[RE] DEFINING TRANSIT CULTURE

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ABSTRACT

Environmental concerns and energy crisis have heightened awareness of energy consumption and instigated thought into alternative and updated means of travel. High speed rail has been highly utilized for travel and transport in Europe and Japan and is experiencing its initiation in the U.S. in the state of California with future proposals in cities across the country. This thesis addresses the notion of high speed rail in a society where travel is dominated by the automobile and the geographies of cities and suburbs exist under a unique paradigm compared to other countries and continents. A proposal is created in a scenario that incorporates the automobile into a network of transportation modes in which efficiency amongst and between each mode is considered the ideal.
[re]defining transit culture
Introduction
The present American is a consumer of high speed information and in theory relies on the efficiency that modern technology provides. Yet in many instances, especially transportation, society is inefficient. The automobile has altered society to be more concerned with private space and self comfort than the sacrifice of such conveniences for increased efficiency in travel and transport. The inception of the interstate system may have improved efficiency of the automobile, but it only further emphasized the ideal of the singular commuter or traveler. The dominance of the automobile as the accepted form of transport has defined social attitudes and the manner in which the American society operates. There are specific examples of efficiency in travel and transport in the United States, but the overwhelming evaluation is one of unsafe and severely inefficient transportation techniques, both for humans and commodities. With the foreseeable depletion of fossil fuels awaits the tipping point of potential change. In an age where the terms “sustainability” and “green” have become catchphrases for discussion there is the opportunity to create an infrastructure that reinvestigates the attitude and lifestyle of the everyday citizen.

An environmentally conscious system of high speed mass transit is capable of initiating a resolution for two inherently problematic qualities of our society; the issue of an increasingly antisocial society and one that is under efficient in transportation technique.
The structure of this thesis is based upon the analysis of the network and its application to mass transit. The two main principles that this thesis aims to address fit within the noun and verb definitions of the word network. The first point addressed is that current transportation techniques are inefficient and harmful to both said environments (environment and human). Ultimately a more interrelated or connected transportation system is needed. The second is the idea that transportation in the last 100 years has evolved or possibly devolved society to a point where social interaction has been manipulated or removed from society. The conscience of the American has become more concerned with personal comfort and social detachment from society than an effort to contribute collectively to a better society. Networks and their social aspects to mass transit is the second area of discussion in this thesis.
Thesis Statement

The ideals of mass transit as well as the application of network theory, including the efficiency of networks, the ability of networks to replicate on a number of scales, and social networks, will provide an architecture that creates a space reciprocating an efficient system that makes a positive contribution to the natural and the social environment.

In this thesis, the term mass transit is often referenced. The definition itself can be ambiguous and therefore problematic, but the intention of the word in this thesis is an allusion to a system of high speed transportation that has high environmental benefits and can move large numbers of passengers. Though airlines fit this description, this thesis is in search of a terrestrial approach that will reduce increasing strain on airline and other current modes of travel.
Efficiency of Mass Transit
A transformation of geographies

In the past two centuries distance traveled each day by the average person has grown by a factor of ten thousand, a clear result of the technology of transportation and the speed of mobility.³ But, as society and cities develop at an exponential rate, the technology of speed grew linearly (for common travel methods) resulting in a society now at a greater distance from home to work.

"The Bus Buddies are part of the fastest-growing group of work travelers in the country, people who rarely see their houses in daylight, leave home when their kids are still asleep, and mainline Red Bull just to stay awake. They're known as extreme commuters. They spend at least a month of their lives each year traveling a minimum of an hour-and-a-half to work and back.

This is what economists call "the commuting paradox." Most people travel long distances with the idea that they'll accept the burden for something better, be it a house, salary, or school.

People usually overestimate the value of the things they'll obtain by commuting -- more money, more material goods, more prestige -- and underestimate the benefit of what they are losing: social connections, hobbies, and health... "

- BusinessWeek -authors Conlin, Gard, and Doyle

Beyond the beneficial incentives of high speed mass transit to the natural and human environment there is a psychological urge for a system of rapid transport. Many would credit it as
America’s desire for speed, but more specifically it is the desire for speed of technology. These two terms [speed/technology] have a paired association. While technology has advanced the way in which humans move and transport, it has also spread into fields beyond transportation such as computers and communications, ultimately becoming an electric-digital society to the point that, “the medium or process, or our time- electric technology – is reshaping and restructuring patterns of social interdependence.”

Society has assimilated a world of digital transfer of information and communication, constantly becoming faster and increasingly complex. In the last century and a half and even more so in the last twenty years, society has transformed under the influence of communication technologies such as the telephone, instant messaging, blogging, and business conferencing via computer software and the internet. The concept of the businessman traveling from New York to Boston overnight on the sleeper car of a passenger train for a business meeting the next day did not disappear because it decreased in service quality, it was simply replaced by more time efficient systems such as airlines and communication technologies. If the business meeting can be carried out from remote locations, the necessity to physically be present does not occur.

