VELO[city] Rethinking the Multi-Modal Urban Station

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VELO[city] Rethinking the Multi-Modal Urban Station: A Proposal for the Chicago Loop

by Amanda Dickson

Submitted to the Department of Architecture on January 17, 2003 in partial fulfillment of the requirements for the degree of Master of Architecture.

Thesis Supervisor: Ann Pendleton-Jullian
Title: Associate Professor, Department of Architecture

Train travel was once integral to the urban condition. Railway stations and rural depots were designed as machines for efficiency and it was within the station that one could escape the chaos of the city to become a part of the streamlined systematization of the industrial age. The terminal, it was thought, existed as an extension of the infrastructure of the railroad and as an integral part of the metropolitan corridor. As such, the architecture of the station resided within the two dimensional network ascribed to the city and to the Western and Midwestern landscape.

This thesis explores the amplification of a static rail station typology into a dynamic and multifaceted urban organism that is activated in its integration of multiple infrastructures operating at multiple speeds of travel-- from airplane to high-speed train to subway to bus to car to pedestrian. Its mediation of multiple notions of arrival and departure results in a public space highly charged with activity; it is a connector, a facilitator, a non-place.

The station program includes access to three underground subway lines (one proposed), on-grade bus connections, a secure high-speed airport train with baggage and ticket check-in, a portion of the pedestrian walkway which snakes underground through Chicago's loop, and a connection to the elevated rail. The exterior poche of the station building houses theaters and restaurants, shops, bars, and a hotel. Within this urban program hunkers a secure zone—waiting rooms and restaurants, newspaper kiosks and conference rooms linked hermetically to the secure airport connector train and ultimately to O'Hare Airport's gates.

Thank you, Ann Pendleton-Jullian, my professor, advisor, mentor and friend.

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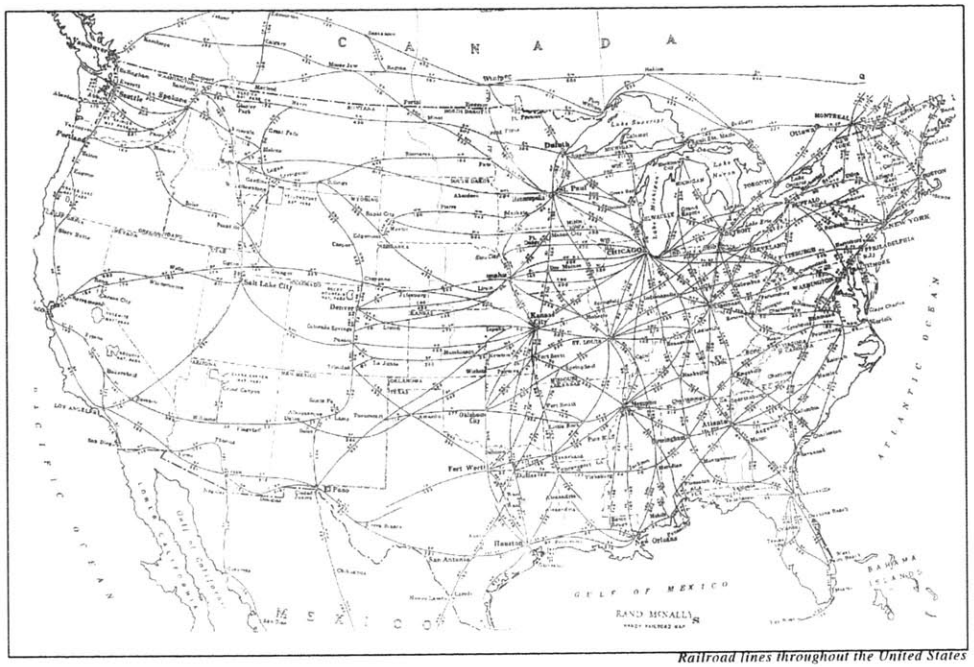


Railroad lines throughout the United States

Chicago as Western terminal to railroad operating south of the Great Lakes and Eastern terminal to western railroads: "Western road... were built from and Eastern ones to Chicago."

Train travel was once integral to the urban condition. Railway stations and rural depots were designed as machines for efficiency and it was within the station that one could not only escape the chaos of the city to become a part of the streamlined systematization of the industrial age, but also glean news and information straight from the telegraph wires. The terminal, it was thought, existed as an extension of the infrastructure of the railroad and as an integral part of the metropolitan corridor.[2] As such, the architecture of the station resided within the two dimensional network ascribed to the city and to the Western and Midwestern landscape.

Within the terminal one encountered city and country folk alike, each intrigued by the other's strange clothes and unfamiliar ways. Within the rural depot one had access to important news and information transmitted over the telegraph wires, linking them directly to the city. Likewise, city-dwellers saw the urban terminal as a portal to the vast and unfamiliar landscape beyond the city. With a decline in train travel after World War II, the station building began to lose its importance within the urban framework. Today many stations stand in disrepair or have been demolished to make way for tenants who will bring money to the city.

The Chicago and North Western Terminal was opened in 1911 and was built with the newest technological innovations in switching and signaling systems. It was designed for maximum efficiency and was able to handle as many as 250,000 passengers and 500 trains per day. On average, however, North Western Station saw approximately 60 passenger trains per day, and was mostly used as a commuter station, providing access

to the burgeoning suburban communities along the North Shore toward Evanston, Waukegan, and Kenosha, or northwest toward Jefferson Park, DesPlaines, Crystal Lake, and beyond.

The exploration and opening up of the American West began to define American social space according to Thomas Jefferson's democratic principles of property division. For Jefferson, a rectangular survey system was the means by which the moral and social goals of a new nation could be achieved. "Opening American space in equally sized parcels, at an affordable price, to individual farmers appeared the precondition for a stable and open democracy."[3]

According to the Land Ordinance Act of 1785, land was divided into square townships six miles on a side, producing 36 square sections of 640 acres each (1 mi2). Grid lines were drawn following the compass, running North/South and East/West deep into the heart of the vast country, overlaying rational (and somewhat arbitrary) geometry over the irregular natural landscape. The grid, overtly democratic, "is the landscape measure of America's commitment to life, liberty and the pursuit of happiness, distributing power equally across space."[4] The translation of these formal principles from the urban settlement in Philadelphia to the agrarian West established a pattern that would pervade the nation's attitude toward its landscape.

Figures 2a, b and c 1920s Advertising for Chicago's Elevated Line

Figures 3a, b and c 1920s Advertising for Chicago's Elevated Line

Following these precise and rectilinear paths carved into the American landscape railroad lines were drawn, and with them telegraph wires, charging through the pristine nature with the force of the steam engine. The railroad's infrastructure had its own sort of beauty, representative of the nation's progress and technological innovation, and politicians like Daniel Webster saw to it that American citizens dismiss their prejudices about the often loud and disruptive machines traversing their land. In a speech given at the opening of the Northern Railroad in Lebanon, New Hampshire in 1847, Webster proclaims, sarcastically sympathetic:

> [The railroad] injures the look of the fields. But I have observed, fellow citizens, that railroad directors and railroad projectors are no enthusiastic lovers of landscape beauty; a handsome field or lawn, beautiful copses, and all the gorgeousness of forest scenery, pass for little in their eyes. Their business is to cut and slash, to level or deface a finely rounded field, and fill up beautifully winding valleys. they are quite utilitarian in their creed and in their practice. Their business is to make a good road. They look upon a well-constructed embankment as an agreeable work of art; they behold with delight a long, deep cut through the hard pan and rock, such as we have just passed; and if they can find a fair reason to run a tunnel under a deep mountain they are half in raptures. To be serious, Gentlemen....[5]

Landscape as theater

"Train passengers had less and less need to interact physically with landscapes through which they were passing. They became spectators who could enjoy watching the world

go by instead of working their way across it on foot and horseback."[6] For this reason, train travel provided a compelling cinematographic vision of the built environment. The landscape was seen as a continuously complacent foil for the action taking place on board. In films such as *Murder on the Orient Express* (1974), *North by Northwest* (1959), and *The Untouchables* (1987) life aboard the train was depicted as rogue, anonymous, and often illicit. The station was the scene of shoot-outs, covert meetings, and questionable deals. The metropolitan corridor was a distinctive environment beyond the urban, suburban or rural, and its anonymity was incredibly attractive.

As the novelty of rail travel wore off, and American towns moved further into the heart of the country, the landscape of the metropolitan corridor became interesting for another reason. Rapid travel across space increased the value of time, and decreased the cost of distance. One's relationship with the landscape became inextricably linked to the speed at which one moves through it, and to the frame through which one views it.

Figures 4a, b and c Grids in the landscape, U.S.A.

Figure 5 Rail networks

Each mode of transportation provides its rider with a unique understanding of the space through which one passes. The ways in which a plane, train, subway car, bus etc. touches hovers, embeds or penetrates the landscape, and the ways in which it rises, emerges, engages, grounds or permeates from it all contribute to the interpretation of that landscape. Space perception is altered depending on the speed of travel (for those who learned to drive with a 55 mph speed limit, places seem much farther away than they do to those who learned to drive with a 75 mph limit, for example.)[7]

The space-time continuum: Poet Alexander Pope coined the phrase (which has been used almost exclusively within the lexicon of progress) with the lines:

> *Ye Gods! Annihilate but space and time*
> *And make two lovers happy.*[8]

The technical innovations which put the first trains in operation transformed man's relationship with space and time, and for the first time, he was made to reconcile his understanding of these two concepts. Herman Melville addresses this phenomenon in his Moby Dick, of 1851:

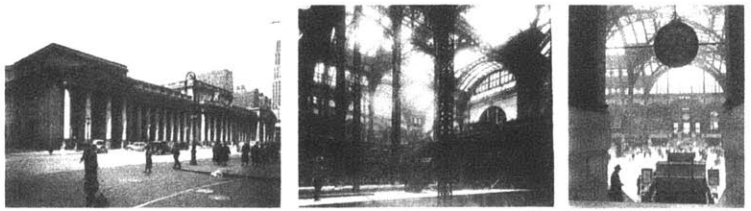
Steam is annihilating space.... Travelling [sic] is changed from an isolated pilgrimage to a kind of triumphal procession.... Caravans of voyagers are now winding as it were, on the wings of the wind, round the habitable globe. Here they glide over cultivated acres on rods of iron and there they rise and fall on the bosom of the deep, leaving behind them a foaming wheel-track like the chariot-path of a sea-god....[9]

figure 6, elevated train, Chicago

Aboard a train, one's understanding of time is as a linear spatial continuum; on a plane, time seems to have become compressed, as no reference point is available, and 'space' is limited to nodal points. Car travel demonstrates the expansion of the space-time continuum, as the interstate often weaves its way through every small town on the map. With air travel as cheap as it has become, flying has become the nation's preferred mode of travel. As a result, Americans subscribe to a predominately node-based way of thinking about time and space. The design of airports or stations as nodal points, disconnected from the surrounding landscape, predominates transportation architecture today, especially in the United States. Europeans, on the other hand, have more experience with rail travel as distances between places are significantly smaller, subscribe to a primarily line-based way of thinking about time and space. Their cities, as a result are more vibrant, dynamic and effective.

The architecture of infrastructure has major potential to transform urban space. Relocating and reprogramming the architecture of infrastructure so that it becomes an integral part of the city's fabric promotes urban density and connectivity. It is in the station that one's impression of place begins to be formulated. The image of the city becomes dependent, then, on the architecture of the infrastructure.

1. William Cronon, *Nature's metropolis: Chicago and the Great West* (New York : W.W. Norton, 1991), 90.
2. John R Stilgoe, *Metropolitan Corridor* (New Haven: Yale University Press, 1983).
3. James Corner and Alex MacLean, *Taking Measures Across the American Landscape* (New Haven, 1996), 8.
4. Ibid.
5. Leo Marx, *The Machine in the Garden* (New York, 1964), 212.
6.
7. John R. Stilgoe *Class lecture GSD 4105* (Cambridge, October 8 2002).
8. Marx, 194.
9. Marx, 196.



figures 1a, b and c Pennsylvania Station, New York, N.Y., circa 1909

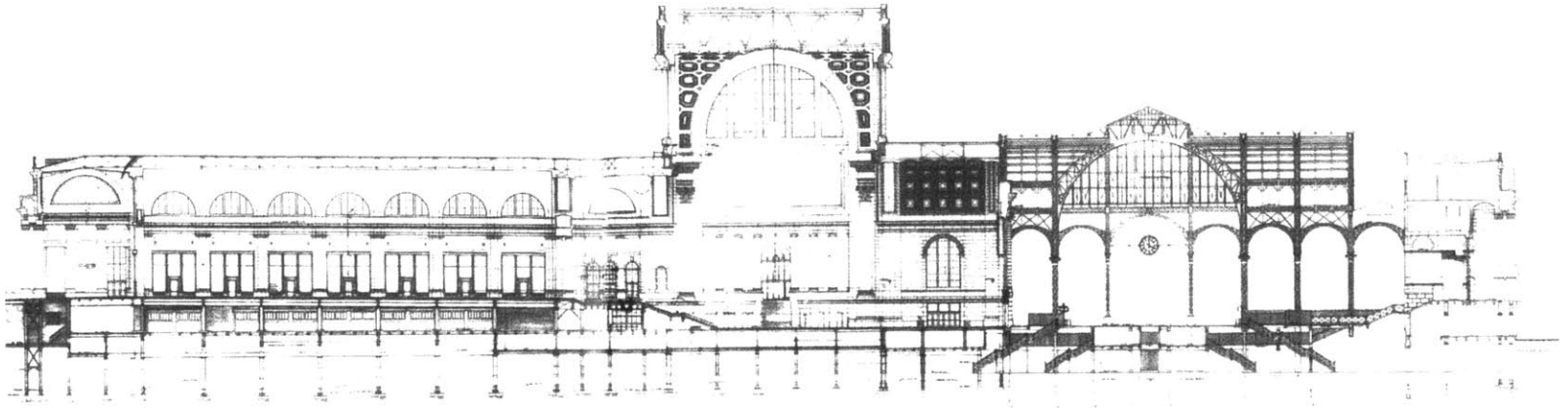
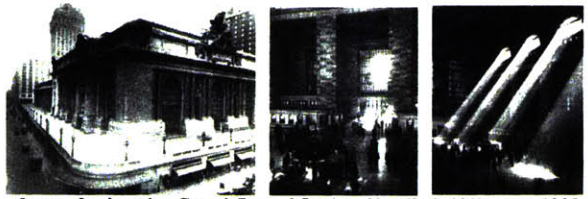


figure 2 section drawing Pennsylvania Station, New York, N.Y.

"Grand Central station stands at the true heart of Manhattan. It exemplifies the ideals and aspirations of a great American city consciously emerging as a world metropolic in the decade before the first world war. Without Grand Central. there would be no Rockefeller Center. The Terminal has, of course, shaped the destiny of Manhattan, but it is equally the foundation of a positive and optimistic urban philosophy which is one of New York's greatest contributions to twentieth-century life. Splendid and conspicuous as it is, Grand Central is more than a building: it is not just a civic monument, but the central component of a humane exercise in urban planning which seta new standard for New York and every other great city, Romantic, extravagant, gargantuan-- overblown, even-- as Grand Central seems to late twentieth century sensibilities, it embodies a practical but progressive vision of urban life which has new relevence in the aftermath of the Modern Movement."[1]



figures 3a, b and c Grand Central Station, New York, N.Y., circa 1930

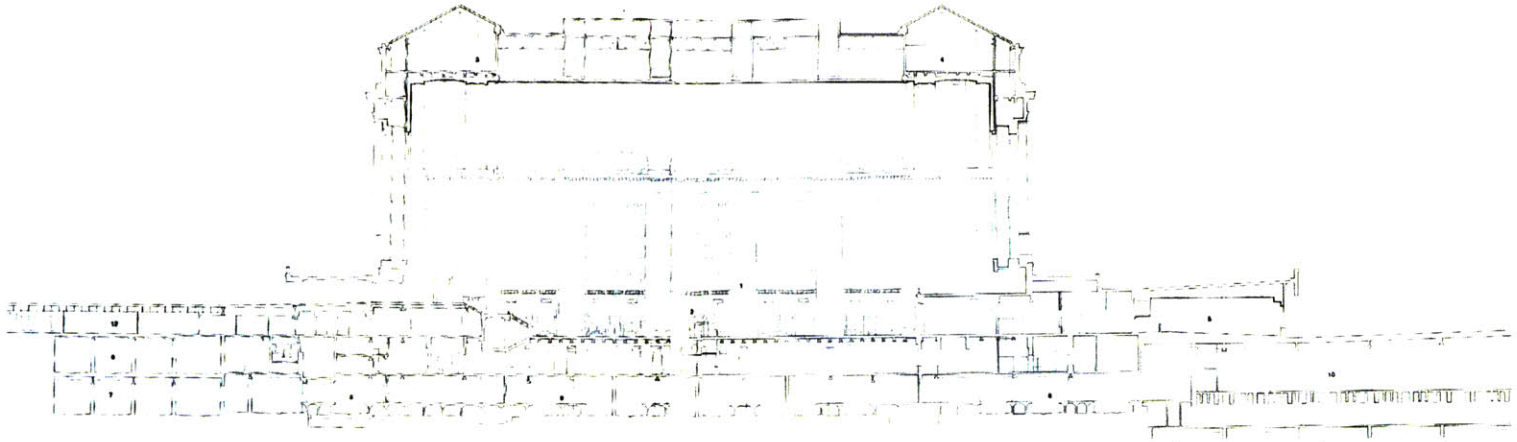
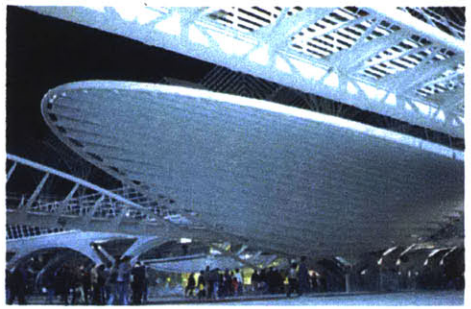
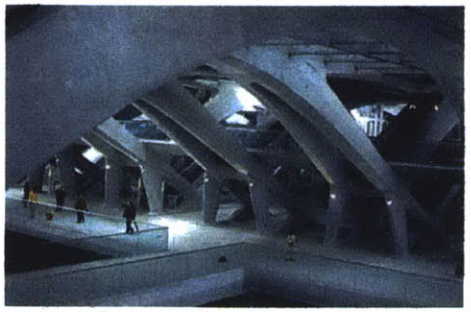
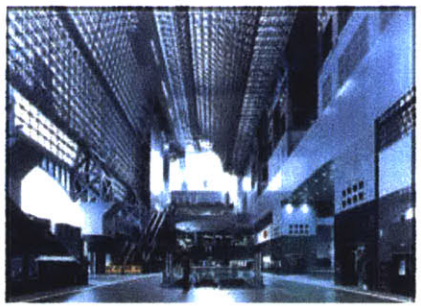


figure 4 section drawing Grand Central Station, New York, N.Y.





figures 7a and b Santiago Calatrava's Oriente Station, Lisbon



figures 8a and b Kyoto Station

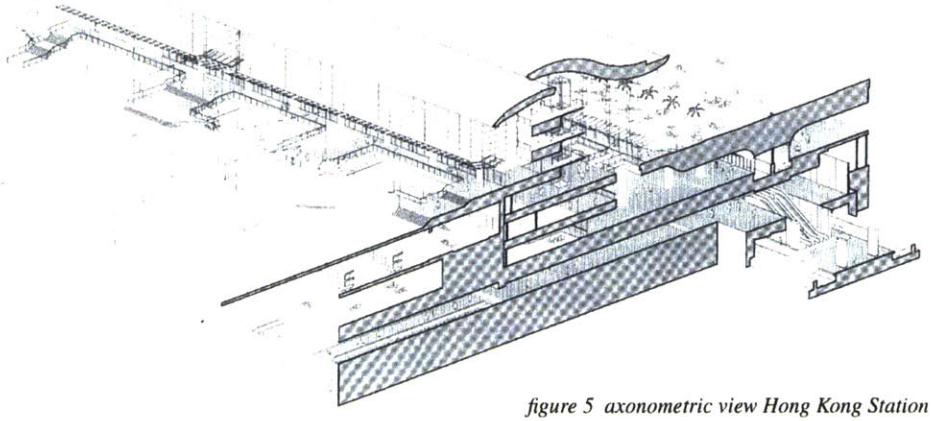
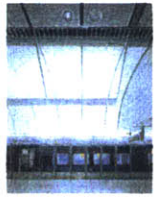


figure 5 axonometric view Hong Kong Station



figures 6a and b Hong Kong Station

Figure 9 Piranesi drawing

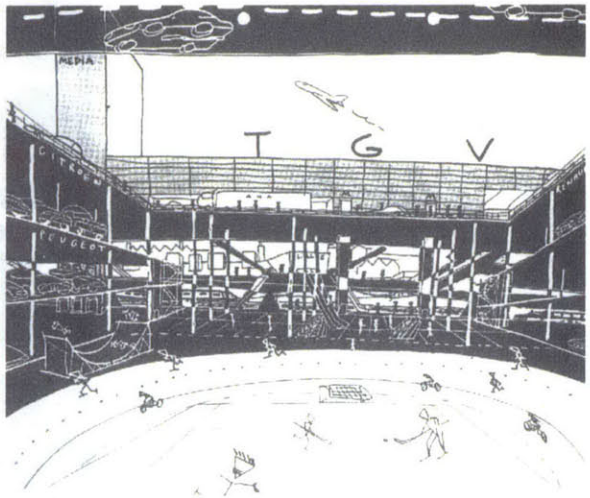


Figure 10 OMA's Espace piranasien at Euralille: most infratructurally complex part of project revealed

"OMA's only architectural intervention in the central sector (at Euralille) was not an addition but a subtraction: at the point of greatest infrastructural density, an absence of building reveals the highway, railway, three levels of parking, and the metro, which dives underneath the whole complex, in one overtly metropolitan moment -- Espace Piranesien."[2]

figures 11a-u early station types

figures 11v, x and early station types

The train shed: a typology challenged

The evolution of the station typology from a one-sided depot to a stub-end combination terminal paralleled an increasing understanding of the station as a gateway. Often the architecture of early stations and depots, though intricately connected on a social level to the communities for which they were built, were context-unspecific. They were kit-of-parts assemblages made-to-order. On the other hand, those that were built into the context, usually abutting Main Street, were often urbanistically more successful public gathering spaces, and were the focal point of their towns.

