LIVE + WORK + PLAY

Engaging and revitalizing the broader urban community through sport | A Design Thesis by Evan Pukal

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Engaging and revitalizing the broader urban community through sport.

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North Dakota State University
School of Design, Architecture, and Art
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signatures:

The following is a design thesis submitted to the School of Design, Architecture, and Art of North Dakota State University In fulfillment of the requirements for the degree of Master of Architecture

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Special thanks to:
Jake Wieneke, for providing insight from an athlete's perspective
Mike Sabatini, for providing insight from sports architect's perspective
My Parents, for loving and supporting me throughout my academic career
My Wife Joanna, for making this thesis book possible

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thesis **abstract:**

As most professional sports leagues continue moving towards a minor league model in an effort to develop athletes right out of high school as opposed to drafting players from the college ranks, the question of where these new developmental league teams will hold games opens the door for smaller market cities to land the stadiums where these teams will compete. If cities are to make a bid for a developmental league team, the tax payers should see a return on their investment in any stadium or practice facilities that are constructed. Given the reality that sports stadiums are largely taxpayer funded, how can stadiums be conceptualized to blur the line between public and private space giving citizens maximum accessibility and utilization of the stadium so the city can see a return on its investment?

In order to provide a monetary return on the taxpayer investment and benefit the local community, these future sporting venues and accompanying facilities should be intentionally designed to engage the broader community throughout the year and serve as a catalyst for urban growth and economic development within its surrounding neighborhood. These multi-purpose sports complexes would feature a more accessible design allowing the stadium and surrounding landscape to become utilized year-round by both the developmental league team and the broader community. This design will not only consider the needs of the sports team, but also the surrounding community. This design will hopefully become a blueprint for major professional sports venues moving forward.

introduction

narrative / premise / justification / themes

02

thesis **narrative:**

Premise for Investigation

It is as if a love for sports is ingrained into the American psyche. Many of those born and raised in the Unites States who are sports fans grew up watching and cheering for their favorite team from a young age. There is something captivating about watching a player hit a buzzer beater, throw the last second touchdown, hit a walk-off homer, or score that go-ahead goal. In addition to the excitement and entertainment, sports also teach athletes mental toughness, enable them to deal with adversity, and build character. For this and many other reasons, professional sports in American culture is not going anywhere. However, in some professional sports, the way that athletes typically make it to the pros has been changing.

The minor league model for professional sports is becoming more and more ubiquitous. Fifteen years ago, of the four major American sports leagues, (MLB, NHL, NFL, NBA) Major League Baseball was the only league to have a minor league counterpart that served as official farm teams for the professional ranks. It was not until 2010 that every team in the National Hockey League had a developmental league affiliate in the American Hockey League which is based in the United States and Canada. More recently, collegiate basketball is seeing many of its top prospects opt to play in the NBA's "G League" rather than attending a major college or university (Zagoria, 2020). These trends are primarily due to the fact that these minor league athletes are being paid by the developmental leagues to play their sport. This contrasts with the NCAA (National Collegiate Athletic Association) where student athletes are not being paid a salary and are only receiving scholarships to attend the college or university. In 2019 the NFL debuted the AAF (Alliance of American Football). However, unlike the NBA's "G League" most of the talent needed to jump-start such a developmental league was still playing at the collegiate level. While the NFL may have had the right idea in attempting to start a developmental league, the debut of the AAF was likely premature. Once the best high school football players begin to choose the developmental league rout rather than college football, they may be able to revive the AAF. As this trend towards more developmental league teams continues, the location of their facilities and where they hold competitions becomes increasingly relevant.

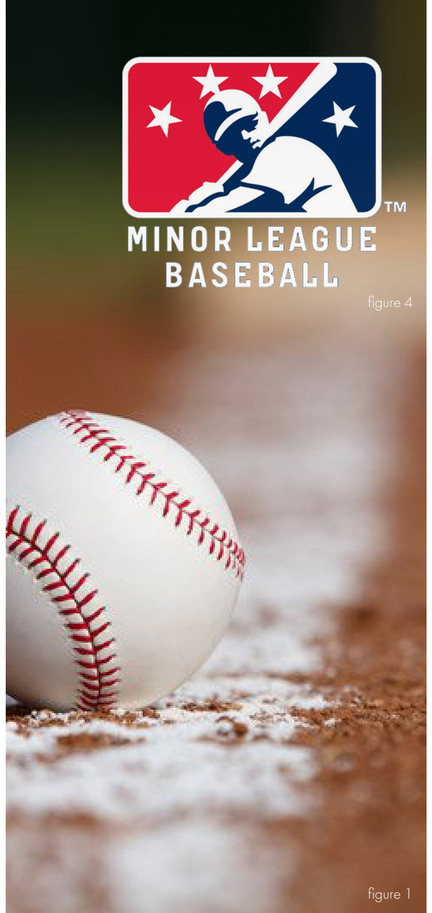


figure 4

figure 1

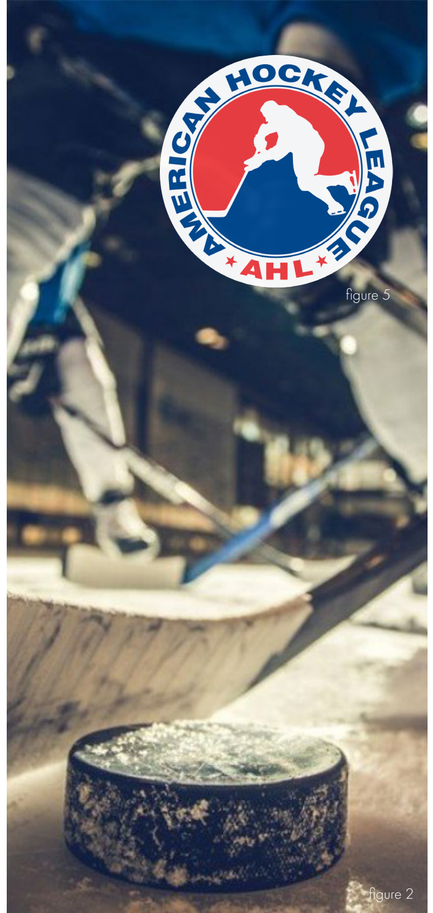


figure 5

figure 2

figure 6

figure 3

Economic Context

While major league professional sports will likely continue to dominate the larger market cities such as New York, Chicago, and Los Angeles, smaller market cities will be primed to make a bid for one of the emerging developmental league teams. However, there is much debate over whether cities should subsidize sports venues at all. From a strictly economic perspective, the subsidization of sports stadiums is unwise because the cities in which they are located rarely, if ever, recoup the taxpayer costs. In fact, 83% of the economists surveyed agreed that "Providing state and local subsidies to build stadiums for professional sports teams is likely to cost the relevant taxpayers more than any local economic benefits that are generated (IGM Forum, 2017)." One of the newer NFL stadiums is the $1.1 billion U.S. Bank Stadium in Minneapolis, MN, nearly half of which ($498 million) was taxpayer funded (Roper, 2016).

One of the primary reasons a professional team is able to elicit the amount of taxpayer funding it does is due to a team owners' negotiating power as a member of a premier pro sports league. This status gives the league monopoly power over the placement or relocation of league franchises in their sport allowing franchises to extract funds from communities that might otherwise enjoy considerable surplus of funds from hosting a franchise at a competitive price (Zimbalist, 2000).

While these billion-dollar stadiums create construction jobs, bring in tourism from out-of-state, and generate business for the surrounding neighborhoods, etc. all of this is still not enough to offset the staggering upfront costs. It is likely that most new professional sports stadiums have little to no positive economic impact on the city they reside in. Sports economist Michael Leeds' research suggests that even if all 5 professional sports teams based in Chicago decided to leave, the net economic impact would be less than 1 percent (Bergman, 2015). However, if the percentage of taxpayer investment in the sports venue was much more minimal, and if the project itself was more modest in scope as to serve a developmental league team rather than a professional team, then the often promised grandiose claims of becoming a catalyst for urban growth in a city may begin to ring true. My hypothesis is that sports complexes that are designed to intentionally engage the broader community throughout the year have the opportunity to become a catalyst for urban growth and economic development, two outcomes that must be carefully defined, within the surrounding neighborhood.

Growth and Development

There are many ways to approach strategic urban growth. One form that a downtown project can assume is that of an extension of the city center (Spreiregen 1965). Stadiums are often used as an anchor for surrounding development. By locating a sports stadium or sports architecture project just outside the city center it creates an attraction that draws business and economic development, thus expanding the cities' urban landscape and extending the city center. The catch however is most stadium projects, especially American football stadiums, act as a destination that only draws people to the stadium a handful of days out of the year due to the limited number of home games that are played during the season. In smaller market cities, to design an American football stadium so that it is utilized throughout the year, there must be an element of public access that allows for events such as farmers markets, outdoor concerts etc. to take place on the site. This engagement with the public also attempts to serve the existing community and address the unwanted dispersal of lower income residents that often results from the gentrification and economic development of neighborhoods.

Conclusion

Through precedent studies, interviews and quantitative research, I intend to explore how a sports complex with minimal public funding can be integrated into a city revitalizing its urban landscape and engaging the public and surrounding community by allowing for the maximum amount of public use when not being actively used by the developmental league team. This complex would embody the idea of live/work/play as it applies to sports in addition to serving as a destination on game days. Hopefully this research can be used to set a precedent for the typology which larger market professional teams could pursue in the future.

theoretical **premise:**

Philosophical Premise

Some of the philosophical questions that helped formulate my research were questions like; what drives the competitive urge? How has competition been integrated in to so many aspects of our culture? Is this why sports have become so important, particularly in American culture? How does an individual end up following a team so closely that they begin to refer to the team as "we"? These and other similar questions got me wondering what the future of sports and sports architecture might look like in the coming years.

Theoretical Premise

The theoretical premise I finally decided to investigate, came in the form of a question. The question was; Given the reality that sports stadiums are largely taxpayer funded, how can stadiums be conceptualized to blur the line between public and private space giving citizens maximum accessibility and utilization of the stadium so the city can see a return on its investment?

Strategies

In order to know the answer to my questions, I was going to need to employ some specific strategies in my research. In regard to my building typology, I relied on precedent studies (primarily successful ones) to understand how other designers tackled issues similar to the ones I would be facing. I also relied on the correlative research done by others in studies looking at the economic viability as well as social outcomes of stadium designs and sports based positive youth development camps. Through qualitative research I gathered information about my site and its surrounding context.

project **justification:**

This thesis project is important to me for multiple reasons. When I was young, I developed a love for sports and competition. The lessons I learned and values that I developed from participating in sporting activities (especially team sports), have served me well throughout my life and have shaped my character. I think my thesis topic is important because through design I hope to make participation in sports a reality for all, regardless of background or income level.

As sports are a staple of American culture and don't seem to be going anywhere soon, I want to investigate how a sports stadium could be constructed and financed in such a way as to aid in the revitalization of urban areas. As inequity is rising, especially in urban areas, I believe it is important that low-income communities have the same opportunities to participate in sports as those that come from wealthier communities. By ensuring that low-income and high crime areas have access to participation in sports provides them with an escape from a potentially unsafe home-life, help develop character, and provide much needed exercise to combat the obesity epidemic in disadvantaged youth.

Economically, my project is justified because I want to see cities receive a return on the taxpayers investment, both monetarily, and intangibly through the improved health and well-being of communities. The funds to build my proposed project will come from a developmental league team associated with an NFL franchise. As I see the NFL moving towards a developmental league model in the coming years (similar to the other "big four" sports in the U.S.), a developmental league franchise stadium and accompanying facilities could be funded through a public-private partnership. This would result in a facility that would serve both the team's needs as well as the public's.

As a profession, architectural design work (outside of pro bono work) often benefits the haves as opposed to the have-nots. I believe that is it imperative that architects find a way through design to aid in creating win-win solutions between the private and public markets that benefits the community as well as owner and investors.

project **themes:**

This thesis project will explore a number of different themes. The themes range in scale from the urban to the individual. The following themes drove much of my research and design exploration.

Expansion of the City Center - After researching the chosen site for my project, I realized there was an opportunity to expand the urban core of the city across the river that divides it. my project would serve as an end cap to the redevelopment of the east side of the city.

Economic Growth and Redevelopment - Given the financial burden that stadiums pose, it is imperative that any taxpayer money invested in a stadium complex project result in a return on the investment. One of the primary ways cities and specifically neighborhoods realize the return is through the economic growth and beautification of the areas surrounding the stadium.

Accessibility to the Public - Accessibility to the public was a primary theme. As stadiums are becoming more akin to cultural centers that are designed primarily for sporting events but can also be utilized by the public when not hosting games, I believe allowing the public to have maximum access results in a sense of ownership within the community and endears itself to the city.

Integration with the Park-scape - As an extension of accessibility, integrating the building with the landscape was important. I investigated what it would look like to blur the boundary between the building and the natural landscape by allowing the surrounding plaza and park space to bleed into the stadium incorperating it with the natural elements of the site.

Promotion of Health and Wellness - In keeping with the idea of sports, I wanted to incorporate the promotion of health and wellness into my project. This was accomplished by investigating ways to engage the public throughout the year and encouraging participation in recreational sports and other physical activities.

Iconic Design - Finally, I wanted to create a stadium that featured an iconic design that could serve as a landmark for the city as well as providing branding opportunities for the team and ownership.

Expansion of the City Center

Economic Growth and Redevelopment

Accessibility to the Public

Integration with the Park-scape

Promotion of Health and Wellness

Iconic Design

site identification

overview / selection / HDR proposal / analysis / character / climate

site **overview:**

The proposed site for the developmental league sports complex is located on the east side of the Des Moines River not far from the state capital building. There are many smaller market cities located throughout the Midwest that could potentially vie for a developmental league team in the future. However, Des Moines, Iowa would make sense as a landing spot for an American football developmental league team as the city is an underrated sports market. There are already three other developmental league teams located in Des Moines, Iowa that feed into other professional leagues. It is possible that in the future as more high school athletes choose to go the developmental league route, the Minnesota Vikings (an NFL franchise) could be looking to start a developmental league franchise in Des Moines. In fact, two of the three developmental league teams currently in Des Moines are affiliated with a pro team from Minnesota (Minnesota Wild and Minnesota Timberwolves).

neighborhood **selection:**

When deciding where to locate my thesis project within the city of Des Moines, I examined the different neighborhoods within the city. Of the 20 most dangerous neighborhoods in Des Moines, Iowa since the beginning of 2020, the Capital View South neighborhood ranked 13th (Area Vibes, 2020). The map on the following page shows the neighborhoods with the highest crime per capita since the beginning of 2020 (indicated in yellow). Locating the sports complex within the Capital View South neighborhood attempts to place the project near a group of neighborhoods that would benefit from an effort to revitalize the area through design without displacing the existing local community. The redevelopment effort would exist at both an economic level and a social/community level. Not only will the stadium complex be a catalyst for economic growth in the area, but also an opportunity to provide much needed social engagement and activities for youth in the area such as summer sports camps, and other structured physical activities.

figure 7

The city of Des Moines is divided up into 54 individual neighborhoods.

figure 8

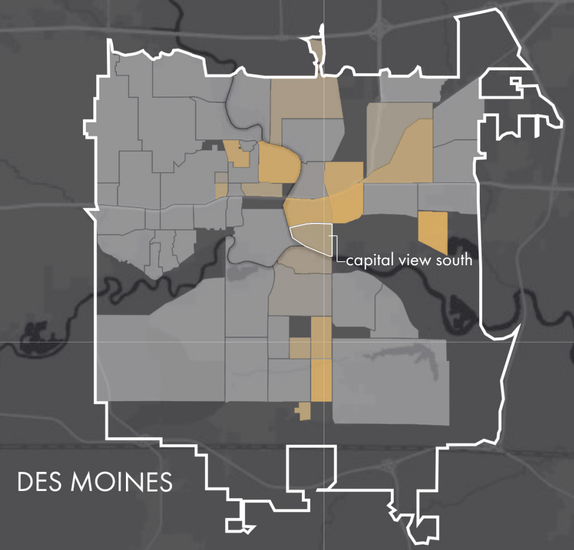
Des Moines was established in 1843 and is the county seat of Polk County.

Total Population: 216,853 people
Percentage by Age:
Under 5 - 6.7%
5 to 17 - 17.6%
18 to 24 - 10.5%
25 to 34 - 16.6%
35 to 54 - 25.1%
55 to 64 - 11.6%
Over 65 - 11.7%

Education Attainment of Adults:
High School Graduates - 86.1%
College Graduates - 25.8%
Attending College - 5.3%

Per capita Income:
Des Moines: $27,325
USA: $31,177
Median Household Income:
Des Moines: $52,251
USA: $57,652

Race and Ethnic Diversity:
White - 65.4%
Hispanic or Latino - 13.3%
African American - 10.9%
Asian - 6.5%
American Indian - 0.2%
Pacific Islander - 0.1%
Other - 3.5%



highest crime per capita

lowest crime per capita

HDR **proposal:**

Another major factor in the selection of my site was the investigation into HDR's proposed master plan for the industrial Market District, located east of the Des Moines River within the Capital View South neighborhood. The city's plan for the entire Market District could take more than 20 years to complete. The project is estimated to generate $55 million in new revenue over 20 years, including land sale and tax increment financing revenue generated by redevelopment. If developed according to the master plan, the Market District would have more than 3,400 housing units, about 210,000 square feet of office space and about 135,000 square feet of retail space. Part of the development plan provides affordable housing and public parking as well as a promise to build with high-quality materials like steel and concrete or mass timber, an eco-friendly product, throughout the 39-acre project (Norvell 2020). Des Moines has a beautiful downtown west of the Des Moines River but the neighborhoods to the east are poised for an expansion of the city center which I believe a vibrant sports complex could help to solidify. This master plan proves that the city is ready for urban expansion.

figure 9

figure 10

site **analysis:**

The site is comprised of 29.5 acres of primarily undeveloped land located just south of the state capital building. The built area will cover approximately half the site (15 acres). Included in the built area will be the stadium, community center, team practice facility and team practice fields. Currently they are zoned as DX2, DXR (Downtown) and I1(Industrial). I am proposing a rezoning that allows the entire site proper to be zoned as DX2.

I also investigated the soil composition of my site. There are only three different soil types within the bounds of the area. Nodaway Silt Loam (220), Urban Land (4000), and Nodaway Urban Land (4220). Both Nodaway Silt Loam and Nodaway Urban Land are classified under the Nodaway series of soils. They consist of very deep, moderately well drained soils. Slopes range from 0 to 5 percent. While my site is within the floodplain, it only has a 0.2% yearly chance of flooding putting it into the 500 year flood zone.

In addition, there is quite a lot of vegetation on and around my site. My site proper is located at the north east end of the HDR Market District proposal, most of which is slated to be a public park. The rationale is that locating my project in the park will not detract from the rest of the development that is part of the proposal. Furthermore, my goal is that the stadium can be integrated into the landscape in such a way as to merge the stadium and the park-scape into a unified landscape blurring the line between the built environment and the natural landscape of the urban park. As part of my design, there will be access to ample park space where people can congregate before and after events. Although my project will serve as en extension of the city core, I want the park space to not just be a concrete plaza but to have a sense of biophilia and connection to nature. I will also be maintaining most, if not all, of the tree line that serves as a buffer between my site and the adjacent train tracks.

The primary way the site is accessed is from Martin Luther King Jr. Parkway which is a divided thoroughfare running along the site to the south. Martin Luther King Jr. Parkway has two lanes of traffic in each direction along with dedicated bike lanes. There is also a pedestrian sidewalks on either side of Marin Luther King Jr. Parkway which allows for direct pedestrian access to my site park-scape and plaza that will surround the stadium complex.

Site Proper

Address:
309 SE 9th Street
Des Moines , Iowa 50309

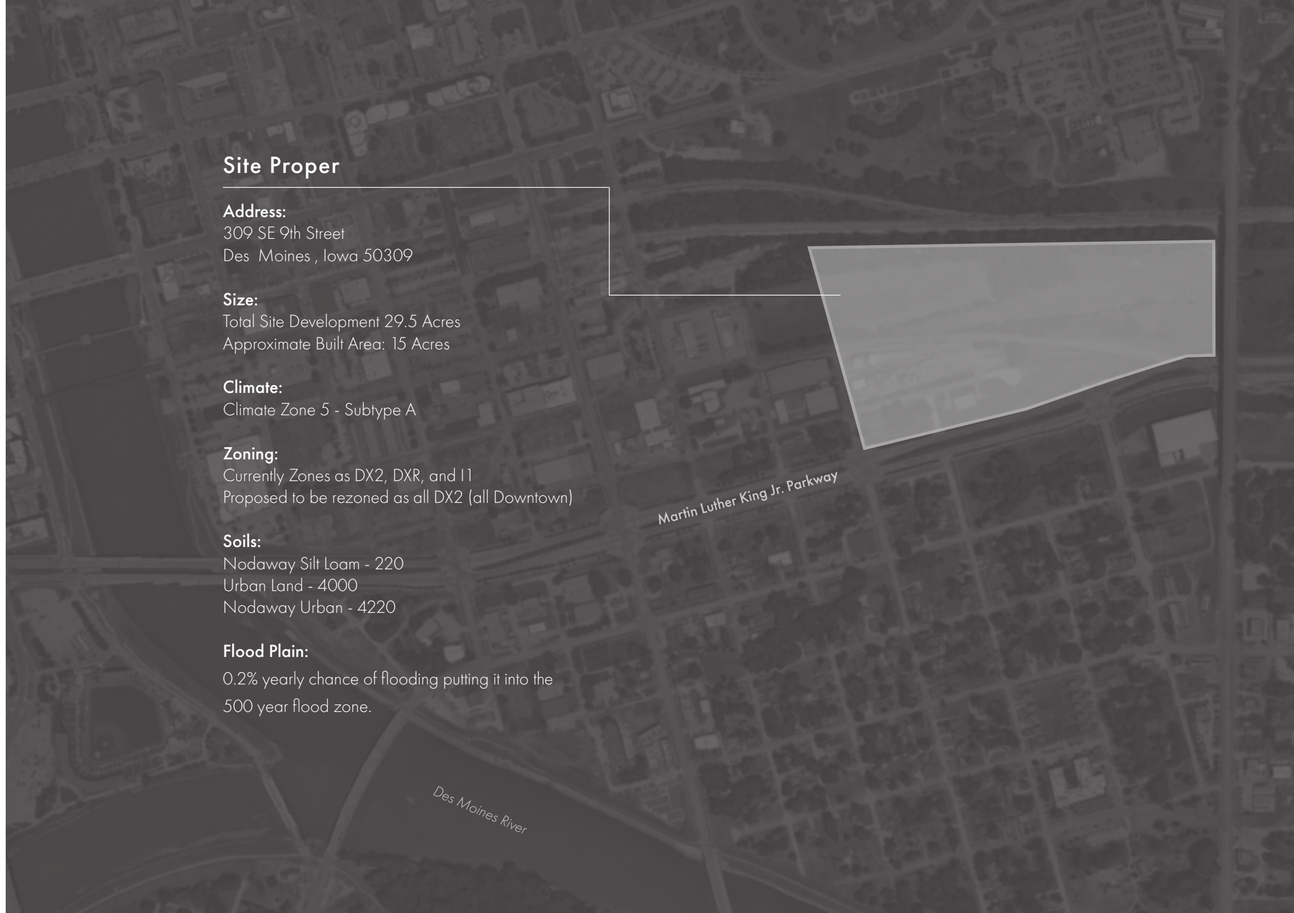
Size:
Total Site Development 29.5 Acres
Approximate Built Area: 15 Acres

Climate:
Climate Zone 5 - Subtype A

Zoning:
Currently Zones as DX2, DXR, and I1
Proposed to be rezoned as all DX2 (all Downtown)

Soils:
Nodaway Silt Loam - 220
Urban Land - 4000
Nodaway Urban - 4220

Flood Plain:
0.2% yearly chance of flooding putting it into the 500 year flood zone.



