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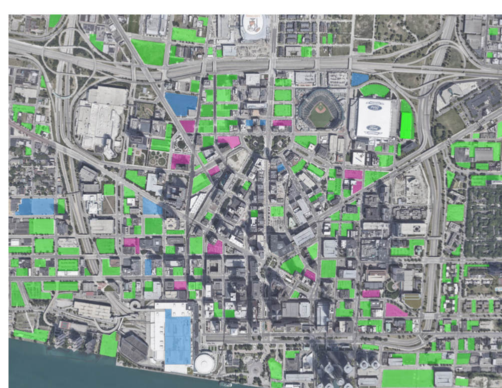
Creating a More livable City:
Transportation and Architecture

Contents

Detroit's Infrastructure

Detroit is filled with hundreds of flat lot parking, and thousands of square feet of street that plagues the downtown area. By creating policy that inhibits vehicle access downtown the sea of parking and circulation can be revitalized into a variety public parks, recreation areas, and rezoned for commercial or residential development. This one transformation would improve the overall quality of life for people living in the city center which in turn would create a more livable city. By limiting car access, there's a tradeoff between inconvenience, which I plan to address, and the quality of life for residents. On the one hand transitioning between a car and public transportation is unreliable and unorganized at best. By far driving directly to your finial location is the fastest and least cumbersome means of travel. However, on the other hand, living in the city plagued by dense, noisy, and unclean automobile further perpetuates the cycle for leaving the city in the first place. This in turn means people more heavily rely on transportation to move to and from their work and residence.

The balance between social interaction, information, material resources, natural environment, work and residence aren't fully being met in most cities. These categories are described in Kevin Lynch's book: The Image of the City, and are one of the five dimensions for a successful city. When these aren't accessible or under abundant, people find ways to access them or struggle to cope without. The American city can offer many of these categories but some are greatly under realized. Natural resources to clean air, in specific, are generally unobtainable when it comes to urban centers. In the United States vehicles account for approximately 30% of the air pollution, and Detroit is no exception. The city also struggles with supplying enough environmental resources for people to use and live. The Riverfront is a great start for contesting this neglect but offers limited area to only people in the furthest downtown region. The riverfront isn't an everyday park that typical residents use as a day to day recreation area and really it isn't intended to. This every day park can only be obtained through proximity, convenience, and community oriented programming.

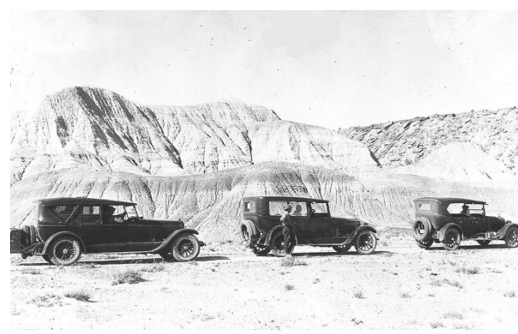


There are several "parks" in Detroit but quantity doesn't seem to be the inherent issue. Maintenance plays a small role in successful parks, but the main issue is the lack of community to fully activate, appreciate, and certainly pay for those parks. The lack or residence within the city creates large gaps of unassociable space even within the most urban parts of the city. A mix of policy and innovation could help bring relief to this issue. Limiting the amount of vehicles accessible to the city and facilitating a way to make this policy functional would in turn better the quality of space within the public and private realm. Several Transportation Hubs in the city could be the solution to facilitating the transition between private vehicles and public means of transit. Before I insert and hypothesize solutions I need to first have a better understanding of the evolution of the automobile and the insertion infrastructure which intertwines cities to this day.

Automotive Infrastructure History

Transportation has been a major part of America for the past 100 years. Since the first mass-produced Automobile the availability, necessity and reliance on roads and infrastructure has exponentially increased in response to this demand. Initial roads and highways were generally funded by state and local government and were intended to connect major cities. In 1916 Woodward avenue became the first paved highway in the United states which connected Pontiac to Detroit. This 27 mile stretch also introduced the first three colored traffic light just three years later. These small connecting highway was the first of many to start connecting cities with automobiles as the primary vehicle in mind. In the early 1920s' Route 66 was proposed to connect Chicago to Las Angeles which pushed this notion to connect cities. It was also one of the first government implemented highway systems that stretched between many states and connected dozens of major cities along the way. Parts of the route started constructed in 1926 and didn't fully finish and connect until 1938. The project was revolutionary and iconic which set precedence for independently traveling large distances. The development of early highways flowed through valleys and mountains where two lanes of travel were all that was necessary to serve its function. Development and scale of infrastructure grew but so did demand especially in urban areas. Highways were paved long stretches of road connecting major cities but weren't effective at feeding urban areas with spreading population and struggled to scale as demand grew for this type of system.

Route 66 Chicago to Los Angeles


Route 66 1927

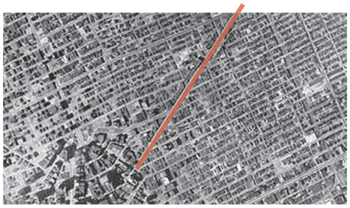
South Water Street Chicago IL.

Davison Freeway Construction Detroit 1941

The development of freeways was one solution to the problem of urban gridlock that was a consequence of intersecting streets with a main highway. The Davison Freeway in Detroit was the first freeway constructed in the united states. In 1942 construction finished and limited the amount of cross traffic which also introduced the on and off ramp that connected to adjacent roads. Freeways separated the plain of traffic flow which allowed for cross traffic to freely pass above or below. This made sitting in 15 minutes of traffic into a short three to four-minute commute on that stretch. This type of infrastructure reimagined how people moved and connected to roads and highways. It was necessary for the growing demand for independent driving and urban traffic. Freeways made traveling at greater speeds possible and the flow of traffic was greatly improved for people traveling in a similar direction.

Davison Freeway Opening 1942

Davison Freeway Detroit 1942



Detroit 1949

Detroit 1951

Detroit 1961

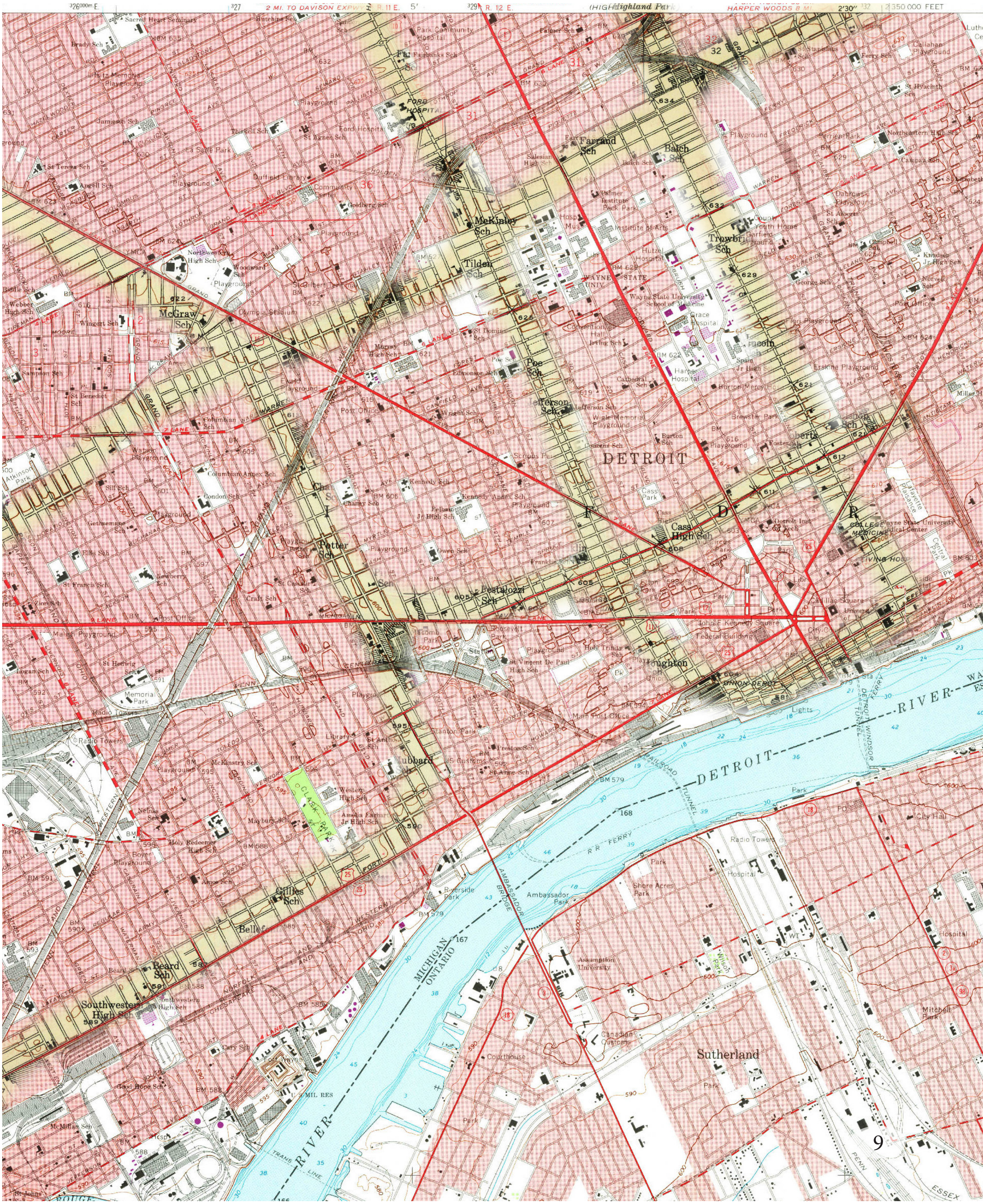
Detroit 1963

Detroit 1999

Detroit 2010

The Federal Aid Highway Act of 1956 granted states 90% of funds to construct a national network of interstate expressways, this was the next step up for automotive infrastructure. The Act was proposed to the public after World War Two as means of defense for transporting troops and supplies around the country. This idea came from the successful German Autobahn network realized during the war and was shortly implemented in the United States in response to their system. The Federal Aid Highway Act of 1956 spanned 10 years where most of the infrastructure was constructed at that time. These new expressways were built in the path of least resistance, most of the planning was economical and logistical by nature. That mean expressways were constructed along existing infrastructure such as train tracks, or major roads, along natural divides such as rivers, valleys, and mountains, or occasionally through poor neighborhoods which happened in many urban areas.

The image on the left is of a 1947 Map of Detroit overlaid on a 1968 Map of the same area. This shows what portions of existing road and city were required to be demolished for Detroits urban interstate system. Portions were constructed near existing transit (top left of map) some portions were through poor neighborhoods such as the Black Bottom community (Middle Right).


DETROIT
DETROIT RIVER
Highland Park
2 MI. TO DAVISON EXPWY
HARPER WOODS 8 MI.
350 000 FEET
R. 11 E.
R. 12 E.
MICHIGAN
ONTARIO
AMBASSADOR BRIDGE
DETROIT-WINDSOR TUNNEL
RAILROAD TUNNEL
Sutherland
Wayne State University
Cass High Sch
Tilden Sch
McKinley Sch
Trowbridge Sch
Balch Sch
Farrand Sch
Poe Sch
Jefferson Sch
Potter Sch
Pestalozzi Sch
Houghton
Hubbard
Gillies Sch
Beard Sch
Southwestern High Sch
McGraw Sch
Ambassador Park
Assumption University
Canadian Customs
Courthouse
Riverside Park
Shore Acres Park
Clark Park
Federal Building
Cass Park
Grace Hospital
Harper Hospital
Ford Hospital

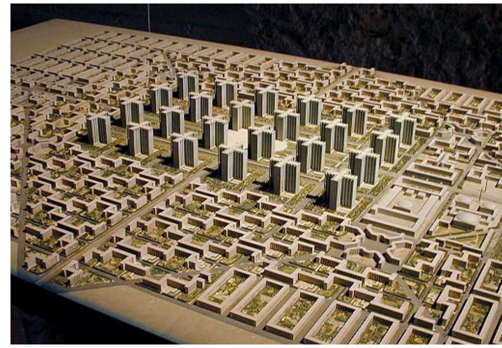
As infrastructure and the social acceptance of vehicles grew so did the dependence on vehicles. There were many competing modes of transportation throughout history. Many of these alternative means of transportation were established well before automobiles were being mass produced. Public transportations lack of success was driven by the inconvenience and how it was historically viewed. One of the first issues with public transportation was that in most cases it catered to more wealthy residence who lived outside the city and used the system to effectively travel to the city center. Another reason public transportation was viewed negatively was because it was usually built privately. This for-profit transportation system had to rely on riders to directly foot the cost of construction and charge patrons to turn a profit for the transportation system. People viewed the transit owners as profiteers and felt taken advantage of for this need to travel around the city. The introduction of automobiles allowed people to affordably buy their own means of transportation which meant less, and less people were using these public transportation systems. This closed loop cycle of dwindling public transit and need for their own vehicle continued through out the nation and affected almost every major city. The capability to move outside the city to a less dense private suburb also increased the demand for a vehicle aside from the lack of public transportation.

The push away from public transportation wasn't entirely a social condition, many public transportation systems were bought out by automobile industries, or outright removed because of the lack of rider ship. Only select highly dense cities were restricted to supplying other means of transportation due to the high demand. Cities such as New York were required to invested in subways and trains to help efficiently move high masses of people that expressways and automobiles just couldn't logistically do. Growing cities should take note that more of the same can only expand to finite limits, there's only so many lanes on a highway you can add, there's only so many cars that can navigate and physically inhabit a city. Cars can be an exceptional median for getting from one place to another on ones' own time and location, but at the cost of many things that go unnoticed or are overlooked.


SHAW'S GARDEN

Transportation from City Living to Suburb

Commuting from the suburbs to the city has been socially normalized. The suburbs offered economic validity, security, and isolation that cities struggle to supply. The livability of a city is restricted itself by the necessity for high density circulation that suburbs generally aren't restricted to. Jane Jacobs spoke about this in her book, The Death and Life of the Great American Cities, stating: "Today everyone who values cities are disturbed by automobiles. Traffic arteries, along with parking lots, gas stations, and drive-ins, are powerful and insistent instruments of city destruction. To accommodate them, city streets are broken down into loose sprawls, incoherent and vacuous for anyone afoot." (Jacobs, 168). This separating and inconsiderate means of city roads seem to have been an issue well before she wrote her book in 1961. The early views of large transportation projects were conceived as being sleek, futuristic, and utopian like. She says "…the Radiant City Scheme (by Le Corbusier) in quantities that apparently satisfied his sense of design, but that bore no relationship whatsoever to the hugely greater quantities of automobiles, amounts of roadway and extent of parking and servicing which would actually be necessary for his repetitive vertical concentrations of people, separated by vacuities. His vision of skyscrapers in the park degenerates in real life into sky-scrap-



ers into parking lots. And there can never be enough parking." She describes his views in a, somewhat, tongue and cheek way in that he lacked the understanding of the amount of space required to accommodate automobiles within a city. The ideal view of a clean, green city is instead covered by cheap parking, and the inherent economic need to park thousands of cars. This unforeseen issue has been historically ignored. The sight of a parking lot is overlooked as a necessity brushed off as an inconvenience. In his book Drosscape, Alan Berger looks at wasted space or underutilized land in American cities. One of the areas is the automotive infrastructure required for commuting, as what he describeds as "The consequences of the conclusion are far-reaching, because the more organizations depend, ultimately, upon flows and networks, the less they are influenced by the social contexts associated with the places of their locations." "Infrastructure is ubiquitous throughout all urbanized landscapes. Cities, regardless of location or size, require a variety of infrastructural systems in order to function. Waste landscapes of infrastructure (LINs) include the landscape surfaces associated with these systems, including easements, setbacks, and rights-of-way associated with transportation (such as highway corridors and interchanges) …" (Berger, 1790) He views this system as a necessity that overlooks many social contexts that an expressway on the East coast is the exact same as one on the West coast. He also highlights the shear size of automotive infrastructure that is currently required "In the U.S. there are nearly 4 million miles of paved and unpaved roads. The National Highway System, now more than 160,000 miles long, carries trucks and passenger vehicles. There are more than 590,000 bridges associated with the network of U.S. highway intersections, ramps, and crossings. Roadside "landscaped" corridors, medians, and adjacent right-of-way add roughly 42,200 square miles of land surface associated with public roads or road corridors in the U.S." These statistics bring to light the expansiveness of this system. Moreover, he hints to the amount of resources required to build and maintain this type of system which seems to only be getting more expensive and worse.

