To the Graduate Council:

I am submitting herewith a thesis written by Edward Brinson Martin entitled "Urban Hubs: Closing the Space , Time , Continuum." I have examined the final paper copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Architecture, with a major in Architecture.

T. K. Davis, Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:

Vice Chancellor and Dean of Graduate Studies

Thesis
2006
.M353

URBAN HUBS: CLOSING THE SPACE, TIME CONTINUUM

A Thesis
Presented for the
Master of Architecture Degree
The University of Tennessee, Knoxville

Edward Brinson Martin
August 2006

DEDICATION

I want to thank my family for their support and understanding.

ACKNOWLEDGMENTS

Thank You.

ABSTRACT

"It is known that the names of places change as many times as there are foreign languages: and that every place can be reached from other places, by the most various roads and routes by those who ride, or drive, or row, or fly."

Italo Calvino,

Invisible Cities

In this thesis, I will be exploring the role that architecture and urban design can play in transforming human behavior. I will develop the idea of a multi faceted transportation hub as a means to encourage people to use alternative modes of transportation, and through that development, evaluate influence fields as a mechanism for movement. In the United States, human behavior has proven to be a limiting factor in the construction of alternative transportation infrastructure. The increased desire to exercise on a treadmill or a stationary bike and inability to ride or walk to work illustrates how much people covet automobiles. The promotion of personal automobiles over the last century has been a major determining factor in the lack of established mass transit infrastructure. However, it is very hard to miss the expansive highway infrastructure and the problems that increased vehicle traffic has on accessibility and mobility. Many people in the US realize that the concept of accessibility and mobility is essential to maintaining a healthy and vibrant urban core. In Nashville, TN, construction has begun on a rail system to move suburban commuters into the city along major corridors. The question, Will people use it once it has proven to expedite commuting time and cost?

As a case study, I will look at the urban creation surrounding a transportation hub in Lille, France. Rem Koolhaas and OMA were the master planners for Euralille , the "city-within-a city" surrounding a TGV station. Euralille has become a major area of convergence in Europe

and has become the catalyst for revitalization for a defunct industrial town.

Rotterdam, Holland has also become a modern model for infrastructural developments. By limiting automobile traffic, the plazas are teaming with pedestrians, bikes, and whisper light rail tracks embedded in the pavers. These transportation "hubs" exist, as more and more infrastructural planning links multiple modes of transportation throughout the city. I will examine the relationship of these developments and the growth of urban areas into a cityscape "defined by waterways, bridges, streets, arterial canals, avenues, and a rhomboid motorway system- together forming the backbone of the city's structure." These relationships will serve as a reference to interesting urban spaces and the people who choose to inhabit these spaces.

Finally, I will prove that Human behavior will only be altered by increasing the positive experience towards a destination to a level comparable to the experience at the destination itself. I will prove this by exploring the spaces created by the convergence of the many different transportation systems and the quality of experience gained through myriad chance encounters.

"Every story is a travel story – a spatial practice."(Breathing cities)

STATEMENT OF THESIS

"It is not a building that defines a clear architectural identity; but a building that creates and triggers potential, almost in an urbanistic sense."
Rem Koolhaas

This thesis will explore the role that architecture and urban design can play in transforming human behavior. It will explore modern culture as an entity inextricably bound to movement, and from that develop the idea of a multi-faceted urban hub as a means to centralize residential, office, recreation, and culture within the urban city fabric. The design and creation of urban spaces, dynamic in quality but steadfast in place, are an essential step towards maintaining the appeal of urban living. Urban hubs are the catalyst for cities to become multi-modal and provide opportunities for a diverse citizenship to converge at many levels. I contend that human behavior dominated by a need for individualistic travel will only be altered by increasing the positive experience towards a destination to a level comparable to the experience at the destination itself.

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1. CENTRAL PROPOSITION

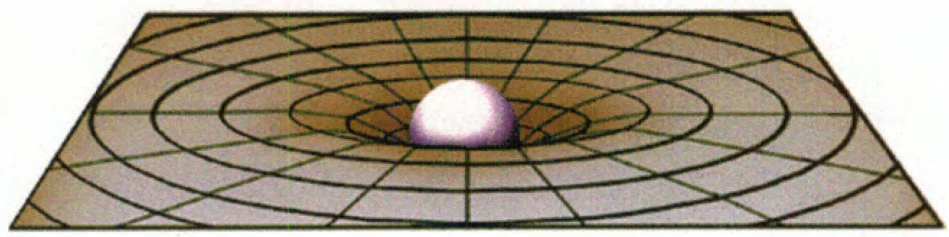
Circulation, Mobility, Movement:

It is known that the names of places change as many times as there are foreign languages: and that every place can be reached from other places, by the most various roads and routes by those who ride, or drive, or row, or fly. Italo Calvino, Invisible Cities p.137

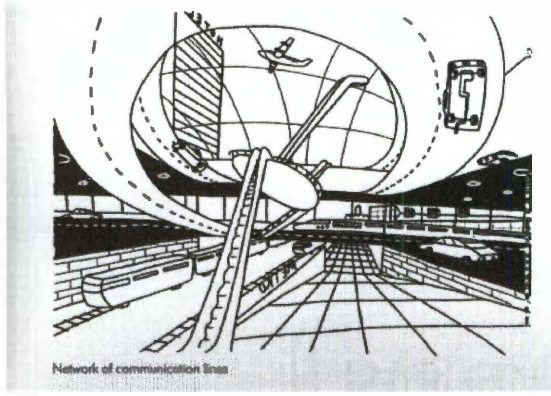
Where are you going? What compels you to move towards something or away from something? It is not the purpose of this paper to delve into a realm of history and sociology that evaluates man as a hunter and gather bound to move in order to survive. However, it is important to evaluate our connection to movement and the forces that either hinder or propel us towards a destination. The theory of relativity states that the increase of gravitational pull is directly proportional to the increase in mass and inversely proportional to distance. This theory implies that there are at least two objects bound together by invisible forces. Both objects have a field of influence that either increases or decreases the invisible force of connection. The gap between the two forces is the Space-Time Continuum.(fig.1)

The space-time continuum implies movement, which is the distance of travel relative to the time of travel. Through transportation and digital innovations, we have been closing the gap in the space-time continuum.(fig.2) An example, of the direct relationship between growing fields of influence and the diminishing space time-continuum, is the development of the airplane.(fig.3) In the recent past Europe was not readily accessible to all Americans and vice-versa, because the amount of time it would take to travel there diminished the "gravitational pull." The influence field might have been strong, but the distance relative to space and time was too great to act forcefully as a catalyst for movement. However, with the introduction of the airplane, the gap between the United States and Europe closed significantly.

This same idea can be illustrated through the introduction of the



(fig. 1 Sphere of Influence.)This diagram shows the curvature of Space as a result of an objects sphere of influence. Source: gravity.com



(fig.2 Rem Koolhaas Sketch)
Rem Koolhaas sketch describing the network of connections at Euralille.
Source: OMA , Rem Koolhaas



(fig. 3 Bauhaus)
Postcard: Dessau, Germany.
Plane flying over the Bauhaus
Source: Bauhaus archive

internet and global connection. The space-time continuum has been virtually eliminated. We can take a virtual tour of the Sistine Chapel without leaving the couch. One might pose the argument that as a culture we are no longer bound to movement. However, the exposure to more possibilities only increases their fields of influence and acts as a compelling force for movement. Thus, like the hunter and gatherer we are still inextricably bound to movement.

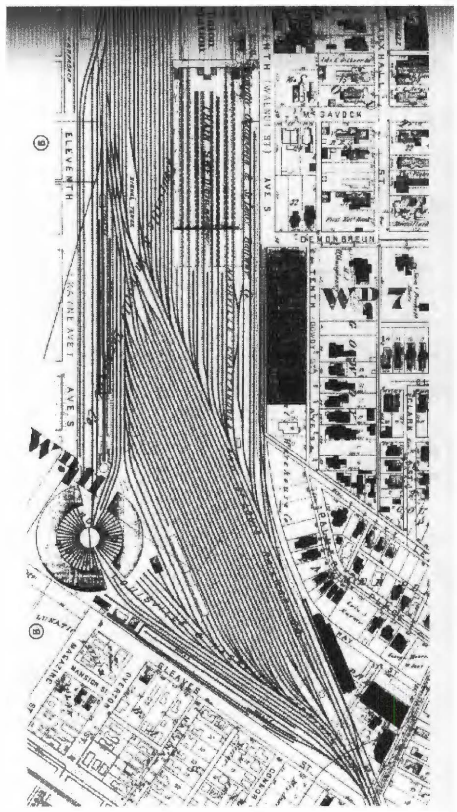
How does this relate to the Urban Hub? In Nashville, TN, four commuter rail lines are proposed to converge on the tracks adjacent to the historic Union Station.(fig.4) Union Station now exists as a hotel and the tracks are used only for commercial rail.(fig.5) In 1900, this station was completed after 10 years of construction and was a major event for Nashvillians. Long since defunct as a passenger rail site, now there is another opportunity to celebrate the influence of this site as a historically significant element of Nashville culture.(fig.6)

The opportunity to design a space that will influence alternative means of transportation for Nashvillians begins with the idea that the hub must have a significant amount of influence as a destination. Upon its inception, Major Lewis, who oversaw every element in the creation of the original Union Station, recognized the importance of innovation and scale as an integral part of the unique experience of rail travel.(fig.7) We realize that rail travel is no longer as exciting as it was in 1900, but the influence of a unique and exciting place that references the history of the site as a distinct element within the urban fabric will be a catalyst for future movement.

What is a Hub?

A hub is that which occupies a position analogous to the hub of a wheel; a central point of revolution, activity, life, interest, etc. (OED)

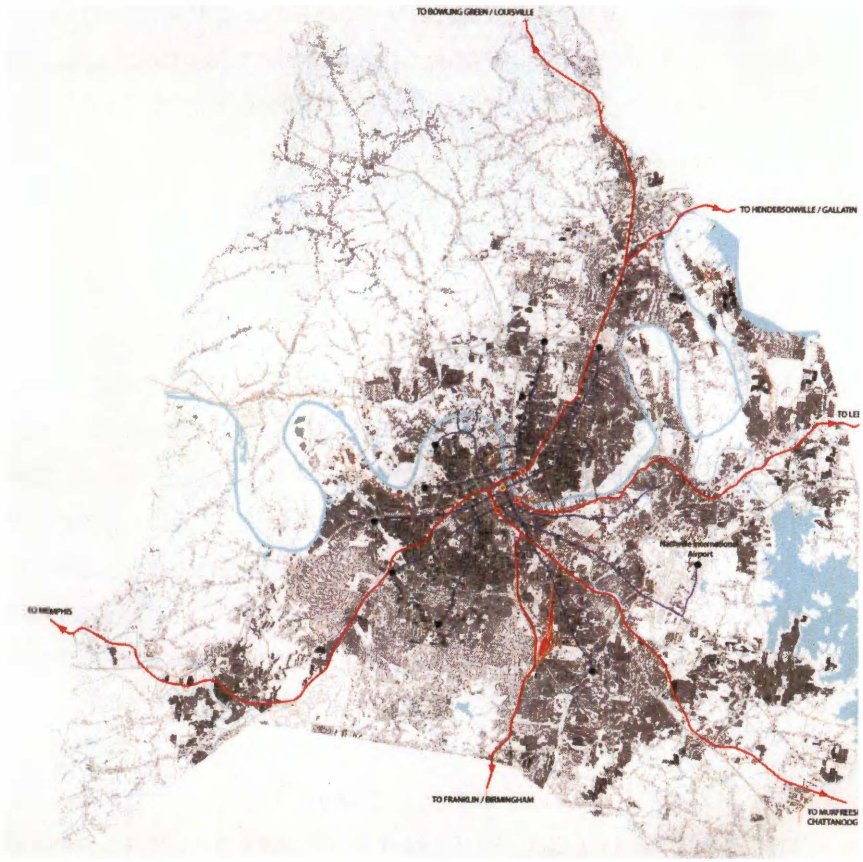
When asked this question in the context of Transportation Geography, I recall an image of Dallas Fort Worth airport and a huge conglomerate of airlines distributing the forces of travel demand for the



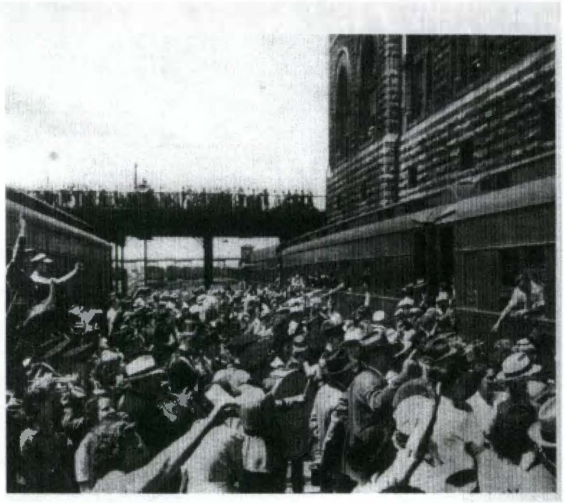
(fig. 4 Plan of Union Station Site Nashville, TN)
Source: Sanborn maps



(fig. 5 Train Shed as a Beacon) Union Station rendering shows the beacon of light from the Train Shed.
Source: Sherman



(fig.6 Commuter Rail Plan)Commuter Rail Spokes planning to converge in Downtown Nashville.
Source:Diagram from Plan of Nashville



(fig.7 The Train Platform)
Union Station in its Prime
Souce:Nashville Photo Archives

south- western United States. However, when asked the same question when referring to an urban hub, I think of multiple use pockets teeming with energy at different times of the day, with different people of different ages and different backgrounds.(fig.8) This is an urban hub: a place of social interactions and convergence of ideals and culture. Why are they rare in many of the cities in the United States? The promotion of personal automobile traffic for the past century has de-centralized many of the spaces that once existed as Urban Hubs within our cities. This is not a new idea, and many people in many different places are constantly trying to propose ideas for a system of well thought out alternative means to personal automobile traffic.(fig.9) The problem is not the money that it would cost to implement these plans; it is a problem of human behavior. Even if the most efficient rail system were set up in one of those cities in the south-eastern United States which have a large sprawling population, the number of people who would use it could never make up for the cost of building such a system. (I qualified this statement because there have been examples of success in the Bos-Wash Corridor in the North Eastern United States.) Thus, it is up to the federal government to subsidize mass-transit and retrofit many of our cities that are suffering from unsustainable sprawl.(fig.10) An urban hub is essentially an area of healthy convergence within the urban fabric. A pocket of convergence within a dense urban core allows citizens to interact in ways that look past individual self-interest and promotes a collective consciousness. Although, most cities in the United States lack the density that enables "pockets" of space to emerge as an integral and important element within the urban core, the current growth models suggest a resurgent potential within decentralized cities. A well-programmed and well-planned composition of buildings surrounding a transportation hub will encourage density and become a destination as opposed to a means to a destination. Urban Hubs will tighten the cities' influence, act as a distinct catalyst of communication, and create a welcome focal point of assembly within de-centralized cities. The urban hub is the answer to altering a culture burdened by the need to drive personal automobiles.



