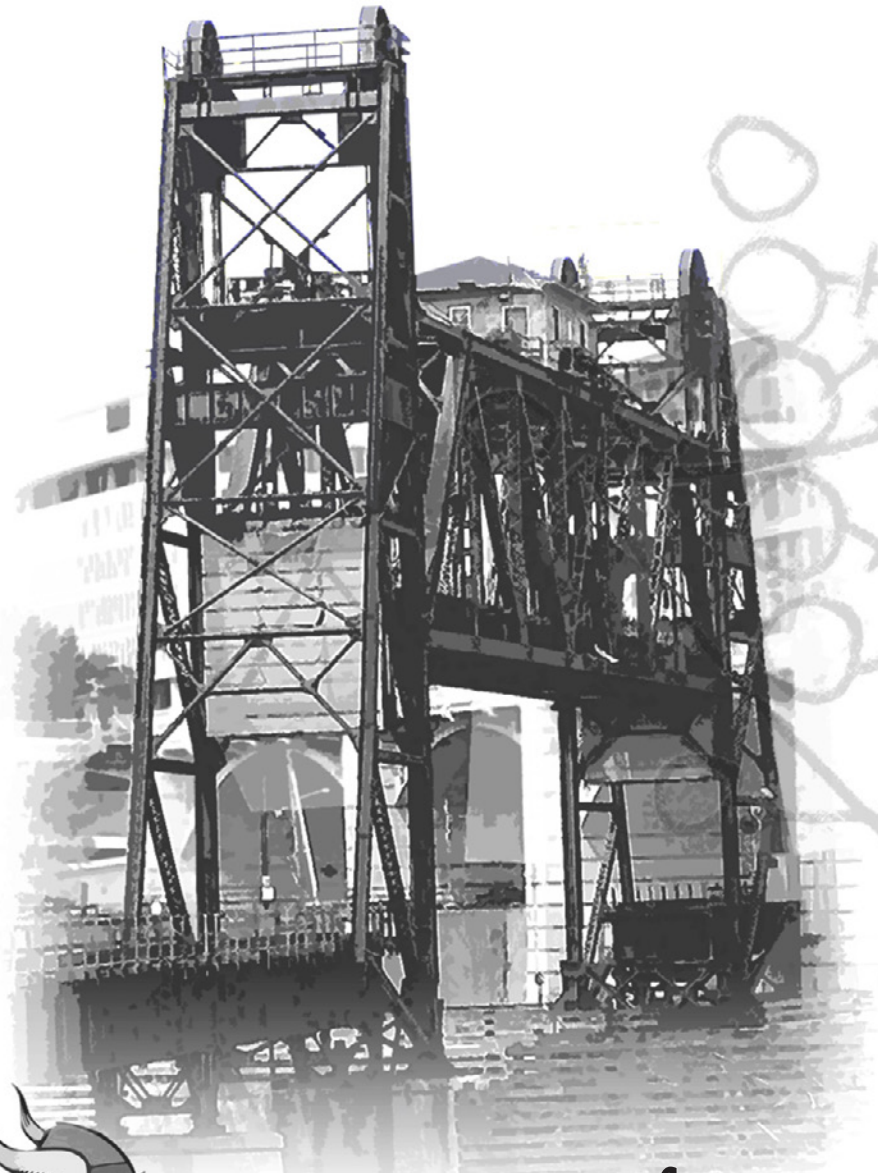

An Icon for Saint Paul

Tyler Kavanaugh

AN ICON FOR SAINT PAUL
MINNESOTA VIKINGS TRAINING FACILITY

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By

Tyler Kavanaugh

In Partial Fulfillment of the Requirements
for the Degree of
Bachelor of Architecture

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An Icon for Saint Paul

I would like to give special thanks to my parents for always supporting me in everything that I have done, for I couldn't have done it without their support.

I would also like to give special thanks to my primary critic, Mark Barnhouse for constantly pushing me and encouraging me to do my best. Mark helped me to learn more in a single year than I thought possible. He has always gone above and beyond what is expected from a faculty member. There should be more teachers like him.

One final thanks to Ron Ramsey, whom I have learned a lot from through the years. Ron never failed to keep us all entertained.

Thank you to all of the teachers that have helped me get to where I am today. I would not be where I am today without all of you.

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Personal Statement

rchitecture is frozen music

Architecture is **frozen music.**

- Johann Wolfgang von Goethe

Buildings are built to fulfill the needs of the clients and occupants. It is the responsibility of the architect to design beyond those primary needs, incorporating thoughts and ideas that give the building life and personality. Architects must strive to create designs that encourage activity, growth and prosperity. Without these factors, great architecture cannot be achieved.

Project Introduction

Abstract

Football is not a matter of **life and death**; it is more **important** than that.

–football manager Bill Shankly

Stadia are increasingly being seen as tools of urban regeneration. Once regarded as single entities of limited interest beyond specific uses, they are now seen as having the potential to attract different groups at different times for different events. Having people using the spaces within and around a stadium is considered successful. Having people using the site for multiple reasons on a daily basis is going above and beyond expectations of stadia design.

This design will help to create a new dimension of sports venue design in America. The stadium will be designed as a mixed-use matrix which will include such amenities as retail spaces, restaurants, and outdoor spaces. These types of areas are critical pieces of a community; they help to bring a community together by giving them a common place. The design will serve as a gathering place both during event and non-event times. New life will be given to the riverfront, with redesigned riverwalks, gathering areas and green spaces all being incorporated in the design.

This project will create an icon for the city of Saint Paul that will serve as a basis for regeneration in the downtown district.

Introductory Statement

Sports facilities can and **should be** 24-hour, culturally **engaging**, architecturally **significant**, revenue generating buildings which have the ability to **alter** the urban **condition** of major league cities.

-NBBJ Architect Dan Meis

Sports facilities shape areas on a large scale. They accommodate a public activity, can be capable of forming and reflecting the identity of the city, and are emblems of civic pride. Stadia should be designed for the players and fans, but furthermore, they are built to celebrate the history of the game and the city of which it occupies. When properly designed, stadia can serve as tools for urban revitalization and development, breathing new life into a decaying component of the city. Stadia give a city unique character, and create numerous alluring public areas.

This project gives the opportunity of revitalization and redevelopment to the city of Saint Paul. When a city as rich in history and character as St. Paul exists, it is appealing to take on the challenge of creating a design to accommodate further growth and activity within the city. The North Bank of the Mississippi River is the thriving economic sector of Saint Paul and is the center of the financial district. A small retail development and public gathering space on the South Bank of the river would make a complimentary contrast to the financial district. This area emerges as an ideal setting for an icon for Saint Paul, and a great location to begin plans for urban regeneration.

Project Description

Project Typology

The ancestors of modern sports facilities are those of ancient Greece. Olympic competitions were held there, as well as other sporting contests since the eighth century BC. The importance of such facilities in Greek life was much different than today. The site of these stadia housed a complex of temples and altars to various deities. At the height of its development, they were a rendezvous for the entire Greek world. A sports field was often situated adjacent to an enclosed training facility, and along the edge of this field was a colonnade with stone steppings to accommodate the spectators.

Figure 2.1 - Roman Colosseum

The **past** was about **function.** The **present** is about **revenue**. The **future** is about **design**.

-NBBJ Architect Dan Meis

Christianity later swept through Europe, and the emphasis of society shifted to religious salvation. Architectural effort was placed on churches rather than recreational and entertainment facilities. At this point, no other major sports stadia were built for the next fifteen centuries.

After World War I the United States of America broke new ground by designing stadia particularly for two flourishing sports; football and baseball. Football helped to form the single tiered elliptical bowl of immense capacity surrounding the field. The first stadium of this type was the Yale Bowl in New Haven, followed by the Rose Bowl in Pasadena and the Orange Bowl in Miami. The stands in these were up to 90 rows deep, since the stadiums held up to and sometimes more than 100,000 spectators, with the more distant spectators being so far away that they can not see the ball clearly.

After World War II, a new wave of stadia design was adopted. Designs shifted gradually towards multi-purpose facilities that were often fully roofed. Large stadiums on out-of-town sites became the common. This reduced land costs, minimized the disturbance of neighboring areas and increased the ease of access by car. Between 1960 and 1977, over 30 such stadia were built. Many of these stadiums accommodated both football and baseball in an attempt to maximize revenue.

The current trend is to design and build on urban sites which reduces urban sprawl and increases the use of previously constructed infrastructure; parking ramps, public transportation, etc., which in turn reduces the need for new large parking lots and the overwhelming use of personal cars.

History of the Minnesota Vikings

Figure 2.2 - Hall of Fame Coach Bud Grant

Figure 2.3 - Hall of Fame Quarterback Fran Tarkenton

Pro Football came to Minnesota in August of 1959 when local businessmen were awarded a franchise in the new American Football League. Five months later in January 1960, the same ownership forfeited its AFL membership and was awarded the National Football League's 14th franchise. The Minnesota Vikings took the field for the first time in 1961.

From the start the Vikings embraced an energetic marketing program that produced a first-year season ticket sale of nearly 26,000 and an average home attendance of 34,586, about 85 percent of the capacity of Metropolitan Stadium.

The success of the Vikings over the next two decades will always be highlighted by the image of the stone-faced Bud Grant on the sidelines of the frozen field at old Metropolitan Stadium. In only their second year under Grant, the Vikings began a stretch of 11 division titles in 13 years. They won the NFL championship in 1969 and NFC titles in 1973, 1974 and 1976. Grant also assembled one of the fiercest defenses in NFL history, known collectively as the Purple People Eaters, for the way they "devoured" opposing offenses.

Over the last 40 years, the Minnesota Vikings have consistently been at the top of their division. During this same period, only the Dallas Cowboys have made more playoff appearances. In addition, only four teams have played in more Super Bowls than Minnesota, who participated in Super Bowls IV, VIII, IX, and XI.

Current Situation

The National Football League is a thriving, economically healthy sports league. An NFL team enhances community pride and helps a city to achieve "major league" status in the competition with other cities in creating new jobs and attracting businesses.

Figure 2.4 - Metrodome Interior

The Metrodome was the last professional sports stadium built to host both and NFL and Major League Baseball team. It has been shown that facilities designed in this manner are no longer practical in today's professional environment. Football and baseball require significantly different seating arrangements and sightlines, both of which are compromised in a shared facility. Since the Metrodome opened in 1982, NFL stadiums have experienced significant advancement. At the start of this season, 26 of the 32 NFL teams are playing in stadiums that have been newly constructed or renovated since 1992. This new generation of facilities has set higher standards in fan accommodations and team revenue sources, making older stadiums like the Metrodome relatively uncompetitive. Within three years Minnesota, Miami and Oakland will be the only remaining facilities which host both sports.

Due to the Metrodome's limitations, the Vikings rank at the bottom or near the bottom of the league in every major revenue category. These categories include available seating, deluxe seating, advertising, concessions and parking. Without a new stadium, the Vikings revenue shortfall will hurt their ability to sign and keep big name athletes. The increased revenue from a better accommodating stadium will increase the Viking's salary cap.

Salary Cap

The salary cap puts a ceiling on the total salary that each team is allowed to pay its players. This ceiling gives smaller market teams like the Vikings a better chance to be competitive. While the salary cap structure is more equitable than in other sports, the 32 teams in the NFL are not financially equal. The salary cap allows each team to spend 63% of the team's total revenues. This is where the Vikings are losing ground. More and more cities are building modern football stadiums which offer more sources of revenue. This increases the salary cap of that team. As the salary cap continues to rise each year, the Vikings salary cap remains constant, resulting in the Vikings falling further behind.

As a result, the Vikings will face a difficult choice. They will either have to pay player salaries up to the salary cap, thus risking financial loss, or spend below the salary cap, thus compromising the quality of players they are able to sign.

Why Not Renovate?

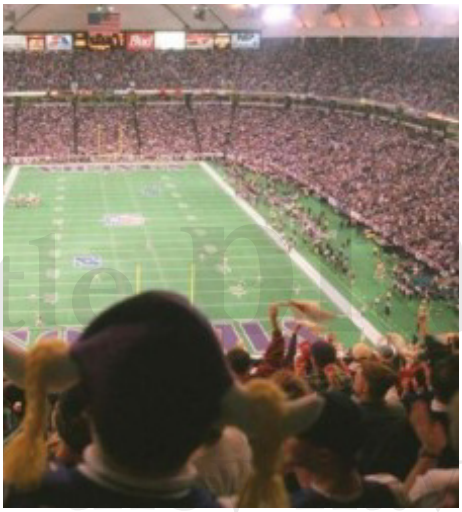


Figure 2.5 - Metrodome Interior

Make no **little plans**;
they have **no magic**
to **stir**
men's **blood.**

– Chicago City Planner Daniel Burham

Renovation of a facility often approach or exceed the cost of a new facility, as it frequently involves nearly completely rebuilding the existing facility. A renovation of the Metrodome would also eliminate the only possible location for the Vikings. Chicago recently completed the $365 million renovation of Soldier Field. During the demolition and construction, the Chicago Bears played at the nearby University of Illinois. The Vikings have no such option anywhere near the Twin Cities.

The changing nature of NFL facilities has affected domed stadia more than any other. Turning the Metrodome into a state of the art stadium is relatively impossible and not economically practical. Detroit, Houston and Seattle all completed analyses of their domed facilities and all three concluded that renovation was neither practical nor economically feasible. The Vikings have already evaluated several proposals for renovating the Metrodome. They determined that all of them lacked key areas such as fan accommodations, premium seating, revenue producing opportunities and parking.

Project Justification

A sports **stadium** is essentially a **large theatre** for the **presentation** of athletic **accomplishments.**

– from Stadia: A Design and Development Guide

The Vikings are fortunate to play in a league that is committed to markets of all sizes, but before long, that alone won't be enough to keep the team competitive. Just as most other NFL communities have addressed their football stadium challenges, it's important that Minnesota and the Vikings work together now toward a fair and responsible solution.

The majorities of cities that are home to professional football teams have recently built new stadiums, performed major renovations to their existing stadium or have plans for a new stadium in development. These stadiums represent 60% of all NFL markets.

With a new stadium, Saint Paul would have the ability to host many media-centric national sports events like the Super Bowl, NCAA Final Four, college football championships, and international soccer. A state-of-the-art, retractable roof facility will make Saint Paul a destination for these events, which generate significant economic impact and international exposure. Even as a sports venue, the stadium is an expansion of the city's tourism industry.

Keeping Pace

Figure 2.6 - Heinz Field rendering

Twelve new stadiums have opened since 1998:

M&T Bank Stadium – Baltimore Ravens	-1998
Raymond James Stadium – Tampa Bay Buccaneers	-1998
Cleveland Browns Stadium – Cleveland Browns	-1999
The Coliseum – Tennessee Titans	-1999
Paul Brown Stadium – Cincinnati Bengals	-2000
Invesco Field – Denver Broncos	-2001
Heinz Field – Pittsburgh Steelers	-2001
Gillette Stadium – New England Patriots	-2002
Quest Field – Seattle Seahawks	-2002
Ford Field – Detroit Lions	-2002
Reliant Stadium – Houston Texans	-2002
Lincoln Financial Field – Philadelphia Eagles	-2003

Figure 2.7 - Qwest Field

Two stadiums have undergone major renovations:

Soldier Field – Chicago Bears	-2003
Lambeau Field – Green Bay Packers	-2003

Five stadiums currently under development:

Arizona Cardinals	-Opening in 2006
New York Jets	
San Diego Chargers	
Dallas Cowboys	
New Orleans Saints	

Economic Impacts

The most common rationale for developing a new facility such as this is to "make something else happen." This is the case when the secondary purpose of the facility is to host the events for which it is designed. The primary motive is then to attract businesses such as a large hotel or mixed-use development, or to provide an additional pedestrian or visitor activity downtown. This design will incorporate two of the three motives.

The publicity that is received by a city by hosting an NFL franchise are believed to justify building a 70,000 seat stadium, even if it is used for only 10 professional football games annually. In a typical year, the teams home games may by aired on 300 or more television stations across the nation and on 100 to 200 regional radio broadcasts. The scores, draft picks and other team information may be reported in dozens of metro area newspapers. This in turn may influence new businesses to locate or expand to the area due to the recreational amenity and status provided by the team.

New jobs, new commercial development and increased tax revenues will be a result of visitor spending while in town for the event. Site selection is affected by the proximity to retail locations which give visitors the greatest opportunities to spend their money. A truly successful site location will satisfy both the needs of the user and maximize the opportunities to capture visitor spending. These opportunities will be maximized with the purposed mixed-use venue.

Economic Impacts
(Continued)

The Vikings will generate an estimated $510 million in out-of-state revenues over the next six seasons - an average of $85 million per year. This revenue, shared equally among all 32 teams in the NFL, originates primarily from the NFL television contract and merchandise. This revenue is in addition to the money that is generated locally.

In 1999, the Vikings had a direct fiscal impact to the state of Minnesota of over $11 million through the payment of income taxes on players and staff, sales taxes, property taxes and admissions taxes.

NFL Commissioner Paul Tagliabue has indicated that the League would likely bring the Super Bowl to the Twin Cities for a second time, with the addition of a new venue. According to a study by Georgia State University, Super Bowl XXXIV, held in January 2000 in Atlanta, generated a total economic impact on the state of $292 million.

Fan Experience

On game days, fans will enjoy an improved experience from the moment they arrive, including:

Figure 2.8 - Metrodome concourse

Wider Concourses:

Metrodome concourses are extremely narrow (24 feet). Concourses of at least twice the width will relieve crowding and improve access throughout the stadium.

Improved Parking:

Access to safe and convenient parking will increase while pregame festivities, including tailgating, would improve.

More Seats/More Comfort:

For the last few years, the Vikings have been one of the toughest tickets in town. In fact, there is a waiting list of fans who want season tickets. A new facility will provide more seats at a wide range of price levels to give more fans a chance to see a game in person.

Enhanced Views of the Game:

A new facility will provide better sight-lines and bring every seat closer to the action.

High Tech:

High-quality video, sound and scoreboard systems to improve the live action experience .

Better Concessions:

A new stadium will mean more places to get the food and drink of your choice. This means less time waiting in line and more time watching the action. Restaurants and team stores will also enhance your game day experience.

More Restrooms:

More restrooms will result in shorter lines so fans will miss less of the event.

Stadium Financing

Public Financing Participation
Financing scenarios for new NFL facilities vary from market to market, but creative cooperation between teams and communities is the standard. The average level of public participation in new stadium construction is approximately 71 percent of the total construction cost. The Metrodome was paid off many years ahead of schedule, and there is no reason to believe that it will not happen again.

Team/Private Financing
The average level of team and private contribution to new NFL stadium construction is approximately 29 percent. The NFL financially assists communities with the construction of NFL stadiums.

Multiple Financing Sources
Sources of public investment in constructing new football facilities also vary from market to market. Recent stadium solutions have used a variety of sources, including public bonds, facilities admission taxes, hotel and rental car taxes, various sales taxes and state lottery revenues.

Theoretical Premise

Sports facilities are as **important** to the self-image of a community as a **town hall,** war **memorial** or **public library,** and they need **not look** like the back end of a **railway shed.**

-Architect Rod Sheard

The Colosseum in Rome is the first great prototype of stadium design. It took the combination of dramatic function and monumental scale, forming a powerful architecture masterpiece. Very few stadia have achieved such greatness since. The worst are distasteful places for players and fans alike, casting only a lifeless shadows over their surroundings as they stand empty, only being utilized for short periods of time year round. The best examples are safe and comfortable, offering entertainment to its guests, but still falling short of architectural excellence.

This design project will attempt to create an iconic building for Saint Paul. It will challenge the concept of sports architecture as it relates to the cityscape. The design will encourage visitors, bringing the site to life and making it a thriving sector. People will walk around and through the site on a daily basis, enjoying the views of Saint Paul and utilize the shops and restaurants.

Stadia and sports venues are designed and built to allow spectators to view athletes perform feats of greatness. The design of the stadium itself is the architectural version of this athletic feat. The architect is given a chance to show his feat of greatness. A structure of this size and magnitude will be judged and criticized by the citizens of the city and all who pass by it. The building will be a long-standing reminder of the greatness or failure of the design, like a high-light reel of the feats accomplished within its walls.

As a building dedicated to the pursuit of human endeavor excellence and endeavor, the stadium itself should, in itself, have presence. It should announce itself, and rejoice in its celebratory function.

Goals

A complete sustainable development balances the environmental interests of society, the environment and the economy.

Environmentally
Designed as a sustainable building, it could generate its own power from renewable sources such as the sun and wind, hopefully setting a new benchmark for sustainable design in sports facilities.

Economically
Designed as a sustainable development because it achieves a return on investment for the public and private sectors, generating new tax dollars to the City of Saint Paul and the State of Minnesota and supporting a vital part of the economy.

Society
It will provide opportunities for the entire neighborhood to use and enjoy the area. The design will serve as a gathering place both during event and non-event times. New life will be given to the riverfront, with redesigned river-walks, gathering areas and green spaces all being incorporated in the design.

Community Goals

Mission Statement

Stadiums are increasingly being seen as tools of urban regeneration. Once regarded as single entities of limited interest and use beyond specific groupings, they are now seen as having the potential to attract different groups at different times for different events. The design must give the team and the fans a sense of place and permanence which they can call their own. The stadium will reflect the identity of City of Saint Paul.

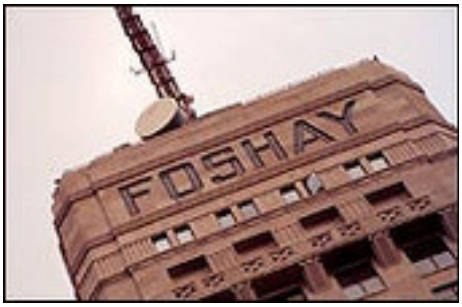


Figure 2.9 - Foshay Tower

Create an Icon

The goal of this project is to create an icon for the city of Saint Paul and will serve as a basis for regeneration in the downtown district. It will serve as a gathering place during event and non-event times. The design will give new life to the riverfront. It will include a riverfront walk, a gathering area, a green space, as well as commercial space as an effort to encourage activity at all times. A connection from the neighborhood areas to the financial district through the Mississippi River walk will encourage a confident cohesiveness to the entire area.

Address the Surroundings

It is noted that most stadiums have traditionally been inward-looking forms. The challenge has been taken to design a form that addresses its surroundings, allowing it to be better incorporated within its urban context.

Reduce the scale

Stadiums are massive forms which can be very imposing on the neighboring structures and spaces. This design will attempt to develop a design that is less intrusive, and will bring down the overall scale and mass of the stadium. Included in the design are spaces allocated for retail spaces and restaurants around the perimeter of the building. Creating these active edges around the building is a very important aspect of bring the scale down and making it a friendly design to pedestrians.

Project Goals

Mission Statement

New technology is no longer simply being added to the traditional sports venue. It now shapes the structure itself, particularly since such engineering advancements as retractable roofing and portable playing surfaces.

Structural Design

A major issue in the design of any stadium is that of the structure. Structure is the underlying principle of every design project, and is especially important in a building of this size and magnitude. The design of the structural system will act to show strength and elegance in the building.

Open to Nature

With the climate of Saint Paul, the design may include a retractable roof and an opening wall. The goal is to create a unique retractable roof system that will be the signature of the design system and will be unlike any other currently built. A retractable wall may also be incorporated into the design. The idea behind these retractable elements is to give the stadium the sensation of an open-air stadium, while providing the benefits of a closed roof stadium when the weather is unfavorable.

Figure 2.10 - Leaves in the Fall

Sustainable Design

A third issue is power generation and self-sustainability. Stadiums are large buildings that use large amounts of electrical power for short periods of time. The football stadium will be used only a few times per week, for only several hours at a time for major events. This building has a great opportunity to collect solar and wind power throughout the week, store it, and use it when needed. This could save vast amounts of energy and money over time, hopefully setting a new benchmark for sustainable design in sports architecture.

Mississippi River Guide

Minneapolis recently came out with a guide for the development of the Mississippi Riverfront. The guide gives seven active ideas and behaviors that will help to preserve and enhance the Riverfront. These ideas and suggestions can easily be accommodated to reflect the river-front along the Saint Paul site.

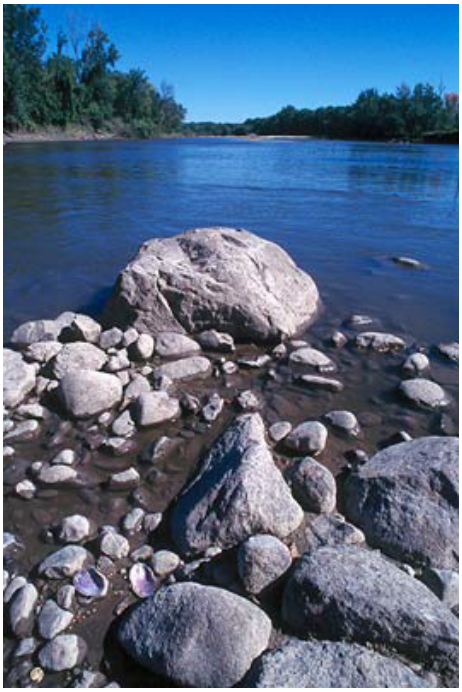


Figure 2.11 - Mississippi River

Natural Resources

Preserve, enhance and interpret natural resources, protect and preserve the biologi cal and ecological functions

Visual Quality

Protect and enhance the views to and from the river and up and down the river, so people may enjoy the natural beauty of a major waterway in an urban setting

Cultural Resources

Preserve, enhance and interpret the archaeo logical and historical resources of the river

Economic Resources

Provide for continued economic activity and development in a manner consistent with the other goals. Protect and preserve the river as an essential element in the system of transportation, water supply and recre ation

Neighborhood Revitalization

Leverage the natural beauty, recreation and economic development features of the river as a means of sustaining the quality of nearby neighborhoods and the city as a whole

Outdoor Recreation & Tourism

Enhance opportunities for outdoor recre ation, education and scenic enjoyment. Continue to make the river an important part of any visitor's appreciation and under standing of St. Paul. Continue to build the riverfront as a major element of the lo cal and regional parkways systems

Public Understanding

Improve the public's understanding of the river and promote public stewardship of its resources. Recognize and strengthen people's relationship with the river.

Analysis

Users & Clients Description

Spectators

For all sports, design begins and ends with the spectator. It is the most criticized figure that must be looked at before anything else. Without the fans, there would be no money to pay athletes, and without an acceptable stadium there will be no fans.

It must be understood that different people have different motives, and that any crowd will contain a variety of subgroups with different reasons for attending. Some have a primary sporting interest, some have social reasons and sometimes these two reasons are mixed.

Figure 3.1 - Vikings fanatics

For many, watching live sports is the highest level of excitement, having a near spiritual quality. These fans are knowledgeable, respond instantly to the action, offer advice to the players, and recognize the form, fitness and style of individual players and the effectiveness of strategies and tactics. These fans stick by their team through the good times and the bad. To these fans, the stadium is their palace, the place they go to observe greatness and a place to call their own.

The 'social priority' group is found in the clubrooms, dining rooms and private boxes, either entertaining or being entertained. The game is interesting, but may interrupt the personal or business conversations. Social acceptance is important to this group, and a stadium that reflects a personal reflection of themselves is of utmost importance. They need a place to meet and mingle with others near their stature, and impress any guests they may invite.

The third group possesses components of the previous two. They usually are casual supporters of the team and will attend when the conditions are right. They often lose interest when the team plays poorly and will only attend when big games are being played. It is important to provide these fans with amenities that will spark their interest with the facility to keep them coming back for more.

Users & Clients Description
(Cont)

Figure 3.2 - Vikings' players celebrate

Players/Athletes

Without the athletes, there would be no game. The Minnesota Vikings need a facility that will reach and exceed their requirements.

The Minnesota Vikings and their fans will be the primary user group of the facility. However, the stadium may be used to host several different types of events. Other users include the Minnesota Thunder soccer team and the University of Minnesota Gophers football,

Users & Clients Description
(Cont)

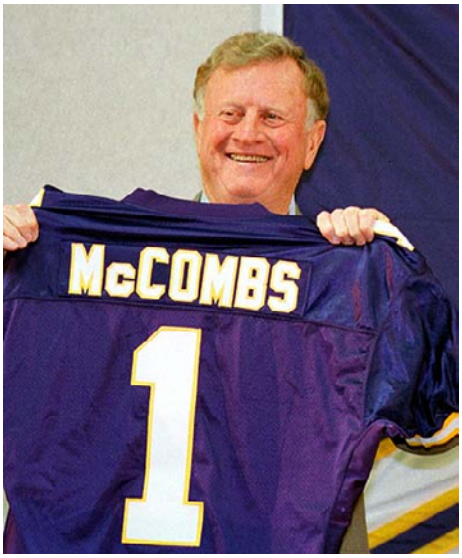


Figure 3.3 - Owner Red McCombs

Owners

Red and Charline McCombs are the owners of the Minnesota Vikings. The owners usually finance up to 29 percent of the stadiums cost. In return, they need a facility that will encourage spectators to attend games and purchase merchandise.

It is impossible for the owners to make their money on gate income (ticket sales) alone. Gate revenue can be enhanced by various forms of premium pricing. Options for supplementing gate income include the sale or rental of hospitality boxes, catering concessions, advertising and event sponsorship, media studio rentals and parking rentals. The more days the facility is used will also increase the profitability of the facility.

The owners need to have an exciting environment for football. It must encourage people to come to the games, which will be the basis for raising capital to finance a portion of the stadium and pay the salaries of the athletes and staff.


Figure 3.4 - Minnesota State Capitol

City of Saint Paul

The city has its own desires for the new stadium that must be included in the design. To help ensure this design will be accepted by the City of St. Paul, the design must be a symbol of what the city is about, it must reflect and react to its context, and will give back to the community (financially). Ideally the design will both encourage and increase tourism to the area both during and between events. The idea behind this project is to not only give the Minnesota Vikings a new facility, but to also create an architectural icon for Saint Paul.

Staffing Requirements

The numbers of users during any given football game are as follows (approximate):

- Two football teams
  - 65 players per team
  - 20 coaches, assistants and trainers per team
- 68,000 to 70,000 spectators
- 200-250 - media personnel
- 30 – Camera operators
- 400 - Concessions
- 100 - ushers
- 120- ticket window operators/ticket takers
- 100 – caterers
- 50 - chefs
- 200 - setup/takedown/custodian
- 50 – security
- 10 - technicians

Parking Requirements

Due to the location of the site, a minimal number of parking spaces will be needed. There are numerous parking ramps within walking distance of the stadium, and others that will be accessed via buses, the newly constructed light rail system, and proposed water taxis.

One formula used to approximate the minimum number of parking spaces needed is as follows:

- # of spectators / 10 = # of spots needed

Using this formula, the stadium will need a minimum of 7,000 parking spaces. In addition to this, private parking areas for players, officials, media personnel, service and deliveries are needed. Private box (suite) holders and their guests, VIP, and similar private visitors should have special, clearly identified parking areas that are separate from the mass parking.