Jane Jacobs describes living in a city as either healthy and successful or nearing a modern slum. “much of the same effects, for different reasons, can occur in unplanned city neighborhoods, where the buildings are too standardized, or the blocks are too long, or there is no mixture of other primary uses besides dwellings.” (Jacobs, 206). Although, high density and overcrowding shouldn’t be confused. You can have high density without overcrowding, the difference is the size and the livability of the unit in comparison, not necessarily the amount of land required per occupant. An example would be a well-planned high-density neighborhood, to a “slum” like neighborhood that had little planning and little consideration for the people living there. Roads and traffic inversely affect the areas relative livability with loud road noise, and space required for parking and searching for parking at high demand times. With this being said, cities require people like a plant requires nutrients or the hear requires blood. The supply of people is a necessity for the function of any city and limiting supply can also slow the growth of a city, the need for a more livable city or a more adequate solution for transportation remains.

Limited Modes of Transportation: Transitioning Space and Speed

Most urban automotive infrastructure has within a few hundred feet residential zones. Automotive infrastructure affects millions of people with air, light, and noise pollution. This stems from poor planning, limited technology, increase in population, and little demand for change.

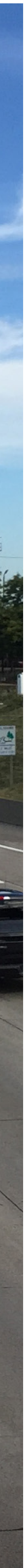
The different forms of infrastructure street, highway, and interstate created steps of transportation, with each step increasing speed, while also decreasing traffic. The road or street is structured as the "local" means of circulation connecting your house to other houses or businesses down the street. Highways formed the main artery of roads where traffic and stop lights favored the direction of circulation over connecting secondary streets. This then connects expressways or the interstate system which is a non-interrupted flow of circulation that takes priority over any other direction of traffic and many external connections. Which then steps back down to the highway then to the road connecting destination A to destination B in a systematic way. The system works extraordinarily well for most suburbs and cities, or cities to cities but can only expand and grow to limited extents of traffic.

Transportation as a means of street, highway, expressway is invasive and limiting, when moving masses of people from the same point A to the same point B. Each person requiring a 4,000-pound car taking up on average 75 square feet of road and parking space. Each person independently navigating cars from location to location looking for parking, which alone is calculated to cause 30% of urban traffic. It implicitly seems unproductive, while also negatively affecting the livability of the surrounding area which already suffers from the effects of loud noise, air pollution, and light pollution caused by transportation. It's one thing to critically critique the issues of this system but for the last 60 years there hasn't been an alternate competing solution that outweighs the positives of the interstate. The solution or alternative would have to be equally convenient and pose more positives than having an independent car.

Automobiles rely on one median mode of transportation which is used for almost every type of travel. I consider it a median because it is a mode of transportation that lies somewhere between walking, biking, moped-ing, flying, or taking the train. It encompasses one system that tries to accommodate every scale of transportation. It's taking your car two blocks down the street to a friend's house which varies to driving it across the state to visit family or driving across the country for vacation. These are all ambiguous and very personal


EXIT 52
Mack Ave
EXIT ONLY
One Pride.

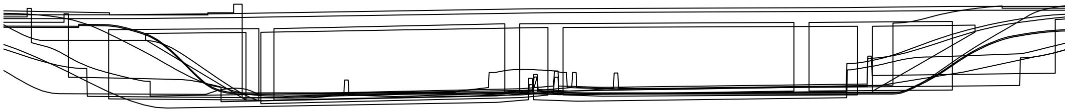
which is where automobiles excel and are most useful. However, it lacks when it comes to transporting mass amount of people from suburb to city, on average I-75 in Detroit moves approximately 200,000 people a day which is plagued with congestion, accidents, and delays. This is where independence and cramming all scales of transportation into a single use median of transportation fails. Alternatives to this would be train, subway, or light rail but all of these have their short comings also. One of which being required stops, each stop adding a few minutes which if there's a significant amount of stops it defeats the convenience and the purpose of this form of transit. It starts to stretch and accommodate more then what the means of it is necessary by stopping say every mile or two to maximize physical convenience at the expense of riders' time. An opposite example would be trying to take a bike 30 miles to a family members house, it would be time consuming and there are better means of transportation. Similar to the scales of automotive infrastructure in an ideal traveling scale would look something like, walk, bike, car, train then back to car, bike, and walk. For each type of transportation, they could also have different scales, so a bike could have one inherent speed on a residential sidewalk but also increase on a bike lane alternatively a train could reach one speed going a 20-mile distance but also have the infrastructure to reach a higher speed when traveling say a 100-mile distance. Each of which uses infrastructure similarly to the rider demand.



Detroit I-75 Section Study

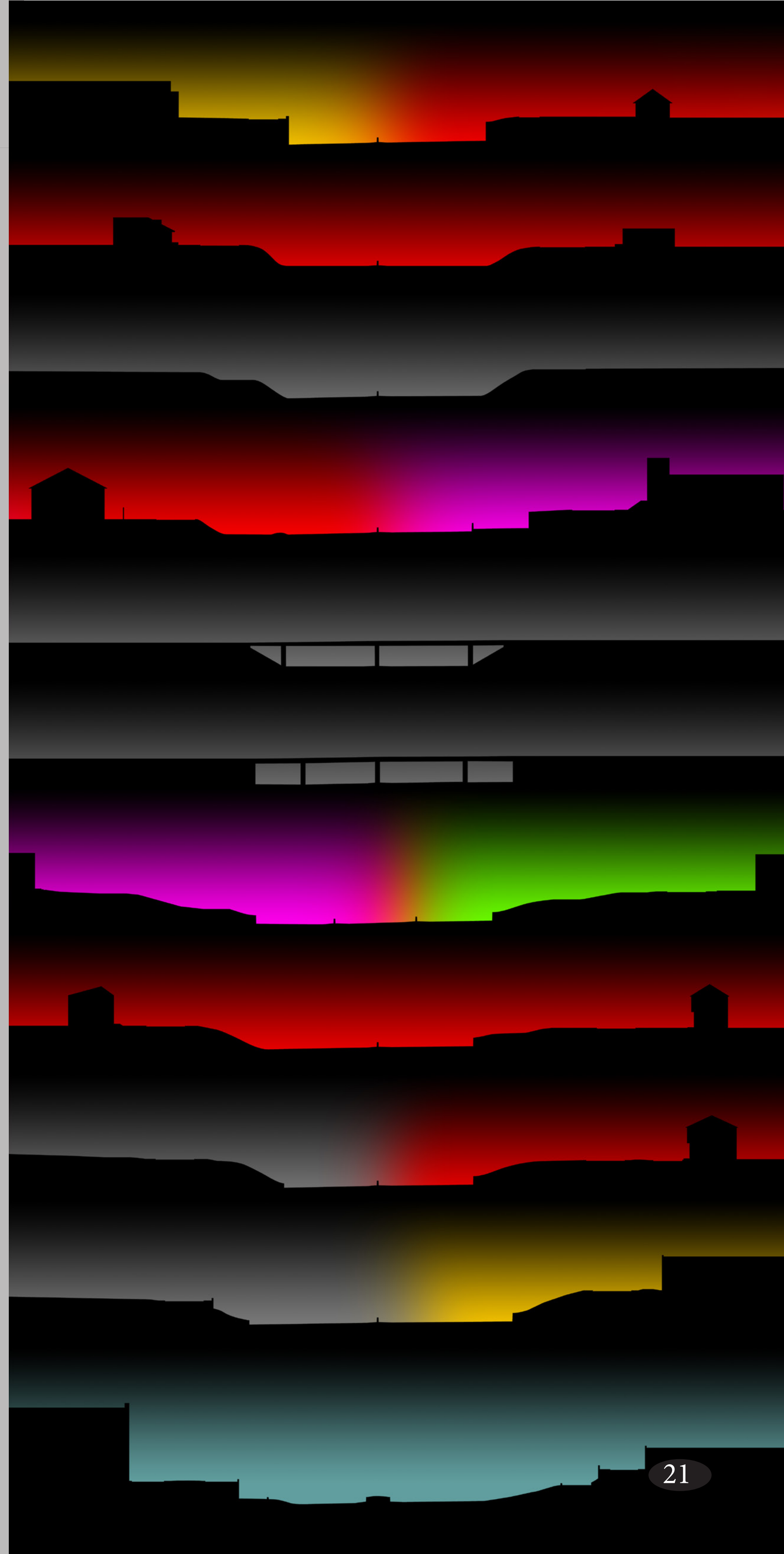
This stretch of Detroits I-75 was used as a selected area for study, because of its stretched use during peak times. The process looked at the overall width of the expressway where the median, road edge condition, and adjacent uses were analyzed. This 5 mile section of expressway is cut every 1/2 mile from the Davison freeway intersection to the I-375 split. The sections are 400 feet wide where the expressway ranges from 150- 230 feet. The median in section generally divides the six lanes in two. As the expressway enters the city center it splits off even further adding multiple lanes from on ramps or subtracting lanes with off ramps. This splitting widens or shrinks the overall width of the expressway and the edge conditions generally reflect and react to these changes.

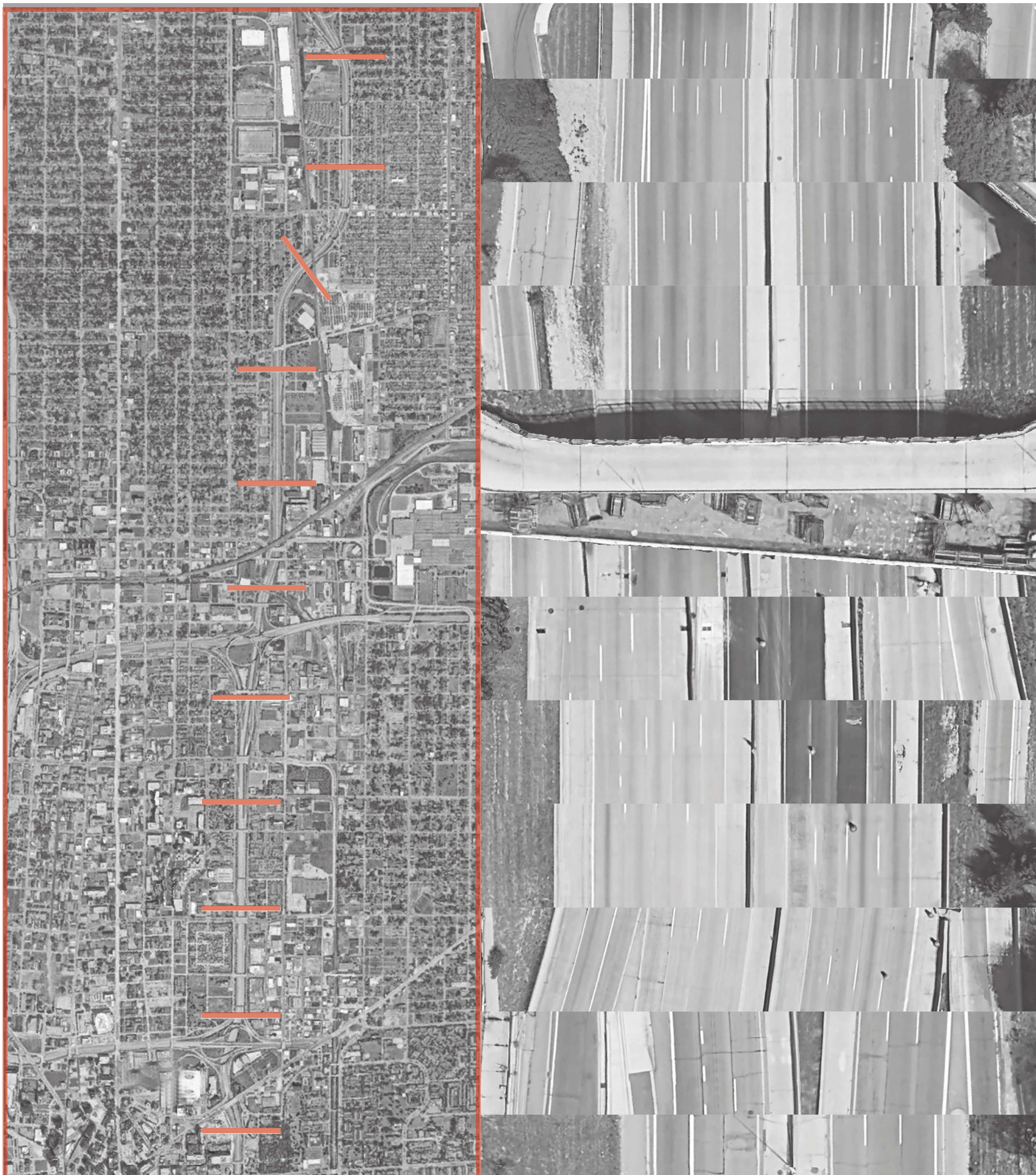
The edge condition where at its narrowest six lanes with median and service lanes tends to have a lower grade slope connecting to the parallel streets above. This changes when lanes are added the slope continues the same, however when it meets the road its cut off with a 2-4 foot earth barrier. These lanes that split on and off are divided by concrete barriers, distancing space, or small earth berms to control accidents if they occur in those areas. Sections cut at bridges are widened at the median which encroaches into the service lane. This compresses the overall road area for vehicle's and is compounded by the encroaching edge condition where the earth is either held back with a vertical wall 15-20 feet tall or a steep angled concrete wall holds back the earth. The main reason for the study was to understand how the road physically interacts with the buildings beside it. Many of which are multi or single family residential zones. Some areas incorporate park space which further distances nearby housing with the expressway. Parks creating a separation between residential and infra-structure greatly help reduce the amount of noise, light and air pollution generated by the expressway which would help residents in one way. However, the park its self suffers because of this proximity. The parks lose much of its function as an inhabitable outdoor recreation space that many of the adjacent residents rely on. Occasionally industrial buildings line the edge of the expressway which intuitively works best for the surrounding areas and people that directly inhabit the nearby land.



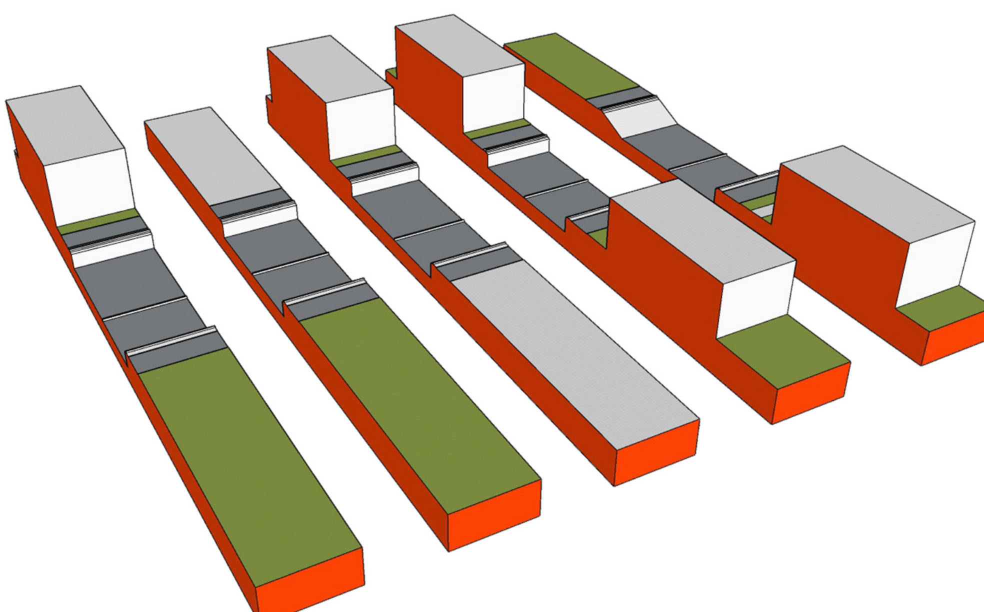
I-75 5 Mile Section

- Residential
- Commercial
- Industrial
- Institutional
- Park
- Parking





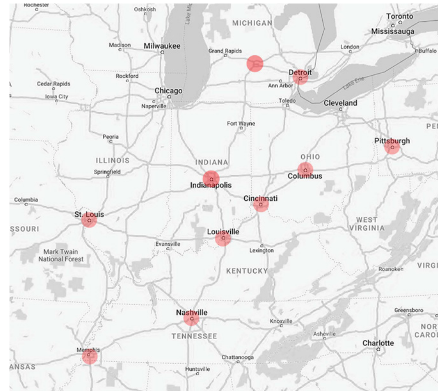
Each section has an associated plan broken into strips which helps three dimensionally piece the section together. The plan sections also help to understand the materials used for constructing the median, edge conditions, road, service areas, overpasses, etc. Each plan giving the sections more information for understanding how each theses very similar conditions can also be very different when breaking down the system into a generalized and manageable condition. The plans also show the relationship in road to ground to grass and back to road. This shows the plants, shrubs, trash and grit that line the road.