(fig.8 Rotterdam City Center) The Rotterdam city center includes a large pedestrian area,where large hordes of people come to shop or otherwise spend their leisure time. Notice the tram and everpresent bicycles in the the "pedestrian center" of the European city. Source: Vroom



(fig.9 Bicycles in Rotterdam) In Holland, for example, all roads are within their cities have cycleways. Rail stations in Holland have over 90,000 cycles, parked daily at 80 stations, mostly guarded, and over cover. In Japan, an estimated 1.25 million cycles are parked daily at stations, with multi-level parking being tried on an experimental basis. Source: Richards



(fig.10 Hofplein Considered Heart of Rotterdam)
The Hofplein in Rotterdam is considered the heart of the city.
Source: Vroom

The Current Growth Model:

According to the United Nations figures on "urban agglomeration", the world will add about 2.2 billion people by 2030. Of that total, 2.1 billion will live in urban areas. Growth models show that thirty percent of the world's population lived in urban areas in 1950: that proportion grew to 47 percent by 2000 and is projected to reach 60 percent by 2030. At the current rates of change, the number of urban dwellers will equal the number of rural dwellers in 2007. In the United States, we missed opportunities to maximize efficient use of space and to mitigate the problem of finding alternative energy sources. Today U.S. consultants who are concerned about energy consumption in the exploding Asian countries urge Asian mayors to adopt energy-conserving planning models by investing in public transportation and by creating multi-use neighborhoods in which residents work, live, and shop in one area.

As Americans have moved to suburbs since the 1950's, per capita land use has increased twice as fast as population growth. William Hudnut, a senior resident fellow at the Washington based Urban Land Institute says Asia should not make the mistakes we made in becoming car dependent, but current data shows that China seems to be following the American model. Even though rail transit is seven to ten times more energy efficient than car travel, the number of cars in China are doubling every five years. In contrast, European cities -with large public transportation systems and high per capita train use- are even better models than progressive American cities, (such as Portland, OR) that are beginning to address public transportation issues.

Opportunities Found:

Today, cities are pouring money into transportation infrastructure in order to provide accessibility and mobility to all citizens. The diversity will provide opportunities for businesses and individuals as the population begins to recognize the benefits of increasingly dense cities. Many cities

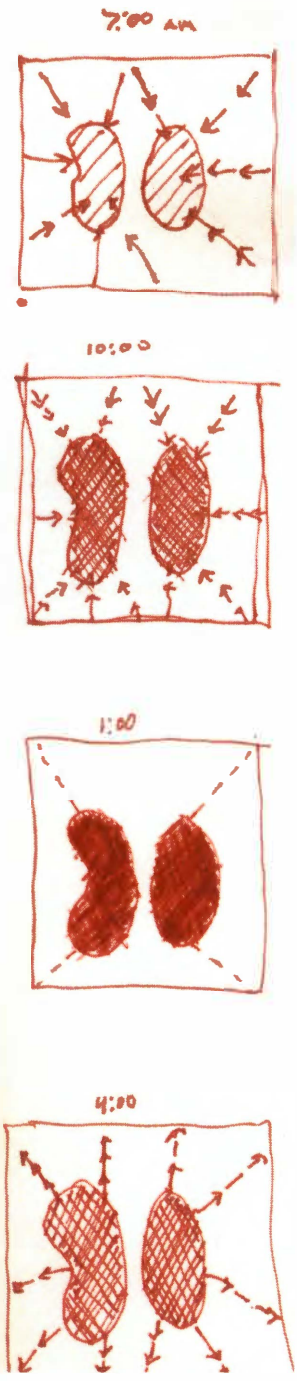
in Europe and Japan provide insight for successful models of density. Both Europe and Japan are characterized by incredibly dense mega-cities but still maintain un-programmed pockets of space within packed urban areas. These pockets, near public transportation stations, serve as collectors during peak hours of traffic, as well as providing areas flexible enough to accommodate a multitude of public programs during non-peak hours.(fig.11) The design and creation of Urban Hubs are an essential step towards maintaining the appeal of urban living.

In Japan, the string of mega-cities including Tokyo to Kobe, has a population density greater than 300 people per sq. Km. Although the land area in Japan is much smaller than the United states, they are still feeling the effects of more and more people moving into urban areas. If the current growth model is accurate, we will be forced to retrofit cities in the United States with the appropriate urban planning to meet the demands of continuing urban population growth.

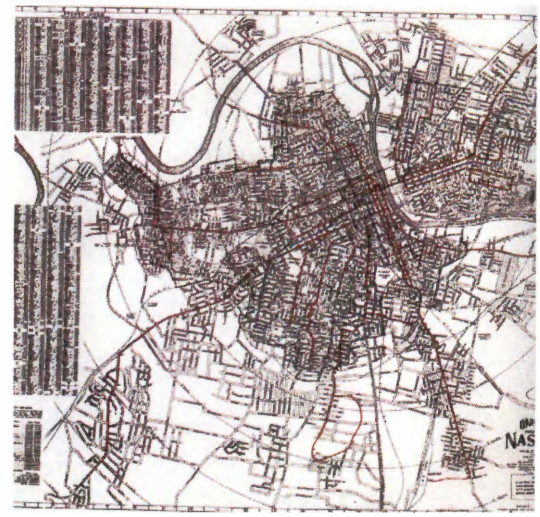
Growth Patterns:

Historical precedents in transportation innovations delineate the growth patterns that emerge according to accessibility. Train stations and subway stops are often surrounded by communities that need access to urban centers.(fig 12) The nodes of growth around transportation stations indicate an element of Human behavior that necessitates both accessibility and mobility.(fig.13)

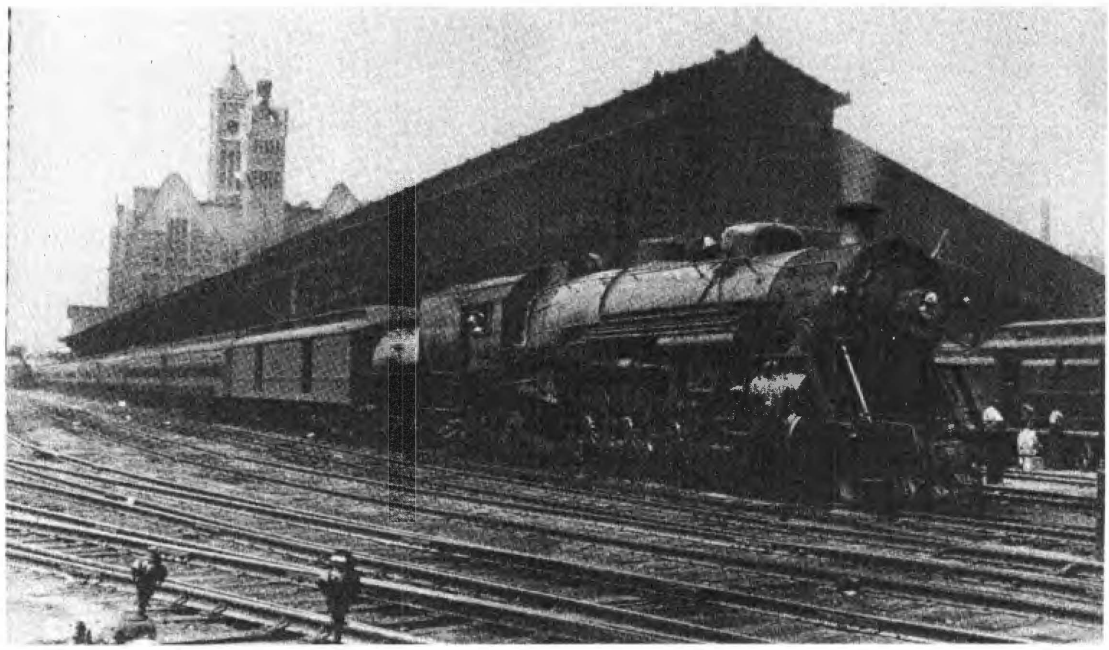
"The right to accessible and symbolic centrality, to recognition on the part of others, to visibility and identity, as well as access to nearby amenities and public spaces are conditions of citizenship. As is the right to mobility, which implies information and exchange, training and job opportunities, the possibility of appropriating the city as a series of freedoms. If the rights of centrality and mobility are not universal, the city is not democratic. "(Borja, Cities of Desire).



(fig. 11 Diagram of Cities as Lungs) This diagram portrays the city as a set of lungs acoomodating increased use. During peak business hours the city becomes more crowded as well as achieving more influence. During non-peak hours the lungs prepare for another breath.Source: Author



(fig 12. Streetcar Map for Nashville (circa 1902)
The map also indicates first ring neighborhoods surrounding the Central Business District. Source. The Plan of Nashville



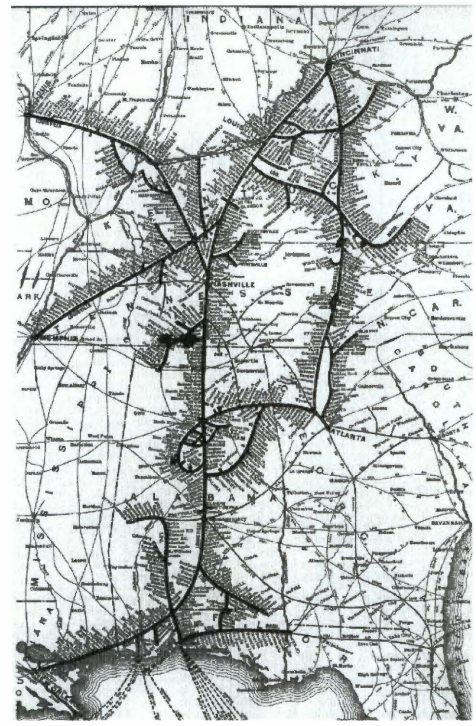
(fig. 13 The Dixie Flyer)
Source: Sherman

The suburban communities developed in the 19th century until the development of automobile expressways in the 1950's is all related to the transportation developments and the possibility of easy access from country to city.(fig.14) Long since incorporated into the major metropolitan areas, historical suburban neighborhoods in Chicago, New York, Boston, Philadelphia, etc. all relate to the scale of horse-drawn streetcar and the network of transportation innovations. The gravitational forces of a well-planed urbanity as well as multi-modal transportation began to close the space-time continuum. Would we benefit by returning to the city planning pre-1920?

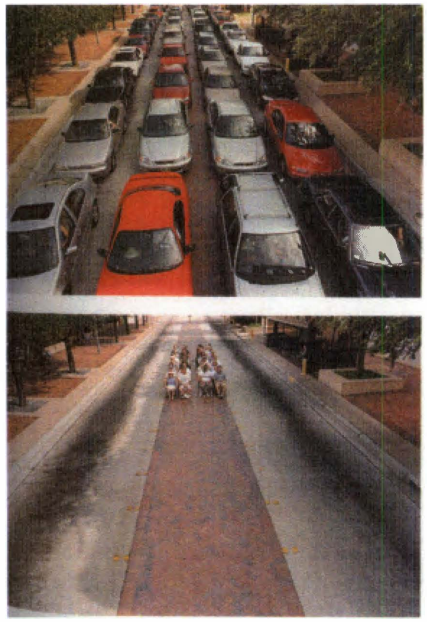
De-Centralized:

In a single building, something extra-ordinary may be sought after and achieved. The whole body of a city, however, shows beyond dispute the state of architectural knowledge of a period. It shows the extent to which the period was capable of organizing its own life. (Gideon p.25)

The American cities developed spatially as a direct relationship to movement. Mobility and accessibility were maintained through multi-modal systems that moved goods and citizens through denser cities. Today, many American cities are congested by traffic jams from 8:00 a.m. to 12:00 and again from 4:00 p.m. to 7:00 p.m. Our love affair with the personal automobile, the pastoral image of the home existing within cultivated farmland, and government subsidies for suburban growth de-centralized the cities. The suburban lifestyle typified by a daily commute from country to city was made universally possible by the mass production of automobiles in the 1920's. The personal automobile, as imagined by Henry Ford, was a catalyst for movement and a democratic means of accessibility. This idea was a step towards closing the gap in the space-time continuum. More exposure, for more people, would provide a diverse citizenship access to a world of influences previously diminished by distance and time. However, the automobile culture, bolstered by marketing and government subsidies, has put a stranglehold on many American cities. (fig.15) The personal



(fig. 14 The Dixie Flyer Route)The Dixie Flyer Map Showing a Route from New Orleans to Cincinatti and East to Atlanta.
Source: The Plan of Nashville



(fig.15 Car Space Requirements.) Car space requirements vs. Bus space requirements.
Source: Plan of Nashville

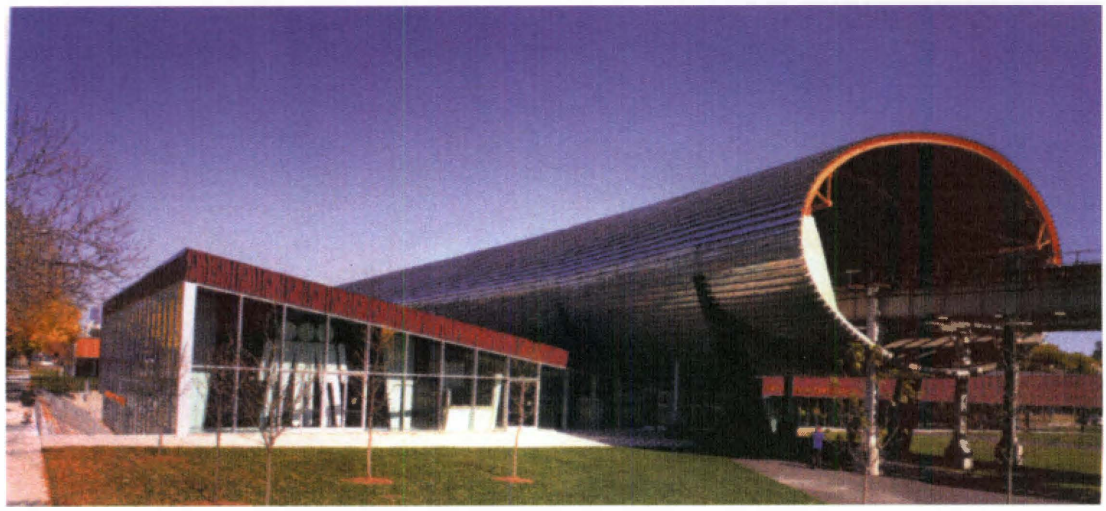
automobile is inherently an inefficient means of transportation. Moreover, the infrastructure needed to maintain mobility and accessibility for a mono-modal culture far exceeds the amount of area available to maintain cities defined by a healthy density.

