Effects of Stadia on their Neighborhood

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Effects of Stadia on Their Neighborhood

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Abstract

Title:
Effects of stadia on their neighborhood

This thesis examines the effects stadia have on their neighborhoods and how they can better benefit their neighborhoods. The proposed site is in downtown Fargo, North Dakota. The project will help improve downtown through bringing additional people into downtown and creating new entertainment. The project examines the economic and social effects stadia have on their neighborhood. The final design is an 8,000 seat arena multi-use basketball and hockey arena. The arena is 530,000 square feet. The thesis examines the effects the arena would have on the neighborhood.

Keywords:
Stadium
Neighborhood
Urban

Problem Statement

How does an individual building affect its neighborhood?

Statement of Intent

Statement of Intent

Project Typology

Mixed Use Basketball arena

Theoretical Premise

Stadia need to adapt to positively affect their neighborhoods.

Actor- Stadia
Action- Adapt
Object- Neighborhoods

Supporting Premises

The actor- Stadia are large projects which drastically change and affect its neighborhood, in many ways for the worse.

The action- Stadia need to minimize their negative effects and intensify their positive effects to help their neighborhoods. Currently stadia create a number of problems ranging from massive, underused infrastructure to their limited economic impact. Stadia rarely can support themselves and often require their city to financially support them (John, Sheaard & Vickery, 2007).

The object- The area surrounding a stadium will experience massive change caused by the stadium during the life of the stadium.

Site

400 Block of Northern Pacific Avenue, Fargo, North Dakota

Project Justification

Stadia are one of the largest project a city can undertake. As the stadia continue to grow larger and more expensive, more focus should be spent on making sure they positively affect their neighborhoods. Stadia create a large amount of problems where ever they are placed and action needs to be taken to reduce those effects.

Stadia should be placed in a high density neighborhood to maximize their effects. Fargo currently has two stadiums; the Fargodome, and Scheels Arena. All of these stadiums have serious problems which affect their neighborhoods, part of which is caused by their location. Downtown Fargo would be a prime place to use the positive effects of stadia to improve the quality of the neighborhood.

Proposal

Stadia are one of the largest projects a city can undertake. Despite their costs, financially and otherwise, they rarely are planned to make a quality impact on urban neighborhoods. Stadia create problems for an urban neighborhood. One of the major factors in creating a successful urban neighborhood is mixed usage buildings (Jacobs, 1992).

Stadiums don't work with this idea. Some of the largest stadiums in the US are designed to support a single team. These stadiums could be in use for just ten days out of a year. Even the Staples Center, the arena in Los Angeles capable of supporting two National Basketball Association (NBA) teams, is still unused around 100 days each year (Staples Center, 2013). New usages that aren't based around a yearly sports schedule need to be brought into a stadium's program to deal with the lack of its main usage.

A stadium's size works against mixed use. A stadium will take up at least a square block by itself. Many will take up multiple city blocks. The same city block could support anywhere from 10 to 20 commercial properties on the ground floor and offices or residences on the above floors. From a economic diversity standpoint, stadiums don't make sense.

The related infrastructure for a stadium also causes problems for an urban neighborhood. A stadium will draw people from many places within a region. Many of these people will require parking. This creates a sort of sprawl. Stadiums are surrounded by parking, moving away the potential businesses they could support. Blocks upon blocks are dedicated to providing parking near the stadium. Public transit helps this problem, but isn't the full solution.

The lack of mixed use affects other urban problems. The lack of use, both in terms of days per year and hours per day, creates problems with safety. The lack of people using the building and surrounding area, no people looking out on to the street and unfriendly facades means there aren't any people to watch the street. No one watching the street means the street isn't likely to be safe. The lack of safety could drive away possible other uses in the area around the stadium.

Facades will affect the urban environment. Often facades will be blank and not scaled to a human figure. A blank facade is boring. A stadium's scale can be intimidating. These factors make other routes a better and more interesting decision. This pushes people away from the stadium, continuing to affect the surrounding area and the safety around the stadium.

Urban Stadia

Despite their problems, the only place a stadium should be is in an urban center. Stadia bring people to together. No other typology brings together as many people. But stadiums do more than physically bring people together. They cause people to bond over a common goal; to see their team win. They enable a common interest to be created. But stadiums need lots of people to support this interest. The best place to ensure stadiums have enough people is in the middle of dense, urban environments.

Cities are for trade. The large amount of people concentrated in a small area creates potential for commerce. A stadium will bring thousands of people into a few block area and because of this can help generate business. How much of a benefit a stadium brings is still not fully understood, but a stadium should aim to help the businesses around it.

One of the problems with the stadiums economic affect in its neighborhood, is how limited of a time it will happen. The effects will only last from a few hours before the game until a few hours after the game. While the effect can't be expanded much, there should still be attempts to increase the time a stadium will effect the economy around it.

Fargo is a good place for a new stadium. Fargo would fit into the requirements for an NBA Development League (D League) team. Current cities with D League teams range from 60,000 to nearly one million people. Fargo is already able to support a minor league baseball and hockey team. University students will be one of the major markets and the basketball season coincides nicely with the university schedule. It would act an additional pull of students from campus to downtown.

Downtown possibilities

Currently there aren't many entertainment options downtown. Downtownfargo.com, a website dedicated to promoting downtown Fargo lists five different entertainment options: the public library, the Fargo theatre, S.S. Ruby boat tours, the Section9 Cyber Cafe, and the Northern Gentleman's Club (downtownfargo, 2013). There is definite room for improvement. The arena would offer multiple forms of entertainment over the year and add a needed variety to downtown. New variety of entertainment would cause additional groups of people to use downtown for entertainment. A greater variety of users would help the life of downtown. The main entertainment of downtown, drinking, certainly causes downtown to suffer when its main user group, college students, leave. Additional diversity can only help downtown.

Downtown Fargo on a Sunday is dead. Absolutely dead. The kind of dead that makes you realize why there are stereotypes that no one lives in North Dakota. But its not only Sunday when downtown suffers from a lack of use. While the arena can't completely fix the lack of use, it can use its schedule to create a large influx of people. Sunday, or early weekday games could bring thousands of people into downtown when they normally won't.

An additional area where Fargo has a need is with a public square. Currently US Bank Plaza is serving as Fargo's square. Other downtowns are able to have squares which people want to be in and are used. This project would aim to add a square which would be used by downtowners.

Fargo's Arenas

Fargo is also a good choice for a new stadium because the current ones are bad for their neighborhoods. A new stadium would allow Fargo to see how stadiums should act on their neighborhoods and how they can be benefits.

The Fargodome is a giant, brick, monstrosity which doesn't fit into either of the two neighborhoods around it. Its separated by parking lots and athletic buildings from the rest of NDSU campus, and shares none of the campus' charm. It doesn't fit into the residential neighborhood to the east. It overshadows everything in that neighborhood. Parking alone for the building is ten square blocks. The same area would house around 650 people (El Nasser & Overburg, 2011). It best fits into the small pocket of sprawl that runs along 19th Ave North. Not the best thing to fit into.

While the Fargodome's fit in its neighborhood isn't good, it's not nearly as bad

as the Scheel's Arena. The Scheel's arena follows one of the worse approaches to siting a stadium; placing a stadium in the middle of nowhere and hoping things grow around it. The buildings closest to the Scheels arena measure in thousands of feet away. Its unlikely that there will ever be walkable development around the Scheels Arena. The lack of development isn't the only problem. Transportation becomes harder the farther a stadium is from most people. Mass transit either has to be expanded specially for the stadium, hasn't happened for the Scheels Arena, or won't exist at all. This cuts into the amount of people who can go and affects one of the major user groups, college students. Around 50 percent of NDSU students have cars, cutting out a decent amount of users (US News, 2012).

The last and smallest of Fargo's stadia is the Civic Center. This arena is the only arena that is in downtown, but still suffers from problems. It has problems with lack of use and aesthetic issues which prevent it from being a quality contribution to downtown. The Civic Center is only used for around one third of the days each month, mostly being used by trade shows and other conventions. The main facade is blank and unappealing to the pedestrian. The Civic Center would still have a use downtown even with the new arena.

Ideal users

For a stadium to benefit its neighborhood, it needs to have quality entertainment. It should have at least one quality stable tenant. The more tenants it can secure, the more often the building can be used, and the stadium will have a better benefit on its neighborhood. The ideal tenants would be a NBA D League team, and a NDSU Division I hockey team.

Typology

An arena is chosen as the typology for this question because of the magnitude of the effects an arena will have. Even though the problem statement applies to every building, there aren't many other typologies that the effect is so obvious. Each building in an urban environment will have an effect on its neighborhood, but none of the power to shape its neighborhood like an arena does.

Owner
The owner of the building will be the owner of the team and manage the arena. Their highest priority is ensuring profitability of the team and the arena. Their requirements will be office space to manage the team.

Team Staff
The team staff will be responsible for running the team day to day. They will consist of coaches, front office personnel, medical staff, marketing and other staff. There will be around 50 people. Their peak will be on game days, with not all of the staff being required every day.

Fans
The fans will be the main user designed to. Profitability of the arena will be tied to the quality of the building and entertainment. The amount of fans will depend on the final seating arrangements, but will be around 3,000 to 4,000 or 9,000 to 12,000 to fit into the current market of Fargo. The fans will have a peak usage during evening there are games.

Players
The players will need their own spaces in the building for before and after the games. There will be around 25 to 30 players. A team exclusive locker room will be needed for each of the home teams.

Retail Owners
There will be around 5 to 10 retail owners on the first floor. They will need receiving access and parking for their employees.

Media
The media will be important for the games. They will need a box for watching the game and reporting, along with places for television trucks. They will have around the same schedule as the fans. There will probably be no more than ten media personnel.

Facilities Staff
The facilities staff will be responsible for running all of the events. They will be the ones setting up and taking down equipment and the people running the concessions. There will be around 50 staff. Their schedule will run from before games to after games.

Security
Security will be responsible for maintaining order. There will be around 10 to 20 security members. Their schedule will be about the same as the fans.

Officials
The official will be running the games. There will be around five officials. They will need space near the game floor along with other facilities.

Major Project Elements

Arena
The main part of design. The arena will feature basketball, hockey, soccer, concerts, and conventions.

Team Spaces
The arena will require additional team areas, such as locker rooms, administrative offices, and training facilities.

Commercial
The arena will also have ground floor commercial to help grow downtown Fargo.

Square
Downtown Fargo is lacking a good public space. The design will incorporate a square to encourage access between Broadway and the river.

Parking
The site already has parking used by nearby buildings. It will need to be replaced, and additional space for game times created.

Region Map

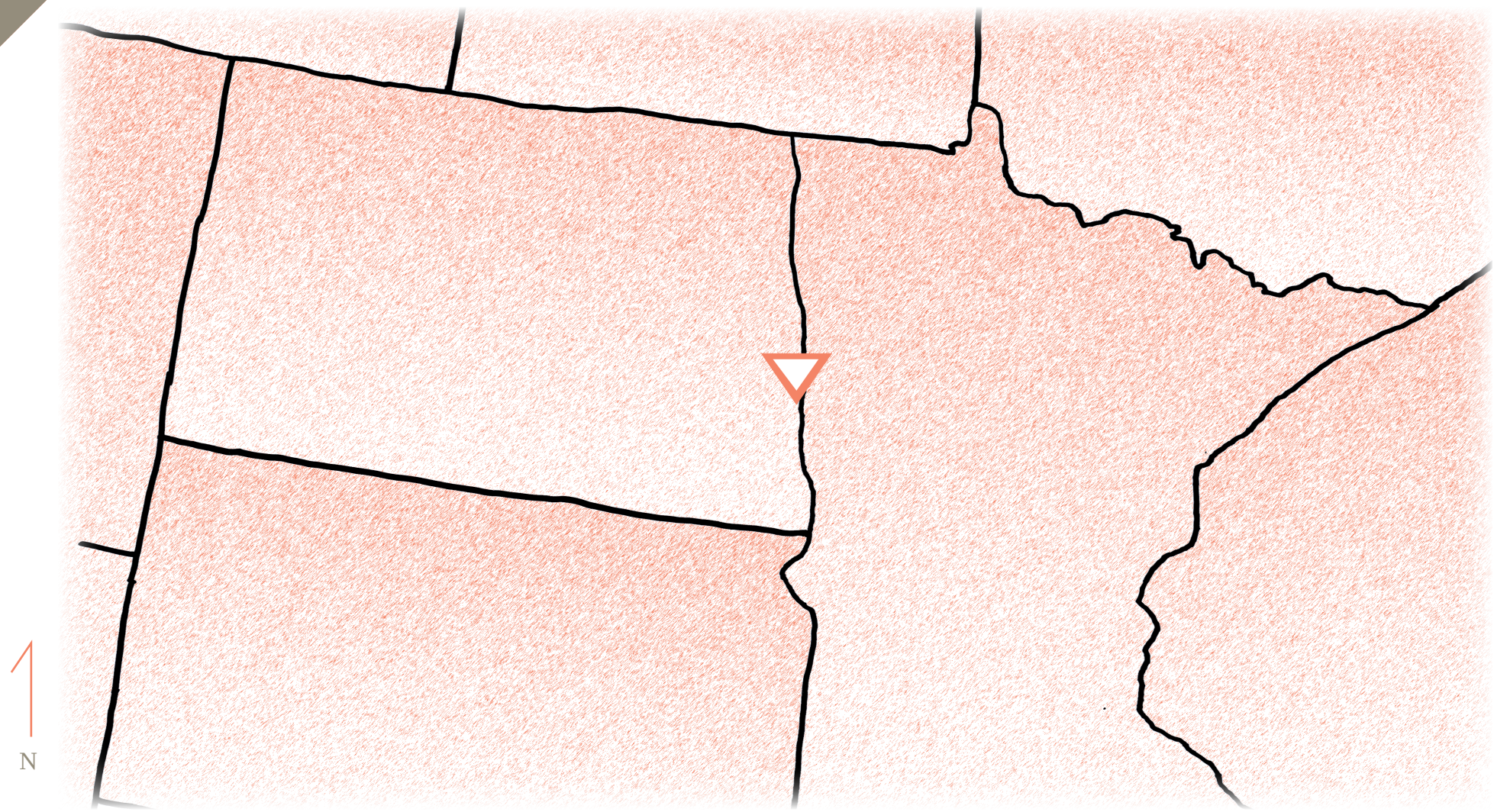


Figure 1: Region Map
Nick Anderson, 2013

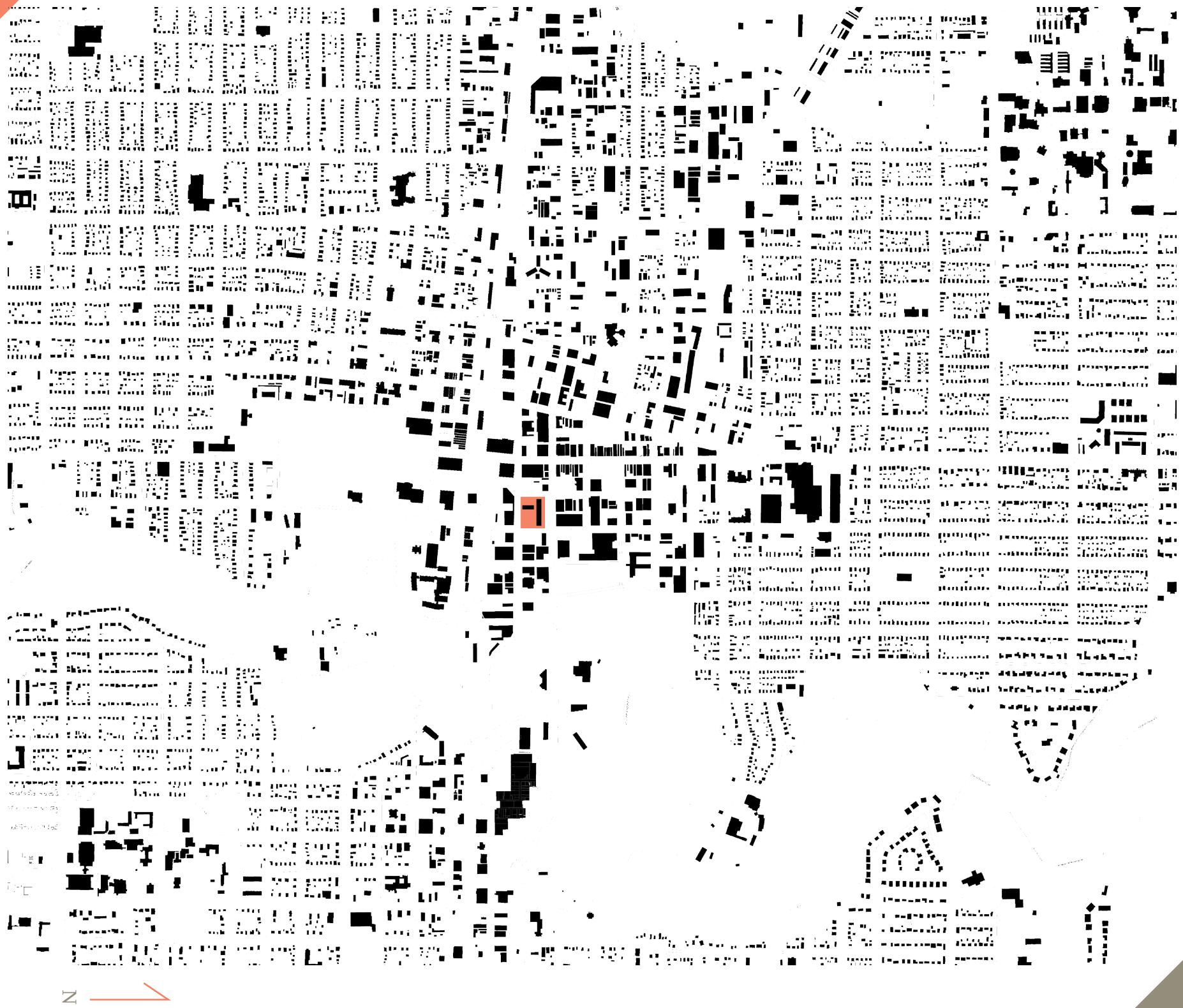


Figure 2: City Map
Nick Anderson, 2013

The site is located in downtown Fargo, North Dakota. The site currently contains parking, an unused building and an adult bookstore. This site would be one of the better infill locations to help contribute to downtown. The blocks between 5th and 4th St N don't contribute much to downtown. Walking along these blocks isn't a pleasant experience. Downtown fails to bring its qualities to the river. This site would hopefully act as a catalyst to the blocks around it, and encourage positive growth east of Broadway. To the south is Fargo's main bus station. This will play a large part in affecting how people commute to the arena.

Figure 3: Site Map
Nick Anderson, 2013

Project Emphasis

This project will emphasis the effects of architectural elements on the neighborhood around them. This project is concerned about both macro and micro decisions which cause effects. The project is also focused on how architecture can help improve a city's economy.

Research Direction

Research will be conducted for the unifying idea, typology, historical context, the site and the program. Research will be achieved through use of case studies, academic papers and site visits.

Design Methodology

I will use a mixed method, quantitative qualitative approach and a concurrent transformative strategy to gather qualitative and quantitative data. I will use graphic analysis, and digital analysis.

Documentation

I will document the thesis through sketches, digital images, and writing. A digital copy of my thesis will be placed in the Institutional Repository. Data will be recorded on a weekly basis. It will be presented as a book at the end of the thesis.

Schedule

Documentation	1/13/14	4/28/14
Context Analysis	1/13/14	1/24/14
Conceptual Analysis	1/15/14	1/24/14
Spatial Analysis	1/21/14	1/29/14
ECS Passive Analysis	1/29/14	2/10/14
Floor Plan Development	2/2/14	2/27/14
Section Development	2/5/14	2/27/14
Structural Development	2/17/14	3/6/14
ECS Active Analysis	2/23/14	2/27/14
Material Analysis	2/27/14	3/5/14
Envelope Analysis	3/4/14	3/9/14
Midterm Review	3/10/14	3/14/14
Project Revisions	3/15/14	4/4/14
Presentation Prep	4/5/14	4/24/14
CD Due	4/24/14	
Plotting and Model	4/24/14	4/28/14
Event Installed	4/28/14	

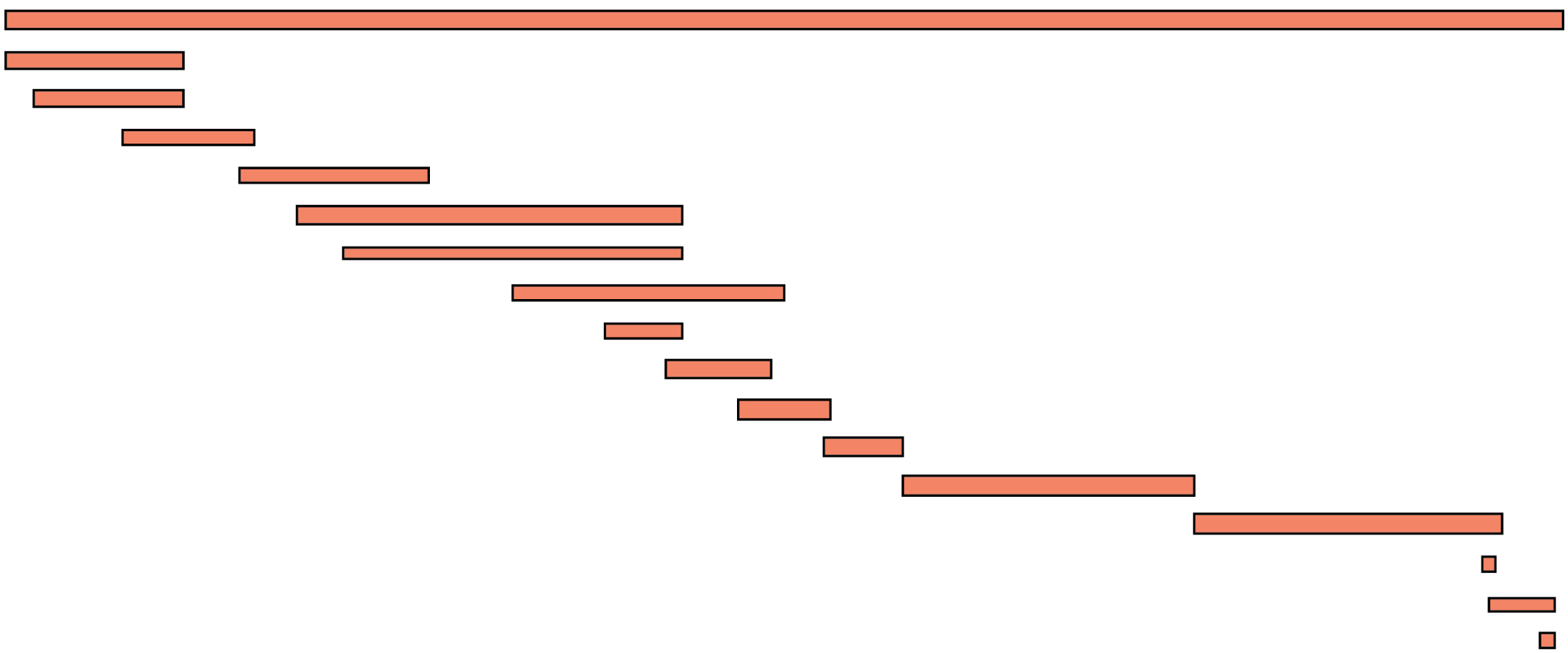


Figure 4: Graphic Schedule
Nick Anderson, 2013

Second Year
Fall 2010:
Architectural Design I
Darryl Booker
Tea House
Boat House

Spring 2011:
Architectural Design II
Cindy Urness
Montessori School
Bird House
Dwelling

Third Year
Fall 2011:
Architectural Design III
Regin Schwaen
Zombie Safe House
Artist in Residence

Spring 2012:
Milton Yergens
Urban infill
Rice Research Facility

Fourth Year
Fall 2012:
Bakr Aly Ahmed
High Rise

Spring 2013:
Don Faulkner
Ghana School

Fifth Year
Fall 2013:
Mark Barnhouse
Water Research Facility

Program

A building will have different effects on its neighborhood. A stadium will have more and greater effects than a normal building due to its program. Some of these negative effects of stadiums were expanded on in the narrative. There will also be multiple positive effects. A stadium will effect its neighborhood economically, socially and through its program.

Economic Effects

The most important effect an urban building will have on its neighborhood will be economic. A new building will create additional demand on services nearby. What kind of demand will be created is determined by the building type. For a stadium the main demands will be parking; retail, shopping and food/drink; and lodging (Hodur, Bangsund, Leistritz & Kaatz, 2004). This demand wont be constant, but instead be focuses between one and two hours before events and a few hours after an event. It will be important for the stadium to create demand during periods where there is little demand already. This will increase the health of the neighborhood by having to rely less on current demand.

New stadia are unlikely to create new spending. So is any other new entertainment building in a market with a decent selection of entertainment. A new movie theatre downtown wouldn't be likely to create new spending due to people having the selection of two movie theaters and a niche theater in Fargo. However, a new arena with the program of a Development League basketball team and a NDSU hockey team may tap into new markets. Sports is unique in that fandom of a specific team is often required to encourage people to use the service. Not fitting into a certain fandom may prevent people from going to sporting events. Even though basketball and hockey are represented in the market, people may not be interested in attending the events due to the team. A successful NDSU hockey team will create fans from NDSU students that aren't interested in hockey in general. Even though there are college basketball teams in Fargo-Moorhead, people are unlikely to be fans unless they attended those universities. The importance of the untapped fan bases is that there may be new entertainment spending possible. This new spending would occur in downtown Fargo.

