ABSTRACT

Title of Document: REIMAGINING PENN STATION

James Gilbert Keawe Ramil, Master of Architecture 2012

Directed By: Assistant Professor Luis Quiros, Chair, School of Architecture, Planning and Preservation

Welcome to New York City! Penn Station serves as a primary gateway into the city for over one-hundred million people every year although the experience is less than ideal. The user faces an underground labyrinth with no connection to the city, light or air while the land above only utilizes about 1/3 of the maximum FAR thereby limiting its value. Through the lenses of clarity, movement, and identity, this thesis explores how to reimagine Penn Station.

REIMAGINING PENN STATION

By

James Gilbert Keawe Ramil

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Advisory Committee:

Assistant Professor Luis Quiros, Chair
Assistant Professor Powell Draper, Ph.D.
Associate Professor Brian Kelly, AIA

PREFACE

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Gateway to the New York City

Arriving in New York City for millions of people happens in only a handful of places, with the busiest of them all being Penn Station. This transportation node receives incoming trains, subway lines, and bus routes and regulates traffic on a massive scale. From an operational standpoint the station works, but in many other aspects its potential in not realized.

Problem Statement

Penn Station's identity is almost entirely hidden below ground. There are only a few small points of direct connection with the urban fabric above at three small entrances. From an urban standpoint the city connects to Madison Square Garden (MSG) and Two Penn Plaza (TPP) as the elements that occupy the site. As a result, there is no substantial ground level retail or service component which create only minimal street life around the edge of the site. Penn Station has no real identity.

On the inside, the lack of natural light form the track bed to the surface can have disorienting effects on all but the most seasoned commuters. The multi-concourse and hallway layout lacks a hierarchy and adds to the potential confusion while also making security difficult to manage. The connections to the subway are also not well laid out and difficult to find.

To add to the mix is the financial return of the site which is especially important considering land value in New York City. Currently built to an FAR of 6.6 out of a

possible 19.5, there are billions of potential dollars to make in increasing the built area on the site.[1]

Conceptual Approaches

As cities become more complex and crowded the need for a clear identity is paramount. In terms of a train station, there are several elements that create this with the most important being clarity of movement and form, lighting and connection to the city. These however must be tempered with the needs of the users and financial viability. These criteria informed every step of the design process for the new Penn Station.

[1] New York City Department of City Planning: http://www.nyc.gov/html/dcp/html/zone/zh_special_purp_mn.shtml

Chapter Two: Abbreviated History of the Train Station

In terms of design, train stations had no real design precedent and many components were invented and improved along with the development of the train and passenger needs. Today rail networks and their associated stations span the globe and more countries are building or upgrading their stations for high-speed networks and connections to other forms of mass transit. The renewed interest reflects the advantages of travel by train—city center location, connections to other forms of mass transit, and station amenities among other—which were first tested over 180 years ago. But no matter how the station typology evolves, the basic functional diagram remains the same.

The First Stations

Located outside of the city centers, the train station consisted of a simple head building and platform for loading and unloading. They carried freight and people alike with no real separation. In effect the station acted as a filter between the urban fabric of the city and the railway system.[2]

Built from 1835-39, Euston Station in London was a typical example of using a "mask of history" to conceal the activity inside the station. The Greek temple entrance presented a familiar face that maintained continuity with the building ideals of the time and was comforting to the early 19th century passenger. [3]

[2] C. Meeks, *The railroad station: An architectural history*. (New Haven: Yale University Press, 1956), 78.
[3] Meeks, 84.

Figure 1: Euston Station Entry Portal, London, 1839

Once past the head station the passenger entered the train shed which was a vast glass and iron vault dominated by the machine. This drastic transition often overwhelmed the uninitiated traveler.

The train sheds became the realm of experimentation of pushing to the limits of steel and glass as engineers pushed to make them taller and wider. These grew more daring as they became symbols of civic and national pride and paralleled the advances in train technology to go faster and further. The introduction and spread of these materials ushered in a new era of structural possibilities. These features had an enormous impact on visitors and became part of the collective imagination of the nineteenth century travelers, writers, painters, and public.[4]

Continuity of Expression

Around the time of the Second Industrial Revolution (1870) the next stage of station evolution occurred. An increase in the number of tracks and passengers resulted in increased size of the station and surrounding area. The new buildings were imposing

[4] S. Parissien, *Station to station* (London: Phaidon Press, 1997), 54.

stone presences well within the urban fabric becoming objects to celebrate rather than push to the city edge.[5]

The train shed a previously hidden element, was now openly celebrated and represented on the entry facades in many stations. This became the symbol of continuity from both the interior and exterior form of the station and was immediately recognizable. This signified transition from the relatively slow movement around the city to the high speed of the train to come.

Figure 2: Gare du Nord, Paris, 1880

The Station Integrates with the City

The transition from steam to electric engines at the end of the nineteenth century had a huge impact on the development of train stations. The train shed lost its reason to exist from a functional perspective and tracks could now be constructed below ground level. The train as machine was absorbed as part of the building, and hidden, only to be revealed within the station.[6]

[5] Parissien, 58.
[6] Meeks, 92.

With the tracks and platforms now below, a massive concourse that included an entrance atrium and ticket office could all be laid out as part of a single space at street level. The space was conceived of as an urban promenade and an attractive public meeting-place that would be good for business and the traveler. There was now a paradigm shift away from linear structures characterized by transparency to enormous and stately structures occupying substantial areas.[7] The original Penn Station illustrates this point well.

The mammoth size of the station occupied four standard New York City blocks and effectively terminated 32nd Street west of the station. The porosity of the main concourse had entrances from all sides and allowed a separation of commuter and visitor traffic. The grandeur of the station was reflective of the power of the railroad and of New York City. The passenger transitioned from a genteel mode of transportation to a grand station to an impressive city.

The station and the city gradually tended to mirror each other more thoroughly. The forecourt disappeared and the station formed a strong street edge.

Figure 3: Aerial of Original Penn Station 1910

Traffic junctions

[7] Parissien, 72.

In the decades after the Second World War, the automobile and airplanes reduced demand for train travel, stations all over the world fell into disuse and disrepair. However, by the 1980s there was a renewed interest in rail travel, which led to the renovation and building of a new type of train station.

The old viewpoint of the railway station as only a point of arrival and departure shifted into one where it became a junction, an interchange of different means of transport, which might also serve to meet a variety of other needs. Because of their ideal location within cities, the large historic terminals became important resources in their own right, with the potential to attract profitable commercial activities and spur redevelopment.[8] The station now mediated between multiple traffic types coming together which influenced the surrounding context and progression through the space. The lines of city to station to platform were blurred.

Figure 4: Interior of Waterloo, London

City within a city

The development of high-speed rail (HSR) rekindled interest in train travel and led to a further redefinition of railway architecture. The new stations, often underground,

[8] B. Edwards, *The modern station: New approaches to railway architecture,* (London: E & FN Spon 1997), 102.

are in effect urban galleries, whose ample spaces are open to a through traffic of pedestrians. They are conceived of as a place one passes through; waiting-rooms are replaced by shopping areas or by zones in which waiting is nothing more than a brief pause.

A common feature of these designs is the disappearance of the façade as a solid introduction to the station or city. There is no proscenium introducing us to the world of the railway, but a transparent shell around the structure.[9] This aesthetic change reflects a change in the stations relation to the city as a whole: in the first stations, passengers' initial contact with the railway was the façade of the building within the urban fabric, but nowadays—most arrive by means of urban transport that enter the buildings underground. In effect, a passenger's first experience of the station is its interior and there is no perception of exterior until he or she departs.

Figure 5: Interior of Porta Susa Station, Turin, Italy

Function and Users

[9] Edwards, 123.

Even though stations have become more complex, the basic three zone diagram remains the same there are three distinct zones that relate to each other and the surrounding city. There is Zone 1: Access and Interchange, Zone 2: Facilities and Zone 3: Platforms.[10] These areas setup the basic relationships found within all train stations. The redesign of Penn Station also utilizes this basic diagram.

Figure 6: Three Zone Diagram

The typical user of Penn station is the commuter followed by the business traveler with the leisure traveler and non-travelling public making up smaller numbers. Therefore the greatest design consideration follows the same order.