Architecture: Sphere of Influence

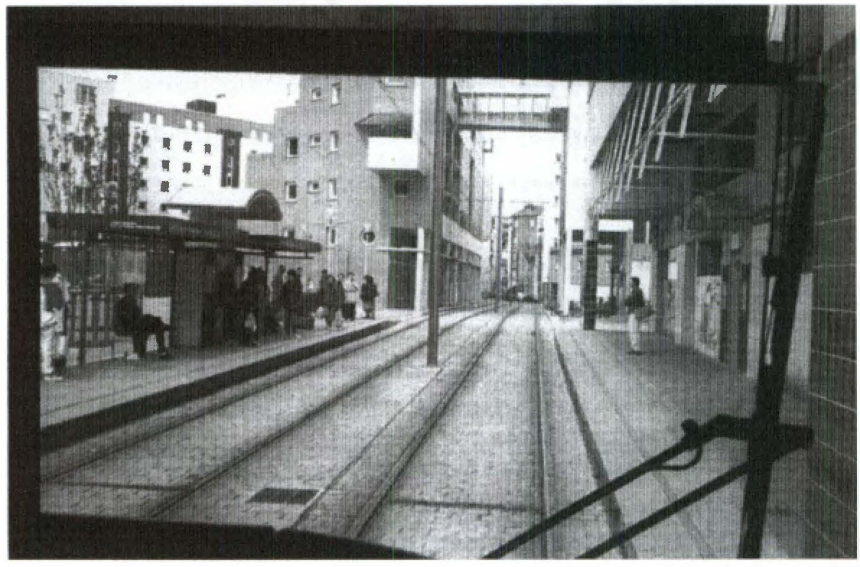
Architecture, which acquires tranquility and balance thanks to geometric order, obtains dynamism thanks to natural phenomena and human movements. (Tadao Ando.)

One goal of architecture is to organize built space in a way that relates to the occupied site, the street, the block, the neighborhood, the city, and the region.(fig.16) By addressing the influence of architecture on multiple scales, I can return to the analogy of gravitational pull. On the scale of the building, a simple study of massing can determine the dynamic quality created between two forms. Remember with increased mass (or influence) the larger the gravitational forces are between two objects. This concept also relates to program. A flexible program within and around a building can increase its gravitational influence. Diversity of program also provides for a diverse citizenship to give the space a dynamic quality.(fig.17)

The differing scales of influence from block to city are addressed through the competing influences. For example, a fine museum or school has the ability to draw people at the regional level. A grocery store has influence on the neighborhood scale. In addition, the design of the building itself, with opportunities for neighbors to meet or semi-secluded areas for quiet times of reflection will provide opportunities at the block scale. The organization of space itself should provide opportunities for ease of movement at all of the scales as well as defining areas adjacent to circulation paths for collection. This organization will begin to close the space-time continuum.



(fig.16 McCormick Campus Center)
Illinois Institute of Technology
Chicago, IL
Source: Architecture Record



(fig. 17 Paris. Light Rail between Bobigny and St. Denis) Tracks located between dense public housing with platforms on either side integrated into the development.
Source: Richards

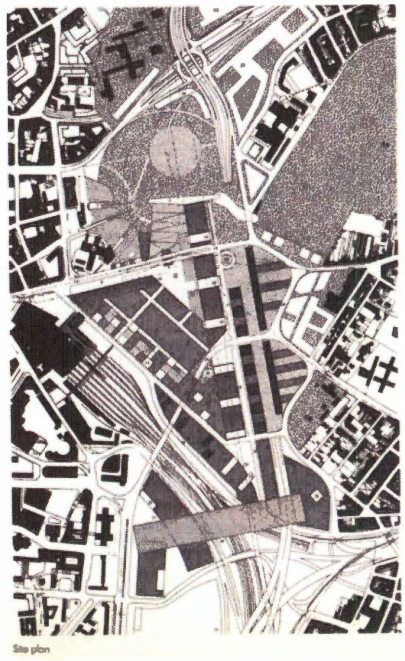
2. CASE STUDY

Euralille: (an Urban Hub)
OMA, Rem Koolhaas

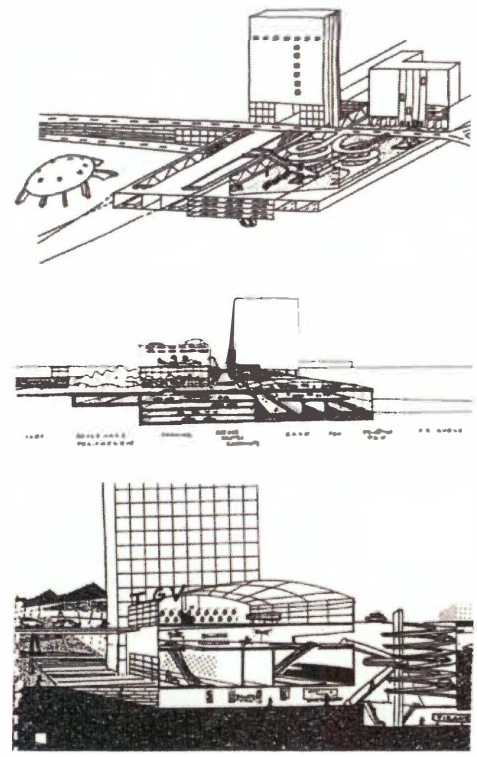
"That is how he looks at architecture nowadays, as the result of the encounter of different means of transport. The energy that is implicit in any trip is manifested here as architecture." (Moneo, Theoretical p. 339)

Euralille, an urban hub, is essentially a city planned around a transportation hub.(fig.18) Rem Koolhaas was chosen as the master planner in 1989 and his vision of a complex of buildings surrounding a TGV station has revitalized the French town of Lille. Although the city's industrial era staples of mining and textiles had been in decline for decades, the design coincided with the completion of the channel tunnel – the resulting Eurostar train would place Lille at a strategically important nodal point in Europe's transport network. At a stroke, this city-within-a-city- Euralille – found itself within 1.5 hours travel time of over 50 million people located between London, Brussels, and Paris. Although Koolhaas' city developed in the middle of an existing one, it was to be something entirely separate. Euralille's importance lies not in where it is, but where it leads to, and how long it takes to get there. OMA's masterplan designated the Eurostar railway station as an urban artery, placing a set of high profile buildings over the tracks, including a vast shopping center, a congress hall and offices.(fig.19)

In contrast to Euralille and the sites proximity to three major European cities, Nashville Tennessee has a relatively small urban population and a vast population sprawl area. However, Nashville has plans for a commuter rail to use existing rail tracks for eight spokes converging in downtown. There is a unique opportunity to tighten the sprawling hinterlands and regain the influence of a metropolitan area. A strategically located urban hub providing all of the amenities within



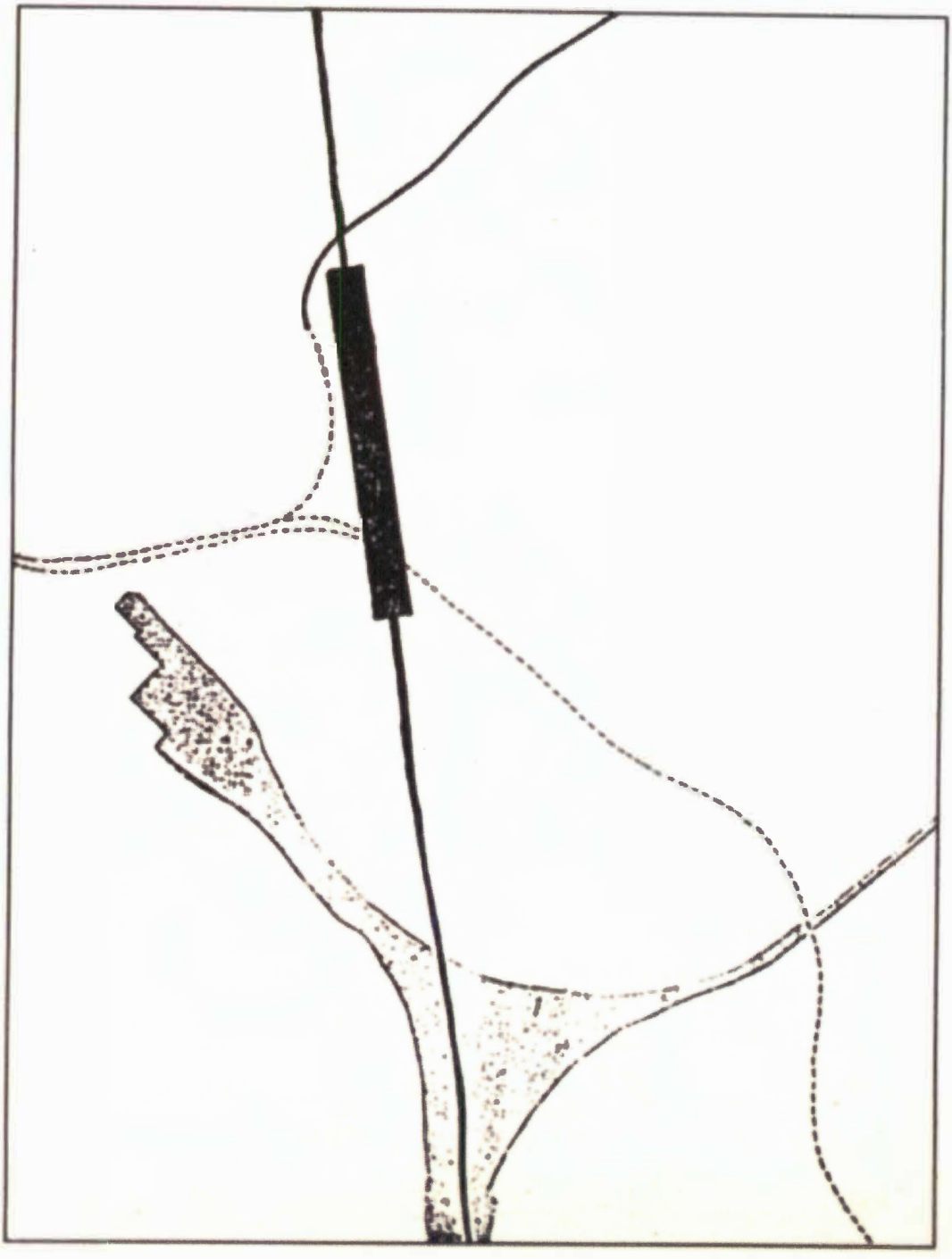
(fig.18 Euralille Site Plan)
Source: Rem Koolhaas



(fig. 19 Sketches of Euralille)
Source :Rem Koolhaas

walking distance of a major convergence has great strength. Where Koolhaas chose to create a city-within-a –city, I think that there is a greater opportunity in Nashville to celebrate the convergence of transportation as a kinetic force. Where the program of Euralille is self-sustainable, I propose that the station is just one element of a larger urban structure and the kinetic energy created by movement will be a vital stitch in the urban fabric.(fig.20)

The program of a transportation hub should not diminish the influence of a Central business district, but complement it. Euralille is dominated by both the infrastructure that defines it and the program that disperses the kinetic force. Within the space-time continuum exists a dynamic area where you are neither here nor there but in transit. These times provide unique opportunities because both origins and destinations have goals embedded in them the in between allows a certain freedom. This is the very reason that plazas are created adjacent to Transportation hubs. The population demands an area of collection that is dynamic. Here movement exists, but you can be either nearing your destination or just departing from your origin, which provides an interesting opportunity to reflect. In Art as Experience John Dewey addresses this issue of the journey. "Coleridge said of the reader of poetry is true in its way of all who are absorbed in their activities of mind and body: 'the reader should be carried forward, not merely or chiefly by the mechanical impulse of curiosity, not by a restless desire to arrive at the final solution, but by the pleasurable activity of the journey itself."