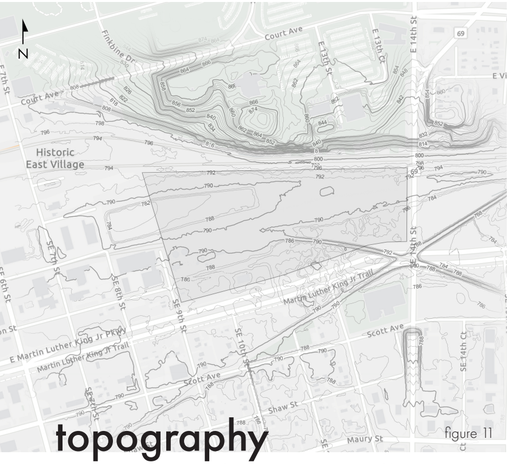


figure 11

topography

My site proper is mostly flat. There is less than a fifteen feet difference in elevation from the highest point on my site proper to the lowest. Being that the site is nearly 30 acres, the fifteen foot change in the topography goes largely unnoticed. As can be seen in the map above, my site sits at the foot of a hill where many civic buildings, including the state capital building, are located. Some of the steepest sloping on my site can be seen along the area where the earth is built up to support the existing train tracks (to be removed) that cut through my site.

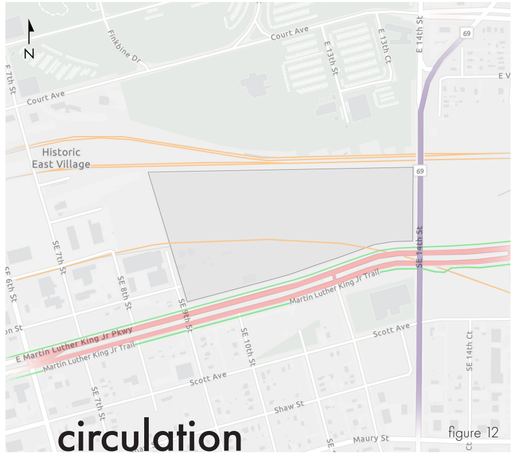


figure 12

circulation

The site is wedged between a two lane parkway, a raised highway, and a set of train tracks. Another set of train tracks also cuts through my site only to come to a dead-end about five blocks west of my site. There are pedestrian sidewalks on either side of Martin Luther King Jr. Parkway. With the construction of my project I am proposing an extension of the urban transportation system to connect to my site. I will also be proposing a larger network of biking/walking paths around my site to increase foot traffic.

- Two Lane Highway
- Parkway with Median
- Sidewalks
- Train Tracks

figure 13

views

The views of my sight will largely be coming from downtown as people take transportation from the center of the city out to where my site is located. Thus the primary approach will be from the southwest as one travels east along Martin Luther King Jr. Parkway. In addition to views of the site, there are interesting opportunities to frame views of both the downtown skyline as well as the state capital building to the north.

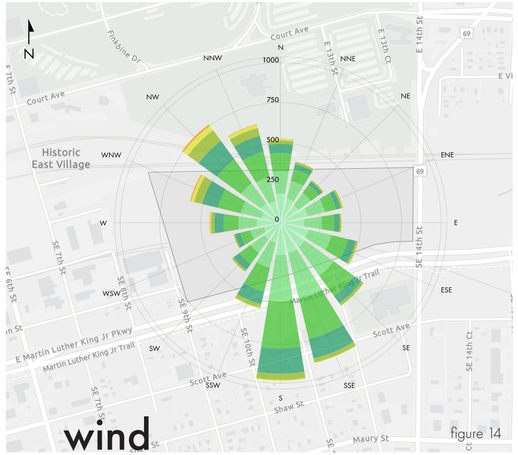


figure 14

wind

By overlaying a wind rose on my site map, I can show how many hours per year the wind blows from the indicated directions. Most of the time the wind is generally coming from the northwest and the south. Over the course of the year, southern winds are blowing for nearly 1000 hours; however, the high speed winds tend to come from the northwest direction. The wind rose will be effective in helping orient building masses and trees in order to serve as buffers to the harsher winds.

- > 0mph
- > 3mph
- > 7mph
- > 12mph
- > 17mph
- > 24mph
- > 31mph
- > 38mph

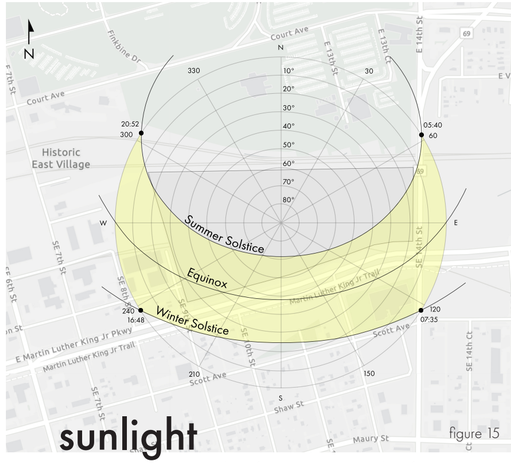


figure 15

sunlight

When designing an outdoor facility or any building for that matter, taking sun angles and hours of daylighting into consideration is important. It is especially important when designing a sports stadium because the orientation can have a direct effect on the game. Games are sometimes played in the evening hours when the sun is at a lower angle. It is also helpful to keep in mind the times of sunrise and sunset for both the summer and winter solstices. As the figure shows, during the summer solstice the sun rises at 5:40am and sets at 8:52pm. During the winter solstice the sun rises at 7:35am and sets at 4:48pm.

site **character:**

The site is quite underdeveloped, as the images show, and is currently not connected in any way to the urban fabric of the city. The few industrial looking buildings on the site belong to the asphalt contractor Bituminous Materials. In addition to the few buildings, there is a train track that cuts across the site. This will likely need to be relocated to join up with the train tracks that run along the foot of the hill that leads up to the state capital building. Outside of the asphalt company and the train tracks, the site has a rather rural feel to it.

The top image is taken from Martin Luther King Jr. Parkway looking northeast (figure 17). The middle image is taken from the raised highway along the east end of the site. In the distance both the state capital building and the skyline of downtown Des Moines is visible (figure 18). The lower image is taken from the site proper near the asphalt plant looking down the set of tracks that cut through the site (figure 19).

Currently the site seems very disconnected from its surroundings. It is oddly rural for being surrounded by downtown buildings, civic buildings, and residential neighborhoods on nearly all sides. While the site as it sits right now is pretty uninspiring, there is certainly potential to turn it in to a destination space that can act as a way to extend the city center bringing the core of downtown Des Moines across the river. A sports complex that engages the community would certainly be a first step in revitalizing and developing this areas of Des Moines.

figure 16


figure 17


figure 18


figure 19

region **climate:**

As defined by the ASHRE climate zones, my site falls within what is considered a cold climate. A cold climate is defined as a region with between 5,400 and 9,000 heating degree days (65°F basis). The Building America cold climate corresponds to the IECC climate zones 5 and 6. As seen on the climate zone map (figure 20) Des Moines, Iowa falls within the climate zone 5 subtype A . The subtype simply meaning that it is moist and not dry like the Rocky Mountains or marine like the pacific coast.

In Des Moines, snowfall is light compared to the amount received in other states to the north and east. Snow cover seldom remains throughout the winter months; however, heavy snowfalls have occurred in Iowa in late autumn and early spring. Summers are warm and more humid. However being that it is land locked and not near any of the great lakes, the average humidity rarely gets above 80%.

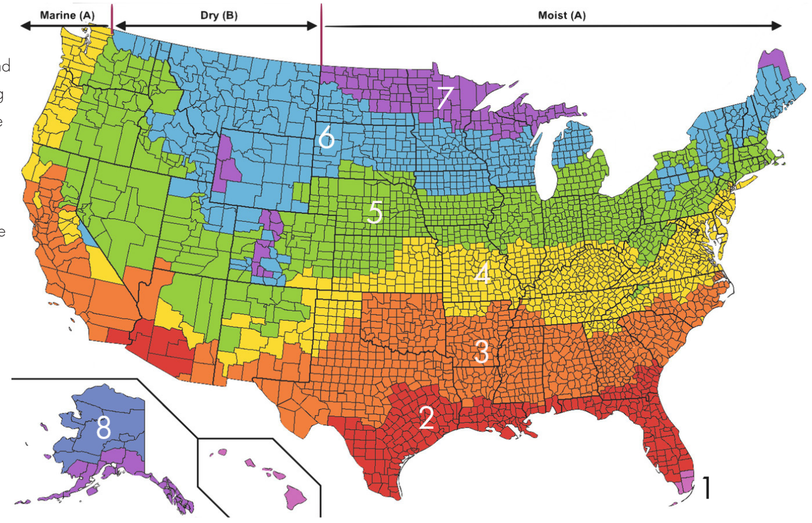


figure 20

Precipitation is seasonal, falling mostly in the late spring and summer (figure 23). The annual average rainfall ranges from less than 26 inches in the northwest to more than 38 inches in the southeast part of the state. Iowa as a whole has experienced severe flooding as a result of rapid snow melt and heavy summer rainstorms. The risk of flooding has increased with the tilling of farm fields and the straightening of some rivers and streams.

figure 21

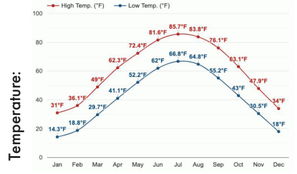


figure 22

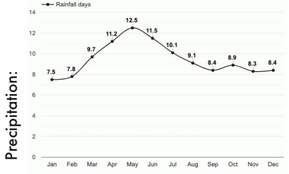


figure 23

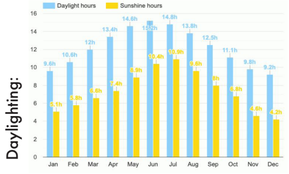


figure 24

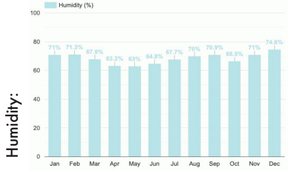


figure 25

context

social context / cultural context / historical context / typological advancement

social **context:**

Tailgating:

As stated previously, since the rise of television and streaming services, curating the game day experience has become increasingly important to stadium designers. One of the beloved game day activities that makes attending a game special is tailgating. People like to tailgate and grill out sharing a meal with friends and their fellow fans before the game starts. Sometimes fans who are not going to the game will turn out just to tailgate. The social atmosphere and camaraderie that is cultivated in the parking lot is then carried into the stadium.

Team Pride:

Another social aspect of the stadium atmosphere is the sense of team pride. Today sports teams often represent schools, universities, cities, regions, and even countries. While often irrational, the sense of team pride can bring people rooting for the same team closer together. This phenomenon can cultivate a sense of community. Through team pride, people will observe and engage in traditions they associate with being a fan of the team. For individuals, there is also evidence that feelings of pride can be linked to the enhancement of one's self esteem (Gordon 2019). There is certainly an element of enjoyment and pride in participating in and rooting for something larger than oneself. This can be seen in the behavior of stadium crowds.

The Crowd:

The United States is a very individualistic society. As such, there are fewer situations where people will feel as if they are part of a broader community or crowd. Large group events like concerts, and sporting events are some of the few times in American culture that people gather in such large groups. There is a unique power that comes from multiple voices joining in together in unison. One tangible way this effect is experienced is through a phenomenon dubbed "home field advantage". There is a psychological effect opposing teams face when fans yell and cheer in unison making so much noise that the they cannot hear to communicate with each other. The effect of crowd noise can sometimes be a determining factor in the outcome of a game.

figure 26

figure 27

figure 28

cultural **context:**

Physicality of the Sport:

Sports culture is certainly alive and well in the United States. American football has a special place in popular culture as it has overtaken baseball as the "American pastime" for some years now. Interestingly enough, in some ways it is a resurgence in the popularity of a more physical sport as there are some who see many similarities between American football and gladiatorial games of the Roman Empire. Garret Fagan, an associate professor of Classics and Ancient Mediterranean Studies and History at Penn State points out that both American football and gladiatorial matches both involve violet displays before a massive, cheering audience. Fagan believes that theses and other similarities suggest a deeper connection. The psychological and cultural lure remains much the same. The distance between the Roman gladiator arena and the modern American football stadium is not as far as we might think (Hicks 2009).

Improved Safety of the Game:

Even though American football is tame compared to gladiatorial matches, there are still plenty of health risks. In recent years, there have been increased efforts to make the game of football safer. Over the years rules have been changed to enhance player safety. In addition technology and equipment companies are putting recourses towards developing new and improved equipment to project players, especially from head-related injuries such as concussions. For example, researchers at UCLA are developing a energy-absorbing microlattice material, called Architected Lattice, that could potentially replace the foam inside football helmets and absorb some of the energy from collisions (Kubota 2016). While it is still inherently a violent sport, steps are being taken to make the future of the game one that can remain a staple of American culture for years to come.

historical **context:**

History of Stadium Typology:

For millennia, sports stadiums have served as a place for the community to congregate and were spectators can marvel at the athletic accomplishments of their countrymen. From the Panathenaic Stadium and Colosseum of ancient Greece and Rome to the Bird's Nest of Modern Olympic Stadium of modern China, stadiums are held dear in the hearts of their people, often becoming architectural icons of the civilizations that build them (Karikari 2017). Long before television and the internet revolutionized the way we consume sports, the only way to experience athletic entertainment was to go to attend the competition in person. The oldest stadiums were designed to host the track and field competitions of the Olympic Games in ancient Greece one such stadium that still stands today is the Panathenaic Stadium. In the Roman Empire, both the Colosseum and Circus Maximus gained a reputation for their trilling and sometimes deadly sport (Karikari 2017). In many ways these ancient stadiums still serve as a blueprint for the modern stadiums we see today.

Innovations in Stadium Design:

The fall of the Roman Empire led to a centuries-long hold on stadium innovation. Few, if any, sports stadiums were constructed during the dark and Middle Ages. It would not be until sports like cricket, soccer, football, and baseball became popular that the public would again call for stadium construction. The English began to revive the art of stadium construction in the late nineteenth and early twentieth centuries (Karikari 2017). These English designs were the beginning of the rise of the modern stadium.

After World War II, team sports with fans cheering for team that represented their cities or regions gained popularity. The stadiums of this era were characterized by the domed multi-purpose stadium hosting primarily football and baseball games. By the 1980's the broadcasting of games on television changed the typology further by allowing more people to view the games than ever before. Stadium design shifted to prioritize the experience of the fan to compete with TV broadcasts. Starting in the mid 2000's we have seen another shift as stadiums become more environmentally conscious as they pursue sustainable practices (Daemmrich 2020).

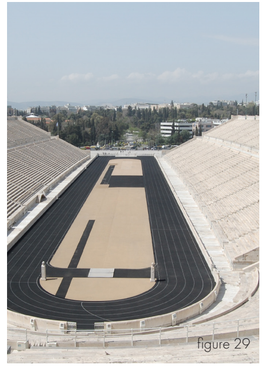


figure 29

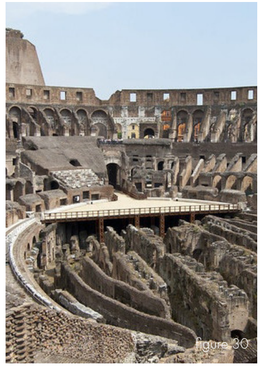

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figure 31

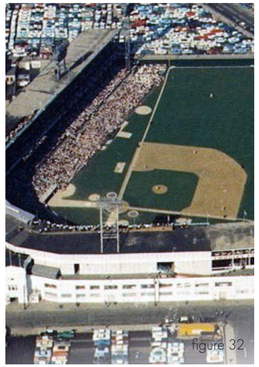
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figure 33

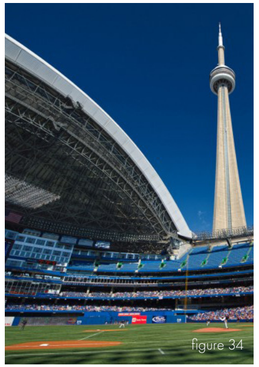
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figure 35

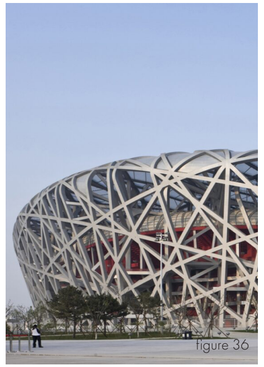


figure 36

566 B.C.

Panathenaic Stadium

Athens, Greece

It was originally a natural amphitheater utilizing a horseshoe shape that brought crowds closer together and amplified sound. Its design remains influential to this day.

80 A.D.

The Colosseum

Rome, Italy

The stadium's Hypogeum (a network of substructures beneath the stadium used for dynamic entrances) was the precursor to modern locker rooms.

1908

White City Stadium

London, England

It was built for the 1908 Olympics and featured the first steel frame skeleton design which was less expensive and quicker to construct compared to stone or concrete.

1912

Crosley Field

Cincinnati Ohio

An array of 632 floodlights extended baseball and the fan experience into the evening starting in May of 1935. Soon after, other stadiums install similar lighting systems.

1965

Houston Astrodome

Houston Texas

It ushered in an era of enclosed domed stadiums. The multi-purpose design could seat 60,000 fans and was the first stadium with air conditioning and artificial turf.

1989

Skydome

Toronto, Canada

It featured the first working retractable stadium roof. The lower level bowl seating was built on a track system to shift with transitioning between different sports.

1992

Camden Yards

Baltimore, Maryland

It incorporated historical elements and played a role in urban renewal. The stadium was part of a redevelopment plan to bring suburban resident back to the urban area.

2008

The "Bird's Nest"

Beijing, China

It was one of the first high profile stadiums aimed at energy efficiency and sustainability. It utilized geothermal heating and cooling and had a rainwater recycling system.

what is next?

typological **advancement:**

When looking to the future of the stadium typology, I came across an article in Architecture Magazine's 2019 August addition. The article entitled "Raise Your Game" looked at the future of stadium architecture and how leaders in the stadium design space such as POPULOUS and WilkinsonEyre are advancing the typology. The article posed a question regarding how stadiums can be designed to serve communities. One of the designers featured in the article was architect Christopher Lee of POPULOUS who had a hand in the Tottenham Hotspur stadium project. Some of his comments struck me regarding the Tottenham Hotsper project as well as stadiums in general, specifically in their relation to both the urban fabric and their significance to their communities. Christopher states "I believe stadiums have taken on a much more civic connotation recently. They are much more akin to a town hall now; a place for communities to own... stadiums are once again taking their rightful place right at the heart of communities, alongside busy high streets and amongst people's homes."(Bacon 2019) My project attempts to incorporate this community centered approach into the stadium design.

figure 38

figure 39

Christopher Lee | POPULOUS

"I believe stadiums have taken on a much more civic connotation recently. They are much more akin to a town hall now; a place for communities to own."

"...stadiums are once again taking their rightful place right at the heart of communities, alongside busy high streets and amongst people's homes."

precedent studies

TCO Center / CHS Field / Commonwealth Center / Yongzhou Sports Park / takeaways

precedent **studies:**

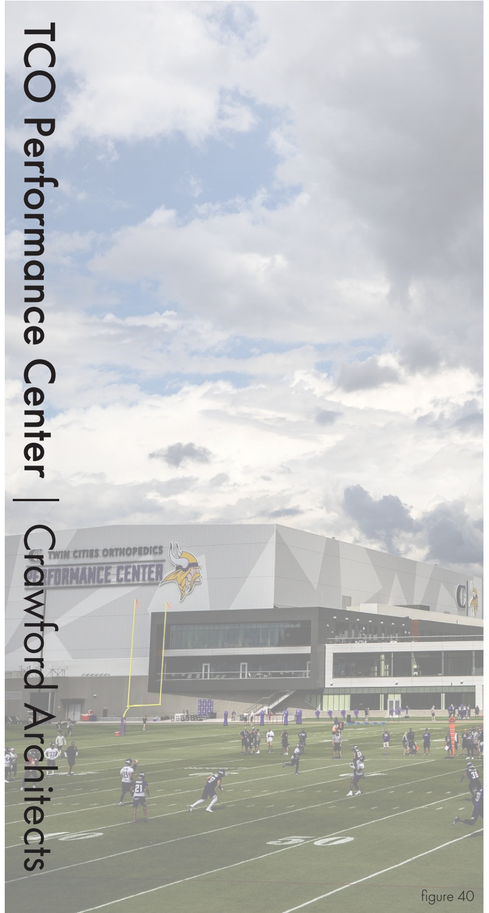
Project Typology: Medium to large scale public and private projects

Location: Urban and suburban

Sustainability: LEED certification, Minnesota's B3 standards, solar energy, gray water system

Design: Modern dynamic expressions of contemporary sports architecture

All four precedent studies were choses specifically for their integrated relationship with the surrounding community in addition to being a sports architecture project. The first two case studies are first and foremost a sports stadium/facility for a private entity while also attempting to engage the public through the architecture and surrounding landscaping and park space. The later two case studies are primarily public oriented providing recreational facilities, as well as fields and courts to the public. All four case studies are examples of user oriented design that are also aesthetically appealing modern sports architecture complexes.

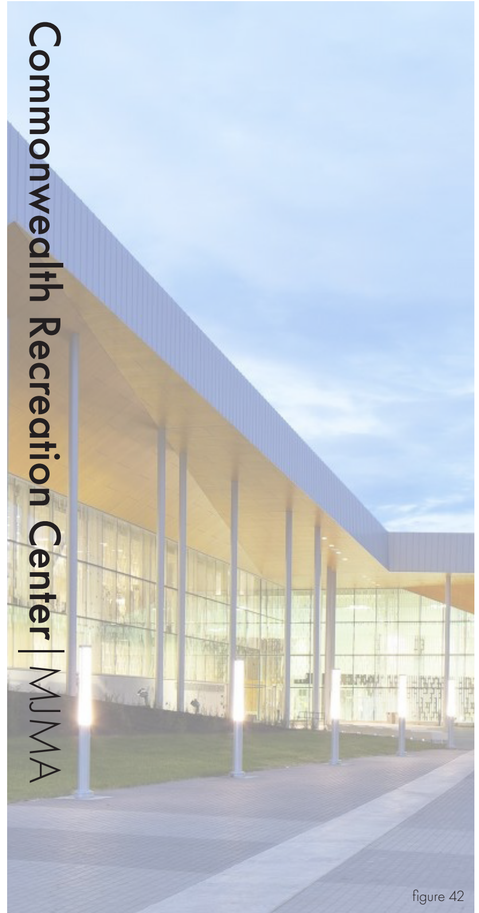


TCO Performance Center | Crawford Architects

figure 40

CHS Field | Snow Kreilich Architects

figure 41



Commonwealth Recreation Center | MJMA

figure 42

Yangzhou Sports Park | PT Architecture Design

figure 43

TCO Performance **Center**

Typology: Sports Architecture
Location: Eagan, MN
Lot Size: 277,000 ft² Built Area
Architect: Crawford Architects
Status: Completed 2018

Summary: TCO Performance Center, the Minnesota Vikings' world-class training facility in Eagan, Minnesota consists of 277,000 gross square feet of office and training facilities. It was constructed only two years after the Minnesota Vikings finished building U.S. Bank Stadium in downtown Minneapolis. Not only do the Vikings' staff use the facility on a daily basis during the football season, but state high school sports are able to utilize the stadium at TCO for the state high school football tournament as a neutral site for games.