[10] Network Rail: Guide to Station Planning and Design, 2011

Chapter Three: The Original and Contemporary Penn Station

The original Penn Station occupied the same site in Manhattan from 1910 to 1963. When it opened 1910 it was the largest railroad station in the world. The 1911 Architecture review lauded the "quiet dignity of the architecture" and "lack of ostentatious display."[11] The separation of incoming and outgoing passengers on different levels made the train station unique and innovative. The brief history that follows covers its genesis to its eventual destruction.

In the 1880's and 1890's the pressure to connect Manhattan Island to the mainland by road or rail mounted grew, but the financial costs and political attitudes shelved such many project ideas. Alexander Casset, Pennsylvania Railroad (PRR) magnate decided not to let this foil his plans to bring his railroad into Manhattan. He commissioned the architecture firm of McKim, Mead, and White (MMW) to draw up tunnel plans that terminated in a grand station and adjoining hotel that created a gateway to New York City.

With the advent of electrified rail, he also made the bold decision to first smoke-free (from a train perspective) railway terminus outside Paris, which allowed the tracks to be located underground and had tremendous impact on the architecture of the station. To economize on space in Manhattan, MMW proposed a vertical alignment of functions that was extremely progressive for its time. Rather than arrive and depart on different sides of the track, they split the function vertically allowing both to occur simultaneously leaving more floor space for grand circulation and waiting halls.

The long standing success of this functional design received high praise and after 50 years of use Lewis Mumford, technology philosopher and urban architecture critic,

[11] S. Parissien, *Pennsylvania Station: McKim, Mead and White,* (London: Phaidon, 1996), 8.

said, “McKim’s plan has crystal clarity that gave the circulation the effortless inevitability of a gravity flow system, with pools of open space to slow down or rest in when one left the main currents. Movement is the essence of transportation, and movement is what McKim’s plan magnificently provided for.”[12]

Figure 7: Interior Waiting Room Original Penn Station

Figure 8: Interior Grand Hall Original Penn Station

The plan

[12] Parissien, 10

McKim's primary goal for Penn Station was the freedom and rapidity of movement into, out of and within the station complex. To accomplish this, most levels of the station had direct access to the key traffic and transport arties to the east and west. For a commuter this layout was particularly useful because the direct access to the train concourse could bypass the general waiting room.

The station site filled four New York City blocks, while the built structure occupied 780 feet north to south and 430 feet east to west. The track and platforms were 45 feet under street level. The movement was mostly ramped based for the easy of movement for passengers and porters laden with luggage alike. The Long Island Railroad (LIRR) was contained in separate facilities so it did not interrupt the long distance flow, but still shared the same entry point and general waiting room.

The plan was not without critics as John A. Droege, a railroad officer warned, "the immensity of things" and the "magnificence" of the general waiting room would lose their luster once the passenger had travelled the appreciable distance from sidewalk to train.[13] Although the path travelled was long for the day, it is relatively short compared to circulation paths of large international airports of today. The number of entrances and exits also allowed for porosity around the entire site creating a buzz of activity at street level.

The architectural language was one of two distinct zones: the exposed steel-framed train concourse and the classically inspired, stone-clad service area. These design moves reflected the different functions of the zones of brutally functional below with the train uses and theatrically classical above for the passengers. McKim resolved that any

[13] Parissien, 13

expression of a traditional train shed at this level would be impossible because of how deep they were laid.

McKim was particularly inspired by the tepidarium at the Baths of Caracalla and paid local people to gather in the space so he could observe how crowds moved within its dimensions. For the general waiting room, he scaled the volume of the tepidarium up by twenty percent. Another building he referenced was the Colosseum in Rome mirroring its three stories with a high attic space and the way in which the crowds accessed it through multiple points of entry and exit.

The facades were austere and imposing clad in Milford granite. Rather than following the strict classical orders, McKim played with the spacing and dimensions that critics said only a master could "take the liberties with the Orders."[14] Comments of the design were mixed, but erred on the side of positive. The largest grievance was the fact that its function as a train station was hidden by the monumental character and no appearance of a train shed, a piece that all the major European stations shared.

However, one of the more overlooked aspects of Penn Station's creation was the razing of razing of several mostly residential buildings. This dispersed a community about the size of some small cities and when these inhabitants left, the social and physical fabric of the neighborhood quickly eroded. Although now home to a world renowned train station, it destroyed the continuity of land uses and eroded the transition between neighborhoods and no visible memory of what existed before the station remains.

[14] Parissien, 15.

Figure 9: Longitudinal Section of Original Penn Station, 1910

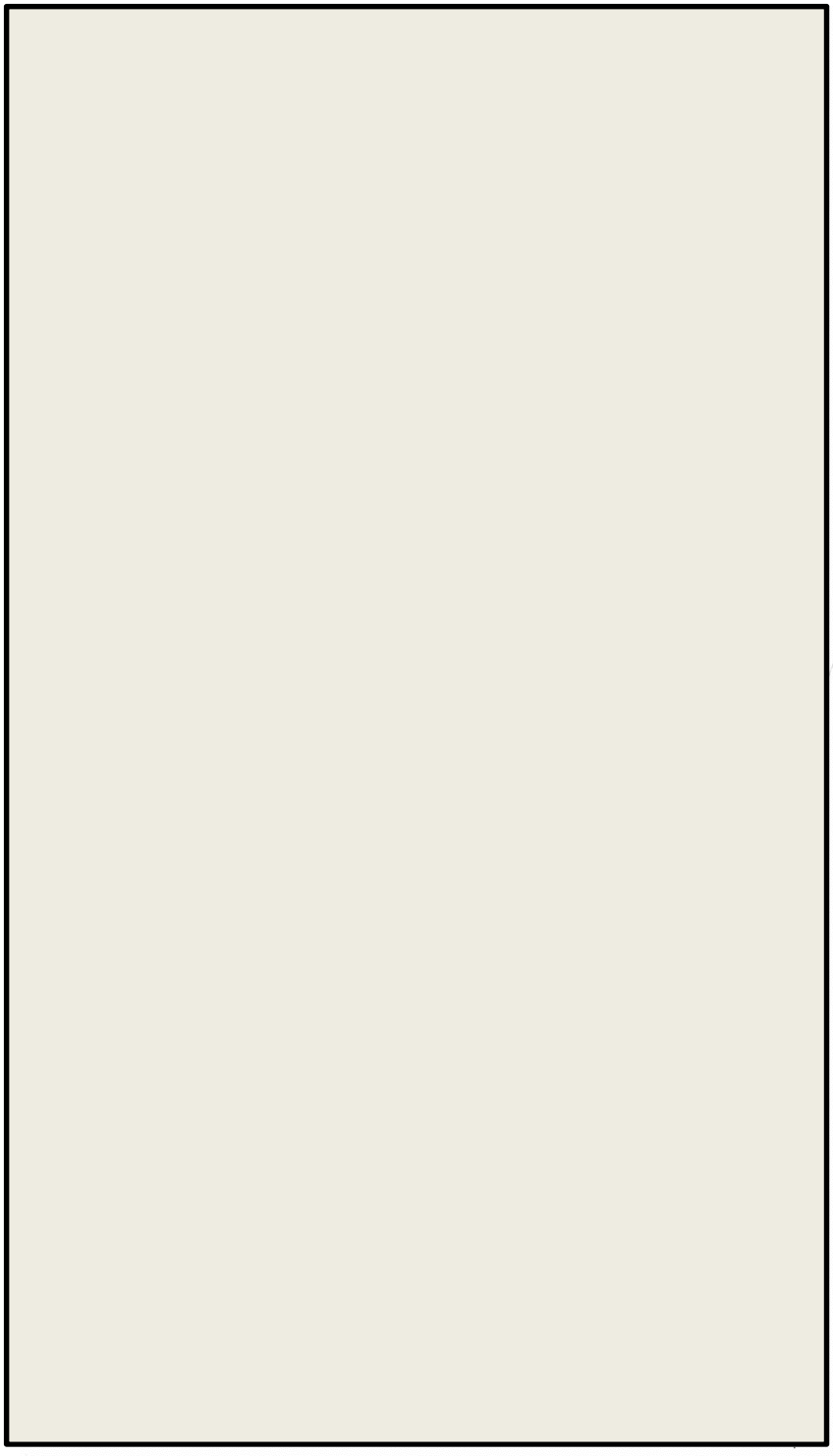

Figure 10: Plan of General Waiting Room Level, 1910

The destruction of the Original Penn Station

After World War II the Penn Station was increasingly viewed as a missed chance for increased revenue. Not maximizing the zoning potential finally caught up with the station as the demands for office and commercial space in midtown Manhattan began to grow.