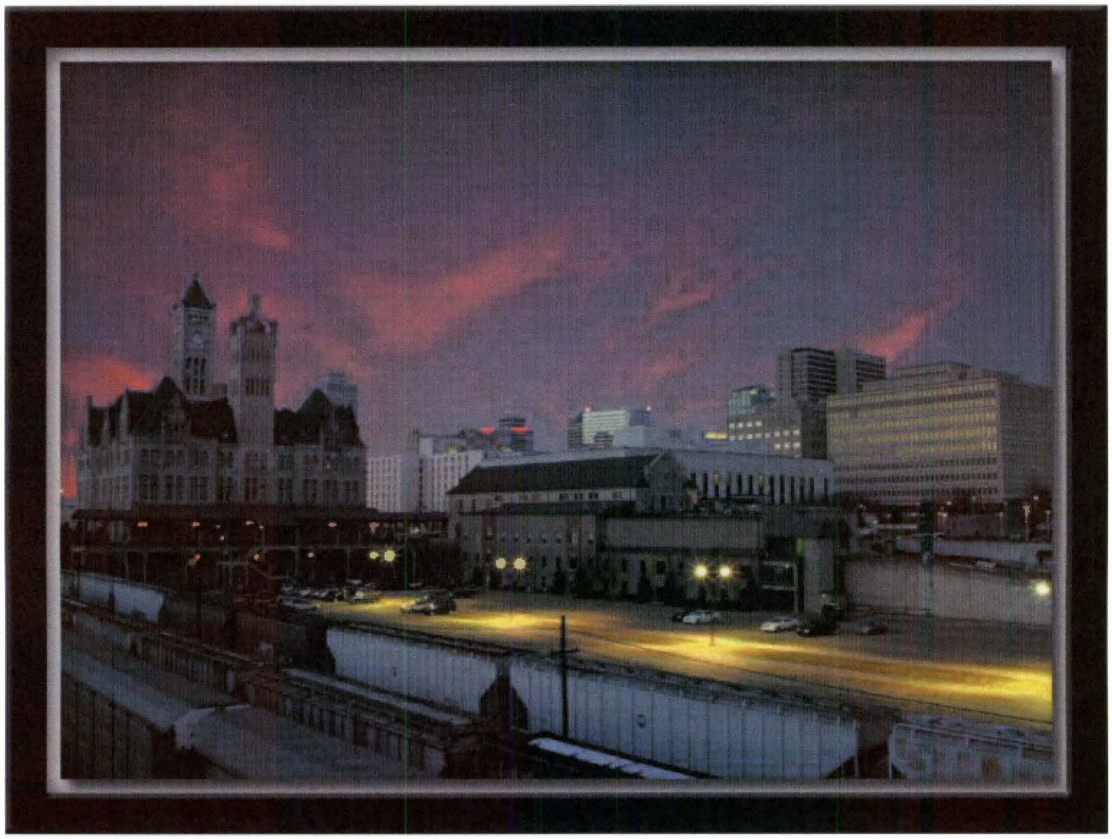
(fig.20 Diagram of Euralille.)Diagram reducing Euralille to its most basic element a wholly seperate elongated node along a transportation route with no reference to place.
Source: Rem Koolhaas

3. SITE SELECTION

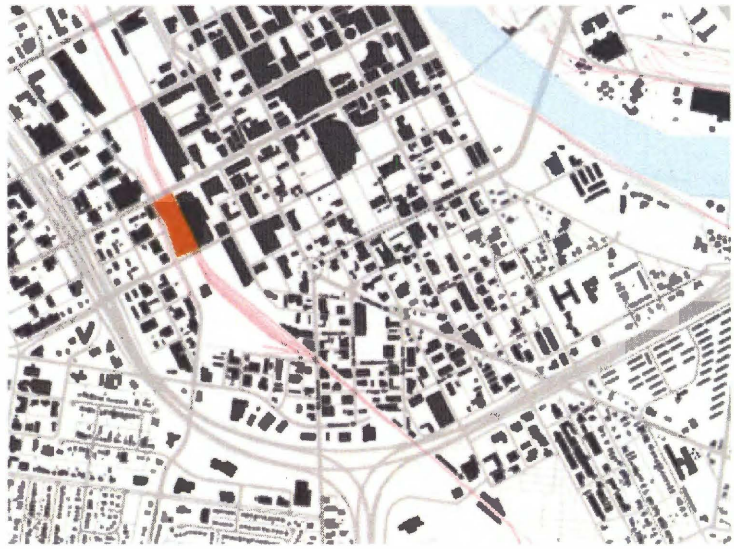
The Site:

At the Corner of Broadway and 10th Ave. South, Nashville' Historic Union Station remains as a Landmark Building and a Gateway into the city.(fig.21) Union Station was completed in 1900 and was a remarkable emblem of progress for Nashville. Although the building itself is an adaptation of the Allegheny County Courthouse designed by H.H. Richardson a decade earlier, the train shed that accommodated ten railroad cars at a time was the largest unsupported span yet erected in the United States. This innovative design illustrated the importance of Union Station as a catalyst for Nashville commerce. It was the Train Shed adjacent to Union Station, not the station house, which qualified the site for national historic status.

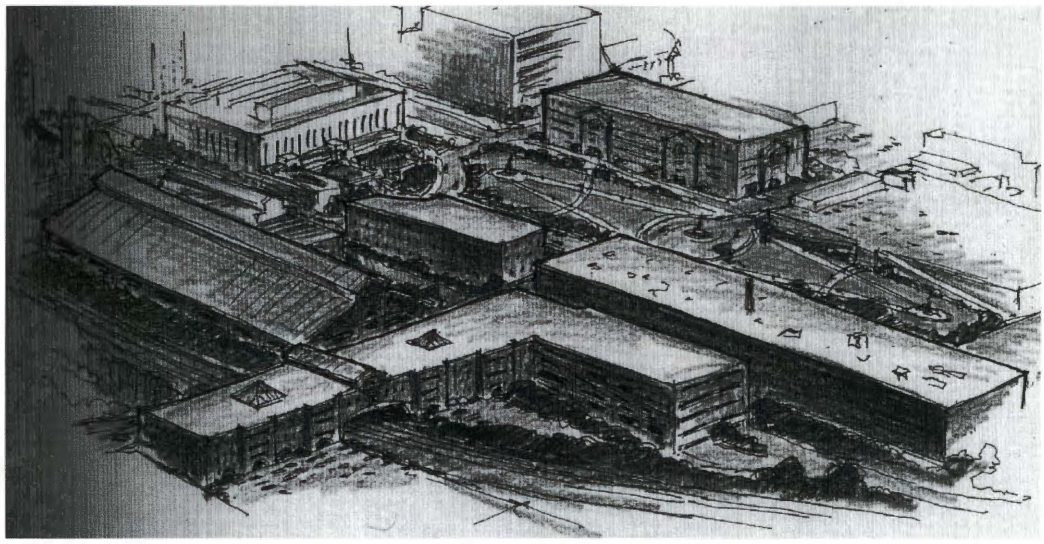
The shed has since been torn down and a parking lot now occupies the site. This area in a neighborhood called the "Gulch" will become a mixed-use area, defined by the transportation infrastructure that gives it energy.(fig. 22) I will propose a design that reflects the historic entry into the city and innovative construction techniques as a reference to the largest unsupported span in the razed train shed, as well as the addressing the potential of the "Gulch" as a unique neighborhood within the city fabric.(fig. 23,24,25)



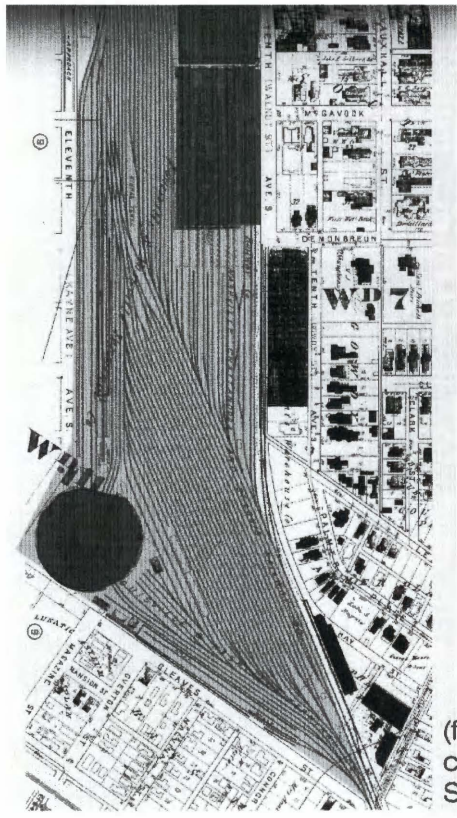
(fig. 21 Union Station at Night). Union Station built in 1900 was modeled after the Allegheny County courthouse in Pittsburgh, PA.
Source: Photo archives



(fig.22 Figure/Ground) The Orange color denotes the site adjacent to the existing Union Station. The site fits within the city fabric and marks an entry into the city.
Souce: author



(fig.23 Perspective of Proposed Building at Demonbreun Bridge) Perspective from the plan of Nashville proposing a new use for the site adjacent to Union Station with the Shed rebuilt as a Civic Space.
Source: Drawing by Frank Orr.





(fig.24 Lazy Susan for Train Cars) indicated by the circle on the older site plan.
Source: Plan of Nashville

(fig.25 Lazy Susan) indicated by the circle on the older site plan.
Source: Plan of Nashville

4. THE PROGRAM

Transportation Hub: will accommodate four of the five commuter trains planning to converge at the old Union Station site. The hub will also provide access to a light rail system, which will connect the first ring neighborhoods and the Downtown core. Finally, the hub will connect to both the Demonbreun Bridge and the Clement land port. Residential housing towers consisting of four eight story towers and one twelve story tower. Each tower has a footprint of approximately forty-eight feet. The towers will have a mixture of loft style accommodations and penthouse apartments to provide opportunities for a mixture of both lower and middle-income families, and individuals. Within the hub, there will be two small movie theaters, four restaurants, two bars, two cafe, a small grocery, and a bookstore.

Transportation Hub	
Approximate sqft.	40,000
Housing	
Approximate sqft.	20,000
Theaters	
Approximate sqft:	3,000
Restaurants	
Approximate sqft:	6,000
Bars	
Approximate sqft:	2,000
Cafe	
Approximate sqft:	2,000
Small Grocery	
Approximate sqft:	1,500
Bookstore	
Approximate sqft:	6,000

5. PRECEDENTS

Architecture Fused with Movement:

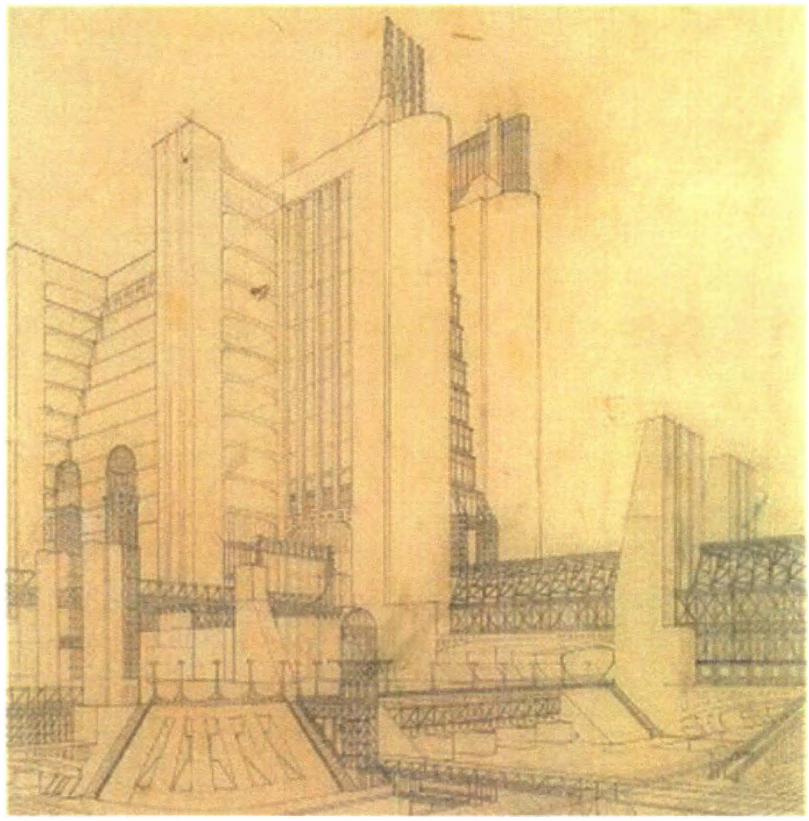
Antonio Sant' Elia's " Citta Nuovo" (Futurists):

Sant' Elia's studies of movement in architecture are a beautiful precedent to analyze when trying to fuse any building with transportation.(fig.26)

McCormick Campus center ,IIT, Chicago, ILL.

Rem Koolhaas and Helmut Jahn each designed buildings one underneath and one adjacent to the elevated train that severs the campus at IIT in Chicago's South side neighborhood. Both structures symbolize a rebirth of the campus and in conjunction create a strong street edge that addresses the campus masterplan as well as the kinetic energy of IIT. Koolhaas and Jahn use the elevated train as an integral element in each of their designs, but they develop the relationship to movement differently. An acoustic shell that reduces the noise of the elevated train emerges in the McCormick Campus center, designed by Koolhaas. In the image, you can see a student playing pool under a ribbed aluminum shell. Koolhaas's choice to reveal the shell increases the sense of movement in the building and gives it a dynamic connection to Downtown. The literal connection to the urban center also relates to Koolhaas' Euralille masterplan. The diverse amenities provided and the idea of an escape from academia through either a game pool or a trip into the city strengthens Koolhaas' building a successful hub.(fig.27,28,29,30)

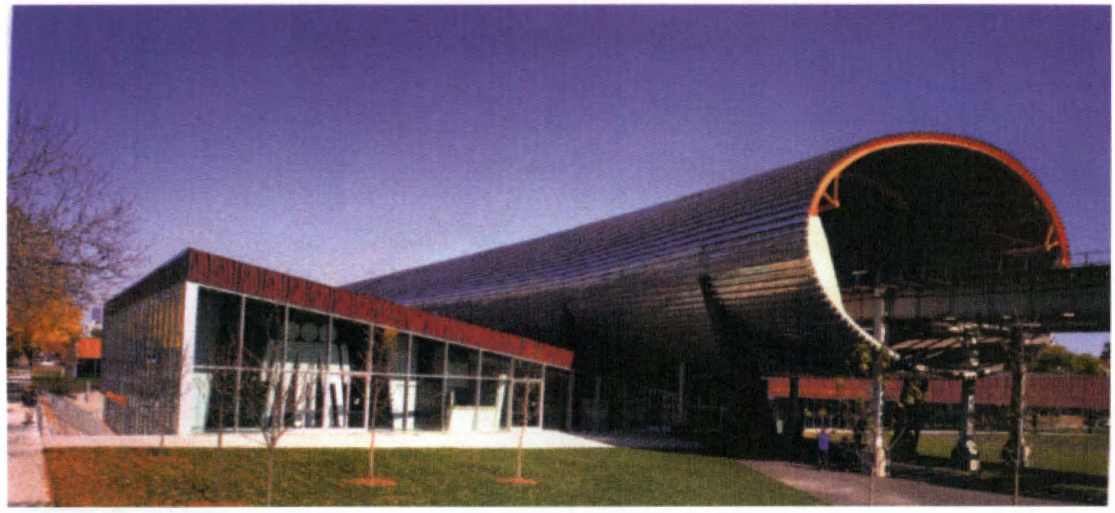
Helmut Jahns' dormitory is a long thin building bounded by the Elevated train on the east side and State street on the west. Directly to the north Koohaas' campus center sits below the train. Jahn chooses to make the two circulation routes boundaries for the dormitory using the circulation within the building as the noise buffer for the dorm rooms. The building is a series of solids and voids creating courtyard spaces with glazing buffering the train to the east. In conjunction, the two building



(fig.26 Citta Nuovo)
Source: Moffet



(fig. 27 McCormick Campus Center IIT
Chicago, Ill)
Source: Arch. Record



(fig.28 The Tube, Campus Hub)
IIT Campus Center
Source: Arch. Record



(fig.29 Helmut Jahn Dormitory)
IIT Campus Center
Source: Arch. Record



(fig.30 The Connection to Chicago)
Source: Arch Record

types work well as a live / recreate relationship and with the proximity to the elevated train, the two buildings are a good model for an urban hub.

