RICE UNIVERSITY

Futures of an Autonomous Houston

by

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A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE

Master of Architecture

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HOUSTON, TEXAS
May 2018
The autonomous vehicle is here, and how it is envisioned in daily life drastically changes the way we perceive the city and its inhabitants. Whether seen as an autonomous mover of people or products, the implementation and policies of autonomy shift the interaction with this novel robotic vehicle, and, in turn, redefine societies to come. My thesis, Futures of an Autonomous Houston, foresees the autonomous vehicle through varying conceptions, engendering multiple possibilities of urbanity within the heavily car driven form of Houston. These scenarios are contradictory in nature, exploring hyper suburban sprawl, the adaptation of current suburban form, nomadic housing, and densification of downtown. Through vignettes though of these conditions brought about by various iterations of autonomous vehicles, we are able to explore the intrinsic relationship between technology, infrastructure, and inhabitation within our ever-connected society.
ACKNOWLEDGMENTS

The person I would like to thank first and foremost is my thesis advisor Dean Emeritus and Harry K. and Albert K. Smith Professor in Architecture Lars Lerup at the Rice University School of Architecture. He was always there for any questions and concerns I had throughout the thesis process.

I would also like to thank my parents and Maria Pettit. Without their help, not only through thesis but through my architectural studies at Rice University, I am not sure where I would be today.

Corey Phelps
The car has been influential on the architectural discourse even without full integration. Within Jose Luis Sert’s book *Can Our Cities Survive: an ABC of Urban Problems, Their Analysis, Their Solutions*, Sert hypothesizes on the problems and solutions for the urban chaos present within the cities of the 1940’s. Heavily influenced by The Congrès Internationaux d’Architecture Moderne, he postulates five reason for the tumult within the city fabric; Mechanized production, Mechanized transportation, new building technics, new ideas in health research, and the vulnerability of the air (Sert 2). The ideals set forth by Sert in the rest of the book address these concerns, with an emphasis on the repercussions of sudden change in infrastructural occupant, the car. The city, while hard pressed to adapt to this form of transportation, was unable to adapt fast enough:

...the street systems of today do not permit the utilization of the technical advances made in motorized transportation. Instead they thwart them, simultaneously breeding the chaos and confusion which we know only too well.

Now modern means of transportation cannot be made to conform to our old-fashioned street systems. (Sert 183)

He then calls for the separation of the car from ‘... office buildings, libraries, museums, hospital, and schools’ (Sert 188), exemplifying the modernist belief that cars should be separate from the person, engendering a rift in the built environment based upon speed of the occupant. Similar views are held by Le Corbusier within
his book Looking at City Planning. His diagrams on page 60 show cross sections of the highway explicitly portraying the need for separation of car and man. The Modernist ideas on the implementation of the motor vehicle within the urban fabric gave a straightforward application in planning schemes, employing it to segment the landscape. This Fordist mentality of land delineation, taken by the architects of the time, shattered the landscape into specialized fields, provoking an architectural manifestation of the assembly line (Gartman 97). The Fordist logic of mass production similarly influenced the building style, producing the machine aesthetic of the Modernist movement. The impact of both the vehicle and the assembly line on the Modernist building aesthetic can be seen within Le Corbusier’s photos of Villa Stein. Placed within shots is a car, allowing the viewer of the perfectly staged photograph to draw correlations between architecture and the machine.

While the Modernist style would waiver through the century with the rise of Postmodernism, the use of vehicular infrastructure as division would occur throughout the century at various scales and has existed in the past. Similar uses of infrastructure were proposed around the time as Corbusier’s and CIAM plans, such as Ebenezer Howard’s Garden City Plan, with its circumscribing ring roads containing various programmatic space, or Nikolay Alexandrovich Milyutin’s Linear City in which all programs are seen as parallel divisions across the landscape, including the infrastructure for the car. This notion of separation of the realm of people and the vehicle, while not as radical, still permeate into today’s society. The road system present within the urban fabric of New York provides little to no relationship to the buildings they contain, and the ladder-like driveways of suburbia delineate land, acting as indicators of private ownership from the street.

