

# North Dakota State University Graduate School

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**Title**

ARACHNID SPORTS + ENTERTAINMENT COMPLEX

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ARACHNID SPORTS + ENTERTAINMENT COMPLEX

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## ABSTRACT

Las Vegas has become a sport energized metropolis. The city not only offers shows, restaurants, and gambling, but now also a successful professional sports market. At the cost of more infrastructure, Vegas has also lost some of its connection to its local community. The strip can be categorized as a tourist grabber, that has also become a money leech and ultimately reducing the interactions from locals across the Nevada area. The metro area has started creating and incorporating many sports teams that have brought community more together than anything in the downtown spaces. Sports offer love and passion that can leave lifelong memories in people. The problem is community members don't want to go the Strip anymore, and with such high potential in the area, the solution with this thesis is bringing those elements of community back to this selective site and offering the locals the chance to regain a space advocated for them. With a sports team, there is an identity that is created, a fan base that supports, and ultimately energy that continues from a night-to-night basis creating a firm community foundation for the strip. By reviving the vegetation and natural factors, effective use of plaza spaces, security and safety design decisions, and sustainable practices, this thesis provides a solution for a new sports arena facility that can achieve the interests of locals and create a space for everyone.

## **DEDICATION**

I want to dedicate my thesis project to a few members of my family: my mom, Rhia, my stepdad, Chris, my brother, Cameron, and my sister, Marena. I also want to dedicate my project to my closest friends throughout school, and the architecture program, Parker, Amin, and Hunter. Lastly, I want to dedicate my project to my thesis advisor, Regin, for pushing me throughout the entire year, and helping turn my vision into a reality.

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## 1. INTRODUCTION

Considered the heart of entertainment, the Las Vegas Strip continues to amaze and serve the diverse interests of tourists and locals alike. Mainly filled with casinos, resorts and entertainment venues, there is a giant opportunity to introduce a new state-of-the-art sports facility. With the recent success of sports in the area, it makes sense to promote yet another space for future expansions of sports leagues. The city has professional football, hockey, and baseball teams already in development and or located in the area. The idea of implementing basketball is growing significantly. Including a sports venue for an expansion team as part of a comprehensive plan for the development on the Strip of Vegas would enhance the city's entertainment portfolio and community engagement.

The recent extent and nature of developments in the last couple of years, on and adjacent to the Strip, have created a tourist hot spot. Although this isn't a major concern, the consideration of the locals has almost been diminished. To assure the connection to its city, Las Vegas, there needs to be a new development that supports the continued relationship between locals and the downtown scenery. The proposed thesis project is intended to facilitate that relationship by creating a space that welcomes in all locals, tourists, sports fans, and non-sports fans, etc. while serving the role of community. This proposed project will positively affect the Las Vegas Strip, not just the entertainment portfolio.

## **1.1. Research Objectives**

The primary objective of this thesis is to propose a design and develop a fully functioning modern day sports facility, that lives in the heart of the Las Vegas Strip. This venue will not only serve the sports enthusiasts and athletes, but also as a multi-purpose space for all sorts of different events and performances. The intent is to create a facility that will serve the city's economic growth, tourism, and involvement with the community.

The significance of this project is about fostering community through design. The proposed project is intended to bring all members of society together in an area that currently emphasizes experiencing casinos, shows, adult activities, etc., to create a facility that will bring all members of society together. The positive experiences enabled by the proposal will bring locals and tourists back to visit. From the economic standpoint to the chills of cheering on the home team, this project will boost entertainment on the strip. With an already dedicated sports fan base in Vegas alone, the success of this project is well guaranteed because of the number of fans that fill up the current venue on game day(s). What is important is creating a new landmark that presents itself as a gateway to the rest of the area, and other portions of the Strip to ultimately bring more locals back to these spaces. To watching sports, musical shows/events, to even just retail shops scattered across the design this will accommodate just about everyone, even the non-sports fans.

There is something to be said about how sports make people feel, and the way massive buildings like this affect cities. In terms of being a landmark, place for events, or even just opportunity for work, these building structures offer much more than just an economic boom. They offer happiness, memories, and thrills you can't capture anywhere else. The goal of this project is to create a design that offers Vegas a new adventure, gives access to a safer more

community orientated facility, diversifies the Vegas portfolio, while creating the experience, of every sports fan dream.

## **1.2. PROJECT TYPOLOGY**

This thesis typology is a sports facility, more specifically a professional basketball arena. The structure offers much more than just basketball but will be designed to accommodate all sorts of events, such as other sport games, concerts, even plays and musicals. The project also includes many multi-use elements in its typology by adding multiple retail and commercial spaces throughout the design. The design achieves optimal viewing experiences for all guests in a bleacher/stands setting, high end plaza spaces to revive the outdoor area, and a space allocated for the supportive local community.

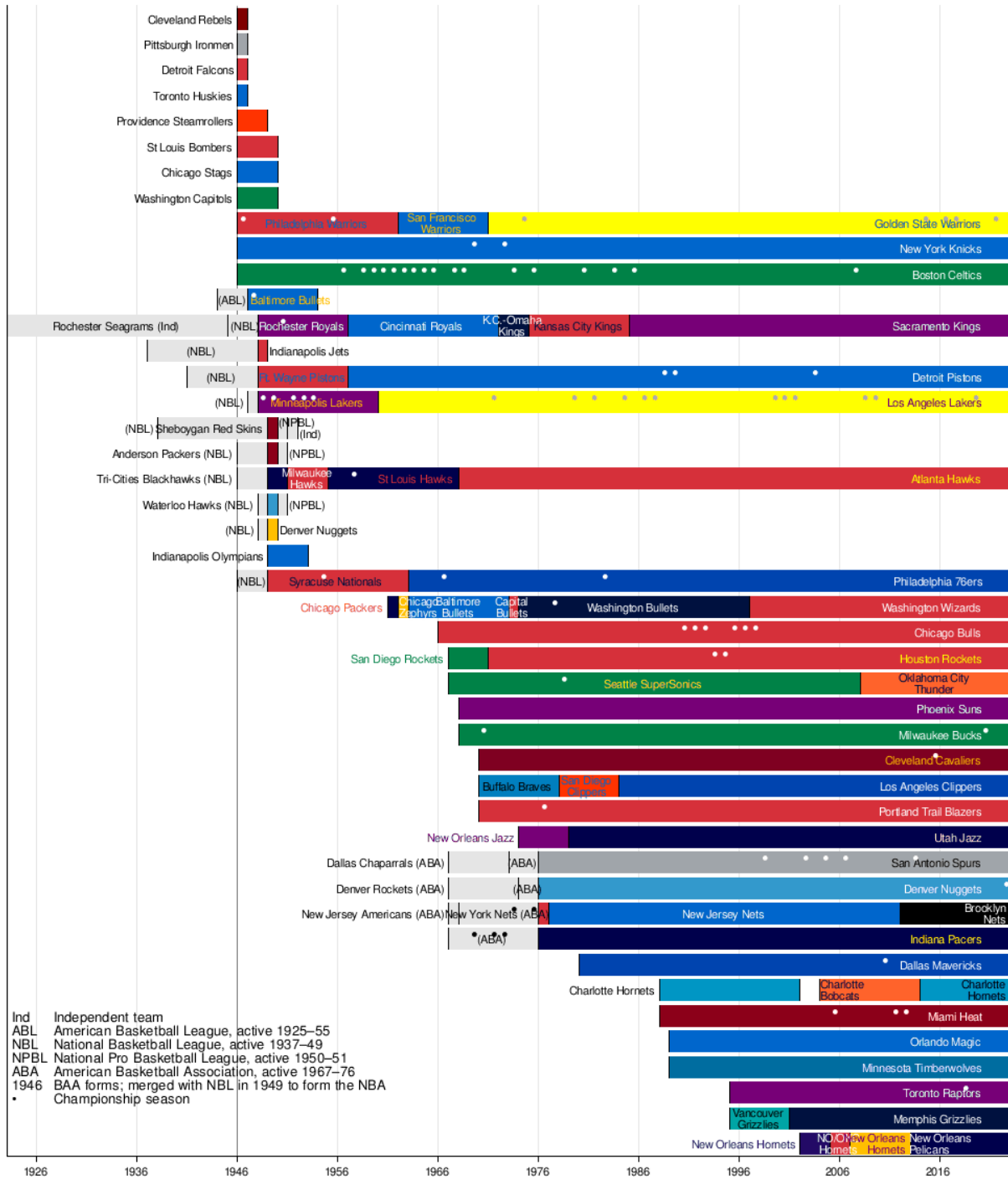
## **2. BACKGROUND/RESEARCH**

There are a couple of different areas of study that were researched and documented as part of this project. The main topics were the expansion of the National Basketball Association, public/community spaces, the natural environment in Las Vegas, sustainability, as well as a few case studies from other successful sports arenas across the world. These factors are critical to understanding the context and ultimate solution of the proposed project that will make the strip a more community friendly area, with a diversified entertainment market.

### **2.1. National Basketball Association Expansion**

With no current team in the Las Vegas, it is important to understand the factors and solutions leading to implementing new teams into the league and giving opportunities for new cities to adopt a team. When the league starts to mention the concept of implementing new teams to the already established 30 NBA team league, Las Vegas ranks at the top of best potential suiters. With the massive sports boom currently happening in the Vegas metropolis, it comes to no surprise this city ranks the top of the list compared to competing cities such as Baltimore, Mexico City, Seattle, or even Nashville. Although there are many great potential areas that could home an NBA team, that offer many different and unique characteristics to their city scene, Las Vegas offers the most potential. With an already established sports market as mentioned, with teams such as the Raiders, the Golden Knights, and Aces, Las Vegas has shown it can accommodate large masses of sports fans and shown how successful those teams have been. On top of the massive areas of interest, and open land to expand and build new infrastructure, Las Vegas has emerged as the top candidate to host a new expansion team for the National Basketball Association.

## 2.1.1. NBA Expansion Across the Years



1 - NBA Teams Timelines - [https://en.wikipedia.org/wiki/Timeline\\_of\\_the\\_National\\_Basketball\\_Association](https://en.wikipedia.org/wiki/Timeline_of_the_National_Basketball_Association)

The NBA has implemented many new franchises across the course of its existence.

According to figure 1, the league started as eleven teams in 1946, and has now grown to thirty

teams in 2024, or currently. Although thirty teams may seem like a lot, across the decades of basketball being played professionally, we have seen an increase in the number of talented players amongst the entire leagues. Most teams now have about two potential all-star caliber players, in contrast to the past where most teams had one or none. The increase can be an outcome from the increase of media and popularity the sport of basketball has seen since the early 2000s. Hall of Fame players have created national images for themselves, diversifying the league by bringing in more talent from overseas countries and creating a larger pool when drafting new players on a yearly basis.



2 - Victor Wembanyama Shaking Hands with Adam Silver at the NBA Draft - <https://www.nytimes.com/2023/06/22/sports/basketball/victor-wembanyama-spurs-nba-draft.html>

This increase in the talent pool is significant because the league is now entering a phase where every team seems to have a roster full of star athlete talents. Team rosters were always full of professional athletes, but the talent across all areas has seen a huge increase. The implementation of a new team(s) could be exactly what the league needs. Viewership, sales, and popularity all increase to all teams by implementing new franchises. According to Austin Karp,



of the Sports Business Journal, "...NBA League Pass subscriptions are up 12% and League Pass viewership is up 13% globally. Watch time on League Pass is also up 28%. The NBA has generated 19.6 billion views across its social media platforms and the NBA App, up 22% vs. last year." The downside is the less opportunities of securing a good player via draft and or free agency. With two or more teams entering the league, those two more franchises are also looking to secure those players, overall reducing the player pool. It is important to note that the last team added to the league through expansion was the Charlette Bobcats back in 2002, and the last team to relocate was from Seattle, the Supersonics, which moved and became the Oklahoma City Thunder in 2008.

It will take all current NBA sports owners to vote on expansion, but with such promising areas, like Las Vegas, the agreement seems feasible and ultimately more of a question of when? Some sources close to the league look at a potential 2025 expansion, once the current TV deals the NBA has on contract ends. It all comes down to the fans, and, sadly, the money to be made from expansion. The NBA is a business, and since Las Vegas has started capitalizing so much on the sports gambling market, the idea of Las Vegas being a home for a new team seems certain.

### 2.1.2. National Basketball Association In-Season Tournament



3 - The Sphere Advertising the In-Season Tournament - <https://www.nba.com/news/2023-in-season-tournament-debut-official-release>

Starting this current season, 2023-24, the NBA is hosting its newest addition to its regular season format. They have started the implementation of their new in-season tournament. The significance of this addition is that the final portion of the tournament is played in Las Vegas. This tournament is another attempt at bringing sports to Las Vegas, especially basketball. The games were played in T-Mobile Arena but will show basketball executives the potential in the area for an expansion team.

After such a successful competition across all thirty teams, the In-Season Tournament looks to be a massive bright spot for the league moving forward. According to the NBA, the tournament attracted an average of roughly 1.7 million viewers, with most of the coverage airing on TNT, ESPN, and ABC. This is an increase of 4% over the average ratings for the entire season compared to the previous year. The first champions were the Las Angeles Lakers, with the runners-up being the Indiana Pacers, a younger, up, and coming team. The prize included a \$500,000 increase to each player on the winning rosters salaries. Although a high incentive, the event was a huge success not only for the players and league, but also Las Vegas. With this being an annual competition, the city will continue to capitalize on this event yearly, as all fans and sports lovers are sure to attend.



4 - Custom NBA Courts Designed for the In-Season Tournament - <https://apnews.com/article/pacers-lakers-haliburton-lebron-nba-tournament-c71a82580486d59cd3ae050403767188>

T-Mobile Area is a good spot for the tournament to be held as of now, but this thesis project will promote a new basketball facility to ultimately end up hosting this event annually instead. By having this event held right on the strip instead of a few blocks off, sales along the

strip will increase, as the opportunity to stay overnight at hotels and resorts are closer to the event venue.