To a large degree this is a juxtaposed existence. Society relies on technology and digital means for so many purposes, yet the human has grown from and evolved as a social creature. Social communication has become correspondence through technology, but it poses the question: if the medium were available to physically transport ourselves as fast as the digital information that is sent, would it become a deployed technology? Likely, the answer would depend on the importance of the message because even the nearly instantaneous departure from the immediate realm of the multi-tasking, technology using, everyday citizen creates a removal from a secondary multi-task. Clearly the technology for such a concept does not exist, but at what point does the benefit of traveling in person, meet equilibrium with the undesirability of not being sent at electronic speed? The fastest form of common personal transportation, the airline, is a popular choice as exemplified by increasing airline demands and congestion. High speed travel, such as high speed trains have the ability to bend time and shrink geographies as well. If it takes 45 hours to make a transcontinental trip by automobile, but only 10 hours by high speed train, travel becomes a viable option. It becomes increasingly persuasive when an economic comparison is factored into the equation. If travel time through rail approaches similar time by air, but provides a more economical cost, then it becomes an attractive alternative to air travel.
Live advertising

One of the best ways to trace the historic increase in speed of travel and document its saturation in our lives is a study of advertising techniques from the last sixty years. The Burma Shave company created the original technique of staging signs along roadsides, each sign with one word of a slogan. By traveling past the signs at automobile speeds, the signs spelled out a slogan.

The modern interpretation of this can be seen in large city metro tunnels all over the world. Essentially the revitalized version is a flip book of consecutive images that when traveling at higher speeds such as the metro train, the vision out the window animates into a sensation of movement.
In The Moment of Complexity Mark Taylor describes the current society as a network culture as opposed to former labels of “media culture” and “industrial societies”. Traditional societal relationships have been restructured with the growth of information economies including media, telematics, and virtuality as opposed to the former grid-like relationship of such ideas as factory and home, work and leisure, or husband and wife. The “network culture” of current society is not a created device for structuring society, but rather a reaction to it. Media, technologies, and a multitude of other mechanisms shaped and continue to formulate the complex society we live in. An ignorant assumption is the association of network to modern culture existing solely in the context of the internet, but in fact the concept of the network is less a recent invention as it is a revelation.

Network theory is scientific reasoning and analysis of organizational patterns. Despite that a more global world begins to create an increasing number of networks and network complexities, they are not necessarily the design of humans. Networks are a natural mathematical structure and organizing approach to groups. Even this paper can be analyzed as a network of words when it is considered that certain words connect and organize others. These common connectors or words that others connect to, not only become highly used, but language becomes nonsensical when they are omitted. For example, if words are considered to be linked when they are next to each other in a sentence, then certain common words such as a, at, and the in the English language become highly used and become common connectors or hubs. The linking of these words reveal the structure of the language and though linguists claim the English language to be relatively complex and disorderly, networks reveal a clear and efficient organization. It is from these patterns that we are able to design our own organizational systems.
Network self-similarity/Fractal Theory
Within networks exists a pattern of simplicity known as self-similarity or fractal theory in which an occurrence at one scale is closely connected to an occurrence at another. If one portion of the network is examined at a closer scale it will reveal a similar pattern to the overall network, and if that scale is further magnified it will reveal again a pattern similar to the overall network and so on. Therefore, a variety of scales must integrate themselves in order to fit under the efficiency model that is the model of the network. Transportation techniques within the scale of the city must interact with transportation on the regional scale which must again efficiently interact and network with a countrywide system of transportation networks that define an ultimately larger, whole network. Furthermore, there exists an impossibly infinite level of networks within networks when the consideration is made for not just modes of transport but housing, work, social needs, etc. and the variety of scales in which they interact. A mobile culture must examine and incorporate a variety of transit devices so that all systems are shared and networked; this will create the maximum beneficial effect.

While it is impossible to address all of the complexities of a network under the scope of this thesis, there are transportation networks at various scales in which it is possible to begin to organize and efficiently critique under one understood network. The city of Chicago for example offers a dizzying amount of transit opportunities as O’hare International airport is a heavily trafficked airport servicing seventy-two million people in the year 2000 alone. Furthermore, the Chicago transit authority and the El train based out of the loop in the downtown portion of the city spread commuters to all regions of the city. Yet, as cities grow and world networks globalize there becomes increased strain on transportation systems. The network of airlines for example has experienced enormous pressures to the point that Chicago O’hare operates at a near maximum capacity number forcing 57000 delayed flights and nearly 5000 cancelled flights per year. The solution is not expanding the network of airlines but incorporating the airline network into a larger transportation network, one which includes a variety of scales from high speed rail to commuter buses to pedestrian walking distances.
Mass Transit and its Social Implications
On social networks

Network theory and analysis has postulated on a number of aspects of the social network or the network of people. The most common theory is the six degrees of separation theory. Under this now well known theory Stanley Milgram theorized that any person can be linked through acquaintances to any other person in the world…in six steps.\textsuperscript{12} The sociologist Mark Granovetter examines the idea of human networks as not the quality of relationships with people but rather the quantity, meaning that a network of people is more beneficial to everyone involved when it becomes expansive rather than smaller but with stronger ties to one another.\textsuperscript{13} An example of this is affirmative-action; it does not just allow minority students to high levels of education, but rather more importantly allows them to share knowledge and experiences as well as make links and connections beyond their own social world, a world that is often divided by race.\textsuperscript{14}

Central to the productiveness of social networks is the act of exponentially growing networks. This is done by applying micro networks to larger macro ones. In other words, a social network with one person who knows another who knows another and so on is a very linear process, but a small group of people who know another small group, who belong to a larger group instantaneously create thousands more connections than one individual.\textsuperscript{15} This concept can be applied to the context of the rail car, a small group of passengers who make an acquaintance in the observation car on a train. That group is then released at their various destinations amongst the rail network and each one is placed in the context of the city scale and continues to make acquaintances. It becomes apparent how fast a network can multiply and socially spread.
The decline of mass transit and the rise of the antisocial society