The automobile began to capture the imagination in the way that the train once did and the independence and individuality available with the car was not possible by riding the rails. The growth of the aviation industry also helped kill the appeal of the train with travelling across the country taking hours not days. These two transportation shifts diverted funds away from train stations and into highways that supported cars and airports. The American rail system fell to a new low and stations fell into disuse and disrepair and many were destroyed under new urbanism regimes.[15]

McKim's station contained the seeds of its own destruction because it was a poor use of space in a market driven, vertically oriented city. Originally Cassat wanted to attach a large, grand hotel to utilize the by right air space of the parcel, but McKim was adamantly against it and won the argument. In 1963, despite many actions and appeals to stop its destruction, Penn Station was torn down.

[15] Moore, P., Moore, B., Nash, E. P., & Diehl, L. B., *The destruction of Penn Station: Photographs by Peter Moore*, (New York: D.A.P, 2000), 6.

Figure 11: Penn Station's Destruction

Contemporary Penn Station, Madison Square Garden, and Two Penn

The new station was redeveloped entirely underground with two large buildings, Madison Square Garden (MSG) and Two Penn Plaza (TPP) on top. The design was highly criticized and Lewis Mumford said, "passengers would be banished into subterranean passageways like ancient Christians, while the wrester and fight promoter will be elevated to the vast arena."[16] The station was built cheaply and had proportions that were far more restrictive of movement. The low ceilings and artificial lighting gave it the feeling of a badly designed suburban shopping mall.

Figure 12: Amtrak Waiting Room

[16] Parissien, 17.

Figure 13: DeFacto Waiting Area

Figure 14: Concourse

Figure 15: Connector Corridor

Madison Square Garden has a history that stretches back to 1889 with three previous locations around New York City. All of them have been demolished. Currently in its fourth iteration, MSG is a major sports and entertainment complex that houses roughly 400 events every year. The building has had many notable artists and athletes perform within its walls.

Figure 16: View of Northwest Corner of Madison Square Garden

Two Penn, located directly east of MSG, is a commercial office building with 29 floors above ground and a total height of 421 feet. Construction started in 1967 and was completed in 1968. Currently the building is at operational occupancy with numerous tenants. The historical and architectural significance of this building are minimal.

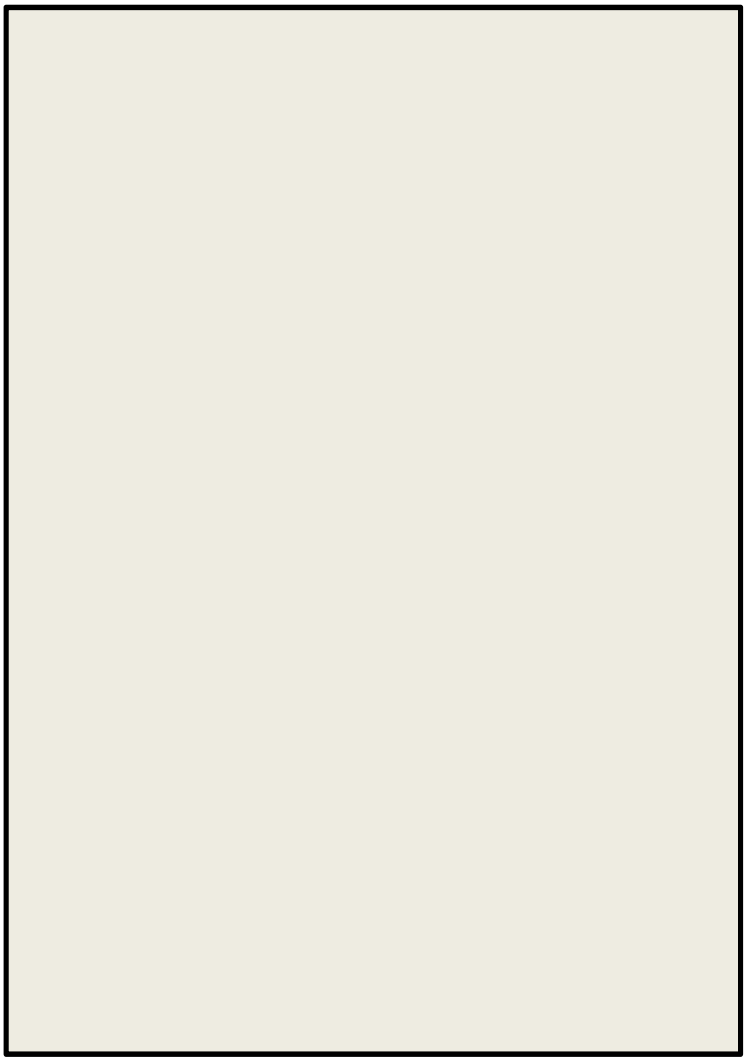

Figure 17: View of northeast corner of Two Penn

Chapter Four: Reimaging Penn Station

FAR and Transportation Value Analysis:

From a value perspective the current site is underbuilt. The current FAR is about 6.6 with the total allowable at roughly 19.5 or about triple what is there now.[17] In a real estate hungry city, this is poor land usage and a major factor to consideration in dealing with the site. MSG and TPP both have value economically, but far less than could be derived from a combination of office/hotel/residential/commercial space occupying all the FAR.

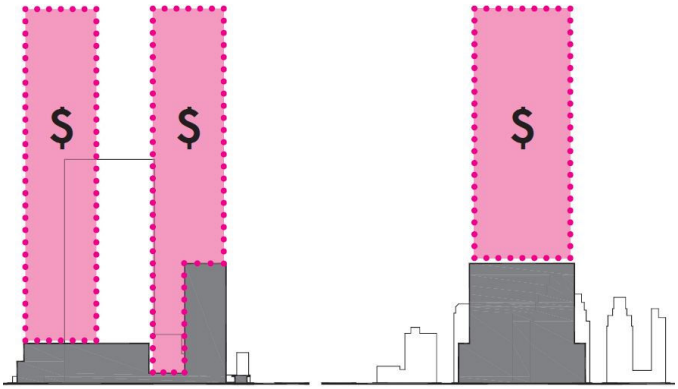

Figure 18: FAR Potential Diagram

First, I looked into building above, between, and around the existing structures to help close the FAR gap. While feasible in some cases, the financial cost and architectural outcomes would have been far from my goals of creating maximum income and architectural unity. Therefore, I decided to remove everything on site down to the track beds. This clean slate would allow for a complete reimagining of what could be.

Program for the new station would be complex, but each use would have a clear purpose and identity within the whole. The program includes transportation as the primary element with office, hotel, residential, and commercial support spaces.