Within the past decade, architects and designers have begun to take on the autonomous vehicles as datums from which to create speculative projects. While inventive, they still work in the vein of a quasi-Modern use of vehicular space, that is a complete separation of it vehicle infrastructure from architecture. While such projects as BIG’s Urban Future Proposal merge the space of the pedestrian and the car, taking advantage of autonomous vehicles sensory capabilities and allowing to person to weave through traffic on a field of lit pavement, it does not postulate any experience to truly synthesize the vehicle and architecture. Assembly Row, another Urban Future Proposal, deals with the efficiency of the parking garage through various methods. While technically a building, the garage they propose is unused by humans, housing only autonomous vehicles. Alloybuild, a Houston, Texas based firm, proposed the most Modernist plan of all, Shuffle City. The Haussmanian plan postulates the carving of tangent, circular loop roads for autonomous vehicles into the grid of downtown Houston. These walkable circles would contain previous urban fabric, filling the residual awkward spaces with parks. The above autonomous vehicle proposals, while forward thinking, fail to acknowledge the most radical change brought about by driver-less cars; the fact they now contain un-programmed space. Other design disciplines have already accepted this view of the car. National Electric Vehicle Sweden (NEVS), the company that acquired Saab in 2012, views the autonomous vehicle as a movable room with an adaptable interior in their InMotion concept car. Like NEVS, the architectural discourse needs to abandon the Modernist implementation of the division of
inhabitation, building, and vehicle for full integration of autonomous fleet vehicles, instead looking at the autonomous vehicle as a program able to take on various forms and sizes, essentially allowing the vehicle to have typologies of its own.

Futures of an Autonomous Houston speculates on these possible types, using vignettes as a primary means of description for four possible chapters of inhabitation within the car-heavy culture of Houston, Texas. Each scenario envisions a different way of interpreting the autonomous fleet vehicle and produces drastically varying results with their implementation. Chapter One: Densifying Downtown looks at the autonomous vehicle as a liberator of space, providing much-needed low-income housing within the city of Houston that can facilitate the loading and unloading of people into and from autonomous fleet vehicles. This housing comes in two typologies; the tower in the parking lot and the cannibalistic reclamation of the parking garage.

Chapter Two: Autonomous Sprawl conceives the autonomous vehicle as a medium sized programmatic void no longer containing the driver. The person inside becomes simply an occupant of space. Programs such as the cubicle or community areas are absorbed into the hull and, in turn, negate the distance of any commute through the occupation of time spent within the vehicle. This opens new areas that were once seen as too far away from populated areas to be considered as occupiable for a new type of living condition. This hyper-sprawl, located on the boundary of Houston’s Metropolitan area, is not based on the privately-owned vehicle. Instead, a fleet logic of loading and unloading of passengers guides its new ladder form.

Chapter Three: Nomadic Housing pushes the limits of a programmatic vehicular space seen in Chapter Two, turning larger autonomous vehicles into rooms of the house able to align into an enfilade condition. These aligned autonomous vehicles can disperse into the surrounding communities and question the role of vehicular infrastructure, reinterpreting even the road as an area for life.

Chapter Four: The Hub and Suburbia envision the transition of the contemporary suburbs from a form based on the privately-owned vehicle to one on an autonomous fleet logic through the adoption of autonomous vehicle hubs placed within its ladders. This hub will act as a seed of change over time as it is adopted as a primary interaction point with the large-scale autonomous vehicle, leaving the roads to be inhabited by a smaller, less intrusive system of autonomy. Over time, the territorial nature of the suburban form, where land is demarcated by driveways and streets, is changed into a part of a distribution network with the autonomous vehicle hub as impetus.
CHAPTER ONE: DENSIFYING DOWNTOWN