The architecture of recent urban stations has defined the vocabulary of its forms with metaphors for speed and efficiency, often prioritizing structural feat over architectural space-making. This has resulted in some very beautiful buildings, though they lack connection to the urban fabric. Such a connection could potentially transform the typology of the station which, since its early evolution has changed little.

The station has become multi-modal and multi-layered, and contains multiple program types. It is once again a place where we can conduct business, share a meal with friends, and see a show.... This thesis project challenges the old station typology, and examines the current needs of a multi-modal urban station. It denies the need for horizontality,

virtually impossible in a dense urban environment and introduces instead a vertically layered space. With the invention of electrically powered trains, stations no longer needed long, exterior platform/shed space. Trains could approach the station via tunnels dug into the earth, and the station was built atop these tunnels. We have, however, maintained the station typology: the large, open barrel-vaulted concourse space is a translation of the multiple barrel vaults covering the passenger platforms.

The architecture of the station is not the architecture of the metropolitan corridor. If it is to be a dynamically active public space, the station requires both density and programmatically contextual complexity. Although trains are used less frequently than airplanes, there is tremendous potential for stations to transform many downtown areas. As trains (and wires) have become embedded in our landscapes, and only traces of them exist for the curious visual thinker, it is time to question their re-conceptualization.

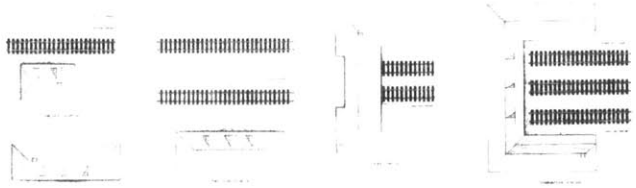
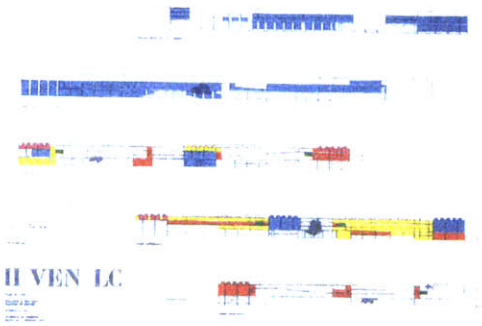


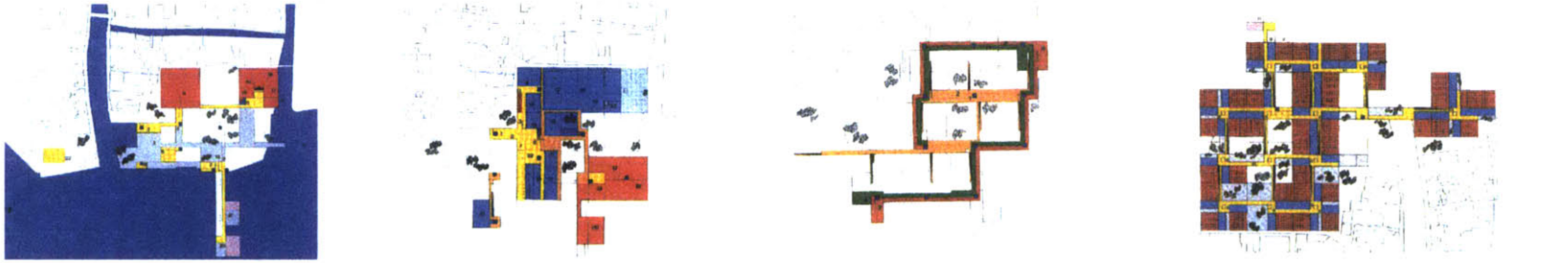
figure 12 diagram of the evolution of the train station typology

Le Corbusier's Venice Hospital project provided an interesting precedent in its successful integration of program and context, building and city, structure and infrastructure.[3] The mat building, defined by Alison Smithson in her 1974 article "How to Recognize and Read Mat-Building" identifies a building type that is "low-rise and high-density,

that is homogeneous in its layout, and that consists of a systematic repetition of a simple element such as a column, skylight or modular room. The repetition provides the framework, both conceptual and spatial, for different possibilities of inhabitation. Framework replaces form and inhabitation replaces function...."[4]



The station building typology proposed in this thesis incorporates the same type of programmatic flexibility through the repetition of a number of elements running vertically through the building. It is essentially bifurcated twice, and each quadrant contains its own vertical circulation. Program elements do not remain within one quadrant, however, but weave their way through the building in plan, sometimes embedding themselves within other program elements. Like Le Corbusier's Venice Hospital project, this thesis examines the possibilities within one building for a series of sub-spaces, urban environments that work their way through the building. In the proposed project, the crux of the building's circulation circuit is a secure airport lounge located on the rooftop with views out to the city and to Lake Michigan.



figures 13a, b, c, d and e Le Corbusier's Venice Hospital project, the archetypal mat building. From left to right (b-e): Levels 1, 2a, 2b, and 3. Above (a):facades and sections

1. Kenneth Powell, *Grand Central Terminal*, (London: Phaidon Press Ltd., 1996), 4.
2. Rem Koolhaas, *S,M, L, XL*,New York: Monacelli Press, 1998), 1200.
3.. Hashim Sarkis, ed., *Case: Le Corbusier's Venice Hospital,* (Munich: Prestel Verlag, 2001), 13.
4. Ibid., 14.

SITE: Chicago, Illinois, U.S.A.

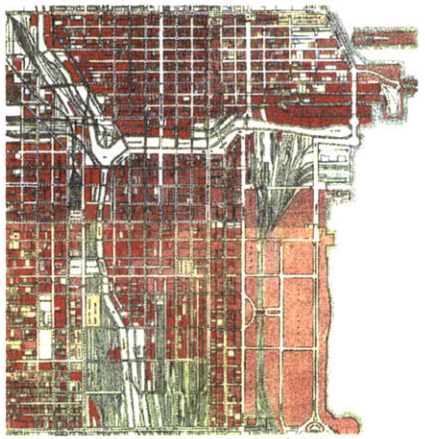


figure 1 1939-1941 W.P.A. land use map, Chicago Loop.

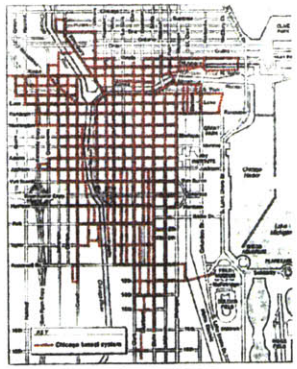


figure 2 1939-1941 W.P.A. map of Chicago tunnel system

Sited on Block 37, (108 State Street) a full city block in the heart of the theater district in downtown Chicago, the proposed station would provide the Loop with a dynamic public space while connecting the city's multiple modes of transportation in one central hub. The rebirth of State Street, once a destination retail district and "bright-light" entertainment center, would be facilitated by the insertion of such a multi-use, high density facility.[1] As a catalyst for future growth of the Central Loop District, the existence of a multi-modal station on this site would increase and organize pedestrian circulation and use of transit while boosting tourism and increasing access to the city's theater district, promoting 24-hour activity in an area that, aside from the theaters, virtually shuts down at night. Located adjacent to Daley Center, the station building would provide an urban backdrop to the open space of its plaza. Daley plaza is punctuated by a large Picasso sculpture, numerous park benches, and some simple landscaping. It is the only space of its kind within the Loop, and is a welcome reprieve from the density of downtown Chicago. The plaza is used primarily in the summer, when weather permits office workers to bring their lunch outside. The station building I am proposing for 108 State Street would provide a similar, but interior public space that would essentially extend the summertime uses of Daley Plaza into the winter months. Across State Street from the site is the Marshall Field's flagship department store, a landmark in downtown Chicago. In Grant Park, two blocks away, Frank Gehry's bandshell is under construction and will doubtlessly attract many visitors from Chicago, its suburbs, or further afield.

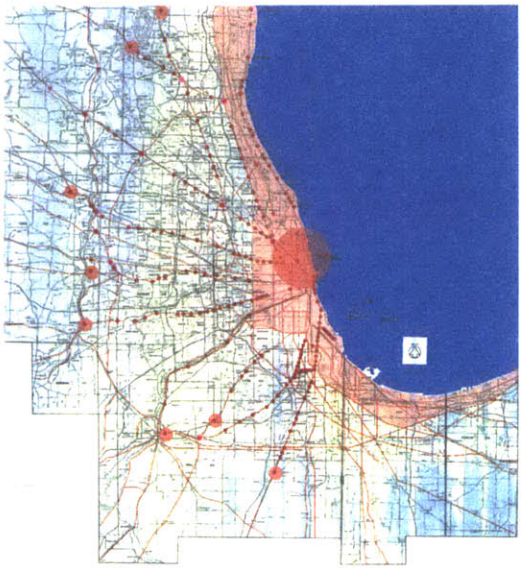
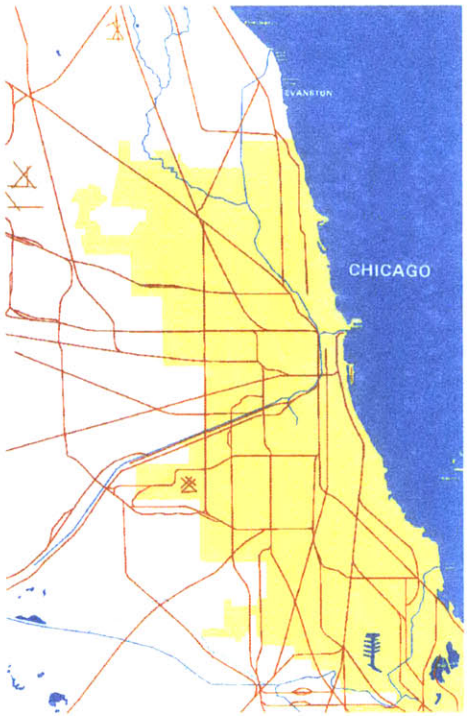


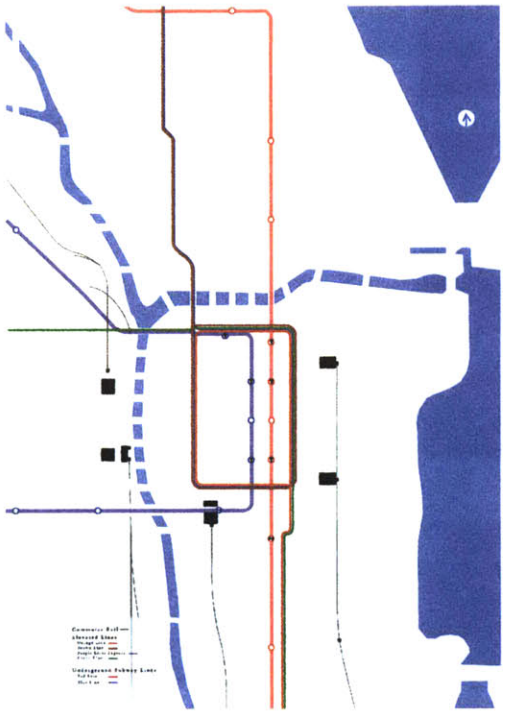
diagram of Chicago and periferal station points

Because Chicago's development as the hub of the Midwest can be attributed almost entirely to its pervasive railroad system, it is not surprising that several railway stations exist within Chicago's boundaries. The former Northwestern Station (now Ogilvie Transportation Center), as well as Union Station, famous for its role in the 1987 film, *The Untouchables*, are located several blocks from the Loop, across the Chicago River. LaSalle Street station is located one block south of the Loop, and the Randolph street station two blocks east of the Loop. Union Station has an interesting history, and has been described as the same type of self-contained urban space that is being proposed for 108 State Street. When it was completed in 1925, Union Station was equipped with several restaurants, shoeshine stands, newspaper kiosks, a police force, a nursery, a hospital and even a jail for the containment of prisoners in transit. In the early 1940s, the station distributed 100,000 passengers and 300 trains per day and was an important public space for war-time moral-boosting. By the 1950s, intercity passenger travel had declined, and in 1969 the great Union Station concourse was demolished to make way for a more modernized version and two new office buildings. In 1972 Amtrak was founded and ran its trains through Union Station, leading to the consolidation of most of Chicago's passenger train service.



Chicago rail network

Specifically, the site is a full city block, now vacant, bordered by State and Dearborn Streets running on a North-South axis and Washington and Randolph Streets, running on an East-West axis. It is one block from City Hall and is adjacent to Daley Plaza. It is also one block from the elevated train and within two blocks of eight el stations. The site has major development potential, and many ideas are being thrown around regarding its potential as a multi-use facility. The City of Chicago has expressed a renewed interest in the redevelopment of State Street as an important retail center. Siting this station project here would anchor the transportation hub in the center of central downtown Chicago while providing an identity of dynamism and excitement for the city. Such an identity would unfold to the station's daily passengers -- tourists and locals alike -- and would begin to define and describe the experience of Chicago.



Chicago transit system

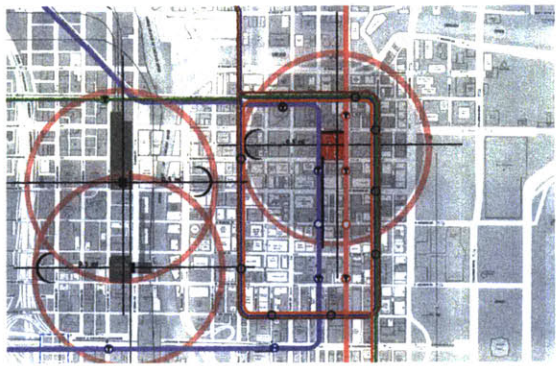
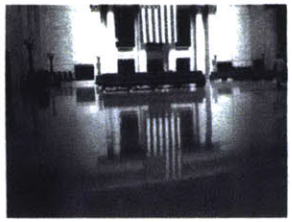
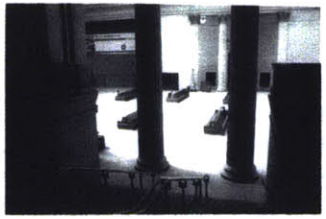


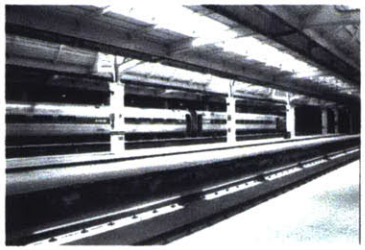
diagram of walking distances within the Loop

Dearborn and Randolph streets

OMA's elevated station, I.I.T.







Images of Chicago's Union Station

view of perifery of site

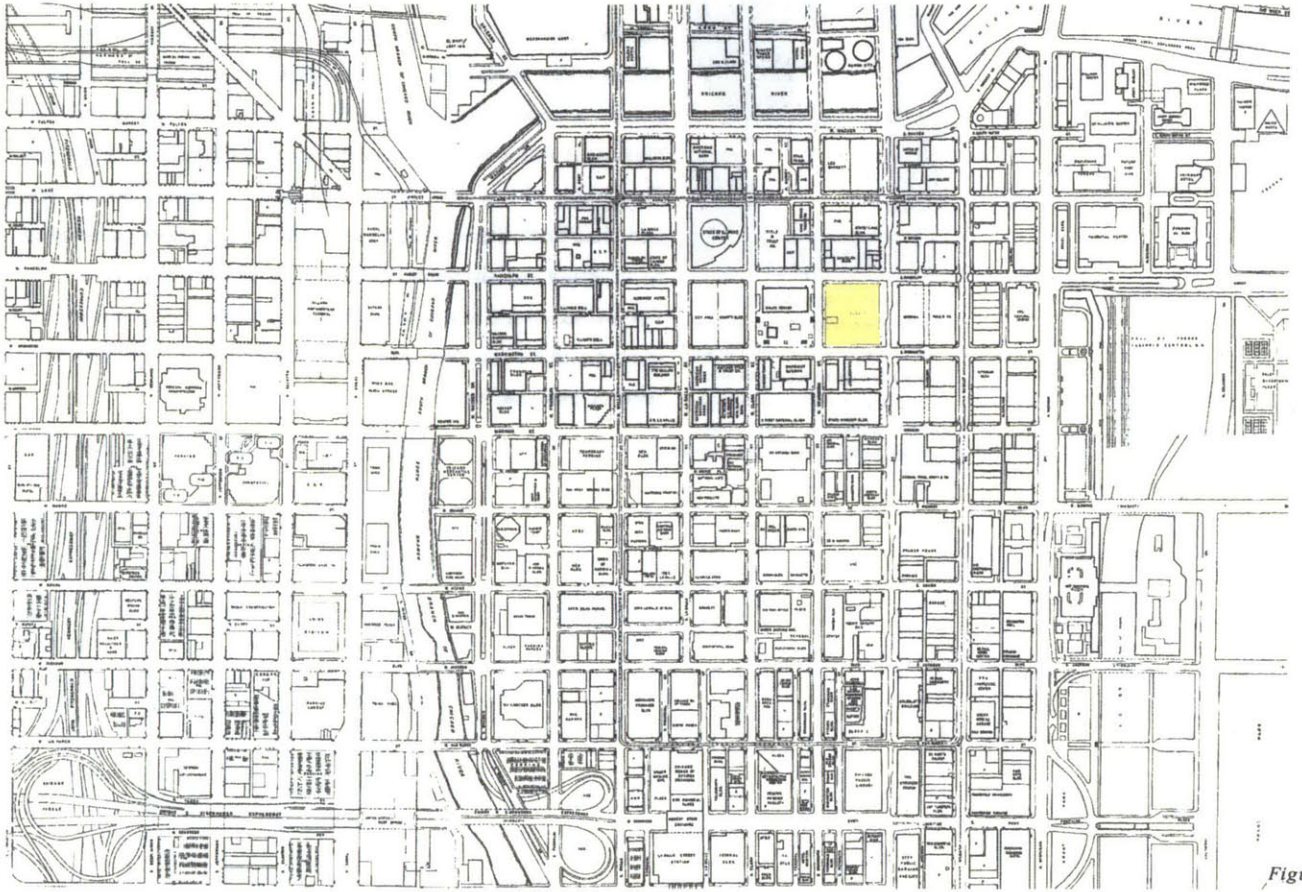
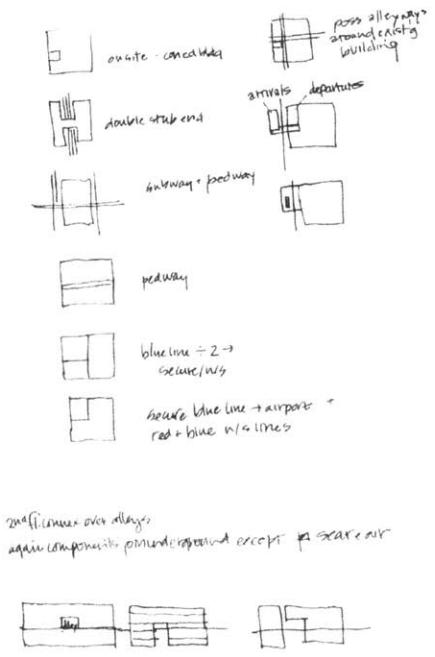


Figure 5 Sandborn map of Chicago Loop with site noted



Site factors

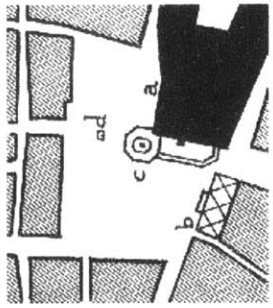
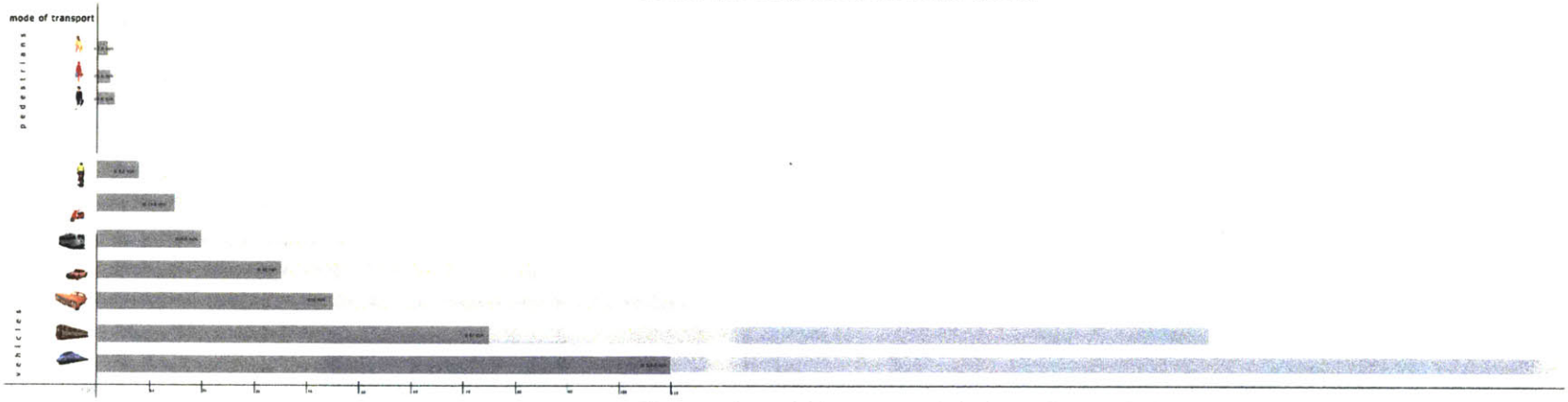


Figure 6 Diagram of Piazza della Signoria, Florence. As a former fortress, the Palazzo occupies one quadrant of the Piazza in a defensive stance, defining the very successful urban public space around it.