[17] New York City Department of City Planning: http://www.nyc.gov/html/dcp/html/zone/zh_special_purp_mn.shtml

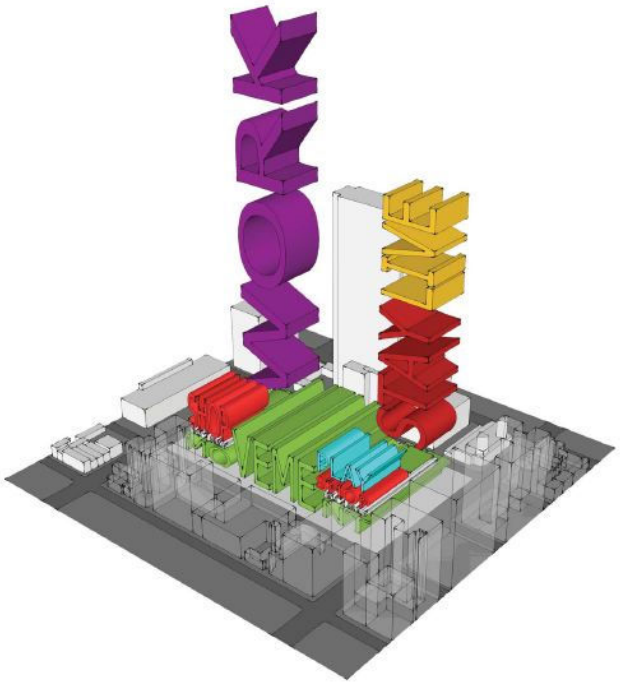

Figure 19: Program Relationship Diagrm

Ridership

An important factor in designing the station was how ridership impacted the peak cycles during the day and how commuters were by far the number one users. Looking at data from the Moynihan Station Development Project report published in 2010, the first factor I researched was Level of Service (LOS) which ties square feet per passenger to level of comfort. For example, LOS A equates to 12.5 square feet per person and allows for completely unrestricted circulation.[18] Each drop in LOS, the more uncomfortable the space becomes. My target in all cases was for LOS A or better in order to accommodate future growth. The second factor I looked at was peak passenger volume to determine how large the concourse needed to be. And finally, I looked at the largest commuter train

[18] Moynihan Station Development Project, Chapter 4.4, Station Circulation Analysis

and its passenger load to determine platform sizing. In all cases, I increased the number by twenty percent to account for long term growth.

Figure 20: Picture of Passengers

Penn Station is the busiest passenger terminal in the United States with over 109 million people using it every year for an average daily passenger count of roughly 300,000. The system used most heavily is the Long Island Railroad (LIRR) with 75,000,000 annually or 231,140 average weekday passengers. New Jersey Transit (NJT) follows with 22,160,000 annually or 79,891 average weekday passengers. And finally, Amtrak has 8,400,000 million annually or 22,953 average daily passengers. This is more passenger throughput than all New York City area airports (JFK, Newark and La Guardia) combined and doubled. The fifth and sixth busiest subway stops in New York City are the 1-2-3 line 34 St. – Penn Station stop and the A-C-E 34 St. – Penn Station stop with 26.9 and 24.3 million annual riders, respectively.[19]

The numbers for daily ridership on all systems continue to increase and the office and nighttime population of the area is also expected to grow as more commercial office and housing develops over the next several years.

[19] Moynihan Station Development Project, Chapter 4.4, Station Circulation Analysis

Designing at the City Scale

The current Penn Station/MSG/TPP sits on an amalgamation of four city blocks between 7th Ave. and 8th Ave. and 31st St. and 33rd St. in New York City. I looked at multiple factors when designing a station site plan that would respect the city as a whole and its immediate neighbors.

Looking first to the surrounding blocks I found that with little exception, they all maintain the strong street edge that is characteristic of most of New York City. This became an item to maintain rather than stray from because it reinforces the locality of the station.

Next I looked at the site zoning to see where the setback requirements were in order for me to build straight up without interruption. With these two primary characteristics set, the building developed a strong, legible rectangular form.

The following step was to look at site penetration and circulation. In making a direct connection to the city, I pulled the axis of 32nd Street into the station. It serves as the major entrance and exit to the station. Commuter entrances want direct access to the train concourse I located them midblock on the north and south end of the site thereby creating a station cross axis. This resulted in four equal quadrants in which to build while leaving the cruciform shape open for circulation space.

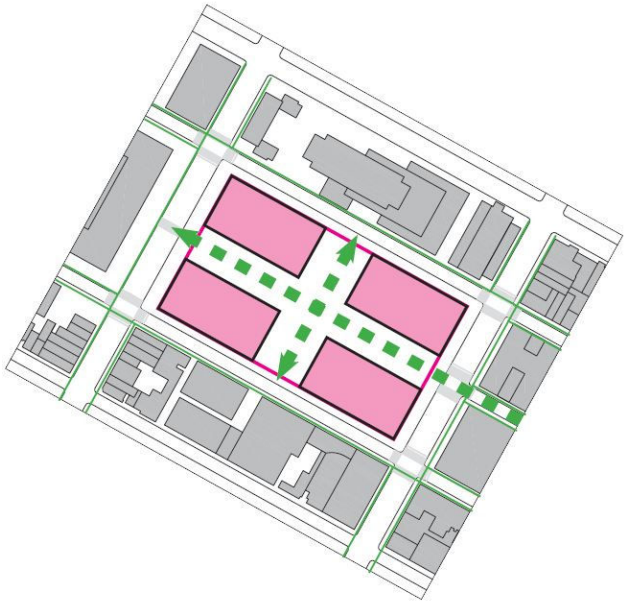

Figure 21: Access Diagram

Next I shifted the bulk of the program to the north side of the site in order to create a more favorable natural lighting condition by leaving more of the site in direct sunlight. However, the current positioning of the bulk blocked a lot of light and view to One Penn Plaza, the skyscraper to the north. So I had to widen the gap between the towers in order to respect the neighboring building, which had an added effect of creating a more generous circulation space at ground level.

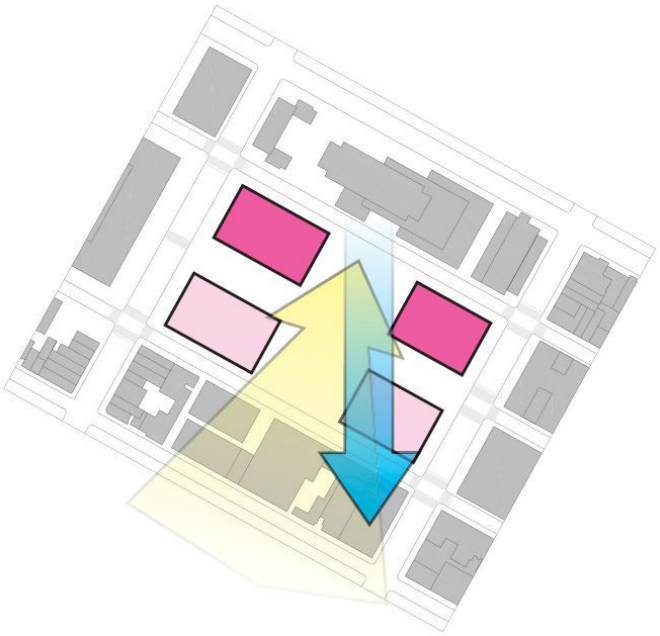

Figure 22: View and Light Diagram

Building Design

The building design had to reflect the identity, clarity and legibility started at the site scale. Throughout the process I looked at my proposals in terms of the current design to see how they would compare and if my strategy could alleviate current problems. Station access is currently through one of four nondescript points at street level or three subway connections. From the surface these entrances form no real connection to the surrounding urban fabric. The subway connectors below ground connect at different points meaning there is no clear area in which the transition of modes takes place. The circulation path is circuitous rather than linear and the spaces lack hierarchy. Three levels mean a tight floor-to-floor height and add to the confusion. Security is also difficult to manage given the number of concourses and hallways that are not in view of each other.

