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Re-tooling an American metropolis

Robert Shawn Hott

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Re-Tooling an American Metropolis

By

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Architecture
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This document is dedicated to Ashley and my parents, Bob and Adele whose support has made this thesis possible.
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Re-Tooling an American Metropolis

Robert Shawn Hott

ABSTRACT

re•tool
v.tr. re•tooled, re•tool•ing, re•tools
1. To fit out (a factory, for example) with a new set of machinery and tools for making a different product.
2. To revise and reorganize, especially for the purpose of updating or improving.¹

The American ideals inherent in the suburbs are the promise of space, affordability, convenience, and traditional family life; conversely the public realms of the suburban typology become disconnected from each other as well as the larger city. The Generic City condition in which the periphery is no longer captivated by the center from which it was created is pervasive in the American landscape.²

Public space within the city has been consumed by their auto-centric infrastructural requirements, creating a loss of activity and identity. “Lowly, unpurposeful and random as they may appear, sidewalk contacts

are the small change from which a city's wealth of public life may grow. Connecting people and places to one another and the metropolis that feeds them is essential for a properly functioning society.

One example of an American city afflicted by auto-centrism and pedestrian marginalization is Tampa. The solution to Tampa's disconnection is a transit-oriented development model in which there are localized areas of higher density that become nodes along a public transit route, thereby connecting areas of low density. By creating transportation nodes, places will become better connected in time and space. Establishing a more social form of transit in the Tampa Bay region will provide the opportunity for the creation of a secular cathedral of transportation. The infrastructures we erect, just as the monasteries in the Middle Ages, must seek to enliven the communal and artistic traditions that make civilization and culture meaningful.

The network of light rail connecting disjointed areas in Hillsborough will be linked to a high speed rail connecting major metropolitan areas across the state. This central downtown node will be manifested as a multi-modal station which incorporates multiple functions into an existing single use environment to densify the urban core of Tampa, create denser housing, and reconnect people to places. The main area of focus is the rail station and its overlap of program to create density and intensity so that connections with places and culture will be reinforced. The station will become a major public space of amenity and gathering point for the community.

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“Writing’s relation to architecture affords only an uncertain mirror to be held up to evidence; it is rather in a wordless silence that we have the best chance to stumble into that zone compromised of space, light, and matter that is architecture.”

- Steven Holl

Introduction

Cities have a reciprocal relationship with their infrastructure. Often under-appreciated, infrastructure provides the framework for modern society to function. Transit infrastructure connects people from where they live to where they work and places of leisure. The journey must not add to the monotony of daily existence, but become a significant pleasurable experience. The journey of life is often touted as being equal to the destination and choice in the modern commute is crucial. Many cities realized long ago that large investments in transportation infrastructure were important to the function of its citizens. Tampa, once on the correct path in public transit had a bustling streetcar network that connected people to downtown. Now the downtown is a pedestrian wasteland created by the auto-centric culture in which we live. The streetcar tracks have been torn up by automobile empires, and the interstate has bisected the districts of our cities and made them un navigable by pedestrians.

The general rule given to students of architecture is that you need more square feet of asphalt outside your design for the storage of automobiles, than space allotted for people. This is a self fulfilling prophecy, because when you design for traffic and congestion that is what will thrive. When you design for pedestrian movement without automobiles, you get a pedestrian friendly environment.
Through the examination of historical presidents of the growth of cities and their transportation infrastructure, this thesis seeks to investigate problems of connectivity and identity within the city. The places we live are becoming more disconnected from the traditional places we work and the places of leisure and relaxation. More often in modern society the first place (home) is becoming a surrogate for the second place (work) and the third place (leisure). All three places have been incorporated into the home through technology. This thesis seeks to create a more socially tangible form of transportation that can connect people to places while still offering the appeal of a place to interact through technology.

The solution that manifests itself for the region known as Tampa Bay, is to connect nodes of activity through a light rail network, and connect the city itself to other cities across the state. The network of public rail transportation will only work, however, if the stations are places in their own right, and not just park and ride lots. The creation of a place with its own identity and a pedestrian oriented environment with the ability for unforeseen and random human interaction to take place is crucial for the life of the space. Public epicenters need grandeur to prevail. They need a constant gravitational pull more compelling than periodic events. The implications for the creation of a new civic space in Tampa provides an opportunity for the creation of an architecture to be experienced through the senses.
History

A city’s formation and evolution is fundamentally based upon economic, geographic and social forces. These forces do not always promote a healthy environment for living, working, and enjoying life.

Garreau identifies seven main reasons to explain how cities have been shaped for the last eight thousand years: industry, governance, commerce, safety, culture, companionship and religion.¹

The first people gathered together for safety against nature. This brought a sense of companionship within groups, and then required governance. Specialized goods and services gave rise to industry and commerce. All of these combined is the culture of a people and the forces evolve over time to shape the city as we see them today.

“Reject the idea that architecture gives form to the city as its own object. Architecture acts no more directly on the city than the city determines what architecture must be” … “the functions of architecture belong to the city, to the extent that they imply prescriptions, procedures, and norms (from the viewpoint of design) as well as habits and lifestyles (from the viewpoint of use).”²

Cities have always been shaped by the most current transportation technology.³ When the most advanced form of transportation was walking and riding donkeys, the city developed a natural response

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³ Garreau, 1991, 32
around life based on such activities. A city evolves into an urban pattern such as Old Delhi or the inner city of Ahmadabad. These cities had to rely on walkability because there were no other major forms of transportation at the time.