Maping Urbin Automotive Infrastructure

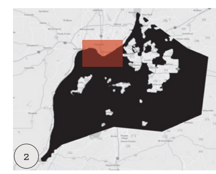
The infrastructure map study was used to better understand how urban areas inserted this vast infrastructural system into their city fabric. Most of this construction was directly linked to the monetary cost and feasibility of the build. Easier meant cheaper, and this bounced between what the environment could support, such as natural barriers like mountains, rivers, and canyons. This was further complicated by the naturally contradictory nature of the structure which was to move as many people as possible to city centers and back that were already densely populated. This meant it was a politically disputed to who's moving to make way for this structure and where. This struggle spread across the country to expedite huge developmental plans within a finite window set by The Federal Aid Highway Act of 1956. The reminisce of this system of quick planning with little consideration to how the system will affect people using it, living by it, and removed for it.

Theses maps break down the essence of the infrastructure highlighting the set in stone structures from the time. The map shows how each city tried to circumvent through the land while still creating expansion for the city's transportation system.

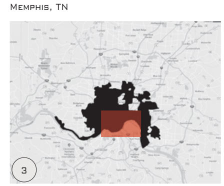


City Interstate Key

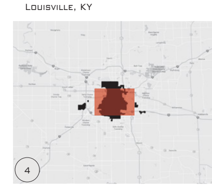
Memphis, TN



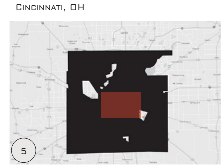
Louisville, KY



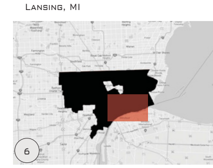
Cincinnati, OH



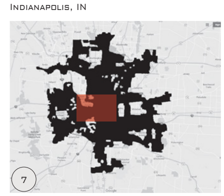
Lansing, MI



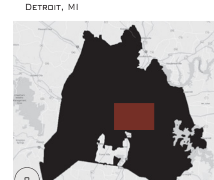
Indianapolis, IN



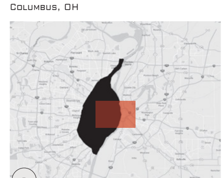
Detroit, MI



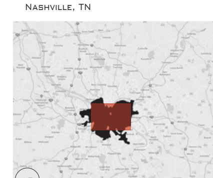
Columbus, OH



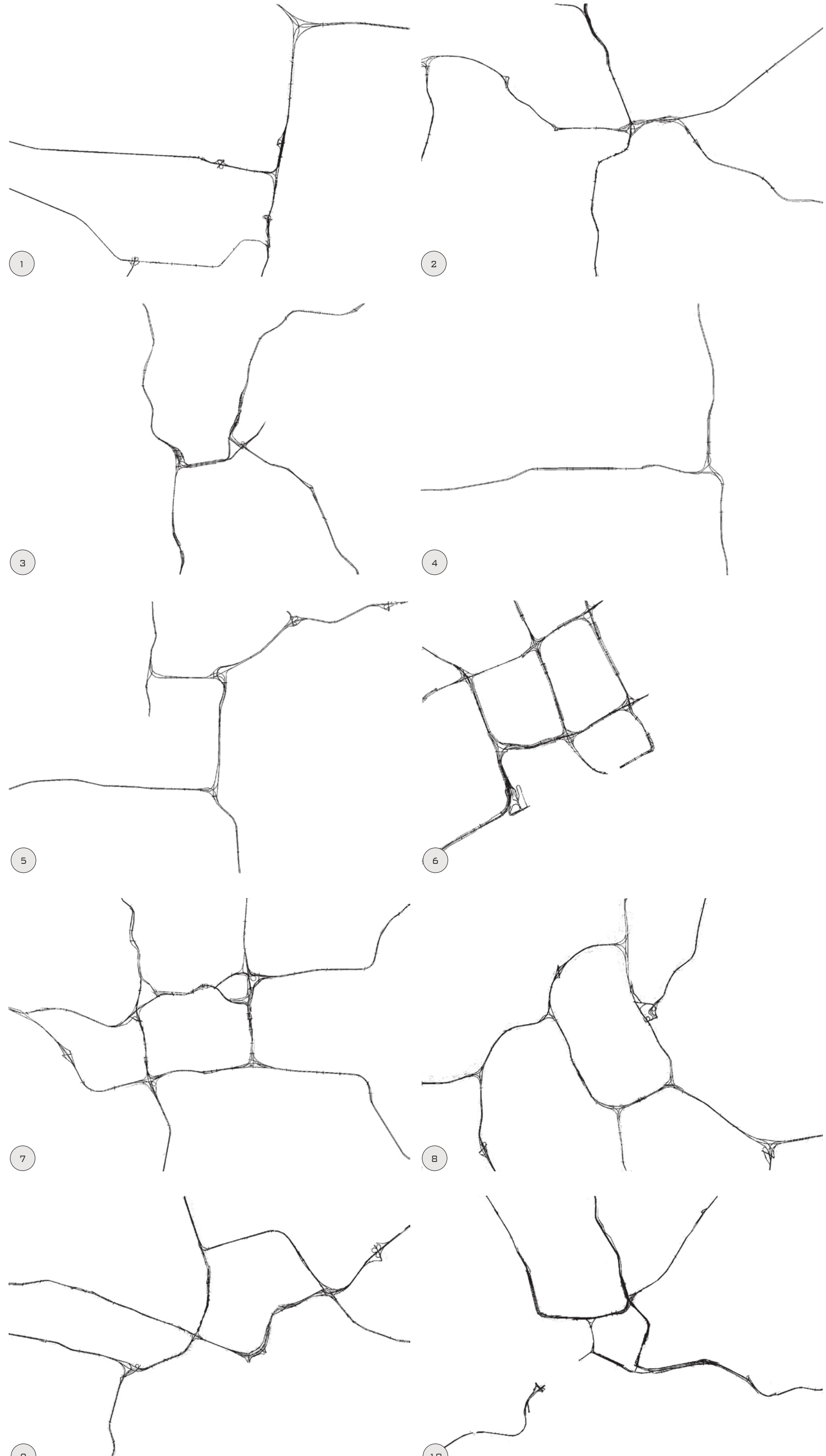
Nashville, TN



Saint Louis, MO



Pittsburgh, PA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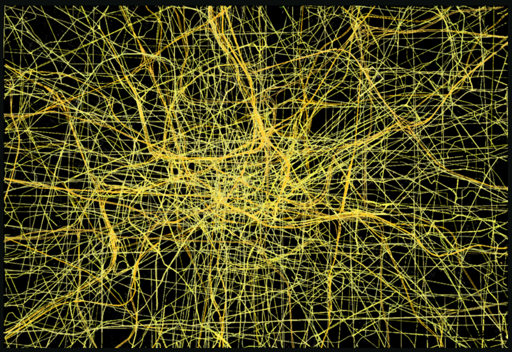
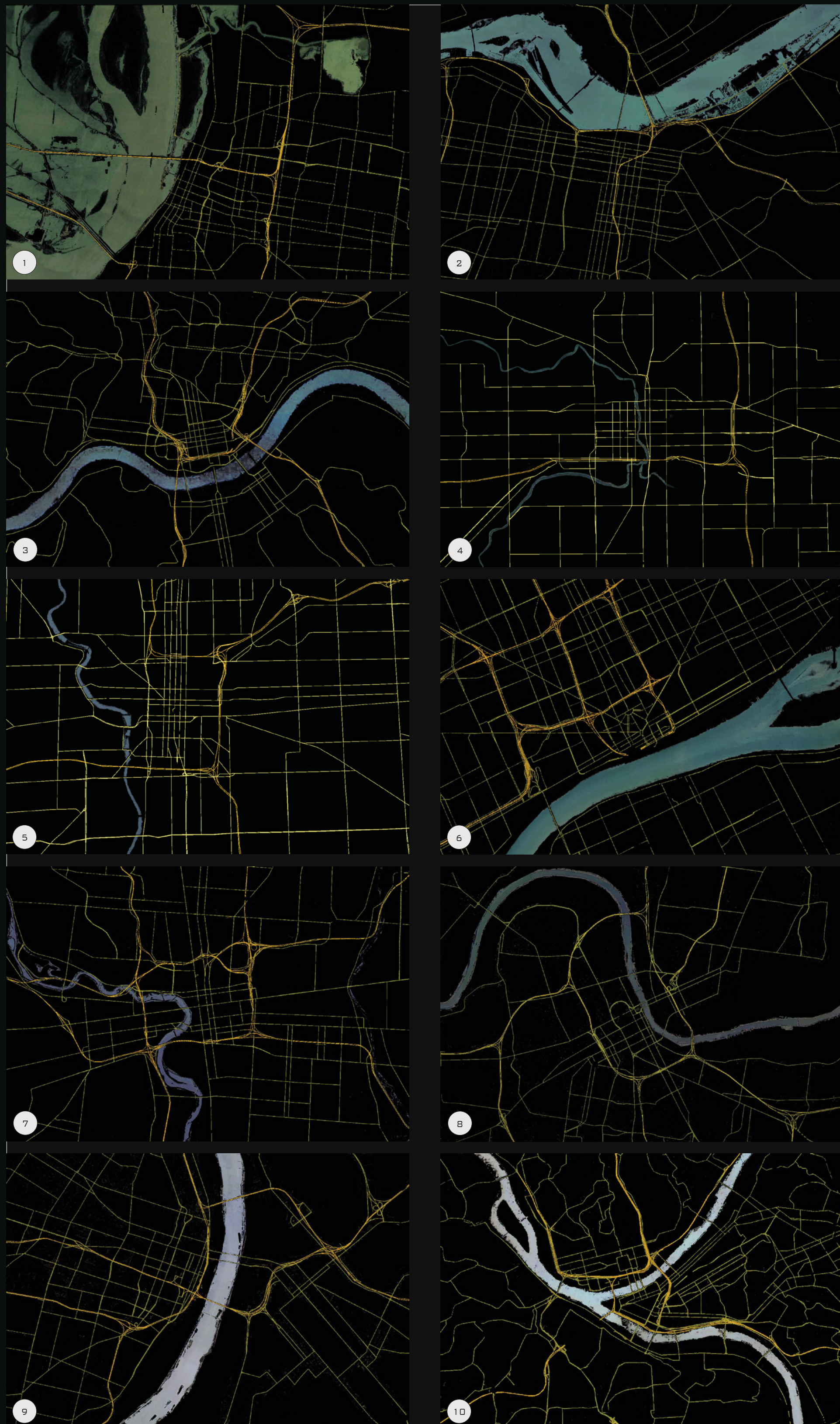
The cities studied needed to have a somewhat dense urban core that ranged from 300,000 people to 900,000 people located in the mid-west United States. The cities that were selected for this study was Memphis TN, Louisville KY, Cincinnati OH, Lansing MI, Indianapolis IN, Detroit MI, Columbus OH, Nashville TN, Saint Louis MO, and Pittsburgh PA. There were some additional cities studied but had innately similar techniques for implementing the interstate system into the city. Some cities had the interstate path drive directly through the urban core splitting in multiple directions from the center, these formed T, H, or F shapes through the city. Others used a wrapping technique or circling. This allowed the city center to remain intact with itself but creates a large physical barrier between itself and the outskirts of the urban core. This however allows traffic to flow around the core of the city without creating unnecessary traffic that intends to circumvent the city. Detroits system looks most like this outer circling technique but divides the city into a seemingly unnecessary amount of cores that other cities of similar scale didn't incorporate. Pittsburgh also has an interesting way it incorporated the system. It has a diverse amount of terrain, and the city was snuggly pressed against its river. This meant the expressway in a short distance goes through mountains, over rivers and through the city.

Secondary streets also play a large role in the development and use of the interstate system. This incorporates highways, and many main stretches of urban street. It's the connection between where someone is to where someone needs to be since there are very few structures that directly connect to the interstate system without first down stepping to a highway or street first. Roads were also affected by the introduction of the interstate. The Detroit Map overlay of 1949 and 1968 shows how many roads were terminated or replaced because of the construction of the interstate system. Roads also need to be expanded at the time when precedence was given to the selected street that incorporated on and off ramps. The intentional and forced flow of traffic shaped the newly used streets. These selected cities help better understand how planners at the time decided to incorporate this new system.

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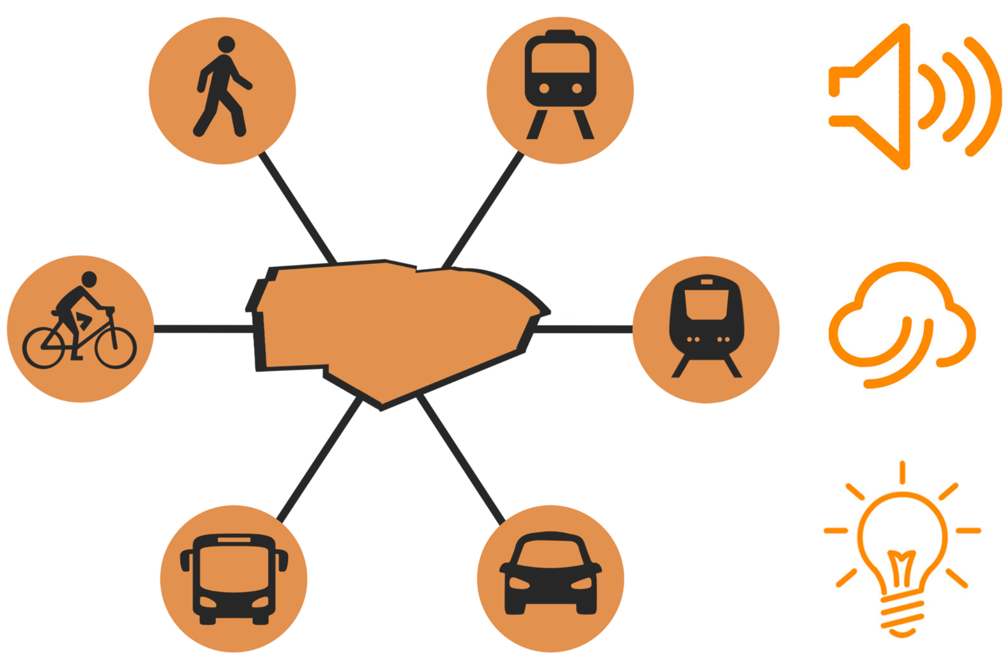
Transportation Hub Overview

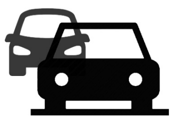
The Transportation Hub would incorporate and facilitate multiple modes of transportation. This would allow for a smooth transition between other modes of transportation such as the bus, people mover, or self-driving vehicle. The building would include a bus terminal, People mover station, Q-Line stop, self-driving parking garage, and pick up area. Other means of local transportation such as bikes, electric scooters, and moving sidewalks would be incorporated into the function of the building alongside future means of transportation. The building itself would be built and intertwined with the different modes of transportation inserting itself onto the expressway, and under or beside the people mover and Q-Line. This would allow people to choose a variety of transportation that makes the most sense for getting to their next destination. The selection and transitioning could be coupled with route finding technology to help determine if taking the bus, people mover, or other modes of transit would get you to your destination quickest. On an individual this level helps introduce people to other means of transit. On a city level it supports the municipal policy for limited personal vehicles in the downtown area. Overall the transportation hub would facilitate the use of other modes of transportation within the urban context.



Advantages For Transportation Hub

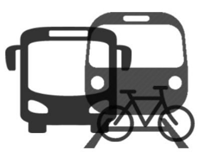
Creating a Healthier City

Create a greener city by reducing light, air, and noise pollution in downtown urban areas caused by vehicles. This would include adding more physical space for people and business, by removing unnecessary parking, roads, and vehicles. A shift in green, public space would sprout from this change in urban planning.



Reduce Traffic

30% of urban traffic is caused by searching for parking. Human error causes accidents and gridlock. Self-driving will streamline people coming and leaving the city with quick pick up and drop off. They will also use less space on the expressway by using flex lanes and the ability to drive closer together.



Public Transportation

New transportation such as an extended people mover would further remove vehicle transportation from the plane of the public realm. Altered bus routes could help accommodate people needing to get closer to their destination that doesn't have a fixed station. There would be plenty of room for bike lanes, and enlarged walk ways for people to move around the city.

No Parking Required

Self driving cars will use less physical space per vehicle. The car would park as close to the adjacent car to more effectively use space required for parking. This could save as much as 30% of space required for a parking garage. Parking would be automated by self-driving cars making the fluctuation in vehicles coming and leaving the city quicker.

Transportation Hubs

Multiple transportation hubs will help unite a variety of public transportation. This helps organize different modes of public transportation to make transitioning between modes of transportation seamless. Public transportation from the hub to a person's final destination removes most of the ground traffic caused by individual vehicles. The hub also would create several public gathering space which would include commercial space, lodging, dinning, shopping, and more.

