Intermodal Theater of Movement
A High Speed Rail Hub for Seattle

Titus Uomoto

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Architecture

University of Washington

2011

Brian McLaren, Co-Chair

Gundula Proksch, Co-Chair

Program Authorized to Offer Degree:

Department of Architecture

Dedication

To my grandpa, thank you for a wonderful education.

Table of Contents

List of Figures

1. Thesis Abstract

The freedom to move from place to place has become an essential part of modern life. Demand for public transportation will increase as costs associated with driving rise, traffic becomes congested, and people become inconvenienced. In order to encourage the use of public transportation there needs to be many different options and the provision of convenience, ease of use, and safety. A clear connection between different modes of transportation, and between interstate and local networks will also encourage public transportation.

Advances in high-speed rail have allowed trains to compete with airplanes and automobiles for long distance travel. High-speed rail is an initiative of the current federal administration and is currently being planned for California, with an initial line breaking ground next year. This Thesis assumes that the next logical step is to link the whole West Coast from San Diego to Vancouver allowing for the opportunity to move millions of people and goods each year at a fraction of the carbon cost of airplanes and automobiles. This infrastructure has a higher up front cost but lower maintenance costs, and in the long run is cheaper than the existing travel options. High speed rail is the transport infrastructure of the 21st century that will reestablish rail as a convenient, reliable, and cost effective means of travel. The stations that link cities together will be the gateways for visitors while also being economic hubs for their respective cities.

This thesis is for the design of a high-speed rail station and transit hub on a site adjacent to the King Street Station and Union Station in downtown Seattle. The site is perfectly situated at the South end of Seattle's central business district. The existing stations have other means of public transportation, such as Amtrak, Sounder, Link light rail, and Metro buses. The station is next to the football/soccer and baseball stadiums that draw in millions of people each year. Located between two prominent neighborhoods this station will also connect Pioneer Square and the International District by bridging the railroad tracks and 4th Ave, which currently discourage movement.

When built the King Street Station and Union Station epitomized the values and ideas of travel. The new station would juxtapose itself to the adjacent 100-year-old stations by speaking to the current cultural values, environmental concerns, and technologies of travel. This station will be a commercially and culturally oriented development that brings together traditional uses related to transport hubs with different aspects of the arts, dance and theater. The passengers become the performers and as they move through the space they are the ones to watch and be watched. Having a theater and gallery the station becomes a place to arrive at and enjoy and not just a portal to rush through to your next destination. This station will be a microcosm of the city that will provide shopping, food, cafes, and entertainment. This station will become an icon for the city and transportation much like how Union Station and King Street Station have been over the last 100 years.

2. Introduction

> "Transport is an essential prerequisite for modern life. The question is how to gain access to the benefits of contemporary civilization (employment, recreation, attractive housing, education) without destroying the environment of the planet, the health of city dwellers and the fabric of towns in the process."[1]

Transportation today is a huge problem; we are consuming gasoline and producing huge amounts of carbon dioxide, adding to global warming. How do we move people efficiently without the environmental effects associated with today's modes of transportation? Can we give them reasons to take public transportation that reduce carbon emissions and also stimulate commercial growth in downtown Seattle?

The train stations of the late 19th and early 20th century were one of the great buildings types that brought together architecture, engineering, circulation and function into an elegant awe-inspiring form. With the new building materials of glass and steel, grand civic spaces were created as temples to transportation. The Union Station and King St. Station are historical landmarks, located at the South end of Seattle Central Business District (CBD). They were and still are gateways to the city.

Today we are experiencing a return to train travel after years of unsustainable reliance on cars and planes. Advances in high-speed rail technology have allowed trains to compete with planes for long distance travel at a competitive price and time. They are a better long-term investment linking city center to city center.

> "The modern train station is a place where tourists, commuters, salesmen, retailers, train spotters, and the homeless converge. The station is a microcosm of the city – it has the strengths and weaknesses of the urban whole neatly packaged beneath its roof."[2]

The stations of the next century will link cities together with high-speed rail. They will be accommodating to the traveler with naturally lit, safe and comfortable spaces that are easy to navigate and friendly to use. The new architecture of these stations has the potential to help reshape old communities. By having transit-oriented development it can allow commerce to happen when passengers enter and exit the city.

This thesis proposes to ask questions such as what is a railway station? How have stations in other countries developed into a successful model that people use frequently and enjoy? What will a High Speed Rail station look like and what does that mean for transportation going forward? Is the function of a train station bringing together different elements of the city under one roof for the main purpose of travel? How can this station solve urban planning issues?

1 from "modern stations" (Edwards, 8)

2 Edwards, 21

3 History of Existing Stations

Timeline

1906 – Built by the Great Northern Railway and the Northern Pacific Railway, the Station opens to the public

1911 – Union station opens to the public and served by Union Pacific Railroad and the Milwaukee Road

1961 – The Milwaukee Road discontinues passenger service to Union Station

1965 – " Modernizing" of building by adding drop ceiling, and covering ornament and columns

1971 – Union Pacific discontinues service to Union Station

1973 – King Street Station is added to the National Register of Historic Places and the Washington Heritage Register

1976 – Kingdome opens to Professional sports

1990 – Downtown Seattle Transit Tunnel opens which is served by buses

1999 – Safeco Stadium opens

2000 – Kingdome demolished

2002 – Vulcan and Nitze-Stagen complete Union Station renovation and Office buildings above tracks

2009 – Sound transit Link light rail begins service

2002 – Seahawks stadium opens

Figure 3.1 - Historic photo of the Union station, then called the Oregon and Washington Station and the King Street station

Figure 3.2 - Historic photo of the King Street station and Union station looking north. Smith tower in background

King Street Station

The Railroads have been closely tied to the development of Seattle. As the terminus of America's Western expansion the rails brought increased population, transportation for freight and communications.

Built between 1904 and 1906 by the Great Northern Railway and Northern Pacific Railway, the station replaced an antiquated station on Railroad Avenue, today's Alaskan Way. The Station extended the transcontinental line from Tacoma and improved Seattle's connections between land and sea. This established the city as the region's primary shipping port between Asia and the US.

Designed by the firm of Reed and Stem of St. Paul, Minnesota, who acted as associate architects for the design of Grand Central Terminal in New York City, the station was part of a larger project that moved the mainline away from the waterfront and into a 5,245 foot tunnel under downtown. The depot's 242-foot tower was the tallest building in Seattle at the time of its construction and was modeled after Campanile di San Marco in Venice, Italy. This tower contained four huge mechanical clock faces built by E. Howard & Co. of Boston, offering the time to each of the four cardinal directions. At the time of installation it was said to be the second largest timepiece on the Pacific Coast second only to the Ferry Building in San Francisco. Later, this tower also served as a microwave tower for the Burlington Northern Railroad, the successor of both the Great Northern and Northern Pacific railroads, which occupied the second and third floors of the station.

King Street Station is a red brick masonry and steel frame building with terra cotta and cast stone ornamentation, though relatively subdued in comparison to the clock tower. The entire first floor exterior is brick clad with granite. The building is L-shaped with the clock tower marking the main entry on the west facade. The architectural style is sometimes denoted as "Railroad Italianate" with definite Italian inspirations in the clock tower while the base shows influences of the Ecoles des Beaux-Arts.

Over the years, remodeling has concealed the station's original interior. The final blow occurred in 1965 when the ornate coffered ceiling of the main waiting room, and a balcony and second level arcade were hidden by a lower dropped ceiling 10 feet below the original. Under the direction of Northern Pacific's in-house architect A.C. Cayou, the waiting room was walled off and

Figure 3.3 - Historic photo of King Street station from MOHAI

Figure 3.4 - Historic photo of waiting room in King Street station from MOHAI

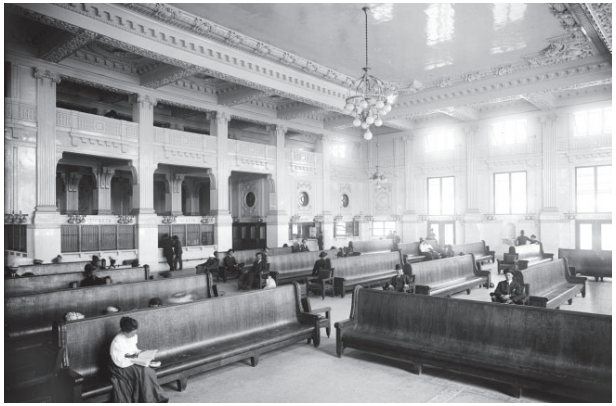


Figure 3.5 - Historic photo of waiting room in King Street station from MOHAI

Figure 3.6 - Historic photo of women's waiting room in King Street station from MOHAI

Figure 3.7 - Historic photo of women's waiting room in King Street station from MOHAI

marble was removed from columns as well as ornamental plaster being sheared from the walls as high as the new ceiling. The grand staircase linking South Jackson Street with the west entrance was reduced to half its original size, and an addition was constructed on the west elevation of the building that was not in keeping with the building's architecture. The only remaining feature left visible in the main waiting area was the terrazzo tile floor and the clock on the west wall above the rest rooms.

From a practical standpoint, the station is close to downtown. However it is not near the intercity bus terminal, although the station is one block from the International District/ Chinatown Station of the Downtown Seattle Transit Tunnel. What appears to be an upper entrance is not used.[1]

The goals of the recent renovation[2] was to restore historic character to the building by replacing the existing roof with original terra cotta tiles, repair lighting and remove the microwave dish on the clock tower, fix the four tower clocks to make them operational, restore interior finishes and exterior building façade, remove suspended tiles from the lobby to restore original ornate ceiling, and complete seismic and structural upgrades.[3]

1 Wikipedia

2 2011 by ZGF

3 http://www.seattle.gov/transportation/kingstreet.htm

Union Station

Built between 1910 and 1911 by the Union Pacific Railway and located on the corner of S. Jackson and 4th Ave in the International District, it was originally named the Oregon and Washington Station. The station is detailed in the Ecole des Beaux Arts tradition, the main waiting area having a high barrel-vaulted ceiling, tiled floors, engaged pilasters and a series of archways separating offices. The space is lit from above with skylights and from the south by a grand semicircular window.

This station served as a major gateway to the Northwest for 60 years before discontinuing service in 1971. Having sat empty for many years, the station was renovated in the late 1990's by Nitze-Stagen and Vulcan Inc and reopened to the public in 1999. Union station is now the headquarters for Sound Transit[1] and its grand hall can be rented out for public events. The Downtown Seattle Transit Tunnel, adjacent to the station, serves buses from King County Metro and Sound Transit's Link Light rail.

Conclusions

These stations represent the old modes of transportation in which there was a separation between public space and trains. The grand waiting areas had little to no programing for travelers and no visual connection to incoming trains. This is the old paradigm for train travel which worked for its era but this concept has been challenged and pushed by countries that have kept up with the changing technologies of train travel. More recently created transit hubs bring together many modes of transport serving many different types of travelers. Because of increased use in public transportation this has led to the hyper-programing of stations and their adjacent commercial districts catering to different individuals.

Figure 3.8 - Historic photo of Union station from MOHAI

Figure 3.9 - Present day photo of Union station from MOHAI

1 Regional transit authority

4 Background Research

Definition of High Speed Rail

The definition of high-speed rail according to the U.S. Department of Transportation is that the train speed exceeds 125 mph. Some characteristics of high-speed rail systems are that most are electrically driven via overhead lines and have in-cab signaling as well as no crossings on level because of safety issues. High-speed rail uses continuously welded rails, which reduces vibrations and reduces discrepancies between segments to allow for a smooth ride.[1] Existing tracks can be used but must be upgraded to meet the standards of HSR.[2]

Benefits of High Speed Rail

Other modes of transport such as automobiles use non-renewable resources, which put green house gases into the atmosphere contributing to global warming. The life cycle cost of maintenance for roads is much higher than that of the rail system but the rail infrastructure has a higher initial cost. Taking into consideration the life cycle costs, rail is much cheaper and better for the environment.

There are also many benefits for high speed rail such as food services, ability to move around comfortably, wireless internet, avoiding long check-in lines, self-service baggage storage, less security, and the system is not as affected by weather. Most importantly though, rail connects civic center to civic center and reinforces their cultural and social importance.

1 http://en.wikipedia.org/wiki/High_speed_rail

2 Find this out for sure XXXX

High Speed Rail in America

High Speed Rail in America was a report done by America 2050 that investigated the implementation of high-speed rail in America and what the landscape of rail would be like in the year 2050. The Cascadia region scored very highly because of the two mid-sized cities, Portland and Seattle and the big city of Vancouver, Canada. The report found that ridership between the cities has grown "fourfold from 1994 to 2009"[1] and with the creation of a high-speed rail system this trend would continue. As noted in this document, "Washington State Department of Transportation has been very active in planning a long-term vision for the regional rail services in the Amtrak Cascades corridor based on incremental improvements."[2] This is evidence that the state would welcome high-speed rail and both Washington and Oregon have been awarded approximately $794 million to begin incremental improvements from the Federal government. The study found that the 180-mile section between Portland and Seattle was very favorable for high-speed rail. According to their metric this corridor was comparable to corridors in New York City, Chicago, Los Angeles, and San Francisco. The

Figure 4.1 - From High Speed Rail in America

1 High Speed Rail in America page 46

2 High Speed Rail in America page 46

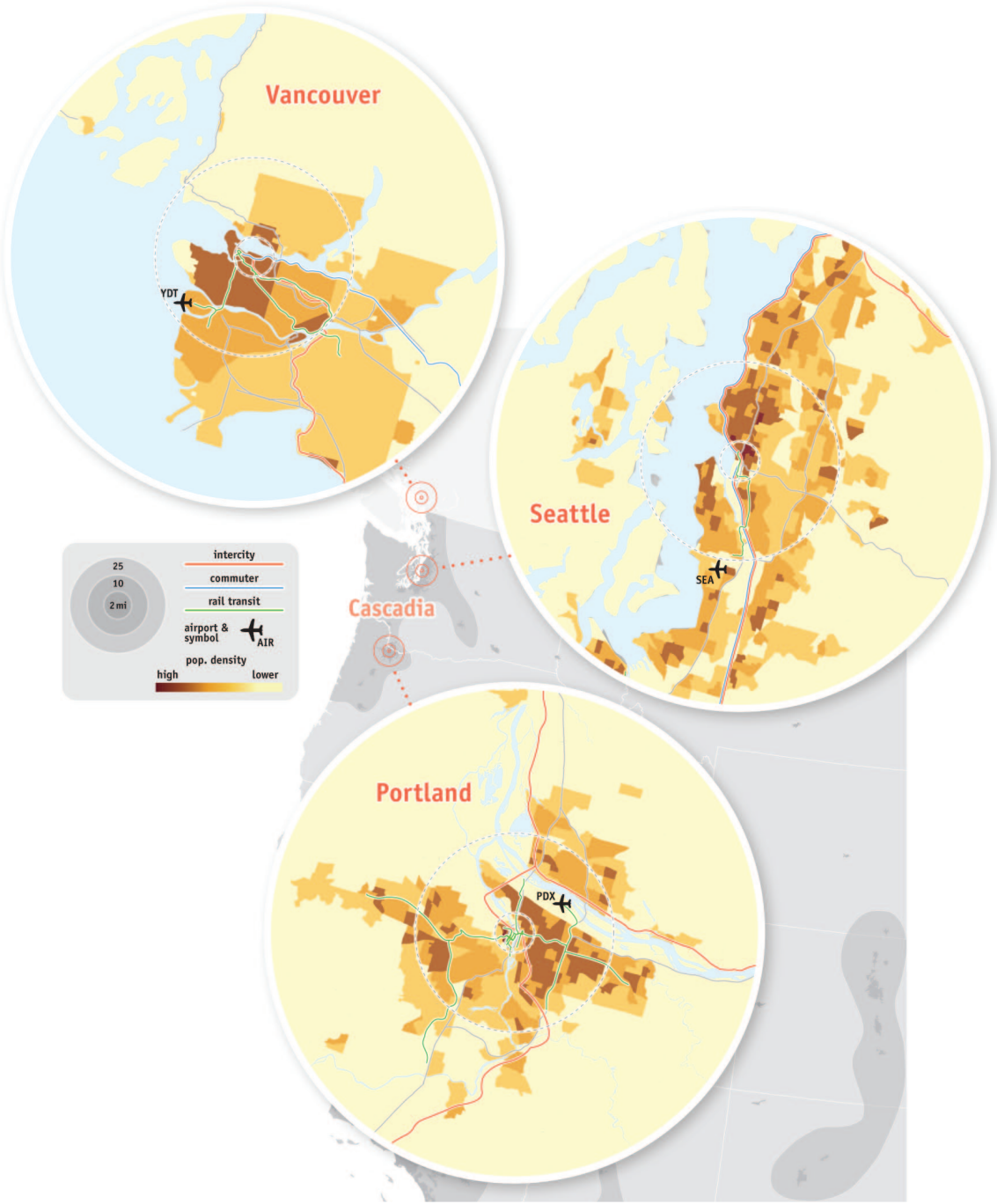


Figure 4.2 - Rail transit networks and population density in major Northwest regions. From High Speed Rail in America page 45.

summary suggested high-speed rail service between Seattle and Portland but classic rail service north of Seattle and South of Portland. This thesis assumes there will eventually be the density and demand to justify the high-speed rail connecting the whole west coast.

