

Applying Design Criteria for Autism Spectrum Disorder to the Design of
Public Sports Facilities

A Thesis

Submitted to the

Faculty of Miami University

In partial fulfillment of

The requirements for the degree of

Master of Architecture

Department of Architecture and Interior Design

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2021

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Applying Design Criteria for Autism Spectrum Disorder to the Design of Public Sports Facilities

ABSTRACT

In the last twenty years the prevalence of autism spectrum disorders has increased from 1 in 166 children diagnosed in 2004 to 1 in 59 children being in 2018 in the United States¹. Despite these growing numbers, the needs of this growing population have received limited consideration in the design of public event spaces, such as sport facilities and arenas. Design that is attentive to the needs of people with autism spectrum disorder has led to established criteria for design of residential and education sectors such as Mostafa's ASPECTSS Index, but more focus needs to be placed on other types of public spaces such as sports arenas. The result of the research is the development of seven design criteria that can be used to both analyze existing facilities as well as in the design of new facilities. The design criteria allow for the adjustment to the sensory stimuli, as many individuals with autism have sensory processing issues, rather than relying on spaces that eliminate sensory stimuli, the design criteria allow individuals with autism a similar experience as that of the neurotypical individual. The methodology includes personal accounts from interviews and personal experience, literature concerning the concerns of individuals with autism, universal design, and case studies analyzing and assessing sports venues, and residential facilities that support the experience of individuals with autism. The design criteria applied to case studies reveals design strategies with broad relevance to public spaces. Through these methods of research, the intent is to identify design criteria that will increase the

quality of life of those on the Autism Spectrum by opening opportunities that they would have previously avoided due to sensory processing difficulties.

Introduction

As stadiums and sport facilities are designed now, a large population is not able to have the experience of going to games or participating if they wanted to. Sports arenas are designed to create a specific experience for the spectator that includes loud noise, crowds, lights, etc. For an individual with autism, who most likely experiences sensory sensitivities, this environment can be intimidating and somewhere that is avoided. Autism Spectrum Disorders have become more prevalent in the last 20 years and will most likely continue to increase. Individuals with autism experience things differently and this can isolate and prevent the individual from having opportunities that neurotypical individuals take for granted. Can a sports facility for both spectating and participating accommodate those with cognitive differences without losing the experience that makes people want to attend entertainment events such as sports games?

To explore this question, survey responses, personal experience, literature concerning individuals with autism, current design methods for autism and universal design, and case studies evaluating current sports venues and residential facilities for individuals with autism. The research of current design methods for autism in

¹ Gaines, Kristi, Angela Bourne, Michelle Pearson, and Mesha Kleibrink. *Designing for Autism Spectrum*

Disorders. New York, NY: Routledge, Taylor & Francis Group, 2018.

residential and educational venues will lead to the development of a set of design criteria for sport facilities. These design criteria will be used to evaluate case studies of Little Caesars Arena and The Virginia G. Piper Sports and Fitness Center for People with Disabilities. The intent of this research is to develop a set of design criteria and design methods that will allow individuals with autism opportunities in sports facilities for both participating and spectating.

Autism Spectrum Disorders

I spent a summer working with Ellie, a young girl with autism, at a summer camp. I saw her sitting out of the main assembly where the other children were dancing and singing because the noise was too much. I saw her having to sit in the hallway during the talent show because she was too overstimulated by the crowd. She was forced to go on the field trips meant for the younger children when she should have been with her peers at the pool, but it was decided she could not handle the pool. Her autism caused her to have sensory issues as well as behavioral issues when she was overwhelmed, and she missed out on many things because she could not be accommodated.

Autism Spectrum Disorder (ASD) is a group of cognitive disorders that all share characteristics and developmental delays. Autism Spectrum Disorder (ASD) is a grouping of four disorders (figure 1) that share similar characteristics that can range from mild to severe. Autism Spectrum Disorders are defined by three key developmental delays: social interaction, language communication skills and stereotyped, repetitive behavior. The severity of these can help to determine the diagnoses of the child.

Author Olga Bogdashina notes “though autistic people live in the same physical world and deal with the same ‘raw materials’, their perceptual world turns out to be strikingly different from that of non-autistic people”². Individuals with autism experience the world differently because they perceive the information that they receive from their senses differently. Of those diagnosed with autism, 90% show symptoms of sensory abnormalities³. In the DSM-5 (Diagnostic Manual for Mental

AUTISM SPECTRUM DISORDERS DIAGNOSES

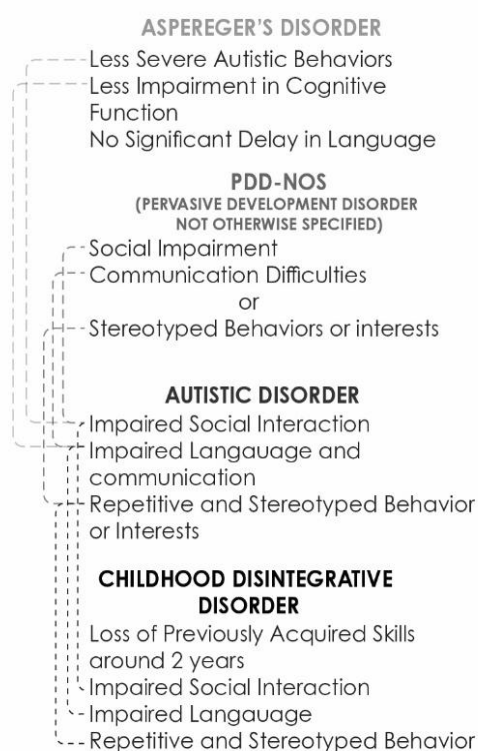


Figure 1: Autism Spectrum Disorders Diagnoses (Diagram from author)

Disorders-Fifth Edition), hypo- and hyper-sensory reactivity is included as criteria for the diagnosis of ASD.

According to Gestalt Theory and Sensory Integration Theory, individuals with autism take in and process stimuli

² Bogdashina, Olga. Sensory Perceptual Issues in Autism and Asperger Syndrome: Different Sensory Experiences - Different Perceptual Worlds. London: Jessica Kingsley Publishers, 2016.

³ Kilroy, Emily, Lisa Aziz-Zadeh, and Sharon Cermak. “Ayres Theories of Autism and Sensory Integration Revisited: What Contemporary Neuroscience Has to Say.” *Brain Science* 9, no. 68 (March 21, 2019).

differently than a neurotypical individual. Gestalt Theory is a framework which says that there is an automatic tendency to perceive stimuli as meaningful wholes rather than as individual perceptual elements⁴. Sensory Integration Theory refers to the ability to intake, process, organize and use the sensory information that allow individuals interact with their environment⁵. Individuals with autism do not perceive stimuli as a whole and they cannot process and organize information in the same manner as a neurotypical individual. Both these theories explain why an individual with autism becomes overwhelmed by sensory stimuli. For the perception of a space, the stimuli are the combination of all the senses being processed and organized, then combining those to experience the whole.

Design Criteria

When designing for individuals with autism the goal is to not get rid of the sensory stimuli, but rather to provide the individual with autism a chance to adapt to the stimuli. The intent is to provide individuals with autism with a similar experience to the one a neurotypical individual may have when experiencing the same place.

In a sports facility, the experience for a neurotypical individual probably includes noise, crowds, and flashing lights. All of these are essential to the “typical” gameday experience, however, because of

Magda Mostafa's ASPECTSS Index

- Acoustics
- Spatial Sequencing
- Escape Space
- Compartmentalization
- Transitions
- Sensory Zoning
- Safety

Figure 2: ASPECTSS Index

the way individuals with autism process these stimuli, they can become overwhelming quickly. To allow the individual with autism to become accustomed to these stimuli, seven criteria have been developed that can be applied in this setting based on existing research.

The Autism ASPECTSS Design Index was developed by Magda Mostafa, a leading expert in design for autism. The index shown in Figure 2 comprises different design criteria that can be used when designing or to evaluate existing designs. The Index was designed for use in educational and residential spaces, therefore not all are applicable to a sports facility. The following seven-criteria

AUTISM DESIGN CRITERIA FOR PUBLIC SPACES



Figure 3: Design Criteria

⁴ Bölte, Sven, Martin Holtmann, Fritz Poustka, Armin Scheurich, and Lutz Schmidt. “Gestalt Perception and Local-Global Processing in High-Functioning Autism.” *Journal of Autism and Developmental Disorders* 37,

no. 8 (July 2006): 1493–1504.

<https://doi.org/10.1007/s10803-006-0231-x>.

⁵ Kilroy, pg. 2

framework for public spaces is a combination of some of the ASPECTSS design criteria and others that can be used in the design of sport facilities as well as residential and educational. Multiply criteria is needed to meet the needs of the wide range of individuals on the Autism Spectrum.

Acoustics

Acoustics and its management are highly prioritized on the ASPECTSS Index. This criterion calls for a reduction in the noise level, but not soundproofing of the space. Sound is a major issue in a sports facility and individualized acoustic controls are needed to allow the individual with autism the control. For Ellie, the young girl with autism who I worked with for a summer, she was given noise cancelling headphones and her camp experience changed. These headphones allowed her to attend the main assembly with her campmates. She would wear them at the beginning, but many times she would take them off during the assembly and be ok with the acoustic levels. The headphones gave her the control to hear all the singing or not and allowed her to adjust to the noise. Ellie is one example of one child with autism and does not represent every individual with autism because autism is a spectrum disorder and includes a wide range of individuals who may react differently to sensory stimuli. Through the following design criteria, Ellie may help guide us to consider how spaces are used and understood through the experience of one person with autism.

Escape Spaces

In *Designing for Autism Spectrum Disorders*, author Kristi Gaines, Angela Bourne, Michelle Pearson and Mesha Kleibrink describes escape spaces as “an area of solitude where the [individual with autism] can retreat to relax and regain control”⁶. An escape space can be an alcove in the circulation space that allows the individual with autism to escape from

the crowd briefly or an enclosed space that isolates the individual from the environment completely. Many individuals with autism seek privacy when entering a new space; this can be a corner or a window in an alcove that allows them to look out away from the space. At the summer camp, the director worked with a special education teacher to create a quiet room for anyone who needs it. This room was used by more campers than just Ellie, many needed to escape from the hectic camp and go sit and read or play a board in the quiet provided by this escape space. An escape space benefits more than just individuals with autism and can be beneficial to any individuals needing to escape for a bit.

Sensory Zoning

Sensory zoning works with transition spaces to shift the individual with autism from one sensory level to the next. Spaces should be organized based on their sensory stimulation levels, into high, moderate, and low stimulation. By gradually stepping up the sensory levels, the individual can adjust from one level to the next. The summer camp I worked for was a middle school. The main assembly happened in the main gym and when everyone was gathered, only the front half of the gym was full of kids. When Ellie was having a bad day, it would take us twenty or more minutes to make it to our group because it was a gradual approach from the hallway to the back of the gym to our group. Ellie need to go through all the sensory zones before she could make it up front, which was the highest sensory zone.

Transition Space

Magda Mostafa, in her ASPECTSS Index, described transition spaces as “the sensory shift from one activity to another, or one sensory level to another, and helps avoid abrupt changes in function and stimulation”⁷. Transition spaces allow for the individual with autism to become accustomed to the next level of stimuli.

⁶ Gaines, pg. 136

⁷ Mostafa, pg. 58

They can choose to continue or stop to become adjusted before being forced into the next space. For Ellie, the transition spaces were the same as the sensory zones, which is not always the case. The back of the gym was a good space to adjust to the sensory level without engaging in the singing and dancing of the other campers.

Predictability

Predictability is the opportunity to see a space before entering, allowing an individual to observe, ponder, digest, and understand the activity taking place in a space as well as learning what the appropriate behavior is for the space⁸. Predictability can be a larger transition space with a view of the next space, or it can be the use of transparency that allows an individual to see and predict what is coming before getting to the space. Predictability can also be a repetition of forms that signal a specific use or program. The predictability goes with transition zones to allow an individual to see what is coming and decide how to precede. Every day at camp, we would line up in a specific hallway before going into lunch. Ellie knew when we got to this hallway and saw the cafeteria ahead that we were going to lunch. We would wait here, and Ellie was able to take the time to understand what was coming next and figure out the right behavior for this activity.

Wayfinding

Clearly marked exits and entrances as well as permanent landmarks can help an individual with autism orient themselves within a space. Flooring material changes have a big impact on those with autism as many will look at the ground to establish their footing as well as become grounded. A transition in flooring can delineate spaces. Although, differing materials or colors can help to delineate spaces, too much pattern can be distracting for an individual with autism and cause them to fixate on that one detail. The summer camp was decorated so each age group had their

own theme in their hallways. The campers could find their hallway by finding their theme, one hallway was decorated in sea creatures, another with stars and planets. Ellie knew where to find our classroom based on these decorations and would try to run ahead to our room whenever she saw sea creatures.

Safety

Safety for individuals with autism is a high priority because they are prone to injuries due to an altered sense of spatial orientation as well as a need for sensory stimulation that can result in self-injury. There are some children with autism who do not have a sense of safety and do tend to wander from their parents or caregiver, and this is another thing to be considered when designing a space for individuals with autism. According to Mostafa in her ASPECTSS Index safety is the "considerations must be taken with all building systems, material choices, surfaces, protective barriers, furniture, fixtures, etc"⁹. Ellie would occasionally become overwhelm and throw herself down to the ground while crying. In these situations, I would try and get her to the quiet room where she could throw herself down onto soft furniture and flooring coverings. The move to the quiet room allowed her to calm down in a safe environment for her and others.

In the next section, the seven-criteria framework will be applied in the analysis of case studies. Not all seven criteria will apply equally to each unique building type. The analysis and diagrams do however indicate the degree to which the criteria can be seen in the case study situation.

Case Study #1: Little Caesars Arena

The Little Caesars Arena was designed by HOK in 2016 and is located near downtown Detroit. The arena anchors the District Detroit, a newer development

⁸ Gaines, pg. 99

⁹ Mostafa. pg. 59

meant to help revitalize the downtown¹⁰. The arena is home to both the Detroit Red Wings (professional hockey team) and the Detroit Pistons (professional basketball team). The overall arena was not designed for individuals with autism but did partner with KultureCity to create sensory areas for those who need quieter areas to escape from the sensory stimuli in the arena.



Figure 4: Little Caesar's Arena Main Concourse

KultureCity is an organization devoted to individuals with autism and their ability to enjoy civic and public spaces. KultureCity works with civic organizations and designers to create more sensory inclusive spaces through sensory rooms that provide a quiet space for escape, as well as training venues to be sensitive to individuals with autism¹¹. The sensory rooms block out all sensory stimuli to allow for the individual with autism to focus on the event they are seeing and hearing.

Little Caesars Arena does not control the acoustics with individuals with autism in mind. But in coordination with KultureCity, they provide Sensory Bags that include noise canceling headphones¹². These do work effectively to limit the noise for the individual wearing them. With these headphones, an individual with autism may not become overwhelmed with the cheering of the crowd, whereas if that

same individual did not have the headphones, they would quickly become overwhelmed. The sensory spaces created by KultureCity act as escape spaces. They allow the individual with autism to remove themselves from the overwhelming stimuli into a quiet, peaceful space.

The following critique of the Little Caesar's Arena presents a discussion of spaces that are not quite accessible for the autism spectrum individual as the arena lacks transition spaces and sensory zones. When an individual enters the arena, they enter a large, two story concourse that wraps around the arena. The vomms to the seats are transition spaces but tend to become crowded and do not allow one to stop therefore do not make very good transition spaces. There are two sensory zones in the arena. The moderate to high stimulation zone are the concourses where there are still many people and noise. The high stimulation zone is in the seating portion, this is where the most noise, flashing lights and confinement will happen. Sensory zoning should be a gradual progression from low to high stimuli.

The concourses are not open to the seating bowl other than the vomms leaving little opportunity for an individual with autism to predict what is coming next. The arena's wayfinding is mostly in terms of signage. Some features, such as the brick walls, may provide limited architectural wayfinding. As differentiation of materials and color does not exist, the concrete flooring is consistent throughout the concourses and does not assist in wayfinding.

Little Caesars Arena did work with KultureCity to construct two of the seven design criteria, Acoustic and Escape Spaces, and given the project typology, safety was a factor in the design. But the

¹⁰ Muret, Don. Facilities. Accessed March 30, 2020. <https://www.sportsbusinessdaily.com/Journal/Issues/2017/10/09/Facilities.aspx>.

¹¹ "Our Story." KultureCity®, 2019.

<https://www.kulturecity.org/our-story/>.

¹² McWethy, Brett. "Comerica Park and Little Caesars Arena Partner with KultureCity." Detroit Red Wings, July 26, 2018. DetroitRedWings.com.

other four criteria were not satisfied for designing for individuals with autism.

Case Study #2: The Virginia G. Piper Sports and Fitness Center for People with Disabilities

The Virginia G. Piper Sports and Fitness Center for People with Disabilities in Phoenix, AZ was opened in 2012 and designed by Baldinger Architectural Studio. The goal of this facility was to create a truly accessible sports facility for individuals with physical disabilities¹³. This was accomplished by going beyond the ADA requirements. While this facility was designed keeping those with physical disabilities in mind and not those with



Figure 5: Main Hallway

cognitive, such as autism, some of the design moves that were done translate well into designing for autism.

The circulation hallway is wider than required to accommodate multiple wheelchair users. This extra width allows

for space for individuals with autism to stop and adjust to the sensory levels in the next space. The main hallway does not have many doors for easier accessibility, and this also allows the noise to travel down it. This results in sensory zones, starting with the low sensory stimulation level at the entrance and offices then to the moderate level in the locker rooms. The basketball courts and the fitness floor on the second level are the highest level of sensory stimulation.

The facility has wayfinding methods that are designed for visual impairments that translate into wayfinding for individuals with autism. The facility uses bright colors on both the walls and floor for visually impaired to be able to navigate¹⁴, but these wayfinding methods also work with individuals with autism. There are multiple floor types used from one activity area to the next to signify a change in space. Textures on the ground are also used to signify stairs and ramps.

The facility does lack predictability of what is coming next. The main hallway is open, but an individual cannot see the basketball court or the locker rooms before entering the space. There are also no escape spaces. There is no acoustical separation in the spaces, such as the second floor which is open to the basketball court below.

The Virginia G. Piper Sports and Fitness Center is an example of a facility that had universal design in mind in the design process. Most of the design interventions are for physical disabilities such as the wayfinding methods for the visually impaired, but they can translate well into the autism design criteria. While the design criteria discussed in this paper was created for individuals with autism in mind, there is flexibility in them that allow more than just individuals with autism to benefit from it. The design criteria can help those with sensory processing issues, PTSD, dementia, physical disabilities and

¹³ Attwood, Emily. Adaptive Recreation and Fitness Facilities Set an Example for All, June 2013. <https://www.athleticbusiness.com/fitness->

[training/adaptive-recreation-and-fitness-facilities-set-an-example-for-all.html](https://www.athleticbusiness.com/fitness-training/adaptive-recreation-and-fitness-facilities-set-an-example-for-all.html).

¹⁴ Attwood

more, fitting into the universal design idea of accommodating the widest range of users.

The Need

As of 2014, there were an estimated 3.5 million Americans with autism of all ages¹⁵. With the rising level of diagnoses, this number will continue to increase. This number is just the individual with autism, this number does not include the families or caregivers of the individuals with autism. Families can be limited on what they can do because they are worried about their loved one with autism. In their article, authors Begem and Mamin said "one study found that parents of children with autism had higher levels of maternal depression and lower social support than parents of children without autism because the mother of children with autism are more time engaged in child caring and maintaining the household and no time for leisure activity"¹⁶. By creating more public venues for spectating or a space for participation in sports for the child with autism, the family also gets a break and a chance to engage in something different.

In a survey of parents with autistic children, 90% of them responded that they would attend professional sport games if there were accommodations for individuals with autism. Of those that have attended sport games with their child, only 2 of 5 had good experiences with the use of noise cancelling headphones. One respondent talked about their bad experience at a game by saying "Lots of screaming & crying. Had to hang out in the bathroom and leave early" after attending a basketball game and a hockey game. Most of the survey responders stated their child

has sensory issues with the majority stating issues with noise specifically.