Site Analysis

Figure 3.5 - Saint Paul Cathedral

History of Saint Paul

In 1805 a United States expedition, led by Zebulon M. Pike, set out to explore the headwaters of the Mississippi River, a region inhabited by the Sioux people. Pike negotiated a treaty with them for land in the region, and Fort Snelling was established in 1820 at the nearby confluence of the Minnesota and Mississippi rivers. Saint Paul became a French settlement in the 1840's when Pierre "Pig's Eye" Parrant, a French-Canadian trader, became the first settler at the site of modern Saint Paul. The community became known as Pig's Eye. The name was later changed to St. Paul at the urging of Father Lucien Galtier, who had built a local chapel dedicated to Saint Paul. Other settlers came south from the Winnipeg area to take shelter at Fort Snelling. However, they were forced to move south to what is now Lowertown, at the time called Upper Town. Divided by a swamp, Saint Paul was effectively two settlements. The settlements grew thanks to the growing river traffic,which was Saint Paul's lifeline. In 1849 river traffic started bringing settlers in by the hundreds, and eventually by the thousands.

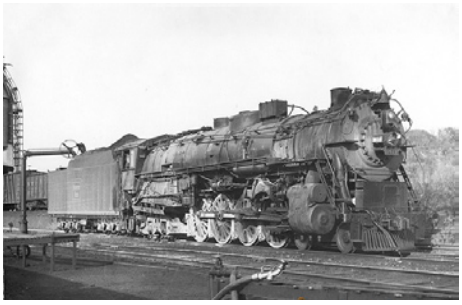


Figure 3.6 - Saint Paul train

Figure 3.7 - Minnesota History Center

The community was made the territorial capital of the Minnesota Territory in 1849. Once Minnesota was considered a territory with Saint Paul as its capitol, it began to grow even faster. Indian canoes became steamboats and later became barges making trade more efficient bringing even more traders and settlers. Saint Paul was officially formed as a city in 1854, and became the northern limit for steamboats traveling the river. The first railroad reached the city in the mid-1860s. As of 1870 the railroad had put an end to the dominance of riverboat traffic on the lower landing. The upper landing had peaked eight years earlier and fell during the Dakota Conflict of 1862. Under the direction of railroad financier James J. Hill, Saint Paul was connected by rail to the West Coast through the state of Washington in 1893. The Great Northern Railway helped Saint Paul become an important distribution hub from which agricultural goods were shipped; soon after it developed as a manufacturing center. The Minnesota Valley Railroad stopped the river trade entirely shortly after opening.

In the 1970s several major buildings were erected, including a large civic center that was expanded in the mid-1990s. Development projects in the later part of the 1990s included the Phalen Corridor Project in the east of the city, resulting in the construction of a highway and light manufacturing plants. The project also resulted in the expansion of the Science Museum of Minnesota, mixed-use development in the downtown riverfront area, and redevelopment of a section of the western part of the city as a retail and office center.

Important Factors for Choosing Site:

Urban Location
River Connection
Pedestrian Path Proximity
Public Transportation Routes
Existing Parking Facilities
Highway Proximity

The use of sports facilities cannot be estimated reliably without first identifying the location, or at least the characteristics required in a location.

Urban Location

The search for a site for this project began by studying maps and aerial photographs of Minneapolis, Saint Paul and many of the surrounding suburbs. Associate Professor Steve Martens suggested several possible sites in the Minneapolis/Saint Paul area to consider. It was very important to locate a site that could accommodate a structure of this scale without overpowering the neighborhood in which it is located. The high, long blank walls characteristic of stadia present a design challenge, especially with a downtown site. A relatively open site was preferred opposed to an occupied site which eliminates the need to unneccessarily demolish numerous existing buildings.

An urban site was important for this particular project. The most important factors to consider in selecting a site are those that affect marketability, attendance and occupancy. A project of this type, scale and magnitude is best suited for a central location because the facility will have a major influence on the surrounding area. With a dedicated focus on urban regeneration, the design include retail spaces, restaurants and other amentities for the citizens of Saint Paul. The design will also focus on using existing infrastructure; parking structures, public transportation and roadways whereas a more remote site where these would be either nonexistent or would need to be constructed to accommodate the high volume of visitors. Placing the stadium within walking distance will encourage pedestrian traffic to the area, thus decreasing the need for expansive parking lots structures.

Figure 3.8 - Saint Paul skyline

River Connection
Minnesota's development as a territory is due primarily to its location along the Mississippi River. Since the river played such an important role in the formation of both Minnesota and Saint Paul, a site near or along its winding path was favorable. The river has a certain importance to citizens of Minnesota and its aesthetic value is unmeasurable. The design will attempt to not only acknowledge the river's presence but also react to it.

Pedestrian Path Proximity
The importance of pedestrian paths is to give the site a sense of welcoming to all near the area. Pedestrian paths provide connections to surrounding areas and encourage walking to the site for both event and non-event days.

Public Transportation Routes
The best way to reduce the number of private automobiles is through the use of public transportation. Locating a site that is near existing public transportation routes or future routes will provide spectators with additional options for traveling to the venue. This will reduce air pollution, traffic congestion and the need for expansive parking spaces. Minneapolis/Saint Paul recently constructed and opened a light rail system in the area which could be incorporated in the design of the facility.

Figure 3.9 - Light Rail Passenger Train

Figure 3.10 - Existing Parking Structure

Existing Parking Structures

The amount and location of parking is affected by the availability of public transportation to the site. There is no possible way to completely eliminate the need for parking areas in the field of stadia design. By utilizing nearby existing parking lots and structures, the need to design and build more can be nearly eliminated. The peak usage time for the stadium will most often be on Sundays, a day when the majority of other businesses are closed. The owners of parking structures near the site would have the ability to earn additional income by renting out the spaces to patrons of the stadium on game days. When the site is located in or adjacent to central city areas, they can take advantage of the existing parking of the central business district (CBD). This reduces the overall budget of the project, and creates a new market for the CBD restaurants and retailers on game days.

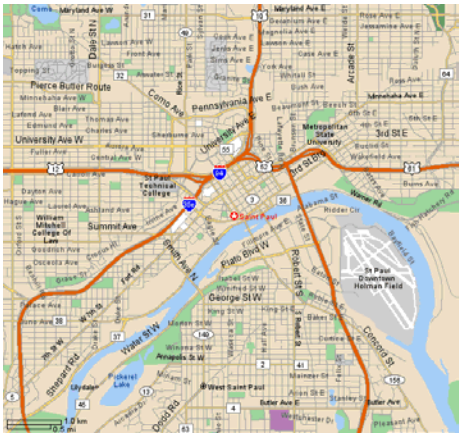


Figure 3.11 - Highway Connections

Highway Proximity

Large numbers of spectators drive from other areas of the Twin Cities, Minnesota and surrounding states. To help relieve over-congestion of city streets, both state and interstate highways should be located near the site. Nearby exits would assist in keeping excessive traffic congestion to a minimum.

Figure 3.12a - Metro area map

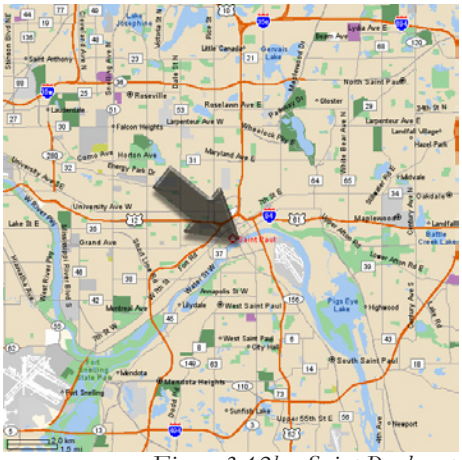


Figure 3.12b - Saint Paul map

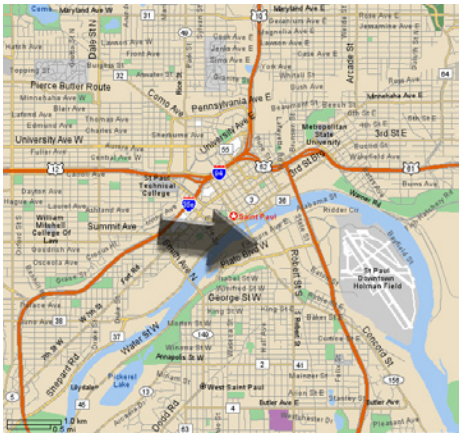


Figure 3.12c - Site location map

Site Description

The chosen site is located on a Harriet Island. It was formerly occupied by warehouses and other miscellaneous buildings until the mid to late 1980's. The majority of the buildings were demolished at that time, leaving approximately 45 acres of relatively unoccupied land.

The boundaries of the site are clearly defined on all sides. The bank of the Mississippi River makes up the northern border, with Wabasha Street defining the west edge of the site. Roberts Street and Plato Boulevard define the site boundaries to the east and the south, respectively.

The site is divided by the Burlington Northern Railway. The tracks enter the site on the south edge in a Northwest direction. They make a wide turn throughout the site, exiting through the north edge of the site heading directly North. The tracks continue across the Mississippi River on a 19th Century steel lift bridge, intersecting with additional tracks on the north side of the river.

The Mississippi River and the railroad serve as historical markers and will be treated as such in the design of the facility.

The Robert Street Bridge on the east side of the site. The bridge is historically significant as an outstanding example of an unaltered, monumental, multi-span, reinforced concrete arch bridge. It is the product of a very complex engineering design process to enable this bridge to be built in this location with its established vehicular, railroad, and river-navigation demands. The resulting bridge includes

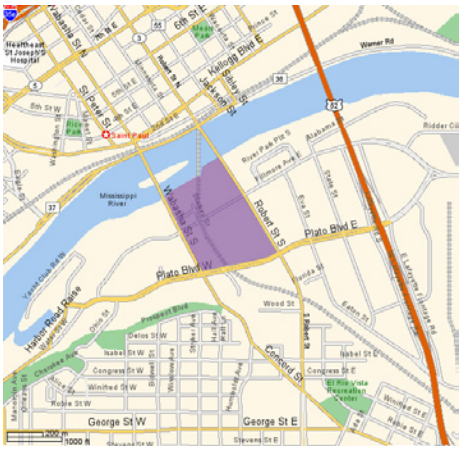


Figure 3.12d - Site surroundings

Figure 3.13 - Site area aerial photograph

Figure 3.14 - Aerial photograph of site

a monumental reinforced concrete rainbow arch, by far the largest in Minnesota. The bridge is outstanding not only for its engineering, but for its aesthetic effect in the overall design of the bridge.

Wabasha Street allows access to the west side of the site. It crosses the Mississippi River on a reinforced concrete bridge which was built in 1998. These bridges form the only roadway connections across the Mighty Mississippi and both will be visible from the stadium..

The bridges link the site to Kellogg Boulevard on the north side of the river, which is a major connection route to I-94 and I-35E. Both of these major interstates are within two miles of the proposed site. To the south, Plato Boulevard intersects with state highway 52 to the east within a mile of the site.

Landmark sites that are nearby include Raspberry Island, located in the middle of the Mississippi River, the First National Bank building, the Xcel Energy Center, home of the Minnesota Wild hockey team, The Science Museum of Minnesota, the State Capital and the St. Paul Cathedral from which the city gets it name.

The area is relatively flat, sloping slightly away from the river. The site itself is currently slightly depressed, sloping from east to west. This will need to be addressed during the site planning for the design.

Figure 3.15 - Aerial photograph showing existing structures

Warehouses inhabited this site up until the mid to late 1980's. Relevant soil and geological testing information was not found, but due to the knowledge of this site formerly supporting warehouses, it is believed that it will be sufficient for a stadium with proper footings. This site sits on a limestone bed, which would need to be analyzed to discover the portion of broken, loose rock. Bedrock was found to be around 80 feet below grade.

There is currently nine structures on the site. The most significant is the US Bank building and parking structure built in 2002, which are located in the northeast corner of the site.

Figure 3.16 - Existing US Bank building

A - US Bank
60 Livingston Ave
Structure - $26.7 million
Land - $2.5 million
Built in 2002

B - **US Bank Parking Structure**
Roberts St. S
Structure - $7.6 million
Land - $1.4 million
Built in 2002

Figure 3.17 - Existing J. Llewellyn Publications

C - J. Llewellyn Publications
84 Wabasha St. S
Structure - $912,000
Land - $156,000
Built in 1940

Figure 3.18 - Existing unknown building

D - Building Name Unknown
Fillmore Ave
Structure - $200,000
Land - $2.67 million
Date unknown

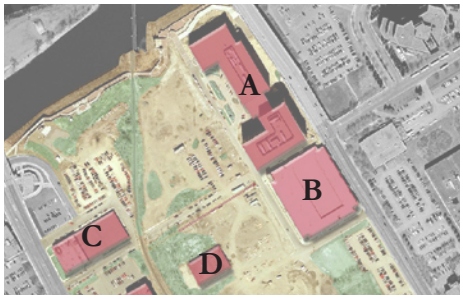


Figure 3.19 - Existing three business building

E - Nasseff Mechanical
Wabasha Deli
Joseph's Grill
122 Wabasha St. S
Structure - $1.3 million
Land - $208,000
Built in 1981

Figure 3.20 - Existing W.I. Maas Mfg. Corp.

F - W.I. Maas Mfg. Corp.
162 Wabasha St. S
Structure - $274,000
Land - 74,000
Built in 1929

Figure 3.21 - Existing Nasseff Plumbing & Heating

G - Nasseff Plumbing & Heating
41 Plato Blvd
Structure - $53,000
Land - $125,000
Built in 1925

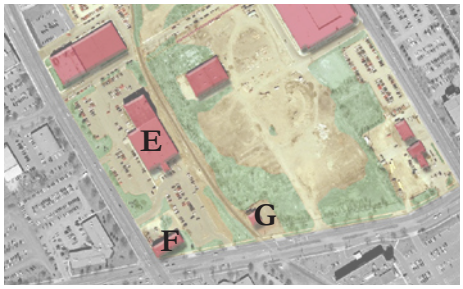


Figure 3.22 - Aerial photograph showing existing vegetation

Warehouses inhabited this site up until the mid to late 1980's. Relevant soil and geological testing information was not found, but due to the knowledge of this site formerly supporting warehouses, it is believed that it will be sufficient for a stadium with proper footings. This site sits on a limestone bed, which would need to be analyzed to discover the portion of broken, loose rock. Bedrock was found to be around 80 feet below grade.

Figure 3.23 - Saint Paul skyline from the site (day)

Figure 3.24 - Saint Paul skyline from the site (night)

There is currently nine structures on the site. The most significant is the US Bank building and parking structure built in 2002, which are located in the northeast corner of the site.

There is very little vegetation on the site with most of it inhabiting on the western part of the site and the most dense areas being along the railroad tracks. The remainder is fairly open, with only a few sparse patches of vegetation.

Even with the site being on the river bank, the site is quite dry. It flooded during the large flood of 1997, but the site has not been flooded since.

Figure 3.25
The Science Museum of Minnesota

Figure 3.26
The Xcel Energy Center

Figure 3.27
The Minnesota History Center

Figure 3.28
Minnesota State Capitol Building

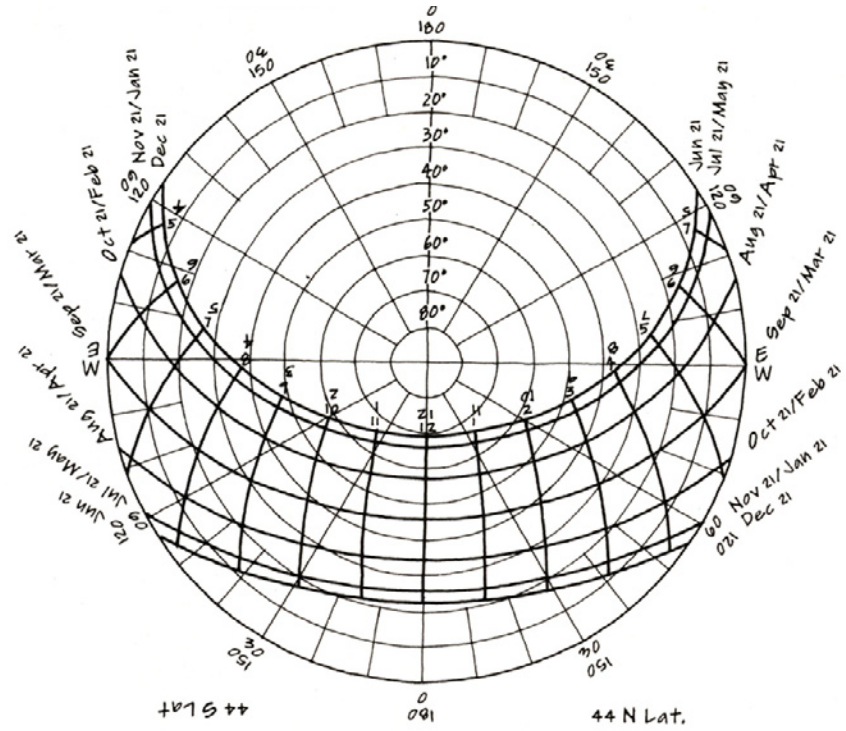


Figure 3.29 - Sun Path Diagram

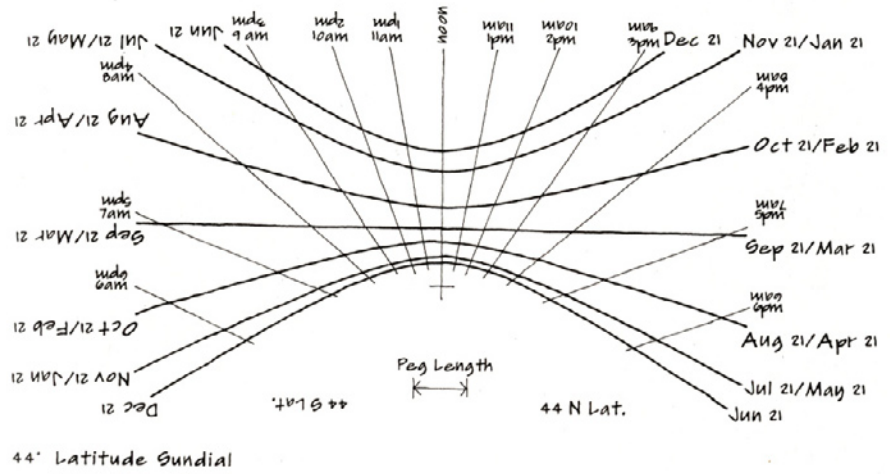


Figure 3.30 - Latitude Sun Dial

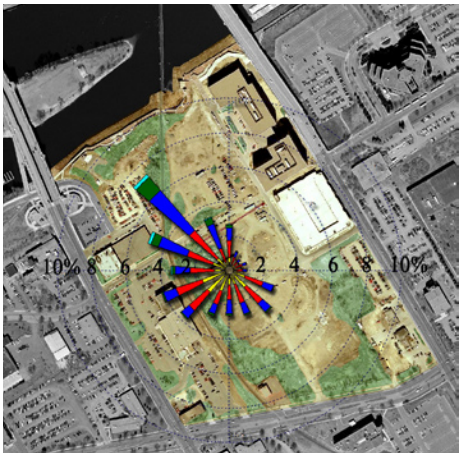


Figure 3.31a - January wind rose

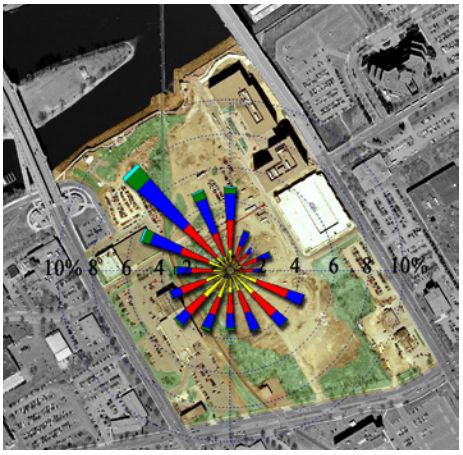


Figure 3.31b - February wind rose

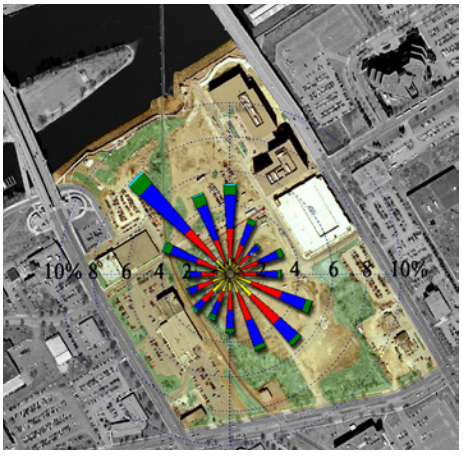


Figure 3.31c - March wind rose

January

The concentration of occupants on the site in January will be for the stadium aspect of the design. January marks the last week of the football season, and the entire post-season. Blistery wind usually comes out of the Northwest, although the dramatic elevation change along with the presence of buildings to the north will help to break the wind.

Average temp: 6 - 23 degrees
Average Precip: 1.02 inches

February

The least occupied time of year on the site will most likely be in February. It is the second slowest retail month of the year after January, and it is the off-season for football. Blistery cold winds come from the Northwest. The most calm area will probably be on the southeast corner of the site.

Average temp: 13 - 30 degrees
Average Precip: 0.78 inches

March

Activity on the site should increase in March. Spring is on the horizon and the temperature will be more comfortable. Retail sales tend to increase from February, so visitors will be out to shop. Cold winds come from the Northwest. The most calm area will probably be on the southeast corner of the site.

Average temp: 24 - 42 degrees
Average Precip: 1.92 inches

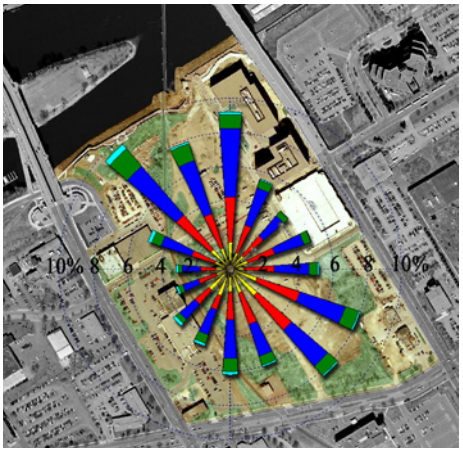


Figure 3.31d - April wind rose

April

The site will be active throughout the week in April. Residents will take advantage of the warmer weather and will start to use the outdoor spaces surrounding the buildings. Cool winds tend to come from the North and the Southeast, bring fresh breezes to the site.

Average temp: 36 - 58 degrees
Average Precip: 2.54 inches

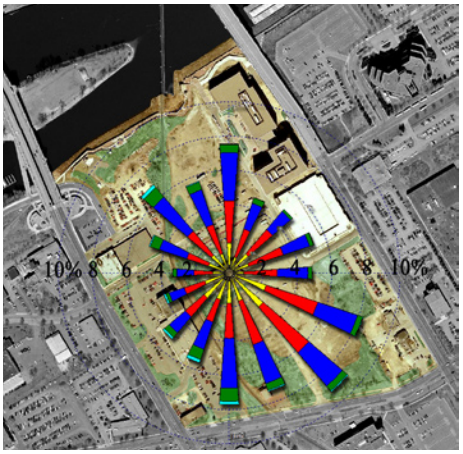


Figure 3.31e - May wind rose

May

May will began to bring more people to the site to enjoy its retail spaces, and the stadium can began to host concerts and other functions, taking advantage of the retractable roof. Cool winds usually come from the Southeast.

Average temp: 48 - 71 degrees
Average Precip: 3.73 inches

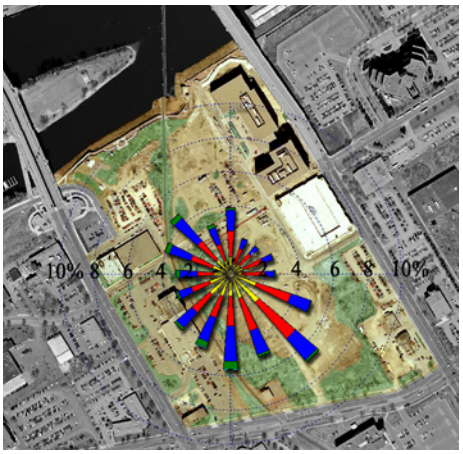


Figure 3.31f - June wind rose

June

The site and it's surrounding areas will began to flourish with activity in June. The parks and walking & bike paths will be in full use as people stroll along the riverfront. Many people will walk and bike to the site from all over. The warm summer breezes come from all southern direction.

Average temp: 58 - 79 degrees
Average Precip: 4.98 inches

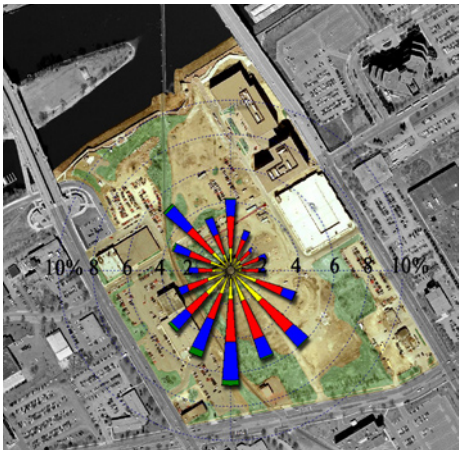


Figure 3.31g - June wind rose

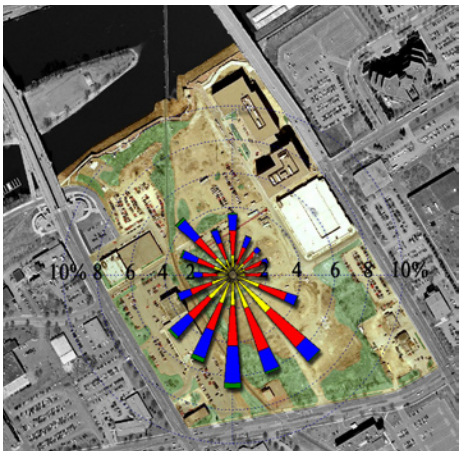


Figure 3.31h - July wind rose

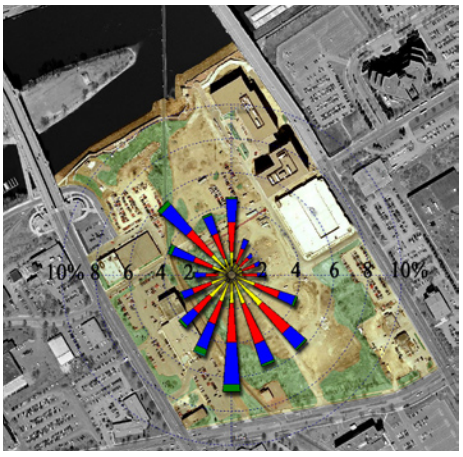


Figure 3.31h - August wind rose

July

The site and it's surrounding areas will continue to flourish with activity in July. The parks and walking & bike paths will be in full use as people stroll along the riverfront. Many people will walk and bike to the site from all over. The warm summer breezes come mostly out of the south.

Average temp: 63 - 83 degrees
Average Precip: 4.41 inches

August

Football preseason begins, which will bring many spectators to the site. With Summer in full swing, residents will continue to use the surrounding outdoor amenities. The parks and paths near the site will be used daily. In August, warm winds tend to originate in the south the majority of the time.

Average temp: 61 - 81 degrees
Average Precip: 4.37 inches

September

Football season begins, which will flood the site with fans on game days, with the roof being open for all of the games. Area residents will continue to use the surrounding outdoor amenities. The parks and paths near the site will be used daily. In September, cool winds tend to come from the south.

Average temp: 52 - 72 degrees
Average Precip: 3.20 inches

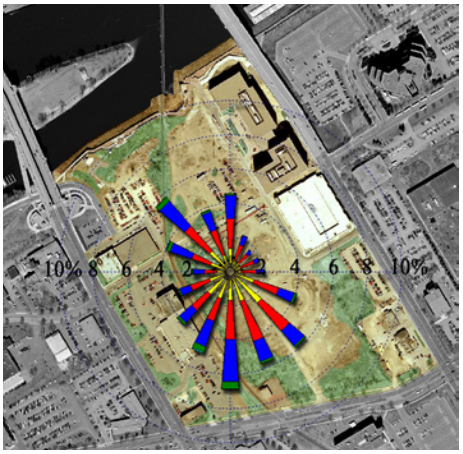


Figure 3.31i - October wind rose

October

The football season continues, which will continue to keep the site busy from week to week. The retail areas will be full of shoppers on non-game days, with the site being very alive on game days. The retractable roof will be open for all of the games, depending on rain.

Average temp: 40 - 59 degrees
Average Precip: 2.51 inches

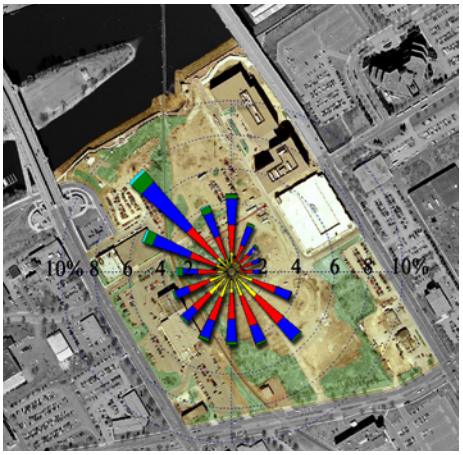


Figure 3.31j - November wind rose

November

With the football season half through, fans will continue to flock to the site to use the site as much as possible. The retractable roof will remain open for the majority of the games, closing only for snow or uncomfortably cold temperatures. Cool winds will most often come from the Northwest.

Average temp: 26 - 41 degrees
Average Precip: 2.09 inches

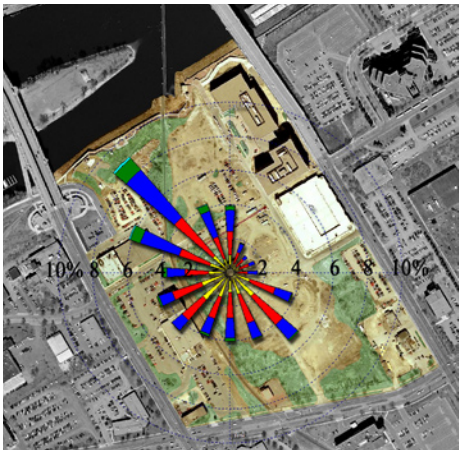


Figure 3.31k - December wind rose

December

The end of the regular season is in sight in December. With only a few weeks remaining and the Vikings in the playoff chase, the site will be a thriving center for retail and sports. The roof may still be open for some of the games, depending on snow and temperature. Cold winds usually come from the Northwest.