California High Speed Rail

Federal funding was awarded to the state of California in 2010. Currently they are in the planning stages for a high speed rail and will break ground on the Bakersfield to Fresno line in 2012. The system is designed for speeds of 250 mph but will operate at speeds of 220 mph on dedicated high-speed tracks. On shared tracks the trains will operate between 90 and 125 mph.[1]

The first phase of this system is 520 miles from San Francisco to LA/Anaheim. The second phase will extend from Sacramento to San Diego creating an 800 mile electrically driven system. Projected times from San Francisco to Los Angeles will be 2 hours and 40 minutes.[2]

Figure 4.3 - California High-Speed Rail system with proposed routes

1 www.cahighspeedrail.ca.gov

2 www.cahighspeedrail.ca.gov

Problem Statement

The Northwest needs a high-speed rail station because of the projected population growth, the low emissions associated with rail, and the need for upgrading the rail infrastructure. Moving passengers and goods with high-speed rail will take advantage of the efficiencies of the linear development of cities along the West Coast. The current King Street Station is small and outdated. By accommodating high-speed rail a new station will create a hub facilitating the transition from interstate travel (King Street Station) to local travel (Union Station), as well as becoming a new urban center for cultural events and activities.

The tracks currently cut off the International District from the Pioneer Square, so the new station has the potential to become an urban bridge connecting the these two historic districts of Seattle.

5 Case Studies

Introduction

In looking at different case studies of stations around the world several became important for this thesis. Two in London, England are high profile existing historic stations that underwent renovation for the High Speed Rail line running from London to Paris. Both had to work within the context of a dense urban site and manage the upgrades for the rail infrastructure.

During the summer of 2011 I was able to travel to Japan and get first hand experience on how the Japan Rail system works. This proved very valuable and would influence the design parameters of this thesis. With hyper programed spaces and multiple modes of transportation coming together in these hubs this became the archetype for this thesis.

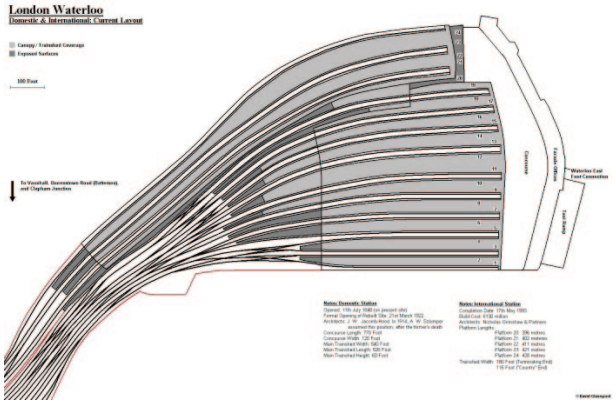


Figure 5.1 - Plan of domestic and international lines. Addition is top portion and handled the High Speed 1

Figure 5.2 - Aerial view of Waterloo station. New addition is barrel-vaulted roof

Figure 5.3 - Interior view of platform under barrel-vaulted roof

Waterloo International Station - London

This was a modification of an existing station to accommodate the new high-speed rail line from London to Paris. It is built on a narrow site and was able to keep trains running during the construction of four new lines and one taken from the main line of the existing station. A new 1,300 ft glass and steel vault was overseen by Grimshaw architects to cover the new lines, which moved 17,000 people per day.[1] The station was in operation from 1994 to 2007, serving for 13 years as St. Pancras was being modified as the main hub for the high-speed rail lines.[2]

The structure of the addition allows for a great deal of natural light onto the platforms. This makes for an enjoyable space as passengers board the trains. The rhythm of the roof and subtle curvature of the platform recalls the elegance of classic train sheds of a century ago.

1 guardian.co.uk

2 http://en.wikipedia.org/wiki/Waterloo_International_railway_station

St. Pancras Station - London

This station became the terminus for the international train service in 2007 but was originally opened in 1868 as the southern terminus for the Midland Main line connecting London with the East Midlands and Yorkshire. Originally a Gothic revival station done by George Gilbert Scott, but after surviving demolition in the 1960s and dilapidation in the last part of the 20th century it was renovated and reopened in 2007. The lead architect on the reconstruction was Alistair Lansley with Foster and Partners as the master planners. This station took over the international rail service High Speed 1 from the Waterloo Station and is currently the end terminus for trains going to mainland Europe.[1]

The classic model of the grand train shed with head house, the renovation looked to increase commercial activities and become a civic space for travelers. The station incorporates several subway lines including the King's Cross line adjacent. The design of the roof looked to create a light filled shed that feels exterior but is inclosed for English weather.

Figure 5.4 - Eurostar map of St. Pancras station

Figure 5.5 - Photo showing historic building

Figure 5.6 - View of tracks under glass and steel shed

1 http://en.wikipedia.org/wiki/St_Pancras_International_station

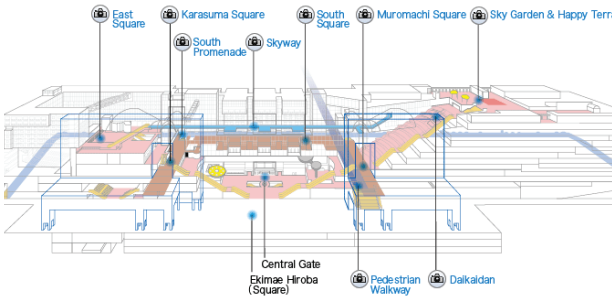


Figure 5.7 - 3-dimensional plan of Kyoto Station highlighting pedestrian paths through station

Figure 5.8 - view of central gate

Figure 5.9 - View from top of stairs looking to central gate

Kyoto Station

One of Japan's major transportation hubs and second largest train station building it is a city within a city integrating a shopping mall, hotel, movie theater, department store and several local governmental facilities. The current building by architect Hiroshi Hara is the fouth rendition of the station; the first one was opened in 1877. The building is a 15-story futurist inspired glass and concrete structure with the main entry gallery covered by a steel space frame and glass roof. Steep stairs and escalators take travelers up the "village hillside" to access the shops and restaurants.[1]

1 http://en.wikipedia.org/wiki/Kyoto_station

Sendai Station

This is the main station for the city of Sendai located in the Miyagi prefecture of Northeast Japan. The station is a transportation hub allowing for high-speed rail, light rail, subway, bus and taxi areas. The main level for pedestrians though is on the 2nd level that must be accessed by climbing up stairs to bridges that span busy roads and tracks.

The building is very utilitarian and inward facing. The double loaded corridors are lined with shops, restaurants and cafes. The Shinkansen[1] is located on the 4th floor and the light rail is accessed from the 2nd level down to ground level platforms. The waiting area is surrounded by kiosks and mobile shops but lacks a center and feels void. The exterior also lacks a connection to the interior and is currently just a place to smoke and watch the sea of taxis.[2]

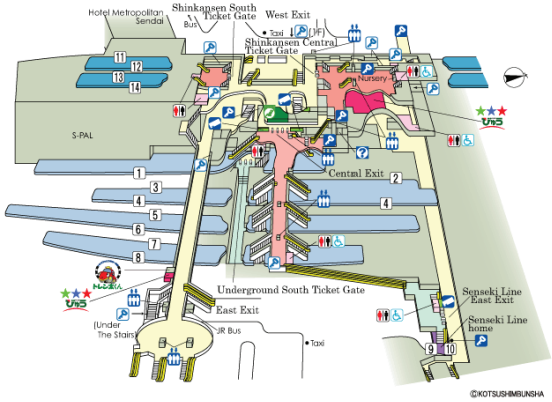


Figure 5.10 - Map of Sendai Station

Figure 5.11 - Internal view of main hall of Sendai Station

Figure 5.12 - View of Sendai Station with a sea of taxis in front

1 Japanese high speed rail

2 http://en.wikipedia.org/wiki/Sendai_Station_(Miyagi)

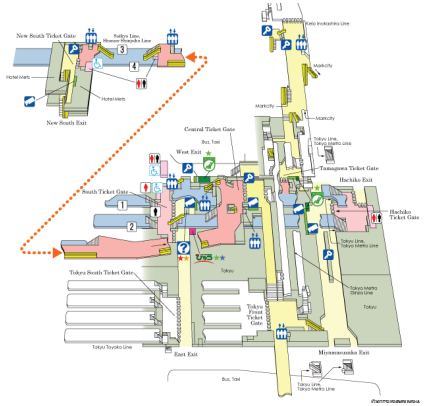


Figure 5.13 - Diagram map of Shibuya Station.

Figure 5.14 - View of pedestrians crossing in front of station.

Figure 5.15 - Tracks in station during down time.

Shibuya Station - Tokyo

As one of the main stations in Tokyo, it handles 412,241 passengers daily, a large portion commuting from the suburbs to the city.[1] There are three different train services coming into this transportation hub, JR East, Private Railways, and Subways for a total of eight lines and sixteen tracks at three different levels. In addition, there is a bus terminal on the west side and taxi areas. The station is a bustling hub of movement as people transfer trains and tracks, buy goods, food, and move to different locations.

One thing missing about this hub is that there is no formal reason to go to the station itself. Some of the informal spaces such as adjacent to the Hachiko statue (West exit) allow for loitering and socializing but for the most part it is a station that accommodates the daily traveler. Around the station is the commercial heart of the district with offices, department stores, restaurants, entertainment, fashion boutiques, and bars catering to the younger crowd.

Way finding is everywhere and needed because the station has been added onto over the years with multiple levels, lines and stairs. Transitions to trains are usually chaotic and frantic but the friendly station attendants are always willing to help you to your correct train or destination.

1 http://en.wikipedia.org/wiki/Shibuya_Station

Shinjuku Station - Tokyo

Opened in 1885, as a stop along what is now the Yamanote line, Shinjuku was still a residential area with not much traffic. Additional lines were connected to the station as the city grew and subway service began in 1959. Now it is a major hub for Tokyo rail lines. Serving 3.4 million people per day in 2008, making it the worlds busiest train station.[1] It has nine lines on multiple tracks on multiple levels. It is a major station for commuters from the suburbs to the city and is surrounded by commercial districts. There is also bus transportation along with taxis, subway, and rail. There are many malls and shopping areas in, above, under and around the station. The development is centered on the transportation and caters commercially to the commuter that needs a quick bite to eat or gift for the family.

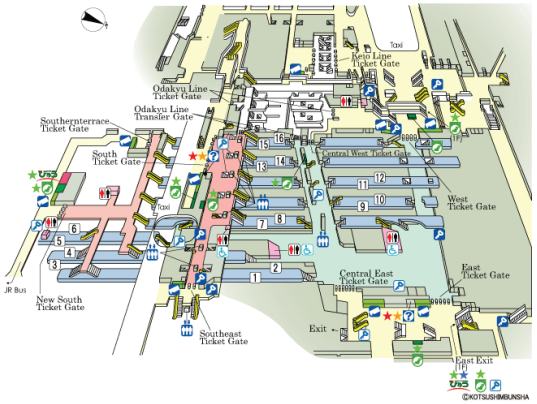


Figure 5.16 - Diagram map of Shinjuku Station

Figure 5.17 - Tracks at one of the platforms

Figure 5.18 - One of the main entrances to station

1 http://en.wikipedia.org/wiki/Shinjuku_Station

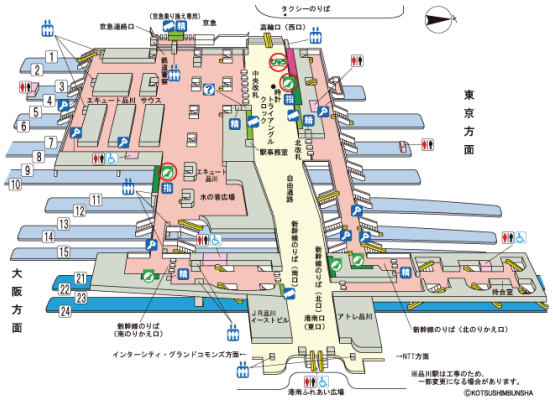


Figure 5.19 - Diagram map of Shinagawa Station

Figure 5.20 - Taxi's in front of station.

Figure 5.21 - Commuters changing trains.

Shinagawa Station

Shinagawa station is one of Japan's oldest rail station, opened in 1872, it is located in the southern part of Tokyo.[1] It was redeveloped in 2003 to accommodate the Shinkansen[2] service and handles 321,739 passengers daily. Over the last decade the adjacent area has been developed because of increased passenger traffic due to the expansion of the station. The station has become a place for travelers to stay because of several major hotels surrounding the station. This is due to the fact that it is the terminus for travel to and from the Kanto region, where an international airport is located.

Travelers often need lodging after long distance travel and this would be a good programmatic element for a high speed rail hub.

1 http://en.wikipedia.org/wiki/Shinagawa_Station

2 Japanese high speed rail

Tokyo Station

Opened in 1914 next to the Imperial grounds, the Tokyo station has been rebuilt a number of times after bombings during World War II, and fire in 1949. In 1964 the station was renovated to accommodate the Shinkansen[1] line and was expanded in 1991.[2] In total there are twenty tracks for trains, nine tracks for the Sinkansen, and eight tracks serving the subways. It is the main terminus for the Shinkansen and many people pass through here going to and from other parts of the country or airport.

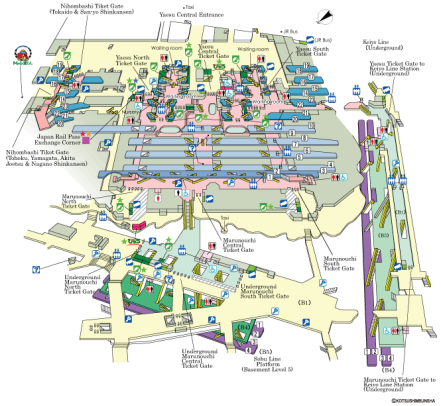


Figure 5.22 - Diagram map of Tokyo Station.

Figure 5.23 - Front of Tokyo Station.

Figure 5.24 - Tracks and platform at station

1 Japanese high speed rail

2 http://en.wikipedia.org/wiki/Tokyo_station

Lessons from Case Studies

It was very interesting to see and travel through these train stations in person. They were extremely busy by American standards but the efficiency of the system allowed the stations to move people on time throughout the day.

The Japanese train stations have existed for decades but have undergone consistent upgrades and expansions to deal with increased usage. The stations increase in usage generates a need for multiple functions creating hyper programed stations with things such as restaurants, cafes, retail, hotels, theaters, government and commercial offices. Commercial districts grow around the stations catering to individuals using the public transportation. These transportation hubs integrate a variety of different modes of travel such as taxi, bus, subway, rail.

These stations are truly the civic centers of the city with the majority of the population benefiting from them.