Designing for individuals with autism in sport facilities will open the facility to engaging with a large population of people who previously avoided these types of spaces. The design criteria are geared for individuals with autism, but they also apply to a larger group of individuals with sensory processing issues and cognitive disabilities. Sensory Processing Disorder affects approximately 5 to 16 percent of children¹⁷. Other individuals with disorders such as ADHD, dementia and PTSD may also suffer from sensory sensitivity. The design criteria also address those with cognitive differences through the safety and wayfinding criteria. Designing for individuals with autism has the potential to open the arena to a larger population of spectators including those with sensory processing issues and cognitive differences.

Conclusion

Autism Spectrum Disorders is a developmental disorder that is rising in prevalence. A symptom of ASD is sensory sensitivity that can lead to individuals with autism avoiding public venues and events due to sensory overload. An analysis of this research led to the development of seven design criteria used to evaluate and design sports facilities. These criteria are based primarily off criteria developed by Magda Mostafa and the research from authors Gaines, Bourne, Pearson and Kleibrink in their book *Designing for Autism Spectrum Disorder*. The criteria address sensory

¹⁵ "Facts and Statistics." Autism Society, August 26, 2015. <https://www.autism-society.org/what-is/facts-and-statistics/>.

¹⁶ Begum, Rabea, and Firoz Ahmed Mamin. "Impact of Autism Spectrum Disorder on Family." Autism-Open Access. Longdom Publishing S.L, November 29, 2019. <https://www.longdom.org/open-access/impact-of-autism-spectrum-disorder-on-family-44919.html>.

¹⁷ Bunim, Juliana. "Breakthrough Study Reveals Biological Basis for Sensory Processing Disorders in Kids." Breakthrough Study Reveals Biological Basis for Sensory Processing Disorders in Kids | UC San Francisco, March 11, 2020. <https://www.ucsf.edu/news/2013/07/107316/breakthrough-study-reveals-biological-basis-sensory-processing-disorders-kids>

processing issues as well as other concerns for individuals with autism.

The current research in autism design focuses on the design of residential and educational facilities. This research expands beyond these areas of focus into the area of public facilities. The focus of this paper is on sports facilities, but the design criteria have a broad relevance to design of public or commercial buildings. The intended outcome is the design of a sport facility, using the design criteria, that allows for both the participation in sports as well as the spectating of professional sport games.

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Addendum

Introduction

COVID-19 changed this thesis process and graduate school immensely. Myself, my classmates, and my professors all had to adapt to this new way of working. It has been a very difficult year since we were first sent home and made an already difficult process worst. But through it all, I learned a lot about myself and my thesis topic. I was able to explore a topic that was interesting to me and learn many things that I can take into my future career.

This thesis process from the beginning research to the final design has opened my eyes to the needs of neurodiverse individuals and the role an architect can have in enhancing their quality of life. When this process began, I was unsure where it would take me or what the results would be, but I knew I wanted to incorporate my love of sports and my experience with autism. This thesis process from the beginning research to the final design has opened my eyes to the needs of neurodiverse individuals and the role an architect can have in enhancing their quality of life.

The Design

My site in Seattle, Washington had an existing roof structure that I was able to embrace and design around. The site allowed for an interesting investigation of an existing structure that had new design around it. Everything except the roof was designed as a new build but had to interact with the existing roof to create an interesting dichotomy between new and old. More of the more difficult parts of this process was designing a large arena in a year when in the real world it would be a team of people working for longer. The idea

of the pop-up entrances existing disconnected from the roof was to honor the existing roof without hiding it behind an addition. The pop-up entrances are in a similar language to the roof of folded surfaces and similar structure, but more contemporary to compliment the design and not duplicate it.

My ideas and design criteria stayed the same throughout the whole process from the first draft to the final design because they were based on a pre-existing system, just adapted for a new use. This consistency helped me explore how the design criteria could be designed and marketed to the public. My six design criteria that made it into the physical form in the design were developed to a good level that were realistic and plausible. These spaces could be in a sports arena. In the end, I decided to not focus on the seventh design criteria of safety. Safety in a sports arena is built in through codes and other rules. Safety, and all of the design criteria, also are in the form of policies put into place by the arena. Safety for autism specifically comes in the form of training for staff and policies that are enforced, not as much architecture outside of the standard safety interventions.

Conclusion

I had to choose what to focus on and what the important aspects of the project because of the size of the program, which has always been the autism, not the arena. The goal was not to revolutionize how a sports arena is designed, but to enhance the experience of the neurodiverse individual through sometimes overall and sometimes small architectural interventions. I believe I accomplished this by modifying design criteria that existed to

be more general and can be used outside of educational and residential facilities. An arena is an extreme example of sensory overload that will be difficult for autistic and other neurodiverse individuals to handle, but these design interventions can be beneficial for many people in many settings.

Thank You

My committee has been a tremendous help throughout this entire process, and I owe them a huge thank you. From the advice they gave to contacts of individuals in the industry, I could not have done this without their guidance. So, thank you for the help on the crazy ride this past year has been with everything!

Thank you to my family and friends who have supported throughout this entire process. It has been a long time coming, but they were always my biggest cheerleaders. Thank you!

Finally, to my classmates, I owe you a huge thank you! COVID has made this harder than it would have been, but you all have been so supportive from design advice to walks to letting me move in with them when I need a new place to live. This has been a crazy year with a lot of hard times, but we did it! Congratulations to everyone and thank you!

FINAL DESIGN

SITE ANALYSIS

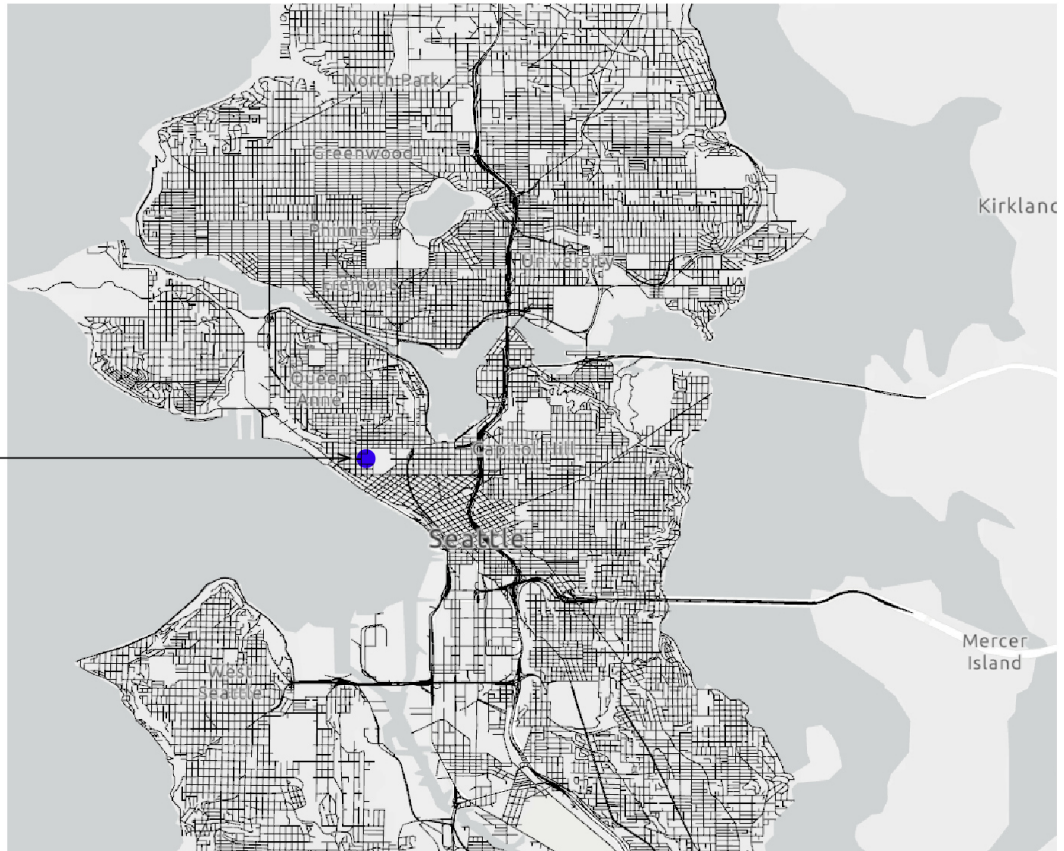
SEATTLE KEY ARENA

Seattle, Washington

Located in Seattle Center, just north of downtown

ZOOMED OUT VIEW

SITE: KEY ARENA
SEATTLE CENTER
SEATTLE, WA



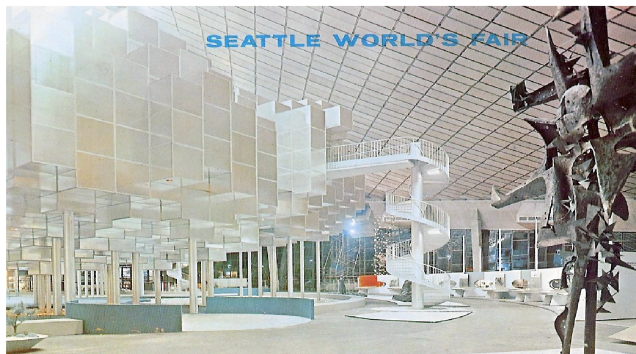
SITE HISTORY

1962 SEATTLE WORLD FAIR (CENTURY 21 EXPOSITION)

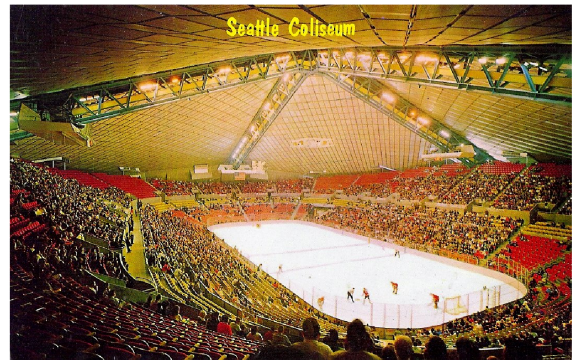


THE COLISEUM (EXHIBITION HALL) —

The 1962 Seattle World Fair, also known as the Century 21 Exposition, redeveloped the Seattle Center into a cultural center in the city and built some of the most well known destinations in the city including the Space Needle.



(1962) SEATTLE WORLD FAIR EXHIBITION



(1967) CONVERTED TO HOCKEY/BASKETBALL ARENA



(1995) ROOF AND SEATING BOWL RENOVATED



(2021) BUILDING TOTALLY RENOVATED

DISTRICTS/DEMOGRAPHICS

SEATTLE OVERALL DEMOGRAPHICS

Population: 724,305
 Median Age: 35.3
 Medium (Household) Income: \$92,263.00
 Households w/ Children: 19.54%

LAKE UNION

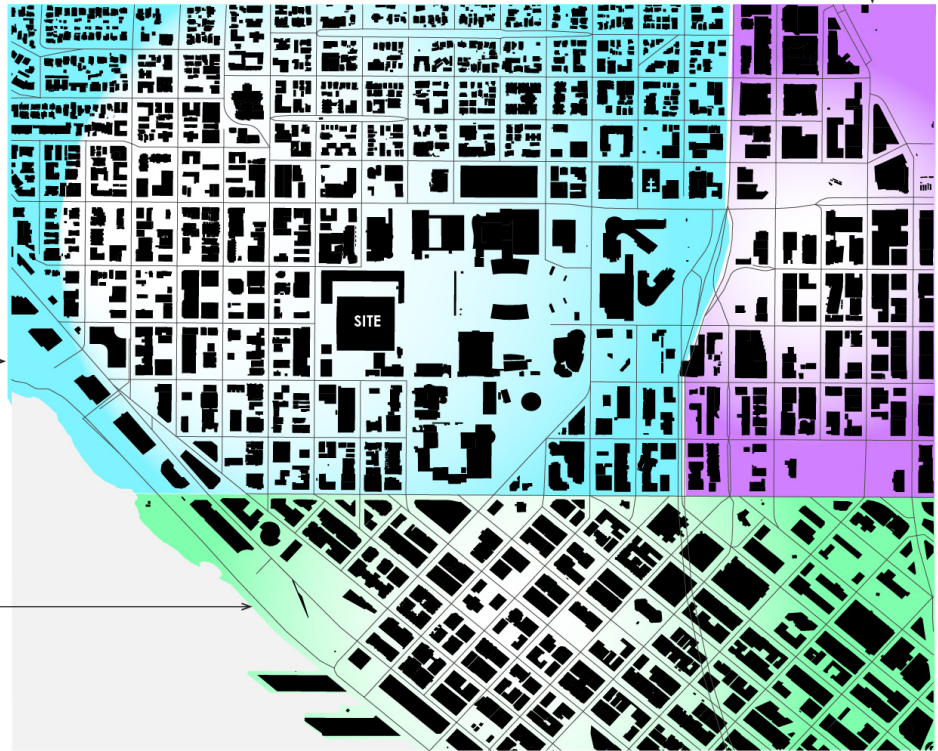
Population: 30,384
 Median Age: 31 ↓
 Medium (Household) Income: \$106,393.00 ↑
 Households w/ Children: 9.58% ↓

QUEEN ANNE HILL

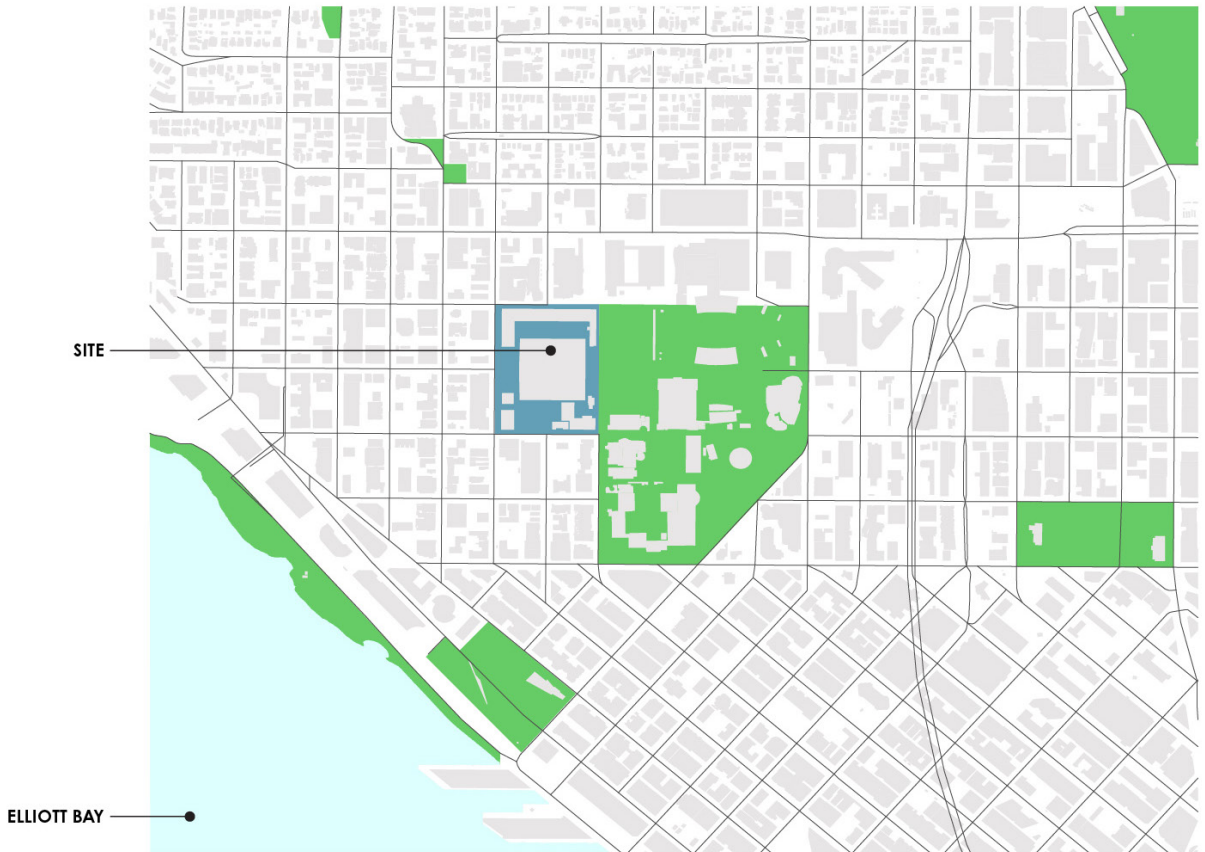
Population: 32,393
 Median Age: 32 ↓
 Medium (Household) Income: \$101,580.00 ↑
 Households w/ Children: 12.33% ↓

DOWNTOWN DISTRICT

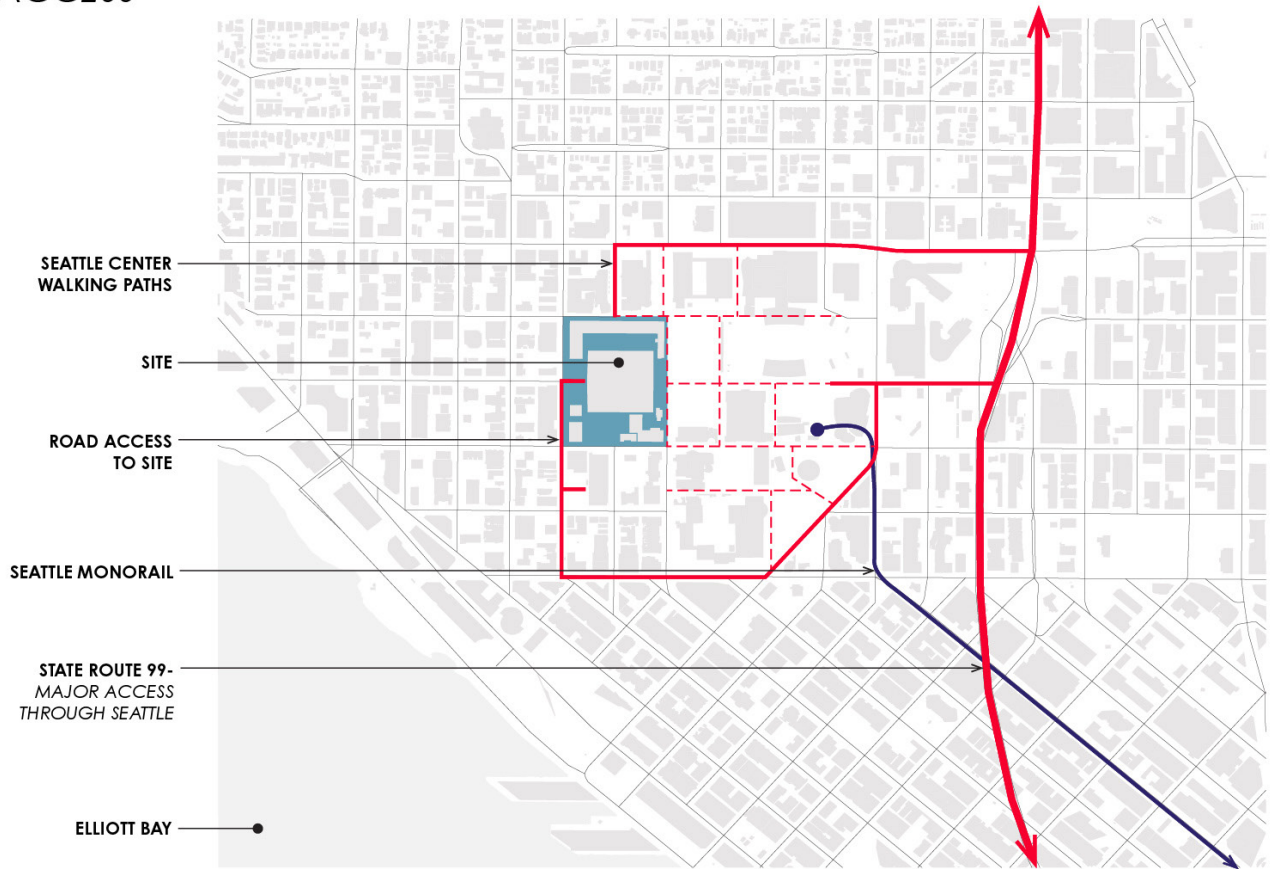
Population: 36,981
 Median Age: 39 ↑
 Medium (Household) Income: \$97,856.00 ↑
 Households w/ Children: 3.45% ↓