Average temp: 12 - 27 degrees
Average Precip: 1.04 inches

Zoning Districts

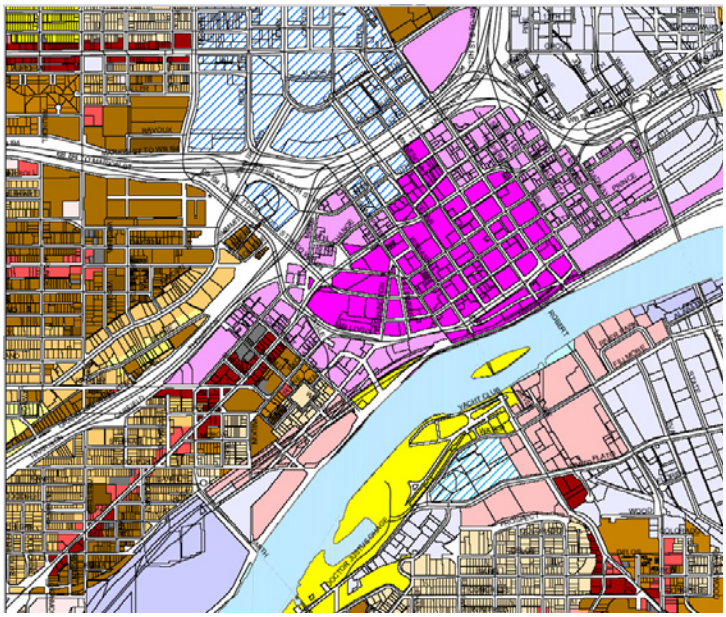


Figure 3.32a - Zoning Map

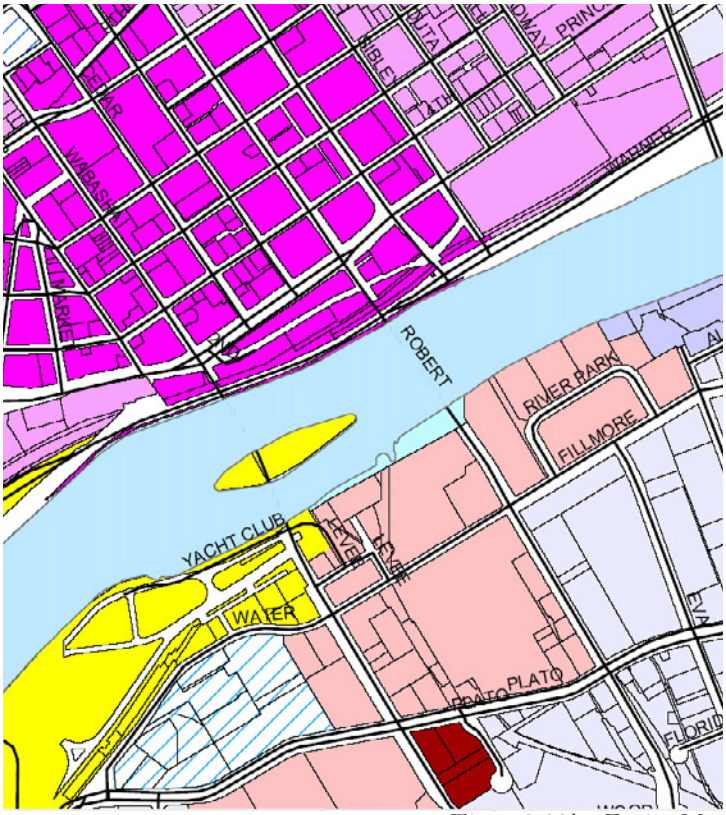


Figure 3.32b - Zoning Map

Legend

- R-LL - One-Family
- R-1 - One-Family
- R-2 - One-Family
- R-3 - One-Family
- R-4 - One-Family
- RT-1 - Two-Family
- RT-2 - Townhouse
- RM-1 - Multiple Family
- RM-2 - Multiple Family
- RM-3 - Multiple Family
- TN2
- OS-1 - Local Office-Service
- OS-2 General Office-Service District
- B-1 - Local Business
- B-2C - Community Business Converted
- B-2 - Community Business
- B-3 - General Business
- B-4 - Central Business
- B-5 - Central Business/Service
- I-1 - Industrial
- I-2 - Industrial
- I-3 - Industrial
- RCI-1
- PD - Planned Development
- P-1 - Parking
- CAAPCJ - Capitol Area Jurisdiction
- Water Features
- Right-of-Way

The area surrounding the site is currently zoned mostly for industrial and business land. The city may elect to change this area after the stadium is built to encourage more retail and restaurants to build near the site. Projects of this scale are often used as starting points for urban regeneration.

Land Use

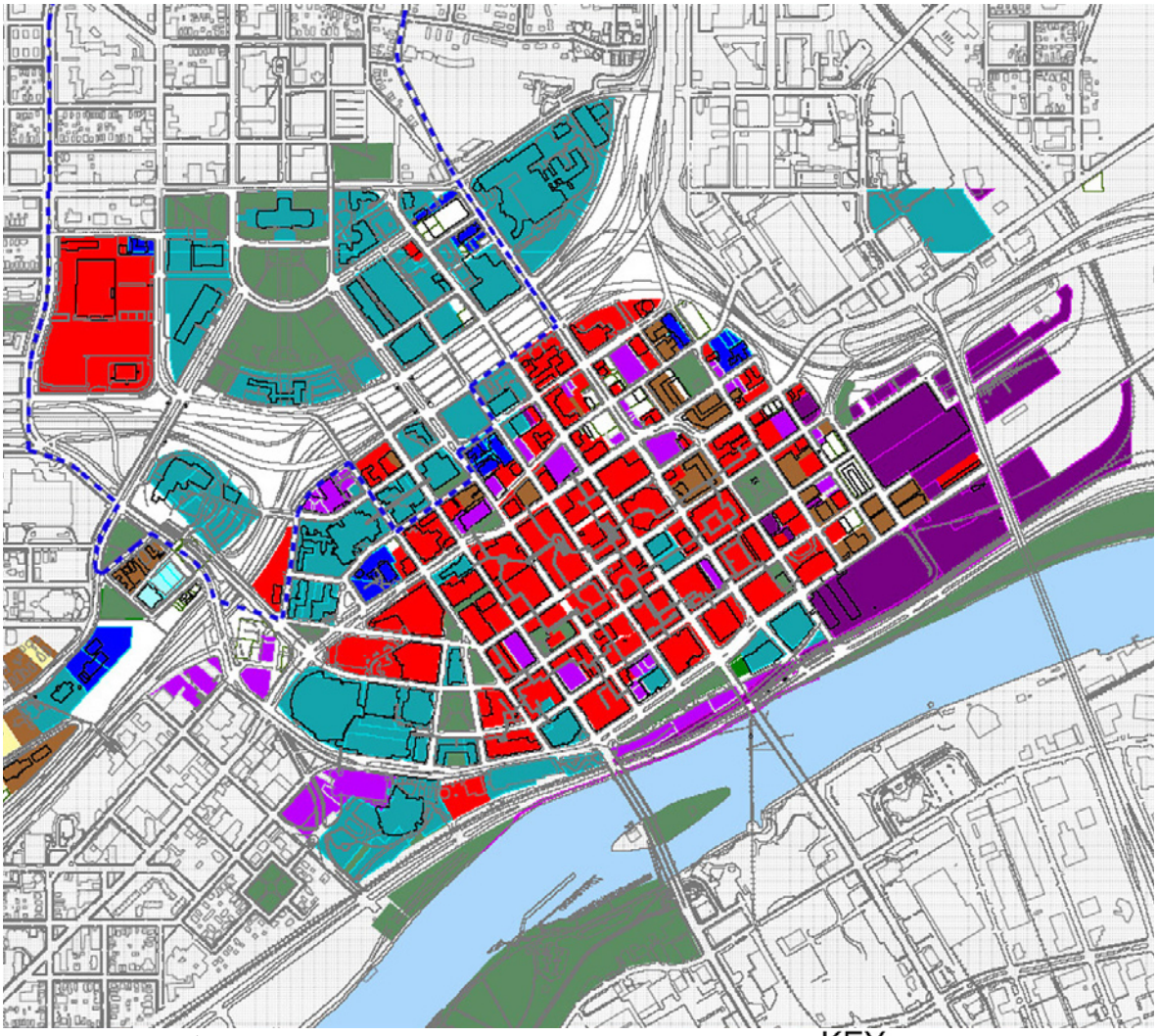


Figure 3.33 - Land Use Map

This graphic shows the land usage of the core of Saint Paul. The majority of space is allocated to commercial use. There is a large array of types of retail spaces within walking distance of the site. There are multiple restaurants, hotels and shopping facilities which should meet the needs of all residents of the area. The design of the stadium facility will add more retail spaces, creating a connection across the Mississippi River to the core of Saint Paul.

Existing Parking Locations

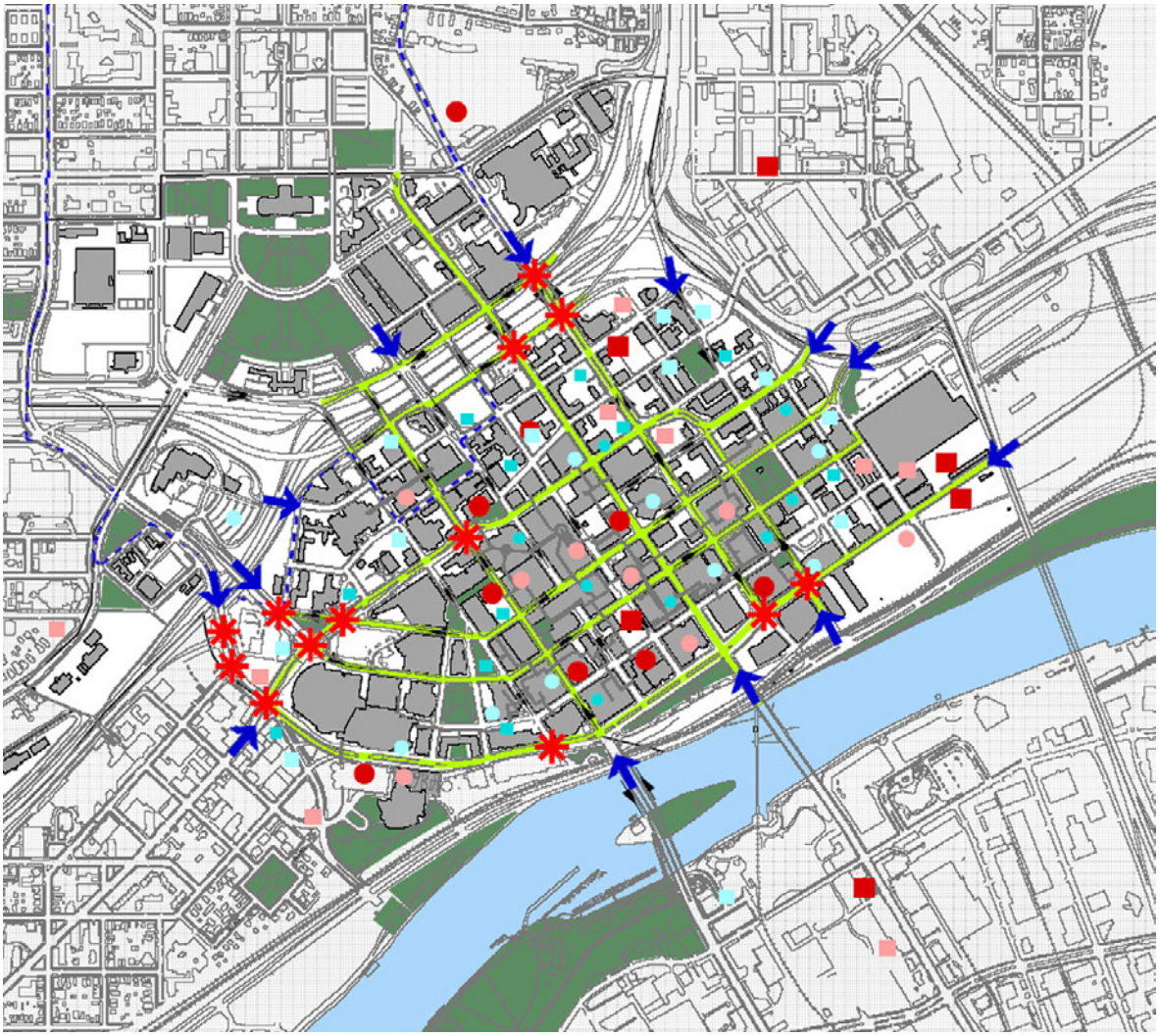


Figure 3.34 - Existing Parking Map

There are numerous parking lots and ramps near the site. The city of Saint Paul would most likely adapt the transportation system to make stops near many of these parking areas on games days. Using existing infrastructure will help to lower the overall cost of the project and will reduce the amount of resources that would otherwise be needed to construct parking facilities.

Public Transportation

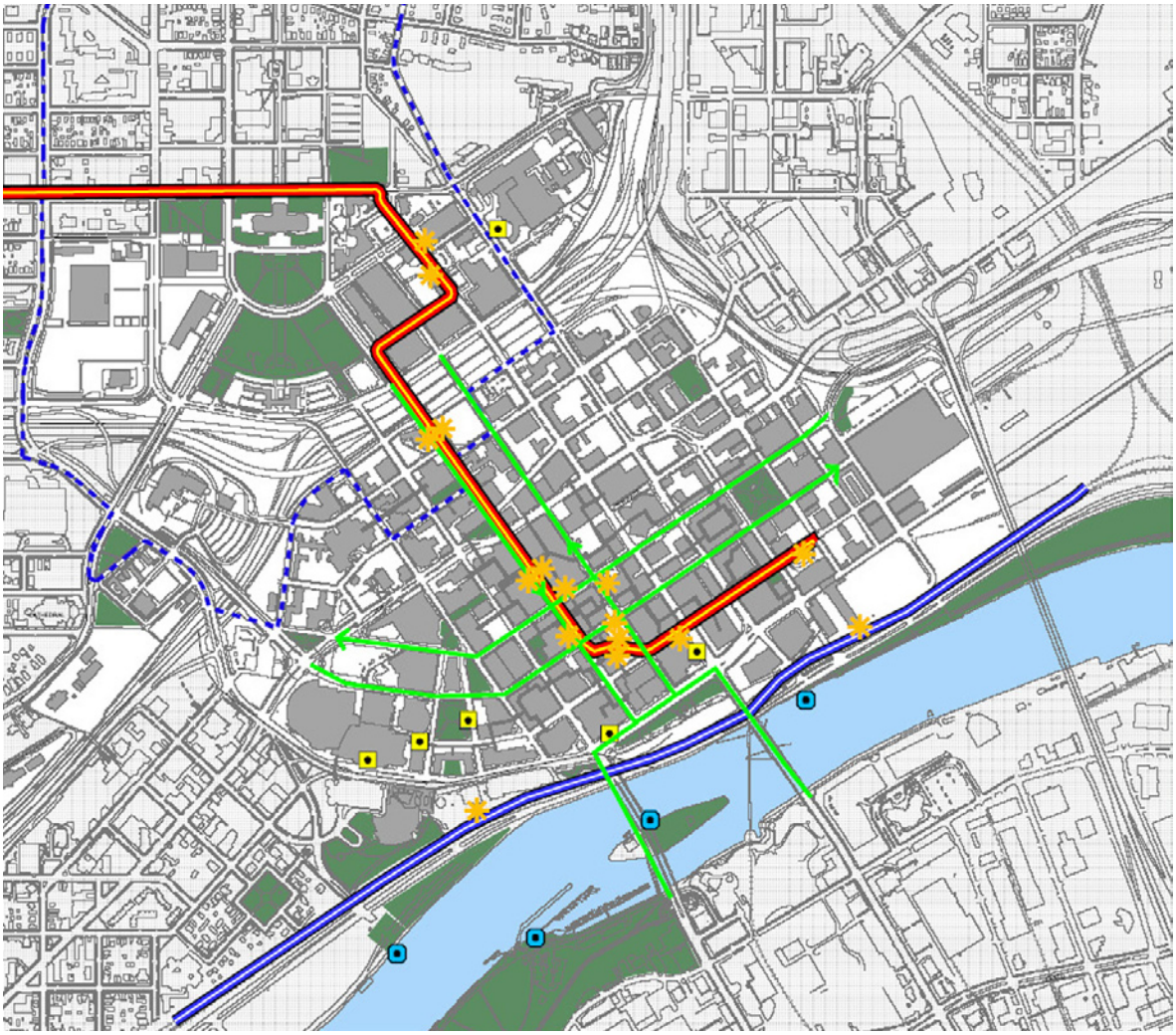


Figure 3.35 - Public Transit Map

This map shows the current and future public transportation routes. The cities of Minneapolis and Saint Paul how began a plan to connect the two major cities by way of a light rail train (LRT) and a high speed rail. These could be used as primary transportation to the stadium, which would in effect lessen pollution, traffic congestion and the need for parking. Also proposed are water taxi stops which would create an experience unique to this stadium.

Galleries & Culture

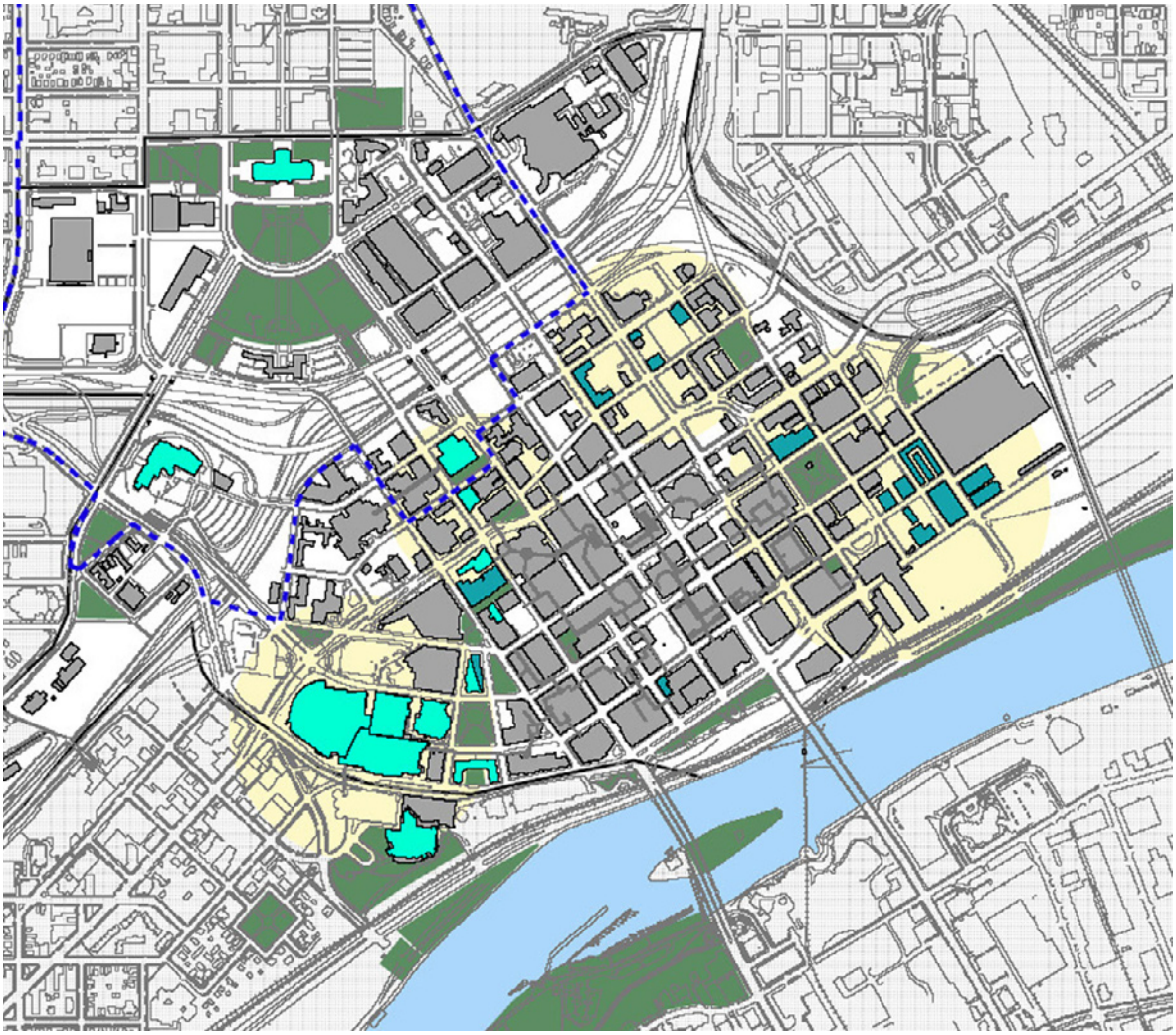


Figure 3.36 - Cultural Facilities & Galleries

Culture is an important asset to any thriving community. In order for any group to be successful, they must have great pride in themselves, their communities and their heritage. There are multiple locations for residents and visitors of Saint Paul to go and experience events that enrich their lives. Culture shapes communities and the built environment within it.

Plan For Proceeding

Research for this project will include case studies of past, present and future stadiums. Other areas of research will include:

- Seating Design
- Circulation Design
- Restaurant Design
- Field Design
- Code Requirements
- Parking Ramp Design

Through the use of case studies, knowledge which will be useful to the design of stadiums will be gained. Points of main interest that will be explored in these case studies include structural design, layout of spaces, building materials, sustainability (natural power), circulation and landscape design (including parking lots).

One major challenge in this project is to design in a way to incorporate this structure with its surroundings, both built and natural, thus making a new icon for the city of Saint Paul, while using the technology of today to enhance the building itself as well as the experience for the players and fans.

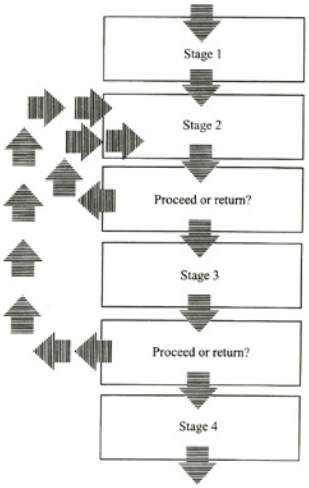


Figure 3.37 - Cyclical Stratefy

Cyclical Strategy

This design strategy allows feedback to loop back to a previous step. This provides the flexibility needed to handle different variations due to unfamiliarity of a project type. There will sometimes be two or more feedback loops nesting inside each other. The main problem in this strategy is the possibility of the designer being caught in an endless loop, which cannot be broken unless the pattern of the problem changes.

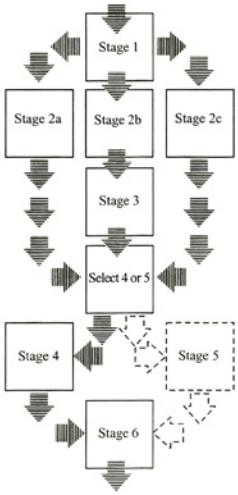


Figure 3.38 - Branching Stratefy

Branching Strategy

This strategy provides more flexibility than the cyclical strategy by adapting to unforeseen situations that may arise. Branching strategies are possible to use when design actions are completely independent of each other. Parallel stages can occur, which have the advantage of increasing the number of different areas a person can work on at one time. Alternative stages can also occur, which allow some adaptation of strategy according to the outcomes of previous stages.

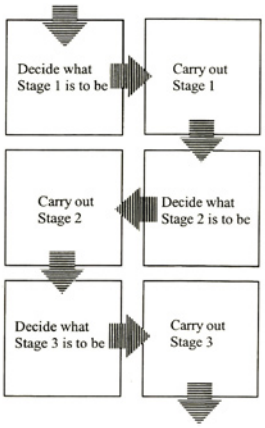


Figure 3.39- Adaptive Stratefy

Adaptive Strategy

This strategy is the best strategy to use on unfamiliar design problems. Adaptive strategies restrict the designer to one design action at a time. Each decision to be made is influenced by the outcome of the previous action. This strategy is regarded as the most intelligent because the search pattern is always being guided by the most current information available. The major disadvantage is the inability to predict or control design time.

Design Process Documentation

The knowledge gained through research and design exploration will be recorded and applied to the design of this project. I will keep a dated sketchbook of thoughts, plans and ideas. Documentation of this process will be through these sketches, AutoCAD as well as SketchUp models. This process will be further examined and explained during the spring semester.

Research

Sustainable Design

Environmental issues have **moved** into the **mainstream** of our **culture.**

-from The HOK Guidebook

Figure 4.1 - Natural creek

Buildings and construction contribute directly and indirectly to most of our environmental problems. Buildings consume enormous amounts of materials and generate even more waste. According to the Worldwatch Institute, buildings in the US alone consume 17 percent of the total freshwater, 25 percent of harvested wood and use 40 percent of the total energy flow.

Sustainable design in buildings and construction requires a holistic view of land, infrastructure and buildings in order to use materials, energy and water resources efficiently, improve the health of ecosystems and address health issues relating to the indoor environment (Mendler & Odell, 2000)

Sustainable Design
(Cont)

It is often assumed that designing and building in a sustainable manner will increase the upfront cost of a building. However, if more emphasis is place on designing one system to a higher standard, it will reduce the need for other systems. For example, increasing the expenditures on the building envelope and improved lighting can lead to reductions in the size and the cost of the mechanical systems.

Figure 4.2 - Maple trees

Designing in a sustainable manner leads to a number of economic benefits. It not only reduces operating and maintenance costs for the building, but will conserve energy, water and materials. Buildings that are environmentally friendly contribute to positive public relations. A single project, especially one of this scale, can open the eyes of the public to the world of sustainable design. As a result, public interest may grow, increasing the demand and technologies needed to continue to expand the area of sustainable design.

Sustainable design should be integrated in nearly every aspect of design. It begins with the site, taking into consideration existing vegetation, parking lot design, and everything in between. Simple tasks like encouraging the use of public transportation and carpooling can reduce pollution and the need for impervious parking area, which in essence helps to reduce runoff and site degradation.

Studying the sun angles and patterns on the site can reduce the need for energy consumption. Effectively employing passive solar heating and lighting can reduce operating and maintenance costs and can create a more comfortable indoor environment. The collection and reuse of gray water on the site for use in toilets and irrigation will reduce the waste of potable water on the site. It may be possible to nearly completely eliminate the need for irrigation if native species of plantings are used in the design.

A list of design criteria for sustainable design from *The HOK Guidebook to Sustainable Design* (Mendel & Odell, 2000) can be found in Appendix E.

Sustainability
represents a **balance** that
accommodates human needs without diminishing the
health and **productivity**
of **natural systems.**

-from The HOK Guidebook

Mendler & Odell gave a list of six goals for the environmental improvement of facilities. They are as follows:

Protect ecosystems and support restoration of natural systems

Promote the development of livable communities

Use resources efficiently, including energy, water, land and materials

Create healthy indoor environments

Move toward eliminating waste and pollution
- -in the production of materials used
- -in the construction of the project
- -in the use of the project
- -in the ultimate disposal of the building and its components

Move away from fossil fuels
- -to reduce the amount of fossil fuels
- -to increase the use of sustainable resources

(2000, p. 6)

Field Turf

The management of live grass on athletic fields presents an extraordinary challenge. Athletic fields are regularly damaged by intense activity and are expected to continuously look as good as artificial turf. TV exposure, demands of coaches, and high salaries of professional athletes all contribute to high expectations.

Artificial turf was extensively used in stadiums until about 10 years ago to reduce maintenance and increase the use of a venue. These synthetic surfaces of the past were usually a thin carpet supported by a shock pad. This type of synthetic turf was generally abrasive, hard, and created situations where "foot lock" occurred, contributing to player injuries.

Natural grass is a fragile surface for sports. It becomes hard and worn out, and therefore increases the potential for injuries. The surface is prone to inconsistencies from divots and bare spots. Grass requires time to regenerate after each use. The schedules for most fields do not allow the grass fields to repair themselves and thereby run the risk of creating dangerous conditions.

Inadequate light levels for vigorous turf growth is the key challenge associated with growing turf in enclosed and retractable dome stadiums. The light levels of closed stadiums are too low to maintain plant growth that can quickly recover from the damage caused by athletic events. As a solution, retractable-dome stadiums have been built. Even retractable dome stadiums have inadequate light levels for vigorous turf growth. Even with the roof open, light levels in these stadiums are less than half of natural sunlight because of shading from the side walls of the stadium.

Field Turf
(Cont)

There is nearly no maintenance needed for field turf compared to natural grass fields. The overall cost, including equipment, is around $4,000 per year. Good, natural grass fields require more than $30,000 per year on average, excluding resodding. High performance stadia fields take more than $100,000 per year in field maintenance.

Maintenance for field turf consists of:

Sweeping up litter, peanut shells, sunflower seeds, etc. from the playing field

Cross brushing the field turf to keep the fiber fib rillated evenly and the rubber filling in the artifi cial grass level and even

Washing down the field turf if your site experi ences extensive periods without rainfall

Treating stains on the turf fibers

Painting lines once per year by turf contractor

Field turf is dramatically different from traditional synthetic turf. The most striking difference is immediately obvious. Instead of a dense, abrasive rug, field turf's fiber surface is soft, silky. Players can slide, tackle and tumble on field turf's unique blend of specially treated Polyethylene fibers without fear of abrasions.

The real advantage of this infill is that you have a consistent surface all season long. The field looks remarkably like natural grass. It has a longer fiber and it has some variation in color and texture. It's not perfectly uniform like the old nylon products.

The rubber granules are a key component. Tire rubber is cryogenically frozen, shattered into smooth, clean, rounded particles, sized and shaped to stay "in suspension" with the sand, which is of a similar size, shape and weight. The sand and rubber are precision layered to guarantee uniformity, with an installation process that is also patented. The result: a stable, resilient, uniform, shock-absorbing surface.

Field Turf
(Cont)

One of the perceptions of artificial turf is that more injuries occur on a synthetic field than on a natural field, and while most experts say this is really a myth with no evidence to support it, others say that perception alone is reason enough to use a natural field.

Safety
Serious turf related injuries generally fall under two categories: rotation injuries to the legs and head to ground impact injuries. Turf burn is the primary minor injury related to turf. Field turf greatly reduces the risk of these injuries.

Leg injury
Because of the granular nature of the infill used in field turf, leg injuries due to a shoe or cleat binding during rotation are nearly eliminated. Granular rubber has a low degree of cohesiveness and therefore has little to no ability to lock or bind a shoe or cleat in place. As torsion is applied to the shoe or cleat, the rubber granules give way allowing the foot to release. This principle is also true for well-maintained natural grass, but as the grass surface begins to deteriorate, so does the turfs ability to give and prevent injury.

Head Injury
The granular rubber infill used in field turf will maintain a G-Max rating (measure of shock absorption) between 100 and 120, well below the allowable rating. Natural grass when properly maintained typically has a G-Max rating of 120 to 130. However, areas of a field that are in poor condition can have G-Max ratings ranging from 150 to 220, or more. The likelihood of head to ground impact injuries is greatly increased as the condition of the field deteriorates.

Turf Burn
Unlike its synthetic turf predecessor, field turf is relatively nonabrasive to the skin. Natural grass is also relatively nonabrasive, but again, as the field condition deteriorates; natural grass gives way to bare ground that is obviously much more abrasive.

