

ABSTRACT

Title of Thesis: GRID AND THE GRIDIRON: RE-IMAGINING MEGA-
STRUCTURES IN THE NEIGHBORHOOD

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In dense urban environments, space is valuable. Unused space is not a luxury taxpayers or developers can afford. Mega-structures like football stadiums are important civic and sacred spaces and are valued in American culture as such. However, they receive infrequent use, sitting idle most days of the year. This thesis will examine how architecture and urban design can make these sacred, civic spaces active and restore public value from Monday to Saturday.

The means of activating spaces stem from allowing the field to function as a park, making retail space in and around the stadium functional on game days and non-game days, providing maximum structural flexibility for non-football functions, and adapting parking lots into public plazas by encouraging in them a variety of uses.

GRID AND THE GRIDIRON
RE-IMAGINING MEGA-STRUCTURES IN THE NEIGHBORHOOD

By

Peter Cunningham

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Advisory Committee:
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Foreward

The design and siting of stadiums has been a lifelong obsession for me. Since I was a boy, I have been fascinated by the experience of stadiums and have been the beneficiary of the generosity of parents and grandparents who have supported me in traveling around the country to visit baseball stadiums, especially ones in great cities like Chicago, Boston, San Francisco, New York, and many others. My love for the sport morphed quickly into a much deeper and more satisfying and lasting love for the palaces in which the events took place. And not only a love of the stadium structures, but it also morphed into love of the neighborhoods and cities in which the stadiums were only a small piece of the vibrant life that took place there. In fact, I can directly link this opportunity, this privilege in my life to my desire to become an architect and to study places like this and to create them anew.

I have often contemplated the rightful role that sports ought to play in my life and in American society. There are times that I view them as healthy relief from concerns and pressures of a mundane life, and there are times I view them as unhealthy obsessions for myself and my culture. But the stadium is an archetypal building form. It has long pre-existed us, and it will long outlast us. The activity that occurs on the field will change, but the formal arrangement will not. Humans, as Aristotle reminds us, are social animals, and we have a fundamental desire to gather, to be in communion with each other, and to congregate, sometimes in very large numbers. So, whether or not sports play too dominant a role in mine and our lives, the mega-stadium at least will remain, and with it, all the questions that follow about its place in the urban fabric. At the very least, it is undeniably important to offer an urbane and architectural critique of the goals and outcomes some of the most expensive structures built in the world.

Dedication

To my parents and grandparents, who at an early age took me around the world to see and experience some of the greatest cities and stadiums in the country.

To my wife, Caroline, who is a constant source of inspiration and dedication, and who has supported me throughout my education and especially this endeavor.

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List of Abbreviations

NFL:	National Football League
MLB:	Major League Baseball
MLS:	Major League Soccer
NBA:	National Basketball Association
NHL:	National Hockey League
FIFA:	Fédération Internationale de Football Association: “international governing body of association football, futsal, and beach soccer”

Chapter 1: Background

Mega-Stadiums as Civic Space

American football is a sport of participatory democracy. Any person, no matter their rank, race, or gender, can invest in a team. Fans buy tickets, paraphernalia, parking passes, portable grills, cable packages, and as many overpriced beers and hot dogs as needed to keep them warm at the game. They engage in fantasies where they run their own teams, drafting their favorite players and imagining themselves as the general managers, and they gamble their hard-earned money on their own prowess at leading their fantasy team.

At the heart of this culture is the football stadium. Fans have rituals with each other and with the place where their favorite game and their favorite team battles. They develop topophilia, a love of place, where they have memories of heart-stopping wins and heart-breaking losses. They have memories of the people and the crowds with whom they shared their agony and ecstasy. And all of this is given memory and life by the place in which it happened. It is a sport of the working class, where “grit” and “grind” are the highest compliments. In these ways, the football stadium is a sacred or religious space. It is a place where crowds gather, united by a common passion, to participate in rituals and to exercise their emotions.

In this respect, football is democratic. But in many other respects, it has become an elite sport, and this true especially of the stadium. Ticket prices reveal a hierarchy and stratification of

wealth and class. This is what social scientists Gary Armstrong and Richard Giulianotti term the “Accumulation and redistribution of capital.”¹ They have more to say:

As the French anthropologist Christian Bromberger has demonstrated in European football, an ethnology of stadia discloses the middle classes in the seated stands, the artisans crafting the game and social ladders on the terracing beneath, with the manual classes and their offspring, both urban and agrarian, swelling the ends with sound.

In the American football stadium, the luxury suites, the cushy seats, the open wet bars and buffets, and the glass walls that protect them from the elements segregate the haves from the have-nots (Figure 1).

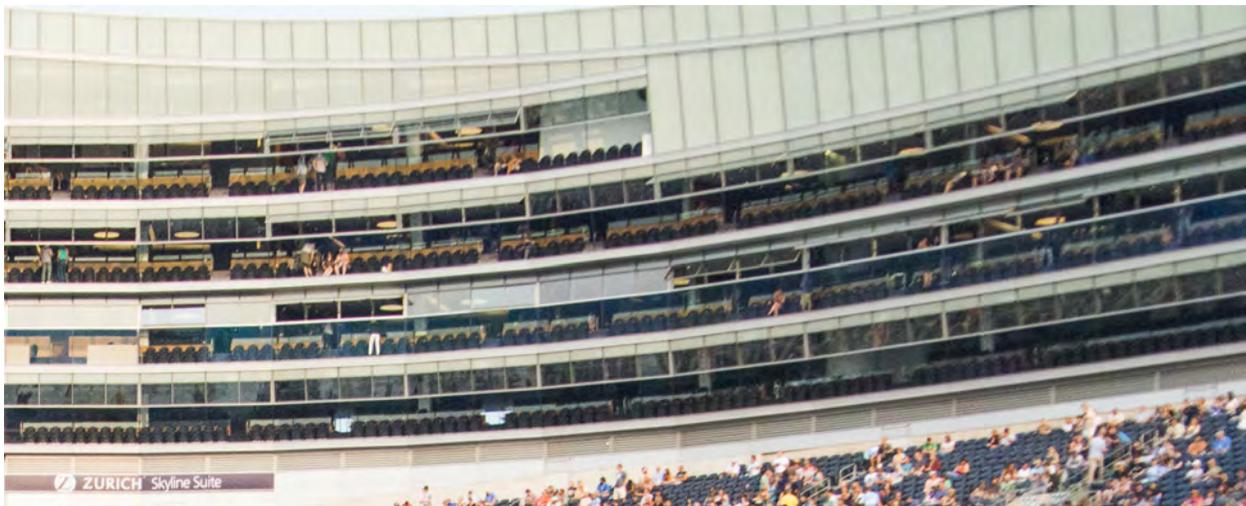


Figure 1. Luxury Suites at Soldier Field. Image in the public domain.

Why does this matter? Hierarchy is arguably inherent in every architectural and urban environment, and so football stadiums should be no exception. What is unique about the football

¹ Giulianotti, Richard, and Gary Armstrong. "Avenues of Contestation. Football Hooligans Running and Ruling Urban Spaces." *Social Anthropology* 10.02 (2002): p. 213. Web.

stadium is that in almost every case, the stadium is partially and sometimes fully funded by the public, and yet, the public does not get to enjoy them freely. With their own hands (in the form of tax dollars paid with their labor, and ballots cast to tax themselves) they have built the stadiums as civic monuments. But they have also forfeited the right either to benefit from the public space of the stadium, which sits gated off when the stadium is closed, or to benefit from revenue that could be generated by that land.

A Problem Yet to be Solved

In 1991 Philip Bess published *City Baseball Magic*, which in hindsight marked a turning point for how Major League Baseball (MLB) teams built their palaces. They no longer wanted to play in modern multi-purpose donuts, with artificial turf and facilities and grandstands that were not tailored to their sport. Instead, they turned to structures that mimicked ballparks past—capturing the nostalgia that’s so often associated with baseball—and that suited the specific and unique needs of their sport. Bess’ proposal called for an intimate new ballpark, Armour Field, on the Southside of Chicago that was nestled neatly into an existing neighborhood, in aesthetic communication with both the history of baseball and the site. More importantly, it sought to restore order and continuity to the neighborhood of which it was imagined to be just one part.² The city instead built a behemoth, modern stadium, Comiskey Park (today, Guaranteed Rate Field), that had distant sightlines, seas of parking, and no dialogue with the neighborhood around it.

² Bess, Philip. *City Baseball Magic: Plain Talk and Uncommon Sense about Cities and Baseball Parks*. St. Paul, MN: Knothole, 1999. Print.

Nevertheless, the ideas in the Armour Field proposal caught on. In 1992, Camden Yards opened in Baltimore and kicked off retro-designed ballpark trend that has remained en vogue until recently with a few exceptions. Denver, Atlanta, Detroit, San Francisco, Pittsburgh, St. Louis, Cincinnati, Seattle, San Diego, Minneapolis, Washington, D.C., and New York twice over have built retro-style Baseball parks located in walkable communities, accessible by mass transit. More than any other feature, the vintage-inspired, transit-friendly design of these stadiums is the unifying theme across America's MLB parks. And it's been shown to benefit the cities: cities like Cincinnati, Minneapolis, Pittsburgh, and San Francisco have seen a spur of development in the blocks adjacent to them, as well as new transit lines which connect them to the rest of the city.



Figure 2. Camden Yards in the heart of downtown. Image in the public domain.

Look around at the professional football stadiums in America, however, and you'll see a different story. Some NFL stadiums are urban—in that they are located in the city—some have public transportation—in that they have a rail or bus stop in addition to massive amounts of parking—but none are a model of a walkable, urban, contextual stadium. It's not a mystery as to why; there are simple reasons why baseball's model has not caught on in football. First, the scale of an average football stadium is much larger than the scale of an average baseball park; as of

2017, the median NFL stadiums seats 68,500 patrons, while the median MLB ballpark seats only 41,900.^{3,4} Second, football stadiums are used less frequently, which means the areas around the stadium needs to have programmatic functions that can survive without the foot traffic—or parking revenue—generated on game days alone. Lastly, professional football stadiums usually cost more for the local government. There is a longstanding history of teams showing they are willing to pack their bags and leave town if that city won't front part or all of the bill for state-of-the-art facilities. Football stadiums have a relatively short life span as a result of changing standards of comfort and technology, as well as a constant desire to be cutting edge and have high-end amenities and finishes. All together, these lead to stadiums of astronomical costs that, if they don't deliver on their promised returns can financially cripple local governments..

Use

In 2016, sports fans made 143 million visits to see teams of the five major professional sports leagues—NFL, MLB, NBA, NHL, and MLS. The MLB has long outperformed the rest of the leagues—an average team drawing around 2.5 million visitors each season. While the NFL draws a much greater number of visitors to each game than any other sport (Table 1), their total seasonal attendance ranks towards the bottom of total seasonal attendance among the five leagues, each NFL team drawing in around just 500,000 visitors a year (Table 2).

³ "2016 NFL Attendance Data." *Pro-Football-Reference.com*. N.p., n.d. Web. 09 May 2017.

⁴ "MLB Ballpark Attendance, Ballparks of Baseball." *Ballparks of Baseball*. N.p., n.d. Web. 09 May 2017.

GAME ATTENDANCE PER TEAM BY SPORT

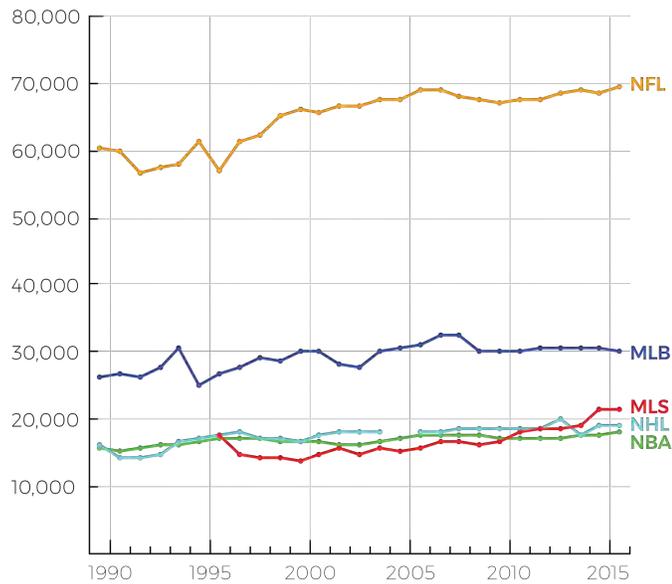


Table 1. Data compiled by author from various sources^{5, 6, 7, 8, 9, 10}

⁵ Attendance tallies in years where season was not completed due to strike or other events are extrapolated to a full season based on the partial season totals. These seasons include 1994 and 1995 MLB seasons, 1998-99 and 2011-12 NBA seasons, and 2004-05 and 2012-13 seasons of NHL.

⁶ Hockeycentral | NHL | NHL Attendances. N.p., n.d. Web. 09 May 2017.

⁷ "2016 NFL Attendance Data." *Pro-Football-Reference.com*. N.p., n.d. Web. 09 May 2017.

⁸ "MLB Ballpark Attendance, Ballparks of Baseball." *Ballparks of Baseball*. N.p., n.d. Web. 09 May 2017.

⁹ "NBA Home Attendance Totals." *Marquee2.jpg (23126 Bytes)*. N.p., n.d. Web. 09 May 2017.

¹⁰ "Major League Soccer Attendance." *Wikipedia*. Wikimedia Foundation, 01 May 2017. Web. 09 May 2017.

SEASONAL ATTENDANCE PER TEAM BY SPORT

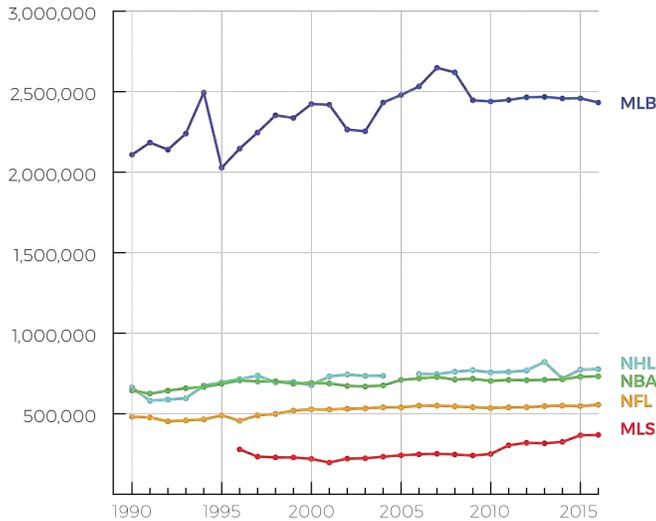


Table 2. Data compiled by author from various sources.

This leads to two problems. First, large crowds require large spaces to both gather and to move through. But these large gathering and circulating spaces are difficult to repurpose for anything other than large crowds. The alternative is flexible space: rooms and corridors that can serve both large crowds on game day and small crowds the rest of the time. Second, NFL owners tend to design the maximum capacity that they hope their team will draw, rather than to a conservative estimate of what they know they could.

NFL stadiums are landmarks, and people are attracted to them and enjoy visiting them. However, they are generally kept private and off-limits to the public. The only way for the public to experience the space is to pay for a ticket to an event in the stadium or take a tour. The edge of the stadium is often defined by walls, fences, and gates, making the field and interior stadium spaces inaccessible. These barriers are in place for both the security and privacy for players and employees working and practicing inside, as well as to prolong the life of the stadium by preventing people from misusing the property. Preventing outsiders from using the stadium

during off hours also helps reduce operational costs of running light and electricity—and it also creates an opportunity to gain revenue from fans who are willing to pay to visit the stadium.

Yet, these motivations don't necessitate keeping all of the stadium behind lock and key. Portions of the stadium could be left open to the public without raising concerns over privacy or extra costs. The edge of the stadium itself has the potential to serve both the inside and outside the park, or to alternate between the two. Tivoli Gardens in Denmark, Copenhagen is an example of this. Some of the buildings along the edge of the park service the park visitors, some buildings service pedestrians on the street outside the park, and some service both., with multiple entrances. This ambiguity of the threshold makes for a more interesting and more productive stadium and street surrounding it.

There is a direct correlation between the usefulness of the stadium and the cost of the stadium. If the stadium is an unusable space in the city, it is creating a dead zone of activity which is not productive for the taxpayers who funded it. Chuck Marohn, founder of the *Strong Towns* movement, has argued that a traditional retail development outperforms box stores and fast food restaurants in many ways, but especially in terms of increasing the taxbase. He compares a equally sized blocks, one of traditional retail in Brainerd, MN made up of 11 properties with a block filled entirely by a fast food restaurant, Taco John's. His analysis:

The eleven old and blighted lots — some of the most undesirable commercial property in the city [two liquor stores, a pawn shop, a barber shop, a bankruptcy attorney, a campaign headquarters, a retail establishment, a cafe and a vacant building] — arranged in the traditional development pattern along the incompatible, major arterial of Highway 210 have a combined tax base of \$1,136,500.

To compare, the Taco John's property — the one that is not only shiny and new but configured precisely as the city of Brainerd desires the old and blighted properties to someday be — has a total valuation of only \$803,200.¹¹



Figure 3. Old and blighted vs. shiny and new. Image courtesy of strongtowns.com.

The division of the land between several shop owners with small, individual properties together contribute more to the tax base and economy of a city than the big box retail or the fast-casual restaurants, which often take up the same space as eight to ten traditional retailers. Not only does the large building with a singular use contribute less to the local economy, but it frequently occupies land that is very valuable. When valuable land is sedentary, it fails to further the economy and the community.

Cost

This type of cost is an opportunity cost to stadiums that sit inactive and do not generate wealth for the city. There is also the literal—and large—costs to constructing stadiums. The cost

¹¹ Marohn, Charles. "The Cost of Auto Orientation." *Strong Towns*. N.p., 2 Jan. 2012. Web. 09 May 2017.

of building an NFL stadium has increased exponentially over the past century, with the five most recent new stadiums all costing over \$1 billion (Table 3). The cost per seat reflects a similar trend, with a single seat costing on average \$21,353 per seat at MetLife Stadium in New York (Table 4). Stadium investors spend what they believe that they will recoup over time, but it is a significant gamble, and sometimes cities do not make a fair return.

RISING COST OF NEW NFL STADIUMS
\$ BIL, INFLATION ADJUSTED

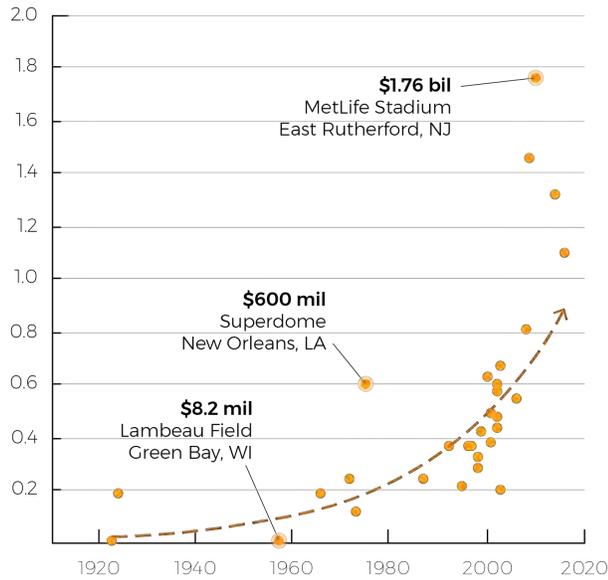


Table 3. Data compiled by author.¹²

¹² "NFL Stadium Comparisons." Stadiums of Pro Football - Your Ticket to Every NFL Football Stadium. N.p., 2017. Web. 09 May 2017.

