# CHICAGO TRANSPORTATION ADAPTATION

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Terminal Project 2008-2009

# TABLE OF CONTENTS


INTENT NARRATIVE/ INDEPENDENT STUDY 4

RESEARCH/ANALYSIS 24

PROCESS DOCUMENTATION 62

FINAL DESIGN DOCUMENTATION 78

CONCLUSION 106

BIBLIOGRAPHY 108

ACKNOWLEDGEMENTS 110

Chicago Transportation Adaptation

By Amy Kraus

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In Partial Fulfullment of Requirements

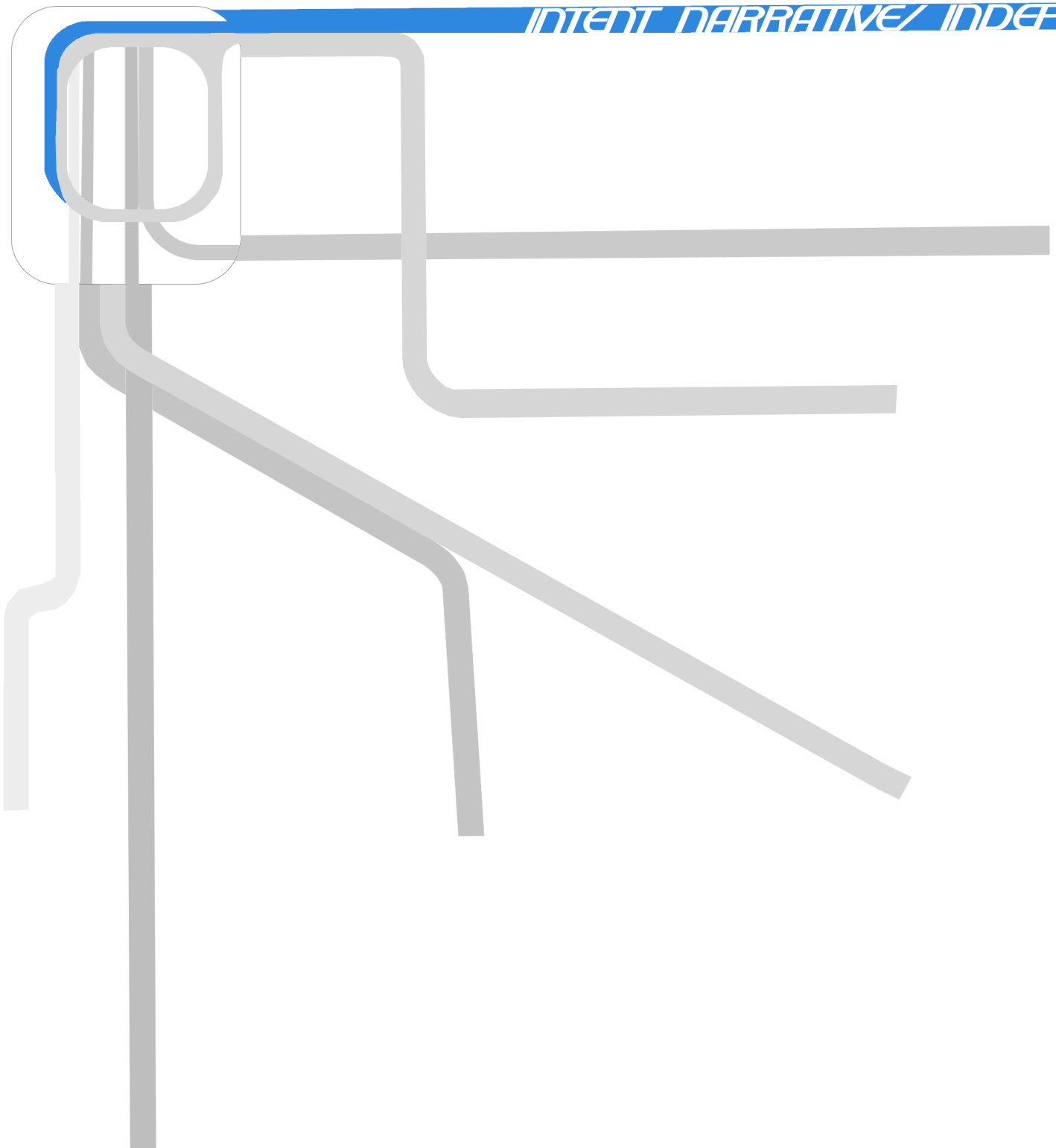
For the Degree of Master of Architecture

Major: Architecture

Under the Supervision of Professor Lindsey Ellsworth-Bahe

Lincoln, Nebraska

May, 2009



While living in Chicago, without a car, I developed a deep interest in the network of transportation that enveloped the city. The freedom from parking tickets, traffic jams and pricey parking rates was liberating to say the least, especially after coming from Nebraska, a culture dominated by the automobile that I have participated in since the age of fourteen.

As I studied abroad in Europe last year, I chose to document public transportation in cities visited as an independent study. While traveling to over 100 cities in nineteen different countries during five months of backpacking on three continents, I took every possible form of public transit, ranging from overnight ferries, to camels, and underground metro trains. The differences in transit between the European countries were not nearly as obvious as the divide between the American and the European standards for public transit. Living in London, and experiencing the London Underground on a daily basis, most likely the best public transit system in the world, made coming back to Chicago's transit system another big adjustment. The wait for trains could be as long as 20 minutes, compared to London, where trains ran every 60 seconds during rush hour. The city of Chicago is not not adequately served by rail transit. There are areas of up to eight square miles within the city limits that lack a station. Even some of Chicago's most dense areas are lacking in rail support.

Compared to Europe and parts of Asia, the United States is lagging in public transit railroad networks and infrastructure. Amtrak, the American passenger train company, shares the tracks with freight trains resulting in extremely delayed and inefficient travel making it impossible for the company to turn any profit. In fact, Amtrak has absorbed more than $23 billion in federal funds over the past 30 years - and leaves no promise for a future profit that justifies this expenditure. In 2001 a report predicted that overall transportation demand will double in the next 20 years and triple in the next 50. However, the 21st century politics of congestion, economics, environment, and energy are helping passenger trains survive. President Obama has released his plan for a high-speed light rail system that will cover various regions of the country, and although many may be disgruntled over the taxes that will be used to carry this out, adding tracks is exponentially cheaper than adding a new lane to a freeway.

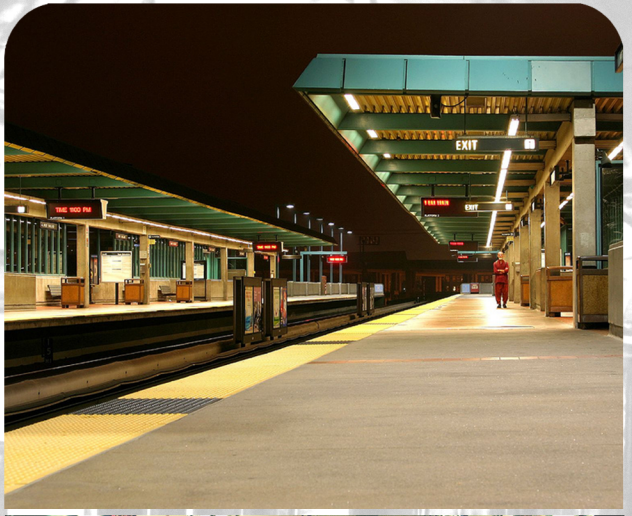
# RUSH HOUR CONGESTION



The benefits of public transportation are numerous, however many problems exist with the current systems in place. For one, many buses and trains are completely full during peak hours, leading to a negative perception of public transit.

# OFF PEAK HOURS





In stark contrast to rush hour, trains during off-peak hours often travel empty, wasting valuable resources and funding, elements that should be applied to higher peak times.

# HUMAN BEHAVIOR

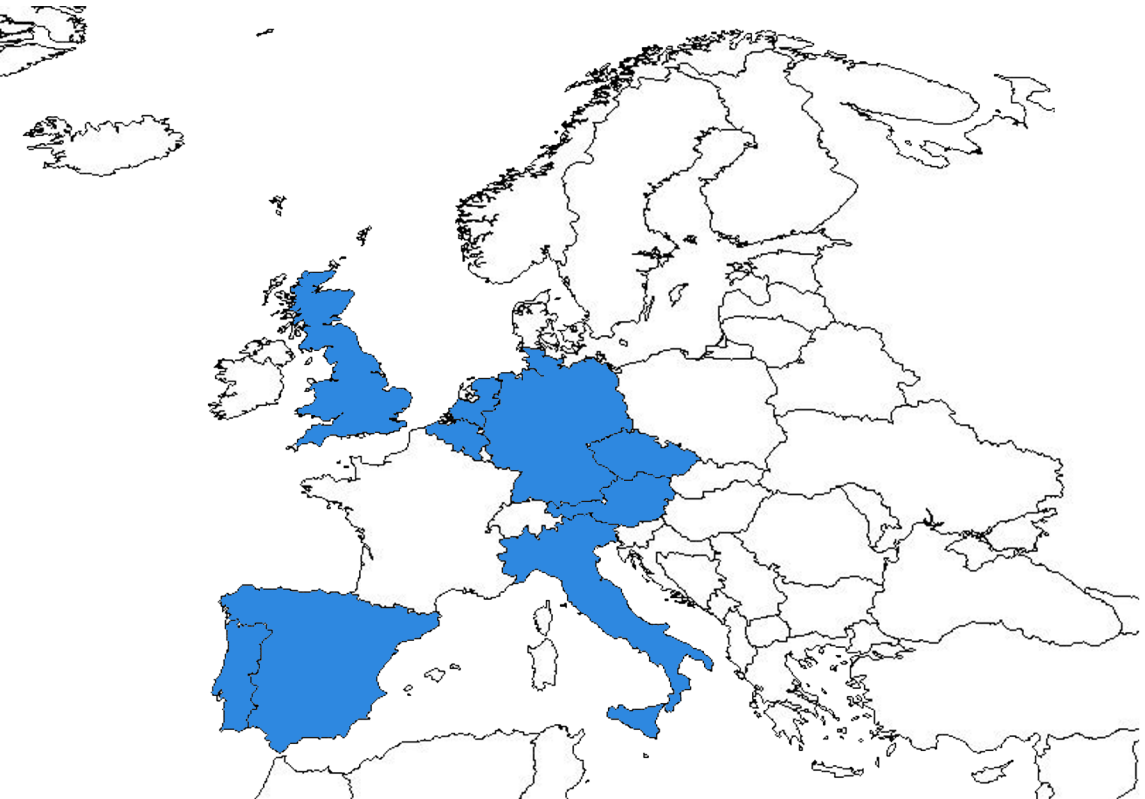
## ASPECTS OF PRESENT SYSTEM

- SOCIAL CLASS ISSUES
- PUSHING
- ANNOYANCES
- EMBARRASSMENT
- DISCOMFORT
- CULTURAL ENCOUNTERS
- BRINGING PEOPLE TOGETHER
- OVERCROWDING
- PERFORMERS
- HUMAN INTERACTION
- WAITING
- AVOIDING EYE CONTACT
- MUSIC

## ASPECTS OF FUTURE SYSTEM

An analysis of public transit systems to various cities visited was done while studying abroad. Through widespread travel in Europe and analysis of its metro systems, one can clearly see the high standards inherent to European design present in the continent's metro systems. This design creates high quality environments, comfortable, user-friendly spaces that in turn help increase the frequency of use and further the demographic interaction. Despite the many advantages of public transportation, the problems with the current systems are still numerous.

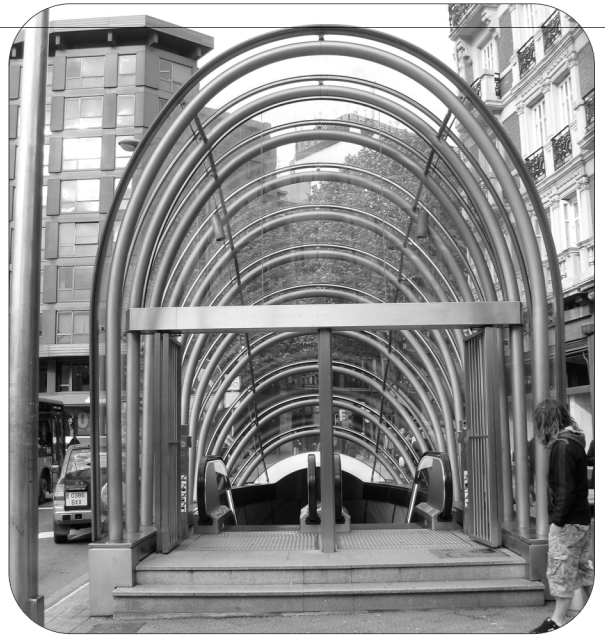
The lower social class associated with public transport, the discomfort caused by packed trains at peak times, and the wasting of resources by driving buses and trains is still a problem everywhere. This problem is much more apparent in the United States considering the general massiveness of the spread-out nation and it's dependency on cars. Considering that mobility is a key topic and sustainability is on the rise, the issues need to be further addressed to maximize efficiency for the citizenship and utilization of the planet's resources.



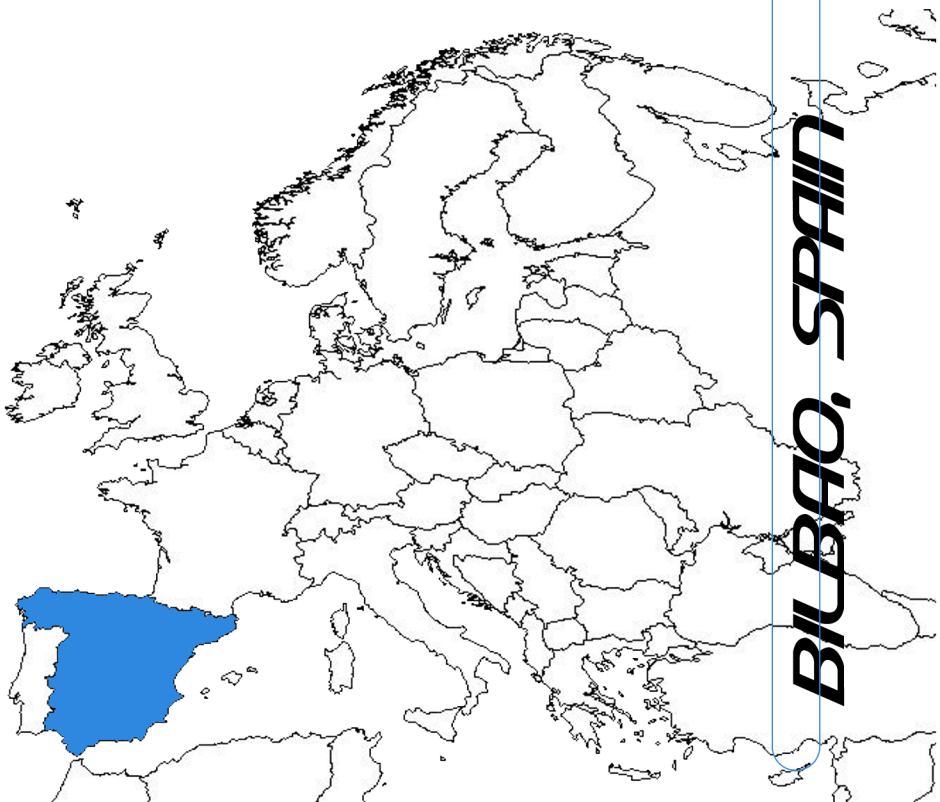
# BARCELONA, SPAIN

Barcelona is a foward-thinking place, always at the cutting edge with its art, design, and cuisine. The city planners and officials used the Olympics of 1992 as a spring-board to bring about major improvements to the city's infrastructure and transportation system. The city currently has a very well-developed system that spans the city, including buses, trams, and underground trains. The metro system spreads its tentacles throughout the city, bringing passengers close to all areas of attraction with less than ten minutes of walking to all locations.

Barcelona uses turnstiles at the entrances of its matro stations to ensure payment of its passengers. The city also utilizes artwork as well as high design in their stations, and has even gone a step further by paying artists to perform at certain locations in metro stations, providing a nice ambiance for those passing by. The trains themselves are advanced, with blinking dots tracking the route on the map, tv monitors, and open-train design.



Bilbao, the commercial hub of Spain's Basque country, is best known for it's Guggenheim Museum. Yet the city is gaining popularity with its growing list of architectural icons. Norman Foster, as well as Santiago Calatrava and a number of other architects, has done work on transportation hubs for the city, as pictured in the top photo.
Bilbao has an outstanding public transportation system, with an easy to follow web of metros, trams and buses crisscrossing the city and heading into the country side. The high design of the metro stations adds much appeal to the public transportation system. The station has screens displaying the number of minutes until arrival of the train. The trains themselves are new in design and have tracking devices that show where the train is with a blinking red dot that moves along the map posted inside.



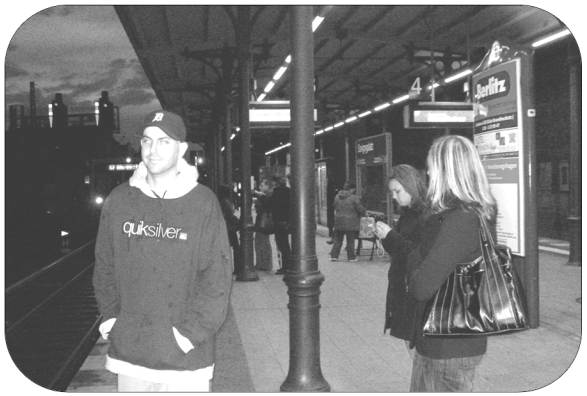
# BILBAO, SPAIN

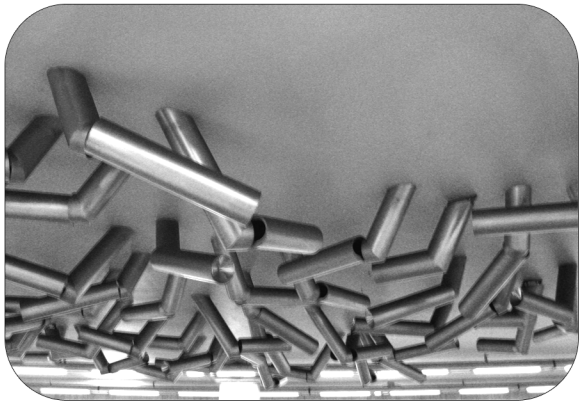
# BERLIN, GERMANY

Berlin is a classic example of urban renewal or post-war rebuilding. The metro system is well developed and covers the city thoroughly despite the hard times the city has endured. During the war an entire line was converted into army barracks only to be discovered recently and now opened as a museum, complete with wartime relics.

The new central station, Haufbahnhof, (shown in bottom right photo) is an architectural icon for the city. The city trains operate on an underground and above ground system. The trains that go from city to city are the new high-speed maglev trains found in Germany and Japan.

The metro trains are a mixture of older trains as well as modern trains that are open passenger cabins from front to back (shown in third photo). These open trains alleviate the problem of crowding and congestion by spreading passengers throughout the train. This design also helps keep trains safer during late off-peak hours by improving visibility of all passengers. There are designated spaces that allow passengers to bring bikes aboard the train.



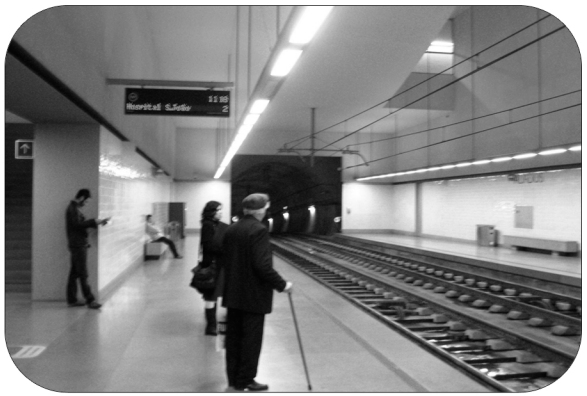


Brussels, the capital of Belgium as well at the European Union, is an important place of business. The city itself is seductive with its surrealist art, Art Nouveau architecture, cafe culture, and large number of galleries and restaurants. Brussels has taken their obsession with art and applied it to their underground metro stations. Each stations displays work by various Belgium artists. This gives the spaces a nice feel as well as a distinction between the other stops.

# BRUSSELS, BELGIUM

# PORTO, PORTUGAL

Porto, the northern port city of Portugal, remains impressively un-Americanized. The city has recently taken a giant stride into the 21st century with the construction of a metro system. Porto's metro system currently comprises four lines converging at the Trinidade stop. The stations give the old city a modern twist. The waiting areas are vast, with extremely high ceilings and skylights, giving the underground "tunnels" a sense of grandeur. The stations appear safe with guards stationed at each station after dark.



Lisbon, the capital of Portugal, just recently renovated and expanded the metro system, within the last ten years, in preparation for the 1998 World Exposition held in the city. The addition of the Oriente train station, the gateway to the new business district and 1998 World Expo area, creates an architectural icon for the city. The amazing design done by Santiago Calatrava acts as a welcome to visitors.

The underground trains were mostly new in design, with connected carts, allowing passengers to walk from end to end without the obstruction of doors. This design facilitates the rush hour passengers who do not have to cram into one cart, but can easily distribute themselves throughout the train, adding to the comfort. This design also may help with crime on trains, as it would be highly unlikely to be alone on the entire train and passengers can see from one end to the other. On the other hand, an annoyance is that beggars utilize this design by walking from one end of the train to the other asking for money. The underground stations were clean and very spacious, with high ceilings gave the impression of being in an above ground space. The stations borrowed the ideas of other cities by incorporating artwork into the stations. The city also stayed native to their own traditions by covering the stations in tiles, to fit in with the city's mosaic style.

## LISBON, PORTUGAL

Venice is a strange, surreal city in which everyday life seems somehow more dramatic than elsewhere. Even Venetian traffic jams are impressive with vaporetti (water buses), chintzy gondolas, and delivery barges, all massed together on the grand canal. The city's main mode of public transportation are vaporetti. The water buses are extremely expensive at approximately $10 for a one-way ticket. Yet, the buses are basically a necessity to get around the city, which has only three bridges that cross the grand canal. As expensive as the water buses may be, they still provide a cheaper, yet less romantic option than the famous gondolas. The problem with these water buses is the slow travel and low number of boats.

The city of Rome has a newly implemented metro system. The problem with the system is that it only has two lines to serve the entire monstrous city. Neither of the lines pass through the central area of Rome. The lack of service to the central area may be due to ancient ruins and buildings throughout the city that are too precious to risk crumbling foundations and the long construction process a new underground system would involve.

The stations and trains that are in place are very modern and up to par with the newest metros throughout Europe. Some of the features of the stations include clean spaces withmoderately high ceilings, artwork in different stations to brighten the area and provide distinction between the different stations. There are also TV projector screens in the stations that flash advertisements or breaking news stories to help pass the time while waiting for trains to arrive. The design of the trains themselves is very modern, with sleek, colorful seats and open trains to allow free passage from one end of the train to the other, to prevent congestion in one cart. The use of TV monitors instead of physical advertisements plastered to the train walls, allows the metro to gain money from advertisers, yet still keep the trains looking minimalist.

ROME ITALY

# VIENNA, AUSTRIA

The underground station in Vienna acts as an underground art gallery. Vienna spends thousands of tax dollars each year to safeguard and develop the artwork in the underground stations. Works of art can be found in the majority of the stations that hundreds of Austrian artists have contributed to so far. Vienna has a unique transportation system which fuses trams with underground trains. The trains themselves can depart underground, gradually rise to the surface, and drive on street tracks, obeying traffic regulations. Vienna's station at UNO City is a unique design that fits the area (shown in third photo).

Vienna seemed to have a problem with cleanliness, at least by American standards. Many of the stations are covered in dusk and need to be swept of garbage. Vienna, like many other cities including Rotterdam, Porto, Brussels, and Amsterdam, has ungated entrances to the trains. This may help with initial costs of installing turnstiles that require tickets for entrance, however over time the city probably loses money due to passengers willing to risk not buying a ticket.

Prague is yet another example of a city that utilizes artwork in the underground stations. Some of the underground stations seem to be a homage to Victor Vasarely, a kinetic artist of the 1970's. There are thousands of repetitions of glass or aluminum elements with all stations looking different on line A, which was opened in 1978. Station walls are covered with aluminum tiles which come in three versions, convex, concave, or flat, and in different shades of color. The designers managed to create a stunning science-fiction-like appearance. Like most cities, underground stations closer to nice, tourist areas were cleaner and better preserved. Due to the walkability of the city's attractions, no photos were taken of the underground system.

The city also utilizes above ground tram lines, and buses. Getting out of the city can prove to be difficult due to the confusing, run-down central station that does not facilitate transportation for English speakers. In the surrounding small towns, they run single cart trains for passengers (shown in the bottom photo). The train stations outside of the city are rundown and small (second photo). The bus system around the country-side is infrequent and confusing in nature.

# PRAGUE, CZECH REPUBLIC

Amy Kraus
Thesis Proposal
Lindsey Bahe: Mentor
04/07/08

Chicago Transportation Adaptation

The massive environmental issues facing the world currently have amplified the need for sustainability. The price of oil, the crowded streets and freeways, and the vehicular emissions seeping into our atmosphere, all have brought public transportation to a heightened level of importance. The price and scarcity of oil will cause the global community to forego the privacy of cars and move to alternative modes of transportation. For this to happen, cities need to improve or build upon public transportation. Design is a powerful tool that can be used to address the problems of public transportation. Chicago has the bid for the 2016 Summer Olympics, a bid which will necessitate the need for a new and improved public transit system to accommodate the proposed Olympic Village, and the growing population of the city.

Mobility is the key topic in all debates concerning the future of cities. It is the subject around which design professionals are constructing a new discourse. Successful architectural design can impact public transportation by improving the ambiance of space, providing comfortable, user-friendly spaces both inside transit stations and the trains or buses themselves; the result of this rethinking and analysis could only serve to improve upon these conditions, improvements that would increase the frequency of use, reinforce the community interaction, and the relation to a broader demographic. The social impact that architecture has on transportation hubs is being examined this semester by traveling throughout Europe without personal transportation. The extensive travel to cities in over 20 countries has lead to a well-rounded understanding of how transportation systems work as well as the impact design has on the users. Europe is drastically ahead of the United States in terms of, well-designed, technologically advanced public transportation systems. The attention to detail and the importance placed on design is apparent in the transportation systems throughout the continent. However, very few cities have dared to rethink the primitive idea of tracks and train that came into existence nearly two centuries ago.

Chicago is the architectural capital of the United States; its skyline continuing to raise and become more impressive with each passing year. The city has three buildings ranking in the top 20 for tallest in the world, and it continues to develop new, taller buildings with each passing year. The two skyscrapers, the Spire by Calatrava and the Trump Towers, both currently under construction, will compete for tallest in the world. The obvious importance of this advanced design alludes to the city's desire for a new architectural icon, an icon that does not necessarily reach towards the sky, but challenges the city's perception of transitory design. This major transportation hub would act as a new attraction for visitors and a sense of pride for locals.

The Olympics in recent years have pushed the boundaries as to what is possible or feasible in architectural design. The Olympics in Beijing have brought attention to the city and its emergence as a leader in progressive forms of architecture. If the city planning and infrastructure is designed to better the city in future years, much like Barcelona, Spain in preparation for the 1992 Olympics, then the Olympics themselves can serve to

create a ripple effect, a reaction that benefits everything and everyone.

In Chicago, the existing, elevated train system ("L"), is dated and needs to be brought up to the progressive architectural standards of the rest of the city. The Chicago Transit Authority (CTA) has been trying in recent years to gain increased tax funds to improve upon the existing stations, stations that are mostly above ground with little visual appeal.

The elevated train is a Chicago landmark that is distinctly their own. However, the trains are all dated and extremely loud for the surrounding neighborhoods. They are not sustainable and will not be tolerated in the coming years with the growing attention being placed on global warming. The addition of a major transport hub will raise the standard of transportation within the city, a necessity in preparation for the 2016 Olympics.

The proposed Olympic Village is centrally located and will integrate public transportation with new infrastructure. The new transit hub will be located adjacent to the Olympic Village in downtown Chicago, south of Grant Park. Currently, Roosevelt station is the closest hub to the Olympic Village, connecting the green, red, and orange lines. The existing routes of the CTA will be reused for this project. A new line serving the Olympic Village and areas currently inaccessible by the "L" and may be added to provide convenience.

The benefits of public transportation are numerous, however many problems exist with the current systems in place in Chicago. For one, many buses and trains are completely full during peak hours, but run nearly empty during off-peak hours. There is also a class issue associated with public transport. By seeing someone standing at a bus stop, one automatically makes assumptions about the lower class of the individual. Seeing individuals standing on the side of the road during extreme weather conditions scares many people away from using public transport. Travel in trains or buses is an interesting dynamic that should be addressed. The way people stare at the floor or hide behind newspapers shows a sense of annoyance, embarrassment, or discomfort. By completely rethinking the way mass transit functions, the proposal would become a theoretical solution to what Chicago could do to address the problems of public transport and advance in the design world. For example, instead of having trains and buses that are too full at peak times and empty at other times, individual high-speed pods that run along a light rail would be proposed. These pods could hold 10-15 people at one time and would run the number needed for the time of day, sending more in the morning and evening. The travel pods could be programmed to decipher which stations have the largest amount of ticket holders at given times. With the use of digital technology, the purchase of a ticket to the transit system would program the starting and ending destination in advance. The pods with longer distances to travel would not need to stop for travelers going only a short distance, who would ride a different pod making frequent stops.

To keep up with changing times and technology, this central hub near the proposed Olympic Village would be energy efficient. Using the idea of biomimicry as a precedent, the structure would be self-sustaining, adaptive, and possibly self-replicating. The station would give travelers the capacity to map their route with the use of digital technologies. The project will explore the use of new materials and strategies for building and the

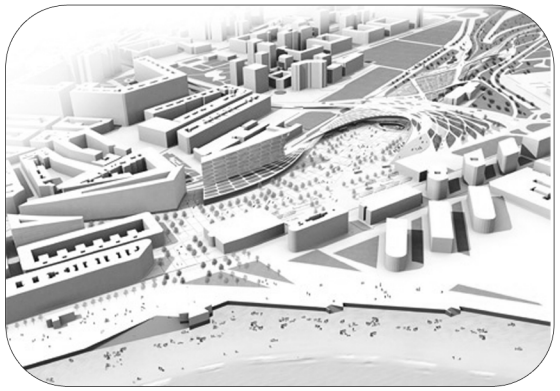
integration of aesthetics and technology for high performing, cutting-edge architecture. The station itself will adapt to its surroundings and perform in a number of ways. The movement of the pods will affect the station itself and cause a reaction in the structure. The reaction a sea anemone has to its environment, the way a sunflower follows the sun, and the movements of a Venus fly trap will all provide insight as to how this building begins to function.