Field Turf
(Cont)

Natural Turf

Advantages:

Aesthetically attractive

Surface that is neither exces sively hard nor soft for com fortable running

Less injurious to players who fall than most alterntive surfaces

If irrigated, it is a relatively cool surface in hot climates

Disadvantages:

Cannot be used in roofed stadia

Difficult to keep healthy even in partially covered stadia

Cannot survive the same intensity and frequency of punishment as artificial sur faces

Field turf replicates a natural grass surface but offers the durability and cost benefits of synthetic fields. Field turf is a safe alternative, resulting in a documented reduction of sports injuries. The sand and rubber infill system is the biggest technical development that the sport surfacing industry has seen in the last 25 years.

Economics

Consider a standard football/soccer field that measures between 90,000 and 95,000 square feet (s.f.) Historically, the cost to construct a GIS turf field with an under-drain system, and other miscellaneous required improvements, has been between $7.50 and $8.50 per s.f. or between $700,000 and $800,000. However, due to competition, mass production and design improvements these costs have fallen dramatically over the past year to approximately $5.50 per s.f. or around $500,000 per field.

- Construction of field $500,000
- Engineering, Surveying, Project Management, Inspection and Material Testing $55,000
- Total Cost to Construct Field $555,000

Reduced Maintenance Costs

Once the field turf is installed, it begins to offset the initial capital outlay as a result of reduced maintenance costs. The life of field turf is estimated to be between 10 and 15 years. By replacing natural grass with synthetic turf, the cost of field maintenance is reduced by eliminating watering, fertilizing, pest/weed control, re-seeding, mowing and striping. Field turf does require grooming, but instead of mowing the grass weekly or bi-weekly, synthetic turf needs only to be brushed every 4-6 weeks during periods of use. The cost for replacing the field turf will be considerably less than the cost to construct the initial field, as the drain system and other field improvements are already in place.

Space Allocations

Major Project Elements

Retail Facilities	95,650 sq. ft
Spectator Facilities	891,490 sq. ft
Team/Player Facilities	27,400 sq. ft
Administration Facilities	50,000 sq. ft
Press Facilities	9,300 sq. ft
Playing Field Facilities	117,600 sq. ft
Stadium Service Facilities	21,900 sq. ft
Miscellaneous Spaces	415,800 sq. ft
Total	**1,603,950 sq. ft**

Space Allocations

Retail/Restaurant Facilities

Retail Spaces	50,000 sq. ft
Restaurant Spaces	22,500 sq. ft
Movie Cinema	20,000 sq. ft
Public Toilet	3,150 sq. ft
Total	**95,650 sq. ft**

Spectator Facilities

Picnic Area	10,000 sq. ft
Ticket Booths	1,600 sq. ft
Turnstiles	4,000 sq. ft
Main Lobby	4,000 sq. ft
Fan Assistance Center	800 sq. ft
Hall of Fame	10,000 sq. ft
Sports Bar	12,000 sq. ft
Lower Level Seating	210,000 sq. ft
Upper Levels of Seating	210,000 sq. ft
Club Level Seating	70,000 sq. ft
Club Lounge	50,000 sq. ft
Stadium Club Restaurant	10,000 sq. ft
Private Suites	90,000 sq. ft
Party Suites	15,000 sq. ft
Owner's Suite	2,000 sq. ft
Concession Stands	8,000 sq. ft
Public Toilets	60,250 sq. ft
First Aid	4,800 sq. ft
Other needs include:	
Ramps	120,000 sq. ft
Elevators	1,040 sq. ft
Telephones	
Water fountains	
Total	**891,490 sq. ft**

Space Allocations
(cont)

Team/Player Facilities

Viking's Locker Room	6,000 sq. ft
Visitor's Locker Room	3,000 sq. ft
Gopher's Locker Room	4,500 sq. ft
Auxiliary Locker Room	2,500 sq. ft
Official's Locker Room	1,600 sq. ft
Weight/Exercise Room	2,500 sq. ft
Coach's Offices	1,800 sq. ft
Player Dining	1,200 sq. ft
Therapy Room	400 sq. ft
Physician's Office	500 sq. ft
Video Rooms	500 sq. ft
Media Rooms	400 sq. ft
Equipment Storage	500 sq. ft
Laundry Room	300 sq. ft
Family Room	1,400 sq. ft
Total	**27,000 sq. ft**

Administration Facilities

Total	**50,000 sq. ft**

Press Facilities

Television Broadcast	800 sq. ft
Press Box	4,000 sq. ft
Scoreboard Operating Booth	800 sq. ft
Sound Engineers Booth	300 sq. ft
Public Announcement Booth	250 sq. ft
Workroom	250 sq. ft
Press Dining	1,500 sq. ft
Equipment Closet	500 sq. ft
Toilet Rooms	400 sq. ft
Total	**8,800 sq. ft**

Space Allocations *(cont)*

Playing Field Facilities

Playing Field	108,600 sq. ft
Equipment Storage	1,000 sq. ft
Sideline Area	8,000 sq. ft
Total	**117,600 sq. ft**

Stadium Service Facilities

Security	1,000 sq. ft
Grounds Crew Storage	1,000 sq. ft
Grounds Crew's Area	2,000 sq. ft
Tenant Storage	1,500 sq. ft
Promotion Storage	2,000 sq. ft
Maintenance Shop	4,000 sq. ft
Concession Office Area	400 sq. ft
Concession Storage	8,000 sq. ft
Loading Dock	2,000 sq. ft
Total	**21,900 sq. ft**

Miscellaneous Space

Mechanical area – 10 % of total	118,800 sq. ft
Circulation area – 25 % of total	297,000 sq. ft
Total	**415,800 sq. ft**

Total for Stadium **1,603,950 sq. ft**

Retail & Restaurant Facilities

Retail Spaces

Quantity 30-50

Space Area 700-2,000 square feet each
(50,000-75,000 square feet total)

Description of Space The retail spaces

Furnishings & Equipment The furnishings needed depends on the type of retail space. Most will require such furnishings as tables, counters, chairs, racks and cash registers.

Design Criteria Should be located near the main entrances to ensure that they can be open on a daily basis. These are the functional areas that will attract residents to the site on non-event days.

Critical Success Factors The retail spaces should include an array of different shopping options to make the area attractive to all ranges of consumers. The retail portion of the design must remain open to the public during normal operating hours even while the stadium is not being used.

Retail & Restaurant Facilities

Restaurant Spaces

Quantity

10-20

Space Area

700-2,000 square feet each
(22,500 square feet total)

Description of Space

The restaurants in the facility will be an attraction for residents of Saint Paul and the surrounding area mostly during non-event days and evenings. There should be a wide range of food options for visitors to enjoy while shopping at the retail stores.

Furnishings & Equipment

The furnishings needed depends on the type of restaurant. Most will be furnished with tables, chairs, booths, counters, grills, ovens and cash registers.

Design Criteria

Spaces should be provided for both fast-food restaurants as well as family restaurants. This will give visitors options, hopefully fulfilling their desires.

Critical Success Factors

The restaurants must provide enough seating for patrons. Some of the restaurants may serve to spectators, so enough points of sale must be present to reduce the time people must wait in line.

Retail & Restaurant Facilities

Movie Cinema

Quantity

1

Space Area (sf)

20,000 square feet

Description of Space

The movie cinema will be used as a separate attraction from the stadium. The cimena will feature the latest titles in Hollywood productions. It will incorporate ten screening rooms into the design to attract a wide array of visitors. The cinema will be include ticket windows, lobby, concession stands, restrooms and a video arcade.

It may be possible to show a live closed circuit broadcast in one or several of the theaters. All of the Vikings home games for the last six years have been sold out, so this would be another way for fans to experience the Vikings.

Furnishings & Equipment

The movie cinema will be furnished with seating, movie projectors, sales counters and ticket stands.

Design Criteria

The cinema must pay attention to many of the same things as the stadium. Issues such as sight lines, restrooms and circulation are very important.

Critical Success Factors

The cinema will have to use current technology to keep pace with newly constructed cinemas. It should include state of the art projectors and sound systems, as well as effective seating arrangements to make for an enjoyable experience.

Retail & Restaurant Facilities

Public Restrooms

Quantity

3 men
3 women
(6 total)

Space Area

500 square feet for men
550 square feet for women
(3,150 square feet total)

Description of Space

Public restrooms are located on each level of the retail area. There will be one female and one male restroom per level.

Furnishings & Equipment

The restrooms will each be furnished with toilet partitions, mirrors, shelves and dispensers.

Design Criteria

The restrooms should be equipped with heat, general light and exhaust. All of the plumbing should be concealed within adjacent walls to make the system most efficient.

Critical Success Factors

The most important factor is ensuring enough restrooms are provided to avoid excessive lines.

Picnic Areas

Quantity

2

Space Area

5,000 square feet each
(10,000 square feet total)

Description of Space

The picnic area will be located around the exterior perimeter of the stadium. These areas will give fans the chance to gather around the site during both event and non-event times. It will be a secondary space to the tailgating area.

Furnishings & Equipment

The picnic area should be furnished with picnic tables and garbages to accommodate 500 spectators or more.

Design Criteria

The picnic areas should be located away from major entrances to prevent congestion. All picnic equipment should permanently secured and resistant to graffiti and other damage.

Critical Success Factors

In order for the picnic areas to be successful, they must most importantly be inviting and safe. They should have scenic views of the river and the city skyline and will be open for public use everyday.

Ticket Booths

Quantity

60 (15 per entrance)

Space Area

25 square feet each
400 square feet at each entrance
(1,600 square feet total)

Description of Space

Ticket booths are used throughout the year during the weeks when events are scheduled. They should be located at each entrance for convenience and should include:

-10 ticket windows
-5 will call ticket windows

Furnishings & Equipment

Ticket booths should be furnished with counters, cash drawers, computer consoles and ticket printers.

Design Criteria

The ticket booths should be distributed around the periphery of the stadium to prevent overcrowding and to help with crowd control. All ticket booths should have a minimum of two feet of counter space.

Critical Success Factors

The entrances of the stadium should be studied to predict which entrances serve the most pedestrians. The busiest entrances may need additional ticket windows to accommodate the larger number of spectators.

Turnstiles at Entrances

Quantity

100 (25 per entrance)

Space Area

40 square feet each
(4,000 square feet total)

Description of Space

The turnstiles are located at each of the public entrances. Spectators must pass through the turnstiles to enter the stadium. They will count the attendance of the game which is important information for the team.

Furnishings & Equipment

The only furnishing will be the turnstiles themselves and a chair or stool for the attendant.

Design Criteria

The turnstiles should be sheltered for inclement weather for the comfort of the spectators. There should be space to add additional turnstiles if needed to handle excessively large crowds.

Critical Success Factors

Turnstiles must get people into the stadium quickly and efficiently to reduce congestion at the entrances. The entrances and turnstile areas must allow people to quickly exit the facility in the case of emergencies.

Main Lobby

Quantity

2

Space Area

2,000 square feet each
(4,000 square feet total)

Description of Space

The lobbies will be the first area the majority of spectators will experience upon entering the building. The lobby should include the team shop, restrooms, fan assistance centers and restaurants. It should also allow access to the retail areas of the facility.

Furnishings & Equipment

The lobbies should be furnished with tables, waste receptacles and temporary booths.

Design Criteria

The lobbies should act as main intersections that direct spectators towards their seats or other areas of interest.

Critical Success Factors

The lobbies give the first impressions to many spectators. They must feel inviting and safe, while at the same time setting the mood of the place.

Fan Assistance Center

Quantity

1 per entrance
(4 total)

Space Area

200 square feet each
(800 square feet total)

Description of Space

Fan assistance and information centers are were fans can obtain directions, locate stadium services, request assistance and find other useful information.

Furnishings & Equipment

Each fan assistance center should be furnished with a desk, chairs and a computer.

Design Criteria

The assistance centers should be located near the entrances off of the main concourse.

Critical Success Factors

These spaces must be easy to locate for fans that are attending events at the facility for the first time.

Hall of Fame

Quantity

1

Space Area

10,000 square feet

Description of Space

The Hall of Fame will contain historic memorabilia as an attempt to tell the many stories behind the formation and growth of the Minnesota Vikings. The Hall of Fame should be accessible during regular hours of operation.

Furnishings & Equipment

The space should be completely furnished and finished. It should be furnished with television monitors and a complete sound system for a memorable experience. Numerous glass cases will be needed to hold the artifacts of football's past.

Design Criteria

The Hall of Fame should be accessible during both event and non-event days to allow the public enjoyment of the this amenity

Critical Success Factors

The Hall must be a well designed, functional part of the design that raises public interest. It must pay tribute to the players and heroic feats of the past and bring them to life.

Sports Bars

Quantity

2

Space Area

6,000 square feet each
(12,000 square feet total)

Description of Space

Each sports bar should be a minimum of 6,000 square feet, and should provide seating for 350 people. The sports bars should be open to the public during both event and non-event times. They should have their own restrooms incorporated into the design.

Furnishings & Equipment

The sports bars should be furnished with tables, chairs, television monitors and a complete sound system. The bar should be furnished with a bar counter, storage and stools. Other optional furnishings include pool tables, dart boards and other gaming equipment.

Design Criteria

The bars should be accessible during both event and non-event times. The Sports Bars do not necessarily need to have views of the field.

Critical Success Factors

The Sports Bars should convey the same excitement as the stadium during games. This goal can be helped by designing the bars with themes to raise team spirit.

Lower Level Seating

Quantity

30,000 seats

Space Area

7 square feet each
(210,000 square feet total)

Description of Space

Lower level seating will be located directly off of the main level concourse. This level will accommodate approximately 20 to 35 rows of seats. The first row of seats should be approximately 5 feet above the playing field. The lower level seats provide the most intimate seating options in the stadium. This is the only level of seating that wraps entirely around the field, provides intimate seating nearest the field and give the sense of a closed stadium.

Furnishings & Equipment

Self-raising armchair seats

Design Criteria

-Minimum sightline clearance of 2 ¼"
-Minimum riser tread width of 32"
-Riser height should be 7" minimum
-Maximum seats per row of 24
-Minimum seat width of 19"
-Wheelchair seating areas, consisting of 1% of lower level seating
-Handrails provided on all stairs
-Handrails at front row of every section

Critical Success Factors

The most critical factor for the seating is to insure that there are no unobstructed sightlines from any seat.

Spectator Facilities

Upper Levels of Seating

Quantity

30,000 seats

Space Area

7 square feet each
(210,000 square feet total)

Description of Space

Upper levels of seating will be located directly off of the fifth level concourse. This level will accommodate approximately 15 to 25 rows of seats. The upper levels of seats provide the most affordable seating options in the stadium. These seats provide good views of the entire field.

Furnishings & Equipment

Self-raising armchair seats

Design Criteria

-Minimum sightline clearance of 2 ¼"
-Minimum riser tread width of 32"
-Riser height should be 7" minimum to 22" maximum
-Maximum seats per row of 24
-Minimum seat width of 19"
-Wheelchair seating areas, consisting of 1% of upper levels of seating
-Handrails provided on all stairs
-Handrails at front row of every section

Critical Success Factors

The most critical factor for the seating arrangements is to insure that there are no unobstructed sightlines from any seat.

Club Level Seating

Quantity

10,000

Space Area

7 square feet each
(70,000 square feet total)

Description of Space

Club level seating is accessed through the third level concourse or club lounges. Elevators, escalators and stairs are used to reach this level through semi-private entrances on the street level. The club level should accommodate approximately 15 to 20 rows of seats. Club level seats are reserved for members of the club. Patrons of the club are an elite group whom have paid the proper dues and have been invited to become a member. The club seats are reserved seats which facilitates the formation of bonds between its members. This often enhances the excitement and participation in the game.

Furnishings & Equipment

Self-raising armchair seats

Design Criteria

-Minimum sightline clearance of 2 ¼"
-Minimum riser tread width of 32"
-Riser height should be 7" minimum
-Maximum seats per row of 24
-Minimum seat width of 21"
-Wheelchair seating areas, consisting of 1% of lower level seating
-Handrails provided on all stairs
-Handrails at front row of every section

Critical Success Factors

The most critical factor for the seating is to insure that there are no unobstructed sightlines from any seat.

Club Lounge

Quantity

2

Space Area

25,000 square feet each
(50,000 square feet total)

Description of Space

The Club Lounge is a private space for stadium club members to relax, eat and converse with other members. The lounge consists of a buffet, service area, a kitchen and bar support area. They will also have private rooms that can be rented on a per game basis.

Furnishings & Equipment

The lounge should be furnished with tables, chairs, couches and television monitors. The buffet area should be equipped with a buffet counter and a drink station, and should be positioned near the bar. The Kitchen should be equipped with counters, cabinets, stoves, ovens refrigerators and plenty of dry storage.

Design Criteria

The Club Lounge should have a semi-private entrance at the ground level, with elevators and escalators devoted to only club members and suite holders. The lounge does not require a view of the playing field, but it should have near immediate access to it.

Critical Success Factors

The Club Lounge must be perceived as a high-class area for an elite group of patrons. They pay extra dues to receive special treatment from the stadium and its staff.

Stadium Club Restaurant

Quantity	1
Space Area	10,000 square feet
Description of Space	The Club Restaurant should be located on the Club Level and will be open to club members and their guests only. The facility will feature an upscale bar area and tiered dining with both pre-game and game time seating available. It should be available for private functions on non-game days throughout the year.
Furnishings & Equipment	The restaurant should be furnished with tables, chairs
Design Criteria	Escalators and elevators should be available for convenient access to the restaurant. A good view of the field is a must. The restaurant should be supplied with its own restrooms.
Critical Success Factors	The restaurant should have a good view of the field. It should be perceived as a high-class area for an elite group of patrons. Club members pay extra dues to receive access to these areas.

Private Suites

Quantity

150

Space Area

600 square feet each
(90,000 square feet total)

Description of Space

Suites are the most personal space in the stadium for spectators. The renters of these spaces are the only occupants allowed within them. Each suite opens to the field and includes a bar area and individual toilets. Private suites are provided with their own semi-private entrance to the stadium at street level.

Furnishings & Equipment

Each suite should be furnished with chairs, tables and televisions. They should have individually controlled HVAC, sound and lighting which is controlled by the occupants. The bar/kitchenette area should include space for cabinets, sink and refrigerator. Each suite should contain its own water closet.

Design Criteria

The suites should have a semi-private entrance at the ground level, with elevators and escalators devoted to only club members and suite holders. Each suite should have movable glazing on the field facade to give a open feeling. The suite connects to the seating area directly in front of the suite which have 12 seats on average.

Critical Success Factors

-Unobstructed view of field
-Feeling of privacy

Party Suites

Quantity

10

Space Area

1,000-1,500 square feet each
(10,000-15,000 square feet total)

Description of Space

Party suites are similar to private suites, but are larger to accommodate more occupants. The renters of these spaces and their guests are the only occupants allowed within them. Each suite opens to the field and includes a bar area and individual toilets. Private suites are provided with their own semi-private entrance to the stadium at street level.

Furnishings & Equipment

Each suite should be furnished with chairs, tables and televisions. They should have individually controlled HVAC, sound and lighting which is controlled by the occupants. The bar/kitchenette area should include space for cabinets, sink and refrigerator. Each suite should contain its own water closet.

Design Criteria

The suites should have a semi-private entrance at the ground level, with elevators and escalators devoted to only club members and suite holders. Each suite should have movable glazing on the field facade to give a open feeling. The suite connects to the seating area directly in front of the suite which have 24 seats on average.

Critical Success Factors

-Unobstructed view of field
-Feeling of privacy

Owner's Suites

Quantity

2

Space Area

1,000 square feet each
(2,000 square feet total)

Description of Space

These suites are designed to be occupied by the owners of the teams. They are usually placed at or near the 50 yards line to give the owners one of the best seats in the house.

Furnishings & Equipment

Each suite should be furnished with chairs, tables and televisions. They should have individually controlled HVAC, sound and lighting which is controlled by the occupants. The bar/kitchenette area should include space for cabinets, sink and refrigerator. Each suite should contain its own water closet.

Design Criteria

The suites should have a semi-private entrance at the ground level, with elevators and escalators devoted to only club members and suite holders. Each suite should have movable glazing on the field facade to give a open feeling. The suite connects to the seating area directly in front of the suite which have 24 seats on average.

Critical Success Factors

-Unobstructed view of field
-Feeling of privacy

Concession Stands

Quantity

50

Space Area

1,500 to 2,000 square feet each
(6,500-8,000 square feet total)

Description of Space

Concession stands should be located on all concourse levels and appropriately distributed. Approximately seven lineal feet of counter space should be provided for every 500 spectators.

70,000/500 = 140 x 7 lineal feet = 980
Approximately 12% should be allotted to novelty
980 x 25% = 118 lineal feet for novelty
980 x 75% = 862 lineal feet for concession

Furnishings & Equipment

Concession stands should be furnished with water, drainage and electrical services, as well as equipment such as cookers, warmers, beverage dispensers, freezers and coolers.

Design Criteria

Concession stands should be located on all concourse levels to provide foods and drinks to spectators during the events.

Critical Success Factors

The concession stands must have enough points of sale to avoid long lines.

Public Restrooms

Quantity

30 men
35 women
10 family

Space Area

800 square feet for men
950 square feet for women
400 square feet for family
(60,250 square feet total)

Description of Space

Public toilets are located and evenly distributed along all concourse levels. The spectator ratio should be based on 60% male and 40% female attendance. Fixtures should be provided based on the following:

Lavatories: 1 per 300 men = 140
1 per 200 women = 140

Water closets: 1 per 300 men = 140
1 per 80 women = 350

Urinals: 1 per 125 men = 336

Furnishings & Equipment

-Toilet partitions, mirrors, shelves and dispensers

Design Criteria

All restrooms should be equipped with heat, general light and exhaust, all plumbing should be concealed within adjacent walls to be most efficient.

Critical Success Factors

Ensuring enough restrooms are provided to avoid excessively long lines.

First Aid Station

Quantity	Minimum of one per level
Space Area	1,200 square feet each (4,800 square feet total)
Description of Space	The first-aid station is used for emergency medical treatments. Each should contain space for a physician and nurse. Also included in the requirements are a waiting area, toilet and storage space.
Furnishings & Equipment	Each station should be furnished with chairs, desks, beds, counter space, cabinets and a table.
Design Criteria	These areas should be located within reasonable distance to an elevator to provide quick routes to ambulances.
Critical Success Factors	-must be a clean, sterile environment

Ramps

Quantity

3

Space Area

40,000 square feet each
(120,000 square feet total)

Description of Space

Ramps should be provided to give spectators easy accessibility to all concourse levels.

Furnishings & Equipment

Each ramp should be furnished with handrails and slip resistant finishes.

Design Criteria

The ramps should have a maximum slope of 10%. They should be between 18-25 feet in width.

Critical Success Factors

Ramps are used not only to get spectators to their seats, but in the case of an emergency, they are used to evacuate people in a same manner.

Elevators

Quantity

10 passenger elevators
2 freight elevators

Space Area

80 square feet for passenger elevators
120 square feet for freight elevators
(1,040 square feet total)

Description of Space

Elevators should be provided to give spectators and staff easy accessibility to all levels of the stadium.

Furnishings & Equipment

Design Criteria

The passenger elevators should be 8'x10'.
The freight elevators should be 10'x12'.

Critical Success Factors

The elevators must be placed carefully to ensure they are available to the correct groups within the stadium.

Team/Player Facilities

Vikings' Locker Room

Quantity	1
Space Area	6,000 square foot
Description of Space	The Vikings' locker room is the largest of the four locker rooms. It should include the showers, toilets, whirlpools and player lockers.
Furnishings & Equipment	The locker areas should be furnished with player lockers, lounge chairs, couches, televisions, and tables.
Design Criteria	The locker room should have 60 built in lockers measuring 36" wide and 36" deep. It should have a direct link to the playing field through a sheltered entrance and should be located on the same level as the field.
Critical Success Factors	The locker room should be designed to enhance team unity. This aspect may be affected by the shape of the room, with an oval being the strongest shape. The locker area should be easily accessible from the player parking area.

Team/Player Facilities

Visitor's Locker Room

Quantity 1

Space Area 3,000 square feet

Description of Space The visitor's locker room should accommodate 60 lockers. It should include the showers, toilets, whirlpools and player lockers.

Furnishings & Equipment The locker areas should be furnished with player lockers, lounge chairs, couches, televisions, and tables.

Design Criteria The locker room should have 60 built in lockers measuring 30" wide and 30" deep. It should have a direct link to the playing field through a sheltered entrance and should be located on the same level as the field.

Critical Success Factors The locker area should be easily accessible from the player parking area.

Team/Player Facilities

Gophers' Locker Room

Quantity 1

Space Area 4,500 square feet

Description of Space The Gophers' locker room should accommodate 50 lockers. It should include the showers, toilets, whirlpools and player lockers.

Furnishings & Equipment The locker areas should be furnished with player lockers, lounge chairs, couches, televisions, and tables.

Design Criteria The locker room should have 50 built in lockers measuring 30" wide and 30" deep. It should have a direct link to the playing field through a sheltered entrance and should be located on the same level as the field.

Critical Success Factors The locker area should be easily accessible from the player parking area.

Auxiliary Locker Room

Quantity	1
Space Area	2,500 square feet
Description of Space	The auxiliary locker room should accommodate 50 lockers. It should include the showers, toilets, whirlpools and player lockers.
Furnishings & Equipment	The locker areas should be furnished with player lockers, lounge chairs, couches, televisions, and tables.
Design Criteria	The locker room should have 50 built in lockers measuring 30" wide and 30" deep. It should have a direct link to the playing field through a sheltered entrance and should be located on the same level as the field.
Critical Success Factors	The locker area should be easily accessible from the player parking area.

Official's Locker Room

Quantity	1
Space Area	1,600
Description of Space	The official's locker room should accommodate 8 lockers. It should include the showers, toilets and player lockers.
Furnishings & Equipment	The locker areas should be furnished with player lockers, lounge chairs, couches, televisions, and tables.
Design Criteria	The locker room should have 8 built in lockers measuring 30" wide and 24" deep. It should have a direct link to the playing field through a sheltered entrance and should be located on the same level as the field.
Critical Success Factors	The locker area should be easily accessible from the official's parking area.

Team/Player Facilities

Weight/Exercise Rooms

Quantity 1

Space Area 3,000 square feet

Description of Space The weight/exercise room is the players workout facility. This area will be used by the players throughout the year, and should be easily accessed from the player locker rooms.

Furnishings & Equipment This space should be furnished with a large array of exercise equipment. Included should be free-weight machines, Nautilus (cable) machines, treadmills and other miscellaneous equipment.

Design Criteria The weight/exercise room should be located near the locker rooms and should be on the same level. It should be accessible from the player parking area and should be open to the players year round.

Critical Success Factors

Coach's Offices

Quantity

12

Space Area

150 square feet each
(1800 square feet total)

Description of Space

The coach's offices should be similar for all of the different locker rooms. It is a place for the head coach to have meetings with players and assistant coaches.

Furnishings & Equipment

The offices should be furnished with a desk, chairs and cabinets.

Design Criteria

These offices should be located on the field level directly adjacent to the player's locker room. There should be a close connection with the player parking area.

Critical Success Factors

Player Dining

Quantity 1

Space Area 1,000 square feet

Description of Space The player dining area is a cafeteria style space that serves a variety of food to the players before and after games.

Furnishings & Equipment The dining area should be furnished with tables, chairs and a buffet style counter.

Design Criteria The dining area is a little used space in the facility. It will only be used as a place for the players to sit and eat, so it is not a main area for concern for design.

Critical Success Factors

Therapy Area

Quantity 1

Space Area 400 square feet

Description of Space The therapy areas are where players are taken for injury recuperation.

Furnishings & Equipment The therapy area should be furnished with chairs, cabinetry, massage tables, hydro-therapy tubs.

Design Criteria The therapy rooms should be located on the field level near the player locker room. The hydro-therapy tubs should each be in a separate space.

Critical Success Factors

Physician's Area

Quantity 1

Space Area 500 square feet

Description of Space The physician's room is where player that have experienced an injury are taken for examination. The area should be made up of several small rooms in the case of several injured players.

Furnishings & Equipment The physician's area should be furnished with physician's tables, chairs and cabinetry.

Design Criteria The physician's room should be located on the field level, and should be near the players locker rooms, the therapy area and the X-ray room.

Critical Success Factors

Video Room

Quantity 2

Space Area 250 square feet each
(500 square feet total)

Description of Space The video rooms are used for studying film. They should be large enough for 20 people to occupy at one time. There are usually 2 video rooms to enable the offense and defense to study film simultaneously.

Furnishings & Equipment These rooms should be furnished with chairs with swing-arm desks, projectors, and screens.

Design Criteria The video rooms often have a theater style seating arrangements with a sloping floor to maximize sightlines.

Critical Success Factors

Media Room

Quantity 2

Space Area 200 square feet each
(400 square feet total)

Description of Space The media rooms are used after every game to interview players and coaches. Two media rooms are usually provided to represent the two teams. These rooms are usually designed to hold 30-40 media personnel.

Furnishings & Equipment The media rooms should be furnished with tables, chairs and banner holders.

Design Criteria There should be a built in platform at the front of the room for tables to be set up on. This will allow better views for the press.

Critical Success Factors

Equipment Storage

Quantity 1

Space Area 500 square feet

Description of Space This will be a storage room for equipment that will be used before and during games.

Furnishings & Equipment The storage room should be furnished with shelving.

Design Criteria The equipment storage should be on the field level, and should be accessible from the field and the player locker rooms.

Critical Success Factors

Laundry Facility

Quantity 1

Space Area 300 square feet

Description of Space The laundry room will provide the team with an in-house facility to wash equipment. The room should be should be large enough to accommodate commercial washers and dryers.

Furnishings & Equipment The laundry room should be equipped with commercial washer & dryers, shelving and counters.

Design Criteria This area should be located near the player locker area.

Critical Success Factors

Family Room

Quantity

2

Space Area

700 square feet each
(1400 square feet total)

Description of Space

This room is used by the families of the players and coaches while waiting after the game. It should be a comfortable area for gathering. One room should be provided for each team.

Furnishings & Equipment

The family room should be furnished with couches, chairs and televisions.

Design Criteria

The family room should be located on the field level near the player locker areas.

Critical Success Factors

Administration Facility

Quantity

Entrance Lobby
Executive Offices
Stadium Operations
Marketing Department
Conference Rooms
Finance/Personnel Department
Public Relations Department
Audio/Video Rooms
Restrooms
Lunch/Break Room

Space Area

50,000 square feet

Description of Space

The administration area should be designed as part of the stadium. It will house the offices of the many different employees needed to run the franchise and the stadium facility.

Furnishings & Equipment

The facility should be fully furnished furnished. The furnishings and equipment needed depend on the individual space.

Design Criteria

The administration facility should have its own private entrance. The administration should be incorporated into the stadium design.

Critical Success Factors

The administration spaces contain the workings of the entire facility. It must be a technologically advanced building to keep up with the speed of business.