### 2.1.3. Past Successful Sports Teams in Las Vegas

The list of teams that have moved to Las Vegas is starting to become long. The Oakland Raiders, an NFL team, moved to Vegas and started play in 2020. The Golden Knights, an NHL team, started its franchise in 2017 and has been successful, as they are currently the NHL Champions from last season. The Oakland Athletics, an MLB team, is relocating after league owners voted in November of 2023 to send the team to Las Vegas and hopes of start playing in 2025. Finally, the WNBA team, the Las Vegas Aces, started in the Vegas area back in 1997 and are currently back-to-back world champions in their respective sport (Archie, 2023). It is important to note that the Raiders and the Athletics both used to call Oakland their home, and have a history with that city, but given the success of the Vegas sports market, it is no surprise that these struggling teams decided on the move.



5 - Las Vegas Golden Knights Stanley Cup -  
<https://www.npr.org/2023/06/14/1182071288/las-vegas-golden-knights-win-stanley-cup>

Other sports also have a strong connection to Las Vegas. The international F1 race also took place here on the Strip. This past November of 2023, racers flew down Las Vegas Blvd as fans stacked around to view the Grand Prix. Although, this sport is not as popular here in the

United States as it is over in Europe and other foreign countries, this race showed a huge benefit to both the sport and the city in terms of fans flooding the area, and the increase in audience, which can be looked at as expanding the sports market. It is rumored that the event saw a \$1.3 million dollar increase in sales across Las Vegas just from people staying and visiting the area. Another significant sporting event hosted in Las Vegas was the 2024 Super Bowl. This event was held at Allegiant Stadium, home of the Las Vegas Raiders. The Super Bowl is arguably the most notable sporting event in the United States, and it demonstrates how confident the NFL feels about the Las Vegas area in hosting and planning its grand yearly event. Overall, many exciting events are coming to the area, after so many successful performances have taken place around the area in recent years.



6 - Allegiant Stadium getting ready for the Super Bowl - <https://www.dazn.com/en-US/news/american-football/roger-goodell-opens-door-for-las-vegas-super-bowl-return/1fvs1c7gays8p1iez5p56n57go>

## 2.2. The Natural Environment In Las Vegas



7 - Las Vegas Landscape - <https://www.britannica.com/place/Las-Vegas-Nevada>

With the development of the Las Vegas Strip starting to eliminate most of the vegetation and landscape features in the area, it is important that the new development focuses on how to revive these elements, as well as identify the many plants species that are local to the Mojave Desert. It is important to understand these features, with sustainability being a huge aspect of this thesis. Working together with the environment is important for any project, but with such a naturally hot climate, it is also important to understand how to design in this setting. These two factors are particularly critical for the scope and scale of the proposed project.

### 2.2.1. Nevada Landscape Features

When it comes to the landscape features in Las Vegas, or Nevada more specifically, it can be classified as a dessert with warm extreme climates. Las Vegas is located within the Mojave Desert. “The smallest of the North American deserts, the Mojave supports significant human settlement only in the Las Vegas area and at a few points along the Colorado River” (McNamee, 2023). The Mojave Desert has many characteristics, but some of the features that

make up the area are: its Basin, the range topography, warm harsh temperatures, surprising amounts of species for plants and animals, and many more (Stephens, 2019).



8 - Nevada Basin Feature - <https://luxuryhomeslasvegas.com/discover-calico-basin/>

The basin feature is considered because of its natural looking sink indent. Basins are naturally created through ages of erosion caused from water, as well as prevailing winds. Although these higher elevations may be considered canyons, they are basins because they are considered much smaller in size than canyons. The Mojave Desert is unlike any other desert in North America in that it has a wider elevation range: it starts at 86 meters below mean sea level in Death Valley and reaches over 1,600 meters above sea level on some of its peaks (McNamee, 2023).



9 - High Elevations Overlooking Vegas Strip - <https://capturetheatlas.com/things-to-do-in-red-rock-canyon/>

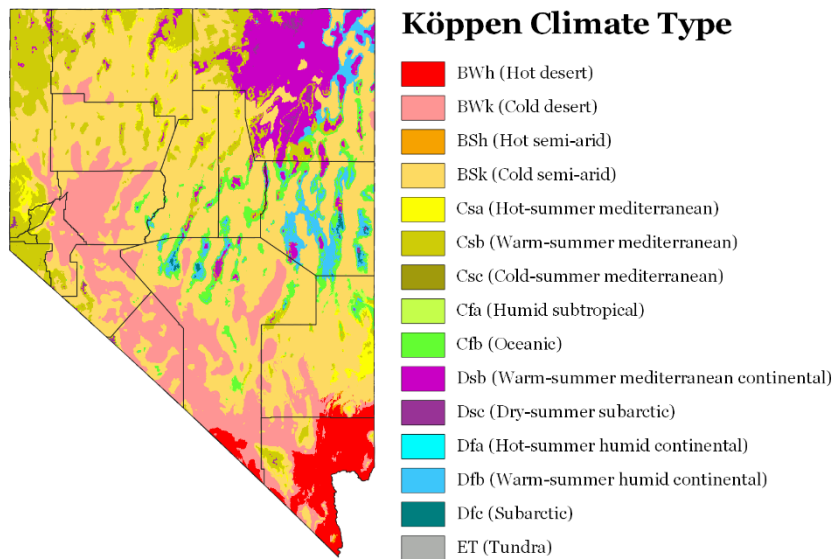
The importance of this feature is that Las Vegas resides entirely in the Basin, with the mountains, or canyons, in the periphery. Not only does it offer major site views of lands, besides the million's lights occupying the Strip, these features help create an environment that is unique to the Southeast portion of our country and is beautiful in contrast of your normal green pastures, and flatter lands in other areas of the United States.

These features play a significant factor in this thesis, because not only does the proposal look towards being sustainable, one of the main goals is to reflect and or revive some of these natural factors into the design process. By understanding these elements, it helps make the site design and ultimately building design more interesting and feasible incorporating the site characteristics. Knowing the basics when it comes to designing in dessert scenes makes building with the natural environment that much easier.



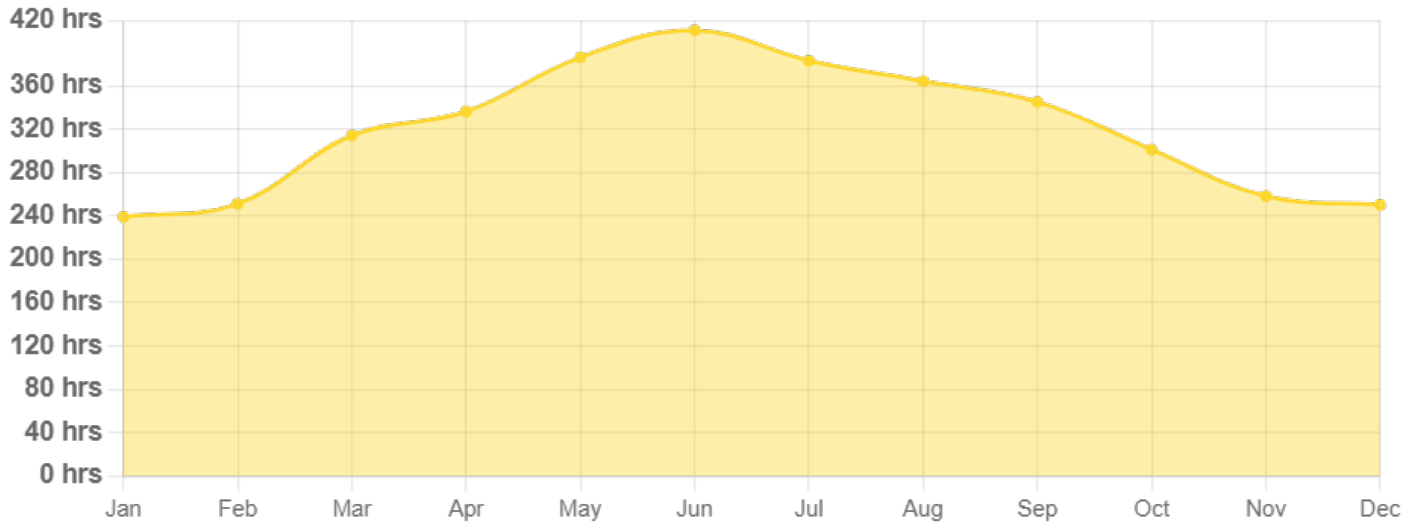
## 2.2.2. Climate Features

### Köppen Climate Types of Nevada



10 - Köppen Climate Classification Map of Nevada – <https://prism.orgonstate.edu>

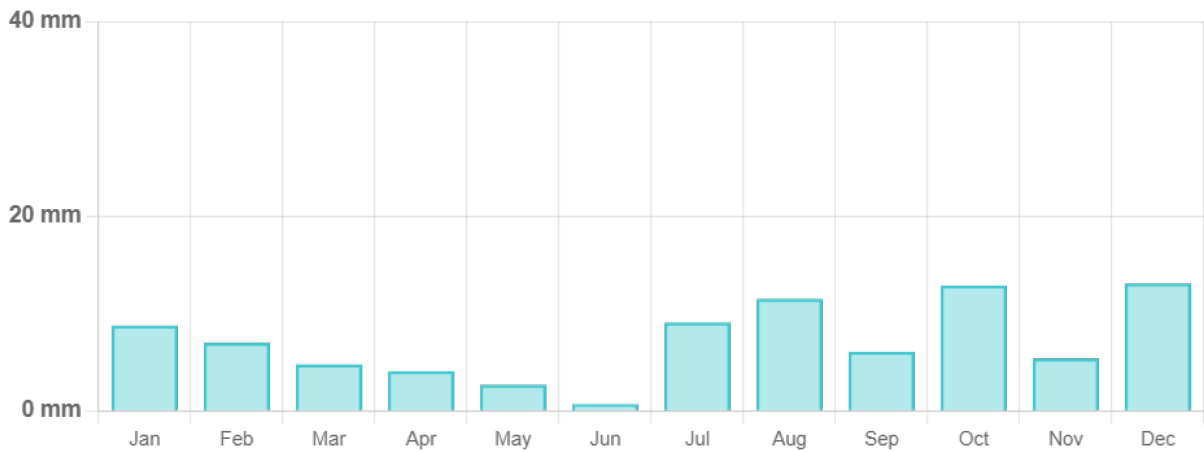
As shown in figure 10, according to the Köppen Climate chart, climate types vary significantly throughout the state of Nevada. In connection to where the proposed project is located, in Las Vegas, our site is primarily in the hot desert climate, or the red portion of the map. With how low in elevation the metropolis resides, the characteristics can apply mainly dry and hot temperatures characteristics. “The Mojave Desert experiences change with the seasons. In winter, freezing temperatures and strong winds can be expected, with rain and snow in the mountains. With enough moisture, spring wildflowers may carpet the desert floor with vivid colors. Summers are hot, and temperatures above 100 degrees Fahrenheit are typical (National Park Service, 2023).”



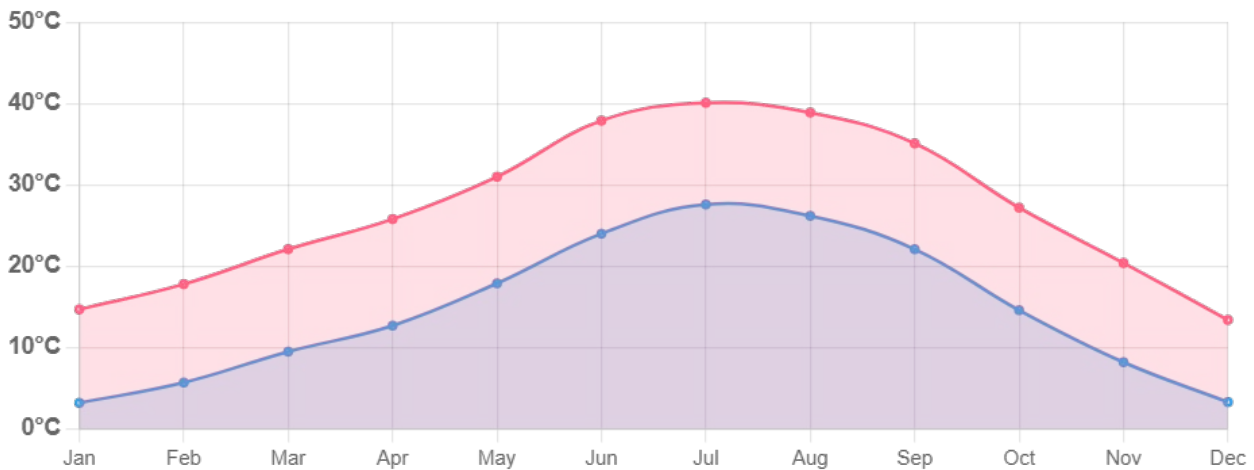
11 - Total Sun Hours Over the Year in Las Vegas - <https://weather-and-climate.com/average-monthly-hours-Sunshine,las-vegas,United-States-of-America>

With little to no rainfall in the year, the dry season makes up most of the qualities of the desert. According to Teresa Bitler, Las Vegas gets 292 days of sun per year, ranking third in the country compared to other cities (Bitler, 2022). This information is important for the proposed project to understand how the material selection would be picked, how the sunlight can be converted sustainability for energy, and how to approach shading and other devices to help with outdoor features and throughout the concourses of the sports facility.

In contrast to the semi-arid climate of the Sonoran Desert or the cold-temperate climate of the Great Basin, the Mojave Desert and the Chihuahuan Desert have warm-temperate temperatures in the summer and cool temperatures in the winter (Sonoran Desert, 2024). According to figure 11 above, you can see the area is heavily sunny year-round, but the most comes in the Summer, May through July. And according to figure 12 below, you can see the little amounts of monthly precipitation, resulting in the areas dryness.