COST TO BUILD A SEAT IS RISING
COST PER SEAT, INFLATION ADJUSTED

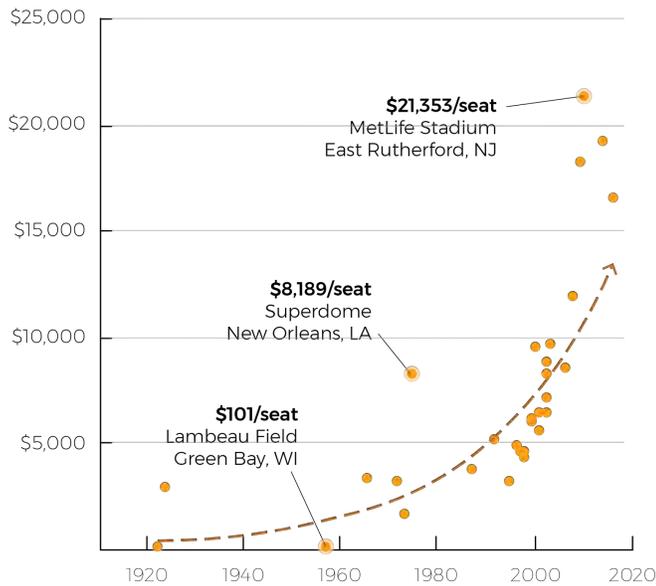


Table 4. Data compiled by author.¹³

Researchers have found that historically, NFL stadiums have never offer financial returns to match either the projection or the expenses. Economist Andrew Zimbalist of Smith College and Roger G. Noll of Stanford University reported back in 1997 that the claims teams made to city officials about how an NFL team would benefit the city were false. In their work, they examine the local economic development argument from all angles: case studies of the effect of specific facilities, as well as comparisons among cities and even neighborhoods that have and have not sunk hundreds of millions of dollars into sports development. In every case, the conclusions are the same. A new sports facility has an extremely small (perhaps even negative) effect on overall economic activity and employment. No recent facility appears to have earned anything approaching a reasonable return on investment.

¹³ "NFL Stadium Comparisons." Stadiums of Pro Football - Your Ticket to Every NFL Football Stadium. N.p., 2017. Web. 09 May 2017.

No recent facility has been self-financing in terms of its impact on net tax revenues.

Regardless of whether the unit of analysis is a local neighborhood, a city, or an entire metropolitan area, the economic benefits of sports facilities are de minimus.¹⁴

One of promoted advantages of new stadiums is that they will attract tourists from throughout the region. But once again, Zimbalist and Noll dispel this theory. The numbers they cite as proof are astounding. They show that even the most successful stadiums have far underachieved as a real estate investment:

Sports facilities attract neither tourists nor new industry. Probably the most successful export facility is Oriole Park, where about a third of the crowd at every game comes from outside the Baltimore area. (Baltimore's baseball exports are enhanced because it is 40 miles from the nation's capital, which has no major league baseball team.) Even so, the net gain to Baltimore's economy in terms of new jobs and incremental tax revenues is only about \$3 million a year—not much of a return on a \$200 million investment.

The cost of building a new NFL stadium continues to rise, yet because NFL teams are highly desired by cities for their perceived economic benefits many cities are willing to invest large amounts to remain host. Because of this, NFL teams have the leverage to their host city hostage by threatening to pack up and leave town if they're not provided with a new or upgraded, state-of-the-art facility at the city's expense. This is the case as recently as 2017 in which the Oakland Raiders announced plans to move out of their shared facility with the Oakland Athletics baseball team and to a new \$1.9B facility in Las Vegas in 2020. In 2016 and 2015, both the San Diego

¹⁴ Zimbalist, Andrew, and Roger G. Noll. "Sports, Jobs, & Taxes: Are New Stadiums Worth the Cost? | Brookings Institution." *Brookings*. Brookings, 28 July 2016. Web. 09 May 2017.

Chargers and the St. Louis Rams respectively announced their plans to move to Los Angeles, precisely because their host cities were unwilling to pay for their new facilities. They believe that the tax revenue the stadium would have brought in will still come in through spending on other entertainment options, such as movie theaters or restaurants.

Some public figures, such as Orange County, Florida commissioner Pete Clark, believe team owners should be responsible for the cost of the stadium, not the city. Clark recently arranged for the Major League Soccer (MLS) expansion team, Orlando FC, to fund its new stadium completely through private funds in exchange while the city provided a loan on the land where it is being built. “There has to be more of a national push to stop this foolishness. To me, it's just foolishness. Let the owners build them. If the owners had half a billion tied up in an arena, how likely are they to leave? Not very likely,” Clark told the *Pittsburgh Post-Gazette* in 2014.¹⁵ Clark’s strategy worked because the private owners believed that the great demand for soccer in Orlando would ensure the teams lasting financial success. Clark’s strategy might not work in other cities, however, where the teams are looking to move to stronger markets. These cities often give in to the demands for new and improved facilities to retain their teams.

¹⁵ Sanserino, Michael. "Stadium Financing Gets a New Game Plan." *Pittsburgh Post-Gazette*. N.p., 11 Jan. 2014. Web. 09 May 2017.

PUBLIC COST, PUBLIC LIABILITY
PERCENT OF EXPENSES COVERED BY PUBLIC & PRIVATE FUNDS

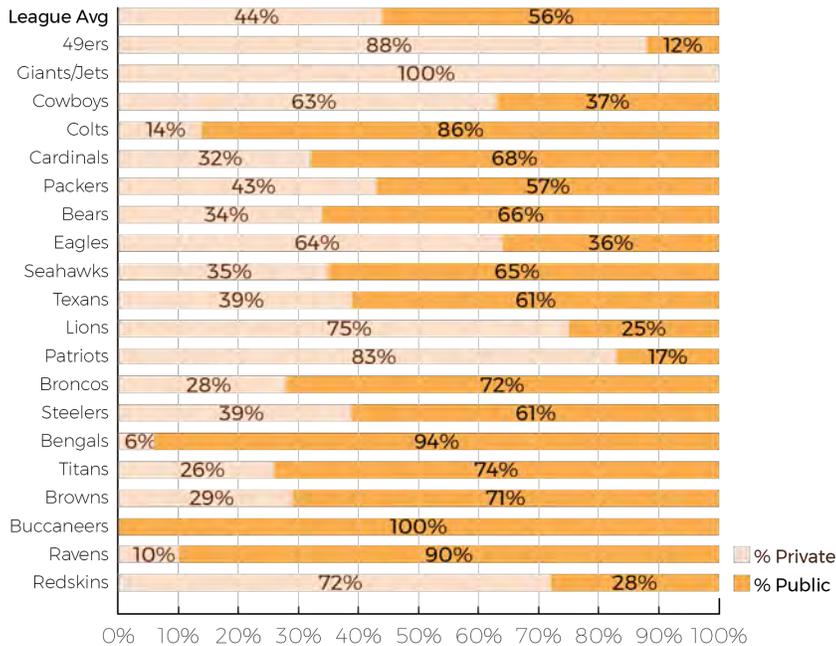


Table 5. Data compiled by author.¹⁶

Real estate developers make property investments when their pro formas show positive financial returns. But in a democracy where votes determine whether to fund a new stadium, public opinion—not future profits—weigh strongest. Recent referendums, such as residents of Boston voting against their city’s 2024 Olympic bid, indicate that voters are becoming wiser to the financial burden of stadiums and mega-projects. Recent stadiums that are financed primarily with private funds—such as Levi’s Stadium in San Francisco and AT&T Stadium in Dallas and MetLife Stadium in East Rutherford, New Jersey—have less incentive to make a place that functions for the city, rather than just for the team on game day. Of course, even privately-funded stadiums are missing out on the opportunity to potentially generate even more revenue

¹⁶ CBS Minnesota. "Funding Information." *Physica Scripta* T162 (2014): 010401. Conventions, Sports, & Leisure, 2014. Web. 9 May 2017.

for the team by incorporating office, retail, or residences that benefit from their proximity to the stadium.

Stadium costs also continue to rise because there is increasing demand for luxury boxes and premium suites. Each construction dollar spent on premium seating yields a higher return on investment than traditional seats. These spaces are more expensive to build, demanding quality architectural finishes, mechanical conditioning systems, and fancy furnishings like wet bars and high-end televisions. But even though these boxes cost more to construct, teams have learned that they can profit off wealthy individuals' or corporations' desires for privacy and luxury, VIP experiences.

In 2014, in response to the opening of MetLife Stadium outside New York City, Sean Dinces wrote an article for *Jacobin Magazine*, with a subtitle that read, "The luxury suites in modern stadiums are reminders that capitalist society values elite consumption over public enjoyment."¹⁷ In it, he quotes another essayist Jonathan Cohn who laments the elitism of the luxury box, "Skyboxes, for all their cozy frivolity, speak to an essential flaw in American social life: the elite's eagerness, even desperation, to separate itself from the rest of the crowd." Dinces adds, "According to Cohn, increasing class stratification within stadiums threatened professional sports' hallowed history as an 'antidote to status anxiety.'" Metlife Stadium, which prompted the critique, was built for \$1.6 billion and includes 212 luxury suites, some of which lease for \$1 million annually. Even the average ticket for a "Non-premium" seat at MetLife is \$123.40, the highest in the league.¹⁸

¹⁷ Dinces, Sean. "Jacobin." *Jacobin Magazine*. Jacobin Magazine, 27 Oct. 2014. Web. 09 May 2017.

¹⁸ "The 5 Most Expensive NFL Stadiums To Attend." *Bankrate*. Bankrate, 2017. Web. 09 May 2017.



Figure 4. MetLife Stadium. Image in the public domain.

Some see the private boxes as inevitable, namely teams and their owners who cite the need for the additional revenue. Art Rooney, the late owner of the Pittsburgh Steelers who orchestrated the team’s move from a relatively new multipurpose venue into a football-specific stadium, argued that the team needed the money to “remain competitive in the NFL.”¹⁹ In the end, the added revenue from the luxury suites—“between \$10 million and \$11 million annually”—was enough to convince the Steelers to build a new stadium that was all their own before they had outlived the useful life of their current one. If stadiums have to benefit the team

¹⁹ Dulac, Gerry. "Revenue from Premium Seating Is the Coin of the Realm in the NFL." *Post-gazette.com*. PG Publishing Co., 01 Aug. 2001. Web. 09 May 2017.

financially in order for the stadium to be considered a success, in a capitalistic society, that means catering to the market demand for premium space.

The trend in cost increase for total construction and in per seat is neither attributable to rising inflation, which is factored out in the graphs of tables 3, 4, and 5, nor to stadiums built with more capacity, which is actually decreasing on average (Table 6). Rather, the increases may be accounted for by North America’s rising cost of labor and material—especially steel, a common material for modern stadiums—as well as the rising standard of state-of-the-art facilities and the price of incorporating new technology. Furthermore, it is important to bear in mind that the cost of a stadium is also affected by regional markets, which can affect both labor and materials costs. New York City has powerful trade unions which can command steep worker salaries and frequently stall construction with labor negotiations. Many buildings in Washington, DC are made of concrete—they offer developers an extra floor plate while staying under the city’s height restrictions—and consequently a healthy, competitive market among contractors tends to drive the cost of both the material and the installation down relative to other materials.

SEATING CAPACITIES ARE DECREASING NUMBER OF SEATS PER STADIUM

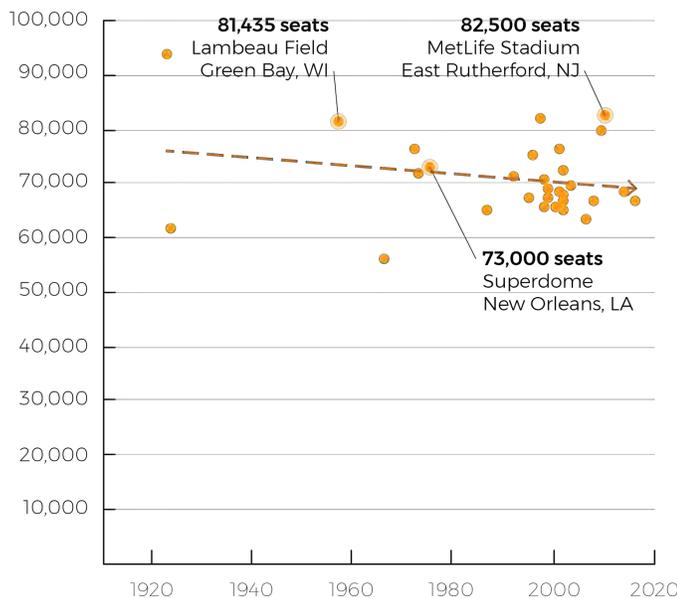


Table 6. Data compiled by author.²⁰

In the end, comparing the cost of stadiums is important to understand and evaluate the public's stake in the stadium. Clearly identifying these costs helps to reinforce that both the stadium and the context of the city around it deserve to economically benefit. It also raises the question of whether the city should be paying for private skyboxes and their luxury amenities, which will neither be enjoyed by the average taxpaying citizen or provide financial returns for the city. Some cities will argue that this is the price to pay to retain a professional football team. But the question will remain, is it a fair price? Ultimately, the questions of whether to retain a football team and how much to spend on a stadium will be answered by whether they can bring about financial return.

Scale

Add the seating requirements, increasing number of luxury boxes, and the desire for food services and other amenities on the concourse levels, and NFL stadiums become some of the largest structures built today in America. There are other factors that influence the size of the stadiums, however. First, the NFL has one of the largest fan bases of any sport, but it has a limited number of games for fans to attend: There are just eight regular season home games, two preseason games, and the occasional playoff game. Second, owners depend on ticketing and concessions for 25% of their revenue.²¹ Third, to host a Super Bowl, the league requires a

²⁰ "NFL Stadium Comparisons." Stadiums of Pro Football - Your Ticket to Every NFL Football Stadium. N.p., 2017. Web. 09 May 2017.

²¹ Fenn, Aju J. "Economics of NFL Attendance." Colorado College, Dec. 2012. Web. 9 May 2017.

stadium to seat at least 70,000 fans, and many cities increase their capacities for this reason alone.²²

Though football stadiums are built to cater to this perceived demand for seats, across the league, attendance has remained relatively steady at 500,000 seasonal fans since 1990 (Table 2). If the trend continues, these large stadiums may not be wise investments for future cities. Not only does an NFL team lose revenue on an unsold seat, but they cannot recoup the money they spent on building and operating that seat, from the structure to hold it up to the circulation space around it to the bathroom stalls and staff to serve the fan who purchases it. In contrast, if there are fewer seats than there are fans willing to pay for them, then the team can charge more money for each seat, making the same profit. And when teams build stadiums with only as many seats than they can confidently sell, they don't have to bear the financial burden of infrastructure that isn't bringing in proceeds.

Top musical agent Dennis Arfa convinces his artists to play at the 20,000-seat Madison Square Garden instead of the 45,000-seat CitiField, the 52,000-seat Yankee Stadium, or the 82,000-seat MetLife Stadium by telling them, "The public pays to go [to Madison Square Garden]...I tell my artists: 'MSG may be more expensive, but in return you get back more tickets at a higher price.'"²³ A smaller, more intimate stadium can draw in these performance artists for concerts as well as other events such as soccer matches, high school and college football matches, outdoor hockey games, circuses and theatrical events, and political or religious

²² Hutt, Jamie. "NFL Confidential Demands For Minneapolis To Host Super Bowl." *DocumentCloud*. Star Tribune, 2013. Web. 09 May 2017.

²³ Editorial. "Madison Square Garden, New York." *The Best Arenas and Stadiums in America*. Rolling Stone, 19 Sept. 2013. Web. 09 May 2017.

gatherings. If the stadium is enclosed with a dome or retractable roof, the list of potential users expands, and the useful season lengthens.

Some stadiums, such as Comiskey Park have shown that it is worthwhile to decrease the size of their stadium. After 12 years of play, the White Sox removed over 6,000 seats from the top several rows of the upper deck. The architect in charge of the renovations, Andy Henning of HKS, noted that “Patrons were simply not buying the top 10 to 12 rows of seats in the upper deck due to the uneasy feeling that they would get when climbing up that high. In addition, the existing upper-deck roof ... provided very little cover from the elements.”²⁴ Consequently, they capped it with a flat roof which both lowered the overall height and resulted in a more intimate stadium experience.

There are urban consequences to building stadiums at such a large scale, even those that seat closer to 60,000 and are relatively intimate settings for viewing. First, the stadium usually cannot fit within a traditional city block. The larger the capacity, the more space required for circulation paths, ramps, and stairs, bathrooms, food vendors, ticket offices and gates, and security checkpoints. Second, the larger the stadium, the less usable space there is in the city for owners to generate profit—and consequently for cities to generate tax revenue—when the stadium is not in use.

While NFL stadiums are on average larger and seat a greater capacity than any other sport, there seems to be a limit to how large they will build them. Teams and cities building new stadiums have come to a consensus that there is a point of diminishing returns—where adding

²⁴ Mock, BaseballParks.com Joe. "U.S. Cellular Field Made Right Call on Rehab." *USA Today*. Gannett Satellite Information Network, 17 May 2013. Web. 09 May 2017.

more seats does not provide any more financial profit. This has led to an encouraging trend towards building stadiums with smaller capacities, if only slightly so. The majority of stadiums built since 2000 have brought the average capacity across the league below 70,000 seats (Table 6). These numbers do not prescribe one figure for total number of seats that should be applied to every stadium, every team, and every city across the league. Each situation is unique, and if a team will struggle to sell 80,000 seats for eight home games in a year, or if the city would not be able to fill the stadium for other events in the offseason, then the scale should be adjusted accordingly.

The issues of scale are important not just in terms of the overall footprint of the building, but also in terms of comparative mass of the surrounding context. It is not *good* or *bad* for a stadium to be larger or smaller, shorter or taller, than those of its context. It may however be *better* or *worse* depending on its size, and decisions about the scale of a stadium should reflect the importance of football and of civic space to the designer, the team, and the citizens.

Access

The final major component of a successful stadium is how accessible it is to the public. Transportation networks can affect social and economic benefits. New bus and rail lines, improved bike and pedestrian infrastructure, and right-sized space for personal vehicles contribute to the life of the street and make a healthy environment. A robust transportation network is more resilient; congestion caused by trains rerouted for line maintenance or a vehicular off-ramp blocked by an accident can be absorbed with minimal impact to commute times if there are other fully-functional transportation options. A diverse transit system enables large crowds to quickly arrive and dissipate before and after games with minimal disruption on

normal city life. All of these factors—social, economic, environmental, resiliency, and efficiency—contribute to the well being of the city.

Importantly, stadiums can be the driver for these transit and accessibility improvements for the neighborhood or even the city. In the case of the 2012 London Olympics, the temporary investment of Olympic stadiums was balanced by a permanent investment into the city's infrastructure. New roads and transit lines were introduced that set the groundwork for a new neighborhood that would give life to the area after the fleeting life of the Olympics departed. Cincinnati's streetcar was built in 2016 after the stadiums arrived in 2000 and 2003 in order to connect these stadiums to the rest of downtown. Pittsburgh's light rail which opened in 1998 was extended to PNC Park and Heinz Field in 2012, within a decade of both stadiums opening.

Chapter 2 - Precedent Analysis

Though they are lacking in the NFL, there are models for successful stadiums in other sports and other countries. Baseball, soccer, and many college football stadiums are successful within the context of their specific sport and urban context, and they offer lessons that professional football stadiums can incorporate. Some NFL stadiums have come closer than others to modeling an urban stadium, so we will first examine these football stadiums to establish a baseline and identify which problems stadium architects have yet to address. The four criteria established in the previous chapter—scale, use, cost, and access—will be the framework for the examinations of other stadiums. The common threads among the precedents inform both the site selection and the programmatic requirements of the design proposal.