Press Facilities

Television Broadcast Booth

Quantity 2

Space Area 400 square feet
(800 square feet total)

Description of Space The broadcast booths are the areas where national television commentary is recorded.

Furnishings & Equipment The booths will include chairs, counters, television monitors, television cameras and acoustical treatments.

Design Criteria The broadcast booths should be approximately 25'x20'. There needs to be a view to the field and hook-ups to the closed circuit and network television.

Critical Success Factors Unobstructed view of the field.

Press Box

Quantity 1

Space Area 4,000 square feet

Description of Space The press box is where radio and newspaper personalities view the game and give commentary.

Furnishings & Equipment The press box should be furnished with chairs and counters.

Design Criteria The press box should be three levels of tiered seating overlooking the field. They are often located on the suite level near the corner of the stadium. Enough seating and space should be provided for 250 occupants.

Critical Success Factors Unobstructed views of the field.

Scoreboard Operating Booth

Quantity	1
Space Area	800 square feet
Description of Space	The scoreboard operators booth is where the control boards for the scoreboard are housed. This booth is responsible for sending replays, keeping the time and scores and broadcasting sponsors. It should include an office, control room and storage space.
Furnishings & Equipment	The booth should be furnished with the control board, television monitors, chairs, desks and storage.
Design Criteria	
Critical Success Factors	Should have a clear view of the scoreboard.

Sound Engineers Booth

Quantity	1
Space Area	300 square feet
Description of Space	The sound engineers booth will contain the controls for the sound system in the stadium. It controls the play-by-play, music and public address systems.
Furnishings & Equipment	The booth should be furnished with chairs, tables, and television systems.
Design Criteria	The sound engineers booth should be located in the same area as the scoreboard operators booth.
Critical Success Factors	

Public Address Booth

Quantity 1

Space Area 250 square feet

Description of Space The public address area is where the stadium announcer calls the action of the game. It should provide space for the announcer(s) and assistants.

Furnishings & Equipment The booth should be furnished with chairs, counters, television monitors and A/V capabilities.

Design Criteria

Critical Success Factors Unobstructed view of the field.

Workroom

Quantity 1

Space Area 250 square feet

Description of Space The workroom provides spaces near the press box and television broadcast booth for statisticians.

Furnishings & Equipment The workroom should be furnished with chairs, counters, television monitors, computers and storage.

Design Criteria The area should be near the press box and television broadcast booth.

Critical Success Factors

Press Facilities

Press Dining

Quantity 1

Space Area 1,500 square feet

Description of Space The press dining area provides the press box and broadcast booths a place to eat. It will also bring food and beverages to the press in the boxes and booths.

Furnishings & Equipment This area should be furnished with tables, chairs and a buffet style counter.

Design Criteria The press dining should be located on the press box level and should be near the press box.

Critical Success Factors

Equipment Storage

Quantity 1

Space Area 500 square feet

Description of Space The storage area should provide adequate space for the televisions, microphones and cables used in the press box.

Furnishings & Equipment The equipment storage should be furnished with shelving.

Design Criteria The storage should be located on the press box level near the press box and broadcast booths.

Critical Success Factors

Toilet Rooms

Quantity 1 men's
1 women's

Space Area 200 square feet
(400 square feet total)

Description of Space Men's and women's toilet facilities should be provided for the press personnel.

Furnishings & Equipment The toilet rooms should be furnished with mirrors, shelves dispensers and toilet partitions.

Design Criteria

Critical Success Factors

Playing Field Facilities

Playing Field (Main Event Space)

Quantity 1

Space Area 108,600 square feet

Description of Space The playing field is where all of the events take place. These include professional and collegiate football games, as well as professional soccer.

Furnishings & Equipment The furnishings depend completely on the event.

Design Criteria The event space should be designed with little excessive space other than the field itself. This will bring fans closer to the field, giving a more intimate feeling.

Critical Success Factors The space must have the ability to change based on the event. This facility should be able to host football games, soccer games, concerts and numerous other events.

Equipment Storage

Quantity 1

Space Area 1,000 square feet

Description of Space The equipment storage area should be provided for all the equipment needed on the sidelines during the games. This includes benches, tables, water coolers, exercise bicycles and fans.

Furnishings & Equipment

Design Criteria The equipment storage should be located directly off of the field for convenience.

Critical Success Factors The storage must be large enough to hold all the neccessary equipment for gameday activities.

Home & Visitor's Sideline Areas

Quantity 2

Space Area 4,000 square feet each
(8,000 square feet total)

Description of Space The sideline areas are the team's personal area.

Furnishings & Equipment The sidelines should be furnished with benches, tables, fans, exercise biles and anything else necessary for the coaches and athletes.

Design Criteria The sideline area must be marked out, and may have direct access to the locker areas.

Critical Success Factors Must follow NFL regulations for size.

Stadium Service Facilities

Security

Quantity 1

Space Area 1,000 square feet

Description of Space The security area should have office and storage space for permanent security personnel. The office should serve as the command post during game days. Included should be toilets and detention rooms.

Furnishings & Equipment The security area should be furnished with tables, desks, chairs and security monitors.

Design Criteria The security office should be located on the service level and should be accessible through non-public areas.

Critical Success Factors

Grounds Crew Lockers

Quantity 1

Space Area 1,000 square feet

Description of Space The grounds crew lockers give the field maintenance personnel a place to leave their belongings between and during shifts. This area should include toilet rooms and showers for the crew.

Furnishings & Equipment The lockers should be furnished with tables, chairs and shower and toilet facilities.

Design Criteria The grounds crew lockers should be located on field level and access to the loading docks and service elevators should be provided.

Critical Success Factors

Grounds Crew Storage

Quantity 1

Space Area 2,000 square feet

Description of Space The grounds crew storage is used to store all of the equipment needed to maintain the stadium.

Furnishings & Equipment The storage should be furnished with cabinets and shelving.

Design Criteria The storage should be located on the field level. It should have access to the loading docks and freight elevators.

Critical Success Factors

Tenant Storage

Quantity 1

Space Area 1,500 square feet

Description of Space Tenant storage should provide general storage for the facility.

Furnishings & Equipment The tenant storage should be furnished with storage cabinets and shelving.

Design Criteria The storage should be located on the field level. It should have access to the loading docks and freight elevators.

Critical Success Factors

Promotion Storage

Quantity 1

Space Area 2,000 square feet

Description of Space This storage provides space for promotional materials. This will hold banners, signs and other promotional items used on game days.

Furnishings & Equipment The tenant storage should be furnished with storage cabinets and shelving.

Design Criteria The storage should be located on the field level. It should have access to the loading docks and freight elevators.

Critical Success Factors

Stadium Service Facilities

Maintenance Shop

Quantity 1

Space Area 4,000 square feet

Description of Space This space should be provided for the general maintenance of the facility. It should include a shop area and a vehicle repair area. The area must be large enough to provide space for mechanical, plumbing and electrical repair.

Furnishings & Equipment The maintenance area should be an unfinished space furnished with cabinetry and shelving.

Design Criteria The storage should be located on the field level. It should have access to the loading docks and freight elevators.

Critical Success Factors

Concessions Office

Quantity 1

Space Area 400 square feet

Description of Space The concessions office is where supplies are ordered to ensure a full stock of food and novelty items for the concession stands on game days.

Furnishings & Equipment The offices should be furnished with desks, chairs and file cabinets.

Design Criteria The concessions office should be on the field level and should be located near the loading dock areas to receive shipping orders.

Critical Success Factors

Concession Storage

Quantity 1

Space Area 8,000 square feet

Description of Space The concession storage area will be a storage area for all of the concessions needed for game days. It should include dry storage as well as cold storage for perishable items.

Furnishings & Equipment The storage areas should be furnished with shelving and cabinets.

Design Criteria The storage area should be located on the field level directly adjacent to the loading docks and the concessions office.

Critical Success Factors

Stadium Service Facilities

Loading Docks

Quantity 1

Space Area 2,000 square feet

Description of Space There should be two separate areas. Some of the loading docks are used to receive incoming shipments of supplies and others are used to dispose of waste.

Furnishings & Equipment The loading docks should be unfurnished.

Design Criteria The loading docks should be located on the field level of the stadium. They should be adjacent to the concessions office and the storage are

Critical Success Factors

Case Studies

Metrodome

Tenants: Minnesota Vikings
1982 - Current
Minnesota Twins
1982 – Current
U of Minnesota Gophers (NCAA)

Architect: Skidmore, Owens & Merrill LLP

Location: Minneapolis, Minnesota

Facts

Capacity:	64,000
Cost:	$68 million
Population Base:	2.2 million
Construction Date:	1982
Playing Surface:	Field Turf
Suites:	113
Club Level Seats:	0
On-Site Parking:	500

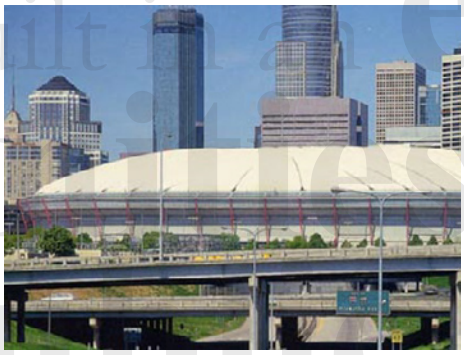
Relevance:

The Metrodome is a poor facility to host professional sports. Playing in the Metrodome, the Vikings rank at or near the bottom of the league in every major stadium revenue category.

The teflon-coated fiberglass roof has torn on four separate occasions, partially or completely deflating on three of those occasions. The tears were do to ice on the pneumatic structure, which could not support the weight.

The Metrodome does give the Vikings an advantage that is often referred to as the 12th man; noise. The Metrodome is one of the loudest stadiums in the nation, which prevents visiting teams from effectively communicating with each other. This aspect of the Metrodome will be investigated and included in the new design.

Figures 6.1 to 6.4



"The Metrodome was built in an **era** when **communities** thought it was a better use of **public funds** to build an affordable, efficient **multi-purpose** stadium for several sports."

- ESPN Analyst Jim Caple

Ford Field

Tenants: Detroit Lions
2002 - Current

Architect: Smith Group

Location: Detroit, Michigan

Facts

Capacity:	65,000
Cost:	$300 million
Population Base:	5 million
Construction Date:	2002
Playing Surface:	Field Turf
Suites:	140
Club Level Seats:	7,000
On-Site Parking:	unknown

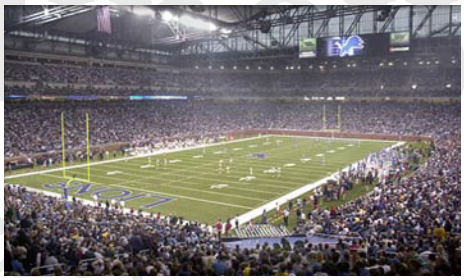
Relevance:

Ford Field holds 65,000 spectators and has a fixed roof supported by two 18ft-wide concrete columns. A structural-steel supported permanent dome was chosen to cover the facility because of Detroit's cold and harsh winter weather.

One of the unique aspects of Ford Field is that the entire south wall of the stadium is made up of two shelled-out J.L. Hudson's warehouses. The 80-year-old buildings have been renovated to include 140 luxury suites on three levels facing the playing field, along with other uses like retail, restaurants and possibly a hotel. On the south entrance of Ford Field is a six story glass atrium. Fans receive tremendous views of the downtown Detroit's skyline through the atrium. This also allows natural light to pierce the facade and enter the stadium.

The stadium is designed and used as a multi-used building. Concerts and other events such as the 2009 NCAA Final Four, the Detroit Football Classic and trade shows. Ford Field has also been chosen to host the Super Bowl XL in 2006.

Figures 6.5 to 6.8



I **want** to **stand** on the **50-yard** line and **know** that I'm **in** the city of **Detroit.**

-Vice Chairman William Clay Ford, Jr

Lambeau Field

Tenants: Green Bay Packers
1957 – Current

Architect: Somerville Inc.
Ellerbe Becket (Renovation)

Location: Green Bay, Wisconsin

Facts

Capacity:	71,000
Cost:	$960,000 (Original) $295 million (Renovation)
Population Base:	1.3 million
Construction Date:	1957 200-2003 (Renovation)
Playing Surface:	Natural Grass
Suites:	167
Club Level Seats:	6,260
On-Site Parking:	4,900

Relevance:

Lambeau Field has been home to some of the most important and historic games in NFL history including the first NFL Championship game and the famous "Ice Bowl" of 1967 when the temperature dipped to 13 degrees below zero.

Lambeau Field has so much history, the team and city felt it better to renovate rather than build something new. The project took 32 months and cost $295 million. The renovation included a new fan concourse and atrium and new facilities for the team including a new locker room, new administrative offices and a new operations facility.

-Packers President & CEO Bob Harlan

The atrium is a five story addition which includes a 25,000 square foot Packer Hall of Fame, corporate meeting or event facilities for 25 to 1,200 people, seven eating option and a larger pro shop. 12,000 seats were also added to the top of the stadium so that more fans could see, hear and feel the intensity of the Green Bay Packers.

Lambeau's atrium and its many attractions create an 'entertainment district' at the legendary stadium, a concept at venues like Camden Yards in Baltimore and Jacob's Field in Cleveland.

Figures 6.9 to 6.12

"It's really **more** than I hoped it would be. It just **shows** the **tradition** of this **franchise**."

-Packers President & CEO Bob Harlan

Soldier Field

Tenants: Chicago Bears
1971 – Current
Chicago Fire (Professional Soccer)
1998 - Current

Architect: Wood & Zapata
2002-2003 Renovation

Location: Chicago, Illinois

Facts

Capacity:	63,000
Renovation Cost:	$365 million
Population Base:	10 million
Construction Date:	1924
Playing Surface:	Natural Grass
Suites:	133
Club Level Seats:	8,600
On-Site Parking:	8,000

Relevance:
Soldier Field was first built in 1928 and was named for the Doughboys who fought in World War I. The historic colonnades and South Wall remained untouched. The historic Chicago landmark is open to the public, much like the memorials in Washington DC, to offer beautiful views of the City of Chicago and the Lakefront year-round. The new stadium design allows visitors access to the colonnades 365 days a year, unlocking a piece of Soldier Field's original tribute that had been unfinished for 80 years.

The architects designed the new stadium bowl to highly contrast the historic Soldier Field. This design decision has been the center of much controversy both in Chicago and the architecture community. While the exterior design stirred up a controversy, the interior is undeniably amazing. A jury of 10 distinguished construction professionals chose the new Soldier Field as Midwest Construction Magazine's overall Project of the Year. "There's not a bad seat in the house."

The sparkling new stadium features a three-level Cadillac Club lounge, a Bears' Ring of Honor throughout the mezzanine level, a Bears Den gallery depicting historical events from Soldier Field's past and an open-air courtyard.

Figures 6.13 to 6.16

"Clients need to be **less fearful** of **provoking** criticism. It is inherently aggressive to move things forward. Those with the **courage** to do so should not be surprised if they become targets of others' **aggression** in return."

- Bears President & CEO Ted Phillips

Qwest Field

Tenants: Seattle Seahawks
2002 - Current
Seattle Sounders (Soccer)
2002 - Current

Architect: Ellerbe Becket

Location: Seattle, Washington

Facts

Capacity:	67,000
Cost:	$450 million
Population Base:	2.5 million
Construction Date:	2002
Playing Surface:	Natural Grass
Suites:	82
Club Level Seats:	7,000
On-Site Parking:	2,000

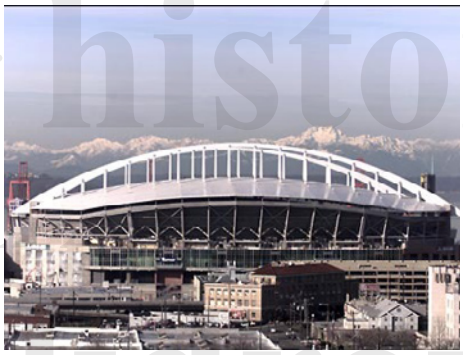
Relevance:

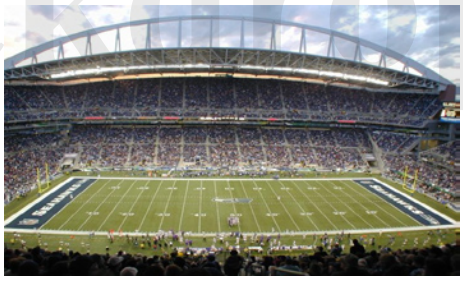
Qwest Field is located immediately south of Seattle's downtown in the Pioneer Square neighborhood (on the former site of the Kingdome). The open-air facility is configured in a horseshoe shape that is open at the north end.

Qwest Field has a field turf playing surface, one of the most common surfaces in the NFL. It features space for 3,000 bleacher seats, also referred to as the "Hawk's Nest". Qwest Field is the first stadium to offer luxury suites behind the north endzone to give fans another thrilling experience. One of the most unique features of the stadium is the overhanging roof design and rainbow tri-chord trusses that rise 260 feet above the playing surface. The roof covers 20 percent of the seating, keeping many seats dry during inclement weather, a common occurrence in the Northwest.

The building is constructed of cast-in-place concrete, pre-cast concrete, steel and concrete masonry units. The color scheme and appearance tie together the historic Pioneer Square neighborhood and Safeco Field, the Seattle Mariner's ball park. The state now has a venue for major events like the Super Bowl, World Cup, Final Four tournaments, concerts and the Olympics.

Figures 6.17 to 6.20





Set just south of **historic** Pioneer Square, against the **backdrop** of **snow-capped mountains** and glistening Puget Sound, Qwest Field is **unlike any other** stadium in the world.

-Seahawks Ceo Tod Leiweke

Heinz Field

Tenants: Pittsburgh Steelers
2001 - Current
Univ. of Pittsburgh Panthers
2001 - Current

Architect: HOK Lobb

Location: Pittsburgh, Pennsylvania

Facts

Capacity:	65,000
Cost:	$230 million
Population Base:	2.2 million
Construction Date:	2001
Playing Surface:	Natural Grass
Suites:	117
Club Level Seats:	6,600
On-Site Parking:	unknown

Relevance:

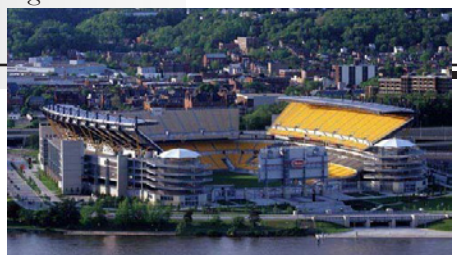
Heinz Field was built in Pittsburgh on a site similar to that of the Saint Paul site. The site is on the bank of the Allegheny River. HOK Lobb designed a successful connection with the river. It is an active space many times of the day. This stadium has an open end design that gives the occupants a great view of the cityscape, especially at night.

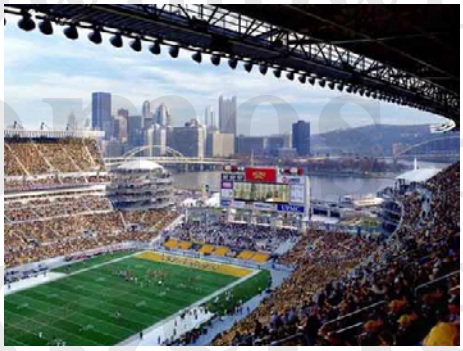
Reflecting Pittsburgh's steel legacy, steel is a primary building material in Heinz field. The majority of the steel is silvery grey in color, except for the large gold-painted 'quad pods' which support the upper deck.

Large masonry anchors Heinz Field, echoing the heavy stone bases of Pittsburgh's downtown landmarks and bridges, such as the City-County Building and the Allegheny County Court House.

The two-tiered stadium offers more intimacy than many NFL venues, with natural grass, great sight lines and a wide-open view of the football action set against the beautiful backdrop of downtown Pittsburgh. There is no such thing as a bad seat in this football-oriented stadium which was obviously designed to take football from a game to an experience.

Figures 6.21 to 6.24





The **open** **south end** of the stadium **creates** a **connection** between the **stadium** and **downtown;** the city **becomes** **part** of the **game day** **experience.**

-HOK Lobb

Paul Brown Stadium

Tenants: Cincinnati Bengals
2000 – Current

Architect: NBBJ

Location: Cincinnati, Ohio

Facts

Capacity:	67,000
Cost:	$400 million
Population Base:	1 million
Construction Date:	2000
Playing Surface:	Field Turf
Suites:	117
Club Level Seats:	7,620
On-Site Parking:	5,000

Relevance:
Paul Brown Stadium was clearly designed with its context in mind. Located between the river and the highway, adjacent to the 1856 Roebling suspension bridge, the new stadium is not a only part of the city. The building engages the city, enhances its surroundings and has become the feature element in Cinncinnati's rapidly changing skyline. Paul Brown Stadium has become a prominent icon for Cincinnati.

Paul Brown Stadium is revered as one of the premier facilities in the NFL. The design placed the majority of the seats (70%) along the sidelines, providing close-to-the-action sightlines and eliminating undesirable corner seats. The upper level luxury boxes and low tiered end zone seats also provide remarkable views of the field. The stadium's asymmetrical, open-ended design offers views of the downtown skyline and the riverfront.

The most striking element of the stadium is it's cantilevered steel-structured roof, which is clad with a coated woven fiberglass fabric that covers the upper deck. This canopy diffuses light rather than blocking it, and the dual curves embrace the structure, further enhancing the sense of intimacy for the fans.

Figures 6.25 to 6.28

The architects **clad** the exposed steel structure in a **variety** of exterior skins, such as anodized **stainless steel**, precast concrete, and **glass**, which they consistently arranged in **horizontal lines** to give the building a finish that deftly **dissipates** its scale.

-NBBJ Architect Dan Meis

Lincoln Financial Field

Tenants: Philadelphia Eagles
2003 - Current
Temple University

Architect: NBBJ Sport

Location: Philadelphia, Pennsylvania

Facts

Capacity:	68,500
Cost:	$320 million
Population Base:	2.1 million
Construction Date:	2003
Playing Surface:	Natural Grass
Suites:	172
Club Level Seats:	11,000
On-Site Parking:	Unknown

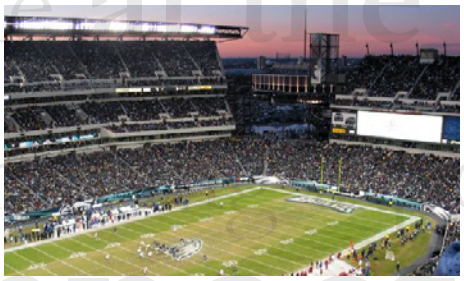
Relevance:

Nearly two-thirds of the seats are located on the sidelines, and are 60 feet from the field. Two three tier grandstands of seats are located on both sides of the gridiron. Two tier sections of seats are located beyond the endzones. The stadium features three open plaza corners for views of the city and into the stadium.

The exterior of the stadium has a pair of wing-like coverings over the upper deck. These wings form some protection from the elements for some fans and serve to focus stadium noise back towards the field, enhancing the game experience.

The 65,000-seat stadium incorporates three open corner plazas with views into and out of the seating bowl, an entertainment building, sports bar, a team store, and signature tower containing an "Eagles Nest Bar" with views into the stadium and to down-town Philadelphia

Figures 6.29 to 6.32



A **dramatic** new venue such as this can **play** a major **role** in **enhancing** the city's **profile** while **at the same time** having a positive **economic impact**. In all we're **conceivably** talking about **hosting** **30-50** major **events** a **year.**

-Eagles president Joe Banner

Minute Maid Park

Tenants: Houston Astros
2000 - Current

Architect: HOK Sport

Location: Houston, Texas

Facts

Capacity:	40,950
Cost:	$250 million
Population Base:	4.1 million
Construction Date:	2000
Playing Surface:	Natural Grass
Suites:	60
Club Level Seats:	4,776
On-Site Parking:	unknown

Relevance:

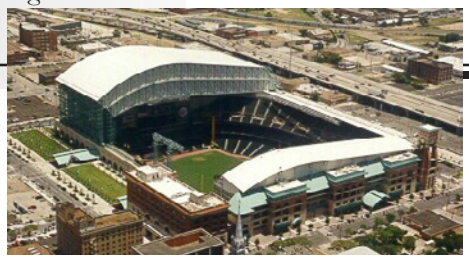
The railroad created Houston. Flourishing trade established a base of wealth and culture, an infrastructure of banks, a port and railheads. By 1910, railroads constituted the city's largest industry. In 1911, Union Station - already key to the rail industry's growth and influence - was redesigned and reopened.

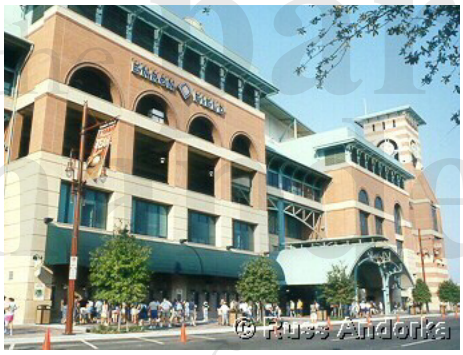
Team officials note that approximately 60 percent of fans enter Minute Maid Park via Union Station. Union Station's lobby features The Shed, the Official Astros Team Store and a café. Walk-up or booked Minute Maid Park tours, offered year-round, also begin in the Union Station lobby.

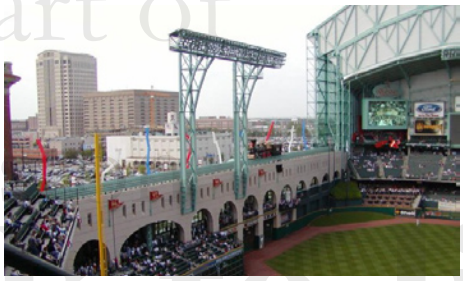
The second and third floors comprise the Conference Center, open 365 days a year and providing a wide array of meeting rooms that can provide businesses and organizations with state-of-the-art facilities. Nestled in different areas of the ballpark are additional meeting rooms and areas that provide the perfect atmosphere for a meeting or luncheon.

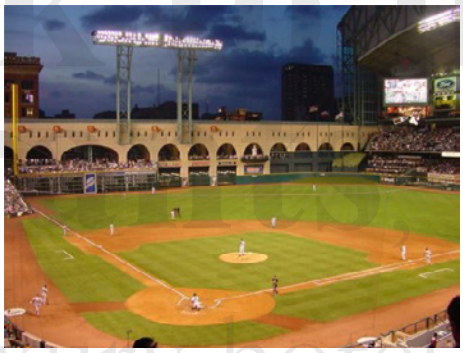
The Houston Astros executive offices comprise the fourth and fifth floors. The sixth floor features the Roof Deck and Club House at Union Station, where private groups of up to 100 can enjoy the game an incredible view of the Houston skyline.

Figures 6.33 to 6.36









The **best** thing about the **park** is that it is **single-handedly** bringing a rough part of **downtown** Houston **back to life**. Like magic, **restaurants**, condos and a new luxury hotel have all **sprung up** around the park.

-KFWB Ballpark Expedition

Miller Park

Tenants: Milwaukee Brewers
2001 - Current

Architect: NBBJ Architects

Location: Milwaukee, Wisconsin

Facts

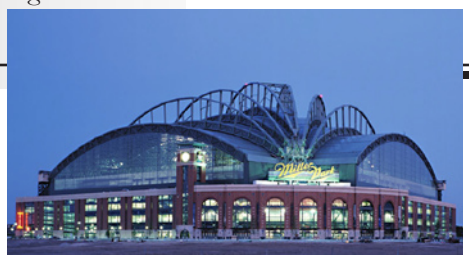
Capacity:	42,500
Cost:	$400 million
Population Base:	1 million
Construction Date:	2003
Playing Surface:	Natural Grass
Suites:	75
Club Level Seats:	3,000
On-Site Parking:	12,000

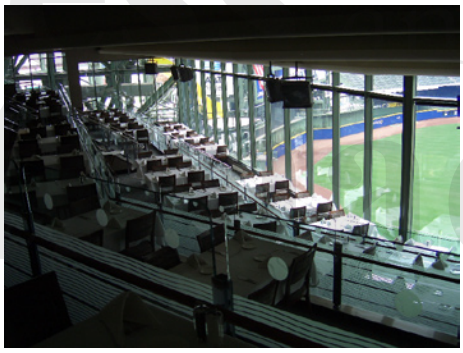
Relevance:

Miller Park balances the finest traditions of ballpark design with the proven technology. Miller Park has many unique features. The main feature being the retractable roof. The 12,000 ton, seven panel roof has a unique fan shape design. The roof can open or close in ten minutes, and sits 175 feet above second base. Miller Park has no air conditioning, but an air circulation system keeps the ballpark thirty degrees above the outside temperature when the roof is closed.

Open year-round, the left field "Hot Corner" is anchored by Friday's Front Row Sports Grill, featuring a great view of the field, the Brewers Fan Zone souvenir shop and the Walls of Honor exhibit recognizing the Negro Leagues, the All-American Girls Professional Baseball League and Wisconsin-born Major Leaguers.

Figures 6.37 to 6.40





The **lacy** quality of the **steel** and the expansive **glass panels** give the building a surprising **lightness** and **intimacy.**

-NBBJ Architect Dan Meis

T.S.A.-Cardinals Stadium

Tenants: Arizona Cardinals
Opening in 2006

Architect: Peter Eisenman & HOK Sport

Location: Glendale, Arizona

Facts

Capacity:	63,000 to 73,000
Cost:	$370.6 million
Population Base:	3.3 million
Construction Date:	2006
Playing Surface:	Natural Grass
Suites:	88
Club Level Seats:	7,400
On-Site Parking:	16,000

Relevance:

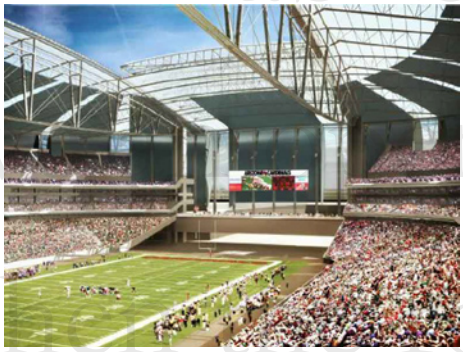
Cardinals Stadium is currently under construction and is scheduled to open in 2006. They design features both a retractable, fabric-covered roof and a field that has the ability to move outside of the stadium to allow the grass to absorb more sunlight.

Roll-out natural grass playing fields have been designed and built in Europe and Asia, but this will be the first of its kind in America. The field slides out of the building on a 234 ' x 400' tray. The idea of moving the field outside of the stadium offers a whole new opportunity of possibilities in the design.

The retractable roof is composed of two large panels that will open along the axis of the field. An open roof will allow fans to take advantage of Arizona's world famous climate.

The construction of the stadium will provide an additional 3500 jobs to the area, and will add $400 million to the local economy.

Figures 6.41 to 6.44



The **basic form** of the design takes its cue from a **barrel cactus...** the translucent **"Bird-Air"** fabric roof will allow the stadium to have an open, **airy feel** even when the roof is closed.