13 - Monthly Precipitation of Las Vegas - <https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,las-vegas,United-States-of-America>



12 - Average Day and Night Temperature in Las Vegas - <https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,las-vegas,United-States-of-America>

### 2.2.3. Nevada Vegetation

About 70% of the Mojave ecoregion is covered by the creosote bush-white bursage association, which is the main vegetation among the land and desert. One of two species of saltbush is heavily prevalent on the fine soils of bajada bottoms (where alluvial fans at a mountain's base combine), whereas creosote bush and white bursage are found in the central sections of bajadas. Spiky Mandora, Wolfberry, Ephedra, Golden Head, Ratany, Fremont Dalea, and Yellow Paper Daisy are some more significant plants (Noss, 2023).



14 - Nevada Vegetation - <https://www.gaiaflowers.com/blog-flower-shop/flower-shop/plants/13-las-vegas-native-plants-and-their-rare-flowers/>

At higher elevations, remnant stands of Pinyon pines, White Fir, and Juniper can be found; Joshua Trees and yuccas can be found at lower levels. By finishing their life cycles swiftly during the brief winter and spring wet season, before the desert is dry and uninhabitable, most annual plants can avoid drought periods. These species are the grasses and wildflowers that, in favorable years, cover the desert in a lovely carpet of color. Shrubs, which frequently lose their leaves during dry spells, and cacti, whose leaves are reduced to a spine, are examples of drought-resistant plants. (Noss, 2023) The cactus's thick stem retains water, while its spiky leaves shield the stem parts from the sun. Reviving some of these vegetation elements throughout the site and proposed project helped with adding a green and sustainable approach to the Strip. It works as shading devices, adds identity and unique characteristics from its home surrounding environment, and reduces noise from the heavily busy traffic and pedestrians passing by.



15 - Joshua Tree - <https://www.nps.gov/moja/learn/nature/plants.htm>

## 2.3. Sustainability

Sustainability was a core consideration of the proposed project. Given where the site is located, there should be many opportunities to create significant differences for the building and surrounding environment around. Moving forward, we as architects need to be able to design and build sustainably. Designing with the natural environment is key in any project, but what was important in this thesis project was being able to utilize the sun climate and water pump systems/hydraulic services from the Hoover Dam to revive the vegetation and produce sustainable energy.

### 2.3.1. Sun Energy Opportunities

As mentioned in the previous section, Las Vegas gets 292 days of sunshine. With such a large amount of energy coming in daily, there are many ways of capturing this energy. These factors work in a system that makes lots of sense for the area and ultimately is what the Strip needs for all future endeavors. There are many cases of solar panels located in the Nevada area, and these devices are used specifically to capture sunlight energy. The benefit of this resource is the continued use of natural energy and reduced energy costs.

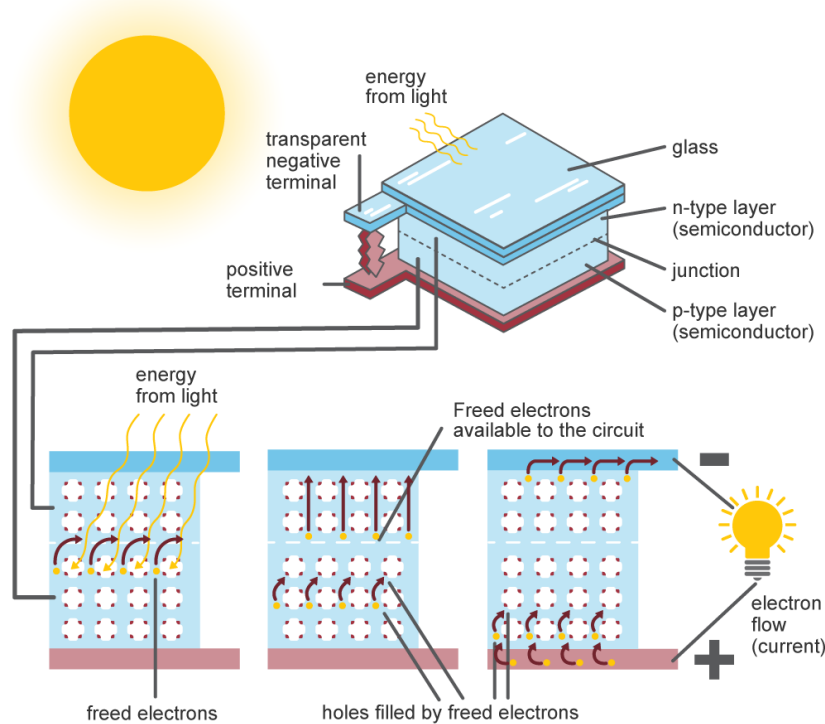


16 - Solar Photovoltaic Panels - <https://www.nrel.gov/research/re-photovoltaics.html>

Not only is this the best route for the Strip due to high demand of energy, but it is the cheapest long-term solution and gives the city of Las Vegas more energy for the rest of the commercial spaces across the Strip. Overall, reducing the carbon footprint, as global warming continues to play a growing role throughout our planet, helps Vegas continue to move in a friendlier, and more sustainable way.

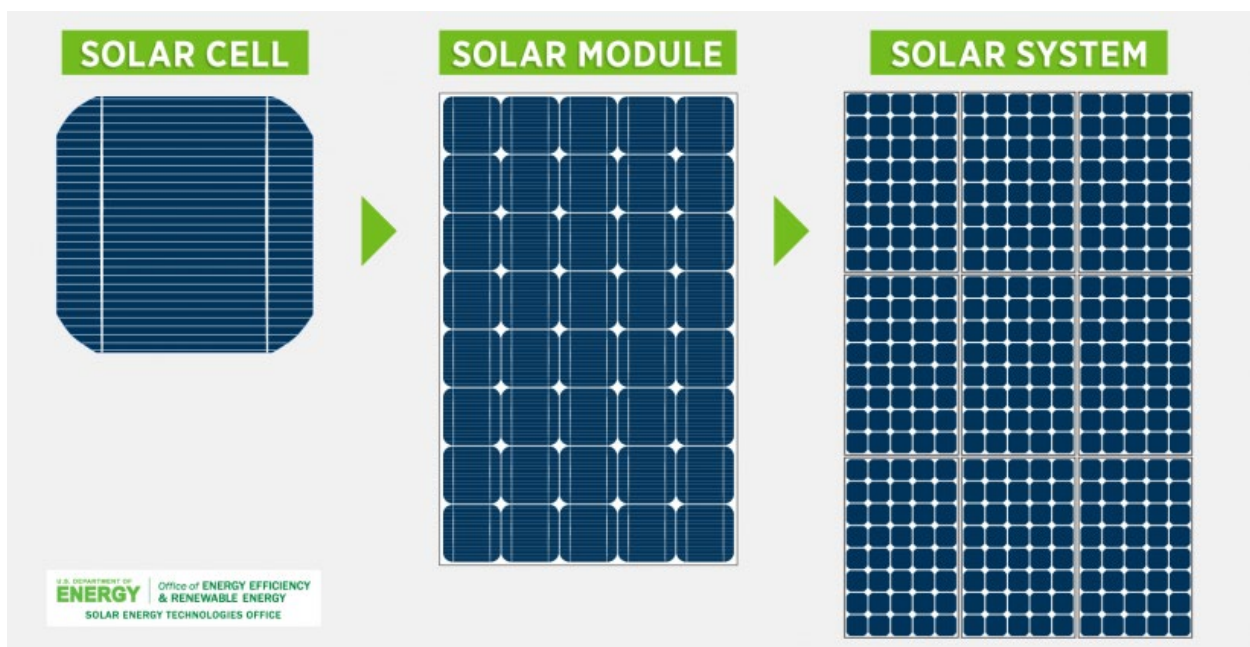
Sunlight is made up of photons, or particles of solar energy, which have different amounts of energy that correspond to the different wavelengths of the solar spectrum. A photovoltaic (PV) cell, also known as a solar cell, is a nonmechanical device that converts sunlight directly into electricity. Some PV cells can also convert artificial light into electricity (U.S. Energy Information Administration, 2023).

### Inside a photovoltaic cell



17 - Photovoltaic Cell - <https://www.eia.gov/energyexplained/solar/photovoltaics-and-electricity.php>

The packaged, weather-tight PV panel, also known as a module, is made up of PV cells that are electrically connected. PV panels come in different sizes and have varying capacities for producing electricity. The electricity-generating capacity of a PV panel increases with the number of cells or surface area of the panel. PV panels can be connected in groups to form a PV array, which can consist of anywhere from two to hundreds of PV panels. The quantity of electricity generated by a PV array depends on how many PV panels are connected in the array (U.S. Energy Information Administration, 2023).



18 - Solar Layouts - <https://www.energy.gov/eere/solar/articles/pv-cells-101-primer-solar-photovoltaic-cell>

By incorporating a lot of these photovoltaic systems on the exterior faces of the proposed thesis project, there will be many energies efficient methods to be utilized. Such as lighting usage, HVAC systems, and even abilities to provide energy to surrounding buildings if needed. The pros are endless, and the cons are strictly only for the initial costs. The benefits outnumber any suggestion that might present itself, making this sustainable element crucial to the environmental aspects of the design.



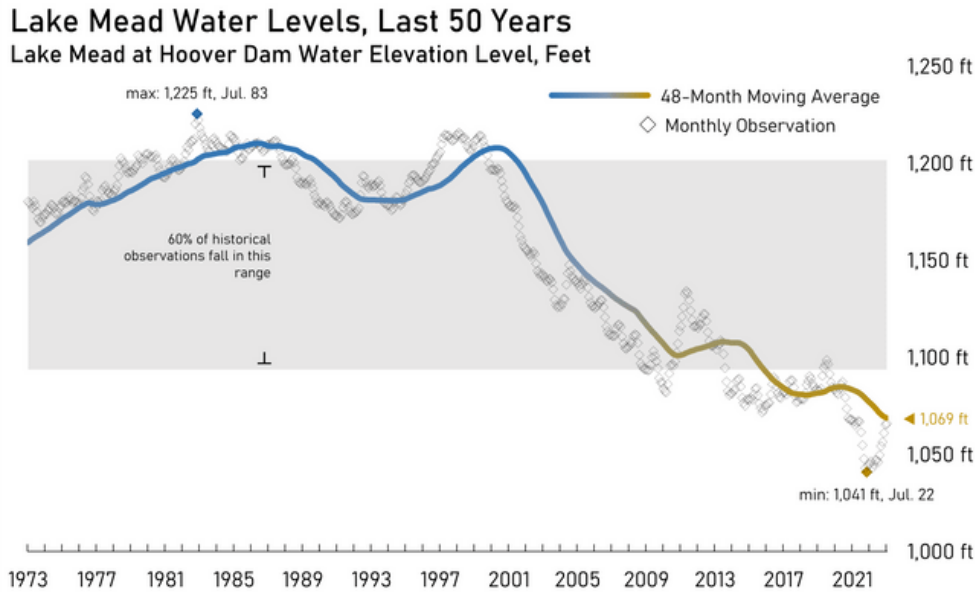
### 2.3.2. Hoover Dam Hydraulic Systems

“Hoover Dam generates, on average, about 4 billion kilowatt-hours of hydroelectric power each year for use in Nevada, Arizona, and California - enough to serve 1.3 million people. From 1939 to 1949, Hoover Powerplant was the world's largest hydroelectric installation; today, it is still one of the country's largest” (Bureau of Reclamation, 2024). This aspect of sustainability needs to be utilized for power usage systems. In many similar aspects mentioned in the previous section, this is another source of renewable energy, ultimately pushing the sustainability elements further.



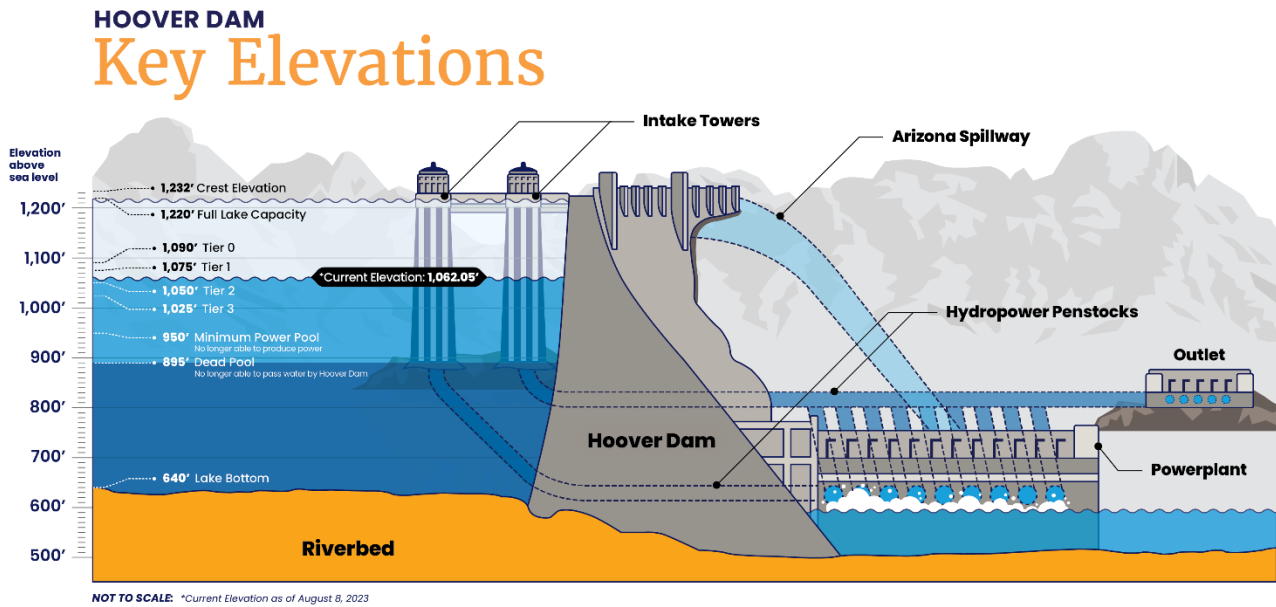
19 - Hoover Dam - <https://pennyelectric.com/blog/hydroelectric-power-hoover-dam-works/>

“Hydroelectric power plants are efficient. Modern hydro turbines can convert as much as 90% of the available energy into electricity. (Fossil fuel-fired plants can convert 50% of the available energy into electricity at best, and unlike water, they release harmful pollutants into the atmosphere.) Water is a naturally occurring resource, so there’s no worry about unstable prices, transportation issues or production strikes” (Santilena, 2017).