The method for evaluating each stadium is based on the subjective components, the architecture and scale, the use, and the access. The three scores, some number out of ten, are averaged to provide a final tally. The architecture and scale score is made up of the following components: fits within city grid, inviting public space, unique character, adaptive reuse, clear demarcation of entrances, right-sized and clear circulation, minimal number of seats, suitability for concerts/other events, short sightlines, and tight sidelines/foul territory. The use score is made up of the following: open year-round, grandstands open to public, public uses within stadium boundary, active nightlife, space for pregame activities, mixed uses, dining/retail, office, residential, and park. Finally, the access score is derived from the following: service for cars, service for transit, service for bikes, service for pedestrians, truck traffic, street(s) closed for pedestrians on game days, walkability score, transit score, bike score. The last three scores are taken directly from the website, walkscore.com which uses its own formulas to calculate the relative transportation friendliness of an exact location.

Professional American Football

While no current NFL stadium represents the ideal urban, contextual, transit-connected stadium, some structures achieve success in terms of use, scale, cost, or access. The following precedents are all examples of stadiums in urban settings. Further diagrams of each stadium can be found in the appendix.

Soldier Field

Soldier Field in Chicago is another example of the stadium in the urban park. It is an adaptive reuse of the old Soldier Field which was built as a single level or bowl coliseum. The historic Soldier Field was controversially retrofitted in 2002 and 2003 with a steel structure that brought spectators closer in and higher up for a better viewing experience. The controversy has stemmed from the architectural contrast between the old neoclassical façade and the modern steel structure and glass curtain wall that rises above the historic colonnade, which remains as the gateway into the stadium (Figure 6).

The architectural and preservationist debate aside, the renovation was successful in bringing fans closer to the field, improving the scale of the stadium, and generating more revenue from ticket sales. The former configuration of the single bowl left fans on the outer edges of the stadium behind the goalposts, far away from the action. The new configuration, while reducing overall seating capacity from 67,000 to 61,500, has increased the number of skybox suites from 60 to 133 which leads net increase in ticket revenue for the team.

From an urban standpoint, this reduction in scale of the seating bowl has allowed the historic colonnade to remain open to the public on non-game days. Since the stadium sits in the museum campus adjacent to the Field Museum, Shedd Aquarium, Adler Planetarium, and McCormick Place conference center—as well as open air pavilions, marinas, gardens, and park space—the area around the stadium is constantly in use even when the games are not happening. Similarly, the parking lots and garages near the stadium are consistently full of vehicles—if not the vehicles of Bears' fans, then the cars of visitors of the other nearby attractions fill the spaces.

In terms of access and transportation, the stadium is isolated from the rest of the city grid by a train yard and Lake Shore Drive. There is pedestrian bridge south of the stadium that climbs

over these obstacles and leads to a Metra station (Chicago's regional rail service), and there is an intersection north of the stadium that leads to the L (Chicago's metro rail service) as well as bus stops and bike lanes. Once on the museum campus however, the sidewalks and bike lanes are generously wide and scenic, cutting through gardens and allees of trees, combining paths of formal symmetry with picturesque meandering (Figure 7).

Though it was designed specifically for the Bears, Soldier Field is used for multiple other events in the off season. Two or three soccer scrimmages between American and European clubs are held at Soldier Field every year. The stadium is actively used during the summer to host some of the most popular musical artists who come to Chicago for two or three weekends each month. It is also used for circuses and other theatrical events for an entire month out of the summer. Throughout the summer, the stadium is used almost every single weekend, even if not to full capacity. Creative programming and its location in the heart of one of America's largest cities have led to the frequent and successful use of the adapted Soldier Field.

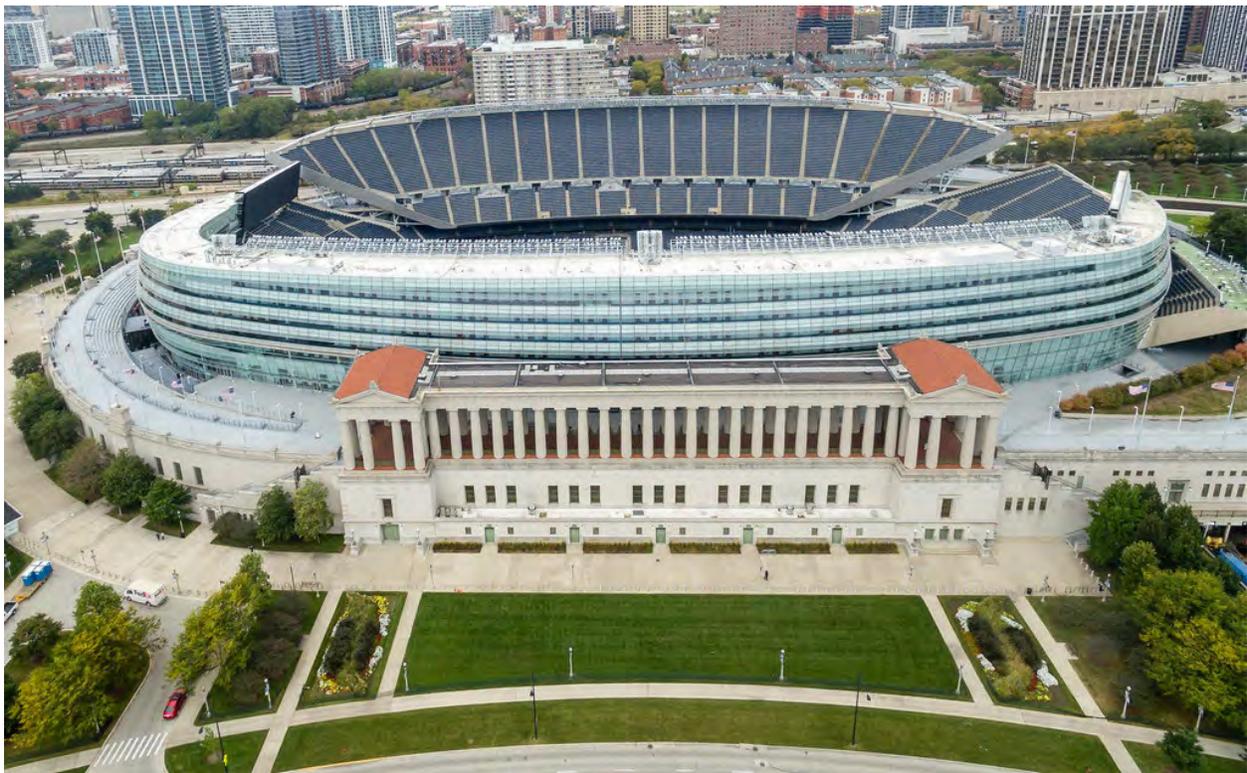


Figure 5. Soldier Field and historic façade. Image in the public domain.



Figure 6. Soldier Field in the park. Image in the public domain.

Paul Brown Stadium

The next four stadiums, Paul Brown Stadium in Cincinnati, M&T Bank in Baltimore, Heinz Field in Pittsburgh, and Qwest Field in Seattle are all examples of football stadiums that are members of sports and entertainment neighborhoods. All four cities replaced multipurpose stadiums shared between NFL and MLB teams with two new sport-specific stadiums in the immediate area, while three of these cities, Cincinnati, Pittsburgh, and Seattle, did so on the exact same location. Both the conversion to sport-specific stadiums as well as the location of multiple stadiums within a few city blocks is a recent and common practice in cities, though each place has a different motivation for this urban design choice.

This type of Euclidean zoning, of the separation of uses in the city is generally frowned upon by proponents of traditional urban design and the New Urbanists, who would instead prefer to see the stadiums integrated into the neighborhood. By placing all of the sports and entertainment options in one part of the city, it can lead to expansive portions of the city that have no activity on the weekdays or mornings and afternoons when no sports events are occurring. The path of these four cities, however, has been one where the stadiums are intended to be the catalysts for development in a dying or already lifeless neighborhood. And though it may take a decade or more, these gambles are beginning to pay out in certain cities, Cincinnati being one of these.



Figure 7. Paul Brown Stadium viewed from museum, over parking lots slated for future development.

Image in the public domain.

For the Cincinnati riverfront, the past 50 years have been all about sports. Between 1970 and 1999, the two professional sports teams in the city, the Bengals in the NFL and the Reds in the MLB, shared Riverfront Stadium, a multipurpose stadium that performed similarly to RFK Stadium in DC. The Bengals were the first to abandon the shared stadium in 2000, moving three blocks west to Paul Brown Stadium. The Reds followed in 2003 moving one block east to Great American Ball Park.

Cincinnati's downtown has historically been dominated by the personal vehicle over the past century, however, that is beginning to change. In 2016, the city opened its first phase of a highly controversial streetcar circulator with a stop two blocks from the stadium. It has seen moderate success since its opening, slightly exceeding its projected ridership figures.

The highways, which cut between Second and Third Streets, just north of the stadiums, provided a serious pedestrian barrier. The highways and the on-and-off ramps were reconfigured around the time that the Bengals and Reds moved into new stadiums to reduce the amount of space the roadways took up by over 50 percent. Engineers also decided to sink the eight lanes of

highway into the ground to allow for the street grid to continue, uninterrupted by highway traffic, and to allow for the highway to be capped with park space in the future.

Not only was Paul Brown Stadium isolated from the rest of the city by the highway, but the three blocks between the two new stadiums sat as temporary surface lots for ten years. These lots were slowly filled in over the years with a mixed-use development—The Banks—which brought offices and apartments over restaurants and bars. This has led to an active and vibrant street life before and after games as large crowds gather at the bars and on the streets, which are closed to traffic. What once was an active tailgating culture on game days has turned into an active bar and dining culture throughout the week. The mix of uses, along with a new public riverfront park, Smale Park, and the National Underground Railroad Freedom Center, has helped Cincinnati reclaim its waterfront.

M&T Bank Stadium

M&T Bank Stadium has been the home of the Baltimore Ravens since 1998 when the franchise began. It is located on the former site of the Wm. Knabe & Co. piano factory and is surrounded by industrial buildings. The character of the architecture itself emulates the architecture around it with brick and expressed steel structure throughout. In respect to blending in with its context, it emulates its predecessor a few blocks north, Camden Yards, which set the trend for retro-looking stadiums six years earlier in 1992.



Figure 8. M&T Bank Stadium, Camden Yards, and downtown Baltimore. Image in the public domain.

The area immediately adjacent to the stadium is an industrial neighborhood. Many of the warehouses provide construction and building materials; there are marble, glass, iron, concrete, machine working, refrigeration, and air conditioning companies all within two or three blocks of the stadium. These are all important industries and one could argue that they are even necessary to have located within the city. The question then becomes: How does a stadium and an industrial neighborhood blend together? There are very few overlapping uses between the two

building types, perhaps the most obvious one being the stadium's need for vehicular circulation and extensive parking. This situation is further complicated by the fact that a neighborhood of historic Baltimore row houses exists behind the warehouses. What additional building uses could be added to the site to bring all of these diverse styles together?

Like the Paul Brown Stadium in Cincinnati, M&T Bank Stadium is separated from the city on two sides by a highway and on the third side by water. However, transportation options are more plentiful around the stadium than at Paul Brown Stadium. Both streetcar and regional rail service make stops within a quarter mile of the stadium and shuttle people around the city on game day. The streetcar connects with the city's two underground subway lines. The stadium is easily accessible by car coming from the south along I-95. Surface lots nearby the stadium, between M&T Bank Stadium and Camden, underneath Martin Luther King Jr. Blvd. and the I-395 off ramp offer plentiful parking spots. In many ways, Baltimore, like Cincinnati, is a commuter city and will for the foreseeable future count on its fans travelling in cars from its suburbs to attend games.

In terms of pedestrian access, the stadium is somewhat removed from other pedestrian destinations such as the inner harbor and the downtown business district. There are no bars or restaurants to service the area around the stadium, which leaves the stadium as the only destination on the weekend. There is a nice pedestrian feature running through the parking lot connecting Camden and M&T Bank Stadium called the Ravens Walk. On game days, vendors set up tents and sell food, drinks, and spirit wear for the fans making their way from the city or the parking lot into the stadium.

There is the potential for the stadium to better connect to the waterfront to the south. There is an existing trail system, the Gwynns Falls Trail, as well as the East Coast Greenway, which at that point share a path. The Gwynns Falls Trail connects over six miles of

neighborhoods from the northwest along the Gwynns Falls. The East Coast Greenway, a trail connecting the entire East Coast from Maine to Florida, passes right through this site. However, while the goal is to separate vehicular traffic from the trail there are several places where the two intersect.

Heinz Field

Heinz Field, which resides at the convergence of the three rivers in Pittsburgh, opened in 2001. Used by the Pittsburgh Steelers, the Heinz Field is shared with the University of Pittsburgh's football team. Previously, Pittsburgh's professional teams, the NFL's Steelers and the MLB's Pirates, had played out of a shared multipurpose stadium. Pittsburgh and Cincinnati have a similar history; both cities demolished their multipurpose venue at the turn of the 21st century and replaced it with two sport-specific venues on either side. However, while Cincinnati has had urban success in the intervening years by replacing surface lots with mixed-use development, this process is moving at a much slower pace in Pittsburgh. The interstitial space is currently owned by developers who are hesitant to move on the land and are not convinced about what types of uses will thrive there, stalling their current plans for multi-story apartments.

The land between the stadiums is somewhat separated by a bi-level highway overpass that becomes the Fort Duquesne Bridge. After crossing the Allegheny, the highway splits in two and becomes a barrier between the north end of the stadium sits and the residential neighborhoods beyond. Fortunately, several of the streets continue underneath the highway overpasses, however, the width of the highway, in addition to the metro tracks that flank the south side of the interstate, and the wide and heavily trafficked roads provide for a long, uninviting, tunneled walk from the neighborhood to the stadium.

The rail network in the area is generous for a city of Pittsburgh's size, while the bus network is underwhelming. There is a light rail station across the street from the stadium that connects to the downtown central business district as well as the suburbs to the south. It does not connect to the suburbs to the north or west of the city, however. There are multiple express bus lines that pass through the site on the interstates, but only two local lines that stop within a

quarter mile of the stadium, and both follow the same route around the stadium. There are also two shuttle boat lines that run on game days only and drop off near the stadium.

In terms of biking infrastructure, there is a long riverfront trail along the Allegheny, the Northshore Trail, that connects seven miles of the riverfront along a park like trail. Yet, there is no street infrastructure in place to encourage biking. In fact, because of their width, the streets are hostile to both cyclists and pedestrians. Every single road encompassing the stadium is at least four lanes wide. On the west side of the stadium, the crowds spill out onto sidewalks that directly abut a road that remains open before and after games, while on the east side, the road is shut down to accommodate the safe travel of tailgaters arriving from the parking lots.

The stadium architecture is itself unique. It is one of the few horseshoe-shaped stadiums left in the NFL. While many remain in college football, most professional stadiums have abandoned the arrangement for the complete bowl to squeeze in more seats and boxes. However, the upper grandstands strategically open to a stunning view of the three rivers, the Pittsburgh skyline, and the hills across the river. The stadium makes use of two spiraling ramps to end the grandstands and to frame the view.



Figure 9. Heinz Field along the Allegheny River. Image in the public domain.

Though the area around Heinz Field is not yet a model urban stadium environment, the architecture of the stadium sets up great views of the game and of the city. The building is distinguishable as a civic space with unique forms and public plazas. The stadium is visually grounded by a story of thickened concrete walls which establish an edge to the street. Out of these walls rise an expressive steel structure which is contextual within the city's history as a steel town.

College American Football

College campuses function like cities on a smaller scale, with dormitories as apartments, lecture halls as offices, and dining halls as restaurants. They are typically designed to prioritize pedestrian movement, and are conceived at a human scale. They are dense, they are self-sufficient, they have shared public spaces like quads or malls, and they have a hierarchy between public and private facilities. Physical recreation is important to collegiate life and, for larger institutions, manifests itself in large stadiums.

These stadiums differ from professional stadiums in a variety of ways. First, the largest stadiums are far larger than those in the NFL. Stadiums at the universities of Michigan, Ohio State, Wisconsin, Tennessee, and Texas for example can seat over 100,000 fans. Second, these seats tend to be bleachers or grandstand seats and have no luxury amenities. Third, the stadiums are often partially or fully open to the campus throughout the week when the stadium is not being used for other events. This allows the stadium to be used as a public space for gathering, teaching, and recreation. Furthermore, universities frequently use these large stadiums for public ceremonies and popular events on campus throughout the year.

Two precedents, Maryland Stadium at the University of Maryland and Nippert Stadium at the University of Cincinnati, leave two important lessons. The first is how a stadium and its context can grow naturally over time and through adaptation, rather than all at once. The second is how a stadium can be used as a public amenity throughout the year.

Maryland Stadium

Capital One Field at Maryland Stadium at the University of Maryland in College Park, Maryland is an example of a stadium that has grown by addition. The stadium has been at its current location since 1950 and has expanded three times since then. In 1985, stadium lights were installed. Six years later in 1991, the Tyser Tower was added to the southern portion of the stadium to profit off of the demand for luxury suites as well as to expand the press boxes. In 1995, grandstands were added over the northern sideline, expanding game day attendance from around 35,000 to over 48,000. In 2001, with the success of the team as it contended for an ACC title, temporary grandstands were brought in to add 3,000 more seats to the capacity. A year later, the University sold the naming rights to the stadium and reinvested the \$20 million it received into rebuilding the luxury suites and in lowering the field to improve viewing angles. The second phase of the renovations calls for the addition of an 8,000-seat grandstand over the west end zone, which would bring the total attendance up to 60,000.

The number of seats and suites, though below average for an NFL stadium, are not so very different as to preclude scale comparisons between the two. The stadium is certainly large, but inside it nevertheless provides an intimate and enclosed viewing experience.

The greatest complaint about the stadium is the poor incorporation of the box suites into the architecture of the stadium. Rather than being integrated as a tier of the grandstands and spread out throughout the stadium, the box seats stand as an independent tower which overlooks the stadium. This has a negative effect for both those in the suites and those in the grandstands below. The tower is very tall and broad, so any seats above the fourth row or far away from midfield have a comparatively distant view and lower the value of that suite in proportion to how far away it is from the center of the field. In contrast, in the NFL, the suites are spread out between the upper and lower tiers to maintain a prime height angle for viewing. Maryland's

tower also has the adverse effect of casting a long shadow across the southern half of the bowl when the sun is low in the fall. If the suites and grandstand terraces were reversed, the angle of the seats would enable the sun to slip past the terrace, avoiding shadows on the field and heating the backs of the spectators on cool late fall days.

The arrangement of the box suites is a side effect of the stadium's history of adaptation. If the stadium had been comprehensively planned and had incorporated the need for box seats from its conception, it is unlikely that the suites would have taken on the form that they have. Likewise, the expansive grandstands over the northern side of the seating bowl give a heaviness and an imbalance to the massing of the stadium. Rather than correcting for these issues upfront, university stadiums have the patience and flexibility to allow for the gradual and thoughtful increase of the stadium.



Figure 10. Maryland Stadium. Image in the public domain.

In terms of accessibility, the stadium certainly benefits from being in the pedestrian friendly environment of an academic campus. Between the upper ring of the bowl and the parking garages that service both the stadium and Clarice Smith Performing Arts Center on campus, is a street that remains open for students to gather and pass through. It connects the northern residential portions of campus to the main hubs of academics and student activity to the

south of the stadium, and it provides pleasant views into the stadium. The campus itself is well connected to the city through three separate bus routes that make stops within a quarter mile of the stadium and connect to local and regional rail.