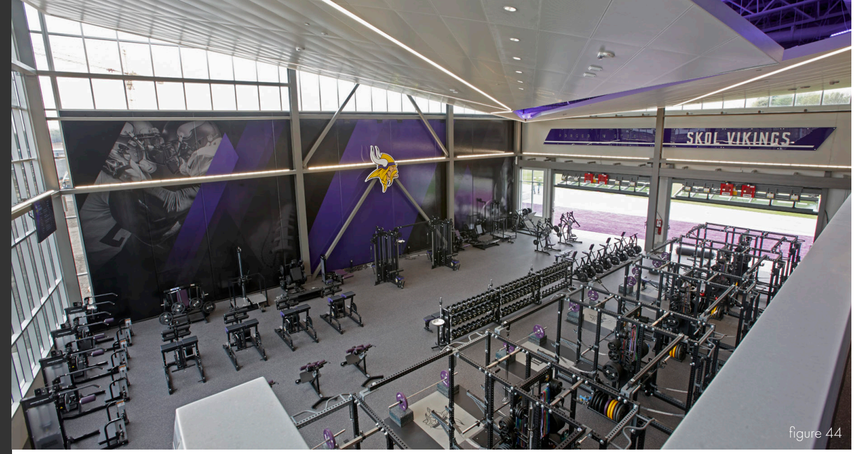


figure 44


figure 45

Program Elements

TCO Perfromance Center includes: four outdoor football fields, a full-size indoor football field with a 6,000-seat stadium, player position meeting rooms and team auditorium; expanded locker room, weight room and equipment facilities. Along with state of the art cardiovascular and specialized speed rooms, a hydrotherapy room, and post-workout recovery rooms; a broadcast studio and media center; and administrative offices for Vikings staff (KrausAnderson 2020).

Social Effects

While it is often difficult to quantify the social effects of a work of architecture, what is evident however, is the difference in the ability of the public to access the plaza and park space at the TCO Performance Center as opposed to the Vikings old facility at Winter Park which was built in 1981. TCO Performance Center in Eagan has the outdoor space to host events and engage with fans who come out to watch training camp in August. Prior to the TCO Performance center being constructed, the Vikings annual training camp was located in Mankato, Minnesota over an hour away from the Twin Cities. Now they can hold their training camp closer to home where the majority of their fans are located.

Economic Effects

Much of the economic effects of TCO Performance Center are still to come. There are plans for the area around TCO and Viking Lakes to be developed in years to come while preserving swaths of green space and wetlands that will be connected by public trails. There are proposals to include commercial office, residential, retail and restaurant spaces as well as a hotel/conference center (Peters 2017). It is encouraging to see that a sports complex can attract new development and jump-start economic development for the surrounding community.

Geometry

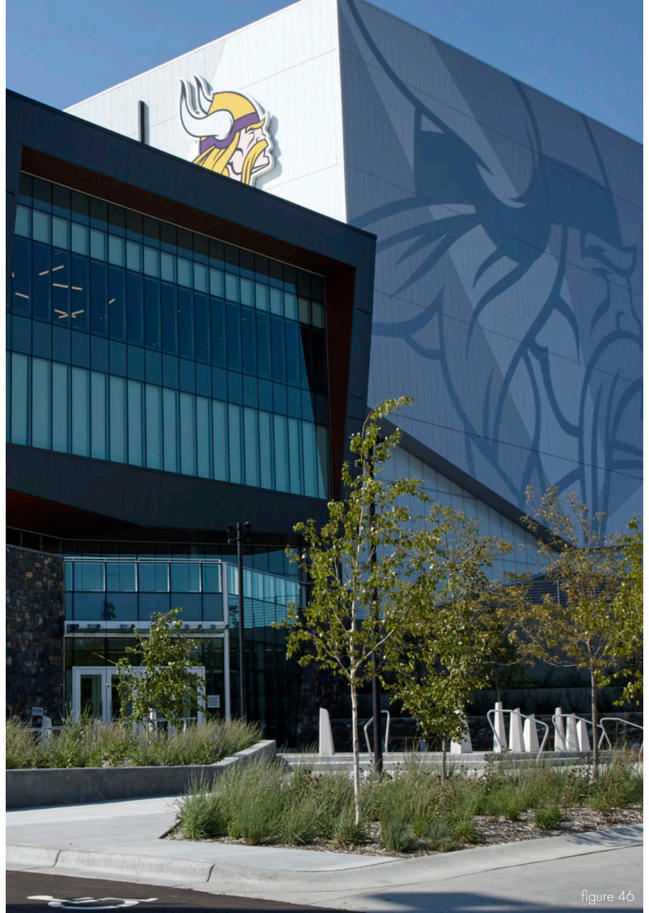
The design team for the TCO Performance Center drew upon the Nordic history of Vikings and paid homage to the teams namesake. The floor plan of the TCO Performance Center proper looks vaguely like a Viking hatchet (figure 10) with the "blade" of the hatchet will be a 6,145-square-foot weight room where "iron will sharpen iron" (Peters 2017).

Landscape

The majority of the public landscaping elements are just to the north of the Vikings Museum and the Vikings Locker Room Store. This landscaped area consist primarily of what is branded as the "Gameday" Plaza and the Upper Plaza which leads to the stadium gate. Most of the activity happens during training camp, but there are year round events as well.

Conclusion

I chose the TCO Performance Center as a precedent because I am trying to provide a similar function only at a smaller scale that would be appropriate for a professional football developmental league team. I also think an important takeaway is that while TCO Performance Center currently functions as a destination, as commercial offices, residential buildings, retail and restaurants begin to go up around the facility, the area will seem less like a destination as there will likely be activity going on at all hours of the day. This growth however takes time to develop which is where an element of urban master-planning comes into play.



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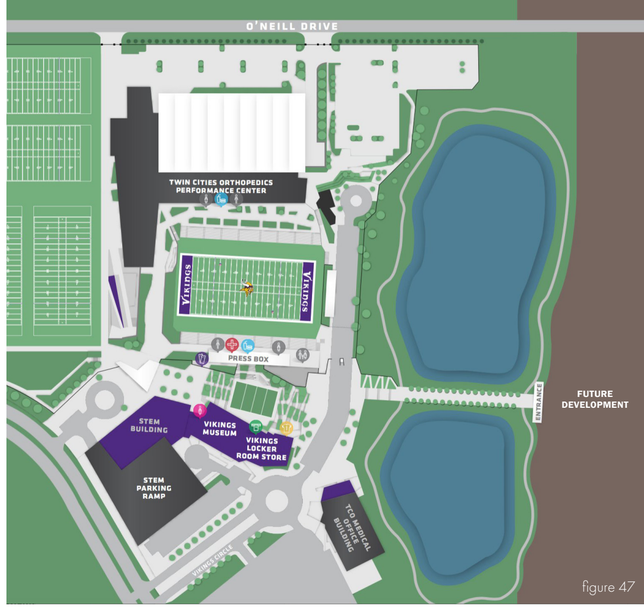


figure 47

figure 48

CHS **Field**

Typology: Sports Architecture
Location: Saint Paul, MN
Size: 347,000 ft²
Architect: Snow Kreilich Archiects
Status: Completed 2015

Summary: CHS Feild is home to the St. Paul Saints minor league baseball team (not affiliated with the MLB). the ballpark located near, but not in, Saint Paul's historic Lowertown District, a collection of early 1800 warehouse structures, The sleek low ballpark offers powerful views to the surrounding truly historic structures, locating the experience within the district. CHS Field sought to change historic design discourse towards a more critical assessment of contextual relationships, needs and opportunities. (ArchDaily).

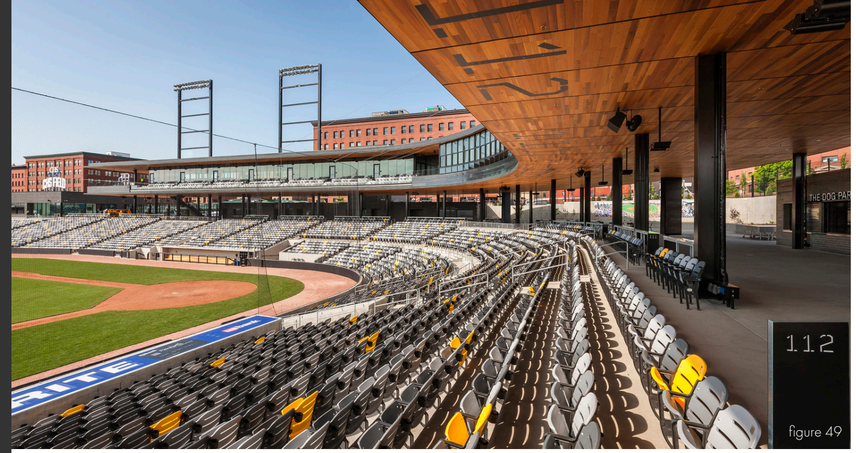


figure 49


figure 50

Program Elements
The program elements of CHS Field include a baseball field, ticket/team store/offices, terrace, concourse, concessions, public art gallery, press box, suites, craft beer corner, grass seating berm, kids corner, and dog park.

Social Effects
As stated by Snow Kreilich Architects CHS Field was conceived first as a park and a public space, and then as a sports venue. Being that it operates as a public space, it offers social engagement opportunities as well as a civic and district identity. The design maximizes the social opportunity of the site and is accessible physically with a level concourse which surrounds the playing field and the seating bowl. The concourse also offers social engagement opportunities as fans walk around the park while enjoying the game. These interactions can be programmed or un-programmed encounters (Arch Daily 2020)

Economic Effects
By providing ample revenue generating spaces, the design assists the team in creating affordable entertainment for all income levels (Arch Daily 2020). While St. Paul, Minnesota is certainly not an undeserved development, it is less affluent than it counterpart, Minneapolis. This gives lower income families the chance to experience a professional game without having to "break the bank".

Geometry

The identity of the ballpark is closely aligned with a sense of place, connecting the ballpark experience with the district and the city skyline through the porosity of structure. The structure is minimal and elegant which conveys an element of transparency. The porosity, lightness, and openness of the ballpark architecture adjacent to the district's massive brick warehouses creates a memorable contrast (Arch Daily 2020).

Cityscape

The design team slipped a 7,000 seat ballpark into a remnant site between an interstate highway, an elevated bridge, a light rail operations facility and the historic Lowertown District on the edge of the city's business district. The main entrance of the ballpark frames the termination of Fifth Street, creating an important connection with the city core of downtown St. Paul (Arch Daily 2020).

Conclusion

I can appreciate the way that the design team for the CHS Field project approached the design as a park and public space before addressing the stadium aspects. I also admire the minimalist aesthetic that exudes from the ballpark. The suite/press/club level structure floats above the grounded seating bowl and masonry concourse amenity buildings allowing for a visual connection from outside the stadium all the way into the baseball diamond. I can also respect the way the concourse offers social engagement opportunities during the game. As a part of my project, I hope to find a way to utilize concourse space year-round.

NORTH SITE SECTION

A Stair Tower
B Broadway Street
C Locker Rooms/Team Support/Commissary Support
D Concourse Level
E Concessions/Restrooms
F Public Art
G Club
H Press Box
I Suites
J Craft Beer Corner
K Special Event Lawn
L Grass Seating Berm
M Bullpens

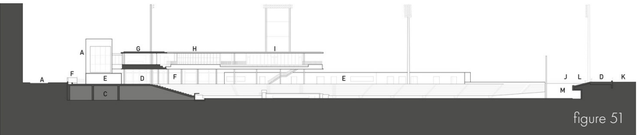


figure 51

WEST SITE SECTION

A Tickets/Team Store/Offices
B Terrace
C Locker Rooms/Team Support/Commissary Support
D Concourse Level
E Concessions/Restrooms
F Public Art
G Club
H Press Box
I Suites

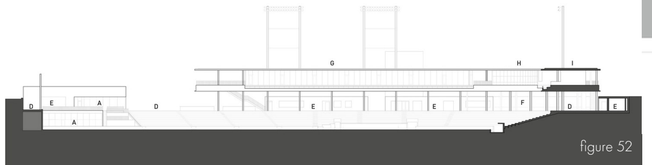
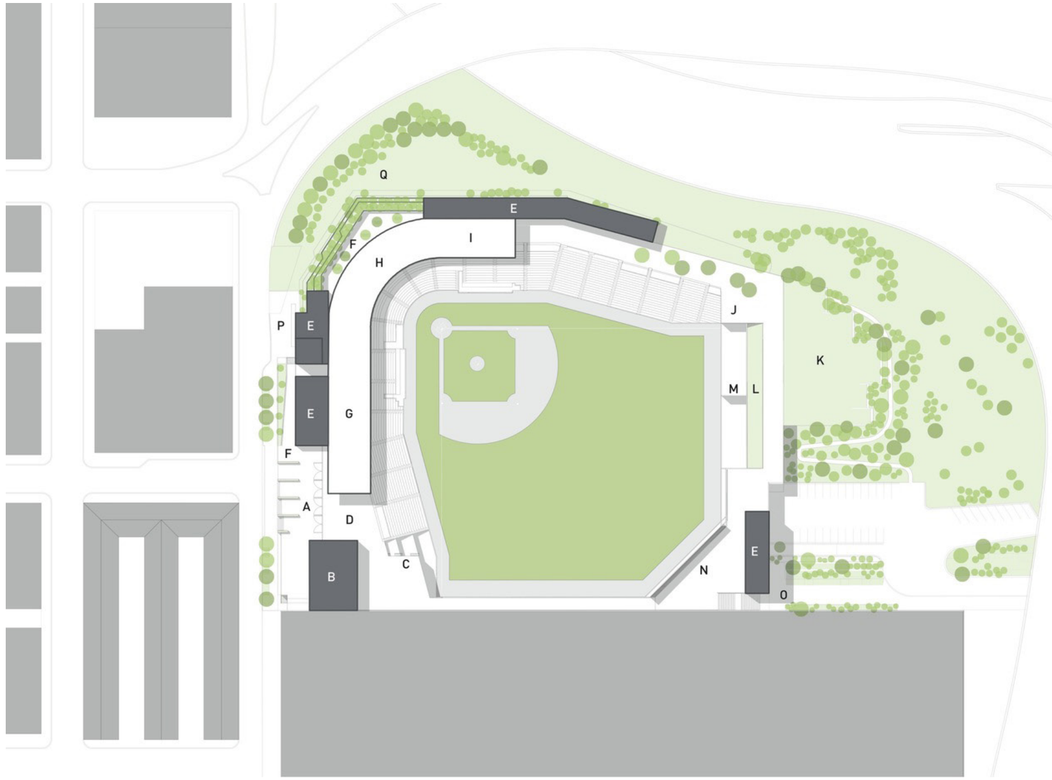


figure 52



SITE PLAN

A Entry Gates
B Tickets/Team store/Offices
C Terrace
D Concourse Level
E Concessions/Restrooms
F Public Art
G Club
H Press Box
I Suites
J Craft Beer Corner
K Special Event Lawn
L Grass Seating Berm
M Bullpens
N Kids Corner
O East Entrance
P Bike Racks
Q Dog Park

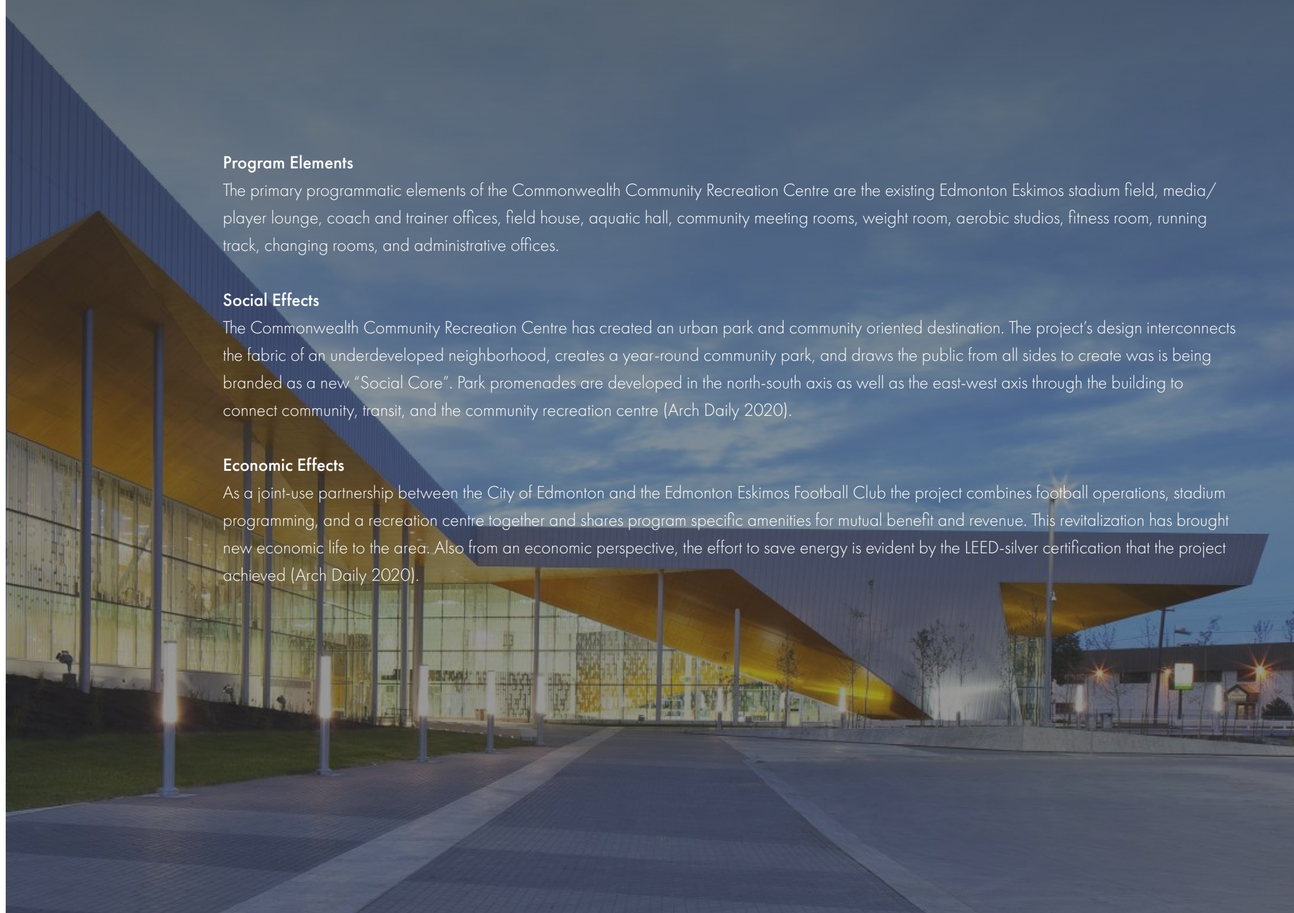
Commonwealth Community **Recreation Center**

Typology: Sport Architecture/Community Center
Location: Edmonton, Canada
Size: 220,000 m²
Architect: MacLennan Jaunkalns Miller Architects
Status: Completed 2012

Summary: The Commonwealth Community Recreation Center is a joint-use partnership between the City of Edmonton and the Edmonton Eskimos Football Club of the Canadian Football League; combining football operations, stadium programming, and a recreation centre. The project is designed to allow partnering yet diverse groups to share their programs fostering interaction between people who might not otherwise meet. The project has revitalized a vacant stadium ground into a 24/7 urban park and community destination (ArchDaily).

figure 53

figure 54



Program Elements

The primary programmatic elements of the Commonwealth Community Recreation Centre are the existing Edmonton Eskimos stadium field, media/player lounge, coach and trainer offices, field house, aquatic hall, community meeting rooms, weight room, aerobic studios, fitness room, running track, changing rooms, and administrative offices.

Social Effects

The Commonwealth Community Recreation Centre has created an urban park and community oriented destination. The project's design interconnects the fabric of an underdeveloped neighborhood, creates a year-round community park, and draws the public from all sides to create was is being branded as a new "Social Core". Park promenades are developed in the north-south axis as well as the east-west axis through the building to connect community, transit, and the community recreation centre (Arch Daily 2020).

Economic Effects

As a joint-use partnership between the City of Edmonton and the Edmonton Eskimos Football Club the project combines football operations, stadium programming, and a recreation centre together and shares program specific amenities for mutual benefit and revenue. This revitalization has brought new economic life to the area. Also from an economic perspective, the effort to save energy is evident by the LEED-silver certification that the project achieved (Arch Daily 2020).

Economic Effects

As a joint-use partnership between the City of Edmonton and the Edmonton Eskimos Football Club the project combines football operations, stadium programming, and a recreation centre together and shares program specific amenities for mutual benefit and revenue. This revitalization has brought new economic life to the area. Also from an economic perspective, the effort to save energy is evident by the LEED-silver certification that the project achieved (Arch Daily 2020).

Geometry

The spacial relationship of the design is seen in the primary masses of the Field House, Aquatics and Gymnasium (green, blue, and red respectively in figures 21-24) and respond to the dynamic triangulated geometries of the site and frame a central lobby space - 'the Social Heart'. These in turn define three exterior forecourt spaces (Arch Daily 2020). The orientation of the building masses creates a sense of positive and negative space when viewing the building in plan. The "in between" space reads as circulation space or at least a place of temperance whereas the building masses of the field house, aquatics center and gymnasium read as destination.

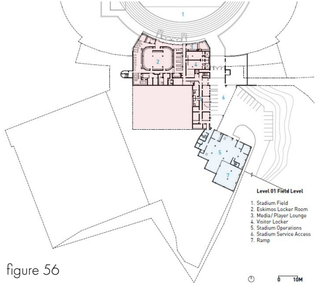
Landscape

The facility adaptively reused the 1978 stadium fitness centre and connects these usergroups over 4 stories through a cascading promenade and an innovative approach to materials and transparency (Arch Daily 2020). This idea of transparency and liberal use of glazing on the exterior of the field houses connects the space visually to the outdoors.

Conclusion

The Commonwealth Community Recreation Center is a perfect precedent for my project because of its nature as a joint-use partnership between the City of Edmonton and the Edmonton Eskimos Football Club. This is precisely what I aim at doing for a small market city in the near future when the NFL adopts the developmental league model. In addition, the project interconnects the fabric of an underdeveloped neighborhood with that of the professional sports team. This intersection of diverse groups sharing their program specific amenities for mutual benefit and revenue is an example I intend to emulate.

figure 55



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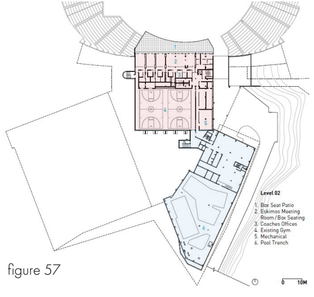

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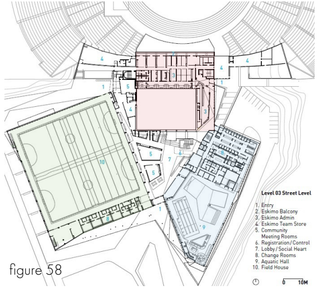

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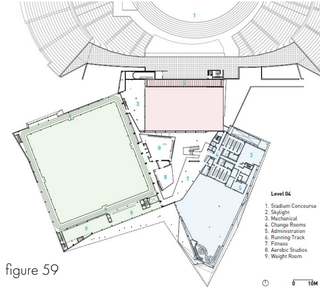


figure 59

Yongzhou Southern **Sports Park**

Typology: Sports Architecture
Location: Yangzhou, China
Size: 33,270 m²
Architect: PT Architecture Design
Status: Completed 2018

Summary: China is facing both challenges and opportunities brought by rapid urbanization. Yangzhou Southern Sports Park offers one solution to the issue by becoming a catalysts for the new urban community life. Compared with architecture for competitive sports, the architecture for mass sports is a relatively new type of architecture in China. It puts forward new demands for the definition, understanding and spatial allocation of sports functions (ArchDaily).

figure 60

figure 61

Program Elements

The Yangzhou Southern Sports Park's indoor programs consists of table tennis and squash courts, badminton courts, basketball courts, a swimming pool, roller skating rink, climbing wall, training room, and multi-functional space. Outside the building there are more basketball and badminton courts, as well as space for other ball-games,a playground, and stake park.