America was at one time a model of efficiency in transport. The birth of the modern railroad coexisted with the United State’s industrial revolution, initiating the blossom of many American cities. In time, technology advanced and the lack of foresight amongst the railroad industry surrendered its popularity to the automobile. The automobile appealed to the American ideal of freedom, individuality, and personal ownership. The car expedited the regression of public transportation and open public space when it became possible to commute beyond a central region of the city and into the suburbs. This ability to expand across space at a greater rate and further distance exemplified a withdrawal from the sense of time. The concept of duration lost importance and was instead replaced with the idea of the “right now” meaning that consuming and owning the latest or largest item, house, car, etc. became more important than a measure of years in a person’s life or the quality of living and experience. The American city was forever changed, becoming a suburban city as Gandelsonas refers to in the book X-urbanism. The fatality of mass public transportation was realized in the form of the interstate highway system following the Second World War. This, “promoted the dominance of the car as the major means of transportation and as a consequence, brought the demise of public transportation,” and the centralized space within the city that served as a hub for mass transit. The prior dependency upon mass transportation, namely the railroad, created stations in the city that became necessary to geographically locate to. This served as a centralized public space for the city and defined how the individual person interacted and perceived quality of life within the city.

The attitude towards this sense of freedom and personal space idealized by the nuclear family’s version of a suburban house with a back yard will likely never change in thought. Perhaps an ancestral urge towards the constant search for freedom still resides in all people whose family immigrated to this country. Yet, it is amongst growing opinion that certain forms of mass public transit may be the appropriate avenue of transportation in the very near future. The urge for freedom and privatization has not removed itself from the thought of the average American, though other incentives have presented themselves in favor of such a system. The first being a growing sense of concern and awareness for the current environment. Catchwords such as “green” and “sustainability” have become a trend and society as a whole has sought out alternatives for energy saving. Secondly, even if a social awareness for the environment does not exist, economic incentives for straying from petroleum use do. The foreseeable end of fossil fuels has
instilled an urgency to at the very least lessen their use. Finally, current society has morphed into a digital and electronic driven state where the concepts of time and space have become nonexistent. A consumer can buy a car online, teleconference to a business meeting in another city and expect darkness to be eradicated from a room in the blink of an eye, yet physical movement to that business meeting is unwieldy, time consuming, and undesirable. The ability to effectively shrink geographies by increasing transportation time nears an analogue system to a digitally/electronically operated society. It is by these methods of thinking that the gap has opened to instill once again a public high speed mass transit system. This is not implying that the reintroduction of mass transit and a centralized transit hub will return the city to what it once was, nor should it suggest that the city of the past is the ideal scenario, but it should be considered that the modern city does lack public gathering space, a key to social interaction.

“The automobile accomplished two things seemingly at a stroke. It promoted a form of extreme individualism in which each person was encouraged to define his own interests in opposition to those of society around him; and it promised to bring, within reach, a social goal of a de-urbanized working class that, during the hell-bent industrialization of the previous decades, had seemed more and more remote. Putting two and two together, middle-class Americans concluded that the key to solving the city problem lay in universalizing this increasingly anti-social form of individualism so that a wider portion of the population could partake.”

fig 6
Mass transit as a networking and integrating tool

The concepts of mass transit fit ideally with integration and social interaction. A networked city both internally and externally is more efficient in transportation time and creates a positive social environment by integrating people into gathering spaces. Furthermore, the entire system of mass transit can be perceived as a social experience at multiple scales. In the context of mass rail transit, interaction begins in the rail car, a different social dynamic than an airplane. The rail car generally offers an observation car which acts as a social gathering space for the occupants of the train and because it belongs to a network of cities there is a continuous changeover of passengers, adding new stories and different perspectives through conversation as the journey progresses. Once at a destination the occupant enters the scale of the town or city of the station and generally finds themselves in a public space and once again an opportunity for interaction. For the duration of the journey, the passenger has experienced social interaction through the network that is the rail line.

Modern highway and interstate systems feed the swarms of commuters traveling from suburban homes to the density of jobs in the city. The formalization of a transportation system ultimately unites people in some fashion. The end destination or central focus of this system is generally where this occurs. In terms of rail infrastructure it becomes the rail station, but in terms of automobile traffic there generally is no central hub, unless it is some sort of a large public parking space, the office is the resultant mixing pot of people. While Elizabeth Mossop states in Open New Designs for Public Space that, “infrastructure increasingly provides the public spaces of our cities and the infrastructure of movement is an essential presence.” there remains a level of skepticism when considering the current monopoly of automobile traffic. It is true certain innovative highway designs and planning occur that do begin to incorporate public space into the design, but it is ultimately the node principle of network design, or a strong central destination that allows for centralized public space, which in turn equates to social interaction.