GREEN SPACE & WATER

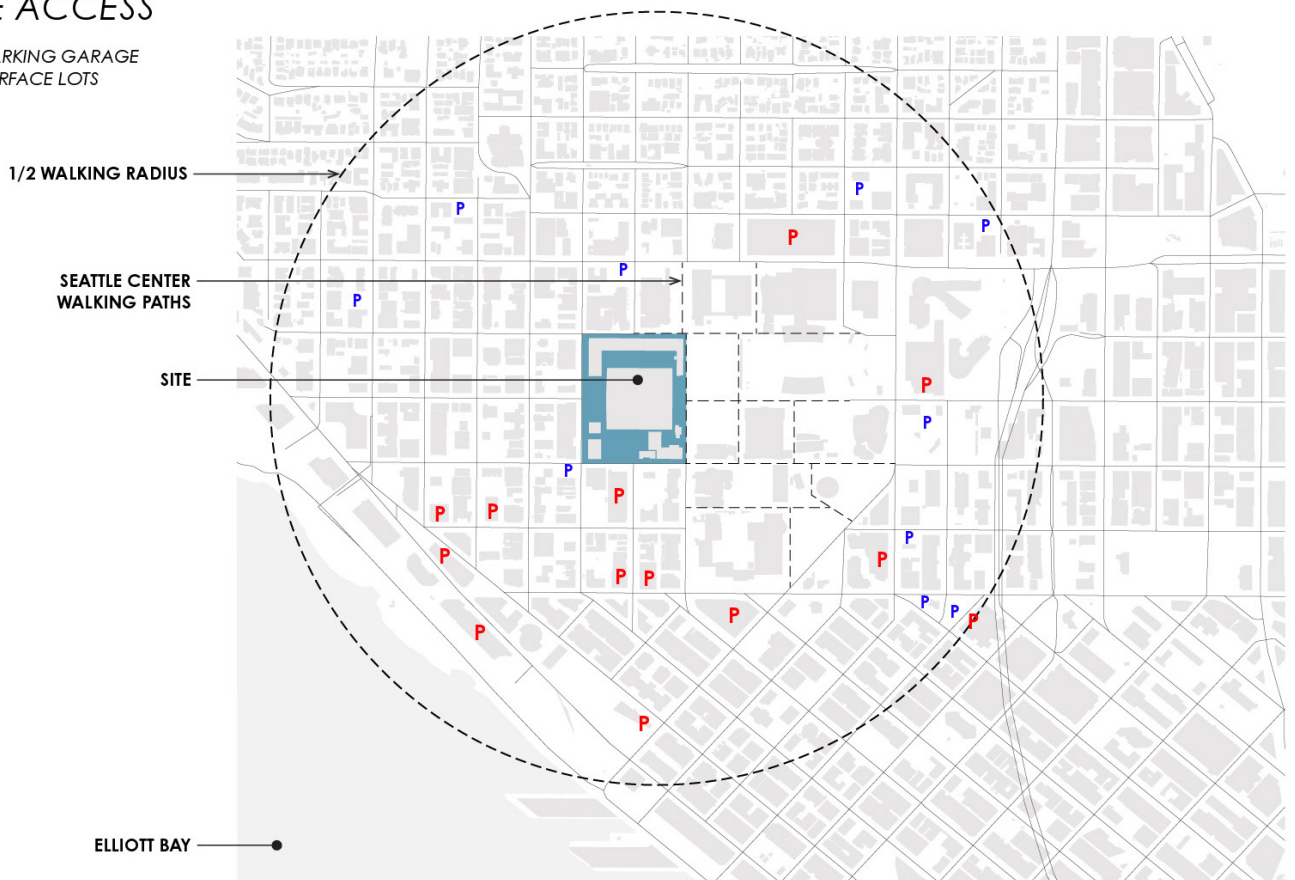


SITE ACCESS



SITE ACCESS

P - PARKING GARAGE
P - SURFACE LOTS



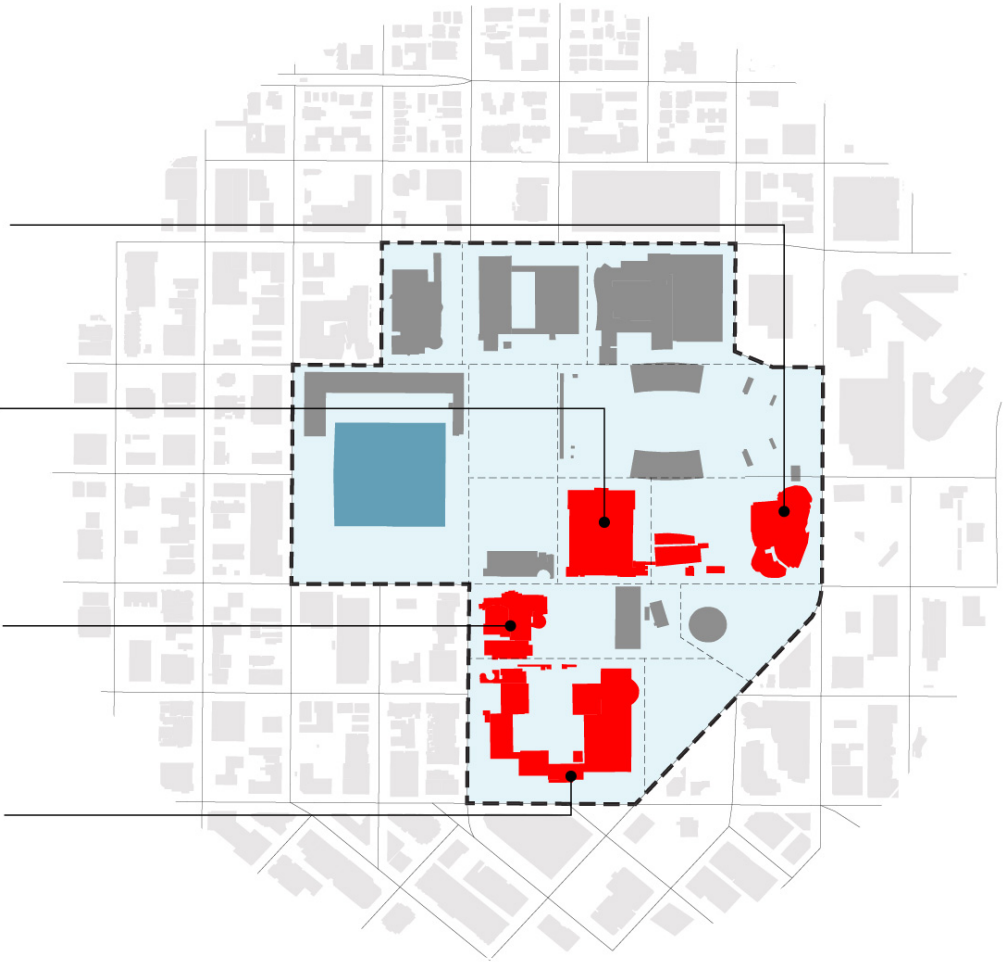
SEATTLE CENTER - AUTISM PROGRAMS

MUSEUM OF POP CULTURE
*Open before hours
Lowered sound before hours
Low sensory break rooms*

SEATTLE CHILDREN'S MUSEUM
*Open early
Sensory escape spaces*

SEATTLE CHILDREN'S THEATRE
Low sensory performances

PACIFIC SCIENCE CENTER
Open early

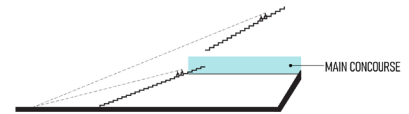
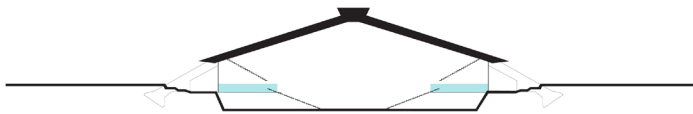


SITELINE DIAGRAM

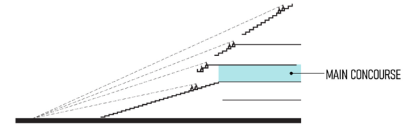
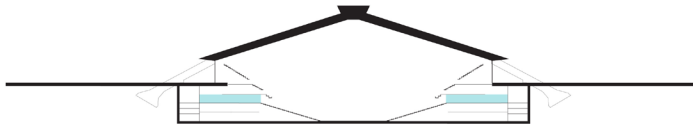
1995 RENOVATION

OVERALL STRUCTURE

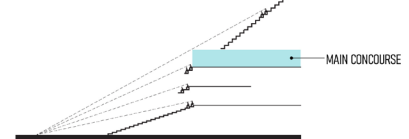
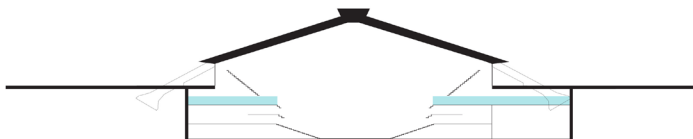
OVRRALL SITELINES



POPULOUS DESIGN



MY DESIGN



ROOF TECTONICS



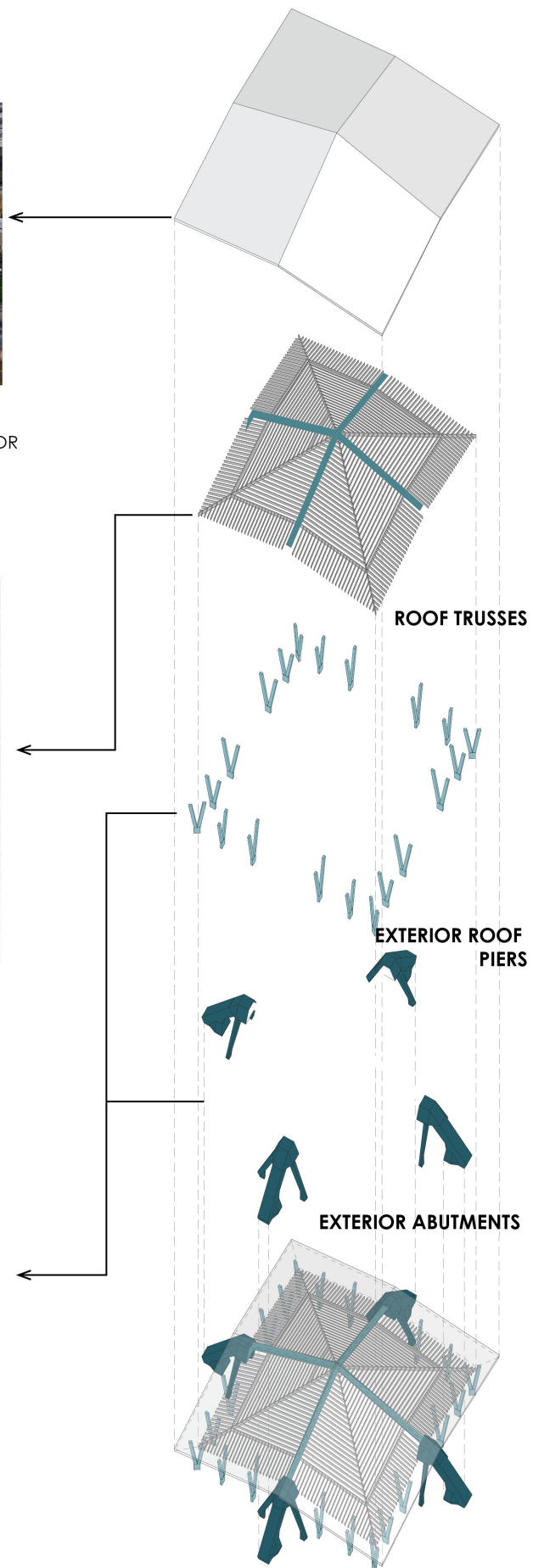
ROOF STRUCTURE:
CONCRETE ROOF ON METAL PANELS WITH
STANDING SEAM ALUMINUM PANELS ON EXTERIOR



STEEL STRUCTURE:
CONCRETE ROOF SITS ON ROOF JOISTS AND
FOUR ORIGINAL TRIANGULAR SECTION
CONNECTED TO LARGE CONCRETE ABUTMENTS



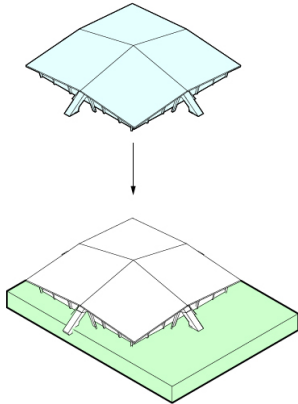
VERTICAL STRUCTURE:
CONCRETE V-SHAPED PIERS AND FOUR LARGE
ABUTMENTS TRANSFER LOADS TO GROUND



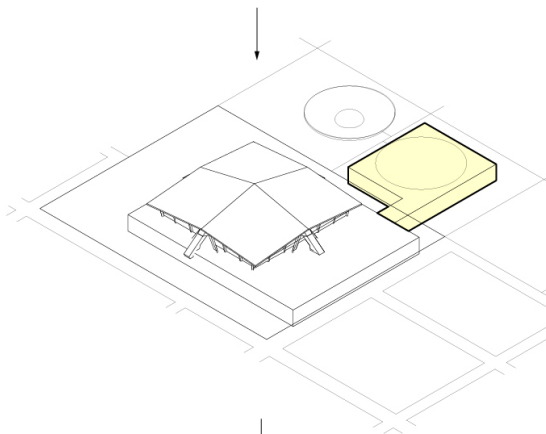
PROCESS WORK

FORM STUDY

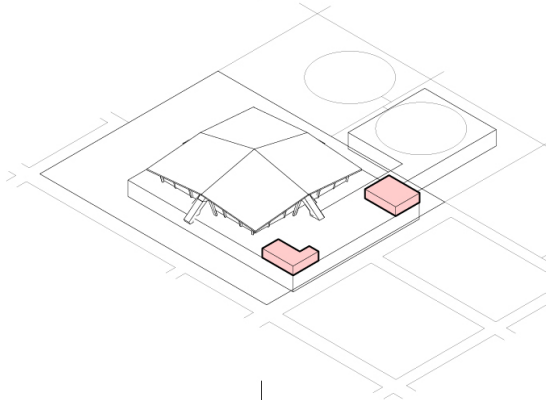
EXISTING



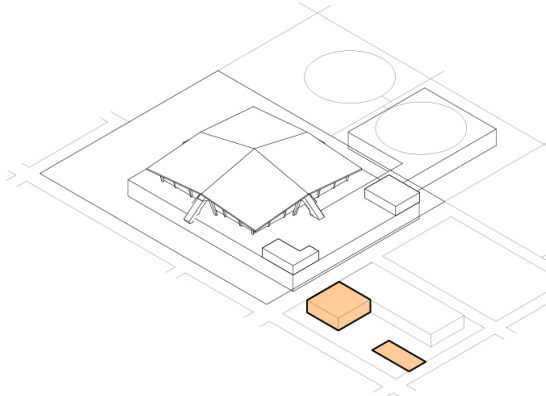
UNDERGROUND:
LOWER CONCOURSE
+ SERVICE LEVELS



**UNDER GREEN SPACE
TO EAST OF ARENA:**
PRACTICE FACILITY

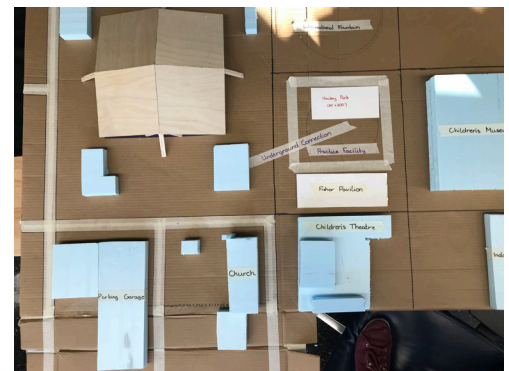
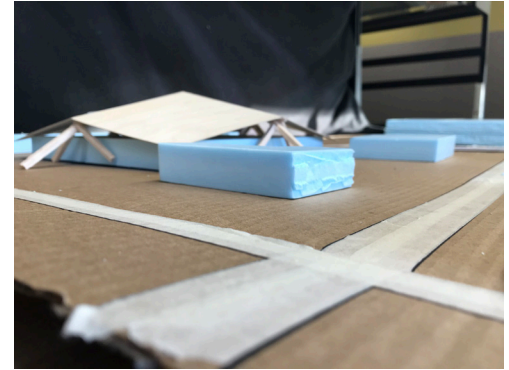