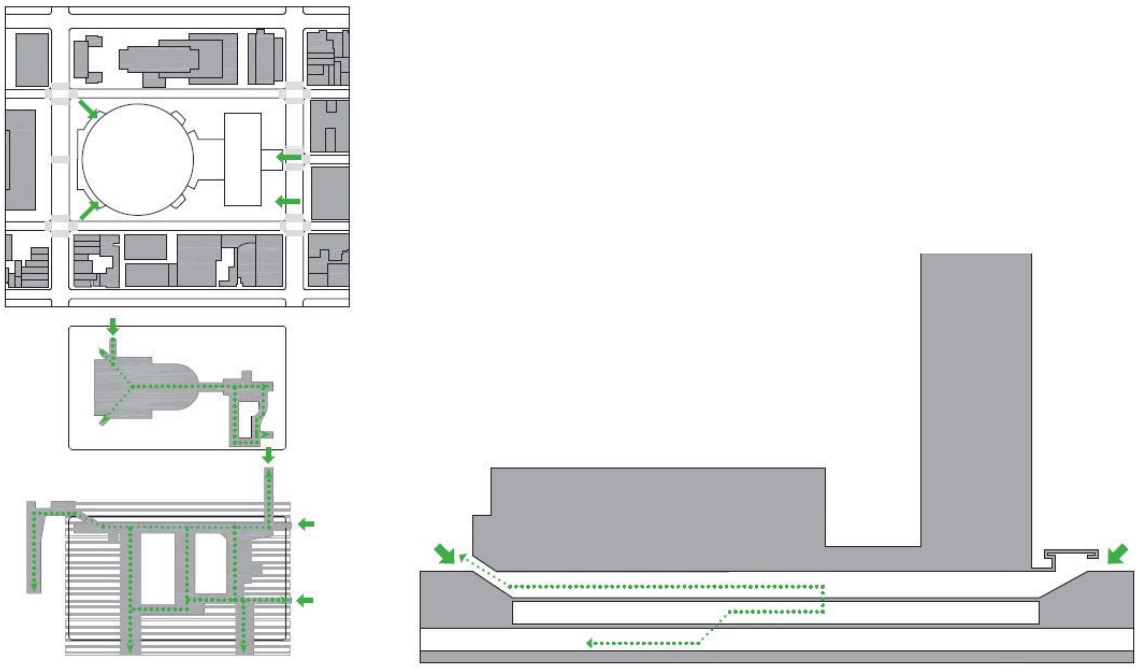

Figure 23: Entrance and Circulation Diagram Existing

In my scheme, the first move was to create four major entrance areas at the surface that project the station to the city and vice versa. Each of these leads to the grand concourse which offers one clear connection area to the subways and clear access to the trains below. By reducing the number of underground floors from three to two, I also made the track area less compacted and more comfortable. And lastly, by consolidating three smaller concourses into one large one the ability to implement security is easier. The new layout offers a rigorous geometry missing from the current station that allows even first time visitors a clear vision of the whole station from many vantage points.

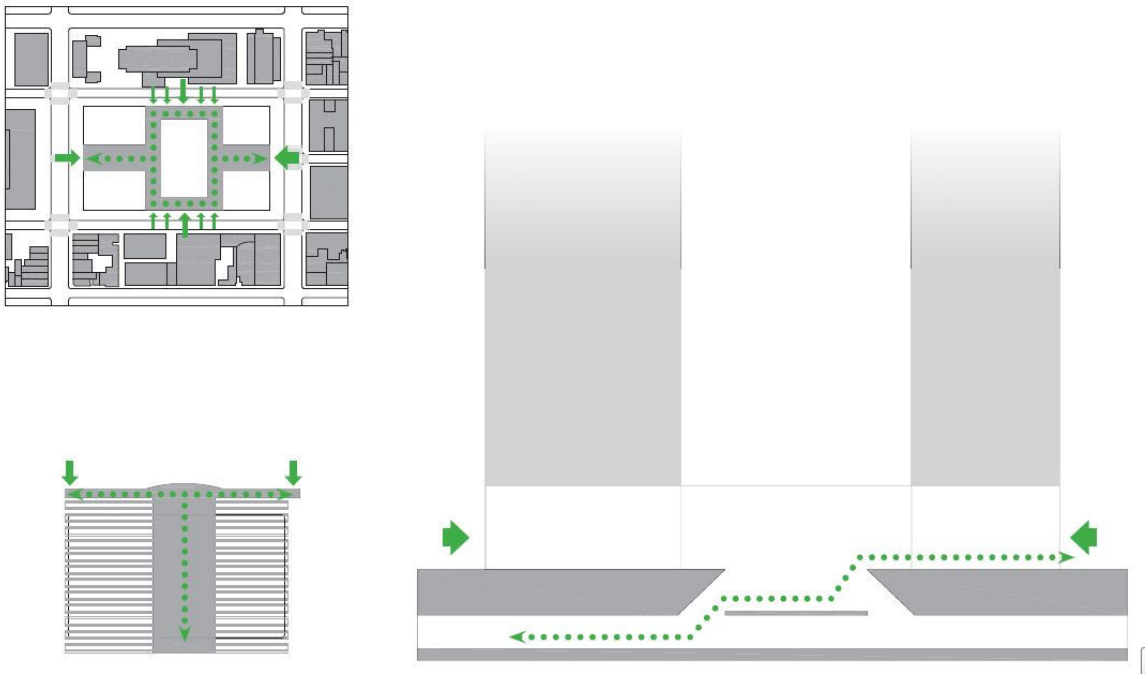

Figure 24: Entrance and Circulation Diagram Proposed

The need for transparency dictated a lot of glazing on all five facades of the station. To help mitigate the environmental effects I devise a couple of systems. First, in the non-circulation areas where the primary retail program is, I used a solid green roof to reduce solar heat gain and temper storm water runoff. In the circulation space, I used a louver system to reduce the amount of direct sunlight into the station. The louvers were positioned according to climatic needs and also to make the grand concourse the brightest spot in the station thereby reinforcing its importance. Also from a practical standpoint, this would allow more diffused natural light to make its way down to the tracks.