Figure 5.25 - Images from Japan Rail stations June 2011


おすすめ商品 送料無料
喜久水庵
CYBELE
白松がヨーカン


JR ハチ公改札 Hachikō Entrance
八公前剪口 하치코 개찰구

6 Site Analysis

Existing Site

The site is located between the Pioneer square on the west and the International District on the east. Pedestrian travel is discouraged between these neighborhoods because of the train tracks and the busy 4th Ave. The area height limit is generally 120 feet in the Pioneer Square district and has increased to 150 feet in the International District.[1]

Union Station and King Street Station is perfectly situated as the gateway to Seattle's downtown. Adjacent to other forms of transportation such as light rail, buses, taxies, travelers can easily navigate the city from this terminus. The two stadiums adjacent to the station draw huge amounts of spectators year round into the local shops, restaurants and bars. Increasing the density and commercial aspect will only help to draw people to King Street Station. By giving people efficient means of travel and a destination this can only help the local economies and encourage public transportation.

1 Zoning code from city

Figure 6.1 - Aerial view of Pioneer Square and the International District with site inbetween


PIONEER SQUARE
SITE
INTERNATIONAL DISTRICT
Seattle
Harborview Park
Pioneer Square Historic District
Smith Tower
Pioneer Square
Kobe Terrace Park
Union Railway Station
Amtrak-Seattle
Qwest Field
Marion St
Columbia St
Cherry St
James St
Jefferson St
Alder St
Terrace St
Yesler Way
Prefontaine Pl S
Dilling Way
Bus Ln
S Washington St
S Main St
S Jackson St
S King St
S Lane St
S Dearborn St
S Charles St
S Plummer St
Airport Way S
Alaskan Way Viaduct
Railroad Way S
Occidental Ave S
Post Ave
1st Ave
2nd Ave
3rd Ave
4th Ave
5th Ave S
6th Ave S
7th Ave S
8th Ave
8th Ave S
Maynard Ave S
Maynard Alley S
Canton Alley S
1st Ave S
2nd Ave S
3rd Ave S
4th Ave S
2nd Ave Ext S
99
519
N
250 feet

Transport Systems

The site has several modes of transportation located adjacent to the Stations. There is the interstate line operated by Amtrak which moved 677,953 people in 2010.[1] The local train lines operated by Sound Transit run from Tacoma and Everett and moved an average of 9,400 people per weekday in the second quarter of 2011.[2] They also run special game day trains which help with the mass of people after games. The Link Light rail which opened 2009 moved an average of 23,700 people per weekday in the second quarter of 2011. This line is currently being extended to Northgate and has future plans to connect the whole region. The Metro bus system runs on main arterials but also runs in the metro tunnel under Seattle's downtown, along with the light rail. The downtown ferry terminal is located within 15 minutes walk in the Pioneer Square district and moved an average of 23,300 people a day in 2010.[3] The transportation systems currently do not have a clear connection and in order to encourage the use of public transportation unifying these networks would benefit the overall system.

---

1 www.amtrak.com

2 www.soundtransit.org

3 www.wsdot.wa.gov/ferries/

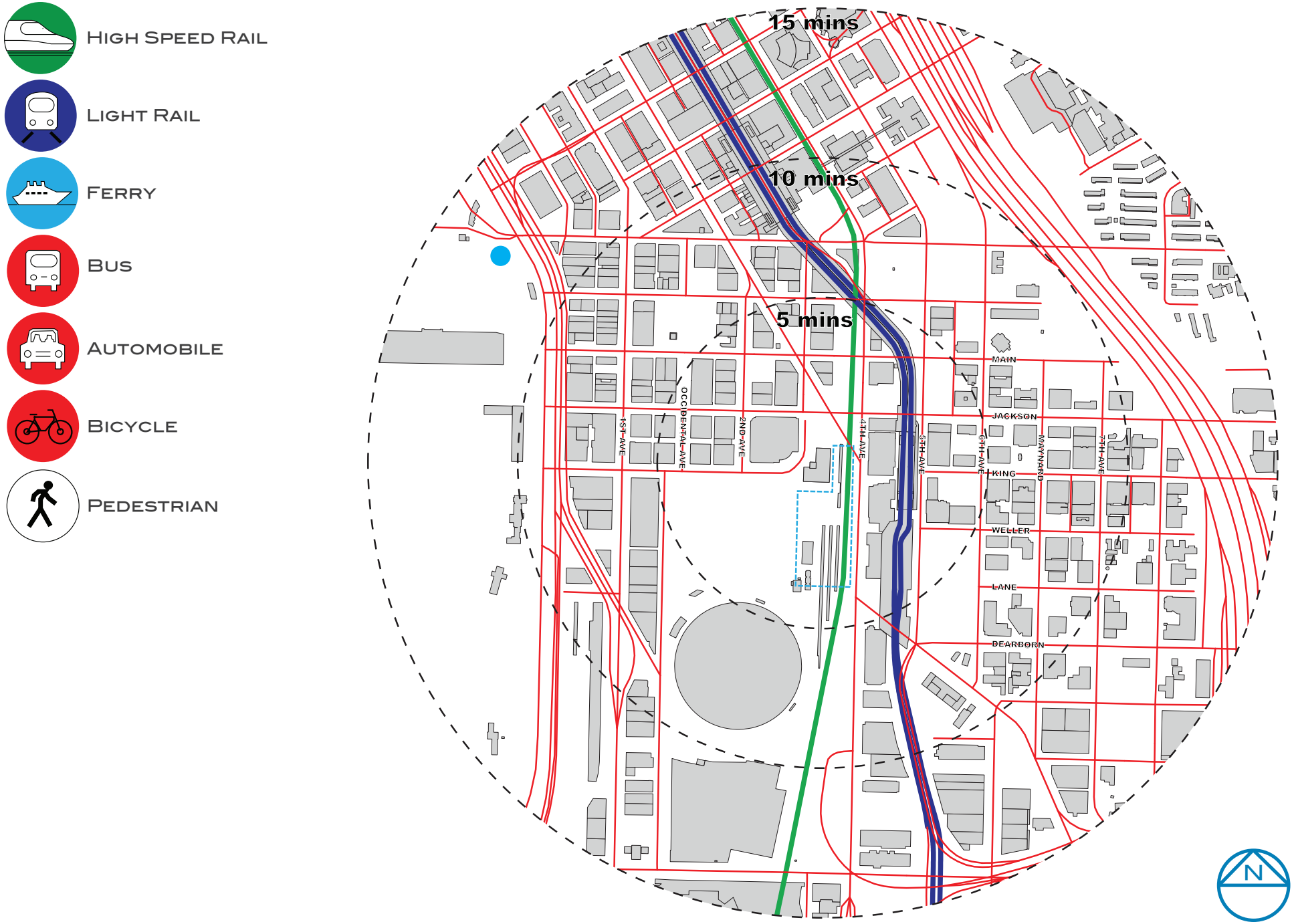


Figure 6.2 - Map of vicinity with different modes of transportation overlaid.

Figure 6.3 - Artist rendering of first phase of development in North lot looking northwest

Figure 6.4 - Artist rendering of North lot development looking southeast

Figure 6.5 - Artist rendering of second phase of North lot development looking southeast

Transit Oriented Developments

> "Transit Oriented Development (TOD) concentrates jobs, housing, and daily conveniences around transit stations. By creating high-intensity, mixed-use land use patterns with pedestrian-friendly design at strategic points along regional transit systems, TOD allows people to use their cars less, walk, bicycle, and ride transit more, and use services within walking distance of their homes and local transit stations."[1]

Stadium Place is the first of two transit oriented developments in the North parking lot of Century Link field that are planned.[2] When completed it will be the largest development on the West Coast with access to High Speed Rail, heavy rail, light rail, street car, regional and local buses, and ferry service. It will include 700 residential units with approximately 900,000 square feet of residential and commercial usage. Phase One broke ground in September 2011.

Stadium Towers is phase two that will add 420,000 sq. ft. of office space and 16,000 sq. ft. of retail.

The third phase of this development will happen above the tracks and be office and retail. This thesis accepts that the developments will happen but chooses to change the program to a hotel for an amenity to the train station. The hotel will not be designed in this thesis but chooses to locate it on the west side of the tracks facing the stadium parking lot. Access to the hotel has been considered in this thesis.

1 Ashby page 21

2 www. northlotdevelopment.com

Figure 6.6 - Aerial view of current site with transit oriented developments highlighted


SITE
TOD
TOD
TOD
6th Ave S
S King St
S Weller St
S Lane St
S Dearborn St
5th Ave S
Link Light Rail-Int'l Dist-Chinatow
Bus Ln
S Jackson St
4th Ave S
2nd Ave Ext S
Amtrak-Seattle
Sounder-King Station
3rd Ave S
2nd Ave S
Airport Way S
I-90
Qwest Field
N

Events

The stadiums draw hundreds of thousands of people each year for the Seahawks, Mariners and Sounders games. A little less than a third of the year there are games being played at the two stadiums. The Seahawks play 10 home games, Sounders play 23 home games, and the Mariners play 81 home games a year. There are multiple exhibitions, graduations that happen in the stadiums and exhibition center also.

The station will help mitigate the tens of thousands of people flowing out of the stadium after games and events. Currently there is only one bridge (Weller St. Bridge) that gets people over the tracks to the International District.

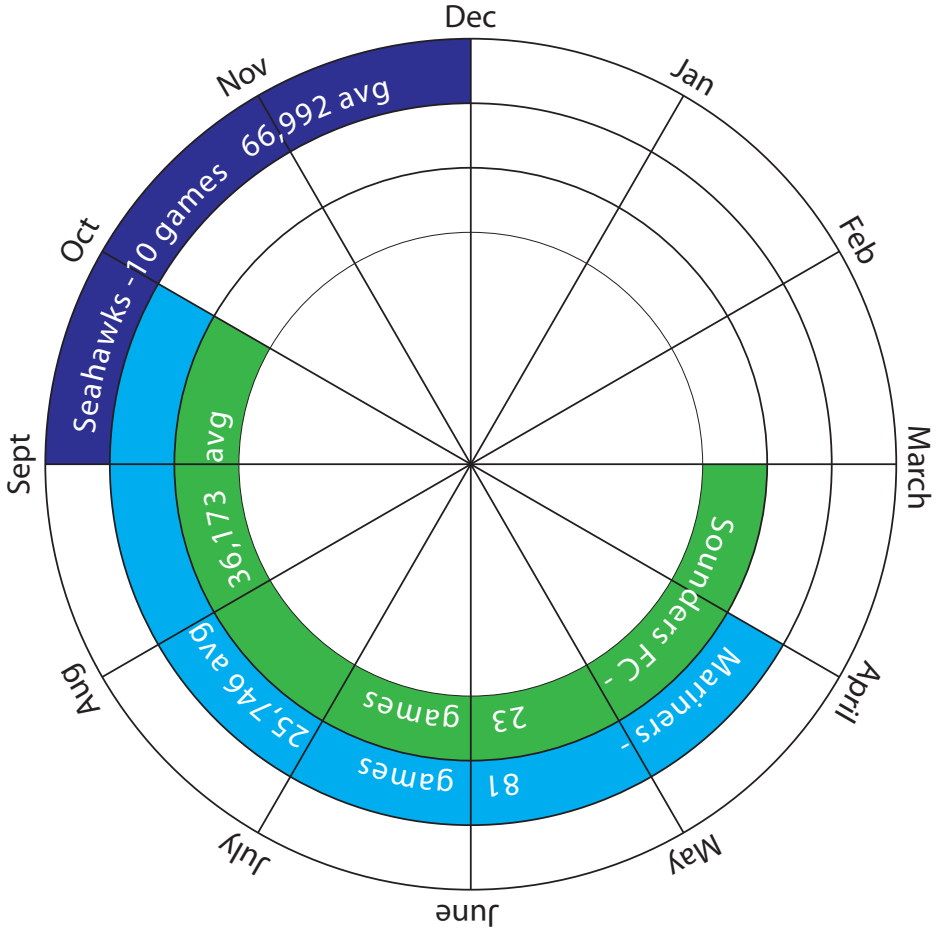


Figure 6.7 - Diagram showing sporting seasons and number of games played with average attendance

Figure 6.8 - Safeco Field where the Mariners play baseballt

Figure 6.9 - Century Link Field where the Seahawks play football

Figure 6.10 - Century Link Field where the Sounders play soccer

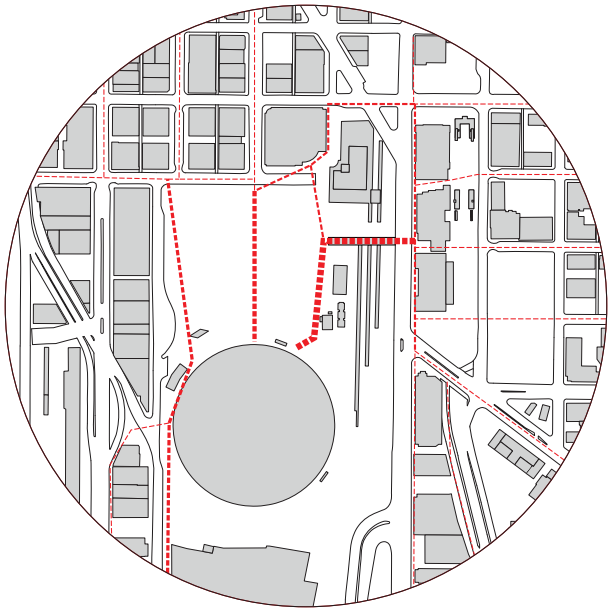


Figure 6.11 - Pre-game there is a steady trickle of people to the stadium 2-3 hours before game time.

In Flow of People

The in-flow of people coming to the stadium happens 2-3 hours before game time. There are many activities that take place. Restaurants and local businesses benefit from this in-flow of people.

Figure 6.12 - Pre-game there is a steady trickle of people to the stadium 2-3 hours before game time.

Surge of People from Stadium

There is a surge of people leaving the stadium after games are over. Tens of thousands of people are released into the neighborhood and overwhelm the different modes of transportation. There becomes a human traffic jam over the Weller St. bridge which is the only connection over the tracks to the International District. The station will become a bridge creating multiple connections to better facilitate the movement of people.

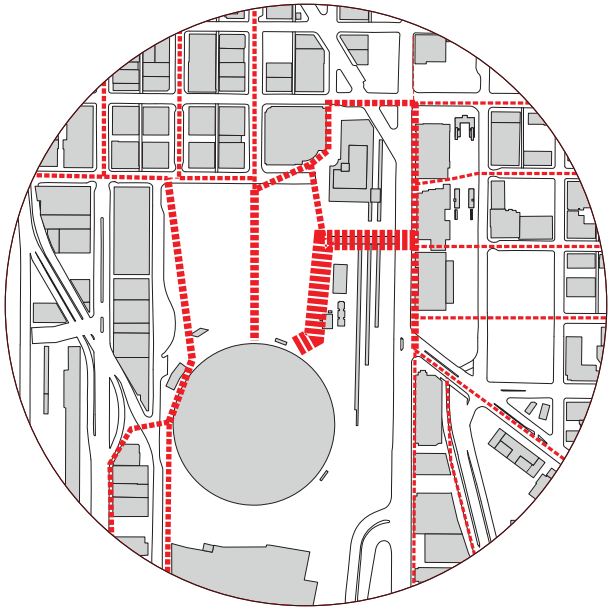


Figure 6.13 - Post-game diagram of surge of people. Weller St. bridge is only connection over tracks

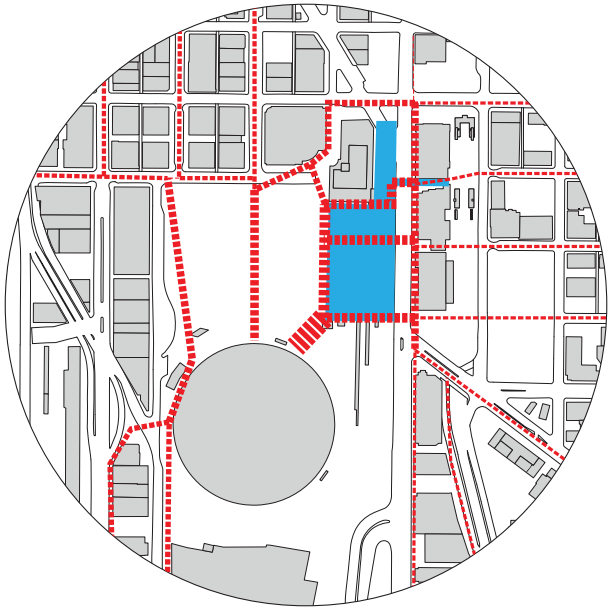


Figure 6.14 - Post-game diagram of surge of people with station creating multiple connections to I.D.