Even if no new spending is created, a stadium will redirect spending from other entertainment buildings to itself and the neighborhood around it. It can be considered that there are two types of redirecting spending: local and non-local (Hodur, Bangsund, Leistritz & Kaatz, 2004). Local redirecting would be taking spending from entertainment buildings in the Fargo-Moorhead area. Non-local directing would be taking spending from areas further outside the Fargo-Moorhead area and bringing it into Fargo-Moorhead.

Local spending is the less beneficial of the two. While it would help the immediate area around the arena, the remainder of Fargo would not feel a positive effect. In addition, where ever the redirected spending was being taken from would feel negative effects of less income. Hodur, Bangsund, Leistritz and Kaatz categorized local spending as Fargo, Moorhead and within a 15 mile radius of the FM area (Hodur, Bangsund, Leistritz & Kaatz, 2004).

Non-local redirecting is the better effect. With non-local redirecting there is the benefit of increased spending in the neighborhood and the city. The arena is able to tap into demand from outside of the city and use it the bring additional money into the city.

A new arena would bring spending into the downtown area. A study examining the effects of the Fargodome found that 46 percent of people attending professional sports were non-local residents (Hodur, Bangsund, Leistritz & Kaatz, 2004). Concerts had 81 percent non-local attendants.

Trade shows had 49 percent non-local attendants. Overall there was a 46 percent local, 54 percent non-local split of Fargodome attendants. The non-local residents bring spending into downtown that otherwise wouldn't occur. The amount of spending each event would differs by each type of event.

63 percent of the spending by non-local attendants is a direct economic impact on the Fargo-Moorhead area (Hodur, Bangsund, Leistritz & Kaatz, 2004). The other 37 percent of spending indicated "the event was not their primary reason for visiting the Fargo-Moorhead area or the trip to the event replaced another planned visit to the area." College football was responsible for a 1.7 million dollar economic impact in Fargo in 2002. Concerts were responsible for a 3.8 million dollar economic impact. Basketball and hockey would have a higher impact due to have three times as many games as football.

Different event types had different amount of spending per attendant. These expenditures don't include ticket price, parking or other things purchased at the Fargodome (Hodur, Bangsund, Leistritz & Kaatz, 2004). Non-local expenditures would not have happened if not for the event. College football had a $15.15 expenditure for local attendants and $105.46 expenditure for non-local attendants. Professional sports had an average expenditure of $8.54 for local attendants and $37.36 for non-local spending. A significant portion of non-local spending is hotel related spending. Adjusting for inflation, for professional sports local expenditures would be $10.98 and $ 48.50 for non-local spending. Using their percentages of attendance and assuming 1,000 person attendance, each basketball game would bring around $28,000 of expenditures. Over a season the basketball team would have an expenditure around $800,000. Assuming every game was a sellout and a capacity of 10,000, a season would have an expenditure of nearly 8 million dollars. Much of the expenditure would occur in the downtown due to the amount and variety of available amenities.

A NDSU hockey team would have an even larger impact. Assuming the hockey team would have similar results as the football team, local expenditure would be $19.67 per attendant and $136.91 for non-local attendants. With 1,000 attendant per game, the expenditure would be around $77,000 per game and $1.7 million per season. With a sellout, the expenditure would be 770,000 per game and $17 million per season.

The additional spending in the downtown area should help existing buildings and open new businesses. Having a significant amount of games during periods where downtown is underused, Sunday-Wednesday, should allow businesses to be opened more often. Part of the reason downtown is dead on Sunday is due to state blue laws. North Dakota prohibits retail businesses from being open before noon on Sundays. This combined with how religious North Dakota is, effects businesses that could be opened legally. The result is that many of downtown's businesses aren't open on Sundays or are only open for a few hours. Other times downtown is dead to the cycle of people thinking there is not anything to do, so no reason to go downtown and businesses responding there is no one downtown and no reason to be open. With games being held during downtown dead times, businesses should respond and open, livening downtown.

Social Effects

In addition to economic effects that an arena will have, the teams that play in the arena will have social effects. Sports create a sense of local pride tied to where they play. Arenas can create topophilia, a love of place (Crawford, 2004). The arena can be one of the main reasons for attending an event. Going to great stadiums, such as Wrigley Field, Lambeau Field, or

Madison Square Garden, make any event worth attending. Stadiums create an atmosphere where people want to be. Even if the building is unattractive, "their beauty is the special, environmental kind, appreciated only to people who relate the setting to their emotional attachment." Sport shares many similarity with religion, making arenas sport's temples. Sport has the ability to bring people together and bond people over a common interest.

Stadium can also be used by communities to market their city. Cities can see the stadium as a potential to improve the image of the city. The arena and team can be powerful marketing devices in encouraging tourism and growth. Stadiums and teams can provide their city with near nightly marketing. New major stadiums can be the reason that a city receives a major event, such as the Superbowl, or March Madness. Major events will place their city and team in front of millions of people.

Along with the positive social effects, sports will bring negative effects to its neighborhood. The main effects are increased crime, traffic and noise. Crime is the most serious problem that occurs. Crime can range from increased vandalism to rioting. English soccer team fans are famous for rioting breaking out after games. Vancouver experienced rioting after its hockey team lost the Stanley Cup Finals. In a study of London football matches, there was 7 percent more property crime per 10,000 fans (Marie, 2010). Violent crime didn't have any statistical significant changes. Along with crime, stadiums will bring a significant amount of traffic and noise to its neighborhood. Planning should be done to ensure the amount of noise and traffic is limited and doesn't coincide with other periods where the neighborhood has elevated traffic.

Program Effects

Diversity of uses is one of the major factors in creating a city and successful neighborhoods. A successful neighborhood will have people constantly on its streets. But people need reasons to be on the streets at different times. Multiple uses and a wide variety of uses in a neighborhood cause people to be on the street at a wide variety of time. Jane Jacobs details what can happen in neighborhoods without a variety of uses and what it does to the neighborhood:

> "...the downtown tip of Manhattan, ... this is a district suffering from extreme time unbalance among its users. Some 400,000 persons are employed here, in a district embracing Wall Street... Yet the district is miserable at providing services and amenities proportionate to the need. It is only necessary to observe the deathlike stillness that settles on the district after five-thirty and all day Saturday and Sunday." (Jacobs, 1992)

Not having use diversity limits what kinds of businesses can survive in a neighborhood. Eventually this can escalate and drive business to other areas. Fargo has a similar "deathlike stillness" that occurs on Sundays in downtown. Downtown's focus on food and drinking limits when people will want to go downtown.

There are two sets of uses: primary and secondary. Primary uses are the reason a person goes somewhere. Residential, offices, retail, and entertainment can be considered primary uses. Secondary uses are reactions to primary uses and offer services to the users of the primary uses (Jacobs, 1992). New primary uses would help create additional secondary uses downtown. While the arena should be responsible for creating new demand, additional uses should be created on the site to create demand during other times.

Arena Floor Design

One of the most important factors in having an arena that can be used effectively is the design of the floor. How quickly the arena can be changed from purpose to purpose will affect how many events the building can hold. With the main tenants having a similar playing seasons it is important for changes to be quick. The most common change will be from basketball to hockey and vice versa. Changes from hockey to volleyball, concerts, or tennis will be similar to the change to basketball. The most common setup allows for changes to happen in around two hours.

The conversion process requires around 50 people. The first step is to lift the netting behind the goals (Geib). Next, plexiglass sheets are removed and placed on carts. The boards are unbolted from the floor and also placed on carts. Insulated plywood boards are then placed over the ice surface.

Next seats are added or changed. The Chicago Blackhawks use a system of extending seats, with two sides of differing amount of seats. The PNC arena uses forklifts to move bleachers of extra seats and risers to raise the hockey seats for basketball games ("Changeover,"). The American Airlines Arena uses a system of seats that retract below the other seats ("Changeovers,"). The University of Wisconsin's Kohl Center uses seats which have to be removed from collapsible stands along with rising stands ("Kohl center arena,").

The basketball floor is then laid down. The floor is constructed of around 200 boards connected through tongue and groove connections. The boards are on risers to allow for airflow between the plywood boards and the basketball floor. The final step is to place the hoops and the foldable floor seats.

The arena will have a permanent ice surface during the hockey season. The ice is formed through use of radiant cooling of concrete ("Changeover,"). Multiple chillers cool brinewater and pump it through pipes in the concrete. PNC Arena, in Raleigh, Carolina, which houses a Division I NCAA basketball team and an NHL team, has over five miles of pipe to cool its ice. Insulation of the ice is important to lower the energy cost required to maintain the ice. The temperature should be between 24 and 26 degrees and will require constant monitoring of the outside and arena conditions to maintain it.

The process of creating the ice surface is more time consuming than changing to a different playing surface. The process can take a few days and requires a significant amount of water. The process is done in five layers. The first is a very thin layer, around 1/16 of an inch ("Changeover,"). The next layer is a white paint to give the ice a better appearance. Another thin layer is then done. The fourth layer consists of painting on all of the decals and markings. The final layer is the longest and most intensive. Around 10,000 gallons of water are used to create the playing surface. This creates around a one inch layer of ice.

Removing the ice is an easier process. Most events can be held without having to remove the ice. Events which need to anchor into the concrete subsurface, such as a circus, require the ice to be removed ("Changeover,"). The first step is to pump heated brinewater through the pipes. Zambonis cut down the ice to around half of an inch. It is then broken down by hand and brought to ice pits to melt. The process of creating and removing the ice should be done as few times as possible over the life of the building.

The ice creates multiple problems in the building. Insulation and heated concrete are required under the chilled concrete to prevent problems with a shifting foundation (Russll-Ausley). There is a constant energy requirement to keep the ice at an acceptable level. The amount of water required, about

the same amount used each day 100 people isn't a problem unless the ice is replaced often ("Water questions & answers," 2013). The water should be processed before being used to produce a better surface ("Water treatment,"). The building humidity needs to be carefully maintained to prevent the forming of a fog over the ice (Russll-Ausley). The PNC Arena requires 12 dehumidifiers to prevent this. The water can't be melted and stored to limit energy use because of the paint placed in the ice. The paint also prevents the ice from being disposed like other water.

The Capital Regional District, part of the Canadian government of British Columbia, published a document on the best practices for disposal of ice paint. They do not classify ice paint as a special waste but it can't be disposed of without treatment ("Environmental regulations &," 2004). Ice paint contains "high levels of calcium carbonate, polymer, starch and titanium dioxide which are not treatable by sewage treatment processes." Ice paint can be filtered by using either a sand bed or multiple layers of filter cloth. The solids should be saved and disposed of in a landfill. This will require additional space and equipment to process. Designing a setup which limits time spent on conversion and energy costs will allow the arena to hold more events and lower owner costs.

A stadia will have many effects on its neighborhood. The main effects are through economic, social and programmatic means. Through planning these effects can be used to better the stadium's neighborhood.

Economically, a stadium will create a benefit for its city and neighborhood. A new stadium may not create new economic spending in Fargo, but should redirect spending from Fargo and the surrounding area into downtown. New teams may create new spending by responding to areas where the market isn't represented. The stadium should bring in spending from in Fargo and the surrounding area. Around 50 percent of attendants will likely be from outside of a 15 mile radius of Fargo-Moorhead. The additional spending should create new businesses and encourage existing businesses to remain open for longer periods of time. This would help remove the dead periods downtown experiences where no businesses are open.

The stadium will create expenditures in Fargo, much of which will be concentrated in downtown due to its existing amenities. A basketball team, which is lightly attended, would create $28,000 of expenditure each games. A season would create $800,000 of expenditure. A sellout season would create a 8 million dollars of expenditure. A hockey team would have an even greater effect. A sellout hockey season would create 17 million dollars of expenditure. In addition to the powerful economic impact, the arena would have effects socially.

The arena will create multiple social effects. Stadiums can become similar to a temple and create a sense of local pride. A great stadium can be a huge boon for its city. A great stadium can be the reason for attending events. A stadium can also be used to market a team. Having a professional team can market the team on a nightly basis to a large amount of people. Having a stadium which receives a major event can put its city in front of millions of people.

But a stadium will also have its negative social effects. Additional crime and traffic will be brought into its neighborhood. For each 10,000 fans, property crime will increase by seven percent. The neighborhood will also be effected by the large increase of traffic going to and from the game.

The arenas program will have effects on its neighborhood. A limited program will be detrimental to its neighborhood and would further the issues downtown is facing. Having a varied program would help the neighborhood. Achieving a varied program which can be used often is done through design of the arena floor. It is important to have a floor which can be switched easily and often to allow for the building to be used often.

A new stadium would greatly affect downtown. It would bring additional millions of dollars of spending into downtown. It would be responsible for removing the dead periods downtown suffers from and could create new buildings. It could help market Fargo to a large audience on a regular basis. But to do this well, the arena's program needs to be well thought out. If done well, a downtown arena would greatly help downtown Fargo.

Stadia have a history reaching back 2700 years. Over the years they have grown from simple hillside architecture to billion dollar complexes. Over the centuries their main purpose has stayed the same, even if the games played in them haven't.

Greek Stadia

The earliest known stadium is the stadium at Olympia (Webster, 1917). The first Olympic games were held at this stadium around 775 B.C. ("Olympia, stadium (building),"). The stadium was simple, using the hill sides to create the stands. The plan was a large oblong open area with judges seats on the south. The stadium was 633 feet long and 105 feet wide (John, Sheaard & Vickery, 2007). Most Greek stadiums would have dimensions similar to this. The stadium held all of the Olympic events: multiple running races, long jump, discus, javelin, and wrestling (Webster, 1917). Entry to the games required the man be Greek and not have been convicted of a crime. The earlier Olympics were of greater significance because they were responsible for a month long truce between the Greek powers. The games were very religious, with the first games being dedicated to Zeus. Most Greeks would at some point in their life attend the Olympic games.

Greek stadia would expand to hippodromes for horse and chariot racing. They would keep the elongated "U" track shape with seating around most of the track (John, Sheaard & Vickery, 2007). However they were larger than the stadiums, with some being 750 feet long and 120 feet wide.

Roman Stadia

The Romans would continue hippodrome development, creating circuses, and start to develop the amphitheater. Roman circuses were very similar to the layout of Greek hippodromes (John, Sheaard & Vickery, 2007). Each had the same "U" shaped plan, with seating around all sides except the top of the "U." Spina, a low, decorated wall, were added to the middle of the circuses to divide the halves of the track. Roman circuses used less of built earth. Lower tiers of seating were made from stone and reserved for the upper classes. Higher tiers were made of wood and were for the lower classes. Circuses could be much larger than hippodromes, with the largest being Circus Maximus in Rome. Circus Maximus was 2165 feet long by 720 feet wide. It had three levels of seating and could hold 200,000 spectators (Spampinato). The remains of Circus Maximus can still be visited in Rome.

Romans would develop Greek theaters into amphitheaters, precursors of modern stadiums. Amphitheaters were focused more on combat than sport. Amphitheaters were oval shaped and had multiple tiers of seating (John, Sheaard & Vickery, 2007). Amphitheaters were much larger than Greek theaters and couldn't use natural slopes for seating. Early amphitheaters used timber structures and the Romans later moved on to stone and concrete. The quality of Roman amphitheaters can be seen today, with multiple, millenniums old, amphitheaters still in use.

The amphitheater at Arles, France, was built in 90 AD ("Arles, roman and,"). It could hold 20,000 spectators and featured gladiator and animal fights. In the middle ages it was converted to a fortress. Today, despite significant damage to the exterior walls, it is used for bull fights (John, Sheaard & Vickery, 2007). The amphitheater at Verona is another example of a Roman amphitheater which is still used today. It was built in 30 AD and could originally hold 30,000 spectators ("Arena di verona,"). It was hit by

an earthquake in 1117 B.C. which resulted in its white and pink limestone facade being destroyed. The building began to be reused in the 1850's for opera performances. In 1913 the building became more renowned for its operas and major Italian opera singers started to use the amphitheater. Today the amphitheater is used for multiple concerts each year. Its capacity has dropped to 15,000 people.

The most famous Roman amphitheater, while not in use but still standing, is the Colosseum. It was finished in 82 AD after 12 years of construction (John, Sheaard & Vickery, 2007). It was built after the great fire of Rome in 64 AD (Hopkins, 2011). Civil wars wrecked Rome until 69 AD when Vespasian was victorious. He built the Colosseum to help his regime and please the people. It could hold 55,000 spectators in four tiers of seating. The Colosseum is 620 feet wide by 510 feet long. It was built from concrete and stone. 80 equally sized arches make the perimeter of the building. Each of the arches were entrances for certain groups. A basement was not originally built but Domitian, Vespasian's second son, constructed one in 80 AD. The basement served similarly as modern arena floor spaces. Animals, fighters and slaves used this space for preparation for events in the Colosseum. The Colosseum was used for more purposes than the average amphitheater. In addition to gladiator fights, animal fights, and executions, the Colosseum could be flooded with three feet of water for naval battles. Part of the reason the Colosseum was able to survive the millenniums was due to the executions. Christians saw the Colosseum as a holy site due to the martyrs who died their. Even thought it has survived, two thirds of the Colosseum was taken and used for other Roman buildings. The Colosseum is one of the most influential Roman stadiums.

Middle Ages Stadia

After the fall of the Roman empire, and the spread of Christianity through Europe, society moved towards religious architecture (John, Sheaard & Vickery, 2007). No significant stadiums would be built in the middle ages. Many of the existing stadiums fell into disuse.

1800's Stadia

In 1894 Baron Pierre de Coubertin lead a congress to investigate reviving the Olympics (John, Sheaard & Vickery, 2007). This resulted in the 1896 Olympics and the games being held every four years. The Olympics and the industrial revolution would be the two major spurs in the development of stadia. They reused the stadium at Olympia for these games.

The Polo Grounds were one of the original American stadiums. The Polo Grounds were a series of four stadiums lasting from 1880 to 1964 ("Polo grounds,"). Built in New York City, it housed the New York Giants, presently the San Francisco Giants, the New York Mets, the New York Yankees and the New York football Giants. The seating capacity ranged from 12,000 to 54,555. The stadium was a multipurpose stadium, which would start to fade out of style.

1900's Stadia

In 1908 the Olympics were held in London (John, Sheaard & Vickery, 2007). The White City was constructed specifically for the Olympics. It was one of the first stadiums to use a steel frame. The building could house over

80,000 spectators. It held all of the Olympic sports in one stadium, making the building enormous. Future Olympics would have less sports to deal with the size of the stadium.

In the early 1900's the amount of American stadiums started to grow. Fenway Park, home to the Boston Red Socks, was built in 1912 ("Fenway park,"). It was a concrete and steel building that could hold 27,000 spectators. Wrigley Field, home of the Chicago Cubs, was built in 1916 ("Wrigley field,"). It held 14,000 spectators and had the first permanent concessions stand. The original Yankee Stadium was built in 1923 ("Yankees stadium,"). The ballpark was the first to have three tiers of seating and could house 58,000 spectators. It was concrete and steel and took only 284 days to construct. The Yale Bowl, home of the Yale Bulldogs, was built in 1914 ("Yale bowl -1914,"). It could house 61,446 spectators, making it the largest stadium built since the Colosseum. City Stadium, home to the Green Bay Packers, was built in 1925 ("Other homes of," 2011). It could originally seat 5,389 spectators.

In 1960, the Rome Olympics decided to separate events and no longer stage them on a single site (John, Sheaard & Vickery, 2007). This continues to be the policy today.

Current Stadia

Stadiums would continue to grow into what we see today. They would become larger and more concerned with the user. As television grew stadiums had to compete. Before going to a stadium had been the only way to see the game. User comfort became more important to creating attendance. Between 1960 and 1977, 30 stadiums were built in the US (John, Sheaard & Vickery, 2007). One of these was the Astrodome, the first domed stadium ("Astrodome,"). Stadiums would become more specialized in their sport. During this time stadiums would start to be built in three main types of locations. Either they would be constructed in a city center, an underused portion of the city to encourage growth or completely outside of the city.

The Staples Center is an example of being built in downtown. The Staples center is located in downtown Los Angeles and is home to the Clippers, Lakers. Kings, Sparks and D-Fenders. The Staples center was built in 1999 and can seat 18,997 spectators ("Staples center,"). It cost 400 million dollars. It is a major example of how additional funding for stadiums can be raised. Staples, Inc. paid 100 million dollars for 20 years of naming rights. It is rare today that a stadium will not sell its building naming rights and field naming rights. The building has over 750,000 visitors each year.

The MetLife Stadium is part of the Meadowlands sports complex. Despite being home to the New York Giants and Jets, MetLife is in New Jersey. The complex is built outside of New York City due to land cost. MetLife can hold 82,500 spectators and cost 1.6 billion dollars ("Metlife stadium,"). The complex has 24,800 parking spots, something which would not be anywhere near possible in New York City. MetLife paid 17 million dollars per year for the stadium's naming rights. Each year it has 630,000 visitors.

Oracle Arena and O.co Coliseum is another example of a stadium being built outside of the city. In this case both Oracle Arena, home of the Golden State Warriors, and the O.co Coliseum, home of the Oakland Athletics and Oakland Raiders, share the same infrastructure. They are built on the same lot. The schedules of the sports mean there is little interference between each building.

Stadiums continue to experience growth and become more expensive. Most stadiums are funded partially by the local or state government and by the teams interested in using the building. This results in the local government

owing the building and the team usually having a lease of around 30 years. Due to the use of government funds, stadiums come under extra scrutiny. This also adds additional time to the building process.

Over the millenniums, stadiums have proven to be an important building to their location. They are drivers of economy, tourism, and relations. They have become more complex over the past century, but have always been a significant building for a city to construct.

Area	Square Footage
Parking	144,000
Receiving	4,000
Retail	57,600
Arena	
Seating	40,000
Floor	17,200
Concessions	6,000
Event Storage	6,000
Seat Storage	8,000
Locker Rooms	12,000
Commissary	6,000
Beer Pump	400
Trash	1,000
Officials' Rooms	1,000
Welding/Painting/Carpentry	1,800
Electrical	3,500
Mechanical	40,000
Team Medical/Training	1,200
Media Facilities	3,000
Laundry	300
Security Facilities	900
Restrooms	15,000
Lounge	5,000
First Aid	500
Box Seats	10,000
Team Offices	6,000
Press Box	1,500
Club Facility	12,000
Control Room	400
Ticket Office	4,500
Staff Room	4,500
Custodial	2,000
Circulation	100,000
Lobby	18,000

