GC was built in a time where walking was a golfer’s only option so locating tees close to greens was a crucial element of design. Today that is a key element of Golden Age design. Cobb’s Creek GC has a few engineered tees where significant amounts of cut and fill was needed to accomplish proper teeing grounds. These “cake box” tees should be corrected by seamlessly blending tees into the landscape.

A variance of tees should be created to accommodate all types of golfers. By providing alternate tees with alternate angles, golfers can experience a hole differently. Multiple teeing areas allow for routine maintenance to occur without disrupting play. It is my opinion that large tees that are slightly raised above the surrounding grade with a free form shape are best because it more closely emulates what is found in nature.
Bunkers

Cobb’s Creek GC has few bunkers all occurring around greens. These bunkers lack any cohesive style, are in poor shape and have lost their interest. The bunkers represented at Cobb’s Creek fail to accurately portray the character of Cobb’s Creek. Bunkers should be unique to a golf course and should represent elements seen in nature. Golden Age bunkers are were designed to look raw, primitive and controlled by nature. Bunkers are vital to contributing to the visual energy and character of a golf course. It is too often that bunkers are found perfectly raked and groomed. Bunkers are hazards, and should be designed as such. Hazards by design are not to punish golfers, but rather to provide interest and excitement.

Hugh Wilson’s bunkers at Merion Golf Club are some of the most famous bunkers in the world. He was one of the first architects to flash the faces of bunkers. This creates a dramatic effect and mimics the faces of bunkers seen on the Scottish links and British Heathland courses. The placement of bunkers at Merion GC have contributed to the enduring success. It is my intent not to mimic Merion’s bunkers but to rather use them as a guide for placement and appearance.

Additionally, the placement of bunkers is vital for the long term success of a golf course. The placement of bunkers provides strategy and makes the game interesting, without them the game would be dull. Bunkers and hazards should look fierce, but in reality they should be quite easy, proving a golfer with a great thrill. Bunkers should never require a forced carry and always allow for the weaker player to maneuver around them.
Vegetation

Vegetation on a golf course is vital for defining the sense of place and character. Sense of place can be simply defined by mimicking the regions natural patterns. This creates a very realistic and natural setting which can be enjoyed by all.

Vegetation also plays a role in how a golf course can be played, a golf course with thick heather will play differently than a course with sprawling oaks. It is the author's opinion that trees and other tall vegetation should be used sparingly around playing surfaces. While it is not the intent to clear all trees from golf courses, it is the intent to use trees to frame views and not define the way a golf course can be played.

The large Poplars, Oaks and White Pines are some of the most common trees found on the course. Large mature species should be preserved in order to create an established and mature appearance. On the smaller scale, grasses and small shrubs should be used to help create a unique character. Dense and thick small scale vegetation should not be placed within the playing envelope, it is an unfair hazard and slows play. Small scale vegetation should be fine and easy for players to retrieve a ball from.

The proper blending of the large and small scale elements unifies the landscape and creates a very special sense of place.
SITE ANALYSIS
Site Location

Cobb’s Creek Golf Course is located in Philadelphia, Pennsylvania. It lies approximately 10 miles west of Center City Philadelphia, on the border of Montgomery (North) and Darby (West) Counties.

The City of Philadelphia runs deep with history. The Liberty Bell, Independence Hall and City Hall are some of the most popular sites along with its rich history. The city of Philadelphia is also home to some of the most influential golf courses in the United States. During the 1920’s, or Golden Age, many architecturally significant golf courses were built within the shadows of Philadelphia. Pine Valley Golf Club, Merion Golf Club and Aronomink Golf Club are just a few shining examples. Each course added to Philadelphia’s prestigious resume for their unique and challenging layouts.
Surrounding Context

Cobb’s Creek GC is surrounded by a variety of different land uses. The majority of the immediate surrounding context is single family residential.

Located at the southern part of the site is the 69th Street Terminal, a major transportation hub in West Philadelphia.

To the west of the site is McCall Golf Club, a small executive golf course designed by William Flynn.

Cobb’s Creek finds itself centred within parks providing unique opportunities to blend passive open and active open spaces.