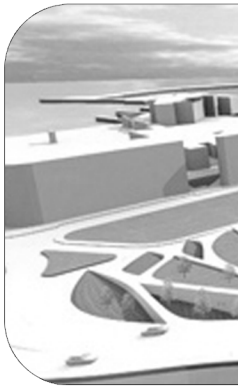
The site in Chicago will be documented and surveyed in the summer in preparation for the school year. Addressing all NAAB criteria from the beginning of the project, to the final is an integral part of producing a complete thesis project. Presenting the material in an appropriate graphic way, and speaking publicly about the project will assist in meeting additional NAAB criteria. By living in Chicago for the summer, site analysis and in-depth observation of the CTA can happen daily. The study of mobility and the comparison to European public transportation hubs will be implemented. Through the use of programming and critical examination the project will show the positive impact design has on public transit in the creation of a transportation hub for the 2016 Olympics.

Public transportation is not a new issue, yet it has not been drastically rethought since trains were first introduced. This project will push the boundaries for mass transit, with the development of a new innovative transportation system and central hub that will add to the progressive forms of Chicago architecture, alleviate problems with the existing system, and provide access to the Olympic venues.

In researching projects involved with mass public transportation and moveable structures, three strategies have emerged. These case studies serve as precedents for particular design outcomes, although they each address different aspects of the proposed project.

The transportation station in Gijon, Spain by UN Studios focuses on weaving together disjointed parts of the city. The roof of the station is designed as a raised continuation of the park, a public space that is accessible for both sides of the rails. The pedestrian areas increase towards the entrance hall as local meeting points on the top of the station provide panoramic views across the plaza towards the city and beach. The roof of the hall becomes part of the landscape providing local connections across the global connection axis and repairing the fracture to city fabric created by the existing railway lines. The idea of weaving the city together and making disjointed areas come together will be one focus of the project.





The second precedent is the eVolo Architecture 2007 Skyscraper Competition. The submission by Eduardo McIntosh proposes to separate the vertical circulation from the main structure of the building.

McIntosh takes the idea of the crane and liberates it from the railway, so the crane transports diverse items across the surface of the building, including itself. The idea of a crane is transformed into a robotic spider with no restrained mobility to get passengers to their destination in minimal time. This theoretical project creates questions and challenges the way existing circulation works.

One interesting idea is the Plug-In City by Archigram. In this case the mechanical device that governs the mega structure is a crane set on a railway. The hovercraft acts as a transportation device that can negotiate almost any terrain, and is totally independent of the structure. The important issue raised is that the mechanical device for moving people opens a whole new array of configuration possibilities.

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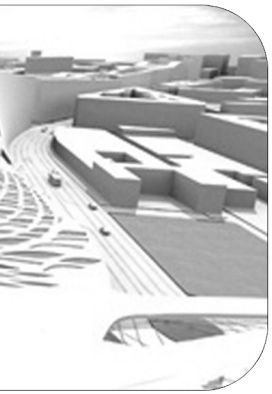
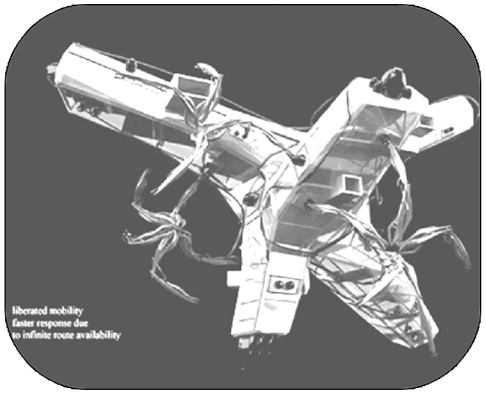
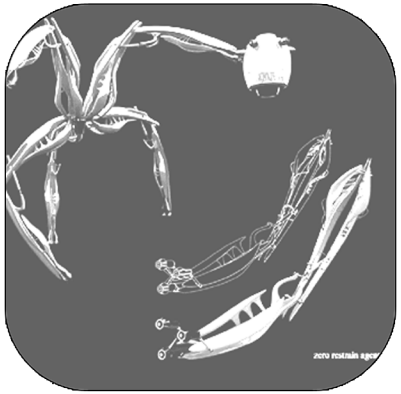
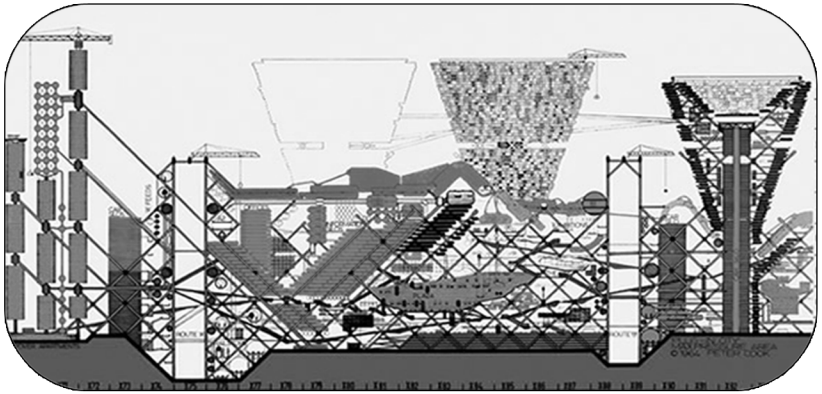
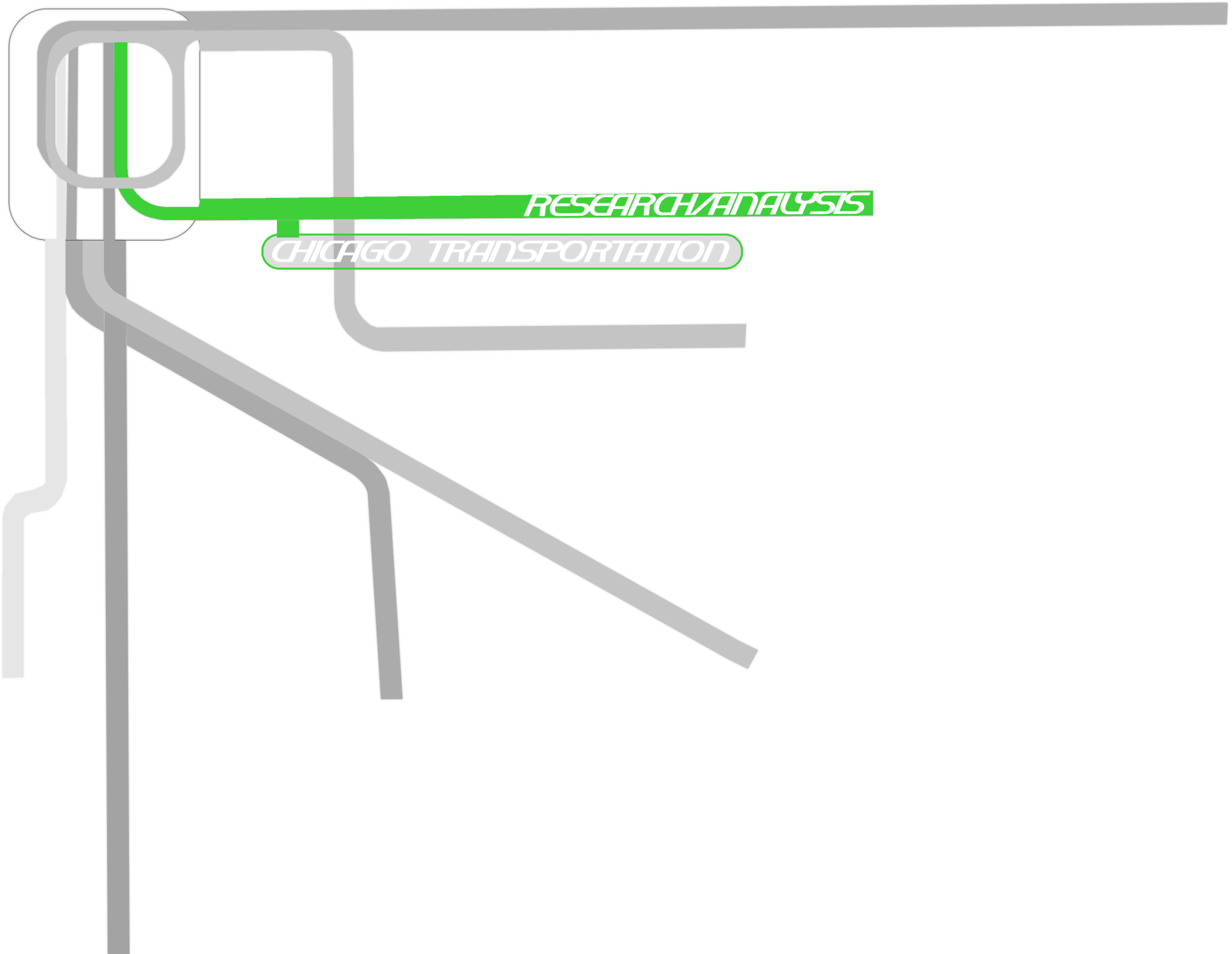


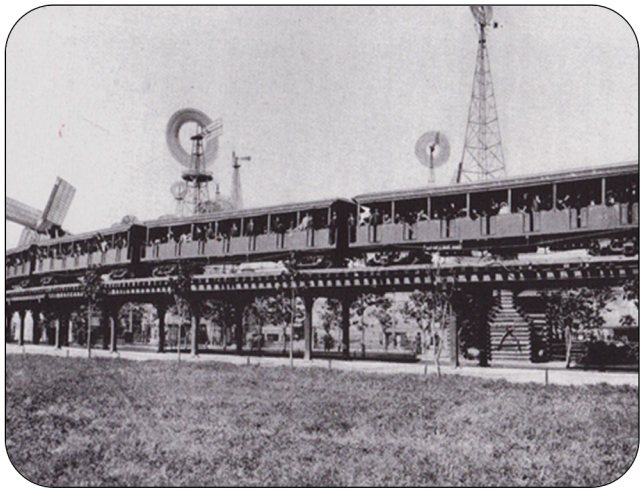


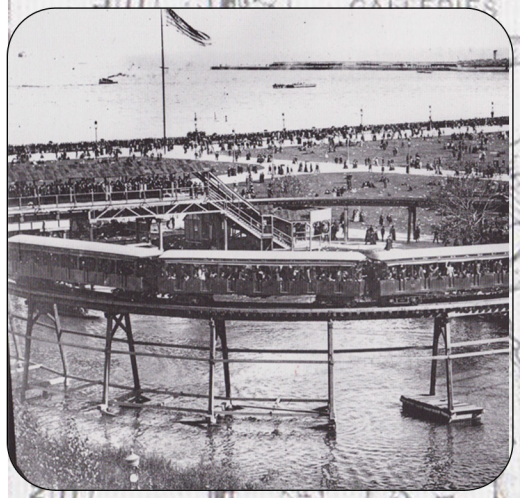






RESEARCH/ANALYSIS
CHICAGO TRANSPORTATION

WELCOME TO CHICAGO
2016 OLYMPIC GAMES
ZOOM!





"Make no little plans; they have no magic to stir men's blood." -Daniel Burnham

It took the World's Columbian Exposition of 1893 to motivate Chicago to build an elevated train of its own, following in Manhattan's footsteps. Transportation was a big part of the city's proposal to Congress for the exposition, especially once a site far from downtown hotels and railroad stations was selected.

The exposition attracted almost 26 million people - at a time when the population of the United States was 52 million people - and confirmed Chicago as a trend setting, world-class city. The World's Fair pioneered the electric third-rail system for Chicago and is still the same system used today. This innovative electric ride was high-tech at the time and successfully carried more than 6 million fairgoers -- setting a design and technology precedent for all Chicago's 'L' lines. The three-mile-long track was torn down after the fair closed.

Ferris Wheel
Chicago 1893

Eiffel Tower
Paris 1889

World's Fairs became precedents because of the similarities with Olympics. Both international events act as a stimulus for cities to improve transit and build iconic architecture, always trying to out-do the city to host the event in previous years. These icons of the world's fair have notoriety around the world.

Atomium
Brussels 1958

The events are both temporary but show the remains for years to come. The peices left behind from these events act as symbols for the city.

Space Needle
Seattle 1962

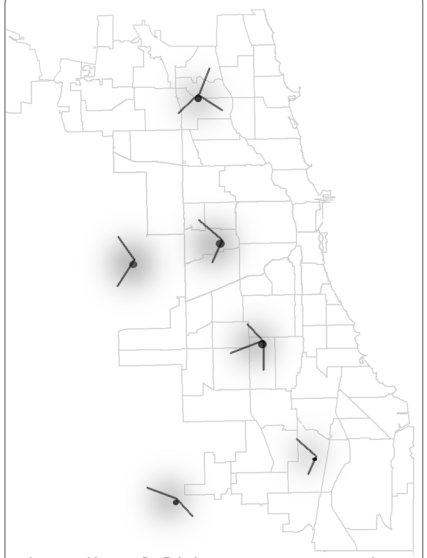
WORLDS FAIR ICONIC ARCHITECTURE

CHICAGO COMMUTING TRENDS

1800: Settling of America: Integration of working and living on the frontier
1900: Rise of the city: separation of working and living
1950: Rise of the automobile: further separation of working and living; decline of inner city
2000: Rivitalization of the city center: reintegration of working and living in the city center

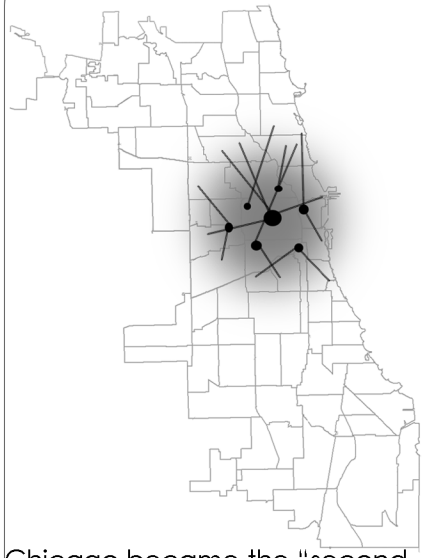
work
residences
commute

## 1800



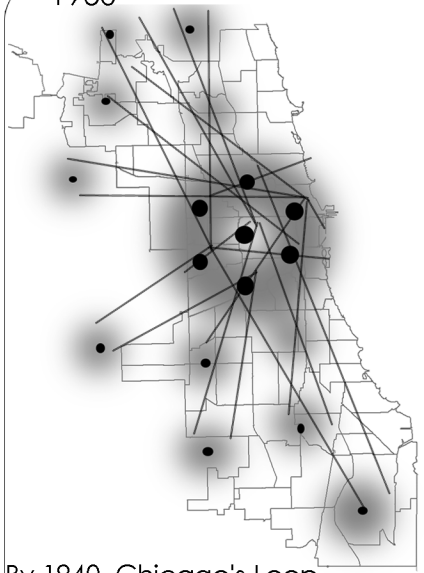
The city of Chicago was not founded until 1837 and the surrounding areas of the frontier were used for agriculture by pioneers. In 1840, Chicago recorded a population around 4,000, but it multiplied over 126 times in the next 40 years to be 500,000 in 1880, the fastest growing city in the world. This rapid growth was due to abundant sources of food, jobs, migration and transportation by the the railroad industry.

## 1900



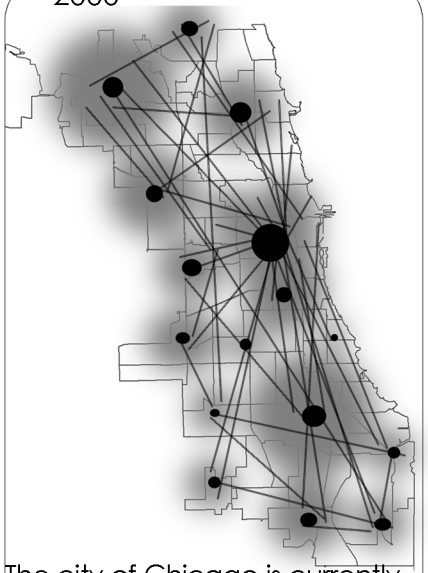
Chicago became the "second city" in population behind New York, with 2.2 million by 1910, despite the setbacks of the great fire and depressions. The city continued to grow at the world's fastest rate though much of the 1900s. The city center became the core of jobs and the majority of residents lived within a 20 minute walk from work. Chicago was a very walkable city with only a two mile radius.

## 1950



By 1940, Chicago's Loop received 603,000 daily commuters, of whom over 113,000 came in from the suburbs. Significantly, one-quarter of all commuters drove in by car, one-quarter took the streetcar, one-quarter the elevated trains, one-eighth the commuter trains, and the rest came by bus or other means.

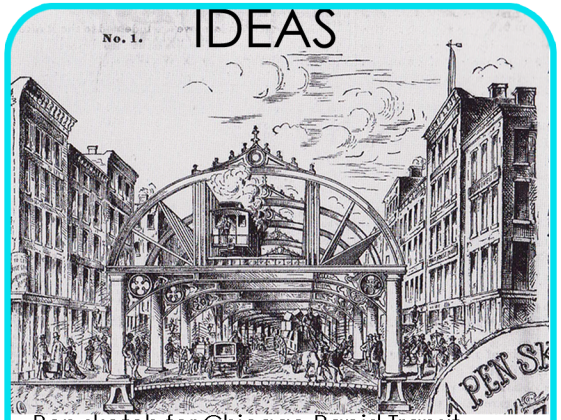
## 2000



The city of Chicago is currently experiencing an influx in it's urban areas and is undergoing a revitalization process in the inner city. The increase of housing, including the student demographic in the downtown area as well as new businesses, is causing this process to take place.

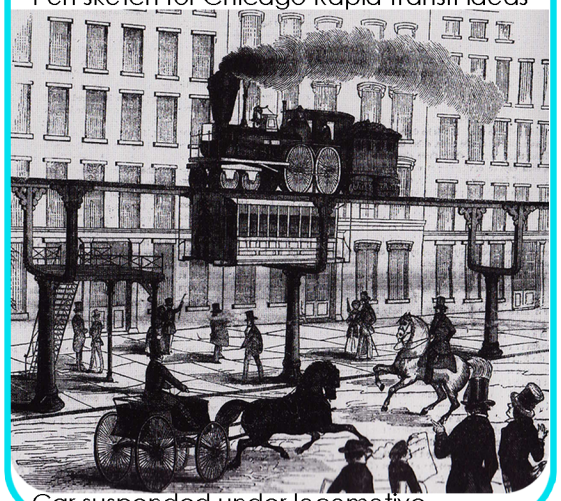
Chicago was widely considered to be the place where the future was unfolding, as it became the world's fastest-growing city in the second half of the 19th century. Therefore, much of the experimentation in transit that took place around the world was centered in brash, bold Chicago. Downtown traffic congestion had become intolerable with this growth, therefore the need for public transit was larger than ever.

## IDEAS



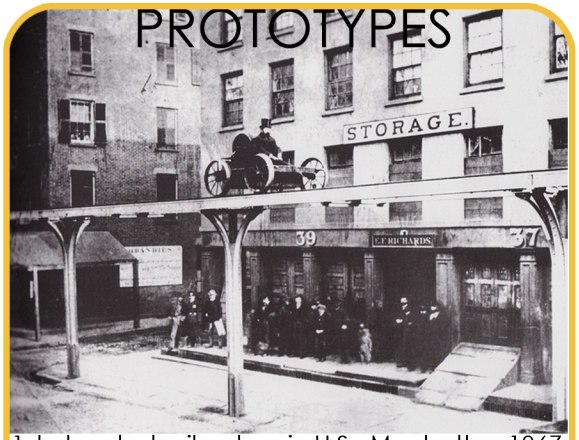

Pen sketch for Chicago Rapid Transit

Pen sketch for Chicago Rapid Transit ideas

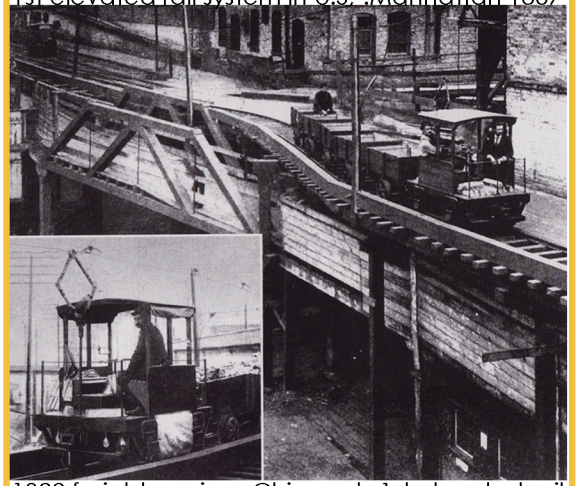


Car suspended under locomotive

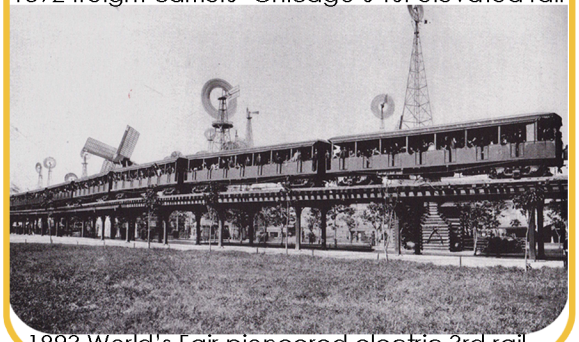
## PROTOTYPES




1st elevated rail system in U.S.-Manhattan 1867



1892 freight carriers- Chicago's 1st elevated rail



1893 World's Fair pioneered electric 3rd rail

## PRECURSORS

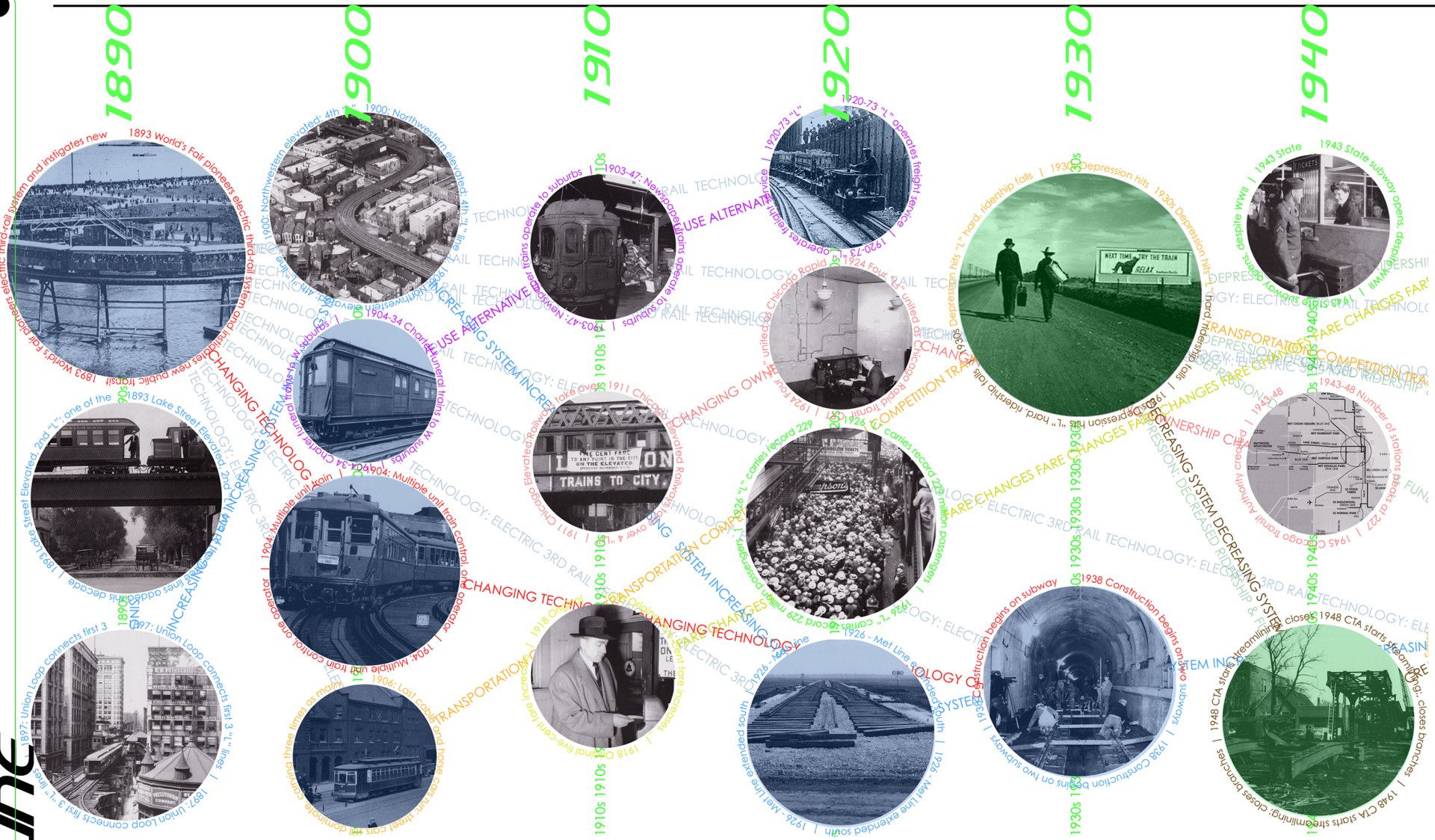
Omnibus 1853

Horse car on rails 1859

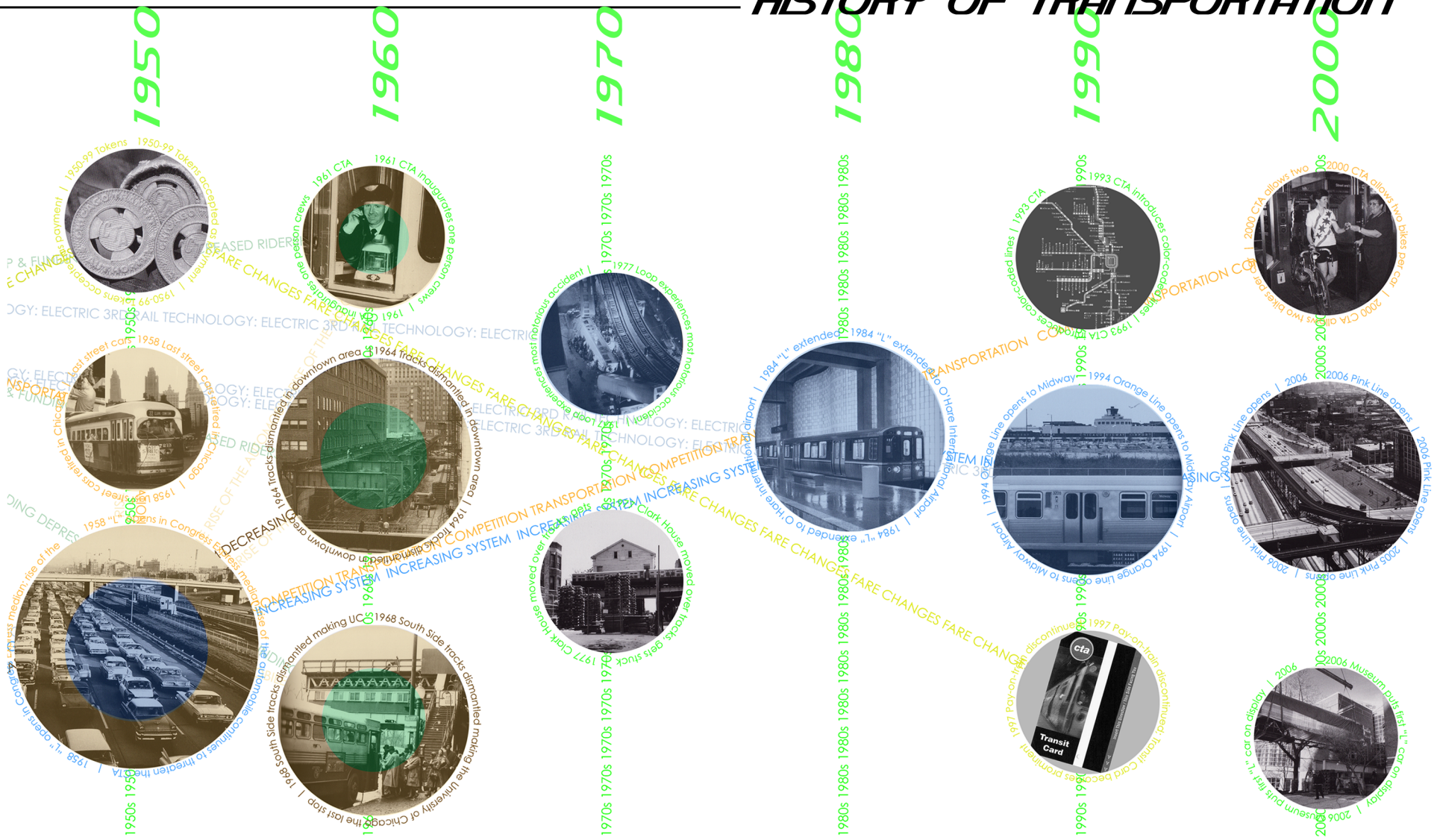
Cable car 1882

Trolleys (powered by electricity) 1890

"L" timeline


1890
1900
1910
1920
1930
1940
1893 World's Fair pioneers electric third-rail system and instigates new
1893 World's Fair pioneers electric third-rail system and instigates new public transit
1893 Lake Street Elevated, 2nd "L"; one of the
1893 Lake Street Elevated, 2nd "L" lines opened this decade
1897: Union Loop connects first 3 "L" lines
1897: Union Loop connects first 3 "L" lines
1900: Northwestern elevated; 4th "L" line
1900: Northwestern elevated; 4th "L" line
1904-34 Charter funeral trains to W suburbs
1904-34 Charter funeral trains to W suburbs
1904: Multiple unit train control a
1904: Multiple unit train control a operator
1906: Last cable and horse car runs; steel cars with motor
1906: Last cable and horse cars running three times as many
1903-47: Newspaper trains operate to suburbs
1903-47: Newspaper trains operate to suburbs
1911 Chicago Elevated Railways take over
1911 Chicago Elevated Railways take over
1918 Original five-cent fare increases
1918 Original five-cent fare increases
1920-73 "L" operates freight service
1920-73 "L" operates freight service
1924 Four "L" companies unified as Chicago Rapid Transit
1924 Four "L" companies unified as Chicago Rapid Transit
1926 - Met Line extended south
1926 - Met Line extended south
1926 "L" carries record 229 million passengers
1926 "L" carries record 229 million passengers
1930s Depression hits "L"; hard, ridership falls
1930s Depression hits "L"; hard, ridership falls
1938 Construction begins on subway
1938 Construction begins on two subways
1943 State subway opens despite WWII
1943 State subway opens despite WWII
1943-48 Number of stations peaks at 227
1943-48 Number of stations peaks at 227
1945 Congress Transit Authority created
1945 Congress Transit Authority created
1948 CTA starts streamlining; closes branches
1948 CTA starts streamlining; closes branches
CHANGING TECHNOLOGY
INCREASING SYSTEM
INCREASING SYSTEM
CHANGING TECHNOLOGY
CHANGING TECHNOLOGY
TRANSPORTATION COMPETITION
TRANSPORTATION COMPETITION
CHANGING OWNERSHIP
CHANGING OWNERSHIP
FARE CHANGES
FARE CHANGES
FARE CHANGES
FARE CHANGES
FARE CHANGES
FARE CHANGES
DECREASING SYSTEM
DECREASING SYSTEM
DECREASED RIDERSHIP
DECREASED RIDERSHIP
ALTERNATIVE
ALTERNATIVE
ALTERNATIVE
ALTERNATIVE
INCREASING SYSTEM
INCREASING SYSTEM
INCREASING SYSTEM
INCREASING SYSTEM
CHANGING TECHNOLOGY
CHANGING TECHNOLOGY