LOCATION: Downtown Houston around Minute Maid Stadium

The autonomous vehicle within this scenario is seen as a liberator of parking infrastructure. Autonomous vehicle companies use an Uber-like app to distribute autonomous fleet vehicles into a given area, decreasing the demand for parking. Once stagnant lots and garages can now be re-purposed with vital program needed within the City of Houston, such as low-income housing.
The lack of ownership of the vehicle within this scenario liberates completely parking infrastructure from the shackles of privately owned vehicles. This allows for a place laden with parking, such as Downtown Houston and in particular around Minute Maid Stadium, to be redefined by an influx of new programs unseen within the 25 of 64 blocks taken up by parking in this area.
GREENSPACE
additional flood infrastructure

Parking lots are also turned into other programs that act as amenities for the new inhabitant of the Arena District. The parks, while providing copious amounts of public space, also impart into the area water infrastructure to help mitigate flooding of downtown through the decrease in impermeable surface area and use of retention and detention ponds.

HOUSING
re-thinking the tarmac

This south-east corner of downtown Houston can begin to densify with low-income housing while adding public space for the new inhabitant. Density can be implemented in two ways. The first being a high-rise tower and parks within current parking lots.
A substantial portion of the first floor is given to a holding bay for the autonomous vehicle. This allows for a queue of fleet vehicles to line up during rush hour as they wait for their turn to receive their passenger in the loading area. Directly adjacent to the queuing area is a charging station for the vehicles. Once the autonomous vehicle is signaled that their inhabitant is ready, they pull around into the pickup area. From here, the person exits the lobby, which contains a cafe and waiting area, and enters the vehicle.

INTERACTION
facilitation of loading

The towers themselves would contain your typical floor apartment floor plan, with each unit having its own balcony space and large glass windows. The pivotal part of this building becomes the ground floor, due to the influx of people loading and unloading from autonomous fleet vehicles during rush hours.

QUEUEING
allocation of autonomy
During non-peak hours, the queuing area for the autonomous fleet vehicle can be switched off while still allowing access to the pull around, engendering a paved public space for the inhabitants of the tower. It can hold within it a multitude of functions, from an area for playing a game of basketball to a place to be rented out for celebrations.
The houses now fill the vacant spaces left by the absence of the vehicle. Holes are cut into the concrete floors, providing a system of compression and expansion for the inhabitant to live within, accentuating both circulation and public space within the home.

The second form of density able to provide low-income housing is brought about through a more cannibalistic means, converting the parking garage. Once filled to the brink with privately owned vehicles, the parking garage’s stacked floor plates are now open inhabitation. The vehicular ramp, a major component of the garage, is cut away, allowing for a Texas doughnut housing type to take shape with a centralized pedestrian circulation system.

The ground floor of the parking garage, with its access to the street network, is also able to take on new life. Its square footage is rented out to the autonomous fleet companies, providing storage for their vehicles during non-peak hours while allowing access to downtown districts when needed.
Each unit type has its own exterior balcony. Once space filled with parked vehicles is now given way to a table and chair for morning coffee.
controlling the excess

The spaces bracketed by the plinths are able to take on larger public programs, such as music venues, or areas of play.

PLINTH

adding programmatic space

The balcony is not the only exterior space created. The uncovered parking areas on the roof are placed with plinths containing various programmatic elements, from grassy knolls to water retention areas. The plinth elements bracket space, breaking apart the vast amount of square footage on the roof while providing seating for the inhabitant and highlighting the various programs.
The density created by these two housing types, the tower, and the parking garage dough-nut, revitalize the banal street-scape of the stadium district. Once dead space with little pedestrian traffic, unless it was game day, is now a lively place with constant interaction between the autonomous vehicle and people.
CHAPTER TWO: AUTONOMOUS SPRAWL

LOCATION: The extents of Houston City limits, such as the City of Fulshear at the end of Westpark Tollway