Cobb’s Creek finds itself centred...
McCall Golf Club
18 Hole Executive Golf Course

Cobb’s Creek Park
Natural Area

Residential
Single Family Housing

Morris Park
Park with sports fields and small gathering areas

Residential
Single Family Housing

69th Street Terminal
A Transportation HUB for SEPTA

Cobb’s Creek Park
Natural Area
The inventory for Cobb’s Creek is straightforward. It can be separated in two portions, clubhouse and the rest.

The clubhouse area contains 2 beautiful historic buildings, a dilapidated cart barn, a driving range, 4,500 sqft practice putting green, maintenance garage and 120 spot parking.

The rest of the golf course consists of 36 holes of golf, a driving range, miniature golf course, batting cages and an abandoned halfway house (located near today’s 9th hole).
Existing Site Conditions
Existing Site Conditions (cont.)
Existing Site Conditions (cont.)
Climate

Philadelphia’s climate is nearly perfect for playing year-round golf. January and February are the worst while April and May provide some of the best playing conditions due to the cool temperatures and low amounts of precipitation.

In the past 10 years, weather patterns have become more and more unpredictable. Severe droughts and flooding have become commonplace. Making it difficult to provide set guidelines for maintenance.
Prevailing Seasonal Winds

Winter

Spring

Summer

Fall
Green Space Context

Cobb’s Creek finds itself at the headwaters of a large green corridor that runs 13 miles through the heart of Philadelphia. Cobb’s Creek Golf Course is the second largest single-owner property along the Cobb’s Creek Watershed. John Heinz National Wildlife Refuge is the largest. The opportunity to create new habitats and connections is too big to overlook.
Restoring an Urban Legend

Site

John Heinz National Wildlife Refuge

Center City
Philadelphia

Delaware River

13 Miles
Vegetation

Over the almost one hundred years that Cobb’s Creek GC has been open, unmanaged plant growth has crowded the golf course and greatly affecting design intent. While beautiful, large shade trees have encroached on putting greens making it a challenge to keep putting surfaces healthy. Cobb’s Creek GC has many wonderful specimen Poplars, a variety of Oaks, Cherry trees, White Pines and Maples.

The playing surfaces today are a compilation of many different variety of grasses. The rough and fairways are composed of a variety of Annual Rye, Kentucky Bluegrass, Fine Fescue, Bentgrass and pockets of Bermuda. Putting surfaces are composed of A1 Creeping Bent.

Unfortunately, a large amount of the vegetation found on the property are invasive plants. Norwegian Maples, Japanese Knotweed, Kudzu, and Tree of Heaven are part of the invasive plant species found on the course.
Current Vegetation

- Mature Poplars
- Mature Cherry Grove
- Mature White Pines
- Mature Poplars
- Mature Shumard Oaks
- Norwegian Maple
Soil Survey

The site provides a wide variety of soil types. Approximately 75% of the site is composed of silt loams: Chester Silt Loam, Manor Loam and Urbana Silt Loam. These are well drained, upland soils and are highly suitable for golf course playing surfaces. Approximately 15% of the site is composed of poorly drained soils associated with water ways and floodplains. These soils, Rowland Silt Loam and Hatboro Silt Loam, should be avoided because of the problems related to flooding and poor percolation.

Common Soils Found

<table>
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<th>Soil Type</th>
<th>Location</th>
<th>Depth to Water Table</th>
<th>Percent</th>
<th>Acres</th>
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<td>Floodplains</td>
<td>12”-36”</td>
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<td>-Moderately Well Dri</td>
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<td></td>
<td></td>
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Hydrology

Cobb’s Creek Golf Course’s biggest asset is also its biggest liability. Cobb’s Creek was used to create interest in the routing of the course. But today the creek is becoming a major problem. Flooding, pollution, and littering have turned parts of the course into an eyesore.

Flooding of Cobb’s Creek is a serious issue. 9 of 36 holes on the course today come in contact with either Cobb’s Creek or Indian River Creek.

Over the last 4 years, the creeks have seen a 65% increase in the severity of flooding. Thoughtfully managing water will be a serious issue for many years to come.
50 Year Floodzone

Cobb's Creek

Indian River Creek
Topography

When Cobb’s Creek GC was designed, the topography played an intricate role in how the course was laid out. The rolling landscape on which Cobb’s Creek lies, defines the character. When Wilson laid the course out, he used the natural landforms to create hazards.