# HISTORY OF TRANSPORTATION




## CAUSE & EFFECT

TECHNOLOGY: ELECTRIC 3RD RAIL
DEPRESSION: DECREASED RIDERSHIP & FUNDING
RISE OF THE AUTOMOBILE

## RELATIONSHIPS

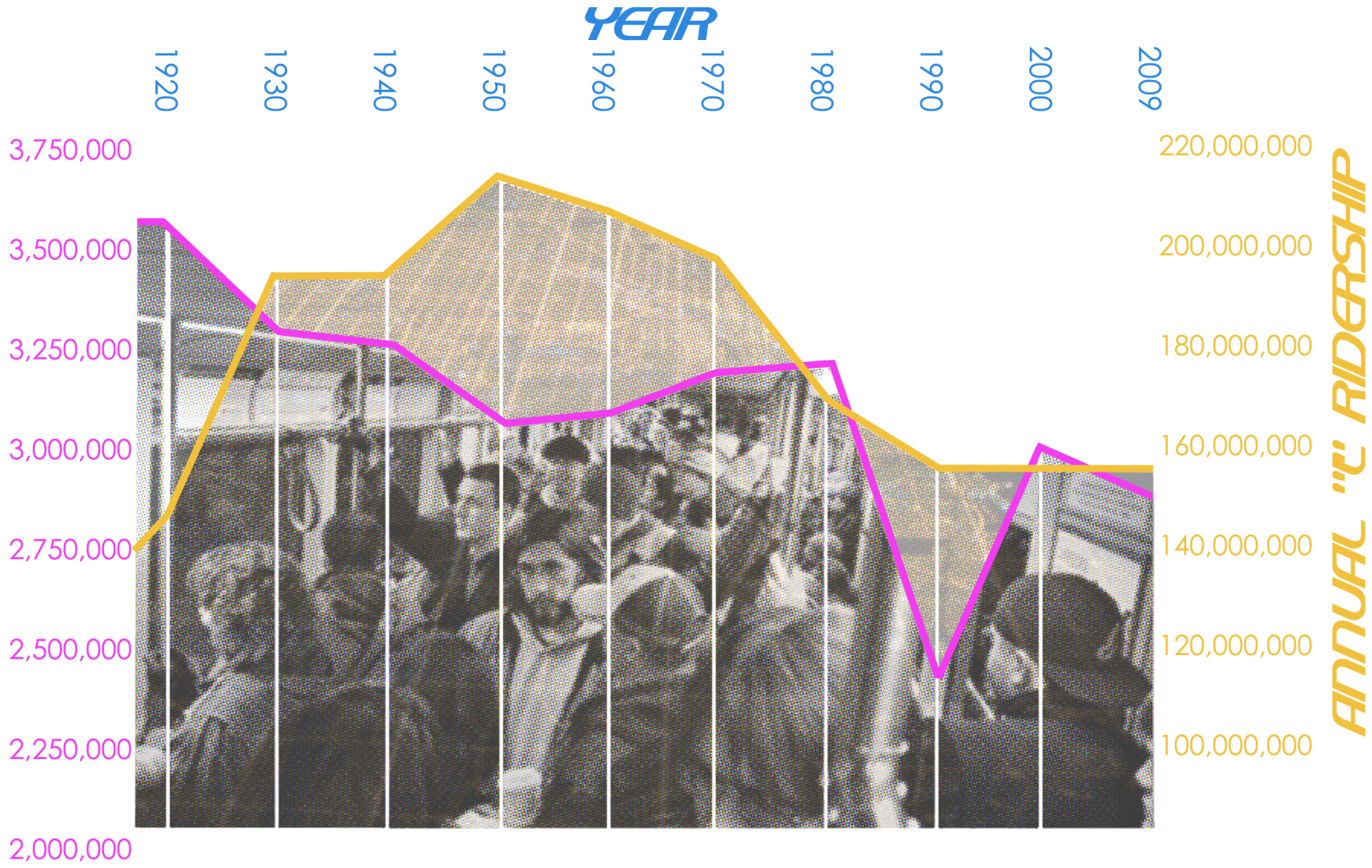
DATES
INCREASING SYSTEM
FARE CHANGES
TRANSPORTATION COMPETITION
CHANGING OWNERSHIP
ALTERNATIVE USE
DECREASING SYSTEM
CHANGING TECHNOLOGY

## CONCLUSION

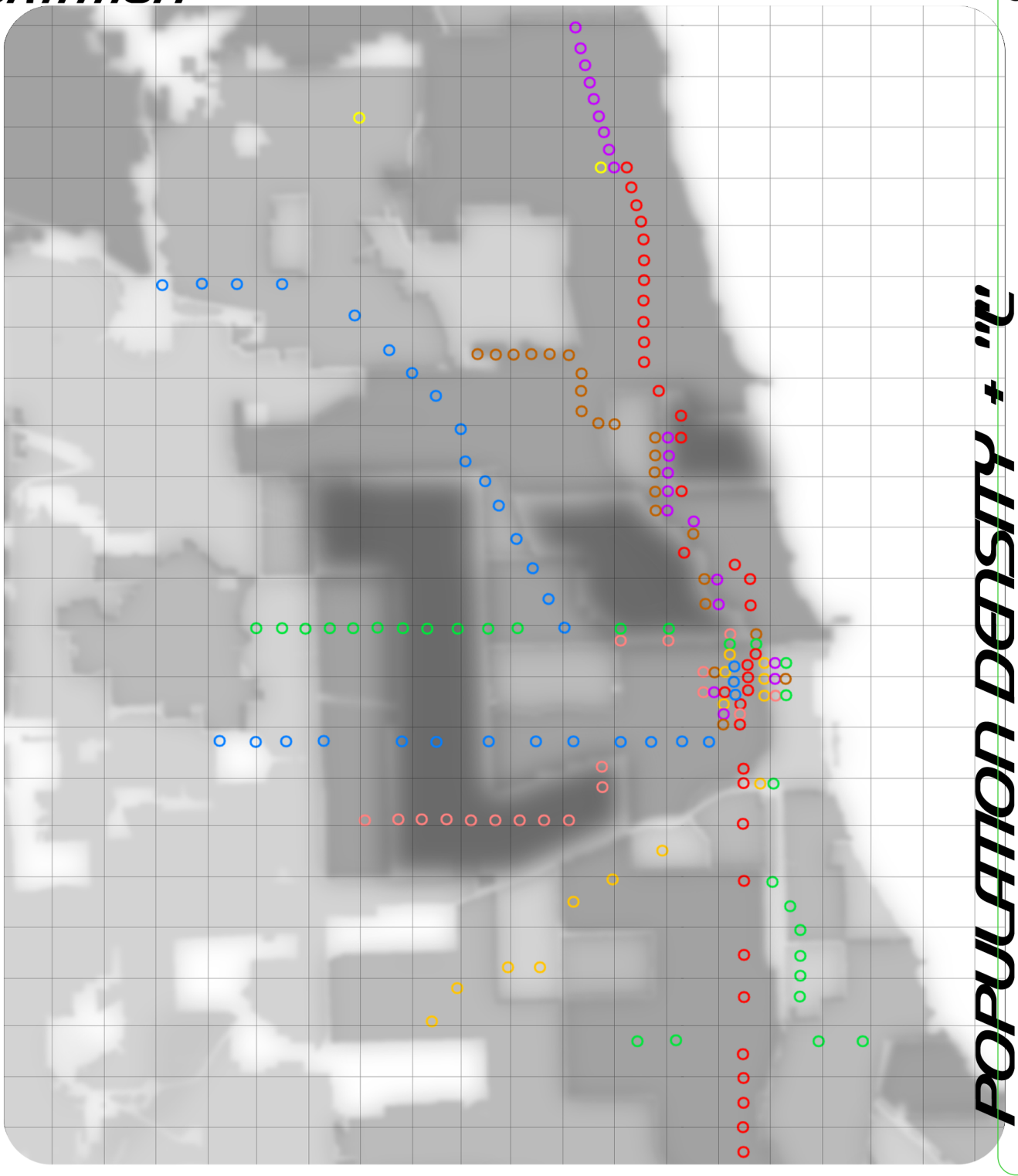
This timeline shows that the most influential event in the history of the Chicago "L" is the World's Fair, the first event to take place, introducing the technology that would be used still today with expansions of the system. Another large scale international event, such as the Olympics, appears to be the only way to make significant changes to the system.

# POPULATION vs. RAIL RIDERSHIP

The first graph shows the population change in Chicago throughout the 20th century, whereas the middle graph displays the changing rail ridership during this time. The fall in ridership correlates with the depression and its after-effects, the rise of the automobile and lack of funding in the 1990s. The last graph compares the annual ridership of the Chicago Transit Authority with the population of Chicago. The current trend shows an increase in the CTA ridership as well as the population of Chicago. With more people moving into a central area, the use of public transit increases.



The "L" helped establish a "city of neighborhoods", as Chicago is known. Trains cut through prairie, guiding growth, this growth however shifted with the rise of the automobile, letting freeways and boulevards guide the growth of the city. With this the density of the city has shifted dramatically throughout the 100+ year existence of the Chicago "L." This diagram represents the disjunction between where the most people live and where the "L" stations are located. A trend which must be overturned to allow for a more efficient system and sustainable city in the changing times.



POPULATION DENSITY + "L" LOCATIONS

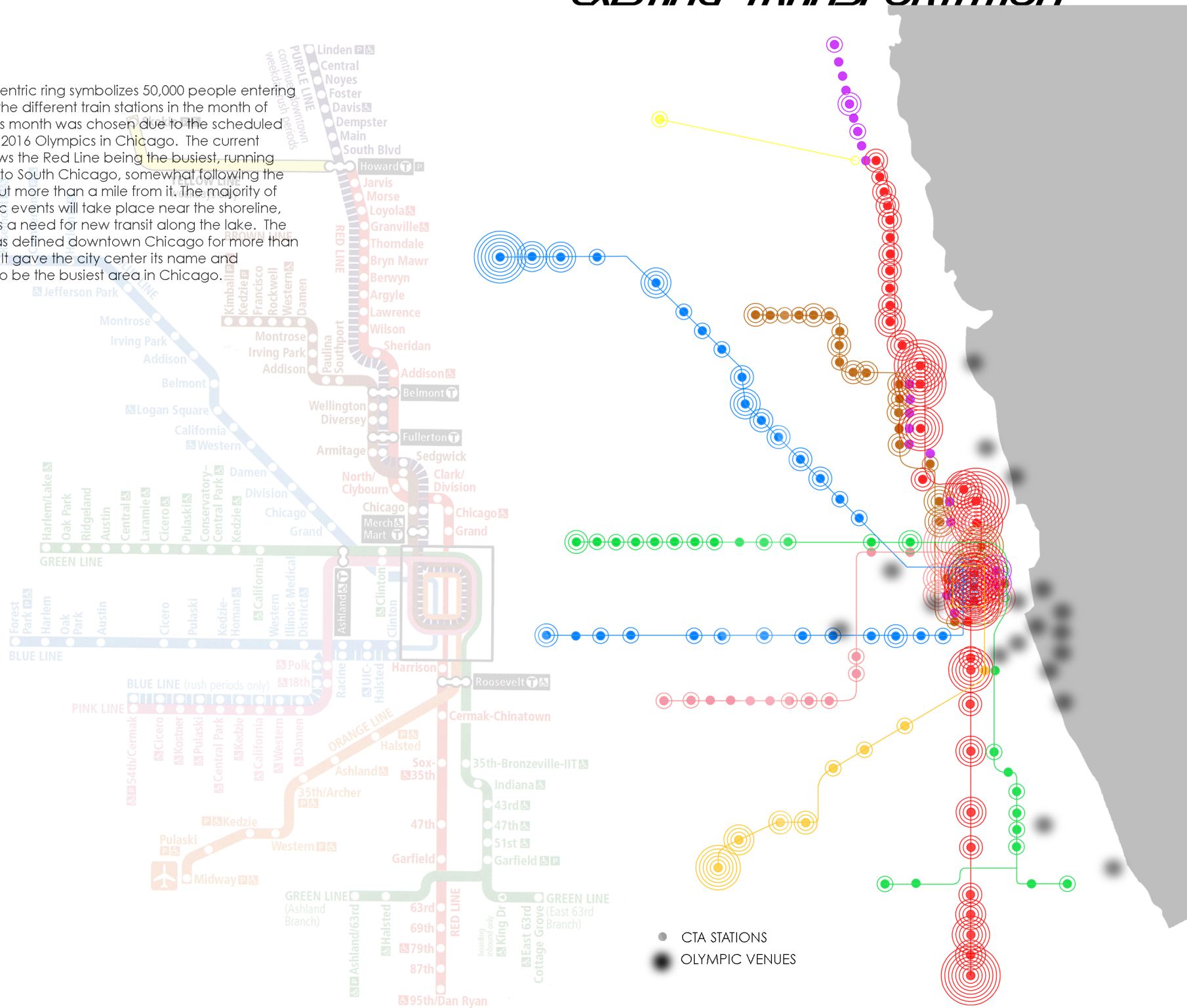
- Greater than 75,000
- 40,000 to 75,000
- 20,000 to 40,000
- 5,000 to 20,000
- 1,500 to 5,000
- Less than 1,500

*grid denotes square mile

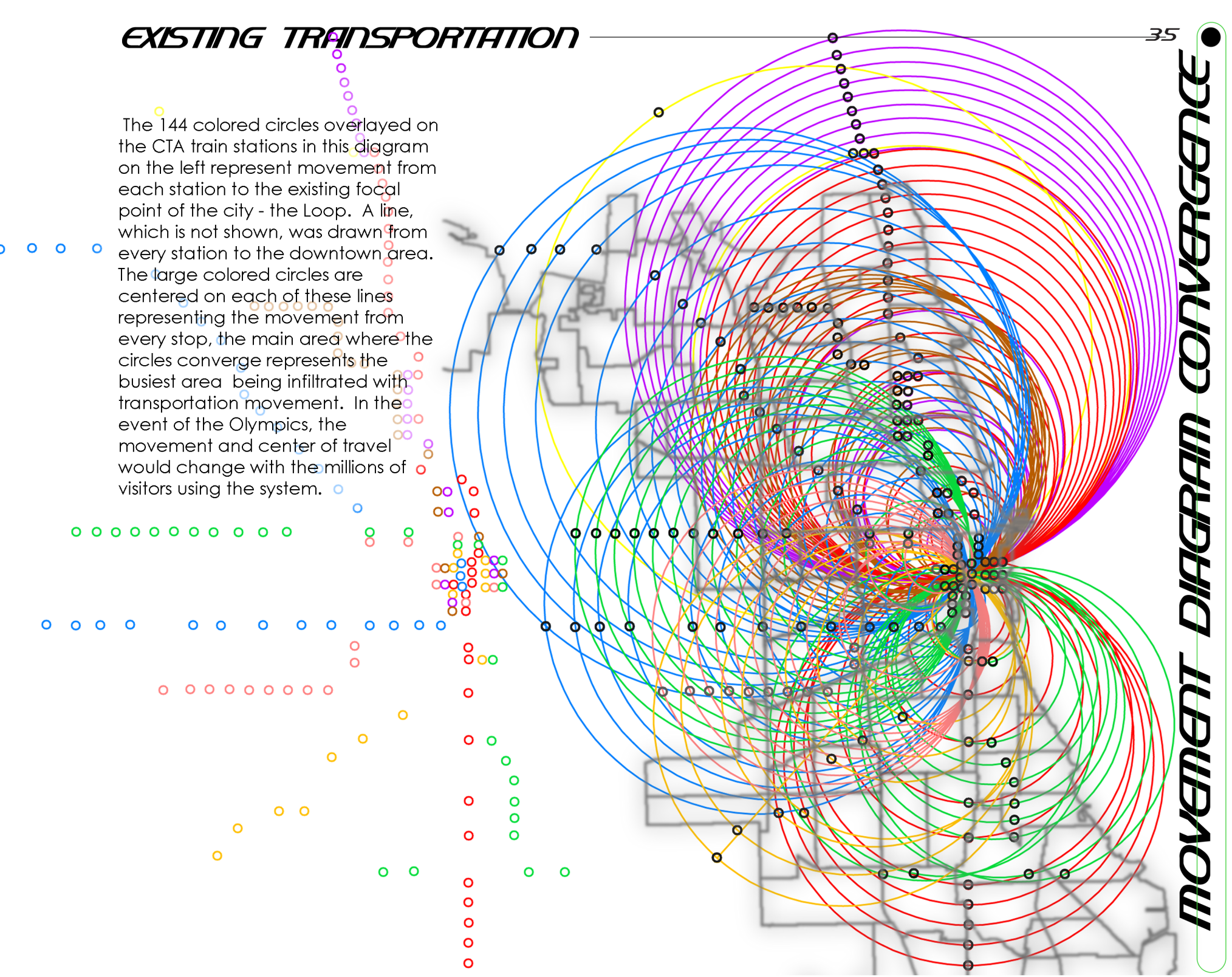
# EXISTING TRANSPORTATION

## CTA STATION RIDERSHIP 8/08

Each concentric ring symbolizes 50,000 people entering or leaving the different train stations in the month of August. This month was chosen due to the scheduled time of the 2016 Olympics in Chicago. The current system shows the Red Line being the busiest, running from North to South Chicago, somewhat following the shoreline but more than a mile from it. The majority of the Olympic events will take place near the shoreline, thus there is a need for new transit along the lake. The loop "L" has defined downtown Chicago for more than a century. It gave the city center its name and continues to be the busiest area in Chicago.



The 144 colored circles overlayed on the CTA train stations in this diagram on the left represent movement from each station to the existing focal point of the city - the Loop. A line, which is not shown, was drawn from every station to the downtown area. The large colored circles are centered on each of these lines representing the movement from every stop, the main area where the circles converge represents the busiest area being infiltrated with transportation movement. In the event of the Olympics, the movement and center of travel would change with the millions of visitors using the system.



MOVEMENT DIAGRAM CONVERGENCE

# RESEARCH/ANALYSIS

## CHICAGO OLYMPICS

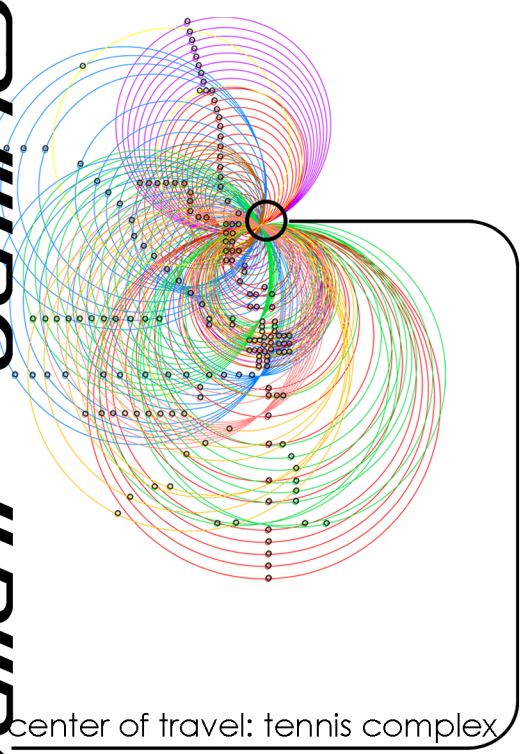
Chicago has the bid for the 2016 Olympics, along with Tokyo, Rio de Janeiro and Madrid. There are many benefits to hosting an international event, at the top of this list is the improvement of public transportation, however Chicago is currently overlooking the need to renovate and expand the existing transit system.

OLYMPIC BENEFITS:
1) Act as a catalyst for widespread urban revitalization
2)Generate economic benefits before the Games (construction, new businesses)
3)Accelerate planned infrastructure improvements
4) Bring in an estimated $6.5 billion in revenue

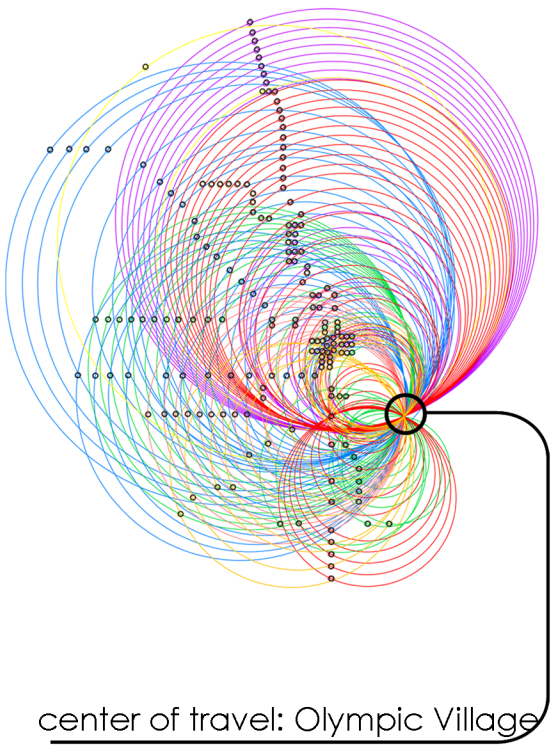
NUMBER OF PEOPLE EXPECTED:
five to six million people

In order for Chicago to obtain the bid - major revision to the current system of public transportation is necessary. Despite concerns that transportation is a major weakness in Chicago's bid, the transit system proposed by the city relies heavily on existing infrastructure, according to their submission to the International Olympic Committee. Chicago is currently planning on using a shuttle system that will link rail stations to Olympic venues under the plan. An earlier review by international Olympic officials raised concerns about the distance between the rail stations and athletic sites. The following diagrams show this disconnect between the existing transportation infrastructure and the proposed venues.

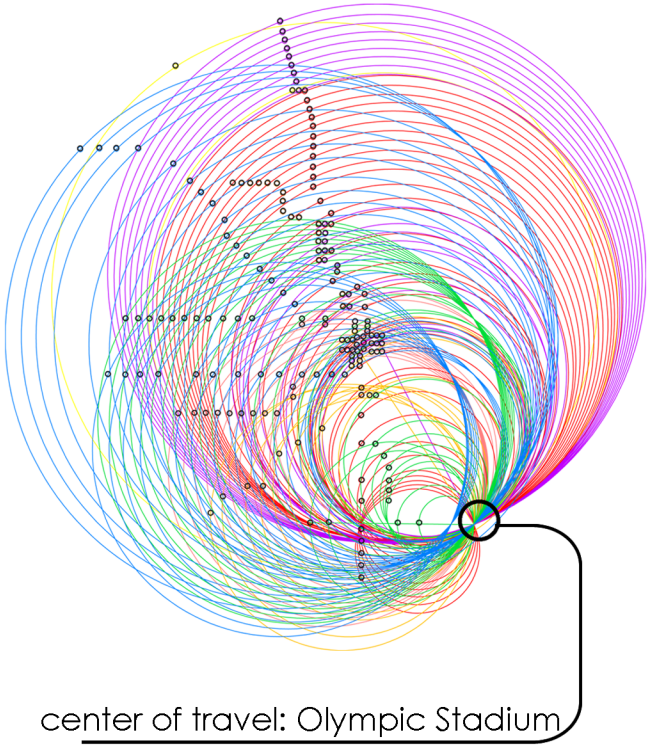
The 144 colored circles overlayed on the CTA train stations in the three diagrams below represent movement from each station to the focal points of the city during the Olympics. A line, which is not shown, was drawn from every station to the main destination, a destination that differs in each diagram, and relates to the three different clusters. The circles are centered on each of these lines representing the movement from every stop, the main area where the circles converge represents the busiest point. The movement that would take place during the 2016 Olympics would change the flow of traffic on the Chicago "L". This demonstrates that the movement that needs to take place during that time is not supported by the existing system.



center of travel: tennis complex



center of travel: Olympic Village



center of travel: Olympic Stadium

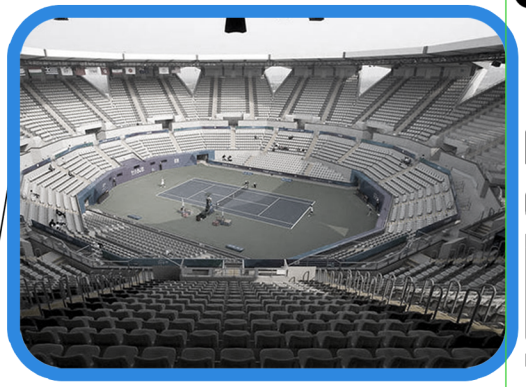
When the movement diagrams are overlayed, the web formed by all the transportation movement can be imagined. The new system would need to be an elastic entity that could support massive crowds for the Olympic Events, but can easily adjust to normal Chicago weekday ridership.

TENNIS STADIUM:
NORTH CLUSTER

LOOP: CENTRAL CLUSTER

OLYMPIC VILLAGE:
CENTRAL CLUSTER

OLYMPIC STADIUM:
SOUTH CLUSTER



# CHICAGO OLYMPICS

## PROPOSED 2016 OLYMPIC VENUES

1 OLYMPIC STADIUM
-ATHLETICS

2 OLYMPIC HOCKEY FIELDS AT JACKSON PARK
-HOCKEY

3 OLYMPIC VILLAGE HARBOR
-SAILING

4 McCORMICK PLACE WEST
-FENCING, TAEKWONDO, TABLE TENNIS
-BADMINTO, GYMNASTICS RHYTHMIC
- PENTATHALON: SHOOTING

5 McCORMICK PLACE SOUTH
-IBC/MPC

6 McCORMICK PLACE NORTH
-HANDBALL, JUDO, WRESTLING

7 McCORMICK PLACE EAST
-VOLLEYBALL, WEIGHTLIFTING

8 SPORTS COMPLEX AT NORTHERLY ISLAND
-CYCLING: BMX TRACK, BEACH VOLLEYBALL

9 SOLDIER FIELD
-FOOTBALL

10 GRANT PARK
-ARCHERY

11 LAKEFRONT ROWING COURSE
-ROWING, CANOE-KAYAK: FLATWATER

12 OLYMPIC AQUATIC CENTER
-AQUATICS, PENTATHLON, SWIMMING

13 UIC PAVILLION
-BOXING

14 UNITED CENTER
-BASKETBALL, GYMNASTICS

15 NORTH AVENUE BEACH
-TRIATHALON

16 WHITEWATER COURSE AT LINCOLN PARK
-CANOE/KAYAK: SLALOM

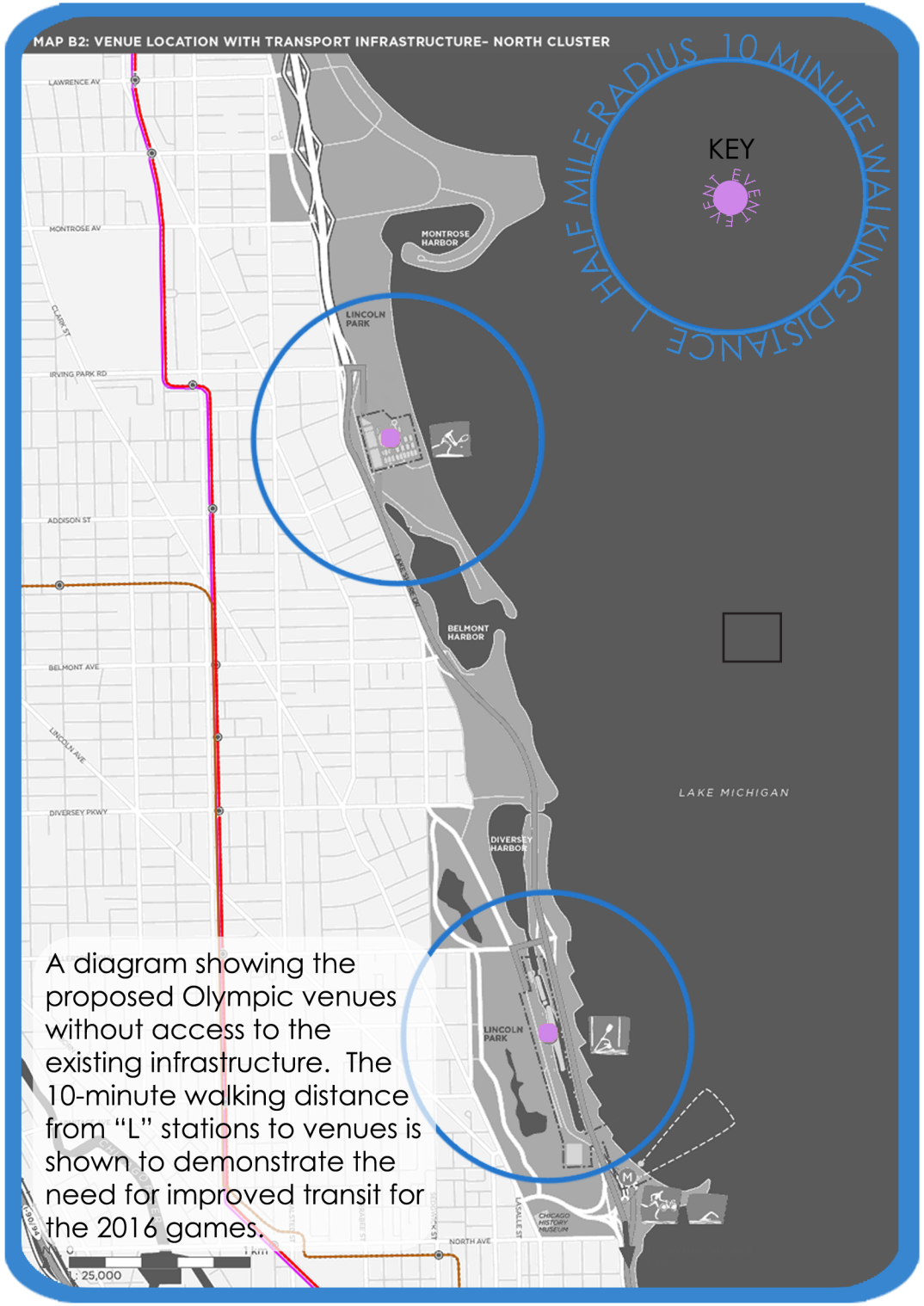
17 OLYMPIC TENNIS CENTER AT LINCOLN PARK
-TENNIS

TRAIN TRACKS
INTERSTATE
OLYMPIC VENUE

NORTH CLUSTER

CENTRAL CLUSTER

SOUTH CLUSTER



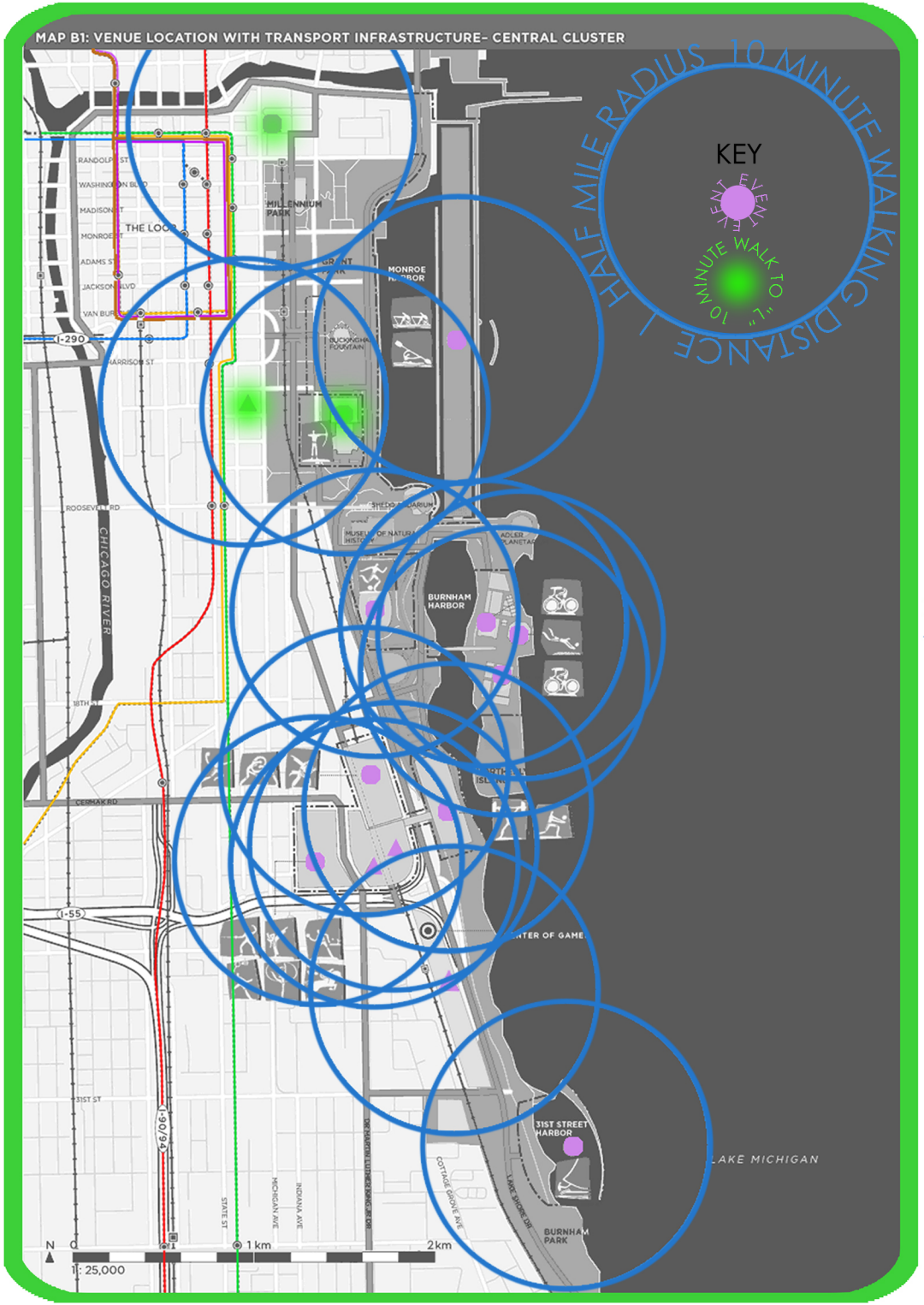

A diagram showing the proposed Olympic venues without access to the existing infrastructure. The 10-minute walking distance from "L" stations to venues is shown to demonstrate the need for improved transit for the 2016 games.