A potential scenario that follows the everyday business person may proceed by a morning drive commute of 40 minutes, parking the car in the office parking lot, work from 9:00 to 5:00, return to the suburb with a 40 minute commute, and repeat the pattern. The amount of social interaction and any notion of cultural knowledge occurred in a time period from 9:00-5:00 in an office with the same people everyday. Now consider a system of high speed mass transit. The same
person spends time with their family for at least 10 minutes, commutes to a central transit station within the city in 15 minutes, from the transit station takes public transit to work for 10 minutes, arrives at the office and works from 9:00-5:00, then returns to that central transit station to returns back to the suburbs. The time difference between the two scenarios is the same, but the opportunities presented at the central transit station change the social dynamic of the commute and the everyday life of the business person. Under this scenario the person now increases the potential of extending their social network beyond the scope of the office. Additionally, assuming the station incorporates public space and additional program such as a market or even a forum for local artists to present artwork, the person acquires a cultural knowledge in addition to the social benefit.
The rail system created node stations along its route throughout the United States and in the context of the city, the node became a hub, a catalyst for activity. Essentially, these stations became public space for the emerging American city. The program for the space was designed as little more than the necessary function of accommodating large amounts of people loading, unloading, and awaiting trains but emerging engineering technologies allowed for increased spans and allowance of light to create sublime spaces within certain stations. This, perhaps unknowingly, increased the program of the public space such as in the context of New York’s Grand Central Station, when travelers gathered to watch the broadcast of John Glenn’s launch into orbit, thus transitioning the gathering space into a temporary theater. Indeed successful transit stations evolved within the context of their cities and expanded their program to accommodate a changing society but becoming less dependent upon the slowing rail industry. Now upon the proposal of high speed train and the rejuvenation of mass transit awaits the opportunity for architecture to surpass the predecessor of the rail station and accommodate for the evolved city. It is essential to take advantage of a proposed infrastructure and couple creative public space with it because it is so rare to get an opportunity to better the environment of the city and create public space in dense developed areas. Essentially, the program for a modern high speed rail transit station must now allure to not only the traveler, but the people within the city itself. In order to relate to the ideal of mass transit as a networking tool it must connect to the greatest number of people. This implies that not only is the traveler a participant in the concept of a more social society, but the general citizen now has a role in the program, therefore the program must evolve beyond the traveler and appeal as a public space for a variety of programming needs. Also, as foreshadowed by the now failing rail industry, there is an inherent possibility that certain industries have a deposition for existence or success in only a certain period of time. Therefore, the space remaining beyond the existence of the industry must respond to the needs of the city civilian and remain a functional space. “As the circumstances of a city change through history, its social and spatial configuration changes accordingly. When the force of activity moves from one part of the city to another, its once significant public spaces may lose their importance and be forgotten, while its other public spaces may not find any degree of significance at all, particularly in marginal areas, where fewer people and activities are concentrated. Some spaces, however, have continuously been a distinguishable node in the history of a city and the social life of its citizens.”

-Public and Private Spaces of the City, 193
Transportation + Social Segregation

Upon a recent train ride, it became evident that rail transportation in the United States defines distinct user types and social classes. The current speed of rail transport is very slow; a journey from central Montana to Chicago, Illinois spans over 24 hours, while even an airline flight with a stopover would take only a quarter of that amount of time. It is clearly apparent that air travel would be highly preferred to rail. Rail transportation, though, offers differences to other forms of transport. First, train travel often provides a more economical choice over airlines. Though a cross country journey can be expensive regardless of transportation method, a ticket for rail fare may save a hundred to several hundred dollars. This means that the incentive for a more affordable travel price outweighs the negative incentive of traveling for a longer duration of time. While many middle class or upper middle class Americans would choose the option of spending extra money for a shorter therefore more comfortable travel, lower class citizens are forced to choose the slower method of travel because it becomes the only affordable option. A second type of user evident on train transportation is the leisure traveler. The charisma of the train has become a savior to the current industry in some respects. Vacationing by train is a common practice by some people, though the train often segregates this user type into first class, sleeper cars, and special dining events in the dining hall. An increase in travel time of the train would create crossover users from other transportation methods.

If it is truly beneficial to have an integrated society or the idea of the city being the melting pot, then it must create urban spaces that integrate people. Integrated urban spaces enhance social learning, personal development and exchange of information, yet unfortunately it has been an increasing trend of more fragmented and segregated urban spaces.\(^\text{23}\) Returning to the model of fractal theory or an analysis of scales, the following can be assumed. **Society** lacks social interaction/understanding, the **city** influences society, **urban spaces** affect cities, **transportation infrastructure** can create urban spaces, and **transportation mediums** (especially rail) create transportation infrastructure hubs. Under this assumption, social integration at the level of the transportation type can begin to affect a greater level of scales. High speed transportation will feed urban spaces, cities, and society with a greater presence of social learning, personal development and exchange of information. The scales beyond the transportation form, such as urban space will only enhance this method by incorporating different user types who inherently offer greater diversity.
The longer two parties are kept in nearby proximity, the more likely social interaction will occur. Circulation diagramming can begin to display how efficiency (in circulation) and free will can coexist.

The orange zones represent duration (time spent by the occupant) within the space or circulation area. Though this is a representation of increased potential for social contact as a derivative of time, it may also imply the physical space needed to allow for efficiency in circulation.
Statement of Idea

It is the intention of this project to create a hub for transport and interaction addressing the issues of efficiency in movement and increased social interaction. Specifically, the scheme is categorized under the typology of high speed rail station, though, with an understanding of network organization and efficiency, it will serve a multitude of other transportation means and the networks in which they consist of.

Occupants of the space will be a variety of demographics and user types. The infrastructure of the train will supplant a variety of people, as vast as the network (of transportation) itself. Additional program will accommodate a variety of users and demographics contributing to more extensive social networks.