20 - Lake Mead Water Levels - <https://usbr.gov/lc/region/g4000/hourly/mead-elv.html>

A reservoir behind the dam, the Hoover Dam in this instance, holds a large amount of water. There is a water intake near the base of the dam wall. Water falls through an internal sluice in the dam called a penstock due to gravity. A turbine at the end of the penstock is powered by the swiftly flowing water. The turbine's shaft ascends into the generator, which generates power. The generator is connected to power lines that provide electricity to residences and commercial buildings across a certain area. The size of the dam determines how much electricity it produces (Santilena, 2017).



21 - Hoover Dam Elevation - <https://knowyourwaternews.com/hoover-dam-a-look-at-its-infrastructure-and-the-importance-of-key-lake-mead-levels/>

It is safe to say that solar power and hydraulic power are both great sustainable approaches to any project. Since each renewable energy source has advantages and disadvantages of its own, there is no one that is superior to the others. It has been impossible for scientists to isolate a single natural energy source that would be optimal in every situation. Though it needs a lot of area and is not suitable for most places, hydropower is more dependable than solar electricity. Although solar power is more compact and can be installed on individual buildings, it might not be the best option in areas with little sunlight or obstructions that make it more difficult to capture solar radiation. Depending on your location and electricity requirements in the end will show which system is more feasible for selective projects. For this proposed project, located in Las Vegas, Nevada, it is safe to assume that solar energy is more beneficial. With the constant energy flow coming from the high amounts of sunny days, this offers a stronger and more efficient approach. With how much of the energy produced coming from the Hoover Dam goes to other states as California and Arizona, research suggests that this isn't as reliable compared to solar energy. However, for the highest sustainability practices for this proposed project, it is useful to benefit and utilize both.

## **2.4. Public and Community Spaces**

Public and community spaces give members of society the opportunity to experience places with other individuals and share knowledge, interests, and passions. These spaces also can engage certain audiences in correlation to hosting events and other meet ups to bring community aspects together.

### **2.4.1. Positive Effects on Community**

When creating a space for a wide range of audiences, it is important to design for everyone. With the use of community spaces, plaza spaces more specifically, large masses of people can be accommodated for a variety of events. Whether it's for spending time on the weekend, passing through on the way to some dinner across the street, or even spending time with friends before going to the sporting event being hosted, these spaces find a way into all community members who interact with them. Users of these large community spaces can vary significantly. Since this thesis project focused on the concept of arena design, and is located on the Las Vegas Strip, the intent was to create a space that could be utilized by fans, locals, and even tourists, as a place that would serve as a common ground. Nothing needs to happen here, the goal was to create a place that would allow anyone the opportunity to enjoy being in the area, meeting new people, sharing ideas, and ultimately being happy in their environment.

While parks and other green areas are often associated with public spaces, this research characterizes public spaces as places where people engage in public life. These include parks, plazas, streetscapes, waterfronts, and other permanent cultural assets like historical sites or museums, as well as publicly accessible socioeconomic assets like farmers' markets, "streeteries," and pop-up cafes (Bridle, 2024). It has long been established that public places improve the health, environment, economy, and social well-being of the communities they are a part of. We are becoming more and more aware of the importance of urban open spaces as we expand our cities. A central city center can feel more like an urban neighborhood by incorporating open space, which includes both green and gray spaces. When designing these spaces, it is important to conceptualize on narrating a tale that connects with locals and unites them in an urban hub with a distinct personality (Koh, 2021). A compelling narrative can foster a sense of community between spaces and its visitors by appealing to their excitement when trying something new, their shared experiences, or their shared beliefs.



22 - Outside Plaza Space - <https://www.wbdg.org/space-types/plaza>

The surroundings of an urban site should be considered when planning it. A design can integrate into bigger systems when it is aware of the site's environment. New venues that don't consider the wider picture aren't likely to attract people or fit in with the surrounding area. Some more things to consider when designing public spaces include the need to mitigate the effects of passing traffic. This covers everything, from reducing noise to ensuring our kids' safety (Bridle, 2024). Provide multimodal transit choices, like bike lanes, parking lots, and walkways. More people will use your park if they can reach it more widely. This covers everything, from creating accessible drop-off locations for people with impairments to including smart design features for our elderly population (Delagran, 2024). Improve the connection between the area and the nearby circulation paths. Aim for easy connections and many ways to get in and out of spaces because this design should entice people to take a little detour to explore it.



23 - Flamingo Sculpture - <https://www.wbdg.org/space-types/plaza>

## 2.4.2. Features to Implement

There are many features that will be incorporated into the proposed plaza space, which will consume much of the project site. There are many strategies and modern-day solutions towards creating a successful community and or plaza space. Implementing the right features will pave the way for the success of the arena design, the sustainability features, as well the goal of bringing the locals back to the strip.



24 - Outside Basketball Court painted by Nick Ansom - <https://www.architecturaldigest.com/gallery/best-designed-basketball-courts-world>

The first piece I would like to implement would be a public outdoor basketball court. Since the proposed thesis project is centered around creating a basketball arena, this outdoor court seems appropriate. With such high traffic potentially at the site at once, the idea of vandalism seems little, and the opportunity to really enhance the area by inserting colors and abstractness directly on the court seems like a great choice. The intent was to bring inspiration and drive community members to feel closer with art when consuming this space. This strategy will bring in an audience not even there for the sporting events, but more so just to use the space.



It is important to note that there are few existing parks or recreational spaces with these qualities, so offering an outdoor activity on the Las Vegas Strip strengthens the overall project.

The next project component would be an outdoor auditorium, or flex space. The proposed project can vary in size, either hosting larger or smaller events, but the idea is to be able to hold mass amounts of people when needed. For bystanders passing by, or even for smaller local events looking to be hosted, this space can be utilized in many ways. Seen across parks all over the United States, these type of spaces gives numerous opportunities to showcase events outdoors. Since Vegas offers year-round favorable climate conditions, this asset needs to be utilized. This design feature is almost primary motivated by the likelihood that there will be fans, and locals, who can't afford tickets inside, but still want to experience the atmosphere and energy the Vegas sports team brings to the area by watching and listening in. This space could also be used for many other events as well, such as plays, concerts, to even watch parties, which gives it lots of flexibility.

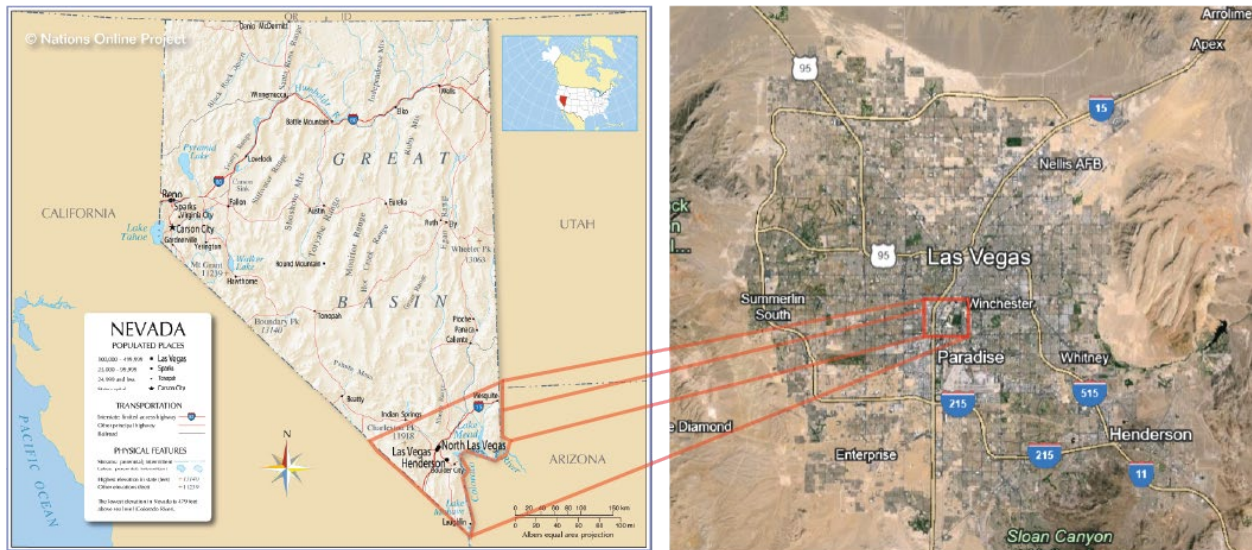


25 - Outdoor Auditorium Seating - <https://news.iu.edu/live/news/27088-students-departments-making-the-most-of-open-air>

### 3. Methodology

#### 3.1. The Site

The big reason I decided on my site being located here in Las Vegas, was from spending my past summer here for my last internship. I called Nevada home for about three months, and ultimately felt so much inspiration that I knew I had to do my thesis here. When considering the Strip, there are many factors to consider. With trying to tackle the problem of bringing locals back to the Strip, I thought this proposed project had lots of opportunity. In sync with my ideas of reviving the vegetation, creating large public/plaza spaces, sustainable factors for the surrounding area, and ensuring public safety helped develop the project even further, and helped choose this site for the proposed thesis.



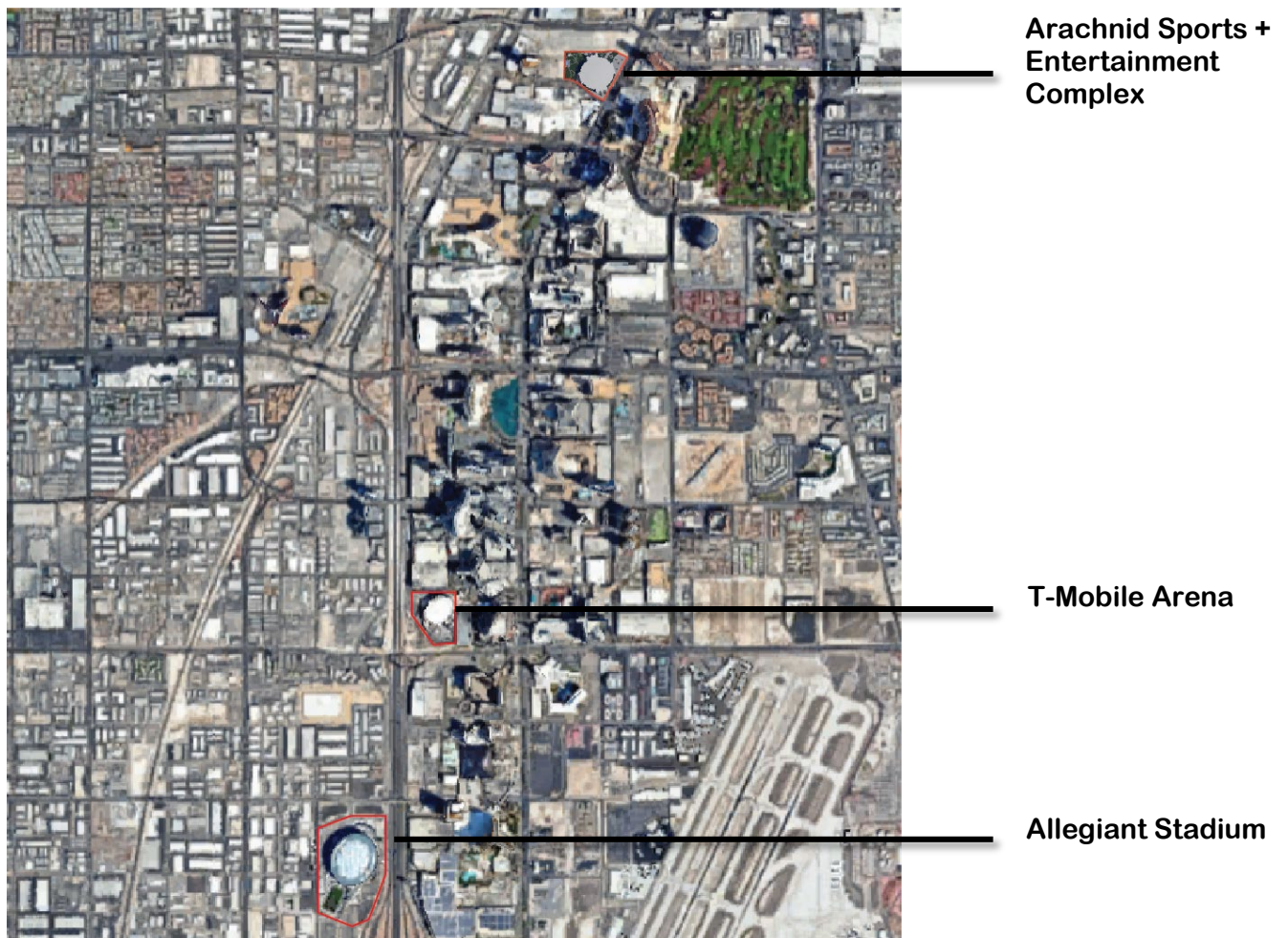
26 - Map of Nevada - [https://www.nationsonline.org/oneworld/map/USA/nevada\\_map.htm](https://www.nationsonline.org/oneworld/map/USA/nevada_map.htm)



27 - Site Plan of Selected Site - [www.googleearth.com](http://www.googleearth.com)

Although the project indeed is a large sports facility, this site offers great foot traffic and lots of marketing with the location being positioned right along the busiest road, Las Vegas Blvd. Along with major hotel corporations around as well, such as the Wynn and Encore resorts, the goal is to capitalize on hosting events with the benefit of being in walking distance from ultimately anything any individual would be needing, such as food and lodging. The site also is right across the street from Fashion St Mall, which offers lots of retail and entertainment. It is important to note that the site is currently lying vacant, and research confirmed that there weren't any future developments in the works.