The course contains 2 large ridge lines, one on either side of Landsdowne Ave. These ridge lines have slopes of excess of 25% slope and are not suitable for golf. The majority of the site lies within slopes of 5%-10%, ideal for placing landing areas.
Topographic Map: 2 Foot Contours
SITE SYNTHESIS
Site Synthesis

Opportunity
Buffer views to US 1
Opportunity
Interesting topography
Opportunity
Improve views across site
Opportunity
Unique topography
Opportunity
Connection to Morris Park
Constraint
Avoid floodplain
Opportunity
Scenic rolling topography

Opportunity
Restore historic wetland and stream
Opportunity
Improve creek aesthetics
Opportunity
Interesting topography
Opportunity
Improve views from clubhouse across course
Opportunity
Connection to 69th Street Station
Opportunity
Unique ridge for green sites
Constraint
Soft Buffer of Conservation area.
Holes 1 and 2

Opportunity
Open up views from clubhouse

Opportunity
Retain heavy buffer

Opportunity
Transform floodzone to scenic wetland area

Opportunity
Enlarge creek buffer

Opportunity
To lengthen and add a new angle from tee

Opportunity
Add heavy buffer of road
Constraint

Tree Encroaching on playing area

Opportunity

- Improve aesthetics of creek
- Remove trees and open up views

Constraint

Trees encroaching on playing area
Holes 3, 4 and 5

Opportunity
Retain heavy buffer of railway

Opportunity
Expand creek buffer and improve aesthetics

Opportunity
Improve aesthetics of creek

Opportunity
Add creek buffer to help manage water

Opportunity
Open up views of creek from fairway and tee

Opportunity
Add heavy buffer of Landsdowne Ave.

Opportunity
Remove trees to unveil hillside
Opportunity
Remove build up to improve water flow and aesthetics

Opportunity
Remove bridge to open up views of creek and fairway

Opportunity
Thin trees to give view of hillside and improve strategy

Opportunity
Improve creek aesthetics
Holes 6, 7, 8 and 16

Opportunity
To create new angle from tee

Constraint
Buffer homes

Opportunity
Take advantage of views from fairway

Opportunity
Reroute fairway to take advantage of topography

Opportunity
Possible connection between greens (6, 16)

Opportunity
Expand fairway to moving topography

Opportunity
Move fairway to take advantage of sliding topography

Opportunity
Move tee box to original alignment

Constraint
Difficult walk up to fairway
Opportunity
Expand fairway to encompass sloping topography

Opportunity
Restore and enlarge effectiveness of bunker

Opportunity
Expand fairway to encompass sloping topography

Opportunity
Expand approach to encompass sloping topography
Holes 9, 10 and 11

- Revive old structure on site
- Adjust tee to original routing
- Take advantage of views from fairway
- Expand approach to encompass sloping topography
- Add new set of tees
- Buffer green to protect from play
- Rework tees to fit into landscape
- Renew effectiveness of bunker
- Renew effectiveness and size of bunkers
- Reroute fairway to encompass interesting greenside topography
- Take advantage of views from fairway
- Expand Playing Surface
- Viewpoint
- Topography
- Creek Buffer
- Buffer Views
- Remove Foilage
- Unique Feature
Opportunity
Renew bunker effectiveness

Opportunity
Reroute fairway to encompass interesting greenside topography

Opportunity
Expand approach to encompass sloping topography

Opportunity
Remove vegetation to unveil hillside

Opportunity
Revive old structure on site

Opportunity
Restore effectiveness of bunkers
Holes 12 and 13

Opportunity
Restore effectiveness of bunkers

Opportunity
Expand fairway to encompass sloping topography

Opportunity
Rethink engineered grading

Opportunity
Remove driving range facility

Opportunity
Restore historic wetland and stream

Constraint
Original tee boxes located within flood plains

Opportunity
Renew original island green

Opportunity
Restore original tee boxes
Opportunity
Restore to historic stream layout

Opportunity
Remove trees and fence line

Opportunity
Rework and regrade slope to fit the character of the rest of the site

Opportunity
Restore historic wetland

Opportunity
New fairway routing
Holes 14 and 15

Opportunity
Lengthen hole by moving tees back

Opportunity
Expand fairway to encompass interesting topography

Opportunity
Expand fairway to encompass sloping topography

Opportunity
Create heavy buffer along US-1.