High Speed Rail

At this point in time the most practical and beneficial form of mass transit is electric powered high speed trains and rail network. Based on an assessment of the European high speed train network, it surpasses all other current forms of transit in terms of the natural environment and will make a positively contribute to the creation of a sustainable transport system. The United States currently has little in terms of productive mass transit. While the interstate system is intended as a device for efficiency for wheeled travel, its negative impacts in regards to the environment and human safety surely make it less than ideal. Air travel is currently the most efficient form of mass transit in the United States. Nevertheless, weather has a direct impact on flight schedules as well as a high maintenance cost in terms of money and time. High fuel consumption, pollution, and continued expansion are also undesirable attributes of the airline industry. In comparison, the energy cost for high speed rail to transport one person per kilometer is one-third that of the airline industry and one-fifth that of the automobile industry. California recently voted to implement a high speed rail network. Among the many benefits include, an annual savings of 1.65 billion dollars in oil costs, a reduction in use of 12 billion pounds of carbon dioxide by the year 2030, and 70 million fewer intercity automobile passengers per year leading to less impacts on urban sprawl and corruption to the environmental landscape. Furthermore, the anticipated cost for a passenger to travel from Chicago to Detroit or Chicago to St. Louis would be approximately $40.00 and take only two hours, while the cost to travel by car would be about
$50.00 and $250.00 by air, given the current price of crude oil.\textsuperscript{27}

The sentiment towards the existing wheeled empire of transport and transit poses harmful consequences as well in terms of the human environment and the safety of transit.\textsuperscript{28} On a global scale, road traffic related injuries are estimated to be the third-highest provider to disease, costing 518 billion dollars annually.\textsuperscript{29} In the United States the average person spends 36 hours annually in traffic delays.\textsuperscript{30}

Acela train

The Acela train is currently the only high speed rail in the United States, operating at speeds of up to 150 mph. It is a line of Amtrak owned rail that runs from Boston to Washington DC. The train operates as a tilting train, meaning that it accommodates high speed curves by physically tilting to lessen the physics of centrifugal force, though, it does not operate at full speed for the majority of the trip length and usually runs at speeds between 75 and 150 mph.\textsuperscript{31} While it is slower than comparable high speed trains in Europe, its level of safety standards are better than any train in the world.

Ideo

The design firm Ideo was hired by Amtrak to create the experience of the Acela train. Their approach involved an evaluation of ten components of the rail travel process, including, learning, planning, starting, entering, ticketing, waiting, boarding, riding, arriving, and continuing. By integrating the travel process they were able to create a system of efficiency and comfort. The focus of the design relates to various scales from the station interior to the seating itself. The most successful reallocations of space involves the move of the power outlets and work surfaces from the café car to the passenger seating. This allows the café car to not only become more efficient and less packed with multiple users but also for more space and an increased social dynamic.\textsuperscript{32}
Design approach

The strategy for design reverts to the concept of the network. By previous study we have concluded that network patterns recur on multiple scales. I propose that the analysis of one scale of the (transportation) network will generate the design strategy at the scale of the station. One scale beyond the station, the analysis of the immediate region of the site and its network of transportation, demographic of user types, travel times, and destinations will generate a formula for the station design. Yet, inefficiencies and problematic areas in the analyzed network must be reconsidered when incorporating it into the design of the station.

The design problem is mainly circulation. Network efficiency is really an issue of efficient circulation; the speed and means in which one component connects to another. The complexity of the proposed design makes this task difficult because it seeks to merge two different concepts, efficiency and interaction. The circulation pattern must move people in and out of the building and from infrastructure to urban space as efficiently as possible, but it also must consider how it can engage different people in social interaction. Given the fact that we are a multi-tasking society driven by timeliness and compact schedules, I believe that social interaction can be a derivative of time available (by occupant). The design of the circulation can be organized in a manner that provides the maximum efficiency while also offering circulation to and within the public space of the station that is not selective based on user type or demographic, but the amount of time the user has available.

The modern rail station is an integration of station and urban space. On one hand the station is a node on the comprehensive rail network, yet it also becomes place within the context of the city. Thus there is an inherent interaction between how the two (place and node) transition between one another. A node is only a component of a larger system, such as the rail network or the network of the city, and is involved solely in function and efficiency in order to maintain the most productive system as possible. Place is the creation of quality space and instilling a presence, purpose or feeling to a visitor. While parking may be a node based infrastructure the thought of an increase in traffic is a concern for the quality of place. Peex and Louw describe the four components of a modern railway station being the connector, transportation node, meeting place, and urban centre. The challenge becomes integrating these components in a manner that creates positive relationships between each.
Across the expanses of glaciated plains, the Midwestern United States historically sprung small trade towns created upon the exploitation of furs, grain and cattle production, and eventually industry. Areas with accessible means and prime geographic location to existing transportation routes grew from trading posts to towns and eventually thriving cities. Remoteness of then interior or “western” areas, separated from the port cities of the East Coast made areas inaccessible. The Great Lakes provided the best means of travel, therefore, areas on the Great Lakes waterfront became the most ideal destinations for trade. Eventually the region became developed and rich farmland inundated the area with farmers and ranchers. Lakeside towns became cities as they connect with the Great Lakes transportation network, especially after the opening of the Erie Canal in 1825. Chicago and Detroit’s waterfront location and even St Louis adjacency to the Mississippi River spawned the emergence of cities within the region, and as the industrial revolution and the steam locomotive materialized, Chicago became a center of agriculture transportation with railroad lines destined to the city. The golden funnel, as it was known, received meat, grain, and timber, processed it and shipped it beyond its borders. In the mid 20th century, however, travel was redefined and the automobile and airlines became the dominant modes of transportation.