Another positive of the site is it is North a couple of blocks from the busiest part of Las Vegas Blvd. By electing to use a lot away from areas such as the Bellagio, Caesars Palace, or even the MGM Grand Resorts located more South, we get away from tourist hot spots. This is key to accomplishing the goal of bringing locals back. Although we are still on the strip, we avoid the areas where high masses of people will be in effort to make my thesis more feasible. I was also avid about avoiding the South areas considering T-Mobile Arena lays just Southwest of my desired spot. There is also less overall traffic in this area that not only helps with congestion of people in the area in terms of safety, but also still offers enough transportation routes to get people in and out of the site.



28 - Map of the Las Vegas Strip - [www.googleearth.com](http://www.googleearth.com)



29 - 3D Image of Selected Site - [www.googleearth.com](http://www.googleearth.com)

I aimed to position my facility with the front entrance facing the Southeast most part of my site. This offers the most sunlight in terms of sustainable factors and visibility, the safest and friendliest main approach, and lastly gives the opportunity to create a massive community orientated plaza space that lives around the facility for all visitors. Shown in figure 29 above, there is also a major public parking lot on the North end that can also be utilized for visitors to the site. Although the main emphasize is accounting for foot traffic, transportation is still a major element considered when choosing the selective site for this proposed thesis project.

## 3.2. Case Studies

### 3.2.1. T-Mobile Areana



30 - T-Mobile Areana Facade - <https://www.t-mobilearena.com/arena-information>

Location - Las Vegas, NV

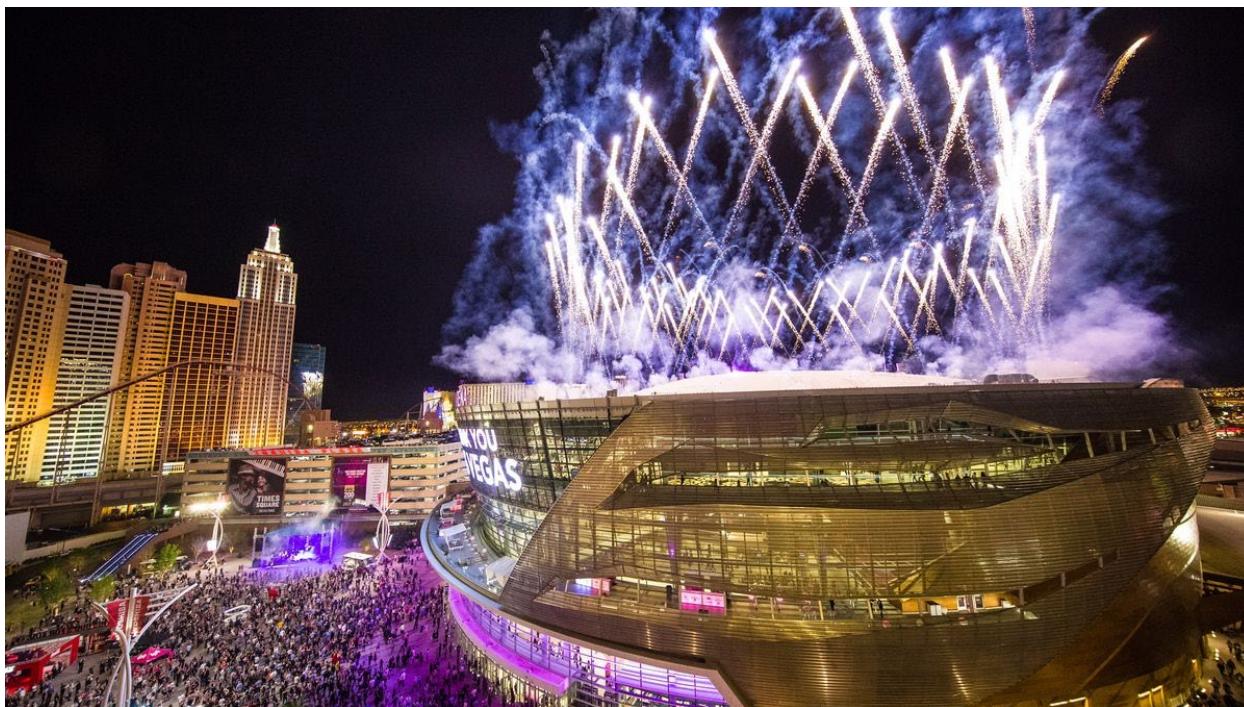
Building Owner - MGM Resorts International & Anschutz Entertainment Group

Architect(s) - Populous

Size - 650,000 sq ft

Date Completed – 2017

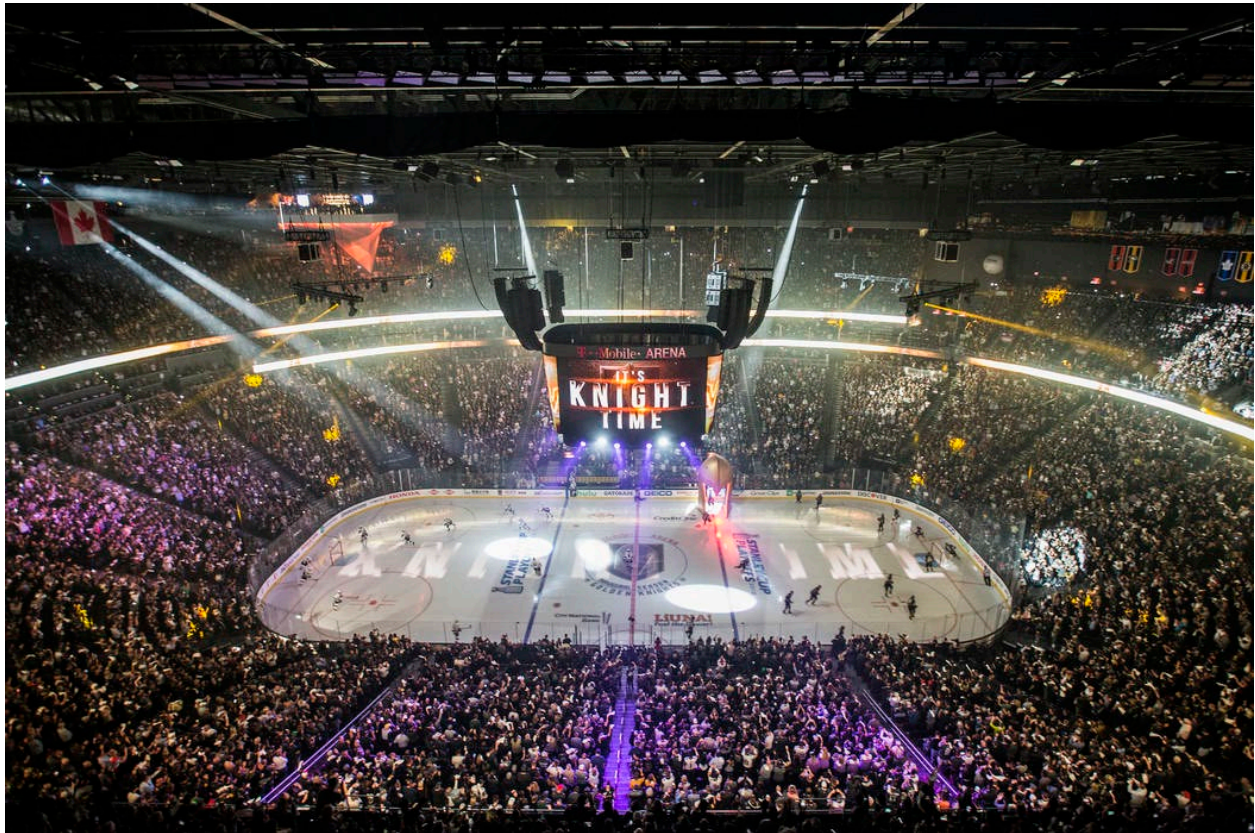
T-Mobile Arena is a gateway that is in the heart of Las Vegas. With the energy filled entertainment market on the east and the mountain range mixed with extreme desert conditions, sometimes referred to as, “No Mans Lands,” to the West. Opened in 2017, this arena has become a new venue for all local community members and fans or tourists to come interact the spaces. Accommodating large masses of people in its arena design, this case study was also selected for its approach of plaza spaces, and its material selection that reflects the Mojave Dessert.



31 - T-Mobile Arena Plaza Space - <https://vegas.eater.com/2018/5/25/17390874/t-mobile-arena-las-vegas-golden-knights-restaurants>

Overlooking the space between the New York-New York and Monte Carlo casino resorts is a massive mesh wall featuring a bright magenta, 9,000-square-foot LED show. The metallic exterior of the building mimics the scorched golden tones of the desert on which the town is situated, while the LED board symbolizes the energy of the city, according to the Metal Construction Association. The venue's south and west faces are intended to reflect the scorching Vegas sun, while its north and east sides serve as an entrance to the city (Metal Construction Association, 2024).

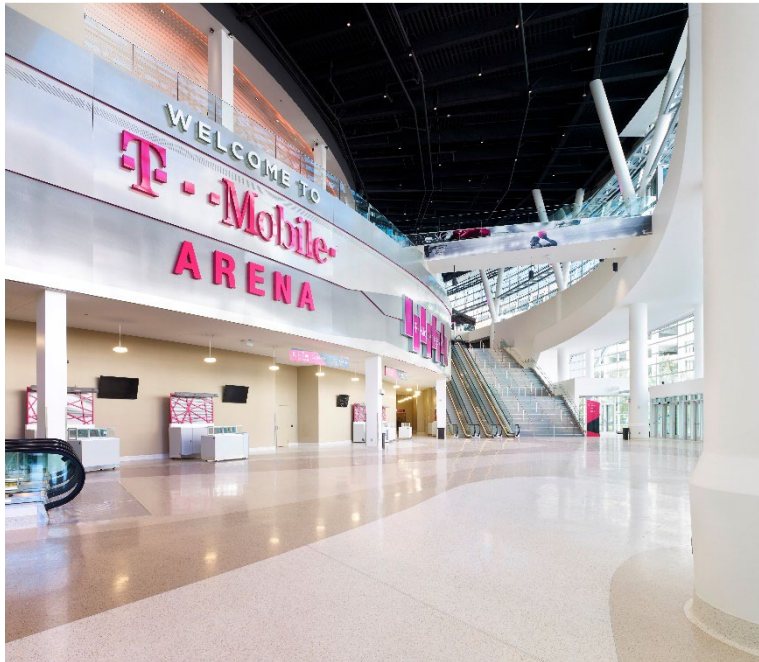
For the multi-use stadium to accommodate the biggest names in music, important UFC and boxing events, basketball games, and other events, it needed a building envelope that could not only survive the hot desert weather but also deliver thrilling aesthetics. However, there was even more exciting news in store for T-Mobile Arena, the new home of the NHL's newest team, the Golden Knights (Metal Construction Association, 2024).



32 - Inside Arena - <https://www.reviewjournal.com/sports/sports-columns/ron-kantowski/how-knights-keep-their-ice-cool-during-hot-las-vegas-temps/>

Achieving LEED Gold rating required combining eco-friendly design principles with sustainable metal products. As a matter of fact, T-Mobile Arena is the first stadium in Las Vegas dedicated to sports and entertainment to receive LEED certification—the gold standard for high-performance green building design, construction, and operation (Metal Construction Association, 2024).





33 - T-Mobile Main Lobby - <https://www.t-mobilearena.com/book-the-arena/arena-event-spaces>

During construction and design phases, to ensure the LEED certification, some of the highlights included using mass amounts of recycled steel for the exterior façade. In addition, 40% of the other materials were obtained from local businesses in Nevada or surrounding states. Once constructed, the construction team also had over 80% of waste recycled. “To reduce energy consumption, high-efficiency LED lighting was installed, and high efficiency heating, ventilating and air conditioning systems are used in the restaurants (MGM Resorts, 2023).” The design team also introduced an on-site well that helped with irrigation of water, ultimately reducing the use of water from the city’s main supply. Lastly, a more sustainable aspect, the designers also introduced a 100-kW rooftop solar array that helps power the entire arena. With this strategy, T-Mobile arena can power most events held, through the captured energy of the sun daily.

### 3.2.2. Chase Center



34 - Chase Center Entrance - [https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center\\_o](https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center_o)

Location – San Francisco, California

Building Owner – GSW Arena, LLC

Architect(s) – MANICA – Gensler - Kendall Heaton Architects

Construction Cost - \$1.4 billion

Size- 900,000 sq ft

Date Completed – 2019



35 – Chase Center Main Lobby - [https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center\\_o](https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center_o)

The Oakland Arena, which became the second-oldest facility in the National Basketball Association at the end of the 2018–2019 season, was home to the Golden State Warriors for 47 years. Every night, the tech sector elite from Silicon Valley and Oakland's working-class residents filled the arena due to the Warriors' incredible success—three NBA titles in the previous five years. The Oakland Arena, which was notable for its diamond exterior bracing, perfectly cylindrical shape, massive parking lot, and near-absence of amenities, was somewhere between a functionalist masterpiece and a midcentury dump. The Warriors are well-liked in Oakland, San Francisco's more progressive and grittier stepsister. Golden State required modernization. They chose a new city in addition to a new arena (Stephens, 2019).

The newest structure in San Francisco's Mission Bay is the Chase Center Arena. With 18,000 seats and 200 events per year, the cutting-edge sports and entertainment complex was built in 2019. MANICA Architecture and Kendall Heaton Architects designed the mixed-use project, while Mortenson Clark Joint Venture oversaw its construction. In addition, the arena features a 5 1/2-acre bayfront park, a 35,000 square foot plaza, and 100,000 square feet of retail space (Enclos, 2023).