Figure 6.15 - Post-game surge of people from the stadium

Circulation of Site

Circulation was the main factor that drove the design of the station. How the pedestrian navigates the level changes and the moving of many people during surge times called for simple, easy movement. By bridging the tracks and 4th Ave the station allows pedestrians to weave together two districts that are currently severed. It also allows for direct access from interstate (King Street) to local (union station).

The points of access responds to the existing block grid and continue from the International istrict to the stadium parking lot. The path from Union Station to King St. Station has a skybridge that allows for continuous movement without impeding traffic. This allows for smooth transition from one mode of public transportation to another mode.

The North / South pedestrian street allows for main access all along building. Track[1] access. Finally[2] there is secondary access to programmatic functions such as retail, restaurants, food court, theater, galleries, artist lofts.

---

1 footnote blah blah blah

2 asdfasasfd fads sd adfasdf asdf sdf asdfa sfsda faf sadf asdf sadf

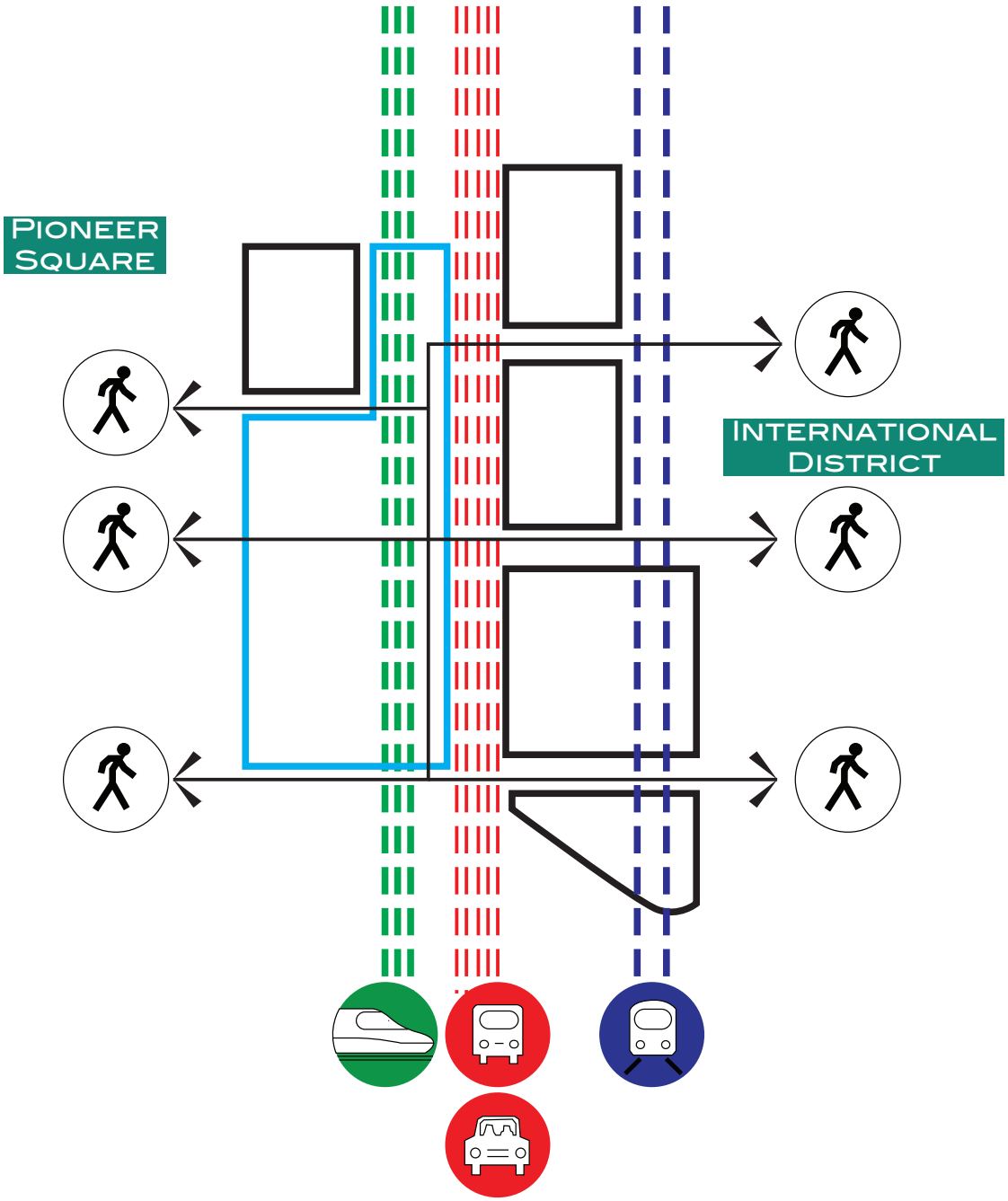
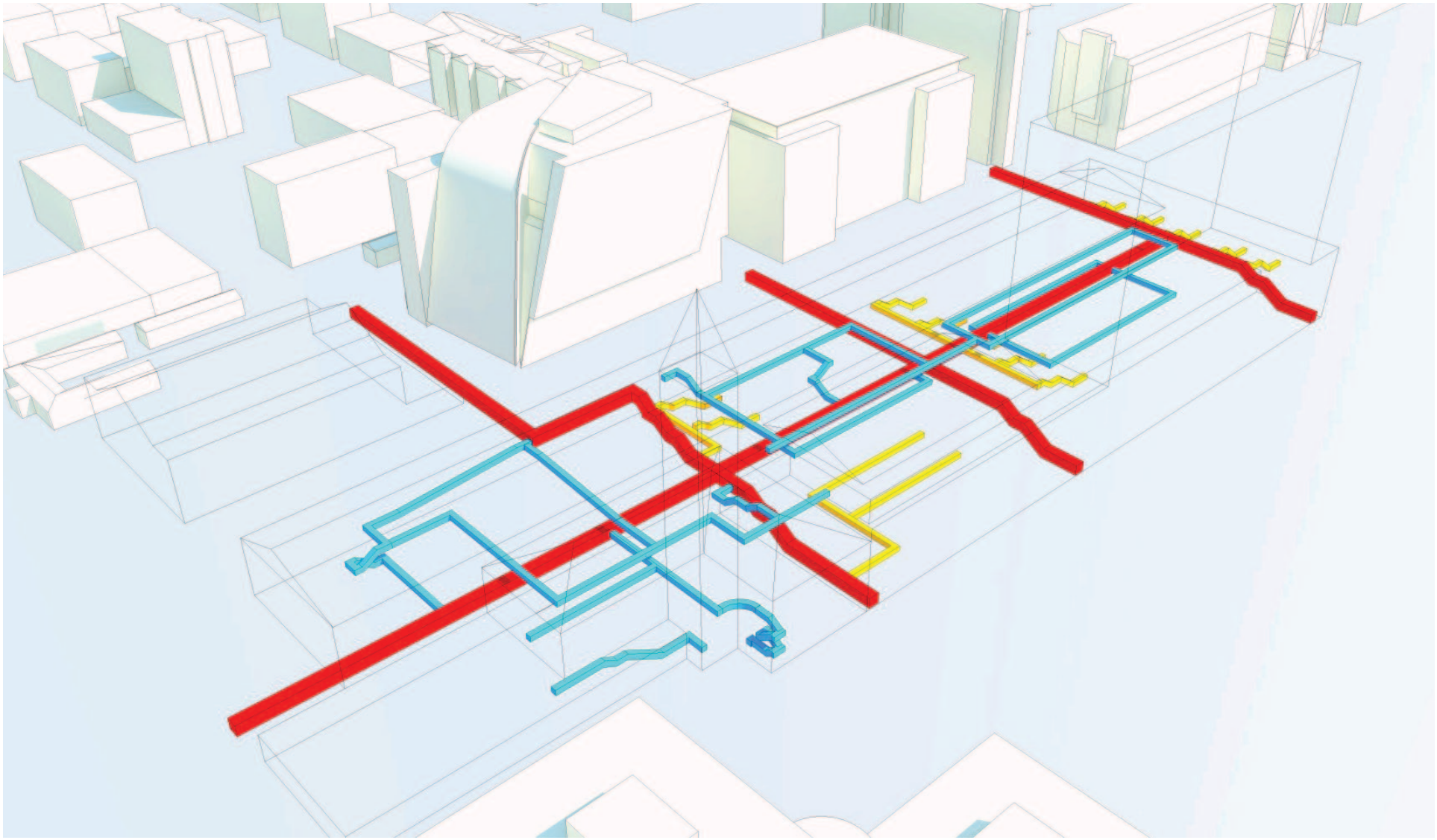


Figure 6.16 - Diagram of different modes of transportation and how they interact on the site.

Internal Circulation

The station is broken up into 3 sections that are based on the street grid. The size of the station is three city blocks long and has to be broken down to the human scale. The North/ South pedestrian street allows for access to the street crossings along building. Off of the main access there is access to the platforms. This takes place mostly from the 2nd level down stairs or elevators. Finally there is access to programmatic functions labeled in blue that allows for access to retail, restaurants, food court, theater, galleries, artist lofts.

Figure 7.1 - Circulation diagram highlighting main routes in red, platform access in yellow and secondary circulation in blue



Program

Keeping King St. Station's historical character is very important and the current renovations make it easy to keep what has been restored. The new station will add 13,800 sq ft of of Station program, 102,000 sq ft of Commercial program and 23,900 sq ft of Cultural related program. The pedestrian experience and needs have been given top priority in this public institution. Flexibility of spaces will allow for different programing to take place and extend the usage hours.

King St. Station Existing Program

Station

Waiting Room 7,500
Women's Waiting Room 1,200
Restrooms ..... 350 x 2 = 700
Baggage Claim 1,600
Ticketing Office 1,500
Staff Offices 3,000
Baggage Service 6,000
Utility 2,700
Total 24,200

Commercial

Cafe/Retail ..... *Total 3,200*

Cultural

Artist Studios ..... *Total 16,000*

New Station Program

Station

Tourist Center 1,600
Information 1,600
Bathrooms (mens 500, womens 500).....4 x 1,100 = 4,400
Internet / Resource Center 800
Station Offices 5,400
Total 13,800

Commercial

Restaurants .....4 x 2,500 = 10,000
Food Stalls 8,500
Cafes 1,700
Hotel Reception and Guest Services.....11,000
Hotel Restaurant.....12,000
Retail
1st Level 6,400
2nd Level 21,000
3rd Level 31,400
Total 102,000

Cultural

Theater 5,700
Gallery / art walk / exhibit spaceff.....7,300
Rehearsal / Flex Space 10,900
Total 23,900

Track Level - 1st Level

The track level is where the interaction with the trains takes place. Travelers buy their tickets, check baggage and board on this level. To get to the high speed rail lines the traveler must go up to the second level (Street Level), cross the local tracks and then come down to track level. The existing station is currently undergoing renovations after receiving federal money to upgrade facilities for current and future uses.[1] After touring the facilities at the beginning of the quarter to personally see the upgrades, it was determined that the renovations would be adequate for integration into a new high speed rail station in Seattle.

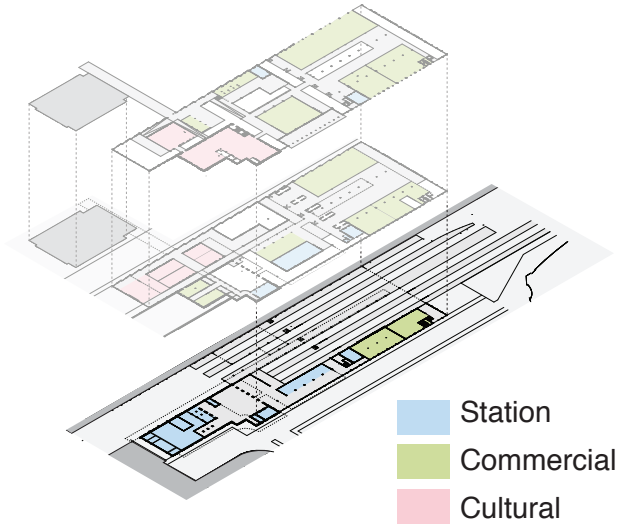
After renovations the King St. Station will have utility space in the North portion along with baggage and cargo, this is essentially the service area that only the staff and workers will have access to. There is currently an interesting dynamic of workers at the station. Amtrak workers handle ticketing and the trains and then there is staff that handle the baggage and maintenance. Both have a common break area located in the back portion of the station.

All ticketing will take place in the central portion of the station. This will consolidate the Sounder, Amtrak, and High Speed Rail ticketing into one place. Baggage will be checked here and taken to the back room where it will be trollied to incoming trains. King St. Station's waiting area will be restored to its original grandeur but opened up by removing the infill portions of the south wall to allow for light and air into the space. This allows for a greater connection between the new and old stations and becomes a blending area for the two.

The new station will have a higher degree of transparency with a strong visual connection to the trains and tracks. There will be an opportunity for some retail at the south end of the station at track level and also an entrance to the hotel for drop off and pick up.

In general, the station programing has been broken down into 3 types, commercial, cultural, and station. These are color coded on the plans and generally grouped together.

1 how much money was awarded.



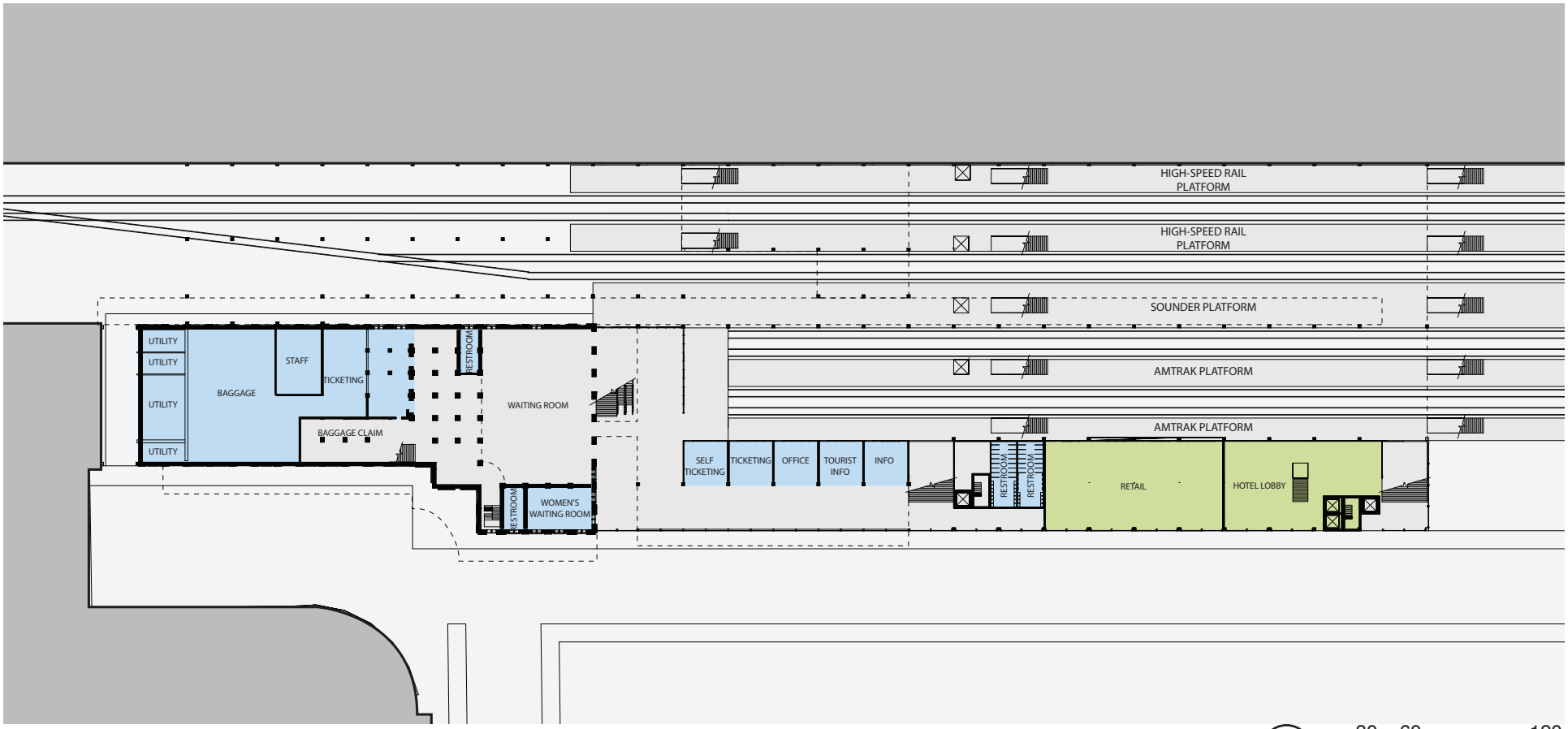


Figure 7.2 - Plan of track level.