Spans:

The train shed that was originally built adjacent to Union station had the largest unsupported span of any structure in the United States. As a reference to this design innovation, I am looking at innovative design solutions in current Transportation structures.

The Madrid Barajas Airport, Madrid, Spain,Richard Rogers Partnership and Lamela

Tapered steel tubular supports rise in Great Vs out of concrete piers set sixty feet apart to brace the roof over the departure level.(fig.31,32)

Cologne/ Bonn Airport, Cologne, German, Murphy/Jahn Architects

The building consists of a structural module of 70-by-70 foot steel trees supported a continuously folded roof plate with north-facing skylights. The roof consists of panels, so called cells, which are placed onto the folded plate with simple bolted connections and waterproof joint seals.(fig.33)

LF ONE, Weil an Rhein,Zaha Hadid

LF one acts as bridge linking the old and new parts of Town and in effect is a building conceived in order to encourage the flow of people. In response to the need to channel this human traffic ,the office of Zaha Hadid has created a building, which is organized around a bundle of pathways.(fig.34,35)

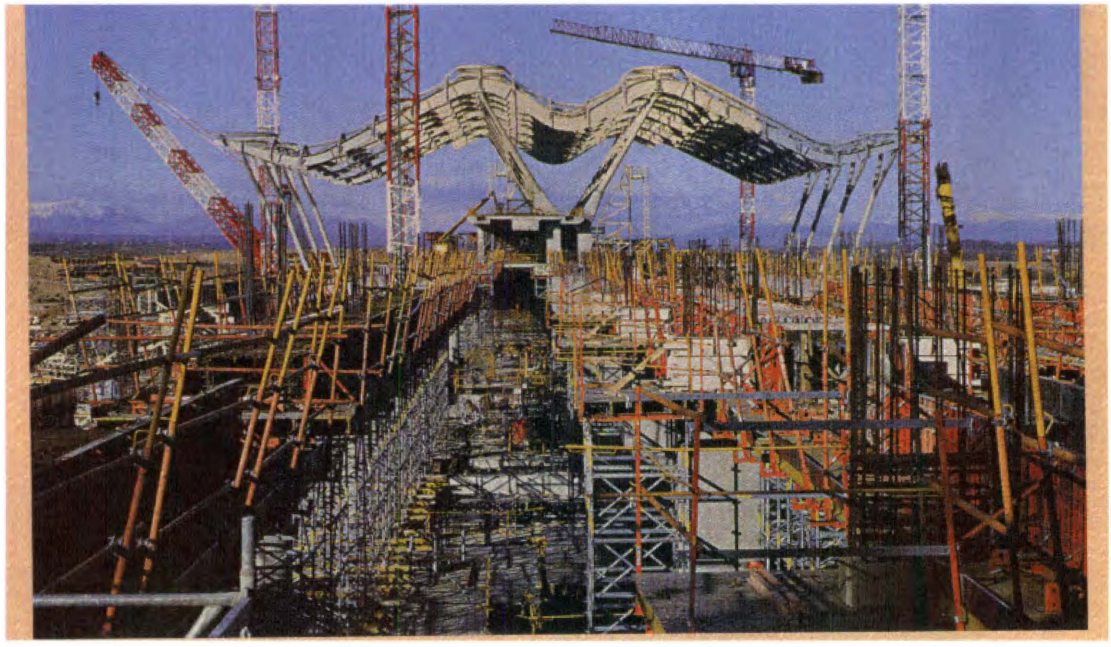
Pennsylvania Station, New York, New York

SOM

Called the most important public work undertaken in New York in more than a generation , the plan to convert the landmark Mckim , Mead



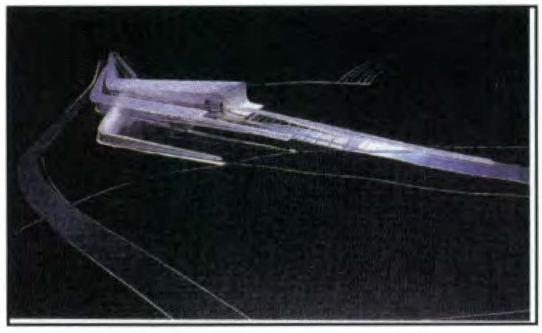
(fig.31 Madrid Barajas Airport)
Source: Arch. Record



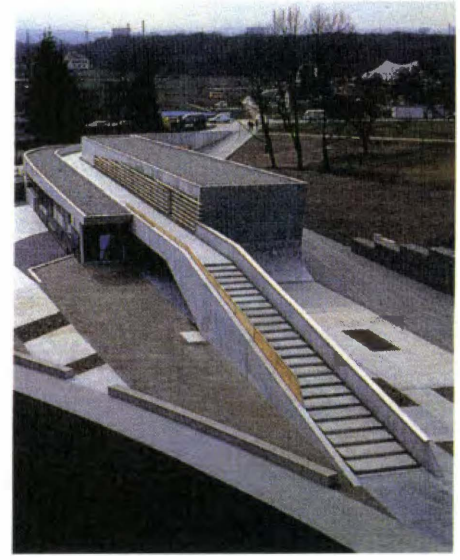
(fig.32 Tapered Steel Tubular Supports)
Source: Arch. Record



(fig.33 Folded Roof Plane)
Source: Arch. Record



(fig.34 LF One rendering)
Source: Breathing Cities



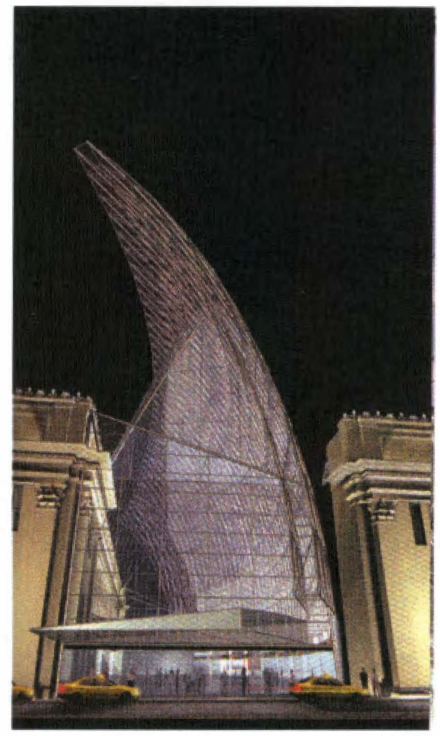
(fig.35 LF One)
Source: Breathing Cities

, and White Farley Post Office Building (one block west of the original station) into the new Pennsylvania Station will expand the facilities of the existing station while creating a far grander arrival and departure gate for the city of New York.(fig.36, 37)

Portland, OR: A Study in Urban Development

A Model for urban structuring that encourages the use of alternative modes of transportation.

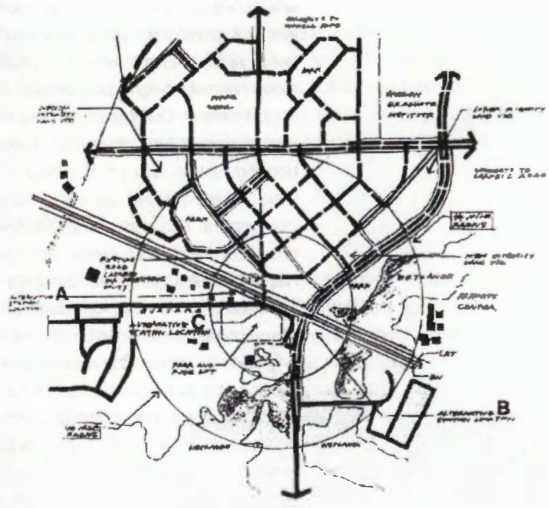
The growth and organization in this city shows the importance of looking into the future of American urban planning.(fig.38,39)



(fig.36 Pennsylvania Station)
Source: Arch. record

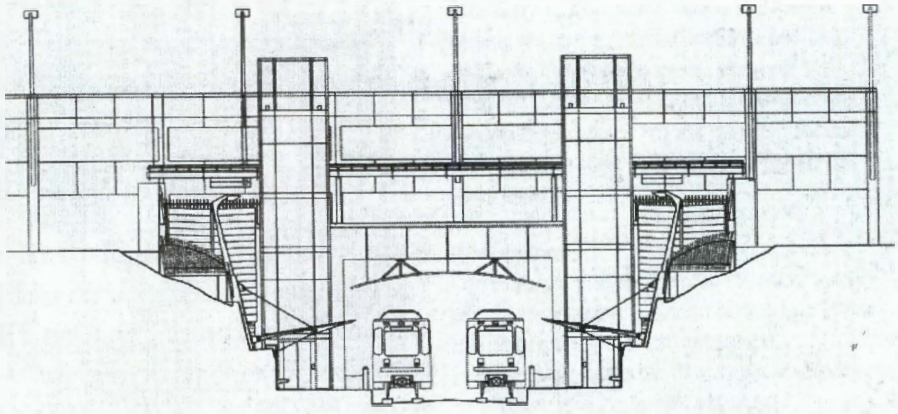


(fig.37 Pennsylvania Station at Night)
Source: Arch. record



7.17
Portland, Oregon. An example of a four-storeyed housing layout around a light rail station, planned at Hillsboro on the Westside Max line, intended to improve the walking catchment within a 400 m radius. Courtesy: Tri-Met.

(fig.38 Portland a City Study)
Source: Richards



2.13
Cross section through Transit Centre showing overhead glazed platform canopies integrated into the column supports, combined with lighting.

(fig.39 Portland Light Rail Station)
Source: Richards

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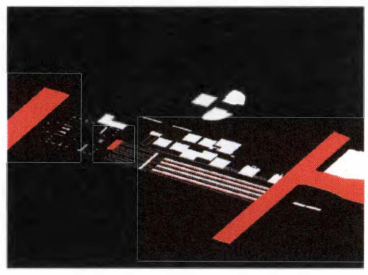
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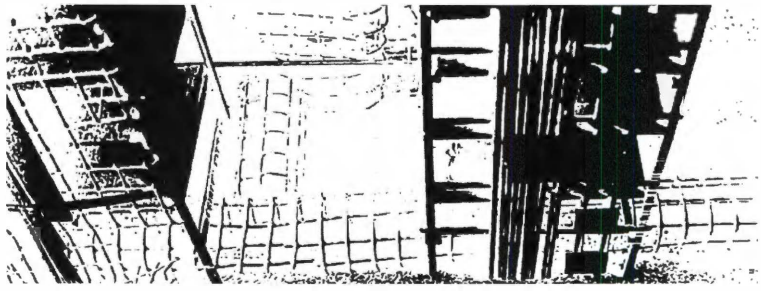
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APPENDIX: DESIGN

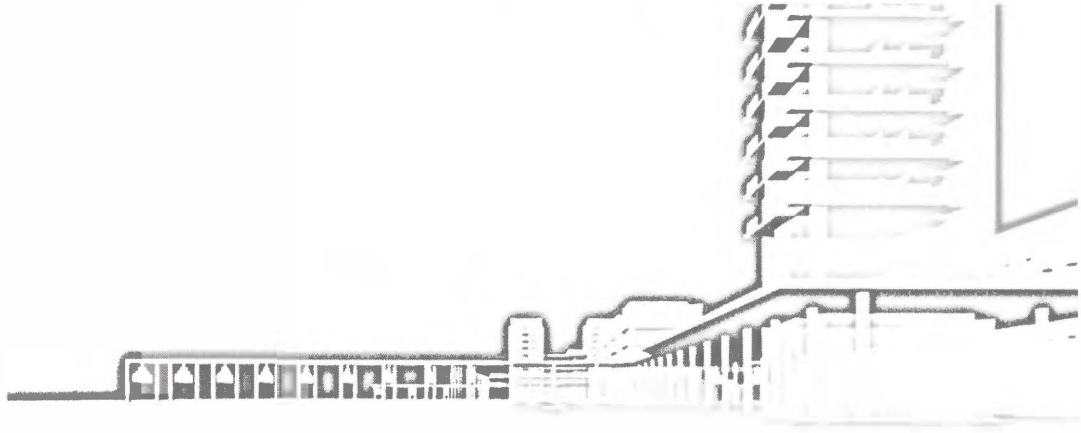


URBAN HUB: CLOSING THE SPACE TIME CONTINUUM

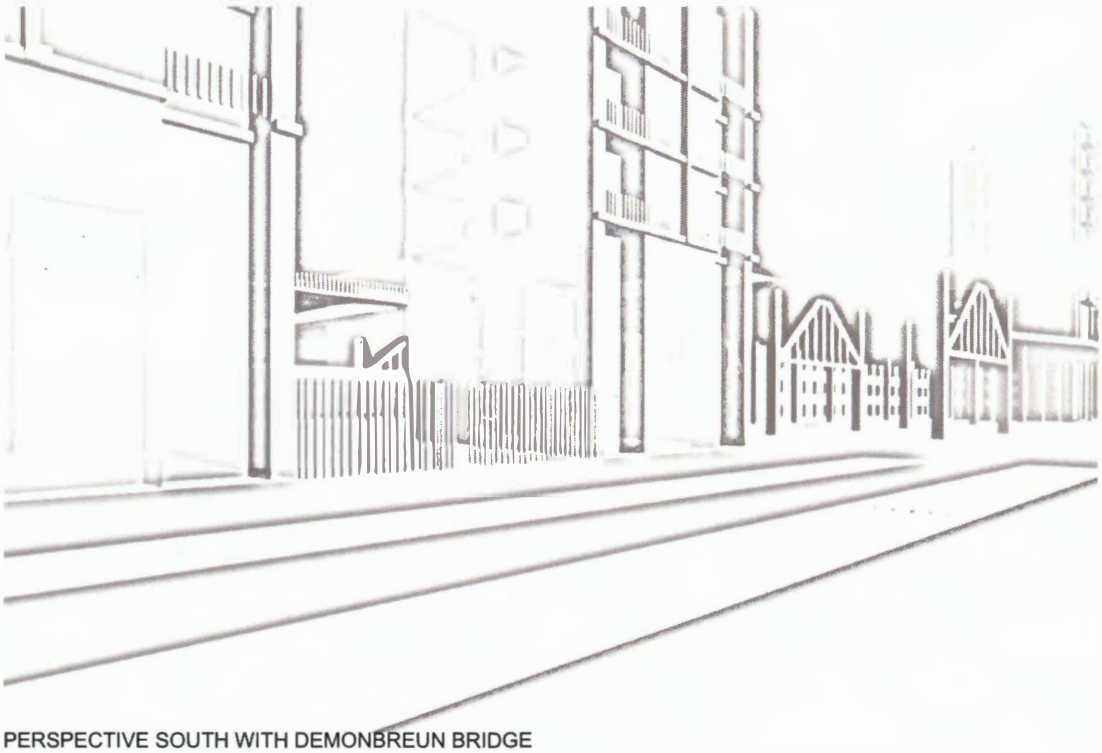
THE CITY WILL BREATHE



NASHVILLE, TN. HAS THE OPPORTUNITY TO CREATE A UNIQUE PLACE OF CONVERGEANCE AND TO CREATE A PLACE THAT BECOMES BOTH A CATALYST FOR GROWTH AND ACTS AS A FILTER INTO AND OUT OF THE CITY.