Social Effects

The design shifts the focus from elite professional sports building to community oriented sports space, encouraging social interaction by providing multi-functional large span structure. The development of architectural profession always comes together with the new possibilities for architectural prototypes. The design thinking about the idea of served and servant space has been inherited in this project. Art, cultural reference and functions are integrated with the external envelope (Arch Daily 2020).

Economic Effects

The sport park acts as the catalyst of the new town of Yangzhou. The historical old town was preserved and surrounded by green belt. In an effort to become economically sustainable operationally, government subsidies are over time being replaced by marketing orientated solutions to generate revenue. (Arch Daily 2020).

Geometry

The geometry of the building is inspired by Kahn's ideology about served and servant space. The appearance of servant space is no longer presented as secondary or in an auxiliary way, but becomes the key character of the facade which was designed using a computer parametric technique to achieve the integration of traditional culture and modern technology. The main functions such as multifunction hall, pool ,badminton, basketball halls are arranged around the public atrium to encourage the visual and behavioral communication and interaction as much as possible, and fully reflect the behavioral characteristics of mass sports. The atrium is more than a circulation space. It also serves as multifunction space for community activities such as small performances, a rock climbing or roller skating etc. (Arch Daily 2020).

Landscape

As the title of the project suggests the building functions as park first and foremost. The "sports forest" on the north side is the main outdoor space. As a transition between the main building and the north side park, the space formed by jogging tracks connects the entire space. The track connects the park with the building. From the indoor runway, one can enjoy indoor sports activities, atrium performances. Along the steps to the outdoors, one can enjoy the green scenery and fresh air (Arch Daily 2020). PT Architecture Design did a suburb job at maximizing usable public space on such a constrained site.

Conclusion

As a precedent study for my thesis project, the Yangzhou Southern Sports Park is an excellent example for a couple of reasons. First, from a socio-economic perspective, not only does it encouraging social interaction by providing multi-functional as well as sport specific spaces where people can meet each other, interact, and engage in friendly competition, but it also shows that sports architecture can indeed serve as a catalyst for urban growth. Second, PT Architecture and Design was conscience of maximizing the public access to the site and even though there is a clear delineation between the "inside" and "outside"of the building in built form, they wove the building and the landscape together using the running track and expansive views to the outdoors. This precedent is a great example of how to engage the local community through sport.

figure 62

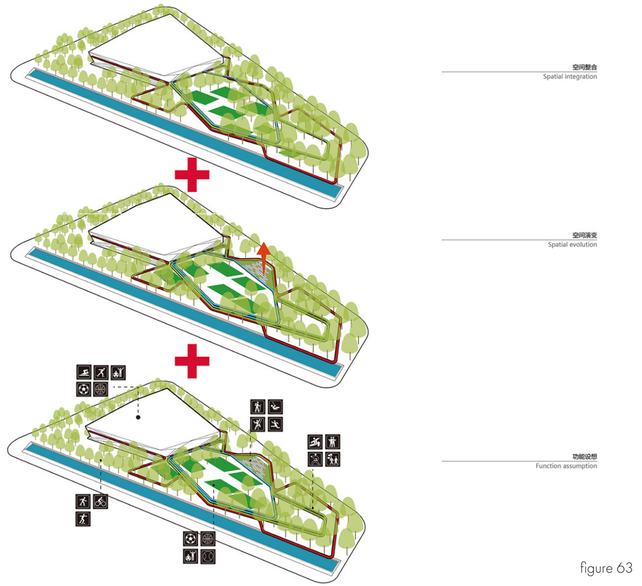


figure 63

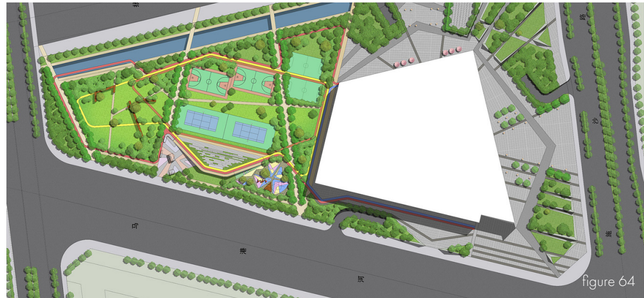


figure 64

precedent study **takeaways:**

Each of the previous case studies were chosen for their unique iteration of the typology. Through the research and analysis of the case studies documented in this thesis proposal some common principles began to emerge that begin to link each of the case studies together. Moving forward, I can extract these principles and use them to inform the research that takes place in the program phase of the thesis project as well as in my future design solutions.

Common Principles:

1. Start with the Park

Of the case studies I investigated, the ones that were the most successful at engaging the local communities were the ones that put the primary emphasis on park space. Parks, plazas, and landscapes are often where impromptu gatherings take place primarily because they are easily accessible. Once the landscape is properly addressed, then the design can move towards a built structure that augments the elements that the site already provides.

2. Blur the Lines Between Building and Landscape

Blurring the boundaries between indoor and outdoor provides a visual tension that facilitates movement and exploration. There ceases to exist a demarcating line between inside and out. This can be achieved through views, material transitions (or lack thereof), structure, and daylighting. While practically there has to be a thermal envelope, the goal of blurring the line between building and landscape is to evoke a sense of biophilia because we as humans are drawn to nature and the outdoors.

3. Pay Attention to where People Gather

In addition to tracking the way people move through a space, it is important to notice where people stop and why they stop. Did something grab their attention? Was there a natural or deliberately designed node along a circulation path? The massing of a building often times informs the areas that people gather. Sports architecture is often seen as a destination because it is hosting a competition or other event, however after the competition is over, is there anything that would want to make them stay a while longer?

4. Bring People Together

Bringing diverse groups of people together who otherwise might not have met seems to be a common way to create social engagement. This is often done by overlapping differing programmatic spaces. A joint-partnership project such as the Commonwealth Community Recreation Centre not only brings people together but also interconnects the fabric of an underdeveloped neighborhood with that of the professional sports team.

5. Encourage Economic Development

In the majority of the case studies economic development and/or urban revitalization came on the heals of the completion of the sports complex. These sports complexes are places of competition and action. People like to be near where the action is. If people keep congregating around the sports facilities, eventually businesses will move to be near where the people are.

Sports architecture as a typology is often thought of in terms of the flashy multi-billion dollar stadiums that seat 75,000 fans or Olympic stadiums that host the opening ceremonies . However, it is often the local gymnasiums, locker rooms, parks, and recreation facilities that shape our everyday lives. I strive to design sports architecture that is meaningful to people in their day-to-day life.

program

live + work + play / clients + users / elements / allocation / criteria

live + work + **play**:

After examining multiple precedent projects and taking note of how modern stadiums relate to the urban context as well as the increased social engagement decided to adapt the mantra of live, work, play to the world of sports. In terms of the word "live", my project will attempt to create opportunities for public engagement along with the promotion of health and wellness in the community through recreational sports and other physical activities. In terms of the word "work", my project will incorporate a state-of-the-art practice and training facility for the developmental league team. While they are at the developmental league level, these will still be professional athletes and coaches, and their success can have direct impacts on their affiliated NFL team. Finally, in terms of the word "play", my project will provide a quality game day experience for both the fans who come to view a game as well as the developmental league team and staff. In addition to the stadium itself, there will be multiple outdoor practice fields that the public will be able to utilize as neutral sites for high school football games when not actively being used by the developmental league team.

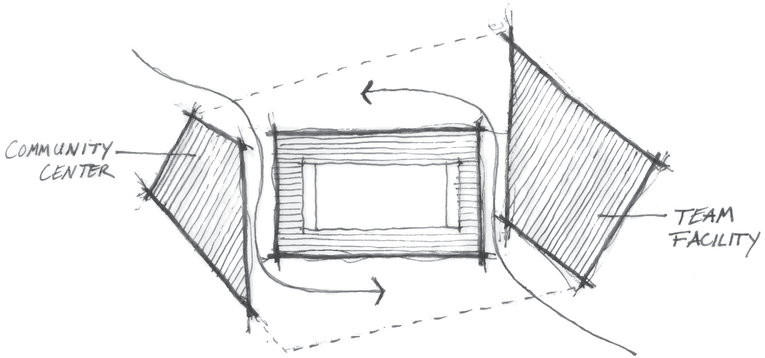
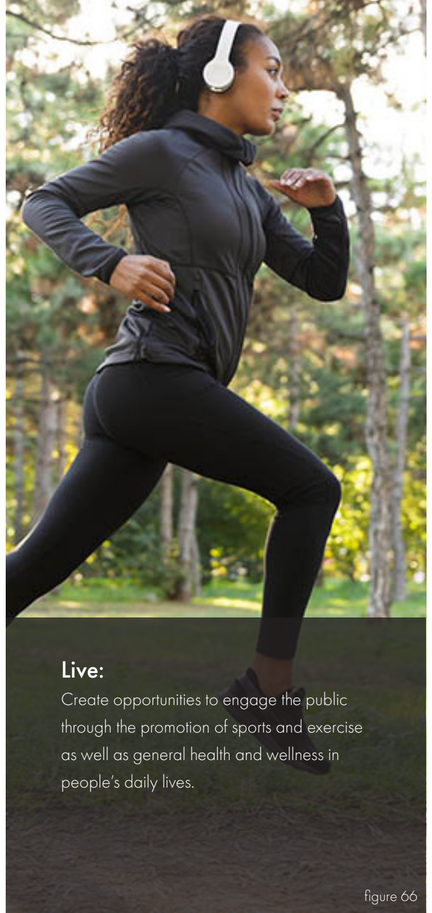
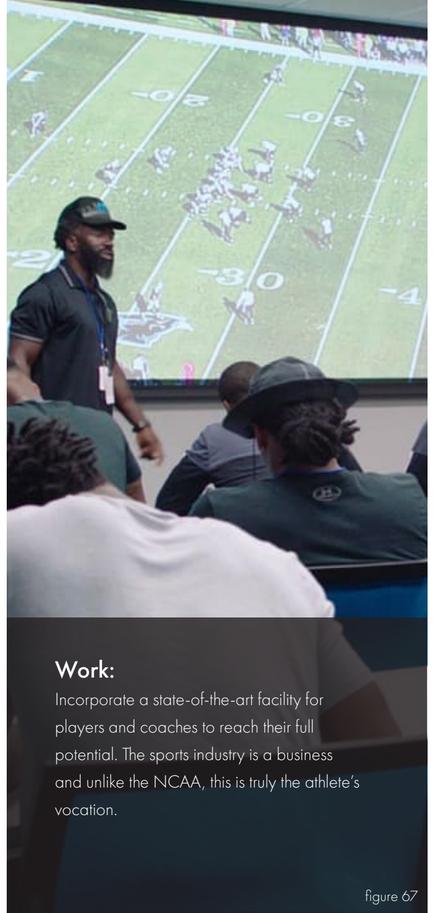


figure 65



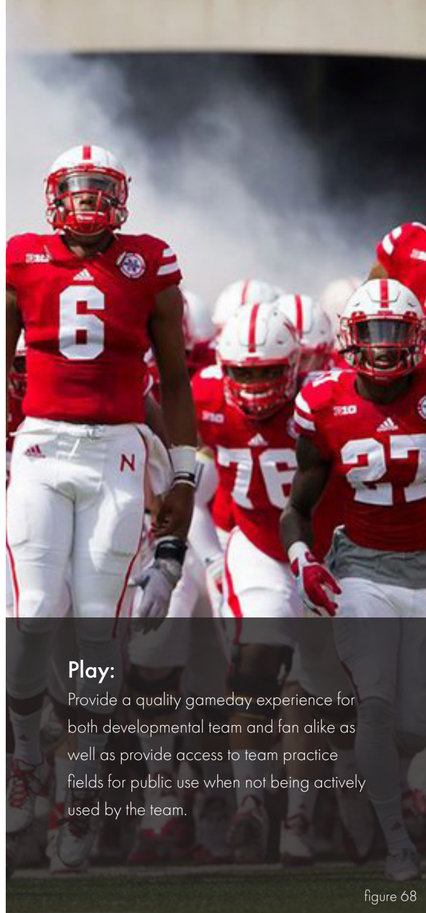
Live:
Create opportunities to engage the public through the promotion of sports and exercise as well as general health and wellness in people's daily lives.

figure 66



Work:
Incorporate a state-of-the-art facility for players and coaches to reach their full potential. The sports industry is a business and unlike the NCAA, this is truly the athlete's vocation.

figure 67



Play:
Provide a quality gameday experience for both developmental team and fan alike as well as provide access to team practice fields for public use when not being actively used by the team.

figure 68

client + **users:**

Iowa Invaders - Developmental League Affiliate of the Minnesota Vikings:
Coaches and trainers of the team who will require offices and medial facilities
Media staff and reporters who cover the team and/or local news.
Corporate staff that manages and runs team operations and finances.
Players for the Iowa Invaders who will require practice fields, training facilities as well as an area within the complex for continuing education as universities could partner with team to provide athlete with post secondary academic coursework.

Stadium Staff:
Stadium security staff for events.
Vendors not directly affiliated with the team who sell food and/or merchandise.
Facilities maintenance staff who provide upkeep for the private team-oriented areas of the building.

Patrons:
Individual fans attending a game.
Families bring children along to the events.
Those with special needs who need accommodations in order to enjoy and properly navigate the sports complex.

Citizens & Taxpayers:
Community members that are utilizing the rooftop community garden or other community center facilities.
Citizens coming to a free event such as a trade show, art fair, or farmer's market located in the publicly accessible concourse.
Passers by who take advantage of the stadium plazas which are open for public use and/or reservation.

major project **elements:**

Stadium:

Stadium seating 35,000 + fans
Publicly accessible concourse
Walk of Fame
Sky Deck
Sideline club and suites
Press box for media and commentators
Stadium Lounges
Team locker rooms
Visitors locker rooms
Press conference/media rooms
Plaza/Park in and around the stadium
Water feature in the West Plaza
Sports Betting Area
E-Sports Arena

Team Facility:

Climate controlled indoor practice field
(2) Outdoor practice fields with bleachers
Building Lobby
Weight room
Film rooms
Team meeting rooms
Positional meeting rooms
Locker room
Recovery facilities
Cafeteria/Nutrition bar
Continuing education spaces

Community Center:

Building Lobby
Pool
Indoor climbing wall
Gymnasium
Racquetball courts
Exercise area
Dance studio
Public locker rooms
Community meeting rooms
Computer lab
Childcare
Warming house
Library
Rooftop community garden

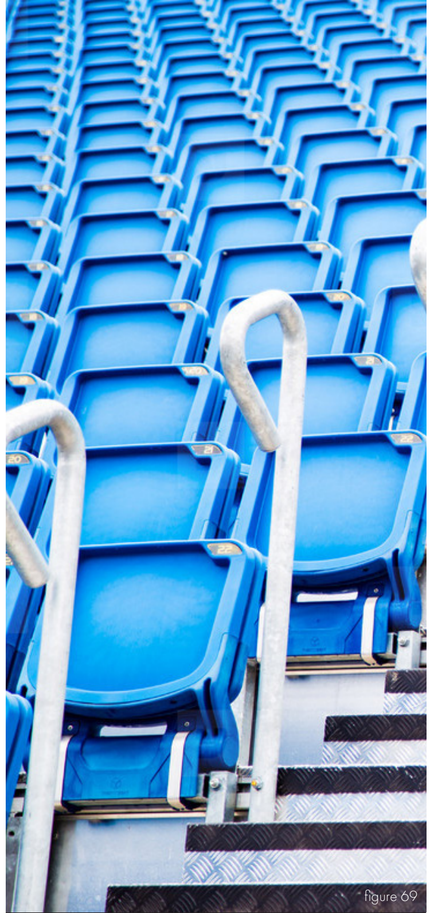


figure 69


figure 70


figure 71

space **allocation:**

Space Allocation Table:

The square footages in the table (figure 72) are approximate and were derived from estimates used in the early design stages. The approximate space allocation square footages were totaled and then a net to gross multiplier was applied in order to factor in circulation. The square footages were derived assuming the stadium will seat no more than 40,000 fans on game days.

Space Allocation Matrix:

The space allocation matrix was used in the schematic stage of the project to identify program adjacencies that were deemed essential, important and desirable. This created a hierarchy of connections which are displayed in the space allocation net diagram (figure 73).

Space Allocation Net:

The space allocation net shows the approximate proportional size of different program elements as well as primary and secondary program connections. The entrance arrows denote primary entry points for the public (figure 74).

Space Allocation Table:

Areas	Approx. Square Feet	Percentage
Industrial	34,100	3.9%
Game Field	61,600	7.0%
Stadium Seating	290,000	33.2%
Concourse	50,000	5.7%
Practice Fields	140,200	16.0%
Team Locker Rooms	6,000	0.7%
Visitors Locker Rooms	4,000	0.5%
Community Center	35,000	4.0%
Public Locker Rooms	6,000	0.7%
Mech/Elec/Other	40,000	4.6%
Areas of Sale	11,000	1.3%
Suites	13,000	1.5%
Lounges	9,000	1.0%
Janitorial	800	0.1%
Restrooms	2,000	0.2%
Security	900	0.1%
Cafeteria	4,000	0.5%
Weight Room	1,500	0.2%
Kitchen	900	0.1%
Film Rooms	1,100	0.1%
Offices	3,000	0.3%
Park Space	50,000	5.7%
Parking	110,000	12.6%
Total Usable Square Feet	874,100	100.0%
Net to Gross Multiplier	1.15	
Approx. Gross Square Feet	1,005,215	

figure 72

Space Allocation Matrix:

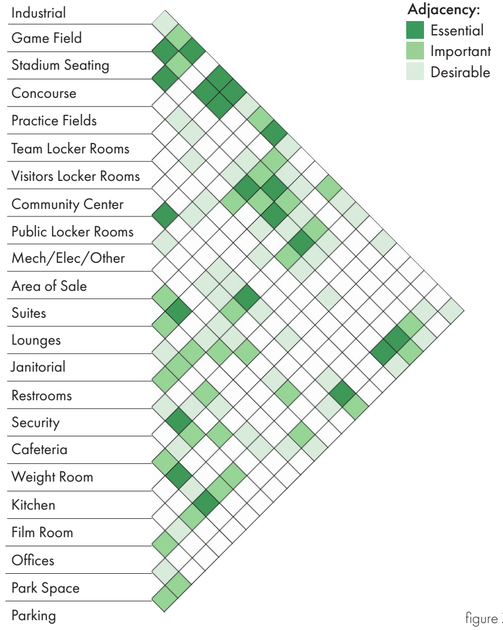


figure 73

Space Allocation Net:

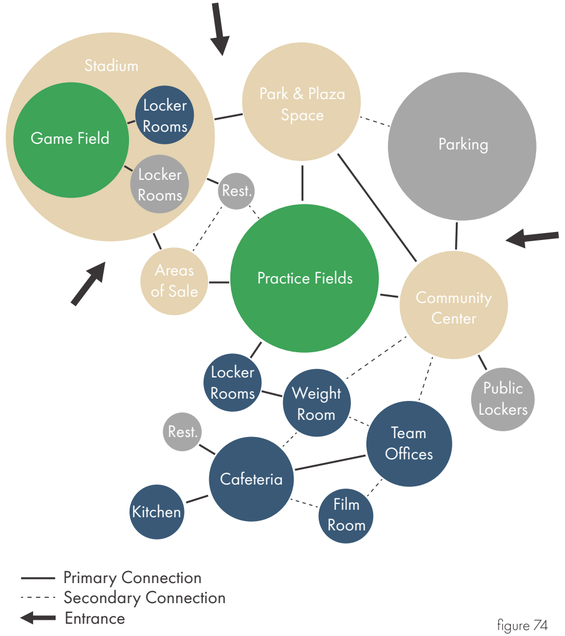


figure 74

performance **criteria:**

Space Allocation:

Performance Measure - The separation of the public, private, and outdoors should be logical and seamless as the user moves about the spaces, given that a specific user is in the appropriate, allowable spaces.

Performance Measure Source - Established guidelines for percentages and proportions of different program types within my building typology.

Performance Analysis - Diagram(s) showing the private and public space as to maximize the public space when it is not being used by the developmental league team.

Performance Judgment - Comparing the final space allocation with the guiding ratios and percentages and the specific Criteria Matrix/Matrices will determine if the space allocation is appropriate.

Behavioral Performance:

Performance Measure - One of the goals of the project is that the building and activities that go on promote participation in athletics and exercise. An evaluation of the health and wellness/fitness level of the surrounding community would set a baseline for the performance goal.

Performance Measure Source - As this is a theoretical project, the most systematic way to ensure health and wellness is incorporated into the project is to adhere to the International WELL Building Standards (specifically because of the Nourishment, Movement, and Mind categories). The image to the right (figure XX) shows the WELL certification matrix that I will be referring to throghout the design phase.

Performance Judgment: The behavioral performance will be judged how my building performs in regard to the WELL building standards.

Code Compliance:

Performance Measure - The project will comply with international and state building codes. In addition, the project will be accessible for those with disabilities.

Performance Measure Source - I will be referencing the IBC, Iowa State Building Codes, and ADA guidelines.

Performance Judgment - The final building plan will be compared with to the codes mentioned above and will evaluated on compliance.