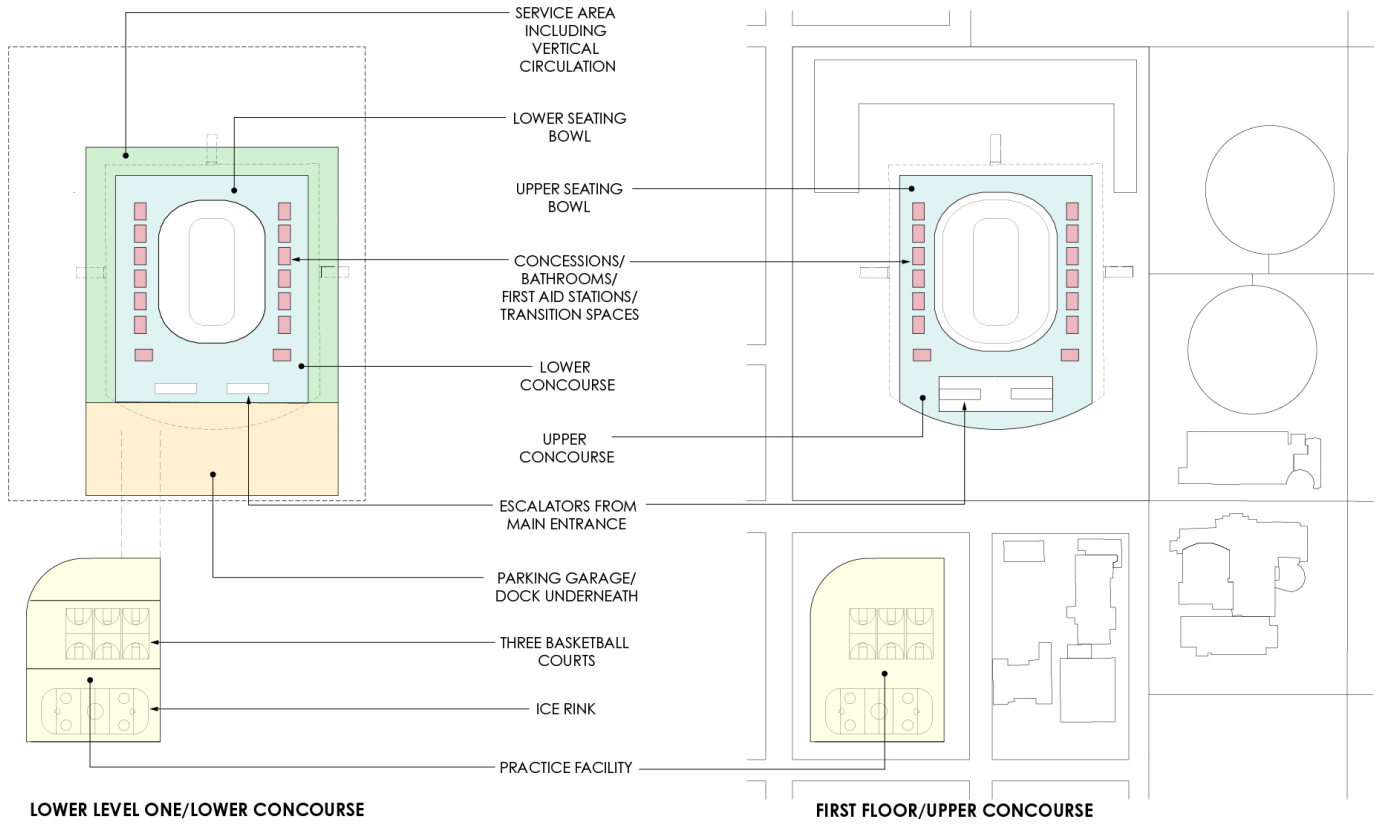
ADDITION:
SOUTH ENTRANCES
PAVILIONS FOR BOTH
ARENA AND PRACTICE
FACILITY



ACROSS THE STREET:
ADDITION TO PARKING
GARAGE, ENTRANCE TO
UNDERGROUND DOCK

STUDY MODEL



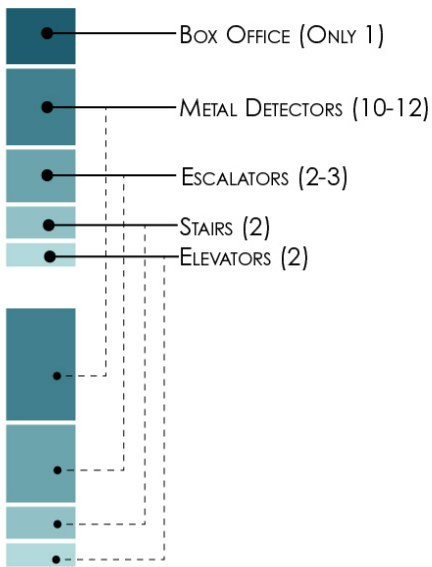


COLLAGE BASED ON SURVEY RESULTS

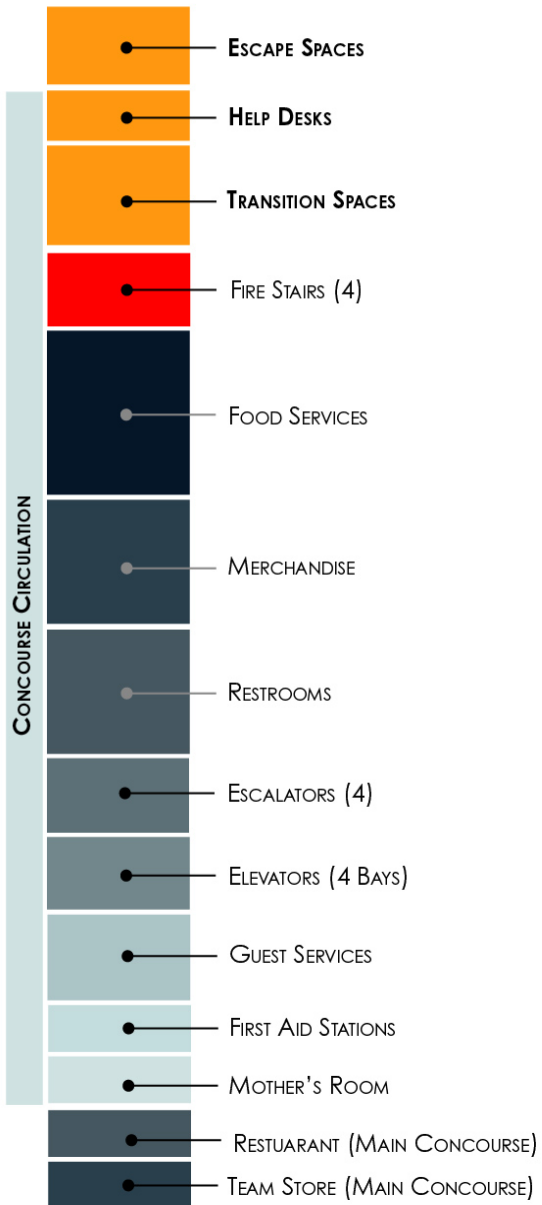
FINAL DESIGN

SEATTLE HOCKEY AND BASKETBALL ARENA PROGRAM

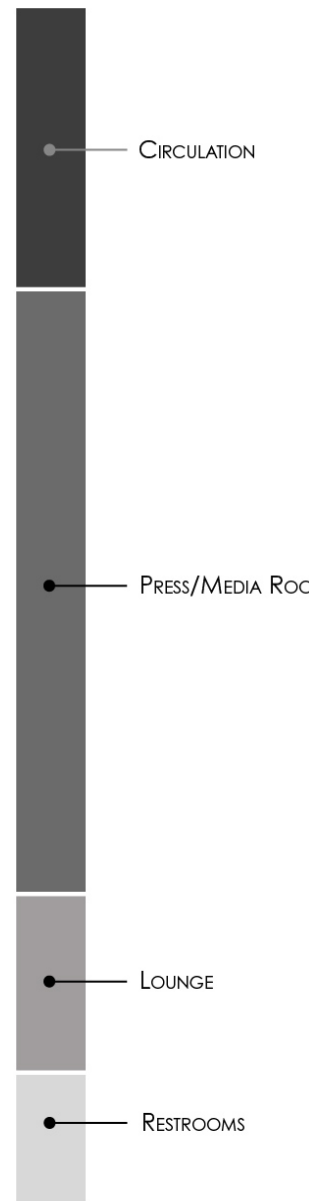
POP-UPS



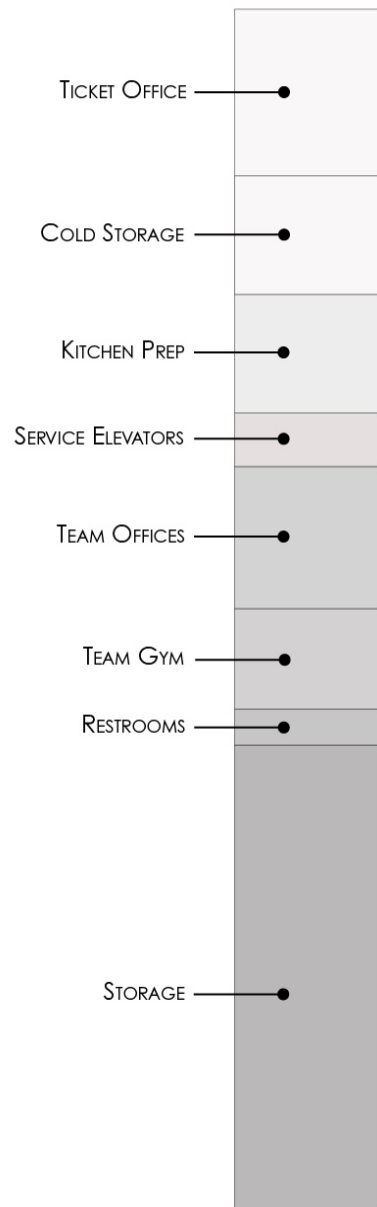
CONCOURSES (3)



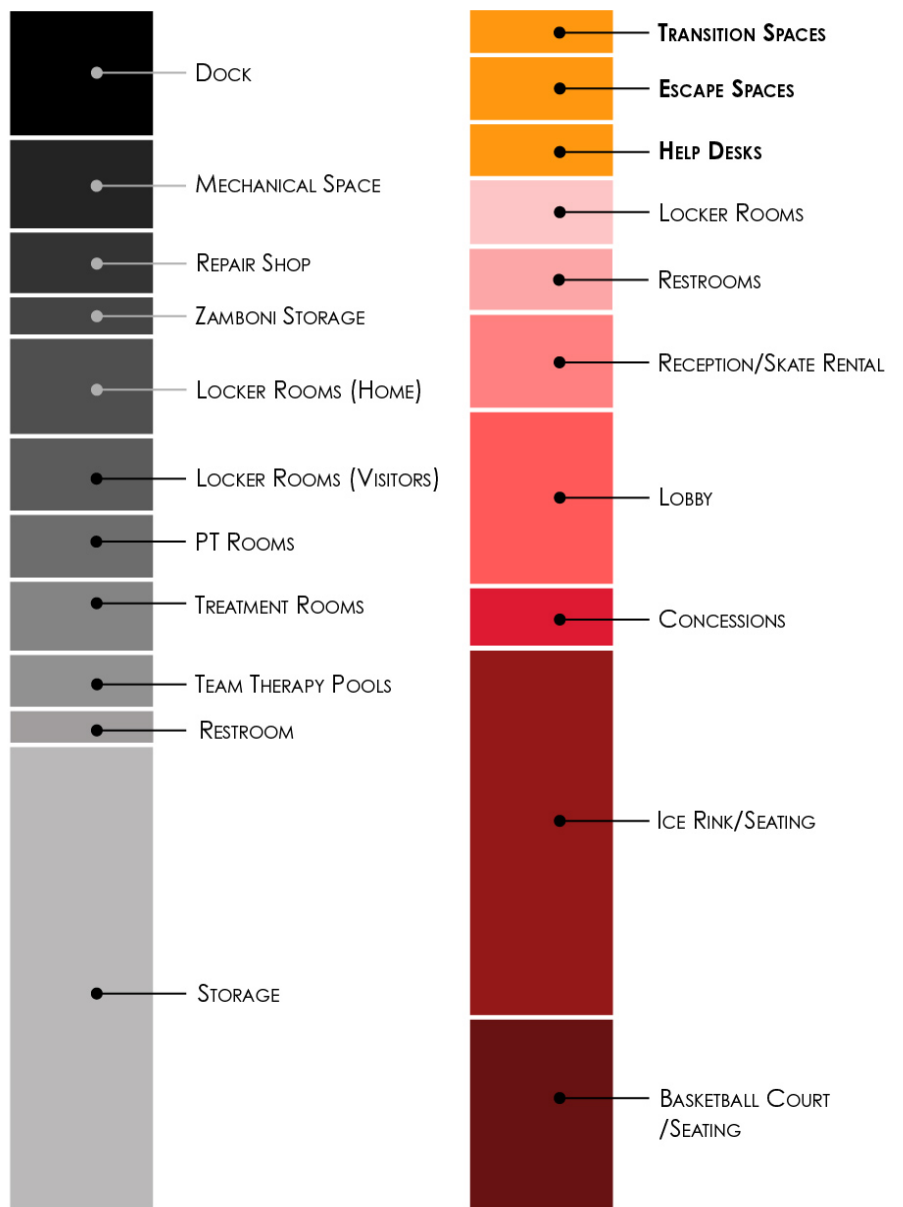
PRESS LEVEL



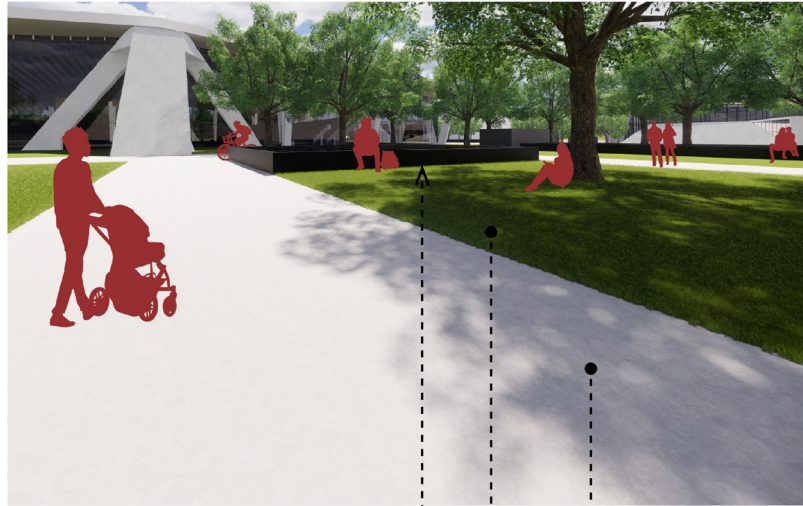
SERVICE LEVEL/PROGRAM



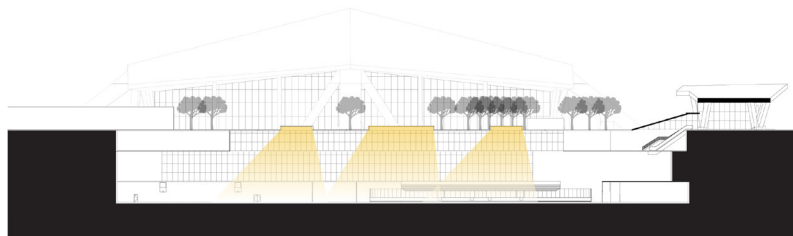
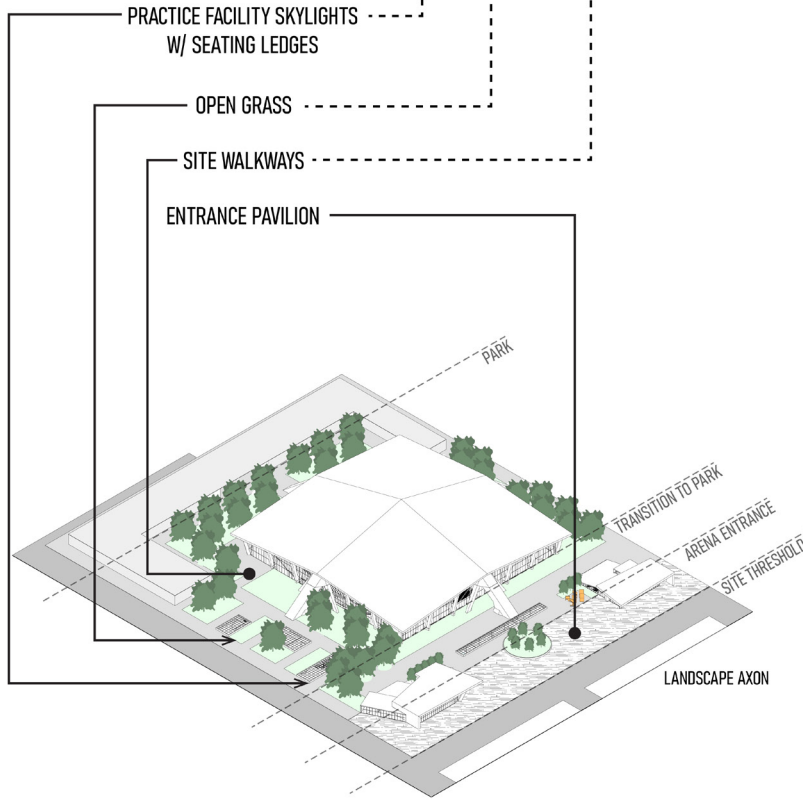
PRACTICE FACILITY