Pedestrian Street - 2nd Level

The pedestrian street level is where the building bridges the tracks. This level becomes an elevated pedestrian street with a circulation zone running the entire length of the building. Main points of traffic transect this pedestrian street and break the building up into three blocks. The cultural portion is located in the north with a gallery and flexible rehearsal spaces that can be also connected with the gallery. This portion is the northern most program and faces the city. There is direct access to the King St. Station building which will have small cafes and retail on this level after the renovation.

Food related functions take place in the middle of the pedestrian street and allow the traveler to sit and watch as people move through the station. An informal theater offers the opportunity to host dancers, actors, improv and an audience. There is again a strong visual connection to the lower portions of the station and trains. Not only is this visually interesting but it allows for natural light to reach the tracks. The south portion of the station concentrates the retail functions and provides hotel access for travelers.

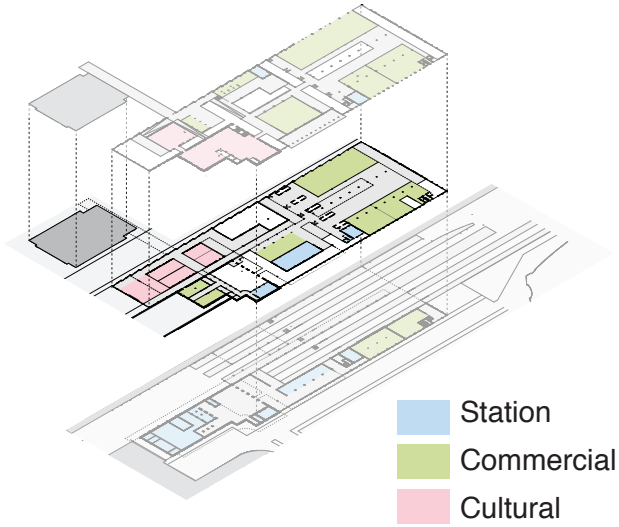


Figure 7.3 - Plan of pedestrian street level.

N 30 60 120

Bridge Level - 3rd Level

The north side of the station is programmed with theater space relating to the cultural functions beneath and has direct access to the artist studios in the King St. Station building. The theater challenges traditional models by opening the space to the public during non-performance times to extend the hours of use.

The skybridge creates a formal connection between the King St. Station and the Union Station, unifying the different modes of transportation. It provides an unimpeded means of travel between the interstate high speed rail and the local light rail.

The central portion of the station has restaurants and a food court for travelers, and there are opportunities to watch from this elevate level as people move through and around the station. The south end provides retail and access to the hotel. It also is a vantage point directly above the trains so the pedestrians can watch as they glide into and depart from the station.

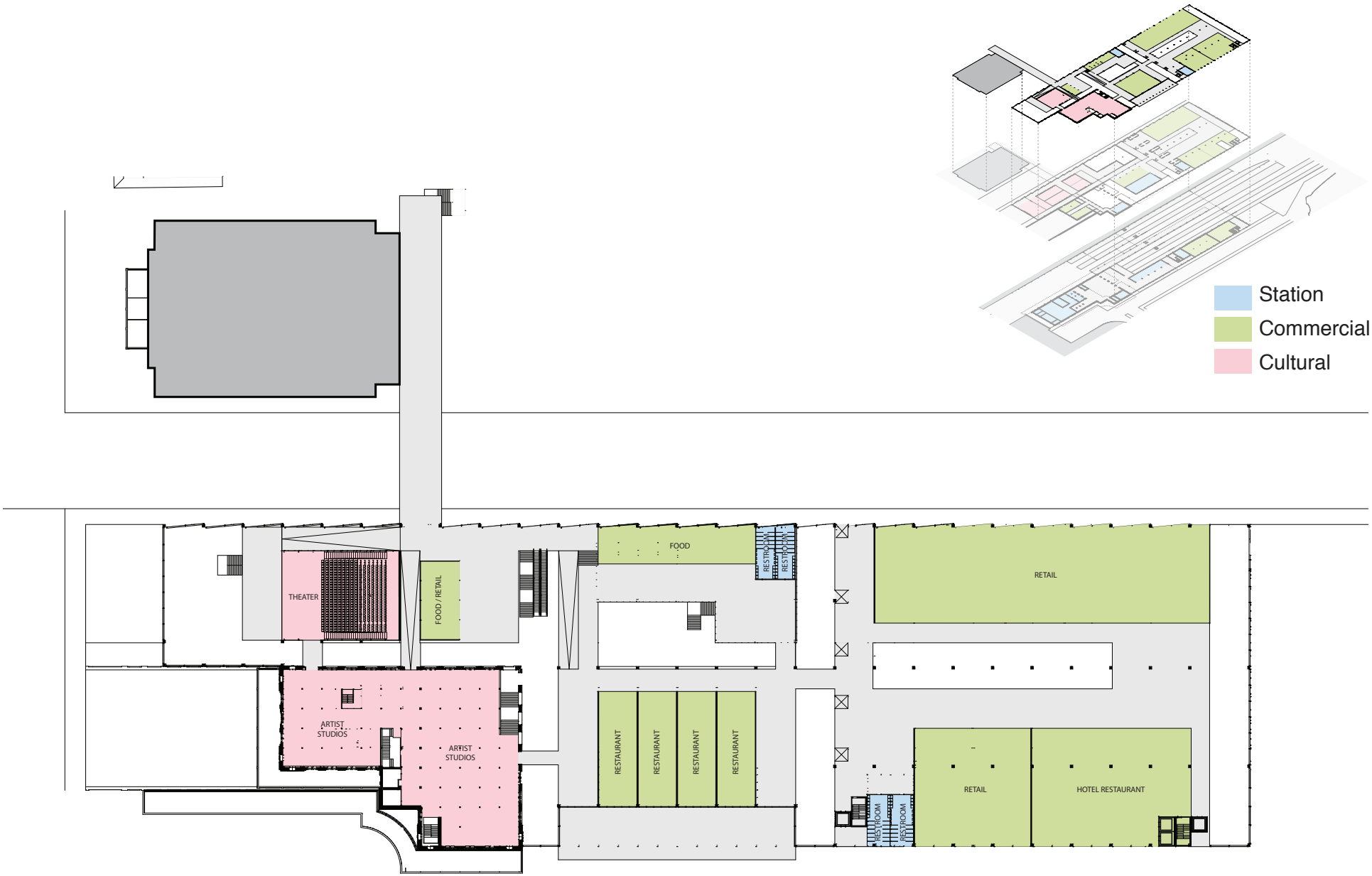
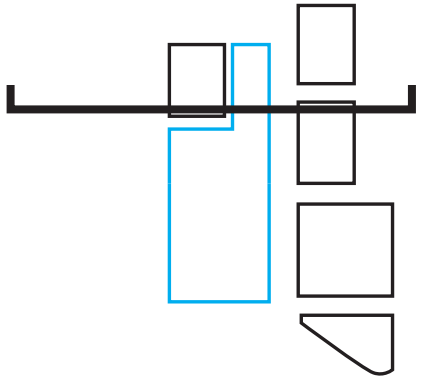


Figure 7.4 - Plan of bridge level

Site Relationship

The station is centrally located between the International District and the waterfront, just south of downtown Seattle. Small in comparison to the scale of downtown, the station will have a big impact, becoming a gateway to the city.



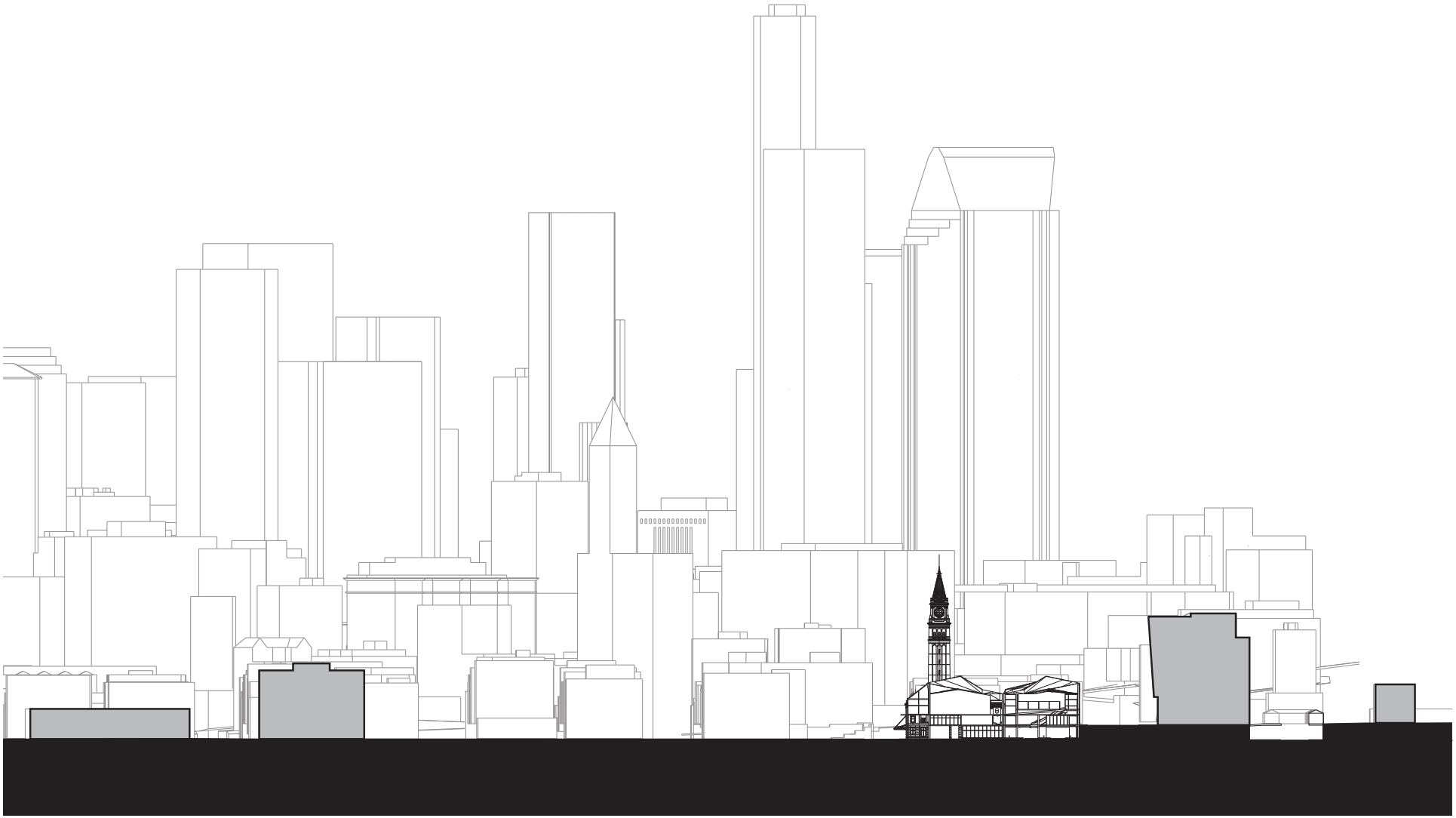
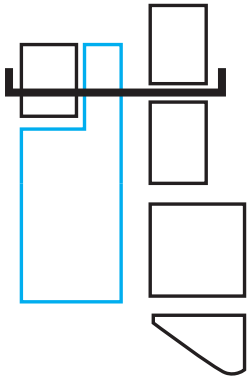


Figure 7.5 - Site section

Connecting Modes of Transportation

This section Illustrates the bridging of different modes of public transportation located in the stations. One of the paths from the skybridge continues past the theater and directly into the King St. Station.

The section also highlights the new station next to the two existing stations which has a different language but similar scale.



1. Artist Studios
2. Cafe
3. Ticketing
4. Restroom
5. Pedestrian Corridor
6. Rehearsal
7. Rehearsal
8. Tracks

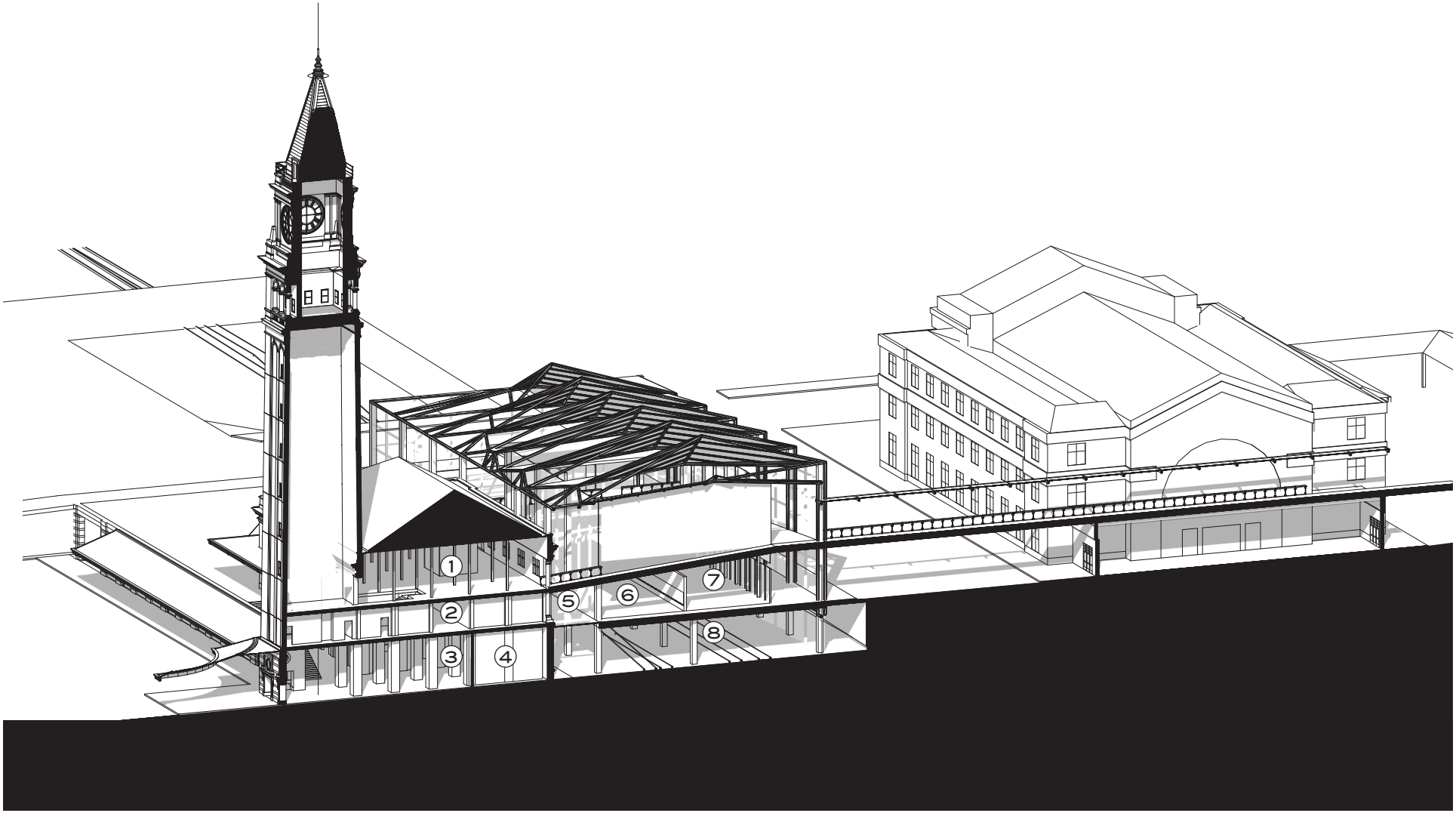
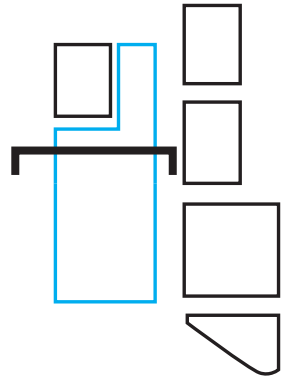


Figure 7.6 - Section axon through the King St. Station clock tower, new station and the skybridge passing just south of the Union Station

Track Relation to Station

The section shows the double height space above the tracks and the visual connection from the pedestrian street down to platforms. The changing levels of the site created issues with bringing natural light to the track level but a glazed street facade will handle issues of lighting.