36 - Center Court - [https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center\\_o](https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center_o)

The Chase Center's interior features a narrow seating bowl and rather steep sightlines, which are intended to highlight basketball and allow for a variety of music arrangements. According to Manica, the facility has roughly twice as many features as any other arena within a medium-sized architectural shell. For example, the main lobby has a four-story atrium with spectacular escalator rides through open air and space-age, Saarinen-esque flourishes. Together with the royal blue and golden yellow of the Warriors, white and blonde wood dominates the

space, giving it a crisp, Scandinavian vibe (Stephens, 2019). The author, Stephens continues by mentioning the Modelo Cantina, an upper deck lounge that is partially intended to look nice on television, looms over the north-end baseline from what feels like miles above the ground.

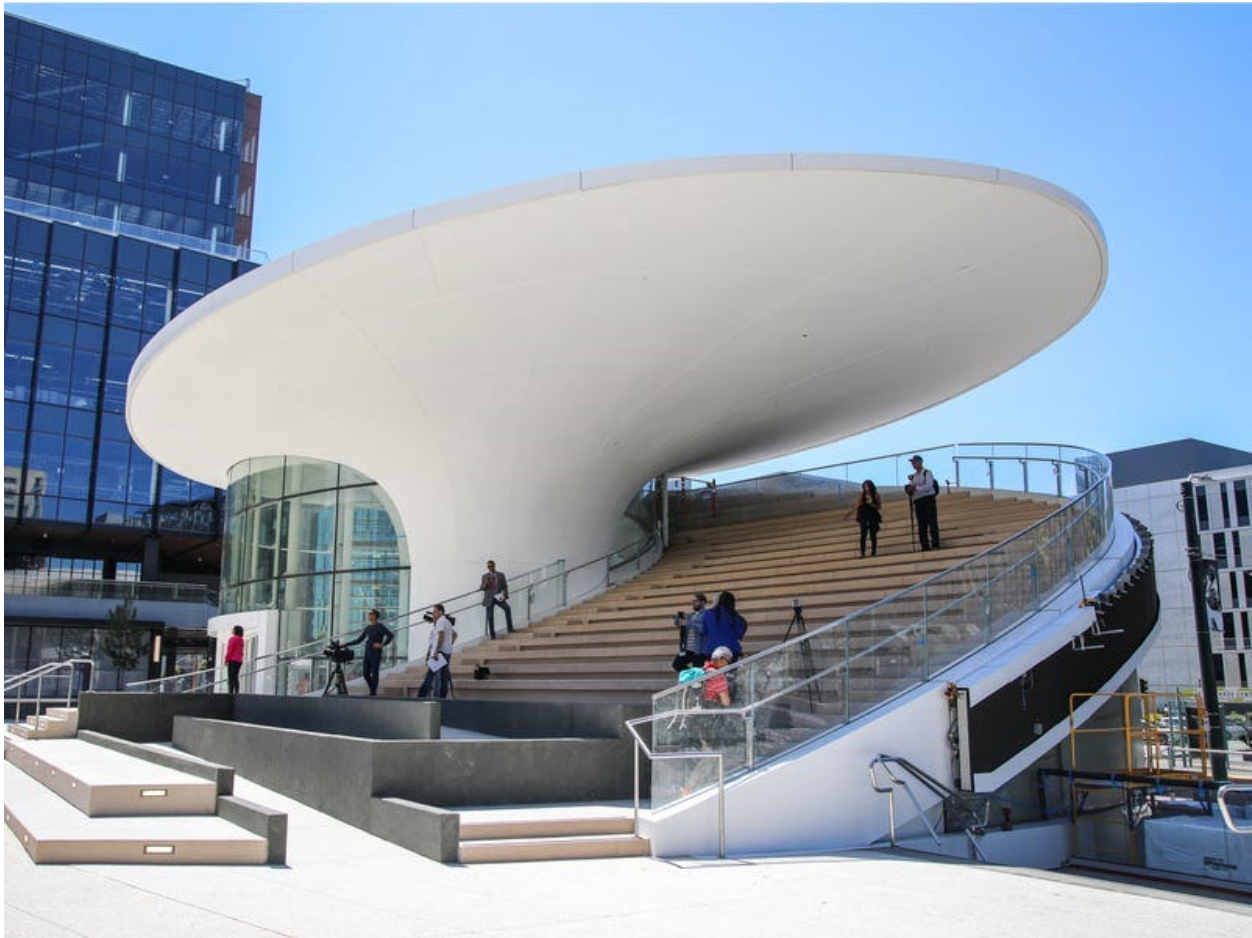
Manica told Stephen they wanted home viewers to be able to identify the arena, which is quite an accomplishment considering how identical the interiors of most stadiums seem (Stephens, 2019).



37 - Chase Center Plaza Space - <https://www.clarkconstruction.com/our-work/projects/chase-center>

The 14 drums that make up the arena massing design vary in size. Every drum is stacked atop the other to create a rain-screen enclosure with 1165 mega-panels—each one distinct and made up of several smaller metal panels—for a total of about 7500 individual panels (Enclos, 2023). The secondary steel trusses supporting the outer rain-screen metal panel envelope span the cavity back to the building's primary air and water barrier. The collaborative design-assist

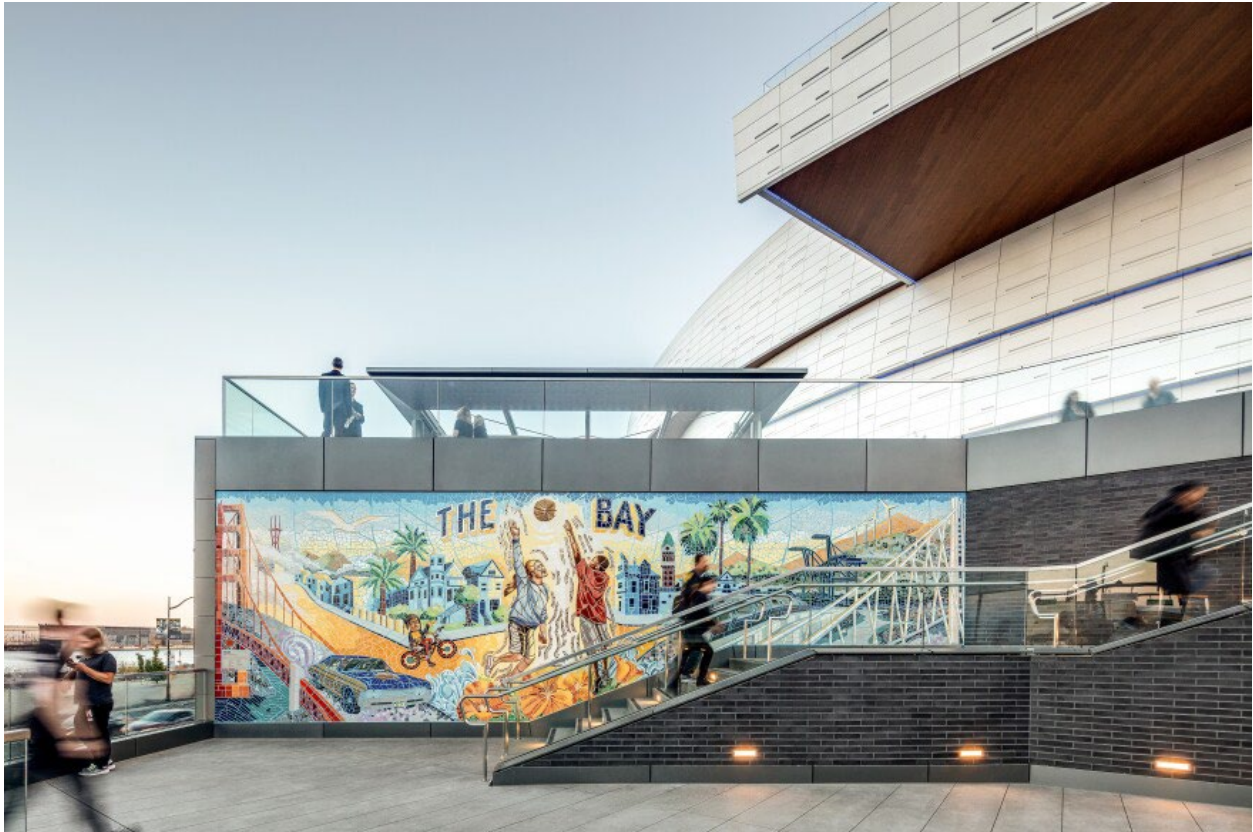
phase was centered on optimizing panel layouts, secondary steel geometry, and interface elements back to the primary structure (Stephens, 2019).



38 - "Thrive City" Chase Centers Plaza Space - <https://www.businessinsider.com/chase-center-golden-state-warriors-stadium-san-francisco-photos-2019-8#kaisers-corporate-slogan-was-used-as-part-of-a-partnership-between-the-healthcare-company-and-the-warriors>

The center's most visually striking exterior element might be the entry plaza, which is about the size of two basketball courts. It is framed on the east by the arena and a large television screen that is fixed to the building's façade, and on the west by a glass pavilion that houses an amphitheater that was built by design office, Shop. The entire drum is surrounded by a public walkway that descends from the entry plaza through a charming passageway resembling a box canyon on the south side and a paseo with eateries and the NBA's biggest team store on the north side (Stephens, 2019). The author continued the outdoor features by stating on the east side are

plazas and a flight of stairs that gaze out over the bay. The most charming design feature of the Chase Center is located there: a wall-length mosaic created by the local group Precita Eyes Muralists, that features the Bay Area in all its quirky glory, complete with Victorian homes, BART trains, cargo cranes, low-rider bikes, and a multicultural game of playground basketball, as shown in figure 39 below. (Stephens, 2019).



39 - Plaza Mural - [https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center\\_o](https://www.architectmagazine.com/design/luxury-and-layups-at-the-chase-center_o)

### 3.2.3. Beijing National Stadium



40 - Beijing National Stadium - <https://arquitecturaviva.com/works/estadio-nacional-en-pekín-6>

Location – Beijing, China

Architect(s) – Herzog & de Meuron

Construction Cost - \$423 million

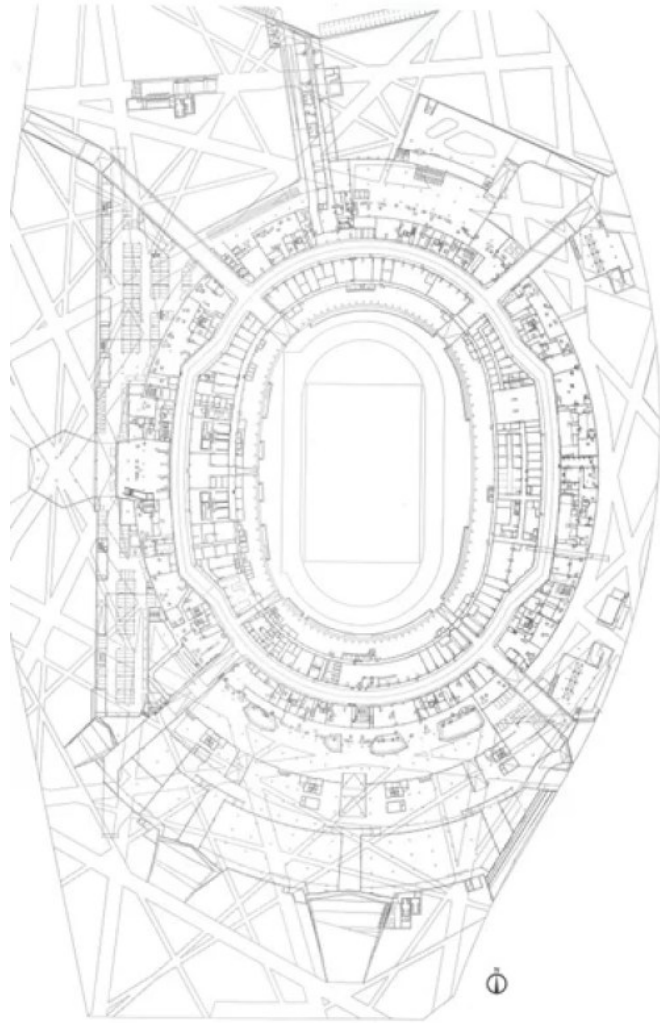
Size- 258,000 sq ft

Date Completed – 2008

Seating Capacity – 91,000 (with 11,000 temporary seats)

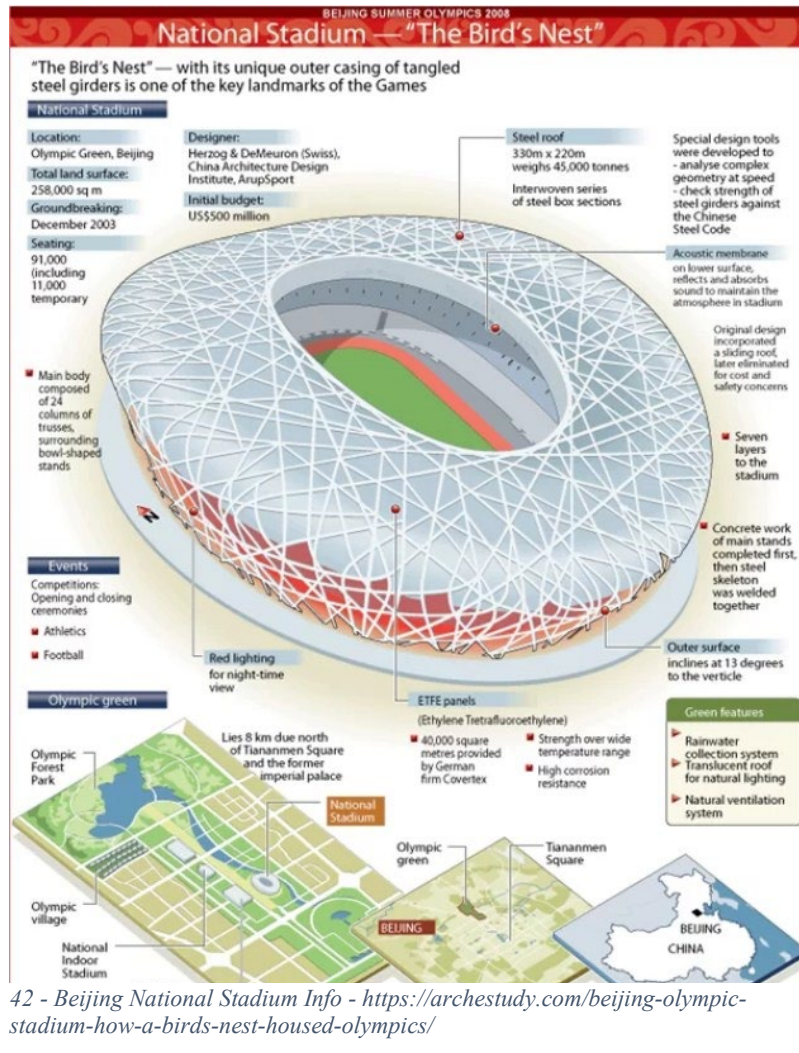
Beijing National Stadium is a spectacular landmark building situated south of the Olympic Green centerpiece. It hosted the 2008 Olympic Games from August 8–24, 2008, including the opening and closing ceremonies, athletic track, and field events, of the 29th Olympiad. In addition, the stadium hosted the Summer Paralympics from September 6–17, 2008, and the Race of Champions 2009 (*Beijing National Stadium, “the Bird’s Nest”, China, 2022*).