SEATTLE HOCKEY AND BASKETBALL ARENA LANDSCAPE AXON

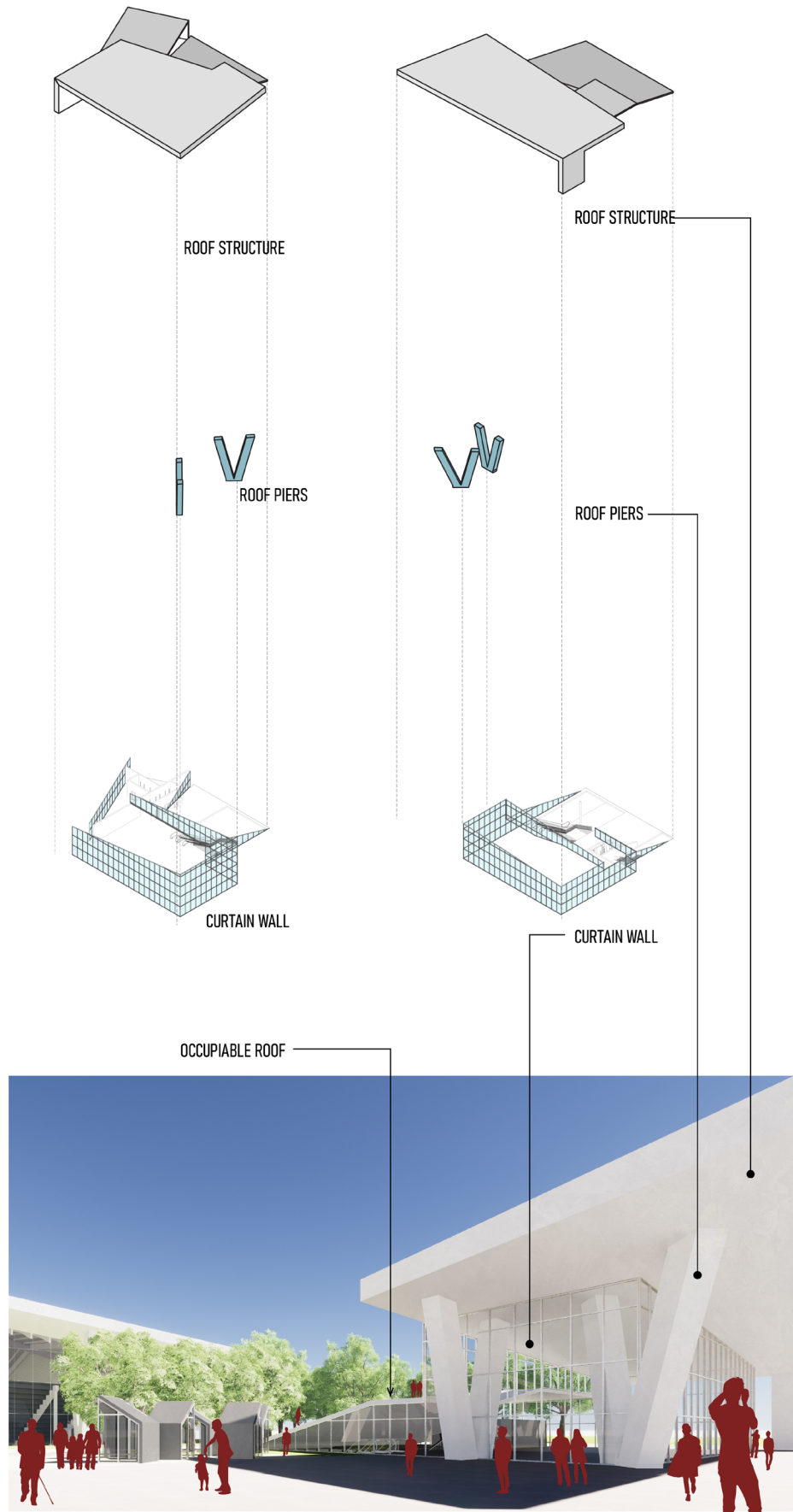


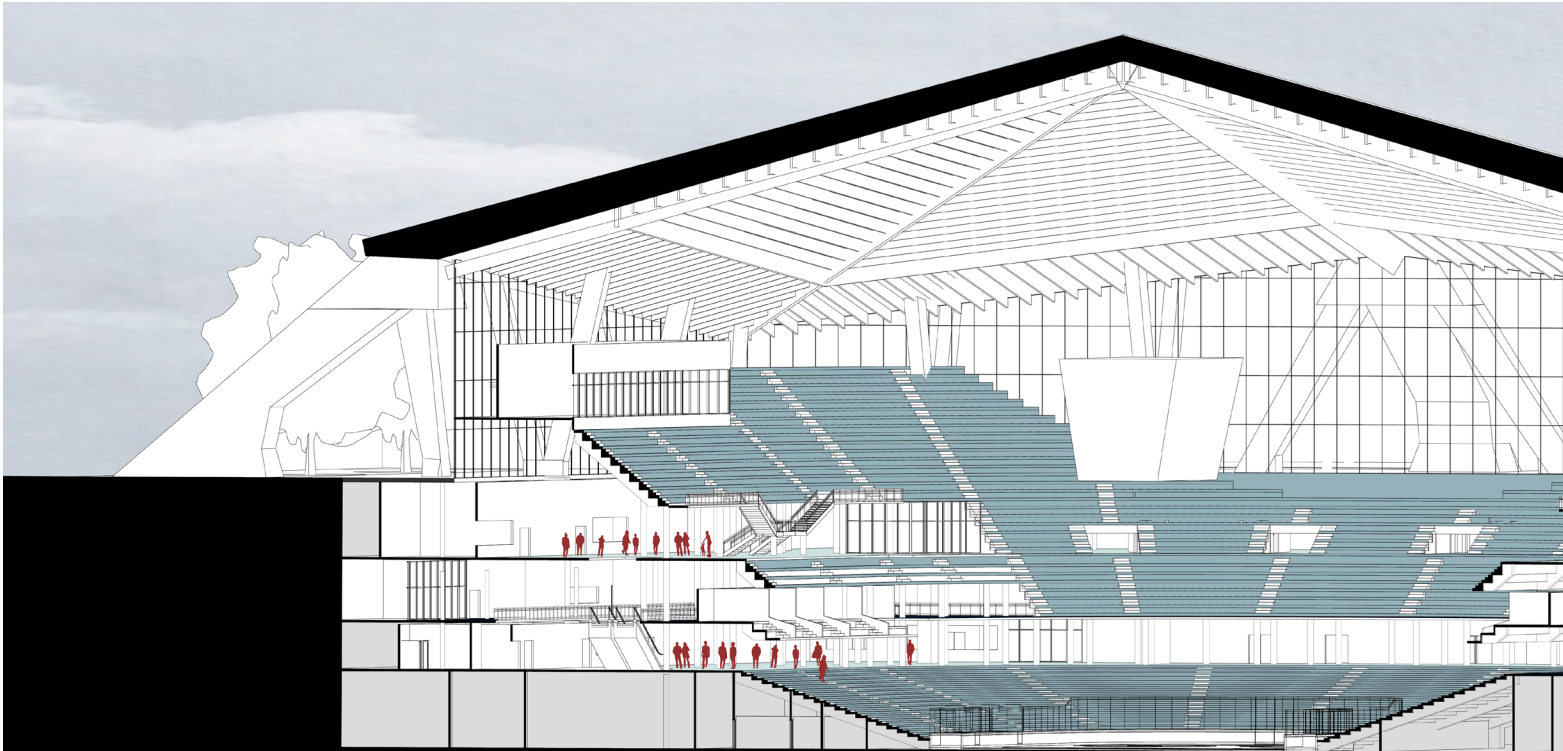
WEST ELEVATION RENDERING



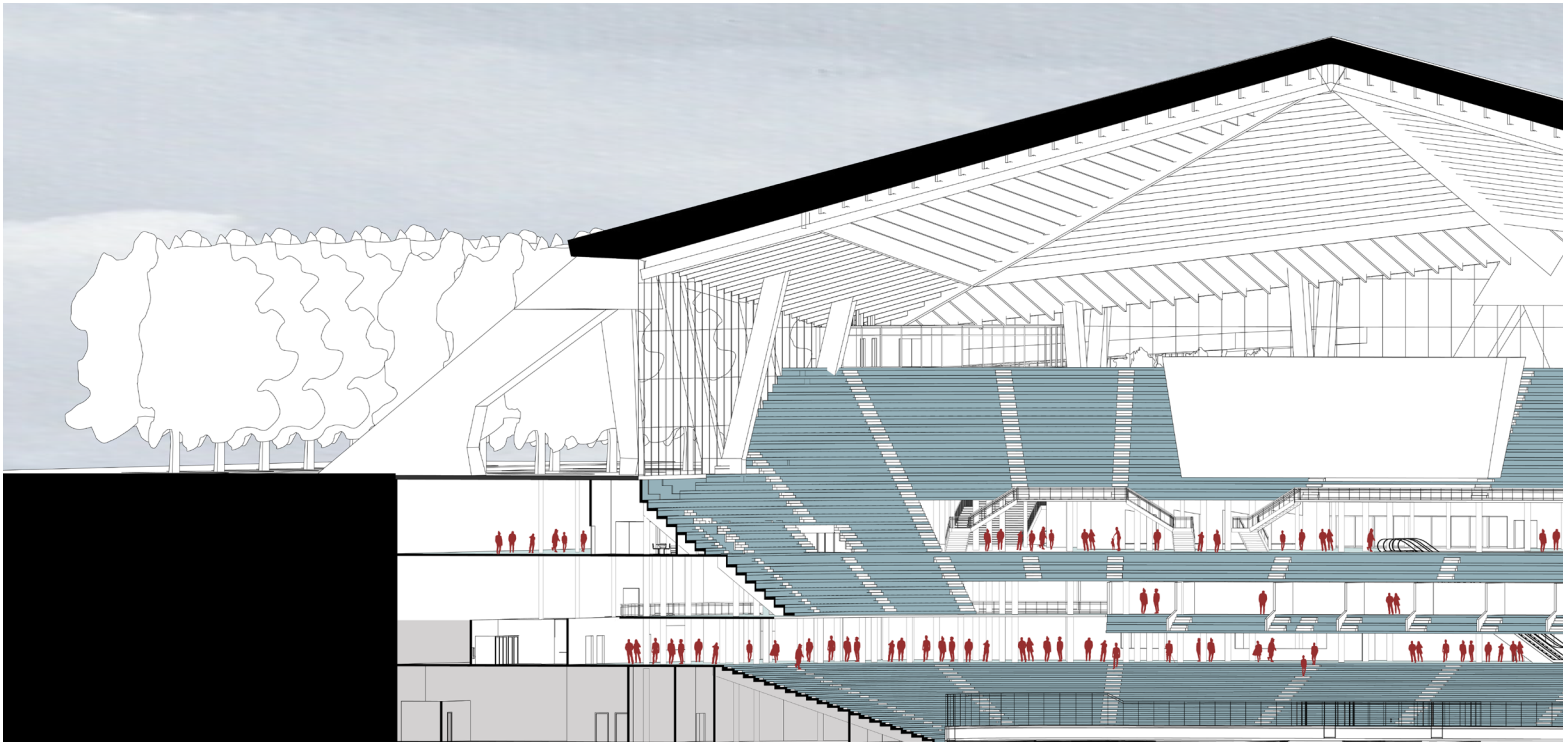
NORTH/SOUTH SECTION

SEATTLE HOCKEY AND BASKETBALL ARENA EXPLODED AXON

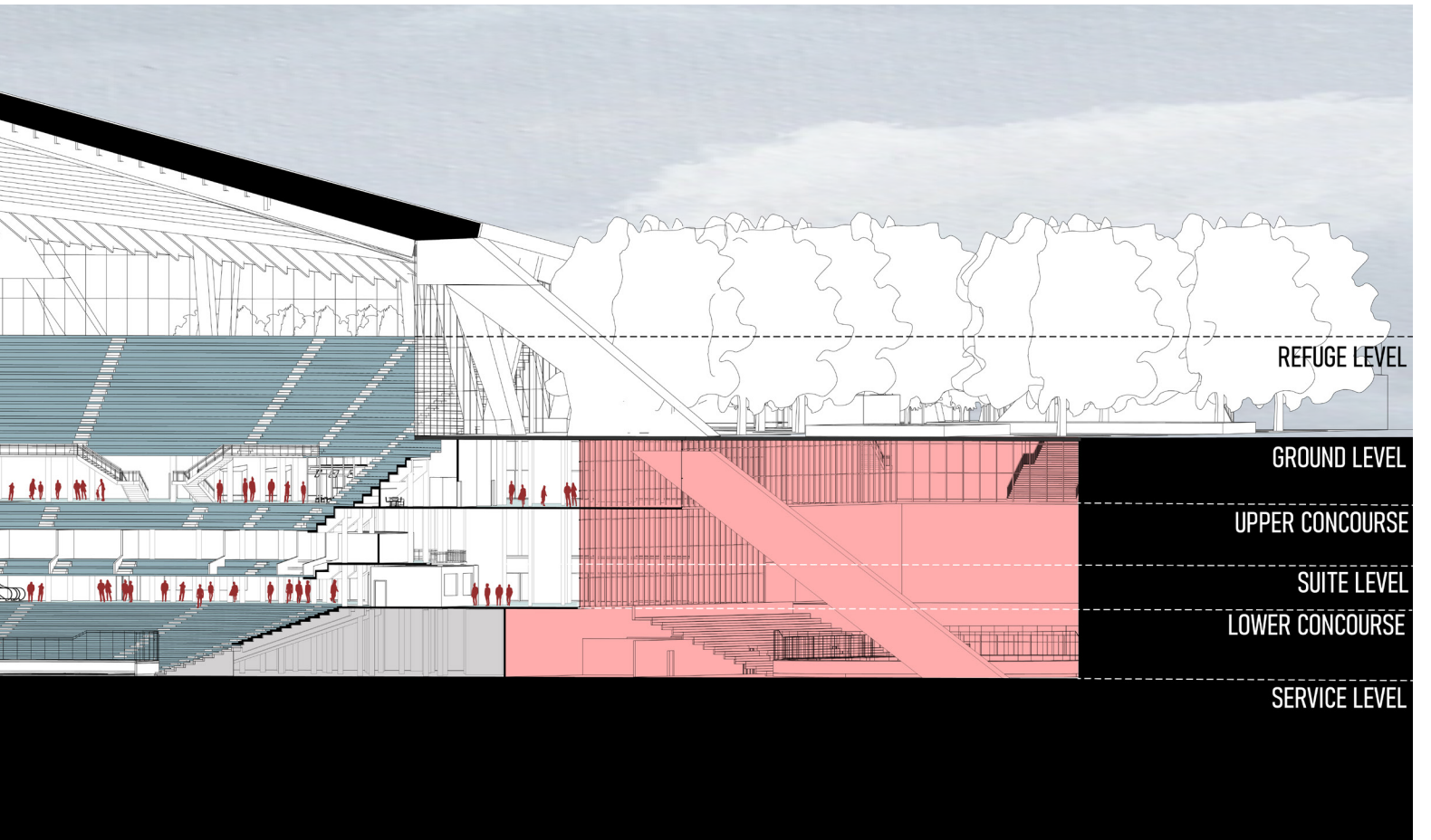
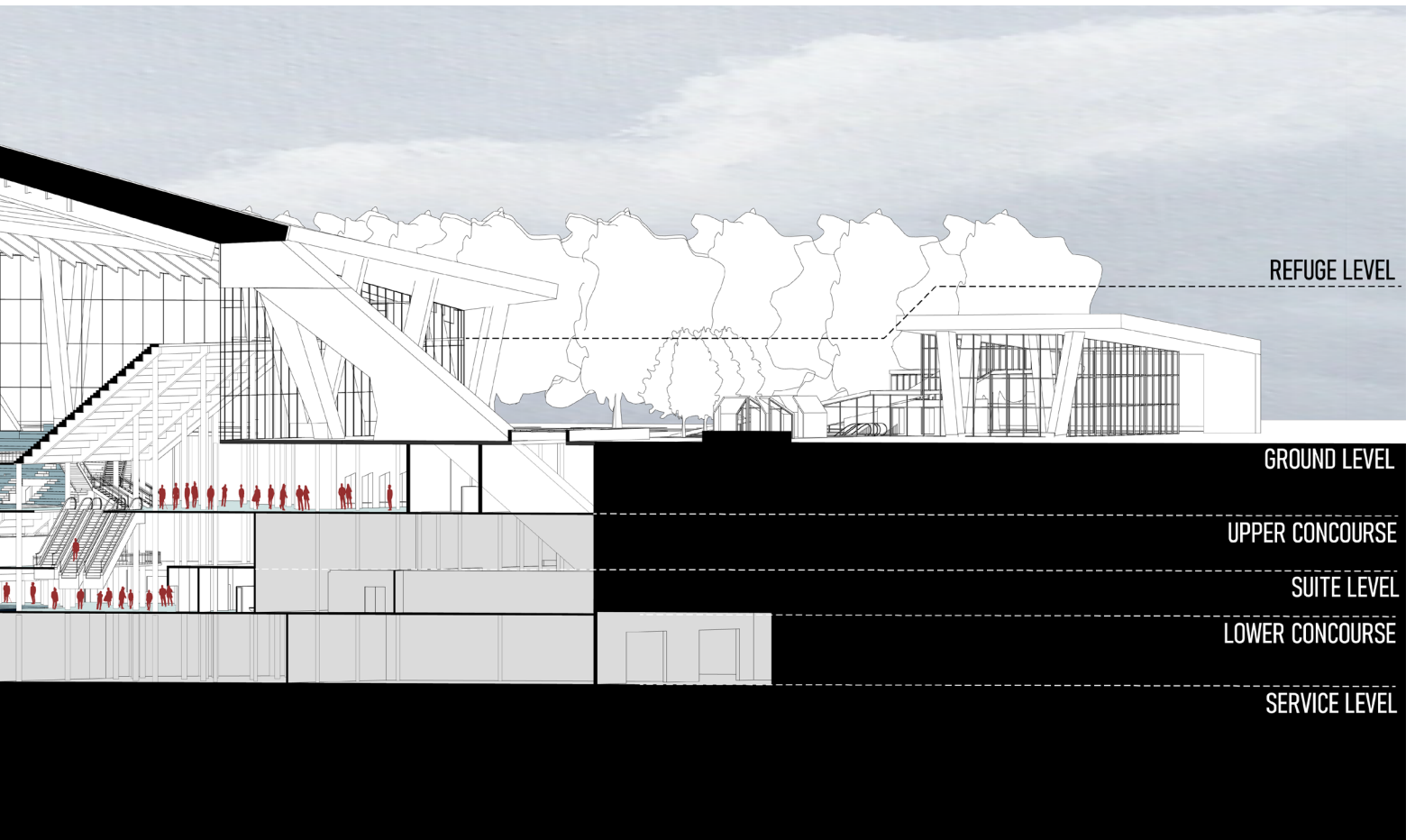


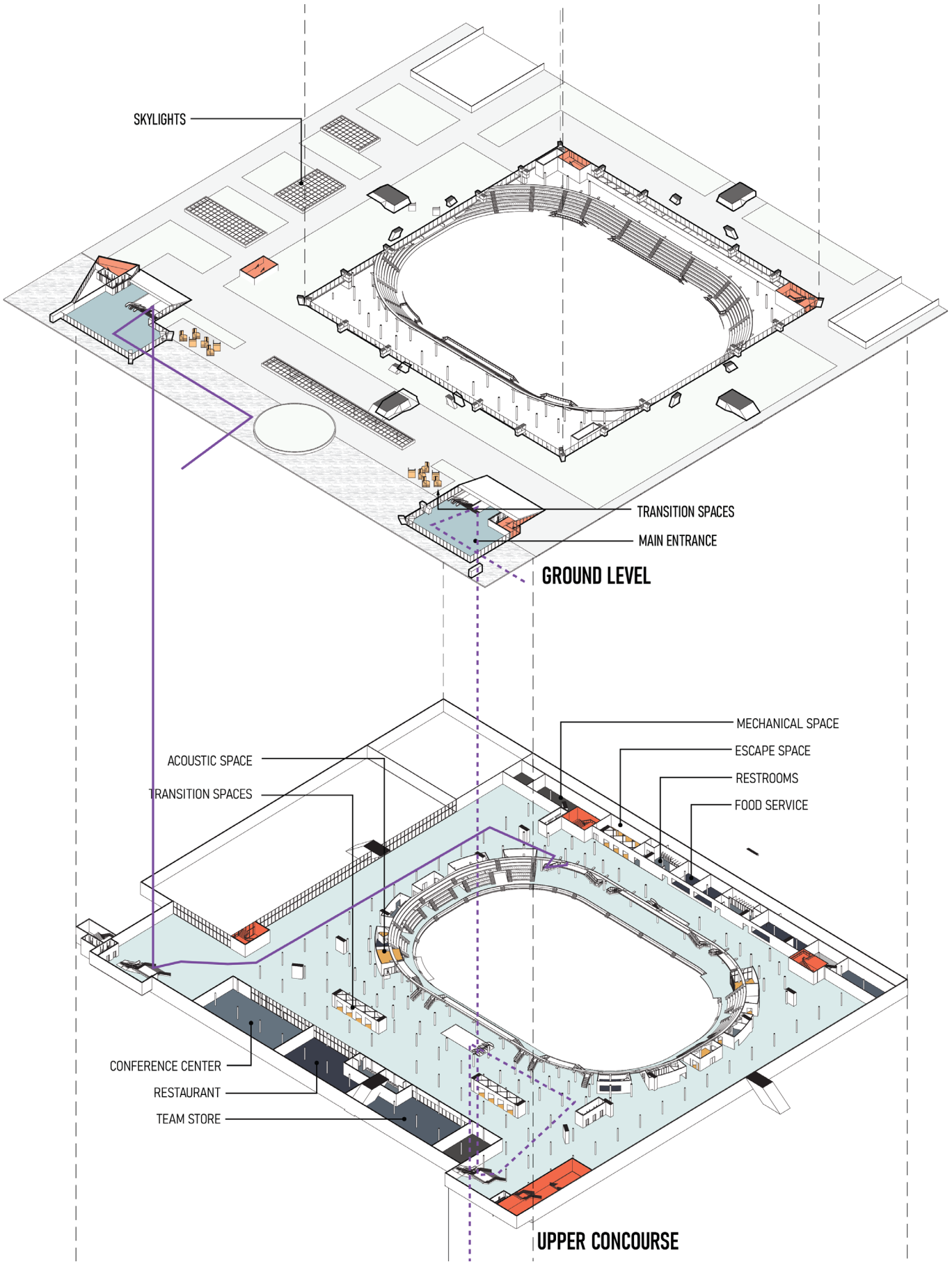


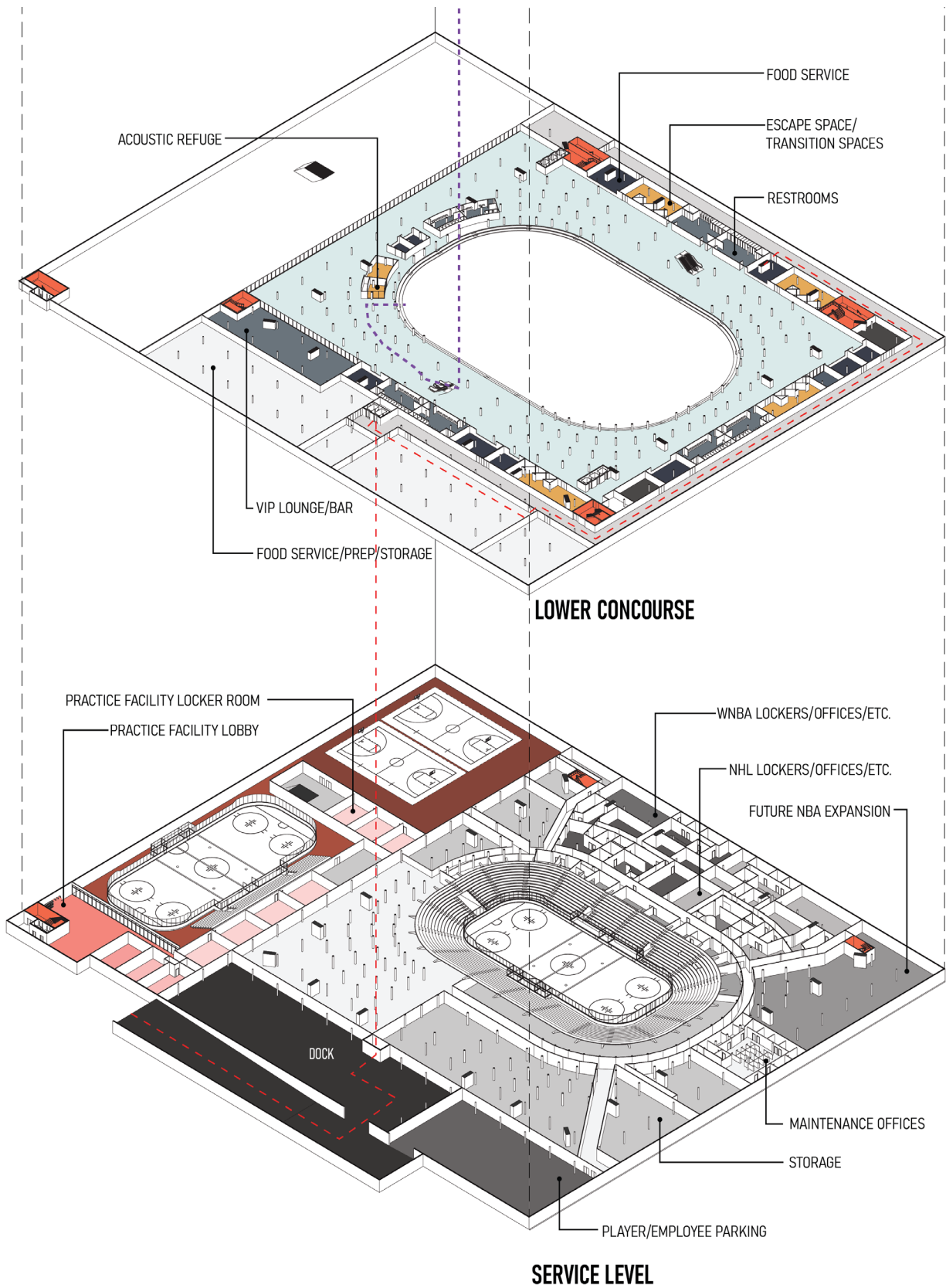
NORTH/SOUTH SECTION



EAST/WEST SECTION







WALKTHROUGH

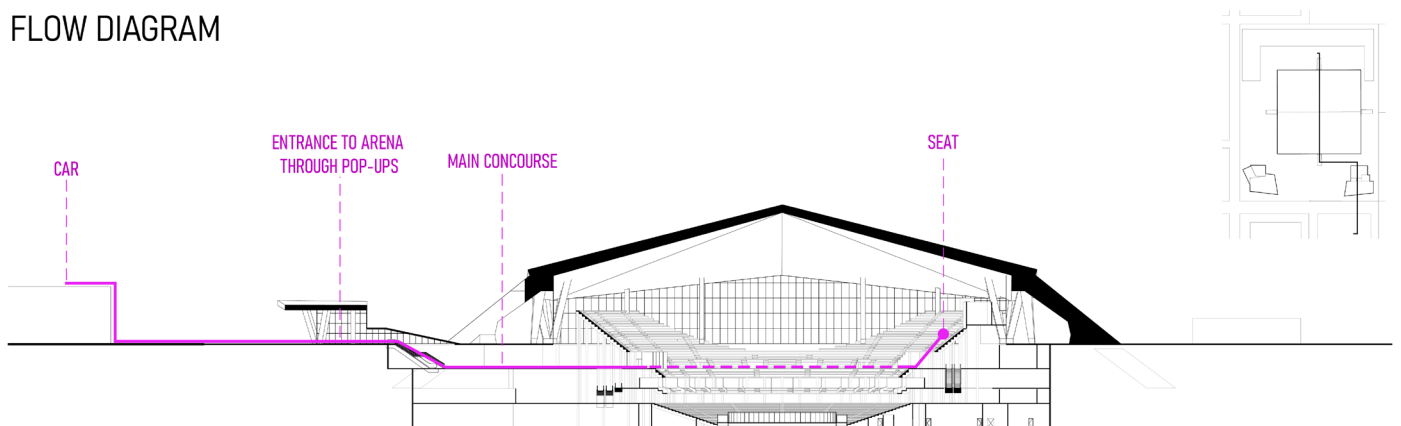


THE SMITH FAMILY

The Smith Family* consists of the two parents, an older son (10 years old) and a younger daughter. The son, Joshua, has autism and is sensitive to noise and crowds. They are attending a game on a Sunday afternoon. This walkthrough will show their experience during a hockey game and how the design criteria can influence one family's game experience in the Seattle Hockey and Basketball Arena.