Cityscape Reimagined

With a shift in transportation to free much of the ground plane, the street scape has the potential to turn into areas of pedestrian circulation and well developed areas of public activation. Secondly, without vehicles the bustling noise of transit are greatly reduced and air quality in the surrounding vicinity is mitigated. Considering these two lines of thought the overall quality of the area is greatly improved. This improvement has the potential to completely alter how people interact and live within a city. Many of the negative aspect associated with automobiles are completely removed and allows people to not only enjoy the surrounding area more but gives them quicker safer access to foot traffic currently inhibited today.

The space that was once occupied by parking and circulation can now be reimagined through this new policy. Parking lots can become soccer fields, streets can become greenways, there's so much underutilized space that can now be redeveloped to make city living tolerable, or even excellent. The space can create and be a facilitator of community connection and interaction. Improving areas of parking that once laid lifeless

and congested with a collage of stagnant unoccupied vehicles. The undermined space of the city, space that has vastly more potential to better the surrounding area. Nearsightedness and conveniences limiting the city's potential opportunities that are overlooked as the urban norm. This is challenged and evoked by a proposed shift in inner-city circulation that a network of transportation hubs can induce.

These newly found spaces can take on several programs, even open green space can be a day to day beneficiary of residents. Green space unlike many parking lots can serve as an individual's escape, that patiently awaits the potential for greater activation. The scale in use ranges from a group's soccer pickup game, to a spontaneous flee market benefiting thousands. Small pavilions can also serve a greater use even in an urban setting. These allow family's living in high rise apartments to temporarily transform that pavilion into their patio.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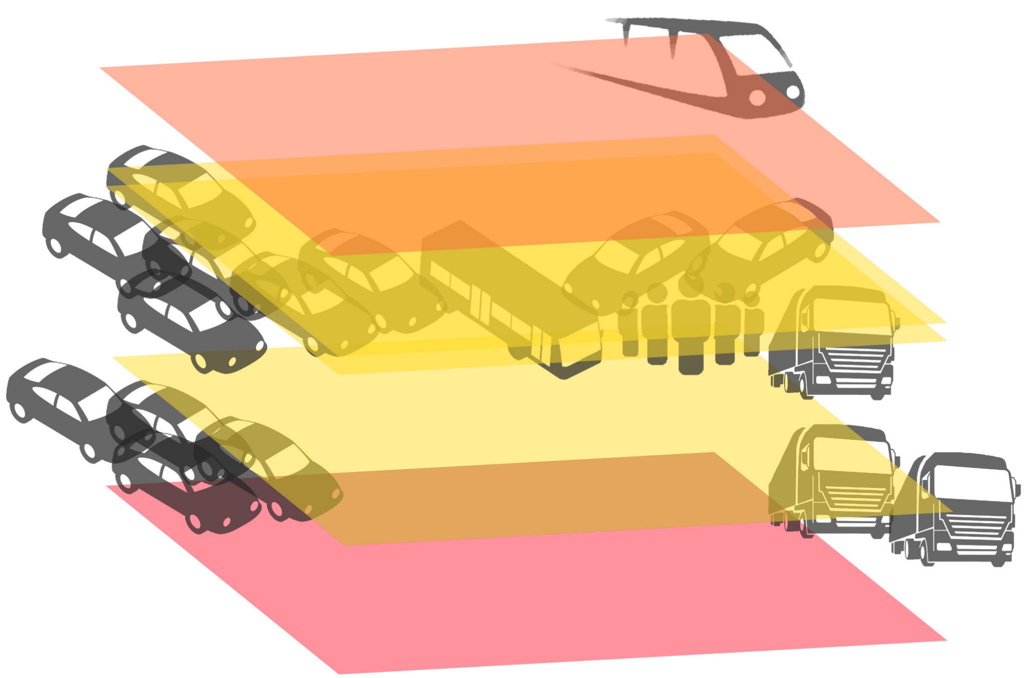
The congestion of the street makes traveling on the ground plane very difficult. This amplified by the width of roads and lack of pedestrian consideration. The ground plane is home to many types of transit in Detroit such as the Qline, bus system, supply chain transportation, bikes, scooters, and by far most abundant personal vehicles. The only few means of transit that break the ground plane is the People Mover and the recessed expressway in many locations. This is the cause of many issues in urban cities globally and, in part, one of the many reasons living in a city isn't ideal. Aside from pollution caused from transportation, congestion also plays a vital role in how a city is navigated and experienced. The ground plane is typically broken by subway systems or the opposite an elevated rail or raised walkways, this is typically only broken when cities become dense to the point that it becomes a necessity. Varying planes of circulation shouldn't be a last resort but a first response to densifying a city. By planning for ahead and for the future, the ground level should support pedestrian using and living in the area systemically. Currently this isn't feasible

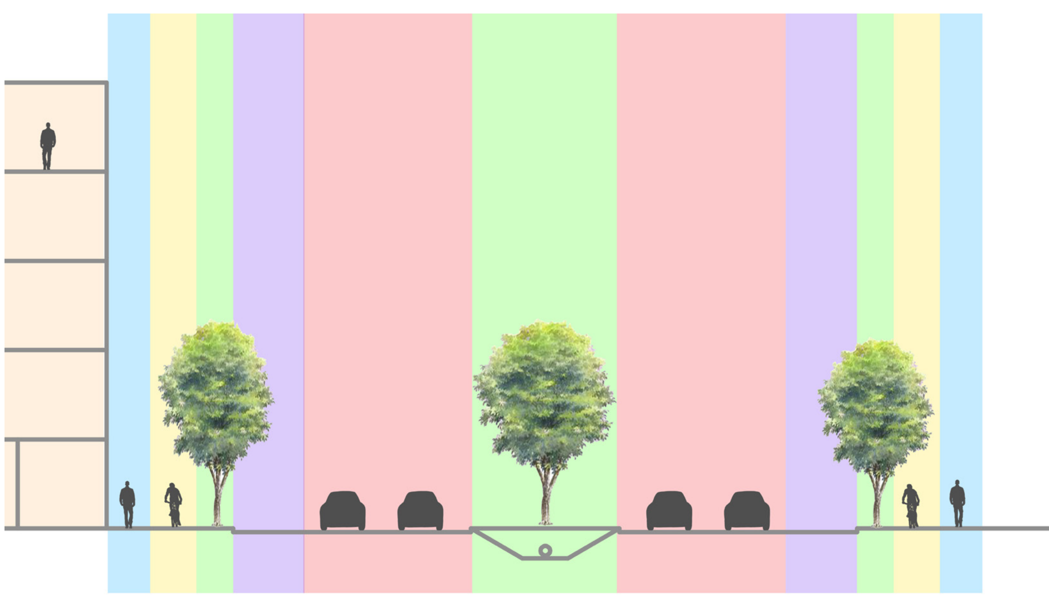
Circulation Diagram



due to the lack of space required for the typical means of city circulation. Aside from proposing flying vehicles, individual transportation isn't possible which leads into the necessity of providing adequate public transportation that can attempt to break this plane.

The standard streetscape of Detroit revolves around the road. If you look at it in section the road and circulation of that is the focal point of the street, where all other means of urban mobility are pushed to the peripherals of the road. What's proposed is that removal of much of the road in response to the limited vehicle access select parts of the city could adopt. This would shrink the road from over 60 feet to just over 20. It would condense down to just two lanes of circulation by either becoming two opposite lanes or for areas that require more circulation for either bus or supply truck it could be staggered with other roads to create a series of one ways encompassing the width of the two lanes. This would give the streetscape over half the area required for automotive circulation, allowing other means of personal transportation (bike, scooter, walking) a larger, safer zone to travel.

Detroit Streetscape

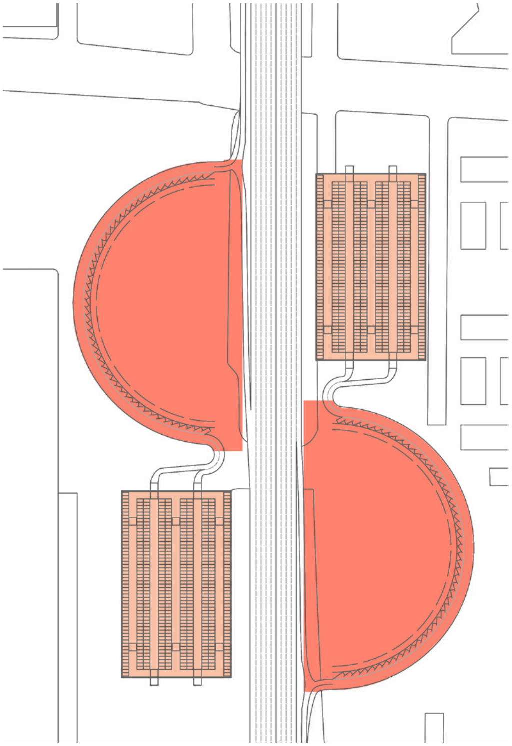


Detroit Central Transportation Hub

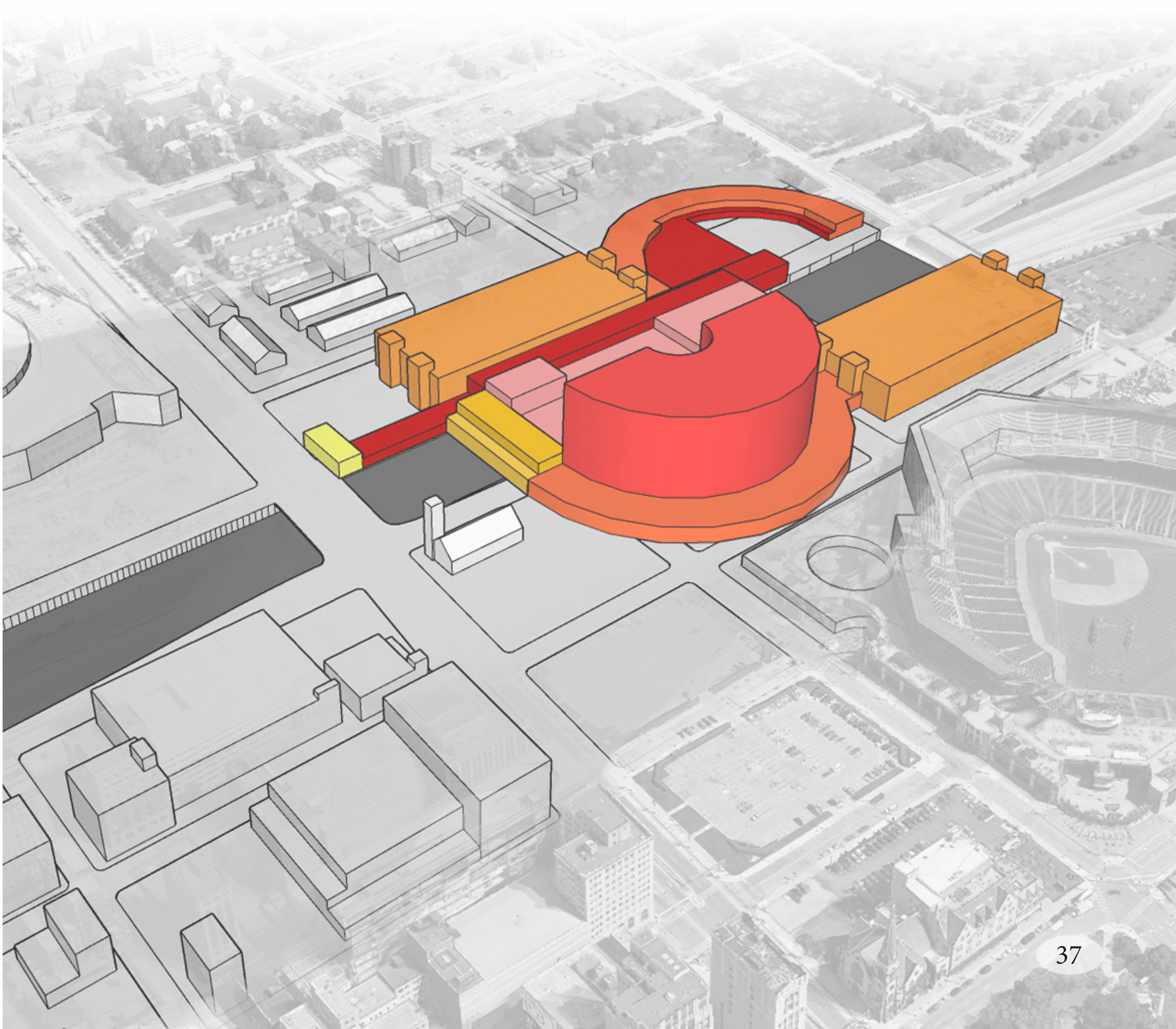
The Central Station was initially selected to be the focal point of the city with flanking satellite Hubs to appease to every day commuters. Contrary to the final plan of having eight equally acting transportation hubs this hub was intended to be the focal point of transportation for the city. It included vastly larger pick up and drop off locations what accommodated up to 50 cars for each transition and for each expressway direction. The building was programmed similarly to many European train stations or American Airports. Transitioning between modes transportation has already been long done so I used these as initial precedents for programing. In particular I looked at the Denver International Airport because of its combination of public transportation and public plaza. The building is a mediator between an airport and train station with standard connections to automotive infrastructure. I looked at how the building incorporated its programs into the transitioning between varies means of transit in the context of a larger scale similar to the design and function of the Detroit Transportation Central Hub. In this large scale hub I incorporated similar functions such as an open plaza, large areas for public/ private transaction, Hotel, and accompanied residential.

The shape of the structure was driven by the function of the building and oriented around the central idea for facilitating the transition between various modes of transportation. Detroit relies greatly on automotive transportation to nourish the much needed people that the city inherently lacks. The self-driving vehicle drop off locations became the initial starting point for the building design. It encompasses about half the footprint of the building where parking, circulation and other modes of transportation required much less space.

First Floor



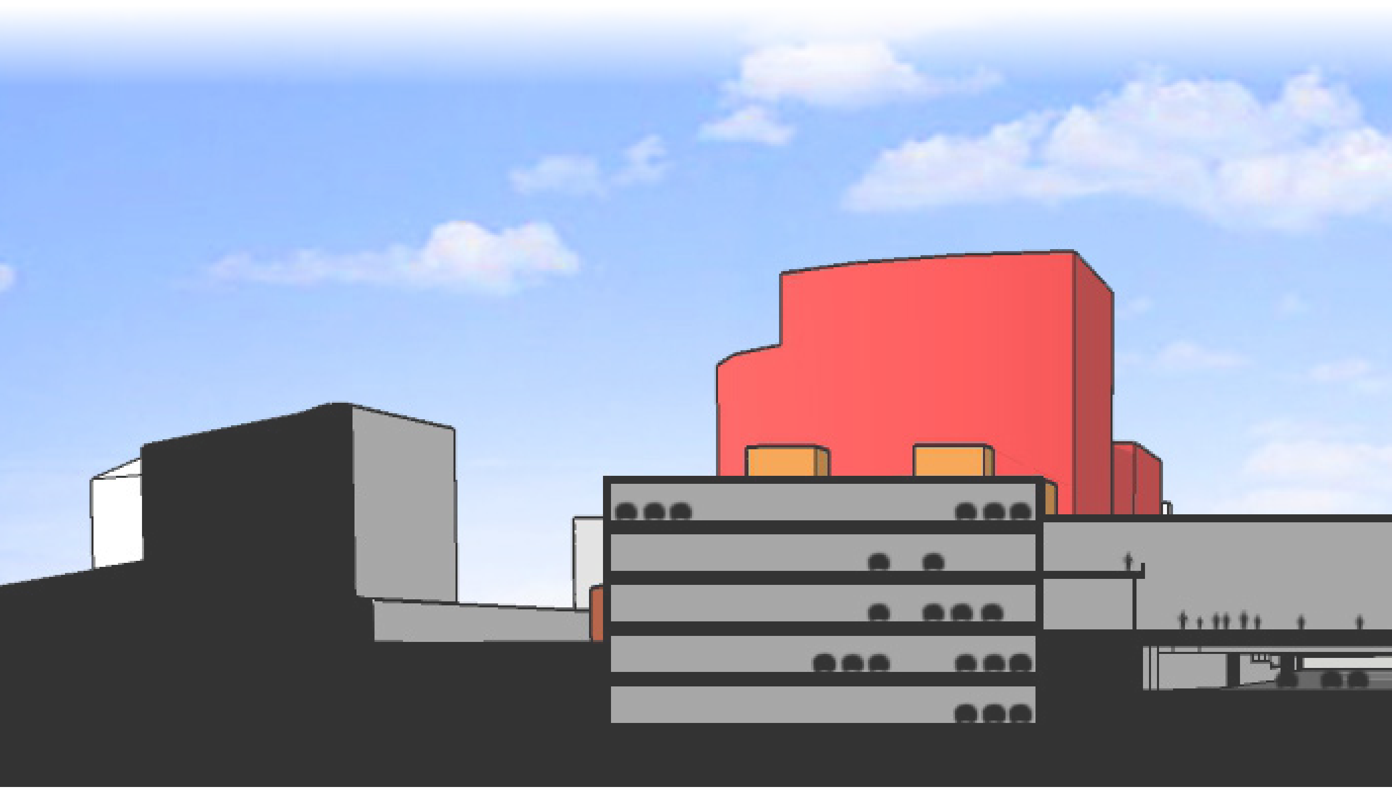
Detroit Central Transportation Hub Initial Massing