INTERNATIONAL WELL BUILDING INSTITUTE™

AIR

Y	?	N			
			P	AQU	Fundamental Air Quality
			O	SMK	Smoking Ban
			O	SMO	Outdoor Smoking Ban
			O	LTA	Long-Term Air Quality
			O	LTE	Enhanced Long-Term Air Quality
			O	STA	Short-Term Air Quality
			O	STE	Enhanced Short-Term Air Quality
			O	SEP	Pollution Source Separation
			O	PRK	Parking Restrictions
			O	LEV	Low Emission Vehicles
			O	AED	Air Quality Education
0	0	0	TOTAL OPTIMIZATIONS		

WATER

Y	?	N			
			P	WQT	Drinking Water Quality
			O	WAD	Public Water Additives
			O	PWT	Periodic Water Quality Testing
			O	WQO	High Quality Drinking Water
			O	WAC	Drinking Water Access
			O	FAC	Sanitary Facilities Provision
			O	WFS	Water Feature Sanitation
			O	LEG	Legionella Control
			O	SWA	Stormwater Management
			O	OVF	Overflow Water Management
0	0	0	TOTAL OPTIMIZATIONS		

NOURISHMENT

Y	?	N			
			P	SUP	Supermarket Access
			O	FRU	Fruits and Vegetables
			O	HFO	Healthy Food Procurement
			O	FAD	Food Advertising
			O	NED	Nutrition Education
			O	AGR	Urban Agriculture I, Provision
			O	AGP	Urban Agriculture II, Promotion
			O	FAF	Food Affordability
			O	FSE	Food Security
			O	FSA	Public Food Inspection Information
			O	BRE	Breastfeeding Support
0	0	0	TOTAL OPTIMIZATIONS		

LIGHT

Y	?	N			
			P	LMP	Lighting Master Plan
			O	LCS	Lighting Control Schedule
			O	EMI	Community-wide Emittance Caps
			O	LCT	Obtrusive Light Control
			O	LTR	Light Trespass Mitigation for Sleep
			O	SVI	Visibility Facilitation
			O	RLI	Right-Of-Way Lighting
			O	LEX	Lighting for Exteriors
			O	MLI	Mass Transit Lighting
0	0	0	TOTAL OPTIMIZATIONS		

MOVEMENT

Y	?	N			
			P	MIX	Mixed-Use Development
			O	MNP	Movement Network Planning
			O	WAK	Walkability
			O	PED	Pedestrian-Scale Design
			O	PDS	Enhanced Pedestrian Environments
			O	CYC	Cyclist Infrastructure
			O	BPK	Bicycle Parking
			O	CYS	Enhanced Cyclist Environments
			O	BSH	Community Bicycle Share
			O	TRA	Mass Transit Infrastructure
			O	TRN	Mass Transit Support
			O	WAY	Community Wayfinding
			O	PAS	Physical Activity Spaces
			O	PRG	Activity Programming
			O	PET	Pet Support
0	0	0	TOTAL OPTIMIZATIONS		

THERMAL COMFORT

Y	?	N			
			P	EXT	Extreme Weather Warnings
			O	HET	Urban Heat Adaptation: Community Support
			O	HPE	Urban Heat Adaptation: Public Education
			O	CLD	Urban Cold Adaptation: Community Support
			O	CPE	Urban Cold Adaptation: Public Education
			O	HIM	Urban Heat Island Mitigation
			O	VEG	Urban Vegetation and Green Spaces
			O	WAT	Urban Water Bodies
			O	SUN	Personal Sun Exposure
0	0	0	TOTAL OPTIMIZATIONS		

SOUND

Y	?	N			
			P	SOU	Sound Planning
			O	SMP	Community Sound Mapping
			O	PLN	Planning for Acoustics
			O	ORD	Noise Ordinance
			O	NLV	Noise Level Limit
			O	HEA	Hearing Health Education
0	0	0	TOTAL OPTIMIZATIONS		

MATERIALS

Y	?	N			
			P	HWM	Hazardous Waste Management
			O	WST	Waste Stream Management
			O	REM	Site Remediation and Redevelopment
			O	CRE	Construction Remediation
			O	ODS	Outdoor Structures
			O	PES	Landscaping and Pesticide Use
			O	HAZ	Hazard Communication
0	0	0	TOTAL OPTIMIZATIONS		

MIND

Y	?	N			
			P	AMH	Access to Mental Health Services
			O	CRI	Mental Health Crisis Support
			O	ABU	Substance Abuse and Addiction Services
			O	ARK	Substance Abuse and Addiction Services for At-Risk Populatio
			O	ALC	Alcohol Environment
			O	RDR	Responsible Driving
			O	IPV	Support for Victims of Interpersonal Violence
			O	SGR	Integration of Streetscape Greenery
			O	CHI	Outdoor Child Play Spaces
			O	GRE	Restorative Green Spaces
			O	BLU	Restorative Blue Spaces
			O	BLT	Restorative Built Spaces
			O	SCE	Preservation of Scenic Views
0	0	0	TOTAL OPTIMIZATIONS		

codes + regulations

zoning / codes / egress

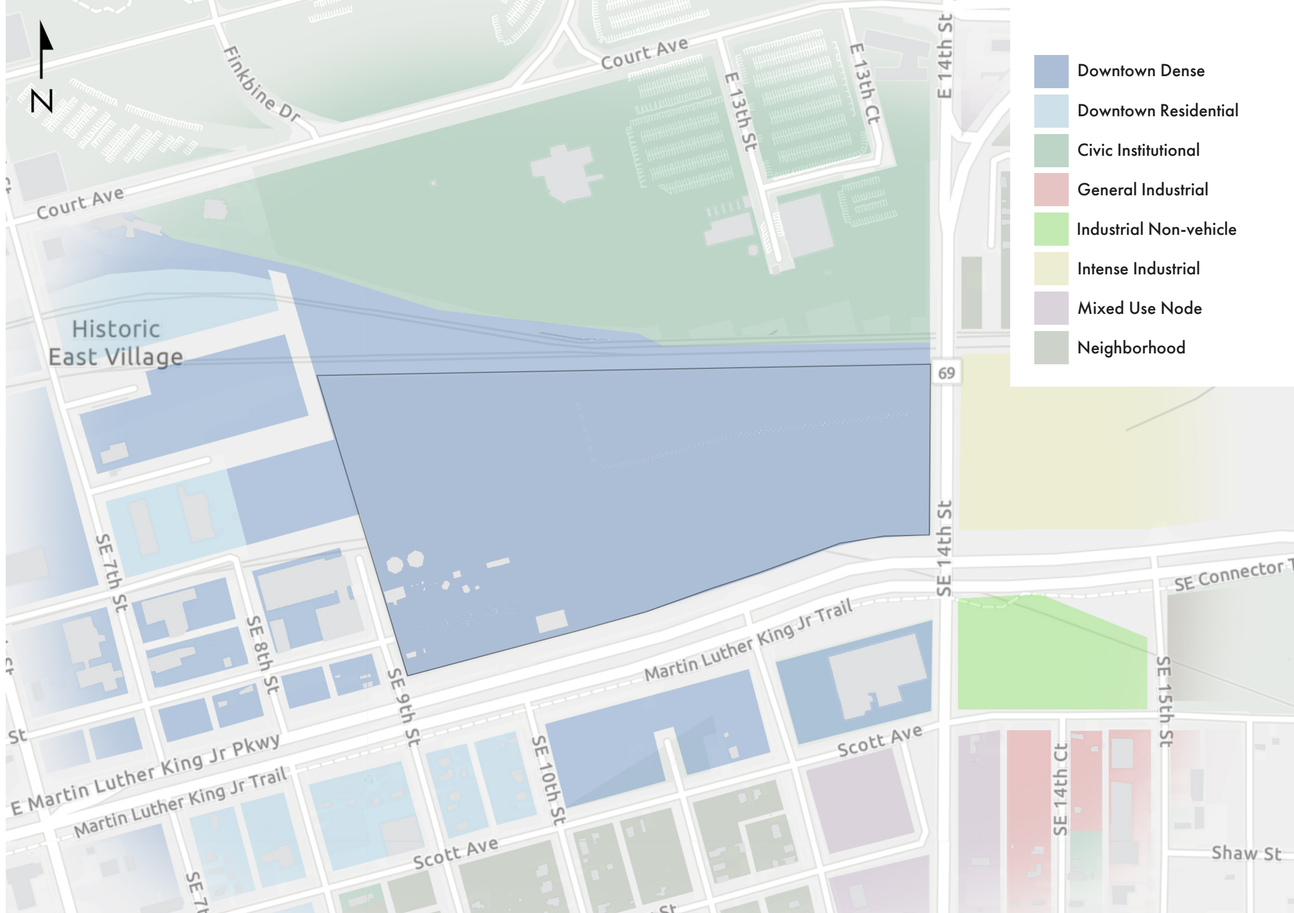
project **zoning:**

My site is currently zoned as a combination of downtown dense (DX2), downtown residential (DXR) and general industrial (I1). I am proposing that the whole site be rezoned as downtown dense even though there will be some public park space incorporated into the design.

Currently my site is made up of 15 parcels owned by various entities. The largest portions of my site are owned by the City of Des Moines and Iowa Transfer RY CO as this area is mostly undeveloped but to the extent it has, it was mainly used by the rail system to transport goods.

My project falls under the civic building type. Fortunately there is a lot of flexibility built in to the code to allow for unique structures within the civic building type.

Site Address:	309 SE 9th Street, Des Moines , IA 50309
Site Size:	12,85,020 square feet or 29.5 acres
Current Uses:	Asphalt Contractor (Bituminous Materials), Merchant Service Company, Burlinton Norther Santa Fe Rail Road
Zone:	Currently Zoned as DX2, DXR and I1. Proposed rezoning of entire site to DX2.
Current Owner:	Multiple owners own different parcels that comprise my project site. The site owners consist of the following: City of Des Moines Iowa Transfer RY CO Burlington Northern Santa Fe RR Bituminous Material Supply LP Merchant Service Company INC Veronica Jurado
Zone Information:	Civic Building Type
Maximum Height:	5 stories or 75' (subject to review)
Setback Requirements:	5 feet - 10 feet (rear setback)
Max Impervious Surface:	85%
Add. Semi-Pervious Surface:	10%
Permitted Roof Types:	Parapet, Flat, Pitched, Special Roof Permitted
Parking Requirements:	Estimated 5,000 spaces



building **codes:**

My project is categorized by the International Building Code (IBC) as a class A-5 structure, which includes outdoor arenas. As a space with a capacity of over 35,000, the code requires a substantial width for egress, in addition to the many restroom facilities.

As a partially outdoor building, only certain areas are specified to require fire suppression systems. These spaces include concession stands, retail areas, and press boxes along with other accessory spaces greater than 1,000 square feet in floor area.

As an A-5 assembly space, the building footprint and height is not limited in the IBC. However, I will be attempting to reduce the height of my building by carving the playing field into the earth allowing for the park-scape to flow directly into the stadium concourse.

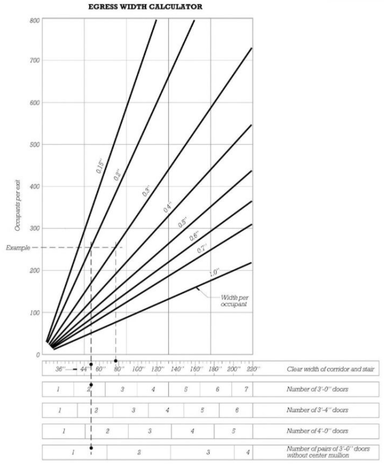


figure 75

OCCUPANCY A-5: ASSEMBLY, OUTDOOR ARENAS

Sprinklers

For buildings of this type, sprinklers are required for:

- Concession stands
- Retail areas
- Press boxes
- Other accessory facilities greater than 1000 sq ft (93 m²) in floor area

For additional building code sprinkler requirements, see page 374.

Measurements

Height is measured from the average finished ground level adjoining the building to the average level of the highest roof. Floor area is measured within exterior walls or exterior walls and fire walls, exclusive of courtyards.

Further Information

For information on Occupancy classifications, see page 6. For information on mixed-use buildings, see page 368. For information on which code to consult, see pages 5–6 and 13.

Unit Conversions

1 ft = 304.8 mm, 1 sq ft = 0.0929 m².

OCCUPANCY A-5: ASSEMBLY, OUTDOOR ARENAS

		Noncombustible							
		3-Hour (page 380)		2-Hour (page 380)		1-Hour (page 381)		Unprotected (page 382)	
CONSTRUCTION TYPE		Type I-A		Type I-B		Type II-A		Type II-B	
IBC NOMENCLATURE		Spr	Unspr	Spr	Unspr	Spr	Unspr	Spr	Unspr
MAXIMUM HEIGHT IN FEET		UN	UN	180'	160'	85'	65'	75'	55'
HEIGHT IN STORIES ABOVE GRADE AND MAXIMUM AREA IN SQ FT FOR ALL FLOORS	UN	UA	UA	UA	UA	UA	UA	UA	UA
	12								
	11								
	10								
	9								
	8								
	7								
	6								
	5								
	4								
	3								
	2								
	1								
MAXIMUM AREA IN SQ FT FOR ANY SINGLE FLOOR OF A MULTISTORY BUILDING		UA	UA	UA	UA	UA	UA	UA	UA

Each number in the table represents the maximum total area in square feet for all floors for a building of the indicated story height.

Key to Abbreviations

UA	Unlimited area	Spr	With approved sprinkler system throughout the building
UH	Unlimited height	Unspr	Without approved sprinkler system throughout the building
NP	Not permitted		

figure 76

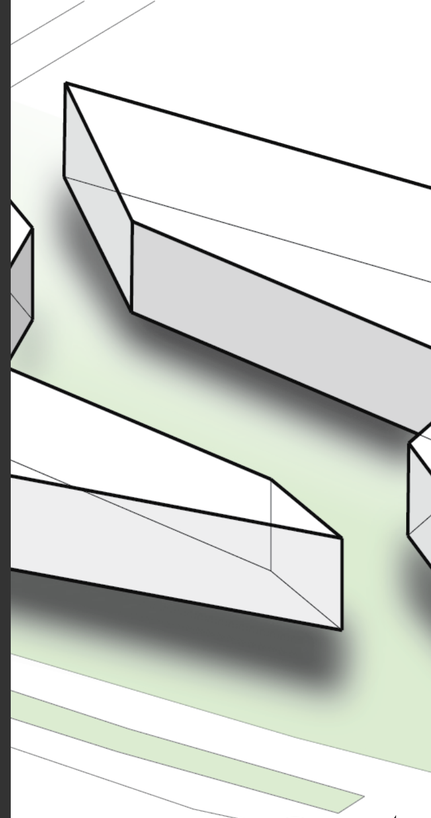
building **egress**:

Building Type A-5: Assembly, Outdoor Arenas

Occupancy:	Estimated 40,000 occupants
Max Travel Distance:	200′ unsprinkled or 400′ for open air seating with combustible construction or unlimited with non-combustible construction or 250′ with sprinklers.
Max common path of egress:	30′ for assembly fixed seating with 50 or more occupants 75′ for others
Largest Area with Single Exit:	49 occupants
Min Door Width:	32″ net clear
Min Corridor Width:	44″ serving more than 49 occupants 36″ serving 49 or fewer
Min Stair Width:	44″ serving more than 49 occupants 36″ serving 49 or fewer
Seating:	For a row with egress at both ends: Maximum row length 100 seats For a row with egress at one end only: Maximum length is limited by common path of egress travel In all cases, maximum require clear row spacing is 22″
Aisles:	Minimum: 42″ for aisles serving more than 50 seats on two sides For occupant load: not less that 0.2″ per person for aisles sloped not more than 1:12 or 0.22″ per person for aisle with grater slopes.
Longest Dead-End Aisle:	20′, unless seats served by a dead-end aisle are within no more than 24 seats of another aisle and minimum clear row spacing is required for rows and egress on one end only.
Aisle Termination:	Cross-aisle sized the same as above, considering combined capacity of all converging aisles
Aisle Stairs and Handrails:	Minimum tread depth: 11″ Maximum riser height 8″ All stairs; ramped aisles sloped more than 1:15 require handrails. Handrails subdividing stairs or aisle serving seats on both sides may be discontinuous to allow aisle access; minimum space between the handrail and adjacent seating is 23″.

development

orientation + access / seats + skin / structure / approach / massing



orientation + **access:**

In some of the early iterations of my project, I toyed with the orientation of the programmatic elements within the boundaries of my site and narrowed it down to a few options.

Option A

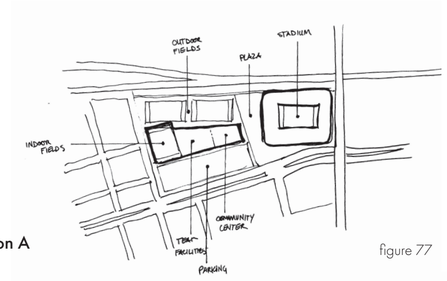
In option A, I tucked the stadium up against the raised highway that runs north/south. This orientation allowed for an optimal shared parking lot location, but it hid the stadium away from the street-scape.

Option B

Option B moved the stadium to the west end of the site but oriented it with the short end facing Martin Luther King Junior Parkway. This orientation also left little interstitial space between the street and the stadium where gameday festivities could take place outside the stadium.

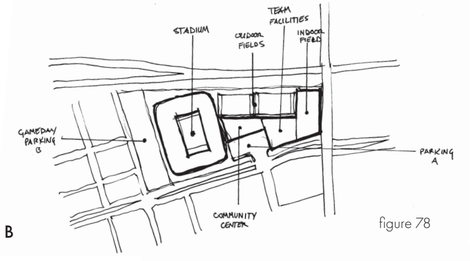
Option C

Option C kept the stadium toward the west end of the site while orienting it so that there was plaza space and parking to the north and south of the stadium. This option also allowed the practice fields to be tucked back against the raised highway.



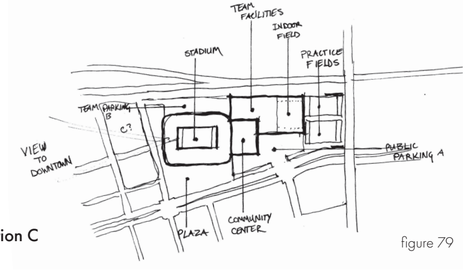
Option A

figure 77



Option B

figure 78



Option C

figure 79

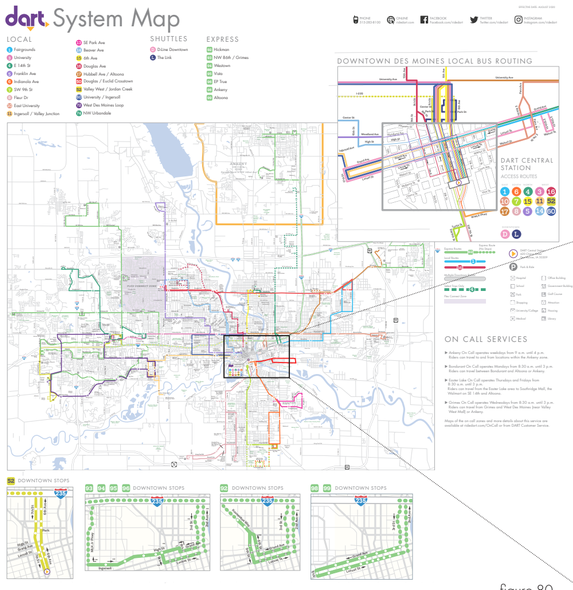


figure 80

9 Martin Luther King Jr. Parkway

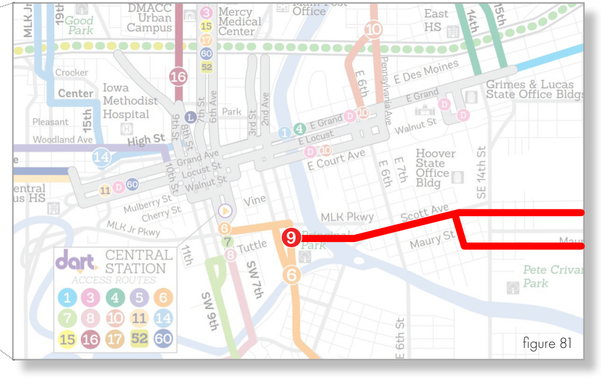


figure 81

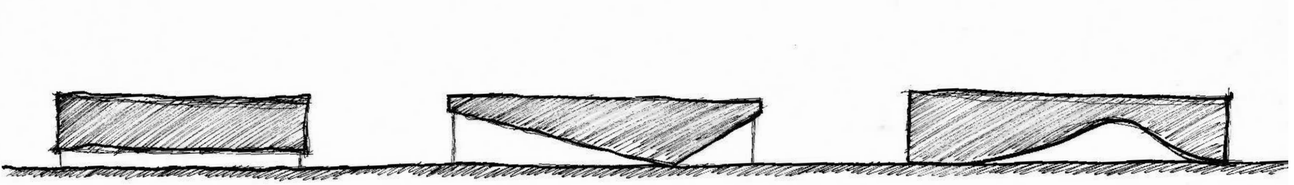
Site Access

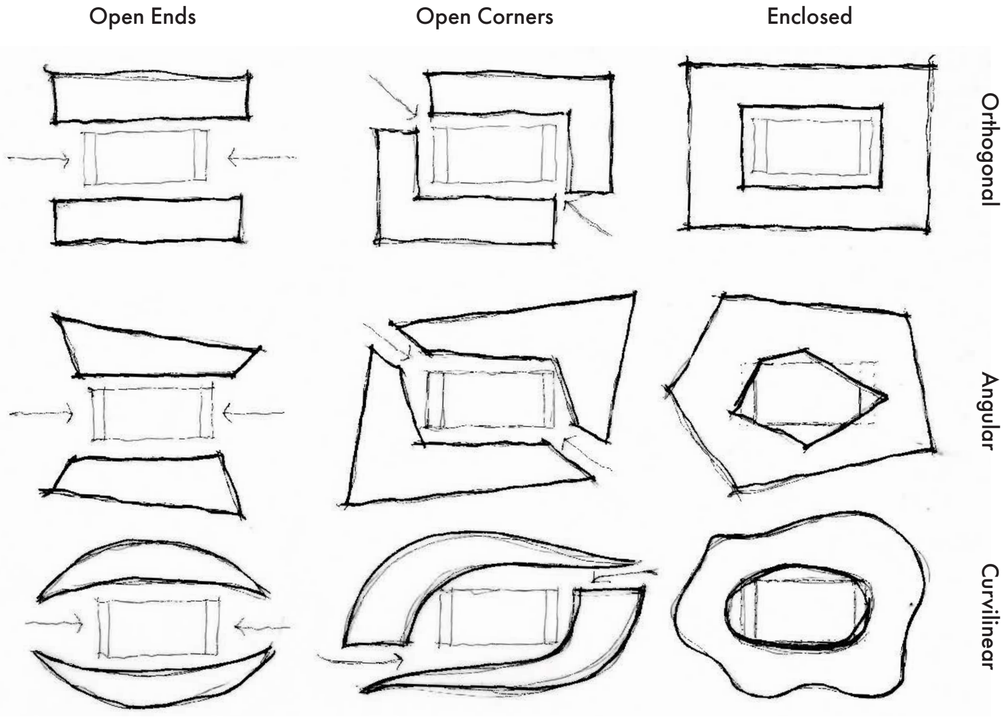
As part of my design development, I proposed an addition to the existing Dart bus system that operates in Des Moines to improve public transportation access to my site. The added Route 9 would branch off of Route 6 and head east along Martin Luther King Jr. Parkway eventually looping back around before heading west over the river back toward downtown Des Moines.

seats and **skin:**

The three most important elements of stadium design are the **seats**, **skin**, and **structure**. When investigating ways to configure the seating bowl, I created a matrix with one axis depicting how open the stadium feels and the other axis depicting the shape of the stadium. The open ended stadium option significantly reduced the number of seats in the stadium and the enclosed options made a visual connection to the surrounding landscape rather difficult. The open corners configuration allowed for a delicate balance between maximizing the number of seats while still being able to create an open air feel as well as a visual connection to the stadium surroundings. Of the open corners options, the curvilinear shape, while visually interesting, would provide challenges from a constructibility standpoint let alone from a cost consideration perspective. However, the orthogonal option, while efficient materially and economically, provided no dynamic element to the design of the stadium (at least in plan). Thus the angular open corner configuration was the stadium shape I began to pursue further.

When thinking about the stadium skin or facade, I realized that the facade and its relationship to the ground could have a profound impact on the extent I could blur the boundary between the interior and the exterior of the building. I began to explore different ways of treating the facade that would allow the surrounding landscape to flow into the building. The facade could be raised entirely off the ground, it could lightly touch the ground at certain moments, it could also lift away from the ground revealing prescribed views into the stadium. I explored these and many other treatments of the facade in an attempt to not only blur the line between the inside of the stadium and the outside, but also blur the boundary between public space and team oriented space.





roof **structure:**

Regarding the structure of the stadium, I primarily researched domed structures, canopy roof structures, and open air stadiums. While more common for soccer stadiums than for American football stadiums, I was intrigued by the canopy roof design. The canopy roof posed an interesting opportunity to give fans protection from the sun, and other elements while still getting the feel of an open air stadium. By keeping the game field open to the air in a cold weather state the home team could benefit from a perceived advantage when a team from a warmer climate comes to play during the late fall and winter when temperatures can get bitter cold. The canopy structure also has the advantage of not requiring any of the mechanical heating and cooling loads that a domed stadium would require.