Opportunity
Shift fairway away from homes

Opportunity
Possible connection between greens(7, 15)

Constraint
No room to expand or shift angles from tee

Constraint
Create heavy buffer along homes
Cobb's Creek Golf Course Restoration and Revitalization

Opportunity
Renew bunker effectiveness

Opportunity
Buffer facing housing for safety and aesthetics

Opportunity
Lessen fairway crowding

Opportunity
Reroute fairway to encompass interesting greenside topography
Holes 17 and 18

Opportunity
Thin hillside to improve airflow and lessen crowding

Opportunity
Space to lengthen hole

Opportunity
Take advantage of views from tee box

Opportunity
Move fairway to interesting topography

Opportunity
Expand teeing area and rework tees to fit into landscape

Opportunity
Expand creek buffer and restore creek aesthetics

Opportunity
Expand approach around green

Constraint
Buffer Landsdowne Ave and parking lot
Opportunity
Restore effectiveness of bunkers

Opportunity
Move fairway to interesting topography

Opportunity
Room to expand approach

Opportunity
Open Views from Clubhouse
Cobb's Creek Golf Course Restoration
Site Masterplan

1 Clubhouse Area
2 Driving Range
3 Olde Course
4 Karakung Course
5 Proving Grounds
The Process

The process for golf course restoration is very complicated. I feel strongly that proper golf course restoration happens in the field; by feeling the wind, witnessing the shots, taking in the views, then cross referencing with research. Historic photos and articles can settle much of the debate about placement of golf course elements.

My restoration comes from playing the course for 20 years, analyzing, determining opportunities, conceptualizing in the field and then playing my concept. This authentic inquiry has equated to a thorough model for restoring Cobb’s Creek Golf Course.
Field Concepts

Historic Referencing
1st Hole  Par 4 - 490 yards

The 1st hole is a tough starting hole a par is a great score. From the first tee the golfer is has to decide whether to take on the creek or layup. The tee box area was integrated with the warm up area, this allows for a wide variety of setups. The tee box was moved back and to the left to make the golfer hit a blind tee shot to stay on the best line to the green. Bunkers in front of the green were moved to create more interest around the green.
2nd Hole

The 2nd is a strong hole but will reward well hit shots. Additional tees were added to create variety and lengthen the hole. The new set of tees (right) leave the golfer with a blind tee shot down the best line of play. Fairway was added to bring the creek into play from the tee.
3rd Hole  Par 3 - 300 yards

The 3rd hole is a classic risk reward hole, it allows stronger players to attack the green but risk they sinking their hopes in Cobb’s Creek. The fairway was widened and brush hiding the creek was eliminated to bring the creek into play. After referencing historic photos of the green complex more fairways was added to the left of the green and an abandoned creek bed was added to create interest and better mitigate flooding.
4th Hole  Par 3 - 184 yards

The 4th is a short par 3 that sits along the banks of Cobb’s Creek. A silt buildup was removed to ease the flow of water and to create the illusion of a more difficult hazard. Enhanced wetlands are added in front and behind the green to filter water and create new habitat.
The 4th is a short par 3 that sits along the banks of Cobb’s Creek. A silt buildup was removed to ease the flow of water and to create the illusion of a more difficult hazard. Enhanced wetlands are added in front and behind the green to filter water and create new habitat.
6th Hole  Par 4- 420 yards

The 6th hole is a “George Crump” Signature hole if there was such a thing, its bold, difficult and exciting. From the tee the player must clear a 60 foot ridge line to reach the fairway. Tee shots down the right side of the fairway have a better angle but run the risk of falling off the “table”. Shots into the green will test every player and must be accurately struck to find themselves on close to the pin.
The 7th is one of the most difficult and most memorable holes in Philadelphia. The 7th green is set atop a 30 foot ridge. Bunker to the right of the fairway was added to challenge the best line to the green. Fairway was added around the approach to accommodate poor hit shots and to allow for up and downs.
8th Hole   Par 4- 383 yards