-Architect Peter Eisenman

Design Process & Final Design

Design Development & Final Design

It is unfortunate that the time allotted for our thesis project passes in what seems like the blink of an eye. In this time I was unable to go into more depth about many of the topics talked about in this program. The decision was made to leave these portions in this final document for underclassmen. These topics will remain as both idea generators and challenges to any who choose to design a stadium.

The final product that was reached through this program and the design process is a strong one. In my mind, it interacts with visitors to the site, the citizens of Saint Paul and the city itself. The dynamic design of the stadium are unlike anything seen throughout the research and design process. I hope you enjoy it as much as I did.

Design Development & Final Design

(Cont)

Figure 8.1 - Site

Figure 8.2 - Site showing views out from the site & traffic to the site

Design Development & Final Design
(Cont)

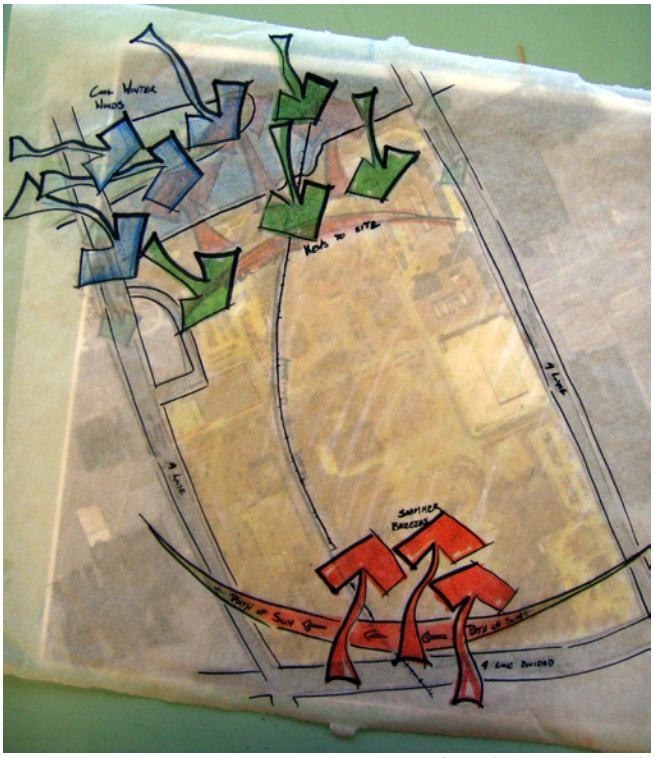


Figure 8.3 - Site showing sun path, wind paths & views to the site

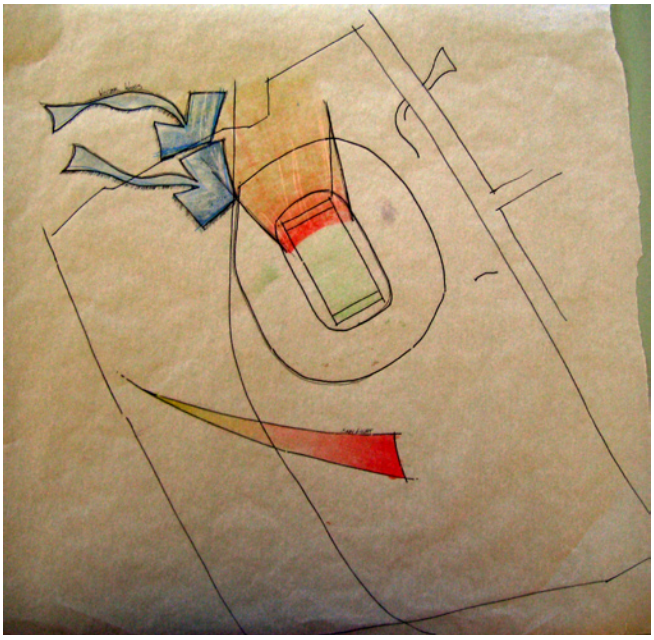


Figure 8.4 - Initial reaction to views, sun path & wind paths

The initial reaction to the site factors was to open up the northern end of the stadium to allow for great views of the Saint Paul skyline and the riverside park. The reaction to the path of the sun was to create an opening in the south corner of the building to allow the sunlight to penetrate deep into the playing area.

Design Development & Final Design
(Cont)

The most preferred seats in a football stadium are those along the sidelines. The design of this stadium ended up with nearly 70% of the seats along the sidelines. Seats were placed behind the endzones to reach the number of needed seats. These areas will also be in the lower ticket cost bracket, allowing more people a chance to attend games.

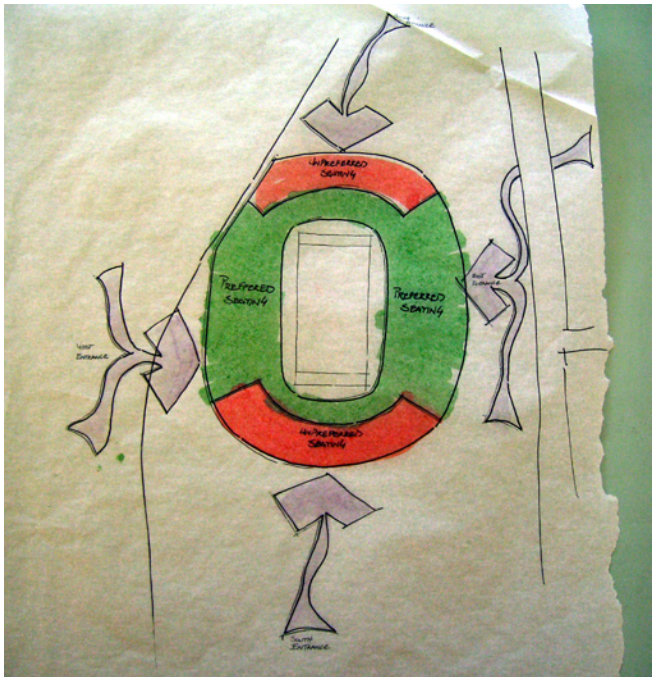


Figure 8.5 - Preferred vs. less preferred seating & possible entrance points

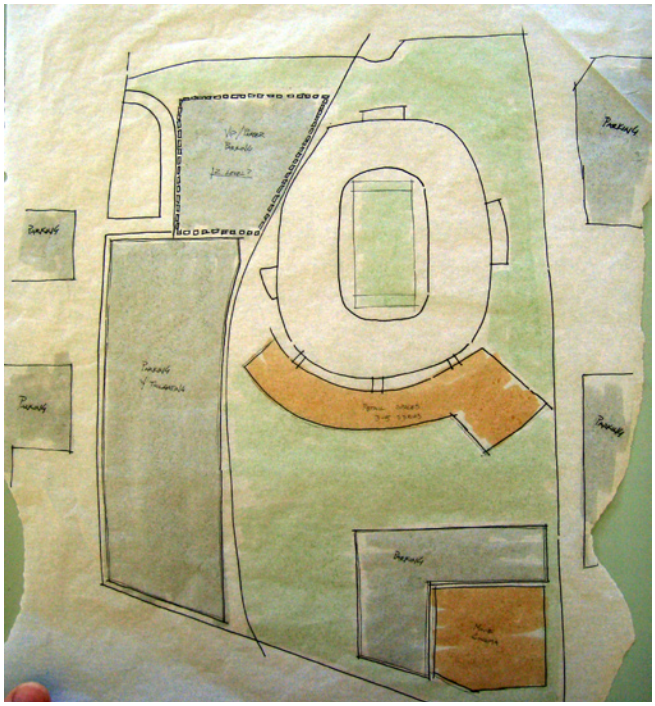


Figure 8.6 - First idea for site layout

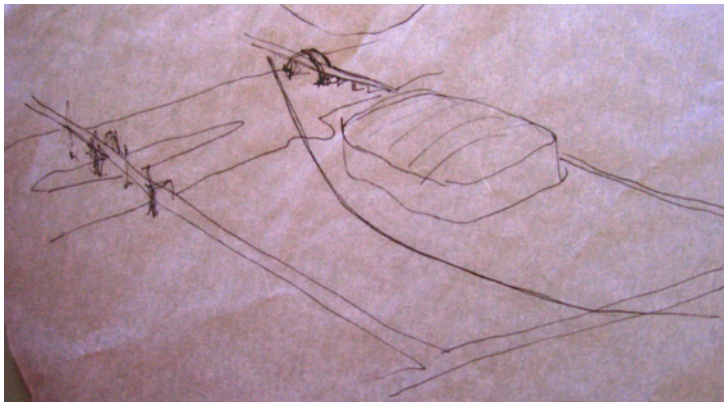


Figure 8.7 - Sketch of site

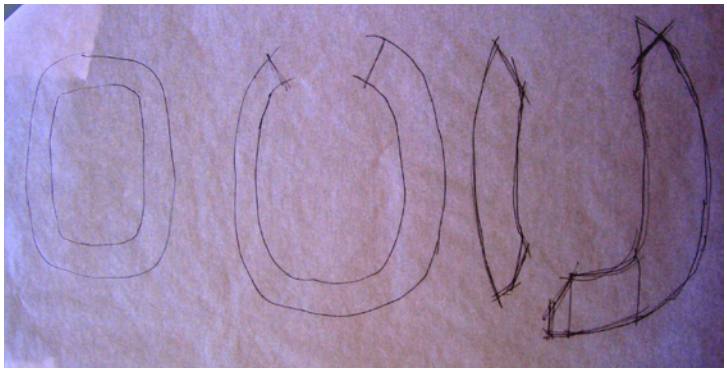


Figure 8.8 - Openings in seating bowl

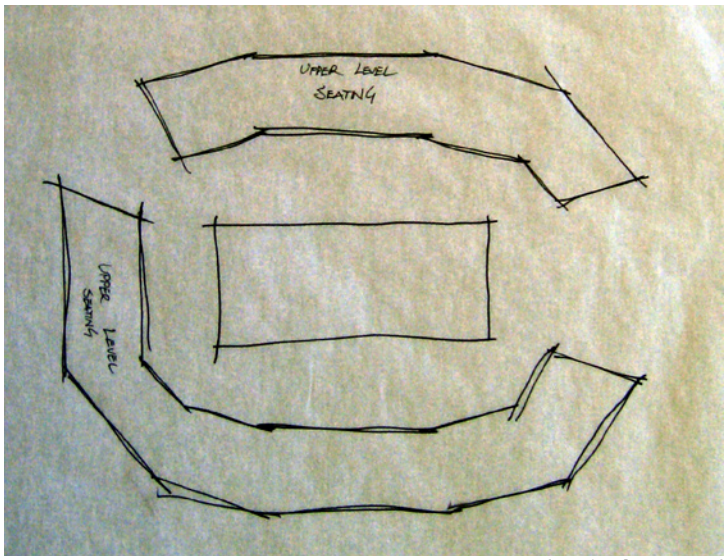


Figure 8.9 - Further development of seating bowl

Figure 8.11 is a sketch showing a section of the building. This building has an asymmetrical design. The west side of the stadium has lower level seating, three stories of suites and an upper level seating deck. The east side has lower level seating, club level seating, the broadcast booth, suites and a smaller upper level seating deck. This aids in visitors always knowing where they are. They will be able to better orientate themselves because of the asymmetrical design and the connection to the outdoors via the glass wall and transparent roof.

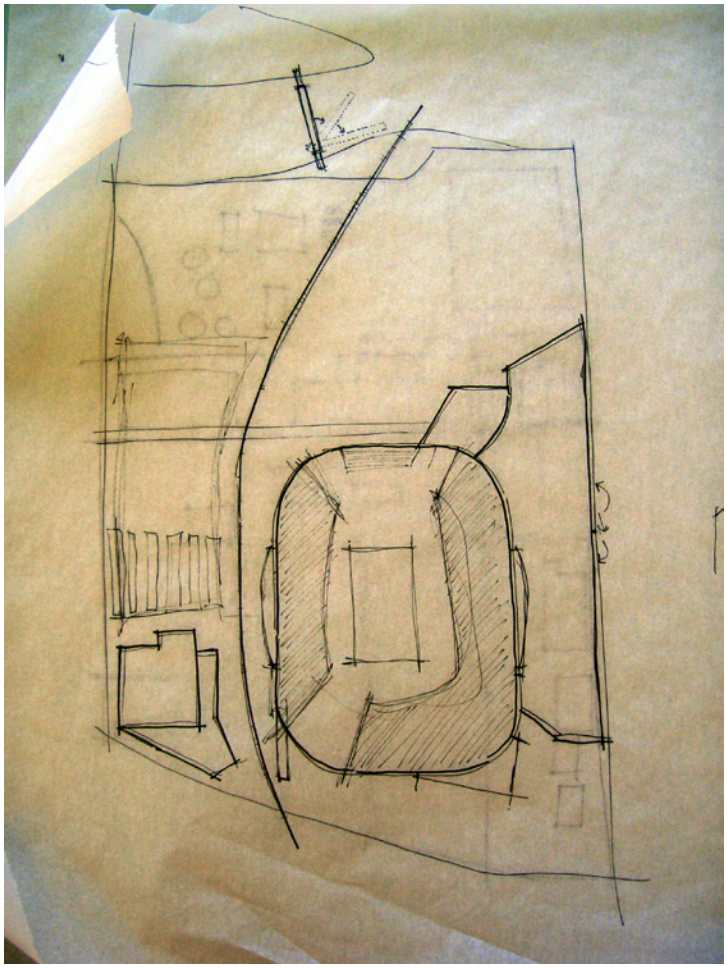


Figure 8.10 - Further development of site layout

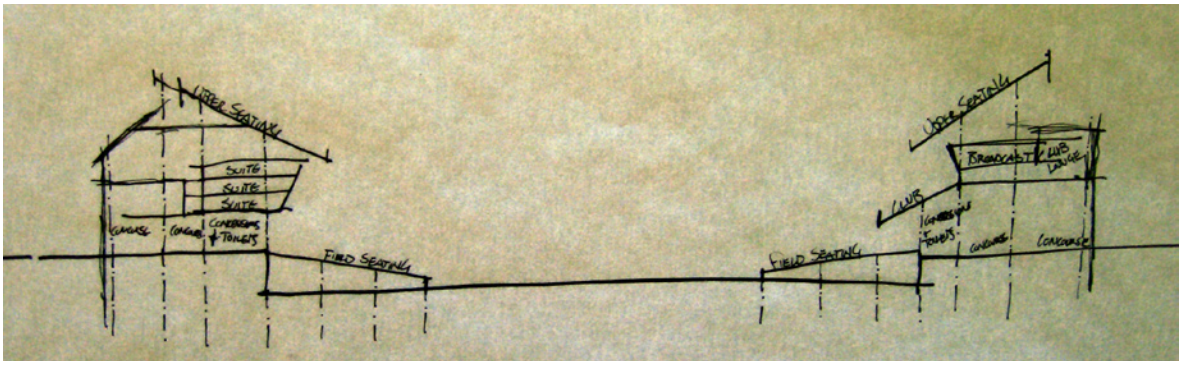


Figure 8.11 - Discovering the seating layout

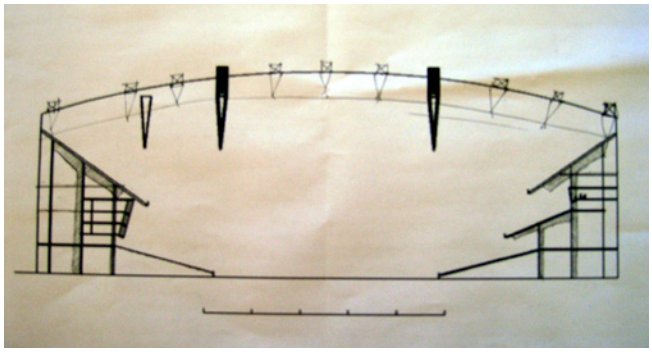


Figure 8.12 - Structure study for seating tiers & roof span

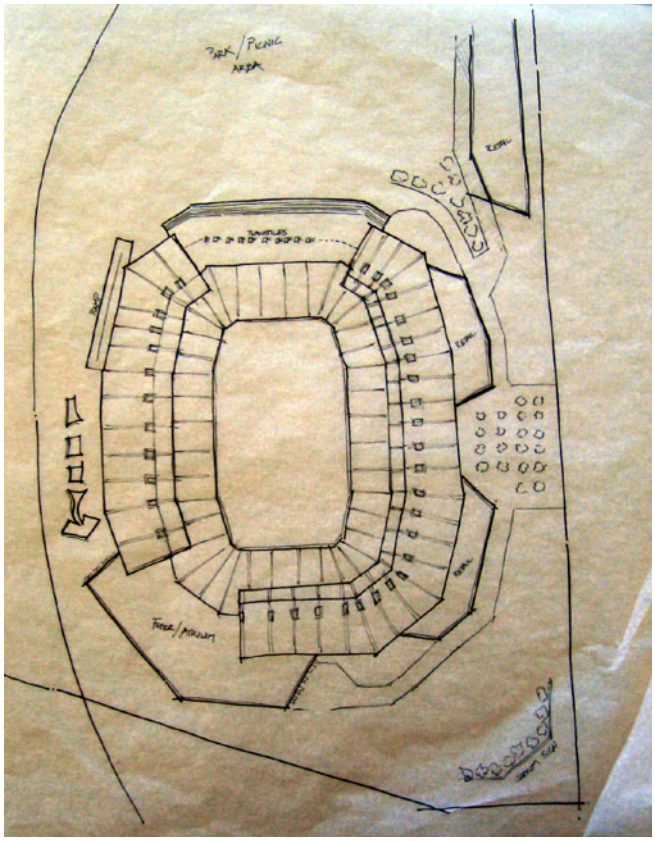


Figure 8.13 - Further site development

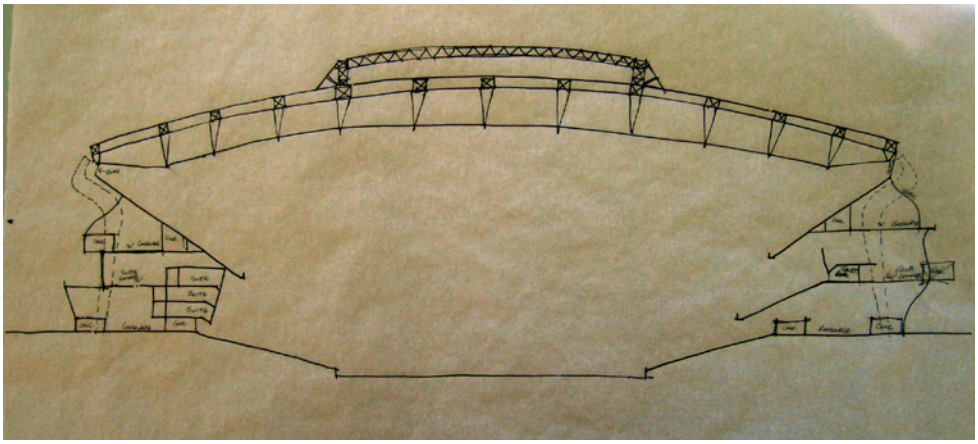


Figure 8.14 - Section showing space layout & structure major structure

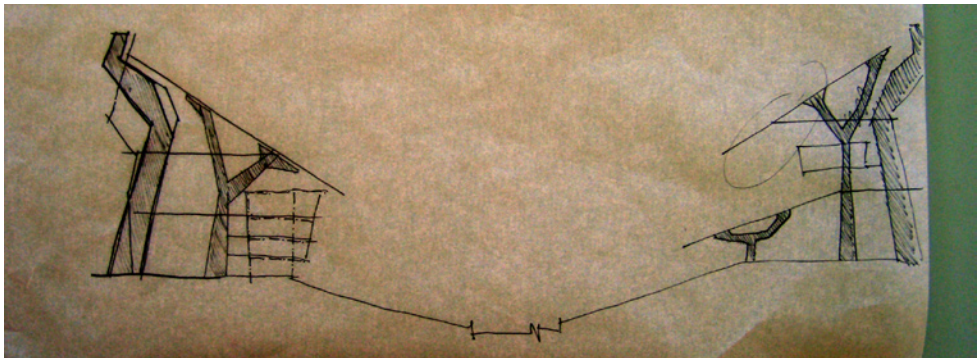


Figure 8.15 - Development of structure

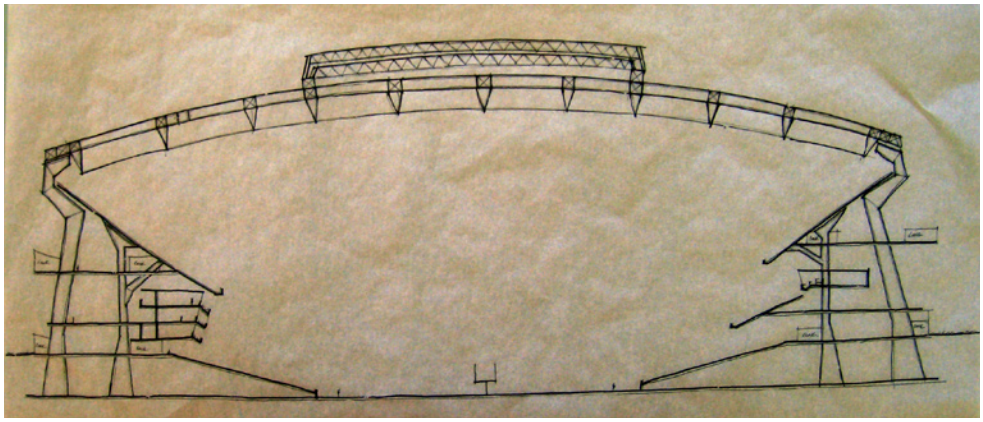


Figure 8.16 - Section development

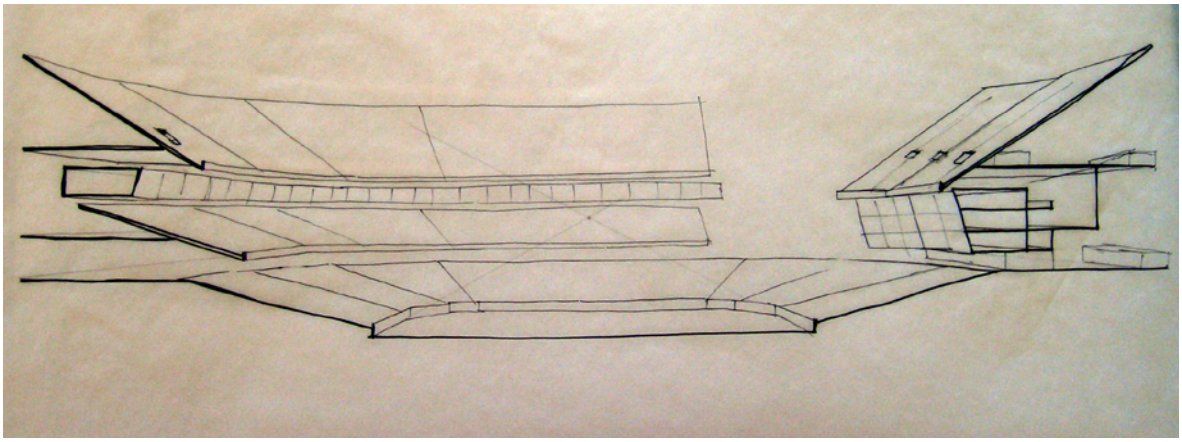


Figure 8.17 - Section axon

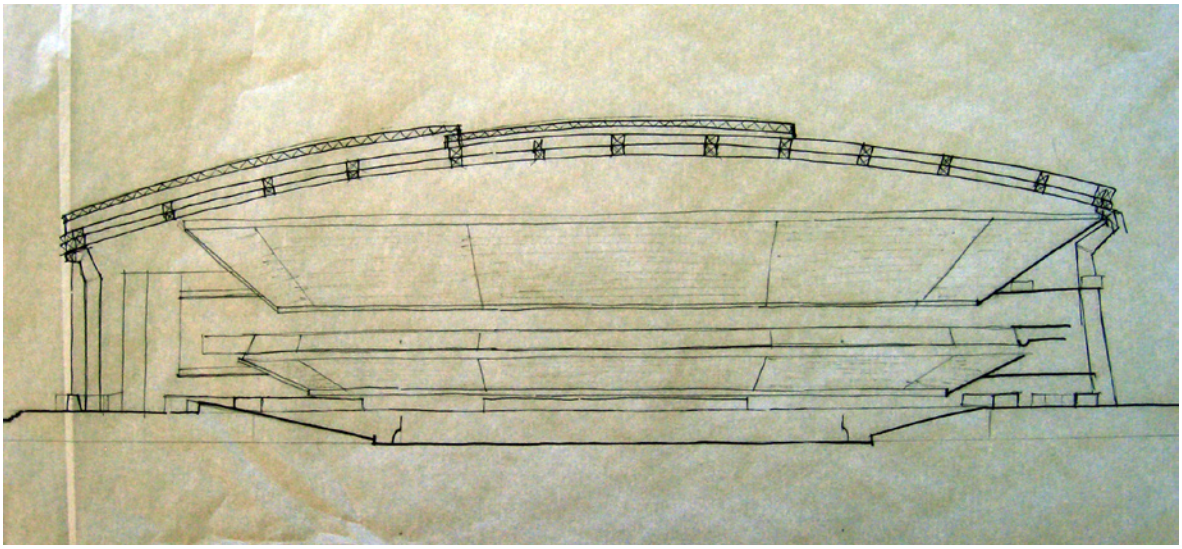


Figure 8.18 - Section axon

Design Development & Final Design
(Cont)

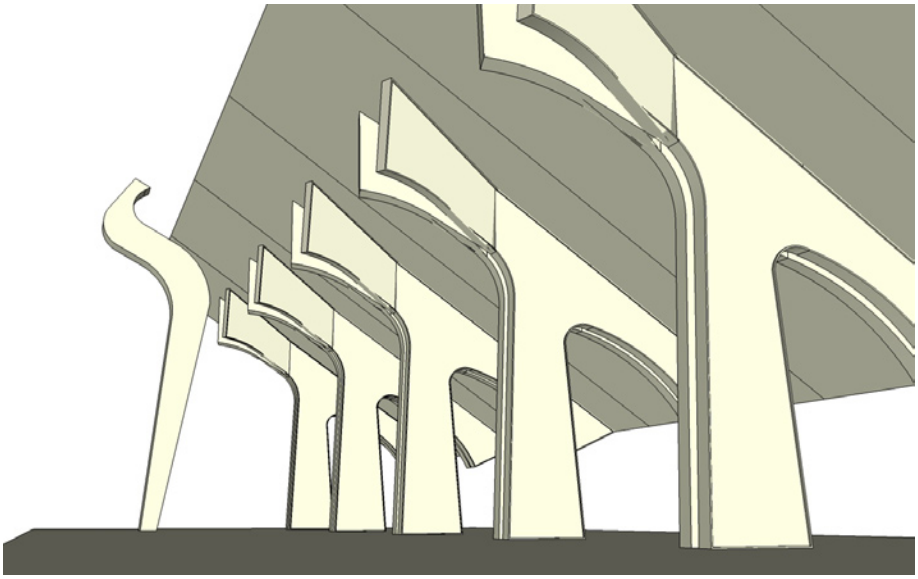


Figure 8.19 - Study of idea for major structural elements

I looked at both Santiago Calatrava and Marcel Breuer for inspiration on the design of the structure. I wanted to combine the fluidity of Calatrava's designs with the visual strength of Breuer's designs.