Interaction Matrix

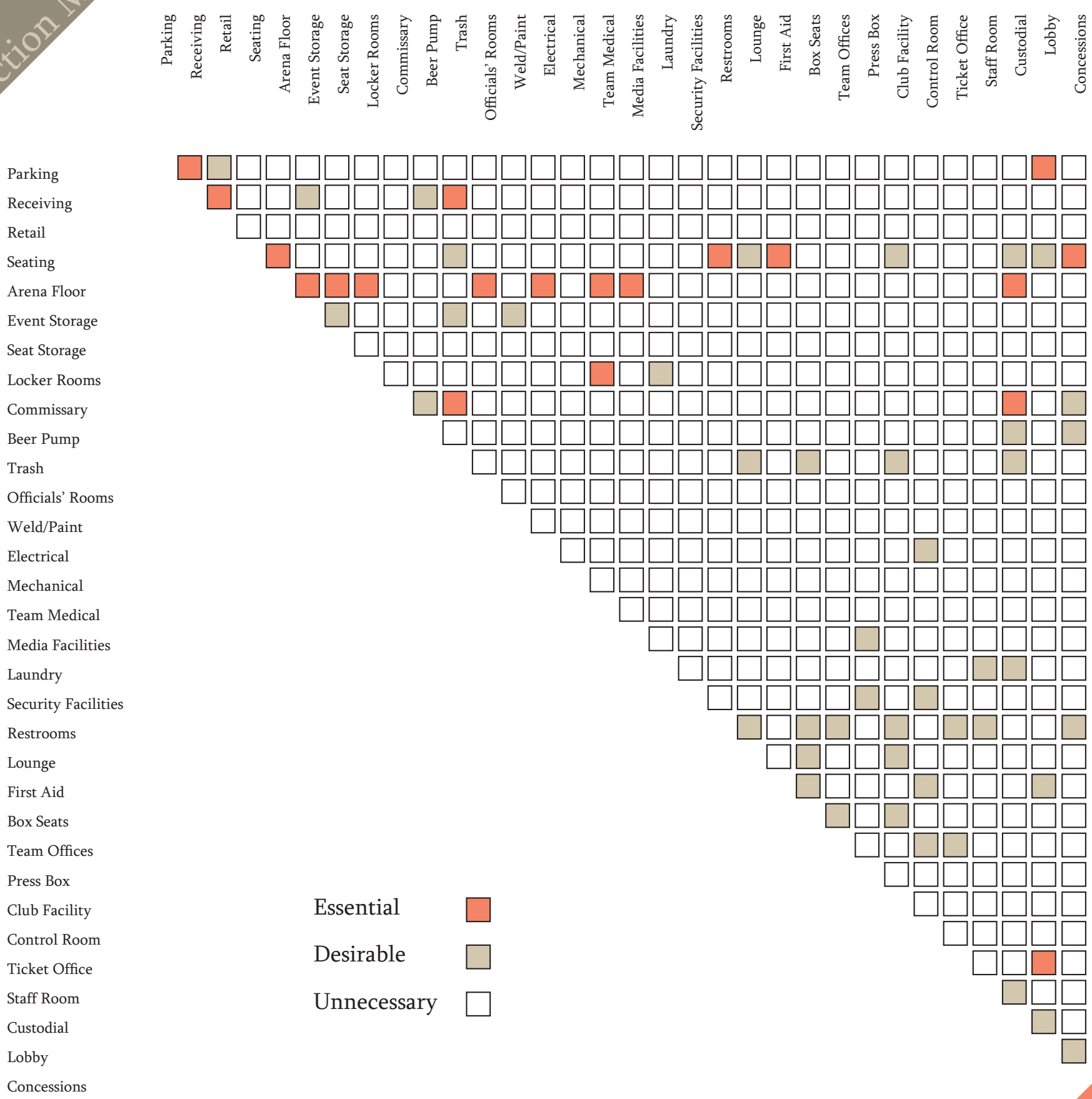


Figure 5: Interaction Matrix
Nick Anderson

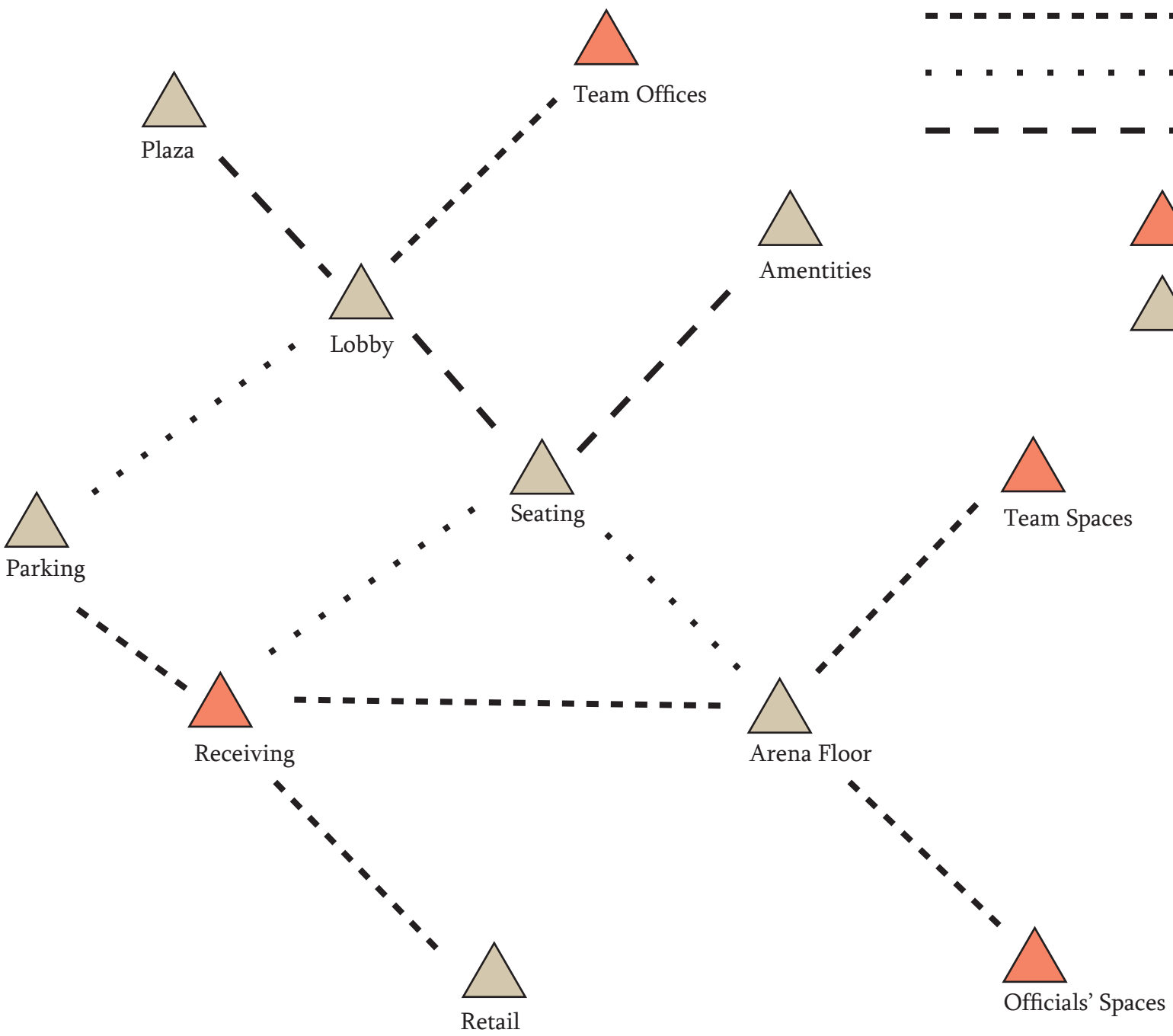


Figure 6: Interaction Net
Nick Anderson

Thesis Project Goals

Academically

My academic goal for my thesis project is to design an excellent comprehensive project. I want to use my thesis to study areas of interest in depth. One of the major areas of interest is the design of long span structures. The arena will be required to have a long span structure and I want to create one which betters the building. I am also interested in the use of passive systems in arenas. I'd like to be able to develop passive systems which drastically limit the life time cost of the building. Additionally, I am interested in better understanding issues associated with mixed-use buildings.

Professionally

Professionally I want to use this project to gain expertise on urban design. This project can be used to significantly expand my understanding and knowledge of urban design and the effects architecture has. This thesis will be focused on the effects a building has to its neighborhood. My neighborhood is the small, but growing, downtown Fargo, which has plenty of potential for urban growth.

Personally

Personally I want to use my thesis to complete a comprehensive project. I want to design a building which meets high standards. I want to use this project to explore new technologies and expand which tools I know how to use.

Site Analysis

Figure 7: View to Northeast
Nick Anderson

The blocks between NP Avenue to 1st Avenue in downtown Fargo are lacking the qualities of the rest of downtown. The 400 block of NP and 1st only contains one business. The Broadway block is better, and is nearly fully developed. However, there are only two businesses on Broadway that are open past 5pm.

Existing Conditions

Currently the site is developed, however most of the site is parking. There are four buildings on the site. One is a parking garage, one is an adult bookstore, two are empty, but one of them is under renovations. The parking on the lot is mainly for the Forum building to the north side. This parking will need to be replaced.

Views

The views on the site are lacking. The site is either facing parking lots or unattractive buildings. The best views are to the north-east, facing the library. At higher levels, there may better views. The river and much of south downtown may be seen due to the low height of the buildings to the east and south.

Built Environment

All of the surrounding lots are developed. To the north is the Forum building and the AT&T building. Both of the buildings on the north side of the street are unpleasant to walk by due to their street wall and the poorly maintained sidewalk. To the north east is the library, city hall and convention center. To the east is a market and parking lot. The market is the only retail building facing the site. To the south east is an office building. To the south is the bus station and city court. The bus station is the main hub for the Fargo-Moorhead bus system. To the south west is a parking lot. To the west is a parking lot and office building.

A block to the west is Broadway, the main street of downtown. The blocks to the north and south offer multiple amenities. To the east is the Family Healthcare Center. Additional office buildings are along NP to the east.

Light Quality

There is a high quality of light on the site. The buildings to the east, south and west are either one or two stories. This will allow for the site to get sun for most of the time. The upper levels of the building will always have southern sun.

Vegetation and Water

There is no vegetation or water on the site. The library to the north east and the bus station to the south west are the only nearby sources of vegetation. A few blocks to the east is the nearest source of water. The Red River is the only body of water near the site.

Wind

Most of the wind will come from the north, north west or the south. Wind from the south will be mostly unblocked. However, wind from the north and north west will be blocked by the Forum, AT&T building, and the Radison building to the north.

Distress

Currently the site suffers from a fair amount of distress. One of the buildings had been empty for many years and one building is still empty. The parking garage, while still used, appears to be unused.

Soils

The soils in Fargo are mainly clay sediments from lake Agassiz (Schwert). The clay can absorb a significant amount of water, making it poor for bearing loads. The sediments go down around 100 feet. Beneath the sediments is a layer of glacial drift. The glacial drift is stronger than the soil above it and can bear heavy loads. Another hundred feet beneath the glacial drift is a granite bedrock.

Water Table

The seasonal high water table is between the surface and three feet below the surface ("Fargo series," 2005). The soils are poorly drained creating the possibility of a water table above the surface.

Utilities

Utilities in the area are provided through Xcel Energy and the city of Fargo. Xcel will provide electricity and natural gas. The city of Fargo provides water, sewage and trash disposal. Hookups are present on the site.

Vehicular Traffic

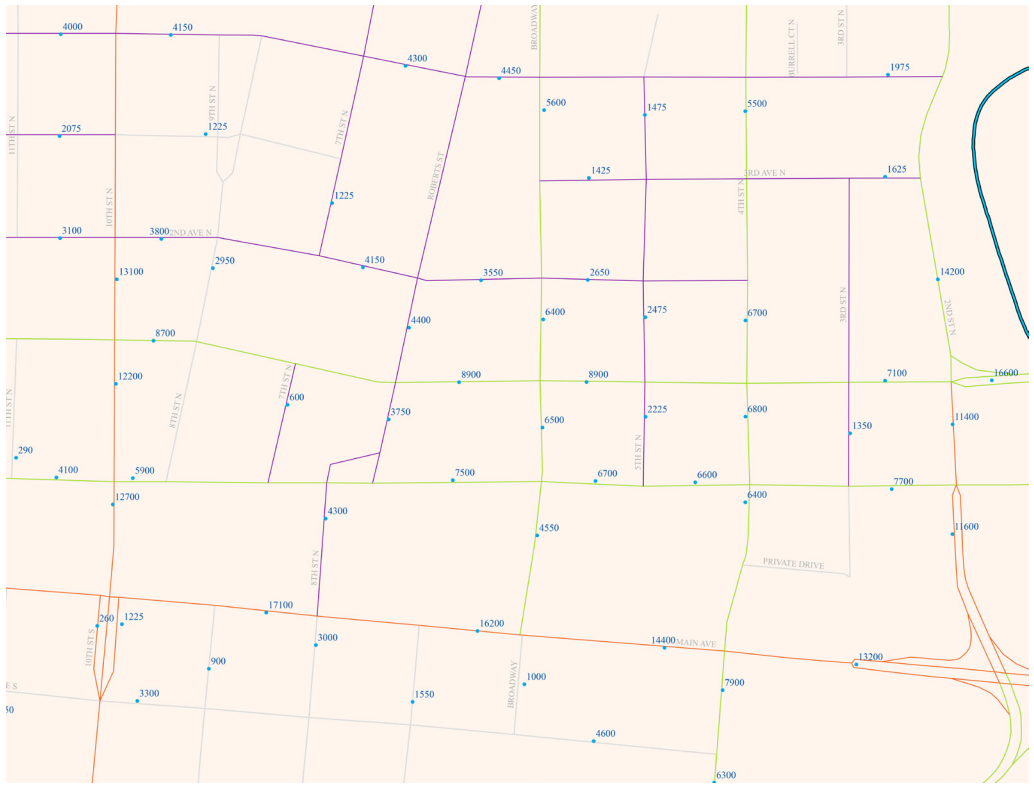


Figure 8: Downtown Fargo Traffic
City of Fargo

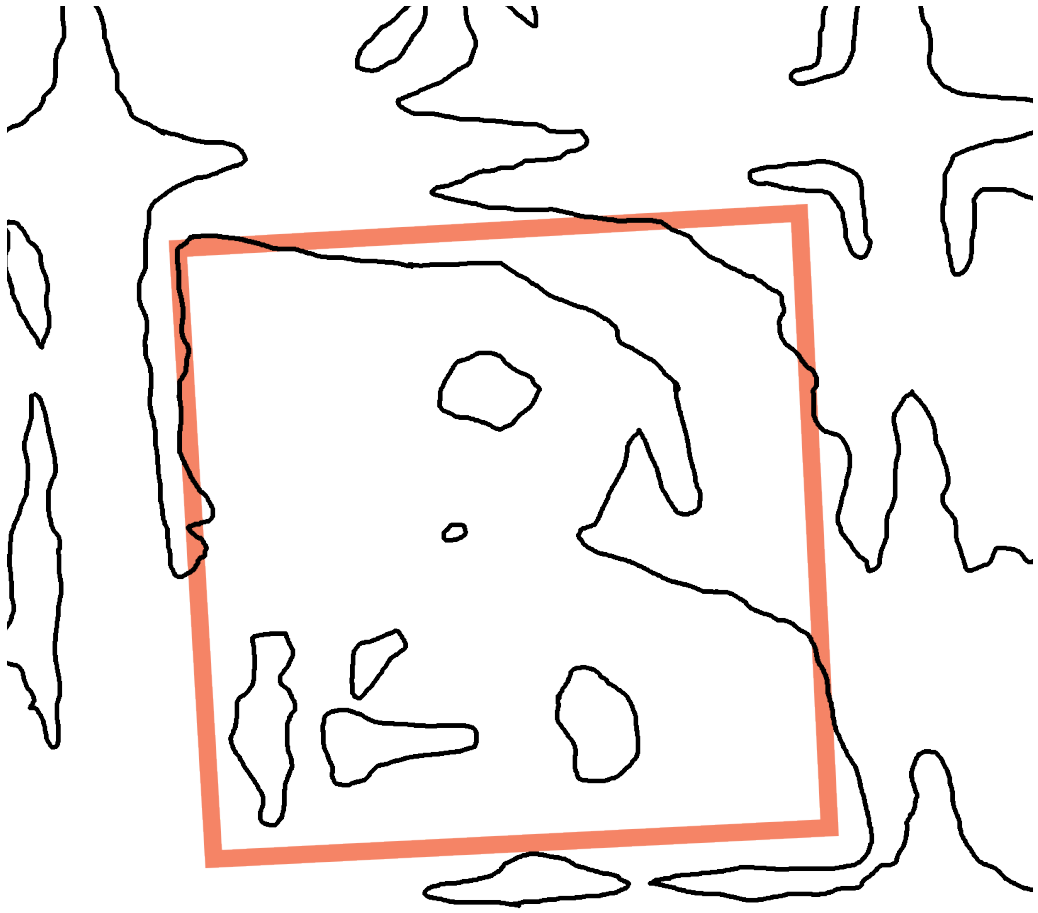
Vehicle traffic is most significant along 1st Avenue North. Around 9,000 cars use 1st Avenue each day. NP Avenue, and 4th Street North have similar daily traffic, with around 6,500 cars each day. 5th Street North is not nearly as busy as the other streets, having only 2,200 cars each day. 2nd Street North, 10th Street North and University Drive are the main arterials in the area.

Pedestrian Traffic

Pedestrian traffic is most significant along Broadway. Most pedestrian

traffic will come from Broadway and radiate out to the other streets. There will be pedestrian traffic between the bus station and downtown. Pedestrian traffic on the site is limited due to poor sidewalks.

Topography



The site is mainly flat, with about one foot of elevation change over the length of the site. There is little to no slope over the site.

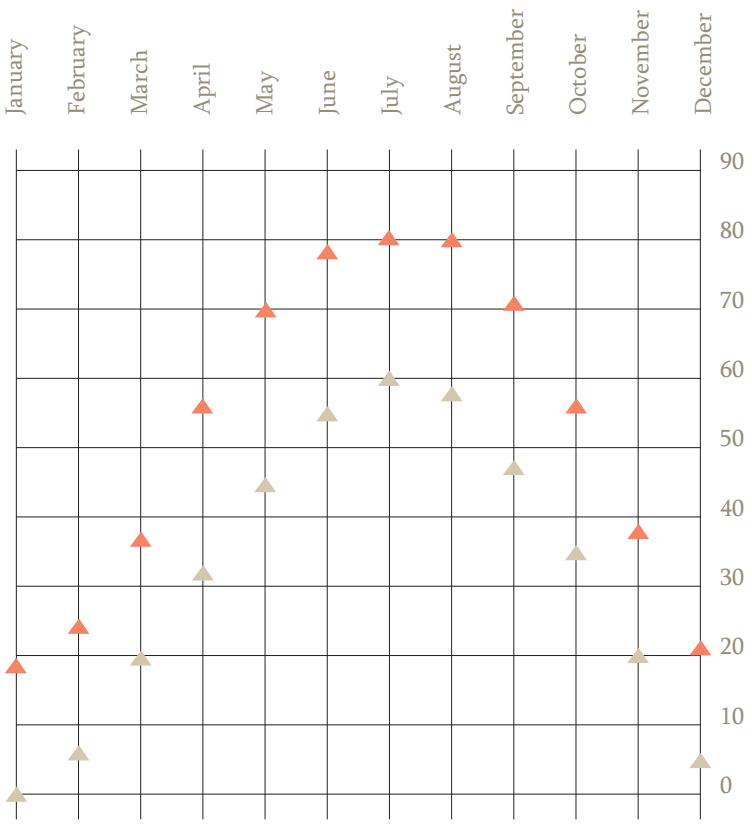
Climate Data

Temperature

Fargo experiences significant temperature swings over a year. The average high can reach from 82 degrees to 18 degrees. The average low can be as low as 0 degrees.

Heating and Cooling Days

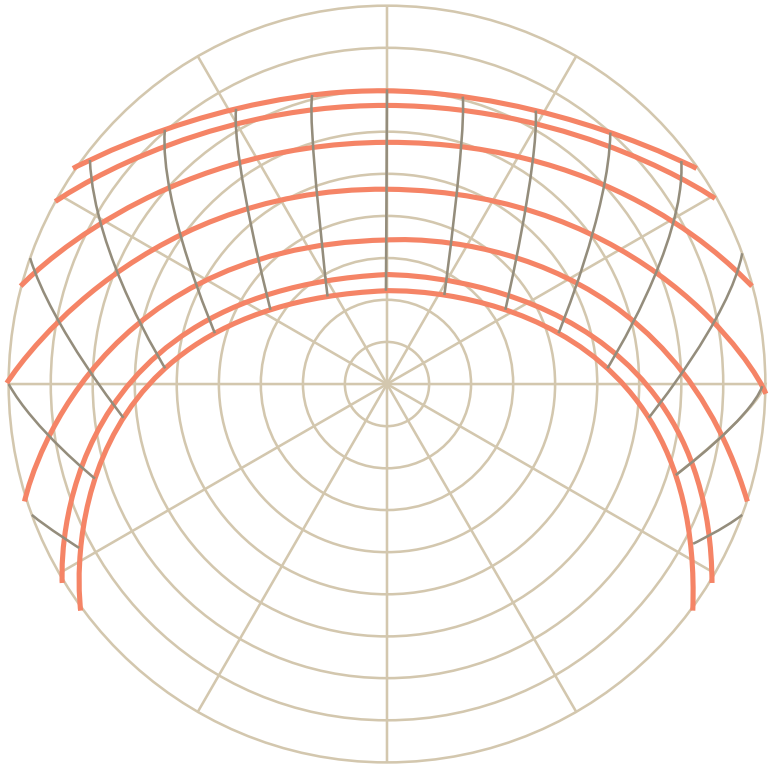
Due to Fargo's usually low temperatures, Fargo will have a significant amount of heating degree days. Cooling degree days are less due to highs being only 10 to 20 degrees from acceptable temperatures. Lows can be 70 to 100 degrees away from acceptable temperatures.



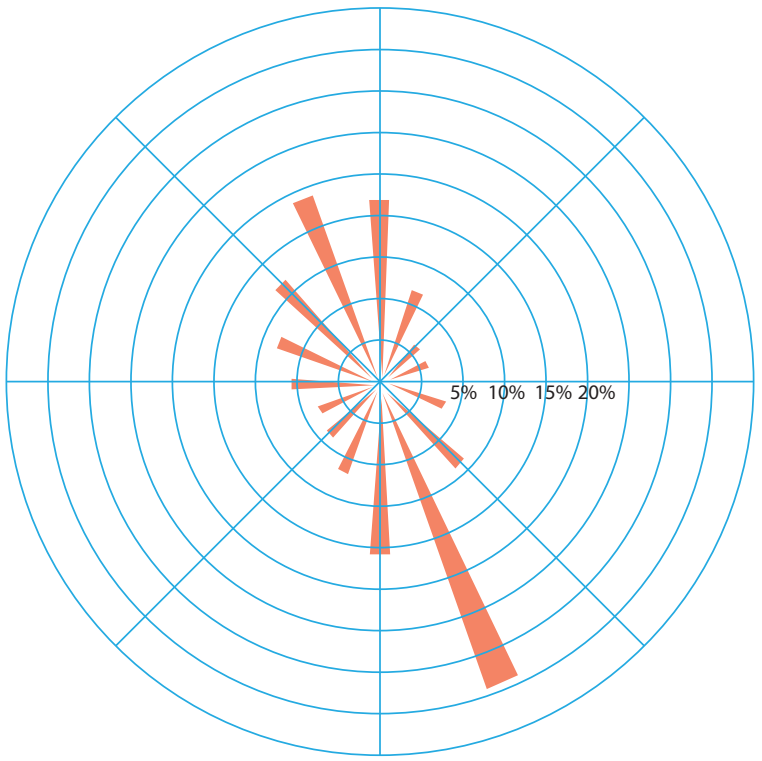
Fargo Average Temperatures

Fargo Degree Days													
Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Heating Days	1832	1484	1212	660	307	93	19	48	239	598	1107	1655	9254
Cooling Days	0	0	0	0	35	108	209	165	20	0	0	0	537

Figure 9: Fargo Climate Data
Nick Anderson



Fargo Sun Diagram



Fargo Wind Diagram

Sun

Fargo is high in the northern hemisphere resulting in long summer days and short winter days. During the summer the sun can rise as early as 5:30am and set as late as 9:30pm. In the winter the sun can rise as late as 8:30am and set as early as 4:30pm.

Wind

Fargo receives a significant amount of wind. Most of the wind comes from the north or north west and the south or south east.

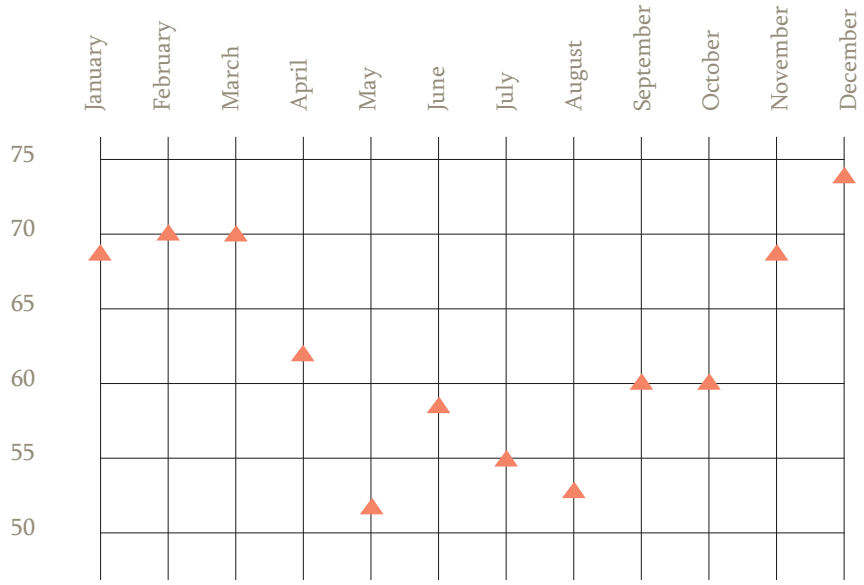
Figure 10: Fargo Climate Data
Nick Anderson

Precipitation

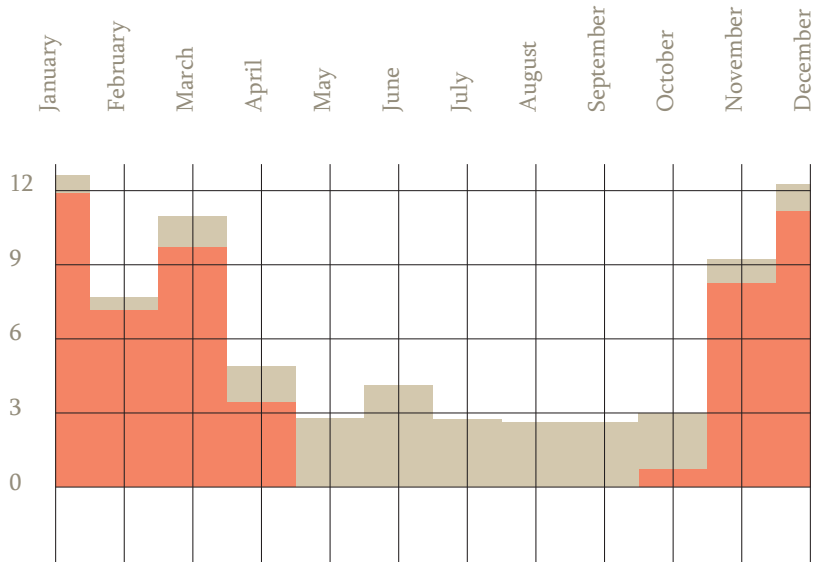
Fargo receives around 75 inches of precipitation each year. Around 50 of those are snow and the other 25 are rain. During the summer there is around three inches of rain each month. The highest average amount of snow is about 12 inches in January.