After the gruelling 6th and 7th the golfer is given a break, after clearing a 40 foot sweeping ridgeline. The variety of the eight hole is second to none. The tee shot overlooks a sweeping 40 foot topography change while the green is placed on a nearly flat green site. After clearing the ridge line the player is left with a short iron into a backboard green.
9th Hole  Par 4- 400 yards

The 9th hole is a short downhill par 4 that requires a thoughtful drive off the tee and an accurate pitch into a sloping green. Approach to the left of the green was added to incorporate sliding topography.
The 10th hole was lost to the rerouting in the 1940s. The green side bunkers will be adjusted to create more interest from the tee for more advanced players while the shorter hitter has more options from the tee.
11th Hole  Par 5- 510 yards

A par on the par 5 11th is a great score, any golfer too greedy may find himself leaving his round in shambles. Strategy from the tee is crucial, shots down the right have a better shot at attacking the green. Four bunkers were added along the approach to challenge any golfer going for the green in 2.
12th Hole    Par 3 - 141 yards

Old photos and newspaper articles were reference when restoring the 12th. An abandoned creek bed was added to recreate what Wilson had intended for this short 2 shotter. There are a various number of tee boxes at the 12th allowing for flexibility. These tees cannot only service the 12th but also the 6th, 9th and 13th.
13th Hole     Par 5- 550 yards

The 13th runs along the realigned Cobb’s Creek, adding interest from the tee and restoring the creeks natural patterns. The green is perched on a hillside making strategy from the tee crucial for scoring. A large collection area below the green was added leaving the less brave with a difficult up and down.
The 14th is a short uphill par 4. The green was enlarged and the approach widened to encompass the sloping topography to the right of the green. Trees were removed along the right side of the fairway and the fairway was widened.
15th Hole  Par 4 - 300 yards

The 15th hole continues the trek uphill. The tee shot require the golfer to clear a 25 foot rise and an existing rock outcrop. The best line to the green is down the right side of the fairway the golfer takes on a huge swale. Finding the swale to the right leaves the golfer with a blind tee shots. The fairway was widened to the right and trees were added down the left to buffer homes.
The 16th green sits on a ledge with a large 10 foot drop off to the left. The green side bunker was moved from the left side to the right. This requires golfers to either take on the hazard or risk falling down the left. The fairway was widened especially in the approach and greens complex.
17th Hole  Par 3 - 190 yards

This par 3 is a Hugh Wilson Signature hole, it very closely emulates the 17th at Merion GC. Both are long downhill par 3’s surrounded by hazards. Additional tee boxes were added to accommodate all players. The green was expanded and the bunkering changed similar to what existed.
Concept Sketch
18th Hole  Par 4 - 410 yards

Match play is the heart of golf and the 18th is a great finishing hole for matchplay because it doesn’t favor any one skill set. The 18th drops 40 feet providing beautiful views of the Philadelphia skyline and a exciting tee shot. The green is guarded by a large bunker in the front this bunker is makes the golfer chose his path from the tee carefully.
Karakung Golf Revitalization
Karakung Golf Course

Par 37 - 3,485 yards
1st Hole  Par 4 - 327 yards

A large ridge line runs through the fairway at the first. The golfer must accurately place their tee shot to have a good angle into the green. The green is perched on a hillside, the crowned green makes for interesting up and downs.
The 2nd hole is an interesting hole, it plays closer to a 3.5 than a par 4. A well struck drive down the large ridge line leaves a short pitch into a green hanging out on the ridgeline. Behind the green is a large backboard allowing the more creative players to sling shot to a close pin.
3rd Hole \hspace{1cm} Par 3- 121 yards

The par 3 3rd requires a daring tee shot for better players. The tee shot must clear a creek to find a green that is set on the edge of a ridgeline. Shot type and trajectory are necessary for accessing some of the pins on this green.
The 4th is a par 5 that rewards golfers for well played strategy. A well struck tee shot will carry the ridge line at the landing area rewarding them with extra yardage. From the landing area the player must decide to go for the green that sits behind a small creek. A classic risk reward hole. archi1628@gmail.com.
5th Hole  Par 4 - 400 yards

The green complex at the 5th sits on different levels. Keeping the ball to the left on this hole is paramount for scoring. Two ridgelines bisect the fairway creating interest and adding to variety.
6th Hole  Par 4 - 440 yards