Detroit Central Transportation Hub Section

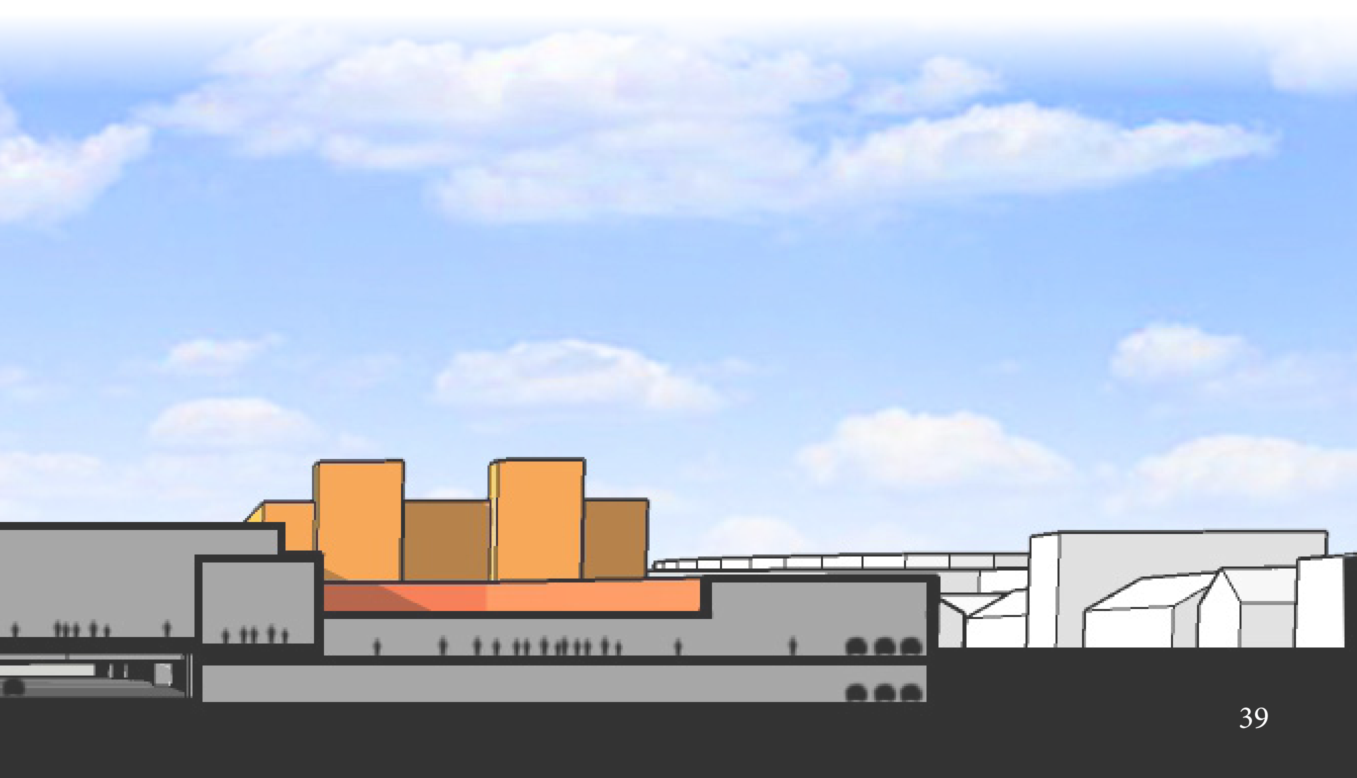
The section shows just a portion of how much onsite parking would be required if most of Detroit used this structure. To calculate this I added up how much parking is currently in Detroit (just the city center) which is well over 4 million square feet and I started condensing and deducting what could be removed. A 4 million square foot parking structure is hardly feasible and logistically speaking unrealistic so a way to reduce the amount of parking area needed for this building would be to rely on future technology. Self-driving cars in combination with smart devices make this building possible primarily because the building relies on self-driving vehicles to incentivize the transition between a personal vehicles to a public means of transit. This transitioning is further broken down in the Transportation Hub Diagram later in the thesis. However, by introducing this aspect of technology self-driving cars and technology can make ride sharing much more convenient so much so that it wouldn't matter if you drove alone or picked someone up on your way to the city.

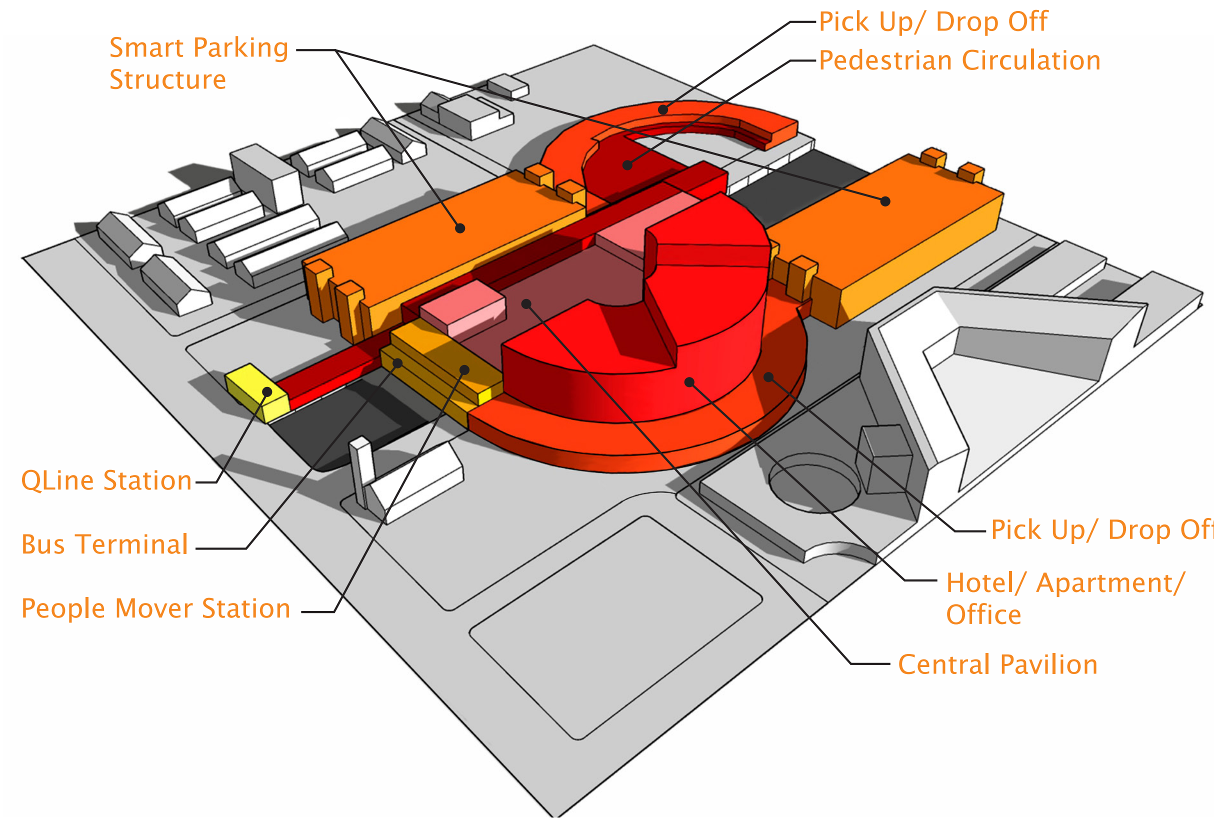
Another thing that would reduce the amount of parking is that a self-driving car wouldn't need to be constantly parked. This however, is a double sided sword in that a car not in a parking spot



simply means it's a car on the road. With apps such as Uber and Lift research is showing that urban traffic is getting worse because of the amount of cars with no "passengers" in it simply moving between picking up passengers and dropping them off. For this reason self-driving vehicles won't reduce urban traffic on their own despite the possibility of perfect driving and optimizing rider transactions. There needs to be an acceptable trade between the chaos of being individually motivated to get from one point to another and the strict rigor of municipal policy. A balance between the two is intended to be met by introducing transportation hubs into a city.

The section also includes the dynamic relationship between the existing infrastructure, existing buildings, drop off locations, pick up locations, public plaza and onsite parking. The expressway level area of the transportation hub includes the pick up locations, where a self-driving vehicle would either come from the adjacent parking, after dropping someone off, or an outside location. On the ground level the drop off location would be located where a driverless car would drop someone off relative their next means of transportation depending on the drop off congestion.





Precedent and Process

The primary precedent I examined for the removal of vehicles in a city was the Chengdu Satellite City in China. For this I wasn't examining any individual building but the city layout in general. It was one of the largest modern attempts to designing a city without the circulation revolving around vehicles. Chengdu is a city of over 17 million people and the satellite city is an extension of that, forming a car-less business district filled with a mix of residential and commercial buildings. The main attraction to the city was the use of space between buildings and the flexibility of this newly created intermediate area. I envisioned a similar scenario for Detroit where the vast amounts of circulation and parking for vehicles could be reimagined as large pedestrian walkways turning the ground plane into a place specifically for people that's scarcely done in an urban setting today. One of the main things that differentiated this future city from Detroit is that they had essentially a blank canvas to start from

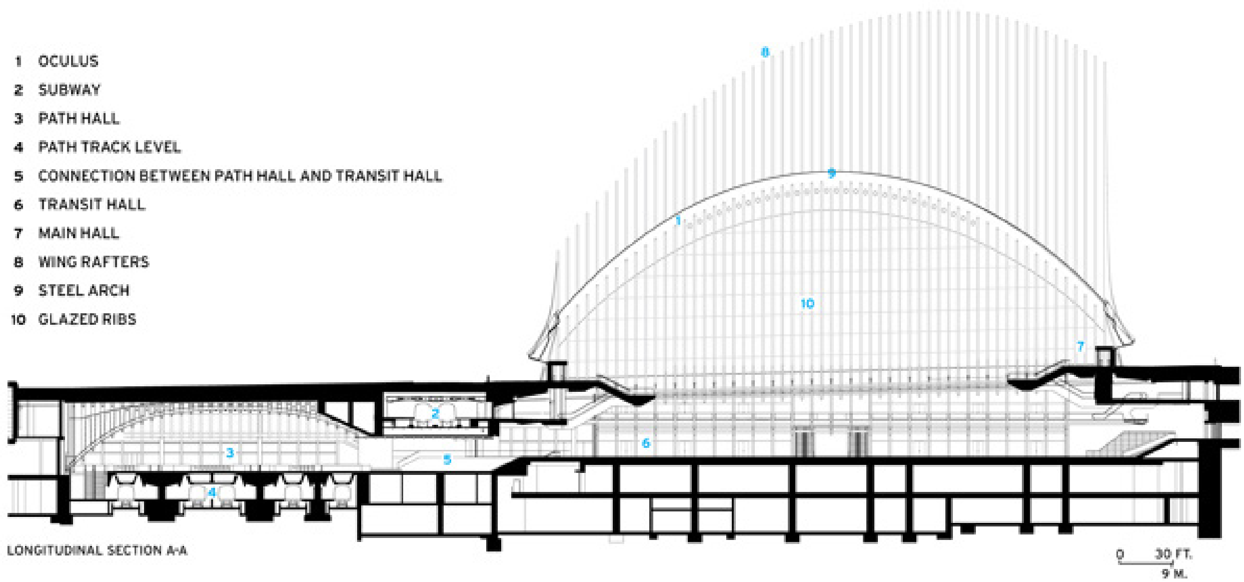
World Trade Central Transportation Hub

Denver International Airport

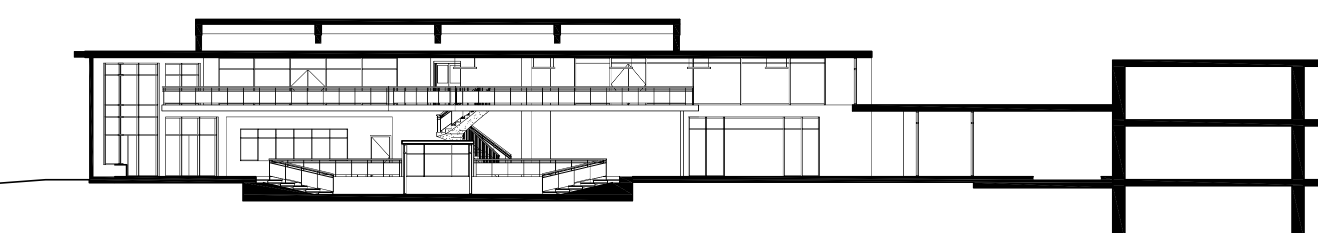
Chengdu Satilite City

which was previously farmland. Detroit, however, is a city that would need to shift how it currently incorporates public transit and strategically weave existing and new. I didn't intend to recreate a master plan for Detroit but I thought it was necessary to create a framework for incorporating new and existing transit infrastructure.

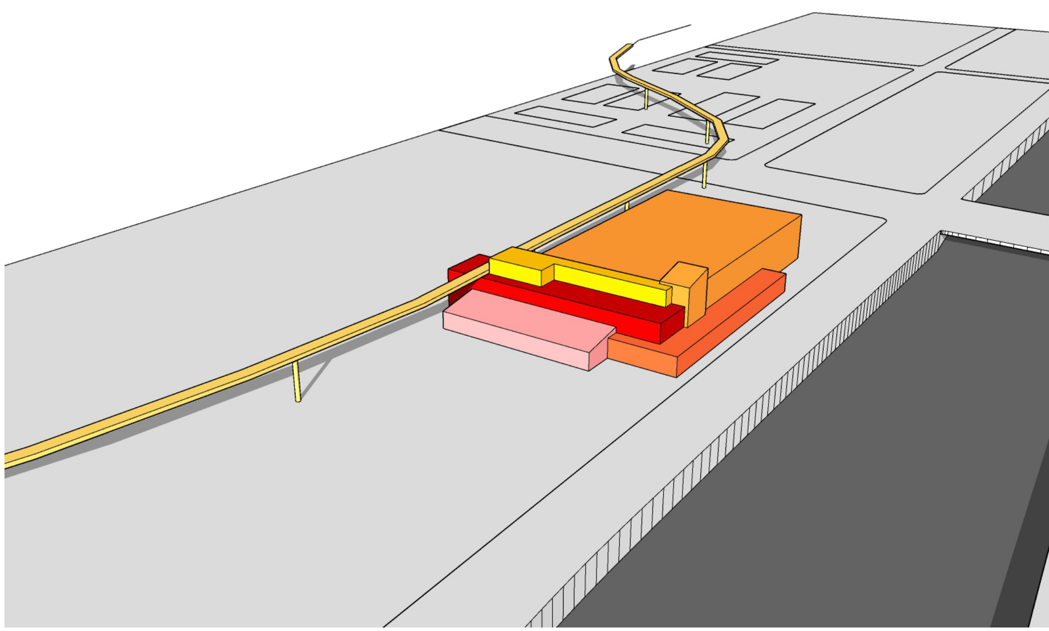
There were a few other precedents that I looked at in regards to programming, space, transitions, and access where were more centered around the design of the transportation hub. Although the way in which I propose a driverless vehicle transition, many of the other means of transportation converge relatively contemporary. As I mentioned earlier the Denver International Airport, I looked at the use of building programming and space. The World Trade Center Transportation Hub I looked at more of the physical space. As in the WTC transportation hub there's a shift from compression in the subway station to an expansive release as you ascend into the atrium. I used a similar transition for the Detroit Transportation Hubs where exiting your vehicle, the perceived median of transit, into the comparatively compressed drop off zone. There's then a vestibule that works as a threshold between the two adjoining spaces opening physically with a double height space and expansive amounts of natural light in the atrium.