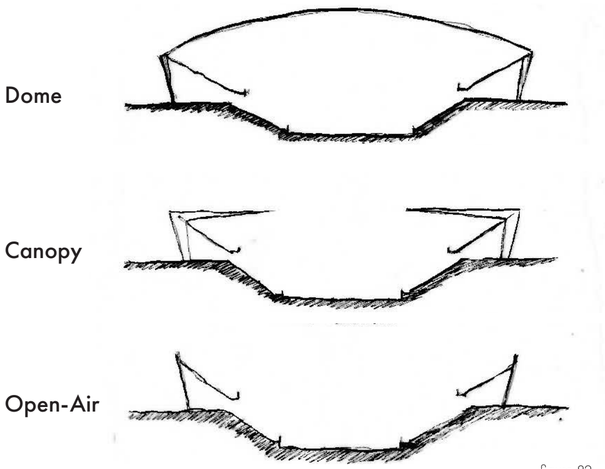


figure 82

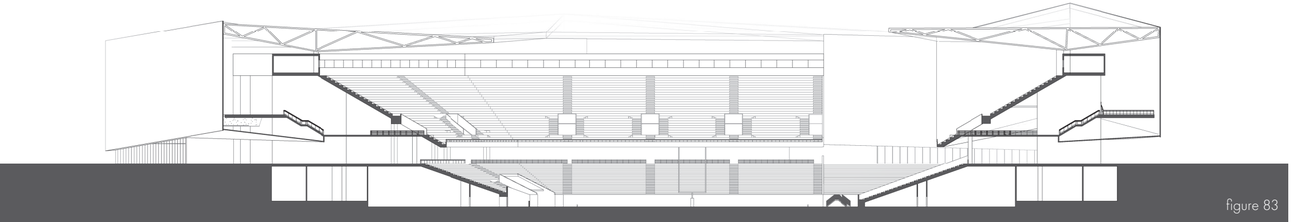
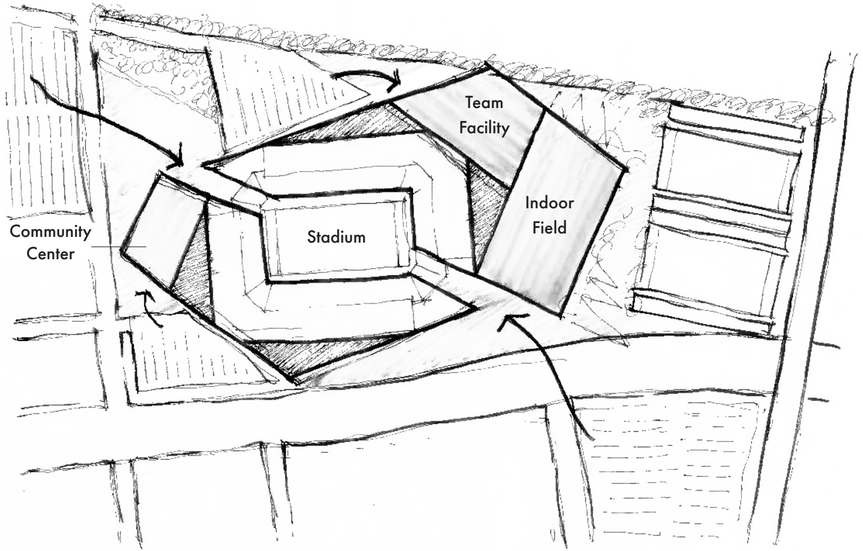


figure 83

building **approach:**



In terms of the building approach, I examined the primary ways people would be accessing the stadium. Given the reality of an automobile-centric city, I examined the views pedstrians would have as they approached the stadium having parked in either one of the gameday surface lots or the designated community center or team facility parking areas.

building **massing:**

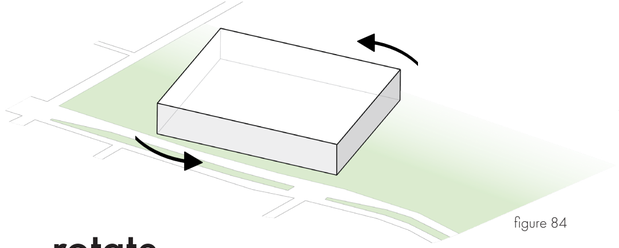


figure 84

rotate

When orienting the stadium, I rotated the initial stadium mass to align it with Martin Luther King Jr. Parkway.

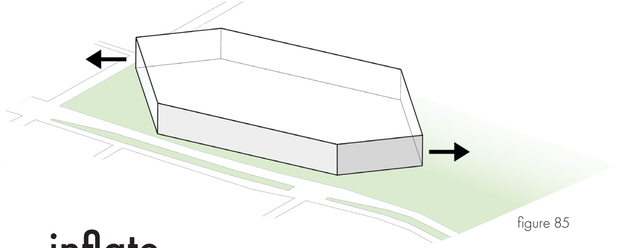


figure 85

inflate

I then inflated both ends to incorporate the programmatic spaces of the community center and team facility.

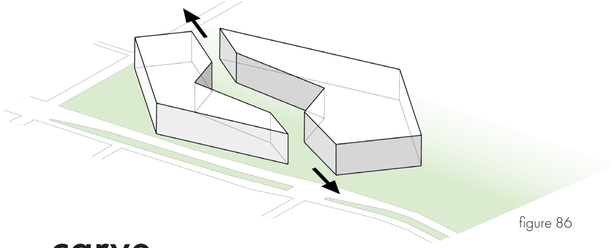


figure 86

carve

Next, I carved out the center of the stadium where the game field is located, creating visual entry points into the stadium.

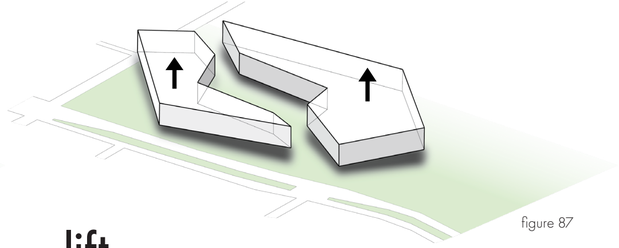


figure 87

lift

Finally, I lifted the facade off the ground allowing for the landscape to flow through and into the stadium.

final design

urban connection / site plan / drawings / renderings / conclusion

"In architecture, it isn't enough to just have the right building that works well. It can also be beautiful. It can also be different. It can create surprise. And surprise is the main thing in a work of art."

- Oscar Niemeyer

urban **connection:**

The final design for my project emerged from an iterative process of investigating the ways stadiums, which as a typology have been historically isolated from their surrounding community, can be more open and connected to the public. This idea of connection to the public is what drove every element of design from the network of walking paths that bleed into the stadium's main concourse, to the undulating wood fin facade that screens the building. This produces a dynamic physical and visual relationship between the interior and exterior of the building.

The iconic shape of the stadium embodies the dynamic and active nature of the project. Not only does it serve as a destination for fans of the Iowa Invaders on gamedays, but the utilization of the facilities for different activities and events throughout the year have the ability to accommodate a wide variety of users. This cements itself as a work of architecture of and for the people.

As mentioned previously, Des Moines, Iowa is a highly underrated sports market with multiple other developmental league teams that feed into their respective sports. The Wells Fargo Arena is located to the north end of downtown Des Moines near the Des Moines River. It is home to both the Iowa Wild (AHL) and Iowa Wolves (NBA G League). Principle Park, home of the Iowa Cubs (Minor League Baseball), is located just outside downtown Des Moines and is nestled between where the Des Moines River and Raccoon River merge.

However, these minor league stadiums sit on the west bank of the Des Moines River. With the HDR proposal to redevelop and gentrify the Market District of Des Moines on the east side of the river, the stadium has the opportunity to provide the final touch, end-capping the urban expansions planned along the corridor of Martin Luther King Jr. Parkway. I believe this expansion will not only have an effect economically but as existing residents in the surrounding neighborhoods begin to see the investment that the city is making into their communities, there will begin to be a positive social effect as well.

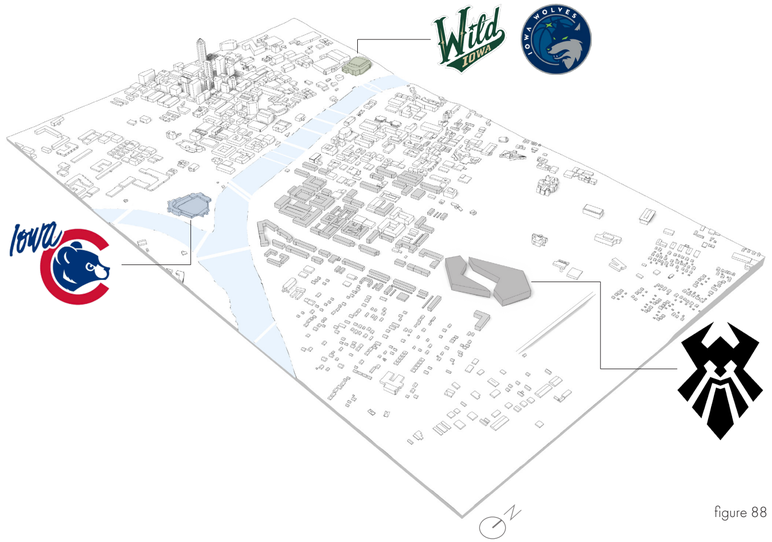


figure 88

urban expansion diagram

Existing

HDR proposal

Stadium complex

site **plan:**

The area surrounding the stadium is open to the public and is often just as active as the areas inside the building. At the open ends of the stadium, are the east and west plazas. During gamedays, these spaces are used for festivities prior to the game. The water feature located within the west plaza converts to a skating rink for public use during the winter months. The outdoor practice fields, when not being used by the Invaders players and coaches, can be reserved for recreational use by community leagues or high school teams. The gameday parking lots just across the street from the stadium are used for tailgating on gameday. The rest of the year, the lots become contract parking for commuters.

The accessibility diagrams to the right, show the different hours of operation for the programs namely the stadium, team practice fields, and community center. The accessibility to the public changes depending on the day. The four clock diagrams show operation on gamedays, weekdays, weekends, and during the offseason. This provides a visualization of the attempt to maximize the public space so citizens can receive the benefits of a taxpayer investment into the stadium.

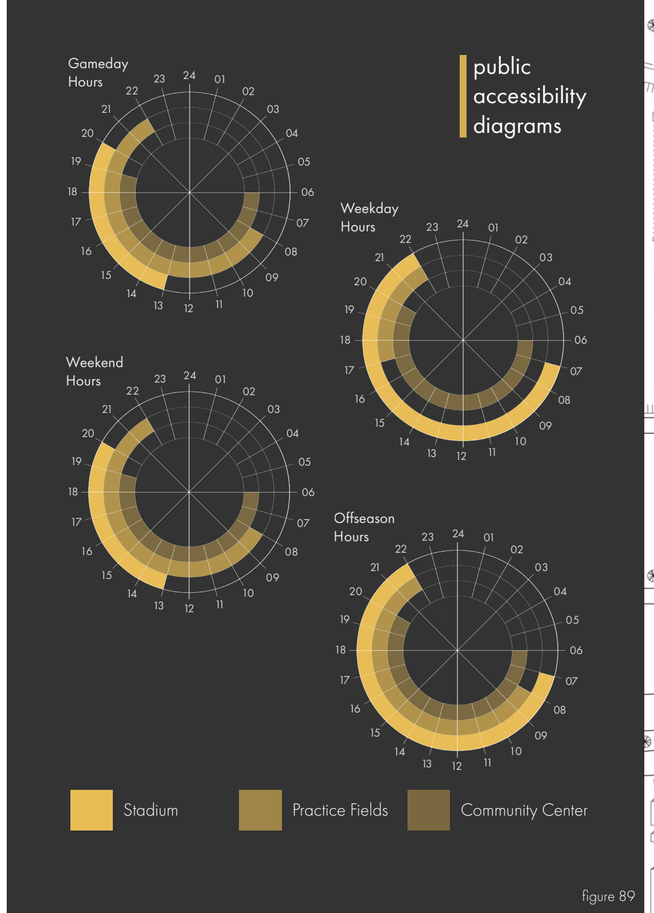
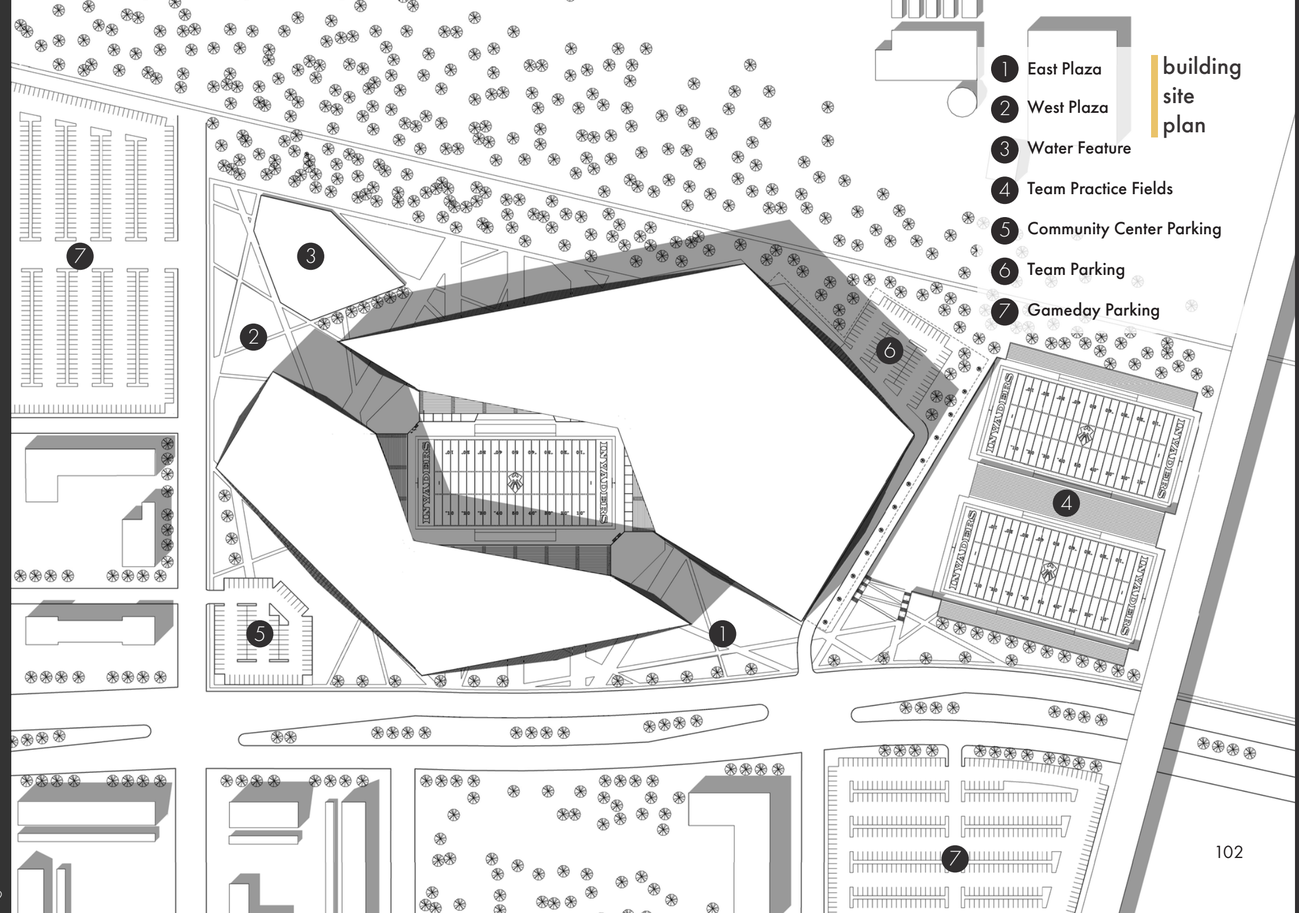
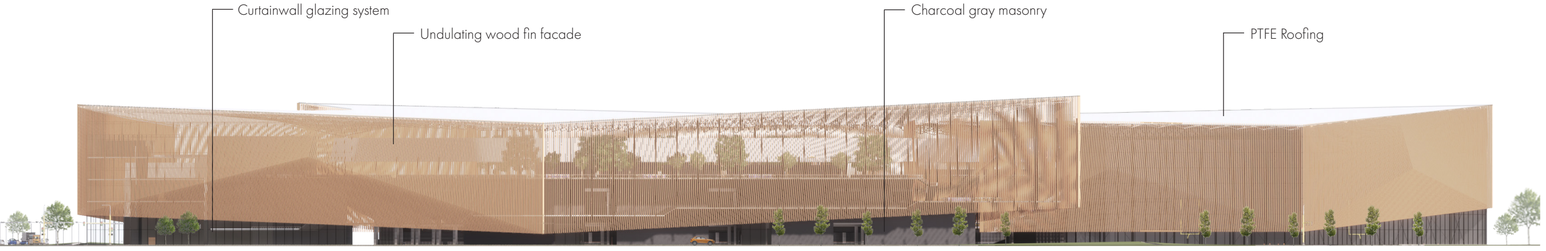


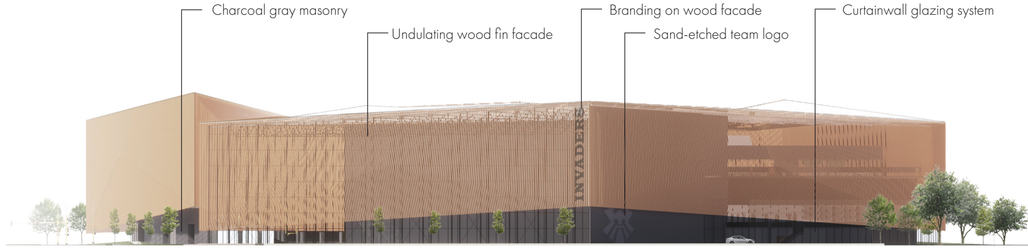
figure 89



analytical **drawings:**



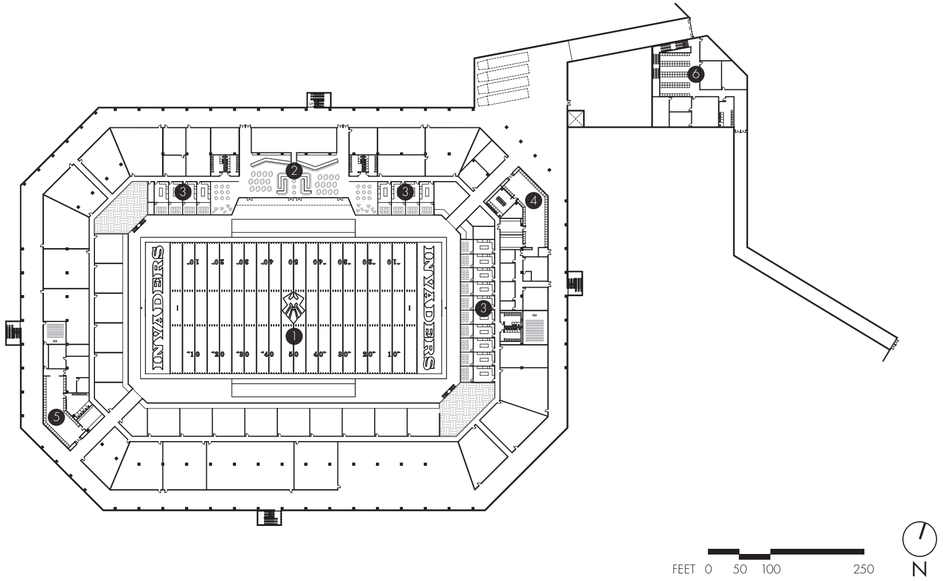
south elevation



east elevation

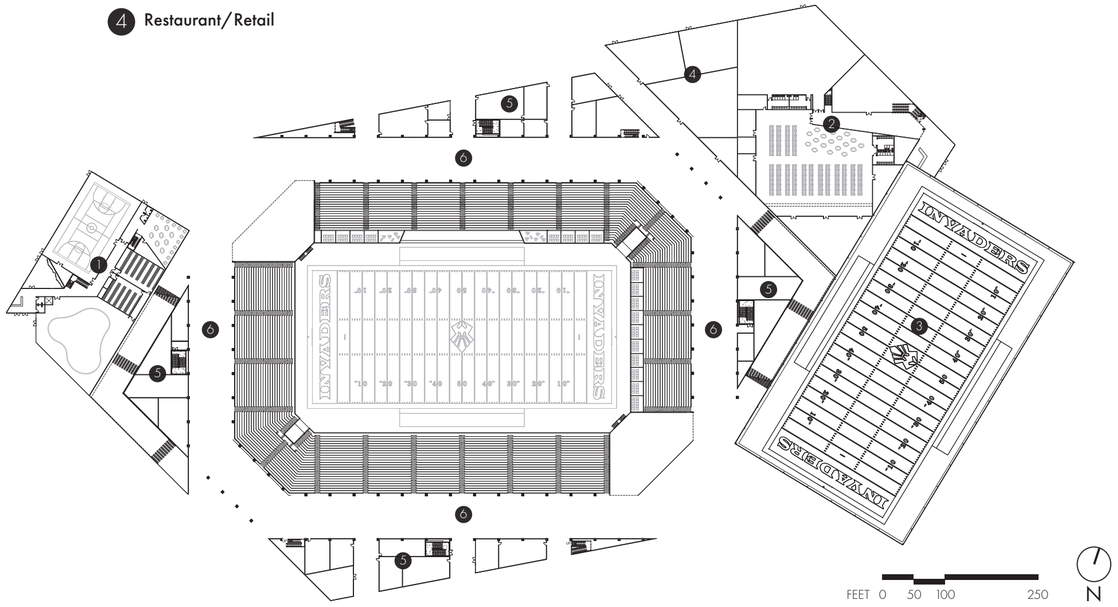
lower level plan

1. Game Field
2. Sideline Club
3. Sideline Suites
4. Team Locker Room
5. Visitors Locker Room
6. Locker Room/Recovery



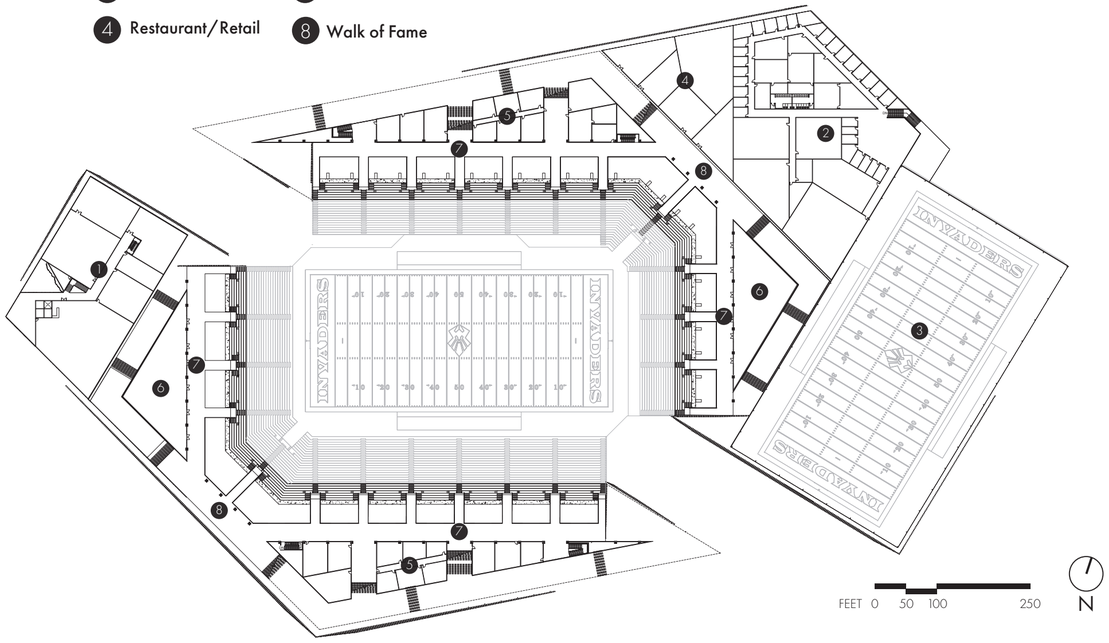
main level plan

1. Community Center
2. Team Facility
3. Indoor Field
4. Restaurant/Retail
5. Gameday Support
6. Lower Concourse



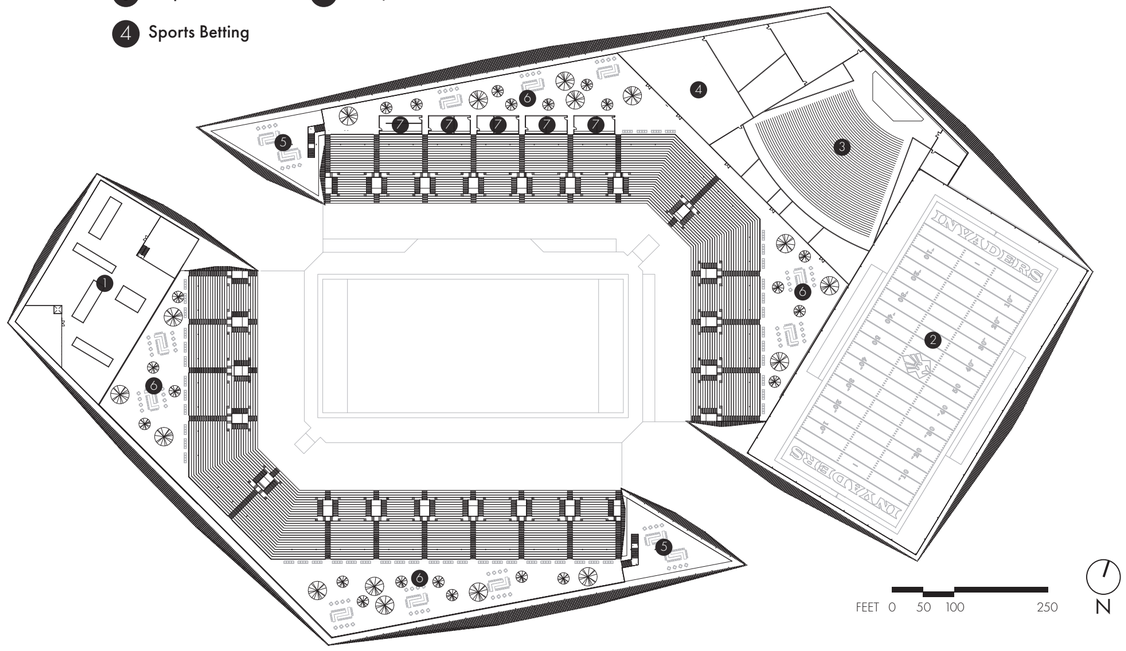
middle level plan

1. Community Center
2. Team Facility
3. Indoor Field
4. Restaurant/Retail
5. Gameday Support
6. Lounge Space
7. Upper Concourse
8. Walk of Fame

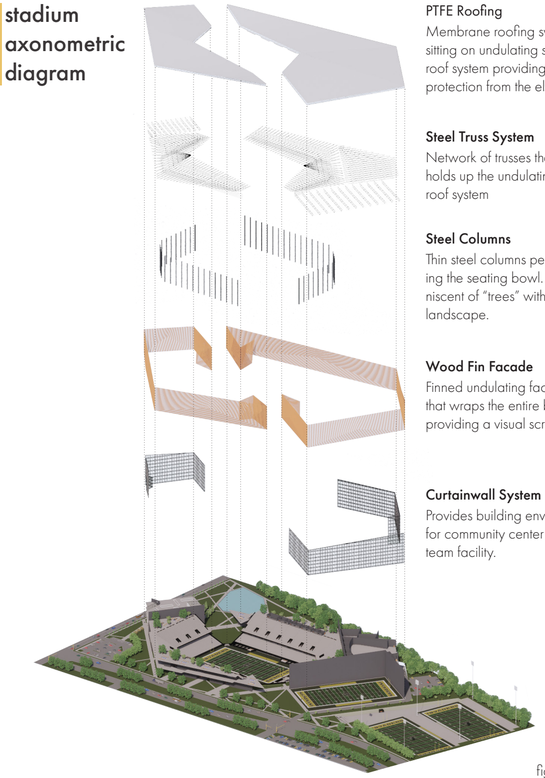


upper level plan

1. Rooftop Garden
2. Indoor Field
3. E-Sports Arena
4. Sports Betting
5. Sports Bar
6. Sky Deck
7. Press/Box Suites



stadium axonometric diagram



PTFE Roofing
Membrane roofing system sitting on undulating steel roof system providing protection from the elements.