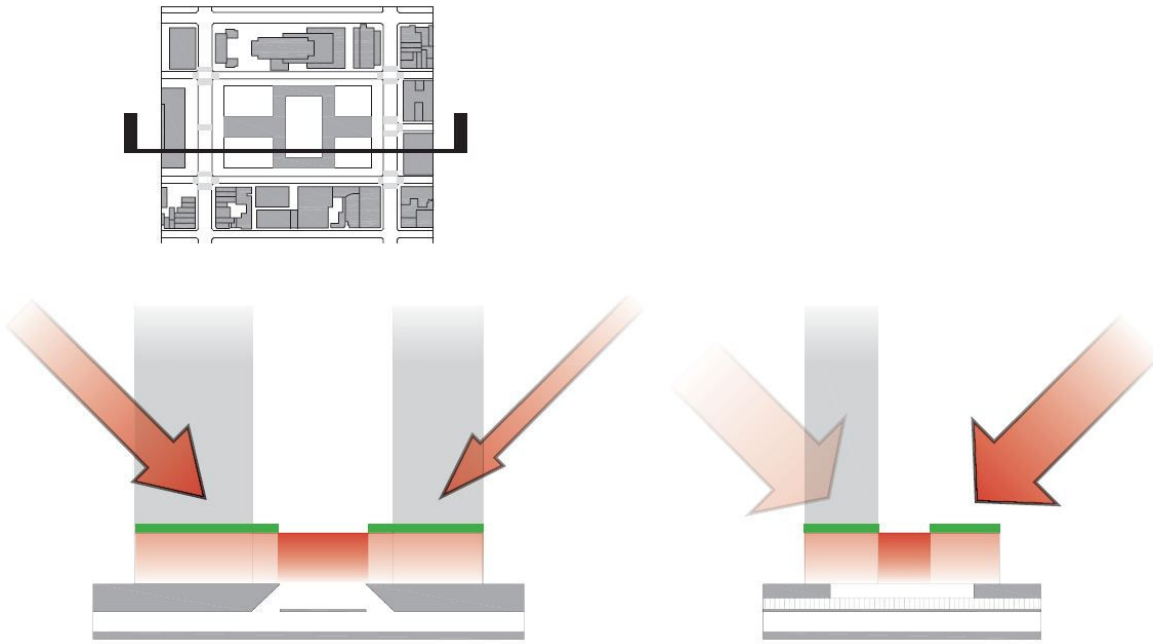

Figure 25: Heat Diffusion Diagram

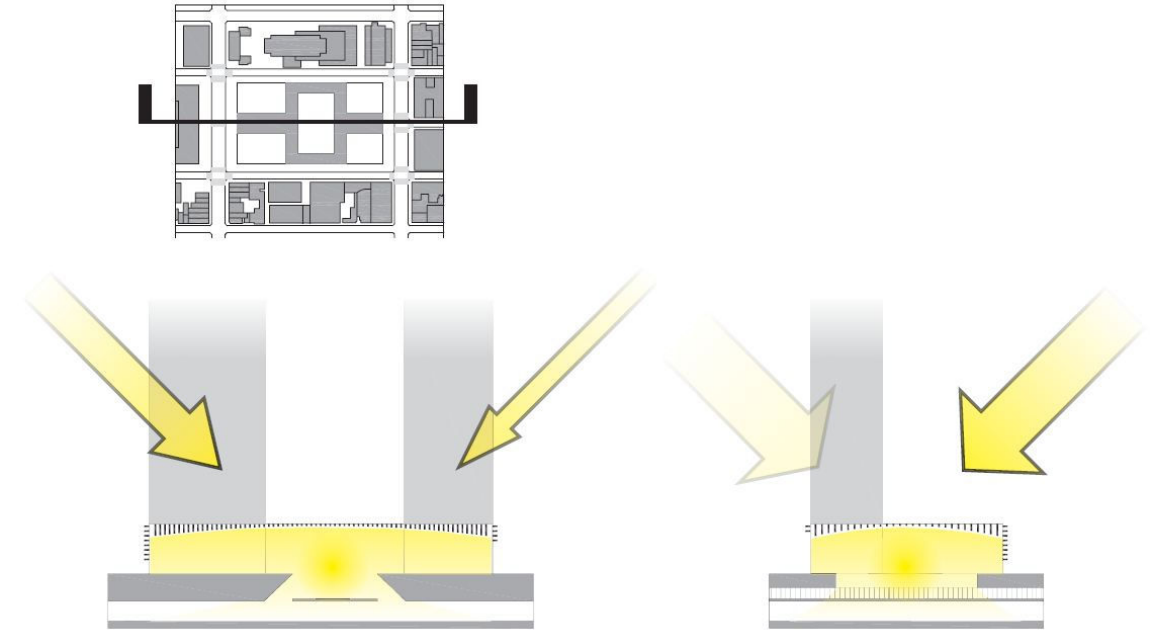

Figure 26: Light Diffusion Diagram

Using structure, bracing and the fill, the new Penn Station has a cohesive identity on all side and all level throughout the development. The base bay system of 60 feet in

the east-west direction by 50 feet in the north south direction modulated by pigmented white concrete columns that lends directionality to the building. This proportion also allows the skyscraper cores to follow a straight line from their zeniths to the track bed without interruption. The columns also carried through from the track bed to the roof so users could easily make the connection to space above and below ground creating a greater sense of understanding of the station.

The cross bracing elements, also of white concrete, are found both on the tower and skyscrapers to unify the structural system and emphasize that while independent functionally, they are of the same whole.

The fill between each bay is developed on a modular system that allows flexibility as the station changes over time. The primary panels will be glazed with the solid panels made of insulated Corten Steel, which over time may be changed with other materials. The noted divergence from this system is at all four major entry points where the façade is completely glazed with a spider clip and glass support system to allow maximum light and connection to the city. Around the perimeter are a series of vertical and horizontal louvers that highlight the different spaces contained within the rectilinear volume. At the top of the building the horizontal louvers wrap the entire building in order to add an overall element common on the entire station.

Figure 27: Facade from NE corner

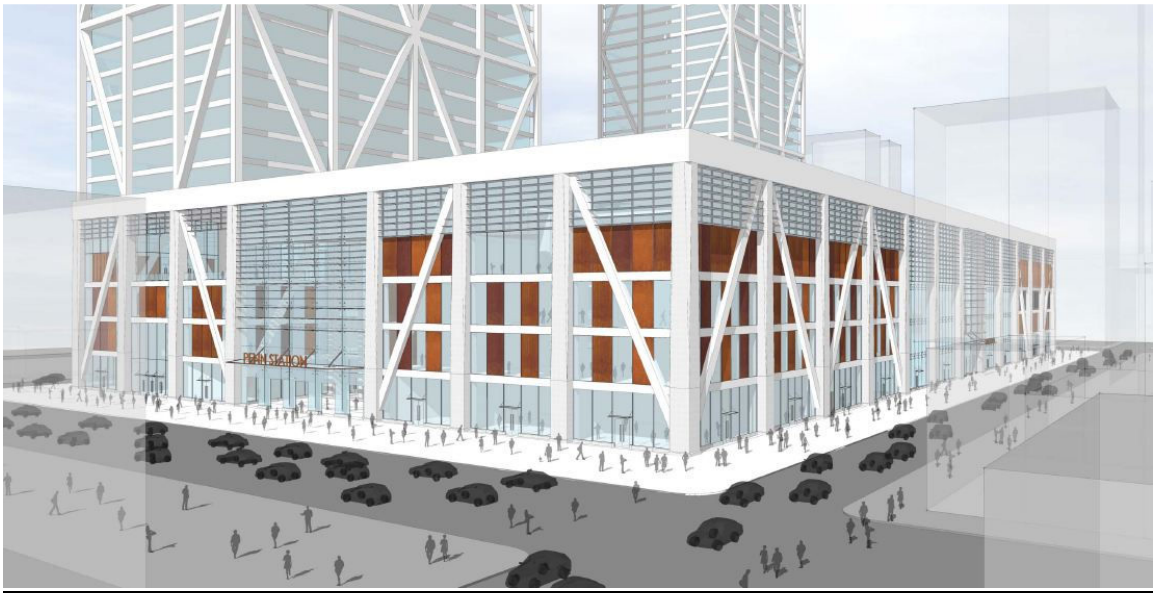

Figure 28: Facade from SW corner

Chapter Five: Conclusions

Through evaluation of the site and its previous and current occupants, I was able to reimagine a better Penn Station. I started with a clear site that took form by respecting the New York City grid and street edge. Then I maxed out the allowable FAR with two towers in order for the new project to achieve financial feasibility. Then I turned my attention to the primary goal of the thesis, creating a new Penn Station with a strong identity through clarity of movement and legibility of form. The result is a more successful station architecturally, functionally, and financially.

Figure 29: Aerial over New Penn Station

APPENDIX A: Station Sections and Perspectives

Figure 30: Cross Section Through Station

Figure 31: Longitudinal Section Through Station

Figure 32: Perspective from Platforms

Figure 33: Perspective from 32nd Street Entrance

Figure 34: Perspective from Business Waiting Room

Figure 35: Perspective over Concourse

APPENDIX B: Precedents

While every train station is unique to its context, they share many common elements and functions. The stations below show a mix of modern and renovated stations that function particularly well as thresholds to their respective urban environment in one or more areas. The ideas and concepts from these stations will help create design guidelines for Penn Station. All the precedents have or had a daily ridership of 100,000 or more sometime in its history.

Kyoto Station, Kyoto, Japan

The current iteration of Kyoto station opened in 1997, commemorating Kyoto's 1,200th anniversary. The station is 210 feet by 1500 feet long and 180 feet tall for a total floor area of 2.5 million square feet, which is larger than MSG and Two Penn combined. The vast scale and size of the project drew criticism from opponents who argued that the building broke down the traditional city grid and density.[20] However, the designers integrated the city grid into the station design so users would be aware of the continuity.

The monumentality of the station commands attention from surrounding vantage points and passengers use it to note their position within the city. The station facilities account for just over ten percent of the total surface area within the building, but was designed so that users of the various other facilities would constantly be aware of it.