With the advent of the autonomous vehicle, the way in which we view commuting drastically changes. Hours spent behind the wheel are now able to be spent doing other activities, such as working, with the interior of the autonomous fleet vehicle facilitating these novel programs while negating distance of the commute. This negation of distance draws into focus the far reaches of the urban form, where wide open space, previously uninhabited, now act as a type of tabula rasa for a new urban form to sprout.
With the advent of the autonomous vehicle fleet, the car is now void of any programmatic function. Through this liberation of purpose, the car now acts as a sponge, absorbing activities into its metal hull. The once hours spent driving behind the wheel are now taken by enjoyable activities, negating the once laborious and tiresome distance that was a part of any commute. The only remaining aspect of the interaction with the car is time spent within the vehicle. The vehicle itself can be arranged a multitude of ways, engendering a variable condition within the standardized space contained of the medium-sized autonomous fleet vehicle. This vehicle has an exterior dimension of 7’ wide x 11.5’ long x 6.25’ high with a floor bed square footage of 30 square feet and an overall interior square footage of 60 square feet. Provided ample space for programmatic ingenuity, the occupant is free to interact with the digital realm. Whether provided by the car through built-in fold out screens or on a phone connected to the on-board Wi-Fi, the inhabitant of this mobile space is now essentially connected to any information he or she may need. The seats face inwards towards the main connective hub.
Liberated from the exclusionary act of driving, the car can take on a communal gathering space for multiple inhabitants. Whether simply chatting to a group of friends or partaking in some libations, the arrangement of the seats within the car provides a cozy, social atmosphere for the user. Built-in Bluetooth engenders a connectivity to on-board speakers, allowing for full customization of the environment.
Another possible program is work in the voided space of the autonomous fleet vehicle. The autonomous fleet vehicle is now an extension of the corporate world, embodying the aspects and characteristics of the standard cubicle. The fleet vehicle disperses the once cramped field of cubicles and allows for a questioning of the current office type. Once the inhabitant enters the vehicle, their work day starts, with access to a built-in desk and screen in the central connective hub. On board sensors keep track of the occupant’s work habits and time spent within the vehicle while driving. The daily office commuter then arrives at an office building that is strictly communal space, having rid itself of the individual work areas.
The final program is a bedroom. Most of the seats have been removed from the space, engendering a freedom for reclining and an abundance of foot space. The seats themselves can vary in reclining degree and are plusher than the standard seat in the other autonomous fleet vehicles. The car windshields are able to dim and block out any form of exterior lighting that may enter. The previously mentioned on-board speakers negate any exterior noise interference and create white noise similar to noise canceling headphones. As you approach your destination, the windows slowly decreasing in opacity, letting in more light and slowly wake the user. If this does not wake the occupant, the seat begins to vibrate with an alarm as a last resort.
The negligibility of distance brought about by the autonomous vehicle questions everything about current urban and suburban form. Suburbia and territory beyond, the once distant relatives of city centers, are now dragged into the fold. The barren outskirts of urbanity are now *'tabula rasa's*, prime for a new form based on the fleet autonomous vehicle and denial of the privately owned vehicle. For Houston, this is Fulshear, a city within the Houston-Woodlands-Sugar Land Metropolitan area. The city is located at the end of the Westpark Tollway, which runs 20 miles west, beginning at West University and ending outside of the Grand Parkway. Within the city limits of this 5886 person city is clear land for a new urban form with a direct adjacency to major car infrastructure, the Westpark Tollway. This new layout utilizes the minimization of roads, juxtaposing the once driving factor and defining quality of suburbia. Instead, it implements drop off and pick up of the inhabitant as impetus. The form itself is reminiscent of the ladders of its contemporary counterpart, but no longer ends in the territorial cul-de-sac. Loop roads, a single lane wide, encapsulate space while allowing the movement of vehicles through its form. The spine of the form contains within it the solar cell fields, with actual fields of grass and parks contained in the secondary legs of the ladder.
WATER
the heart of the public parks
The parks act as a community space for the inhabitant. Small ponds act as anchors within the green space. Here, the new autonomous sprawl suburbanite can frolic in the water or even swim.

PATHS
connecting the public areas
These park spaces contain an abundance of walking and running paths interweaving with ample space for games and activities. The paths trace throughout the varying loop roads, connecting the parks into a continuous network of green space.