Steel Truss System
Network of trusses that holds up the undulating steel roof system

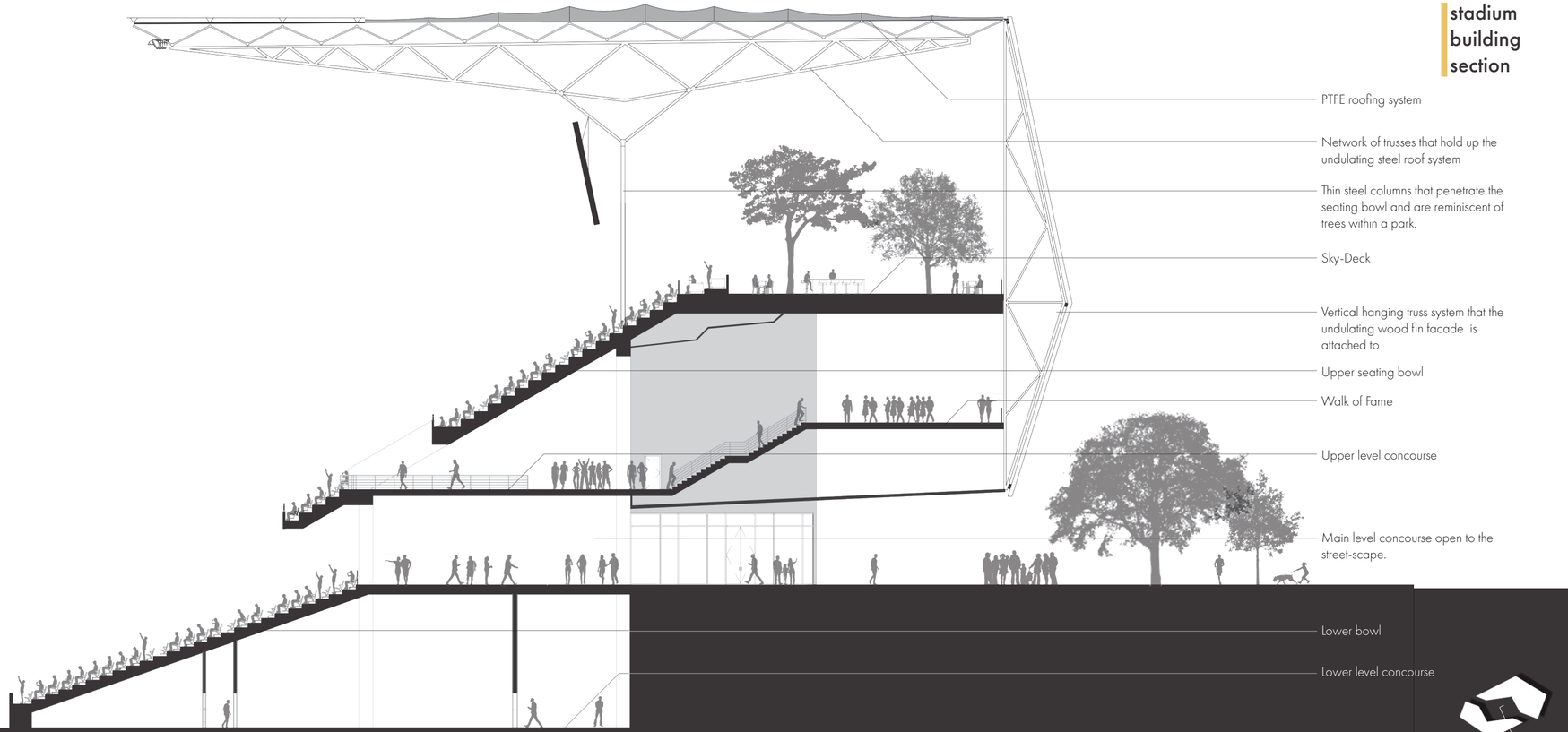
Steel Columns
Thin steel columns penetrating the seating bowl. Reminiscent of "trees" within the landscape.

Wood Fin Facade
Finned undulating facade that wraps the entire building providing a visual screen.

Curtainwall System
Provides building envelope for community center and team facility.

figure 90

stadium building section



project **renderings:**

Stadium

The stadium bowl sits over 35,000 fans in addition to the box suites in the Sky Deck and the Sideline Club suites. The seating orientation provides an intimate fan experience by bringing the seating bowl as close to the field of play as possible. The concourse serving the stadium is a publicly accessible, multi functional space that can adapt to different events, farmers markets, 5Ks, local art galleries, etc. (figure 91) The Walk of Fame is a extension of the upper level concourse (figure 92). Here, players that go on to play in the NFL are enshrined and added to the branding wall.

figure 91

figure 92

Team Facilities

The two outdoor practice fields are utilized daily by the Invaders' players and coaches during the season. When not in use they are open to the public and available as neutral sites for high school football games and reservable for other recreational sporting events. The indoor practice field is where the team practices during the colder months or when they are scheduled to play a dome team (figure 93). The team weight room provides ample space for team strength and conditioning sessions (figure 94). The state-of-the-art facility provides athletes with the best opportunity to succeed.

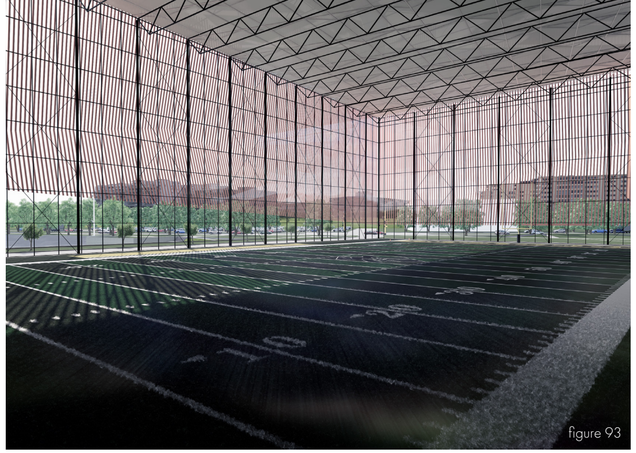
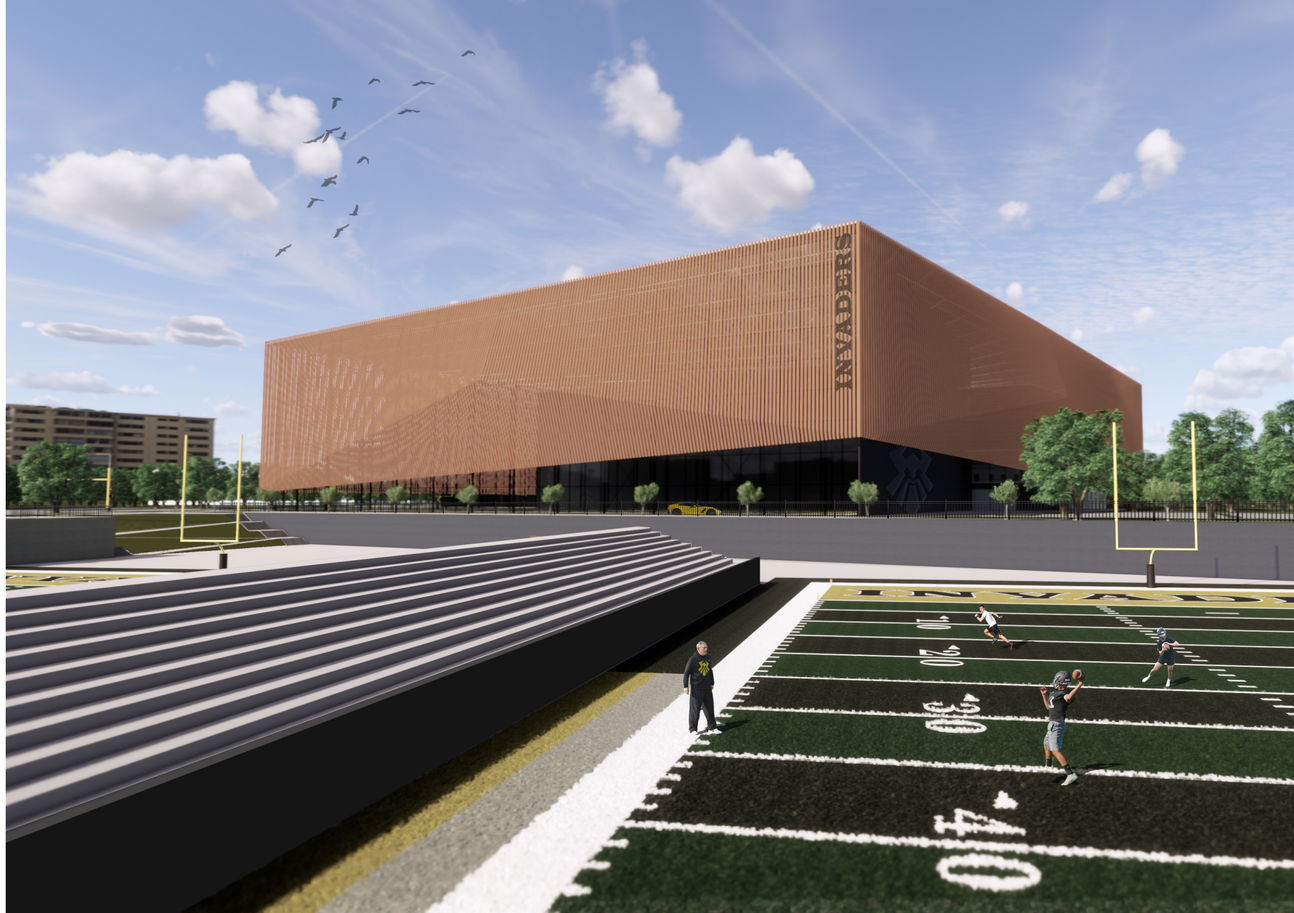


figure 93

figure 94

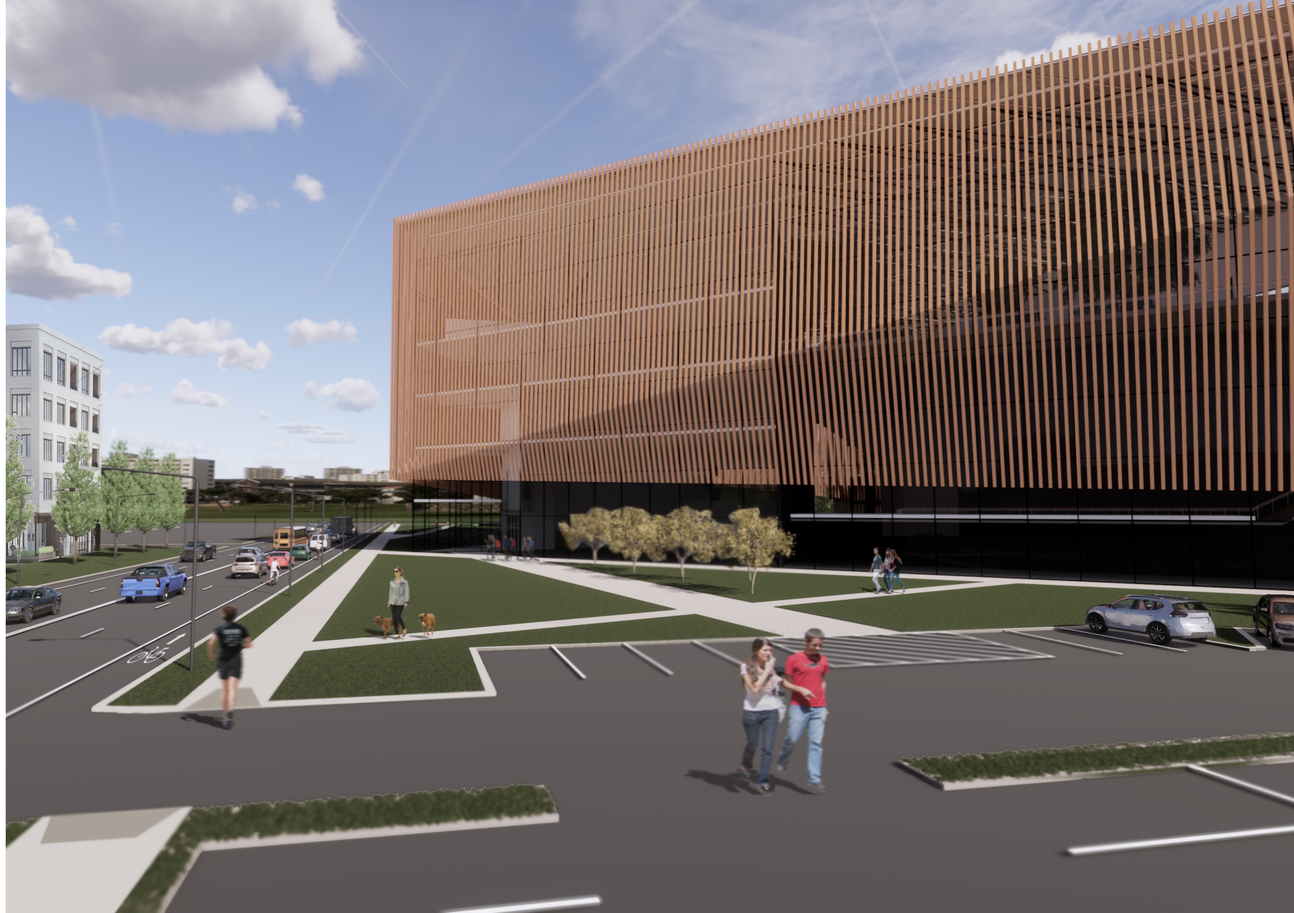


Community Center

The public community center is open before, during, and after typical business hours to accommodate a wide array of schedules. The gymnasium is open to the public for pick-up games and reservable for recreational leagues (figure 95). In addition to the gymnasium, the community center boasts racquetball courts, a community fitness center, dance studio, and climbing wall. These are just some of the opportunities provided to the public to be engaged in sports and promote health and wellness. There is also a rooftop community garden where locals can grow their own produce and those interested in gardening can practice developing their "green thumb"(figure 96).

figure 95

figure 96



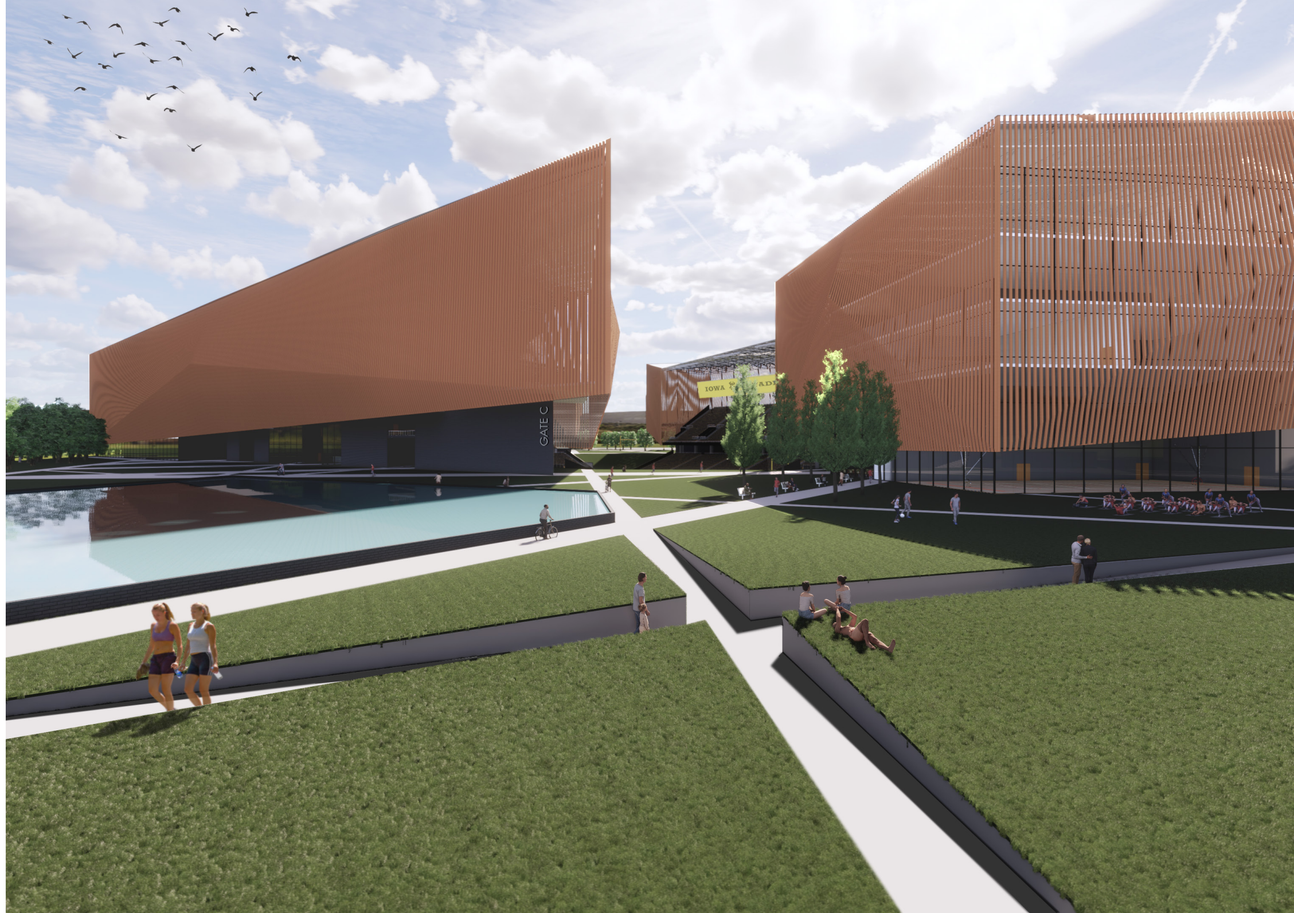

IOWA INVADERS
IOWA INVADERS

conclusion:

Taking on the enormous scope of work involved in the design of a stadium was immensely challenging. I embraced the need to design at a variety of scales ranging from the urban to the individual. It was also an extremely rewarding project full of valuable learning opportunities that I will carry forward into my career.

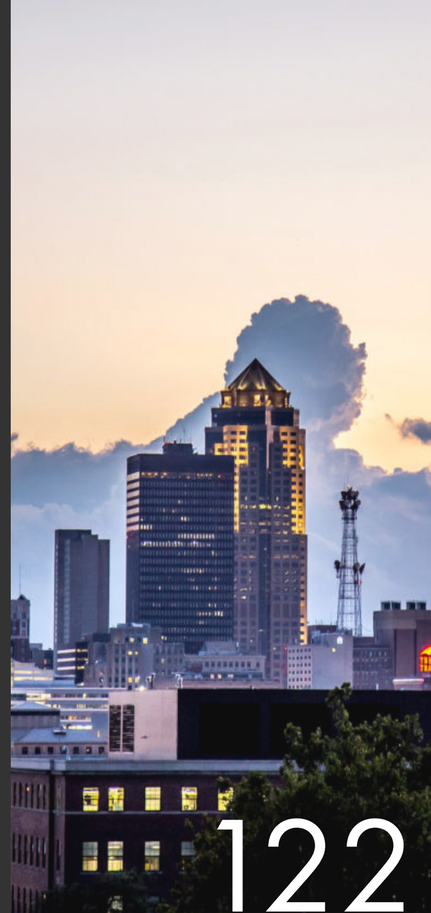
I am a fan of sports and American football myself and I enjoyed being able to work on a project that was of significance to me. I am intrigued to see where the landscape of sports architecture will go in the future and how we as designers can continue to tackle the economic, social, and environmental challenges that projects of this size and scope propose.

> *"Individual commitment to a group effort: That is what makes a team work, a company work, a society work, a civilization work."*
>
> - Vince Lombardi



bibliography

important references



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appendix

interviews / literature reviews / summary / board / program / author / experience

professional **interviews:**

figure 97

Jake Wieneke

Athlete | Montreal Alouettes

Jake is a wide receiver for the Montreal Alouettes of the Canadian Football League (CFL). He played high school football in Maple Grove, MN and college football at South Dakota State. He signed with the Minnesota Vikings as an undrafted free-agent in 2018. He had a short stint with the Salt Lake Stallions of the Alliance of American Football (AAF) before signing with the Montreal Alouettes in 2019. He was named a division finalist as most outstanding rookie (Zurkowsky, 2019).

figure 98

Mike Sabatini

Senior Architect | POPULOUS

Mike is a licensed architect with more than three decades of professional experience. Mike served as senior project designer for the Citi Field ballpark project, home to the New York Mets. During his professional tenure prior to joining Populous, he provided design services for a number of facilities. Mike's career has included such notable projects as Citi Field, TD Ameritrade Park, home of the Men's NCAA College World Series, 1996 Atlanta Olympic Stadium, Bank One Ballpark, Fenway Park Renovations, Olympic Stadium in Guangzhou, China and University of Notre Dame Stadium renovations. He has also been involved in revenue enhancement projects for several professional and collegiate clients (Mike, Sabatini, n.d.).