*This does not represent every individual on the Autism Spectrum and is just used to illustrate the project

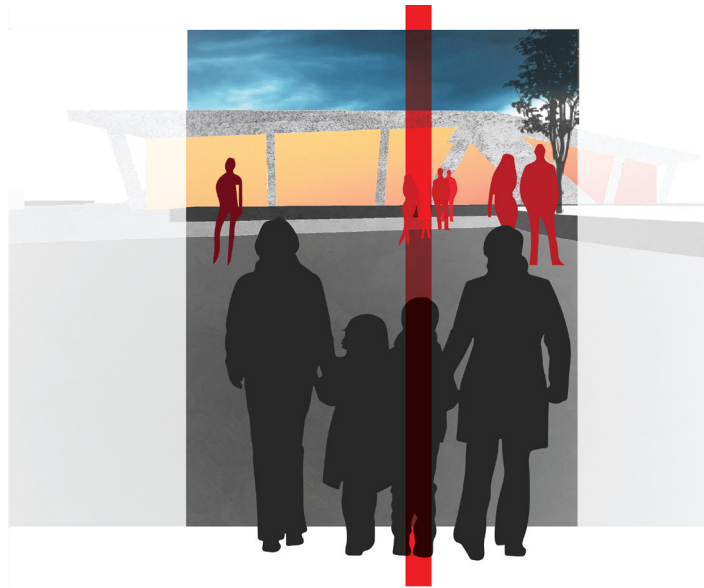
FLOW DIAGRAM



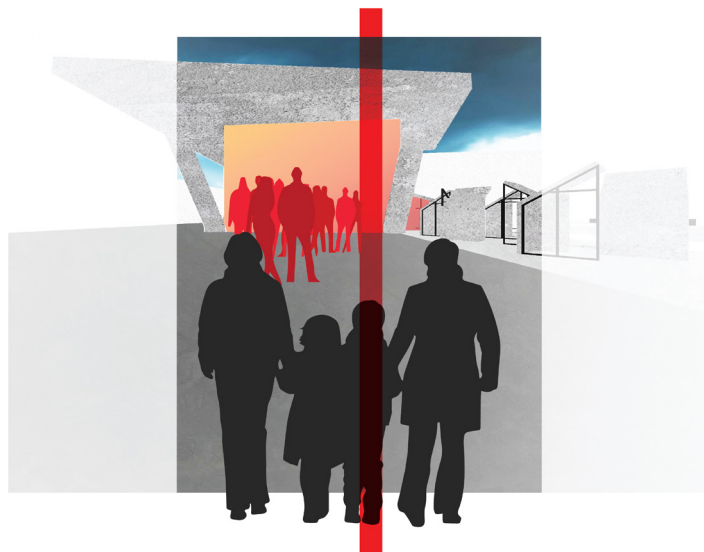
LEAVING PARKING GARAGE

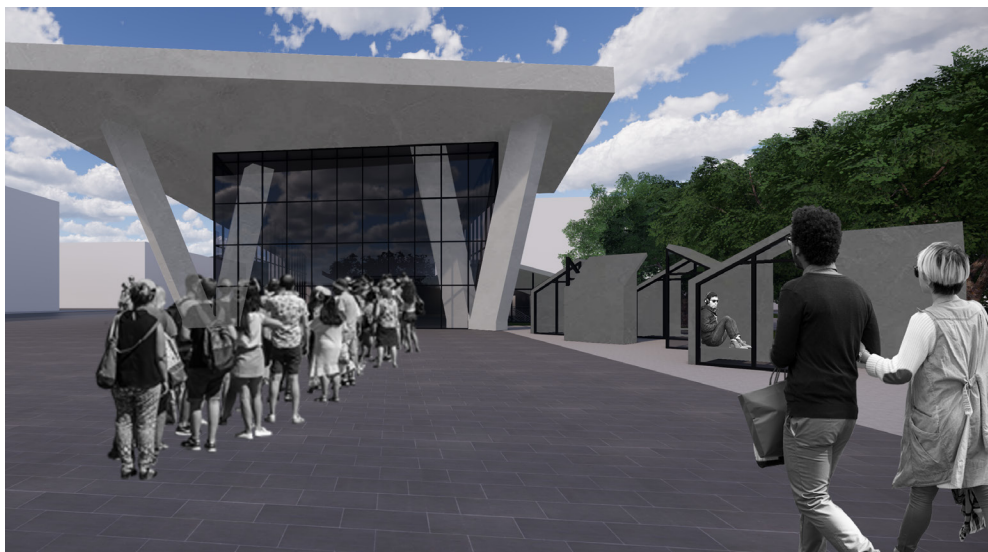
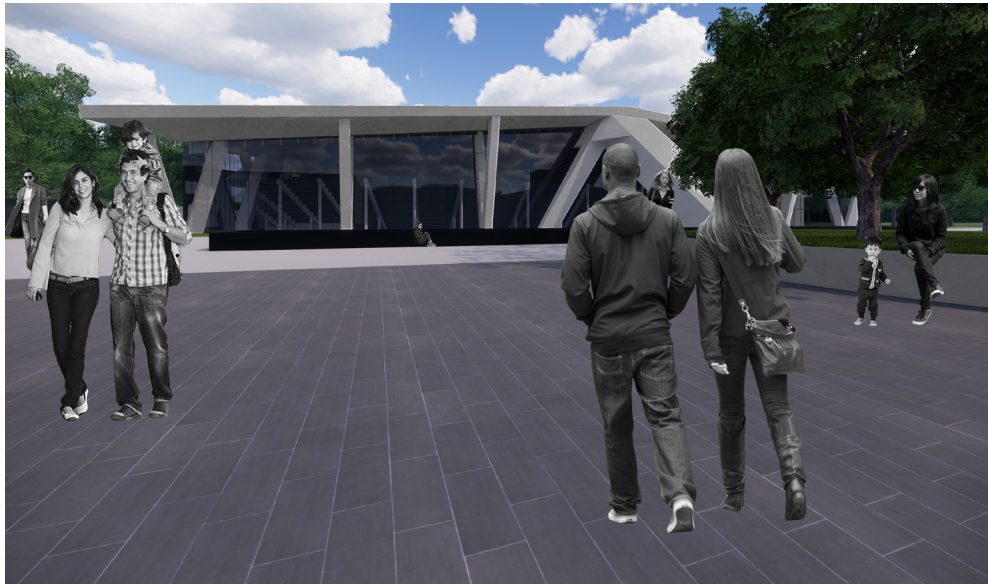


IN PLAZA

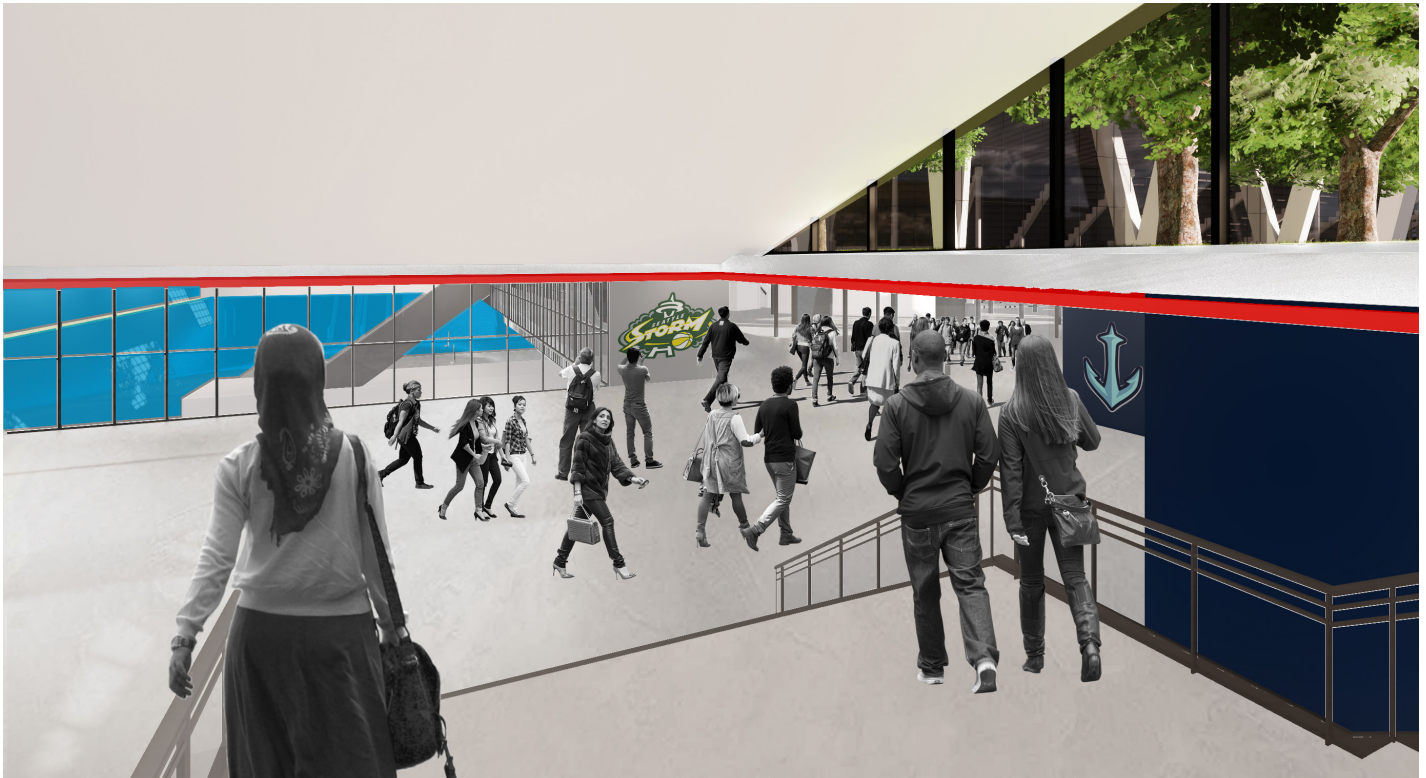
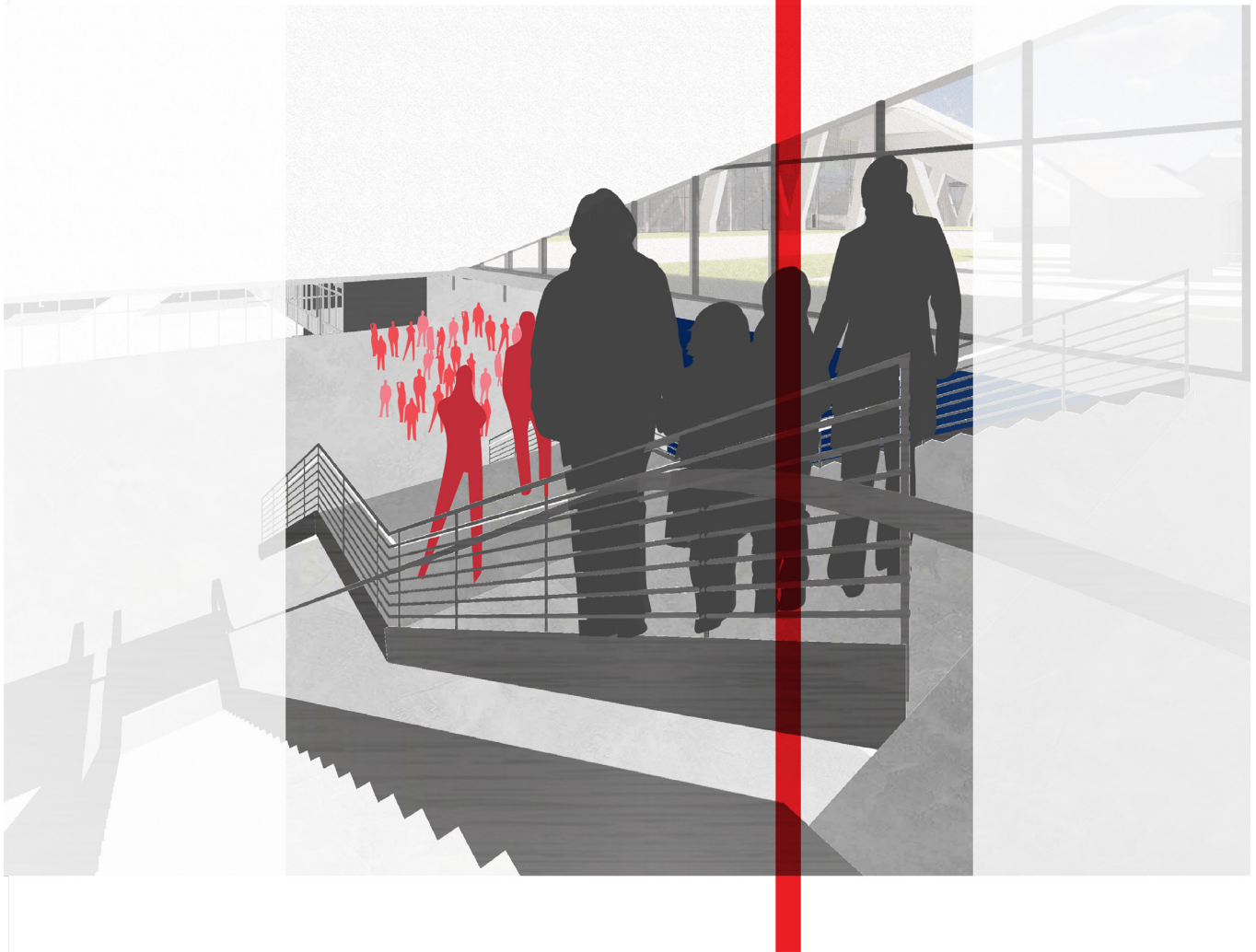