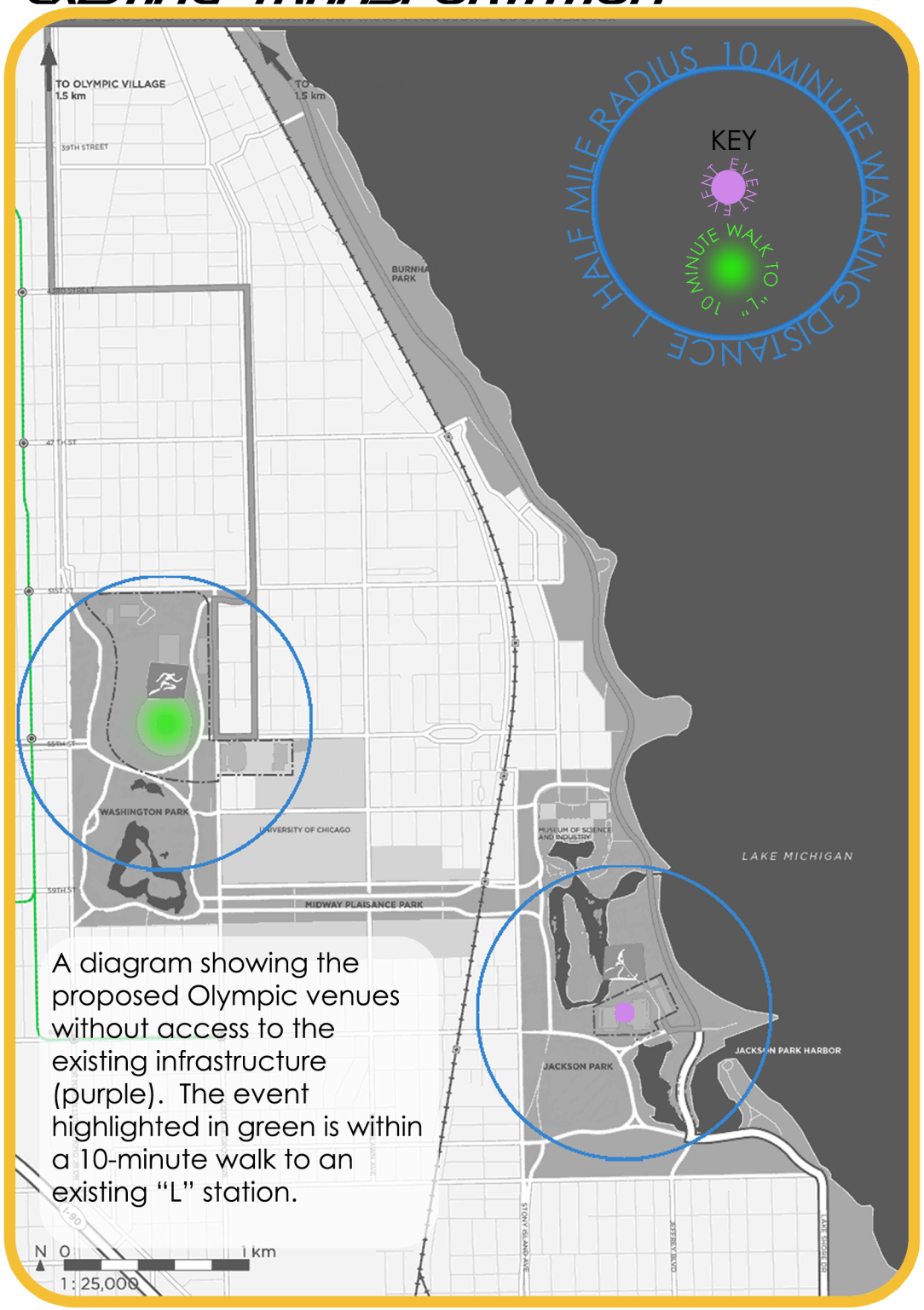
OLYMPIC VENUE NORTH CLUSTER

BELMONT HARBOR
DIVERSEY HARBOR
LINCOLN PARK

THE LOOP
CENTER OF GAMES
LAKE MICHIGAN

LAKE MICHIGAN
JACKSON PARK HARBOR


MAP B1: VENUE LOCATION WITH TRANSPORT INFRASTRUCTURE- CENTRAL CLUSTER
KEY
EVENT VENUE
10 MINUTE WALK TO
HALF MILE RADIUS 10 MINUTE WALKING DISTANCE
MILLENNIUM PARK
THE LOOP
MONROE HARBOR
BUCKINGHAM FOUNTAIN
I-290
HARRISON ST
ROOSEVELT RD
CHICAGO RIVER
BURNHAM HARBOR
18TH ST
CERMAK RD
I-55
31ST ST
I-90/94
31ST STREET HARBOR
LAKE MICHIGAN
BURNHAM PARK
STATE ST
MICHIGAN AVE
INDIANA AVE
COTTAGE GROVE AVE
LAKE SHORE DR
N
0
1
1 km
2km
1: 25,000

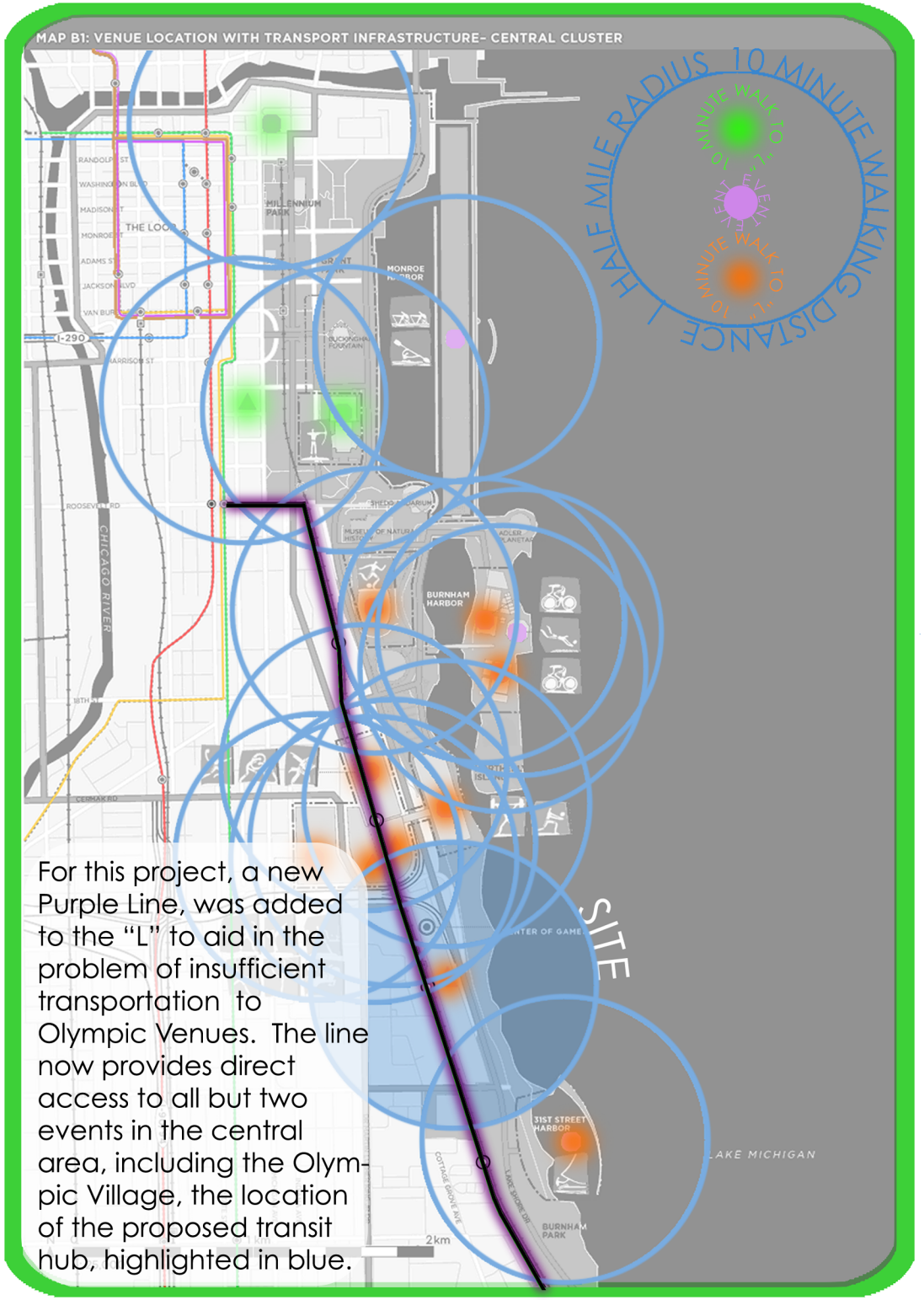



A diagram showing the proposed Olympic venues without access to the existing infrastructure (purple). The event highlighted in green is within a 10-minute walk to an existing "L" station.

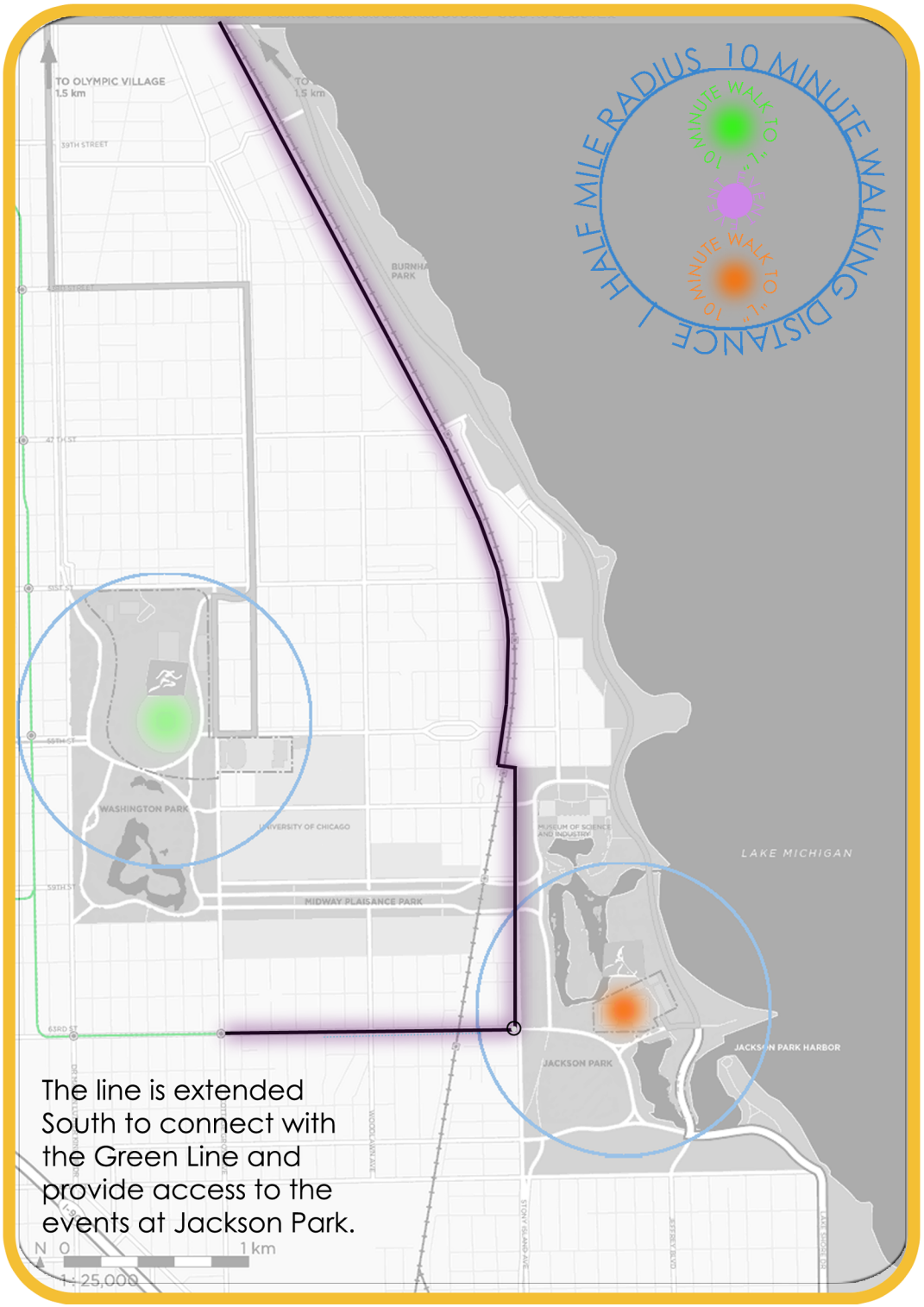
OLYMPIC VENUE SOUTH CLUSTER

# PROPOSED TRANSPORTATION

## OLYMPIC VENUE CENTRAL CLUSTER




For this project, a new Purple Line, was added to the "L" to aid in the problem of insufficient transportation to Olympic Venues. The line now provides direct access to all but two events in the central area, including the Olympic Village, the location of the proposed transit hub, highlighted in blue.



OLYMPIC VENUE SOUTH CLUSTER

# RESEARCH/ANALYSIS

## SITE ANALYSIS

After a number of sites were evaluated for the location of the new transporation hub, the site adjacent to the Olympic Village was chosen. This new development will be located on 37 acres just south of McCormick Place on what is now a parking area for large trucks. The athlete housing would be built on a new level atop the truck parking.

The selected site has both positive and negative aspects. The site is very disjointed with the railroad track and the interstate system piercing through and dividing the area. Currently there is no access to the lakefront or the Olympic Village from the selected site, due to these dividers.

## SITE SELECTION

PROS

- → not congested (like downtown)
- → in central cluster of events
- → 'South Loop' is rapidly growing/developing
- → near many events at McCormick Place
- → close to lakefront
- → blighted area → in need of regeneration
  - ← green space

CONS

- → next to interstate
- → next to railroad tracks (could be pro)
- → McCormick Place blocks view of skyline from ground
  - ↳ building must have high point
- → not accessed by existing "L"

SITE IN RELATION TO LANDMARKS

# SITE CONNECTION DIAGRAM




A schematic diagram done to highlight the major connections on the site with the arrow overlayed to suggest possible paths the building form/bridge would take. This was the primary diagram to influence the form and circulation of the final design.

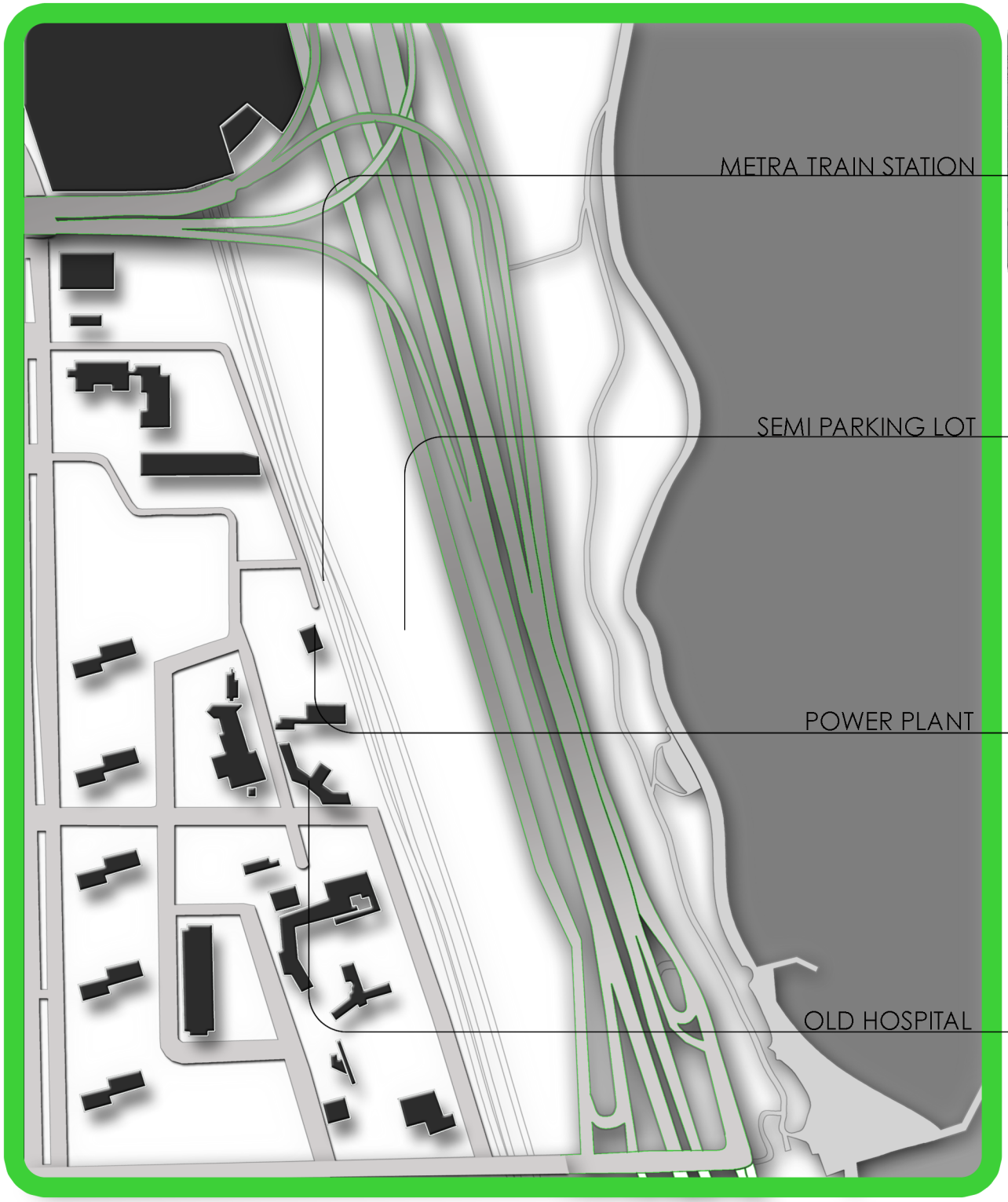
50

Tickets
Tickets

YELLOW

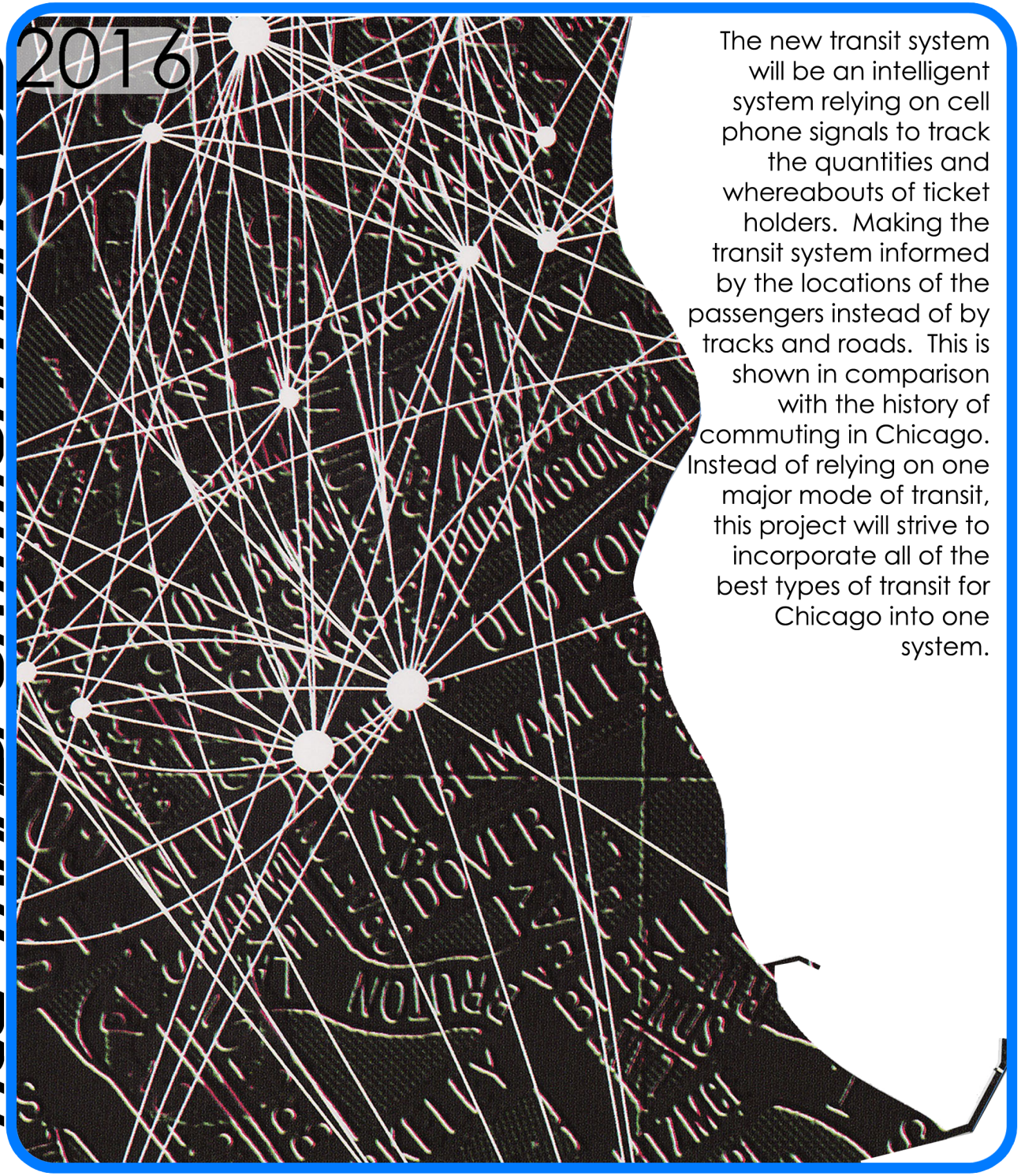
27th Street

# NEGATIVE ASPECTS OF SITE

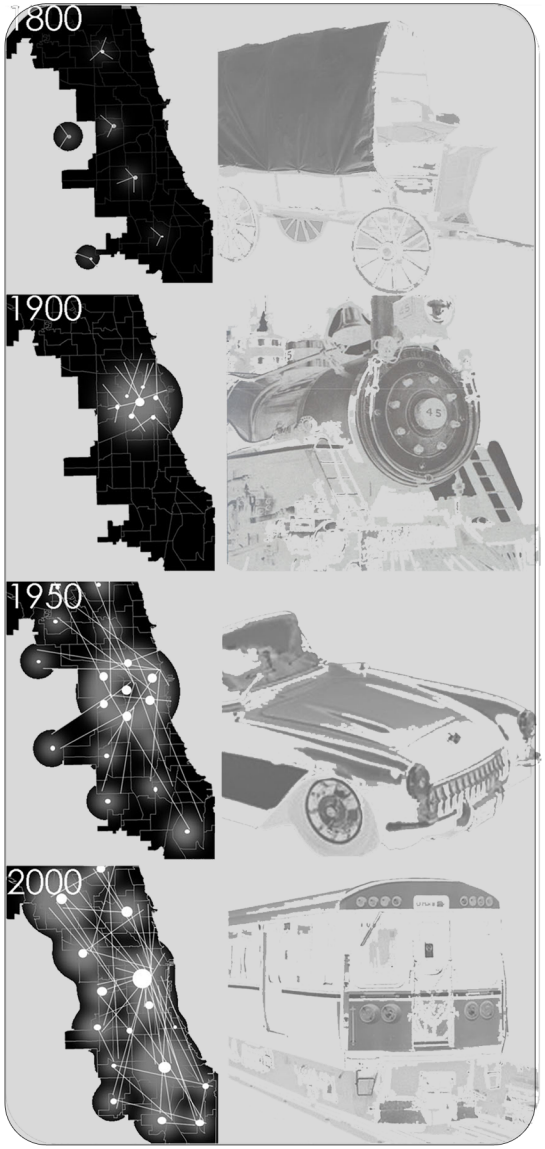


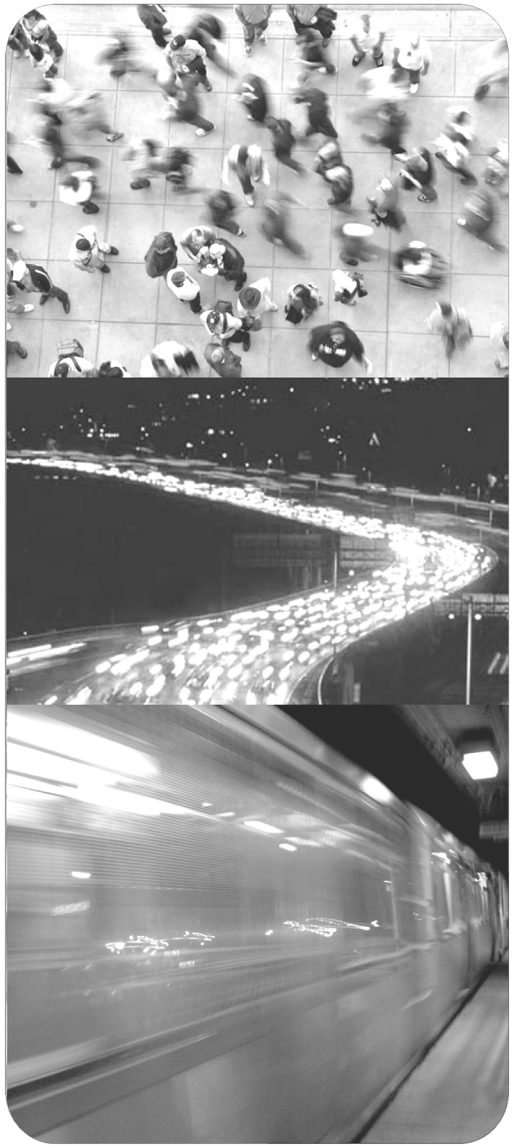
## POSITIVE ASPECTS OF SITE

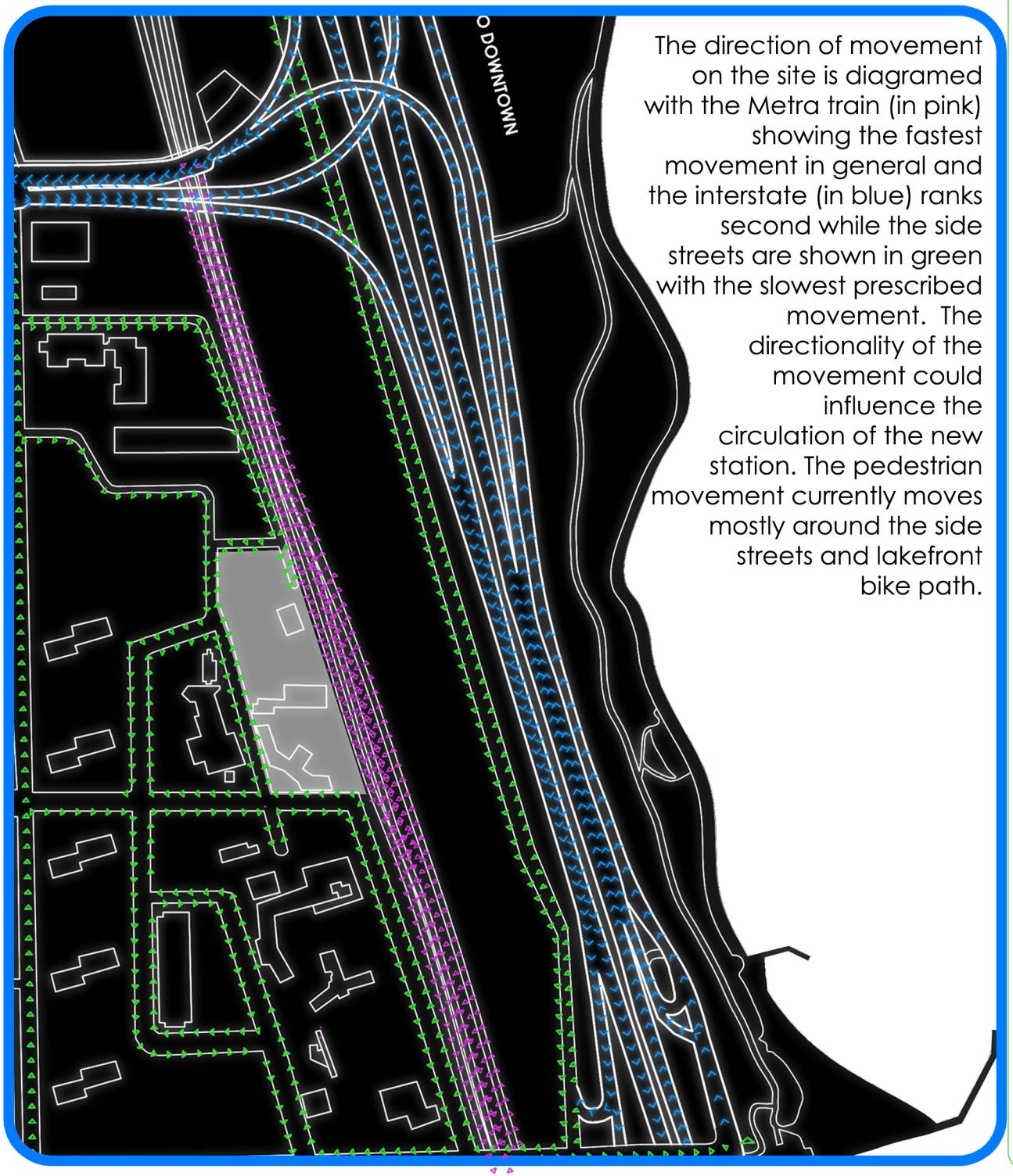
# NEW TRANSPORTATION ANALYSIS




The new transit system will be an intelligent system relying on cell phone signals to track the quantities and whereabouts of ticket holders. Making the transit system informed by the locations of the passengers instead of by tracks and roads. This is shown in comparison with the history of commuting in Chicago. Instead of relying on one major mode of transit, this project will strive to incorporate all of the best types of transit for Chicago into one system.