41 - Beijing National Stadium Floor Plan - <https://archestudy.com/beijing-olympic-stadium-how-a-birds-nest-housed-olympics/>

The project's gross floor area is approximately 254,600 square meters. The Olympic stadium features an elevated platform at its entrance where guests can take in a panoramic view of the entire Olympic complex. The stadium and plinth merge into a single element. In addition to walkways leading into the stadium, the visitor's zone amenities include sunken gardens, stone squares, bamboo groves, etc. The goal of any sports building's planning is to provide improved views for every spectator that visits the venue (Ansari, 2021).



According to Ansari, the façade of the Beijing Olympic stadium consists of steel and concrete. The stadium consists of basically two structures. One is the concrete bowl-like structure inside the stadium and the other is the steel-framed structure. The contrast between the grey steel structure and red-painted concrete inside the stadium is well demonstrated in figure 42 above. This structure, during night lights, looks like a sun that emits light. Initially, the concrete structure inside the stadium was completed first to create an illusion of a bird's nests. The form of the stadium has been built with massive steel beams and pillars, as the existing steel brands did not have the flexibility required for the stadium. As a result, they created a brand-new steel

called Q460. The steel beam begins at the outer floor, extends above the façade, curves to form the roof, and then bends once again to reach the stadium's floor (Ansari, 2021).



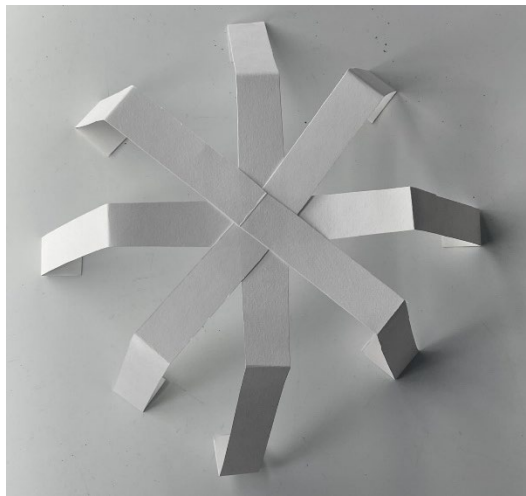
43 - Beijing National Stadium Exterior -  
<https://archestudy.com/beijing-olympic-stadium-how-a-birds-nest-housed-olympics/>

To create the illusion of randomness found in the bird nests, the steel beams and columns are designed to run randomly but in a balanced manner. The stadium's roof cladding is made of ETFE (Ethylene Tetrafluoroethylene) film to protect spectators from wind and rain (Ansari, 2021). Approximately 46,000 square meters of single-layer ETFE films were used in the stadium. The primary structure of the steel frame is made up of 24 girders that are welded together as a single structure. The secondary structure consists of columns and struts that braided to link all the beams. The third structure consists of stairways and provided a frame for the roof.

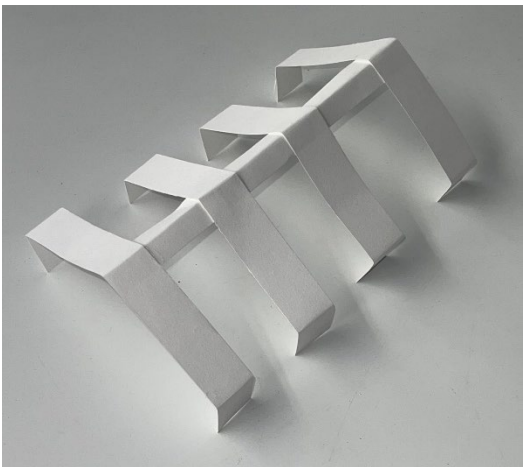
A major reason for selecting this case study for the proposed thesis project was for its inspiration in its structural systems. This major sports facility was able to create beautiful, exposed structure elements that also worked as exterior features. Long steel beams and columns worked for all the structural needs and provided an eye appealing resemblance along with it from a bystander's perspective. The goals that were laid out with the proposed thesis project were to create massive steel beams, also exposed, that worked as one of the main design features that showed structural elements can be used in design aspects as well. Being able to design efficiently and design friendly by accommodating large masses of people through approaches and material selection was the goal of the Beijing National Stadium, and ultimately, inspired this thesis project to follow along in many characteristics.

### 3.3. Structural Models and Process

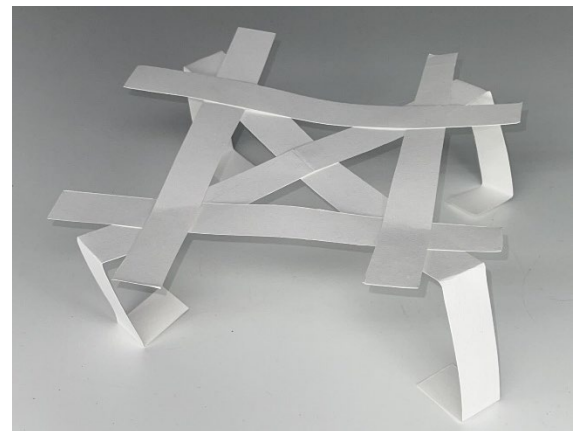
What started as a simple system grew to a much more complex concept. I grew interested in an overlapping sequence, that resembled symmetry and had supports going along each edge creating an octagon shape. This led me to a “tic tac toe” concept that ultimately led the way for this proposed project. With a few adjustments, I created the elements of the structural system incorporated in my sports facility.



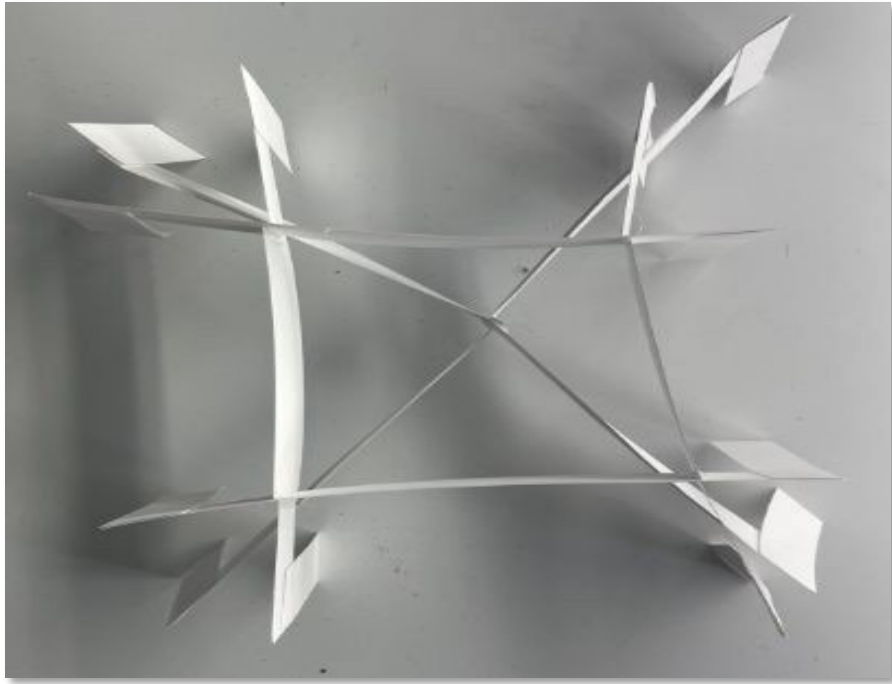
44 - 2nd Structure Model



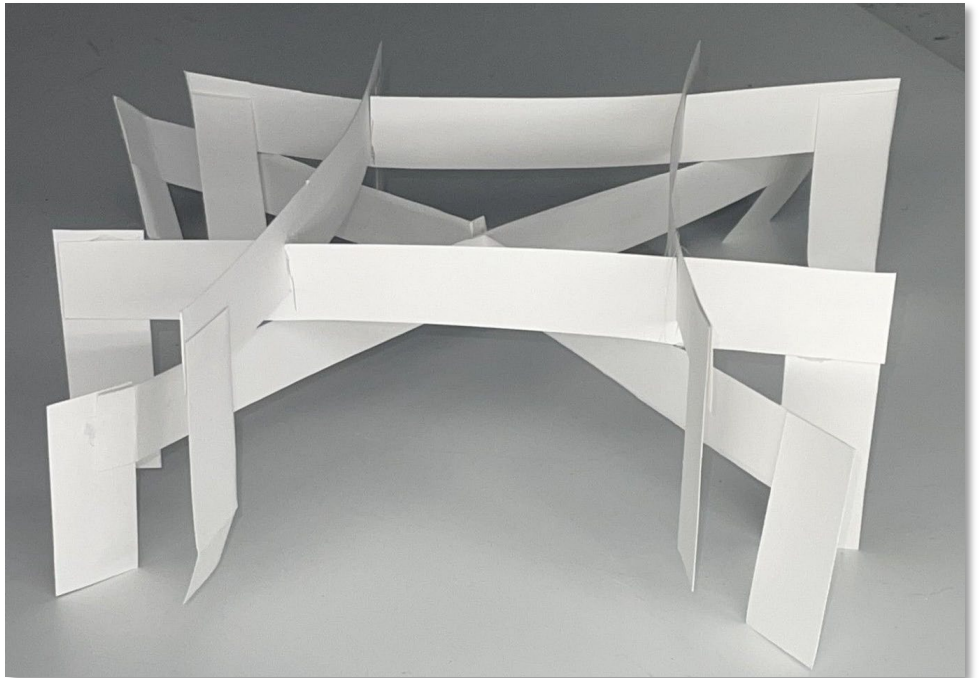
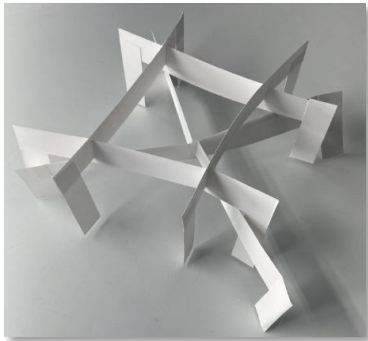
46 - 1st Structure Model