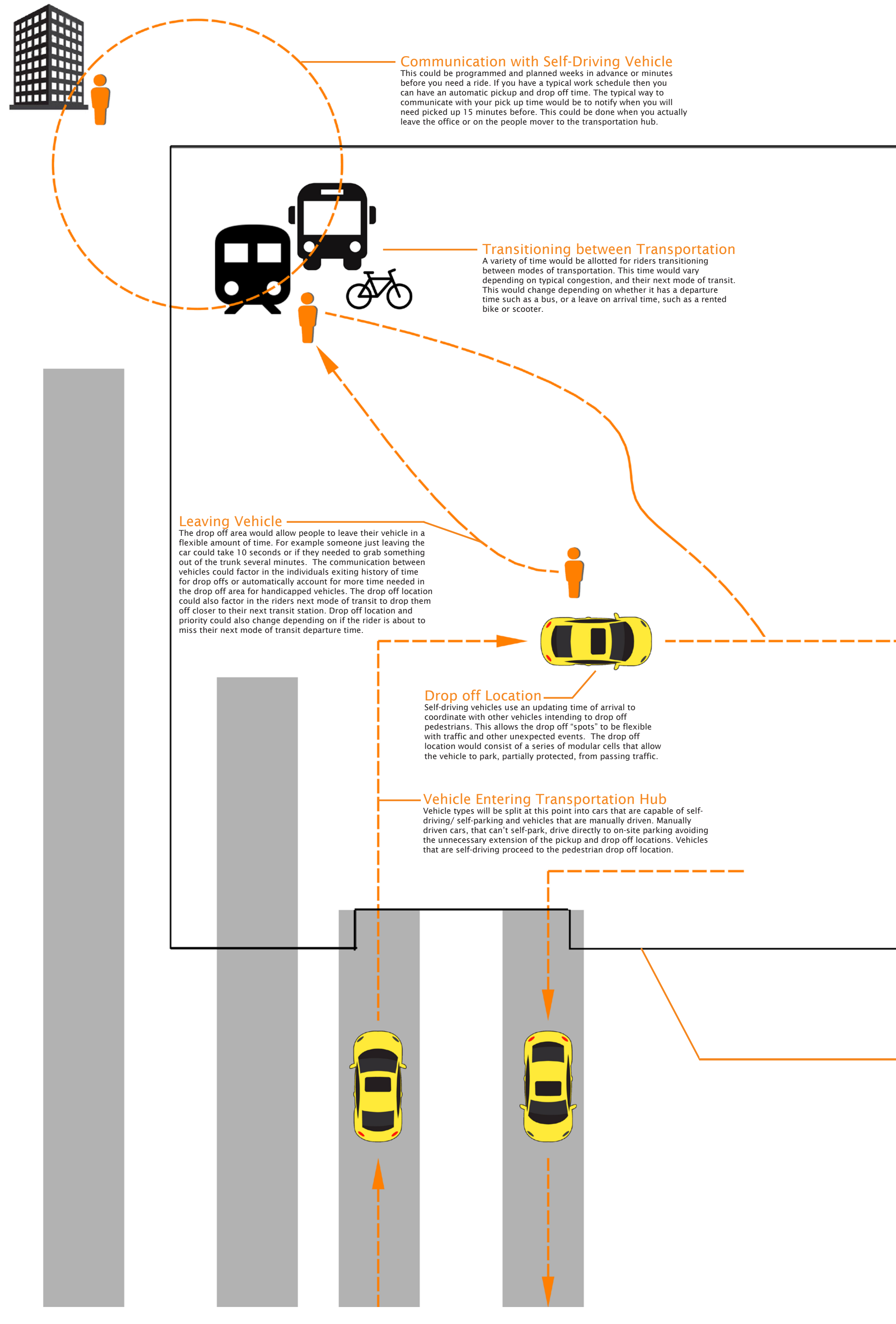
World Trade Central
Transportation Hub

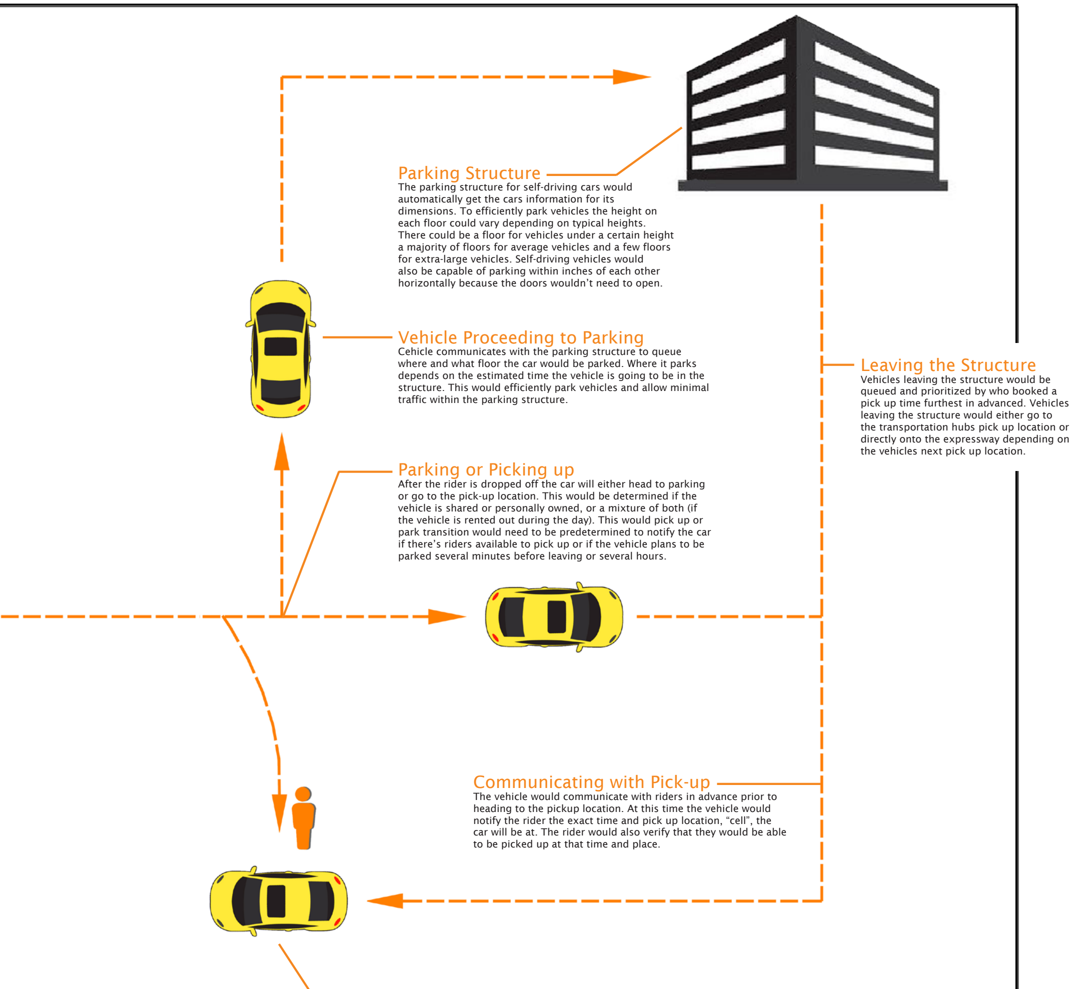


Detroit Satellite
Transportation Hubs



Sketch Massing of Satellite Hubs


Communication with Self-Driving Vehicle
This could be programmed and planned weeks in advance or minutes before you need a ride. If you have a typical work schedule then you can have an automatic pickup and drop off time. The typical way to communicate with your pick up time would be to notify when you will need picked up 15 minutes before. This could be done when you actually leave the office or on the people mover to the transportation hub.
Transitioning between Transportation
A variety of time would be allotted for riders transitioning between modes of transportation. This time would vary depending on typical congestion, and their next mode of transit. This would change depending on whether it has a departure time such as a bus, or a leave on arrival time, such as a rented bike or scooter.
Leaving Vehicle
The drop off area would allow people to leave their vehicle in a flexible amount of time. For example someone just leaving the car could take 10 seconds or if they needed to grab something out of the trunk several minutes. The communication between vehicles could factor in the individuals exiting history of time for drop offs or automatically account for more time needed in the drop off area for handicapped vehicles. The drop off location could also factor in the riders next mode of transit to drop them off closer to their next transit station. Drop off location and priority could also change depending on if the rider is about to miss their next mode of transit departure time.
Drop off Location
Self-driving vehicles use an updating time of arrival to coordinate with other vehicles intending to drop off pedestrians. This allows the drop off “spots” to be flexible with traffic and other unexpected events. The drop off location would consist of a series of modular cells that allow the vehicle to park, partially protected, from passing traffic.
Vehicle Entering Transportation Hub
Vehicle types will be split at this point into cars that are capable of self-driving/ self-parking and vehicles that are manually driven. Manually driven cars, that can’t self-park, drive directly to on-site parking avoiding the unnecessary extension of the pickup and drop off locations. Vehicles that are self-driving proceed to the pedestrian drop off location.



Rider Pick-up Transition

The rider would enter the vehicle, and verify the next destination and that the vehicle they were in was correct. The vehicle would decide which exit its taking depending on the rider's next location (East or West Exit).

Transportation Hub

This structure would incorporate and facilitate multiple modes of transportation. This would allow for a smooth transition between taking the bus, people mover, or self-driving vehicle. The building would include a bus terminal, People mover station, Q-Line stop, self-driving parking garage, and pick up area. Other means of local transportation such as bikes, electric scooters, and moving sidewalks would be incorporated into the function of the building. The building itself would be built and intertwined with the different modes of transportation stretching over the expressway, and under or beside the people mover and Q-Line. This would allow people to choose the transportation that makes the most sense for getting to their next destination.

Transportation Hub Diagram Outline

Cars entering the Transportation Hub

Vehicle types will be split at this point into cars that are capable of self-driving/ self-parking and vehicles that are manually driven. Manually driven cars, that can't self-park, drive directly to on-site parking avoiding the unnecessary extension of the pickup and drop off locations. Vehicles that are self-driving proceed to the pedestrian drop off location.

Drop off Location

Self-driving vehicles use an updating time of arrival to coordinate with other vehicles intending to drop off pedestrians. This allows the drop off "spots" to be flexible with traffic and other unexpected events. The drop off location would consist of a series of modular cells that allow the vehicle to park, partially protected, from passing traffic.

Leaving Vehicle

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Transitioning between Transportation

A variety of time would need to be allotted for riders transitioning between modes of transportation. This time would vary depending on typical congestion, and their next mode of transit, whether it has a departure time such as a bus or a leave on arrival time such as a rented bike.

Driverless Parking or Picking up

After the rider is dropped off the car will either head to parking or go to the pick-up location. This would be determined if the vehicle is shared or personally owned, or a mixture of both (if the vehicle is rented out during the day). This would pick up or park transition would need to be predetermined to notify the car if there's riders available to pick up or if the vehicle plans to be parked several minutes before leaving or several hours.

Vehicle Proceeding to Parking
Car communicates with the parking structure to queue where and what floor the car would be parked. Where it parks depends on the estimated time the vehicle is going to be in the structure. This would efficiently park vehicles and allow minimal traffic within the parking structure.

Parking Structure
The parking structure for autonomous cars would automatically get the cars information for its dimensions. To efficiently park vehicles the height on each floor could vary depending on typical heights. There could be a floor for vehicles under a certain height a majority of floors for average vehicles and a few floors for extra-large vehicles. Self-driving vehicles would also be capable of parking within inches of each other horizontally because the doors wouldn't need to open.

Leaving the Structure
Vehicles leaving the structure would be queued and prioritized by who booked a pick up time furthest in advanced. Vehicles leaving the structure would either go to the transportation hubs pick up location or directly onto the expressway depending on the vehicles next pick up location.

Communicating with Pick-up
The vehicle would communicate with riders in advance prior to heading to the pickup location. At this time the vehicle would notify the rider the exact time and pick up location, "cell", the car will be at. The rider would also verify that they would be able to be picked up at that time and place.

Rider Pick-up Transition
The rider would enter the vehicle, and verify the next destination and that the vehicle they were in was correct. The vehicle would decide which exit its taking depending on the rider's next location (East or West Exit).

Communication with Self-Driving Vehicle
This could be programmed and planned weeks in advance or minutes before you need a ride. If you have a typical work schedule then you can have an automatic pickup and drop off time. The typical way to communicate with your pick up time would be to notify when you will need picked up 15 minutes before. This could be done when you actually leave the office or on the people mover to the transportation hub.

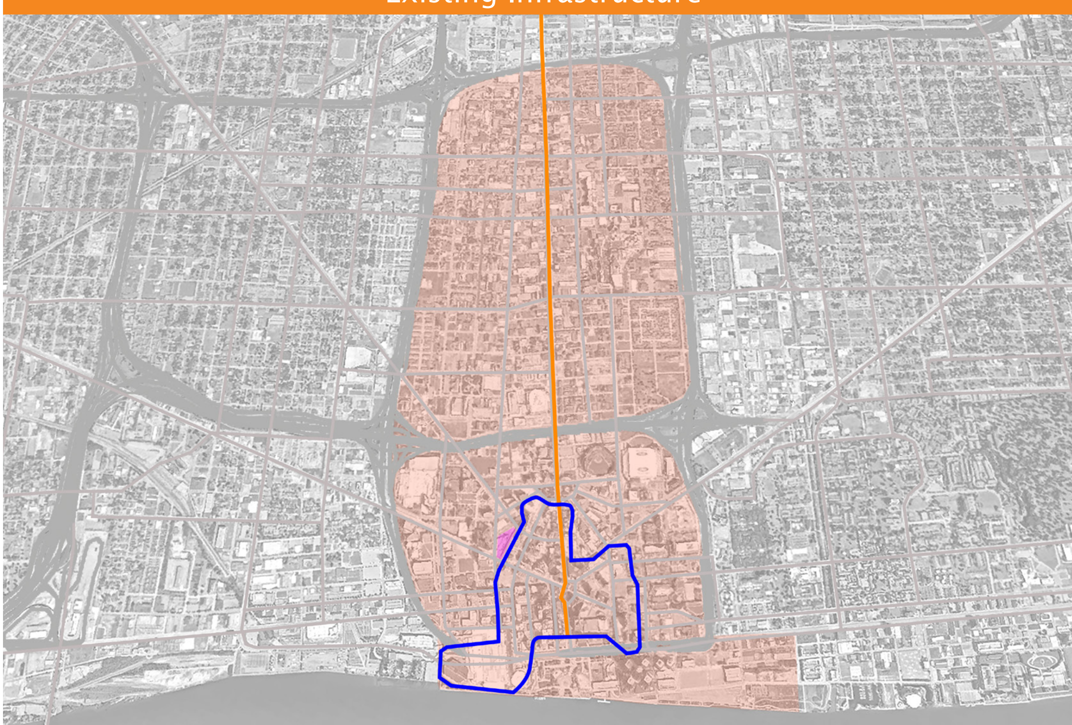
Transportation Hub Locations

New transportation such as an extended people mover would further remove transportation vehicles from the plane of the public realm. Altered bus routes could help accommodate people needing to get closer to a location that not all people mover terminals could accommodate. There would be plenty of room for bike lanes, and enlarged walk ways for people to move around the city. The eight transportation hubs would create a web of access points into the city. The transportation hub creates a network which would help people from outside the city navigate

Site Key

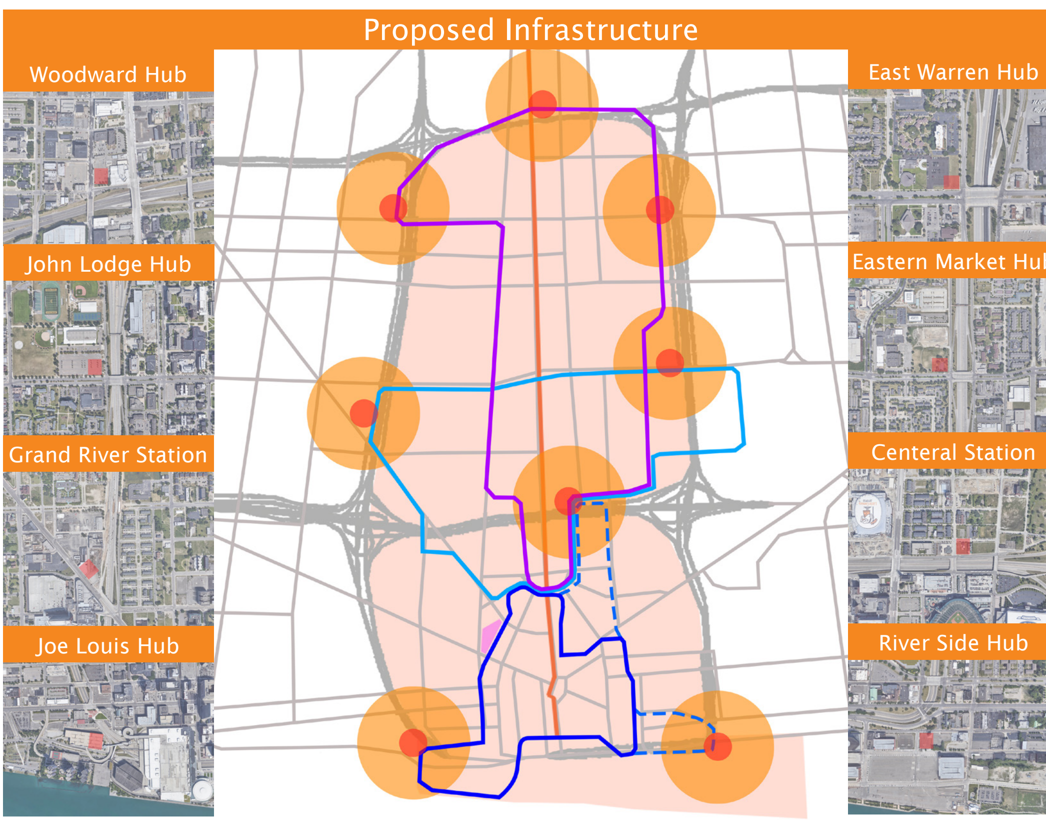
- Proposed Limited Vehicle Access Zone
- Proposed Transporation Hub
- Existing Detroit People Mover
- New East/ West People Mover Loop
- New Midtown People Mover Loop
- Alternate People Mover Location
- Existing Expressway and Primary Roads
- Existing QLine
- Rosa Parks Transit Center
- 5 Minute Walk

Existing Infrastructure



and acclimate to Detroit. Everyone from residents, to tourist, to business professionals would all funnel through the mediating facility in a way connecting them despite their individual intents.