1. Food
2. Platform
3. Informal Theater
4. Platform
5. Restaurant
6. Food
7. Platform
8. Station Office
9. Ticketing

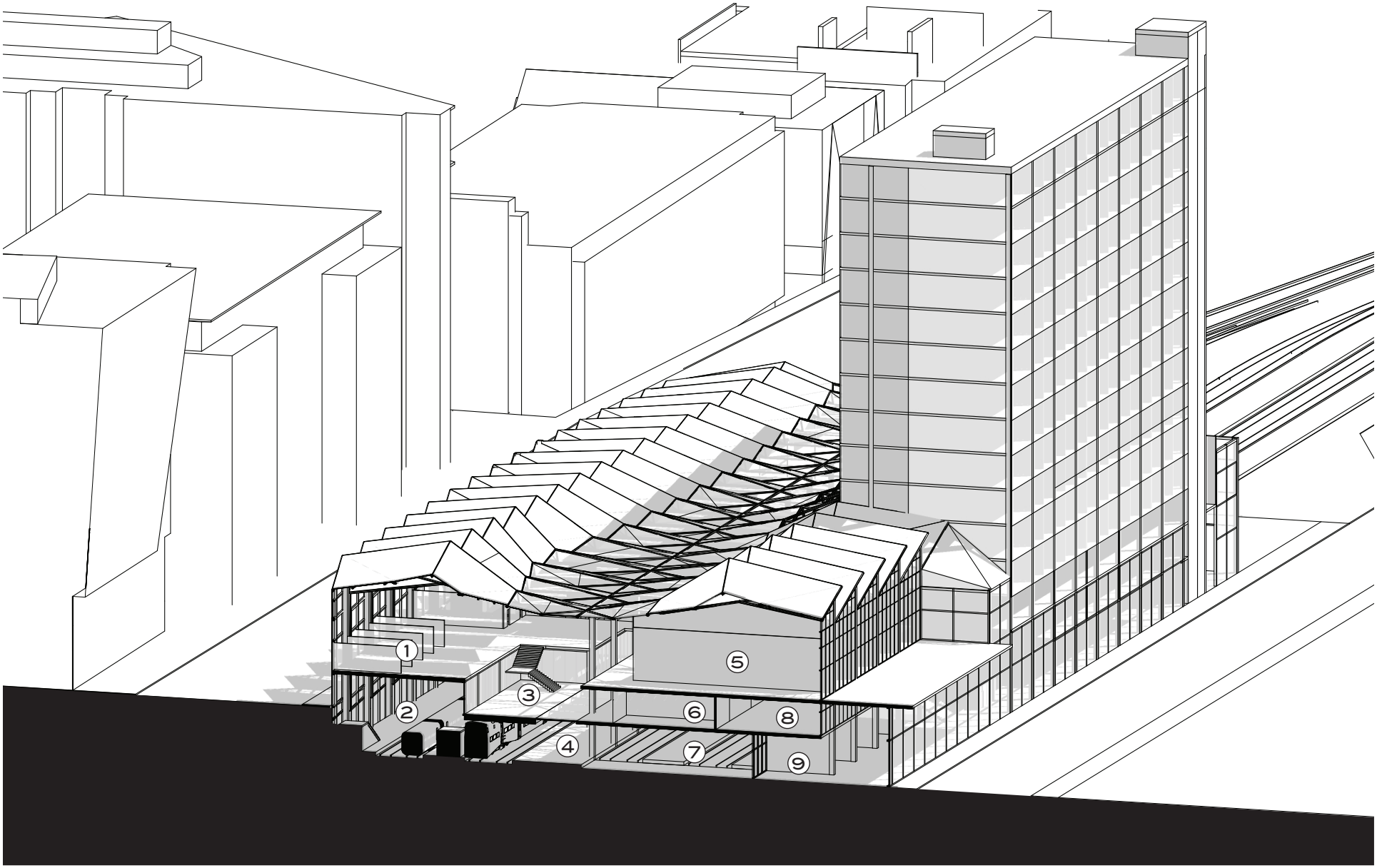
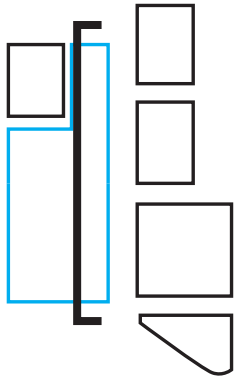


Figure 7.7 - Section axon through station highlighting double height space above high speed rail tracks. Also pedestrian street though food court.

Three Zones of Building

This longitudinal section is taken through the pedestrian street and highlights the three different zones of this building. the northern most portion is culturally related with gallery, rehearsal and theater programming. The second portion is restaurant and food related and the third portion is retial related. This all happens above the tracks which are station related.

The roof encompasses the three zones with a structure and rhythm that make it identifiable in the city. With subtle shifts in roof pitch the angle allows for more or less natural light depending on function.



1. Lobby
2. Theater
3. Rehearsal
4. Food
5. Rehearsal
6. Food
7. Informal Theater
8. Platforms
9. Restroom
10. Retail
11. Retail

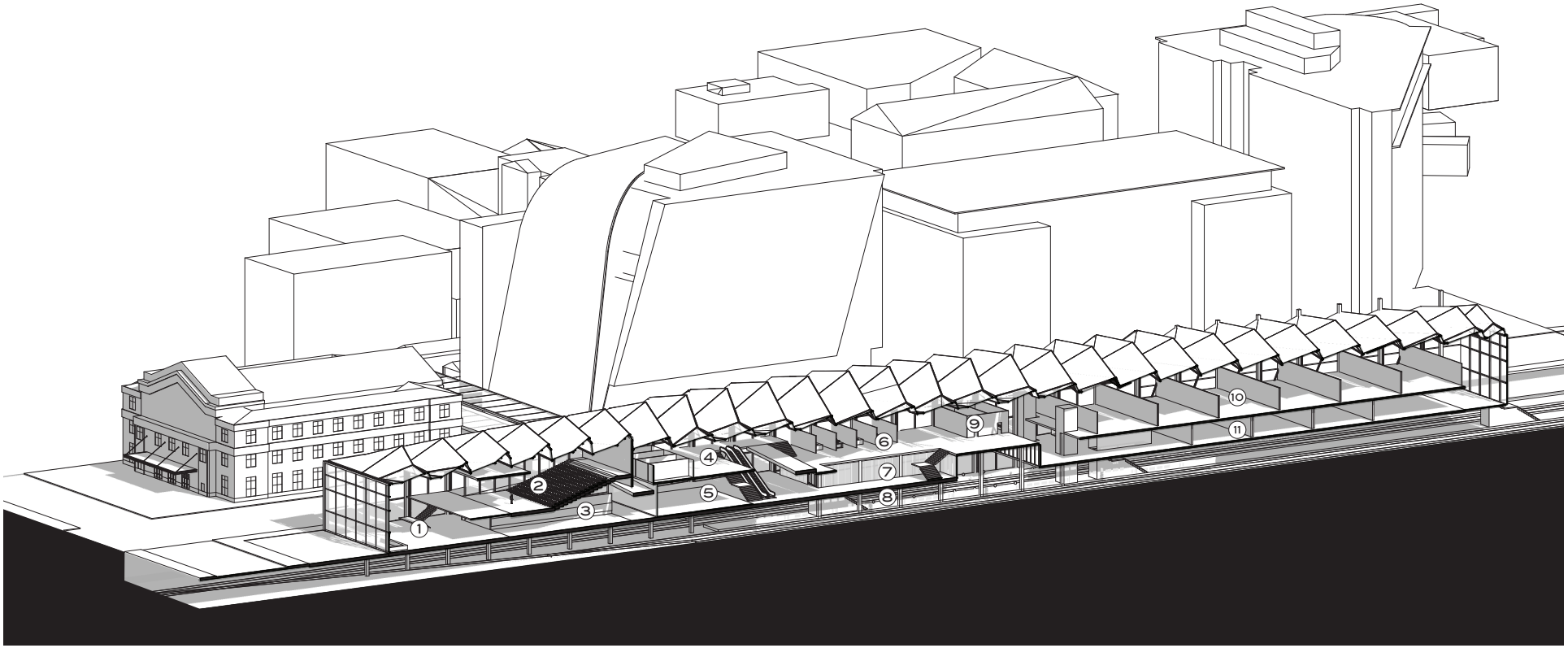


Figure 7.8 - Section axon of the station through the pedestrian street which runs the entire length of the buiding.

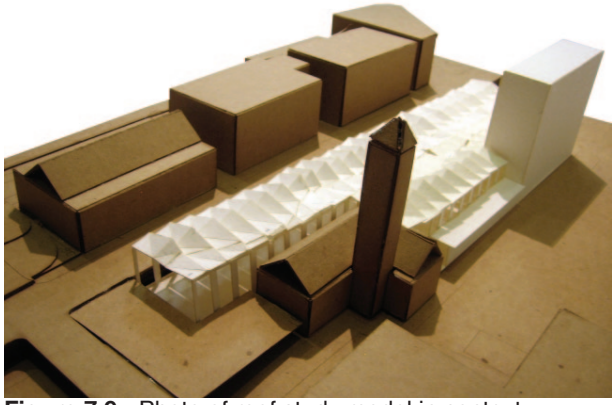


Figure 7.9 - Photo of roof study model in context

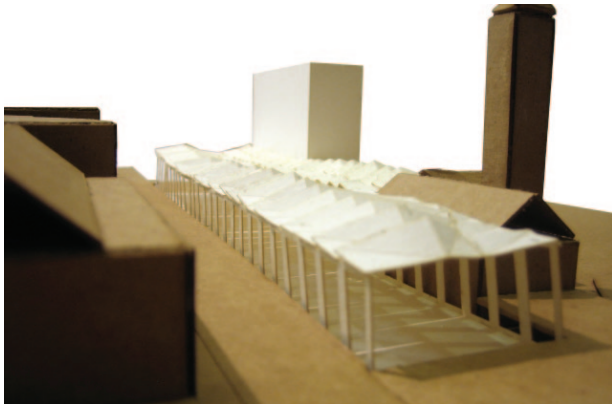


Figure 7.10 - Photo of study model laser cut from water color paper

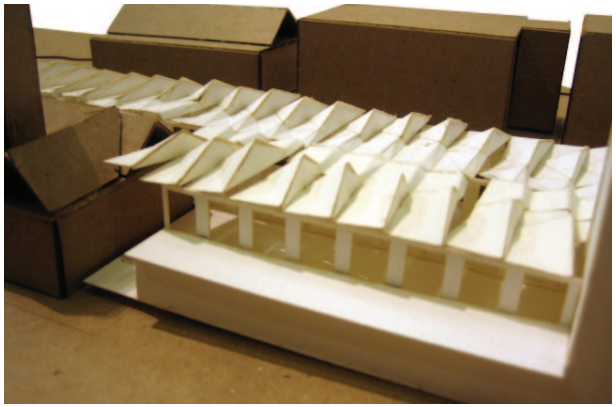


Figure 7.11 - Photo of study highlighting saw tooth roof

Roof Form

The articulation of the roof was generated with parametric modeling in response to the internal functions of the building. The roof's glazed area is more or else depending on the needs of program. The theater needs less natural light therefore the roof is more opaque. The internal pedestrian street needs a large amount of natural light so the roof is almost totally glazed. The saw tooth roofs face south and receive sun on clear days.

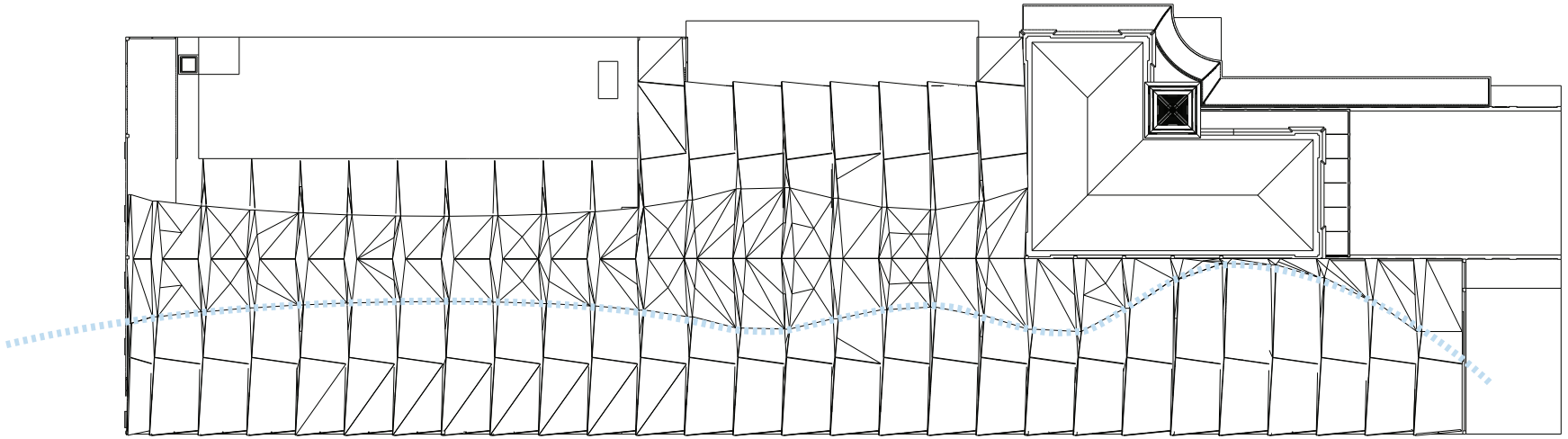


Figure 7.12 - Roof Plan diagram of glazing

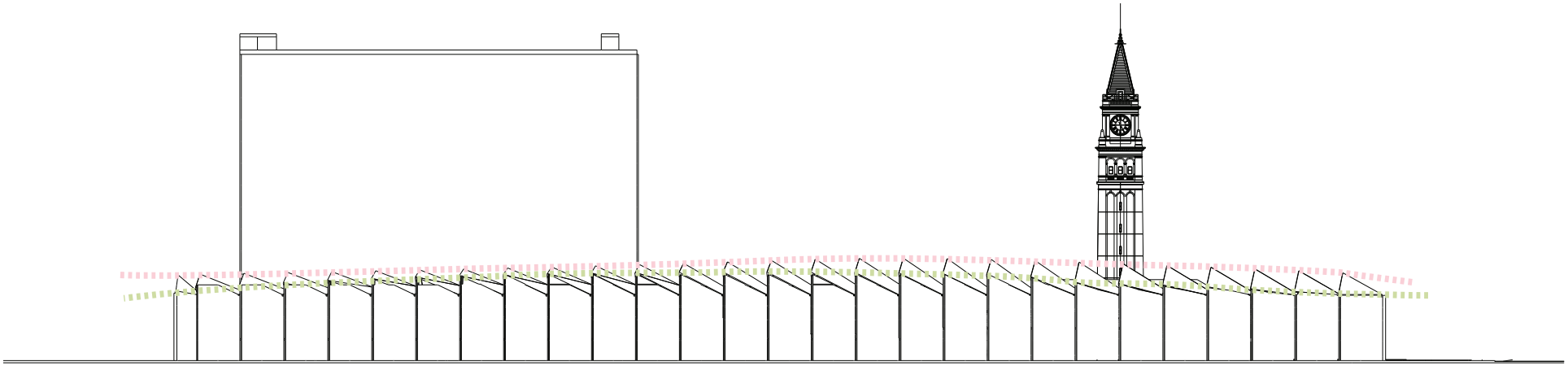


Figure 7.13 - Elevation diagram

Roof Structure

The structure of the roof is based on repetitive bays of 30 feet. Columns rise from footings to support the different levels of metal decking with a two-way slab. The trusses span 110 feet in the East/West direction and will be assembled off site and craned into place. Joists running between the beams of the trusses support the metal panels and insulation of the roof as well as the glazed portions. The saw tooth roof faces the south to take advantage of the sun when it is out.