45 - 3rd Structure Model

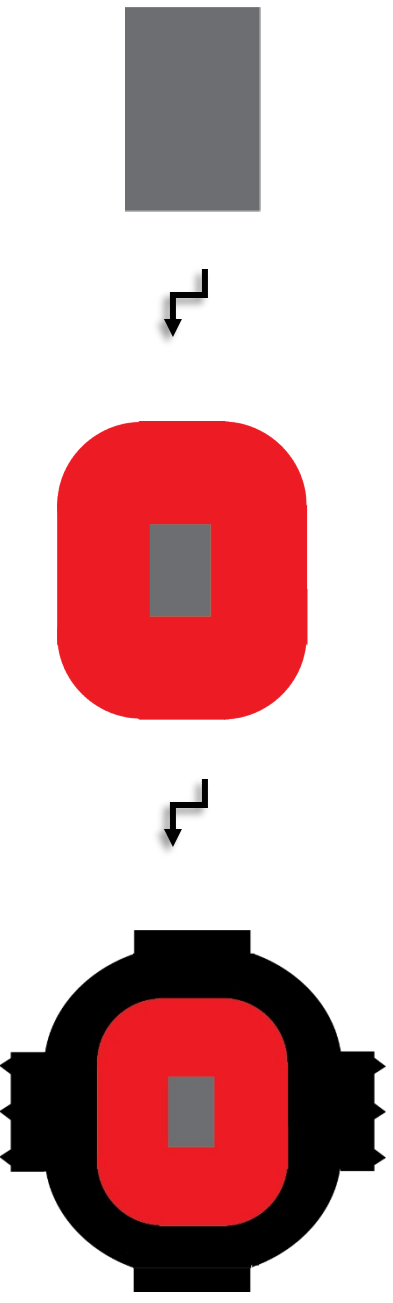


47 - Final Structure Model



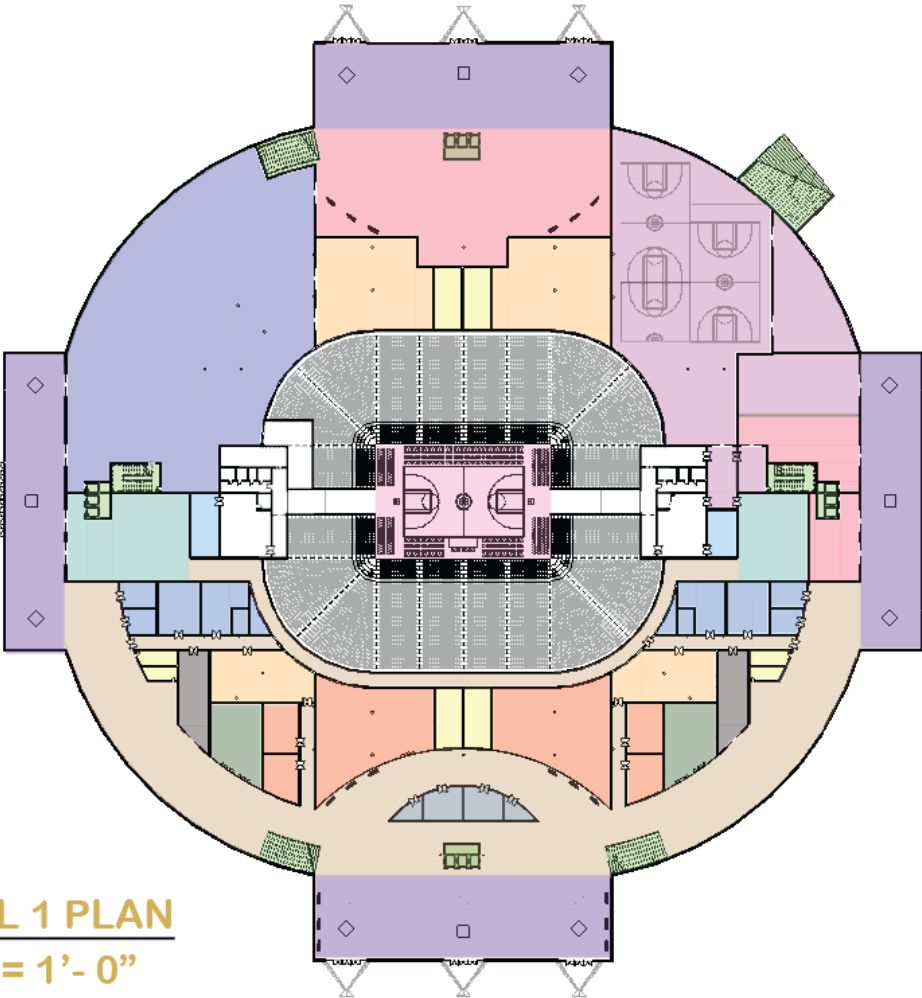
48 - Final Structure Model Perspectives

The process was simple. I started with the main basketball court and centered that on my site where I thought gave me the most space to expand outwards. From there I went about adding my general seating, as well as the locker rooms, and my entrances from the concourses. After working with slopes and figuring out the best way of providing optimal site views for fans to enhance my seating obstacle, I was able to work more on my main concourses, or general circulation. This gave me the opportunity to shape my exterior boundary. Once this was obtained, laying out the rest of my rooms/spaces came naturally. I laid out my stairs and elevators, my major spaces such as VIP suites, concessions, team store, and bathrooms, of course, which ultimately filled up the rest of my areas. Although the shapes are generic, I was happy to see my program fit into these spaces and provide an efficient facility that safely welcomes its guests and events.



49 - Design Process Graphics

### 4. Design Solutions



**Key:**

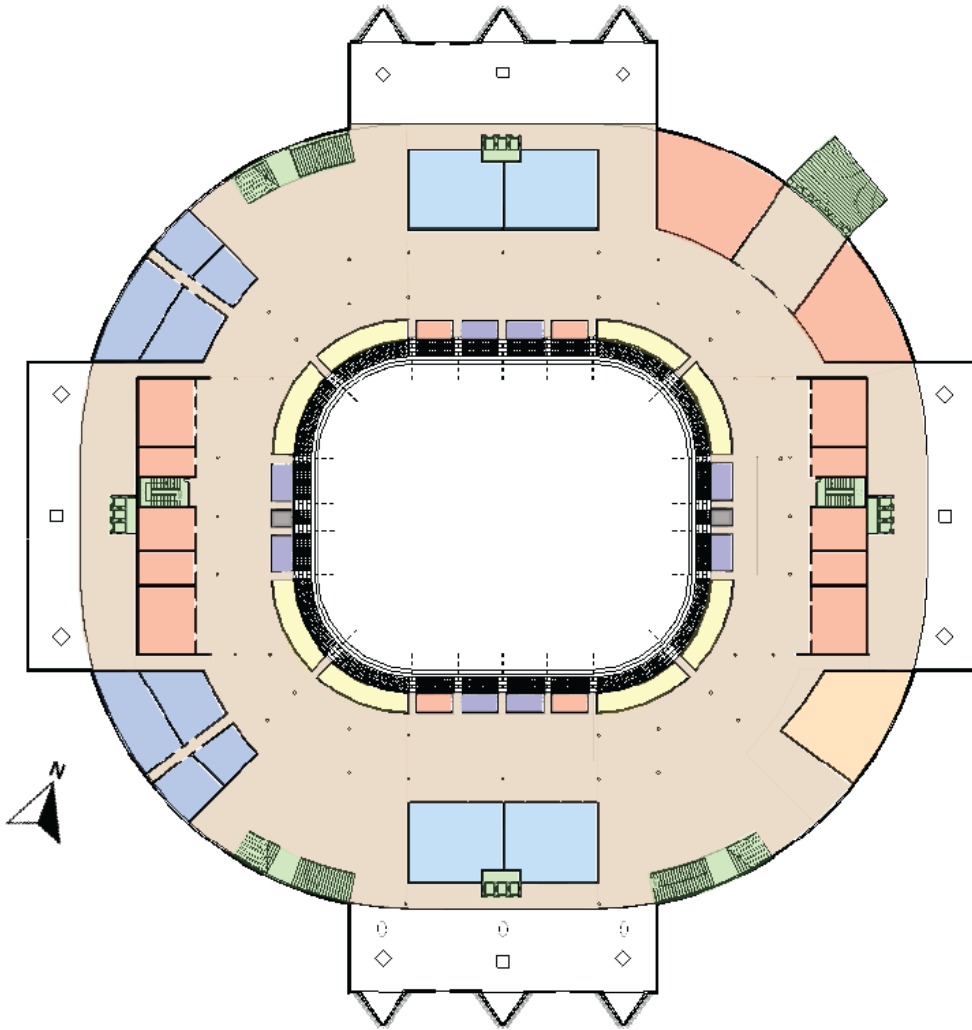
	Lobbies
	Flex Spaces
	Player Facilities
	Mech.
	Restrooms
	Parking
	Stairs + Elevators
	Locker Rooms
	Coaches Offices
	Courtside
	Media
	Admin.
	Storage
	Retail
	Reception/Tickets
	Circulation



**LEVEL 1 PLAN**  
 1/32" = 1'-0"

50 - Level 1 Floor Plan





**Key:**

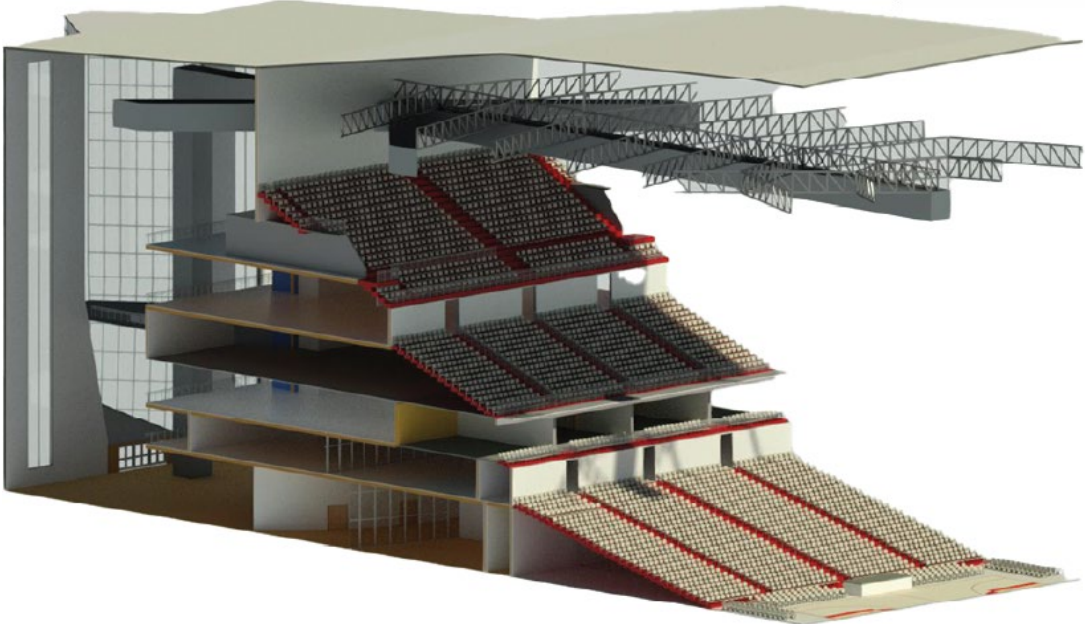
	Restrooms
	Stairs + Elevators
	Court/Bleachers
	Team Stores
	VIP Suites
	Admin.
	Storage
	Retail
	Mech.
	Circulation

51 - Main Concourse Floor Plan

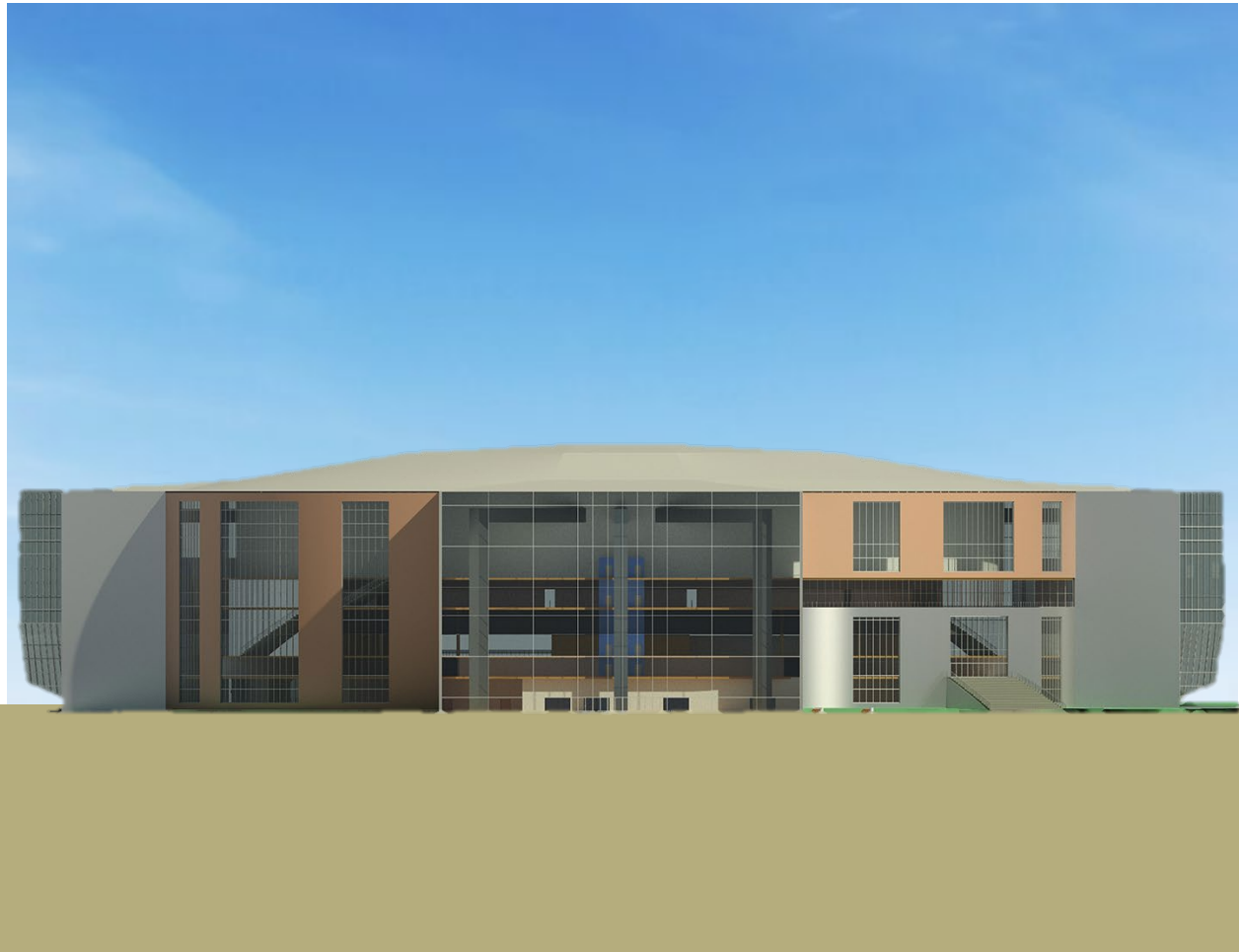


52 - Northeast Section Cut

**3D ISOMETRIC**



53 - 3D Isometric



54 - East Elevation



55 - Birds Eye Perspective



57 - Front and Main Entrance



56 - Main Lobby



58 - Indoor Arena



59 - Outdoor Plaza Space

## 5. Final Thoughts

After going through the thesis program here at NDSU, I can firmly say I feel more prepared for my future career in architecture. I was able to freely choose the path of my project and appreciated being able to make my own design decisions for one last school project. My project was inspired through my experiences and admire to want to challenge myself. However, I believe this proposed thesis project, with its large scale of it, lacked in certain areas. I am not a professional, yet, but projects this size are extremely challenging, and is not something that can be accomplished, or solved, in a year's span.

I am a major sports fan, and although seeing arenas and sports facilities like this inspires me and ultimately draws me in as an architect, these projects require lots of collaboration and in my opinion, should be a joint project if someone looks to follow in my footsteps of large-scale sport facilities for their thesis in the future. I felt as if certain areas of this proposed project were lacking because of the selective amount of time given to complete, and not enough time given to each design aspect and phase. If given more time, I know this idea and project could've been carried out much better. However, I was proud of the way this project came together at the end. There was enough time to carry out the key design intentions, and although some challenges weren't completely solved, I believe this project fulfilled its problem of bringing locals back to the Las Vegas Strip. I categorized this project as a piece of the puzzle, towards ultimately solving that issue, and making more community orientated spaces in that environment through much more development and projects of similar typology.

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