The footprint of 108 State Street is a near square, measuring 364' by 324'. There are a number of existing factors which when applied to the site start breaking it down into parts. A pedestrian walkway bisects the site along the East-West axis at level -01; two subway lines flank the East and West sides of the site, and are located two levels below State and Dearborn Streets; the typical Chicago block is divided by an alleyway through it, running either E-W or N-S. The programmatic duality inherent in the juxtaposition of secure and non-secure zones within one building adds to its further bifurcation.

Speed 4

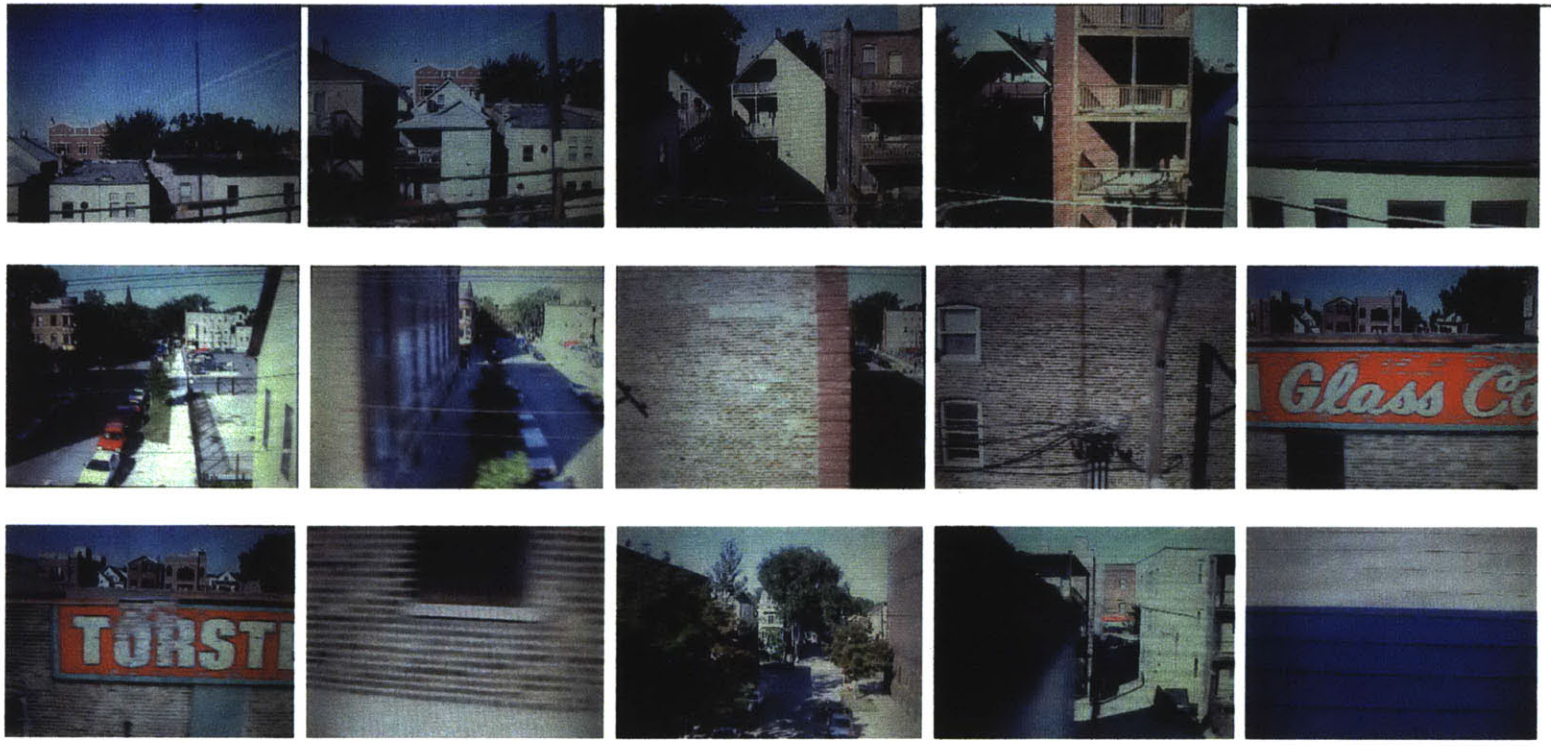
My car eats up the tarmac of crazed streets, lamp posts and eucalyptus trees flying past in the opposite direction. Pure speed revives the heart, sweeping boredom away, while the wind howls like a maniac, rattling the branches and leaves of trees, and rain beats down, washing the fields bright green.[2]



The speed at which one travels is dependent on both the mode of travel and the purpose for the travel. The chart above examines pedestrians (tourist, business woman, shopper) and vehicles, (bicycle, motorbike, city bus, automobile, taxi, commuter train and high-speed rail) and notes both the average speed at which each travels (darker band) and the distance (lighter band) achieved after 15 minutes (in miles). In designing a station as a dynamic public space, the investigation of speeds at which people experience the space is crucial. Metaphoric collision of velocities and forces activates the space, while virtual collision of elements helps to create an environment ripe with excitement.

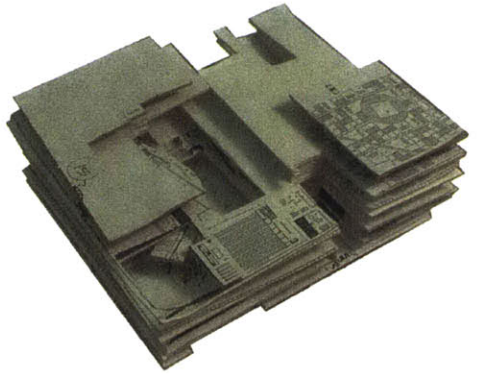
figure 3 night view of downtown from the Hancock building

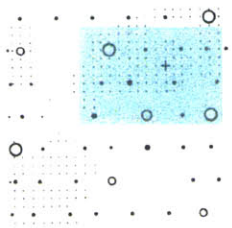
figure 4 elevated train

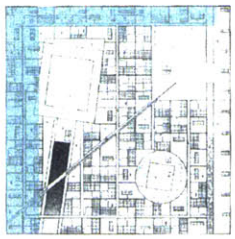

Glass Co
TORST

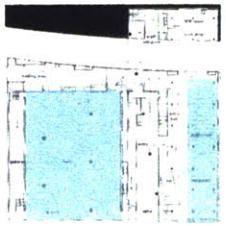
1. City of Chicago, *Request for Qualifications,* (Chicago: Department of Planning and Development, 2002), 3.
2. Rem Koolhaas, *S, M, L, XL*, (New York, Monacelli Press), 1164.

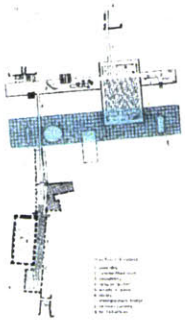
The design methodology I applied to this project initially was one of cannibalization. To focus on the multiple spatial typologies within the proposed station building, I borrowed pieces of the plans of several of Rem Koolhaas' projects (the Dutch Parliament competition project, his Architecture Museum competition project, the Kunsthal project in Rotterdam, the Lille Congrexpo (Lille Grand Palais) and the Palm Bay (Agadir, Morocco) Seafront Hotel and Convention Center competition project). This freedom from the specific allowed the project to grow through a series of models made from collaged plans. The organization of the multiple program types within one building where velocity, circulation and the activation of spaces through the juxtaposition of uncomfortable building programs were key concerns, became an experiment in densification and imbrication.

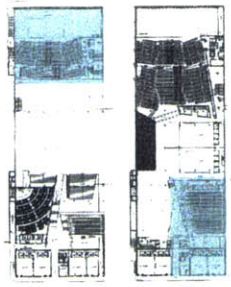


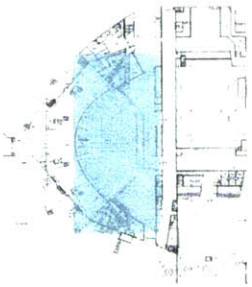


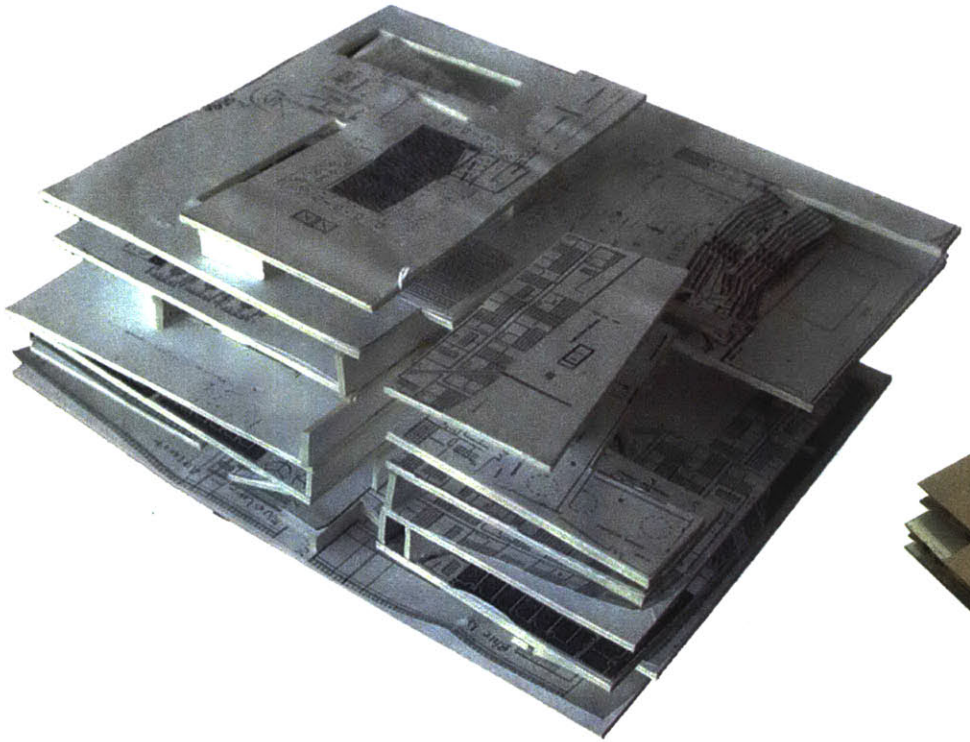


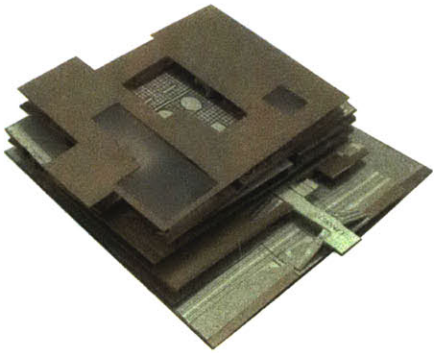


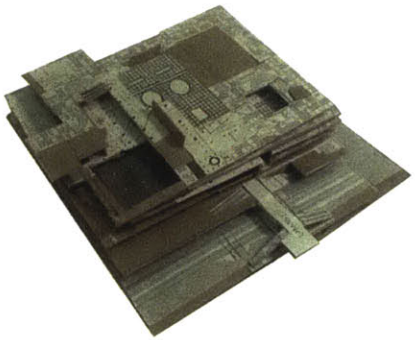












nightclub

design store

baggage check

hotel

bar

smoking terrace

public circulation

take-out

clothing store

secure nightclub

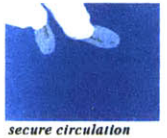
secure design store

secure baggage check

secure hotel

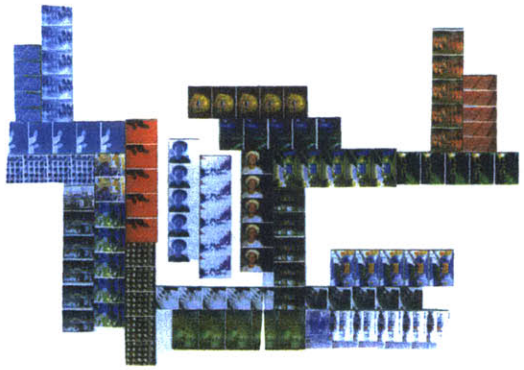
secure bar

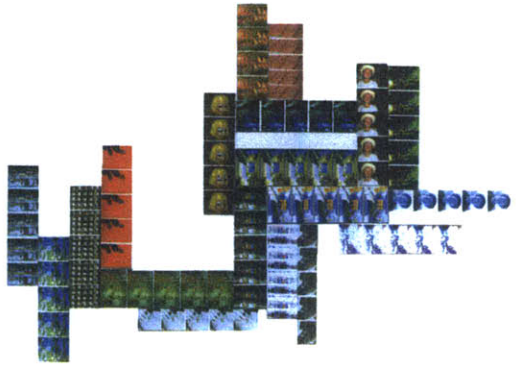
secure terrace


secure circulation

secure take-out

secure clothing store





Playing the program game:
Two configurations of program pieces combined and arranged in plan

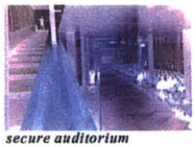
tea shop/cafe

auditorium

baggage check

Playing the program game:
Program components

secure tea shop/cafe

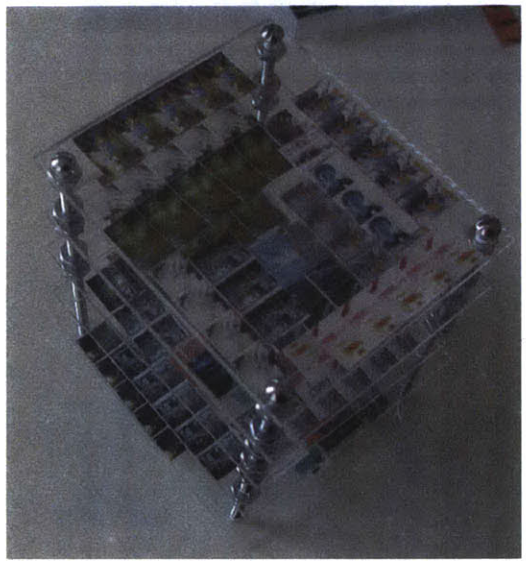


secure auditorium

secure baggage check

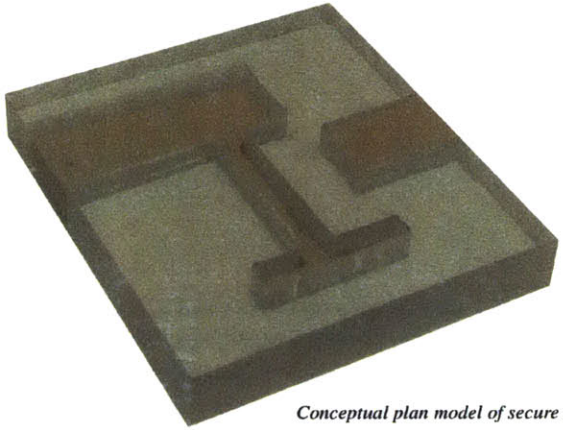
The inverse images signify similar components within secure zone

Reconciling the problem of a secure zone with its own amenities and program components embedded within a dynamic public space meant choreographing the relationships between program elements and determining where and when one might penetrate the secure zone, either physically or visually. Illustrated here are program pieces which when combined and overlapped start to create compositions akin to architectural plans (far left). These are meant, however, to be read only as evocative maps of possible spatial relationships. Each program piece has a secure zone counterpart, represented with a color inverse of the same program image.

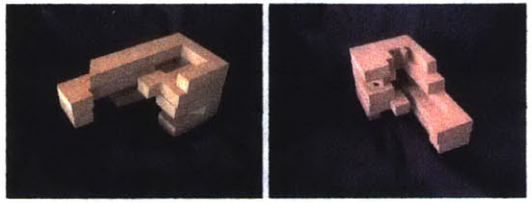


Possible distribution of program throughout building

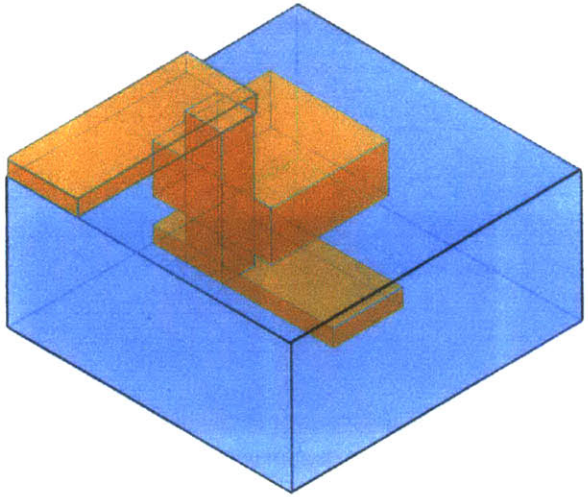
Game play: arranging pieces of the program

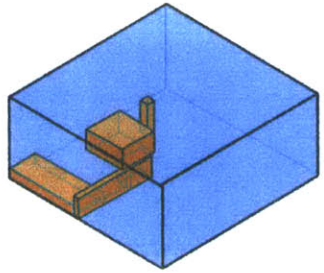


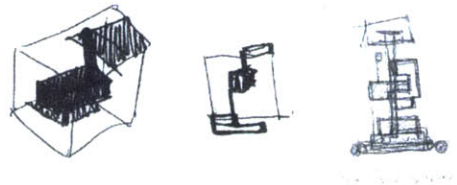
Conceptual plan model of secure zone embedded within building



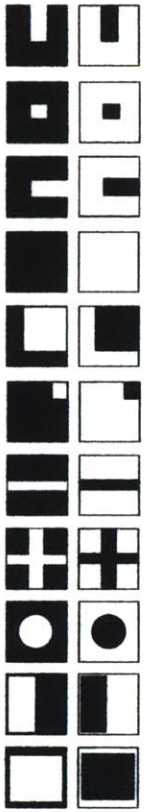
The void space within hotel component at left is the secure zone holding conference spaces, auditoria, secure circulation and a connection to the airport train below.