Tailgating is an important part of the game day experience, and this is even more so at universities. It provides alumni the opportunity to reconnect with their school—and to motivate them to become school boosters. At the University of Maryland, there is a significant population of commuters, and these commuters fill up surface lots around the stadium. On weekends, these lots are filled with fans coming to see either a football, soccer, lacrosse, or baseball game, and so they see continual use, including pregame social use. While the lots take up a large amount of space and are poorly designed for pedestrians to cross safely, they are nevertheless easily replaceable if the university needs to develop that land or if the lots become unused due to fans utilizing mass transit. In other words, because it is not in a city, and because the university already owns the land, there is not as urgent a need to develop the land and make it a profitable.

Ad hoc growth requires patience and careful planning which can be better achieved by the steady hand of a school board rather than the rapid turnover of a mayor or city council. But this type of growth allows for the correction of smaller mistakes, rather than risking it all on large ones. Much like how Olympic stadiums are now constructed to adapt to life after the big event, so ought stadiums now allow for adapt to life in the future—either one of consolidation or expansion. Many NFL stadiums have been built with a capacity larger than the city can sell out. However, creating a stadium with fewer seats than are expected to be needed can drive demand for a ticket to the game and encourage future growth of the stadium.

Nippert Stadium

Nippert Stadium at the University of Cincinnati in Cincinnati, Ohio is another example of a stadium that has experienced ad hoc growth. This is true of the campus as a whole, an eclectic mix of buildings from some of the greatest architectural minds of the 20th century. Frank Gehry, Michael Graves, Peter Eisenman, Henry Cobb, George Hargreaves, Thom Mayne, Bernard Tschumi, and several other notable names have contributed their statements and personalities to the campus over the last 50 years. While the result is certainly eclectic, the idea that several signature architects could have their unique voices expressed on campus is unified both by the bounded space of the campus and the resulting medieval relations between the buildings. Rather than large rectilinear open spaces like the quads and malls of the University of Maryland, many of the public spaces of Cincinnati's campus are made through curving streets that at places widen into plazas.

The greatest example of this is Bearcat Plaza to the northwest of Nippert Stadium. Four curved buildings come together to form the plaza which is at the heart of the campus. The buildings that join are the student life center, the university center, the campus recreation center, and of course, Nippert Stadium. Thousands of students walk through this plaza daily, spreading out on its steps to study, or sitting on balconies overlooking it while they meet for their meals. One unique aspect of Nippert Stadium: students are free at any time to wander into the grandstands. It is a space that is truly open to the public, and the public makes use of it.

As mentioned, the stadium has a history of additions and renovations that have brought it to what it is today, a 40,000-seat stadium. It is one of the smallest stadiums among the NCAA FBS schools, but it also has the reputation as one of the most electric atmospheres and enjoyable game experiences. Like Maryland Stadium, it began as a horseshoe arena and several additions brought a grandstand over one sideline while over the opposite was built press boxes and luxury

suites. However, Nippert Stadium is much more visually balanced in terms of its massing than Maryland Stadium.

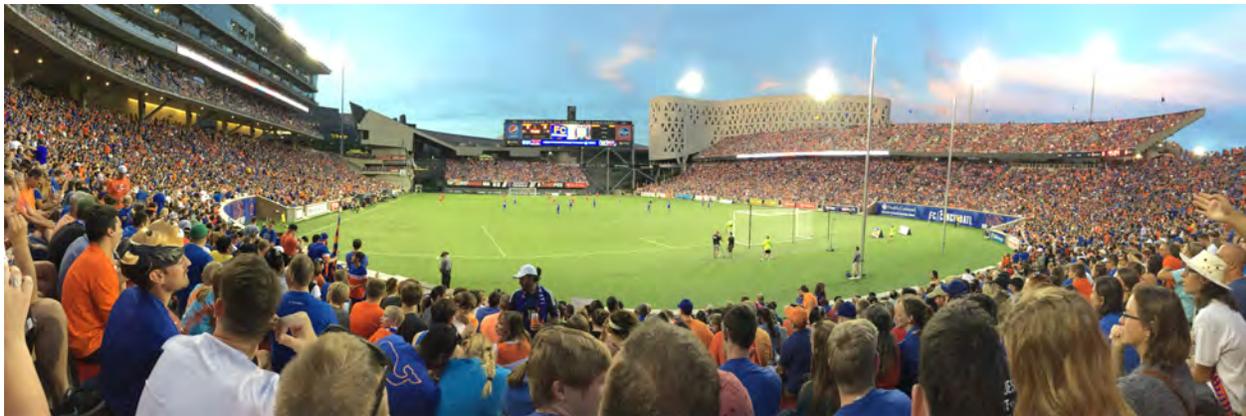


Figure 11. Nippert Stadium. Image in the public domain.

If in the future, the football program demanded further expansion, there would be very limited options. This is because the stadium is wedged in between several important campus buildings, some brand new and some quite historic. The Dieterle Vocal Arts Center, originally built in 1910 as the women's gymnasium, now the home for opera, voice, and choral studies in the Cincinnati Conservatory of Music building sits at the top of the bowl on the south end zone. There is also an underground maze of performance halls and rehearsal spaces that would render any additions on that end very expensive. On the north end zone, the new campus recreation center designed by Thom Mayne butts within 30 yards of the back of the end zone allowing for only a small student bleacher section. But any future adaptation would follow the same logic of previous adaptations; open space is a luxury in an urban campus and there is a beauty to the compactness and the overlapping growth.

The stadium is accessible by over 5,000 students who live on campus and the many others who live off campus in the dense residential neighborhoods that surround the campus on all sides. Bus routes shuttle people to and from the downtown region and other UC shuttles carry

people to and from branch campuses in the suburbs. Future plans call for an extension of the downtown streetcar up the hill to the campus, though those have not been funded yet, and its construction seems to be far away at this time. The bike infrastructure on campus is robust, but there are very few bike lanes or trails that lead bike commuters off the campus. Vehicular commuters leave their cars in the structured garages that line the periphery of the campus, and the partake of the pregaming activities in the plazas and open spaces around the stadium.

Baseball

Building a case for a model urban stadium for a professional football team in the U.S. cannot be achieved by examining today's professional football stadiums, of which there are no models, or by looking at college football, which is governed by urban patterns unique to the American university. Many baseball stadiums in America, though fundamentally different from football stadiums in terms of use, scale, and interior layout, are excellent examples of good urban neighbors and have an evolved sense of civic presence.

The following ballparks are examples of stadiums both old and new, that have set (Wrigley Field, Fenway Park), reset (Camden Yards), and continued (Great American Ball Park, PNC Park, and AT&T Park) this trend. What characterizes them all is an intimate viewing experience, a unique architectural style, and a clever shaping of streets and urban plazas, and their integration into the city's fabric.

Wrigley Field

Historic Wrigley Field in Chicago's Northside neighborhood of Wrigleyville is a classic example of the early 20th century urban ballpark. The stadium, built in 1914, fits neatly within the city's grid, matching the scale and character of the neighborhood around it. The structure has been designated a National Historic Landmark which means that it has lasting architectural and historical value in addition to its value as a sports venue.

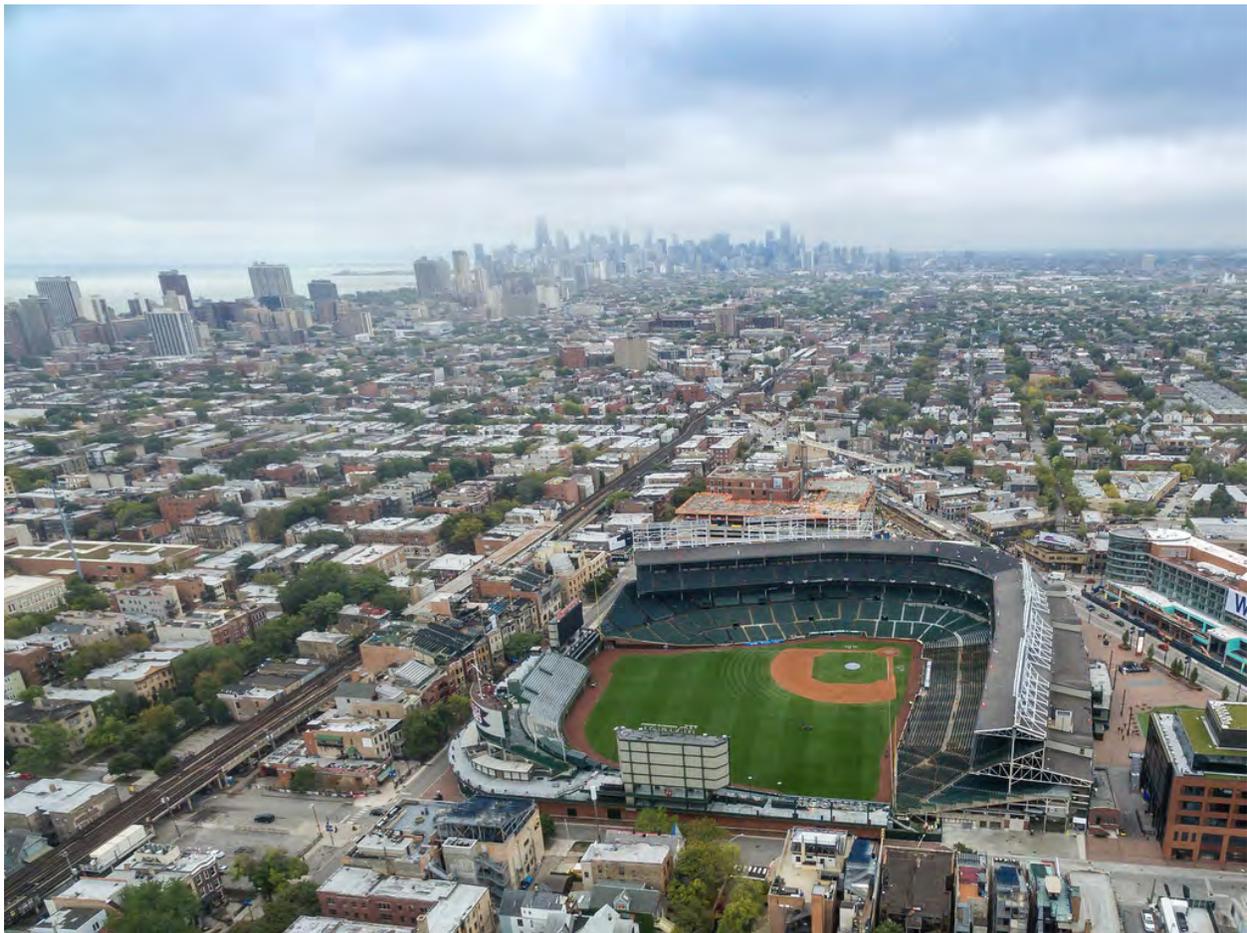


Figure 12. Wrigley Field. Image in the public domain.

Many years of adaptation have brought the park up to its present modern standards. In 1914, the ground level seats were constructed and over the course of two offseasons from 1927-1928 the upper grandstands were added. In 1937, the famous outfield bleachers were added and

ivy was planted along the walls. The park underwent several small tweaks and renovations the next 75 years, including recasting the infield grandstands and the addition of lights. The Cubs were the last team to adopt night baseball, and the neighborhood still regulates how many night games they can play each year (just 30 out of 81 home games) to reduce the amount of brightness and noise disturbing the residents nearby. From 2014-2017 other major renovations have occurred including the reconstruction of the underground offices and team clubhouses, new video scoreboards, and renovations to the plazas outside the main entrances.

But the stadium has always retained its character as an intimate stadium in a dense residential neighborhood. While the context surrounding the stadium is very residential, there are also bars and restaurants to service fans on game day before and after games as well as residents in the area. The houses adjacent to the stadium certainly benefit from their proximity to this landmark. Many of the homes take advantage of the short outfield bleachers and operate during games as rooftop seating and luxury boxes. Trulia, an online real estate website has found that within a one-mile radius of the stadium there is a 22% increase in median home-value compared to the rest of metro Chicago.

Access to the stadium has been controversial at times, and residents are particularly concerned about the possibility of street closures before and after games. Both Clark St. and Addison St. are major thoroughfares in the city and residents argue that traffic congestion would be only be worsened by the frequent street closures. The Cubs have pushed back arguing both for the safety of the fans—citing numerous terrorist attacks where trucks have driven into crowds—and that the street are used by pedestrians already. The Cubs ownership also seeks to profit from the street closure by requiring a ticket to get into the gated-off area and opening it for concessions.

In addition to residing in the middle of a dense, walkable neighborhood, access to Wrigley benefits from its adjacency to Chicago's metro rail, its location on two major roads, plentiful bike lanes, and several bus stops near the stadium. Since the neighborhood developed prior to the age of personal vehicles, mass transportation is prioritized over vehicular flow and parking space. Residents are entrepreneurial with the little open space that they have, selling their alley and driveway spaces on game days. Churches, clinics, and other businesses with lots sell their spaces for up to a mile around the stadium.

The success of Wrigley can be boiled down to two things. First, the "Friendly Confines" has an intimate and inviting atmosphere which creates a very exciting and unique fan experience. Second, it is highly integrated into its neighborhood and thrives because of robust mass transportation network which connects it to one of the largest metropolitan regions in the country.

Fenway Park

Fenway Park, built in Boston in 1912, is, with Wrigley Field, one of the two surviving urban ballparks from that area. It is built on an asymmetric lot which has led to unique ballpark features like the green monster and short right field stoop. The park is a beloved piece of Boston architecture, earning a designation as a National Historic Landmark on its 100th birthday in 2012. Much the same as Wrigley, the park is a success because it works on both an architectural and an urban scale. The stadium, which only seats 37,731, is the fourth smallest in the major leagues, but even those with smaller capacities feel larger because their tallest tiers are taller and their furthest seats are further than Fenway.



Figure 13. Fenway Park. Image in the public domain.

The quirks of the field and the intimate experience aside, the real brilliance of Fenway is in coopting neighboring streets into its urban space on game days. The street behind third base, Yawkey Way, closes on game day and the street becomes a public plaza. Fans who have tickets can be checked in to the plaza and are free to roam about, buying food and drink, spirit wear and

enjoying the pregame buzz of activity. These same bars and shops are open when the team is out of town so that the many tourists who visit and admire the legendary stadium throughout the year can taste what it might like during a game.

A unique architectural feature can be used as an urban effect. Where it is not brick, the stadium's metal and wood panels are painted a shade of green which immediately and subconsciously ties not only the stadium architecture together, but several of the nearby buildings as well. Every store along Yawkee Way, and many around the block, colors some element of its facade, either its trim, its metal garage doors, its awnings, or even its entire facade with this color to immediately associate itself with the Red Sox brand. The effect is a cohesive environment between the stadium and the street, and even when the fan is outside the stadium he feels a part of the action.

Outside of Yawkee Way, there are several office and warehouse buildings. Many of these warehouses have been converted to boutique office space or to big- and mid-box retailers. A large movie theater, for instance, contributes to keeping the area active at night when the Red Sox are not playing. There are currently very few residents in the area, however, several mixed-use buildings with retail on the ground floor and several stories of condos and apartments above have been constructed in the past five years, and more are on the way.

In terms of access to the stadium, there are both regional and metro rail stations within a quarter mile of the stadium. Bus lines and bike lanes are plentiful as well. Much of the area has surface parking lots and structured parking to service car commuters, but gradually these lots are being filled in with more retail, office, and apartment space.

One of the most important lessons from both Fenway and Wrigley is that both the attraction to the stadium and the small size of the stadium (as well as the popularity and performance of the team) drive demand for tickets. Both the Cubs and Red Sox could likely fill

more seats and make more revenue, but their decision to remain in smaller venues indicates that the exclusiveness and the traditions of the park drive ticket revenue at the same if not higher rates.

Orioles Park at Camden Yards

Camden Yards in Baltimore, Maryland is most notable for having kicked off a trend in “retro” stadium design back when it was built in 1992. It achieved this status for several deserved reasons. First and foremost, it was designed to look like a retro stadium with its brick cladding, arches, painted metal, and flat roof. Second, it was small in scale both horizontally—confining itself to a large city block and taking advantage of site restrictions such as the adaptively reused Camden Yards warehouse building—and vertically, shorter than most the buildings surrounding it. And last, it was one of the first stadiums to abandon the modern, multipurpose model in favor of the sport specific model.

Despite its size—48,000 seats, ninth most in the MLB—it is still regarded as an intimate game experience. This can be attributed to the enclosed nature of the park, with the grandstands wrapping around the outfield on one side and the warehouse building enclosing the other side. The experience at Camden Yards is one of being in a room. Much like a room in a house, the sense of enclosure comes from being surrounded by walls and a ceiling. There are windows in the house which frame view to the outside world, and there are openings in the stadium which frame views of a skyline, a river, or a mountain range.

Accessibility, while similar to M&T Bank Stadium to the South, benefits from its closer proximity to the Inner Harbor and downtown. There are regional and metro rail stops on the doorsteps of the stadium which is used by several fans. Most of the game’s attendees commute by car however, and they make use of both the parking lots to the south towards MTBS as well as the public parking garages used by the businesses on weekdays.

A balanced mix of uses surround the ballpark. From historic row houses in a neighborhood to the west and east, to restaurants and bars immediately to the north, to university campus space further north, to offices further north and northeast, the site is a hub for many

people. This is very valuable because it means that this place is activated by all types of users at all times of day.

Camden Yards has its own version of Yawkey Way, Eutaw Street. On game days, this street is gated off and it becomes the major circulation corridor for the stadium around the outfield. There are box offices, restaurants, and pro shops on the ground level, and team offices above. When the Orioles are away, however, the gates open and the street is used by the public. There are porches with park benches in the outfield with views over the outfield towards the empty stadium. The restaurants and pro shops are open for business. And, if nothing else, the walk serves as a pleasant street for pedestrians walking from the northern parts of town to the Camden Yards transit stations.



Figure 14. Eutaw Street on gameday. Image in the public domain.

PNC Park

PNC Park in Pittsburgh, like the ballparks in Cincinnati, shares the general urban and site access issues of its stadium neighbor, Heinz Field. It also achieves, with similar or greater success many of the things that Great American Ball Park achieves. It successfully frames a view of the bridge, river, and skyline behind the stadium. It forms a street edge on all four sides of the stadium. It activates the waterfront. It pulls away from the edge of the street at the corners to create a civic face and entrance to the stadium. And, as one of the smallest stadiums in the league, it provides one of the most intimate viewing experiences.

Yet, there are certain lessons to be learned at PNC that can't be found at Heinz or Paul Brown Stadium. The first lesson is in how the stadium makes use of a pedestrian bridge. PNC has an advantage over Heinz Field in that pedestrians can access it from downtown much easier than they can Heinz, or for that matter, anything else on that side of the river. The bridge, an extension of a local street in the downtown area, is normally open for two-way vehicular traffic and bike lanes. However, hours before and after games, the bridge shuts down for cars and bikes and is opened exclusively to pedestrians. Those who live downtown or are staying at a downtown hotel, or who seek cheaper parking, or who wish to enjoy the bars and restaurants before the game arrive via the bridge.



Figure 15. PNC Park with Roberto Clemente Bridge. Image in the public domain.

The second feature that distinguishes PNC from other professional stadiums is how it incorporates retail into the edge of the park. A bank, a pro shop, and five restaurants operate daily throughout the year, and on game days, they can serve guests from outside of the park. This enables the park itself to be a destination when even when there are no attractions inside the gates to draw a crowd. The retail spaces, which sit beyond the outfield terrace and beneath the upper bleachers and scoreboard, are only accessible from outside the stadium, so they cannot be enjoyed by a ticketed patron unless he leaves the stadium and returns.