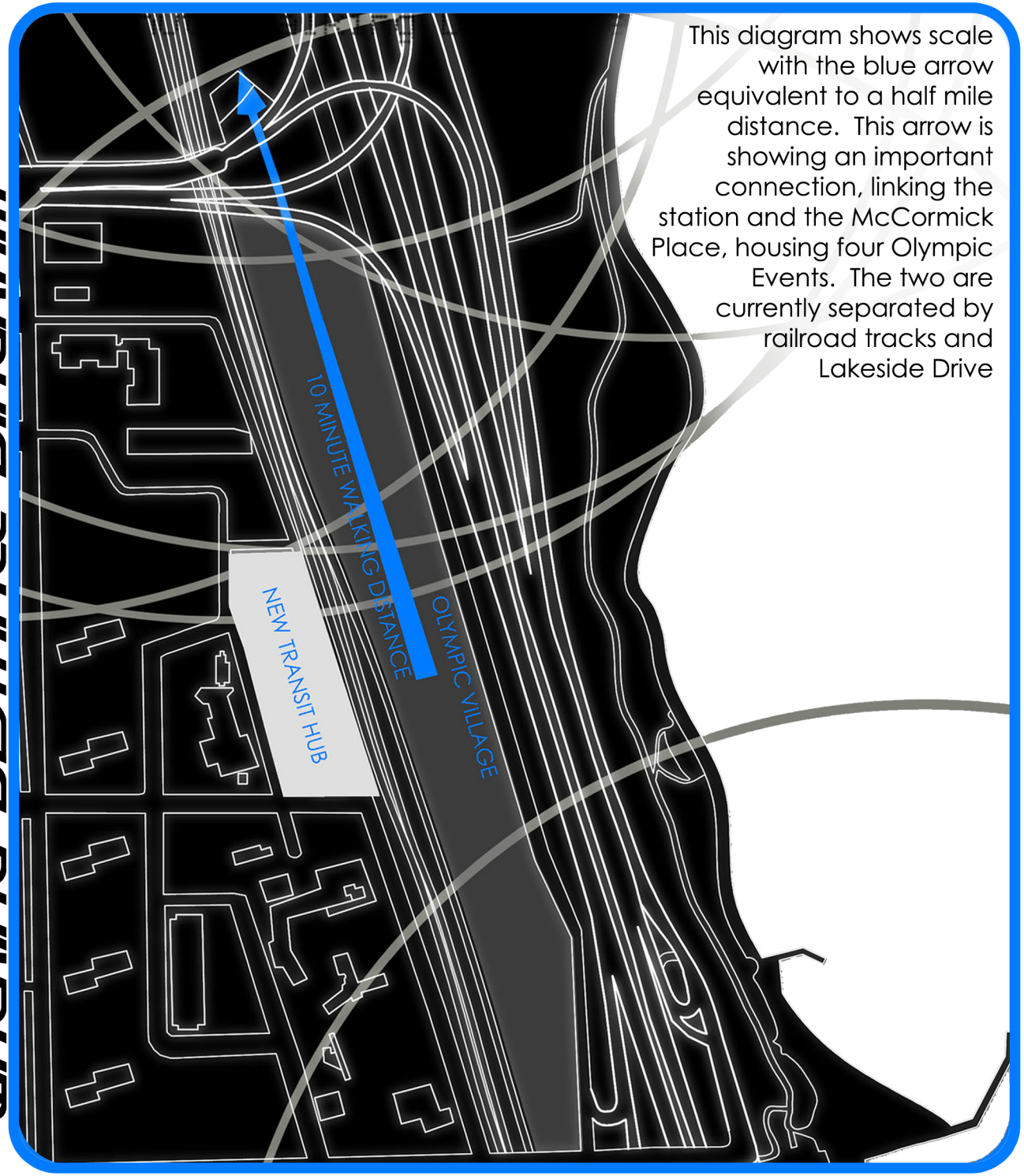




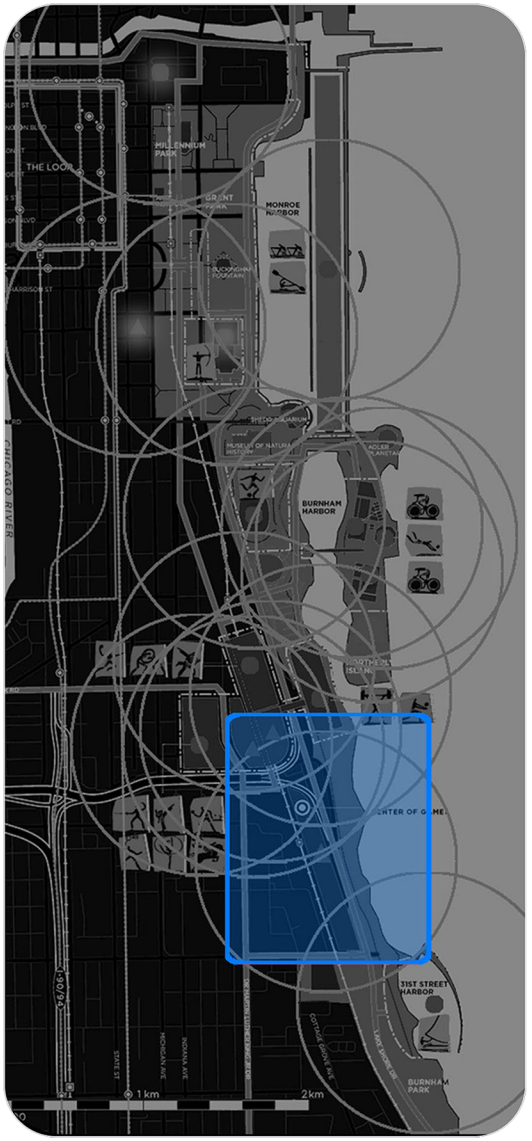

The direction of movement on the site is diagramed with the Metra train (in pink) showing the fastest movement in general and the interstate (in blue) ranks second while the side streets are shown in green with the slowest prescribed movement. The directionality of the movement could influence the circulation of the new station. The pedestrian movement currently moves mostly around the side streets and lakefront bike path.

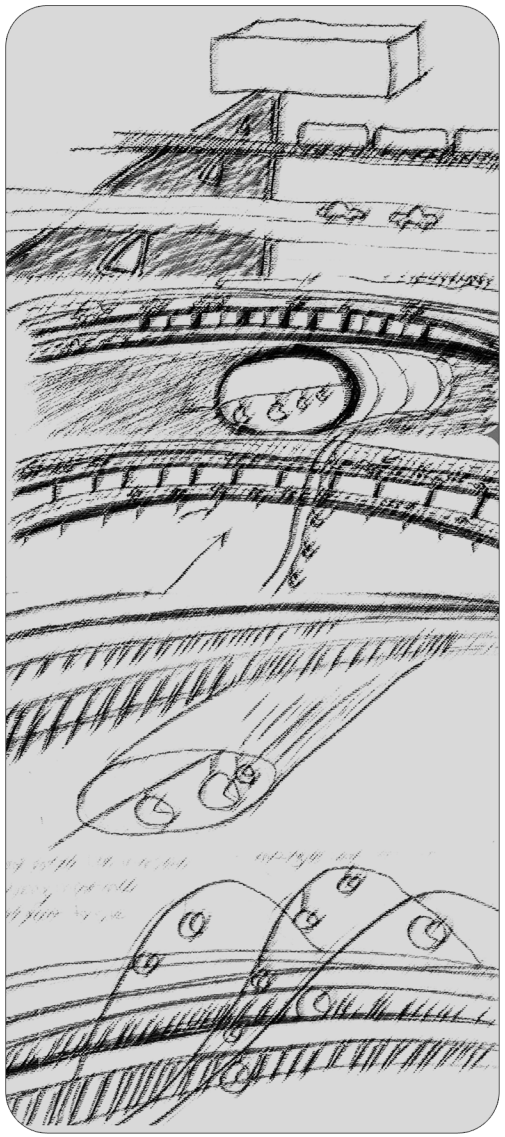
## PRESCRIBED MOVEMENT

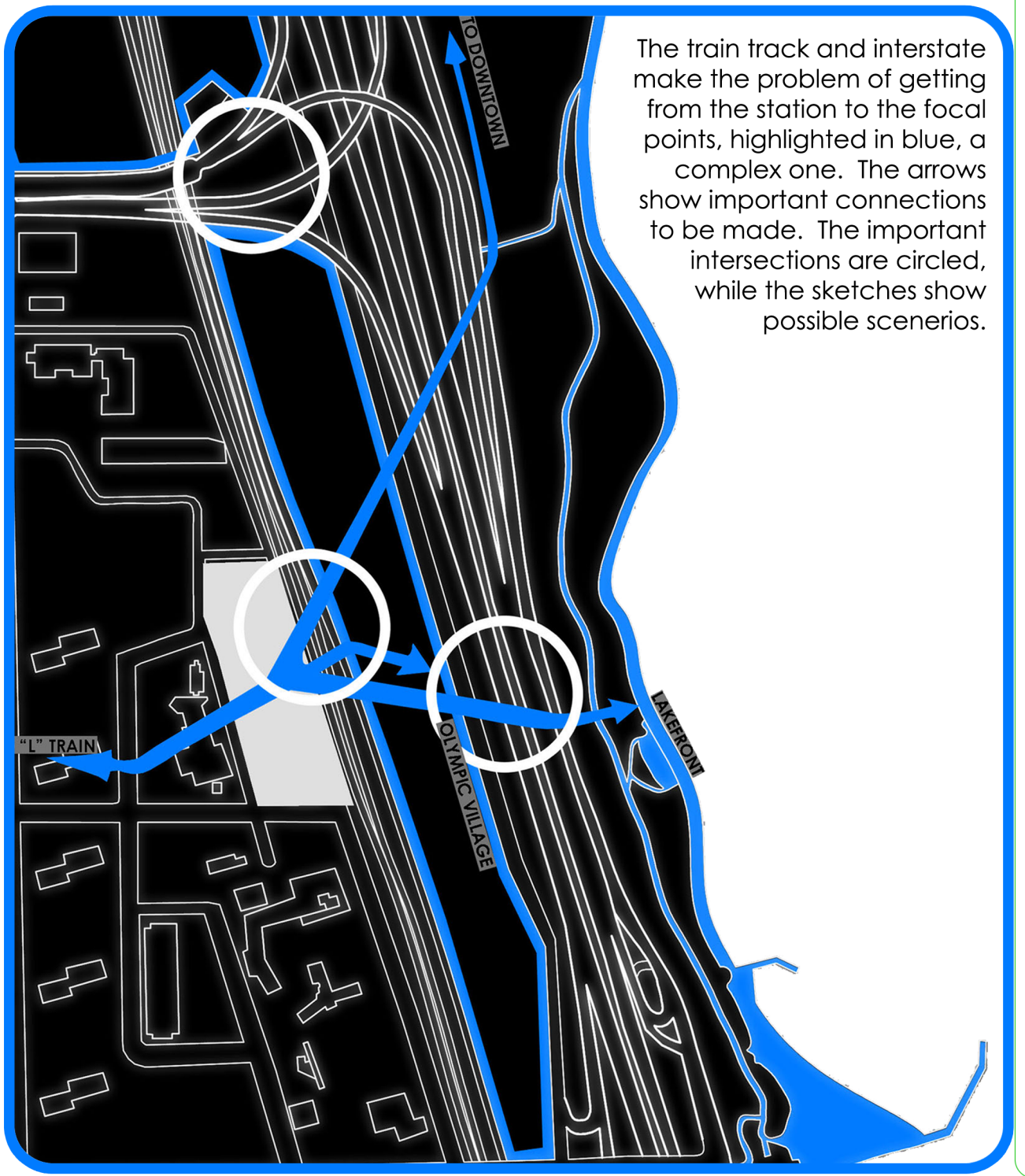
# WALKING DISTANCE DIAGRAM




This diagram shows scale with the blue arrow equivalent to a half mile distance. This arrow is showing an important connection, linking the station and the McCormick Place, housing four Olympic Events. The two are currently separated by railroad tracks and Lakeside Drive

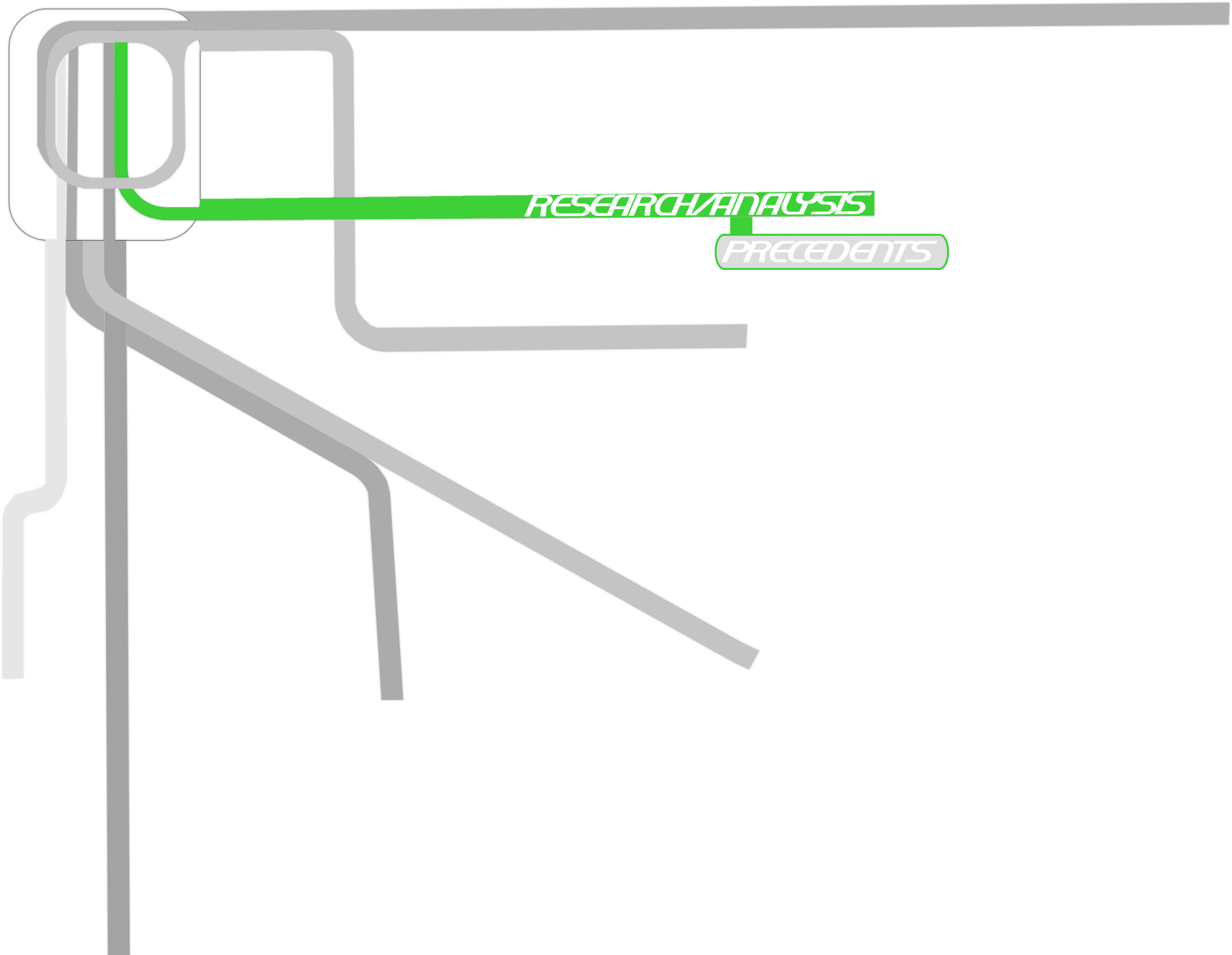







The train track and interstate make the problem of getting from the station to the focal points, highlighted in blue, a complex one. The arrows show important connections to be made. The important intersections are circled, while the sketches show possible scenerios.

## MAJOR INTERSECTIONS


RESEARCH/ANALYSIS
PRECEDENTS

# PREVIOUS SUMMER OLYMPICS

The Olympics in recent years have pushed the boundaries as to what is possible or feasible in architectural design. The Olympics in Beijing have brought attention to the city and its emergence as a leader in progressive forms of architecture. Public transportation is a key part of securing a bid for the Olympics.

## INNOVATIVE ARCHITECTURE

ATHENS

BEIJING

BEIJING

London is currently undergoing a 30 billion dollar renovation of their already efficient transit system. If the city planning and infrastructure is designed to better the city in future years, much like Barcelona, Spain in preparation for the 1992 Olympics, then the Olympics themselves can serve to create a ripple effect, a reaction that benefits everything and everyone.

## IMPROVED PUBLIC TRANSIT

SYDNEY

LONDON

The site chosen for the Olympic Village in Chicago is strategically located in the South Loop, an area previously thought unsafe, but now on the upswing with high-rise apartments going up and a fast increasing density. The site has much potential but is currently blighted and underused, especially with it's direct adjacency to the lake.

## SUCCESSFUL CITY PLANNING

BARCELONA

ATHENS

MILLENIUM PARK

OLD

Railroad tracks act as dividers in cities, often surrounded by blight, separating the "good" areas from the "bad." The tracks remain the same both visually and functionally as they did at their inception in the 17th century. These rustic looking divisions of space decrease property values and inhibit smooth transitions between areas both physically and visually.

EXISTING

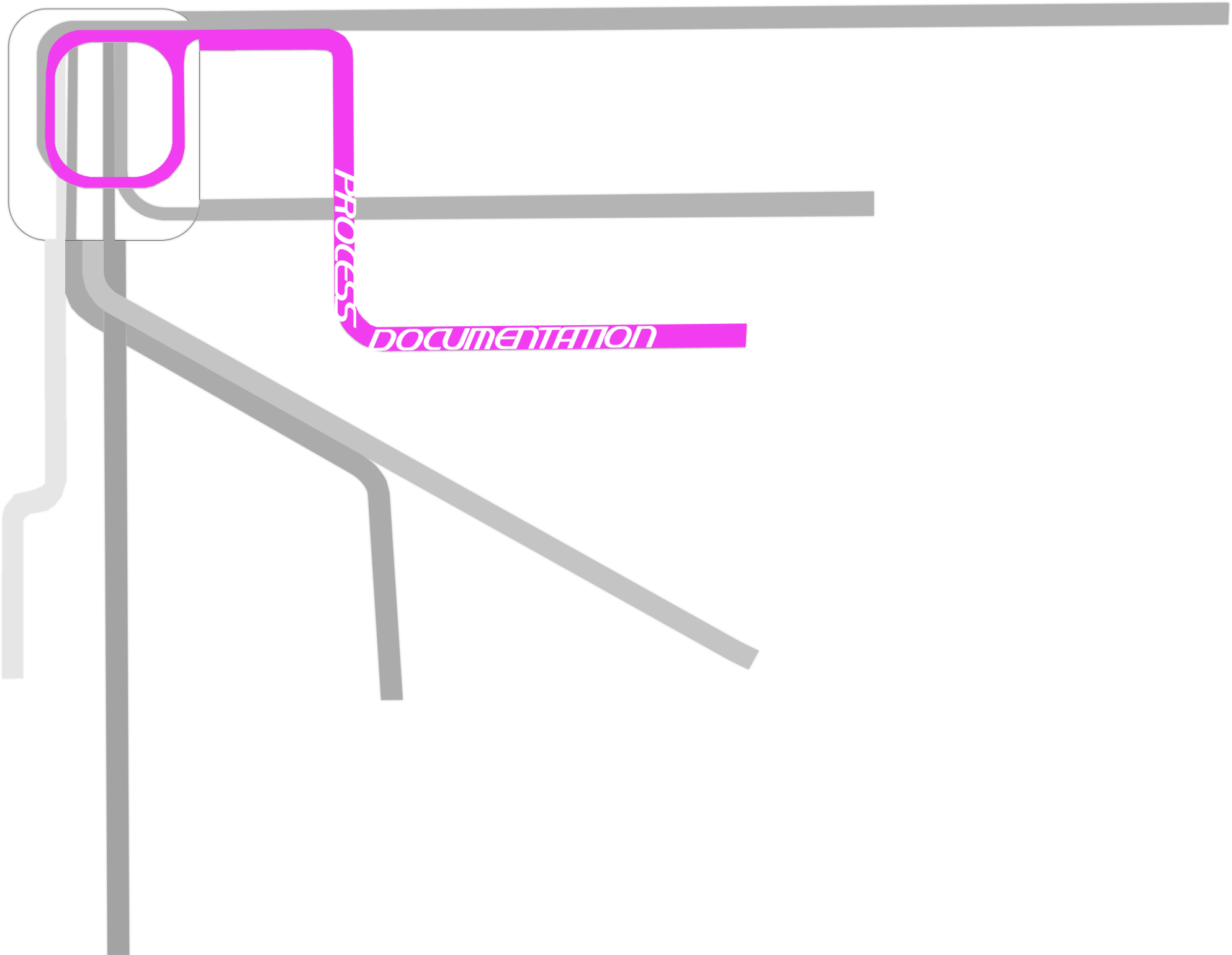
Chicago was among the earliest U.S. urban-rail pioneers and became the world's largest rail hub. Over a hundred years later, the dozens of Illinois Central Railroad tracks that converged downtown, were an eyesore. Therefore Chicago covered some 25 acres of tracks and commuter lines with Millennium Park. Creating a public space that bridges over the existing railroad tracks and creates a connection with the lakefront will be a major focus of this terminal project. The building itself can become a raised platform, weaving the site together.

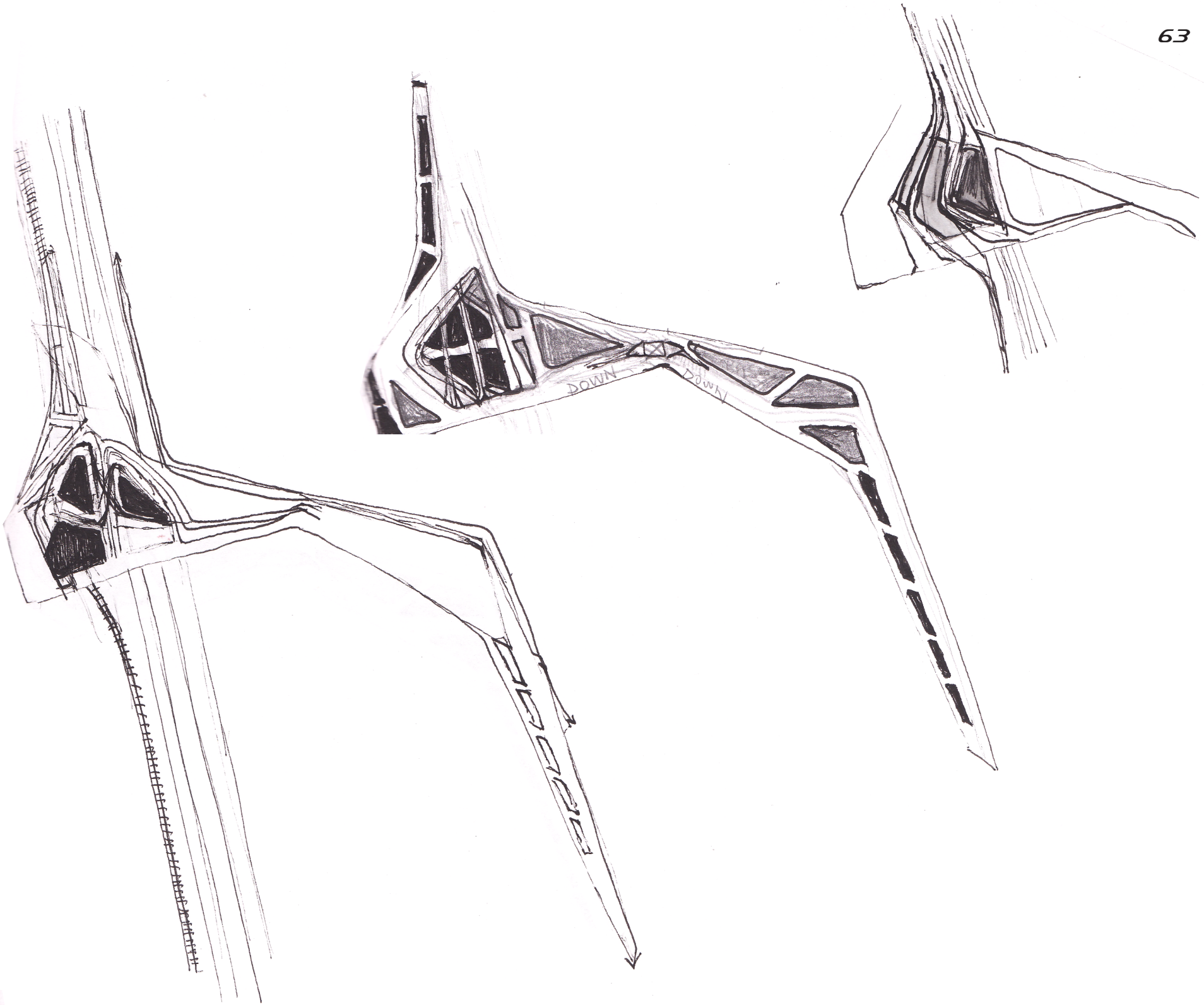
NEW SOLUTION

# YOKOHAMA PORT TERMINAL

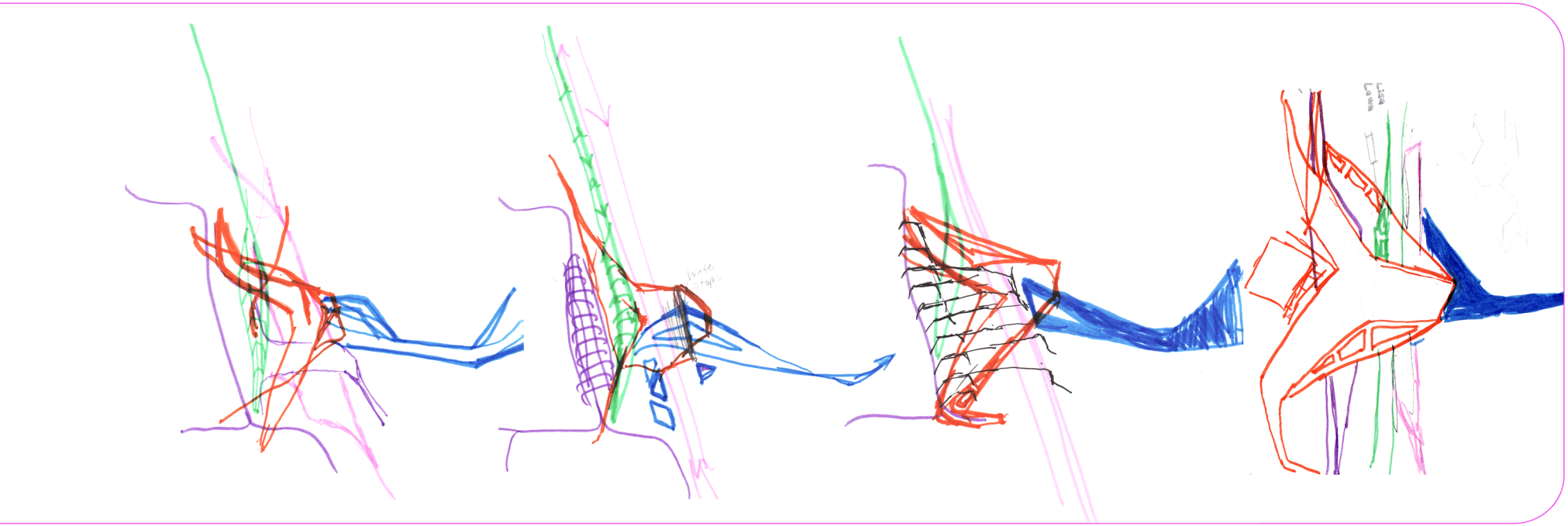
The Yokohama International Cruise Terminal in Japan is one of FOA's award winning projects, noted for its use of dramatic form, innovative materials, and fascination with the interplay of architecture, landscape and nature. The focus of FOA was to produce a new type of transportation space with more urban qualities. Rather than concieving the building as an object on a pier, it was thought of as an extension of the ground plane. The form was derived by the transformation of the lines of the circulation diagram into a folded surface. A series of programmatically specific interlocking circulation loops allow us to subvert the traditional structure characteristic of this type of buildings.