The par 3 3rd requires a daring tee shot for better players. The tee shot must clear a creek to find a green that is set on the edge of a ridgeline. Shot type and trajectory are necessary for accessing some of the pins on this green.
The seventh is a wonderful hole. From the tee the golfer must choose his path carefully, flat and stress free tee shot to the right and brave a slanting topography to the left. Shots from the left take the sloping topography to right of the green out of play while shots to the right risk a difficult up and down.
8th Hole     Par 5 - 512 yards

Is a great example of the best Cobb’s Creek has to offer, sweeping hillsides and gentle streams. This is one of the most fun tee shots on the entire golf course, hit it and watch it roll. After hitting a long drive down the right side the golfer must take on green that is placed on the top of a hill sits 25 feet about his feet in the fairway. A very fun hole.
9th Hole

The 9th is one of the flattest holes on the course. Scattered with bunkers the shorter player must be weary of the small bunker in the fairway, it can most certainly ruin your round. The greenside bunkers allow for a variety of shots into the green.
Clubhouse Restoration
Clubhouse MasterPlan

1  Clubhouse
2  Driving Range
3  Reception Hall
4  Maintenance Facility
Clubhouse Elevations

Section A: Scale 1”=10’

Section B: Scale 1”=10’
Section C: Scale 1”=10’
The Proving Grounds
Cobb’s Creek was created in a time where very few public golf courses existed. The founders of Cobb’s Creek wanted to create a place where golfers of all backgrounds could play. They also set forth that Cobb’s Creek should create an environment that facilitated learning.

The Proving Grounds taps into the same principles set forth by its founders. The Proving Grounds is a place where beginners can develop their skills in a learning environment. By creating an atmosphere that is fun and entertaining for all skill levels, golfers will be motivated to play more golf. The unique flexible layout provides many different options for play.

The addition of lighting to the course could serve as a community gathering place. Fundraisers could be held, new midnight golf programs could be put in place to provide a place where youth could get off the street, or it could simply become a new source of late night entertainment for people of all ages.

The ideas are limitless ...
Charlie Sifford (above) was the 1st African American Touring Professional. He learned the game at Cobb’s Creek.
Proving Grounds Master Plan

1. Himalayas Putting Course
2. Interpretive Educational Trail
3. Par 3 Course/ Practice Area
4. Clubhouse
Proving Grounds Image Board

all above flickr.com
The Proving Grounds was designed to allow for versatility. The course has no tee boxes or bunkers, and contains five putting greens, 40 feet of elevation change, and is 6 acres of close cut fairway grass. This formula equates to a golf course that can change on a daily basis. The routing of the course can be set based on a player’s skills set and current playing conditions, also allowing for golf clinics and other learning events. Because of its versatility and variety of greens complexes, golfers are forced to use their imagination and creativity to make it around this short course. This entertaining new addition to Cobb’s Creek Golf Course will allow golfers of all skills levels to experience golf in a relaxed environment.
The Himalayas Course provides another option for beginners and experienced players to play golf. This model is based off a large putting course in Saint Andrews, Scotland and is an alternative to the typical “miniature golf course”. The course allows for the routing of the course to change on a daily basis and encourages the players to use their imaginations to make their way around. This is truly a unique and fun model that can let everyone participate and enjoy golf.
Himalayas Putting Course Sketch
The idea for the interpretive educational trail came naturally. The proving grounds was established as a place for learning, thus allowing the trail to educate people on how our natural ecosystem functions and illustrates the elements for restoration. Since the trail is located in a degraded creek, the habitat revetment system will be used to educate users on our ecosystem and will also create new habitats. Signs will be set up at each major vantage point to educate the users on how each element functions and how they can improve their watershed. The trail parallels the Proving Grounds and runs along a degraded part of the Indian River Creek.
Interpretive Educational Trail Welcome Sign
Interpretive Educational Trail Image Board

all images above flickr.com
A Model for Restoring Cobb's Creek
Cobb’s Creek, an Opportunity

Cobb’s Creek Golf Course has a unique opportunity to merge a golf course and stream restoration project. Being in the Northern part of the Cobb’s Creek Watershed, Cobb’s Creek Golf Course has the ability to improve ecological functions on site and downstream. The site contains nearly 2.1 miles of natural creeks—the second highest density on any one single property on the watershed. These systems serve an ecological function and are aesthetically pleasing amenities.