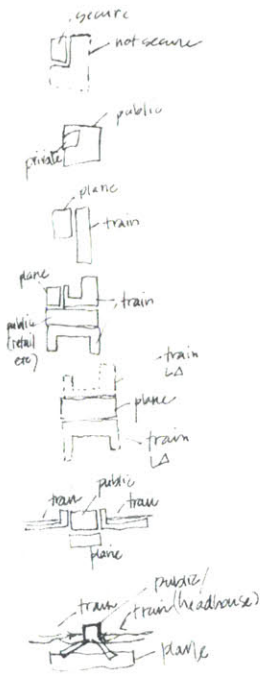




Ideas about secure zone relative to the rest of the building

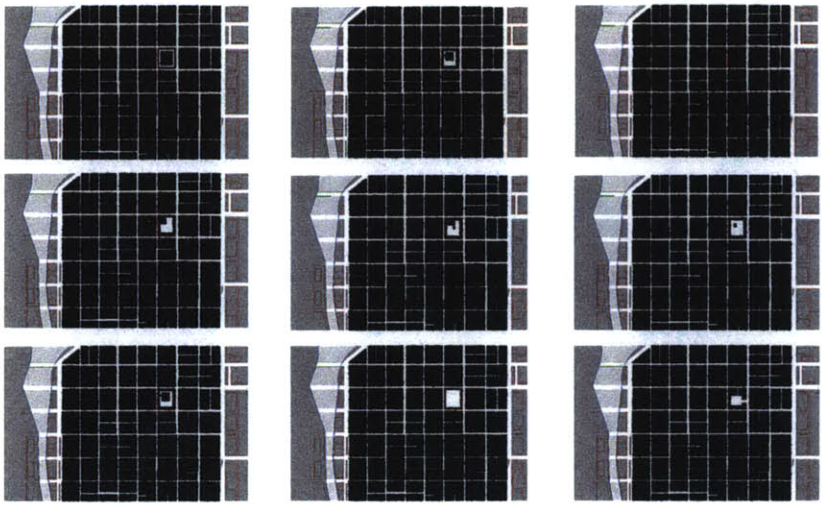


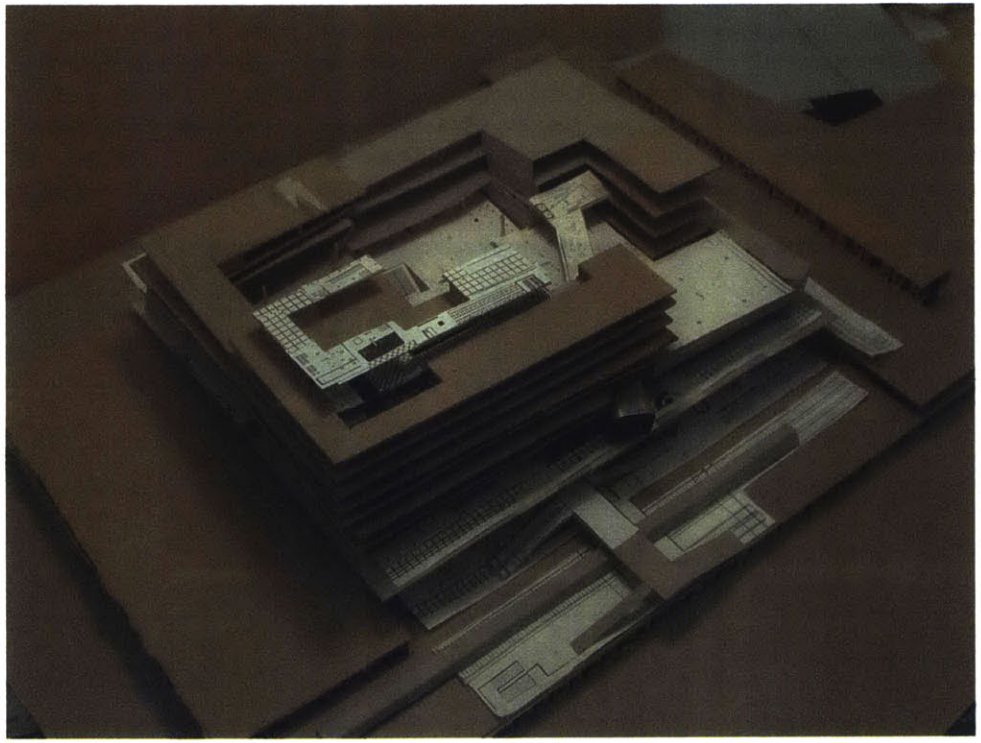
Dualities and inversions

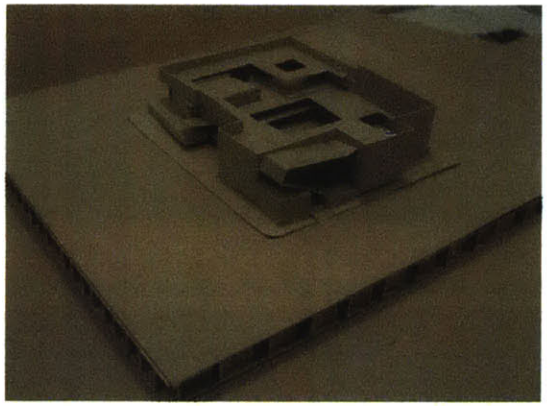


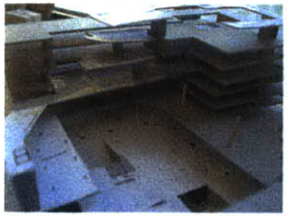
Sketches of program dualities

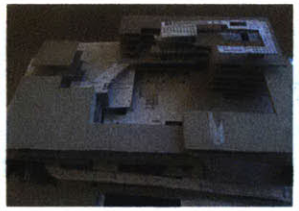
The architectural marriage of a secure airport connector train and its periferal, also secure, areas with the highly public components of a station building poses a very interesting problem. Should the secure zone read within the building? Should it express itself on the building's exterior? Or should it be embedded as a dark solid within the building? The question of where the boundary should be drawn continually redefines the building on an urban scale. Its location on busy and thriving State Street in the very heart of downtown Chicago presupposes a need for a relatively public and permeable building. How then to contain a secure area, itself full of its own public spaces, within a larger station building?











rise
permeate
emerge
engage
ground

ARRIVAL Velo[city]