PNC Park is regularly lauded as one of the greatest stadiums in the MLB and certainly one of the greatest of the modern batch of stadiums. The recipe for success according to this park is the intimate experience, pedestrian prioritization around game time, and keeping the edge active year-round with retail

AT&T Park

The last of the baseball stadiums in this analysis, AT&T Park in San Francisco was built along the edge of McCovey Cove on the bay side of San Francisco. It takes great care in making an amenity of this natural feature and its location on the bay by opening the grandstands to a spectacular view of the water. The right outfield edge of the stadium is a mere 20 feet wide and home run balls are regularly hit into awaiting oars of kayakers in the cove. Like the stadiums of a century ago, Fenway Park and Wrigley Field, AT&T allows the asymmetry of the site to dictate the form of the ball park.

The edges of the stadium, like Great American Ball Park and PNC Park, are fine façades that meet the ground and form an edge to the street, continuing the street wall from block to block. Entrances and public spaces are again defined by pulling away these continuous facades at the corner revealing a plaza which in this case is further signified as civic space by the inclusion of a clock tower (which are offices). The only activity along this entire block of the stadium, however is a small box office window. Along the narrow side of the stadium that leads towards the bridge over the cove, there is a pro shop and a restaurant that are open to the public, however, they miss out by not being on the street with the most traffic and visibility.

In terms of traffic, while there are many cars that travel past the park on the very busy King St., there are also several forms of highly functioning transit with drop offs on the stadium's doorsteps. The Caltrain brings passengers in from the entire valley and all of California, as well as local streetcar service provide alternative means of transit for game attendees. The San Francisco Station, the largest station in the city is a terminus for nearly every bus, streetcar, and train line in the vicinity and they all stop within a quarter mile of the ball park. Those traveling on the city's underground metro rail, the BART, are within one mile of the stadium and can transfer to streetcar service if they want to avoid the walk. The area is both very

bikeable and walkable. A scenic path, the partially implemented San Francisco Bay Trail, runs between the outfield wall and the cove and travels along 500 miles of bay frontage.



Figure 16. AT&T Park. Image in the public domain.

Professional European Football

Many stadiums of Europe perform much better in terms of use, scale, cost, and access. The largest stadiums in Europe are almost all host association football games, and many of these are in neighborhoods in and around cities. American and association football fields are almost the same dimensions – 110m x 48.8 m according to NFL regulations and 100-110m x 64-75m according to FIFA regulations. Action on both types of pitch is oriented in the same direction – the majority of the action taking place across midfield with scoring opportunities on either end, meaning the more valuable seats are at midfield. Top level teams across Europe draw as many fans to games as NFL teams (60,000-80,000).

The author had the opportunity to travel and visit twenty-five of these stadiums in Europe in England (London, Liverpool, Manchester), Scotland (Glasgow), Ireland (Dublin), Portugal (Lisbon, Porto), and Spain (Madrid, Seville, and Barcelona). In these countries, the top-flight teams all had stadiums in neighborhoods near the center of cities, though usually not in the downtown area. The stadiums usually fill out a city block, making a street edge on at least two or three if not all four sides. They frequently have other programmatic elements in the immediate vicinity of the stadium including restaurants, bars, shops, movie theaters, supermarkets, and other sports stadiums. These stadiums are all connected to the rest of the metropolitan region by means of public transit – light and heavy rail, as well as busses. The supporting structure of the canopy and the grandstands is highly articulated and emphasized. The stadiums of England, Scotland, and Ireland tended to be marked by a history of adaptation as grandstands were added and roof shelters were made column free. Meanwhile, the stadiums of Portugal and Spain tended to emphasize clarity and Modern purity in architectural form. The following examples highlight the best of these urban parks and elucidate these points in further detail.

Stamford Bridge

Stamford Bridge, in London, England, is a quintessential English Stadium. Like many of the stadiums of that country, it has a long tradition and has developed its form slowly and over time. From its beginnings as no more than a set of sloped hills in the heart of a West London neighborhood, it grew, grandstand by grandstand into one of the most cherished and storied facilities in the Premier League of England. Each of the stands along the four sides of the stadium were built independently of each other made to look uniform through the repeated use of steel trusses on the canopy and blue painted corrugated steel across the facades.

The most striking feature of Stamford Bridge from an urban perspective is the way it insulates itself from the major thoroughfare or high street of Fulham Road. Rather than capturing valuable frontage on the major street, it is set back from it allowing space instead for hotels, pubs, and food markets, and multifamily buildings who can make more regular use of the visibility and heavier foot traffic offered by high street.



Figure 17. Stamford Bridge. Image in the public domain.

Within the stadium block behind the major road, there are several other buildings with uses other than football: two hotels, several bars and grilles, a health club, a team office, and

team megastore. On match days and non-match days alike, each of these buildings remain open for business. Patrons are drawn into the establishments that do not have visibility from the high street by the attraction of the stadium which together with a great restaurant offers enough motivation to come to the area. This entire plaza area is open during the day on non-match days, with vehicular access granted only to service vehicles. On match days, the plaza is secured with temporary bollards and barriers and police who perform security checks and patrol the area. Anyone can enter the plaza space, but then a ticket is required to enter the stadium facility itself.

Anfield Park

Anfield Park in Liverpool, England is another relic of the Premier League stadiums. A renovation was recently completed on western stand which has updated the façade that faces the row house neighborhood it abuts and has also modernized the interior of that grandstand. The stadium strikingly rises above the tree canopy of the adjacent Stanley Park, only a half mile away from another 40,000 seat Premier League stadium, Goodison Park. Like Stamford Bridge, Anfield Park is a product of addition—grandstand by grandstand—over time.



Figure 18. Anfield Park façade expansion. Photo by author.

The newly added façade to the northeast of the stadium is an important element that has begun to engage the neighborhood around it. Before the renovation, the stadium backed up to the

neighborhood, and the rowhomes in turn showed their back to the stadium. These row homes were demolished and in their place was erected a much grander, though still simple façade. The new façade serves to not only mask the utilitarian functions of that side of the building—the service entries and other back of house functions—but it also creates a new public plaza that serves as an open space for spectators to fill before and after games. The service functions are handled by elevating the entrance to the grandstand above an access ramp which keeps them out of sight and aesthetically serves as a base, visually anchoring the series of columns that rest upon it, serving as a piano nobile. Furthermore, in demolishing the rowhomes, the designers strategically left intact a row that faces rather turns its back to the stadium.

Ibrox Stadium

Ibrox Stadium in Glasgow, Scotland, is yet another intimate stadium in the neighborhood. Unlike Stamford Bridge and Anfield which are in almost exclusively residential neighborhood with one retail street nearby, Ibrox is surrounded by a mix of residential, industrial, and civic uses. Its brick neo-classical façade makes a grand wall to the street that it fronts. Unlike the two English stadiums previously mentioned, it fronts a major street that carries significant traffic diminishing the impressiveness of façade somewhat. While it still carries a great deal of visual importance, it is impossible to take in the full grandeur of the façade at once. It is also difficult to enter or exit the stadium during events since there is only a narrow sidewalk between the base of the façade and the street.



Figure 19. Ibrox Stadium façade. Image in the public domain.

The façade, though draped in the cloths of neoclassicism, nevertheless appears to be aware of its presence on a busy thoroughfare by making use of repetition in its bay structures. Rather than attempting to make larger compositional gestures which cannot be easily perceived while moving quickly nor from an oblique angle, the bays march along the street bookended by slightly wider bays and interrupted in the middle with a grander portion of the façade that demarks the main entrance. The steel trusses supporting the canopy and attached to columns that rest in the thickness of the façade poke out above the cornice of the brick façade, along with the contemporary corrugated metal material spanning between them. It is an interesting effect that helps signify what is old and what is new. By setting back the trusses and the canopy from the façade even if only by a foot or two, it helps to reduce the overall impression of height, and bring the building more in line with the lower density, two- and three-story buildings that surround it.

Estadio do Dragao

Estadio do Dragao in Porto, Portugal, is one of the most remarkable, pristine works of modern stadium architecture across the globe. Like many of the contemporary public works in Portugal, Spain, and Brazil, there is an emphasis placed on the purity of form. Conceptually, the stadium is elevated on a plinth, and when the visitor stands upon it, they are greeted with an uninterrupted view from their location by the stadium out to the horizon. In effect, the raised plinth is a tabula rosa, a blank slate erasing the messiness of the urban fabric in the adjacent context, and offering large concrete expanses for people to admire the distant hills of Porto, or to look back and up at the marvelous structure of the stadium.



Figure 20. Estadio do Dragao. Image in the public domain.

After such care had been taken to clean the slate for the stadium, naturally one would expect it to rise with the same purity of form and idea. The perfectly circular stadium is covered by a continuous and undulating canopy which in turn is supported by two massive trusses which span the length of each side of the field. The trusses die into large, freestanding, concrete anchorages, and the rest of the grandstands similarly rise out of the plinth in a monolithic concrete mass. The lower bowl of the stadium dips down from the plinth/concourse level without any façade acting as a threshold between indoors and outdoors. Only ten foot tall security gates serve to divide the space, though visually, because they are painted white and match the concrete ground plane, they fade out of view.

Estadio do Dragao only separates itself from its context visually and aesthetically, remaining connected to the neighborhood around it through proximity. While the circular form of the stadium makes it impossible for it to form a public room with neighboring buildings, nevertheless it is still a part of the neighborhood around it. Across the street from the stadium sits a shopping mall with a cafeteria and grocery store. Either up or down the hill that the stadium rests on are residential neighborhoods, and two light rail lines make connections to the stadium. It is as integrated into the neighborhood as a circular stadium sitting on a plinth could ever be, and it was in fact one of the most active open spaces around a stadium on a non-match day among the more than twenty-five stadiums the author visited. Nevertheless, the purity of the stadium form, above all, magnifies the civic significance of that building and its importance to that neighborhood and city.

Estadio Santiago Bernabeu

The legendary home of the famed football club, Real Madrid, Bernabeu is located along one of the busiest and highest trafficked streets in Madrid, the Paseo de la Castellana. It's location on the paseo, while offering transit convenience and high visibility, is not ideally suited for providing safe passage to the pedestrians traveling to the game, nor can the streets easily transform into public spaces for the crowds to spill out into before and after events. As a result This makes it difficult to coordinate the points of intersection between pedestrians leaving the stadium and cars trying to pass through the city.

Bernabeu is one of the largest stadiums in Europe, capable of hosting up to 81,044 seated spectators, and yet this massive complex is also located in a very dense part of Madrid. While much of the historic city is built to five to six stories or 60-75 feet tall, as is common in historic districts of cities, buildings along the Paseo de la Castellana and within a quarter-mile of it are built up to ten to twelve stories and around 160 feet. The stadium similarly is right around 160 feet tall, blending into its context at least in terms of height.



Figure 21. Estadio Santiago Bernabeu. Image in the public domain.

The stadium establishes its civic importance and sets itself apart from its context in ways besides its scale, however. First, it is set back from the build-to line that every other block of buildings adheres to along Castellana. Unfortunately, it fills in this gap between the building façade and the build-to line with surface parking and bus drop off, rather than a well-furnished public plaza or pavilion or market buildings that could serve people passing through the area.

Second the monumentality of the stadium architecture sets itself apart from the architectural context of its neighbors. It is built in a brutalist style, exposing the materials and construction of the stadium. Unadorned columns and beams make up the composition and rhythm of the façade, switch-back stair cases enclosed in semi-cylindrical drums interrupt every other bay, and the top rows of the underside of the grandstands substitute as a cornice. The

circulation structures, large circular ramps at the end of the stadium serve to anchor the ends of the stadium.

Yet, while the architectural composition of the stadium evokes its monumentality by means of its set back and its contrasting style, the expression of structure and functionality is dominant, and in many ways visually repellent. The brutalist style of the stadium is hostile and uninviting which should certainly not be character traits that it seeks to give. Urban design approaches can provide remedies for some of the inherent flaws of the bare and exposed structure. Vegetation can soften the connection between stadium and ground. Ground level activities such as shops and restaurants that spill out onto public spaces can make the place appear more inviting. Lastly, details and materials at the ground level that are smaller and more intricate than the monolithic gestures offered by the grandstand structure and circulation ramps can draw people in closer. Whereas the broad gesture of a bare wall of concrete can repel people, detail and intricacy can draw people in.

Precedent Analysis Summary

No stadium mentioned above provides the perfect model for an American NFL stadium to emulate. Each example is flawed in some way, either in fans ability to access the stadium, the way in which the stadium engages its context, or in the structure and form of the stadium itself. The takeaways from these stadium precedents fall into two categories – urban lessons and architectural lessons.

Urban Lessons

The stadium should be accessible by as many means of transportation as possible. One rail line can easily be overwhelmed by large crowds exiting the stadium all at once. Likewise, a couple of highway access points will be jammed for hours if there isn't another way for fans to leave but by car. Redundancy and hierarchy make for successful transportation around stadiums.

The program and the land use around the stadium can be anything. There are examples of successful stadiums in parks, in industrial warehouse districts, in neighborhoods with single story homes, in commercial downtowns, adjacent to shopping malls and movie theaters. What makes the stadium successful is that whatever programmatic elements occur on stadium grounds complements whatever programmatic elements occur in its context.

Stadiums can come in any size, but they should be to scale with their context. Estadio Bernabeu in Madrid is 150 feet tall but the buildings across the street are fifteen story apartment buildings. Three sides of Goodison Park in Liverpool are surrounded by two story, twenty-five feet tall town homes, and the corresponding facades of the stadium rise thirty feet then step back ten feet to rise another fifteen feet. Other stadiums rise high above their surrounding context like Aviva Stadium in Dublin yet architectural elements like entry facades or a piano nobile are employed to relate to the height of surrounding context. Furthermore, in stadiums like Stamford

Bridge or Anfield Park, breaking the stands into separate massings can reduce the overall visual weight of the stadium, making it so that a main stand rises above as the primary façade and the other stands recede in hierarchy. Several stadium complexes also use other buildings such as team megastores, hotels, restaurants, etc. to transition in scale, materials, and architectural language from the surrounding context to the stadium.

Architectural Lessons

Stadiums can be categorized by three fundamental architectural elements: façade, structure, and circulation. Thinking all the way back to the Roman Coliseum, the structure is often clearly visible and expressed. From the columns and beams that support the grandstands and the trusses and cables that support canopies, the expressed structure is an iconic part of the stadium that not only supports impressive loads but makes the stadium instantly recognizable. It is a part of the typology of “stadium.” Bernabeu’s exposed concrete columns and beams, Stamford Bridge’s massive steel truss cantilevers, Dragao’s bowstring trusses and concrete anchors – the structural element itself is a part of the narrative and experience of the stadium.

The circulation can also be an iconic part of the stadium experience. Because so many thousands of spectators are moving through the stadium at one time, the mechanisms and pathways through which they move must be comparably massive. In many cases this leads to an expression of the circulation in the massing or upon the façade. At Heinz Field and at Bernabeu, there are cylindrical circulation ramps with interior escalators at various points around the stadium. Wrigley Field, RFK, and Paul Brown Stadium express the circulation directly on the facades of the buildings. M&T Bank, Great American, pull the circulation ramps, stairs and escalators away from the stadium in separate structures. On the other hand, others like Anfield in Liverpool fully embed the circulation into the interior of the stadium in protected and enclosed

fire stairs, disguising them from the facade. Some stadiums distinguish between vertical and horizontal circulation. At many stadiums, the vertical circulation is used only to get to a new level at which point there is a new horizontal course that leads to each section of the grandstands. At others like Wrigley and RFK, the vertical and horizontal are more integrated; the ramps serve to distribute crowds both upwards to the higher sections as well as across the stadium to sections around the circumference of the stadium.

There is no right or wrong answer to how to express circulation and structure. Like any artistic statement, the expression of the structure and circulation evokes a sensation or a sentiment about the stadium. What does matter is that, in addition to contributing to an artistic expression, the circulation and the structure must also achieve their functional purposes. The circulation should direct spectators clearly, quickly, and efficiently to their destination (whether that be their seat, the exit, or an amenity). The structure should provide shade from sun and shelter from rain while supporting and holding steady cheering fans.

But perhaps the most important tool in the stadium architect's toolbelt is the façade. The façade first and foremost is how the building dialogues with its context. It is the tool by which the stadium either distinguishes or disguises itself from the buildings around it. It is the tool by which the stadium addresses the public sphere, either inviting people into it or repelling them from it. It is the tool by which the public sphere—the streets and the plazas adjacent to the stadium—is made. And it is the tool by which the building is given its architectural significance, elevating it as a landmark of the city, and a source of civic pride. While an expression of structure is preferred in this era of stadiums, a more wall-like façade can help to better define the threshold between interior and exterior, give more visual weight and permanence to the building, and communicate that the building and the activities that occur within are a vital component in the life of the city.

Chapter 3: Site Selection

New York City, is one of the few cities in America that can unquestionably support a 60,000 mega-stadium. There are several stadiums and arenas throughout the five boroughs: Madison Square Gardens in Manhattan, Yankee Stadium in the Bronx, Citi Field in Queens, and the Barclays Center in Brooklyn, but there are no mega-stadiums anywhere in the city. The two football teams, the Giants and the Jets share MetLife Stadium in the Meadowlands of New Jersey, which embodies all the worst characteristics of American Football stadium. It is accessible only by car and one rail line. It is surrounded by seas of parking. It is located in an entertainment zone—the only other buildings within a mile walk of the stadium are an abandoned basketball/hockey arena, a shopping mall, and a movie theater. New York has such a rich history of urban stadiums and ballparks and certainly a football stadium built here need not be an exception to this rule.

Two sites in New York offered great promise for ideas of an urban stadium, well connected to the city, making use of its façade to form plaza and street, providing active uses at all times of day and every day of the year. The first of these two sites finally considered was a block of vacant land on the far east side of Manhattan between 38th and 42nd streets and immediately south of the United Nations Headquarters. The second site was underdeveloped industrial land in the eastern half of Red Hook, Brooklyn along the Gowanus Canal.



Figure 22. Solow site. Aerial photograph from Google Earth.



Figure 23. Red Hook site. Aerial photograph from Google Earth.

The Manhattan site is currently owned by the “irascible but talented billionaire developer,” Sheldon Solow.²⁵ The site of a former power plant, he purchased this land in the 1990’s when it was slated for demolition, and has sat on this land ever since. A high-rise proposal passed through the city’s permit office in 2008, but due to an untimely recession that

²⁵ <http://www.nytimes.com/2013/08/20/nyregion/prime-lot-empty-for-years-yes-this-is-manhattan.html>

same year, Solow waited almost a decade to break ground on the site, which finally occurred in 2017, in fact during this thesis study.

The site offers the possibility to design a stadium in the heart of one of the densest and best connected cities in the world. There are multiple transit stops within a quarter mile walking radius. It sits along the edge of the river offering potentially stunning views across the East River into Brooklyn. The many constraints of the site—small footprint, existing tunnel and highway infrastructure, proximity to the UN site, to name a few—would provide a very structured and challenging framework for the design of the stadium. It would place an emphasis less on the design of the city and more on the design of the stadium. There would also need to be an exploration of scale and density on the stadium parcel to justify its presence there both architecturally and economically. The stadium on the Solow site, in other words, would be offer a model for a stadium on the scale of the block.