Noise

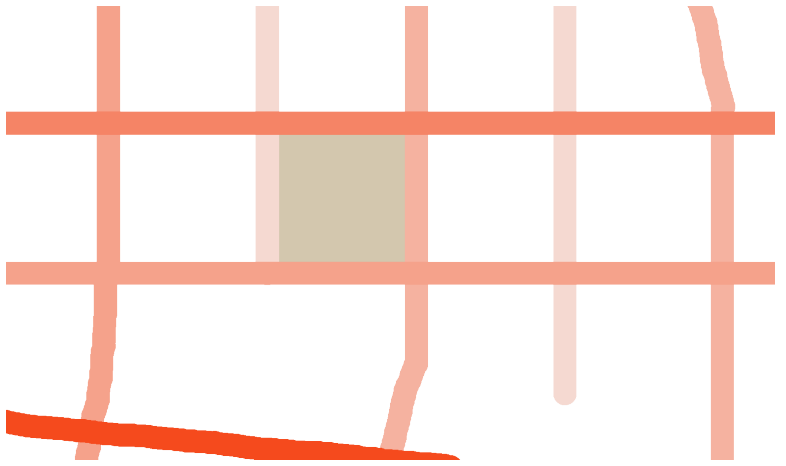
Most of the noise from the site will come from the roads and the trains. 1st Avenue North is an arterial road and will handle much of downtown's traffic causing noise. The second main source of noise will be the train tracks a block south of the site. 4th Avenue will be another source of noise.



Fargo Relative Humidity at Noon



Fargo Precipitation



Site Noise

Figure 11: Fargo Climate Data
Nick Anderson

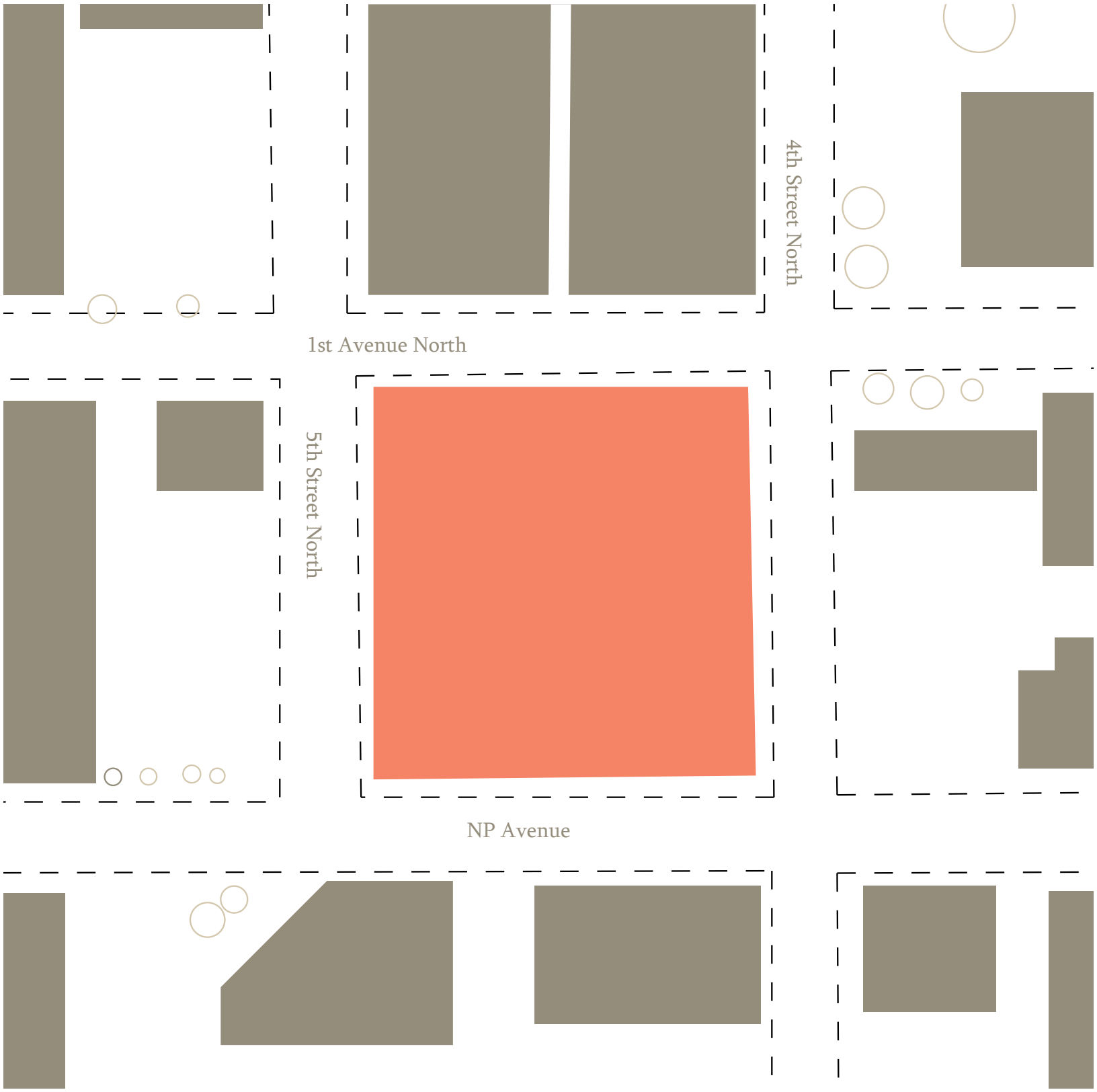


Figure 12: Site Map
Nick Anderson

Figure 13: Photo Grid
Nick Anderson
Satellite Image by Google

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Pinnacle Bank Arena

Pinnacle Bank Arena is an arena in Lincoln, Nebraska. It was designed by DLR Group. It is 470,400 square feet and can seat around 16,000 people for basketball. The arena is multipurpose and is home to the Nebraska Huskers' men and women's basketball teams. It was designed to also support hockey, tennis, circuses, volleyball, concerts, and other events.

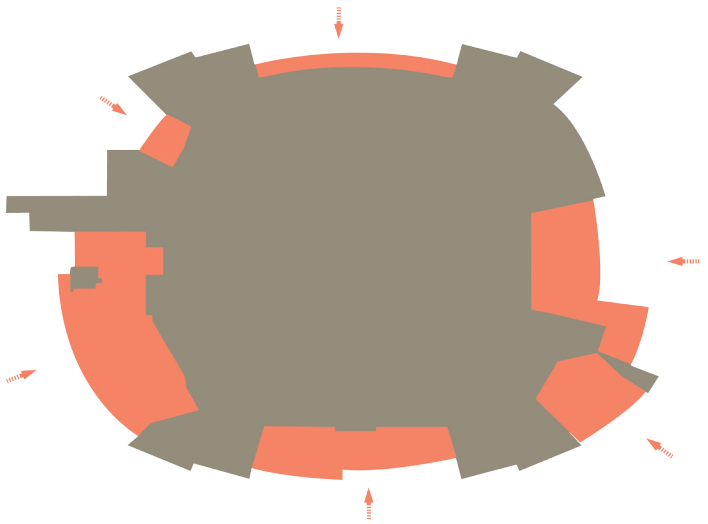
Pinnacle Bank Arena is similar to the Arsenal North Stand with both of their main focuses being on displaying a sport and creating a profit from the building. It shares the ability to have multiple uses with the Daxinganling Sports Center. Both Pinnacle and Daxinganling Sports Center have to be able change around seating configurations to suit the event.

Unlike Arsenal, Pinnacle is able to configure its surface to allow for different types of events to be held. Neither of the other studies can show as many types of different events as Pinnacle can.

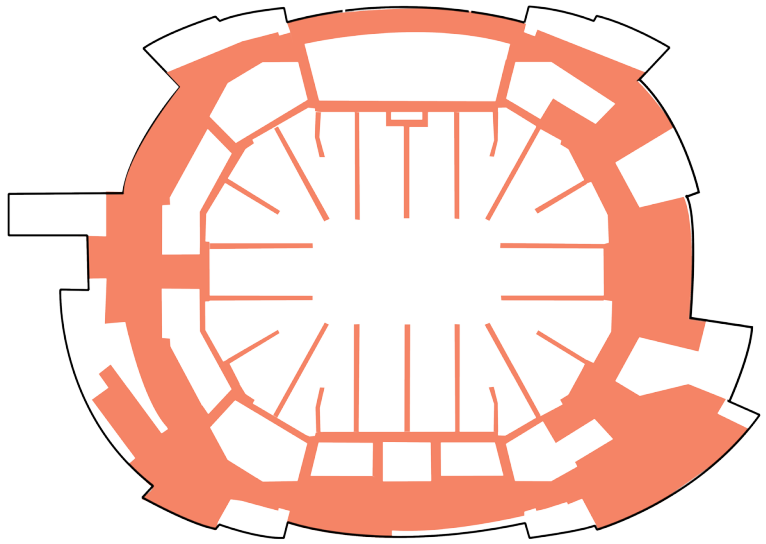
Pinnacle Bank Arena sits away from Huskers campus and on the outskirts of downtown Lincoln. It is within half of a mile of the campus football and baseball stadiums and shares much of the same parking with them. It is separated from downtown by large industrial buildings. It is set against a rail yard which ends the downtown and is near a major highway. Both of these create barriers around the arena. The highway turns into downtown streets but cuts through the major paths between the campus and the arena. A significant amount of parking is also set between the arena and the campus, making for a unpleasant walk.

The building fits into my unifying idea by being able to support many different events. This allows for the building to be used more often than if it only supported basketball, but still is empty for large amounts of time. Other purposes could have been added to allow for more usage. Due to the rail yard the building is on the edge of downtown. This allows for less of the area around the arena to use the arena to their advantage. The parking for the arena is shared with baseball and football stadiums, but still takes up a lot of land that could be used for other downtown buildings. Walkability is also poor, with the surrounding blocks likely being unused around game time. The arena has a good program and is able to allow for many events, but could better affect its neighborhood.

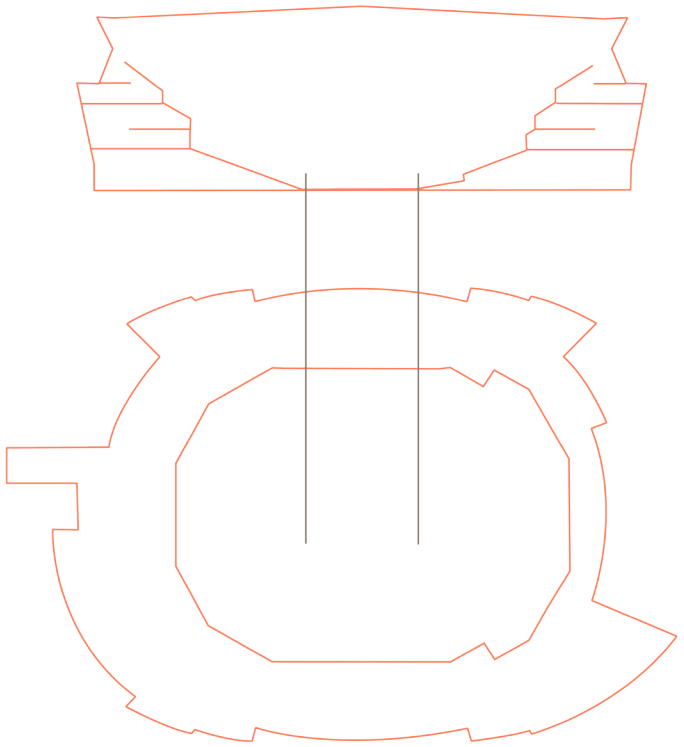
Figure 14: Pinnacle Bank Arena Perspective
Image by Wikipedia user CrunchySkies



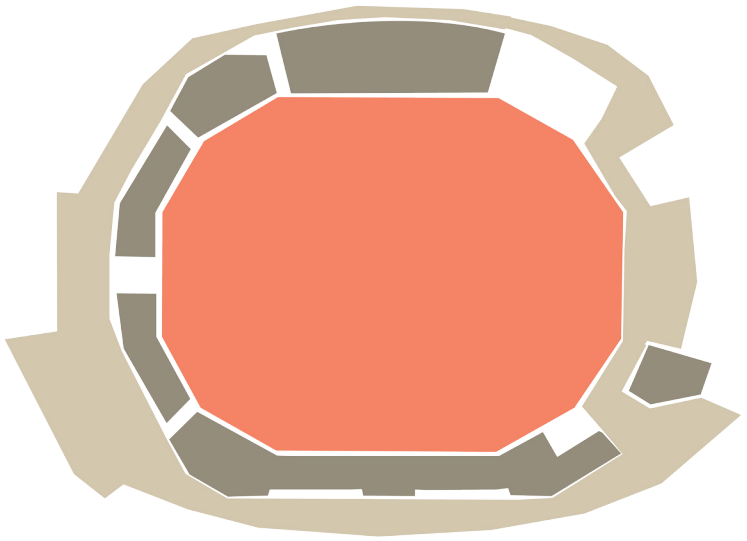
Pinnacle Natural Light



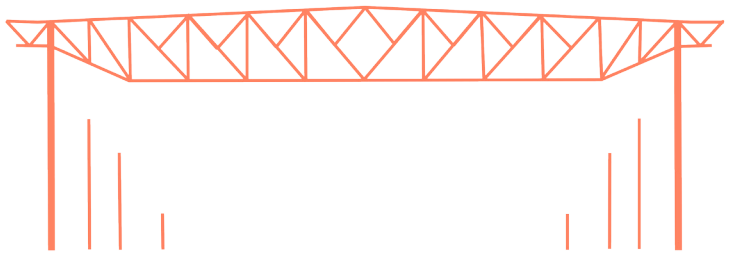
Pinnacle Circulation to Space



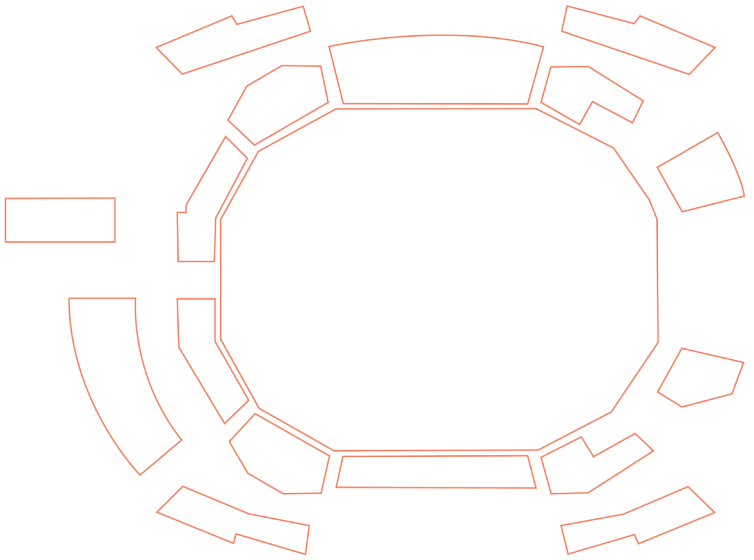
Pinnacle Section to Plan



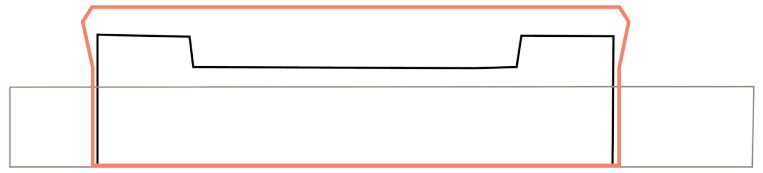
Pinnacle Hierarchy



Pinnacle Structure



Pinnacle Geometry



Pinnacle Massing

Figure 15: Pinnacle Diagrams
Nick Anderson

Arsenal Stadium North Stand

Arsenal North Stand was part of the Arsenal Football Club's stadium. It was in North London, England. It is 45,000 square feet and seats 12,400 people. It was an addition to the existing Arsenal Stadium. The stadium was demolished in 2006. The stand was an addition to a culturally significant building, which had an effect in its neighborhood for 80 years.

Unlike Pinnacle, the Arsenal Stadium is in a residential neighborhood. This required significant planning of how the stadium would affect the houses around it. It had more significant restrictions than if it were in a downtown. It is the only building that is built for only one sport, although concerts can also happen at the stadium before and after games. The stadium uses a significant cantilevering structure to support the second level of seats.

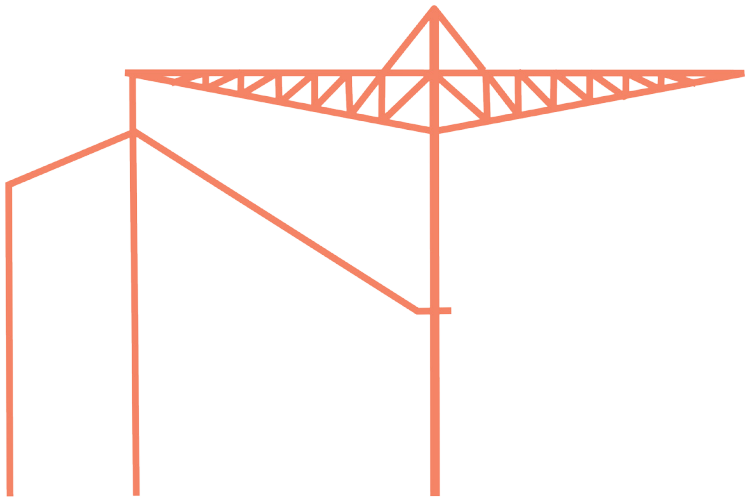
This stadium deals with how it effects its neighborhood. It had to be planned to fit into the neighborhood architecturally and not overpower the neighborhood. The overall height and appearance of the facade had to be carefully chosen to not negatively affect the neighborhood. It also had to deal with the Arsenal club's culture and its affect on the building. Arsenal is an old and prestigious football club and the architecture had to fit with that culture and the stadiums existing architecture.

The architects understood the building had to be able to compete with London's downtown. Part of this was achieved through the food inside the stadium. Unlike most stadiums, Arsenal prices were similar to pricing of businesses nearby and were open after the game was over. The building was designed to make being their attractive before and after the games, lengthening the amount of time the building can be used. However, the ability to play only one sport limits how many events can be had each year.

The area around the stadium isn't able to make use of the stadium being there. The amount of traffic also has an effect on road use and mass transit use in the area. The total area can support over 40,000 fans, all of whom spill out into a residential neighborhood after the game. This will create problems will the neighborhood. The stadium would have been better placed in a district more suited for business. Arsenal's new stadium was moved from this site and placed in a more suitable location.

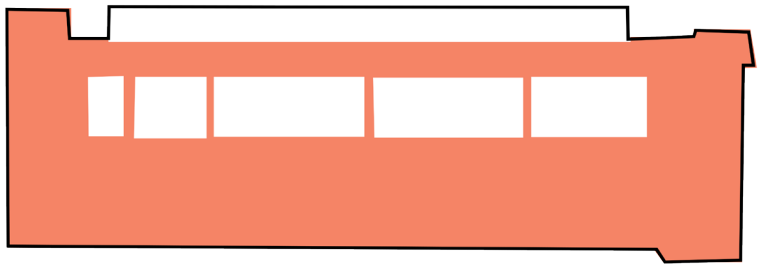
Figure 16: Arsenal North Stand
By flickr user jazzebbess

Figure 17: Arsenal North Stand
By flickr user steve260589

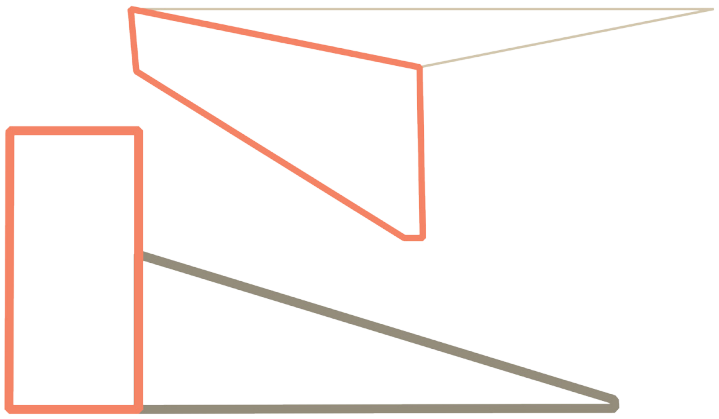


Arsenal Structure

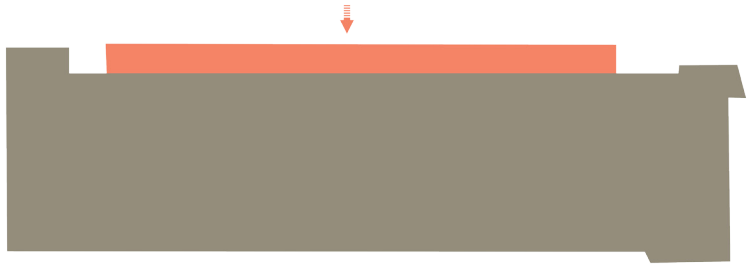
Arsenal Massing



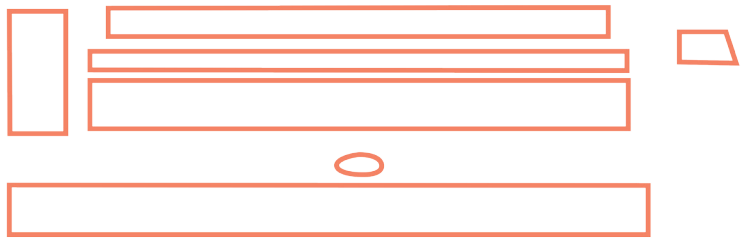
Arsenal Circulation to Space



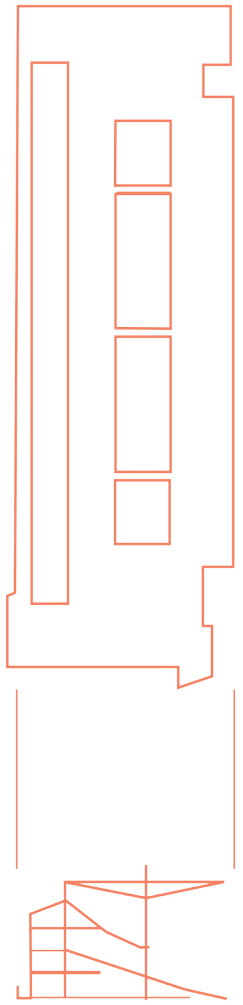
Arsenal Hierarchy



Arsenal Natural Light



Arsenal Geometry



Arsenal Plan to Section

Figure 18: Arsenal Diagrams
Nick Anderson

Daxinganling Sports Center

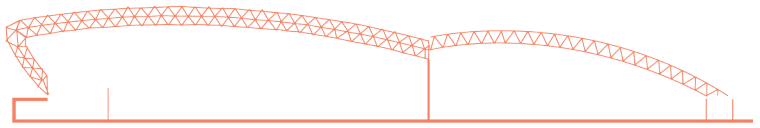
Daxinganling Sports Center is a multi-use building in Daxinganling, China. It is 283,737 square feet. The building has an arena, large pool and other fitness areas. It was designed by Had Architects.

Unlike the other two case studies, Daxinganling isn't designed for showing professional sports. It has a large arena where events can be showed, but isn't geared towards a single team. It acts more as a public fitness center. The program wasn't focused on making money from sporting events and differs greatly from the other two case studies. Instead it has a larger variety of spaces and uses. The building features an arena primarily for basketball, but it can be converted for other events. It has a large amount of permanent seating and thousands of removable seats. The building also has a large swimming pool where swimming competitions can be held. Daxinglaning is the only building which also supports theatrical performances. It uses a large space frame to create its curves. That allows for the multiple large spans the building needs.

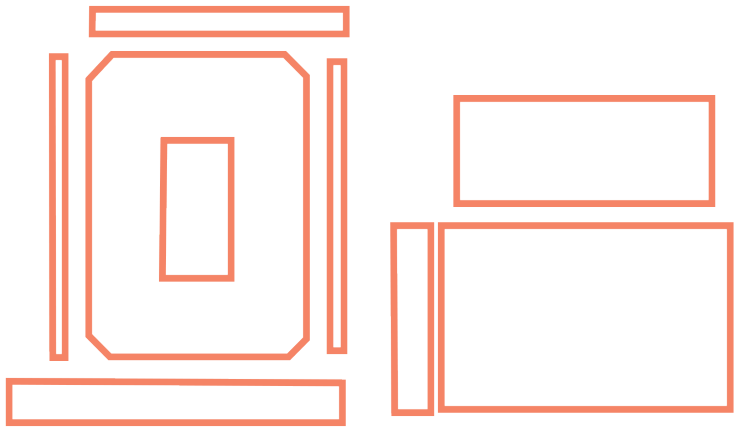
The building is located on the outskirts of the town. Its curves are meant to blend with the hills behind the building. This building is another that would have been better suited being placed in a higher density neighborhood.

This building is the best example of multiple uses to allow for the building to be used for more often. The wide arrange of uses means the building is used for a significantly higher amount of time than the other two case studies. The other buildings were not aimed for the public to use the main sporting areas. The area around the building can't utilize the sports center being there. Allowing for large arena spaces to be used by the public would allow for the building to be used more often.