APPROACHING ENTRANCE



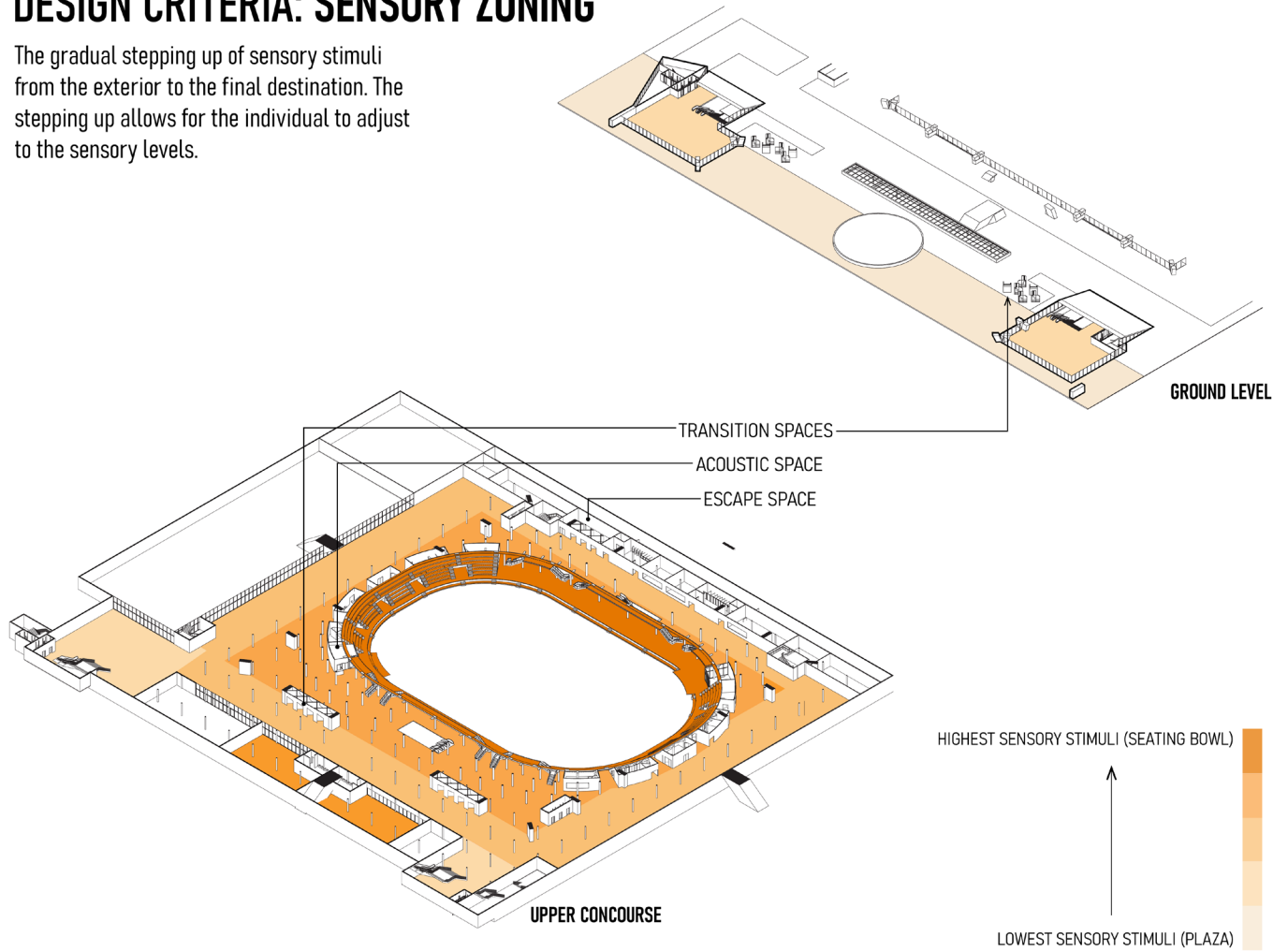


MOVING INTO ARENA

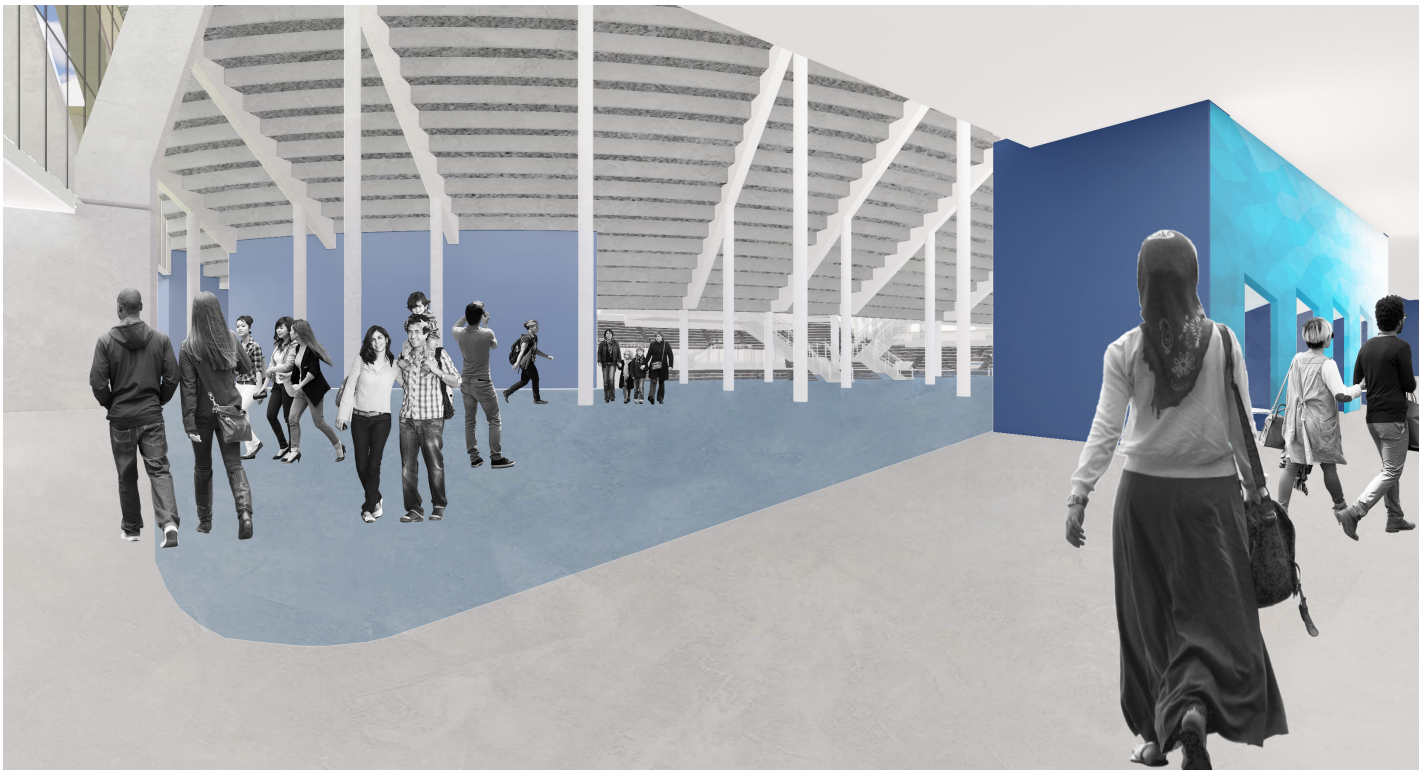


DESIGN CRITERIA: SENSORY ZONING

The gradual stepping up of sensory stimuli from the exterior to the final destination. The stepping up allows for the individual to adjust to the sensory levels.



IN UPPER CONCOURSE

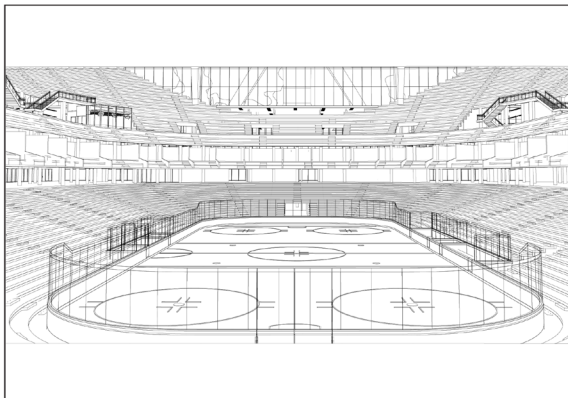
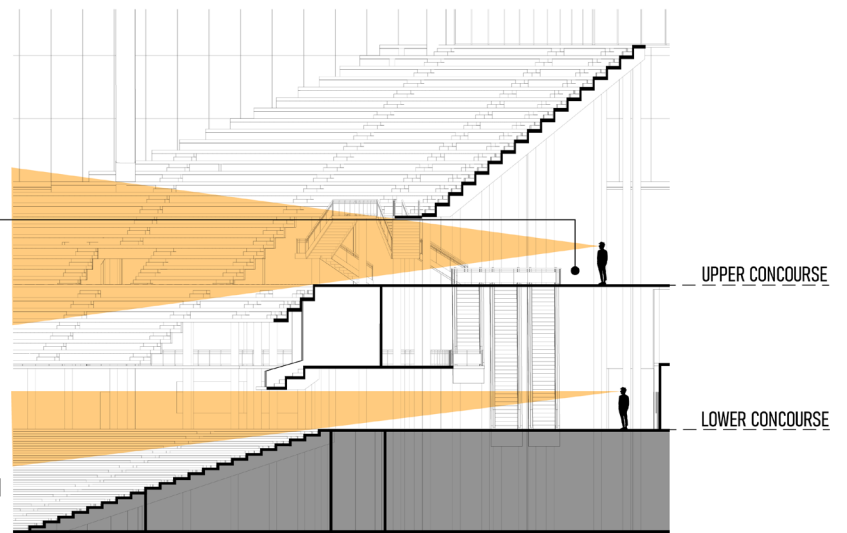


DESIGN CRITERIA: PREDITABILITY

Ability to view, ponder and understand what is coming next. This design criteria works with transition spaces, acoustic refuges and sensory zoning.

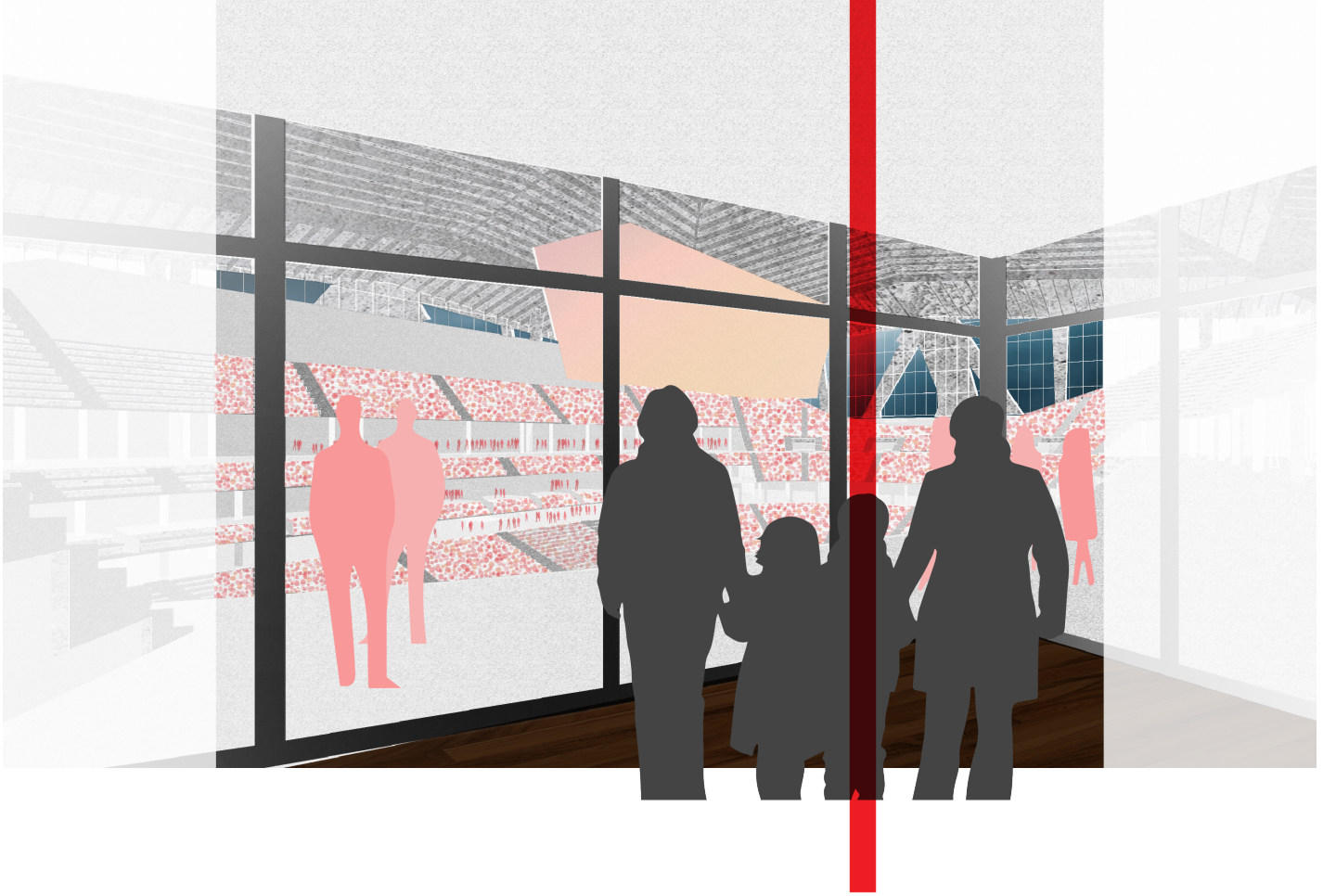
OPEN CONCOURSE DESIGN

CONCOURSE SECTION



VIEW FROM LOWER CONCOURSE TO BOWL

IN ACOUSTIC REFUGE

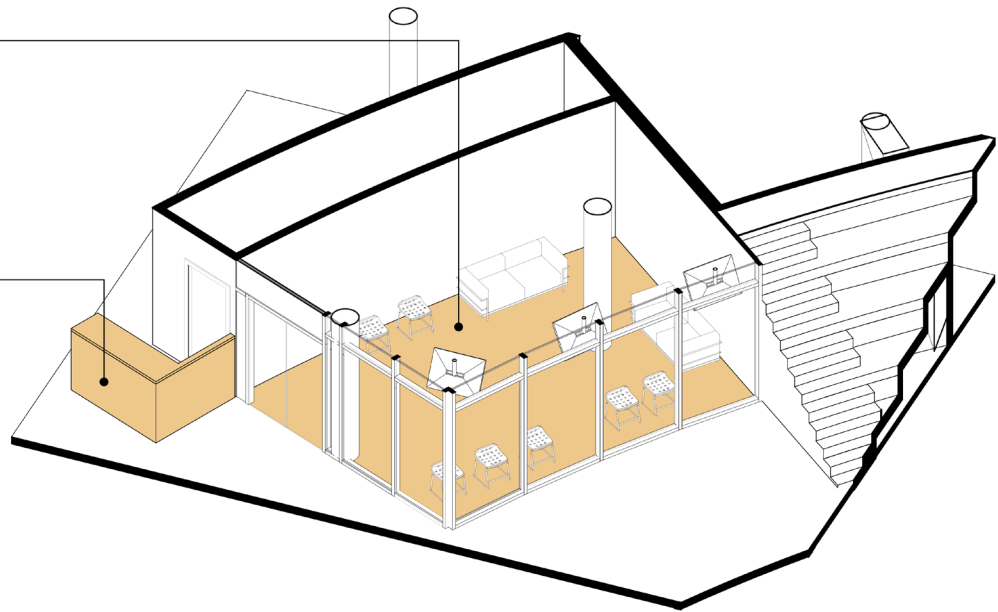


DESIGN CRITERIA: ACOUSTIC CONTROL

ACOUSTIC REFUGE & HELP DESK

ACOUSTIC REFUGE
 Acoustically isolated from concourse
 Curtain wall with views into bowl
 Both soft and movable seating
 TV for seating away from curtain wall

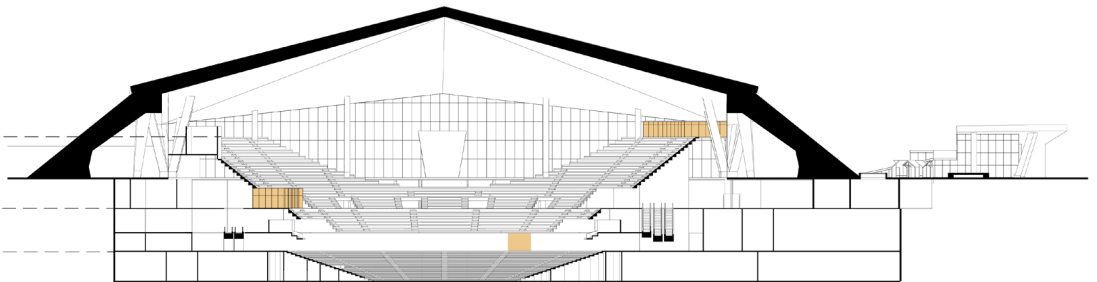
HELP DESKS
 Hands out sensory kits
 including headphones