The Red Hook site, on the other hand, presents problems at a much greater scale, the scale of the neighborhood. There are many issues with the neighborhood that are common to many urban areas in America. There are environmental concerns with contaminated soil, contaminated water ways, and concerns of flooding from sea level rise and catastrophic storms. The site is in many ways disconnected from the rest of the city, inaccessible but by one metro rail stop. There are many storage and warehouse buildings that are of no architectural merit and will eventually be demolished for higher and better uses that can capture more value from their proximity to water. There is a large recreational park which is an amenity to the neighborhood, but also has poorly defined edges, a lack of identity, and limited use. It offers the possibility of envisioning the stadium as the catalyst for urban redevelopment

Ultimately, the Red Hook site was the more compelling choice for to pursue the design because it allowed for the opportunity to study how mega-stadiums ought to address the issues of

site and not just of the stadium. The greatest problem with mega-stadiums as identified in the opening chapters and precedent analysis is the way in which they respond to their environment. By choosing a site that allows for flexibility in the shaping of the public realm and in the proposals for program adjacent to the stadium, it enables this thesis to become a truly unique proposal for a new model mega-stadium.

Furthermore, the Red Hook site bears much more in common with American urban landscapes than the Solow site. The Solow site is in the heart of the densest city in America, accessible by one of its most robust transit networks. The cost of land is higher here than in any other city, and the site is bounded by tunnels, skyscrapers, and the United Nations headquarters. The four hundred foot and taller high-rises adjacent the stadium make it less than ideal for a stadium which at its highest could not even approach half their height. While weaving the stadium around various pieces of infrastructure—tunnels, highways, parks, and rivers—would provide an interesting challenge, it would represent site conditions that are uncommon for most stadium sites.

The Red Hook site on the other hand, bears much in common with issues facing post-industrial metropolises across America. It is a medium density urban area filled primarily with two to three story buildings, and with several derelict buildings and empty lots. Public transportation connecting it to the rest of the city exist, however they are limited and must be addressed. The ecological and environmental issues of contaminated soil and water and of flooding are problems almost every post-industrial city must address. The neighborhood is dealing with a decline in the local maritime industry, and consequently increased pressures from the wealthy and affluent to gentrify the area. The universality of these problems enable the impact of the thesis to be more generally applied to other cities building new mega-stadiums.

Analysis of Red Hook

Red Hook, Brooklyn faces challenges as it adapts from its marine and industrial past into a new future as a hip residential neighborhood. Red Hook was founded by Dutch immigrants in the 17th and 18th century. Like much of the land around New York City, it has a marshy edge and was unsuitable for dwelling or cultivating. The parts of the land that were stable were used for farms and the landscape was littered with farms and mills.



Figure 24. Red Hook land reclamation and historic water edge. Map by author.

In the 1850's the shipping industry around New York saw rapid and massive growth. With it grew the demand for land that could be used for docking ships and holding and

transporting shipped goods. During this time, the shoreline of Red Hook was expanded, land was reclaimed, and several basins and piers were constructed. On this newly formed land were constructed the massive warehouses and grain elevators that could store the large shipments coming in from around the world. This led Red Hook to become the busiest port in the entire from the mid- to late-19th century.

The first half of the next century saw it gained a gritty reputation for a couple reasons. First, many working-class persons called this area their home. There were many impoverished people, primarily immigrants, living in tenement housing and in unsanitary, unsafe conditions. This led to one of the earliest and largest housing projects in the country, the Red Hook Houses, which still stand, serving as an affordable housing option for many low-income families. Second the neighborhood's gritty reputation was solidified by the fact that this was the place where Al Capone got his nickname Scarface, and his infamous start as a mobster.



Figure 25. Red Hook Houses. Image in the public domain.

The neighborhood went into decline with the rise in the containerization of shipping industry in the 1960's and 1970's. The docks and shipping channels in Red Hook were not large or deep enough to facilitate the larger vessels that were traveling the world. So the shipping industry in the area moved to the new ports in New Jersey. The population declined from 18,575 in 1960 to 10,485 in 1980.²⁶ Population has held steady since that time with 10,228 residents as of the 2010 census.²⁷ As commonly occurs in NYC when there is an abundance of housing and a lack of residents, artists began moving into the warehouse and loft spaces. Between Red Hook, and neighboring Park Slope and Carroll Gardens, there are 2,600 artists making it the sixth most concentrated havens for artists in city.²⁸ The area is a tight-knit community, not only because of these artists, but because the area is like a peninsula, bordered on three sides by water and to the north by the Gowanus Expressway.

One of the most unique features of the site is the Gowanus Canal. It is a small inlet, only 1.8 miles long that extends up into Brooklyn and serves as an important shipping channel for barges to make deliveries to warehouses further inland. For several reasons—combined sewer outlets releasing into the water body, toxic industries along the water's edge that has leaked, and illegal dumping—it has become one of the most toxic bodies of water in the country. It was granted a Superfund designation by the EPA in 2013 and was given a 10-year timeframe for the

²⁶ <https://www.nycgovparks.org/parks/red-hook-park/history>

²⁷ <https://data.cityofnewyork.us/City-Government/New-York-City-Population-By-Census-Tracts/37cg-gxjd/data>

²⁸ <https://hyperallergic.com/390330/not-just-bushwick-new-study-charts-where-nyc-artists-live/>

cleanup to occur. Large debris such as shipwrecked vessels and dumped cars and tires were removed in 2015-2016, and dredging is expected to occur in 2019. The only recreational activity that can legally occur on the Gowanus is fishing, however anything caught in the waterway is assumed to be toxic. There are significant consequences to the toxicity of the canal and chief among them is the fact that when a storm surge reaches the Gowanus and causes it flood, it brings its toxicity into the neighborhood. The solution is to first, clean the water; second, replace the canal's seawalls with softer edges which can both clean the water and absorb some of the impact of surges; and third, regulate the activities on and along the water. Doing so will turn the Gowanus from a diseased canal to the model of a healthy urban one and become a desirable amenity for the community, potentially driving real estate value and encouraging more people to live along its edges.

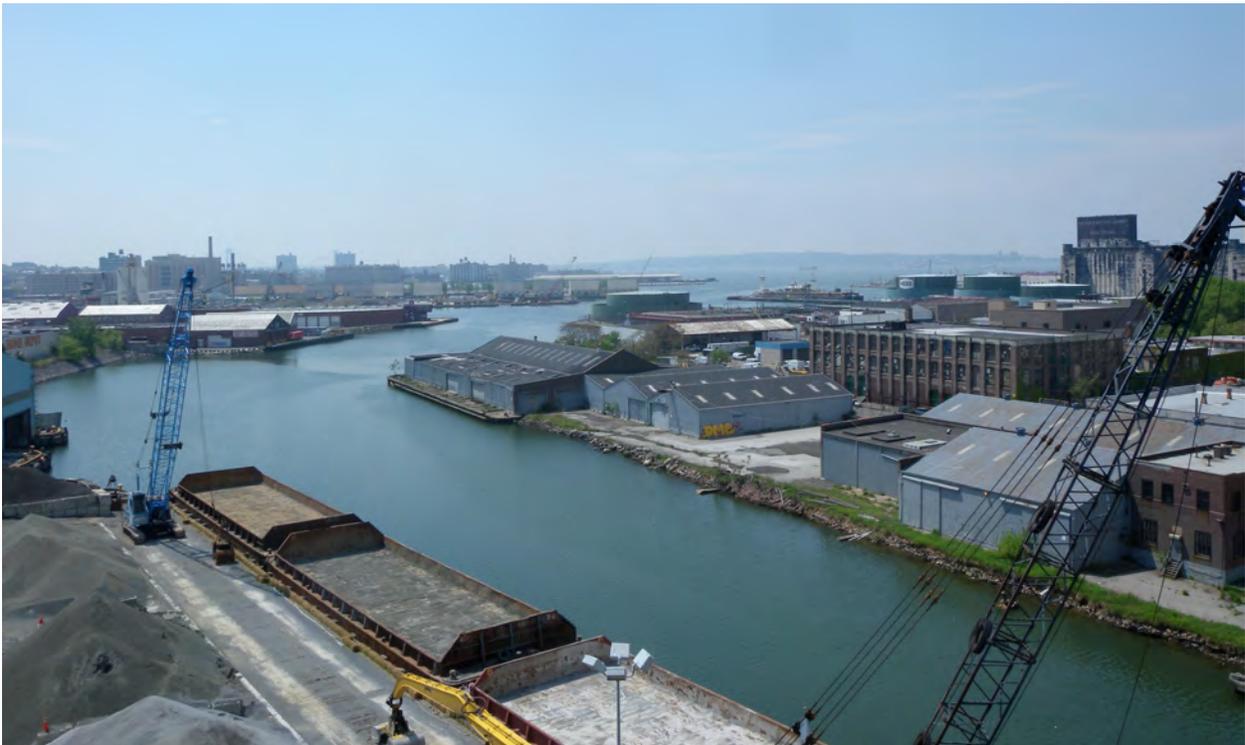


Figure 26. Gowanus Canal. Image in the public domain.

Another remnant of Red Hook's past as a major shipping port is the Erie Basin. Shaped like a hook and projecting from the western edge of Red Hook Park, a narrow 400-foot wide strip of land functions as space to load and unload shipments as well as to keep calm the water in its arm. It was named to connect it metaphorically to the Erie Canal, and was an important stop for grains traveling from the Midwest down to ships that would transport it to rest of the world. Today, much of this land is essentially a large parking lot, an auto pound of the NYPD, and certainly a higher and better use for this land could be imagined. A bridge could connect one end of it to Red Hook's historic main street, Van Brunt Street. There is currently very limited shipping traffic that takes place inside the basin, but importantly a free water taxi brings people from Manhattan to an Ikea store that sits on the edge of the Erie Basin.

An important part of the grain's journey from the Midwest to a ship that would carry it elsewhere across the globe was the grain terminal. The Red Hook Grain Terminal was built in 1920 to store grain from trains as they waited to be loaded onto ships and vice versa. The building's simple and repetitive form lent itself to quick construction which was complete in just over 16 months; the 90 foot silos were all poured within 13 days. It can hold over two million bushels or two and a half million cubic feet. Its developers were optimistic that it would encourage shipping use along the Erie Canal which was only being used at 10% of its overall capacity. But, that optimism proved foolish, and the grain terminal and the canals become obsolete almost as soon as its construction was complete. Shipping industries left New York City in the 1940s and 1950s because labor costs were so much higher than other American ports with capabilities of reaching the Midwest such as New Orleans and Philadelphia. The grain terminal never turned a profit and closed for business permanently in 1965. It has sat unused ever since,

with only a couple of suitors inquiring after it with the intention of converting into a recycling plant.²⁹



Figure 27. Red Hook Grain Terminal. Image in the public domain.

The Grain Terminal rises strikingly from the midst of the Red Hook Park. The park, and its associated facilities like the Red Hook Recreation Center, is primarily intended for recreational and sporting activities. There are over 60 acres of park land programmed for soccer, softball, basketball, tennis, racquetball, and other sports. There are gymnasiums and courts and

²⁹ <http://www.nytimes.com/1990/05/13/realestate/streetscapes-columbia-street-grain-elevator-recycling-red-hook-s-1922.html>

weight rooms in the Rec Center, as well as an outdoor pool the size of three Olympic pools, all free for public access. Prior to 1930 when Robert Moses, head of the New York City Parks Commission, converted this land into a park, it was full of industrial uses. Recent testing has revealed that much of the soil is contaminated by the industries that existed prior to the park, and consequently much of the park soils must be remediated. Nevertheless, the park is an important part of the character and identity neighborhood and an amenity that residents from several neighborhoods around make use of.



Figure 28. Red Hook Recreation Center. Image by author.

The last feature of importance is another creation of Robert Moses: the Gowanus Expressway. The Gowanus Expressway, a piece of the Brooklyn-Queens Expressway connects

vehicular traffic from Staten Island and Long Island up to Manhattan and Queens. The highway flies above Hamilton Avenue at over forty feet, and it divides Red Hook from the neighborhood to the North, Carroll Gardens. It renders the area underneath it uninviting because vehicles use Hamilton Avenue as a secondary route when the Expressway is congested. Furthermore, it blocks the sunlight and drains its storm water onto pedestrians below making it a very uninviting place to cross. However, the Brooklyn grid continues underneath it, as does the most convenient route to and from the nearest subway station, the Smith and 9th Street Station.



Figure 29. Gowanus Expressway. Image by author.

Chapter 4: Design Process and Proposal

Several goals derived from the theoretical and precedent analysis of the first two chapters were held in mind during the design of a stadium for Red Hook. First, the stadium should create both a great room for viewing sports and four walls to four other great public rooms. In other words, one plaza inside the stadium—the field of action—and multiple plazas outside the stadium—public plazas each with their own characteristic and purpose.



Figure 30. Plaza in a Plaza. Drawing by author.

Second, the stadium should be considered not just as a building, but as a component of the park.

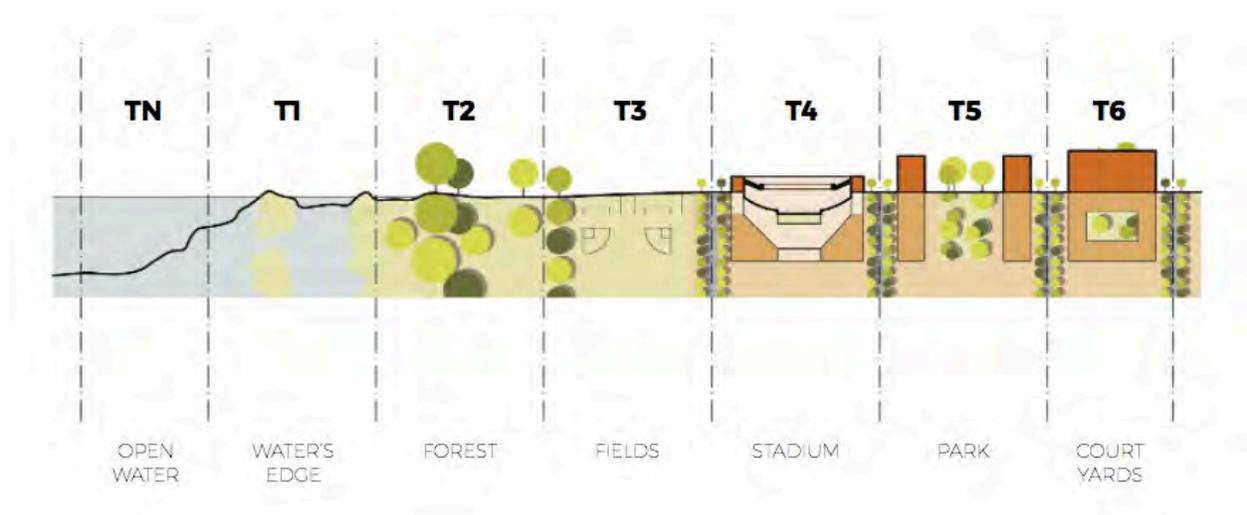


Figure 31. Park Transect. Drawing by author.

Third, the stadium façade should be used to treat the public space with dignity, as well as to call attention to itself. A masked rather than skeletal façade is the preferred way to achieve this.

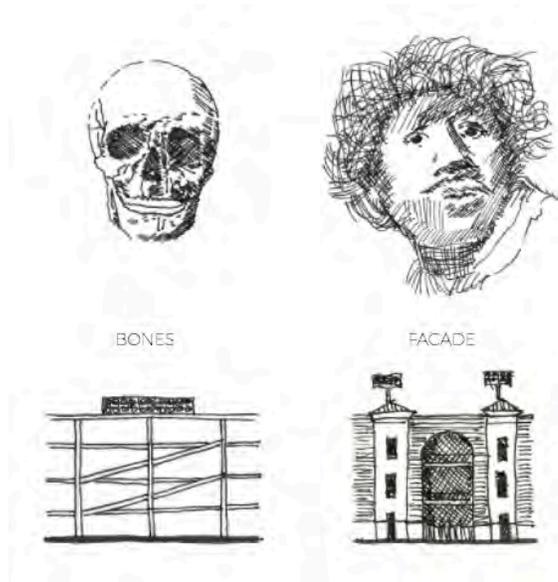


Figure 32. Skull vs. Mask. Drawing by author.

Fourth, stadium façades should shape the urban space and define the edges of streets and plazas.



Figure 33. Façade shapes urban space. Drawing by author.

Fifth, the stadium should be at harmony with the scale of their context, neither too large and overwhelming its context, nor too small and wasting space that could be better used by denser, taller buildings.



Figure 34. Stadium and scale. Drawing by author.

Sixth, the stadium should be insulated from major thoroughfares by being sited on minor or secondary streets, and creating pedestrian friendly environments immediately adjacent to the stadium.

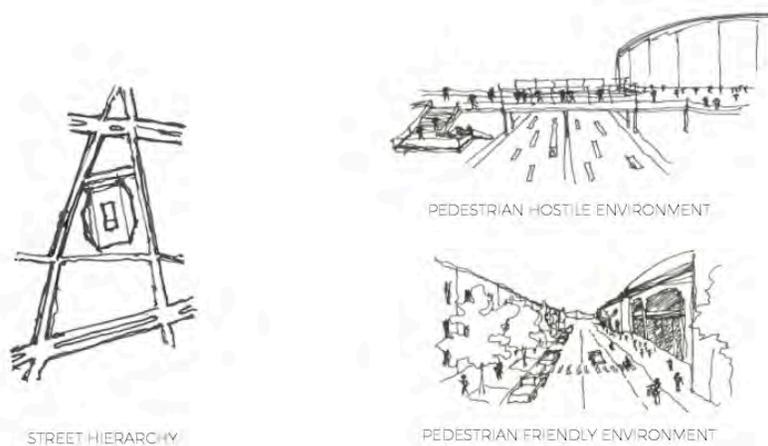


Figure 35. Street hierarchy creates pedestrian friendly environmental. Drawing by author.

Seventh and lastly, the stadium should be a part of the neighborhood rather than a Euclidean zone of entertainment.

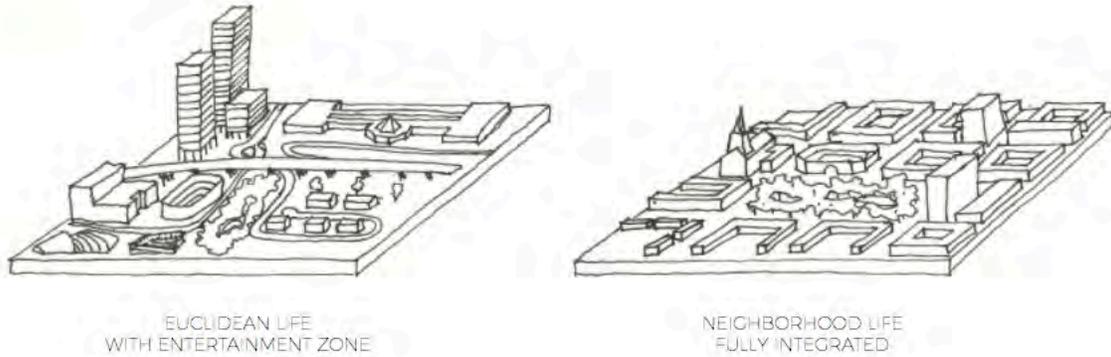


Figure 36. Euclidean zone vs. neighborhood life. Drawing by author.