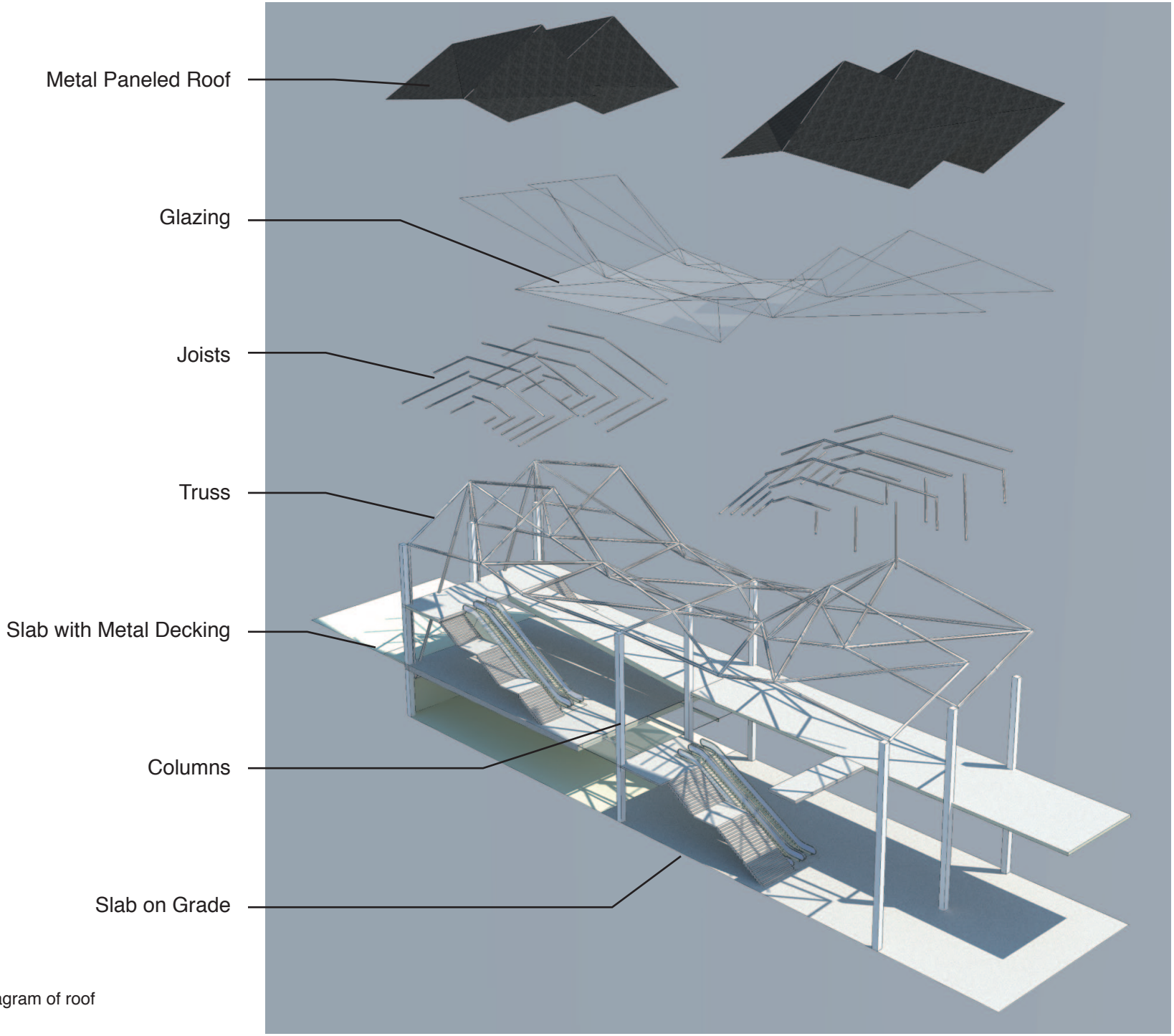


Figure 7.14 - Structural diagram of roof

Narrative Perspectives

The design of the station was based on pedestrian movement and experience. As the traveler moves through the station there are different moments when they become the actors on stage. In identifying the users, three main narratives emerged during the design process. The pedestrian using the station as a bridge between two neighborhoods (Transect path), the pedestrian coming to the station for an event or retail (Destination path), and the pedestrian changing modes of transportation (Commuter path). These three user groups and experiences helped set up the movement through the station.

Transect Path

The transect path became important in thinking about moving people through the station before and after games in the adjacent stadiums. There will be restaurants and bars for pre-game festivities and after-game celebrations. The station creates multiple connections between the two neighborhoods replacing the one point of access across the tracks, the Weller St. bridge.

This is a forward thinking thesis and with three potential transit oriented developments in the neighborhood there will be an increase in the number of people in the area. Creating a free flowing bridge for pedestrians will help weave together these neighborhoods.

The perspectives highlight the experience from stadium parking lot to internal spaces with views of the trains, and finally looking back on the station facade and roof.

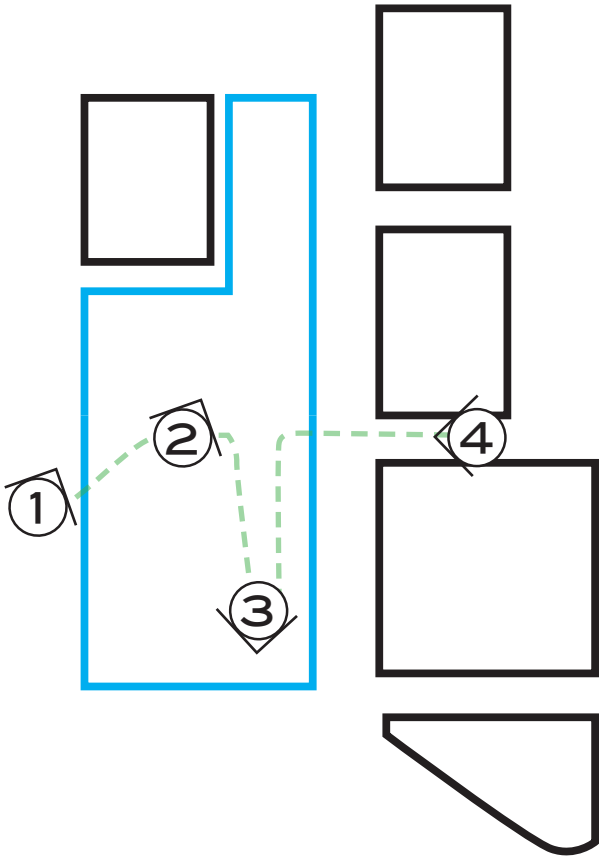


Figure 7.15 - Plan diagram of transect path through station

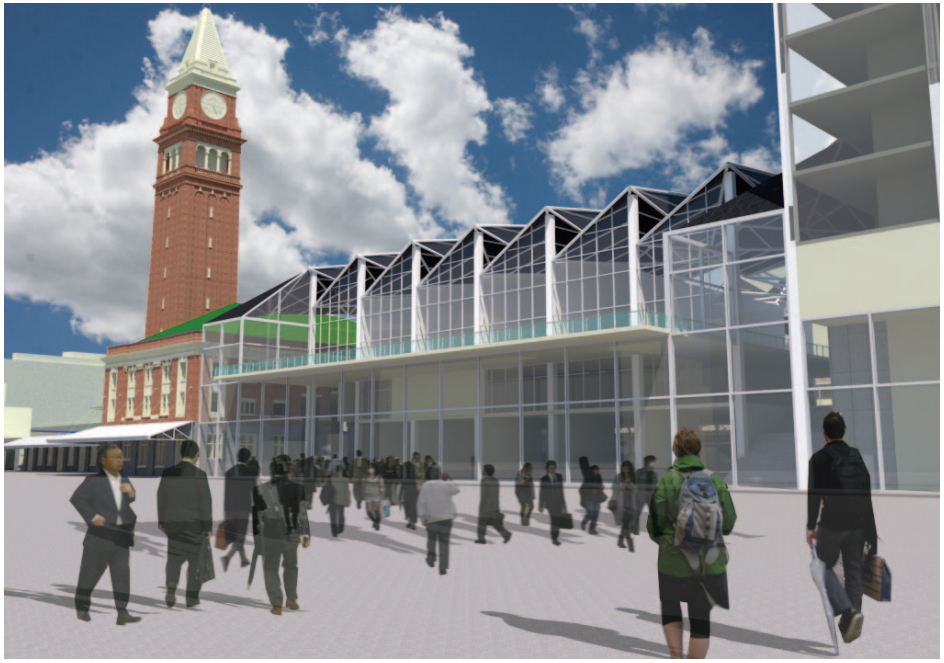


Figure 7.16 - View 1 from stadium parking lot. Highlights difference between old station and new, with new station focusing on light materials and technologies.

Figure 7.17 - View 2 of the internal pedestrian corridor with glazed floor to allow for natural light to platforms. Views to trains constant reminder of trains below.

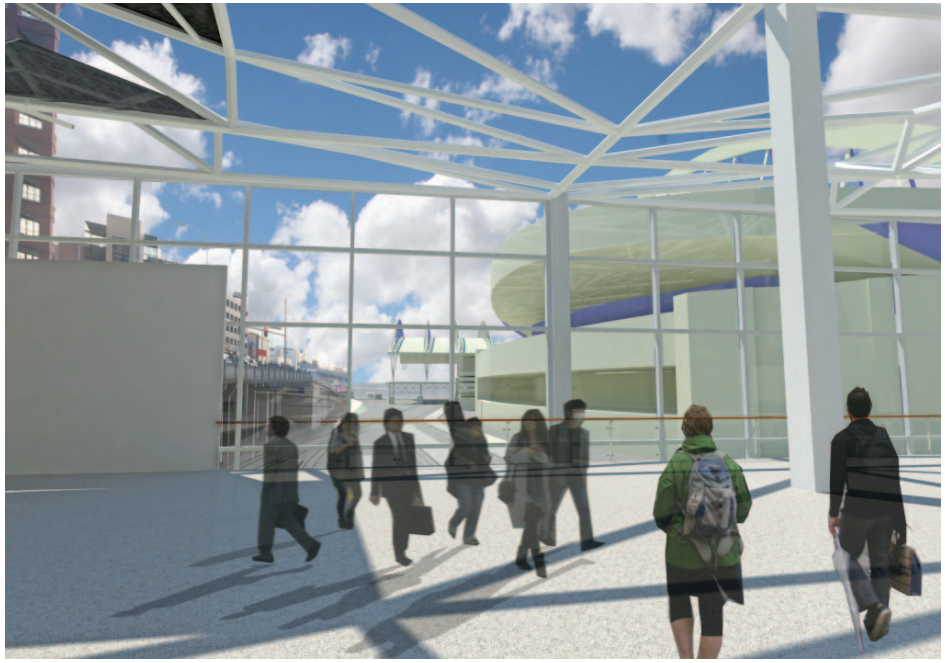


Figure 7.18 - View 3 looking South framing tracks and stadiums. Viewer could watch trains glide into and out of station as they pass directly underneath.

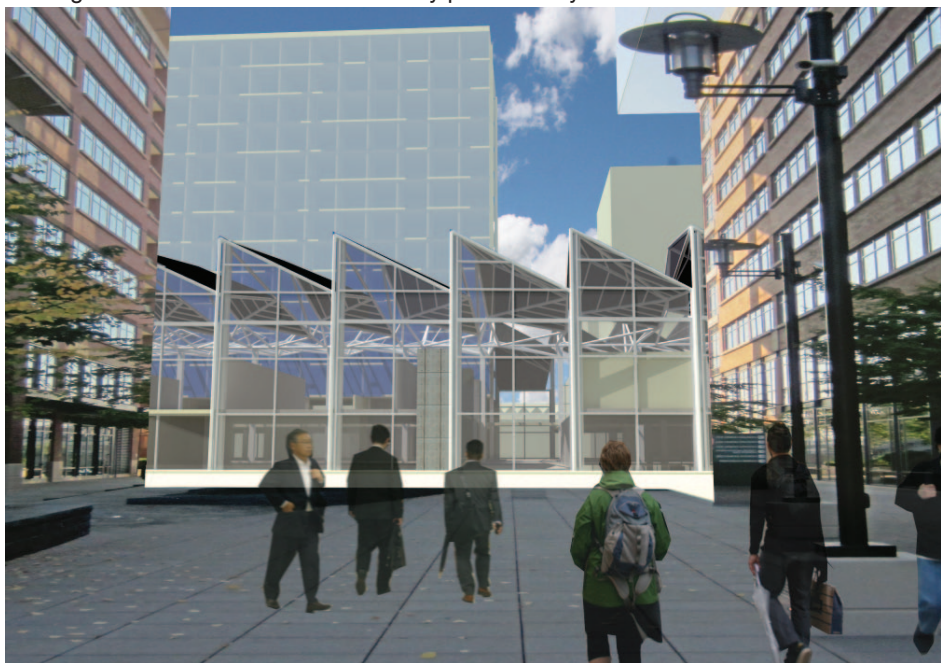


Figure 7.19 - View 4 looking West from International District at pedestrian pass through point. Saw tooth roof highlighted.

Destination Path

The station will become a destination for people because of the commercial and cultural aspects of the station. The south end of the station is dedicated to retail which will serve both the traveler and the user coming to the station for shopping.

A 300 seat theater will attract people related to the performing arts. The north end of the station will also serve as a gallery space for artists located on the third floor of the King St. Station. The spaces under the theater and adjacent to the gallery will be rehearsal or flexible space for displaying additional material. The pedestrian has the opportunity to view these spaces as they move along the internal pedestrian street. The internal pathway serves two functions, one is to get natural light to the track level and the second to highlight the facade of the King St. station building.

Theaters might only be used only a portion of the week, this allows for an opportunity to extend the hours of use by opening it to the public. By having a moveable wall the theater can be enclosed for performances or open for informal activities. In the case of opening the theater the city skyline becomes the backdrop for the public to enjoy.

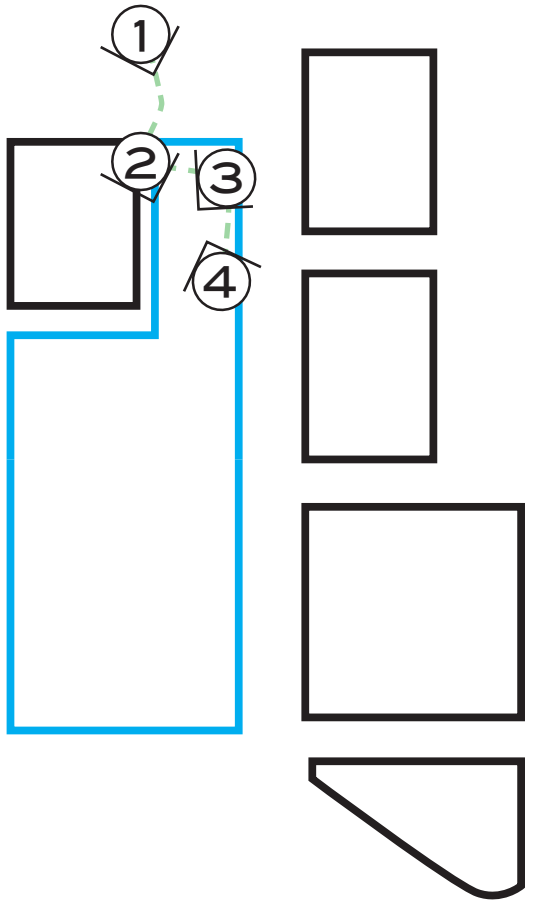


Figure 7.20 - Plan diagram of destination path through station

Figure 7.21 - View 1 looking south. The station becomes the terminus for 2nd Ave and an icon in the city skyline. At night this will be a glowing box identifying the station.