The strategically placed hubs would make use of easy access on and off the expressway. Each Transportation Hub is located in areas that are already occupied by parking, the building itself feeds off this space, and in many ways adapts well to the previously programmed sites. For example the Joe Louis transportation hub would be built into the already existing parking garage. To the north the John Lodge transportation hub situates itself in the Wayne State Physical Education Center flat lot parking. The parking lot itself is then transformed into an activated bustling gate to Detroit. Not all sites were selected from just the association to parking, some of them were selected by their location and ease of access to other amenities. The Eastern Market hub was selected because of its walkability to the vastly cultural Eastern Market. On the other hand the Grand River Hub is located near the up and coming neighborhood of North Corktown to help spur residential development.

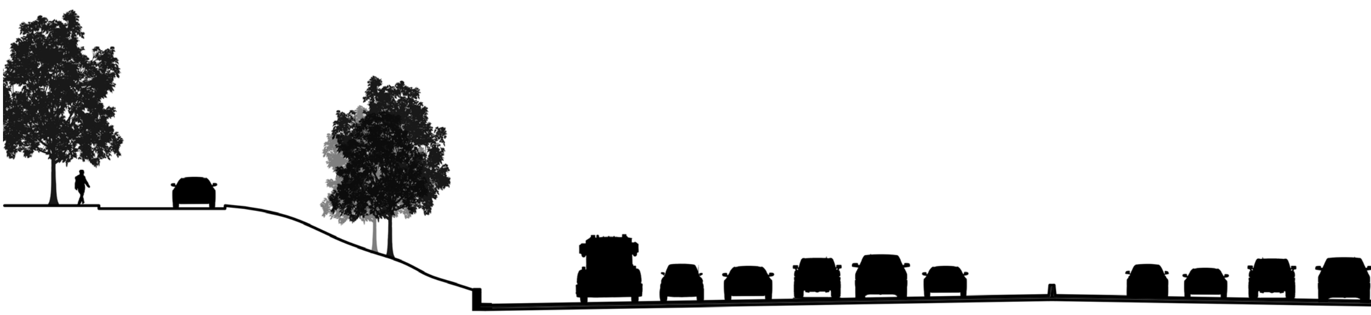


Network of Detroit Transportation Hubs

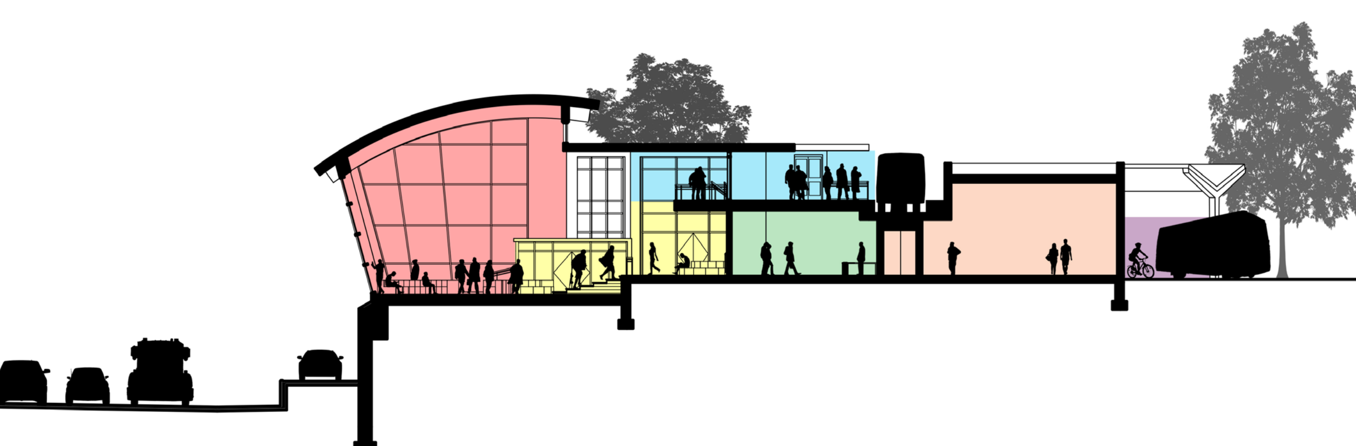
The proposed solution to decongesting the downtown is to utilized and facilitate public transit. Currently public transportation is separated, and self-directed with little external influence on what happens around it. For example, the bus routes rarely influence the schedule of the people mover or vice versa. Some bus routes might have an extra stop to accommodate a nearby people mover, or Qline station but this doesn't incorporate or consider direction, time of day, or schedule of the other associated modes of public transit, that are necessary for a city that intends to grow.

There are several ways to help coordinate public transportation from city planners, certain policies, to certain commercials. However, architecturally we can implement built anchors around the city that considers local policy, technology, and traditional architectural features. The Detroit transportation hubs act as a median between several lines of thought where function and facilitation are just a small portion of the overarching goal, but none the less important. The general design of the building revolved around transitioning people from their vehicle to other modes of transit, specifically from an autonomous vehicle to public transportation. The building includes typical wayfinding techniques with physical maps located in the lobby and seating, integrated with traditional signage but to really incorporate the building in the future it would also need to be smart.

Technology plays a major role in everyday lives and will only become more relied upon in the future. The buildings ability to adapt with technology will be the

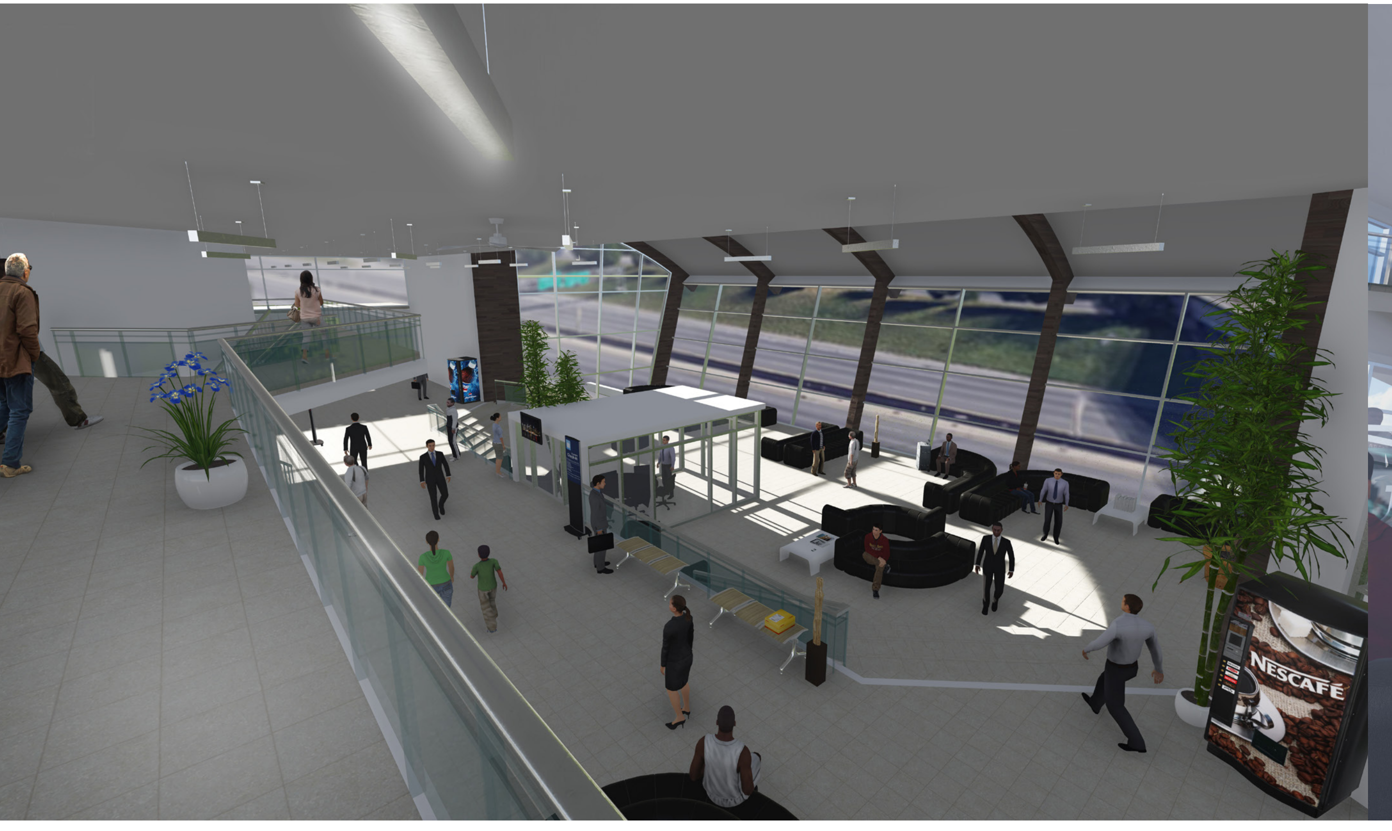


factor that makes it successful and usable. I propose that incorporating artificial intelligence to help identify peak times and coordinate typical pedestrian routes to help morph flexible modes of transportation. This would also be very useful in the expansion of transit. For example, if one transportation hub showed that it was continuously needing more bikes in the bike lot could recommend an expansion of that lot. AI could also coordinate and anticipate different time specific activities such as a baseball game starting and ending and fluctuating a bus route to just accommodate the increase of demand for this one activity. This could also alter people mover and bus stops, if no one is stopping or getting picked up at say at the East Warren transportation hub it could simply pass that it without the unneeded stop. The coordination of this would be seamless and driven by smart devices that could either be on your phone or there's physical smart stations located inside the building to schedule this. There's also a small information desk near the bus station where there would be several people to help with scheduling and finding the best route of transportation.



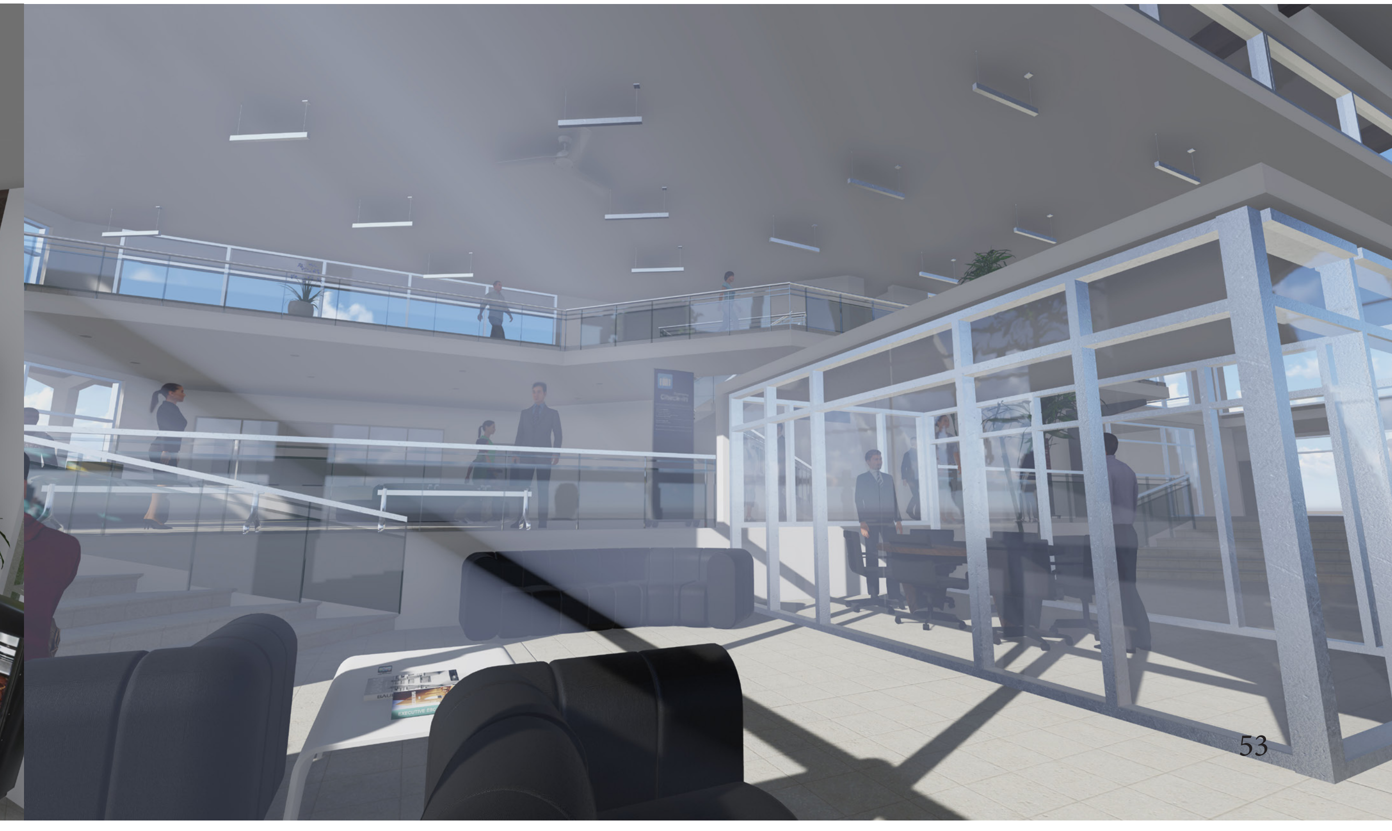
Incorporating Transportation by Phasing

Much of what's proposed is information driven and needs to be flexible upon what people need at specific times. With that being said, there does need to be one solidified point of contact from the general means of transit (automobile) to all the other (public transit). This point of contact organizes the general consensus of city transit and creates a reference point to where most of the transitions take place. This network of public transportation would struggle to be incorporated into a city without a physical transit node facilitating these transactions. This is the case for many cities with several modes of transportation where each transit works independently from each other. Train stations have their own schedule and stops, busses have their own terminal and stops, and vehicles have their own parking lots and individual stops. This creates uncontinuity and lack of usability in terms of transitioning, in general this is the current state of transportation. Each transit has their own identity and leadership with lack of rider flexibility and community awareness. Historically this has worked out of necessity for people with no other means but to incorporate it willingly it would need to act much more efficiently.