A-1: Title Page



PERSPECTIVE SOUTH WITH DEMONBREUN BRIDGE

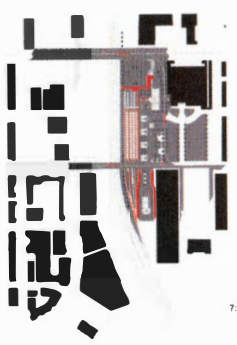


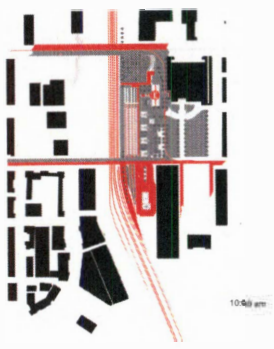
PERSPECTIVE FROM LANDPORT

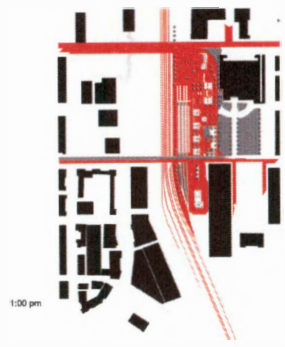


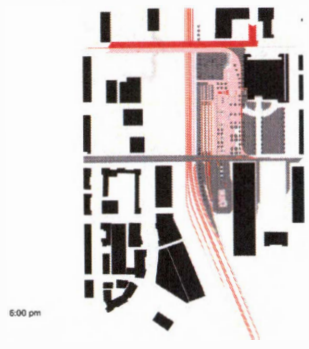
PERSPECTIVE FROM CUMMINS STATION

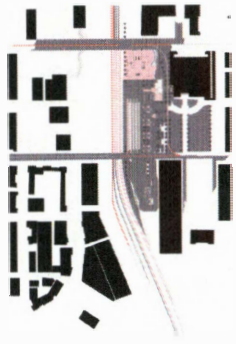
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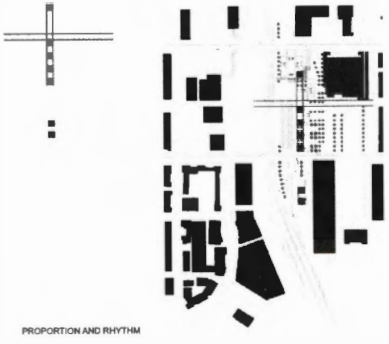

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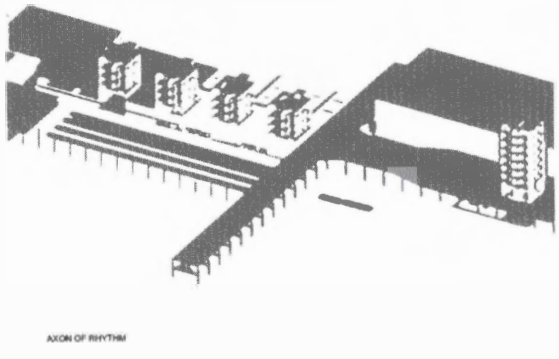

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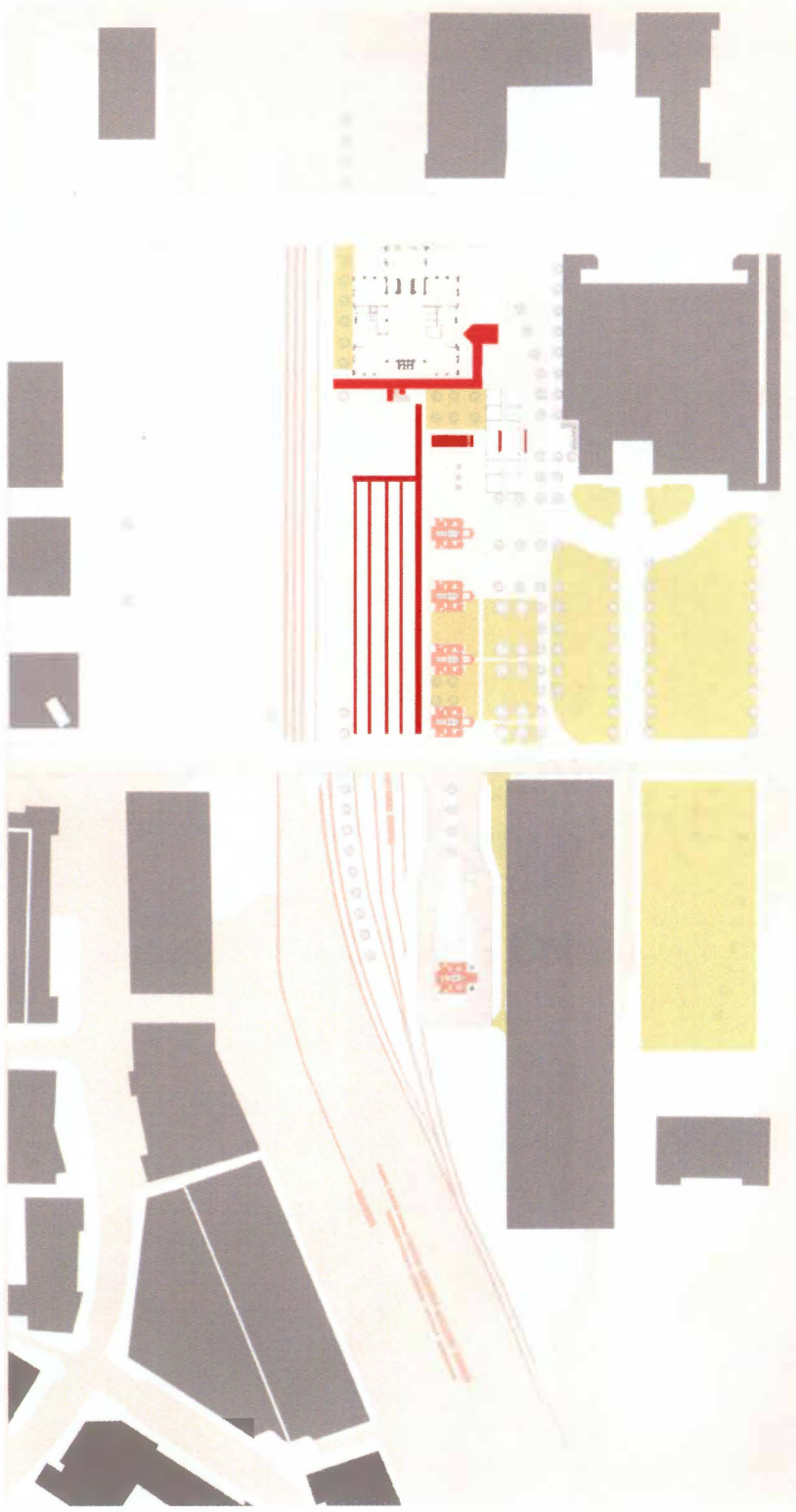

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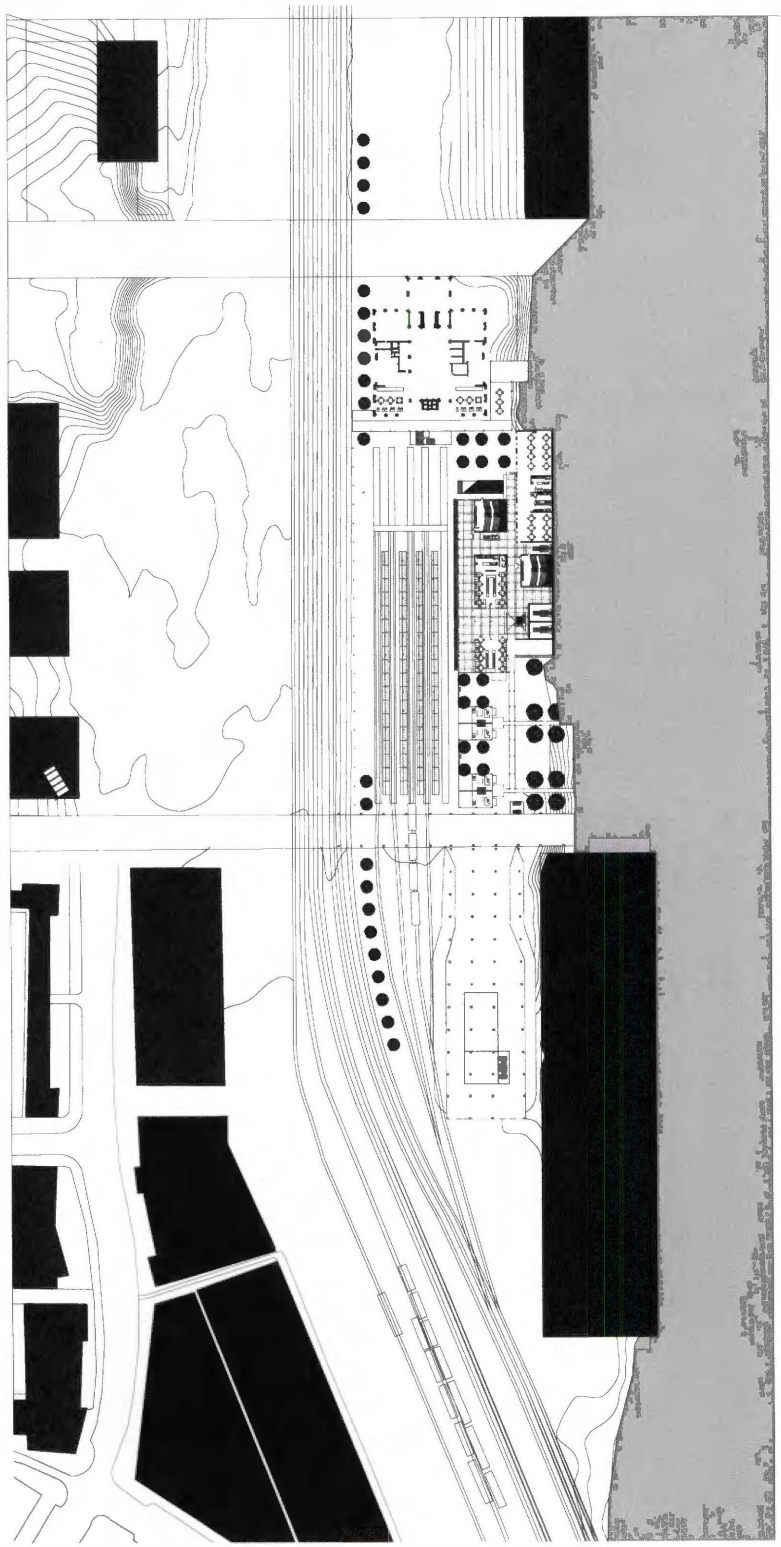