The design approach to the project will be significant in the schematic design of the new transportation station for Chicago. The treatment of the ground plane and the disconnected site will be an emphasis as well as incorporating landscape and pedestrain zones into a fully functional terminal with layered transportation.

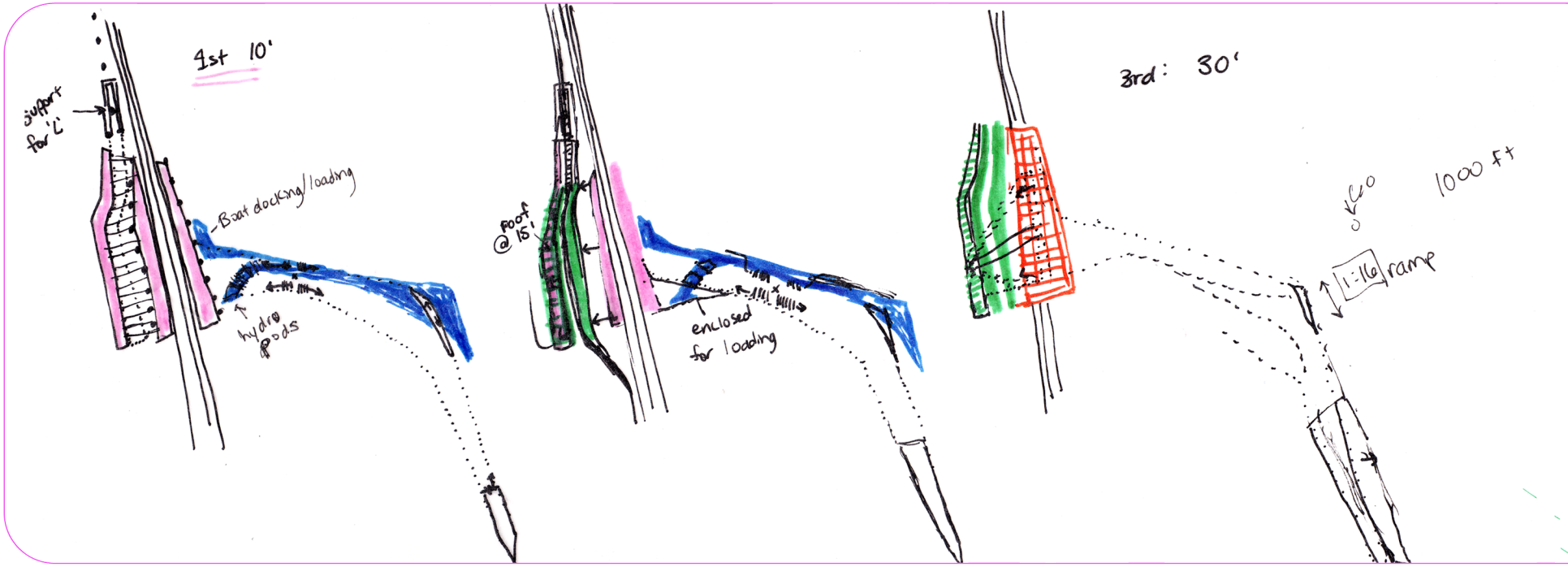

PROCESS
DOCUMENTATION

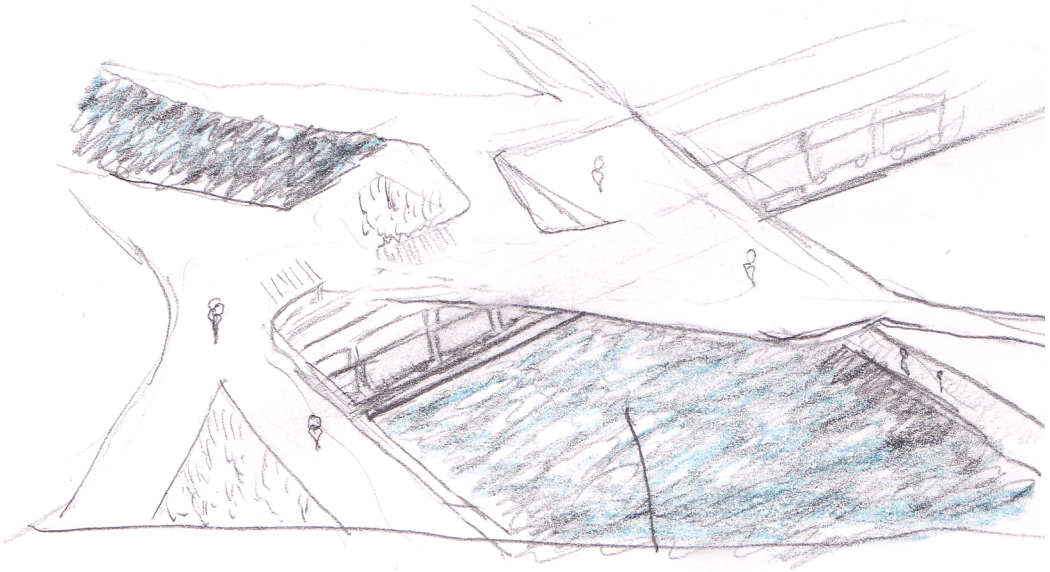

DOWN
DOWN

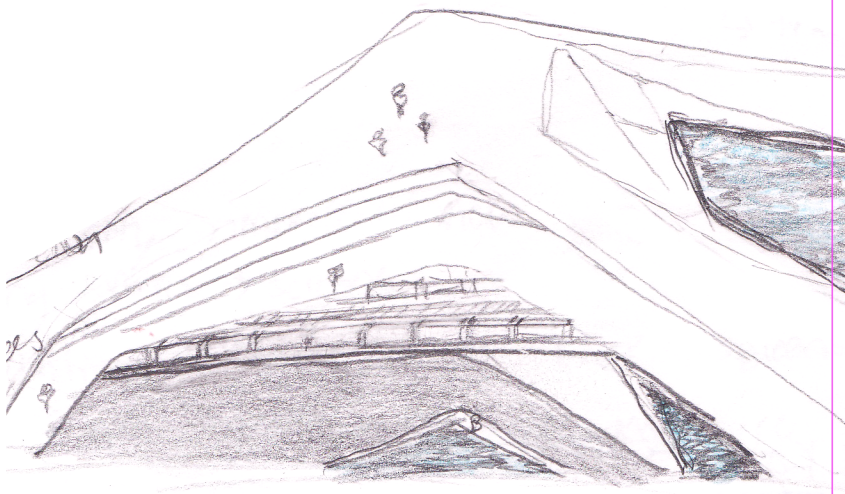
# FORM SKETCHES



# PLAN SKETCHES



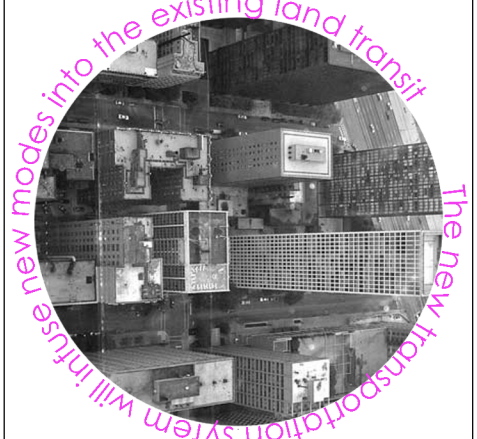




PERSPECTIVE SKETCHES

# TRANSIT SYSTEM PROGRAM

## TRANSIT MODES




## MATERIALS

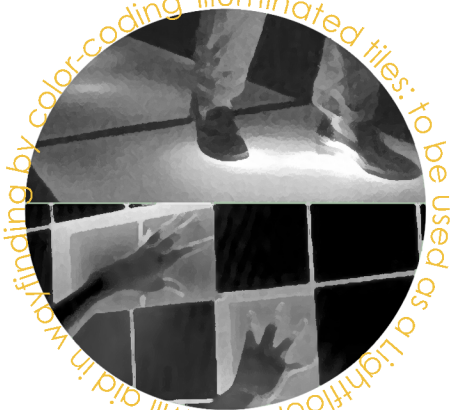
## EVENTS

The transit hub will act as the gateway to the city, the first impression of Chicago

Bringing people together in the transit system creates interesting cultural encounters

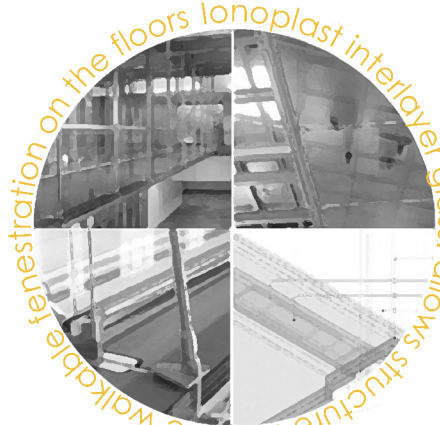
Free & clean public restrooms will draw inside even those not using the transit system

Shopping including convenience stores and retail allow expediency for passengers


Illuminated tiles: to be used as a lightfloor that will aid in wayfinding by color-coding

High Performance Concrete: used to suspend the structure across the longest spans

Light-Emitting Laminated Glass: will provide an alternative to signage in terminal

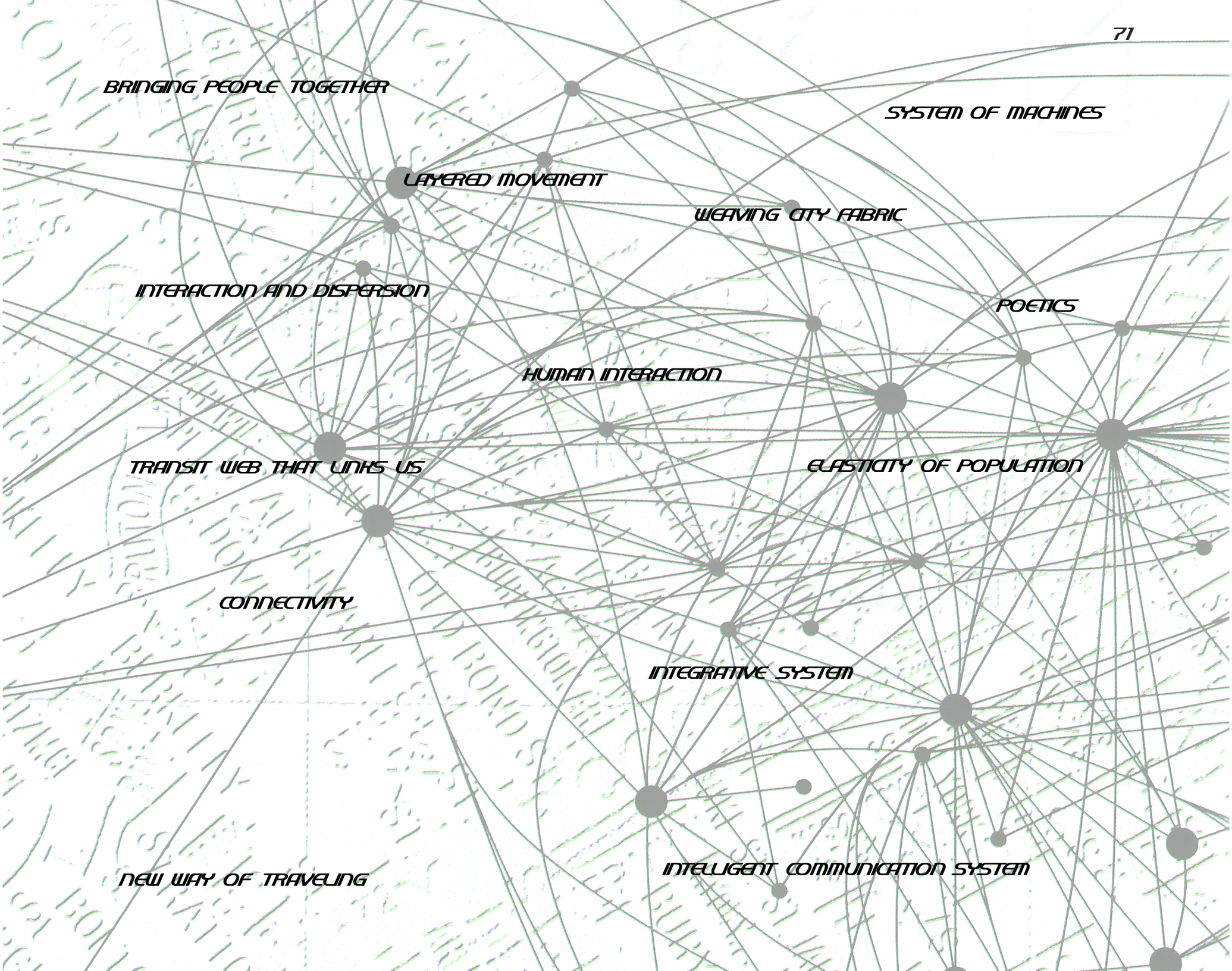

Ionoplast interlayer glass: allows structure to have walkable fenestration on the floors

Water transit is key in addressing the disjunction between Olympic events & old transit

The sky gives a unique alternative to public transit becoming distinctive to Chicago

# SQUARE FOOTAGE STUDY

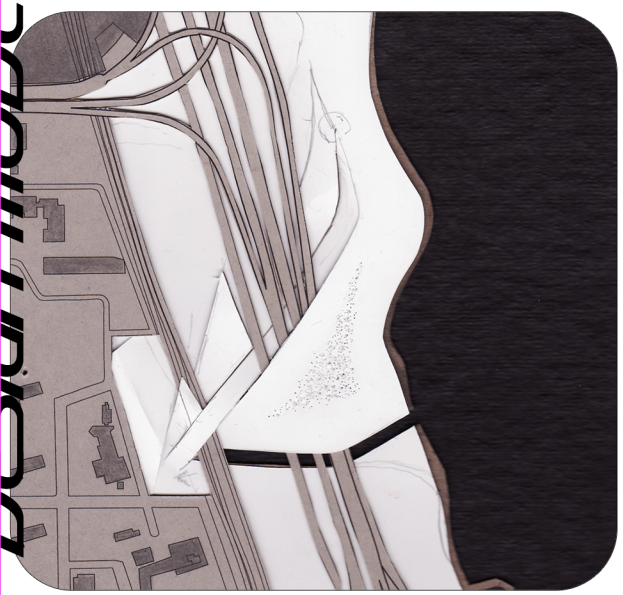
| 1‘ X 1’ SQUARE | 2‘ X 2’ SQUARE | 3‘ X 3’ SQUARE |
| --- | --- | --- |

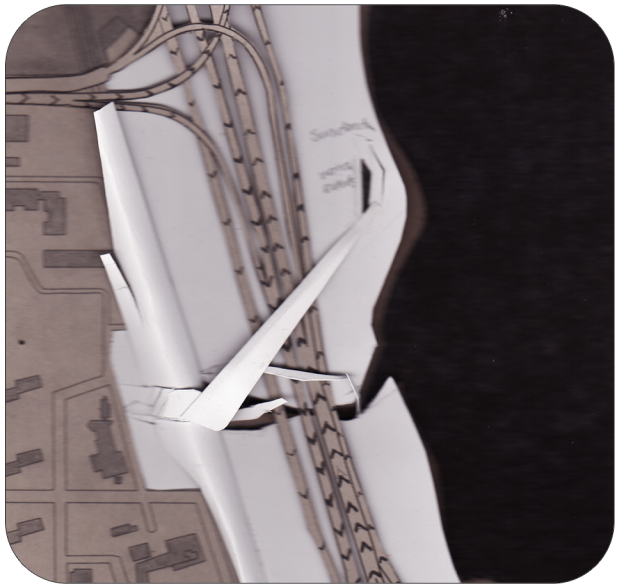

BRINGING PEOPLE TOGETHER
SYSTEM OF MACHINES
LAYERED MOVEMENT
WEAVING CITY FABRIC
INTERACTION AND DISPERSION
POETICS
HUMAN INTERACTION
TRANSIT WEB THAT LINKS US
ELASTICITY OF POPULATION
CONNECTIVITY
INTEGRATIVE SYSTEM
NEW WAY OF TRAVELING
INTELLIGENT COMMUNICATION SYSTEM

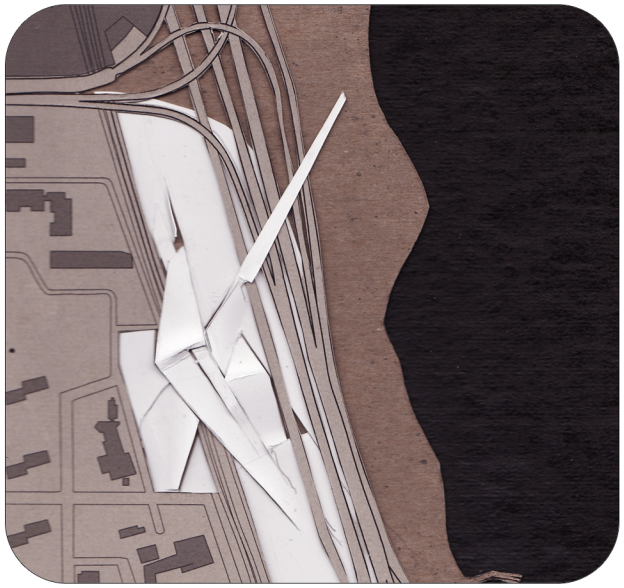
# FOLDING PLANE MODELS



Attempting to fold the ground plane and create a raised parkway weaving the city fabric together was a focus of the terminal project. These models explore this idea and look to Millennium park as a design precedent, which created a platform over the 25 acres of railroad tracks downtown and made a connection with the lake.

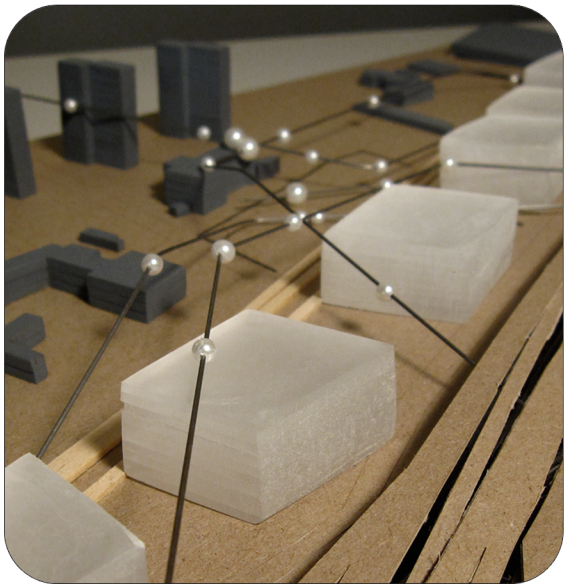


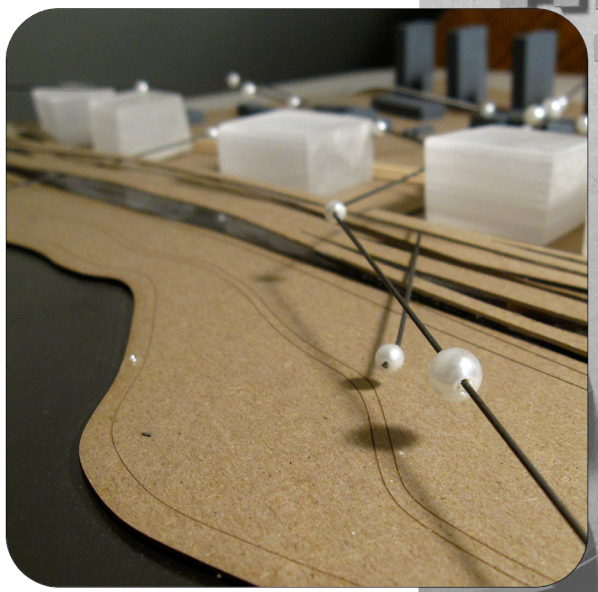




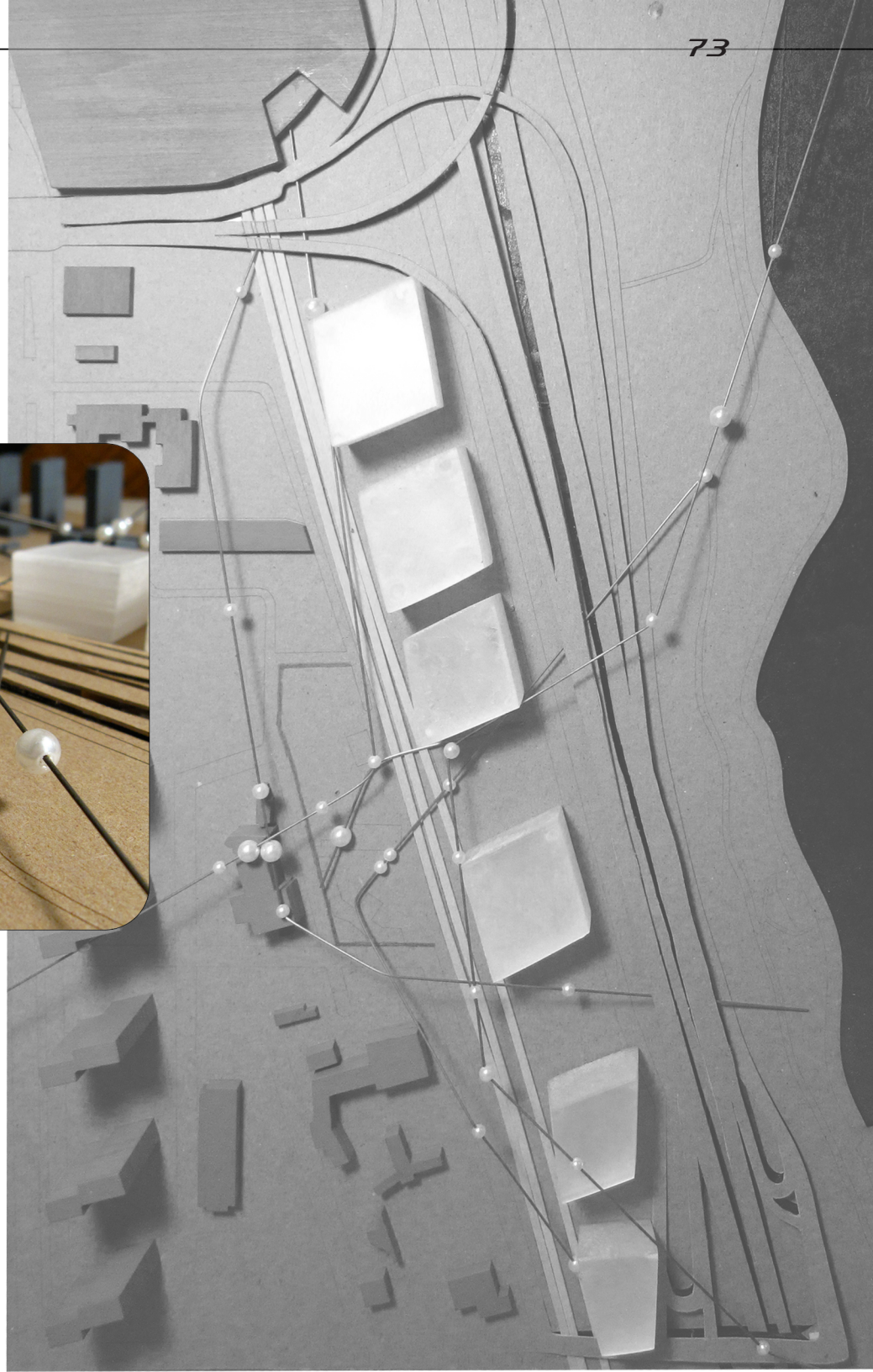
The option of having more than one station was an idea being explored at this time - a main hub and several mini hubs in the surrounding site. Another focus of these models was thinking of the system as integrative to the urban fabric instead of additive.

The idea behind this model was to show a system or web with movable pieces, that could diagrammatically inform the project. A diagram representing the conceptual web is shown on page 71. The wires stream out from the designated site and make connections with the important areas. The movable pearls on the wire represent a number of things like a transit web, a system of machines, weaving urban fabric, or layered



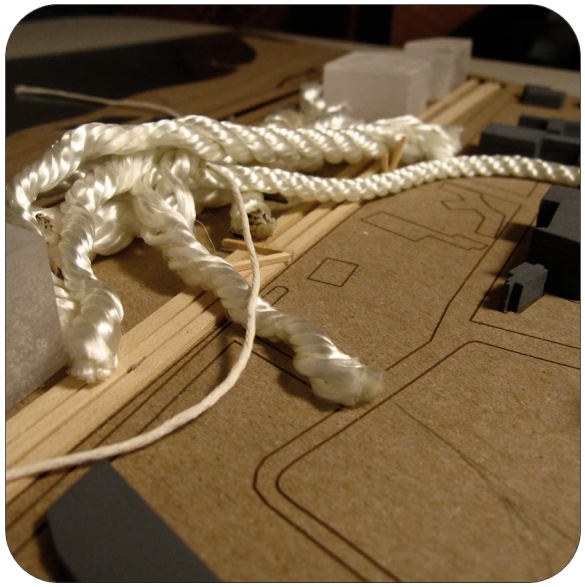


movement. The different sizes of pearls comes from the idea of having varied types of connection modes in the new transportation system.



# ROPE MODEL

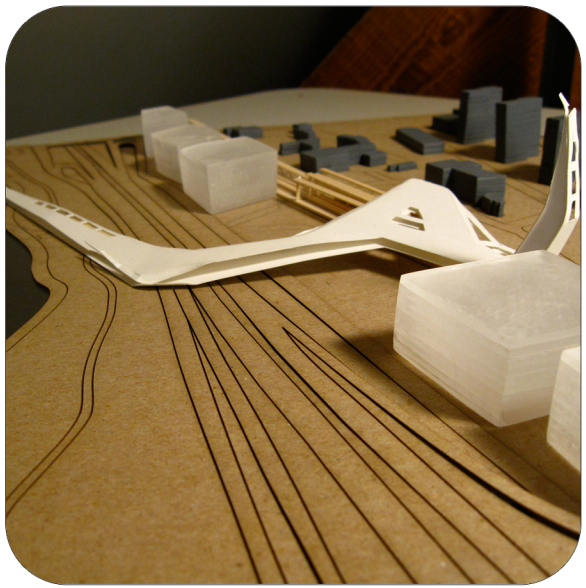
To address programmatic issues, a rope model with varied sizes of girth represents the types of transit merging on the site and the predicted amount of space each would require. The largest size of rope represents the Metra, commuter train, carrying the largest amount of people. Next is the "L", followed by vehicular traffic like buses and cars.

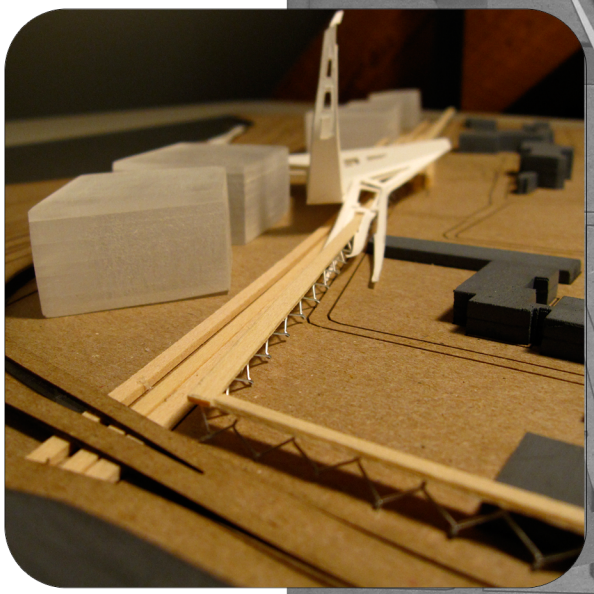


The smallest rope represents pedestrian pathways or small people movers. The model was done as a study on the interaction of these layered modes of transit.

# FORM STUDY MODEL

By enlarging the overhead concourse from the various platforms, the concept of the bridge emerges. The roof becomes a raised parkway that pedestrians and bike riders can use to gain access to the lakefront. The interior space of the bridge can begin to function as an airport terminal with shops, people movers and restrooms. The form itself provides and urbanized link, across



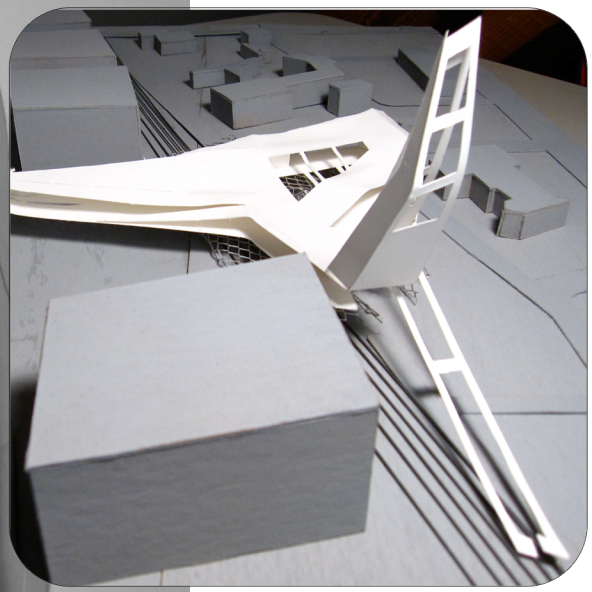


the railroad tracks and interstate, providing access to the once inaccessible Olympic Village, and lakefront. The tower gives the architecture an iconic look and function, with gondolas that would travel from the tower by cable and make connections to the lakefront and McCormick Place, while providing spectacular views of the Chicago skyline and Lake Michigan along the way.