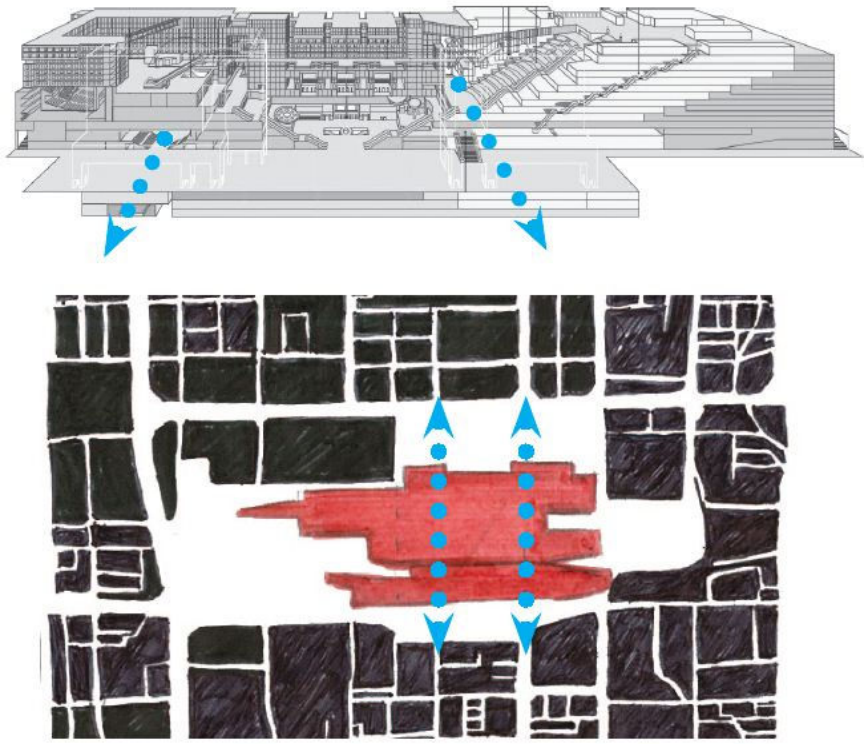

Figure 36: Kyoto City Grid Penetrating Station

[20] C. Asensio, *Stations and terminals,* (New York, N.Y: Arco for Hearst Books International, 1997), 115.

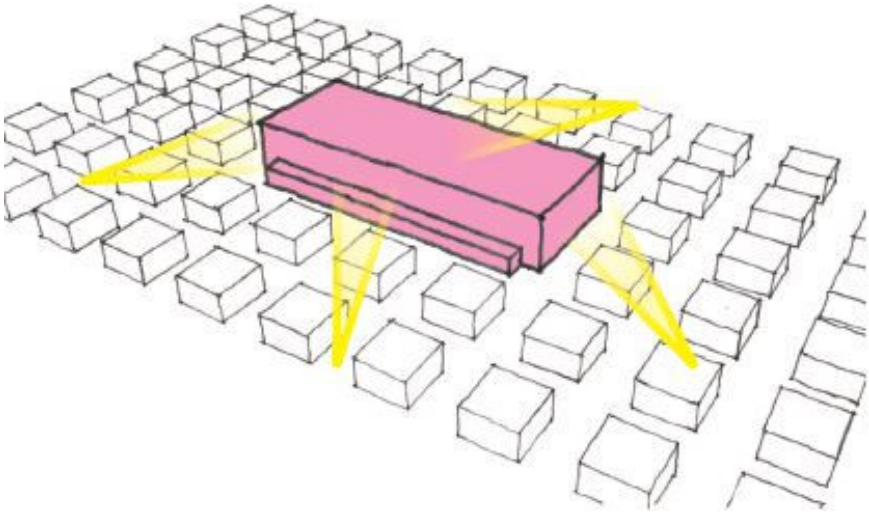

Figure 37: Kyoto Station as Neighborhood Icon

Figure 38: Interior view of Kyoto Station

Hung Hom, Hong Kong, PRC

This recent multi-modal transit hub in Hong Kong serves 150,000 passengers daily, but was designed to handle double that traffic as rail travel to mainland China increases. The arrival sequence is clearly designed with the pedestrian, taxi/auto, bus, and metro traffic all arriving on separate sides of the building which highlights the threshold of entering the station.

The building form is a rectilinear glass box with an articulated wave roof evokes the movement of water and points towards downtown Hong Kong giving the passenger an immediate relationship to where she is in the city—on the water's edge across the harbor from Hong Kong. The transparent transition gives an immediate understanding from either side of the curtain wall.[21]

Once inside a passenger can assess key element of the building from a single viewpoint making it easy to navigate without assistance. Natural light is the primary lighting source and adds to the easy understanding of the station. Once inside, there are three main flow and pause spaces. The main pedestrian path is along the main entrance with the retail core in the middle and the service core at the rear. Perpendicular to these paths is the main entry area in the middle with two subordinate spaces on either end. Here people wait for arriving passenger or take a break before boarding their train.

The retail has an excellent layout with ticket, convenience, souvenir, and other quick services on the main level. Certain retail stores have through passage ways to connect the primary path with the retail core. Above this are spaces for longer term meals, lounging, or people watching. They are out of the way of the passenger traffic and

[21] Asensio, 150.

connected by bridges. The view from here still allows for all station functions to be within view.

Local and international trains are separated along the same access and lead to the same track set separated by clear, bulletproof partitions that allow a visual connection to the other spaces, but prevent unauthorized immigration or departure to China. Daylight does not penetrate to the tracks below, but the scheme is a mix of fluorescent and spot lights to add a rhythm to the spaces.

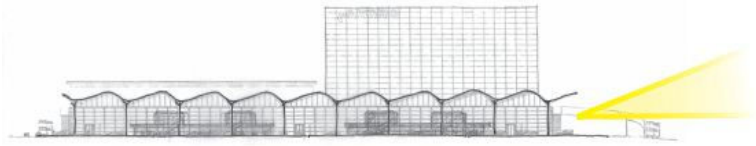

Figure 39: Elevation of Hung Hom station showing projection towards Hong Kong

Figure 40: Rolling Roof Forms Inside Station

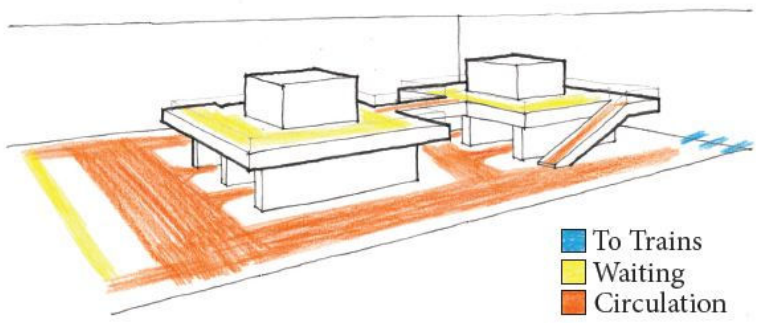

Figure 41: Hung Hom Circulation Diagram

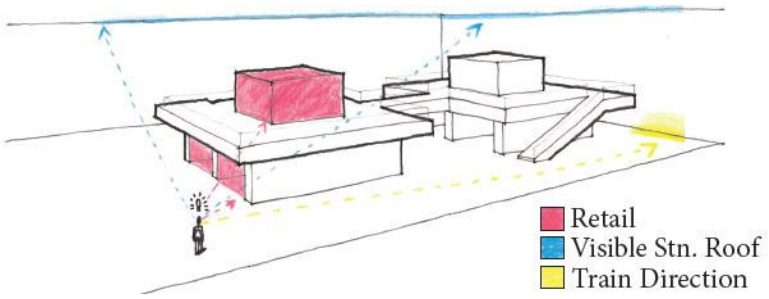

Figure 42: Hung Hom Legibility Diagram

Beijing South, Beijing, PRC

Sited outside the city center, this massive new station is the third largest in the world and yet remains easy to read and navigate. At first encounter the monumentality dwarfs every nearby building and it is clear that this is transportation infrastructure. Because the tracks are surface level the immediate surroundings are not typically urban. The design erased the fabric that existed there just a decade ago. Street level passengers arrive from the north or south entrances and those coming from the subway enter in the center of the station from below. Large indicator boards are at all major entrances and rotate through departure and arrival information frequently. There are multiple ticket offices to handle major holiday crowds, but usually only the main bank of them is open. There are also numerous self-serve kiosks near the metro entrance.

A skylight runs the entire length of the roof providing daylight as the primary lighting source. This filters down to the subway arrival level and guides people up to the main waiting room.[22] The train platforms are on grade and while covered from above, they still receive oblique daylight from the east and west sides.

The layout of passenger services is clearly visible from both the north and south entry points making it easy to navigate. The first encounter is a security checkpoint (a ticket is not necessary to gain access), then the main waiting area with two parallel rows of alternating retail outlets and platform entry doors. The main circulation is through the middle of the waiting area followed by two concentric ring with one around the passenger area and on outside the retail. The retail outlets all allow passengers to pass through from one ring to the other seamlessly. The entry gates are sequential with even and odds on separate sides.

[22] Asensio, 176.