This model for restoring Cobb’s Creek also provides the opportunity to show that golf courses and natural ecosystems can coexist. My model for restoration will change the perception of golf course’s impact on the environment.

Enhanced stream corridors, enhanced wetlands and bioengineered revetments are used to improve water quality, reduce flooding, trap sediment and create new habitats. The logs, roots and boulders provide a long term sustainable model because the systems are anchored into the banks to resist movement during high flow periods. Bioengineering revetments help to reestablish natural habitats and can lessen the negative impact of man. These revetments can be easily made with trees that will be removed from the golf course. Over time, they will blend into the natural environment and will become part of a complex ecosystem.
Elements for Restoration

To improve the habitats along Cobb’s Creek corridor, a wide variety of elements were created that can be used to improve water quality, decrease water flow and improve habitats. These elements can be easily implemented with materials found on the site and provide stability to this shifting ecosystem.
Tree Revetment

Proper placement of downed trees deflect heavy flooding from impacting banks.

Trees placed at 20 to 40 degree from the stream bank help prevent bank erosion.

New habitat is formed and allows for the restoration of habitat on the banks.

Each tree is secured to the shore line to allow for subtle movement.
Log Jam Revetment

Placement of Logs allows for normal stream flow but slows fast moving flood waters

Each tree is secured to the shore line to allow for subtle movement.

Logs provide functionality and provide an added aesthetic value

Provides new habitat for aquatic and terrestrial wildlife
Rootwad Revetment

Proper placement of tree roots deflect heavy flooding from impacting banks.

New habitat is formed for aquatic and terrestrial wildlife.

Each tree is secured to the shore line and to one another to allow for subtle movement.
Boulder and Riffle Placement

Placement of small stones mimics the natural patterns of a stream and creates new habitat for invertebrates.

Large boulder placement slows water and replicate inherent character of stream.

Boulders placement is important to slowing bank erosion.
Wetland

This typical wetland model can be created in low areas to capture and treat water as well as create new habitats for wildlife. This model is capable of being placed in large areas where drainage and flooding are major issues. The placement of this model should not be placed within the relative proximity of the golf course due to the frequency of flooding. A wetland provides an aesthetic solution to an area that contains poor drainage and experiences frequent flooding.
Enhanced Wetland

This model has the same benefits of a wetland, but can perform the same functions in a smaller area. This can be done by overlapping ecological functions and using a series of habitat zones to clean water before it enters a stream.
Enhanced Stream Corridor

This enhanced stream corridor model provides the same function as an expansive wetland but in a very small area. The same physical, chemical, and ecological functions can be performed in an enhanced stream corridor. Besides its ecological benefits, this model can be added as an aesthetic amenity.
Element Placement

This concept model illustrates how these habitats and revetments can be used along the creek system to regulate flooding create more habitat.
Sustainable Maintenance Practices
Changing the Perception of Maintenance

One of the goals set out with this project is to change the perception of golf course maintenance. For a long time golf course maintenance has been seen as an abuser of our natural environments and a massive machine that eats up our natural resources. In this chapter I am setting out a few basic guidelines that can be used at Cobb’s Creek to change the perception of golf course maintenance.

One of the problems with golf course maintenance is the average golfer. The average golfer relates green with being great because this is what they see on TV. These golfer courses are “green” one week a year but since the average golfer sees this every week on TV they believe that this is normal. Unfortunately that is not the case, green doesn’t necessarily equate to great playing surfaces but it does equate to higher costs and increased pressure on our ecosystem.

Why take all the time and money to keep every square inch perfect when in actuality he spends 70 % of his time in a few areas? Maintenance should be focused on the greens, approaches and landing areas the rest should be of “playable quality.” The goal of the maintenance plan at Cobb’s Creek is to achieve fast and firm conditions throughout the golf course
Conserving Water

One of the most important issues facing the future of golf is water use. Required large amounts of water to keep every acre perfect. Unfortunately, droughts and booming populations have limited the available water for golf courses for better. Golf courses must adapt or die!