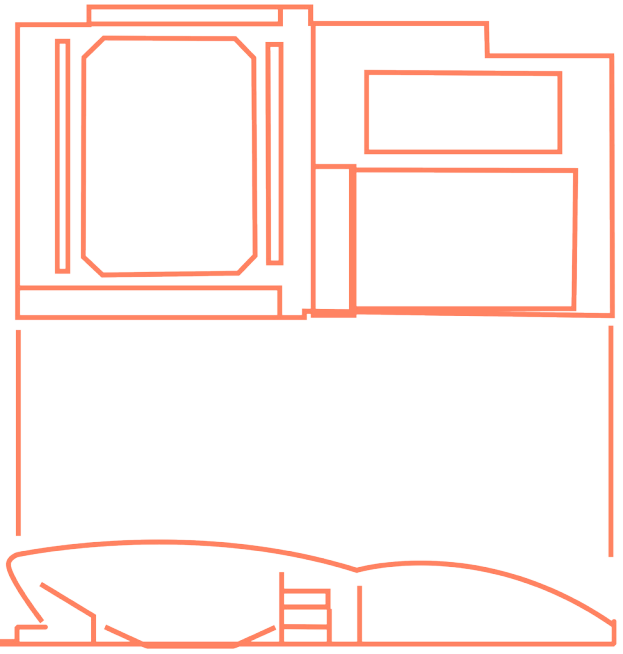
Figure 19: Daxinganling Sports Center
Image by Tang Jiajun



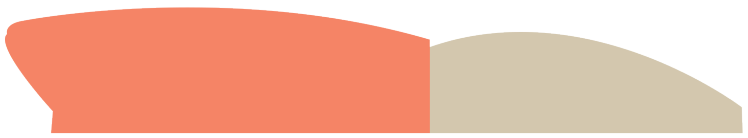
Daxinganling Structure



Daxinganling Geometry

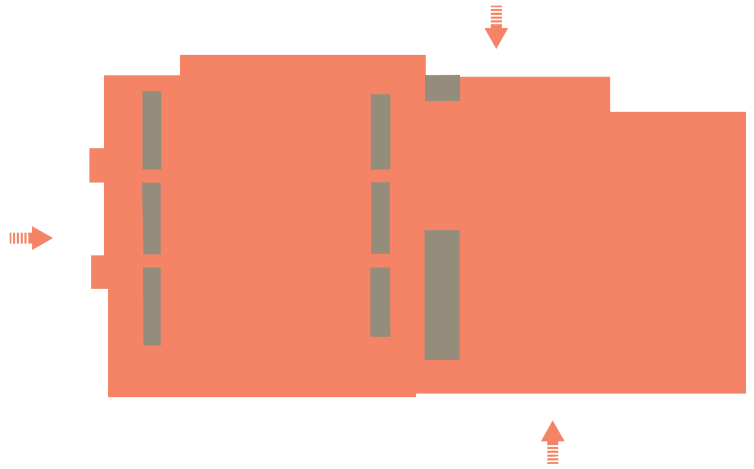


Daxinganling Plan to Section

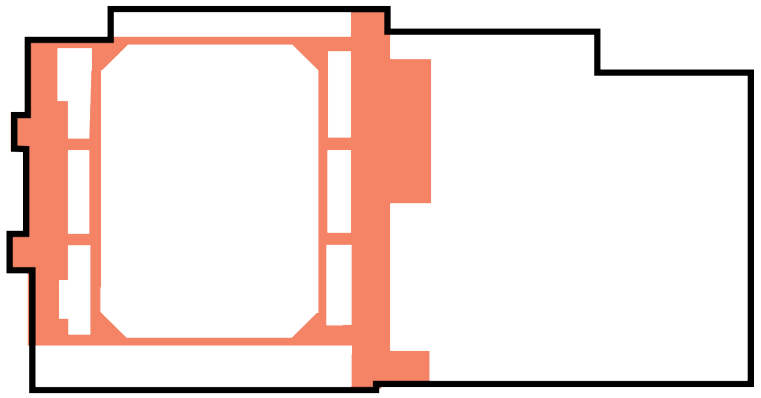


Daxinganling Massing

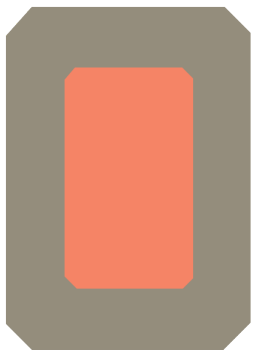
Figure 20: Daxinganling Sports Center Diagrams
By Nick Anderson



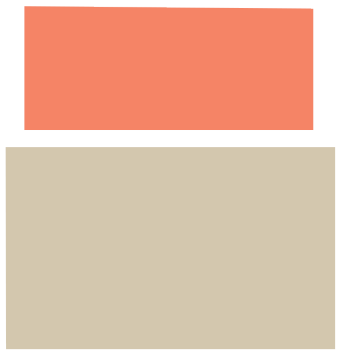
Daxinganling Natural Light



Daxinganling Circulation to Space



Daxinganling Hierarchy



Case Study Conclusion

The case study series examined sporting facilities, with an interest in professional sporting arenas. The study examined a college basketball arena, a soccer stadium, and a sports center. The theoretical premise was not changed over the case study series.

Pinnacle Bank Arena was used as an example of a current multi-sport arena and the program that goes along with the typology. Arsenal North Stand was used as an example of stadiums effects on residential neighborhoods and how the effects were dealt with. Daxinganling Sports Center was used as an example of a sports building with multiple uses.

Each building was similar in that their main focus was on sports. Both Pinnacle Bank Arena and Daxinganling Sports Center are able to support multiple sports along with events such as concerts or plays. Arsenal is also able to support concerts. These buildings use their ability to have multiple events to have the building open more often and more profitable. To best effect its neighborhood, the building should be able to be used often.

Arsenal was the only case study in a residential neighborhood. It is also the only building which only supports one sport. Arsenal had to be able to compete with downtown London and responded through offering extra entertainment before and after the games along with pricing concessions inside the arena at the same prices outside the arena. Pricing concessions inside the stadium would normally compete with the businesses around it. But Arsenal didn't have any businesses nearby. Its likely that pricing similar to businesses outside the stadium will lead to net losses for everyone. Businesses would be less likely to receive income from those unwilling to pay the high prices of stadium concessions and stadiums would receive significantly less income from concessions. Pinnacle Bank Arena was built on the edge of downtown in Lincoln, Nebraska. The building shares parking with a baseball and football stadium. It is separated from its university because of this parking and a highway. Daxinganling Sports Center was built on the outside of town. Both of these arenas can to better to support their surrounding neighborhood.

Arsenal North Stand had additional restrictions and requirements because of the location, and history of the club. It was required to better fit into its neighborhood through scale and atheistics. It also had to deal with the clubs expectations of quality.

Pinnacle Bank Arena was the case study most similar to my proposal. It elevates the first level of concourse to allow for support spaces and storage to be kept at the floor level. Only one of the entrances is on the ground level. The other uses a ramp to move people to the concourse level. Very little of the ground floor can be accessed by the fans. The fan support spaces are places between the arena and concourse. Support spaces need to be near the floor, but no fan spaces need to be by the floor. Placing fan support spaces between the floor and concourse allows for views and natural light, but limits the fans ability to watch the game when not in their seat.

Pinnacle has to deal with supporting both hockey and basketball on the same floor. They have to deal with maintaining both floors and adjusting the amount of seats when switching event types. It is important this process is an efficient as possible to limit expenses and wasted time.

Design

Process

I wanted to create a design, which fit into the neighborhood but still showed the importance of the arena. Most of the buildings downtown are rectangles and I did not want to deviate too far from that. I started with an idea shown in the top image. I liked the curved roof and strong columns, which made it through to the final design. I worked through a series of ideas to reach my final design.