TOP OF BOWL - TWO REFUGE SPACES

UPPER CONCOURSE - TWO REFUGE SPACES

LOWER CONCOURSE - TWO REFUGE SPACES

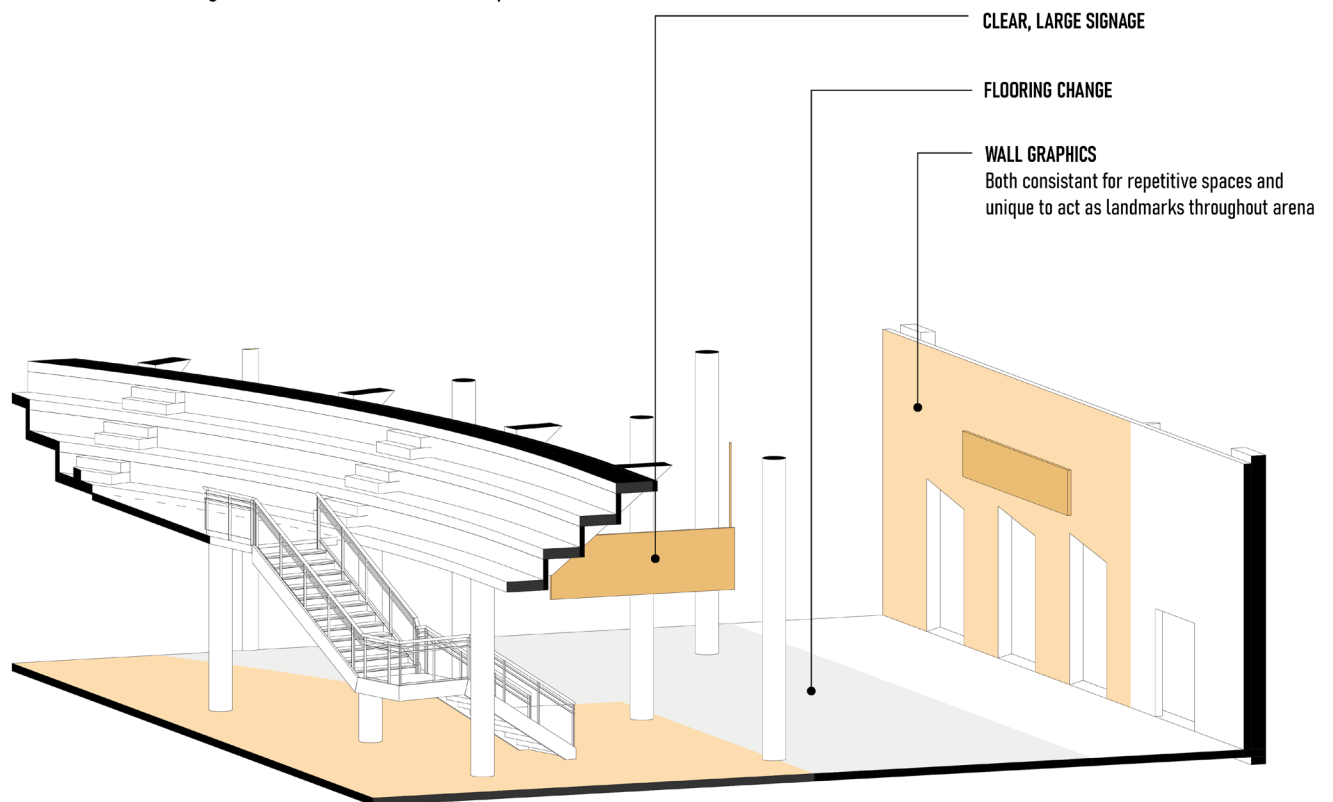


MOVING THROUGH CONCOURSE

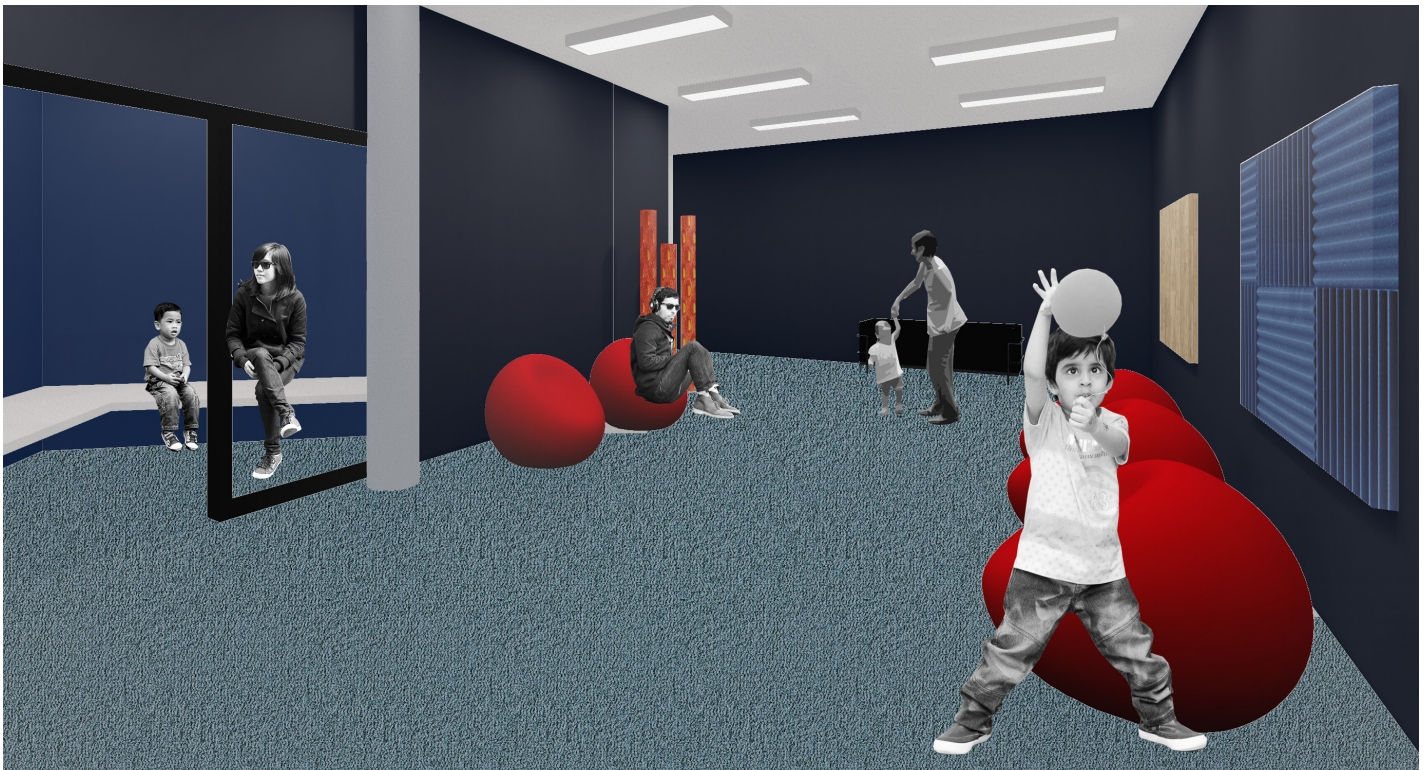
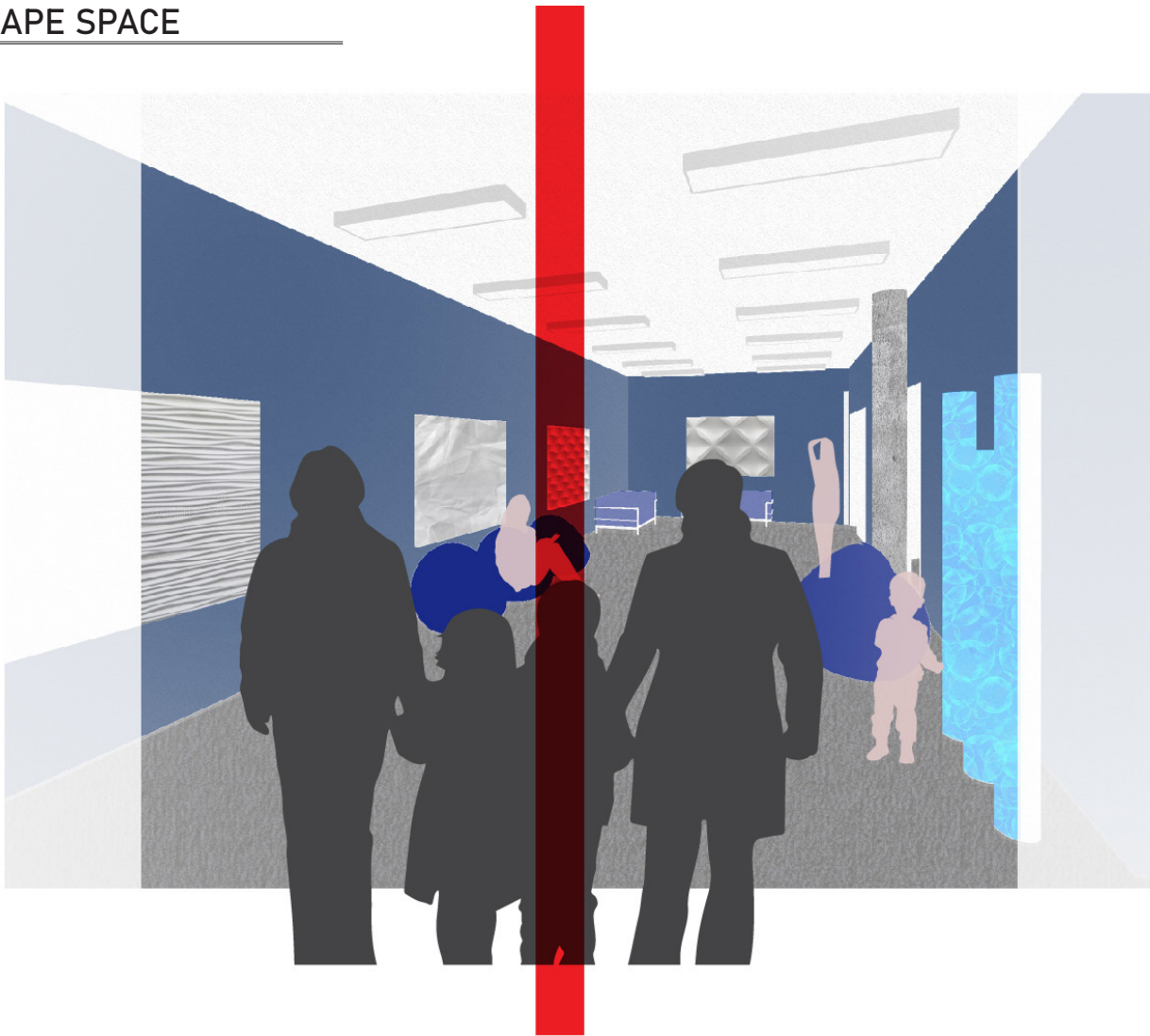


DESIGN CRITERIA: WAYFINDING

Signage, material changes and wall graphics can help an individual orient and ground themselves within the space

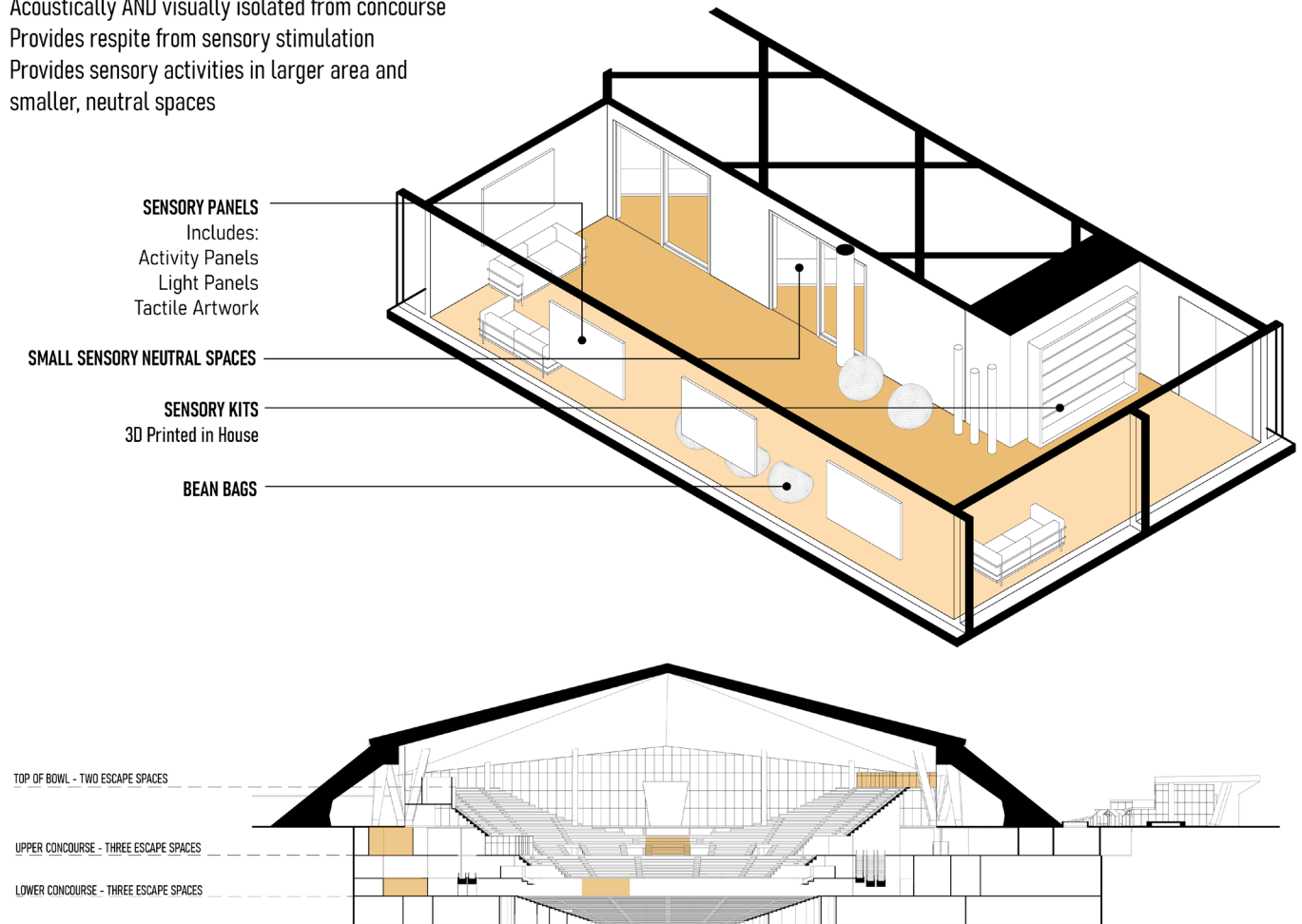


IN ESCAPE SPACE

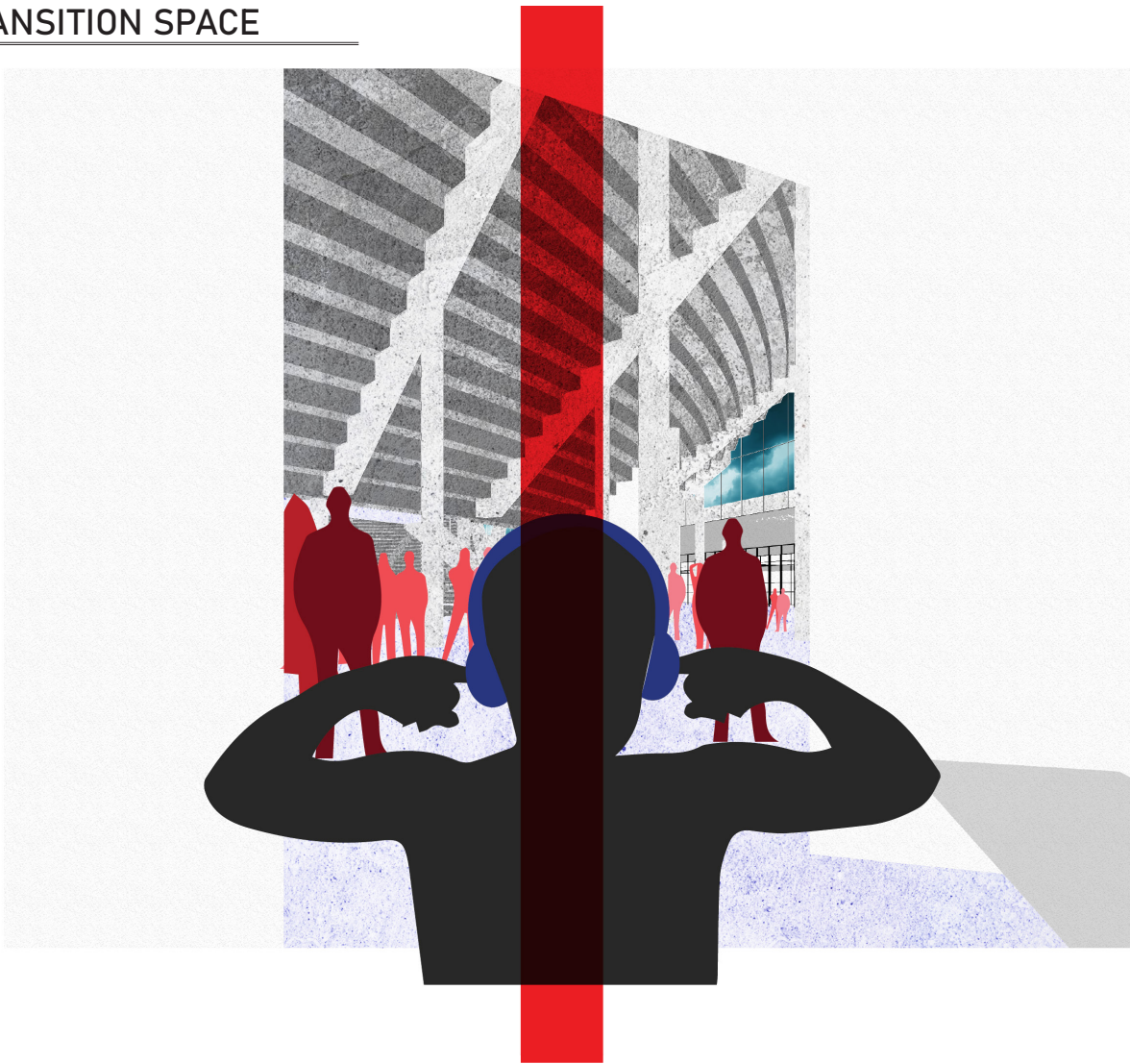


DESIGN CRITERIA: ESCAPE SPACE

Acoustically AND visually isolated from concourse
Provides respite from sensory stimulation
Provides sensory activities in larger area and smaller, neutral spaces



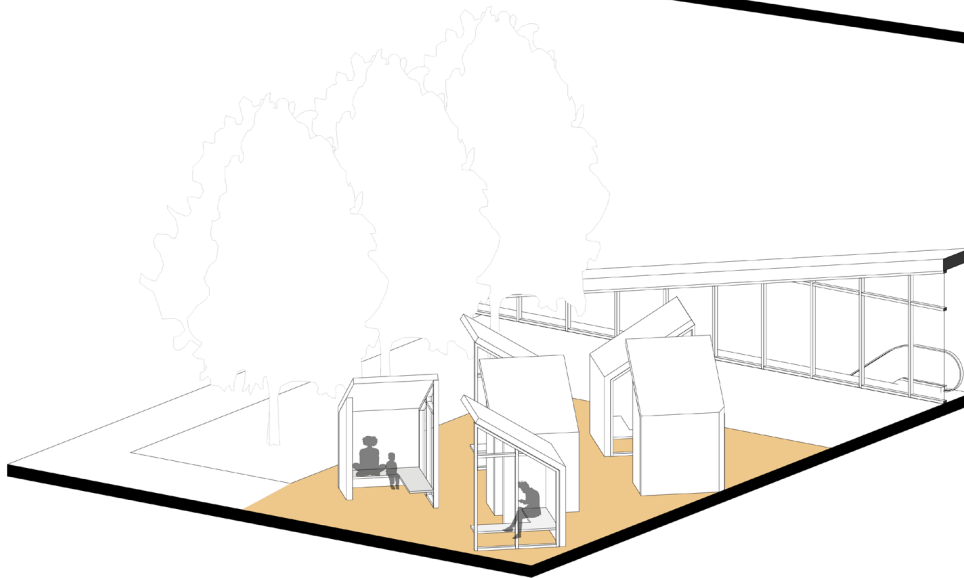
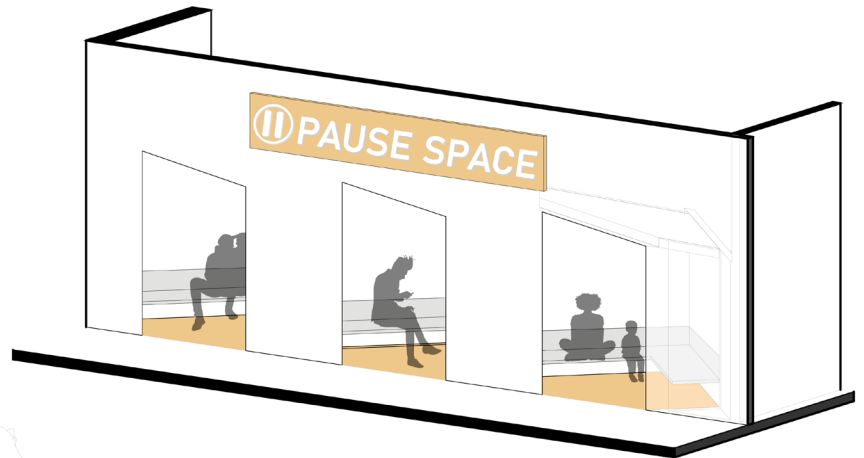
IN TRANSITION SPACE



DESIGN CRITERIA: TRANSITION SPACES

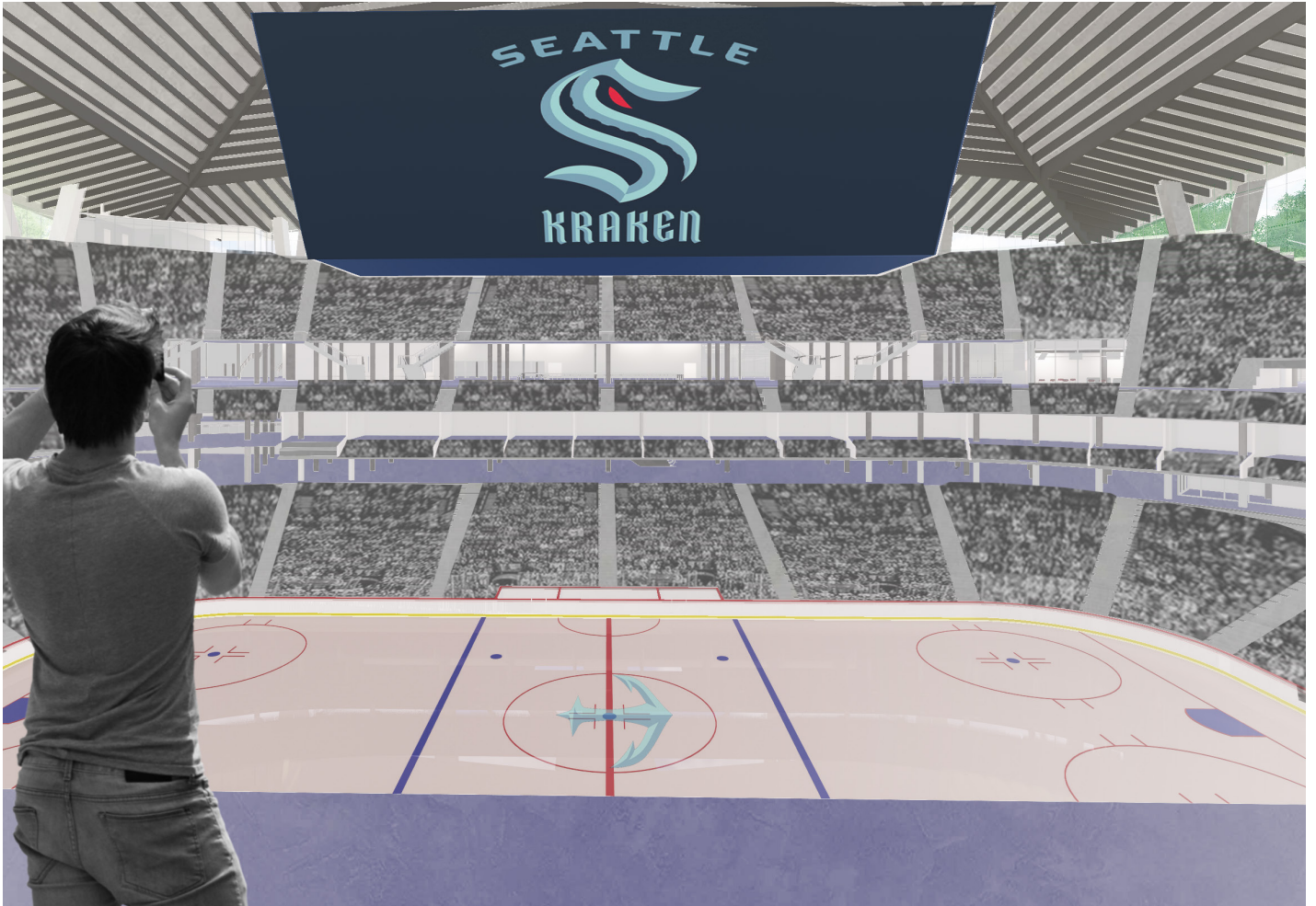
Allows for users to recalibrate senses when moving from one sensory zone to the next
 Users can sit and adjust to the sensory level
 Located in many different places inside and outside of arena

INTERIOR
 Located throughout arena
 Acts as a stopping point for any type of user



EXTERIOR
 Located in clusters just passed entrance lines
 Outside game time, become sheltered seats





ADDITIONAL EXPLORATION

3D PRINTED FIDGETS





In my last semester, I took Murali's Mind and Medium course and for my independent study project I decided to integrate my thesis project. The project was to explore a form of digital media and I chose to explore 3D printing.

As a part of the acoustical design criteria, help desks are spread throughout the arena and these desks hand out noise-cancelling headphones as a part of sensory kits. Sensory kits normally include several fidgets that can help with anxiety and stress that a lot of sensory stimulation. My independent project was to design a fidget that could be 3D printed in house in the arena and then assembled and handed out. The fidget I designed is in the form of a cube with each side being a different activity to allow the individual to fidget with their hands. This fidget allowed me to explore autism at a much smaller scale to the arena scale. My design criteria that I developed happens at all scales from overall design ideas to small

individual rooms to small sensory fidgets to be handed out.