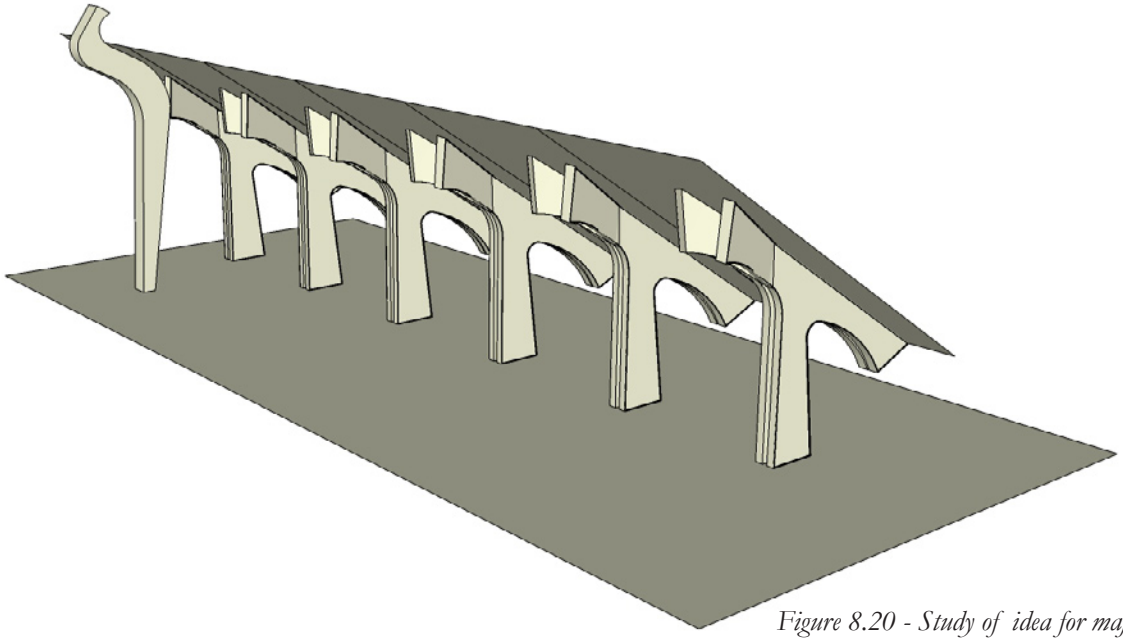


Figure 8.20 - Study of idea for major structural elements

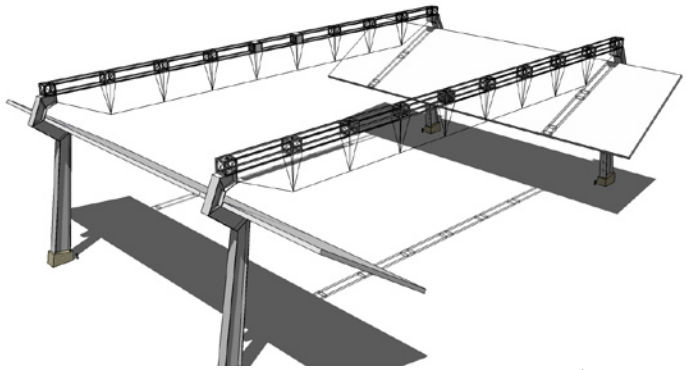


Figure 8.21 - Roof span study in relation to upper level seating

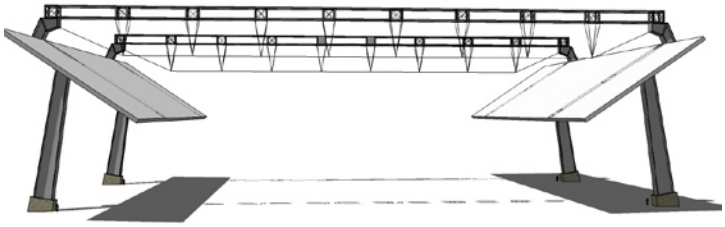


Figure 8.22 - Roof span study in relation to upper level seating

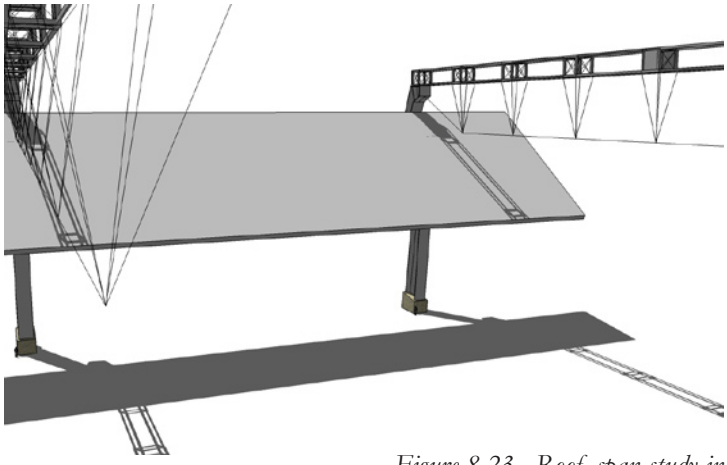


Figure 8.23 - Roof span study in relation to upper level seating

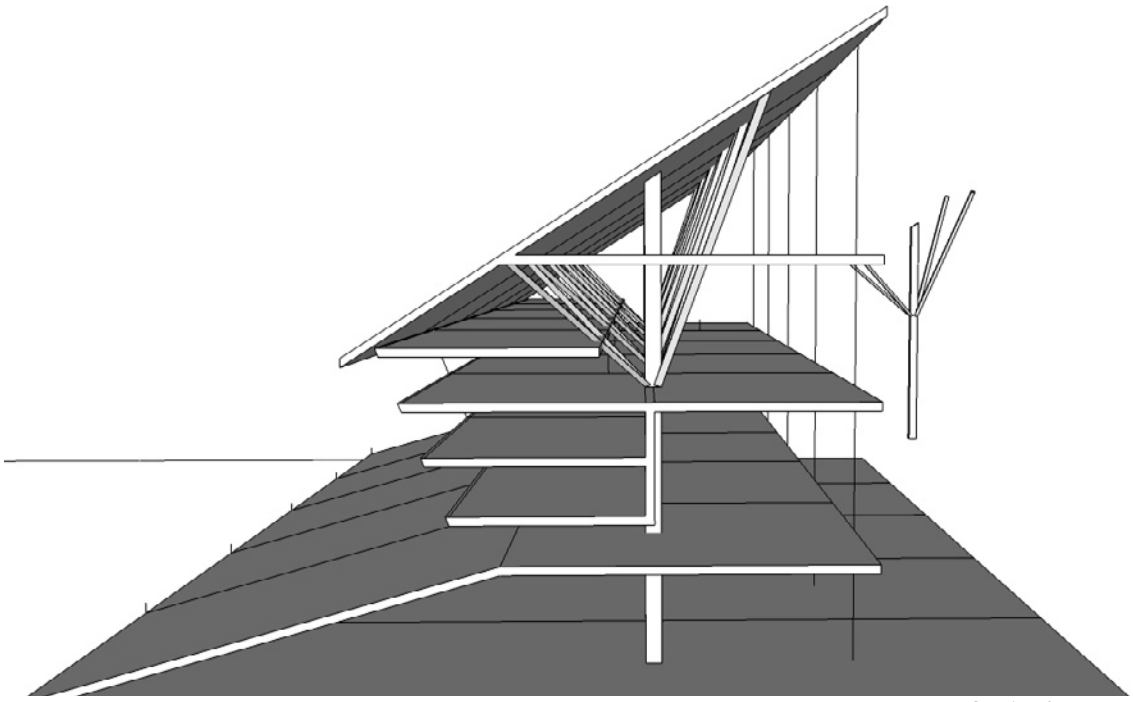


Figure 8.24 - Study of tree structure

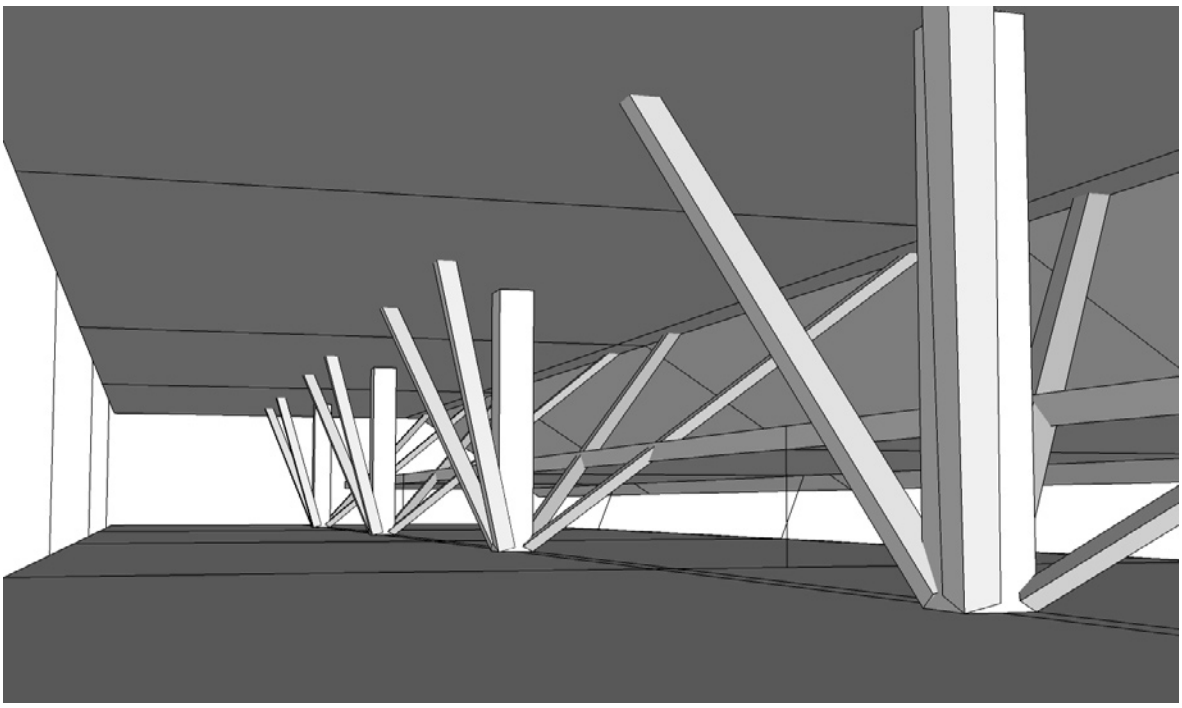


Figure 8.25 - Study of tree structure

Final Boards

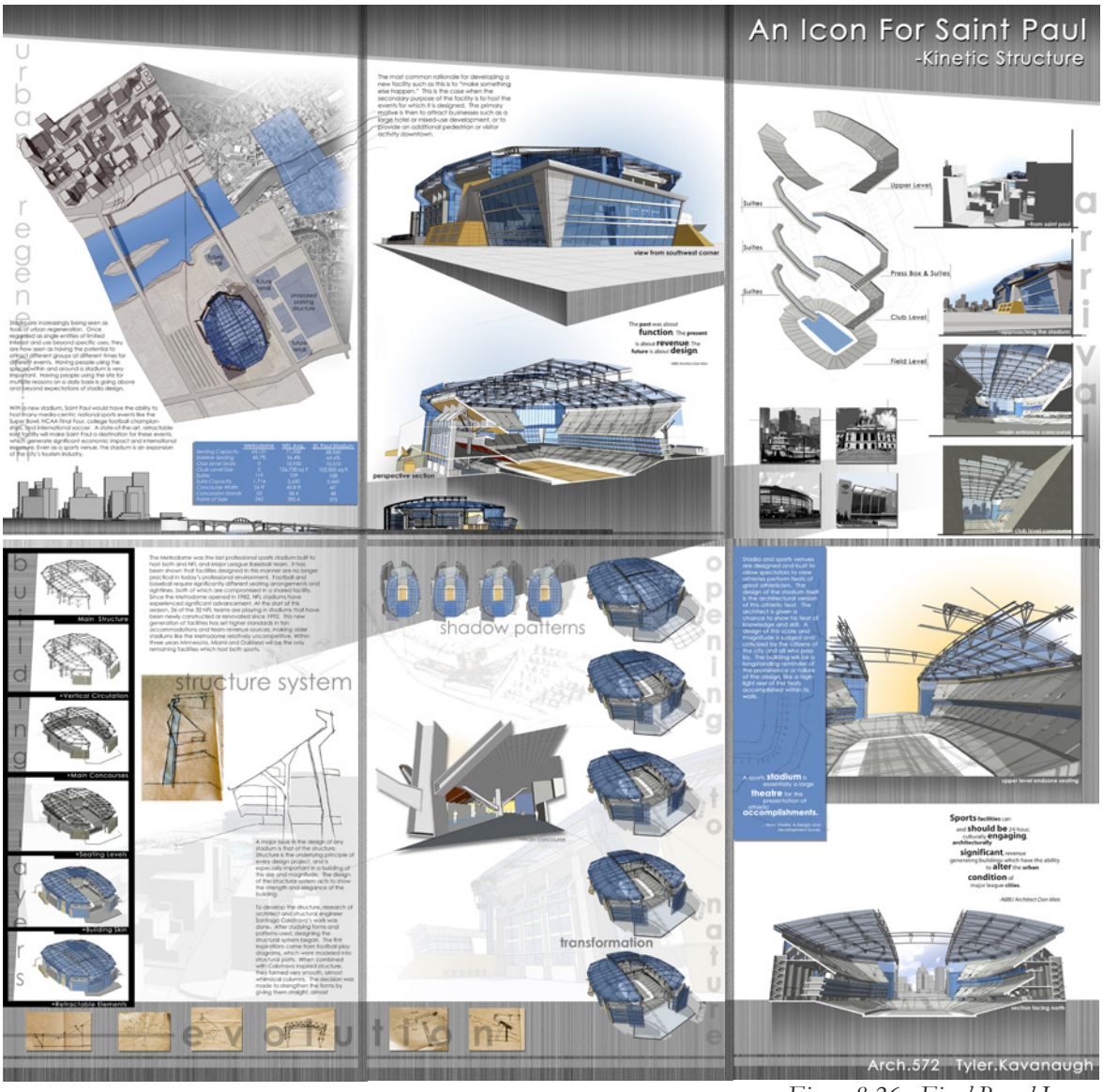
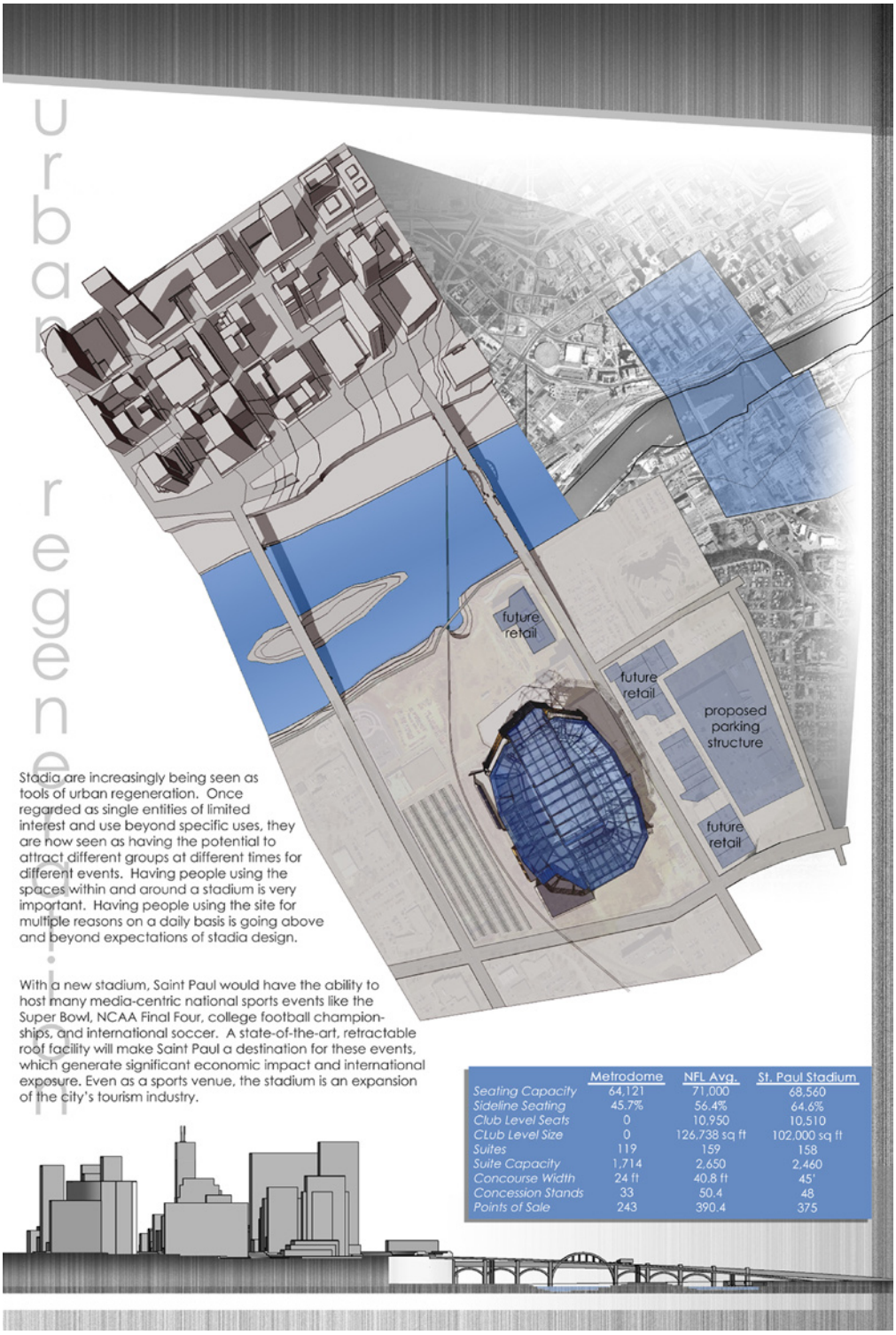


Figure 8.26 - Final Board Layout

Final Boards
(Cont)

Figure 8.27 - Final Board 1



	Metrodome	NFL Avg.	St. Paul Stadium
Seating Capacity	64,121	71,000	68,560
Sideline Seating	45.7%	56.4%	64.6%
Club Level Seats	0	10,950	10,510
CLub Level Size	0	126,738 sq ft	102,000 sq ft
Suites	119	159	158
Suite Capacity	1,714	2,650	2,460
Concourse Width	24 ft	40.8 ft	45'
Concession Stands	33	50.4	48
Points of Sale	243	390.4	375

Figure 8.28 - Final Board 2

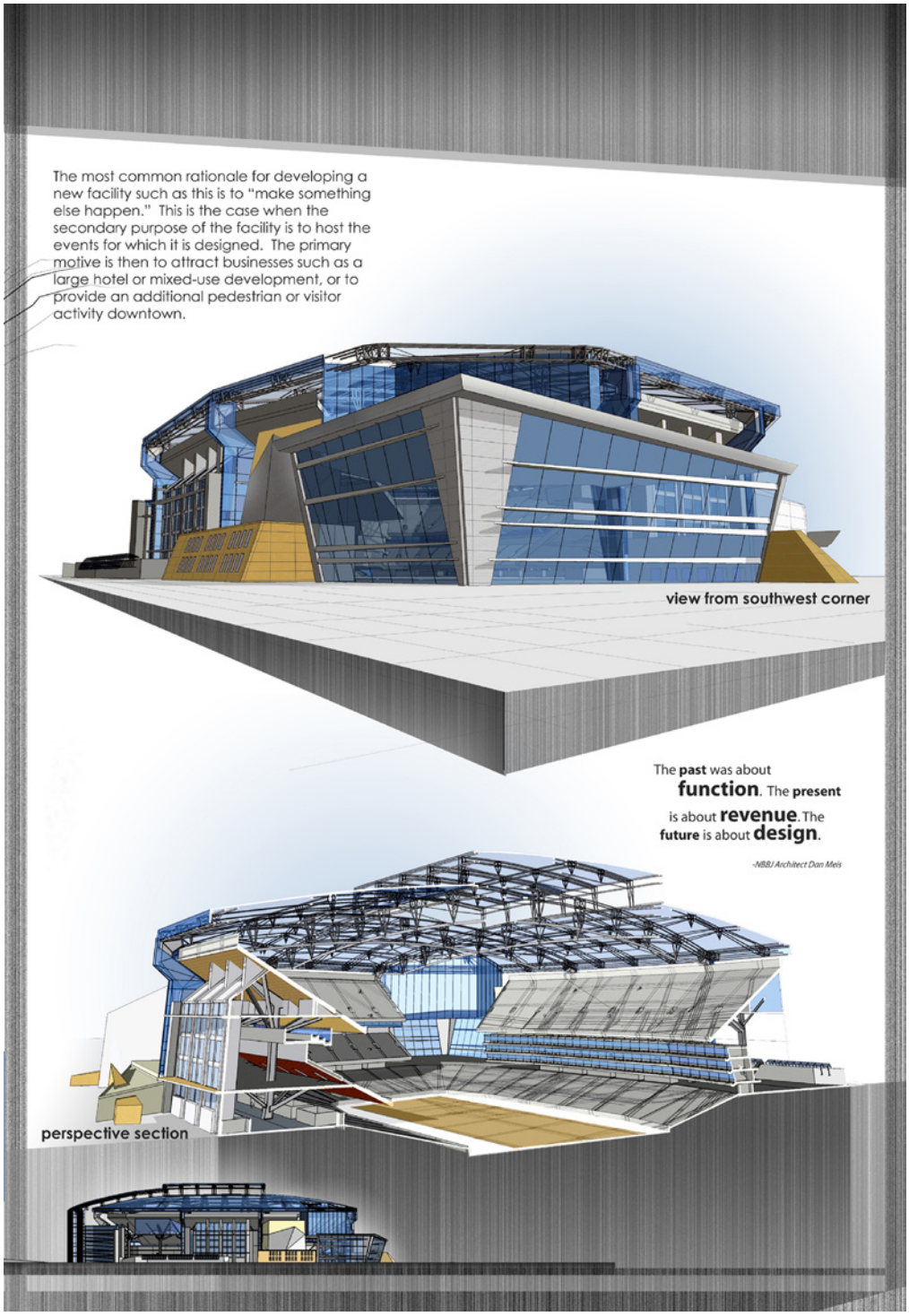


Figure 8.29 - Final Board 3

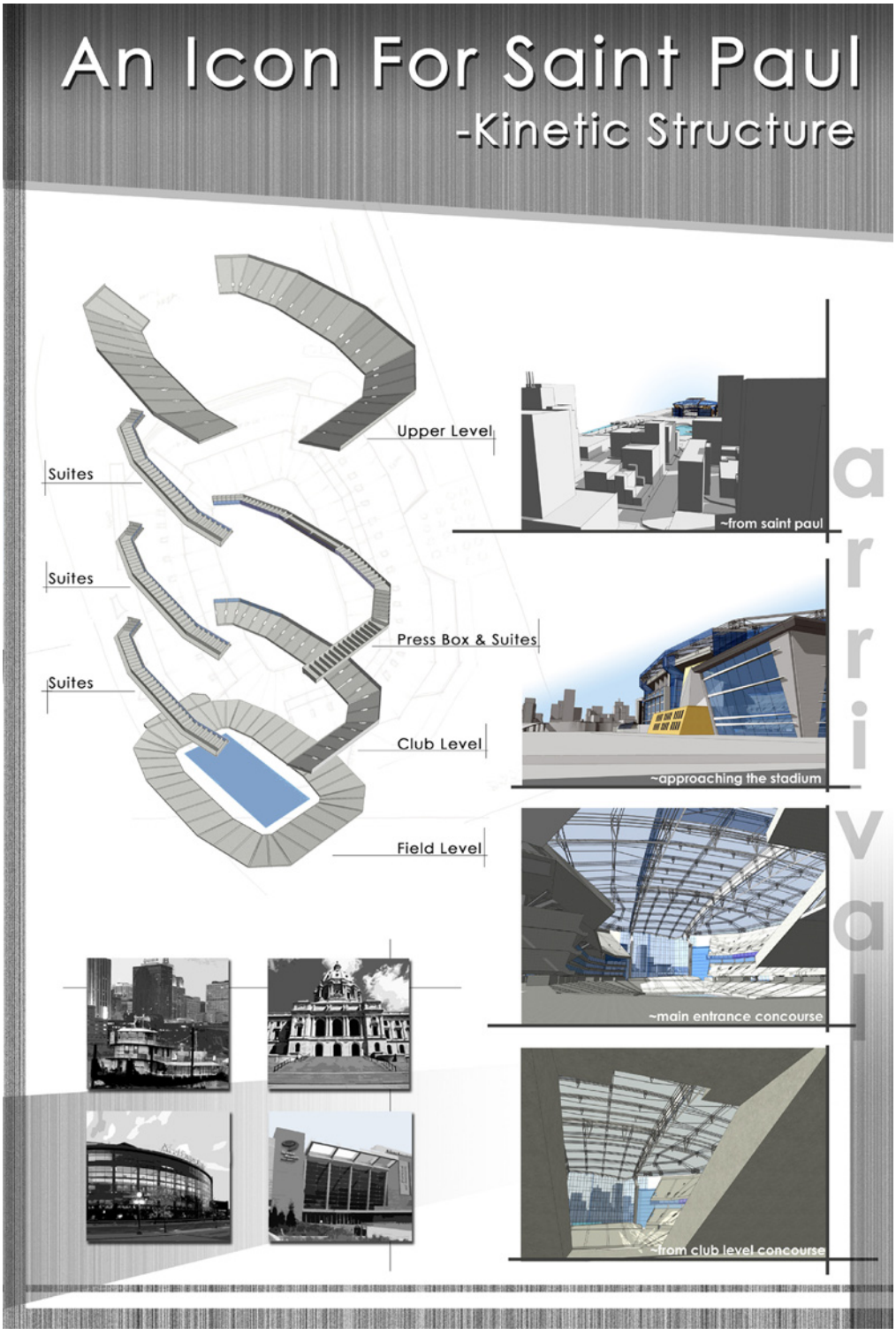


Figure 8.30 - Final Board 4

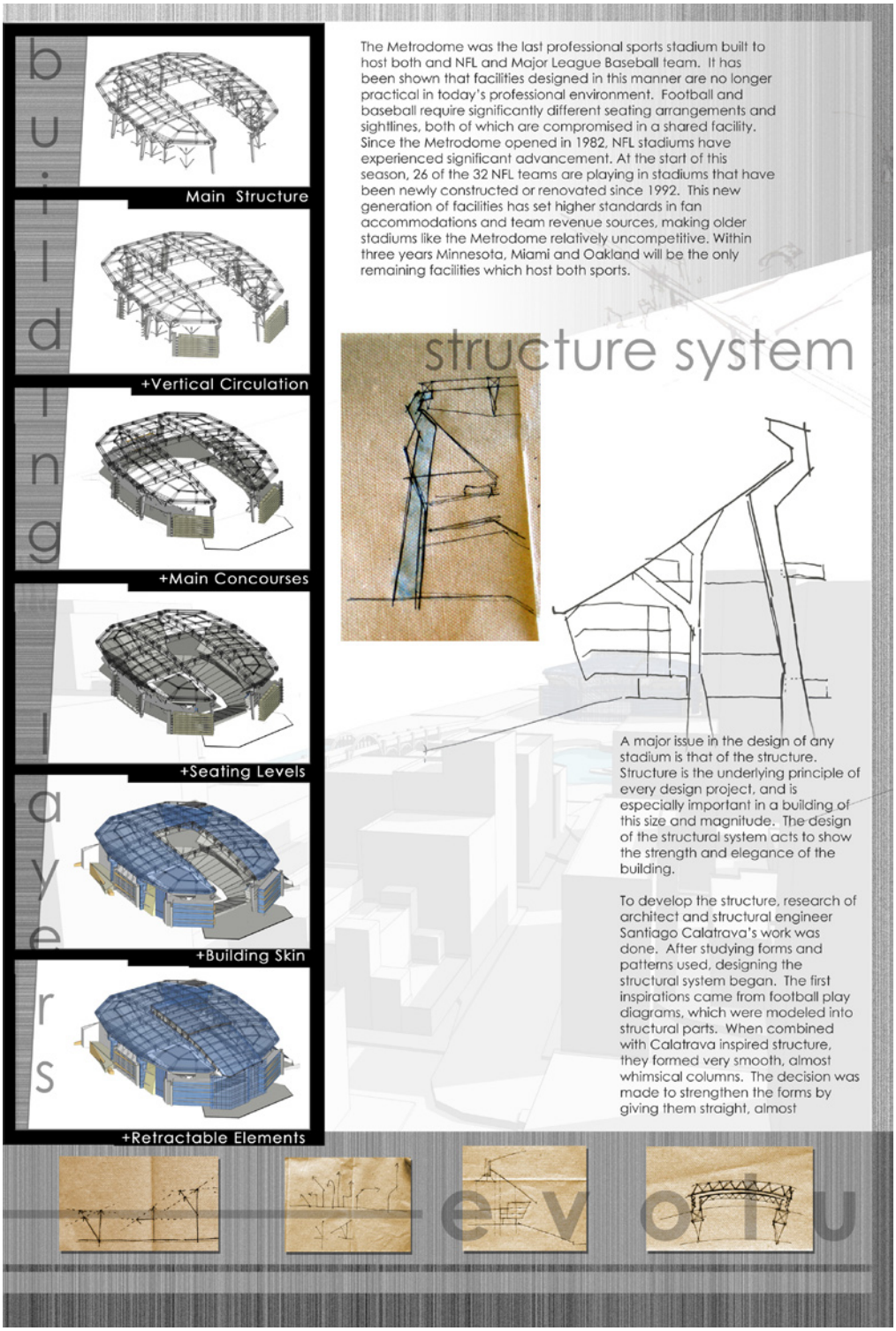


Figure 8.31 - Final Board 5

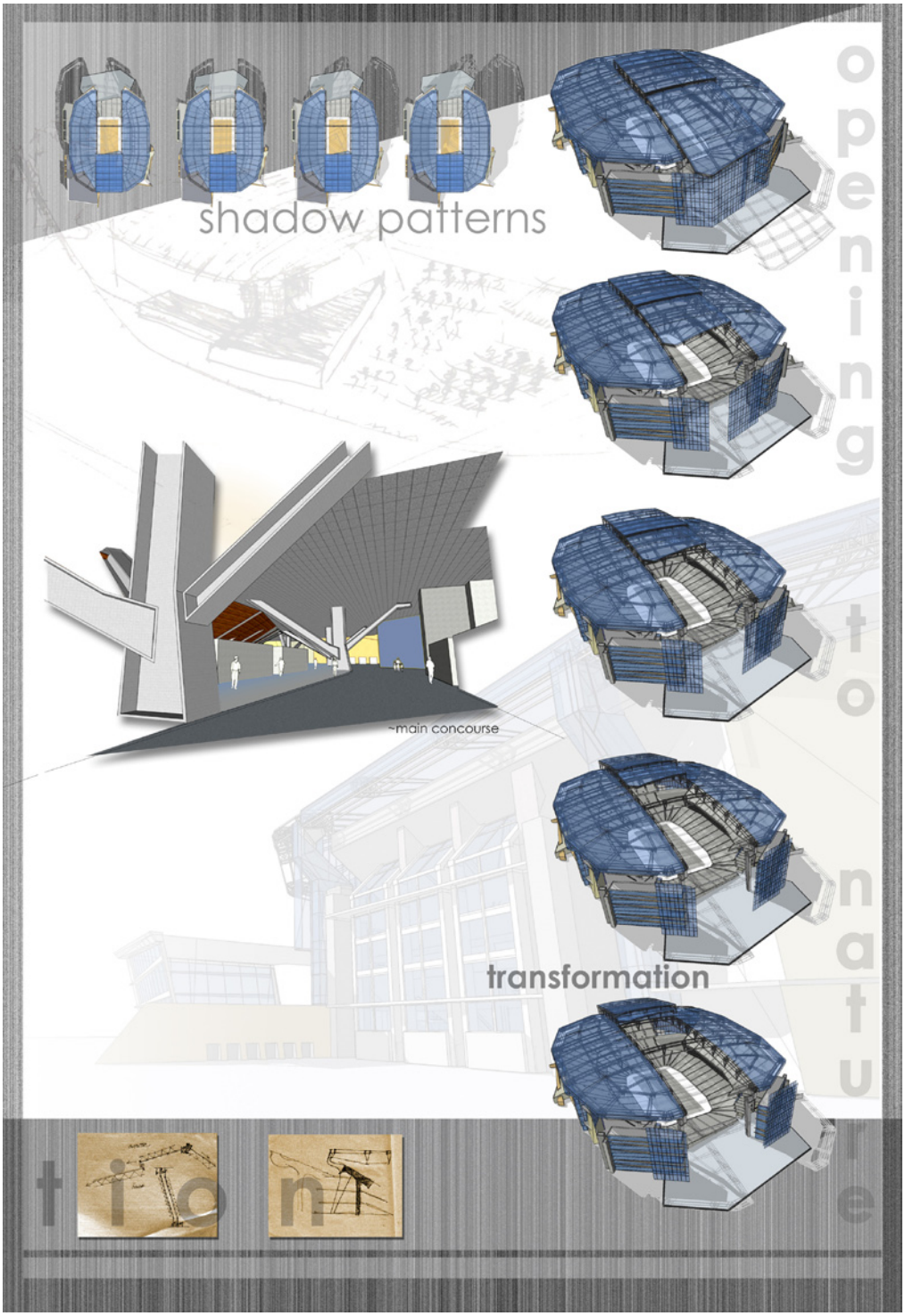
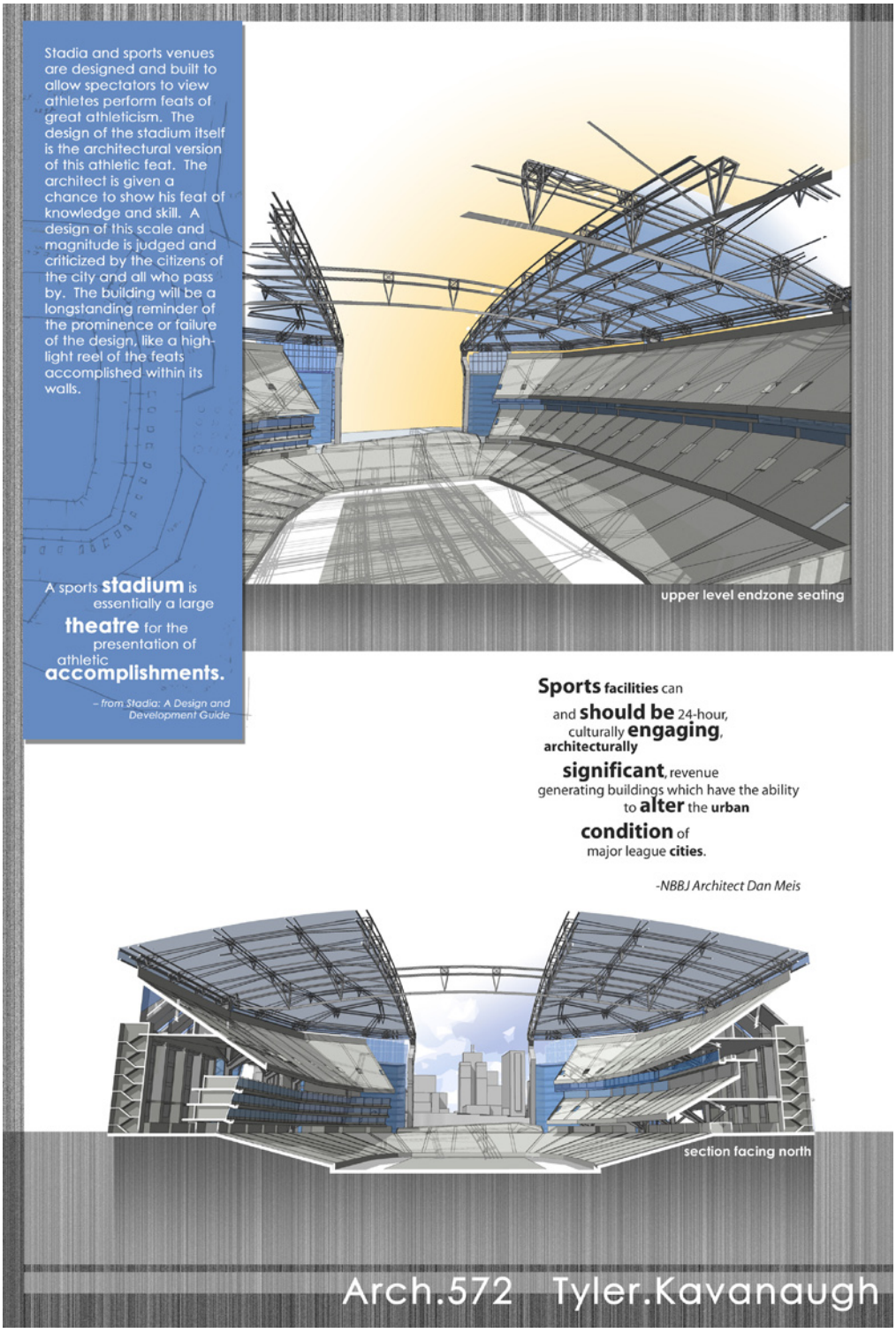