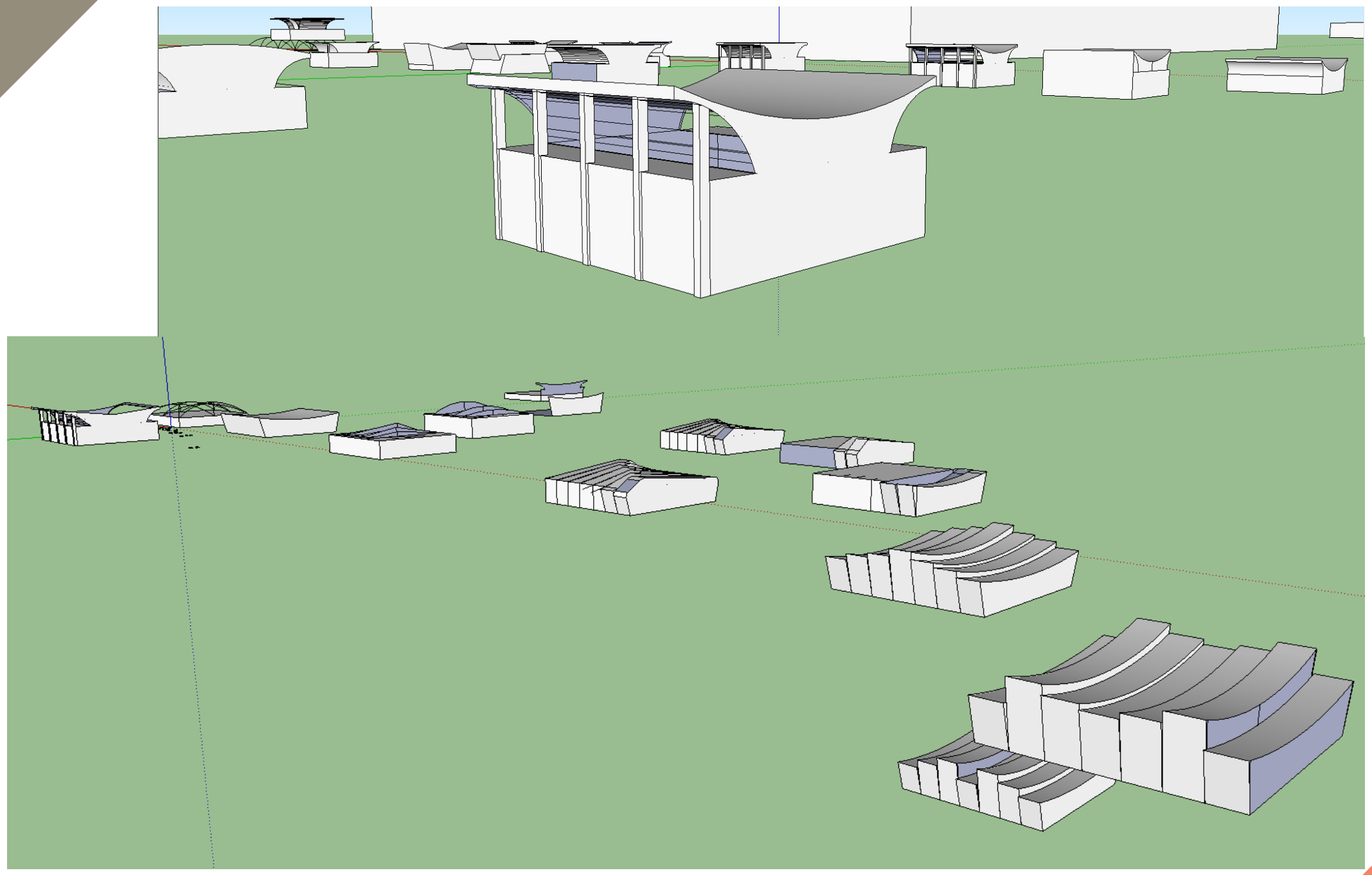


Figure 21: Process
Nick Anderson

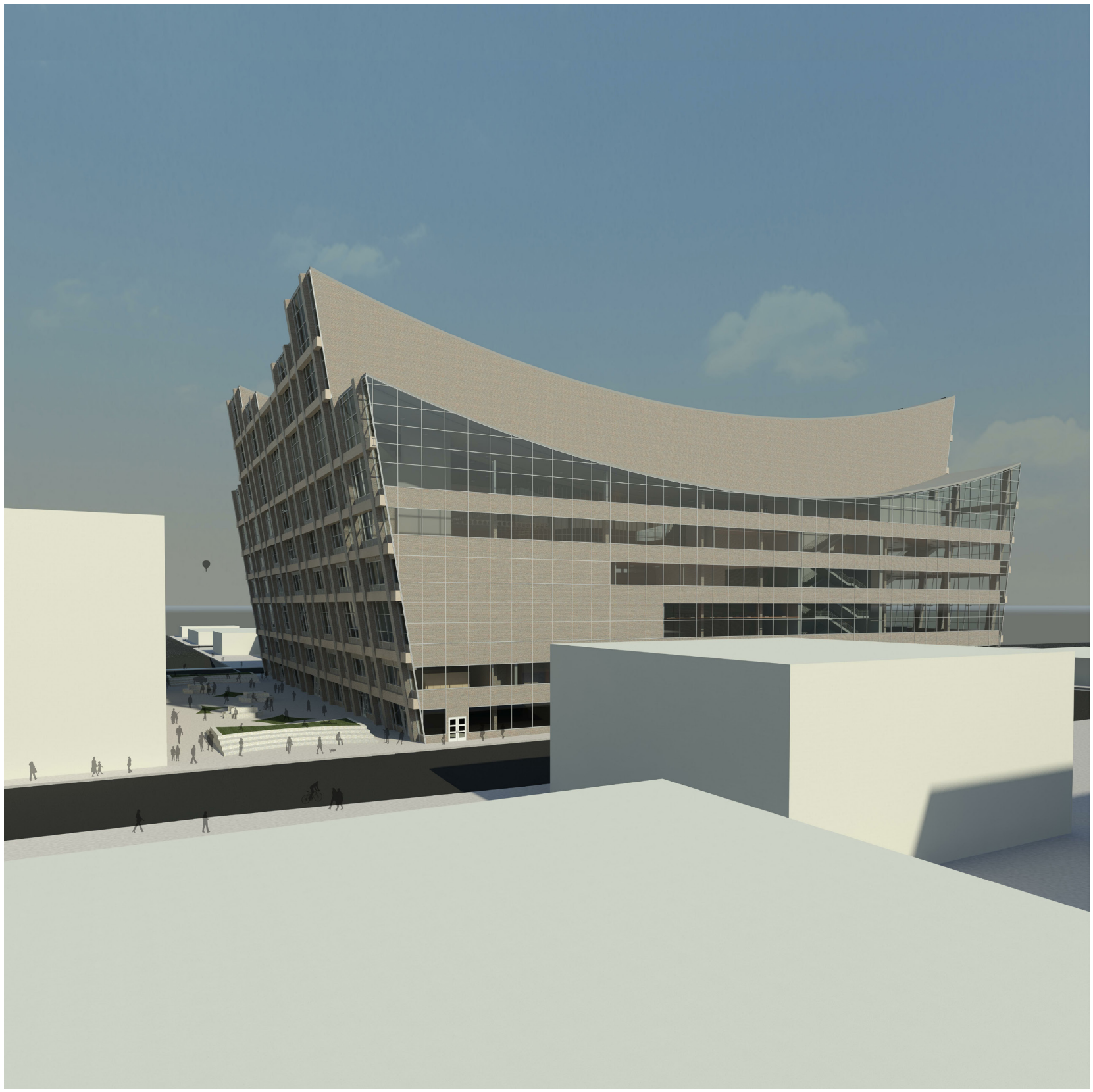


Figure 22: Exterior Perspective
Nick Anderson

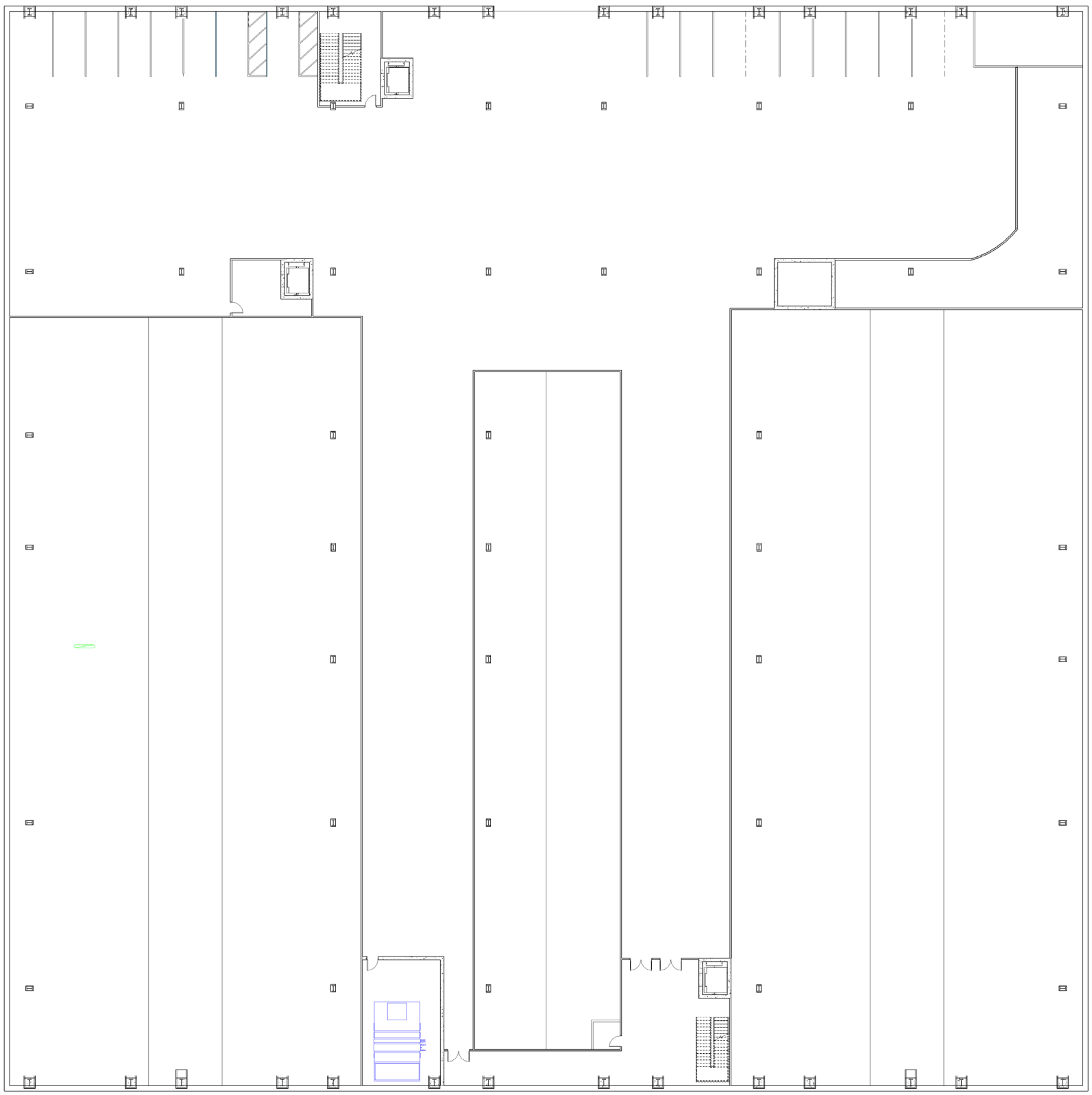


Figure 23: Level B1
Nick Anderson

Figure 24: Level 1
Nick Anderson

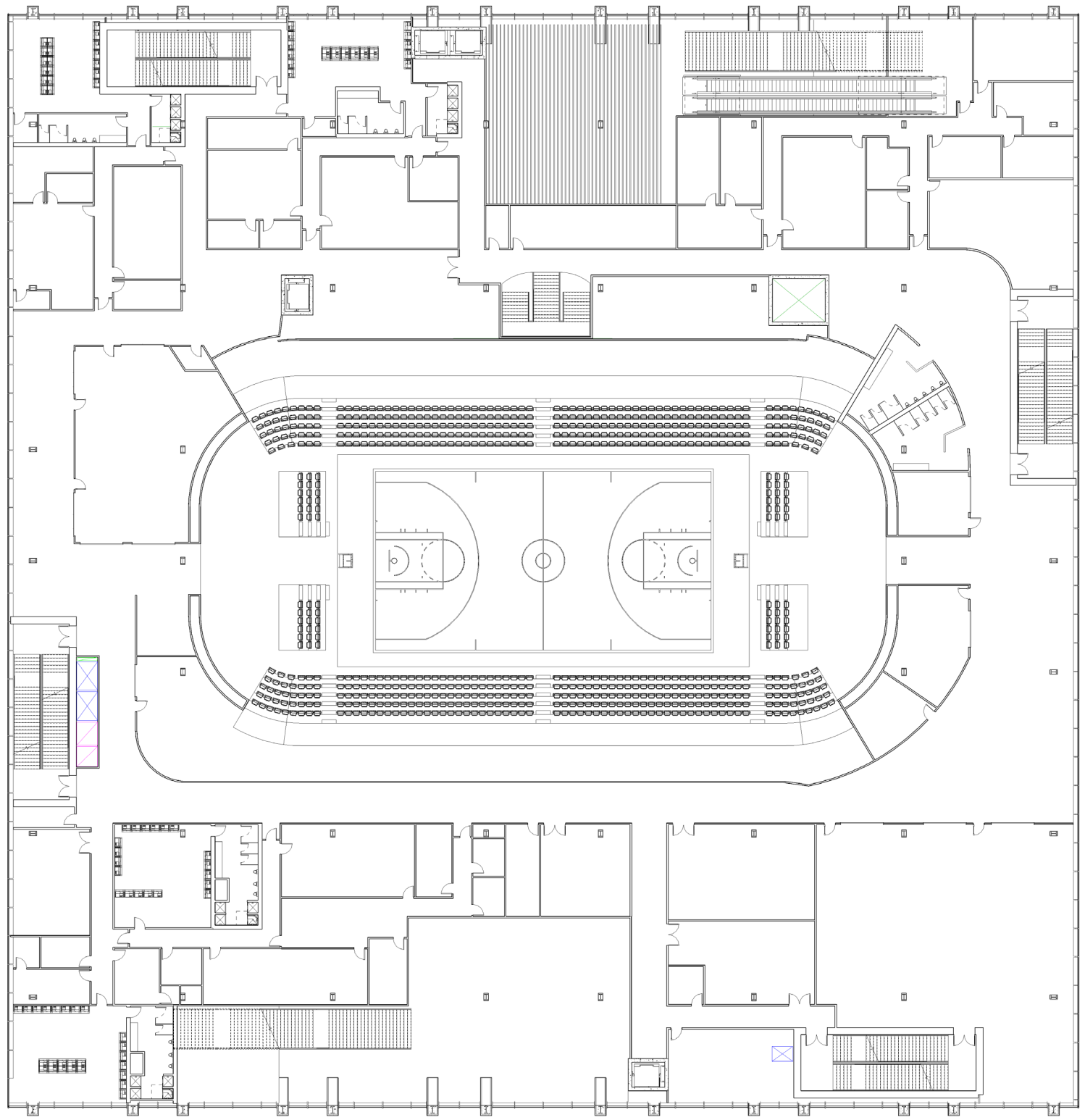


Figure 25: Level 2
Nick Anderson

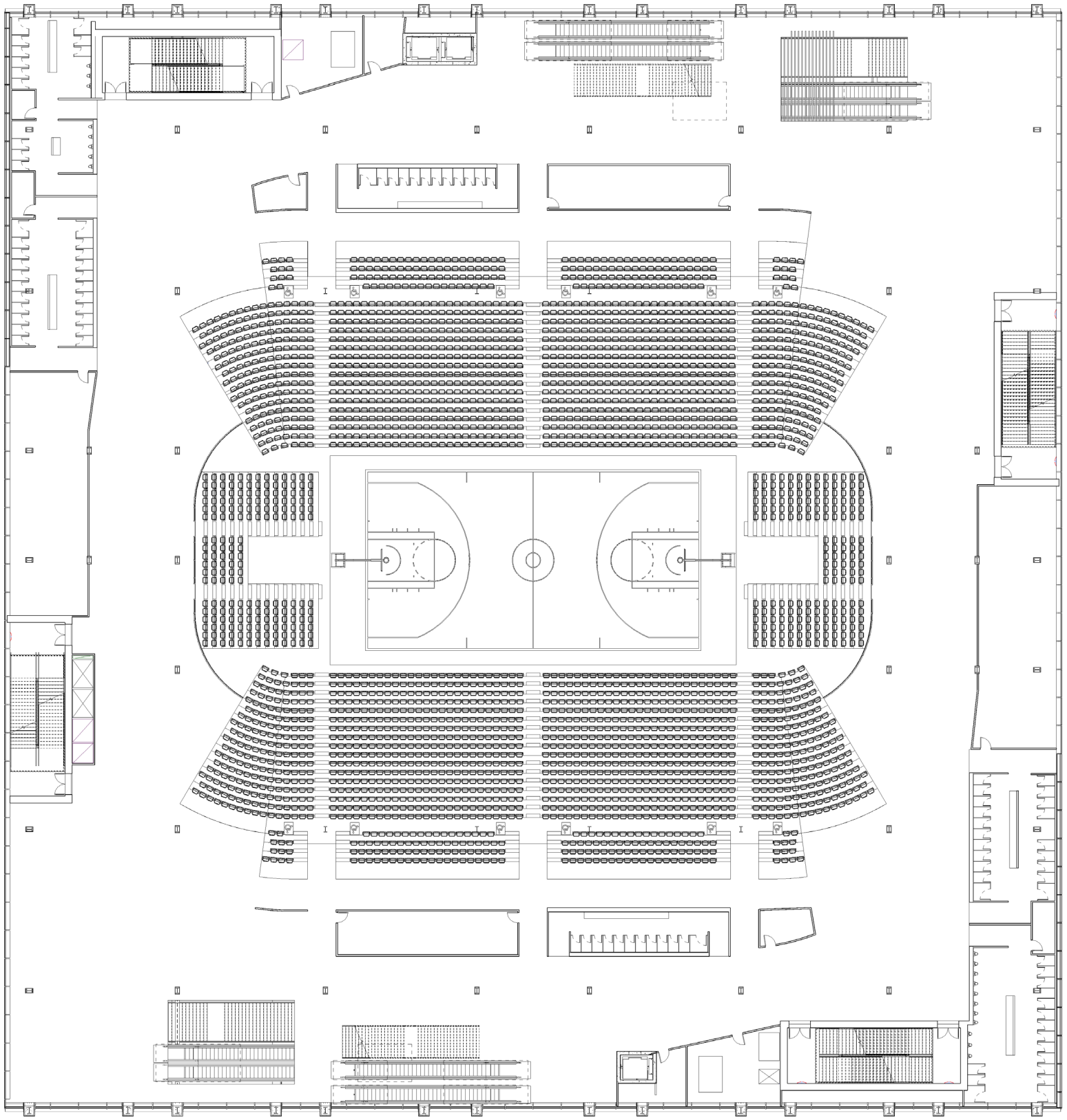


Figure 26: Level 3
Nick Anderson

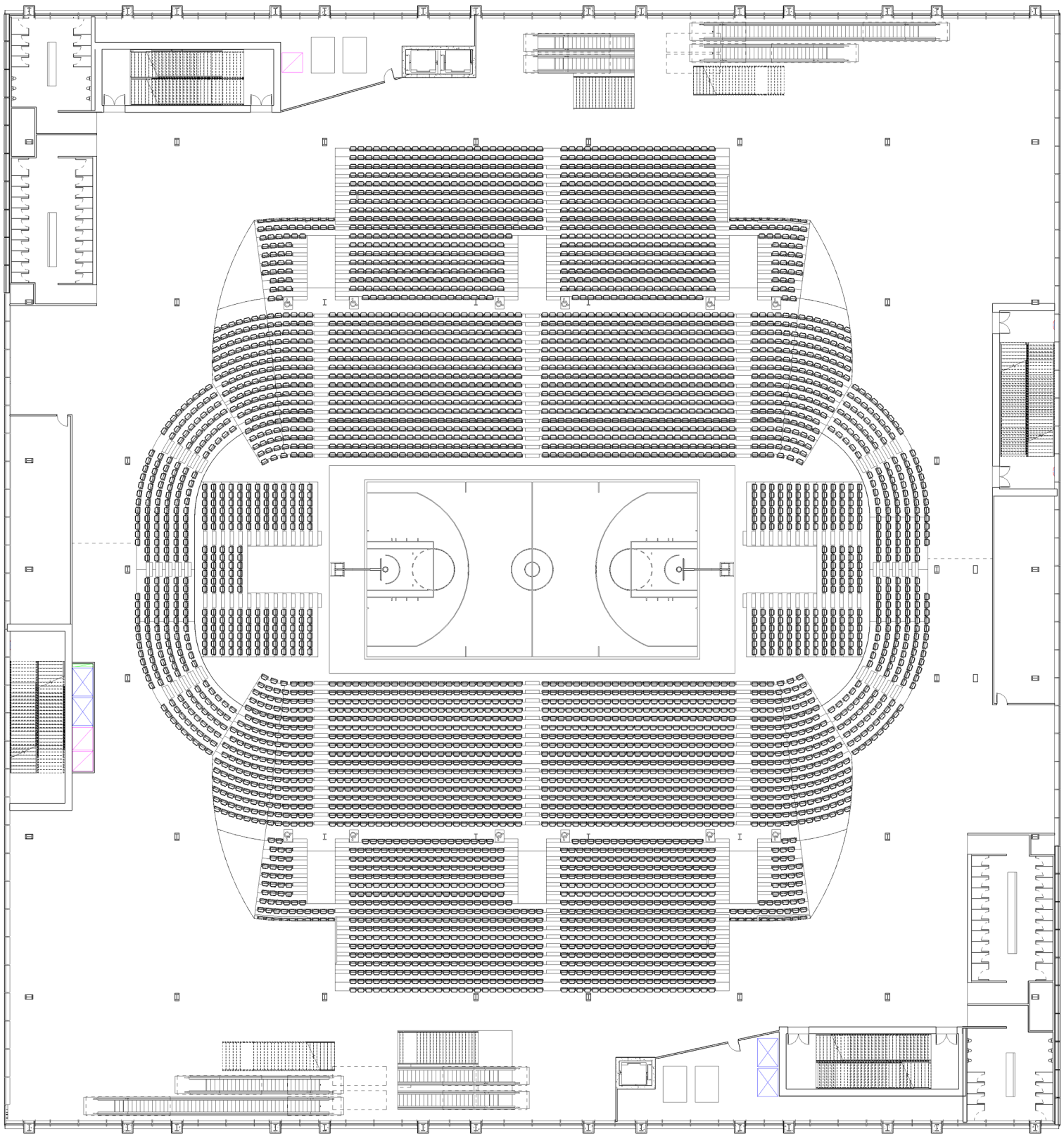


Figure 27: Level 4
Nick Anderson

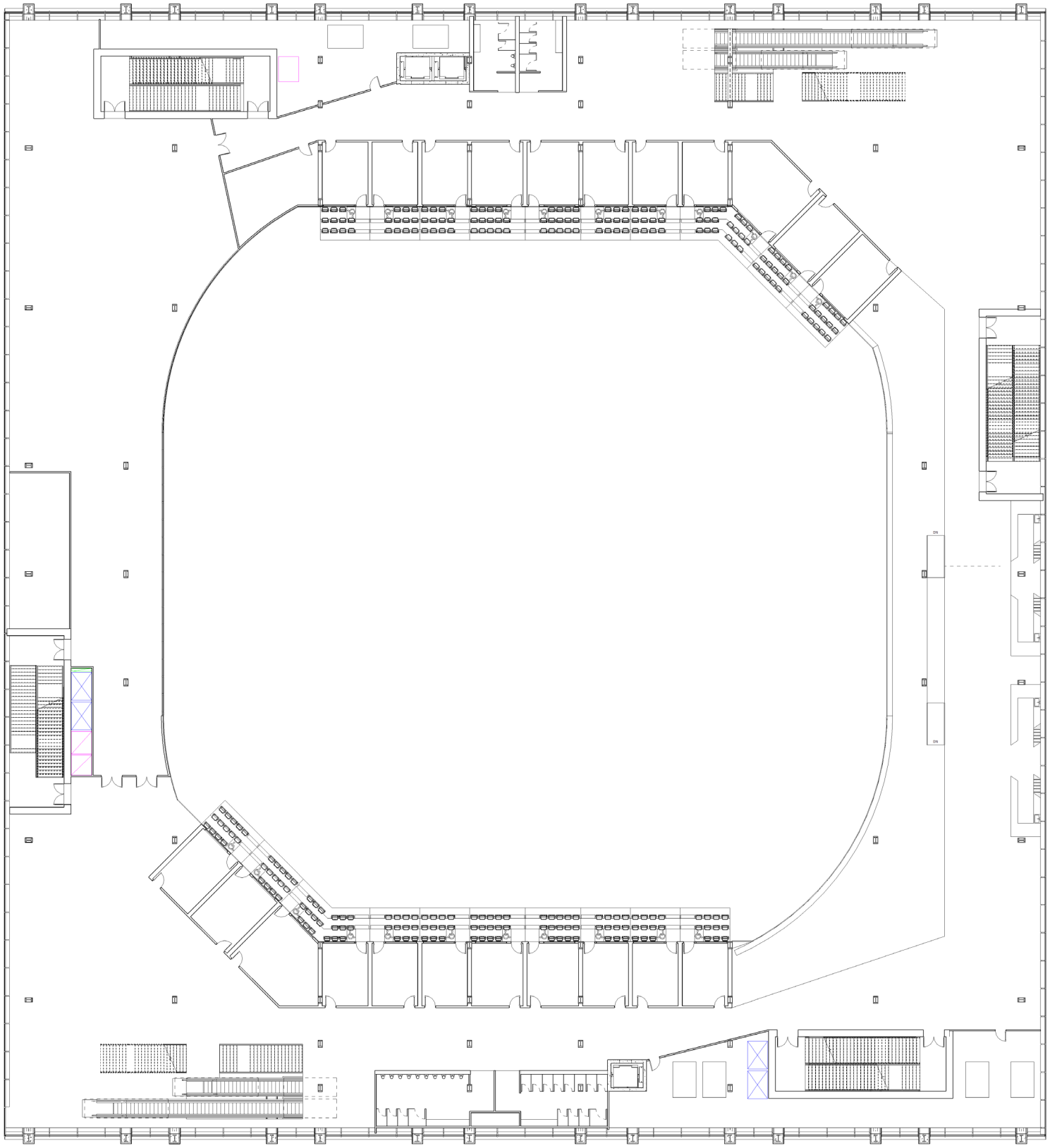


Figure 28: Level 5
Nick Anderson

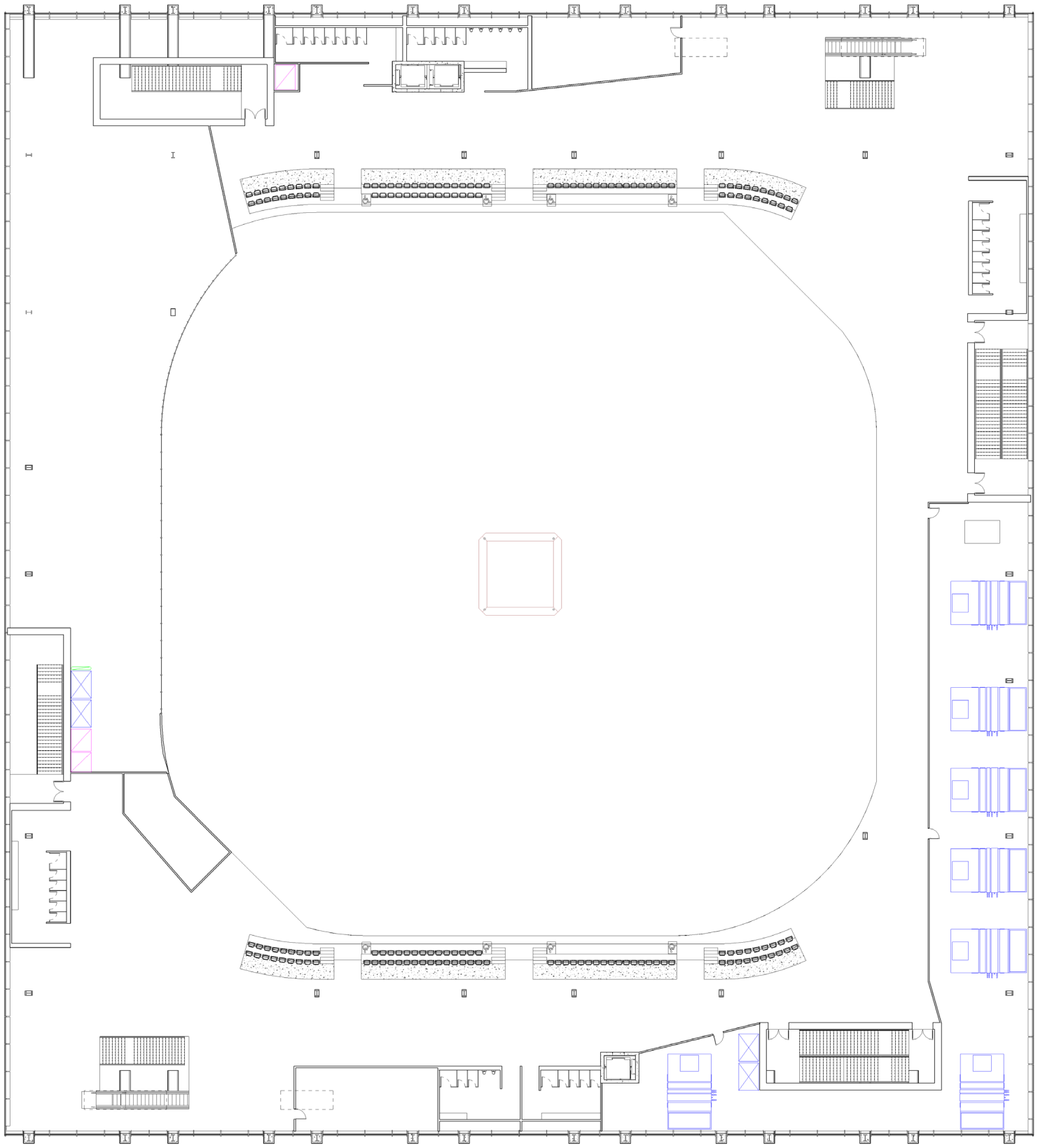


Figure 29: Level 6
Nick Anderson

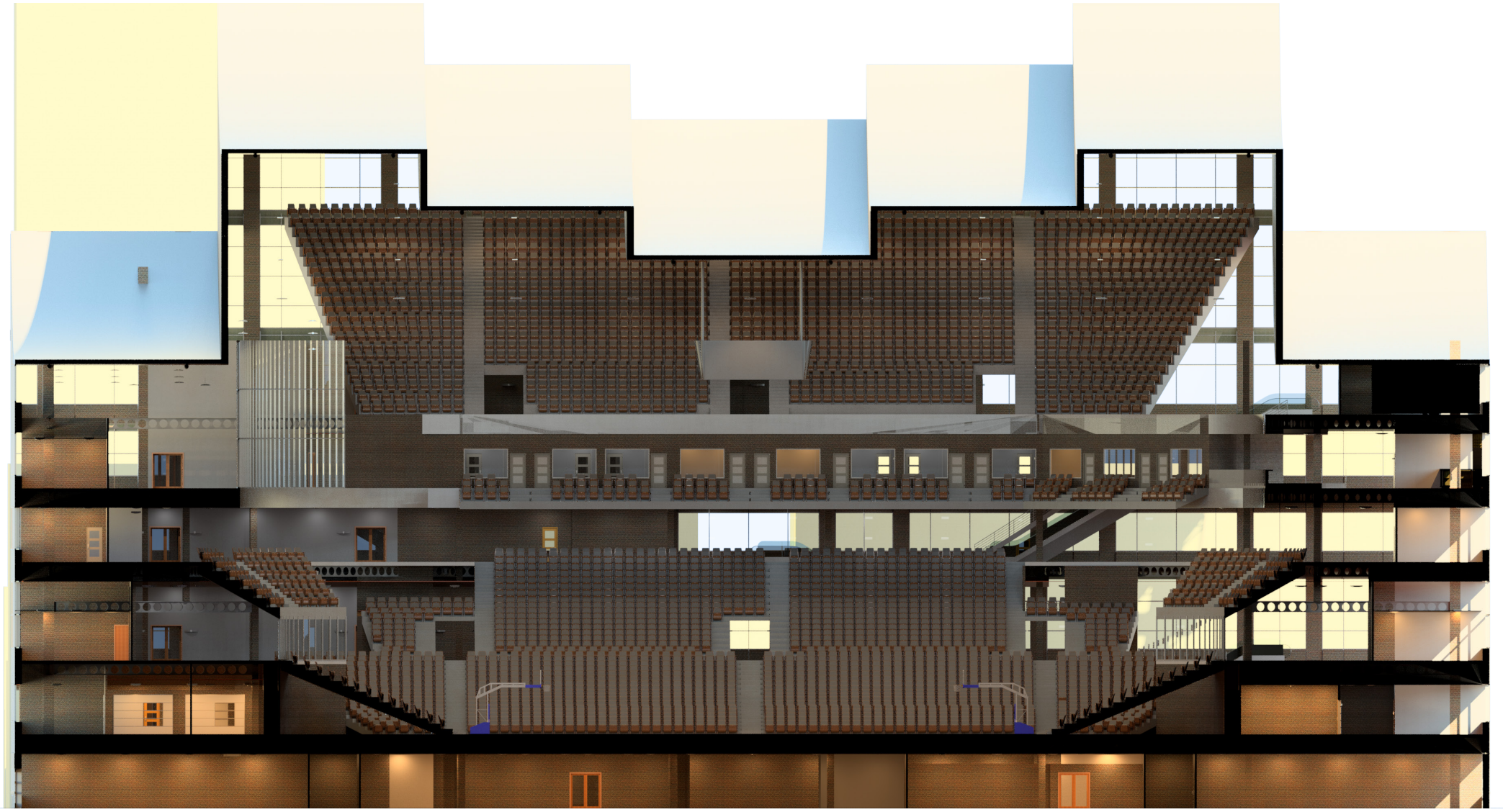


Figure 30: Transverse Section
Nick Anderson

Figure 31: Longitudinal Section
Nick Anderson

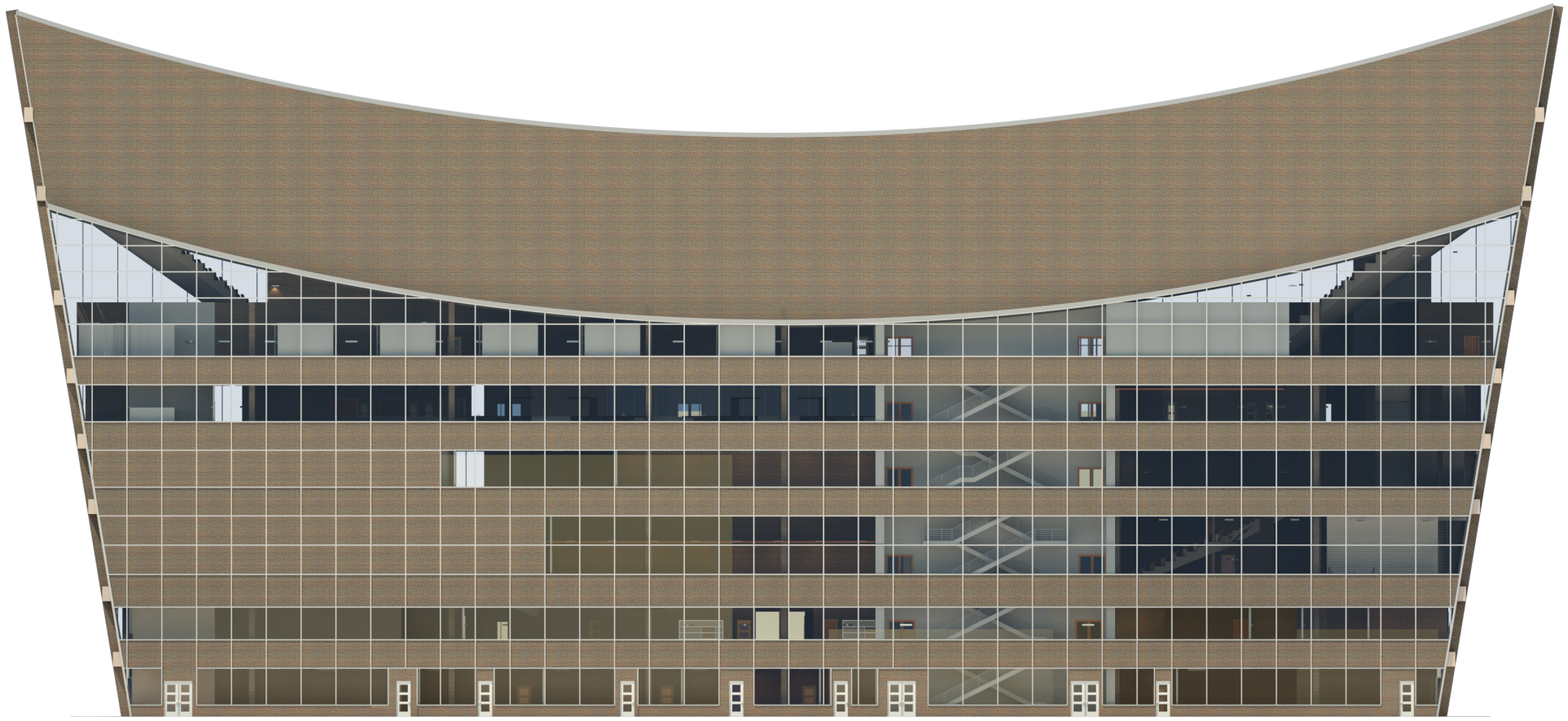


Figure 32: East and West Elevations
Nick Anderson

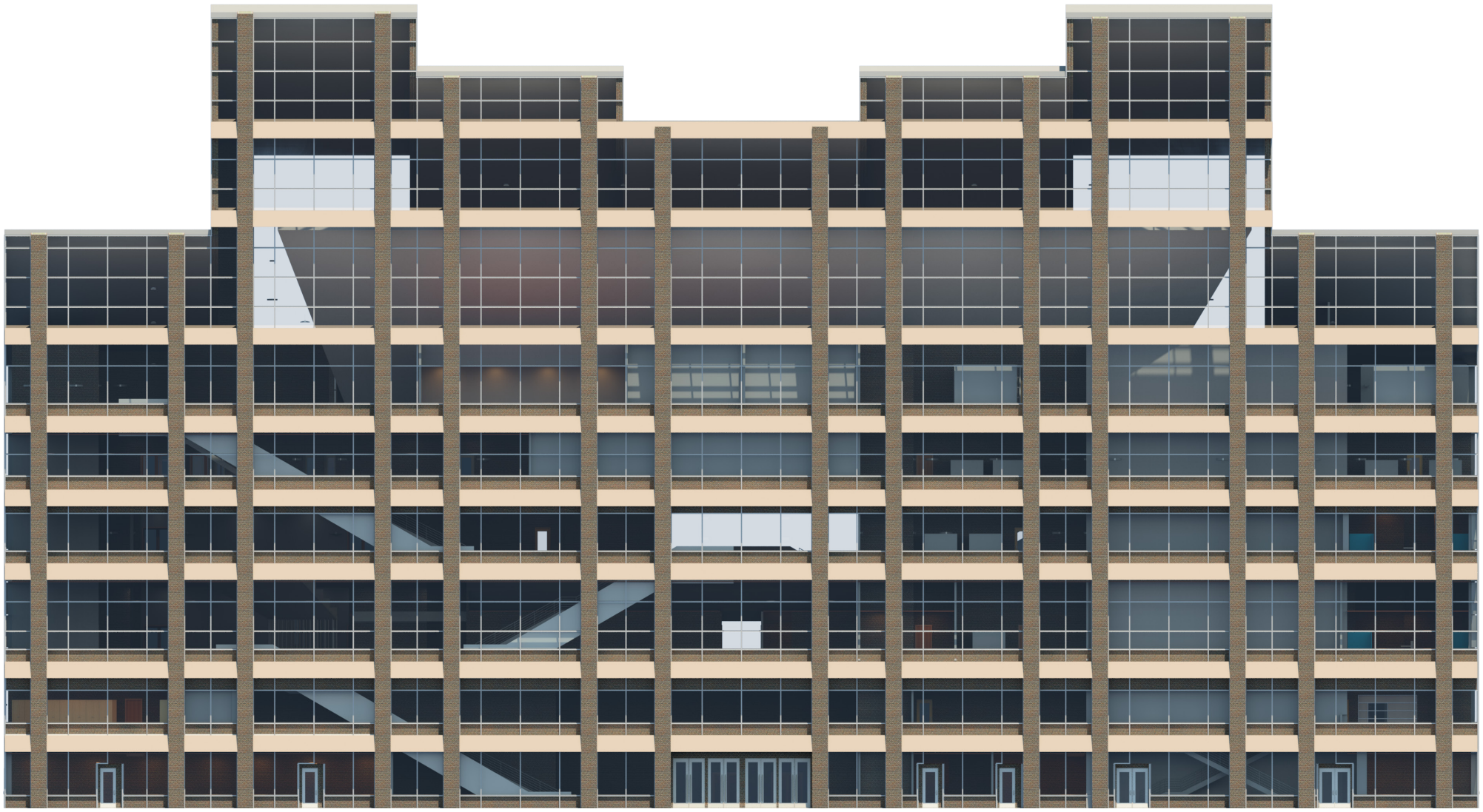


Figure 33: North and South Elevations
Nick Anderson

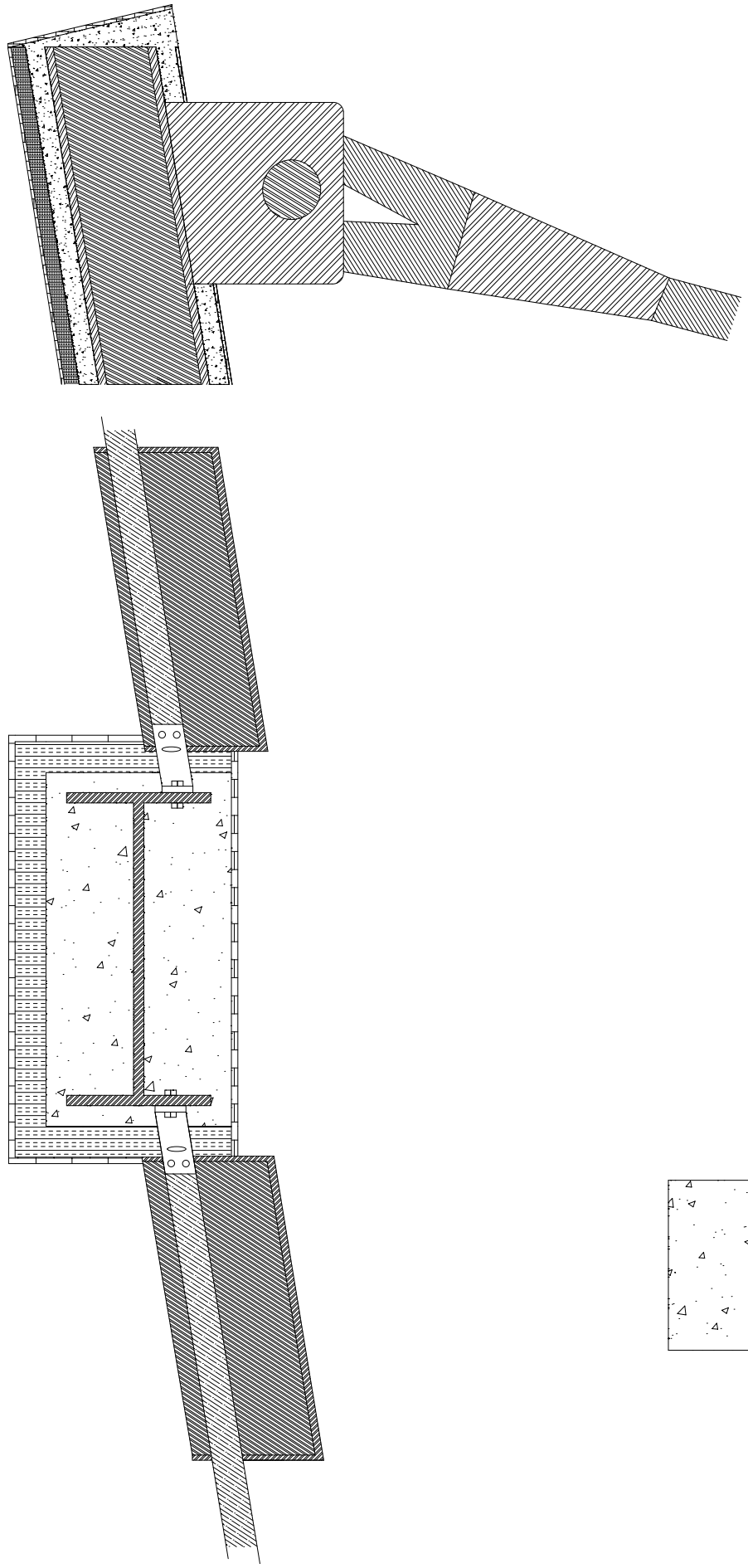


Figure 34: Column and Wall Details
Nick Anderson

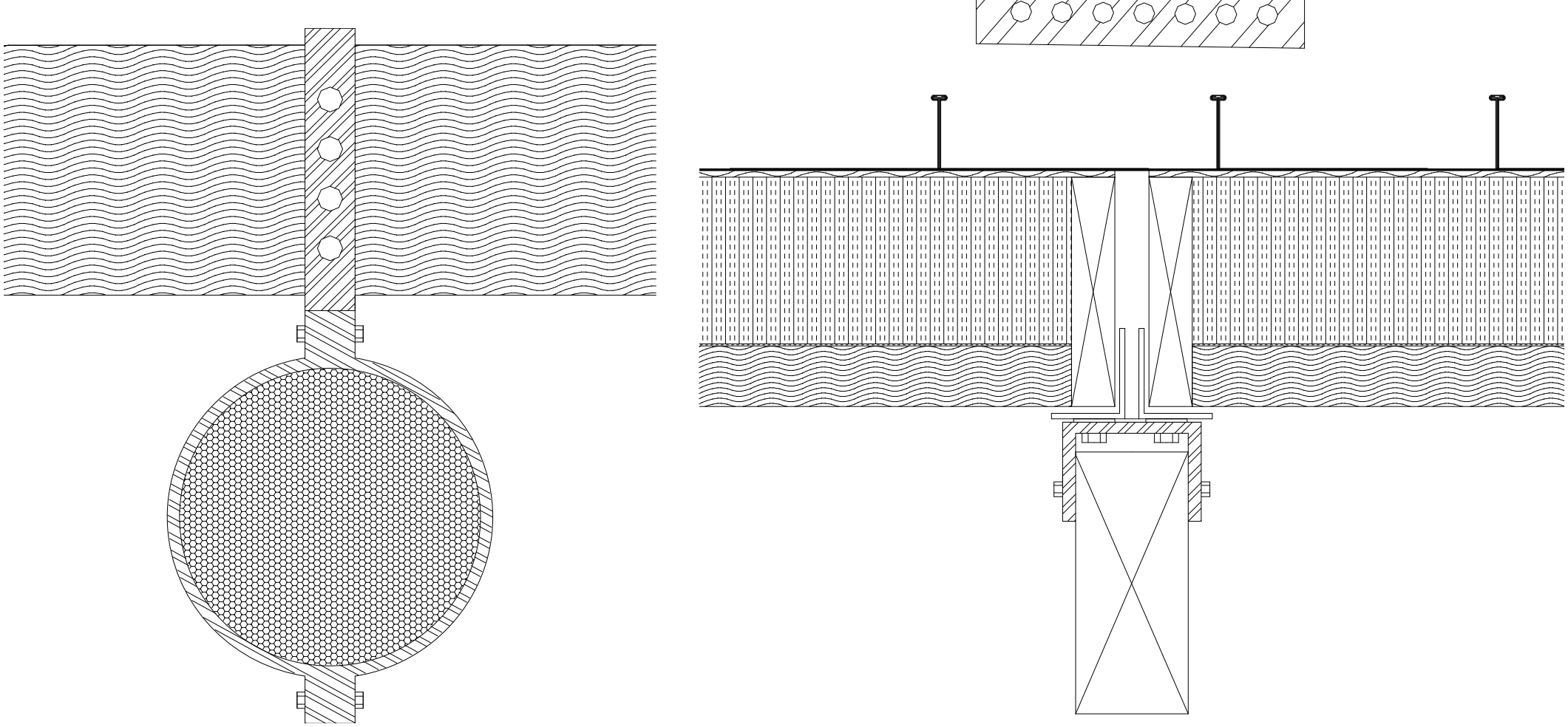


Figure 35: Cable and Panel Details
Nick Anderson

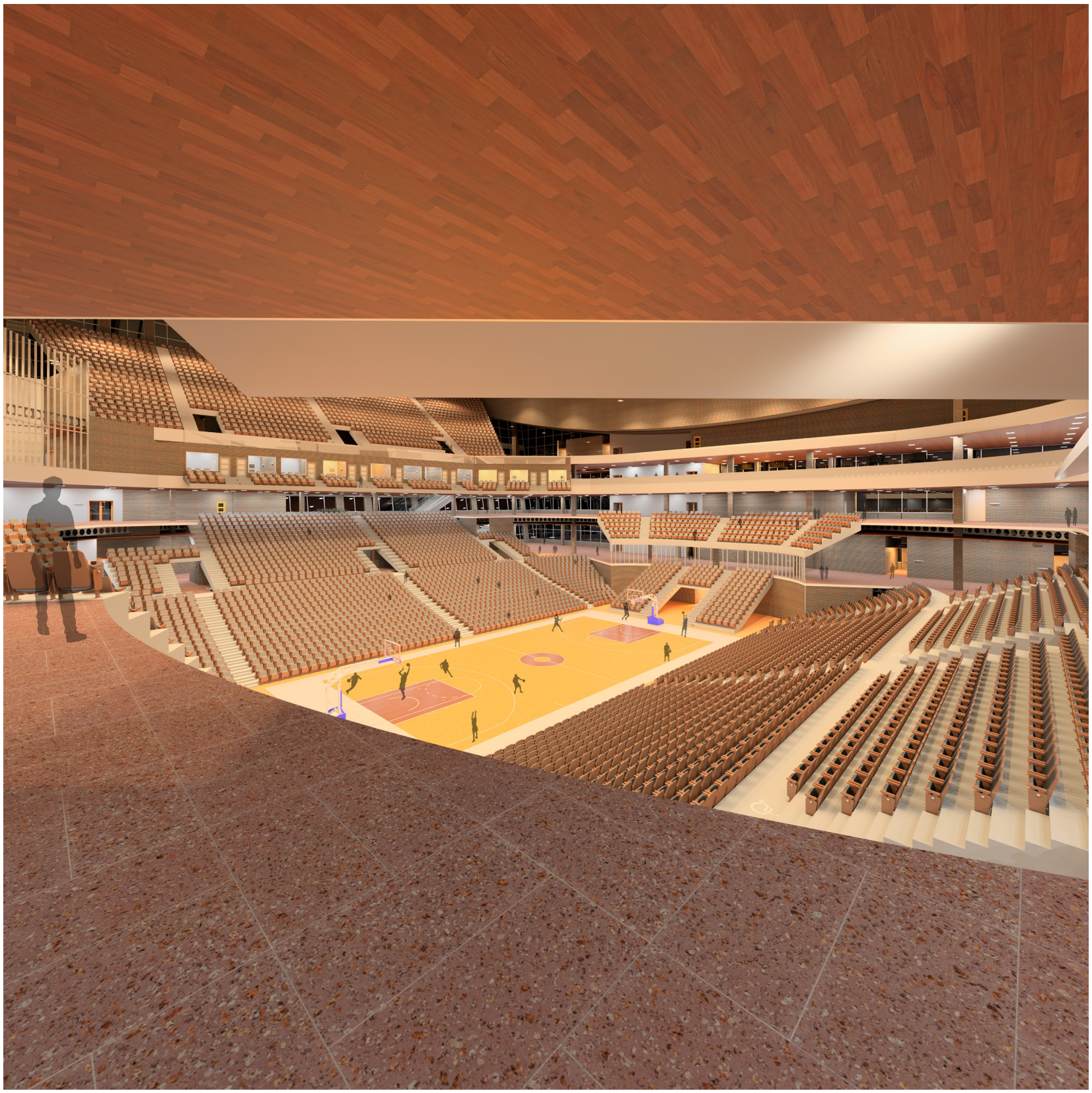