Prior to reorganizing the site and implementing these goals for the stadium however, the first moves of the design sought a remedy to some of the sites environmental issues. The first strategy was to initiate a process of excavation, remediation, and reclamation of the soil on the site. Because the stadium as well as all of the new development will require significant excavation for its subterranean spaces, and because much if not all of this soil will need to be cleaned, a local process for cleaning the soil on or near the site is preferred. The proposed solution calls for converting the Grain Terminal building into a machine that can clean the soil by mixing the soils with water and cleansing chemicals in its silos until the chemicals separate

out the harmful metals and pollutants in the soil.³⁰ The freshly cleaned soil can then be deposited as berms and swales a quarter to half mile offshore. When mixed with stable materials like boulders or large pieces of recycled concrete, these berms can act as barriers along the shores of Red Hook to break storm surge waves and reduce the impact of tidal waves crashing into Red Hook. Meanwhile, the area in between the berms and land's edge can become a natural habitat for marine life and creatures such as oysters, which made a home in Red Hook's prior to its industrialization, can return to this area and contribute to a natural process of cleaning the water and sea floor.³¹

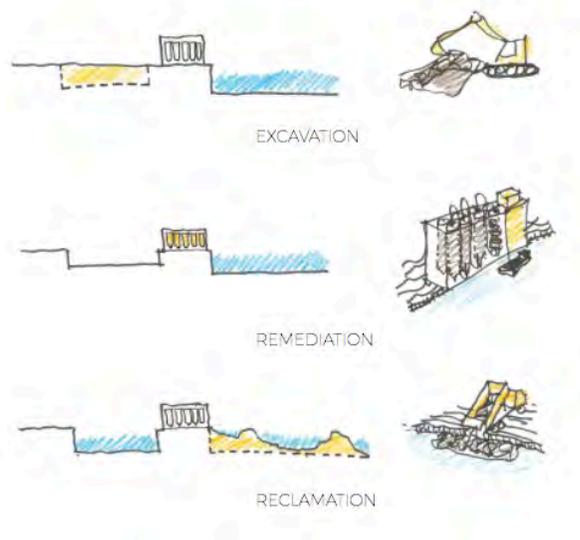


Figure 37. Soil remediation strategies. Drawing by author.

³⁰ Soil cleaning methodology and concept derived from the work of Prof. Neima Brauner, Prof. Amos Ullmann, Dr. Hadas Maman, and Dr. Zvi Ludmer at the Hebrew University of Jerusalem.
<http://www.eng.tau.ac.il/research/laboratories/Environmental/>

³¹ The ideas and science behind the breakwater schemes is indebted to the work of Landscape Architect Kate Off and her work *Living Breakwaters*.

A second environmental strategy meant to deal with the flooding of the neighborhood is to locate the stadium near the canal and sink the playing field deep within the ground. This allows the stadium to function like a bathtub in the event of catastrophic storm surges and consequent flooding. The stadium, as designed here would retain much of the water that would have otherwise inundated the neighborhood, reducing approximately 12 million cubic feet of storm water from the streets. This is equivalent to nearly two inches of water from the new, proposed developments of Red Hook, or three quarters of an inch across the entire neighborhood of Red Hook both new and existing.

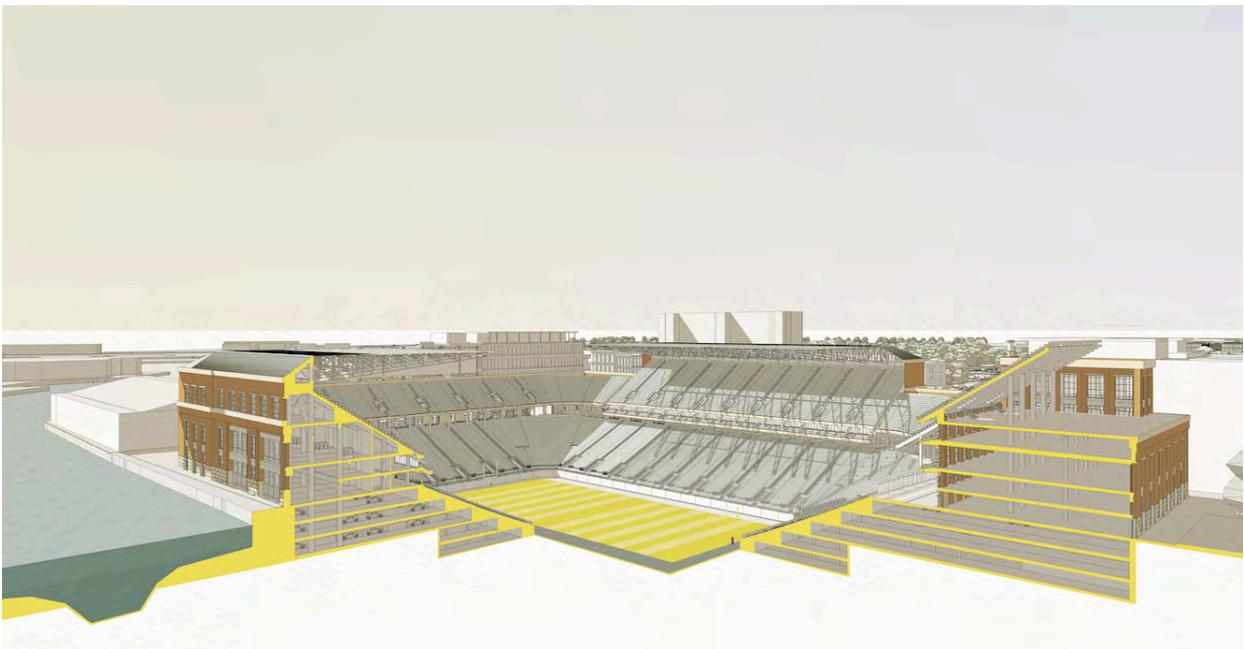


Figure 38. Section cutaway. Drawing by author.

The site organization is reconsidered to better shape the park, to create a new neighborhood on the western portion side of Red Hook in the place of the dying industry, to incorporate new uses into the neighborhood, and to better connect the stadium and Red Hook with the rest of New York City.



Figure 39. Aerial rendering of new proposed neighborhood. Drawing by author.



Figure 40. Existing Site Plan. Drawing by author.



Figure 41. Proposed Site Plan. Drawing by author.

The park is reshaped through extending the grid down to the water's edge and using the buildings to create a visual edge to the park from inside the park. The more structured recreational activities which formerly filled the entire park are relocated along the Erie Basin whose width is conveniently suitable for soccer and softball fields as well as a vehicular and pedestrian trail along the water's edge. The central part of the park, just west of the grain terminal building, is left open as a large field for sunbathing, picnicking, informal gatherings and recreational uses, and for spectacular views out to the Gowanus Bay and across to Staten Island. Further north, the park becomes much more formal and tightly programmed as it begins to be shaped and influenced by the grid. Many of the streets are continued past that first layer of the

park. Activities in this zone are imagined to be paved recreational sports like basketball, tennis, and racquetball, parking along a permeably paved zone where tailgating could occur on game days and visitors could park on non-game days. The edge of the park that greets the street would be defined by formal bosques of trees which would serve as a visual and experiential threshold into the park, as well as insulating park goers from street sounds.



Figure 42. Park Aerial. Drawing by author.

This zone is an important piece of the park in that it massages the connection between city into park. But it is also significant in that it sits along the primary east-west axis connecting historic Red Hook to the West with the new Red Hook to the East. Inside the park, this east-west axis is most prominent in the form of a new basin. Contaminated soil inside the park here is excavated below sea level and replaced not with clean soil, but clean water. Docks and a marina inside this new basin would allow for water activities such as punting, canoeing, swimming, and fishing in the summer, and ice skating in the winter. At either end of this axis are two plazas. The one to the West is surrounded by primarily residential uses with multi-family buildings taking

advantage of views into a small and intimate urban park. To the East, the plaza is envisioned as a market plaza, full of glassy pavilions that can host vendors selling their wares and foods throughout the week and then transform to food stalls where fans can grab a beer and hot dog before heading into the stadium on game days. In the center of this plaza is a grassy field the exact dimensions of a football field where fans can play a pickup game of football or a stage could be set up for a pregame concert.



Figure 43. Summer and Winter Scenes. Drawing by author.

It is important to consider how the neighborhood and these open plaza spaces might be programmed to incorporate a variety of uses and keep the area active and vibrant all week and all year long. In order to achieve this, the primary use must be residential, because only this use type will guarantee that people will be in the area at all times. There is a small amount of office space surrounding the plaza directly north of the stadium because of its proximity to the metro stations. Along Court Street, the street that runs in front of the stadium to the west, there will be ground floor retail stores, with residential overhead. As the stadium meets the market plaza, the ground floor shopping turns into restaurants and bars that spill out onto the streets and take advantage of views into the park and towards the stadium façade. Directly South of the stadium, the water promenade plaza is imagined to be activated by football activities for the players and front office personnel. A large indoor practice field is built within an existing warehouse building. Across the plaza from this facility is a building with restaurants on the ground floor and offices for the team's managers, as well as a press briefing room. The rooftop of the building on gameday becomes a desirable place to companies to rent out as it provides spectacular views in 360 degrees over the stadium, out to the New York Bay, as well as towards the skyline of Manhattan.

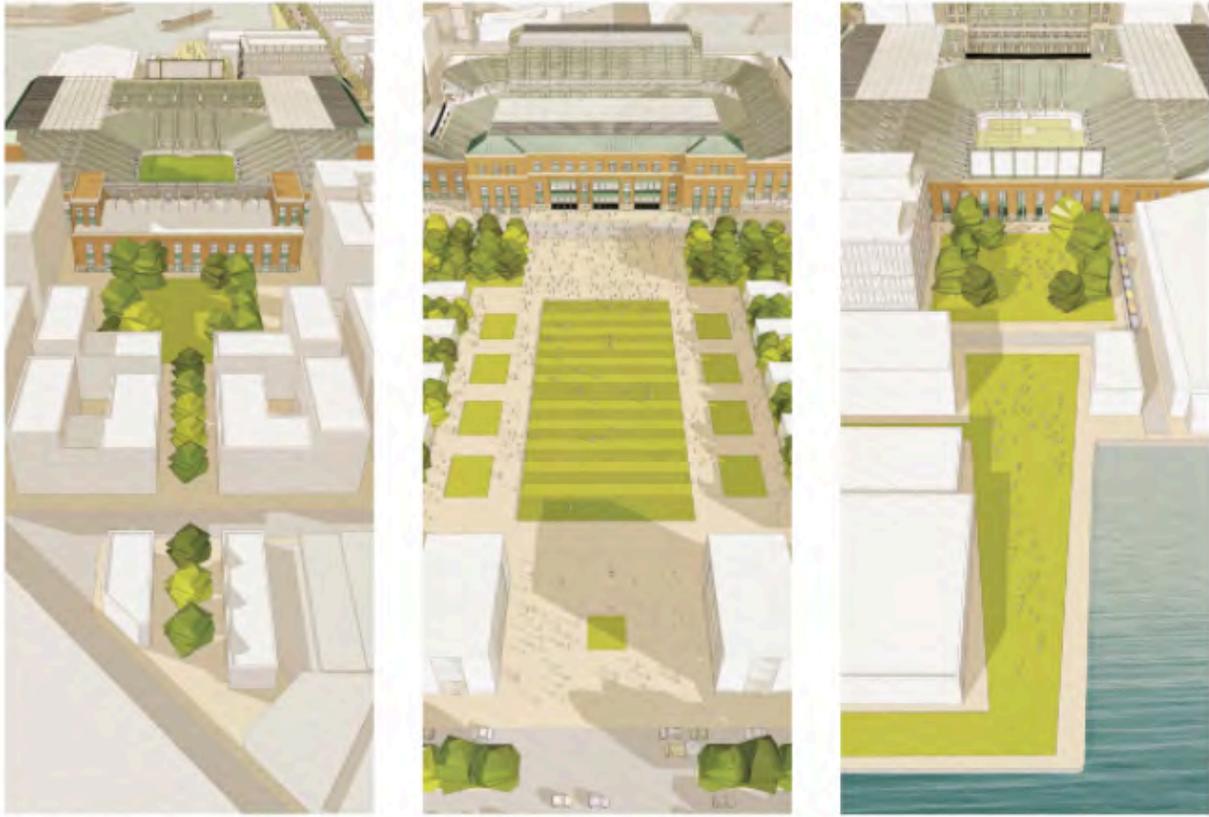


Figure 44. Metro Promenade, Market Plaza, and Water Promenade. Drawing by author.

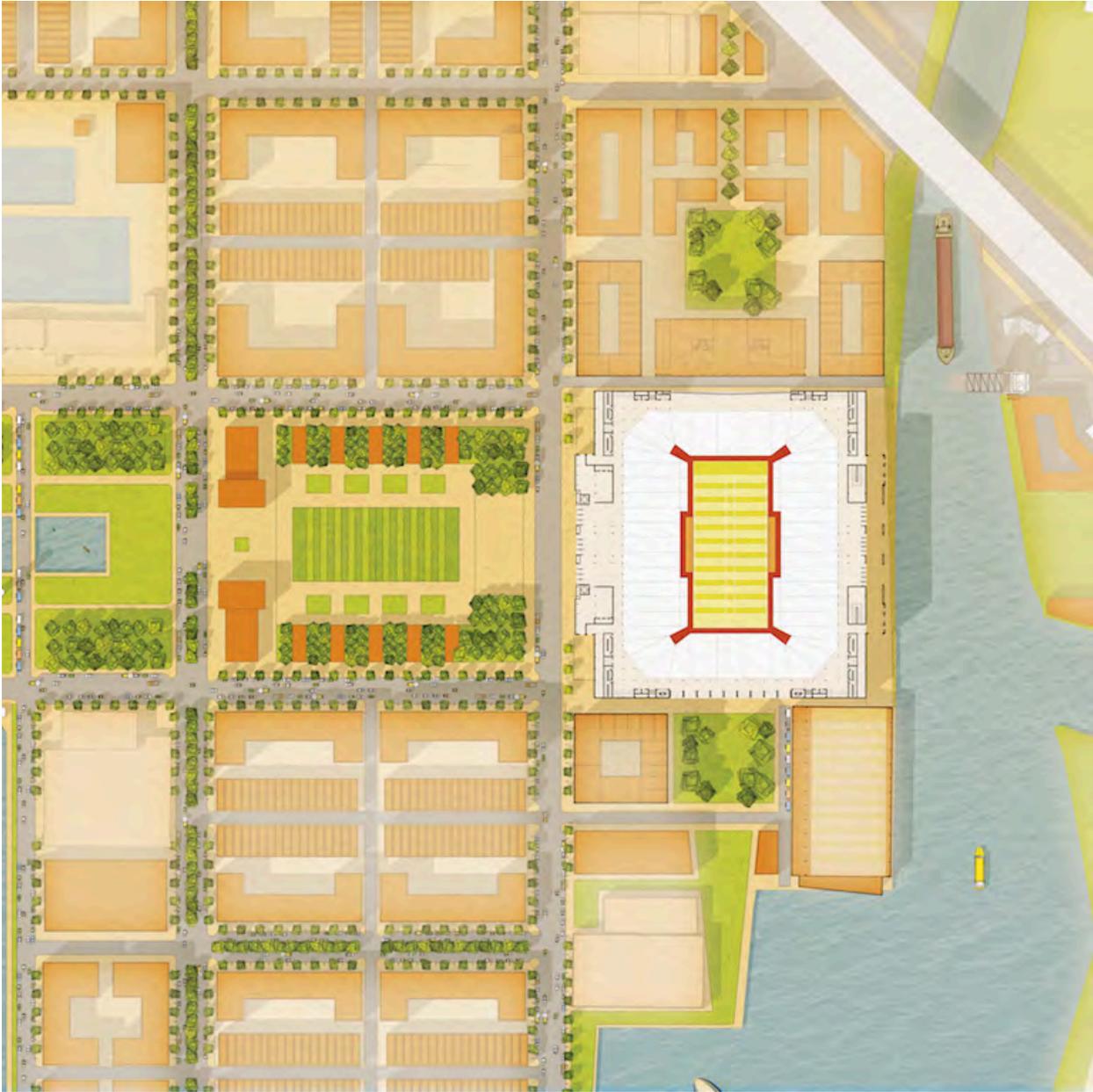


Figure 45. Stadium Plan. Drawing by author.

Of course, none of these strategies for creating park and place would work unless it is connected to the city and the city to it. As mentioned, there is one transit stop in Carroll Gardens that is a half mile or ten-minute walk from the stadium. The stadium was sited in its location primarily to take advantage of this fact, because most fans attending the stadium will be traveling

there by means of the Metro's robust system. But for a transit system to be truly robust there must be a variety of options. A streetcar connecting the waterfronts of Brooklyn and Queens is proposed by the city. One possible route for the streetcar brings it through Red Hook and makes a stop in between the stadium and the existing metro rail stop. Other transit options into the neighborhood include traveling by water taxi from Manhattan, or traveling by bus or bike. Vehicular transit is also possible, thanks to the stadium's proximity to the expressway, and its ample subterranean parking spaces. By designing flexibility into the transit system, any delays or over-crowding in one type of transportation can be absorbed by the other transit lines.

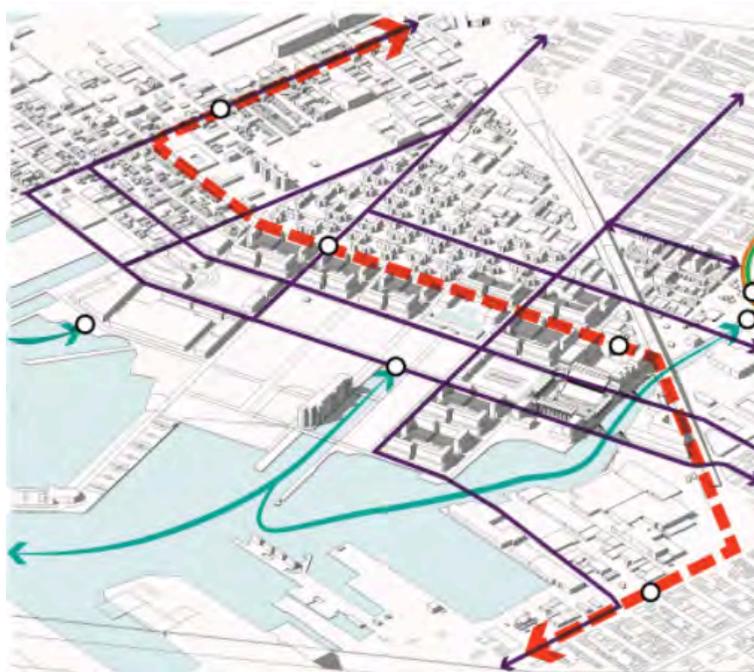


Figure 46. Transit networks. Drawing by author.

Designing for flexibility is also critical in making the public plazas around the stadium, the stadium periphery, and the events on the field active and well attended throughout the day and throughout the calendar. The plazas are envisioned to be a part of the realm of the stadium and its festivities on event days, with temporary barricades that prevent vehicles from entering

the space, and provide necessary security checks for people entering. Anybody may enter this area and partake of the pregame festivities, but only those with tickets could proceed further into the stadium. When the event has concluded, this space once again returns to the realm of the public and its daily activities.

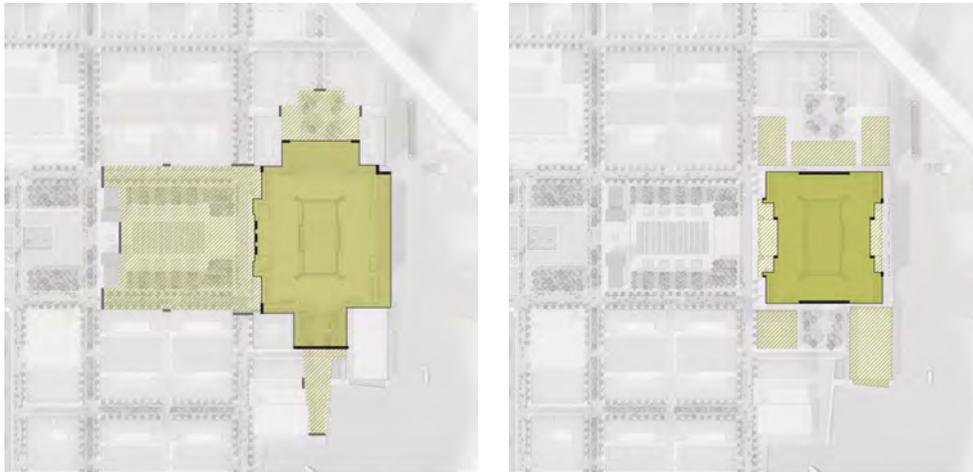


Figure 47. Flexible public space; gameday on top, everyday on bottom. Drawing by author.