Train

Rail networks have historically been a major factor in the vitality of the Midwest. Postwar America soon transitioned to automobiles and an interstate system, reducing railroads drastically. Though there are recent proposals for a Midwest high-speed rail network. The Midwest High Speed Rail Association has current proposals for a network of rail connecting the Midwestern cities of Minneapolis, Madison, Milwaukee, Detroit, St. Louis, Kansas City and beyond. Such high speed travel equates to similar travel times as airlines for the region.

Automobile

The inception of the Highway Interstate System seared through cornfields and fueled the booming automobile industry in Michigan. Though less efficient in travel times compared to rail, the personal freedom and extensive series of roads and highways offered unbridled freedom that other forms of transportation failed in.

Airline

As the rail industry began to fail, airline traffic began to exponentially grow. The Chicago area alone offers two major airports including O’hare which serves 76 million passengers per year, the third highest of any airport in the country.

Amongst these three modes of transport, and especially rail, there is one city in which they all converge. The third largest city in the United States...Chicago, Illinois.
Chicago is incredibly diverse in culture and demographics. Different cultures offer unique perspectives. From Polish communities to the country’s second largest Spanish-American population they are connected by an efficient transportation network. The "el train" branches out to numerous neighborhoods, but as Midwest funnels to the city, the city funnels to the central downtown area. Making this region a potential hub for diverse gatherings of people.

The image to the left displays walking proximities to elevated train stops, but the bus system covers all of the shown roads as well. The ability to efficiently transfer between transportation modes is central to the design of efficient networks.
As the network of the city funnels people to the density of the downtown area, there again begins a pattern of networks and available infrastructures. The site of the Union Station is the largest rail station in the area and is within walking distance of other networks that it could potentially link to. Additionally, programmatic space such as parking can be diffused using some of the adjacent areas and program can be determined by centralizing it in one space, such is the case with the farmers markets. Chicago landmarks can become an additional draw to visitors and residents of the city and the new high speed station can being to incorporate these programs and networks.

fig 12
By analyzing a series of networks from large to small, they directed the site to the Union Station, just east of the Chicago River and the extreme densities of the downtown area. The chosen site actually resides to the South of the existing concourse building and Great Hall. This area is underdeveloped and the tracks of the station run directly below. An existing parking structure can be enlarged and used to accommodate the large volumes of people that the site will receive.
immediate views from the site orient the visitor to the extremely dense
downtown, a likely destination for a tourist -east

fig 15
In the context of the city, the site sits amongst range of urban contexts. To the West the densely trafficked Kennedy Expressway lines its way into the city from the suburbs. To the North sits older neighborhoods of Chicago and higher end residential units on Chicago’s North side. The very densely centralized downtown area sits to the East, and just beyond it millennium park and Lake Michigan. The South offers areas of unclaimed riverbanks and generally spread out lower scale structures.
yearly weather averages
temperature
rainfall
snowfall
Program

This thesis aims to engage the social aspects of society, utilizing mass transit to do such. It is my opinion that heightened social attitudes and interactions exist on two main scales of mass transit. The first is the direct human interaction presented upon travelers in an enclosed space such as the rail car. The second scale is the urban space, gathering space, and place as a component of the station. This is the scale in which this project can impact. I propose that in addition to the transportation program exists public and green space, ideal for gathering local residents to a portion of the site and creating an opportunity for diverse social interaction.

Existing adjacent to the site is a conventional rail terminal. It is inadequate to support the transition to a high speed transit facility. The new station, however, will utilize existing program available to the site accomplishing two tasks guided by this thesis. First, by not demolishing the building above the current terminal and by using under utilized buildings it is in accordance with an environmentally conscious and sustainable system of design. Secondly, the site itself becomes a small hub branching out to available program within immediate walking distance. The site replicates itself as a network on a different scale yet again.

In order for the program to remain true to the ideals of mass transit and the application of network theory there must be multimodal forms of transit in addition to high speed rail. There must be high speed commuter rail, access to local bus systems, car rental, parking, and bicycle parking. Though high speed rail is to be the primary and most effective transit system on the site, it is ultimately a device that creates efficiency by diversifying other transportation uses.
Quantitative Program

Transportation Program

- **high speed rail**: secure waiting area for high speed rail w/ direct access to train platforms and seating for 300
- **commuter rail**: secure waiting area for commuter rail
  - existing space available in Great Hall, adjacent to site
- **bus**: curbside bus pick up / drop off area
- **automobile**: curbside automobile pick up / drop off area
- **bicycle**: secure bicycle racks

<table>
<thead>
<tr>
<th>Facility</th>
<th>Square Footage</th>
</tr>
</thead>
<tbody>
<tr>
<td>high speed rail</td>
<td>20000 sf</td>
</tr>
<tr>
<td>commuter rail</td>
<td>15000 sf</td>
</tr>
<tr>
<td>bus</td>
<td>15000 sf</td>
</tr>
<tr>
<td>automobile</td>
<td>15000 sf</td>
</tr>
<tr>
<td>bicycle</td>
<td>2000 sf</td>
</tr>
<tr>
<td>platforms (existing)</td>
<td>12000 sf ea.</td>
</tr>
<tr>
<td>general circulation, concourse,</td>
<td>60000 sf</td>
</tr>
<tr>
<td>restrooms</td>
<td></td>
</tr>
<tr>
<td>baggage check</td>
<td>6000 sf</td>
</tr>
<tr>
<td>ticket sales area</td>
<td>10000 sf</td>
</tr>
<tr>
<td>rental car desks</td>
<td>3000 sf</td>
</tr>
<tr>
<td>employee lockers</td>
<td>4000 sf</td>
</tr>
<tr>
<td>security checkpoint</td>
<td>3000 sf</td>
</tr>
<tr>
<td>administrative offices</td>
<td>8000 sf</td>
</tr>
<tr>
<td>20% mechanical and circulation</td>
<td>23200 sf</td>
</tr>
<tr>
<td>total buildable transportation</td>
<td>139000 sf</td>
</tr>
<tr>
<td>program</td>
<td></td>
</tr>
<tr>
<td>total transportation program</td>
<td>166200 sf</td>
</tr>
<tr>
<td>(includes existing)</td>
<td></td>
</tr>
</tbody>
</table>