As a part of my research, I conducted two separate interviews. One with Jake Wieneke of the Montreal Allouettes and the other with Mike Sabatini a senior architect at POPULOUS. Each interview was advantageous to my design research for different reasons.

I was excited at the opportunity to interview Jake Wieneke as I played high school football with him. The interview with Jake was helpful in understanding what design elements of a stadium and team practice facilities are important to an athlete at the professional level. He was also able to convey to me his experience playing football at the college level at SDSU. I asked him about his experience playing at both the new Dykouse Stadium complex (with the team practice facility directly adjacent to the stadium) and how it compared to the old Coughlin-Alumni Stadium. I was able to get his impression on the Minnesota Vikings TCO performance center during his time at the Vikings training camp in 2018. I asked him about the importance of community outreach and to what degree he believes sports play a significant role in developing character. One of the most surprising answers Jake gave as a part of the interview was that even if he had been given the opportunity to play on a developmental league football right out of high school (that paid him to play football) rather than playing college football, he still would have chosen the collegiate football route. Initially this answer surprised me as I had expected he would have opted for the route that paid him to play the sport. The more I thought about it though I realized this was likely because of the people he met, relationships he developed, and experiences he had along the way. I know I wouldn't have traded my high school football experience for anything. I wished I would have followed up with him on that question to understand exactly what he meant by his answer.

The interview with Mike Sabatini helped me understand the designers perspective on minor league stadiums. I got his take on how COVID-19 might effect the design of stadiums in the future. He enlightened me on how COVID-19 was accelerating the trend toward more technology integration for things like tickets, concessions, etc. as a part of the gameday experience. He also helped me understand some of the ways stadiums, specifically minor league stadiums, are typically financed. In addition, Mike talked with me about ways stadiums generate revenue for the city such as corporate sponsorships. The interview opened my eyes to some of the unique challenges that minor league teams face simply from a branding perspective as all of their top performing players end up leaving for the professional ranks. This makes team branding more difficult than at the professional level because their star players don't stick around. More of their branding revolves around the city and connection to the local community. The fact that star players eventually leave is what gave me the idea for "Walk of Fame" in my project, where players that go on to play in the pros would get their jersey and likeness enshrined for posterity.

literature **reviews:**

The Economics of Sports Facilities and Their Communities

John Siegfried and Andrew Zimbalist (2000)

1. Overview

While this article is from two decades ago, many of the observations and arguments it raises are still true today. This article looked specifically at the economic viability of sports stadiums and arenas for professional teams in one of the four major sports leagues in the United States. The article did not look at minor league stadiums or on the effects those stadiums have on their smaller market communities. It is clear that the budget for professional sports stadiums today along with the way they are designed disadvantages the communities in which they are located. If the same model of design and financing is perpetuated, at some point the public will reject the idea of sports stadiums and arenas placed within the urban core of their cities.

2. Summary of Article

The article examines the economic impact that sports facilities have on their surrounding communities and host cities. As of the year 2000 when the article was written, more than $21.7 billion was planned to be spent on stadiums and arenas built or planned since 1990 (two thirds of which was contributed through public funds). Taxpayer dollars were not always utilized to pay for sporting venues for profit-making privately-owned sports franchises. Until 1953 all major league sporting venues were constructed exclusively with private funds (except for the LA Coliseum, Soldier Filed, and Cleveland's Municipal Stadium which were built with the intent of luring the Olympic Games). Since then, it has become routine to use public funds for the construction of major league stadiums. It is argued in the article that major league sports' collective control over team additions and relocations give them an effective monopoly, which results in increased negotiating power with potential host cities. Further, it is argued that through the "substitution effect" and monetary "leakages", the net effect on output from sports teams is estimated to be virtually zero. The two solutions proposed were divestiture resulting in smaller competing leagues, or legislation prohibiting existing leagues from exercising collective control over team relocations.

3. Impact to Metropolitan Area

3.1 Impact on Residents

The article argued that through independent research on the economic impact of stadiums no statistically significant positive correlation between hosting a major league sports facility and economic development could be found. In addition, no significant difference in personal income

growth from 1958 to 1987 between the 36 metropolitan areas that hosted a team from one of the four major sports leagues was found, compared to areas that did not host a team. In fact, it was argued that new sports stadiums actually reduce per capita income in the host communities.

3.2 Substitution Effect

One of the reasons argued that sports franchises did not provide any net economic effect in an area was the "substitution effect". Essentially, it was purported that money one spends taking a family to a game is money that is not spent on local entertainment (e.g. bowling alleys, golf courses, theaters, etc.). Rather than adding to the economic activity they simply rearrange spending. This would certainly be an issue provided the claim that income per capita was in fact reduced in host cities.

3.3 Core Redevelopment

Although the article argued that it is difficult to justify building a stadium or arena on the grounds of promoting economic growth, it was conceded that it is possible that the construction of a stadium or arena could facilitate efforts to redevelop and revitalize an urban core, provided housing and commercial construction follow the erection of the stadium. Many governments and municipalities subsidize economic development efforts in a city's core and sports facilities are often part of this strategy.

4. Negotiation Power of Relocation

The article argues that the key to team owners' negotiating power is their membership in a premier pro sports league. This status gives the league monopoly power over the placement or relocation of league franchises in their sport allowing franchises to extract funds from communities that might otherwise enjoy considerable surplus of funds from hosting a franchise at a competitive price. This is one of the reasons that leagues hold exhibition games in other cities (or countries i.e. London in the case of the NFL). By expanding the number of cities where the games take place leads to a geographical increase in the fan base as well as the number of potential host cities in the future. I somewhat agree with the article's solution of limiting a leagues ability to collectively control franchise location and relocations. While this would incentivize major league teams to congregate to the largest cities, this would in turn open up smaller market or even mid-sized cities to land a minor league team in the future, especially if the NFL were to adopt a hierarchy within the developmental league similar to the MLB that has various levels of competition (Triple A, Double A, Single A and Rookie Ball).

5. Public Funding

Some have wondered why build a stadium or arena for a team rather than simply dole out a cash subsidy? Building a stadium can assist to help secure political support from labor unions and those in the construction industry. Also, cash transfers would not provide any incentive for the team to put a good product on the field. Most significantly though, the 1986 Tax Reform Act prohibited using municipal bonds that are exempt from federal taxation to pay for the construction of facilities if an excess of 10% of the facilities annual debt service is covered by facility-related revenues. The proponent of the act had intended to reduce the federally tax-exempt bonds used for financing stadiums. Instead, the act pushed many cities to pay a larger portion of stadium costs in order to retain eligibility for tax-exempt bond funding, increasing the subsidization of sports facilities through tax dollars. Going forward, however, paying for stadiums and arenas using tax dollars would not be such a poor investment for communities provided increased public access and utilization of the stadium was built into the design. Unfortunately, most of the pro American football stadiums built today are designed like European walled cities, enclosing all commercial activity within its confines. My design would attempt to mitigate this flaw by maximizing the public access and use of the facilities by the public throughout the year.

6. Affluent Fans

Along with the rising cost of sports stadiums, the median income of all sports event ticket purchasers is increasingly higher than the overall median income level. It appears that sports consumers have grown relatively more affluent over time. An example of this fact was the ability to charge for a personal seat license for season ticket holders, which even in the 1990's ranged from several hundred to several thousand dollars depending on the league, team, and seat location within the stadium. Keeping the construction cost of stadiums more modest would mean that owners would not have to institute higher ticket prices to recoup costs. This would allow as many working-class patrons as possible in the surrounding neighborhoods enjoy a game, which is certainly a design goal for my project.

7. Conclusion

In summary, because of the increasing budgets of professional sports stadiums and arenas largely due to increasing cost to construct and the monopoly-like negotiating power that pro sports leagues currently hold, the fact that taxpayers are still footing a large portion of the bill means that pro sports stadiums and arenas aren't such a good investment for urban communities. Especially since most of those in the community and surrounding neighborhoods will not be able to afford a ticket to go see the game. My goal is such that in the design of a minor league stadium I can address some of these issues.

Left on Base: Minor League Baseball Stadiums and Gentrification

Eric Joseph van Holm (2016)

1. Overview

Although most studies on sports-led redevelopment focuses on major league sports facilities, minor league sports more applicable to the majority of America's municipalities as host cities for minor league sports teams often vary greatly in size. As such, it is relevant to study the redevelopment surrounding stadiums in relation to gentrification as revitalization has different affects for suburbanites and existing residents. From the results of the study, I would argue minor league stadiums do not have the same effect of gentrification and displacement of residents as is traditionally understood to occur around major league stadiums. In fact, the increase in total incomes in the community is a tangible public benefit of a stadium. However, communities that host franchises are not as diverse as those without a franchise a decade down the line. Designing a stadium so that is serves the local community, especially those that are disadvantaged is important in fostering diversity.

2. Summary of Study

This study investigated the effects that minor league baseball teams have on redevelopment as well as potential gentrification and displacement of residents in the communities and neighborhoods surrounding the stadium. To analyze the potential effects, the study selected over 30 minor league baseball stadiums (hosting competition ranging from Rookie Ball to Triple A) in markets of various sizes that were constructed in the early 2000's and looked and data before the stadium was constructed as well as one decade later. This time frame was selected because stadiums may have an immediate effect on the area and attract an influx of visitors during its "honeymoon" phase, but to effect long-term development of the area, a longer time horizon was required. To determine whether redevelopment and or gentrification/displacement occurred, four dependent variables were examined; percent change in median rent; percent change in median income; change in turnover; and change in the percent of minority population. After checked for robustness, the results show that minor league baseball stadiums have a significant effect on income and racial composition.

3. Percent Change in Median Rent

Percent change in median rent (adjusted for inflation) indicates whether individuals place a greater value on living near a minor league baseball stadium. After checked for robustness it was found that the percent change in median rent was less than 5%. While the overall population went up,

the influx of housing units built around the stadium served as an offsetting force keeping median rent rates relatively constant. Expectedly, owner occupied housing decreased as much of the housing built around the stadium were rental units. However, rents increased in areas with primarily minority residents in 2000, which is consistent with the literature on how expensive residential segregation is for the disadvantaged.

4. Percent Change in Median Income

A jump in the percent change in median household income would in indicate that the area had redeveloped providing greater tax revue to the city and reduced its strain on government resources and services. The results seem to indicate that the areas around the minor league stadiums did indeed redevelop as the full model indicated that there was over an 8.5% increase in the median income for the communities around the stadium. This is likely driven by the fact that new business was attracted to the area as the percentage of professional workers in the neighborhood rose by 60% and the those that were college educated rose by over 93%. In addition, the percentage of those with manufacturing jobs went down 16.5%. While this is a mixed effect, cities often are wiling to move manufacturing plants to the outskirts of the city in order to make room for redevelopments of the city's core which with a rising median income reduces reliance on government.

5. Change in Turnover

Turnover was measured to test whether the residents of a neighborhood were changing at an increased rate. The full model indicated that there was less than 1% turnover in communities with a minor league baseball stadium. However, the percent change in vacant housing went up by 9%. Areas with higher home ownership rates saw less turnover than those in primarily rental areas. Turnover was surprisingly low given that an influx of professional workers and an increase in the housing supply often leads to higher turnover. Speculatively, the increased standard of living in the area could lead more renters to stick around longer than normally anticipated.

6. Change in Percent of Minorities

The change in minorities looks beyond the total rate of change in a neighborhood captured by the turnover to understand how subgroups are affected specifically. Given the full model, the change in the percent of minorities in the area around a stadium went down by 3.4%. While the diversity of the areas still increased, they did not increase as much as areas that did not host a minor league stadium. One explanation giving by the study for the decrease was that as the populations around the stadium increased in general, the number of minorities held steady, only their share decreased.

Somewhat surprisingly, the share of minorities increased in areas that had higher shares of owner-occupied housing back in 2000.

7. Conclusion

Displacement may be an inconsistent outcome of gentrification due to underlying conditions prior to the revitalization of a neighborhood in addition to the difficulty of pin-pointing the exact moment gentrification occurs. Even so, the fact that incomes in the area around minor league baseball stadiums increased from 2000 to 2010 is a positive sign of redevelopment and cities often are willing to sanction some degree of displacement in the pursuit of increasing their fiscal strength. My goal is to design a stadium that can lead in the redevelopment of an area without any significant displacement or hindrance to the growth of diversity in a population.

Participation in a summer sport-based youth development program for disadvantaged youth: Getting the parent perspective

Allison Riley and Dawn Anderson-Butcher (2012)

1. Overview

The following review investigates a study performed to get the parents perspective on the impact of participation in a sports-based youth development program for disadvantaged youth. The review covers the primary, secondary, and long-term outcomes purported by the sports camp (LiFE). This review will not cover the details regarding the facilitation of the camp, only the outcomes perceived by the parents. Based on the results of the study, I argue that access to youth sports for low-income families is important because in addition to improving the health and overall well-being of those involved, participation in sports-based positive youth development (PYD) programs can foster personal development in the areas of self-control, effort, teamwork, and social responsibility which can be linked to higher academic achievement; school engagement; less substance abuse and delinquency; and increased mental health.

2. Summary of Study

According to the article, the purpose of the study was to explore the impact of low-income youth participation in a summer sports-based PYD program on individual, parent, family, and community level outcomes. Ten parents of children from low-income families who participated in the Learning in Fitness and Education (LiFE) summer camp (which is put on by the Ohio State University) were interviewed. As a part of the interview, parents were asked some of the following questions; "What ways if any, has your child's participation in [the program] impacted him/her?" and "What changes, if any have you noticed in your family as a result of your child participating in [the program]?" The findings provide qualitative evidence of the value of sports-based PYD summer programs as parents were able to identify key outcomes at the individual, parent, family, and community level such as biopsychosocial development and positive changes in affect, parents' peace of mind due to child involvement, improved family interactions, youth involvement in prosocial activities, and community interaction/support.

3. Personal Development

In the interviews, parents noted that as a part of the summer camp the children were being taught skills and lessons for both sport and life. By learning sports specific skills participants grew in their perception of their athletic competence and confidence. This in turn increased their likelihood of engaging in opportunities to learn and try new things they did not previously think they could do or

would have even attempted. One parent even mention that participation led their child to pursue increased activity outside the program. Keeping youth active leads to an overall improvement in health and well-being and can promote weight loss and healthy eating. In addition, sports can provide an outlet for pent-up energy leading to behavioral improvement at home. Though engaging in sport specific activities, youth can develop a positive work ethic, teamwork, communication, and confidence. These abilities and values that are fostered in an athletic environment will often be carried into adulthood making for more competent and confident individuals.

4. Social Competence

In addition to personal development, parents were aware of improved social competence and responsibility. As a part of the LiFE sports camp one hour a day was devoted to social competence education. Parents indicated that their child being placed in a group of peers led to an increased ability to deal/adapt to different people and led to an increased ability to relate to other children. Parents appreciated the fact that the program exposed their children to "kids from all over." The social development taking place at camp was also reported to spill over into home life. This was partly due to the active nature of the camp, leaving kids drained and without extra energy with which to harass their siblings. Sports have the ability to improve social behavior especially when it comes to learning to sportsmanship in competition. In both team and individual sports competition make tempers flare. Sport teaches the essential skill of being able to earnestly compete, trying to defeat your opponent, and win or lose, being able to shake hands at the end.

5. Access for Low-Income Families

Parents indicated the fact that the sports-based camp was free to attend provided them with a much-needed financial relief. They felt like they could send their kids to camp without feeling like it was at the expense of paying certain bills. It is critical that programs such as these continue to receive funding, whether it be private or public. Disadvantaged youth should not be excluded from sports simply because their parents can't afford it. It is increasingly becoming commonplace that children and students of parents who have wealth can afford to not only pay to have their children participate in sports, but they can pay for additional personal trainers or lessons so that their kids have a better chance at making the team, getting the stating role. While access to personal trainers and private lessons should not be restricted, allowing the cost to participate in sports become a barrier to entry, keeps disadvantaged children from accessing coaching and the opportunity to participate and build a work ethic that can outperform the competition simply by putting in the hard work and effort required to succeed.

6. Peace of Mind

One of the highest impacts for the parents themselves was the reported peace of mind that they had sending their children to the sports-based PYD. Parents indicated that they could be worry free for many reasons including but not limited to; the quality of the counselors and the supervision that was provided; the fact it took place at and was affiliated with a university; the structured programming; the safe environment; meals and transportation were provided; and the fact the parents know exactly where their kids were. A common theme with parents was that they were glad that the youth in their community were engaged in activities with their peers rather than sitting idle or worse, out on the streets. Communities have been concerned about unstructured time of youth for a long time. Providing structure in the lives of children especially in the summer when school is out could be exceptionally impactful for youth from disadvantaged backgrounds. This study gave qualitative evidence to support this claim.

7. Outreach

One of the perceived advantages of the camp location was that it was on a college campus as it was put on by the Ohio State University (OSU). Parents saw the exposure of the college environment and the university campus as a goal that their children can work towards. In many ways, the camp could be considered as an outreach effort to the broader community. In fact, many sports teams partner with organizations to facilitate camps just like the one that was part of the study. The NFL has a "Play 60" campaign that operates in thousands of schools across the US in partnership with the American Heart Association in an effort to combat childhood obesity. I can see a future developmental league football team being in a position to fill that role, in Des Moines, Iowa. During the offseason in the early summer, players could give back to their community by volunteering as counselors putting on a football camp for youth in the surrounding neighborhoods.

8. Conclusion

In conclusion, parents of children involved in the sports-based PYD were able to notice tangible changes in their children's personal development and social competence as a direct result of their participation. In addition parents greatly appreciated the ability to enroll their children without having to worry about cost of attendance, transportation to and from the camp, and providing meals. Parents were also personally affected by having peace of mind knowing where their children were at and that they were under the supervision of adults. After reviewing this study, it is clear that from a parent's perspective providing access to sports and sports-based development opportunities for children is clearly a net positive for the individuals, the families and the community at large and can help set up children for a better, and healthier future.

literature review **summary:**

Much of the literature surrounding the economic impacts of major league sporing venues is rather dismal. Today's modern sports stadiums are becoming extremely expensive to construct. This is largely due to the fact that major league sports have an effective monopoly on the sports entertainment market due to the collective control over team relocations. This unfortunately allows major league sports teams to extract more money than necessary from potential host cities to pay for their stadiums. Because of this as well as other factors taxpayer don't see the return on their investment. One solution that would aid this issue would be restricting the collective control that major leagues sports currently has on the locations of their franchises. This minimize their negotiating power and would insensitive teams to pursue the largest market possible leading to teams congregating in and around cities like New York, Los Angeles, Chicago, Dallas, etc. This would however further open up medium and smaller market cities to possibly landing a developmental league team and stadium.

In addition to the cost to build, the prices of attending a game are increasing as well. The rising costs of attendance are effectively keeping large portions of lower-income and working class people from being able to attend. By designing stadiums with a more modest budget, owners would not be forced to raise ticket priced in order to recoup some of their costs. This would allow more people who want to purchase tickets to a game the financial ability to.

In contrast to major league venues, the literature on minor league stadiums (specifically minor league baseball stadiums) is more promising. However, in relation to economic viability and gentrification the results are mixed. The median rent in areas around a minor league stadium were found to rise slightly over ten years, proving that the community valued living near the stadium. Also, the stadiums were shown to have the power to redevelop and revitalize a community. When compared to cities that did not host a minor league baseball franchise, cities that built new stadiums saw a sustained increase in the median income of the population a decade later. Governments appreciate this because this means that less people will be relying on government resources or services.

When looking at the potential displacement effects, the change in the turnover rate compared to the control group was found to be negligible meaning that ten years after the ballpark was constructed, existing residents were not displaced at a higher rate than areas that did not build a

stadium. Although, it was determined that the neighborhoods around the stadium were not as racially diverse after ten years as the cities without stadiums. This is likely because populations around the stadium increased in general, but the number of minorities held steady leading to a lesser share of the total population in the community. A stadium that is able to deliver on its promise to economically revitalize an area while simultaneously providing outreach and engagement opportunities to low-income residents within the community should, in my opinion, be a design goal for all sports architecture projects in the future.

In regard to outreach and community engagement, providing access for youth (especially youth from low-income families) to participate in athletics can be huge benefit to both the children and their parents. Engaging in sports-based youth development programs helped children in their personal development. It gave them the opportunity to build character and cultivate a positive work ethic and parents were also able to see an improvement in their competence and confidence in their athletic abilities. Parents also perceived an affect on their children's social competence as well. The lessons values learned from competing respectfully with and against their peers while learning sportsmanship was spilling over into their home life and improving their relationships with their siblings. Participation especially during the summer months also gave the parents peace of mind knowing that their children were under the supervision of adults and not out on the streets.

Providing structure for their lives through an athletic environment where they can learn, grow, and develop as a young adult will set them up for success in the future which in turn bodes well for their community as a whole. To think that architecture can aid in shaping that process is an amazing gift as a designer.

thesis **board:**

The image to the right (figure 99) is of my thesis presentation board that I submitted for the 2021 McKenzie Prize as part of my thesis project submission. Dimensions of the board are 6' x 4'.

figure 99

architecture **program:**

I completed my four year undergraduate Bachelor of Science in Architecture degree at the University of Minnesota - Twin Cities. After taking a few years off, I returned to academia to pursue my Master of Architecture. I ended up choosing to attend North Dakota State University and transferring into the 5th year of the 5 year architecture program. Given my short time at NDSU, I only got to experience the School of Design, Architecture and Art during the COVID-19 pandemic. While most of the courses were taught virtually, I had the great fortune of learning from many different professors including professor Ron Ramsay and observing his masterful use of narrative in communicating design solutions. In addition, I had the privilege of being a part of Dr. Bakr's thesis design studio and learning from his expertise in resort design and cultivating an entertainment experience through architecture. The students and staff at NDSU welcomed me into the program and were a wonderful resource throughout my graduate school experience.

figure 100

the **author:**

Evan **Pukal:**

[redacted]

studio **experience:**

University of Minnesota:

Second Year

Term: Fall 2015
Professor: Bob Ganser
Project: Warming House; Minneapolis MN

Term: Spring 2016
Professor: Nina Ebbinghowser
Project: Mississippi Interpretation; Minneapolis MN

Third Year

Term: Fall 2016
Professor: Andrew Blaisdale
Project: Biking Collective; Minneapolis, MN

Term: Spring 2017
Professor: Matt Byers
Project: Mississippi Marketplace; St. Peter MN

Fourth Year

Term: Fall 2017
Professor: Nat Madson, James Kehl
Project: Venue Promenade; Tysons VA

North Dakota State University:

Fifth Year

Term: Fall 2020
Professor: Ronald Ramsay
Project: Bärlin Brewing; "Agincourt, IA"

Term: Spring 2021
Professor: Dr. Baker Aly Ahmed
Project: Live + Work + Play; De Moines, IA

Professional Experience

Firm: Wold Architects and Engineers; St. Paul, MN
Position: Architectural Designer
Years: 2018 - 2020

LIVE + WORK + PLAY

Engaging and revitalizing the broader urban community through sport.

Evan Pukal / Master of Architecture
Spring Semester 2021
Arch 772: Design Thesis
North Dakota State University
School of Design, Architecture, and Art
Professor: Dr. Aly Ahmed Bakr