PROPORTION AND RHYTHM


AXON OF RHYTHM

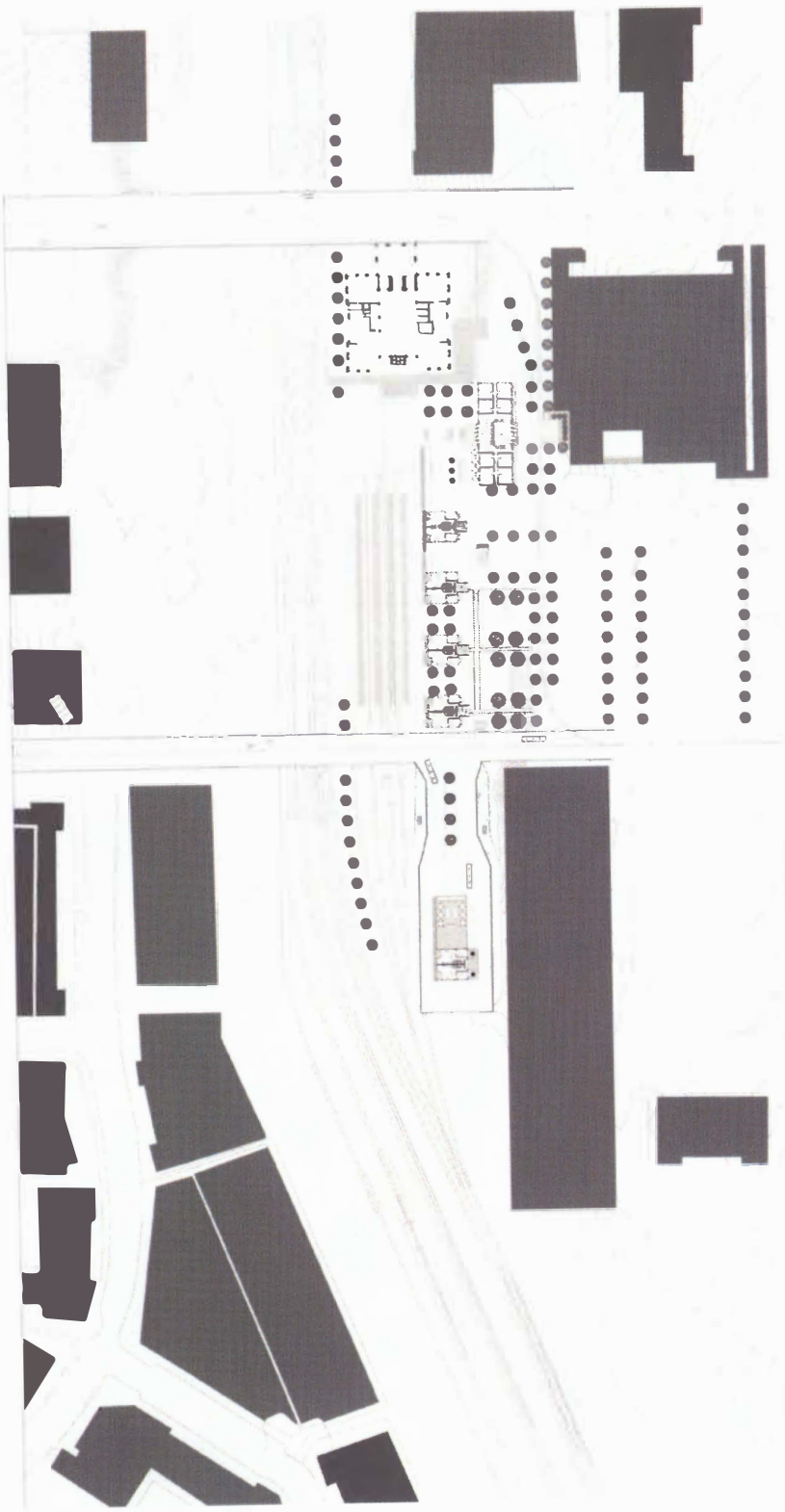
A-3: Diagrams



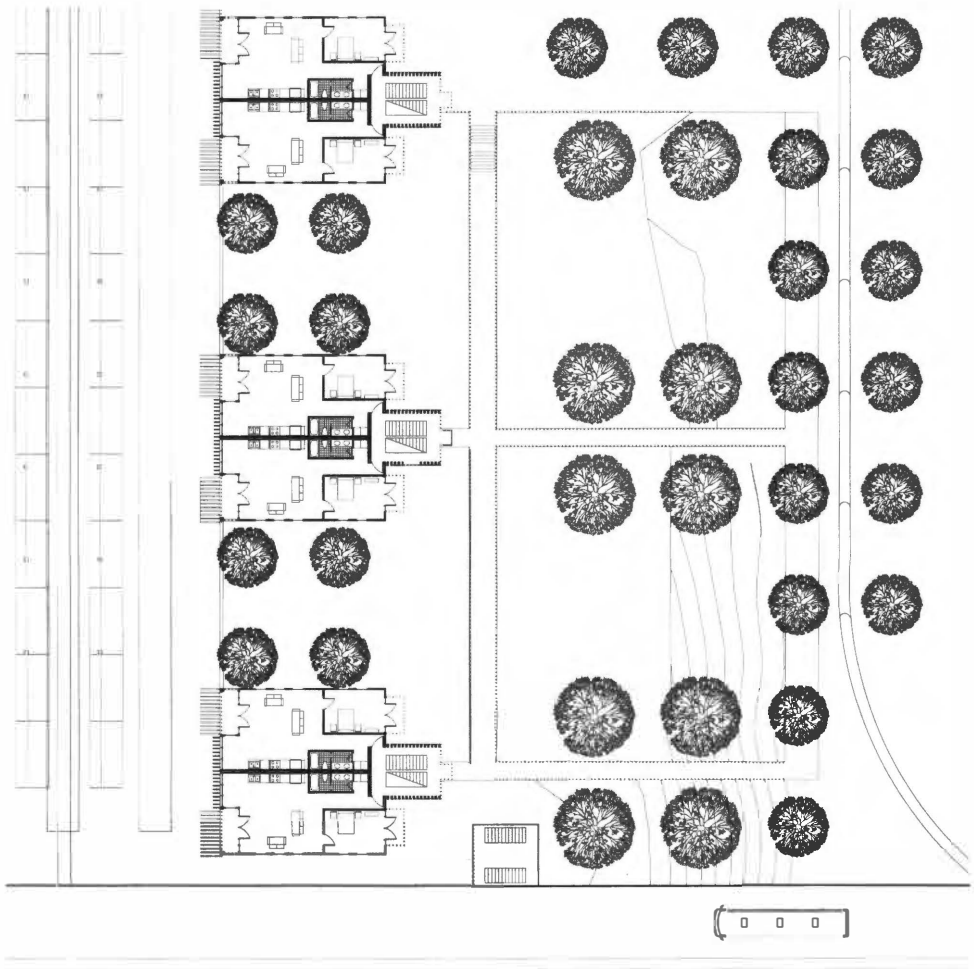
A-4: Site Diagram



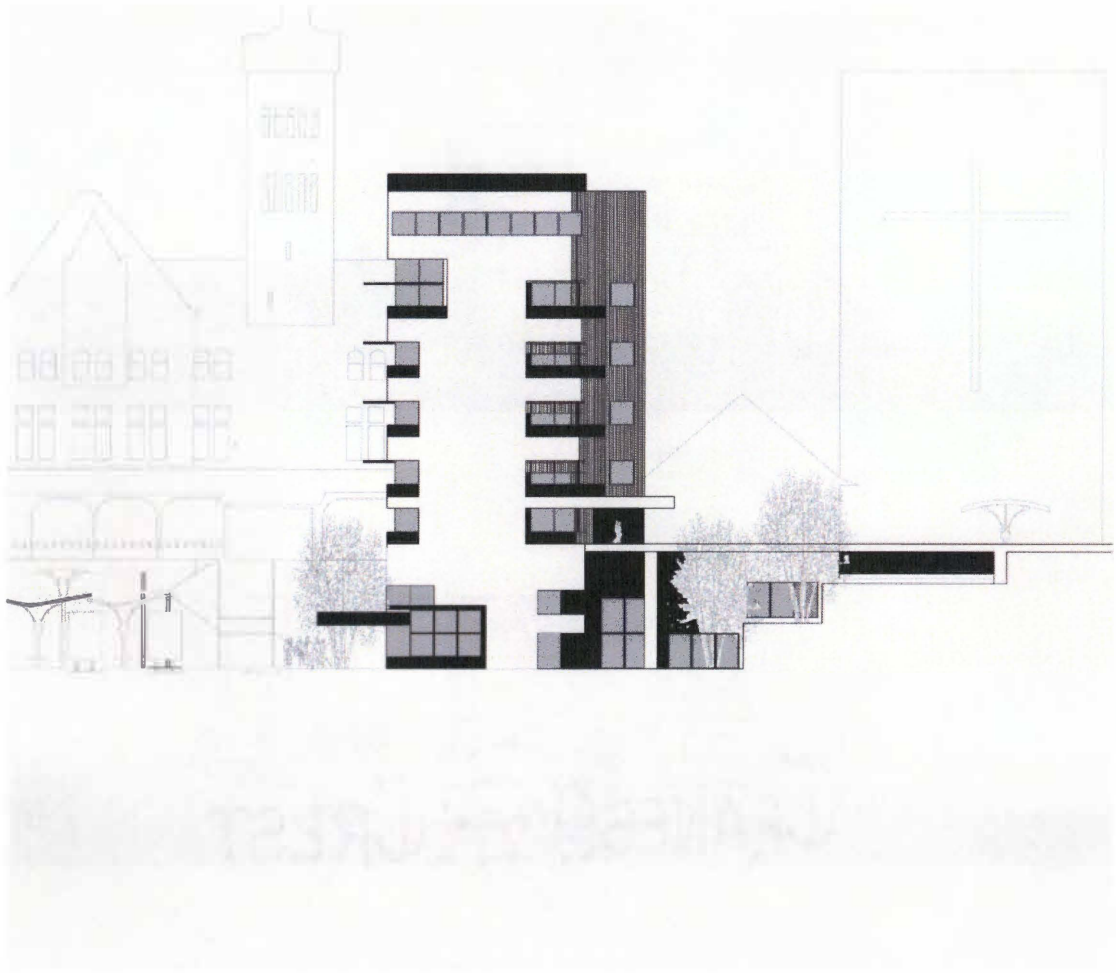
A-5: Ground Plan



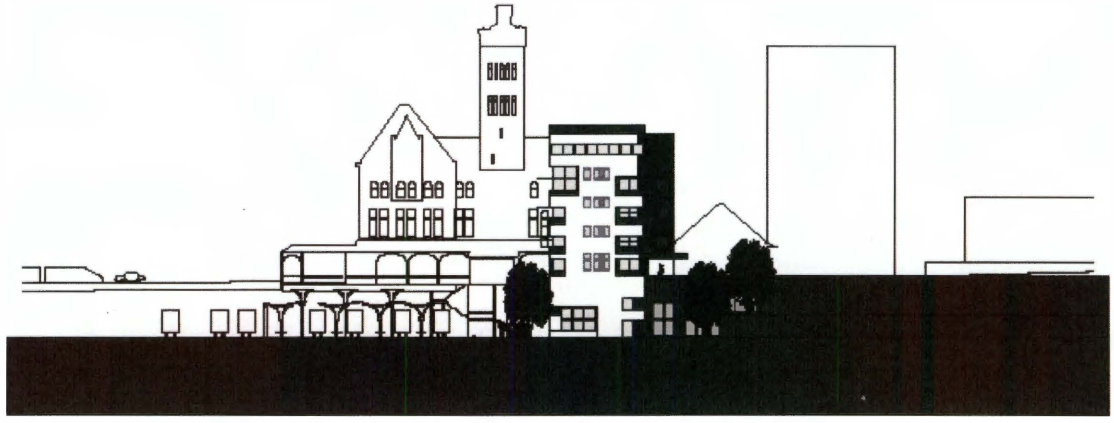
A-6: Upper Plan

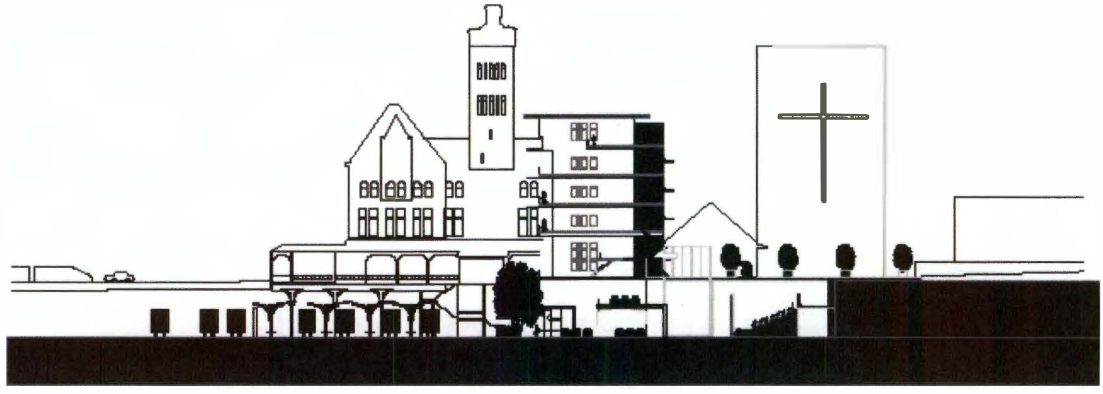


A-7: Plan Enlarged



A-8: Elevation South





A-9: Elevation and Section





A-10: Elevation and Section

APPENDIX:
CODES

16.24.380 Light.

A. Habitable Spaces. In residential occupancies, every habitable space shall have at least one window of approved size facing directly to the outdoors or to a court. The minimum total glazed area for every habitable space shall be eight percent of the floor area of such room. Wherever a wall or other obstructions face a window of a habitable space and such obstruction is located less than three feet from the window and extends to a level above that of the ceiling of the habitable space, such window shall not be deemed to face directly to the outdoors nor to a court and shall not be included as contributing to the required minimum total window area for the habitable space.

Exception: Where natural light for rooms or spaces without exterior glazing areas is provided through an adjoining room, the unobstructed opening to the adjoining room shall be at least eight percent of the floor area of the interior room or space, but not less than twenty-five square feet. The exterior glazing area shall be based on the total floor area being served.

B. Common Halls and Stairways. Every common hall and stairway in residential occupancies, other than in one- and two-family dwellings, shall be lighted at all times with at least a sixty watt standard incandescent light bulb for each two hundred square feet of floor area of said common hall or stairway, or equivalent illumination, provided that the spacing between lights shall not be greater than thirty feet. In other than residential occupancies, means of egress, including exterior means of egress stairways, shall be illuminated at all times with a minimum of one-foot candle at floors, landings, and treads.

C. Other Spaces. All other spaces in residential and nonresidential buildings and structures shall be provided with natural or artificial light sufficient to permit the maintenance of sanitary conditions, the safe occupancy thereof, and the safe utilization of the appliances, equipment, and fixtures. (Ord. BL2001-585 § 1 (part), 2001)

16.24.390 Ventilation.

A. Habitable Spaces. In dwelling units, every habitable space shall have at least one openable window. The total openable area of the window in every room shall be equal to at least forty-five percent of the minimum glazed area required in Section 16.24.380, above.

Exception: Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the unobstructed opening to the adjoining room shall be

at least eight percent of the floor area of the interior room or space, but not less than twenty-five square feet. The ventilation openings to the outdoors shall be based on a total floor area being ventilated.

B. Bathrooms and Toilet Rooms. Every bathroom and toilet room shall comply with the ventilation requirements for habitable spaces as required above, except that a window shall not be required in such spaces equipped with a mechanical ventilation system of sufficient capacity to provide at least one complete air change each six minutes. Air exhausted by a mechanical ventilation system from a bathroom or toilet room shall discharge to the outdoors and shall not be recirculated.

C. Cooking Facilities. Unless approved through the certificate of occupancy, cooking shall not be permitted in any rooming unit or dormitory unit, and a cooking facility or appliance shall not be permitted to be present in a rooming unit or dormitory unit.
Exception: Where specifically approved in writing by the director.