Public Space Program

- **greenspace**: 30000 sf
- **midwest market hub**: 20000 sf
  - (w/ additional 10000 sf capable of overlapping greenspace program on seasonal basis)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Square Footage</th>
</tr>
</thead>
<tbody>
<tr>
<td>greenspace</td>
<td>30000 sf</td>
</tr>
<tr>
<td>midwest market hub</td>
<td>20000 sf</td>
</tr>
<tr>
<td>total public space program</td>
<td>50000 sf</td>
</tr>
<tr>
<td>total program</td>
<td>216200 sf</td>
</tr>
</tbody>
</table>
The ideal of the interconnected transportation network must incorporate multiple transportation modes and connectivity between them. Listed below is the hierarchy of transportation on the site:

**Network of Transportation (Scale of Station)**

- High Speed Rail
- Commuter trains
- Bus
- Automobile
- Bike
- Pedestrian

The listed modes of transportation occur in the program, though some are not directly on the site. High speed rail is clearly part of the built program. Commuter trains, run on tracks 1&2 of the proposed high speed train track design. These tracks are already served from the Great Hall building, which is now highly underutilized, but an incredible space. Because it is part of Chicago’s iconography, local commuters deserve to utilize its space, which could not be matched by any new proposal or design, but is not large enough to serve all of the needs of a new high speed transit facility. The site is already a drop off and pick up point for the local transit buses and will remain so. Additionally, automobile traffic will need to access curbside pick up and drop off and additional parking will be added to the adjacent parking structure. Bike space is designated in the new program and is a result of Arnhem station’s program, but refigured for American bike use standards.
The program for green space is a reaction to the ideals of mass transit, creating a space beneficial to the natural environment as well as creating a space of social gathering. The Midwest market hub will consist of seasonal farmers markets. As determined by site analysis, a number of seasonal markets exist in close proximity to the station, and the centralization into one market would further the concept of a networked station. Because of the nature of the seasonal market, it can cross over into outdoor green space during its season. As in the precedent of Grand Central Station and outlined in the Burnham Prize competition brief, the market will consist of space for art displays and vendors. The culture of the city would be ideal for such a program.
a precedent for the design of the station in Chicago.

Main Station
Stuttgart, Germany
Ingenhoven, Overdiek, and Partners _ Frei Otto special adviser
2002-2008

The new Main Station is a competition winning entry for the redevelopment of the former terminal station to a modern high speed through station. The design realigns the tracks to run between the old station while maintaining the historic presence of the original building but removing the old train shed and tracks. By removing the shed structure, the platforms and tracks are moved to a suburban level and the inhabitable roof becomes not just a shed but a park at the street level. The roof/park, known as Strassburger Platz, performs as a public gathering or communication space linking the new development of the station area to the main park area in the downtown.\textsuperscript{38} Mobius structure gracefully transitions from the concrete roof shell to the platform level, becoming light wells to carry light into the nearly 40 foot deep tracks. Also, the park area above is loaded with soil and planted with trees and grasses, enhancing the environmental controls benefit of the building by keeping temperatures at a constant regardless of season and without an HVAC system.\textsuperscript{39} The environmentally conscious design won a Global Holcim award and is striving for a zero-energy, or carbon neutral designation.\textsuperscript{40}

A similar situation presents itself in Chicago at the Union Station site in terms of adapting and updating a former system and station into a modified, high speed through station. Contrary to having to reconfigure and lower the tracks, the Union Station tracks are already 21 feet below grade and simply require connecting the south and north bound tracks. Also, Chicago’s ecological awareness and green roof program in addition to designing a station based on the environmentally superior high speed train indicate that environmental measures at Main Station may set
Arnhem Station  
Arnhem Netherlands  
UN Studio  
1996-2010

Arnhem Station in the Dutch city of Arnhem, is part of a larger master plan. It is a transfer station located at the entrance to the city and acts as a catalyst to the remaining development around it. Ultimately, the area becomes a revitalization of activity with proposed infrastructures of rail, offices, and a hotel, but assimilates urban space and planning into the design as well. While high speed train is the celebrated means of transportation arriving at the station, it is designed to include a multitude of transportation mediums from trains, taxis, buses, cars, bikes, and trolleys. Nearly 65,000 people pass through the station daily because of its unique location and program as a threshold for the city. The model of Arnhem station is a mold of what transportation can generate for the context of the city.

The design strategy for the station is dependent of topographies of the site and the natural elevation differences as a precedent for the layered separation of differing transportation program. Shared or overlapping interests on the site, such as pedestrian movement, are mapped to and within the building and therefore determining program and square footages based on movement intensities. This also allows pedestrians and visitors to choose their own destinations in an efficient manner. Efficient circulation is further enhanced by strategically oriented natural light at different programmatic areas.