DIMINISHING
vanquishing the control of the car on form
The connection from the house to these areas are direct when compared to the demarcating and territorialized nature of past suburban forms through the minimization of street width from a width of 24' to a 10' wide permeable surface. Sensor technology on-board the autonomous fleet vehicle further increases this connectivity through increasing the safety of crossing the street.
The central spine of the ladder form contains within it a solar field along with some housing. Combined with the windmill array, these facilities can produce electricity that is then stored within batteries for use by the community. Any excess electricity is then sold back to the grid for profit and evenly distributed among the inhabitants.
PUBLIC

driveway as usable space

The housing acts as a bracket for a new type of public life within the suburban condition. Once strictly circulatory areas are now intimate interaction spaces. Driveways, which divided land across plots, are replaced by pull off and pick up areas that when not in use act as front porches.

STREET

now safe

The street itself is also re-purposed as well. During non-rush hours, it is able to contain public events, taking on the role of a community space. The nature of this space becomes the quintessential embodiment of the new interaction and synthesis of contemporary society with technology.
CHAPTER THREE: NOMADIC HOUSING

LOCATION: The city's vast network of car infrastructure

The notion of the autonomous vehicle as a programmatic experience, as seen within Chapter Two, can be extrapolated upon, drawing non-sedentary uses within, such as those seen in the current housing typology. Once space taken by seats for driving are expanded upon, increasing in size with each vehicle able to take on a single program of the house. Housing programs are now able to travel the vehicular infrastructure of Houston, and, once at its location, arrange themselves into an enfilade condition of rooms.
The programmatic possibilities of the autonomous vehicle are not limited to simply pass-times such as office work or interacting with friends, both digital and in real-time. The concept of the autonomous vehicle as a programmatic sponge can be extrapolated upon, increasing in size and undertaking house-like programs. No longer using fleet technology, instead being privately owned, the autonomous vehicle can be reminiscent of an RV, but infinitely expandable through alignment of the vehicles one next to the other, allowing for circulation through an enfilade of autonomous rooms. The most basic unit is a minimal living quarters containing a small bathroom with built-in shower, kitchenette, and futon. This fundamental unit of inhabitation, once connected to a way-point station containing electricity and plumbing connections and whose access can be rented or privately owned, is minimal in cost while allowing the freedom of movement of the contemporary vehicle through its infrastructural network of highways and roads.
The next unit is a bathroom. It is based on the central circulation corridor present within the other unit types, dividing the unit in two. This pathway is flanked by a hand washing area, containing a double sink and under cabinets, and a wash and toilet area similar to that of an RV with the whole room acting as a showering area.
This can connect to any of the other expandable housing units, with one possibility being a living room. Two couches bracket the circulation path with enough space to seat six people. The walls themselves act as media screens, minimizing their presence within the space itself. The central circulation path part of the enfilade condition is vital, providing square footage in a spatially limited area.
The basic studio unit can be expanded through the alignment of other autonomous room types. One is a dining room and kitchen. Contained within is a table and kitchen with ample storage from built-in cabinetry along the walls. The windows are dim-able, allowing or some privacy to be had within the space. The central circulation path can be used to further extend the table, allowing for more occupants to dine at once.
This would be connected to the bedroom unit, housing a queen size bed and built-in storage for clothing. This is the only unit type that does not contain the through circulation path, allowing for this unit, containing the most private program within all of the autonomous units, to act as a cap to the enfilade condition of autonomous rooms.
The unitized system of housing provided by the autonomous vehicle technology questions the way land use is seen today, especially within the housing market. The current market contains three basic types of housing: apartment, condo, and the privately-owned house. The nomadic housing type, brought about by the autonomous vehicle, does not align with any of these categories. Nomadic housing is privately owned but has no roots holding it in place. All it needs is a connection to plumbing and electricity, engendering a hyper-mobile living arrangement able to occupy land previously unused within the housing market. The rooms themselves would detach from each other and use current infrastructural networks to move locations, tethering together and moving as a single unit down the street.
The question now is what becomes of the once banal parking lots that hold the privately-owned vehicles? They are now seen as open fields for inhabitation. No longer containing stagnant non-autonomous cars, any pavement that is connected to car infrastructure is now ripe with opportunity. Parking lots around major destinations become hubs for new spatial interactions and provide income to the owner of the land who is now able to rent "lots" out by the hour, day, month, or even year. For example, the parking lots towards the southwest corner of Rice University’s campus are as space for housing students and other people seeking a place to live near the Medical Center.
Parking lots are not the only areas that are able to be rethought as a place for housing. If wide enough, an autonomous vehicle can be placed anywhere along a path, opening up new areas such as along Buffalo Bayou for inhabitation by people. Parks now have a new way to create money if need be through the implementation of connections necessary for the nomadic housing, generating income other than through the renting of other public facilities.
CHAPTER FOUR: 
THE HUB AND SUBURBIA