D. Process Ventilation. Where injurious, toxic, irritating or noxious fumes, gases, dusts, or mists are generated, a local exhaust ventilation system shall be provided to remove the contaminating agent at the source. Air shall be exhausted to the exterior and not be recirculated to any interior space.

E. Clothes Dryer Exhaust. Systems to manage exhaust from clothes dryers shall be independent of all other systems and shall be installed in accordance with the manufacturer's instructions. (Ord. BL2001-585 § 1 (part), 2001)

16.24.400 Occupancy limitations.

A. Privacy. Dwelling units, hotel units, rooming units, and dormitory units shall be arranged to provide privacy and be separate from other adjoining spaces.

B. Minimum Room Widths. A habitable space, other than a kitchen, shall not be less than seven feet in any plan dimension. Kitchens shall have a clear passageway of not less than three feet between counter fronts and appliances or counter fronts and walls.

C. Minimum Ceiling Heights. Habitable spaces, hallways, corridors, laundry areas, bathrooms, toilet rooms and habitable basement areas shall have a clear ceiling height of not less than seven feet.

Exceptions:
1. In one- and two-family dwellings, beams or girders spaced not less than four feet

on center and projecting not more than six inches below the required ceiling height.

2. Basement rooms in one-and two-family dwellings occupied exclusively for laundry, study, or recreation purposes, having a ceiling height of not less than six feet eight inches and not less than six feet four inches of clear height under beams, girders, ducts and similar obstructions.

3. Rooms occupied exclusively for sleeping, study or similar purposes and having a sloped ceiling over all or part of the room, with a clear ceiling height of at least seven feet over not less than one-half of the required minimum floor area. In calculating the floor area of such rooms, only those portions of the floor area with a clear ceiling height of five feet or more shall be included.

D. Bedroom Requirements. Every bedroom shall comply with the requirements of Sections 16.24.400(E) through 16.24.400(I).

E. Area for Sleeping Purposes. Every bedroom occupied by one person shall contain at least seventy square feet of floor area, and every bedroom occupied by more than one person shall contain at least fifty square feet of floor area for each occupant thereof.

> Access from Bedrooms. Bedrooms shall not constitute the only means of access to other bedrooms or habitable spaces and shall not serve as the only means of egress from other habitable spaces.
> Exception: Units that contain fewer than two bedrooms.

G. Water Closet Accessibility. Every bedroom shall have access to at least one water closet and one lavatory without passing through another bedroom. Every bedroom in a dwelling unit shall have access to at least one water closet and lavatory located in the same story as the bedroom or an adjacent story.

H. Prohibited Occupancy. Kitchens and nonhabitable spaces shall not be used for sleeping purposes.

I. Other Requirements. Bedrooms shall comply with the applicable provisions of this chapter including, but not limited to, the light, ventilation, room area, ceiling height and room width requirements; the plumbing facilities and water-heating facilities requirements; the heating facilities, electrical receptacle requirements; and the smoke detector and emergency escape requirements.

J. Overcrowding. Dwelling units shall not be occupied by more occupants than are

permitted by the minimum area requirements of Table 16.24.400.

a. See Section 16.24.400(L) for combined living room/dining room spaces.
b. See Section 16.24.400(K) for limitations on determining the minimum occupancy area for sleeping purposes.

K. Sleeping Area. The minimum occupancy area required by Table 16.24.400 shall not be included as a sleeping area in determining the minimum occupancy area for sleeping purposes. All sleeping areas shall comply with Section 16.24.400(D).

L. Combined Spaces. Combined living room and dining room spaces shall comply with the requirements of Table 16.24.400 if the total area is equal to that required for separate rooms and if the space is located so as to function as a combination living room and dining room.

M. Efficiency Unit. Nothing in this section shall prohibit an efficiency living unit from meeting the following requirements:

1. An efficiency living unit occupied by not more than two occupants shall have a clear floor area of not less than two hundred and twenty square feet. A unit occupied by three occupants shall have a clear floor area of not less than three hundred and twenty square feet. These required areas shall be exclusive of the areas required by subsections (M) (2) and (M) (3) of this section.

2. An efficiency living unit shall be provided with a kitchen sink, cooking appliance, and refrigeration facilities, each having a clear working space of not less than thirty inches in front. Light and ventilation shall be provided in conformance with this chapter.

3. An efficiency living unit shall be provided with a separate bathroom containing a water closet, lavatory, and bathtub or shower.

4. An efficiency living unit shall have a maximum number of occupants of three.

N. Food Preparation. All spaces to be occupied for food preparation purposes shall contain suitable space and equipment to store, prepare and serve foods in a sanitary manner. There shall be adequate facilities and services for the sanitary disposal of food wastes and refuse, including facilities for temporary storage. (Ord. BL2001-585 § 1 (part), 2001)

16.24.410 Plumbing fixtures and fixture requirements.

A. Dwelling Units. Every dwelling unit shall contain a bathtub or shower, lavatory, water closet, and kitchen sink which shall be maintained in a sanitary, safe working condition. The lavatory shall be placed in the same room as the water closet or be located in close proximity to the door leading directly into the room in which such water closet is located. A kitchen sink shall not be used as a substitute for the required lavatory.

B. Rooming Houses. At least one water closet, lavatory, and bathtub or shower shall be supplied for each four rooming units in a rooming house.

C. Hotel. Where private water closets, lavatories, and baths or showers are not provided, one water closet, one lavatory, and one bathtub or shower having access from a public hallway shall be provided for each ten occupants of any hotel.

D. Employee Facilities. A minimum of one water closet, one lavatory, and one drinking facility shall be available to employees. Drinking facilities shall be a drinking fountain, water cooler, bottled water cooler, or disposable cups next to a sink or water dispenser. Drinking facilities shall not be located in toilet rooms or bathrooms. (Ord. BL2001-585 § 1 (part), 2001)

16.24.420 Toilet rooms.

A. Privacy. Toilet rooms and bathrooms shall provide privacy and shall not constitute the only passageway to a hall, other space, or to the exterior. A door and interior locking device shall be provided for all common or shared bathrooms and toilet rooms in a multiple dwelling.

B. Location. Toilet rooms and bathrooms serving hotel units, rooming units, or dormitory units, shall have access by traversing not more than one flight of stairs and shall have access from a common hall or passageway.

C. Location of Employee Toilet Facilities. Toilet facilities for employee use shall have access from within the employees' regular working area. Required toilet facilities shall be located not more than one story above or below the employees' regular working area and the path of travel to such facilities shall not exceed a distance of five hundred feet. Employee facilities shall either be separate facilities or public customer facilities.

Exception: Facilities that are required for employees in storage structures or kiosks, which are located in adjacent structures under the same ownership, lease or control, shall not exceed a travel distance of five hundred feet from the employees' regular working area to the facilities. (Ord. BL2001-585 § 1 (part), 2001)

16.24.530 Fire safety requirements--Means of egress.

A. General. A safe, continuous, and unobstructed means of egress shall be provided from any point in a building or structure to the public way, in accordance with the requirements of the building code and fire code as adopted by the metropolitan government.

B. Emergency Escape and Rescue Openings. Basements with habitable rooms and every sleeping room shall have at least one openable emergency escape and rescue window or exterior door opening. Where openings are provided as a means of escape and rescue, they shall have a sill height of not more than forty-four inches. The net clear opening dimension required by this chapter shall be obtained by the normal operation of the window or door opening from the inside. Escape and rescue window openings with a sill height below the adjacent ground level shall be provided with an approved window well.

C. Minimum Net Clear Opening. All emergency escape and rescue openings shall have a minimum net clear opening of four square feet.

D. Minimum Net Clear Opening Height. All emergency escape and rescue openings shall have minimum net clear opening height twenty-four inches.

E. Minimum Net Clear Opening Width. All emergency escape and rescue openings shall have a minimum net clear opening width of twenty inches.

F. Operation. Required emergency escape and rescue openings shall be operational from the inside of the room or space without the use of keys or special tools, knowledge, or effort. Bars, grilles, grates, or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with the building code and such devices shall be releasable or removable from the inside without the use of a key, tool, or force greater than that which is required for normal operation of the escape and rescue opening. Where such bars, grilles, grates, or similar devices are installed in existing buildings, smoke detectors shall be installed in accordance with Section 16.24.550.

G. Aisles. The required width of aisles in accordance with the fire code shall be unobstructed.

H. Locked Doors. All means of egress doors shall be readily openable from the side from which egress is to be made without the need for keys, tools, or special knowledge or effort, except where the door hardware conforms to that permitted by the building

code. (Ord. BL2001-585 § 1 (part), 2001)

Zoning Codes

17.08.020 Zoning districts described.

D. Mixed-Use Districts. The purpose of all mixed-use districts is to provide for and encourage a mix of compatible land uses that provide opportunities to live, work and shop within compact areas. Included among the common goals for these districts is the efficient use of land capitalizing on a high level of services, reduced reliance on the automobile with enhanced usage of mass transit, strong pedestrian relationships, and creative opportunities for the economical preservation and adaptive reuse of existing structures, most notably those which contribute to the historic resources of the community. A mixture of residential, office, personal service and retail shopping opportunities is encouraged within all mixed-use districts with individual components complimenting and reinforcing other uses within the district. Owners are encouraged to plan and develop mixed-use projects capitalizing on the more flexible design opportunities offered by Article V of Chapter 17.40.
To effectively implement the mixed use policies of the general plan, a variety of mixed-use districts are provided that offer a range of permitted uses and intensities of development. The lowest intensity districts encourage development at intensities commensurate with nearby residential areas and local shopping services. The higher intensity mixed-use districts, being more permissive in the allowable intensity of development and the range of nonresidential uses, are intended to be located in areas characterized by excellent mass transit opportunities and high levels of support services....

3. MUG, Mixed-Use General District. The MUG district is intended to implement the moderately high intensity mixed use policies of the general plan, being appropriate near major concentrations of employment, commercial or institutional uses. This district also may be used near the central business district, within regional activity centers, or in areas otherwise policied for concentrations of mixed commercial development with high levels of accessibility, including public transit service. The bulk regulations are designed to encourage consolidation of land and large scale development on or near arterial streets.

17.12.030 Street setbacks.

A. Measurement. For single and two-family lots in the RS, R, MHP, AR2a and AG districts, the minimum building setback from a street shall be measured from a street right-of-way line. In all other districts, setbacks from streets shall be measured from the centerline of the travelway pavement.

B. Street Classifications. All street classifications are as established in the "Subdivision Regulations of the Metropolitan Government of Nashville and Davidson County" and the "Major Street Plan" as adopted by the metropolitan planning commission.

C. Street Setbacks.

1. The minimum setback of a structure from an adjacent street shall be established by the following tables according to the zoning of the property and the classification of the street.

2. When the rear setback of a corner lot is oriented towards the rear setback of a neighboring lot, the required street setback along the street common to those two lots may be reduced by fifty percent. A corner residential lot created by plat prior to the effective date of the ordinance codified in this chapter may reduce the required setback of Table 17.12.030A by fifty percent along that street running parallel with the side of the residential structure.

3. In residential areas with an established development pattern, the minimum required street setbacks for the R, RS and MHP districts shall be the average of the street setback of the lots immediately adjacent on either side of the lot, or the value provided in Table 3-D, whichever is greater. If the average setback is greater than the standard of Table 17.12.030A, the required setback shall not be more than twice that required by that table. When the adjacent lot is vacant, or the subject lot abuts a side street, the value provided in Table 17.12.030A shall be used for that side. In areas undergoing new subdivision development, the zoning administrator may apply the standards of Table 17.12.030A below. In the MUN and MUL districts, the average street setback of existing structures along the same block may be applied to new construction on that block if determined appropriate to maintain or reinforce an established form of character of development.

4. When a subdivision plat establishes a reservation of land for future right-of-way acquisition, the street setback shall be measured from the ultimate right-of-way line.
5. Double frontage lots are subject to the provisions of Section 17.24.060(B). Property abutting a street designated as a scenic arterial by the major street plan shall comply with the provisions of Section 17.24.070.

6. The front façade of a principal structure on a corner lot that has lot lines of unequal length abutting the streets shall be oriented to the shorter lot line, except where the Zoning Administrator determines that the longer lot line is more appropriate based on one or more of the following criteria:

a. The longer lot line of a lot zoned for office, mixed-use, commercial, or industrial use is located along an arterial street as shown on the adopted major street plan;

b. The proposed structure will contain multiple businesses with outside entrances;
c. The predominant character or pattern of adjoining development is or will be oriented to the street on which the longer lot line is located.

(1) Two-family dwellings with any parking proposed between the street line and the front edge of the residential structure shall provide a minimum street setback of thirty feet.
(2) Lots having vehicular access to these streets shall develop in a manner which avoids back-up movements into the public street.

Note 1: Properties abutting a street designated as a scenic arterial by the major street plan shall comply with the provisions of Section 17.24.070.
Note 2: In no event shall any street setback provisions permit a principal building to be constructed within an area designated for street improvements on a major street plan adopted subsequent to the effective date of this note.
Note 3: No street setbacks shall be required in the CC, CF and MUI districts.
Note 4: U=Urban Arterial, S=Scenic Arterial, OW=One Way Arterial (e.g., U2=two-lane urban arterial and S4=four-lane scenic arterial).

(Ord. 2002-1013 § 1, 2002; Amdt. 1 with Ord. 2002-1012 § 1, 2002; Ord. 2001-858 § 1, 2001; Ord. BL99-117 § 1 (part), 2000; Ord. 98-1268 § 1 (part), 1998)

17.16.050 Office uses.

(Refer to zoning district land use table)

B. General Office. A general office shall be limited to two thousand five hundred square feet of gross floor area per establishment.

C. Leasing/Sales Office. A leasing/sales office shall be limited to two thousand five hundred square feet of gross floor area per establishment. (Ord. 96-555 § 4.2(C),

1997)

17.16.120 Recreation and entertainment uses.

(Refer to zoning district land use table)

C. Park.

1. Location. Notwithstanding any other provision of the Metropolitan Code of Laws, no new park, as herein defined, shall henceforth be constructed within two thousand feet of the property line of any landfill or other waste disposal facility. (Amdt. 1 with Ord. BL2002-1273 § 7, 2003; Amdt. 1 (part) with Ord. 99-1644 § 1 (part), 1999; Ord. 98-1268 § 1 (part), 1998; Ord. 96-555 § 4.2(J), 1997)

VITA

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