Additionally noteworthy of the station is the funding of the project, which is privately funded though Dutch Railways, ING, and the City of Arnhem.
Santiago Calatrava’s Orient rail station is perhaps one of the first of this typology that began to look at a multitude of programming. The program consists of a series of transportation methods and integrates them all into one plan. Train rail is separated from the rest of the program of a bus station, subway station, taxi stands, airport shuttles, parking, and public and commercial space. The technique to incorporate the vast amount of programming into one fluid system is done by connecting the rail line continuously through the site and running the remaining program perpendicular to it. This allows for the train to connect through the site which then links two parts of the city of Lisbon. The remaining program is deterred from interfering with this line and the neighboring programmatic elements by utilizing changes in elevation. Ultimately, the section becomes a diversified stepping of programmatic spaces and functions.
Grand Central Station
Warren and Wetmore
New York City, USA
1903-13

Grand Central Station, though not of the contemporary cannon, is the premiere example of place within a transportation typology building. Countless experiences and memories are consistently retraced to this space and the event or events that millions of people have witnessed, transcending urban space to place. The approach to the design at Grand Central was to design a building that celebrated urban life, creating spaces designed for people foremost. The sub-grade concourse is the focus of the building while street level galleries allow observers to watch the scene below. Indeed the station is a premium example of the creation of quality place within a transportation typology building. Based on the nature of train travel of the era, Grand Central Station served as a host to a diverse assortment of people. It truly offered a comforting bond between the millions of occupants passing through its walls, witnessing the routines of the individual to the historic transcendence of thousands of people gathering to experience historic events such as John Glenn’s space launch or the events of 9-11. Today, only 30,000 passengers use the terminal, but nearly 500,000 people pass through daily, a true testament to the quality of space it instills. The importance of efficient circulation is evident in the design of Grand Central. A person can travel through the station in isolation and unawareness of the trains, yet a traveler has nearly seamless access to the platforms. The Incoming Station, with a separate concourse to the west of Grand Central’s express concourse allows for increased occupancies dispersed amongst several concourses, though circulation is viable without interruption through the express concourse. This organi-
zational strategy would later be incorporated in late twentieth century airports.\textsuperscript{45} Further circulation strategies include a once progressive ramp system that allows for an easy transition from the street level to the submerged level of the concourse. Clearly mainstream design by modern standards, the Grand Central Station was the progressive instigator of separation of concourse waiting area and the trains themselves, yet never losing sight of efficient circulation. Additionally, layered concourses differentiated passengers based on long distance train or commuter train, again increasing circulation efficiency. Wayfinding, the ability to navigate an unfamiliar space with ease, is considered to be extremely good in Grand Central, despite an enormous volume. The building, at its peak, was capable of sustaining occupancies of nearly 200,000 people. The quality of the space has immortalized the station as an icon in the city. Furthermore, it has allowed itself to sustain while transportation occupancies have fallen below initial intent. In addition to social events, programming includes exhibitions and installations. Initial program of the spaces, however, included an art gallery, art school, theatre, library, massage rooms, and additional functional programming. Other stations have succumbed to intense markets and retail marts, but Grand Central seeks to remain experientially intact by incorporating only a level of restaurants and consumers that it can support, contrary to what some claim of Union Station, Washington D.C.\textsuperscript{46}

Though ideal in terms of space quality, Grand Central is a superb model of efficient circulation.
Code

Occupancy Type
303.1 Assembly Group A. Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering together of persons for purposes such as civic, social or religious functions, recreation, food or drink consumption or awaiting transportation. A room or space used for assembly purposes by less than 50 persons and accessory to another occupancy shall be included as a part of that occupancy. Assembly areas with less than 750 square feet (69.7 m²) and which are accessory to another occupancy according to Section 302.2.1 are not assembly occupancies. Assembly occupancies which are accessory to Group E in accordance with Section 302.2 are not considered assembly occupancies. Religious educational rooms and religious auditoriums which are accessory to churches in accordance with Section 302.2 and which have occupant loads of less than 100 shall be classified as A-3.

A-3 Assembly
Waiting areas in transportation terminals
309.1 Mercantile Group M. Mercantile Group M occupancy includes, among others, buildings and structures or a portion thereof, for the display and sale of merchandise, and involves stocks of goods, wares or merchandise incidental to such purposes and accessible to the public. Markets

Construction Type
602.2 Type IA
allowable building height in stories (11)
allowable building height in feet (unlimited)
allowable building area in sf (unlimited)

Fire Protection Systems
903.2.1.1 Group A-1. An automatic sprinkler system shall be provided for Group A-1 occupancies where one of the following conditions exists:
1. The fire area exceeds 12,000 square feet (1115 m²).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than the level of exit discharge.

[F] 903.2.6 Group M. An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. Where a Group M fire area exceeds 12,000 square feet (1115 m²);
2. Where a Group M fire area is located more than three stories above grade; or
3. Where the combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).

705.4 Fire resistance rating of 3 hours for group A-1
705.4 Fire resistance rating of 3 hours of group M

Means of Egress
1015.1 Length of exit access travel will not exceed 250 feet (with sprinkler system)
1018.1 4 exits per floor level with occupant load exceeding 1000 people
1014.2.1 Where two exits or exit access doorways are required from any portion of the exit access, the exit doors or exit access doorways shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between exit doors or exit access doorways. Interlocking or scissor stairs shall be counted as one exit stairway.
1016.3 Dead ends where more than one exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors more than 20 feet (6096 mm) in length.
Project Documentation
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