LOCATION: The current suburban form surrounding Houston, such as the area of Oak Ridge North.

In this scenario, a dispersed network of autonomous hubs, containing a transportation center and distribution warehouse, is used to transition the territorial and privately-owned-vehicle-based nature of suburbia for new demographics and ways of inhabitation. The hub itself is placed at the edge of Oak Ridge North, allowing for dispersal of non-car owning people into the surrounding area. The hub, over time, will become the primary mode of interaction with large-scale autonomous vehicles, allowing for an adaptation of the now obsolete space of the garage and street-scape.
The way in which we envision the autonomous vehicle drastically changes its implications and implementations in society. Within this chapter, it is seen as a small-scale mover within current day suburbia connecting back to a distribution hub, converting the territorial form of suburbia to one open to a multitude of new demographics with the acceptance of the autonomous fleet vehicle as a major mode of transportation. The hub is placed at the entrance of a given suburban form. For this scenario, this is located within the area of Oak Ridge North along I-10, a 45-minute drive North of Downtown Houston. The programs within the hub are simple; a warehouse, including distribution area and storage, and a transportation center for the surrounding community. The location provides direct access to both the surrounding community and major arterial roads and highways, vital for both programs. The hub acts as a seed of change within the community, allowing access for new demographics into suburbia unseen due to the need for privately owned vehicles. The hub type bypasses this necessity, giving the key to the locked form of suburbia to anyone with access to an autonomous fleet vehicle, and in turn access to the hub.
The nature of the autonomous vehicle is much smaller within the suburban form than the previous scenario and less intrusive into the surrounding context than the contemporary car that has defined suburbia from its inception, allocating larger autonomous fleet vehicles strictly to the autonomous fleet hub. This redefines the suburban experience over time. Initially, privately owned vehicles will still be using the streets of suburbia, but as time goes on, the occupancy of the street will be transitioned to the two small scale vehicle types as the hub gains prevalence in the surrounding community. The first small scale autonomous vehicle type is a single occupancy vehicle that brings the suburbanite to the hub for people out of walking or biking distance. Households with more than one person are able to “tether” vehicles together into a train that acts in unison.
The next minimized autonomous fleet vehicle is a mover of packages. These tie back to the localized warehouse system that then store and disperse goods into the surrounding area, decreasing overall time of deliveries. On one side of the autonomous vehicle is access for the person to receive and place packages, and the other has access for loading and unloading robots within the warehouse.
MITIGATION
transitional aspects of the hub type

The hub then must act as a community area and as a mitigation of scales for the autonomous vehicle, with the front facing the bulk of Oak Ridge North acting as an access point for the smaller, local transportation methods, including the smaller autonomous vehicles and human powered vehicles like bikes.

LOCKERS
hub as a distribution of goods

The suburban inhabitant utilizing the facility as a transportation center can also pick up goods from the warehouse on their way through a locker system in which small-scale packages can be placed. This is shown in plan later in the chapter.