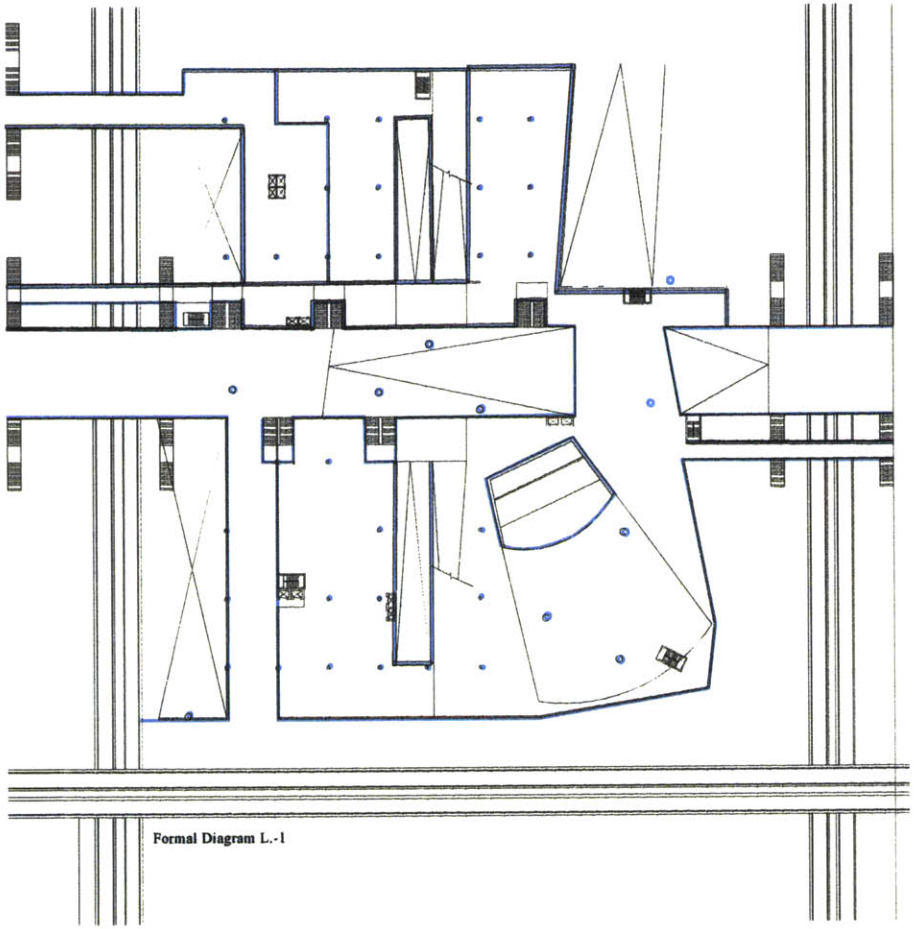
PENETRATION

TOPICALITY

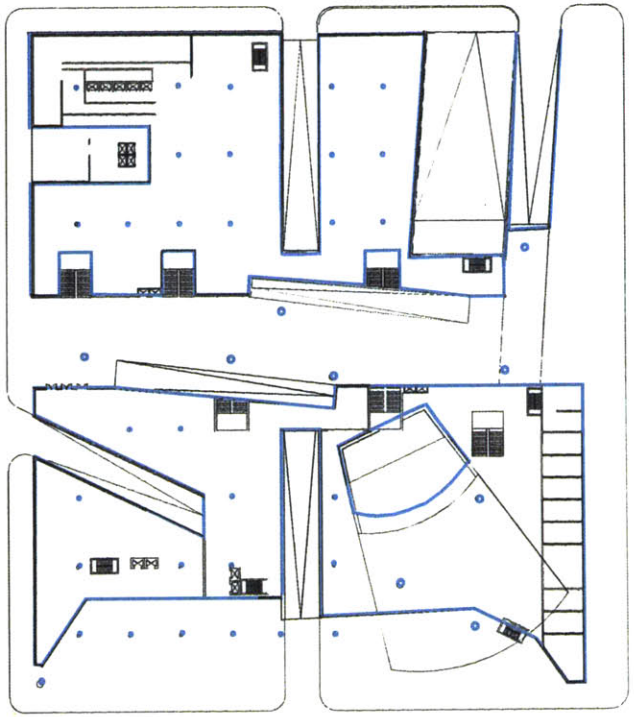
SUBMERSION

TANGENCY

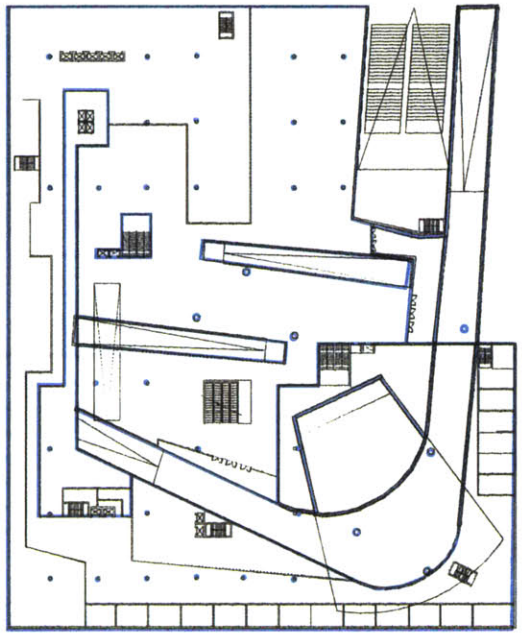
PERCH



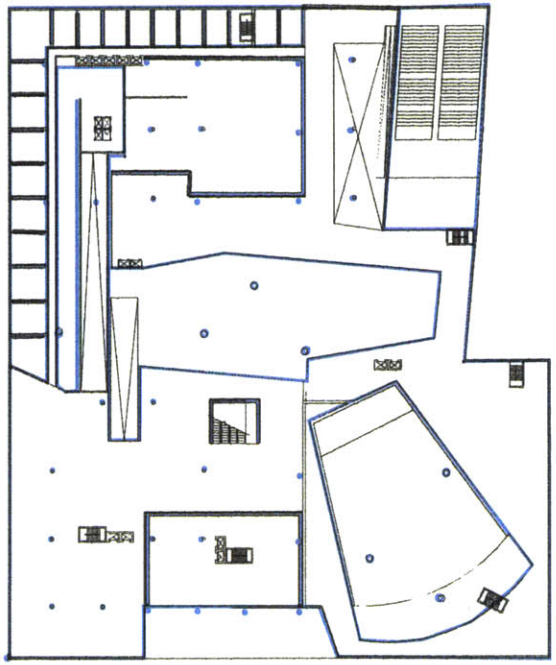
Formal Diagram L.-1



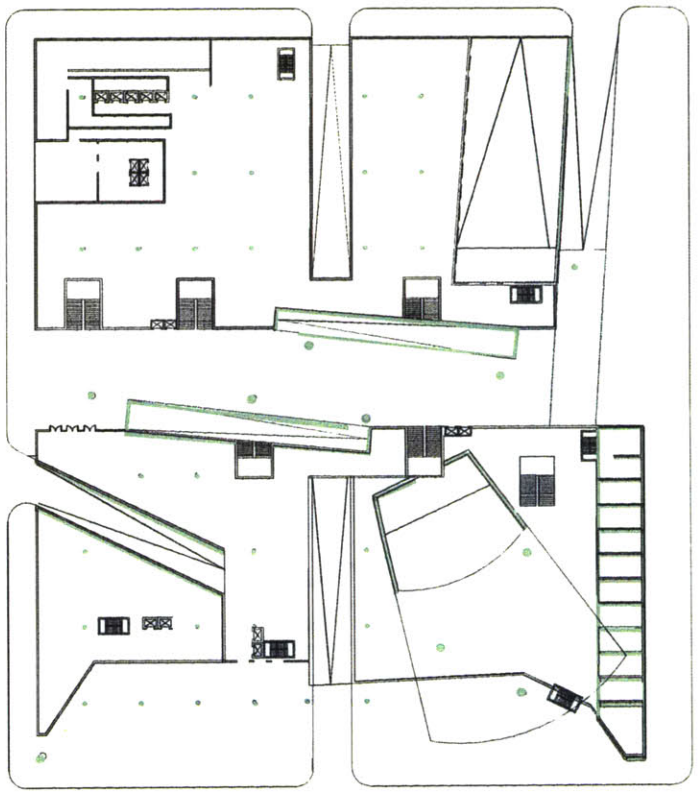
Formal Diagram L.1



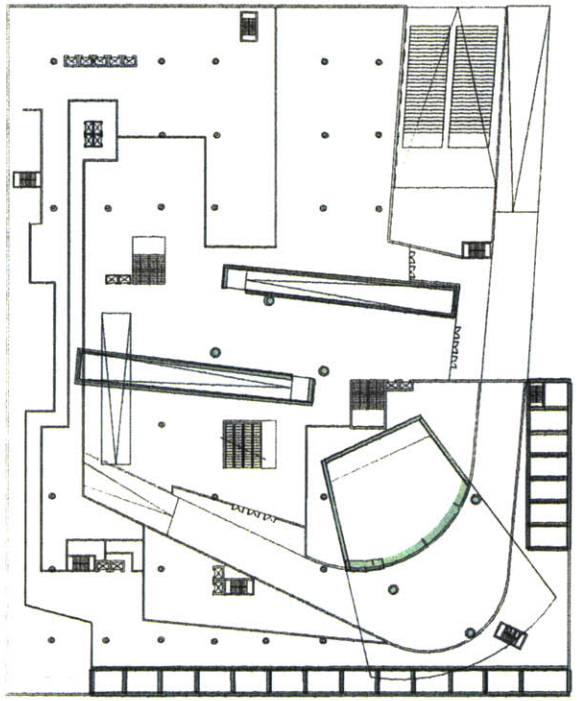
Formal Diagram L.2



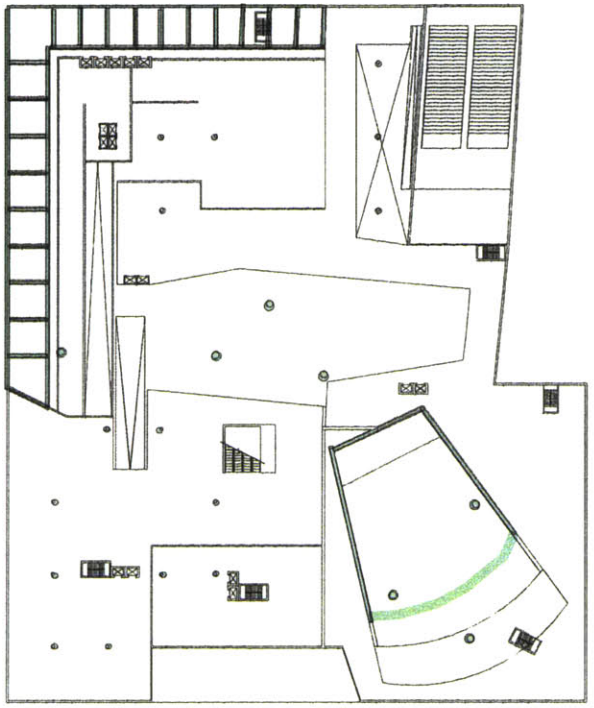
FORMAL DIAGRAM L.-01, 01, 02, 03



Structure L.1

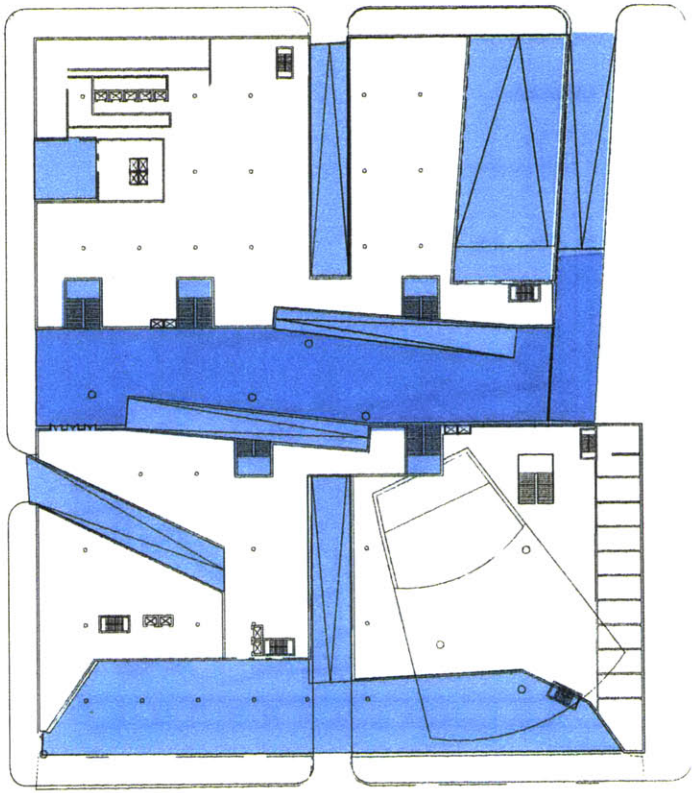


Structure L.2

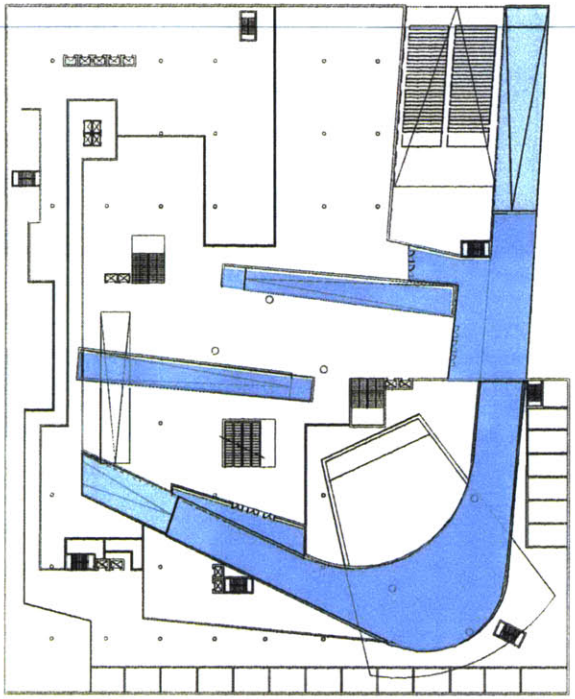


Structure L.3

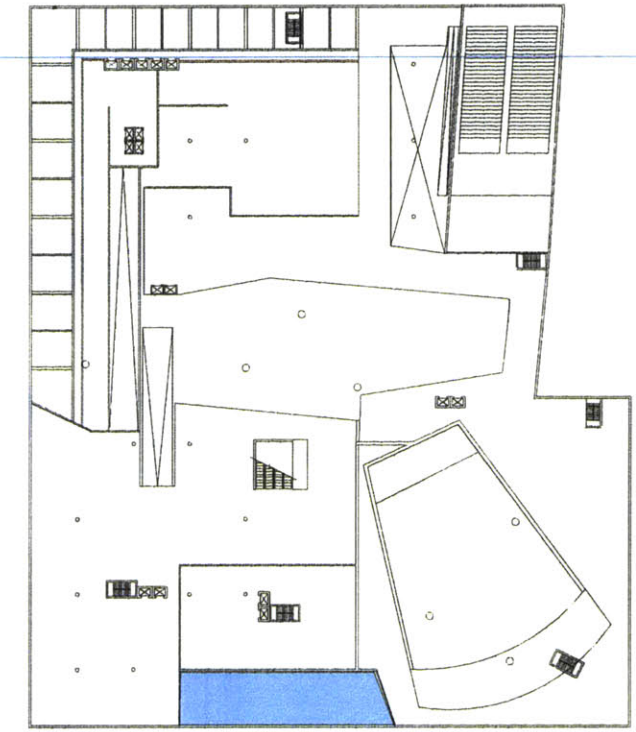
STRUCTURAL DIAGRAM L.01, 02, 03



Exterior Spaces L.1

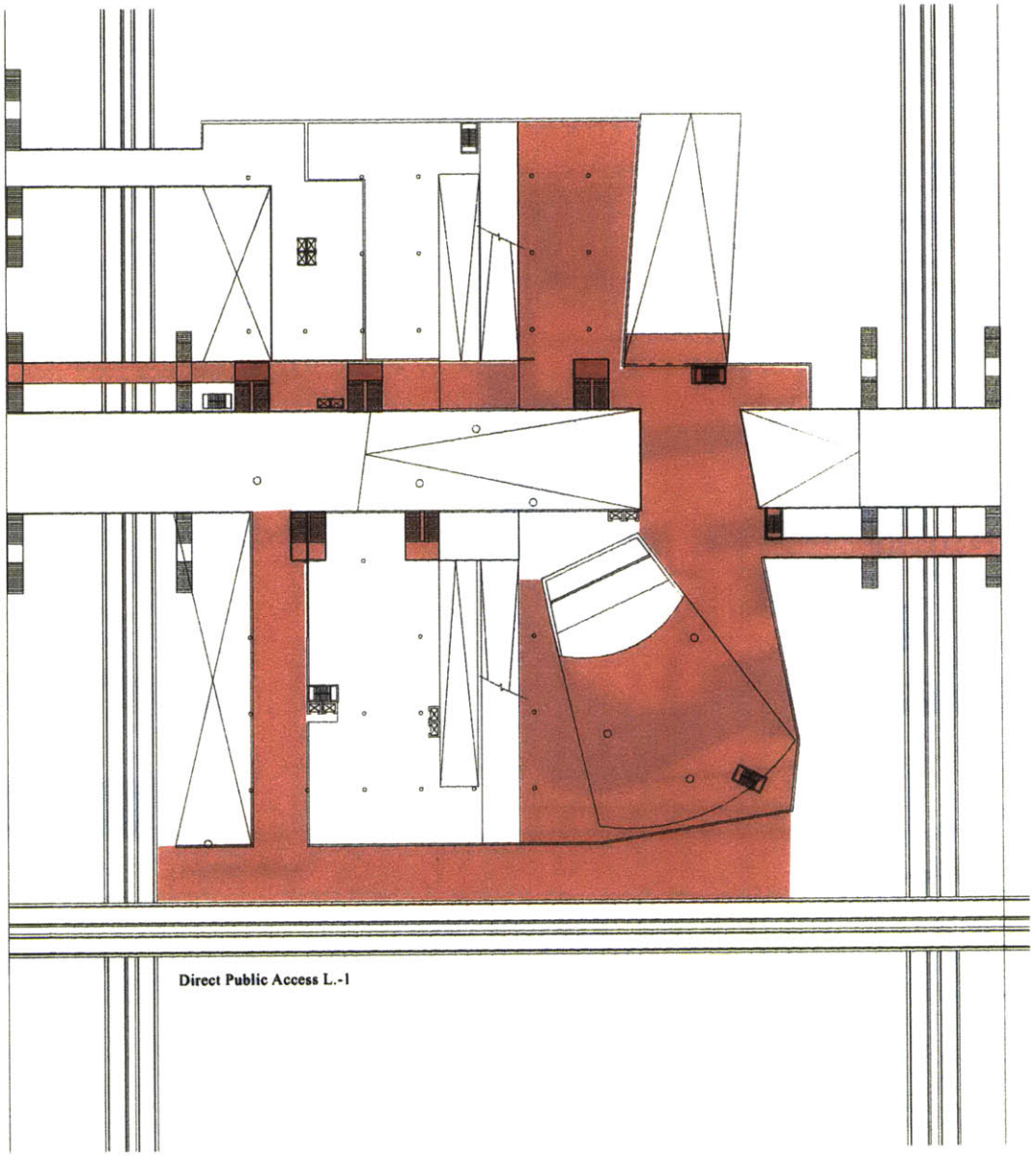


Exterior Spaces L.2

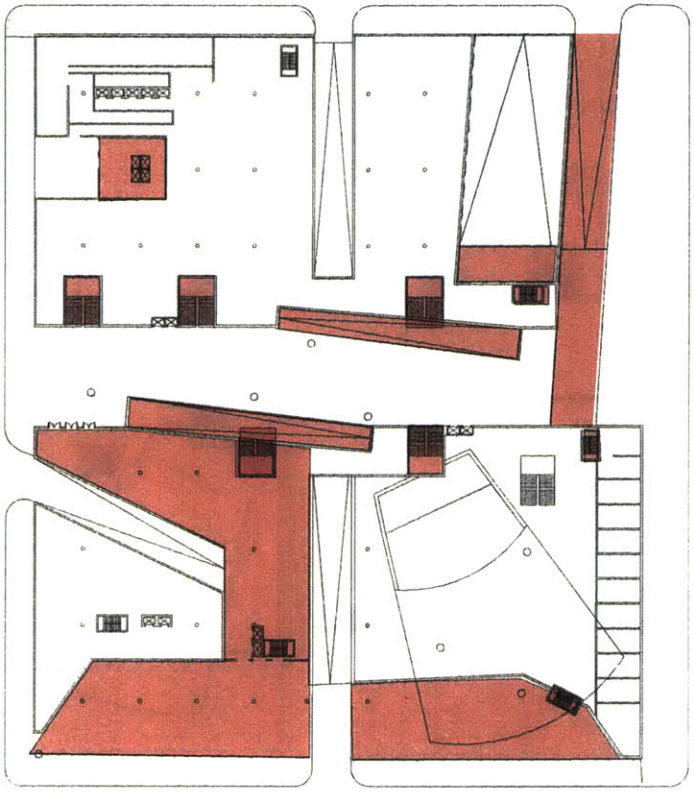


Exterior Spaces L.1

EXTERIOR SPACE DIAGRAM L.-01, 01, 02, 03



Direct Public Access L.-1



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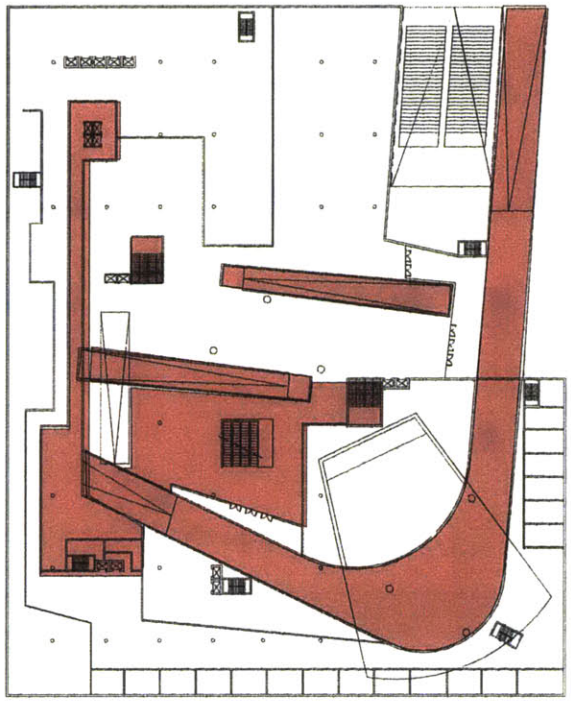
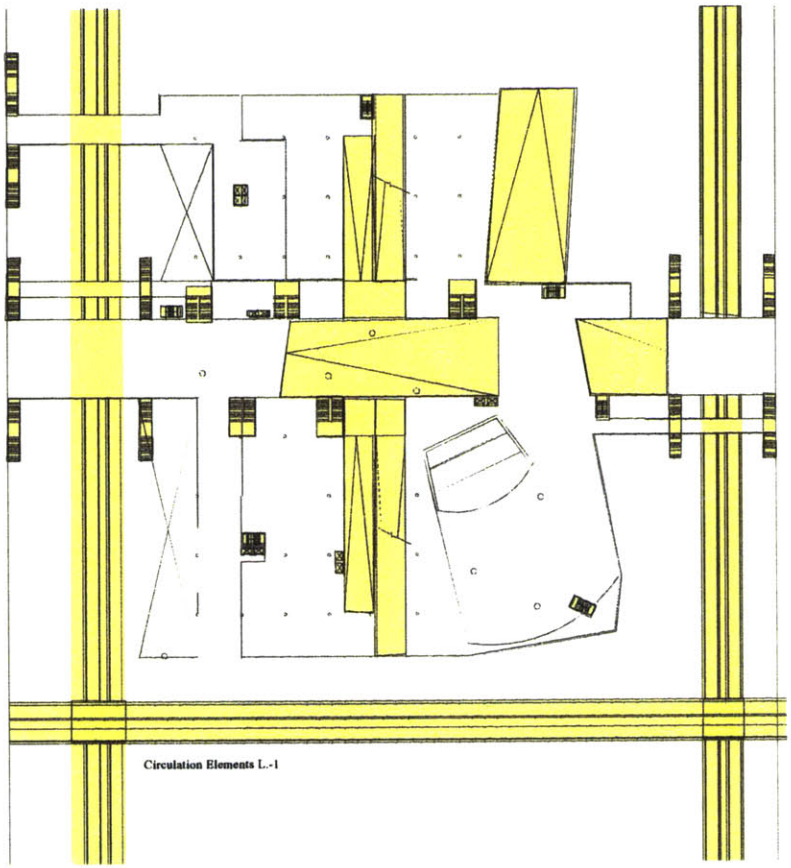
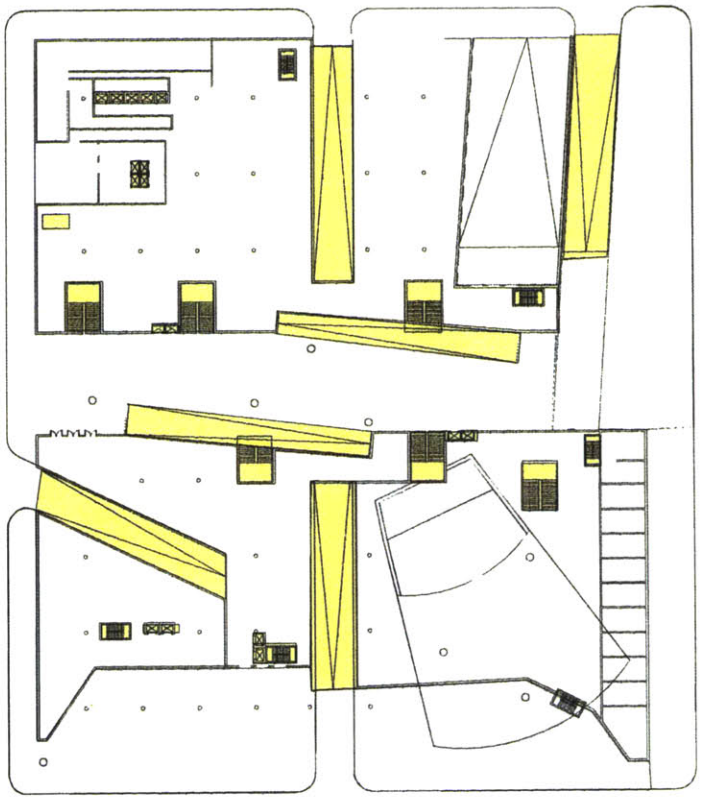