Figure 7.22 - View 2 looking south along internal pedestrian corridor with rehearsal/flex spaces adjacent. Glazed walkway will allows natural light to reach track level.

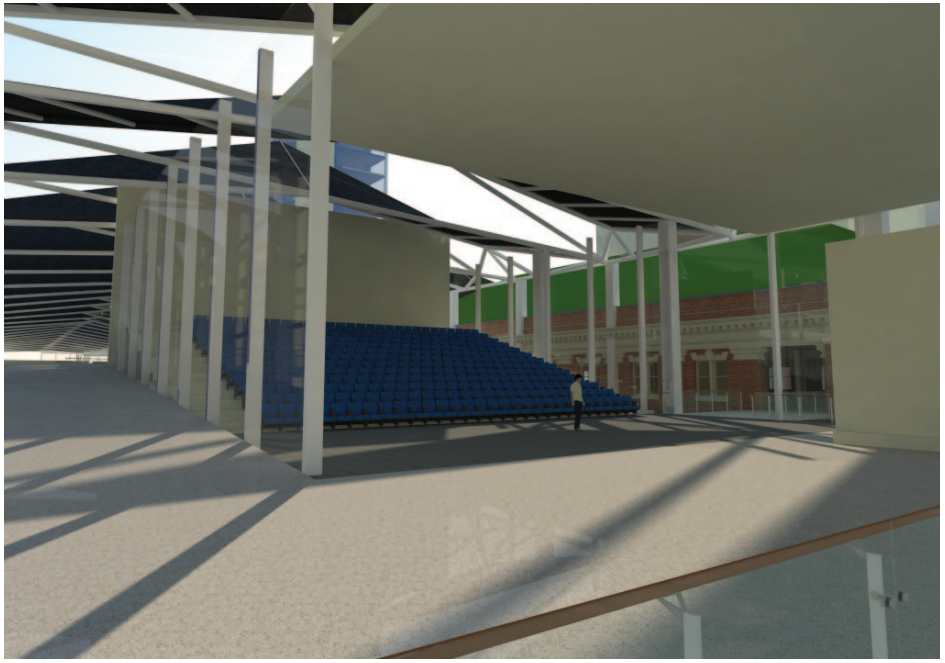


Figure 7.23 - View 3 looking at theater and seating. Movable wall allows theater to become open to the public during none performance times.

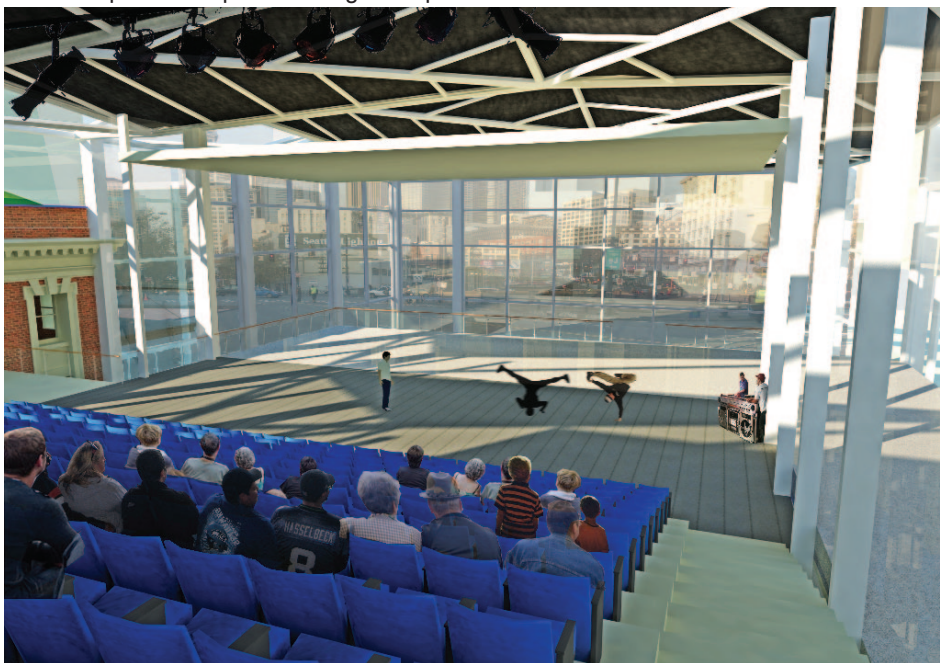


Figure 7.24 - View 4 from seating looking north. When wall is up city becomes the backdrop for informal performances.

Commuter Path

The commuter path highlights travelers transferring from one mode of transportation to another. The King St. Station handles the interstate travel and the Union Station handles the local travel. A skybridge over 4th Ave allows people to safely cross without waiting on traffic and also be sheltered. It creates a continuous path between the different modes of transportation. This will encourage the use of public transportation to have an encompassing system that is easy to navigate.

The connection of the new station to the old has been to create a buffer zone of transparency between the two. The south wall of the King St. station has been carved away to allow for light and air into the existing waiting room helping to blend the two stations together. This also allows for a strong visual connection to the trains from the existing waiting room that had none.

When boarding the high speed trains the platforms are in a double height space which allows for natural light to reach the tracks.

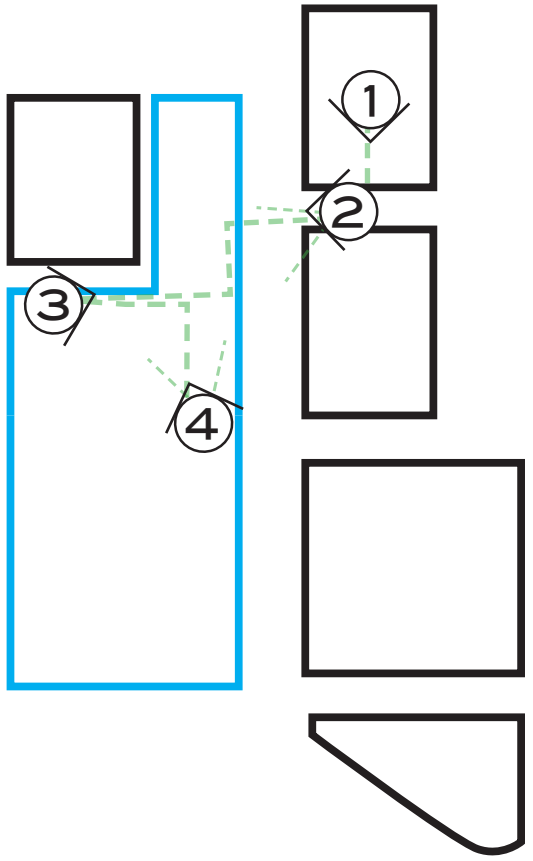


Figure 7.25 - Plan diagram of Commuter path from Union Station to King Street station

Figure 7.26 - View inside of Union station looking South. Travelers walking on the skybridge will become silhouetted on the vaulted glass window

Figure 7.27 - View looking west on skybridge over 4th Ave.

Figure 7.28 - View of grand stair from King St. station to Union station. The King St. station south wall has been carved away to allow for light and air into the waiting area.

Figure 7.29 - View of platforms and trains. Double height space allows for natural light onto tracks.

8 Conclusion

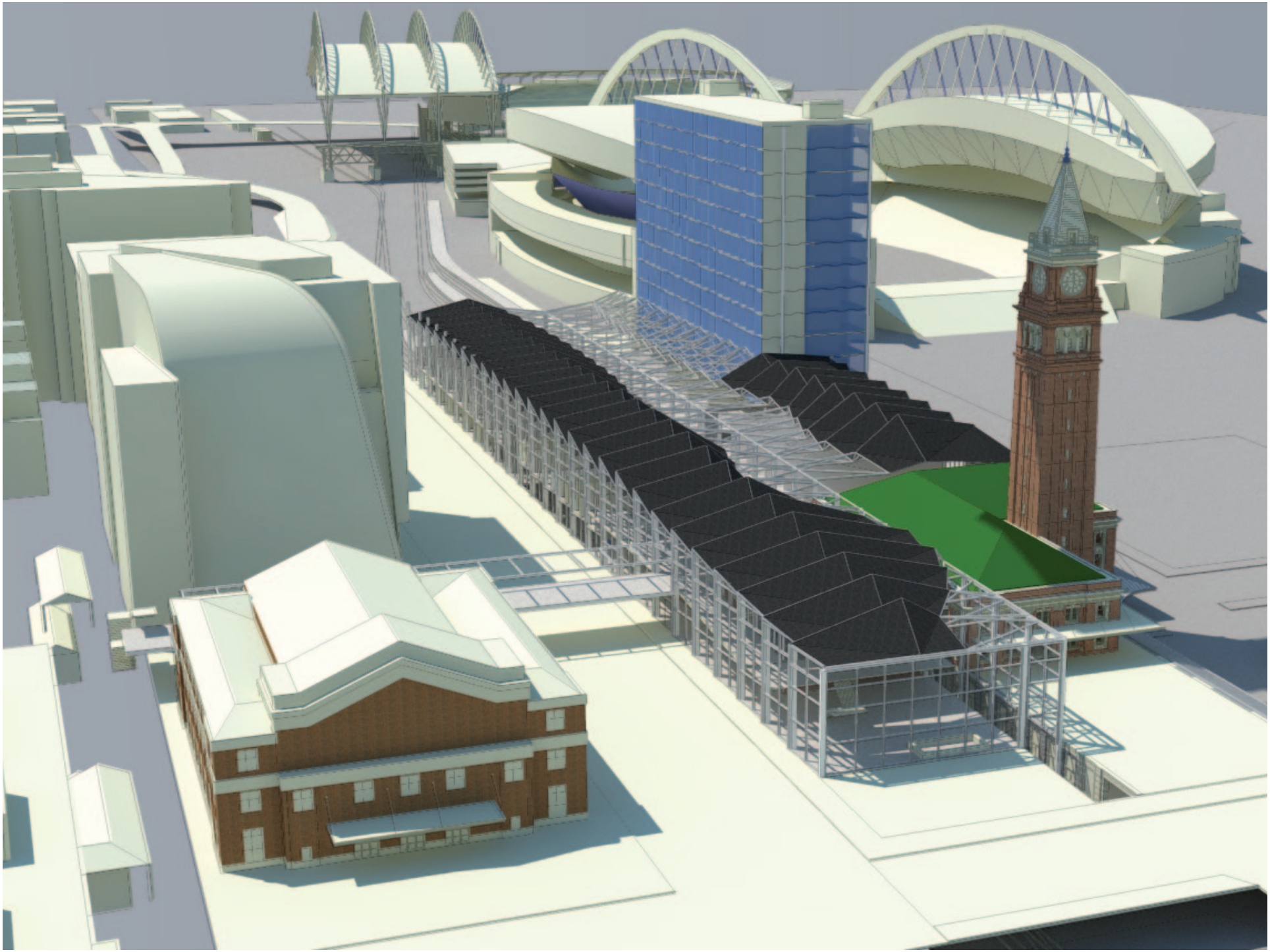
Transportation is a growing issue for our mobile society. The U.S. has not invested in public transportation over the last half century, instead opting to subsidies the air and automotive industries which produce large amounts of green house gases. The rail network developed by linking city centers together and by expanding and upgrading the rail infrastructure this will move the country toward a green public transportation. Advances in train technology have allowed Japan and European countries to expand their rail network to move goods and people cleanly and efficiently.

The current King St. Station and Union Station are over a hundred years old and a new station is needed to handle projected increases in population density as well as expanded demand for public transportation. Having grown up in the area clarifying the different modes of transportation on the site became important. The development of this thesis grew in scope from a train station to a civic building connecting two historic districts.

This transit hub is a microcosm of a city that mixes different users and programs under one roof. The flexibility of different programs increases the hours of use of the building benefiting the public. A clear connection between different modes of transportation encourages pedestrian use and this connection extends to the surrounding neighborhoods improving civic movement.

Although this is an academic exercise it is my hope that it demonstrates the potential benefits to the neighborhoods and transportation networks. A regional transit hub will elevate Seattle to the forefront of public transportation.

Figure 7.30 - Rendering highlighting stations in context



9 Bibliography

America 2050. *High Speed Rail in America*. Lincoln Institute of Land Policy and the Rockefeller Foundation, 2011. PDF

Ashby, Jocelyn. “Layton City’s commuter rail station; performance space, public market.” Thesis. University of Utah, 2004. Print.

Bell, Victoria Ballard., and Patrick Rand. *Materials for Design*. New York: Princeton Architectural, 2006. Print.

Berens, Carol. *Redeveloping Industrial Sites: a Guide for Architects, Planners and Developers*. Hoboken, NJ: John Wiley & Sons, 2011. Print.

Brown, Christopher. *Still Standing: a Century of Urban Train Station Design*. Bloomington: Indiana UP, 2005. Print.

Browning, Jill. “Urban Movement Systems Inform Civic Architecture: A new Intermodal Transportation hub in Riga, Latvia.” Thesis. University of Washington, 2009. Print.

Cerver, Francisco Asensio. *The World of Contemporary Architecture*. Cologne: Könemann, 2005. Print.

Easterling, Keller. *Enduring Innocence: Global Architecture and Its Political Masquerades*. Cambridge, MA: MIT, 2005. Print.

Finizio, Gino. *Architecture & Mobility: Tradition and Innovation*. Milano: Skira, 2006. Print.

Guggenheim, Michael, and Ola Söderström. *Re-shaping Cities: How Global Mobility Transforms Architecture and Urban Form*. London: Routledge, 2010. Print.

Marshall, Alex. *How Cities Work: Suburbs, Sprawl, and the Roads Not Taken*. Austin: University of Texas, 2000. Print.

Moberg, Martin. “A Design for the Redevelopment of the Union Train Station Site in Seattle, Washington.” Thesis. University of Washington, 1986. Print.

Momoyo, Kaijima, Kuroda Junzo, and Tsukamoto Yoshiharu. *Made in Tokyo*. Tokyo: Kajima Institute, 2006. Print.

Sumner, Yuki, Naomi Pollock, and David Littlefield. *New Architecture in Japan*. London [u.a.: Merrell, 2010. Print.

Ogawa, Yoshihide. “Architecture as Environmental Filter : a New Direction for Architecture in the 21st Century.” Thesis. University of Washington, 2006. Print.

Pascatore, Monica. “Transition Center: A Train Station & Exhibition Center.” Thesis. University of Maryland, 2002. Print.

Pawley, Martin. *Norman Foster: a Global Architecture*. New York: Universe, 1999. Print.

Shambhu, Prachi. “House of Bazaar and Movement: An amorphous Bazaar encased in a Sculpted structure at Mt. Baker station, Seattle.” Thesis. University of Washington, 2011. Print.

Shannon, Kelly, and Marcel Smets. *The Landscape of Contemporary Infrastructure*. Rotterdam: NAi, 2010. Print.

Vogel, Gerd-Helge. “Mobility: The Fourth Dimension in the Fine Arts and Architecture.”*Contemporary Aesthetics* 2005.1 (2005). Print.

William Conway, and Eric Kahn. Community Design Center, Washington University, *NWA Rail: Visioning Rail Transit in Northwest Arkansas : Lifestyles and Ecologies.*Fayetteville, AR: University of Arkansas Community Design Center, 2007. Pdf