# LARGE SCALE STUDY MODEL

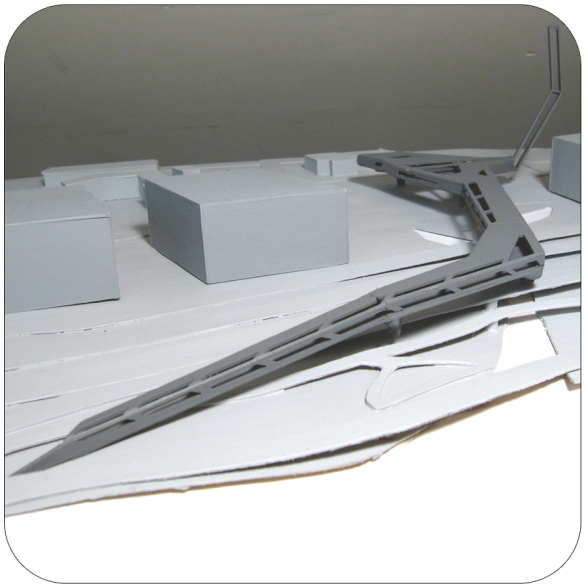


This study model of the final design addressed ramps and additional circulation connections besides the obvious link being made by the form. The "L" raised 20' above the ground pierces through the form as shown in the middle photo. This provides direct pedestrian access to the "L" platform. There are several ramps that move pedestrials from the roof plane down to the



interior space, as well as ramps that link the form with the ground plane. The architectural language of the form is derived from the articulation of the movement on the site - the alteration of the prescribled North to South movement.

A visible circulation core to showcase the dynamic movement within the station was an important aspect of the design. From the roof plane, one can look down and see the various transit types moving below, as well as the visible gathering space where people can meet momentarily before being dispersed again.



The tower from which the gondolas travel, draws inspiration from the icons of famous World Fairs such as the Eiffel Tower or the Feris Wheel, pioneered at Chicago's Columbian Exposition in 1893. The tower is a spectacle, making its mark on Chicago's skyline, creating an intense entrance to the city and acting as a beacon with strong illumination at night to aid in wayfinding.