Perception of what a healthy golf course looks like is a huge problem today. Golfers must understand that “Augusta” green grass isn’t necessary to have optimal playing conditions. While green grass is aesthetically pleasing, it is very costly, increases playing costs, and stresses our ecosystems, while not necessarily equating to better playing conditions. At Cobb’s Creek Golf Course, the perception will be changed. Brown, fast and firm playing surfaces will be the norm.

To reduce the water usage:
- Select a palette of grass varieties that can flourish with low water input.
- Focus irrigation on greens and landing areas.
- Create rough areas that require no water.
- Hand Water!
Irrigation is focused on greens, approaches and landing areas.
Turf Selections

Tees and Fairways

• Fine Fescue (30%)
• Patriot Bermuda (30%)
• Perennial Rye (40%)

Rough

• Kentucky Bluegrass
• Perennial Rye
• Fine Fescue
Greens and Approaches

- Crenshaw Bentgrass
- Southshore Bentgrass
- Providence Bentgrass
- L-93 Bentgrass

Fescue and Native Rough

- Fine Fescue
- Wildflower Mix
Golf Maintenance Strategies

Tees
- Cut at .5”
- Cut twice a week
- Reel Gang Mover
- Growth Regulator every 21 days

Rough
- Cut at 2”
- Cut twice a week
- Rotary Gang Mower

Fescue and Native Rough
- Maintained Sparsely
- Cut twice a Year
- Rotary Gang Mower
- Ensure no growth of large vegetation
Fairways
- Cut at .5”
- Cut Twice a week
- Reel Gang Mover
- Growth Regulator every 21 days

Approach
- Cut at .156”
- Cut 4 Days a week
- Tri Plex Mower
- Low Does of Growth Regulator every 21 days

Greens
- Cut at .12”
- Cut 6 Days a week
- Tri Plex Mower
- Low Does of Growth Regulator every 21 days
Reducing Mowing

The gang mower is a vital element for reducing costs and reducing the negative impact on the environment. The gang mower is a versatile mower that can cover a lot of ground quickly. It can be rigged to cut rough with a rotary connection or rigged to cut fairways and tees with a reel attachment. Connected to a tractor, this mower is nearly four times more efficient and requires 60% less man hours than a Toro Reelmaster.
The intention of supplementing playing surfaces is to improve playing conditions, not to enhance aesthetics. Thus, nutrient inputs should be limited to the greens and approaches. Too often, golf course superintendents find themselves wasting time, money and fertilizers to obtain perfectly green golf courses.

The greens and approaches should be supplemented with low doses regularly throughout the year. This will allow the plant to establish deep roots and will in turn become much stronger than a plant that is fed only in times of high stress.

Practices like topdressing (addition of sand to playing surfaces) should be limited or eliminated. Topdressing is a common practice but studies show that topdressing increases soil temperatures and leads to leeching of nutrients. To reduce this leeching, a system that requires the use of organic fertilizers should be added. They are known to improve both root systems and playing conditions. Again, the goal of nutrient input is to improve playing conditions; not aesthetics.
Buffering Waterways

Buffering the creeks and streams in Cobb’s Creek GC is vital to preventing fertilizer from seeping into the natural water system. The creeks and streams at Cobb’s Creek GC should be buffered by natural wetland and stream corridor plants. These buffers should provide the same functions as a natural occurring stream buffer. Not only does buffering protect our waterways but it also improves the aesthetics of the golf course and contributes to the unique sense of place.
Models for Buffering Waterways
Bunker Maintenance

Buffering the creeks and streams in Cobb’s Creek GC is vital to preventing fertilizer from seeping into the natural water system. The creeks and streams at Cobb’s Creek Golf Course should buffered by natural wetland and stream corridor plants. These buffers should provide the same functions as a natural occurring stream buffer. Not only does buffering protect our waterways, but it also improves the aesthetics of the golf course and contributes to the unique sense of place.
Conclusion
Conclusion

I hope one day Cobb’s Creek can be restored and when it does I hope that I can have a hand in bringing her back to her former glory.

I would take this time to thank my Mom for her dedicated support throughout my life. Love You Mom.

To my friends and family thank you for your support.
Bibliography