Similarly, the programs in the perimeter of the stadium, a restaurant, a team store, and two bars operate inwards to fans in the stadium on game days, and outwards to the patrons of the neighborhood the rest of the time. There are no food stalls sitting empty and unused throughout the year. Food within the stadium is vended not from traditional kitchen spaces that are embedded underneath the grandstands, but from freestanding carts and kiosks that can be moved, collapsed, and modified. The foods that require extra preparation space are located on the ground floor of the buildings to the north and south of the stadium. The building to the north of the stadium with the grandstands on its roof would be accessible from the street that runs along the top of the lower stadium bowl. The ground floor of that building would function like a cafeteria with restaurants along the walls and open seating in the middle. It would also serve as a cafeteria

for the employees who would work in the office buildings throughout the week that surround that plaza. The buildings to the south of the stadium shape another smaller plaza that would have casual restaurants opening out onto the plaza and views out to the water.

Lastly, the grandstands and the field are envisioned to be used for multiple purposes, ranging from football to soccer, to the stadium is designed to be usable for many different event types from football, to soccer, to concerts, and many others. It is meant to be used at its capacity for NFL games. For MLS games, half of upper decks along sideline can be curtained off to reduce capacity by 10,000 while both goal line upper deck grandstands can be covered with team branded tarps to reduce the capacity by another 10,000 to 40,000 total. The entire upper grandstands can be tarped or curtained off to reduce overall capacity down to 30,000 while still maintaining an intimate and exciting atmosphere. The long extension of the canopies over much of the lower bowl will serve to acoustically amplify crowd noises. Concerts can make use of this stadiums by filling in as many as 60,000 or as little as 20,000 while the venue still appears to be full. An attendance in excess of 60,000 can be achieved by making up for seats lost behind the stage at one end of the stadium with pit seating on the field.



Figure 48. Football, soccer, and concert scenes. Drawing by author.

Providing flexibility for each of these three events as well as other collegiate soccer and football games, international soccer scrimmages, as well as other special events and gatherings like boxing matches, bowl games, circus/acrobatic shows, and ceremonial, political, and

religious gatherings. Because the offices and suite levels with views onto the stadium are conditioned spaces, they can be rented out for conferences, weddings, or other smaller scale events. Considering all of these uses, the stadium could conceivably be occupied every single weekend of the year and several weeknights as well.

Simplifying the structure, mechanical functions, and program contribute to the flexibility of space. The structure is open and unadorned within the facility, although dressed with a façade on the exterior. A system of concrete columns and beams support the grandstands and concourses while lighter steel trusses support the canopy. Canopy trusses also support the loads of PV panels, stadium flood lights, and translucent roof membrane which allows natural light to illuminate the upper grandstands during day games while shielding spectators from precipitation. Radiant heating in the roof helps to melt snow and reduce live load. The main concourses are open air which reduces energy consumption and reliance on expensive mechanical equipment. Electricity is generated through solar photovoltaic panels on the opaque portions on each canopy. This is used to partially condition and power the luxury suites, press boxes, upper level offices, and subterranean levels which include parking garages, locker rooms and equipment rooms, kitchens and medical facilities, small warmup rooms.

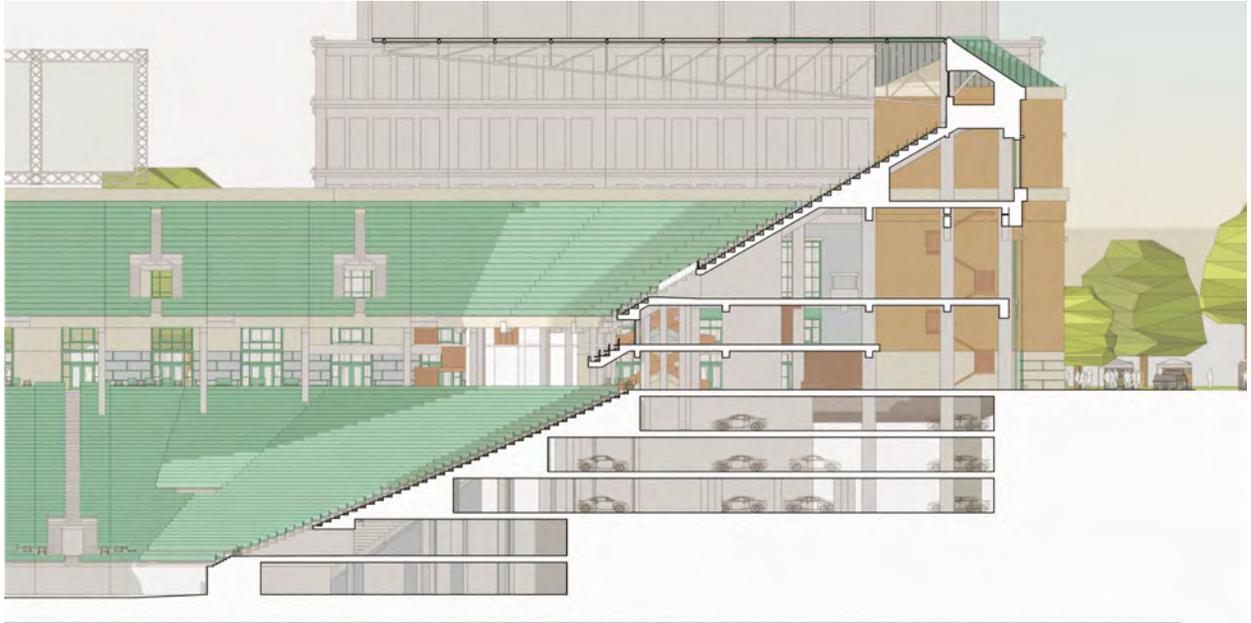


Figure 49. Stadium section. Drawing by author.



Figure 50. Exploded Axon revealing structure, circulation, and façade layers. Drawing by author.

Chapter 5: Conclusions

A stadium is a natural building to be the first mover in a new development. This is a common strategy in many cities. The downside is that the stadium can feel strangely isolated from the rest of the city until the development moves in. A possible solution to counteracting this problem is to ensure that other developers are willing to begin building at the same time as the stadium. The stadium cannot make the desirable public spaces: it is only one of the walls to the plaza. Nevertheless, on a site like Red Hook where a large amount of civil work would need to be completed first before any building could take place, the stadium is a logical building to kick off the development. It can provide a model for developers in the future for how the environmental remediation process occurs and give them more realistic expectations for cost.

The stadium can also provide dignity and grandeur to public spaces, as well as a good reason to go there and a way to keep the place active. Stadiums are an attraction and people place value on simply being near landmark buildings. Development in this area will also benefit from a soon-to-be cleaned Gowanus Canal, a spectacular new park, and better access to transit. When these attributes are combined, they make a compelling case both to potential residents and potential developers to invest in this new neighborhood. The stadium is at the heart of the development, but in the end, it is one piece of a larger puzzle that will make the neighborhood complete.

The stadium itself can be a source of civic pride and enjoyed by all, not just by fans attending an infrequent event. By enabling the field, stadium concourses, and plazas around the stadium to be reprogrammed for both daily life and special events, the stadium serves its city, rather than its football masters. The stadium does indeed have a place in the neighborhood; one of both civic servant, making itself useful for its neighbors, and also one of civic landmark, gracing its neighbors with its dignity and grandeur.



Figure 51. Stadium façade from Market Plaza. Drawing by author.

Appendix

Soldier Field

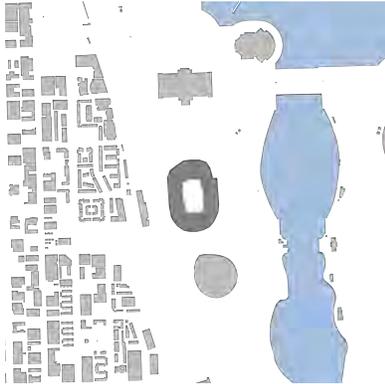


Figure Ground



Urban Edge and Plaza



Land Use



Pedestrian Access



Bike Access



Transit Access



Vehicular Access

Paul Brown Stadium



Figure Ground



Pedestrian Access



Bike Access



Transit Access



Vehicular Access

M&T Bank Stadium

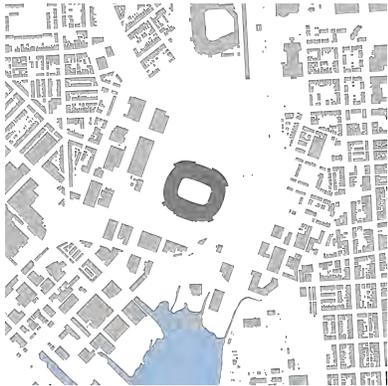
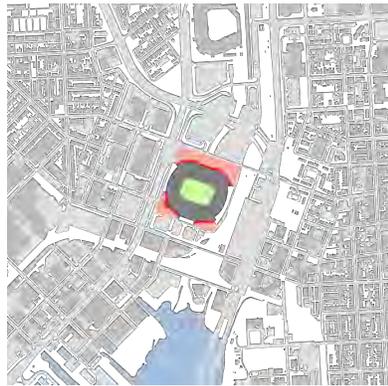


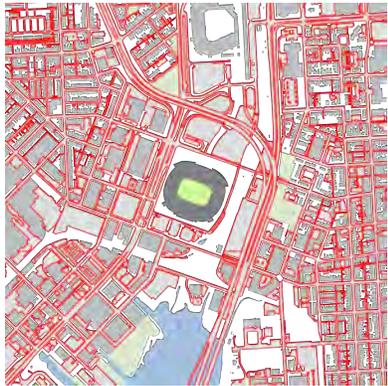
Figure Ground



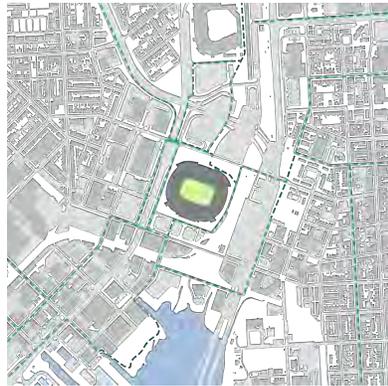
Urban Edge and Plaza



Land Use



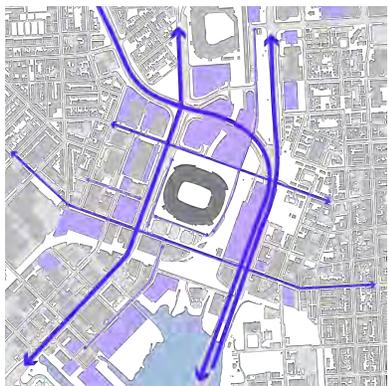
Pedestrian Access



Bike Access



Transit Access

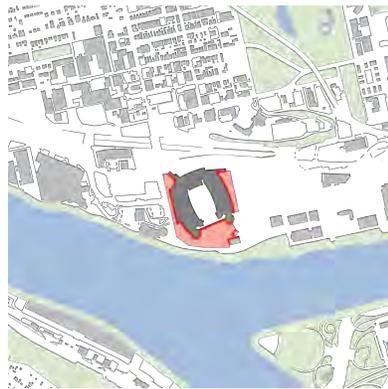


Vehicular Access

Heinz Field



Figure Ground



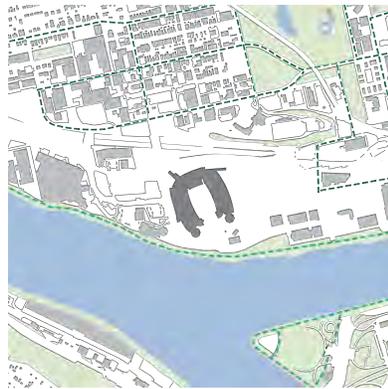
Urban Edge and Plaza



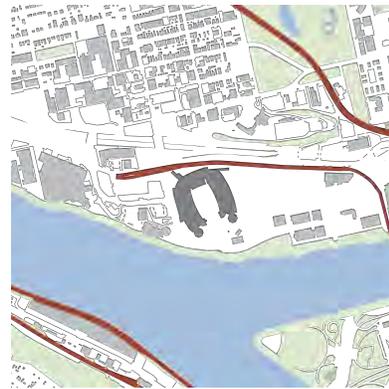
Land Use



Pedestrian Access



Bike Access



Transit Access



Vehicular Access

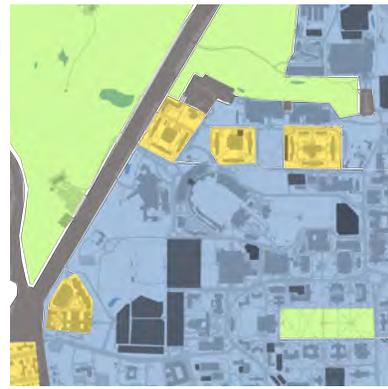
Maryland Stadium



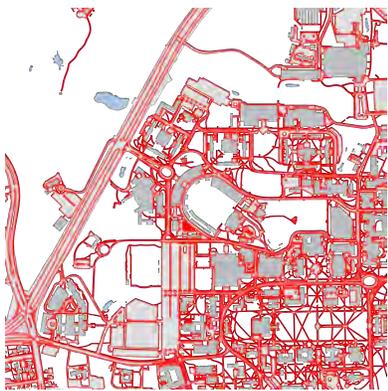
Figure Ground



Urban Edge and Plaza



Land Use



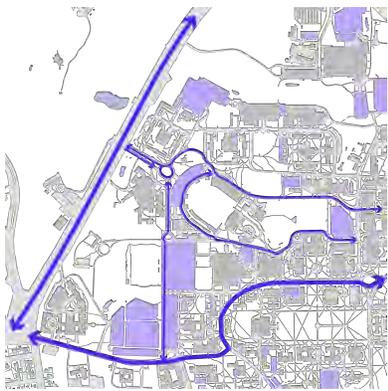
Pedestrian Access



Bike Access



Transit Access

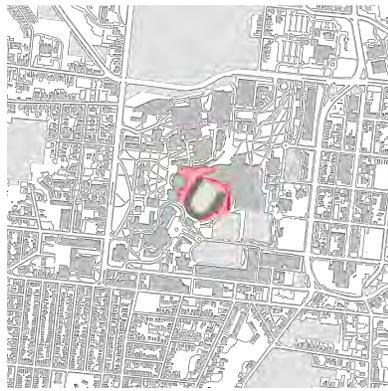


Vehicular Access

Nippert Stadium



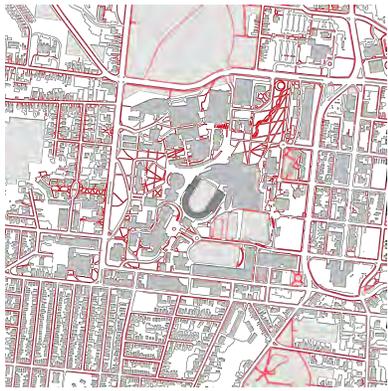
Figure Ground



Urban Edge and Plaza



Land Use



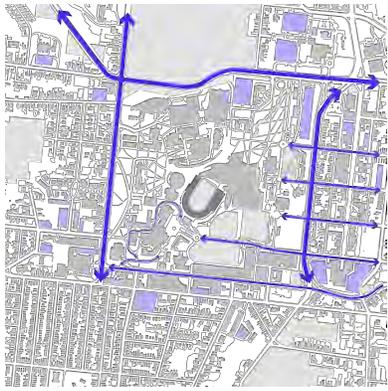
Pedestrian Access



Bike Access



Transit Access



Vehicular Access

Wrigley Field

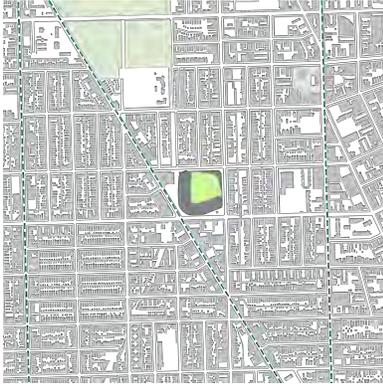


Figure Ground



Urban Edge and Plaza



Land Use



Pedestrian Access



Bike Access



Transit Access



Vehicular Access

Fenway Park



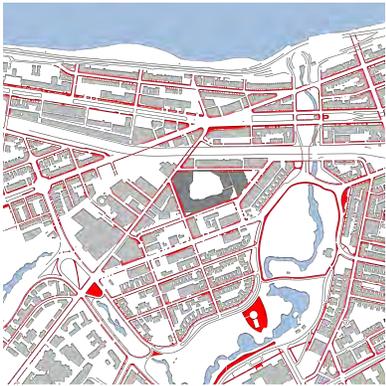
Figure Ground



Urban Edge and Plaza



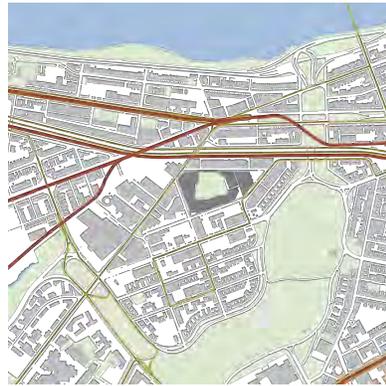
Land Use



Pedestrian Access



Bike Access



Transit Access



Vehicular Access

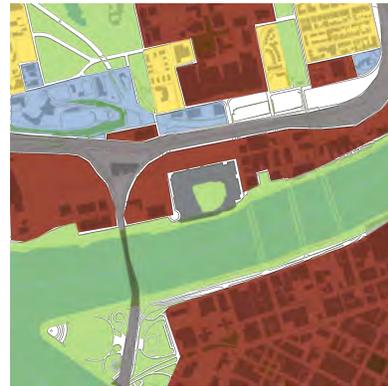
PNC Park



Figure Ground



Urban Edge and Plaza



Land Use



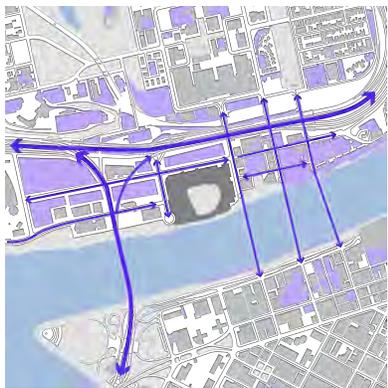
Pedestrian Access



Bike Access



Transit Access



Vehicular Access

AT&T Park

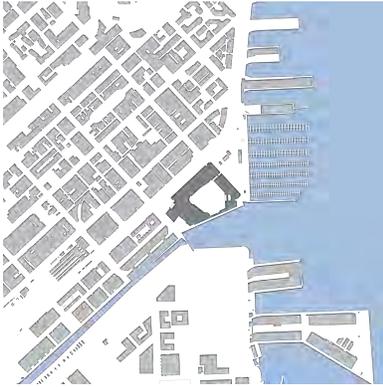


Figure Ground



Urban Edge and Plaza



Land Use



Pedestrian Access



Bike Access



Transit Access



Vehicular Access

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