Figure 8.32 - Final Board 6



Final Model

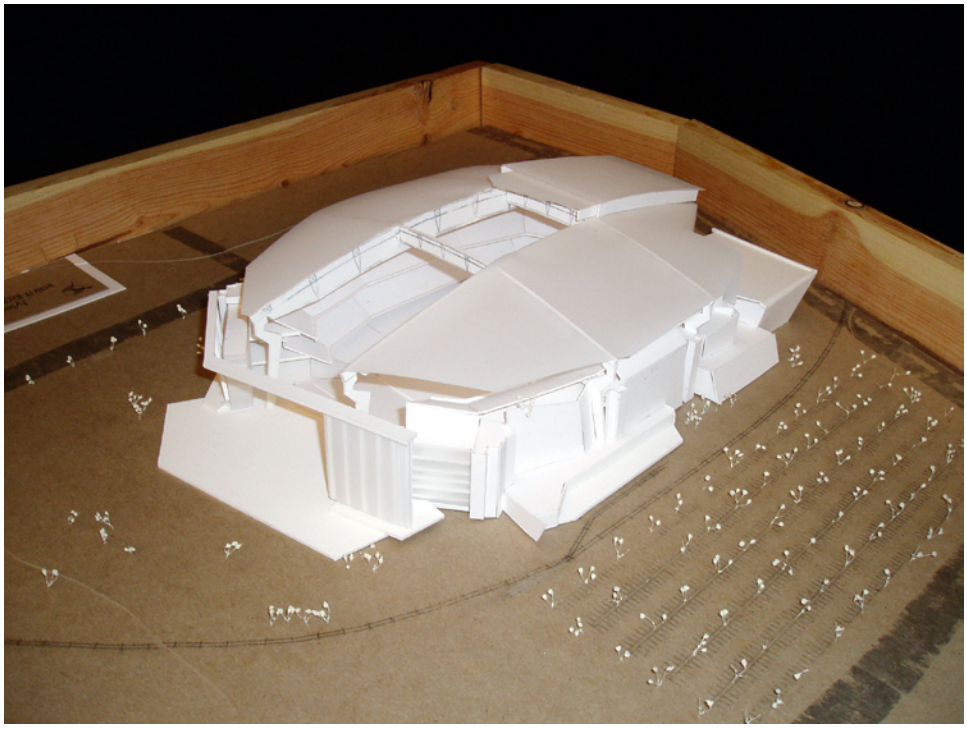


Figure 8.33 - Model picture from Southeast

Figure 8.34 - Model picture from South

Final Model
(Cont)

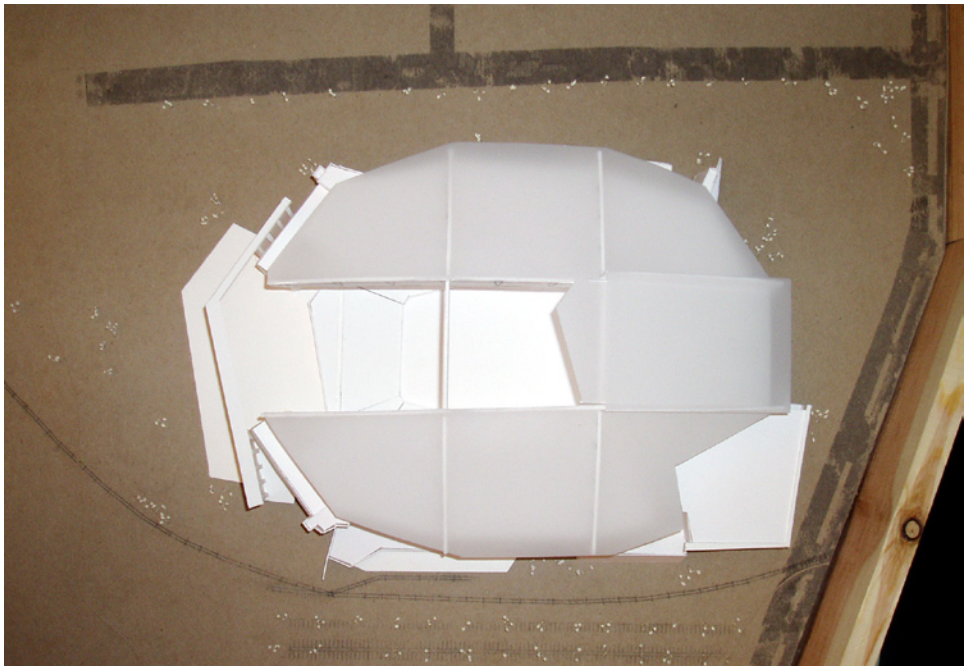


Figure 8.35 - Aerial photo

Figure 8.36 - Model picture from Southeast

Appendices

Appendix A

Minnesota Vikings Football Stadium

Tyler Kavanaugh

Saint Paul, Minnesota

There are clearly problems with the current stadium that the Minnesota Vikings are currently using. Within the last few years, every other team in the NFC North has either built a new stadium, or rehabilitated their existing stadium. The estimated cost to perform the necessary repairs on the Metrodome to bring it up to par with other NFL facilities would cost approximately the same as designing and building a new stadium.

The Metrodome ranks near the bottom of the league in every revenue category. This revenue shortfall will eventually hinder the ability to sign major athletes. The following table shows the shortcomings of the Metrodome in comparison to recently built stadiums.

	NFL Average	Existing Metrodome
Total Seating Capacity	71,500	64,121
Percentage of Seats on Sideline	56.4%	45.7%
Club Seats	10,950	0
Suites	159	112
Suite Capacity	2,650	1,714
Stadium Club Area	126,738 gsf	0 gsf
Concession Stands	50.4	33
Concession Points of Sale	390.4	243
Main Concourse (Width)	40.8 feet	24 feet

http://www.vikings.com/stadiumvision_photo_objectname_comparison_chart.html

A new stadium design will consist of the following amenities:

- More seating
- Enhanced views of the game
- Club seats
- Larger number of suites
- Stadium club area
- More concessions
- Wider concourse

Professional sports teams bring significant financial resources to the economy of a city. The Vikings must play in a stadium that helps them succeed, and provides an enjoyable experience for the fans that support them. The 2004 season will mark the start of the 23rd season played in the Metrodome. This is two seasons longer that at the former Metropolitan Stadium.

The Metrodome was initially funded through the sale of 30-year bonds. The debt of the facility was recovered fourteen years ahead of schedule. The Minnesota Vikings were largely responsible for the tenant-generated portion of the funding that retired that debt. This new stadium will be built for both the city as well as for the Vikings. It will be a multi-functional use building that will be used to host concerts and other events.

It is important that the new stadium is located in the urban environment of the Twin Cities. The site is located on the bank of the Mississippi River, directly south of downtown St. Paul.

Necessary information for the design will be gathered through a series of case studies that will discover:

- Building forms
- Structure
- Circulation patterns
- Facility amenities
- Funding
- Energy conservation
- Other possible uses

The underlying premise of this project is that athletics are an important cultural componant for a city, and this fact impacts the design of the building that houses them.

MINNESOTA VIKINGS

Appendix B

Thesis Proposal

New technology is no longer simply being added to the traditional sports venue. It now shapes the structure itself, particularly since such breakthroughs as retractable roofing and portable playing surfaces. Increasingly stadiums are seen as tools of urban regeneration. Stadiums were once regarded as single entities of limited interest and use beyond specific groupings; they are now seen as having the potential to attract different groups at different times for different events.

A. A User/Client Description:

The stadium will be designed to serve a large array of clients and users. St. Paul, as well as its residents and businesses are the main clients. The city has its own desires for the new stadium to have included in the design. To help ensure this design will be accepted by the City of St. Paul, the design will be a sign of what the city is about, it will reflect and react to its context, and will give back to the community (financially). Ideally the design will both encourage and increase tourism to the area both during and between events. The idea of this project is to not only give the Minnesota Vikings a new facility, but to also create an icon building for the city.

Minnesota's football team, the Vikings, and the owners of the team, Red and Charline McCombs, are the other clients. They have both similar and separate needs and desires that must be integrated into the design. The Minnesota Vikings need a facility that will fit their requirements, which includes the playing surface, lockers and exercise areas, medical facilities and a souvenir shop. There will be little need for offices, as the main offices will remain at their current location in Winter Park; the Viking's training facility in Eden Prairie, Minnesota. The owners need to have an exciting environment for football. It must encourage people to come to the games, which will be the basis for raising capital to finance a portion of the stadium and pay the salaries of the athletes and staff.

The Minnesota Vikings and their fans will be the primary user group of the facility. However, the stadium may be used to host several different types of events. Other users include the Minnesota Thunder soccer team, University of Minnesota Gophers football, concerts, rodeos, motocross as well as an array of other uses.

There are an enormous number of employees needed to make a facility of this size to operate smoothly. The stadium will be designed to have a capacity of approximately 68,000 to 70,000 spectators. A method to expand the seating may be included, in which it would hold at least 72,000, which is the minimum size required to host a Superbowl.

The numbers of users during any given football game are as follows (approximate):

- Two football teams
  - 53 players per team
  - 20 coaches, assistants and trainers per team
- 68,000 to 70,000 spectators
- 100 - media personnel
- 400 - Concessions
- 100 - ushers
- 60 - ticket window operators/ticket takers
- 100 to 200 - caterers
- 200 - setup/takedown/custodian
- 50 – security
- 10 - technicians

Due to the location of the site, a minimal number of parking spaces will be needed. There are numerous parking ramps within walking distance of the stadium, and others that will be accessed via buses, the newly constructed light rail system, and proposed water taxis.

One formula used to approximate the minimum number of parking spaces needed is as follows:

- # of spectators / 10 = # of spots needed

Using this formula, the stadium will need a minimum of 7,000 parking spaces. The Metrodome has 500 parking spaces. In addition to this, private parking areas for players, officials, media personnel, service and deliveries are needed. Private box (suite) holders and their guests, VIP, and similar private visitors should have special, clearly identified parking areas that are separate from the mass parking, and close to the entrance.

B. Major project Elements:

- Playing surface
- Team locker rooms, weight rooms and offices
- Spectator seating
- Private viewing areas/suites
- Concessions
- Restaurants
- Restrooms
- Lobbies
- Gift shop
- Museum/Visitor area
- Ticket areas
- Broadcast facilities
- Mechanical/Electrical
- Storage
- Circulation
- Landscaping
- Parking

C. Site Information:

Large stadiums on out-of-town sites were the major trend during the 1960s and 1970s. This reduced land costs, minimized the disturbance of neighboring areas and increased the ease of access by car. The current trend is to design and build on urban sites which reduces urban sprawl and increases the use of previously constructed infrastructure (parking ramps, public transportation, etc.) which in turn, reduces the need for new large parking lots and the overwhelming use of personal cars.

The Mississippi River is the reason for the growth and development of St. Paul as well as a major factor as to why it was chosen as the capitol of Minnesota. The site is on the riverbank of the Mississippi, which forms the north boundary. A railroad defines the west edge of the site. These two constraints on the site serve as historical markers and will be treated as such in the design of the facility.

Saint Paul began as a French settlement in the 1840's. The settlers came south from the Winnipeg area to take shelter at Fort Snelling. However, they were forced to move south to what is now Lowertown (then called Upper Town). Divided by a swamp, Saint Paul was effectively two settlements. The settlements grew thanks to the growing river traffic. River trade was Saint Paul's lifeline. In 1849 river traffic started bringing settlers in by the hundreds, and eventually by the thousands.

Once Minnesota was considered a territory with Saint Paul as its capitol, it began to grow even faster. Indian canoes became steamboats and later became barges making trade more efficient bringing even more traders and settlers. As of 1870 the railroad had put an end to the dominance of riverboat traffic on the lower landing. The upper landing had peaked eight years earlier and fell during the Dakota Conflict of 1862. The landings allowed residents to keep connected with Saint Paul's West Side. The Minnesota Valley Railroad stopped the river trade entirely once it opened.

St. Paul has a diverse mix of people of different races and backgrounds. The population of the urban core of St. Paul is approximately 40,425. A demographic study showed:

- 6,872 Hispanic origins (17%)
- 3,638 African origins (9%)
- 808 American Indian origins (2%)
- 2425 Asian origin (6%)
- 26,277 Caucasian (65%)
- 405 other (1%)

Appendix B

Thesis Proposal

The chosen site is on a Harriet Island. It was formerly inhabited by warehouses and other miscellaneous buildings until the middle to late 1980's. The entire site is approximately 22 acres of open land. The boundaries of the site are clearly defined on all sides. The bank of the Mississippi River makes up the northern border. The east side of the site is defined by Livingston Avenue and Roberts Street and the south end is flanked by Plato Boulevard. The railroad tracks edge the site on the west, but may be incorporated into the design of the building, thus enlarging the overall site area to nearly 28 acres.

Immediately north on either side of the site are two automobile/pedestrian bridges. They are very different from one another, but both have interesting designs to them, and will be visible from the stadium. These bridges form the only roadway connections across the Mighty Mississippi. They connect to Kellogg Boulevard on the north side of the river, which is a major connection route to I-94 and I-35E. Both I-94 and I-35E are major interstates and are within two miles of the proposed site. To the south, Plato Boulevard intersects with state highway 52 to the east within a mile of the site. The railroad tracks cross the Mississippi River immediately to the north of the site. There is a lift bridge that was first constructed near the turn of the century.

Other major landmark sites are Raspberry Island, located in the middle of the Mississippi River, the First National Bank building, the Xcel Energy Center (home of the Minnesota Wild), The Science Museum of Minnesota, St. Paul Cathedral (from which the city gets it name) and the State Capital.

The site is relatively flat, sloping slightly away from the river. This will need to be addressed during the site planning for the design.

There are very few trees on the site, and most of them are on the west edge of the site along the railroad tracks. The remainder is fairly open, with only a few sparse patches of vegetation. Loose gravel covers the entire site.

Warehouses inhabited this site up until the mid to late 1980's. Relevant soil and geological testing information was not found, but due to the knowledge of this site formerly supporting warehouses, it is believed that it will be sufficient for a stadium with proper footings. This site sits on a limestone bed, which would need to be analyzed to discover the portion of broken, loose rock.

Even with the site being on the river bank, the site is quite dry. It flooded during the large flood of 1997, but any record of it flooding since then non-existent.
The site was chosen, in part, because of the view of the St. Paul skyline. The city sits above a limestone cliff that is approximately 80 to 100 feet in height. Two bridges, both with attractive and appealing design link the St. Paul core to the site area. The railroad bridge is an engineering and artful creation.

The longer axis of the site runs nearly north to south. The premier direction for a football field axis is fifteen degrees west of North. Studies have shown that anything from twenty degrees east of North to 75 degrees west of North is acceptable. The underlying principle for this is to ensure that the athletes will not have the late afternoon sun in their eyes.

Wind near this site usually flows from the west, following the river. The limestone wall and St. Paul buildings to the north act as a wind buffer for the site.

There is currently only one structure on the site. It is an abandoned one story building that will be demolished due to its location and condition.

Even with the site being lined on the west side by the railroad, it is relatively quiet. The trains pass by at slow speeds due to the sharp curve in the tracks on the north side of the Mississippi River. The train's whistle doesn't currently sound when passing anywhere near the site.

D. Project Emphasis:

One major issue in stadium design is that of the structure. The design of this element will be emphasized in this project. Structure is the underlying principle of every design project, and is especially important in a building of this size and magnitude. The structure will act to show the strength and elegance of the design.

A second issue is power generation and self-sustainability. Stadiums are large buildings that use large amounts of electrical power for short periods of time. There seems to be an opportunity to use a self-sustaining system which collects and stores energy throughout the day to be used when needed. This facility will be used only a few times per week, for only several hours at a time for major events. This building has a great opportunity to collect solar and wind power throughout the week, store it, and use it when needed. This could save vast amounts of energy as well as money over time.

Finally, I have noticed that most stadiums have traditionally been inward-looking forms. I am taking the challenge to design a form that addresses its surroundings, which will allow it to be better incorporated within its urban context. Stadiums are massive forms which can be very imposing on the neighboring structures and spaces. This design will attempt to develop a design that is less intrusive, and will seem to bring down the overall scale and mass of the stadium.

E. Plan for Proceeding:

Research for this project will include case studies of past, present and future stadiums. Other areas include:

- Code requirements
- Seating design
- Field design (drainage)
- Circulation design.
- Restaurant design
- Parking ramp design

Through the use of case studies, knowledge which will be useful to the design of stadiums will be gained. Points of main interest that will be explored in these case studies include structural design, layout of spaces, building materials, sustainability (natural power), circulation and landscape design (including parking lots).

One major challenge in this project is designing in a way to incorporate this structure with its surroundings, both built and natural, thus making a new icon for the city of Saint Paul, while using the technology of today to enhance the building itself as well as the experience for the players and fans.

The knowledge gained through research and design exploration will be recorded and applied to the design of this project. I will keep a dated sketchbook of thoughts, plans and ideas. Documentation of this process will be through these sketches, AutoCAD as well as SketchUp models. This process will be further examined and explained during the spring semester.

Appendix C

Thesis Schedule

Fall Semester 2004

Week 1: (Oct. 4-8)

October 7th

Seminar – "Cradle to Cradle" book reaction due
Seminar – Pollution Politics & Health presentation due
Thesis Proposal due
Student critic preference slips & faculty preference slips available

Week 2 (Oct. 11-15)

Research
October 14th
Student and faculty return preference slips to the main office

Week 3 (Oct. 18-22)

Research

October 21st

Primary and Secondary critics announced

Week 4 (Oct. 25-29)

Research
Define Program

October 28th

Last day of A/LA 561

Week 5 (Nov. 1-5)

Research
Work on Program

Week 6 (Nov. 8-12)

Research
Work on Program
Site Information
Work on draft of program

November 11

Veterans' Day Holiday

Week 7 (Nov. 15-19)

Research
Work on Program
Last week of A/LA 571
Presentations

Week 8 (Nov. 22-26)

Research
Work on Program

November 24th

Draft of thesis program due to Primary critic (1 copy)

November 25th &26th

Thanksgiving Holiday

Week 9 **(Nov. 29-Dec. 3)**
Finish site information
Review thesis program with critics

Week 10 **(Dec. 6-10)**
Finish final draft of thesis program
December 9th
Final draft of thesis program due to Primary critic (1 copy)
December 10th
Last day of classes

Week 11 **(Dec. 13-17)**
December 16th
Program grade due to A/LA 561 instructor
December 13th to 17th
Final exams

Week 12 **(Dec. 20-24)**
Research
Base model building

Week 13 **(Dec. 27-31)**
Research
Base model building

Week 14 **(Jan. 3-7)**
Research
Base model building

Spring Semester 2005

Week 15 **(Jan. 10-14)**
January 11th
Classes begin
Identify potential form-givers from program
Conceptual work
Schematic design & sketching

Week 16 **(Jan. 17-21)**
January 17th
Martin Luther King Jr. Holiday
Base map and site analysis completed
Conceptual work
Schematic design & sketching

Appendix C

Thesis Schedule

Week 17 **(Jan. 24-28)**
Site design & master planning finished
Study site relationships & functional arrangements
Graphic expression of at least two design concept/concept alternatives
Conceptual work
Schematic design & sketching

Week 18 **(Jan. 31-Feb. 4)**
Arrangement; Space-planning relationships fully resolved & organizational patterns clarified; patterns of "spatial structure".
Conceptual work
Schematic design & sketching

Week 19 **(Feb. 7-11)**
Studies of form, volumetrics, massing
Conceptual work
Schematic design & sketching

Week 20 **(Feb. 14-18)**
Relationships- vertical section; structural & system concepts established
Movement/circulation systems resolved
Design development

Week 21 **(Feb. 21-25)**
Material studies & initial exterior elevation studies
February 21st
President's Day Holiday
Design development

Week 22 **(Feb. 28-Mar. 4)**
Expressive character & technology of assembly
Wall sections resolved & detailed material studies complete
Design development

Week 23 **(Mar. 7-11)**
Thesis mid-term reviews with primary & secondary critics; all key design decisions have been made
March 11th
Mid-Semester Thesis Reviews
Presentation work
Model Building

Week 24 **(Mar. 14-18)**
Spring Break, or catch up on any tasks where you've fallen behind
Presentation work
Model Building

Appendix C

Thesis Schedule

Week 25 **(Mar. 21-25)**

Revisit all design issues addressed above, especially site/context; structural/HVAC layouts

March 25th to 28th

Easter Holiday
Presentation work
Model Building

Week 26 **(Mar. 28-Apr. 1)**

Interior space studies & character sketches finalized
Is intended design expression clear? Does it confirm original design directives?
Presentation work
Model Building

Week 27 **(Apr. 4-8)**

Storyboard the layout of your final presentation
Decide on presentation medium & buy materials
Presentation work
Model Building

Week 28 **(Apr. 11-15)**

Latest date to start final presentation
Presentation work

Week 29 **(Apr. 18-22)**

Finish All Presentation Boards & Models
Final touches, output/printing, mounting
Prepare for Presentation

Week 30 **(Apr. 25-29)**

April 25th

Presentation Boards Due at Memorial Union Ballroom at 4:30

April 26th & 27th

Annual Thesis Exhibit in Memorial Union Ballroom

April 28th & 29th

Final Thesis Reviews

April 29th

Draft of Thesis document Due to Primary critics

Week 31 **(May 2-6)**

May 2nd to 5th

Final Thesis Reviews

Week 32 **(May 9-13)**

May 12th

Final Thesis document Due at 4:30 pm in Department office
Final Exams

May 13th

Commencement at 4:00 pm at Fargodome

Appendix D

Design Experience

2nd Year Fall – D'Anjou

"Lucy's Skull"
Museum exhibit designed for viewing of ancient skull

Vacation Retreat
Single family vacation home in the mountains
Bozeman, Mt

School of Architecture
Copenhagen, Denmark

2nd Year Spring – Yergens

University Avenue Housing
Loft apartments & commercial spaces

ADA Accessibility
Hitterdahl, Mn
Historic Lutheran church

Lutheran church
New church for small community
Hitterdahl, Mn

3rd Year Fall – Prafcke

Ronald McDonald House
Short-term housing for parents of hospitalized children
Fargo, Nd

Case Dealership
Heavy timber construction
Implement Showroom for construction equipment
Fargo, Nd

3rd Year Spring – Elnahas

Theatre for the Arts
Black Box Theatre
Chattanooga, NC

West Acres Bank
New bank in Fargo, ND

4th Year Fall – Barnhouse, Urness

Downtown Fargo Masterplan
Historical redevelopment for Fargo, Nd

4th Year Spring – Kratky

Marvin Windows Competition
Medium Density Housing in Moorhead, Mn

San Francisco High-Rise
Bioclimatic Skyscraper – green building methods and design

5th Year Fall – Martens

Historic Redevelopment Guide
Valley City, Nd

Appendix E

Sustainable Design Criteria

The design of this stadium will attempt to address many different sustainable issues. The following list has been taken from *The HOK Guidebook to Sustainable Design* (Mendel & Odell, 2000) and includes many of the ideas that will be incorporated in the design.

Planning and Site Work

16.1 Provide convenient walkways linking all major destinations on the site.

16.2 Support the use of mass transit by providing pedestrian-friendly physical linkages such as covered or enclosed access to subway, bus or trolley stops or stations.

16.3 Explore potential for sharing parking areas and shuttle services to public transit with neighboring facilities.

16.5 Make provisions for car pooling. For example, design the parking lot with preferred parking areas for high-occupancy vehicles.

20.1 Avoid expansive parking areas; they create concentrations of contaminated runoff, reduce infiltration, create "heat islands," and are aesthetically unpleasing. Instead, consider structured parking and incentives to reduce parking to provide more green space on the site. In required surface parking lots, use parking islands that are at least 10-15 feet wide to allow for healthy plantings and filtration of stormwater.

23.2 Place a priority on the use of native species. Native plant materials are adapted to the local climate and regional ecosystem, promise low maintenance requirements and usually do not require irrigation.

24.3 Consider use of harvested water for irrigation. Using municipal water for irrigation is a waste of a resource. Plants do not require potable water and are often sensitive to chlorine.

27.1 Consider using photovoltaics for all outdoor lighting, including parking lots, walkways and garages.

32.2 Retain and protect as much on-site vegetation as possible and restore degraded areas where possible. Vegetation not only filters pollutants and runoff, but also maintains the stability of the soil, thereby reducing erosion from both wind and water.

38.2 Crush excavated rock material for reuse on site.

Energy

17.1 Explore opportunities for passive solar heating where appropriate. Passive or "natural" heating options involve the coordination of glazing, thermal mass and surface reflectance. A passive heating system is divided into five elements: collector, absorber, storage, distribution and heat regulation.

18.3 Optimize building glazing. Evaluate U-value, visible light transmittance and shading coefficient of the glass. Consider impact of the orientation and exterior and interior sun shading on performance glazing.

18.4 Consider the use of exterior shading and sun control. Exterior shading and sun control can dramatically influence solar heat gain and therefore both the sizing of cooling system (first cost) and the energy required to cool the building. Explore both natural and architectural options including trees and other vegetation as well as interior and exterior building overhangs, fins, shades, and the like.

19.1 Prepare a detailed analysis of the sun's position relative to the site and possible building forms during schematic design.

26.4 Consider potential for use of wind turbines where space allows and wind access is good. Wind power can be cost-effective, as it can be produced for as little as 5 cents per kW.

Water

15.2 Integrate design of water collection systems closely with the architecture so that rainwater is collected from clean surfaces that are as close as possible to the points of distribution. The cleanest collection areas are the roof and plaza areas designed for pedestrian use only.

15.5 Integrate the design of water reuse systems closely with the landscape design. Collection of rainwater will reduce stormwater discharge; however, release of treated gray water will increase overall water flows on the site. The benefits of water reuse will be best realized when the selection and placement of landscape planting are closely coordinated with the design of water collection and reuse systems.

17.2 Consider the use of waterless urinals. They are odor free, low maintenance and are installed on a typical drain line. A small quantity of "blue seal" liquid of biodegradable oils and alcohol isolates urine from the room atmosphere. Periodic replenishment of the blue seal is necessary; however, no water supply plumbing or valves are required.

Appendix F

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Appendix G

Photograph Credits

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2.2 http://www.webcom.com/collectr/fb/images/fpgrantb.jpg

2.3 http://www.allposters.com/IMAGES/PHOTOFILE/AABF034.jpg

2.4 http://www.lexpix.com/mpls_detail/big/metrodeme.jpg

2.5 http://www.lexpix.com/mpls_detail/big/metrodeme.jpg

2.6 http://www.laface-mcgovern.com/heinz_side.jpg

2.7 http://www.seahawks.com/stadium.aspx?SecID=31

2.8 Photograph by Corey Beste

2.9 http://a124.g.akamaitech.net/7/124/33/568ddef4232c16/images.citysearch.com/profile/e0/9a/5574134p1.jpg

2.10 http://www-personal.umich.edu/~zhibiny/photogallery/My%20fotos/Nature%2001.jpg

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3.1 http://www.startribune.com/stonline/images/news91/15vike29.l.jpg

3.2 http://www.startribune.com/stonline/images/news35/vk1VIJP14.l.jpg

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3.8 Photograph by author, Tyler Kavanaugh

3.9 http://cuckoo.com/daniel/pictures/places-houston-lightrail/IMG_1006

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3.10 Photograph by author, Tyler Kavanaugh

3.11 http://maps.yahoo.com/

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3.14 http://www.ci.stpaul.mn.us/maps/

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3.16 Photograph by author, Tyler Kavanaugh

3.17 Photograph by author, Tyler Kavanaugh

3.18 Photograph by author, Tyler Kavanaugh

3.19 Photograph by author, Tyler Kavanaugh

3.20 Photograph by author, Tyler Kavanaugh

3.21 Photograph by Corey Beste

3.22 http://www.ci.stpaul.mn.us/maps/

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3.29 from *Sun, Wind & Light*

3.30 from *Sun, Wind & Light*

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3.31 Aerial photograph: http://www.ci.stpaul.mn.us/maps/
Wind rose diagram: ftp://ftp.wcc.nrcs.usda.gov/downloads/climate/windrose/minnesota

3.32 http://www.ci.stpaul.mn.us/maps/

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3.37 from *Design Methods Manual*, Hatlen, V.

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Tyler Kavanaugh