Direct Public Access L.2

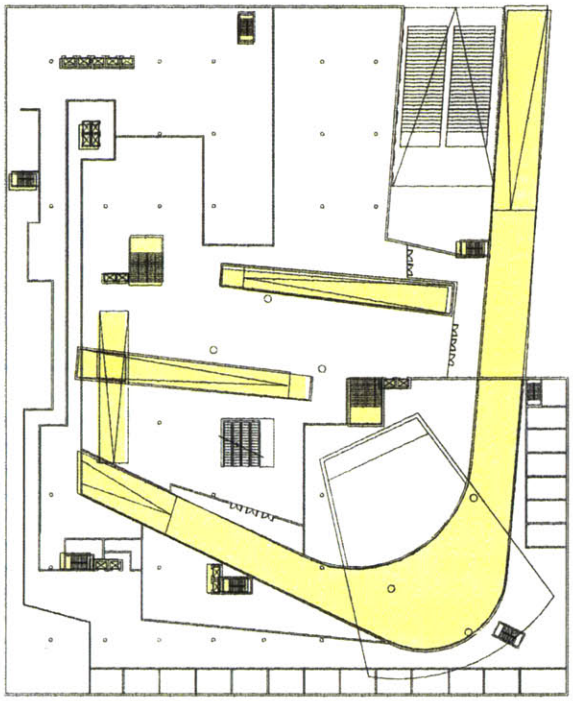
DIRECT ACCESS DIAGRAM L.-01, 01, 02



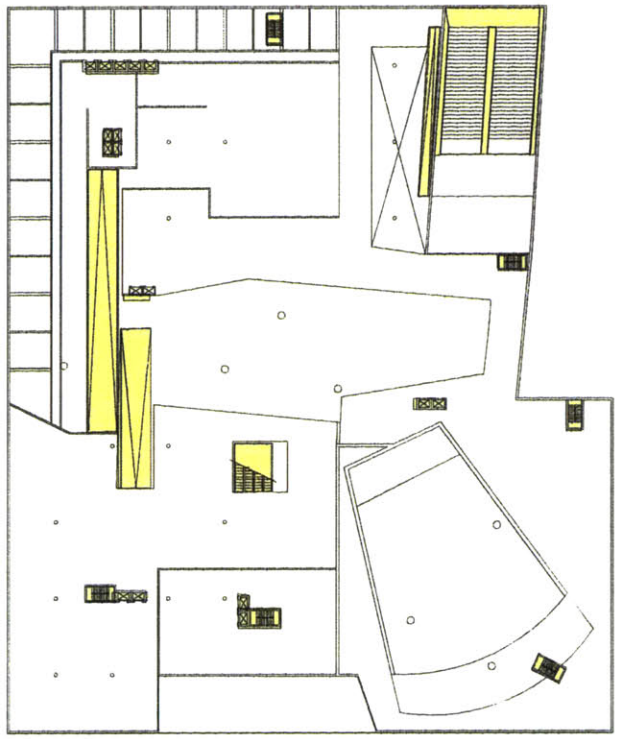
Circulation Elements L.-1



Circulation Elements L.1

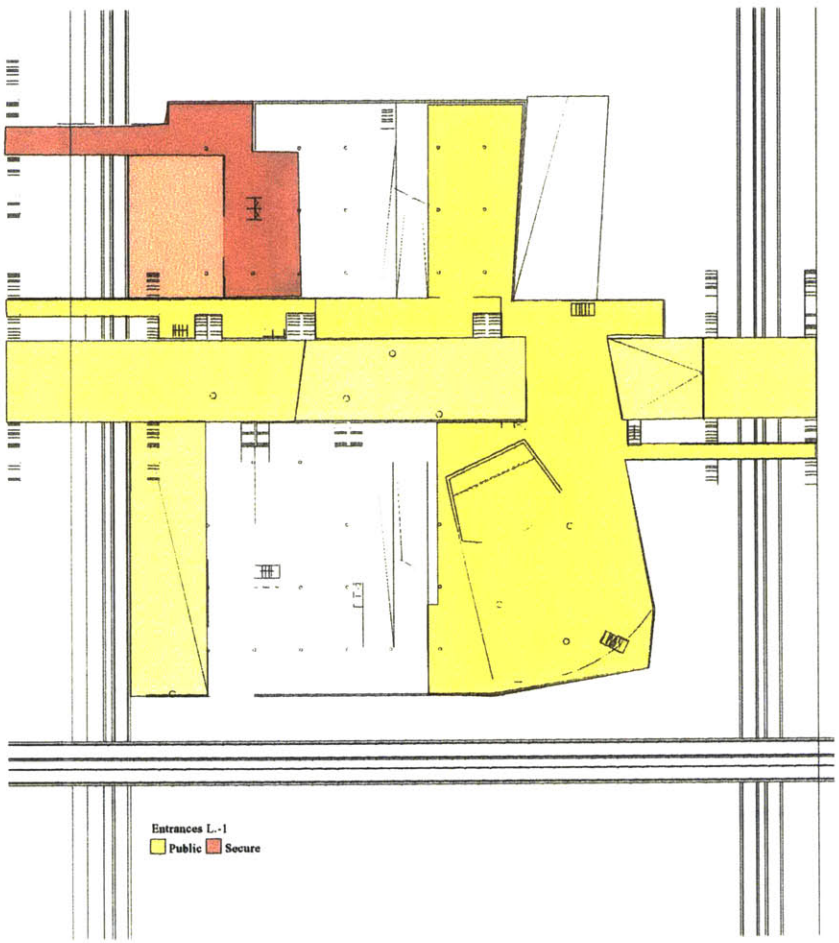


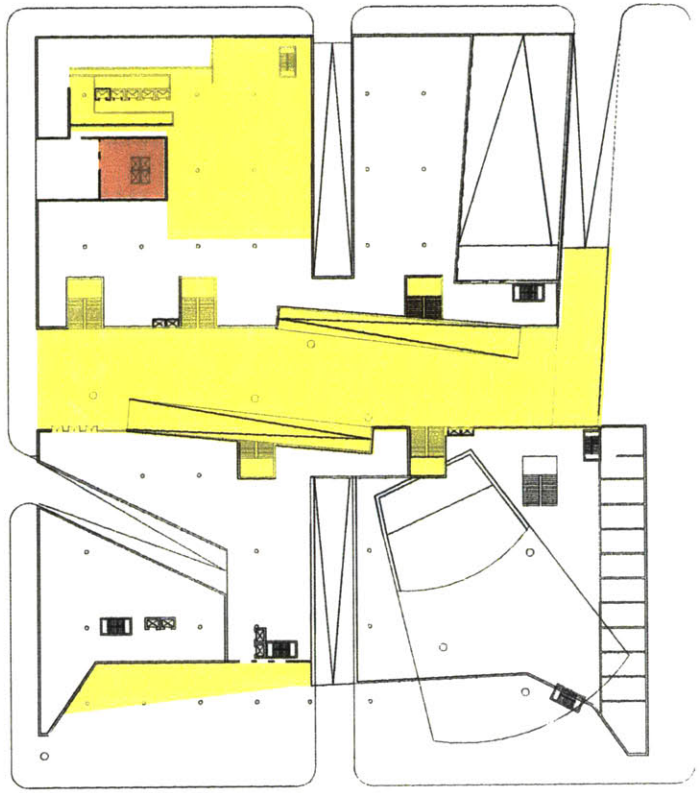
Circulation Elements L.2

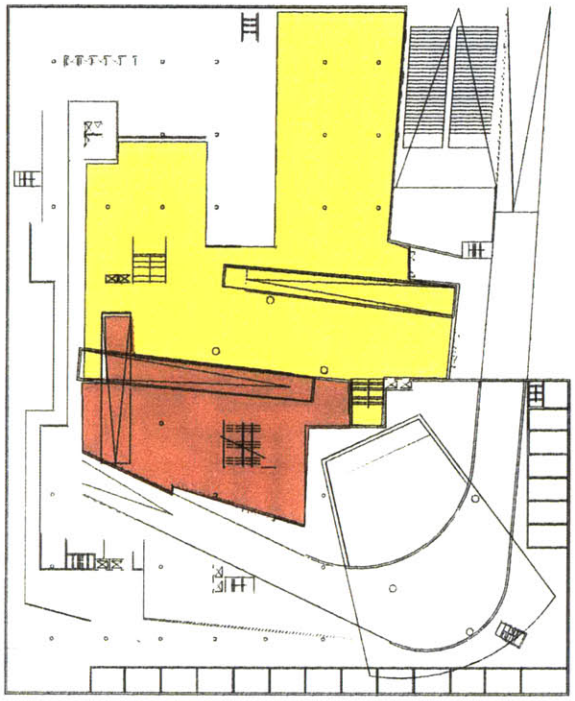


Circulation Elements L.3

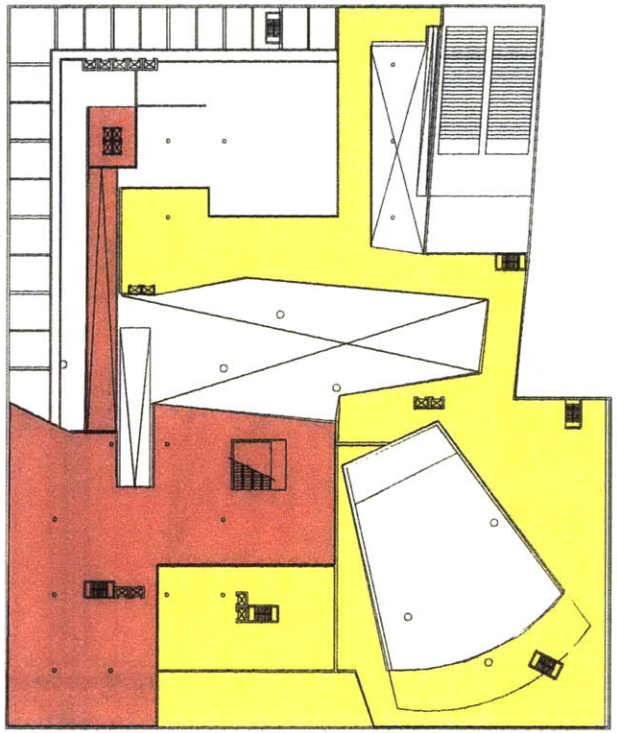
CIRCULATION DIAGRAM L.-01, 01, 02, 03


Entrances L.-1
Public
Secure


Entrances L.1
Public
Secure



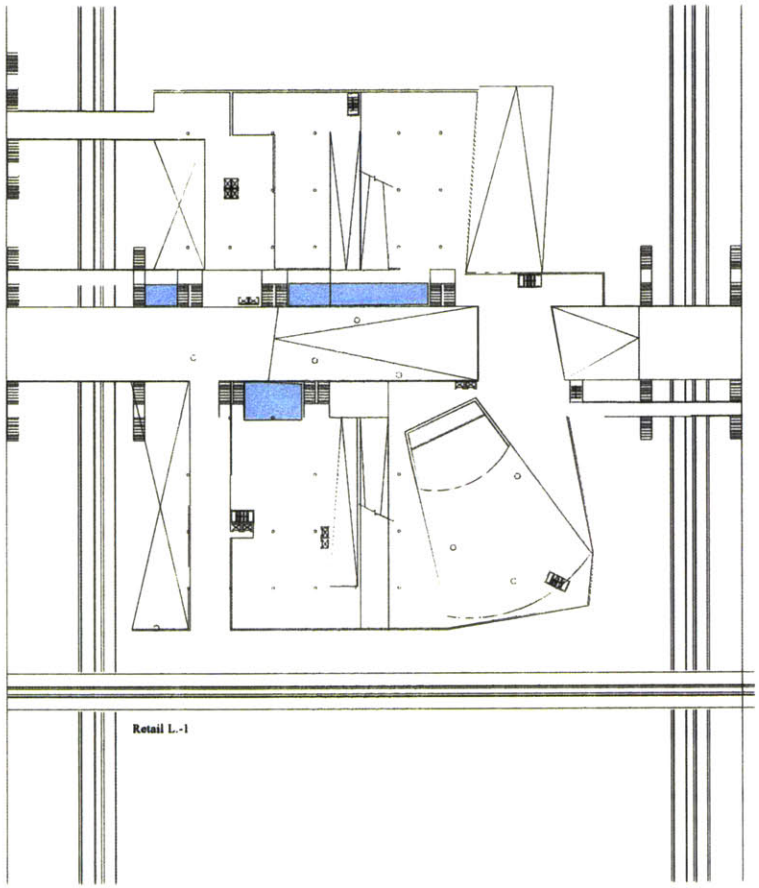
Public vs. Secure Entrances L.2



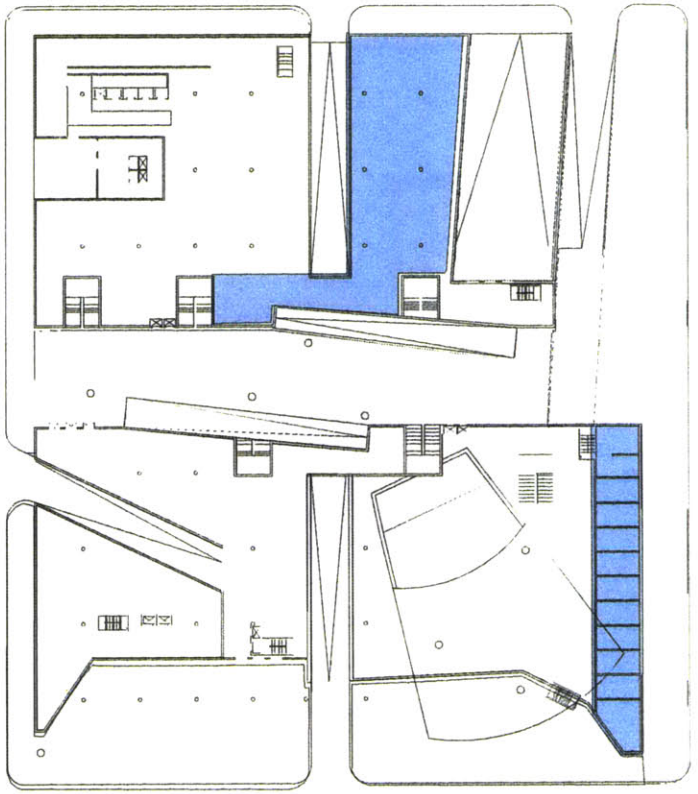
Secure versus Non-Secure Zones L.3

Secure Non-Secure

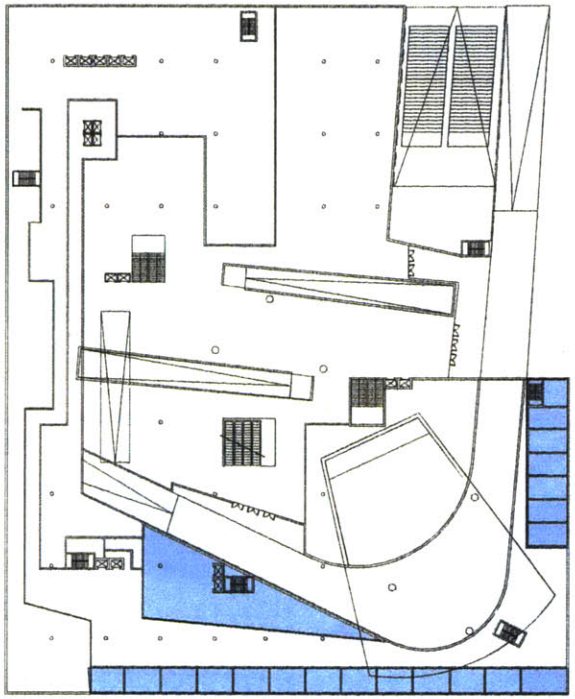
SECURE/NON-SECURE ZONE DIAGRAM L.-01, 01, 02, 03