Figure 36: 4th Floor Perspective
Nick Anderson

Figure 37: Upper Bowl Perspective
Nick Anderson

Figure 38: Lower Bowl Perspective
Nick Anderson

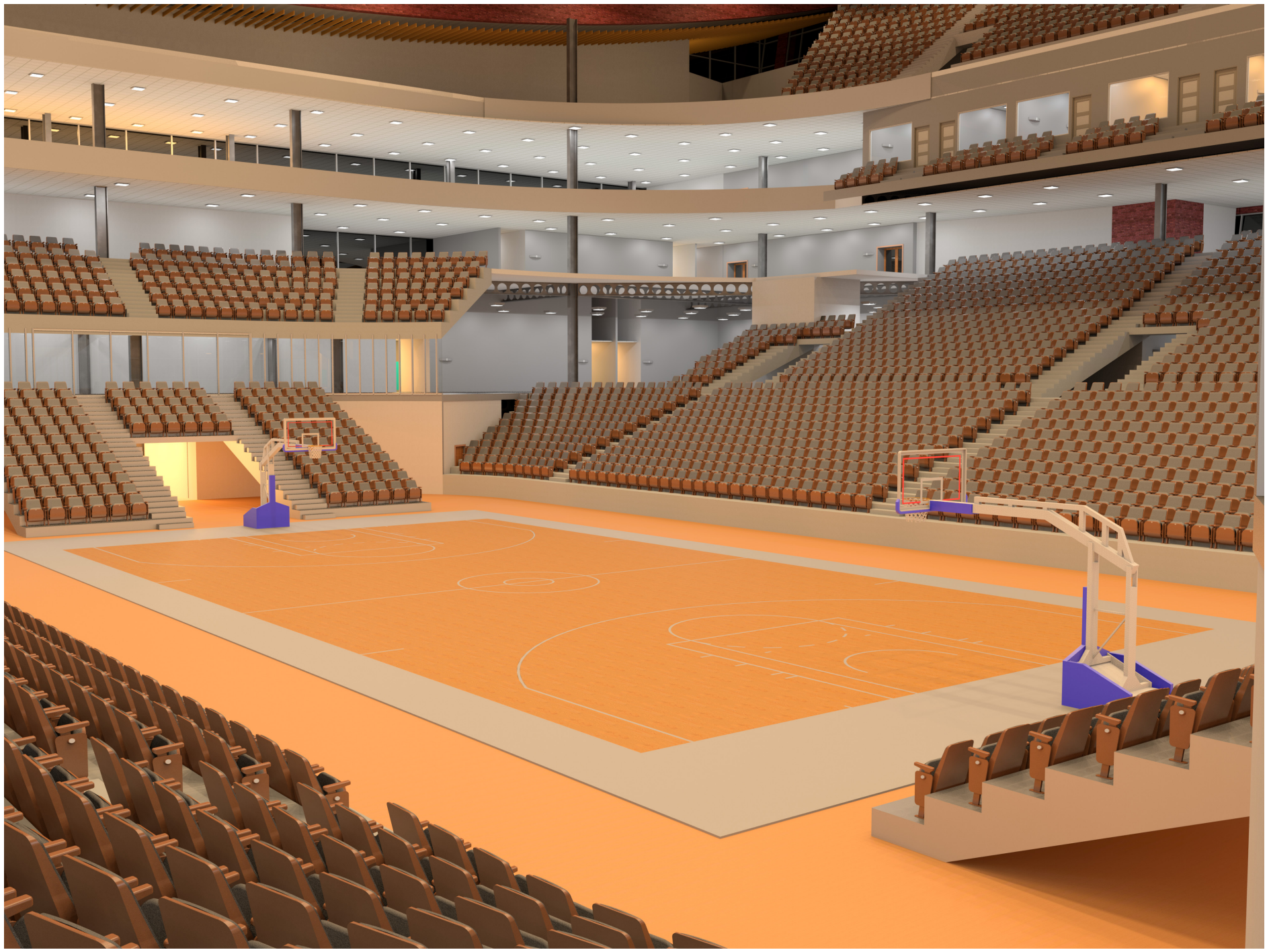


Figure 39: Corner Perspective
Nick Anderson

Structure

The arena uses steel frame for most of the structure and a cable system for the roof.

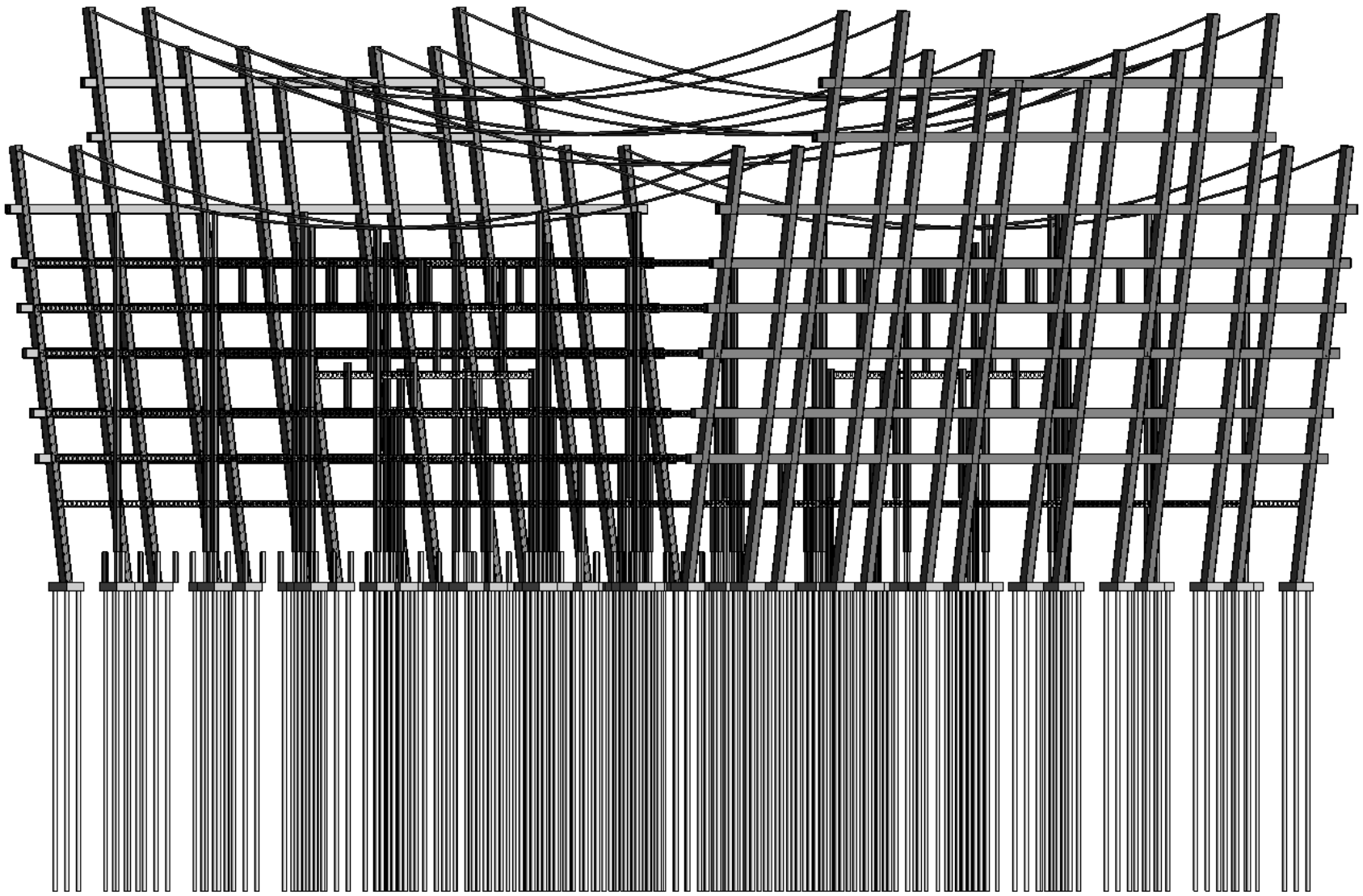


Figure 40: Structure Perspective
Nick Anderson

Figure 41: Neighborhood Outline
Nick Anderson

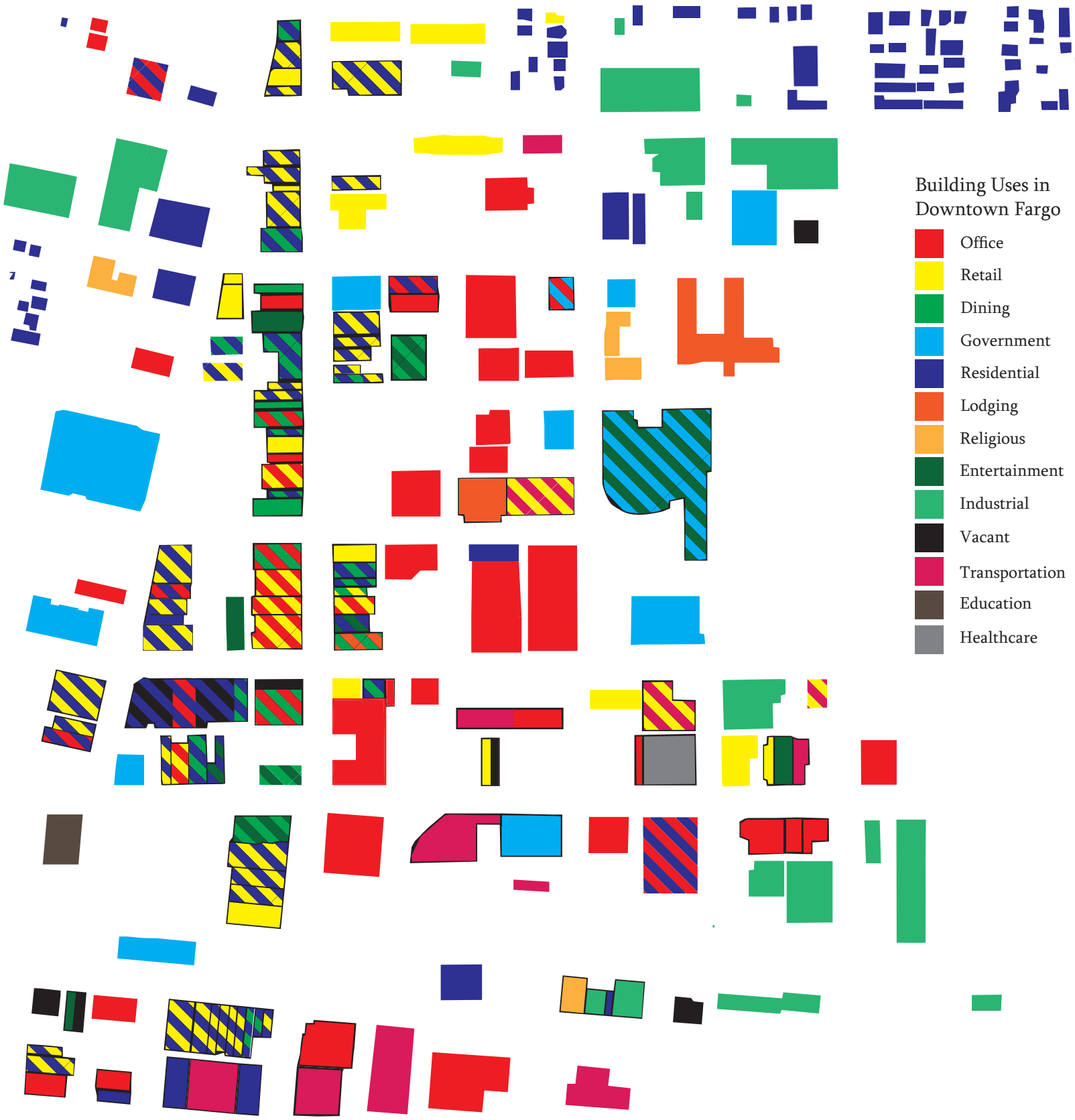


Figure 42: Neighborhood Uses
Nick Anderson

Figure 43: Neighborhood Walking Distances
Nick Anderson

Figure 44: Neighborhood Traffic
Nick Anderson

Figure 45: Neighborhood Amenities
Nick Anderson

Downtown Fargo Parking

Parking Lot or Ramp

100 Number of spaces

Total off-street public parking: 1899
Total on-street parking: 1204
Total: 3103

With current 50 percent usage after 4pm there are around 1551 available spaces

Figure 46: Neighborhood Parking
Nick Anderson

Figure 47: Neighborhood Spending
Nick Anderson

Figure 48: Neighborhood Weekend Hours
Nick Anderson

Figure 49: Neighborhood Infrastructure Improvements
Nick Anderson

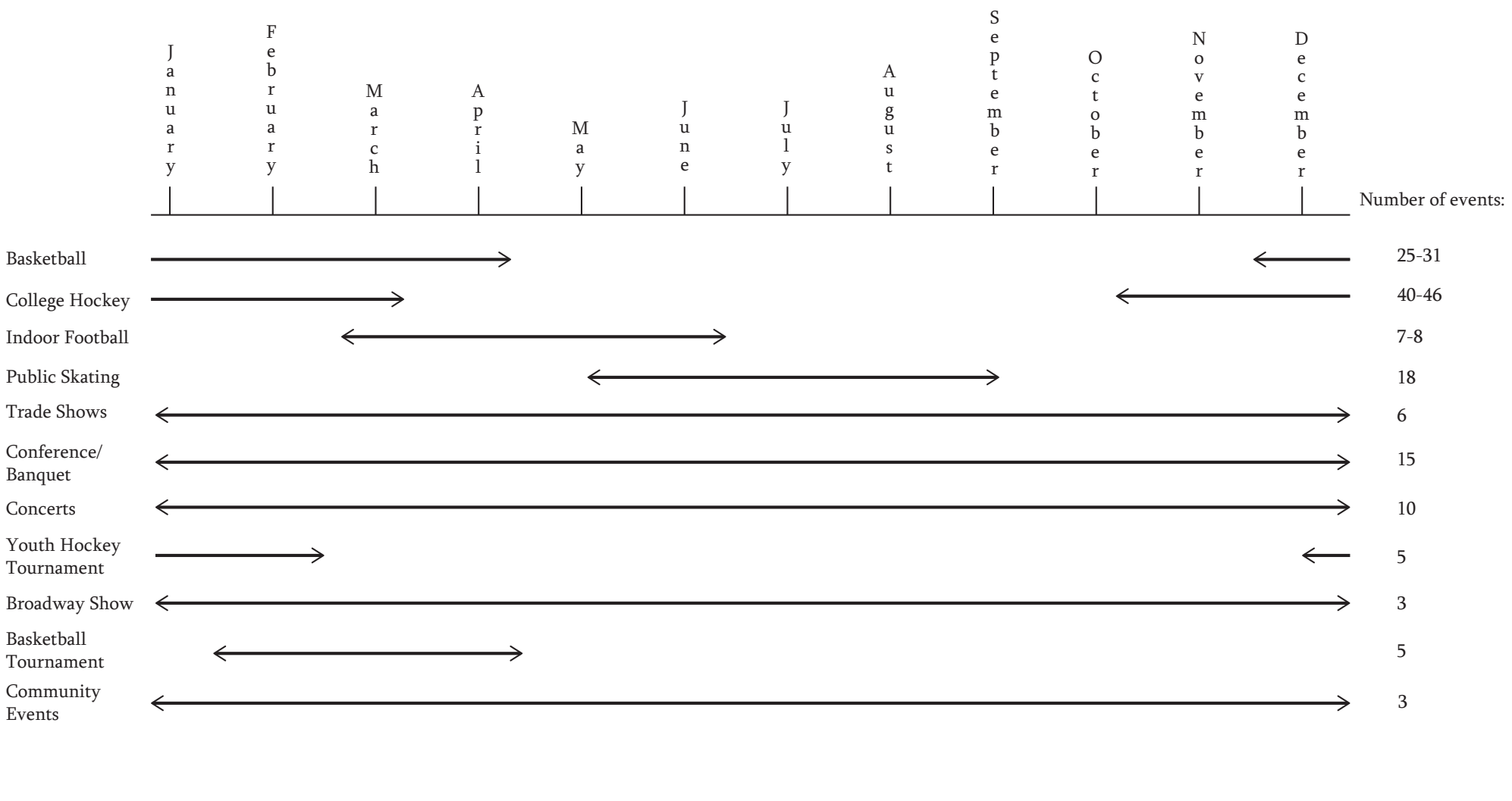
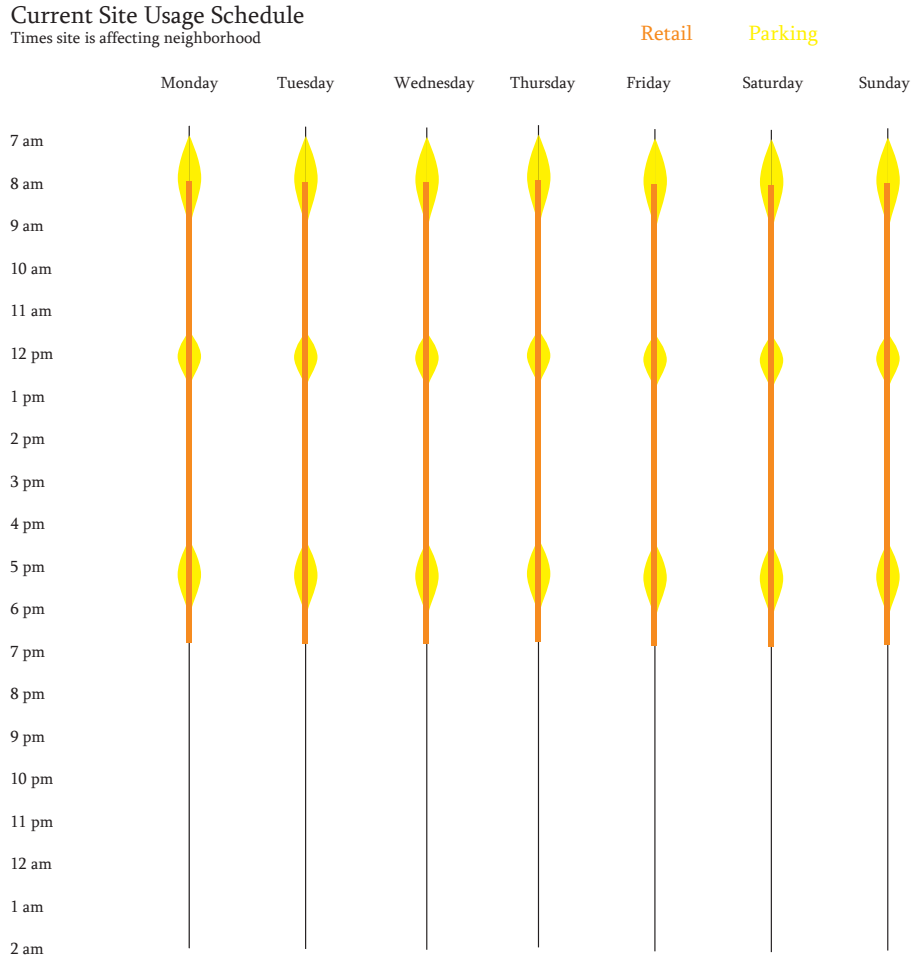