The major flaw with this layout is during boarding time when passengers queue in front of one of the entry gates blocking the second ring of pathway. The only options are to weave in between people queuing or use the middle or outer ring pathway. Given the immense scale and passenger throughput this station experiences, the layout is clear and easy to use even for first time passengers.

Figure 43: Aerial of Beijing South Station

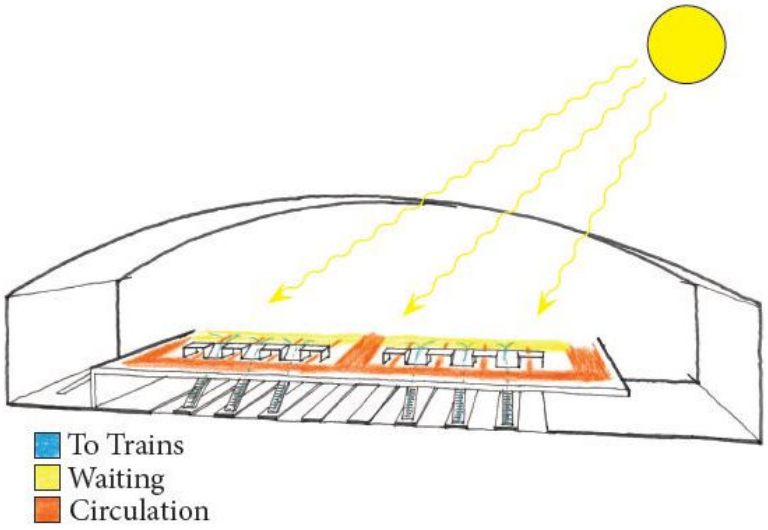

Figure 44:Beijing South Circulation and Sunlight Dagram

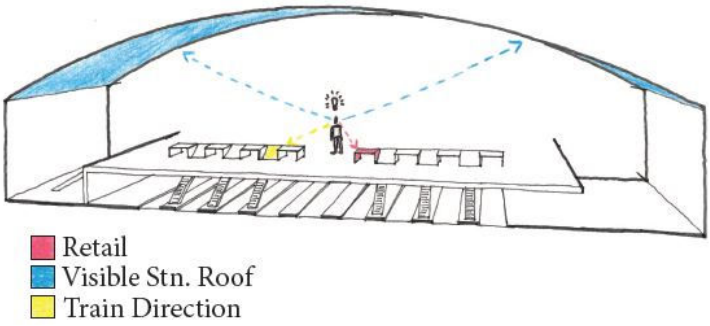

Figure 45: Beijing South Legibility Diagram

Berlin Central Station, Berlin, Germany

Located on the site of a previous station destroyed during World War II, the development of Berlin Central Station was a key element of urban revitalization for the neighborhood. This iconic structure reads clearly as a train station with the design highlighting the train and tracks from many vantage points. At the highest level is the long, gently curving train shed that intersects the main building. From the plaza directly in front as well as points around the retail floors, a passenger can always see the action of the train.[23] This constant reminder creates an intensely transitional space in between movement and experiential realms.

The near full glazing of the building allows a passerby to see arriving and departing trains and allows day lighting throughout the station. From the upper deck, passengers have a clear view to the surrounding neighborhood slightly off axis cruciform plan aligns to the cardinal directions and aids in orientation. This simple move allows passengers to figure out which tracks lead in what direction.

The three levels between the top level and underground tracks are service and retail oriented. The main ticket hall is on the ground level with information points on the others. The retail in a mix of local, national and international outlets and provide for shopping in a unique atmosphere.

[23] Asensio, 45.

Figure 46: Berlin Station Interior View

Figure 47: Berlin Station Exterior View

St. Pancras, London, UK

St. Pancras railway station opened in 1868 as the terminal that connected London with the East Midlands and Yorkshire. Nearly 100 years later it narrowly escaped demolition. It was renovated and expanded in the 2000s and heavily promoted as a public space which meant making it easy to access from multiple levels.[24] The station contains a restored and renovated hotel, a shopping center with fine dining, a bus terminal, and easier connections to adjacent King's Cross and the London Underground.

From nearly every entrance the visitor has a sense of the possible transition to movement space. The sweeping train shed evokes a bygone era of when engines produced huge amounts of steam and fumes which produces a historical continuity of the space. The international Eurostar trains rest above in partial view of the retail concourse below. The Champagne bar (see figure XX) provides a distinct atmosphere that one could not find anywhere else.

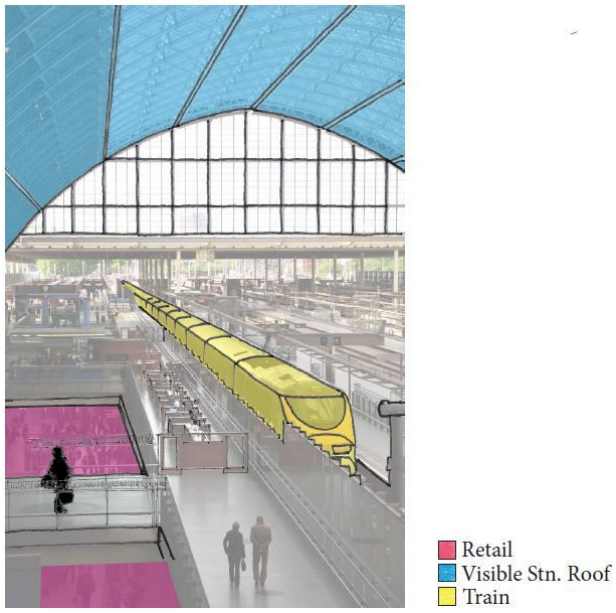

Figure 48: St. Pancras Legibility Diagram

[24] Asensio, 89.

Figure 49: Champagne Bar in St. Pancras

Union Station, DC, USA

Union Station opened in 1907 and heavily renovated in 1988 into its current form. The station always served as a grand threshold to Washington DC and its direct sightline to the Capitol Building reinforces the sense of place. From an urban perspective it aligns with Massachusetts Ave and maintains the street edge although pulled far back in order to accommodate passenger drop off and pickup. Its architectural and urban qualities share the same characteristics of the surrounding buildings. Its monumentality has a strong civic presence and is at home among other governmental buildings and museums. Its sense of place provides a strong transition that instantly reminds people of their location.

The internal functions have changed drastically from its inception with the addition of 212,000 square feet of retail space in 125 stores. This maneuver brought a use that is not prevalent in the area to a location with a high daily traffic count from both commuters and office employees. The projects retail center contains a variety of national retailers, local merchants and dining establishments that reflect the needs and spirit of the station as a crossroads of cultures and people.[25] Union Station's beautiful public spaces now serve special events including Inaugural Balls, art exhibits, and concerts which include a holiday show by the National Symphony Orchestra.

[25] Edwards, 197.

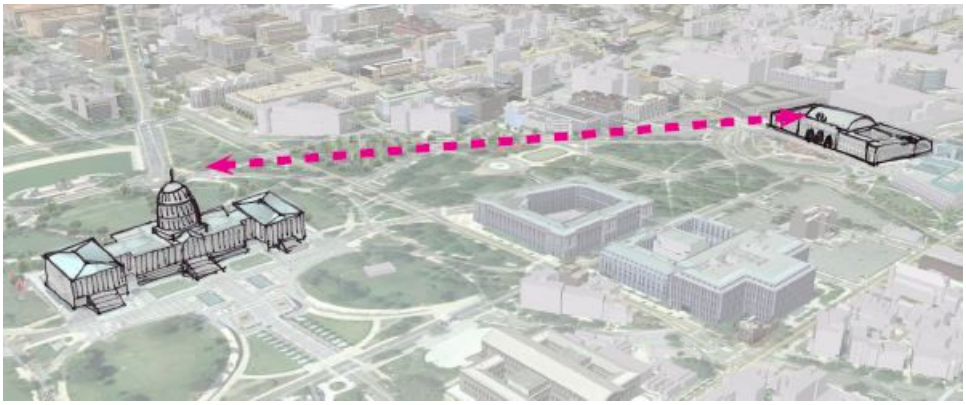

Figure 50: View corridor between Capitol and Union Station

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