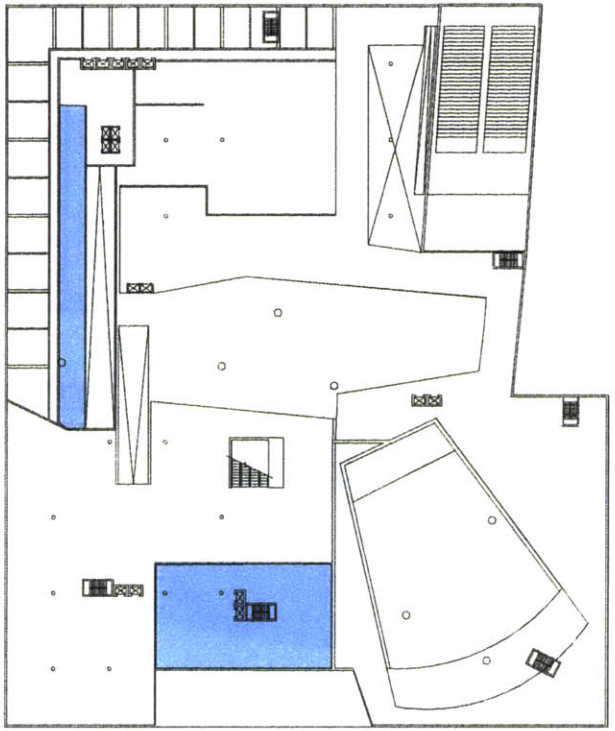
Retail L.-1



Retail L.1

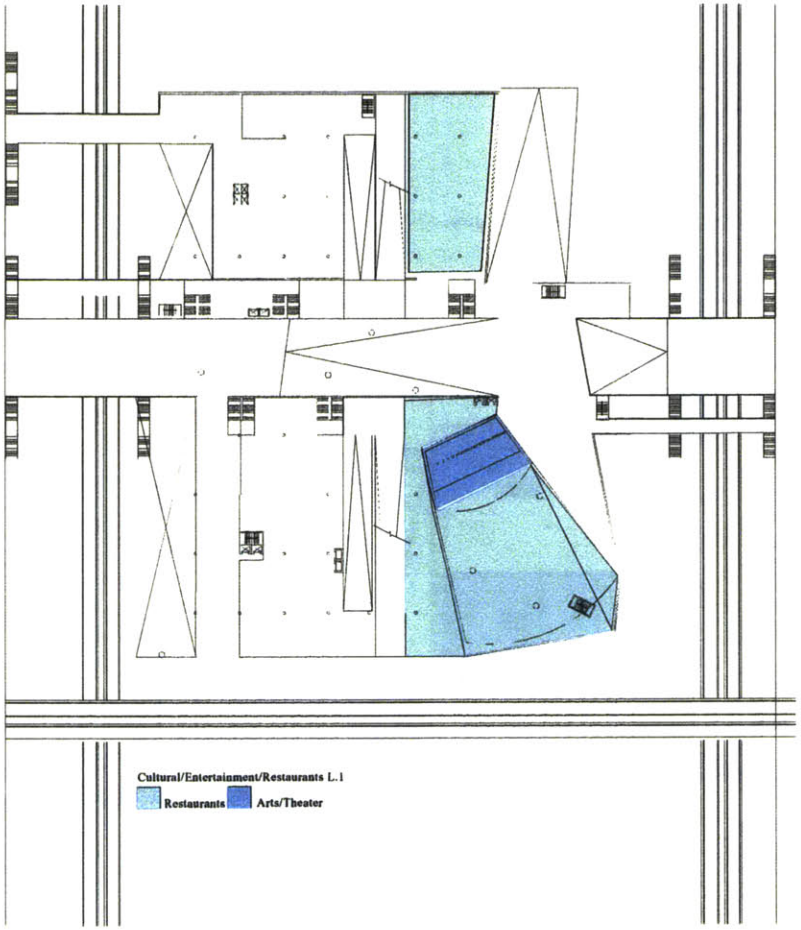


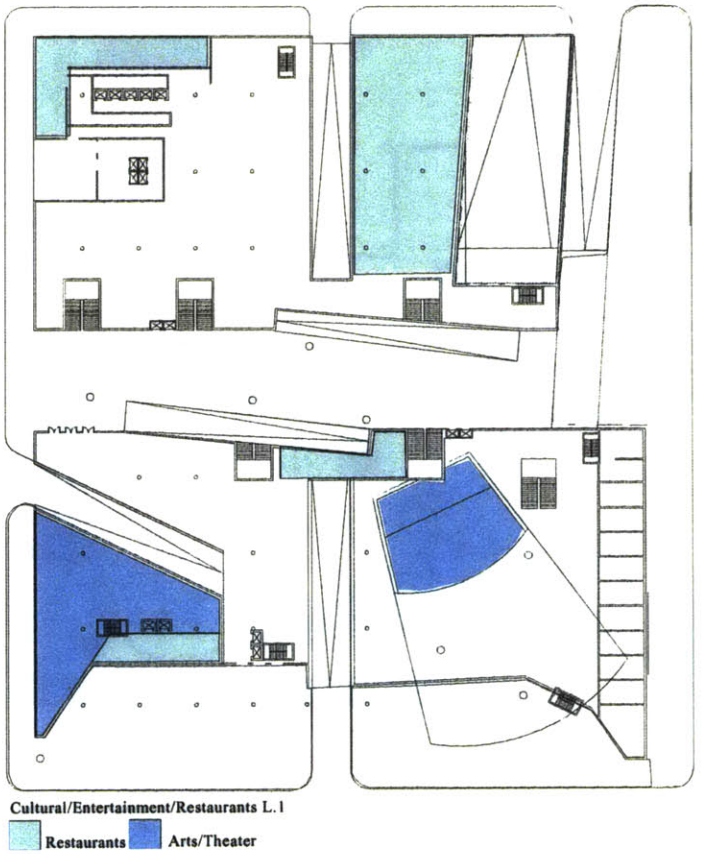
Retail L.2

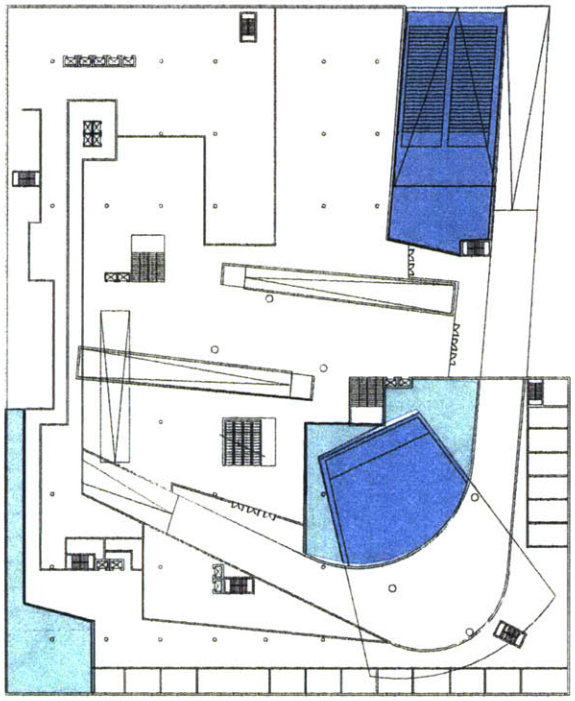


Retail L.3

RETAIL DIAGRAM L.-01, 01, 02, 03

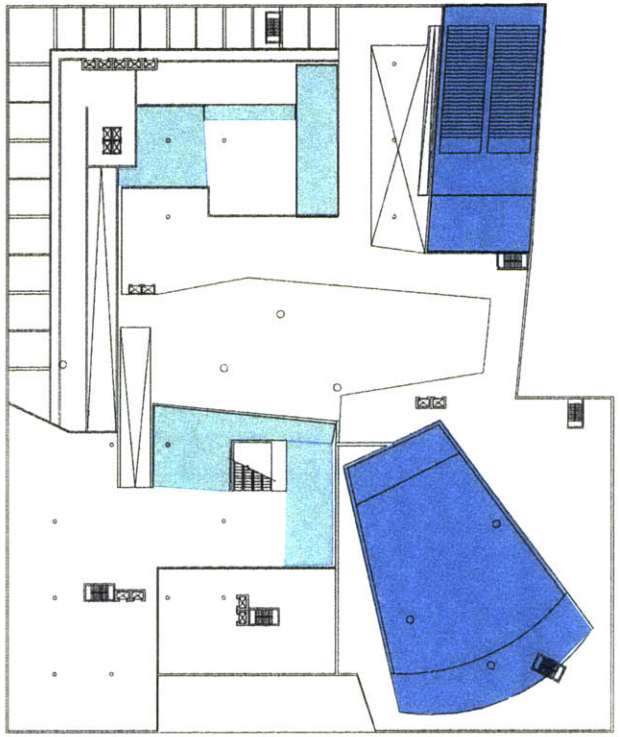

Cultural/Entertainment/Restaurants L.1
Restaurants
Arts/Theater


Cultural/Entertainment/Restaurants L.1
Restaurants
Arts/Theater



Cultural/Entertainment/Restaurants L.2

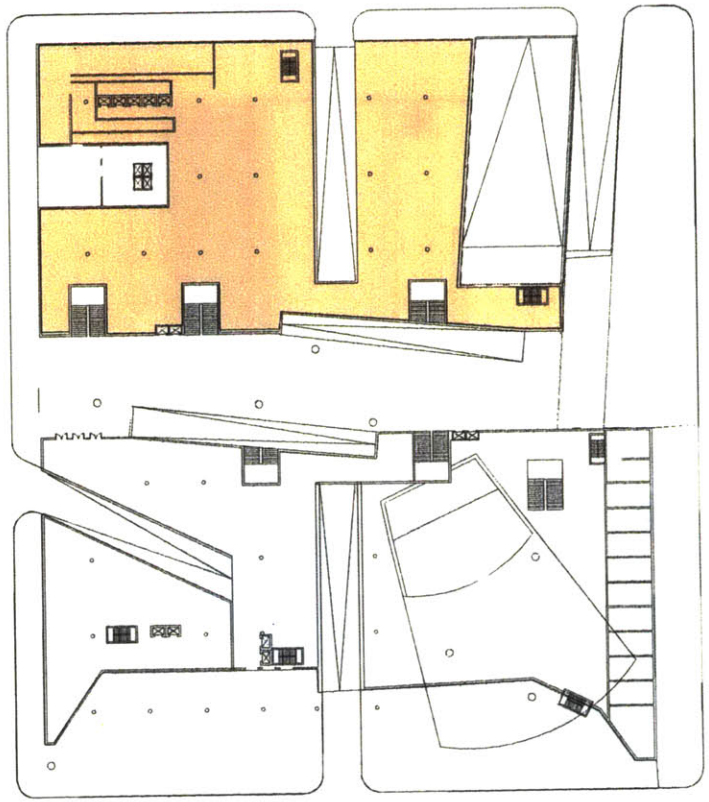
Restaurants Arts/Theater



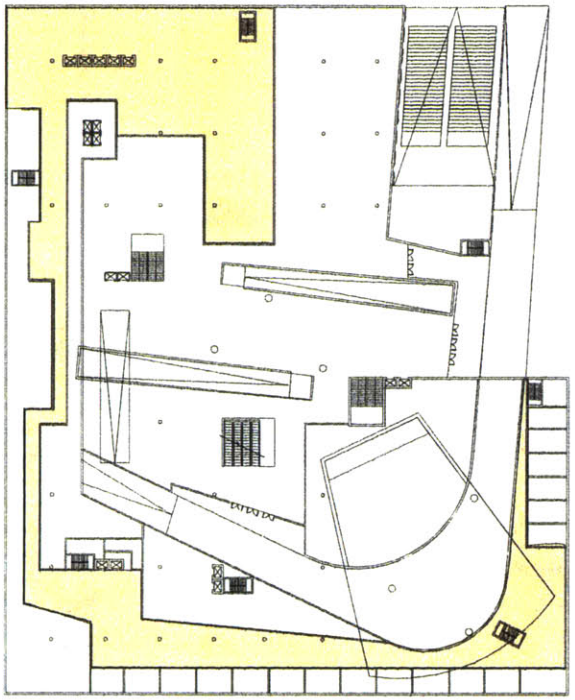
Cultural/Entertainment/Restaurants L.3

Restaurants Arts/Theater

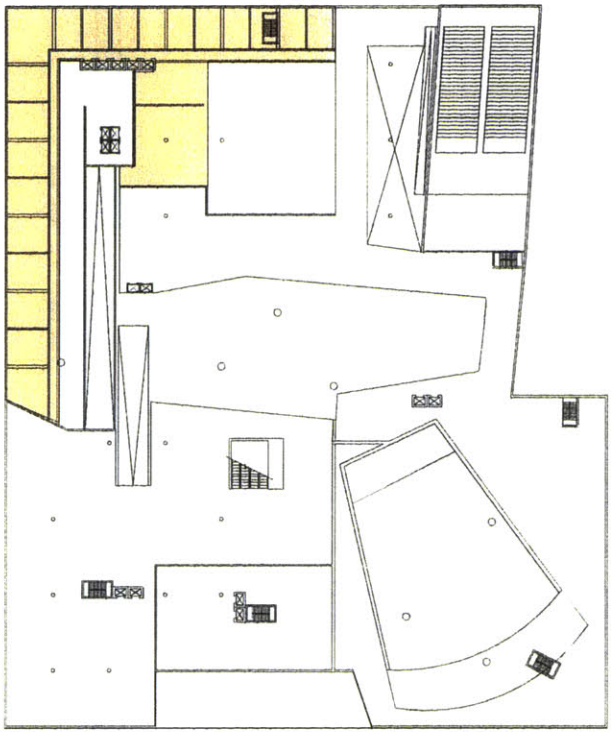
ENTERTAINMENT DIAGRAM L.-01, 01, 02, 03



Hotel L.1

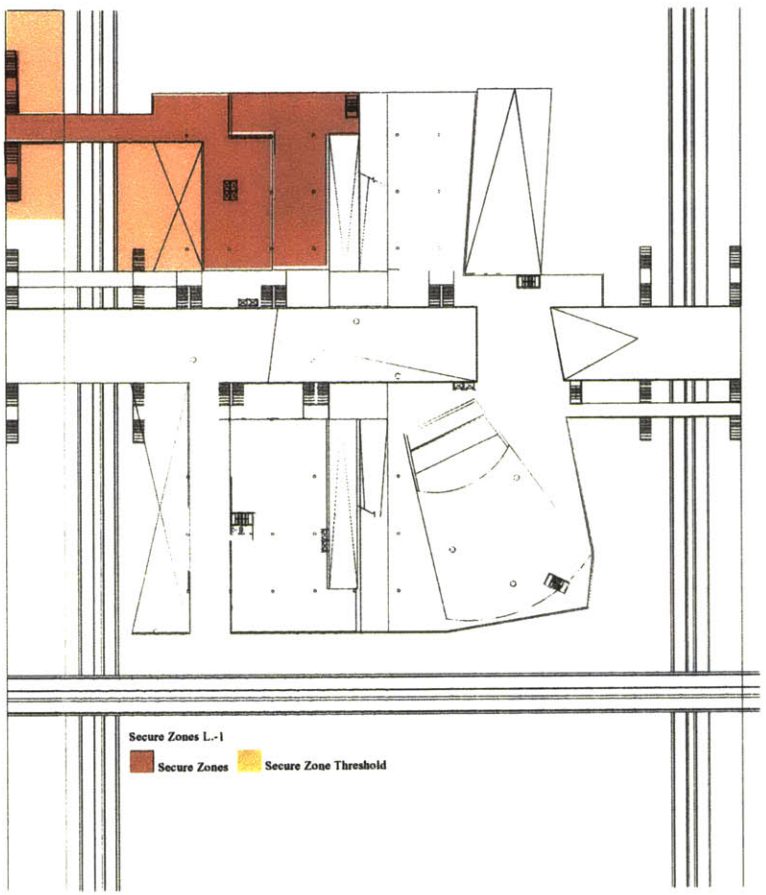


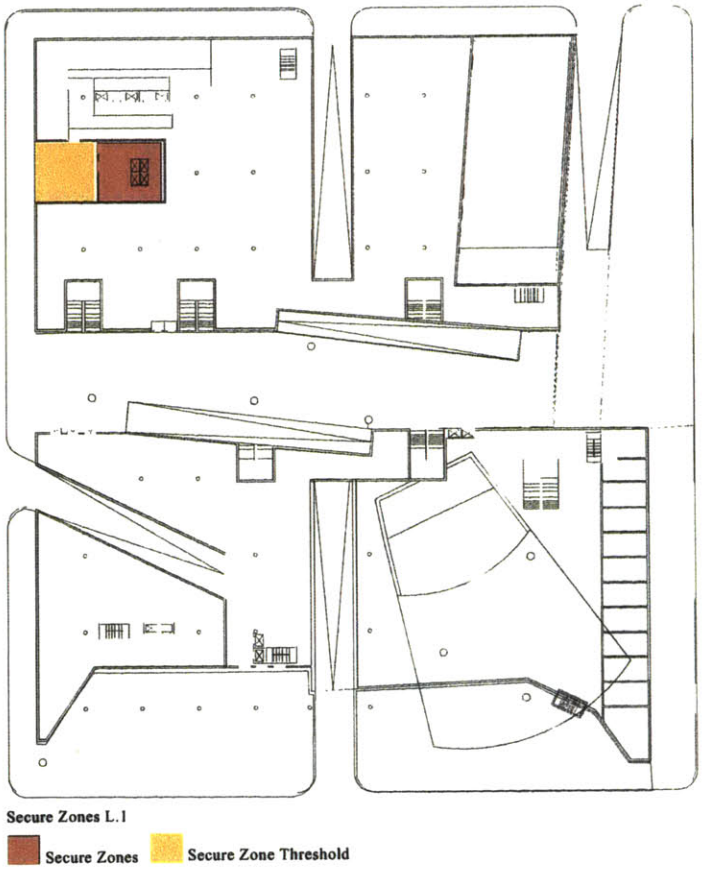
Hotel L.2

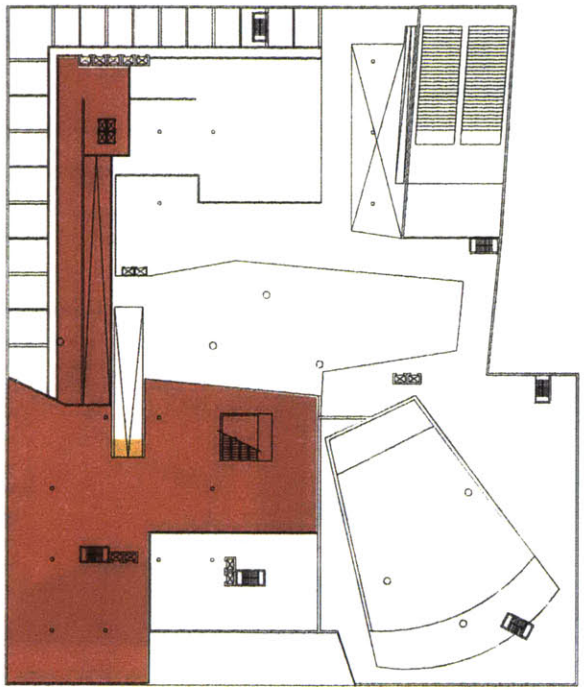


Hotel L.3

HOTEL DIAGRAM L.01, 02, 03

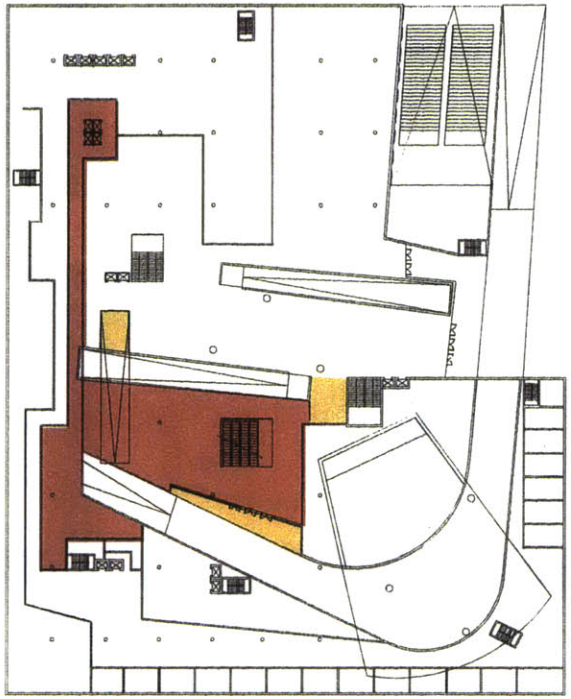

Secure Zones L.-1
Secure Zones
Secure Zone Threshold


Secure Zones L.1
Secure Zones
Secure Zone Threshold



Secure Zones L.3

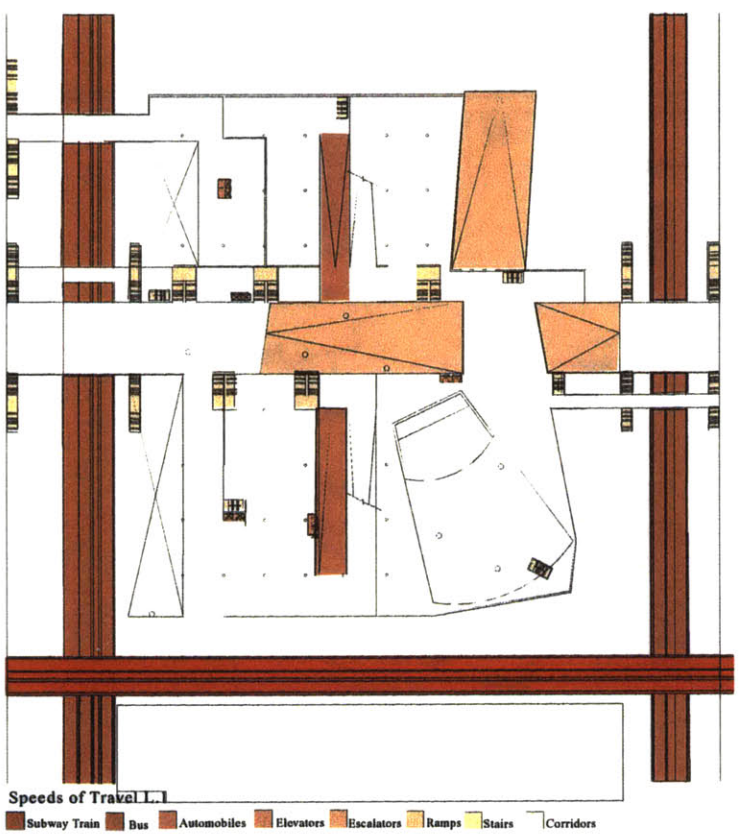
Secure Zones Secure Zone Threshold

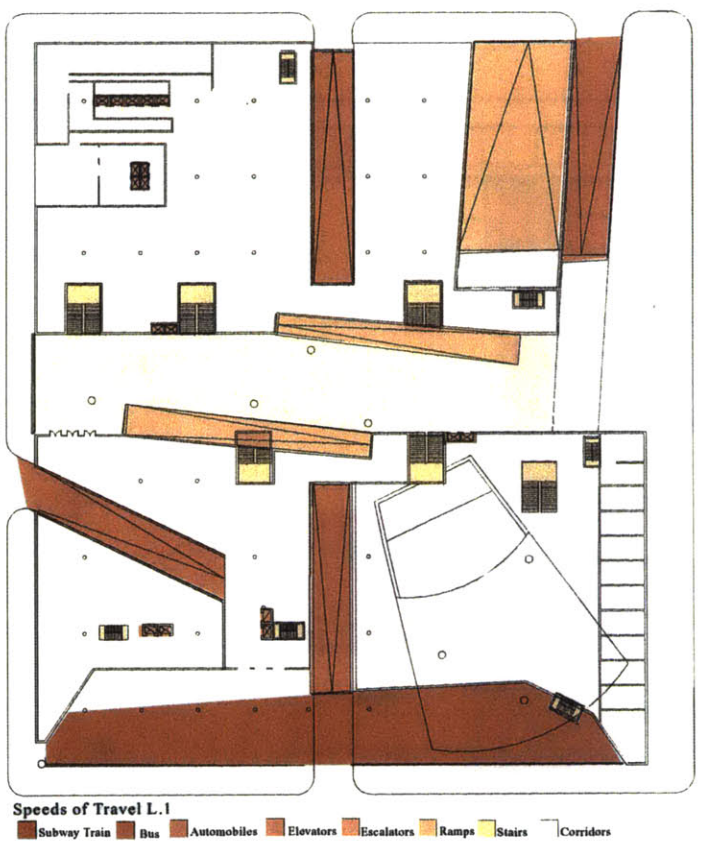


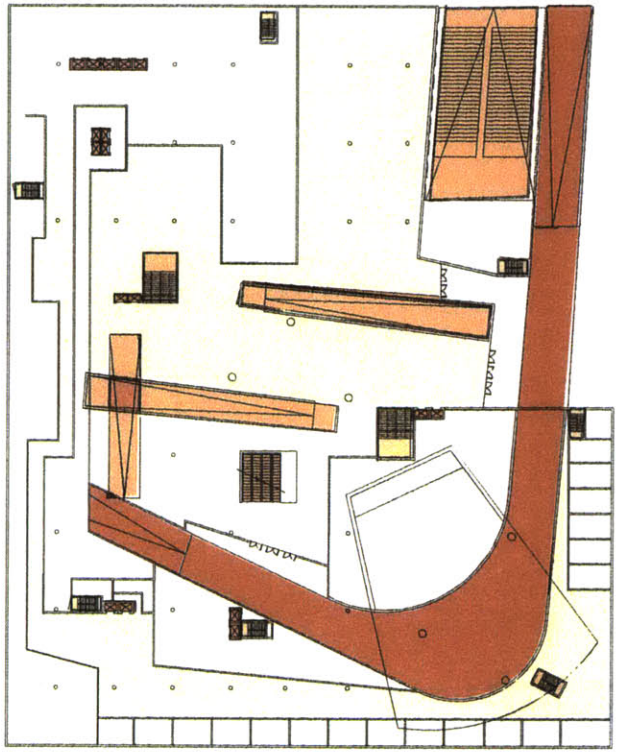
Secure Zones L.2

Secure Zones Secure Zone Threshold

SECURE ZONE DIAGRAM L.-01, 01, 02, 03

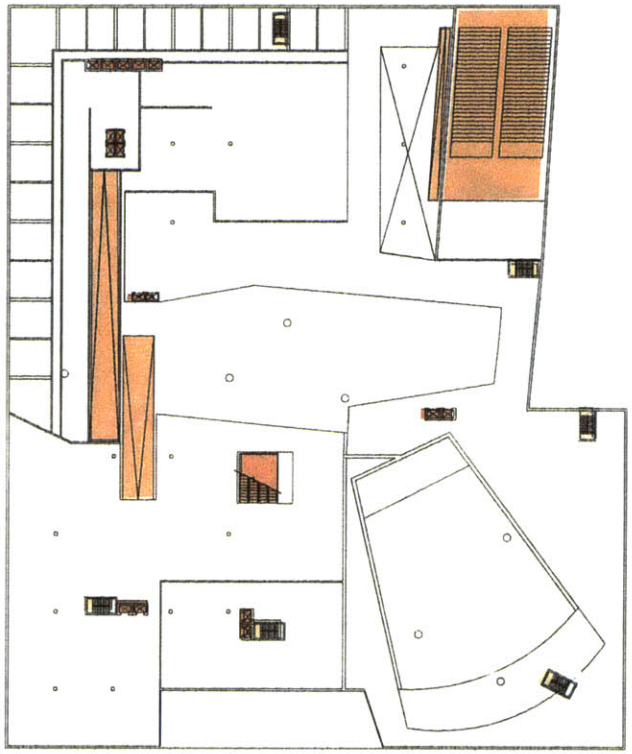

Speeds of Travel L.1
Subway Train
Bus
Automobiles
Elevators
Escalators
Ramps
Stairs
Corridors


Speeds of Travel L.1
Subway Train
Bus
Automobiles
Elevators
Escalators
Ramps
Stairs
Corridors



Speeds of Travel L.2

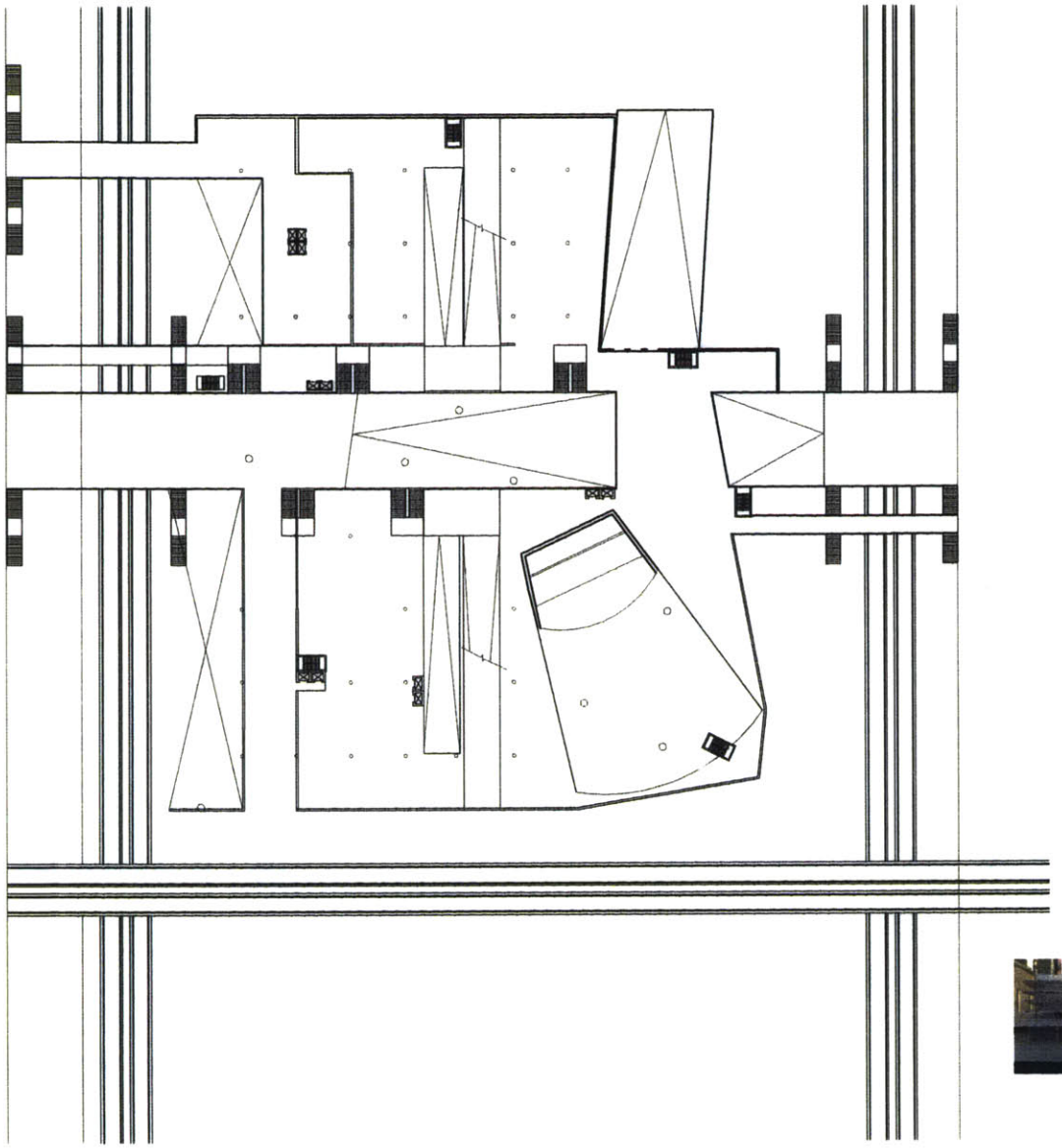
Subway Train Bus Automobiles Elevators Escalators Ramps Stairs Corridors