Figure 50: Arena Schedule
Nick Anderson

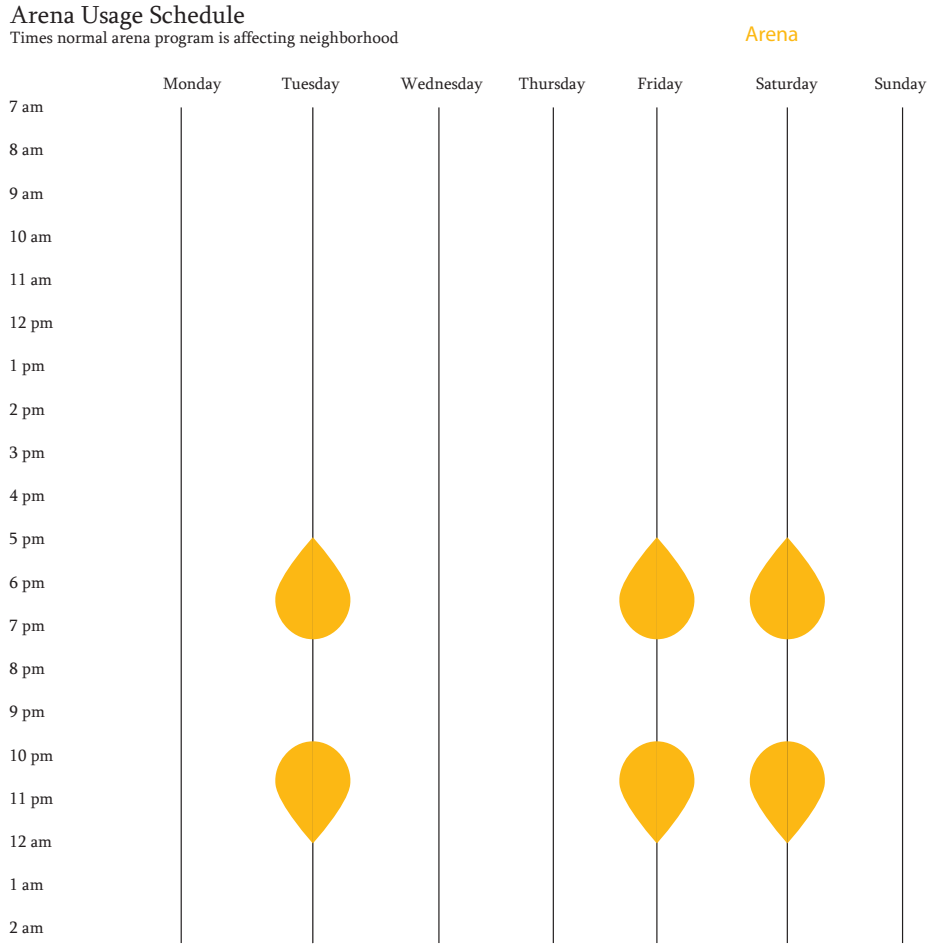
Current Site Usage Schedule

Times site is affecting neighborhood



Arena Usage Schedule

Times normal arena program is affecting neighborhood



NP Garden Usage Schedule

Times NP Garden program is affecting neighborhood

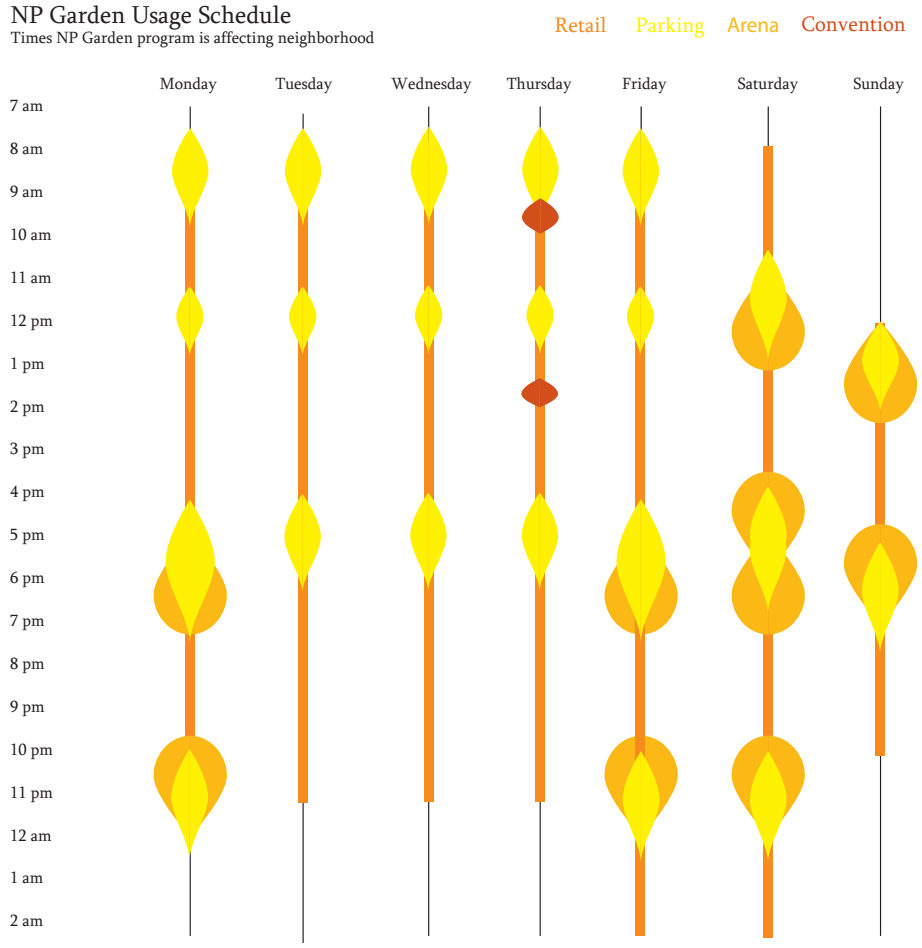
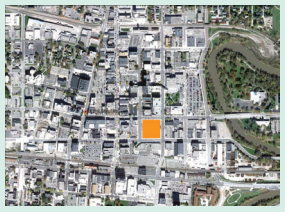


Figure 51: Usage Schedules
Nick Anderson

Figure 52: Buildings Effected
Nick Anderson

Final Boards

How does a building affect its neighborhood?



Site

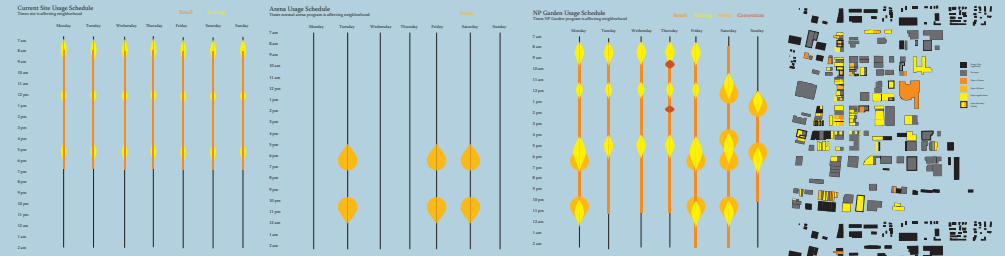
NP Garden is located on the 400 block of NP Avenue, in downtown Fargo, North Dakota. The current site houses multiple parking lots, a small parking garage, one retail building, and unused office and retail space.

The site was chosen due to its proximity to Broadway and the bus depot and the size of the lot. Other possible sites were the NP parking lot and city hall parking lot. Both of the other lots were too small to house an arena. Parking lots were considered to limit having to relocate current buildings. The program will allow for all of the current uses on the site to be replaced in the arena.

The main uses of downtown are offices, dining and residential. Broadway is the most active part of downtown, due to being the street with the most mixed uses. Activity seriously falls off a block away from Broadway.

Broadway houses most of downtown's dining establishments and bars. Two walking routes from parking to the arena will have people pass by most of downtown's amenities.

Due to Fargo's weather, people are hesitant to be downtown in the winter. The main two tenants of the arena will be a NBA development league team and NDSU men and women's hockey teams. Both of these sports play during the winter, encouraging people to come downtown when it is least active.



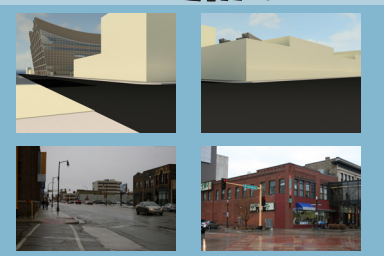
Program

The main parts of the program are a 8,000 seat arena which supports basketball and hockey as the main tenants. In addition, the arena will be able to support conferences and conventions. Most of the ground floor is retail and there are two levels of parking to replace the existing parking and alleviate the additional need for event parking. There is 36,000 square feet of retail, 180,000 square feet of parking, and 300,000 square feet of arena spaces.

Most of the buildings in downtown are used between 9am and 5pm, Monday to Friday. This leads to downtown being considerably less active during the nights and weekends. It is important to keep balance between uses and when they are used. When a majority of the uses are in a certain time, it limits the growth and activity in a neighborhood. This can be seen in downtown by simply looking at how many buildings are closed or have limited hours during the weekends.

Entertainment is one of the most limited uses in downtown. Downtownfargo.com lists the library and the Fargo theater as the two main entertainment buildings. The other options are boat tours, a gentleman's club, a cyber cafe, and pinball. An arena would add to downtown's entertainment options, and bring thousands of people downtown to times that downtown is not very active.

However, placing just an arena will bring effects to downtown similar to other single use buildings. If additional uses aren't added to the building, it and the surrounding area will be undersued, similar to the other single use buildings downtown. Retail spaces on the ground floor allow for the building to affect the neighborhood for most of the day. The arena brings in a large amount of people during times when Fargo isn't active. The convention section allows for the massive arena to be used during the day. Public parking replaces existing private parking and allows for additional downtown long term parking.

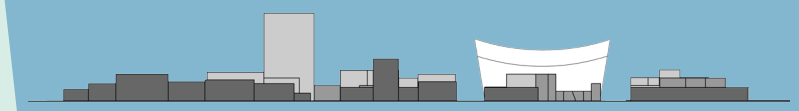


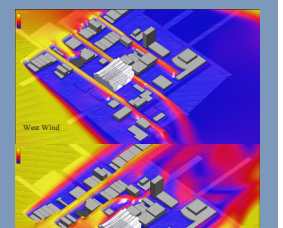
Scale

The arena's footprint and height means it will become a dominant figure in downtown. It will become the second tallest building in Fargo, only shorter than the Radisson. Due to most downtown buildings being less than three stories, the arena can be seen from much of downtown.

Traffic

The arena will create additional traffic and need for parking in the neighborhood. Much of the existing lots are underused during times events would happen. This limits the amount of additional parking that would need to be constructed.





Infrastructure

The arena would require additional off site infrastructure to be constructed. The main infrastructure required would be additional parking. The current parking lots would be rebuilt as parking ramps, adding a significant capacity of parking. Pedestrian bridges would be built over the railroad on 4th Street North and Broadway. This prevent having to wait for trains, an unfortunate event during Fargo's winter.

Sun/Wind

The arena would have an impact on the sun and wind patterns of the nearby buildings. The most common wind directions are from the north and south. The arena would block much of the wind from the south. The arena will block most of the sun of the Forum and AT&T buildings to the north of it, but will otherwise have small effects of the solar access for other buildings.

Water Usage

Stadiums use around 5 gallons of water per seat per event. At 8,240 seats, my arena would use between around 41,000 gallons per event. With waterless urinals, around 12,000 gallons are saved per event day, dropping the needed water to around 29,000 gallons. Over a year the savings could be as much as 1.8 million gallons of water. The arena would create a demand of an additional .29 to .36 percent of Fargo's daily water supply. Without the urinals it would be between .41 and .51 percent.

Carbon Dioxide

Building construction will generate around 56,800 tonnes of carbon dioxide. Electricity for an event will be around 4.5 megawatt hours. This will generate 42 tonnes of carbon dioxide if powered by coal or 24 tonnes if powered by natural gas. Retail will generate around 1.3 tonnes per day with coal or .77 tonnes with natural gas.

The arena uses LED lighting to lower the electricity required. LEDs can reach efficiencies of 100 lumens per watt compared to high-intensity discharge lamps, which can only reach around 60 lumens per watt. HIDs would add 159 kilowatts of lighting electricity.

Economic

The arena will cause additional spending in downtown. A study of the Fargodome found the average attendee spent around 20 dollars outside the arena when attending a sporting event. This will greatly contribute to downtown's dining and retail.

Figure 53: Final Board 1
Nick Anderson

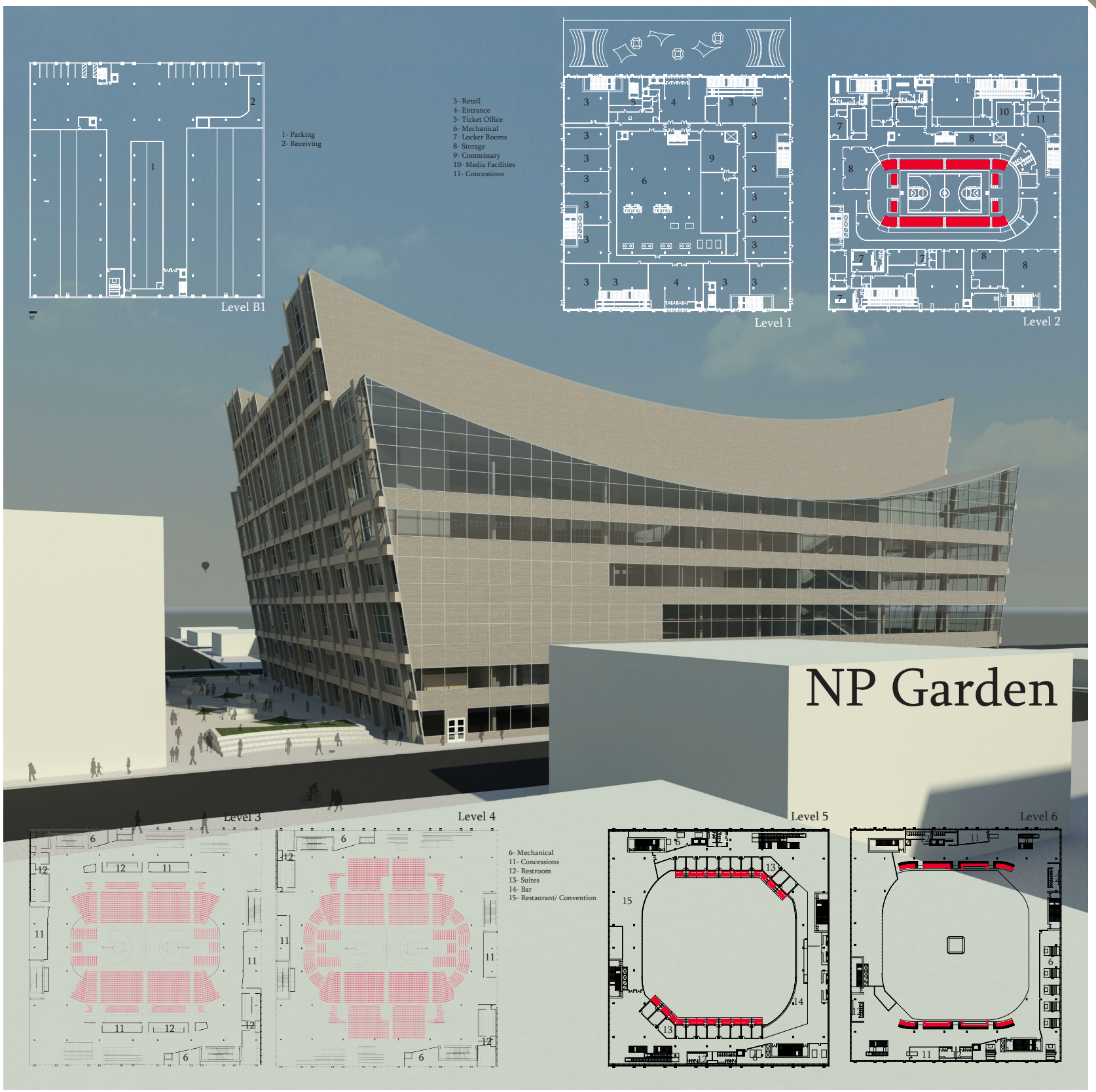
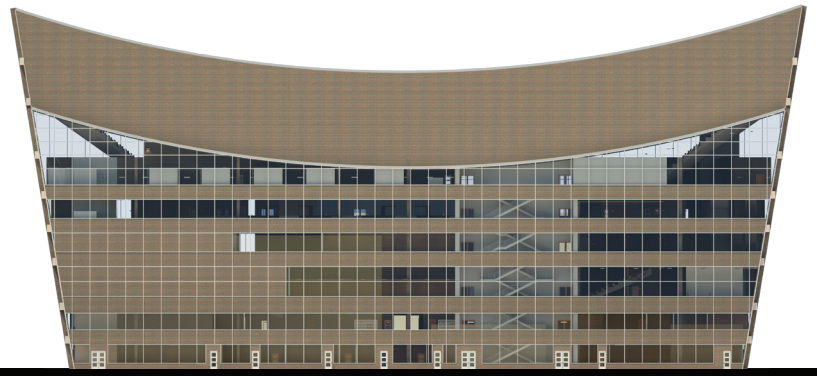
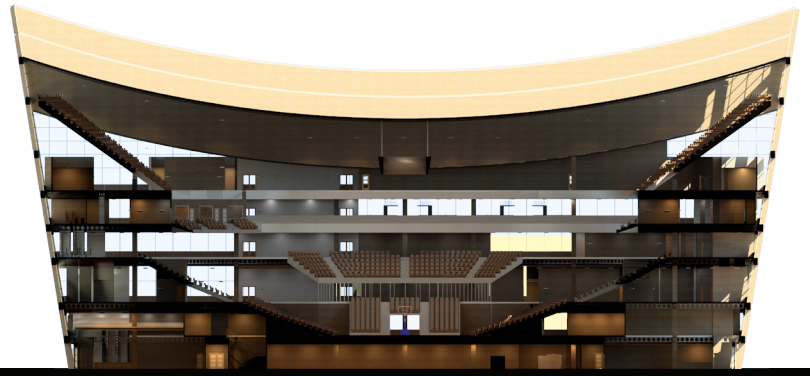


Figure 54: Final Board 2
Nick Anderson



East and West Elevations



Longitudinal Section

Transverse Section

North and South Elevation

Nick Anderson
8390
Arch 772- Design Thesis
Spring 2014
Ganapathy Mahalingam
Revit, 3DS Max, Photoshop, Illustrator, Indesign, Autocad, Google Earth

Figure 55: Final Board 3
Nick Anderson

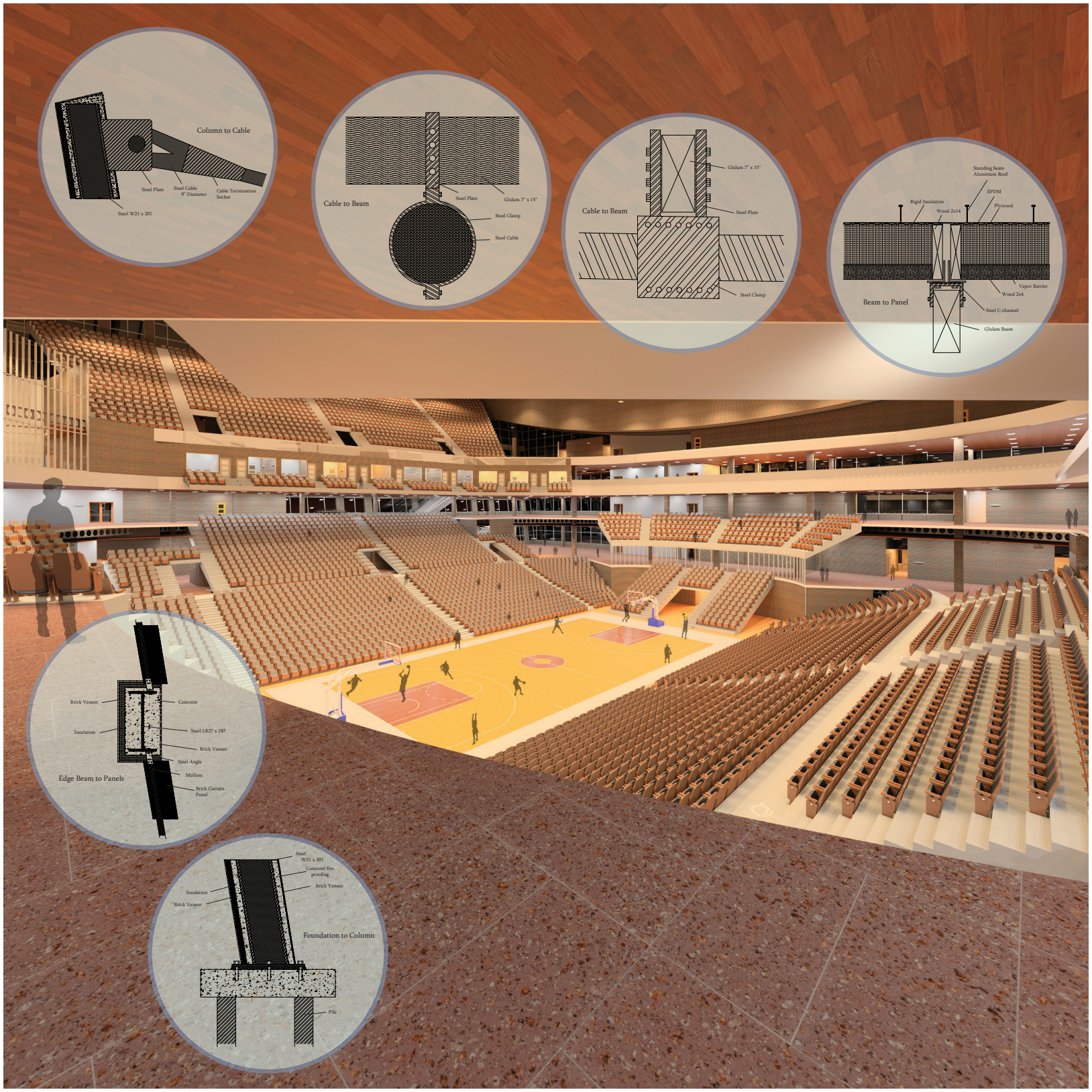


Figure 56: Final Board 4

Nick Anderson

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About Me

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Hometown- Woodbury, MN

"Why do they always paint hallways that color?"
"They say taupe is very soothing."
-Ocean's Eleven

Figure 57: Nick Anderson

Nick Anderson: San Francisco.
(Nick Anderson, 2012)