# FINAL DESIGN DOCUMENTATION

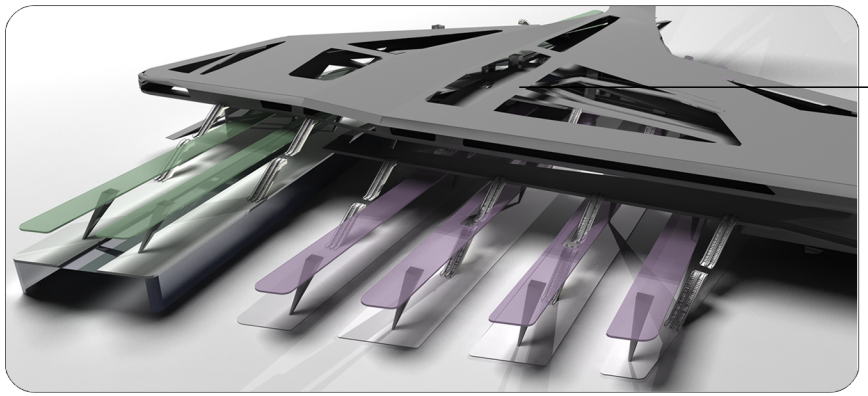
# PLAN 1' 10" CUT ; SCALE 1:125

# PLAN 2 : 20' CUT : SCALE 1:125

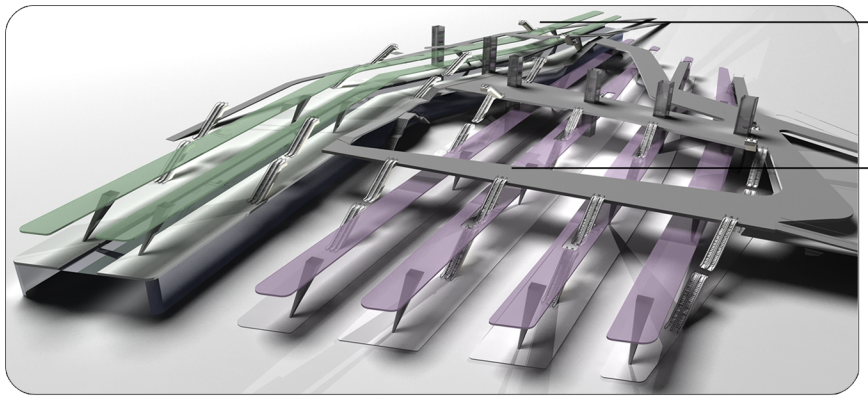
# PLAN 3 : 30' CUT : SCALE 1:125

PLAN 1 : 40' OUT : SCALE 1:125

PLAN 5 : 60' CUT : SCALE 1: 125

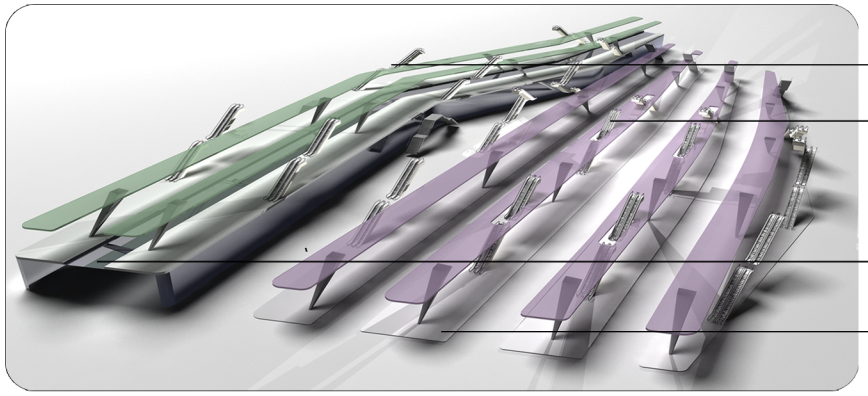


MAIN INTERIOR SPACE



CONNECTION RAMPS

30’ WALKWAY CONNECTION

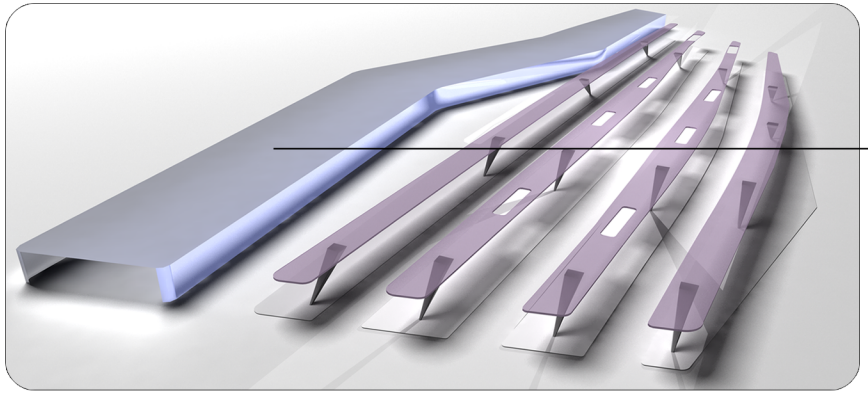


“L” PLATFORM AWNINGS

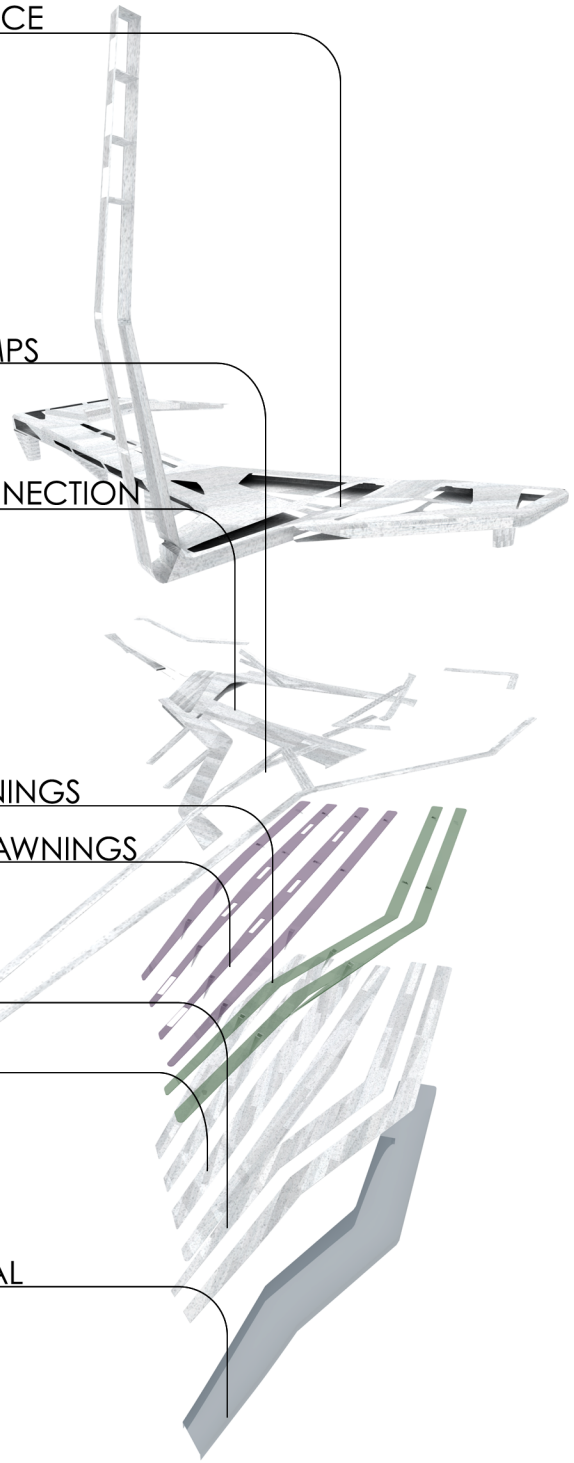
METRA PLATFORM AWNINGS

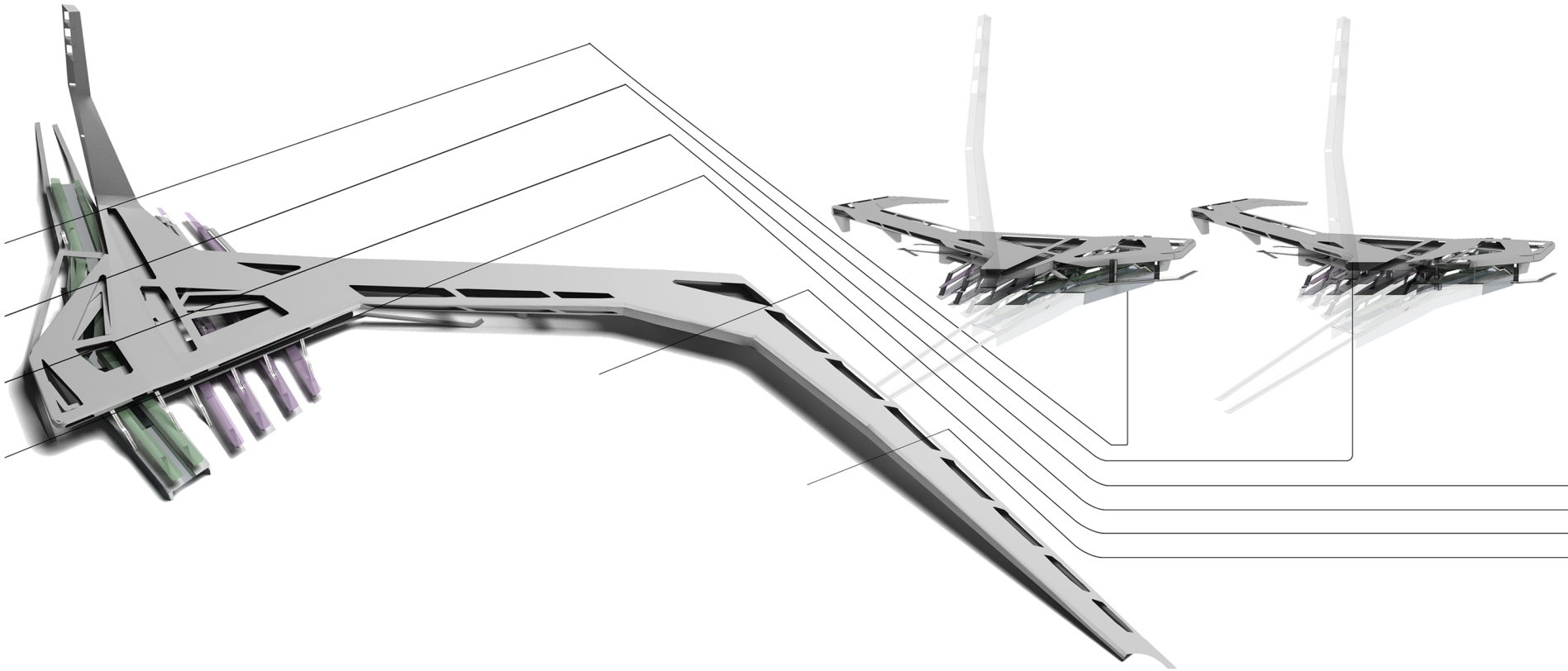
“L” PLATFORMS

METRA PLATFORMS

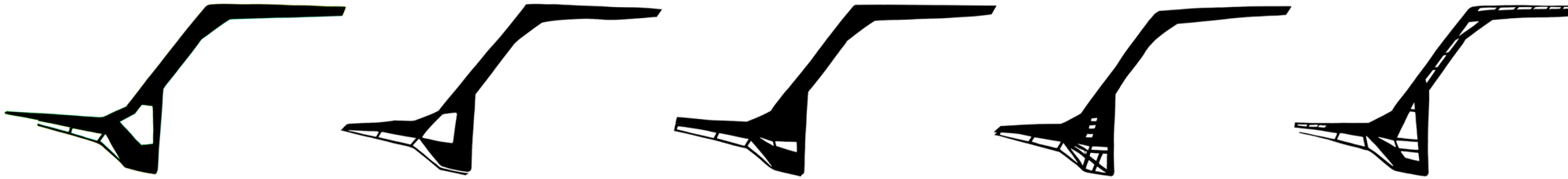


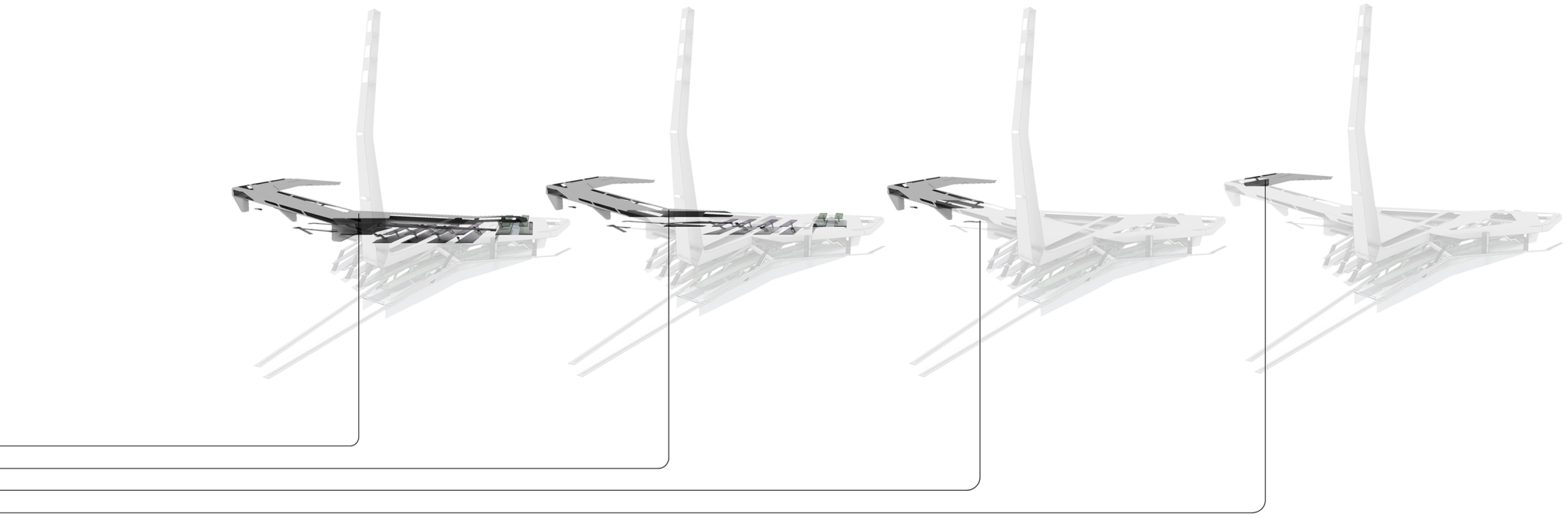
BUS & TAXI TERMINAL





## FORM SUBTRACTION ITERATIONS



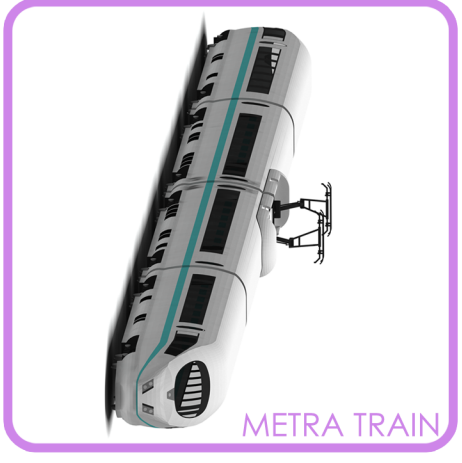


# TRANSIT MODES SERVING STATION

TAXI

BUS

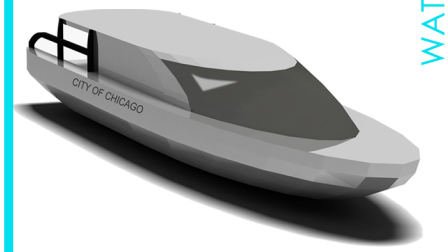
"L" TRAIN



METRA TRAIN

# PROPOSED TRANSPORTATION

WATER TAXI




BICYCLE

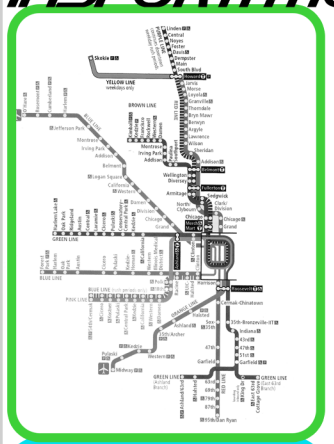
GONDOLA

PERSONAL RAPID TRANSIT

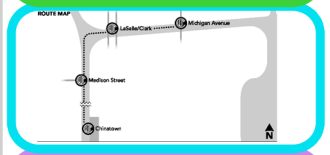
# EXISTING TRANSPORTATION

CHICAGO PUBLIC TRANSIT ROUTES

"L" TRAIN ROUTE

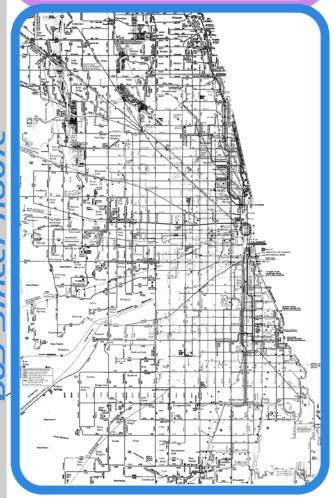


WATER TAXI



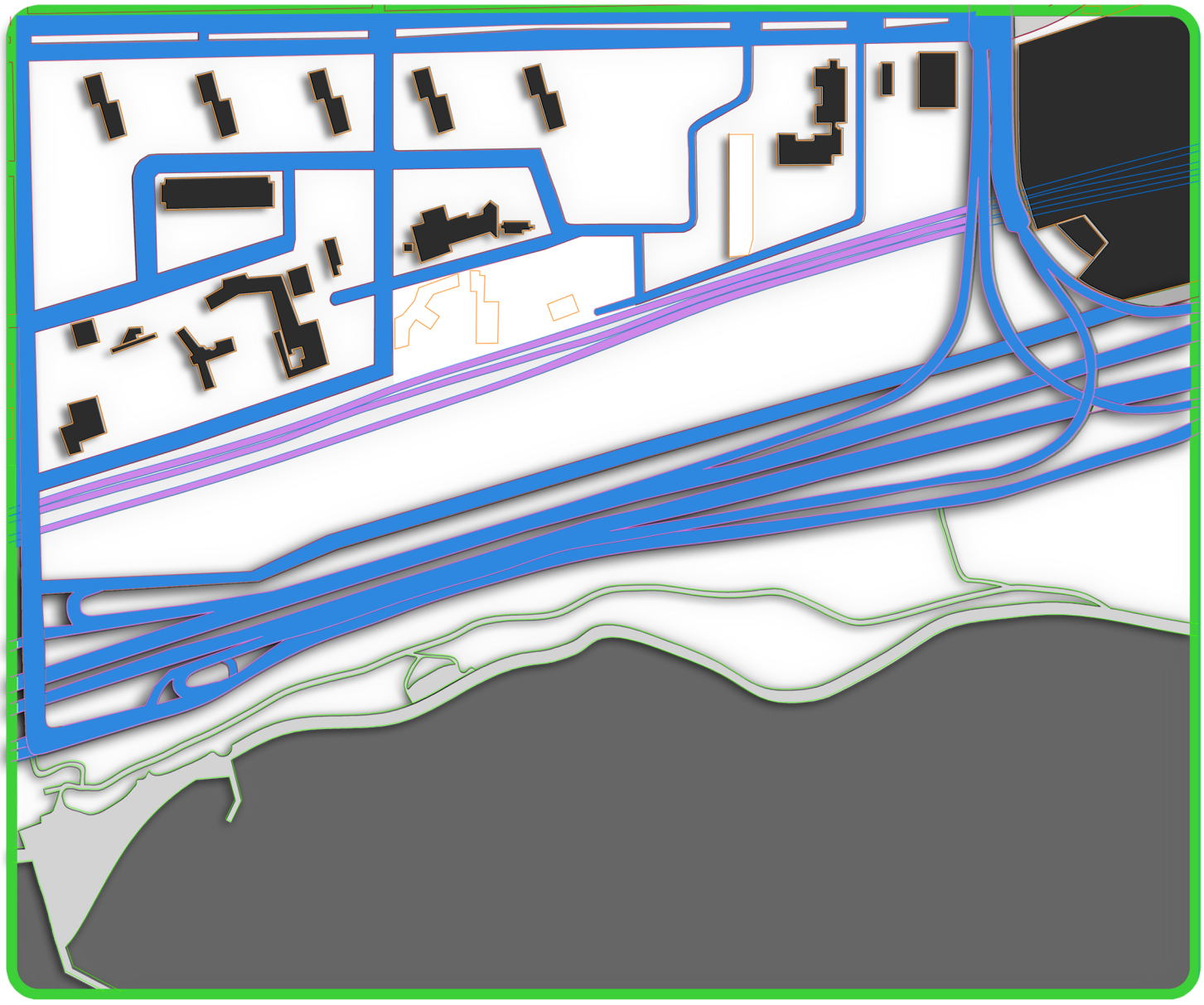

METRA TRAIN ROUTE

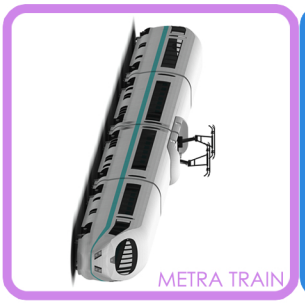
BUS STREET ROUTE



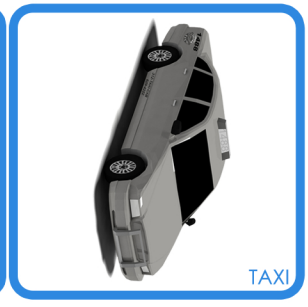
STATION TRANSIT ROUTES

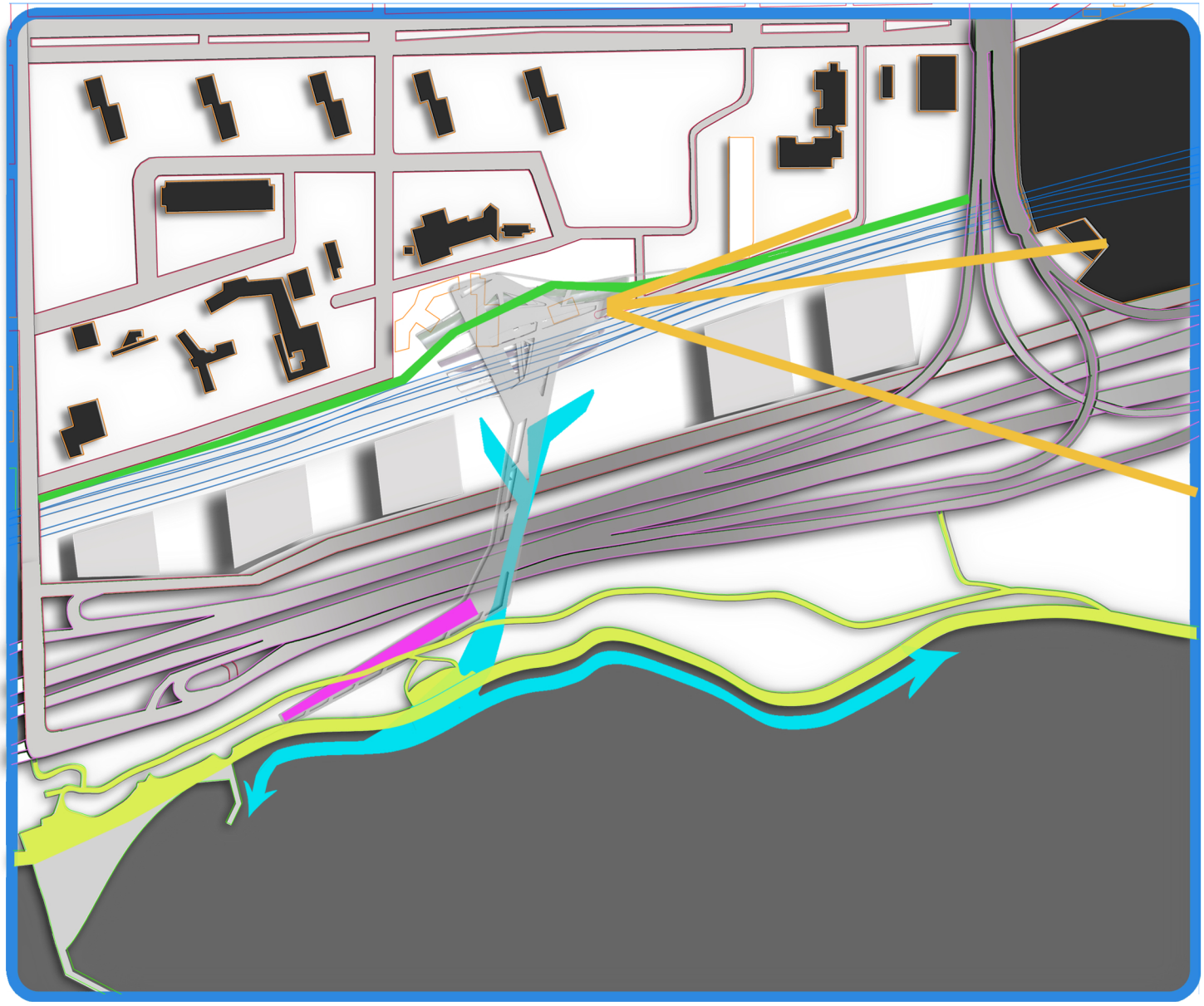
# EXISTING TRANSPORTATION




METRA TRAIN

BUS


TAXI



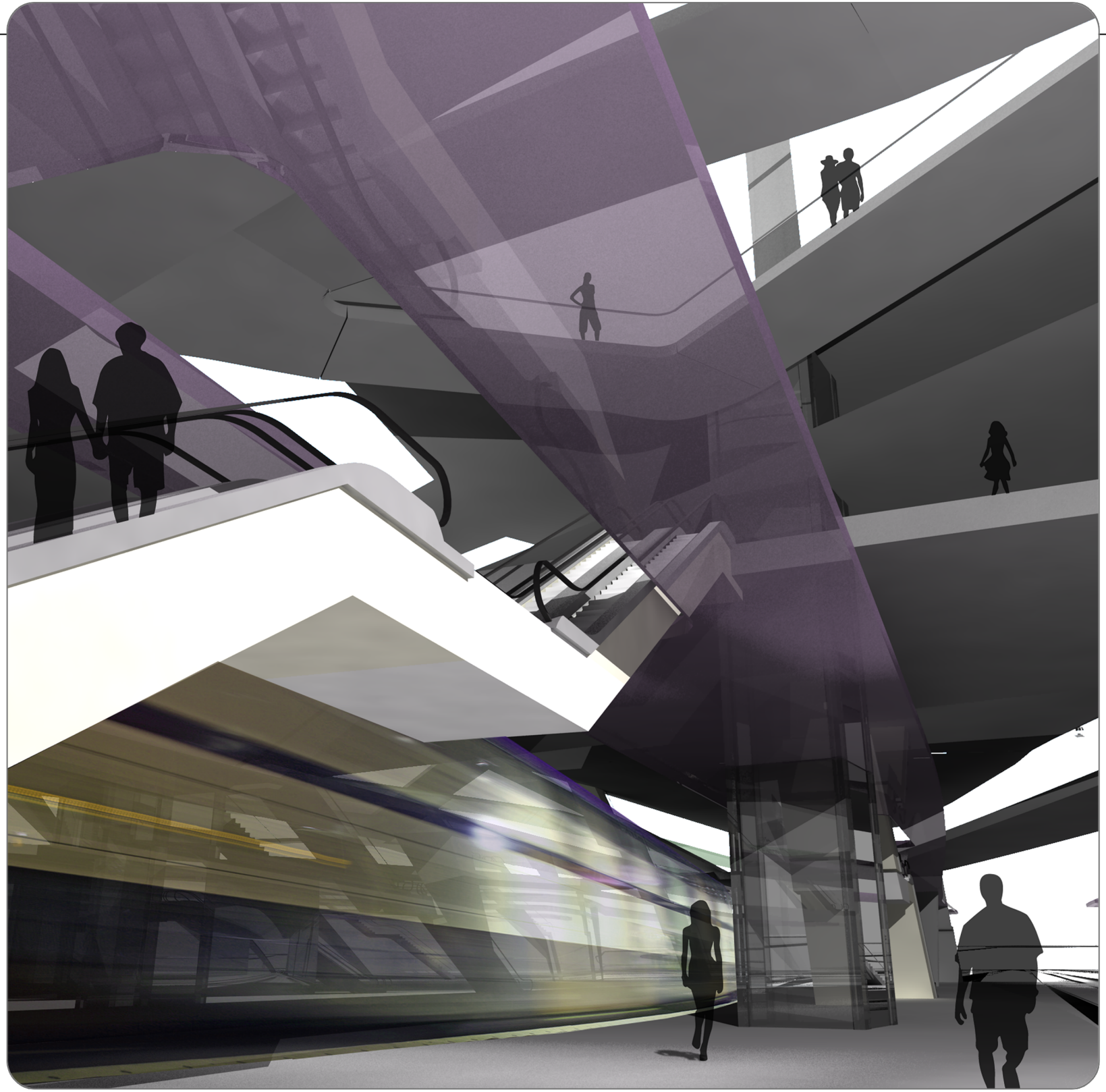


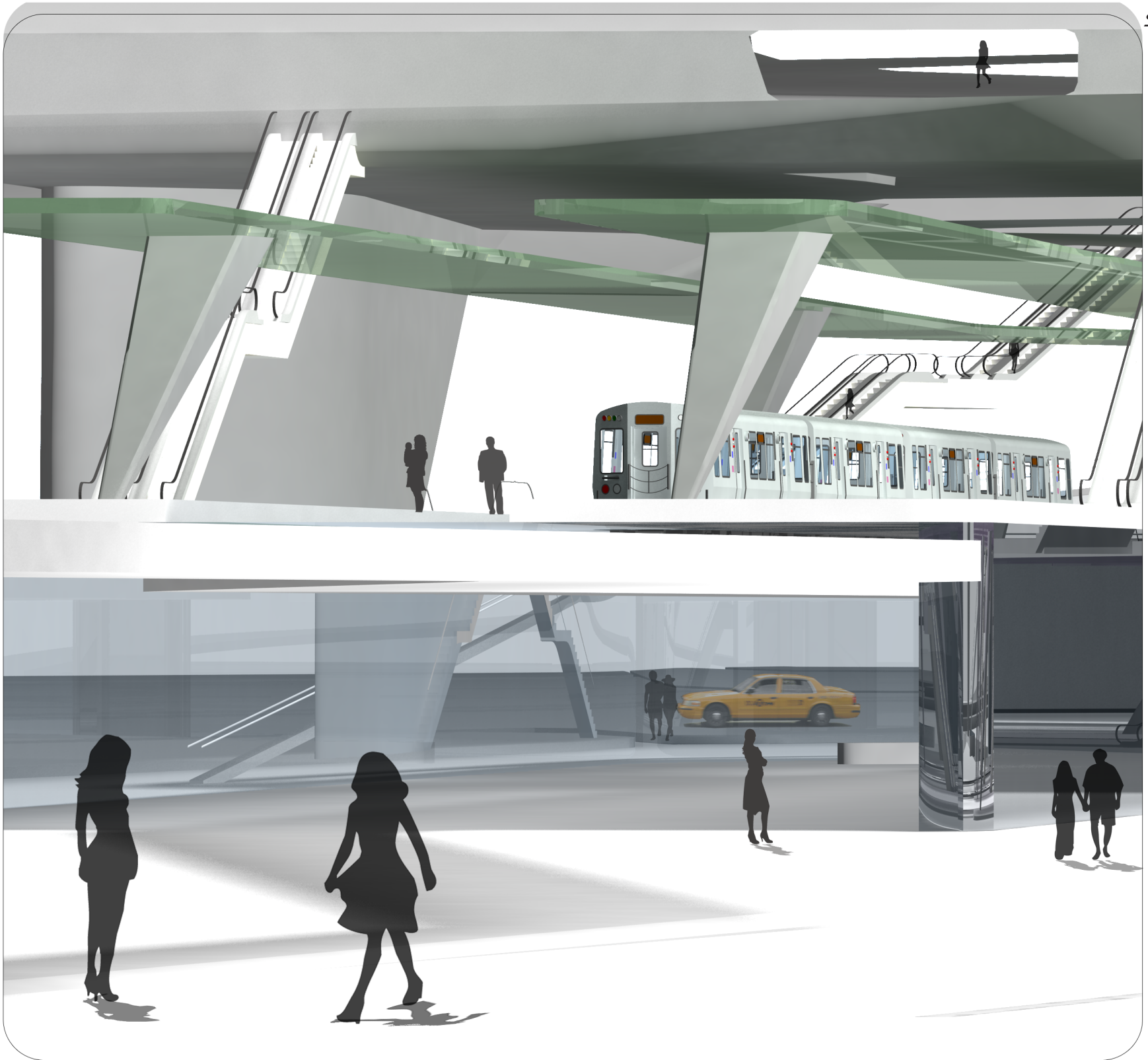
# PROPOSED TRANSPORTATION

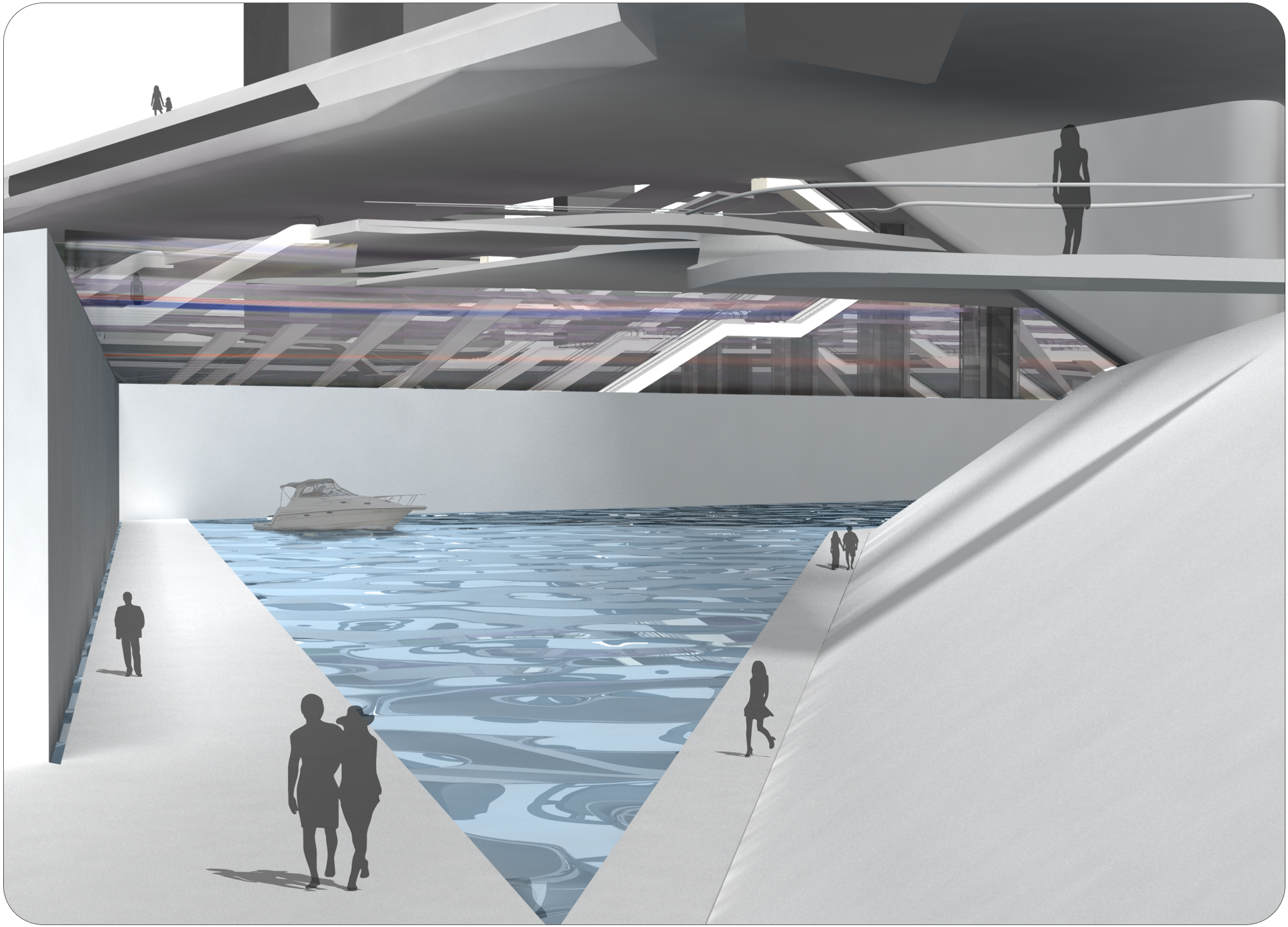
GONDOLA

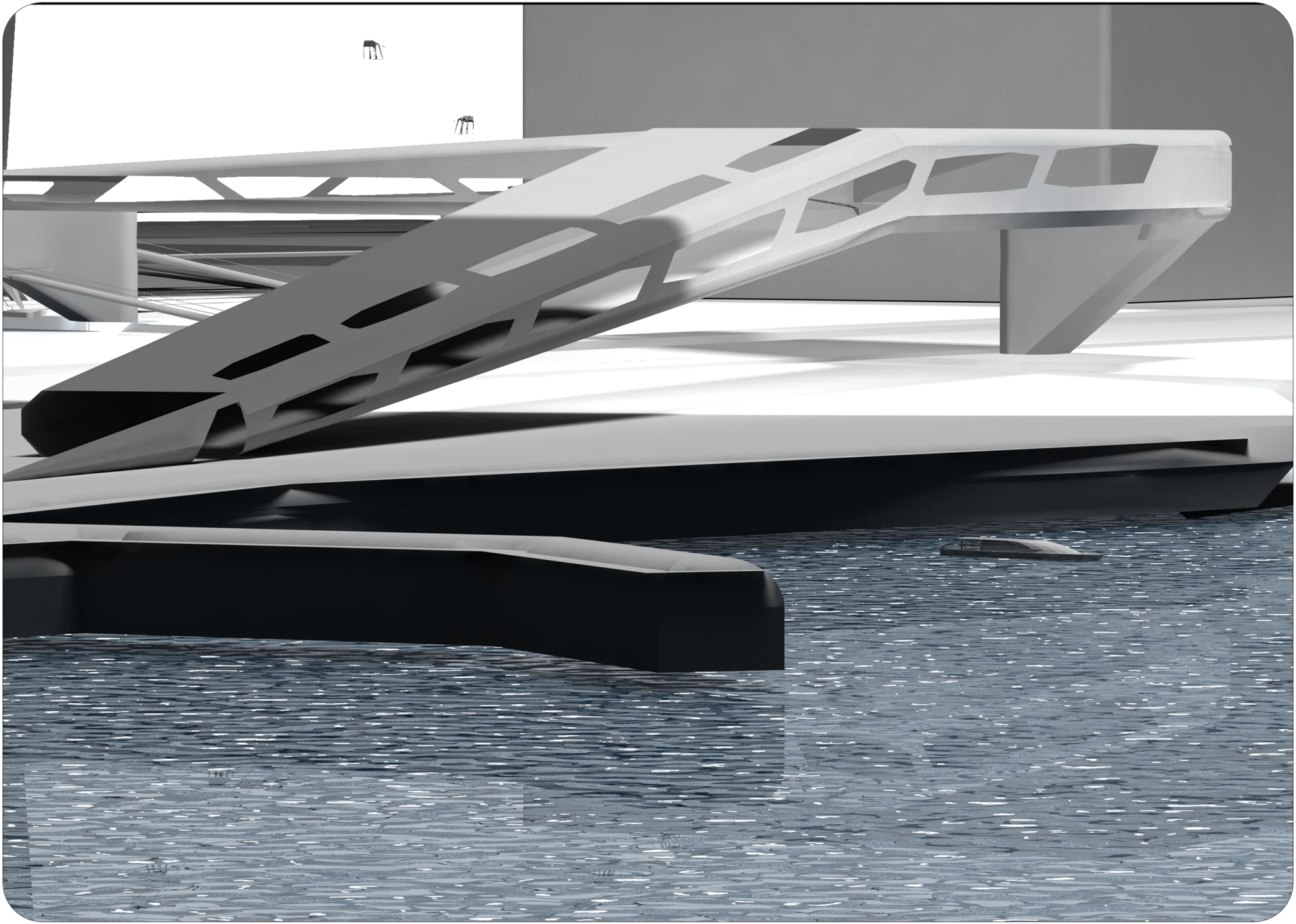
PERSONAL RAPID TRANSIT

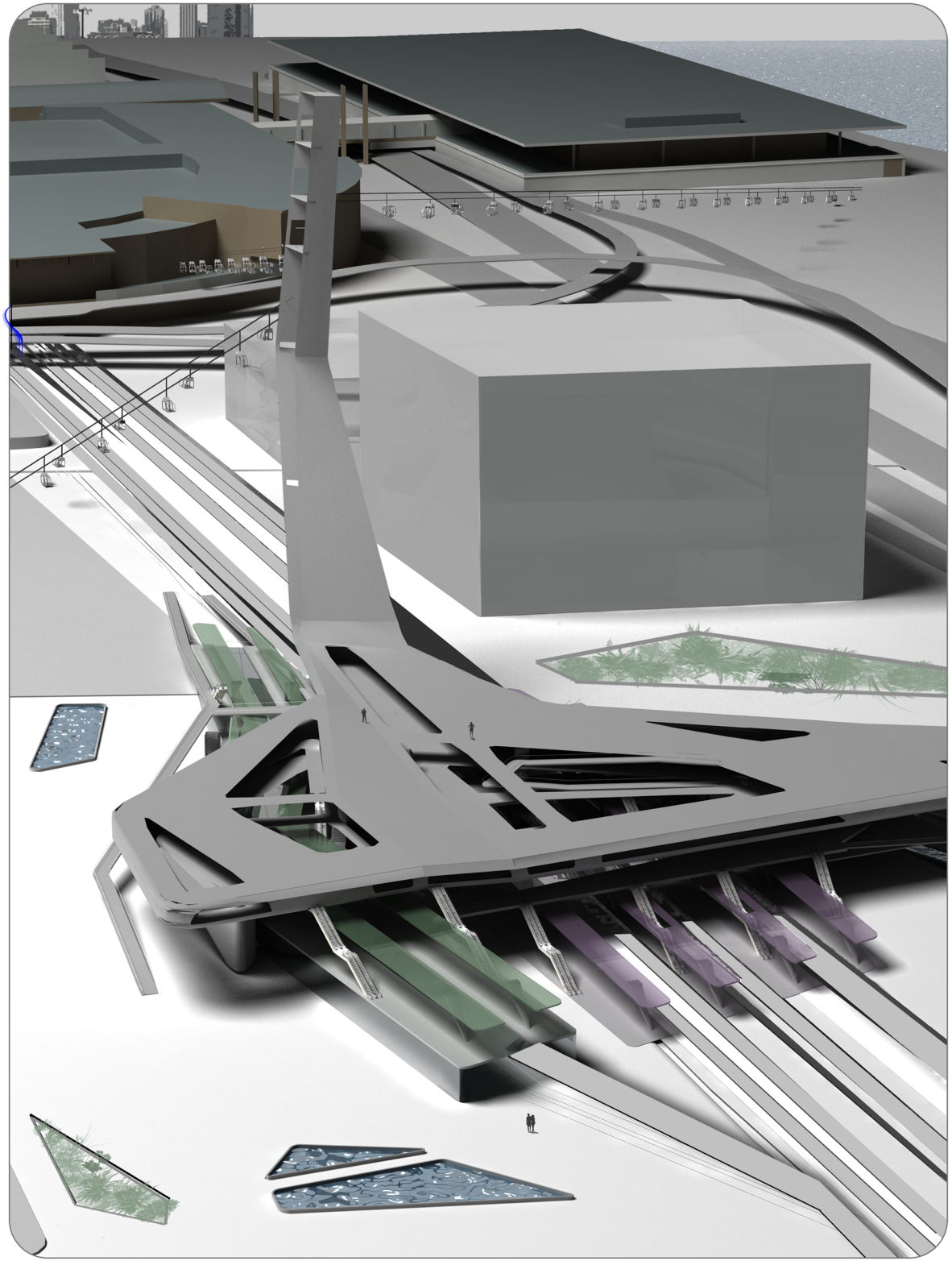
# METRA TRAIN PLATFORM





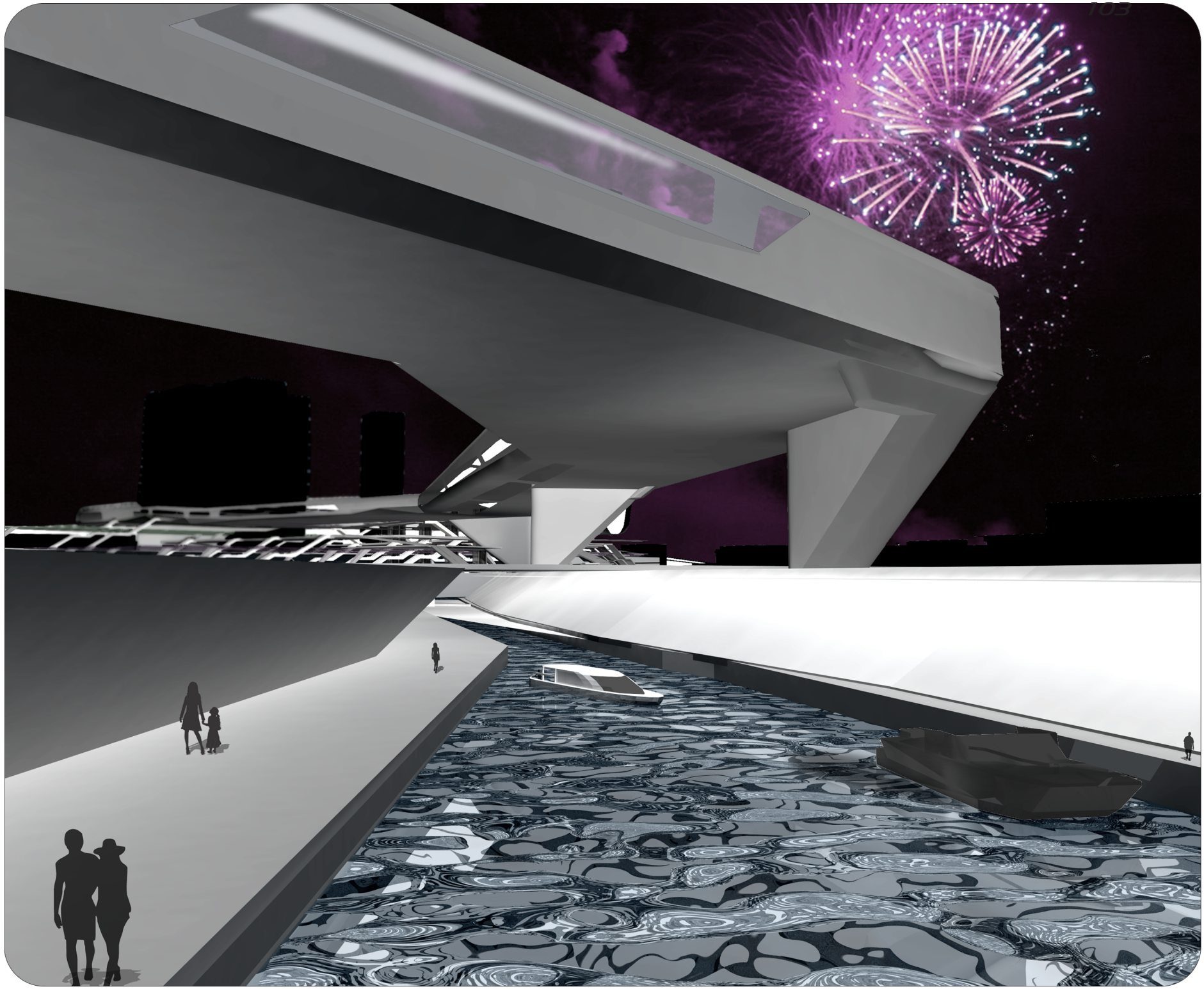


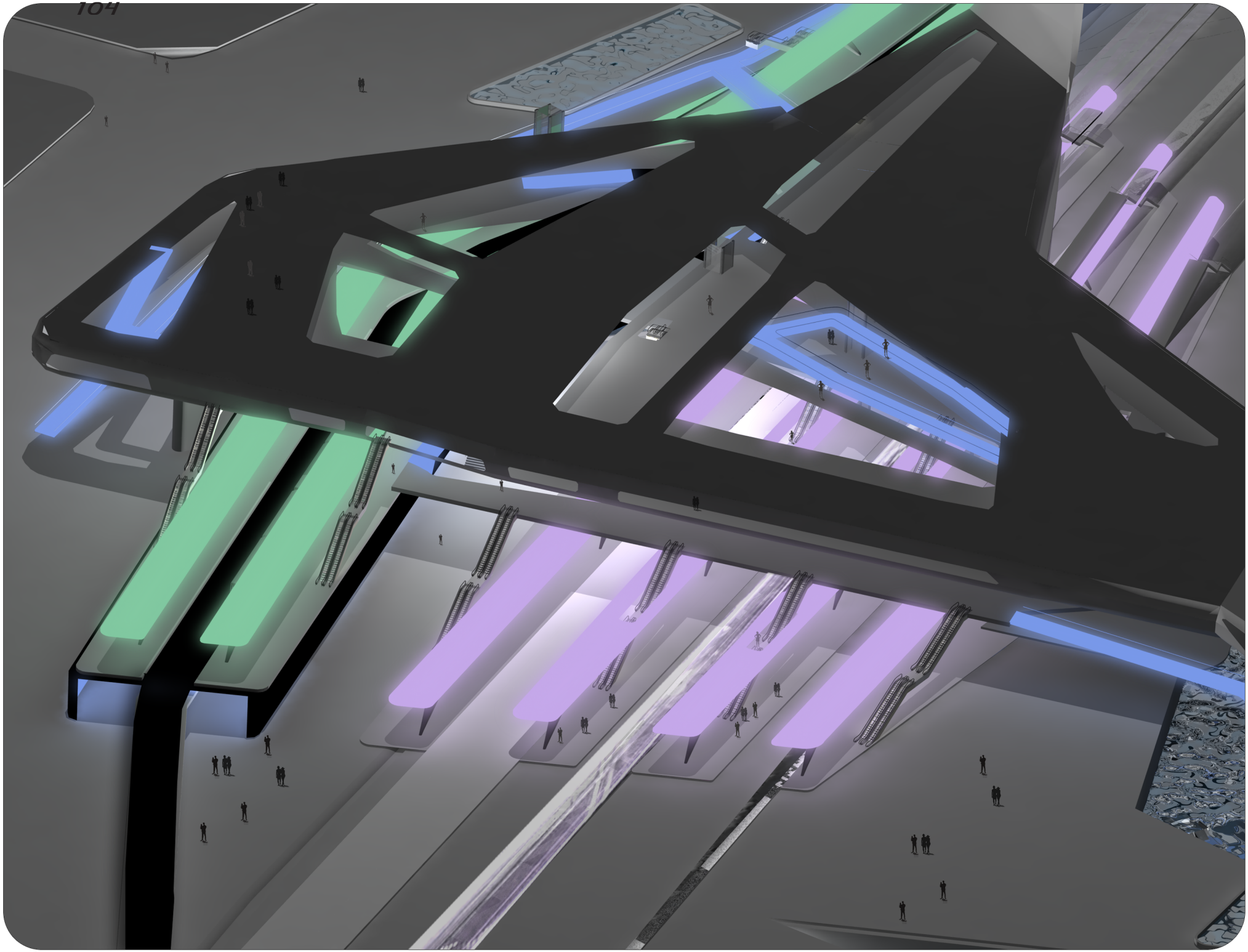


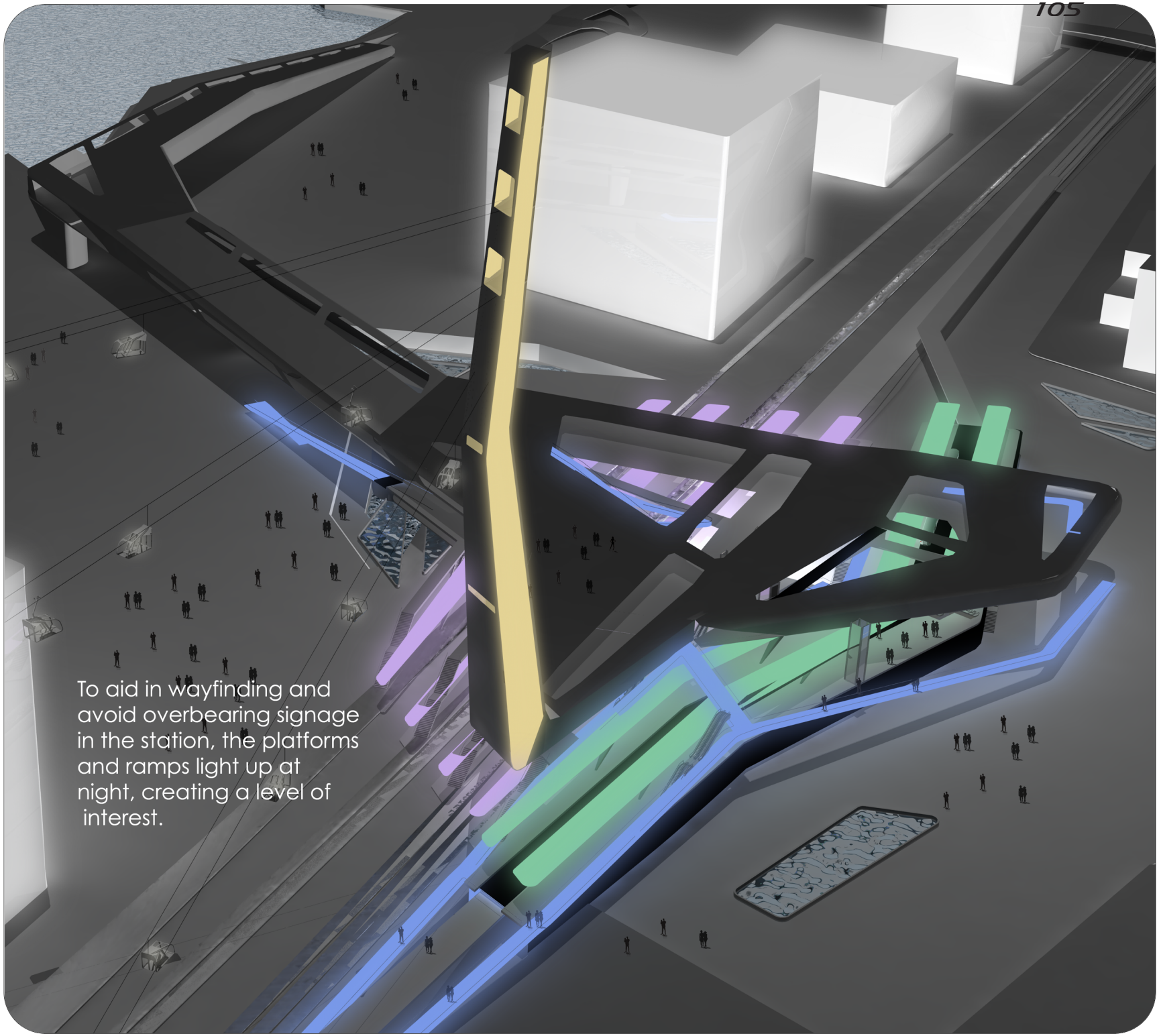


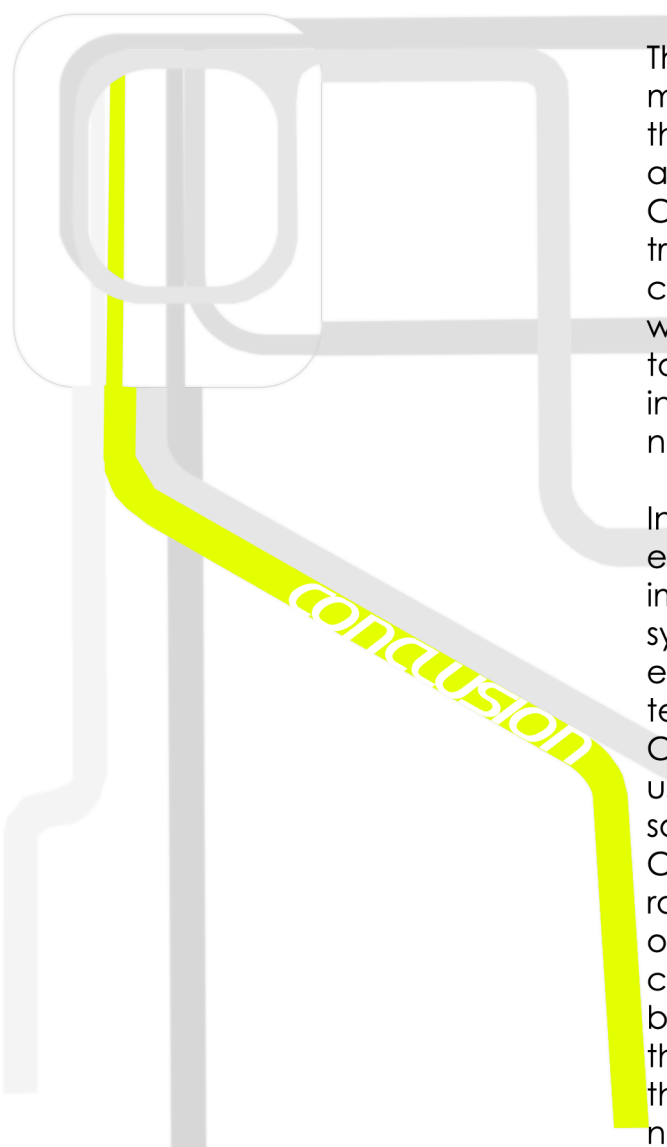
TOP


CHICAGO OLYMPICS 2016






To aid in wayfinding and avoid overbearing signage in the station, the platforms and ramps light up at night, creating a level of interest.




The city of Chicago has implemented many forms of transportation throughout its history. Urbanization and industrialization have driven Chicago's explosive growth, transforming the city into a national crossroads. The converging waterways and railroad system helped to establish the city as a crucial intersection within a developing nation.

In 1893 the World's Fair pioneered the electric third-rail system, which was implemented in the temporary transit system that was constructed for the event. This introduction created technological precedents for all of Chicago's elevated train lines still in use today. This supposedly temporary solution to the congestion gave Chicago's one-million-plus inhabitants rapid and easy access to major parts of the city. As times changed, the city's growth was no longer influenced by the development of the "L," but by the superhighways that pierced through it. Over the next 25 years, new lines were built and old lines deconstructed in reaction to the evolving car culture of America. Tracks were rerouted to make way for cars and the changing demographics of the city. Despite the many problems of the "L" this iconic feature of Chicago remains a working antique, giving passengers and interesting viewpoint of the city.

By looking to the past and planning for the future, a new type of hybrid architecture is born that combines the constructive disciplines of architecture and city planning.

The motivation behind the project was to create an architecture of movement and divergence that helped to convey and enhance circulation all while placing emphasis and providing links to all of the key elements within the site. The web that was developed as a result of the pre-existing site conditions became integral in the extraction of a formal solution. The final solution was not generated out of the desire to create an architecture that was specifically defined by conventional means. Rather, the focus was placed on the creation of a form that expressed movement and served as a link between the people and the city of Chicago.

WELCOME TO CHICAGO
2016 OLYMPIC GAMES
ZOOM!

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