WAREHOUSE
utilizing the autonomous network

The warehouse program formally reveals itself from behind the waiting area mass. This move not only accentuates the prominence of the storage program, but also reinforces the entry of the building with a subtle overhang.
MAINTENANCE
vehicular facilities within the hub

Within the central pick up area is also an automated maintenance facility for the fleet vehicles. Here, they are able to recharge, refill tires, and get oil changes along with many other small fixes.

MASSING
building form as coverage

The drop-off and pick up area contains cover for people waiting outside, access to an interior waiting room, and a charging station for the vehicles. The exterior covered space is provided by the overlapping massings of the two major programs; the transportation hub and the warehouse.

CENTRAL
transportation as primary program

Much of the square footage of the ground floor of the hub and the site is given to the transportation access point for larger autonomous vehicles, with the warehouse on the second floor. The hub is centralized around this interaction of the autonomous fleet vehicle and the suburban inhabitant.
The lack of private vehicle ownership as a necessity for the occupation of the suburban form opens up the once closed-off suburbia for new programs that can provide income to the current suburban inhabitant. These are broken into two categories, new structures, and adaptation of current building types. The new structures would include Accessory Dwelling Units built for the incoming demographics, such as students who need a one-bedroom apartment or a small family of 2 people who would pay rent to the property owner. The adaptive programs concentrate on one antiquated space whose obsolescence is caused by the autonomous fleet vehicle and adoption of the hub; the garage. This space can be retrofitted for a wide variety of programs that could profit the suburban inhabitant. That includes such programs as secondary living areas for new demographic, similar to the ADU, or workstations that can tie into the warehouse distribution network provided by the hub.
The garage door acts as an interface for the interaction between these packages moving vehicles and the garage, now turned maker space. The once isolated suburban inhabitant becomes a part of a new type of distribution and production network brought about by the autonomous vehicles and hub typology.
SHRINKING
decreasing the size of the street

The minimization of the vehicle able to access the suburban form and localization of large-scale traffic allows for a rethinking of the defining quality of suburbia, its street. The banal, 24-foot-wide street-scape of Oak Ridge North is transitioned into public space, while still allowing access to the driveways of the surrounding houses along the street. These streets also emphasize the importance of water mitigation within Houston suburbs.

REPLACING
transitioning pavement to public

The new public spaces vary from playgrounds to green space and water infrastructure. Pedestrian circulation paths are also included within the street, once missing from Oak Ridge North.

YARDS
private property as extension of the street

Front yards now act as an almost extension of public life. These private green spaces, once divide by the pavement of the street privately owned vehicle street network, are now connected with public walkways and minimal permeable pavement for the small-scale autonomous vehicles.
CHAPTER FOUR:
HUB PLANS
**TRANSPORTATION**

*waiting area as transitioning element*

The waiting area contains within it a variety of seating arrangements. Seating for individuals waiting for their ride are placed directly next to screens showing which vehicles have arrived. Group seating at tables are adjacent to the coffee shop.

**STORAGE**

*parking-lot for small scale vehicles*

Most of the site towards the suburban form of Oak Ridge North is filled with storage for the small scale movers of people and products.

**STORE**

*amenities to the suburbanite*

Next to the waiting area is a small general store with shelves and pick-up lockers for ordered goods. This area is able to be restocked by robots through a connection to the warehouse.
REFILL
lockers on the first floor

The refilling of the general store and lockers is done by autonomous warehouse robots on an intermediary floor between the first and second. This robotic floor acts as storage location for these robots. It is only accessible by the robotic inhabitant.

CONNECTION
to the warehouse

The connection point to the warehouse is located at the overlap of the two massings. Two small lifts move the warehouse robots to the second floor where the warehouse is located.
SHELVES
the storage of goods

The robotic lift allows access to the main storage area. This area is connected to the loading docks on the first floor through a system of elevators.

OFFICES
overseeing day to day activity

The second floor also contains offices for the few people that oversee the facility. Their windows look over the drop off and pick up areas. Each office has a direct connection to the mainframe of the hub, allowing them to alter code as need be.
WORKS CITED