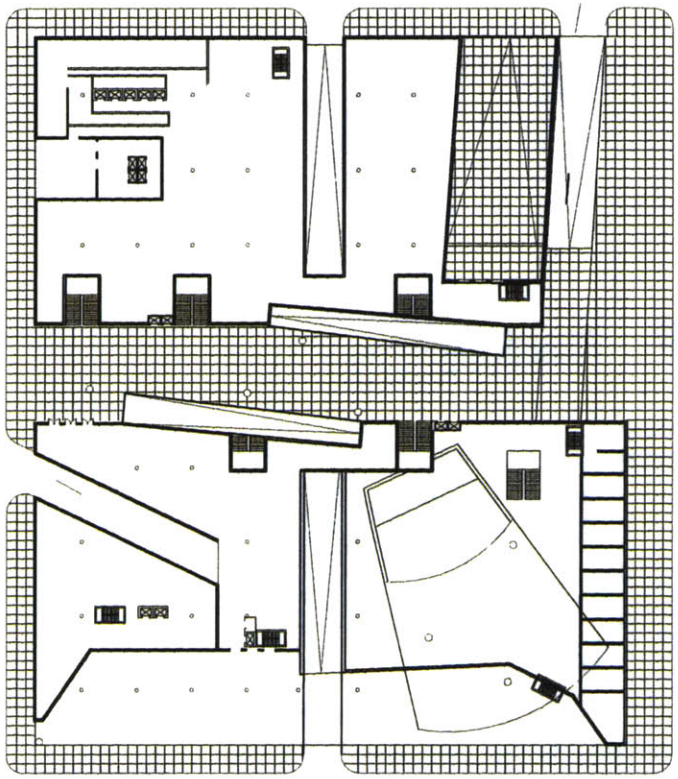


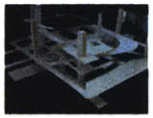
Speeds of Travel L.3

Subway Train Bus Automobiles Elevators Escalators Ramps Stairs Corridors

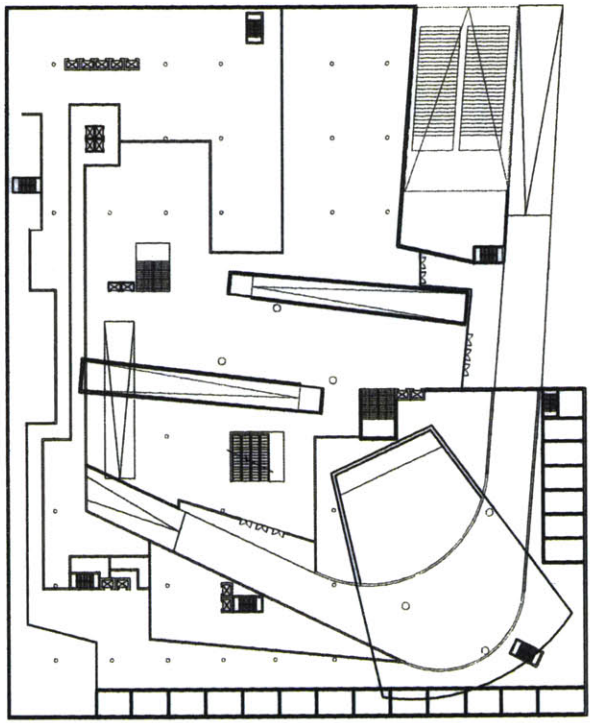
SPEED DIAGRAM L.-01, 01, 02, 03



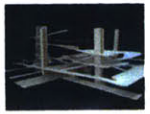


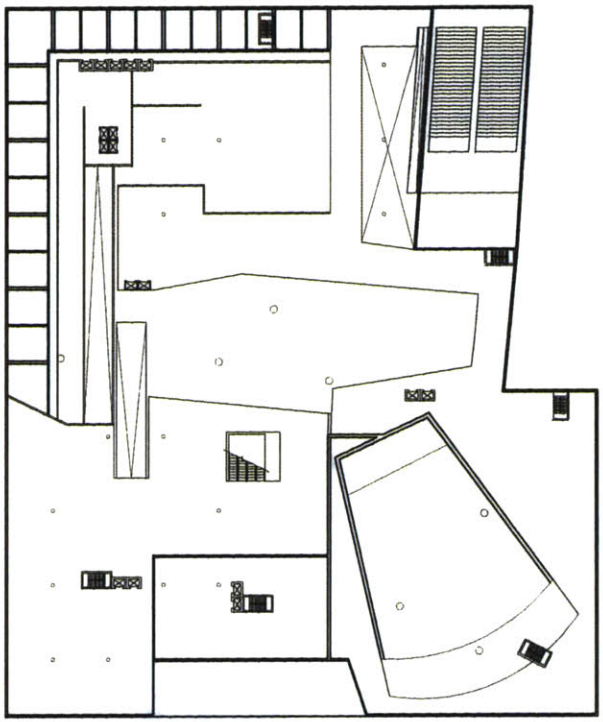


GROUND FLOOR

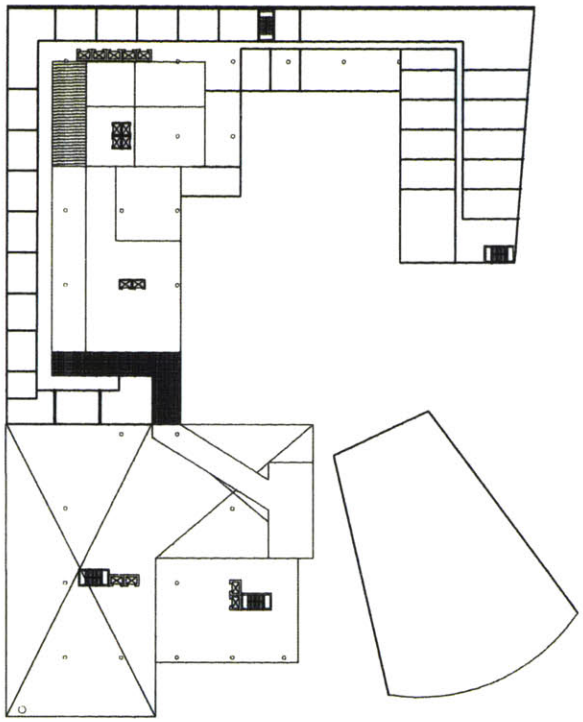


SECOND FLOOR

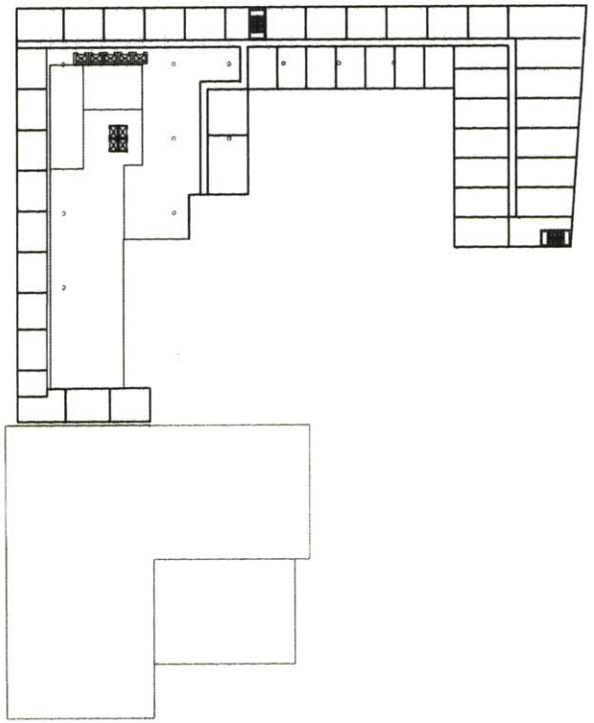




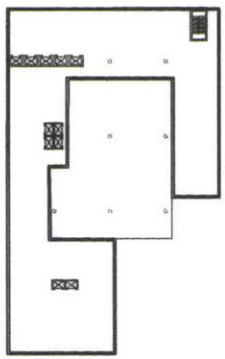
THIRD FLOOR



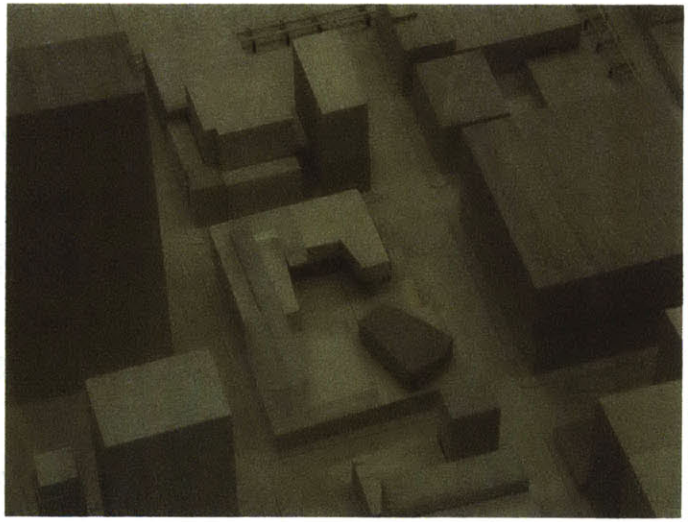
FOURTH FLOOR

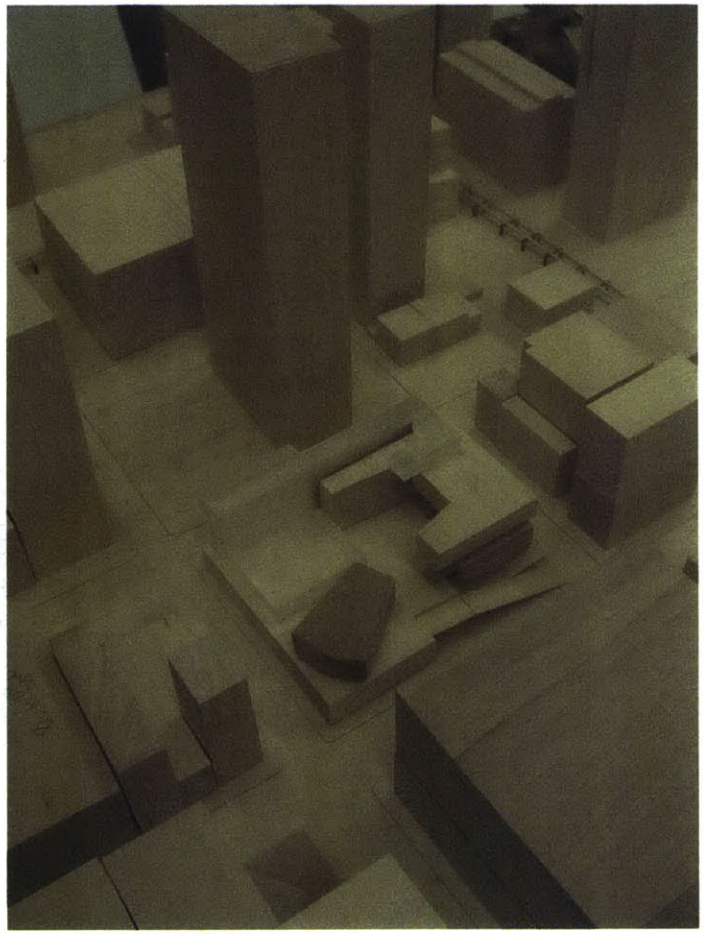


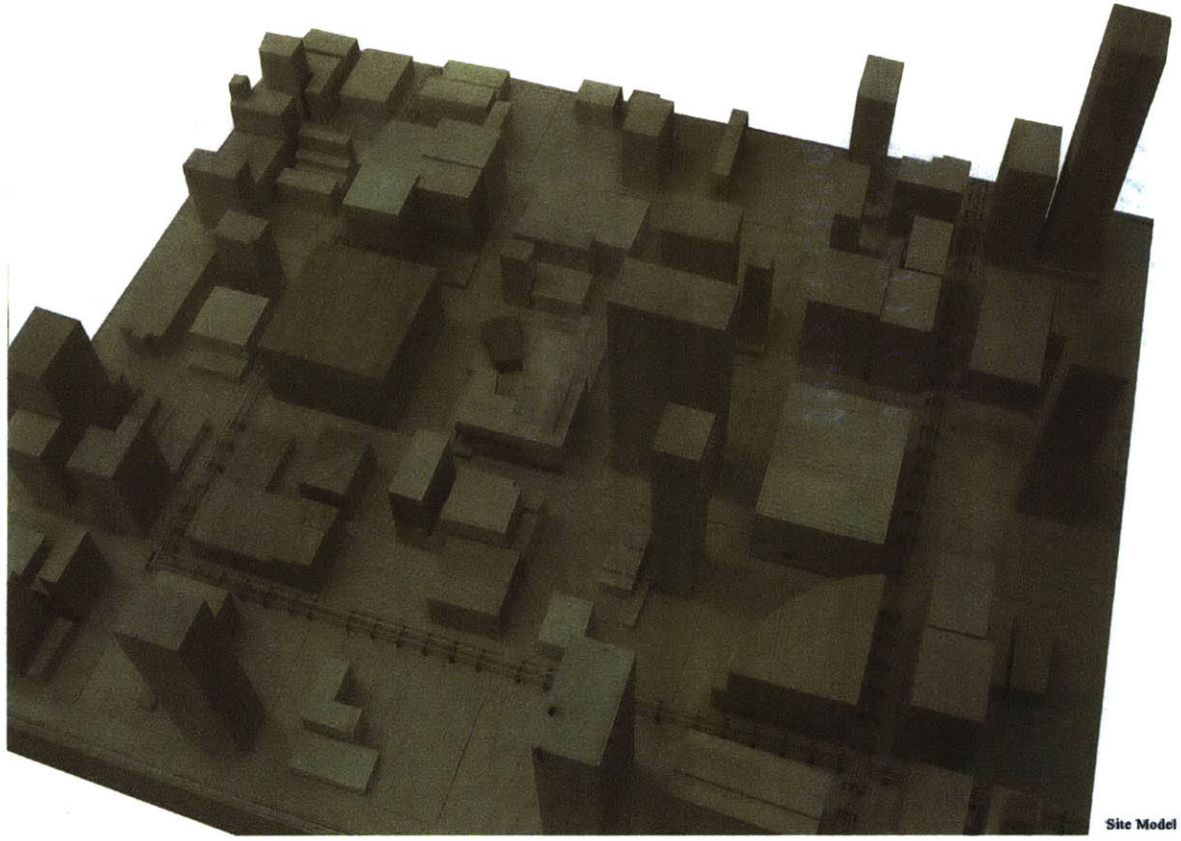
FIFTH FLOOR



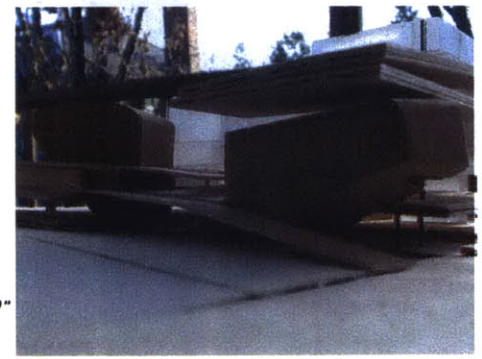
SIXTH FLOOR

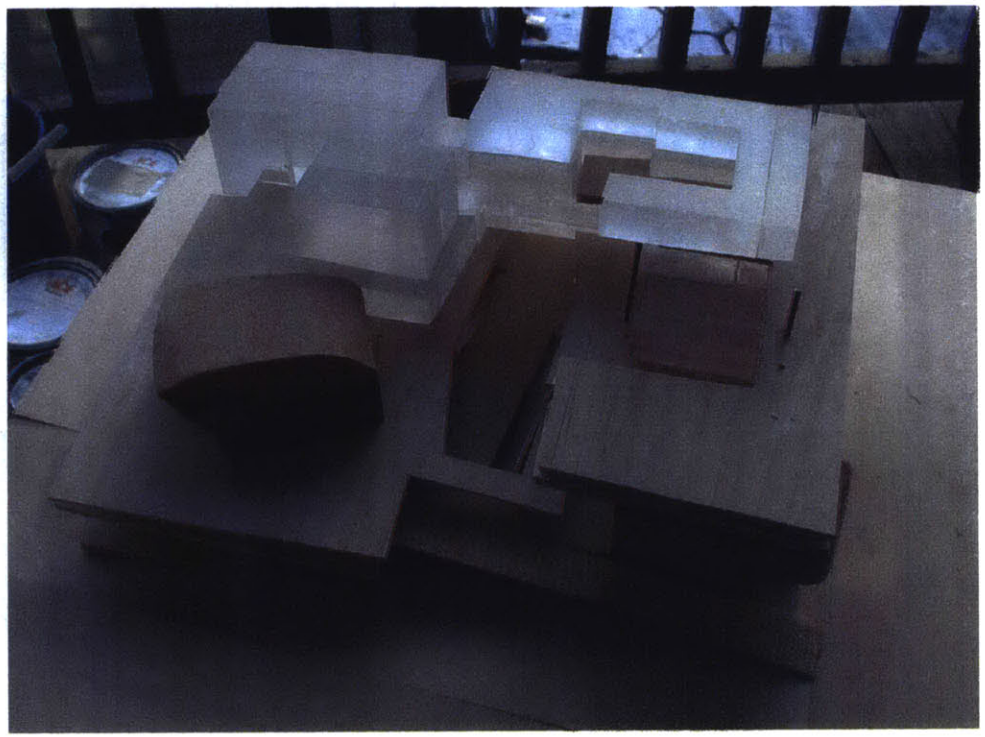




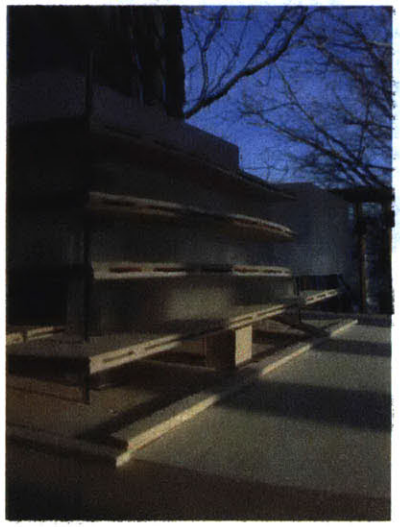


Site Model 1/64" = 1' 0"

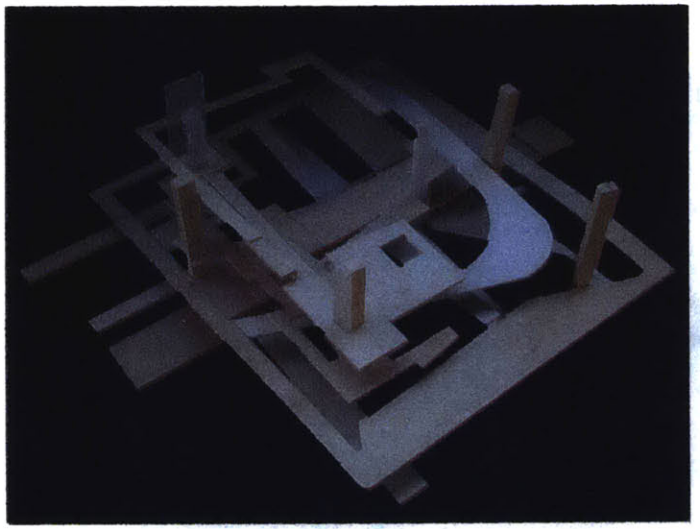


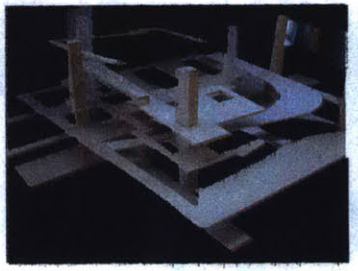


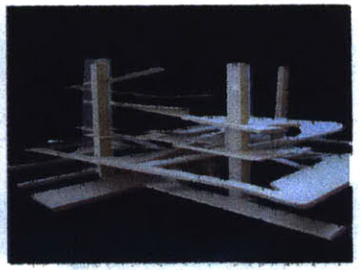
Basswood and plexiglass model 1/32" = 1'0"
Views from (clockwise from large image)
E.S.E.; W.N.W.; W.N.W.



Basswood and plexiglass model 1/32" = 1'0"
Views from (left to right): N.N.E; S.S.W.







Circulation model at 1/32" = 1'0"

FIGURE CREDITS

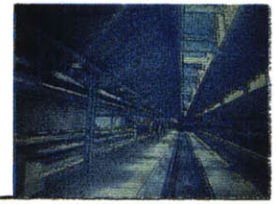
All images and figures, unless otherwise noted, are by the author.

Section 01: TRAIN TRAVEL

1 Rand McNally *U.S. Railroad Main Lines*, 1929
2. http://www.art.com/
3. Ibid.
4.a. James Corner and Alex S, MacLean, Taking Measures Across the American Landscape (New Haven: Yale University Press, 1996., 56.
b. Ibid., 45.
c. Ibid., 126.
5. Ibid., 107.
6. Web page not noted.

Section 02: INVESTIGATIONS

1.a. Steven Parissien, *Pennsylvania Station* (London: Phaidon Press Ltd., 1996), 25.
b. Ibid., 17.
c. Ibid., 18.
2. Ibid., 53.
3.a. Kenneth Powell, *Grand Central Terminal* (London: Phaidon Press Ltd., 1996), 17.
b. Ibid., 17.
c. Ibid., 19.
4. Ibid., 58.
5. Axel Menges, ed., *Arup Hong Kong Station* (Stuttgart: Edition Axel Menges, 2001), 27.
6.a. Ibid., 53.
b. Ibid., 51.
7.a. http://www.galinsky.com/buildings/oriente/
b. Ibid.



8.a. http://www.westjr.co.jp/english/english/products/con03/
b. Ibid.
9. http://www.thebritishmuseum.ac.uk/pd/exhibitions/
10. Rem Koolhaas, S, M,L,XL (New York: Monacelli Press, 1998), 1200.
11.a.-y. George Douglas Rail City Chicago (San Diego: Howell-North Books, 1981), .
12.
13.a. Hashim Sarkis, ed., *Case: Le Corbusier's Venice Hospital and the Mat Building Revival* (Munich: Prestel Verlag, 2001), 46.
b. Ibid., 38.
c. Ibid., 39.
d. Ibid., 40.
e. Ibid., 41.

Section 03: SITE
1. http://tigger.uic.edu/depts/ahaa/imagebase/ca/loop/loopframes/wpaloopframe.html
2. http://tigger.uic.edu/depts/ahaa/imagebase/ca/loop/loopframes/wpaloopframe.html
5. Sandborn Fire Insurance Map
6. Camillo Sitte, *City Planning According to Artistic Principles.* Columbia University Studies in Art, History, and Archaeology; no. 2. (London: Phaidon, 1965), .
3. Web site not noted.
4. Web site not noted.

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Burnham, Daniel H., and Edward H. Bennett. *Plan of Chicago.* NewYork: Princeton Architectural Press, 1993.

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City of Chicago, Department of Planning and Development. *Request for Qualifications, Purchase and Redevelopment of the 108 State Street Property.* Chicago: City of Chicago Department of Planning and Development, 2002.

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