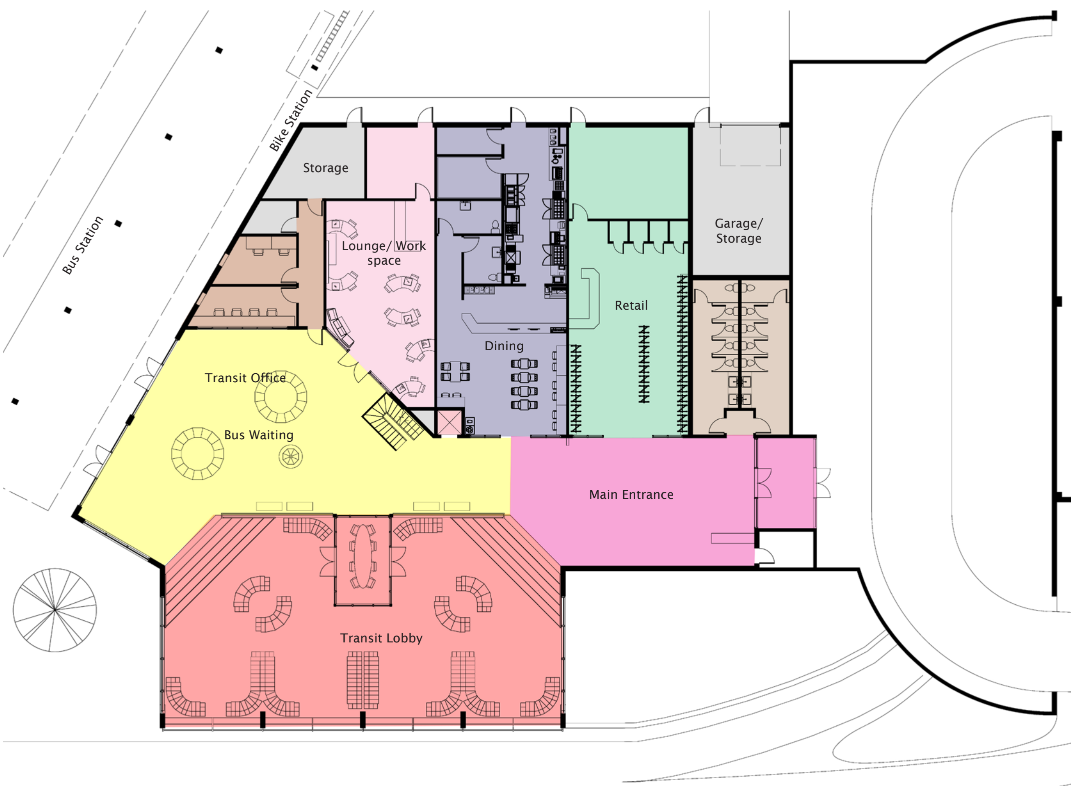
For that to happen it would need to be phased in response to demand.

What's proposed is an intuitive plan for transportation hubs driven by location and assumption of demand. To truly make a successful plan initially implementing this system with the existing people mover and immediate downtown as the limited vehicle zone and not incorporating midtown into the plan yet. This would set precedent for midtown and help develop the needed artificial infrastructure system needed to incorporate the larger areas of the no vehicle zone. Once the system is worked out downtown the several locations proposed could be utilized with little physical infrastructure and congestion pricing to help facilitate using the expanded system in midtown. These smaller scale kiosks would provide the basic core of the transit hubs where simply creating a way to incorporate ridesharing with bus routes and bike rental. By over proposing areas, for this say ten select sites around midtown, the top five most used sites would develop into the next phase of the project. Each of these selected sites would need to also need to identify sites that can incorporate further expansions of the phases. This would include adding more parking to the areas and building a small transit hub and even later phases incorporating an extended people mover station.

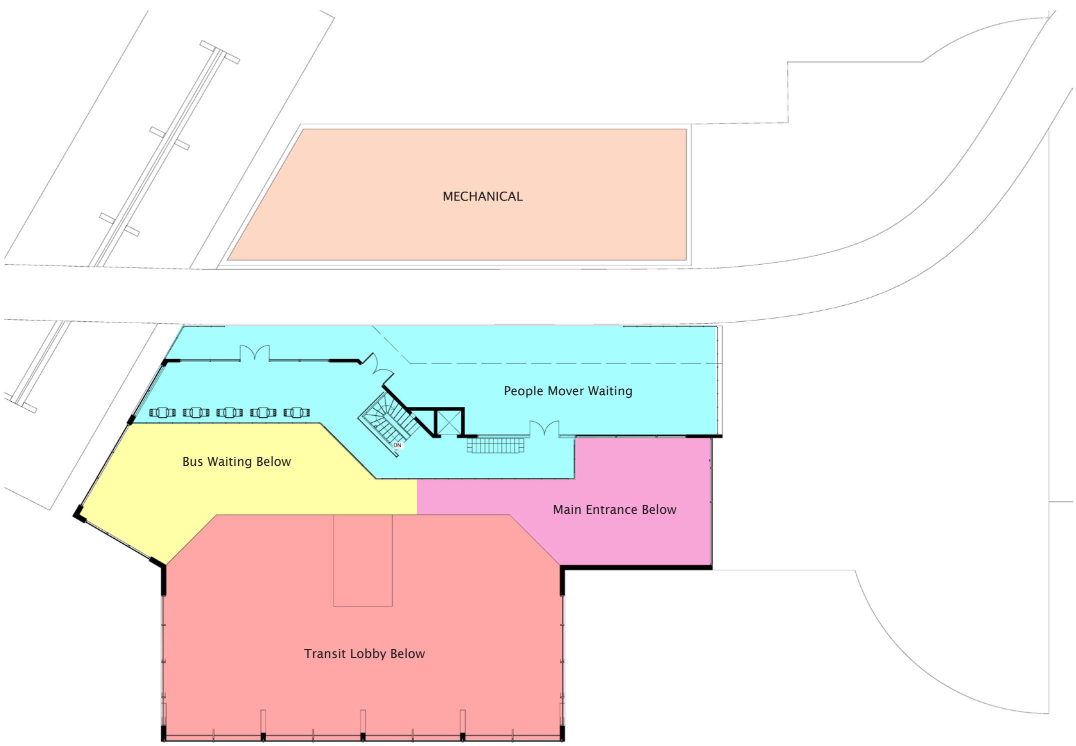


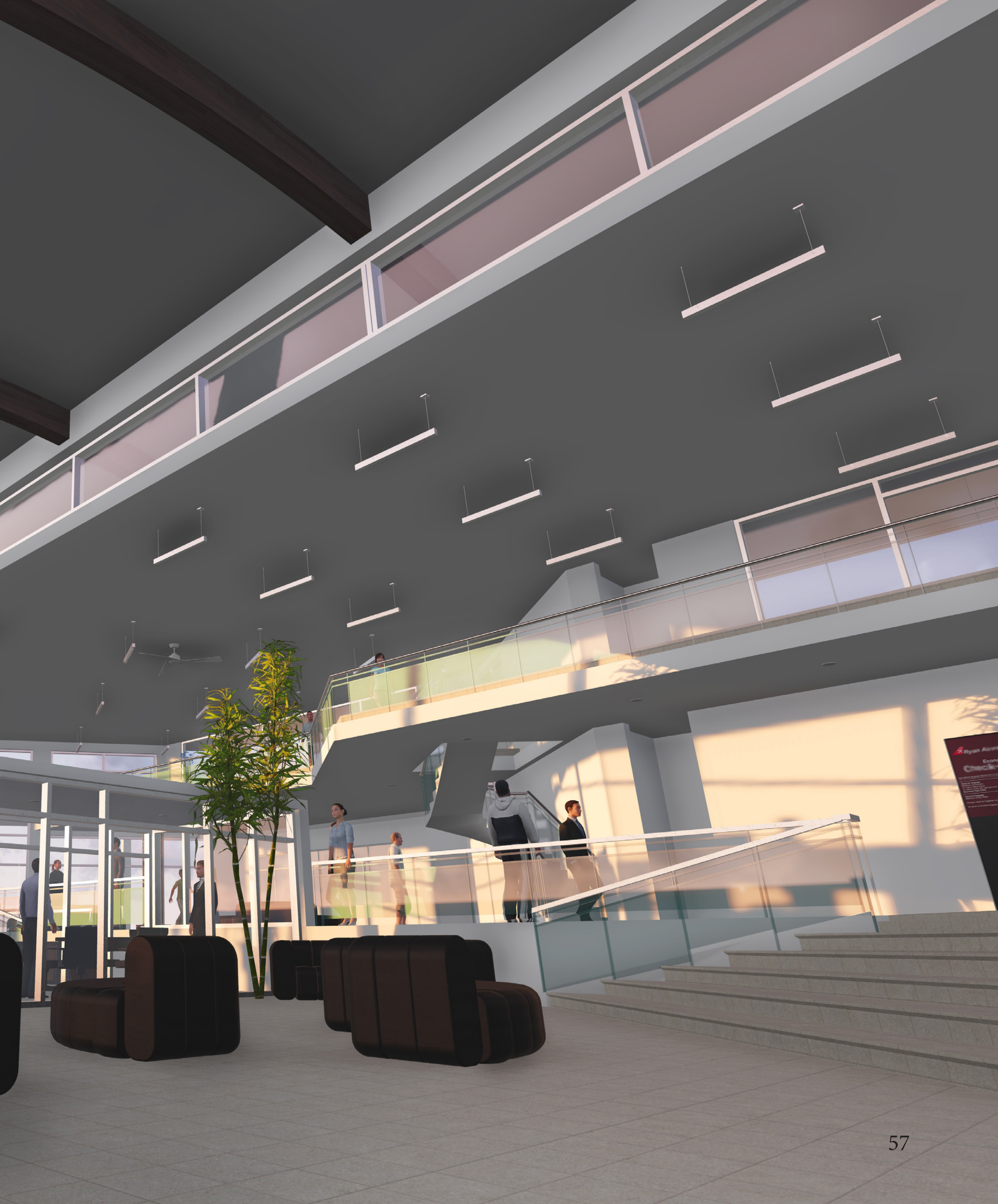
Developing the phasing of transit hubs is important for creating a well-developed transit system. These test sites would respond to the current need and ease of access not easily understood by looking at general statistics in a city use. This would be conducted as a bottom up approach while still needing an overarching group to help coordinate this process. The phase would then extend into the final development of the transportation hub. Where the building is fully realized and can start incorporating other systems into the plan, such as autonomous vehicles and other supplemental plans to help facilitate smoother and easier transitions of transportation.

First Floor

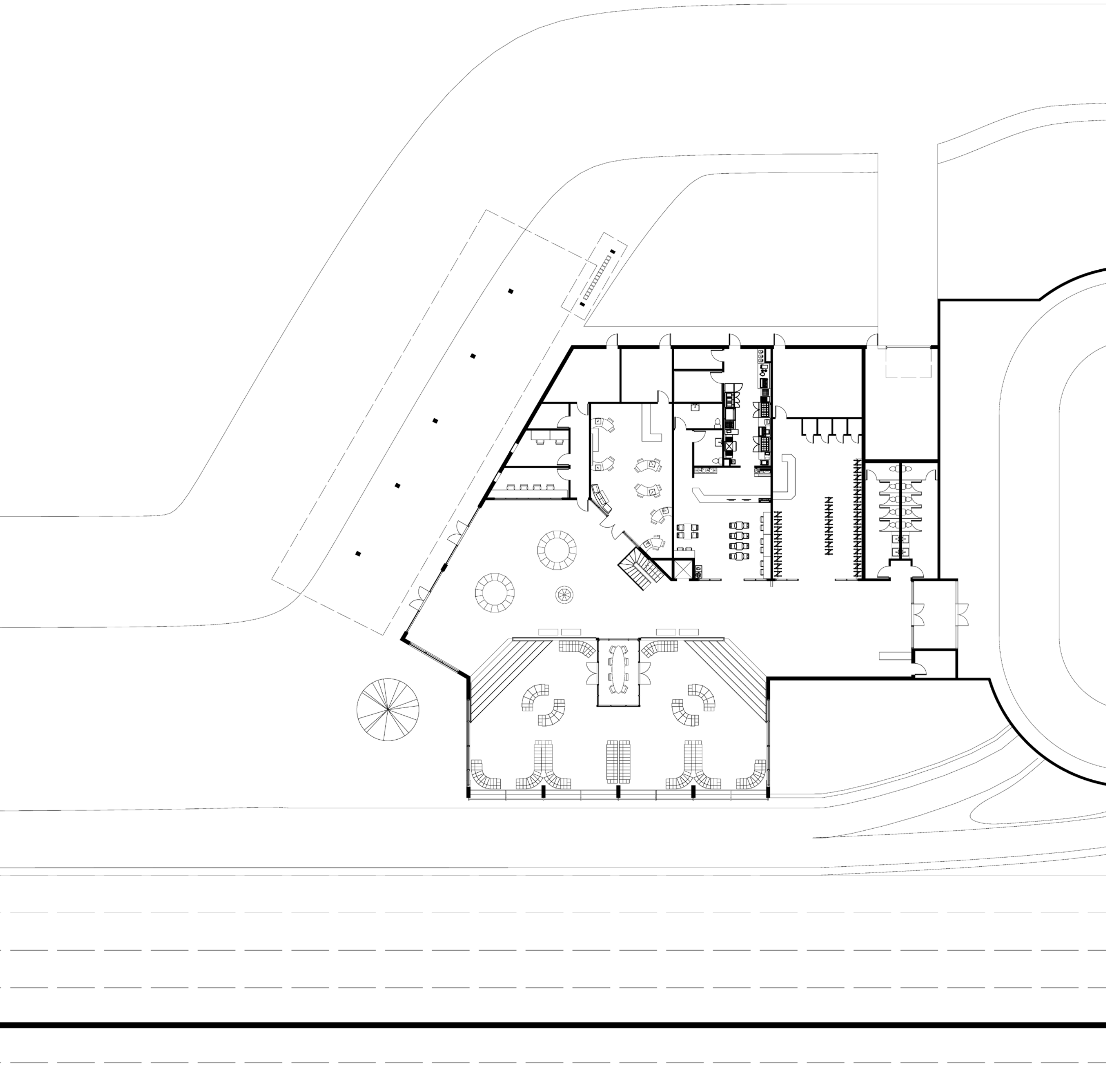


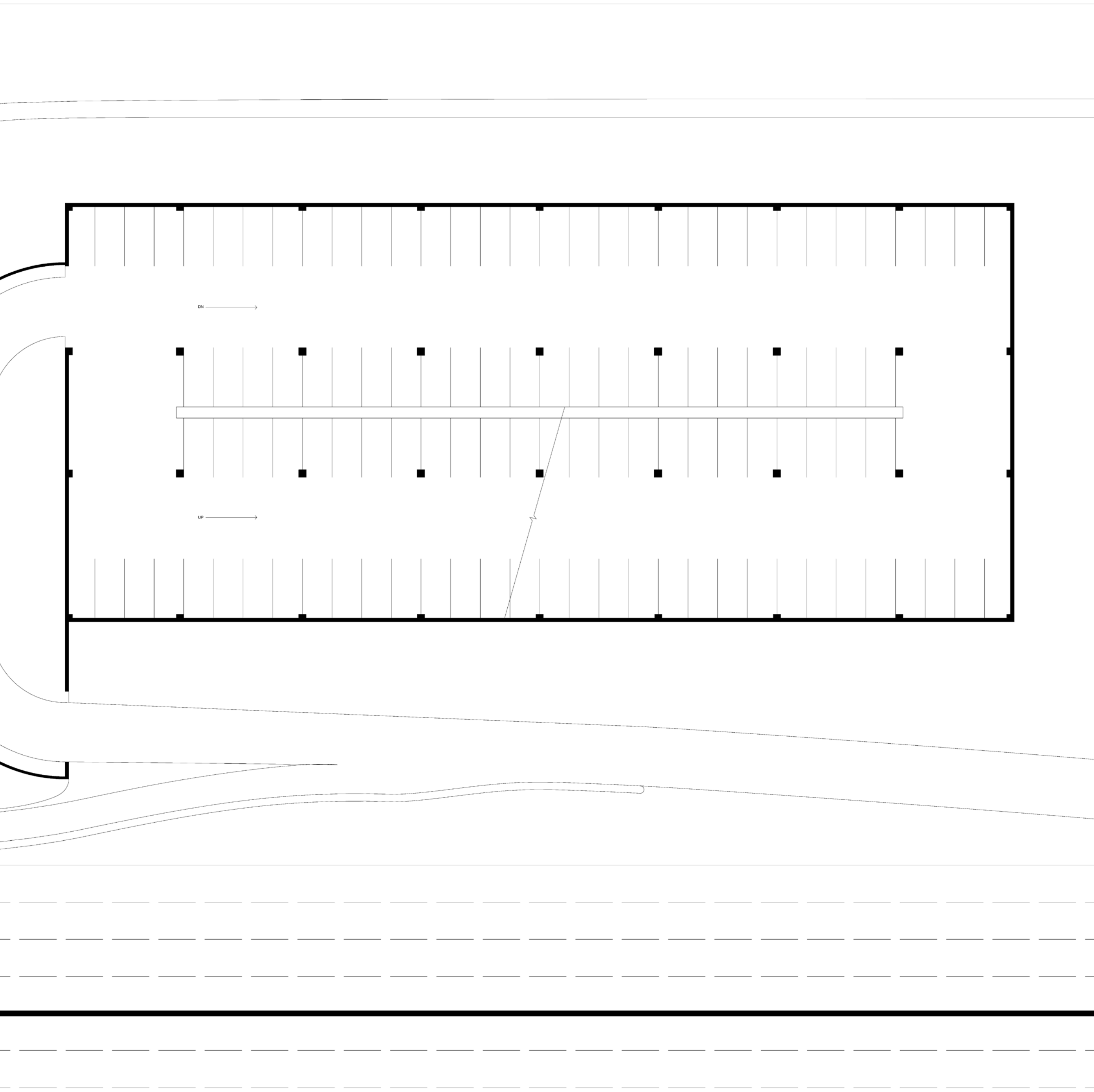
Second Floor





Transportation Hub Site Plan

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