When new modes of transportation become available in developed cities, they must conform to the standard set by the old typologies. In the case of Old Delhi the only modern vehicles able to navigate these passages are motorcycles and auto rickshaws. These cities continue to retain the walkability and unique qualities of public space.

Modes of transportation have profound impacts on city development and how people live. “With the industrial revolution came an upheaval in which the majority of people no longer lived in and off of the countryside, or on eccentric hamlet lanes.”\(^4\) The early industrialized city was wrought with pollution and disease while the suburbs promised the middle class a way to avoid the horrors of everyday city life. It is only natural for people to want to live in areas abundant with nature, but they also need to work in more dense areas with connectivity from work to home. Eventually the city spreads so far that more people live and work outside of the original city boundaries.

\(^4\) Ibid., 362
In the industrialized age, the suburbs were viewed as an escape from the city and a way to live closer to nature. The colonial idyllic of owning a mansion in the countryside had been replaced by the industrial need for housing workers in the centers of commerce near factories.\(^5\)

Suburbs arose partially because cities had been accused of separating our relationship to the environment and the land. People felt the need to be away from the congestion and negative stereotypes of the industrialized city. However this perceived abundance of nature within the suburban setting has a way of disconnecting society from the cultural landscape of the city.

In the United States during the early 1890s, streetcar suburbs provided the amenities of a country life while still providing the convenience of public transportation to and from work. These utopian cities were the peak of the suburb as the ideal living situation with a balance of town, city and country life.\(^6\) Transportation hubs within communities became town centers. Much of this was relatively unplanned urban growth, but much denser and more successful than the typical post 1950s American suburb because they were not designed around private transportation.

Walkability and public transportation in these cities were necessities until the 1930s when automobile production became cheap and affordable to the middle class. Since then, the car has been one of the most pervasive objects of American life. Sprawl and private car ownership seemed a perfect marriage because when the necessities of life are spread all over a region public transit becomes inefficient. This situation negates planning for efficiency in other forms of transportation since almost everyone now owns a car.

The government funding of transportation infrastructure geared toward privately owned vehicles has trumped the development of public space in our cities. Cities that began during the post industrial revolution, the age of the automobile, never had a chance for walkability and good public space. There was never a

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need; therefore, no such places arose. Auto-centricity repels the other (more sustainable, enjoyable, and less costly to the individual) modes of transit.

Uncontrolled development coupled with market forces in the form of abundant oil and cheap land around the peripheries of the central city pushed developers into horizontal urbanization, sprawling low quality houses on what used to be farmland. Growing populations and decreasing density increased commute times and distance between urban centers. This was made possible by affordable fossil fuels and expanded highway infrastructures which dominated the progression. If people are only given parking lots, freeways and publicly funded roads, then they will have no option but to invest in private transportation. Automobiles, along with housing, represent most people’s largest investments.

Property values increase around the land which is built up causing developers to find the cheaper land farther away. This leaves gaps between the developments and causes areas to spread. “in spatial terms, much of the city is generated by default rather than intent. Creating a new cartography—a mutant form of figure/ground—comprised of control and residual spaces”7 There is a continuous desire for connectedness between culture, land, and cognition.8 An individual’s balance for the needs of these things causes some people to never find solace in the heart of the beautifully congested city, and some will never have a fulfilled sense of community and culture in the suburb.

The complete social impact of suburbia may never truly be known. However, this typology is now a fundamental part of American life. The spread of cities is an unfortunate side effect of civilization. The best one can do is observing the typology as a necessary evil of contemporary cities and design around the existing environments.

7 Koolhaas, 2000, 193
8 Garreau, 1991, 363
Problems

The American ideals inherent in the suburbs are the promise of space, affordability, convenience and traditional family life but the public spaces have now become disconnected from each other as well as from the larger city. Traditional notions of geography based on proximity are becoming increasingly disassociated in spread out regions. These sprawled regions are the in the process of redefining the city.⁹

In Tampa today there is a lack of connectivity through the sprawl. For the average commuter, the daily journey from the home to work has become an unsustainable necessity. There is a required private car ownership. There is also little identity to distinguish between the vast areas of low density. Downtown Tampa is the remnant of culture left behind by the vast expanse of low density that has spread from the center as a ripple, creating a edge city. For many the region known as Tampa has spread beyond downtown and now encompasses nearly the whole of Hillsborough County.

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⁹ Koolhaas, 2000, 433
Problems: Lack of connectivity between cities, regions, districts

“Today, we have moved our means of creating wealth, the essence of urbanism – our jobs – out to where most of us have lived and shopped for two generations.”¹⁰ This has led to the increase of what Garreau calls ‘edge cities’. The edge city can be understood as having centerless and homogeneous growth emergent from some relic of the past. Not really a ‘city’ in the traditional sense, it is only labeled as such by Garreau because it contains the functions of the conventional city, but more spread out. However, these edge cities are still areas in their infancy. Even the best cities appeared chaotic and flawed in the beginning. Here Garreau implies all edge cities are merely larval forms and we have yet to see an adult, fully matured city. But one could also ask if these cities will ever grow up and not just out.¹¹

A problem of the edge city condition in Tampa is that it lacks connectivity to the regions that created the suburban environment. More people live and work in the periphery than in the center. There is more housing in the edge city then there is in the downtown core. For the sake of efficiency, companies have moved their offices out into the suburbs.¹² This generates a condition of decay, in which the center becomes neglected and thus becomes devoid of life. The edge city is no longer captivated by the center from which it was created.

As cities spread horizontally population densities fall. The average density of the United States has fallen 28 percent over the last 50 years due to this rapid horizontal development and as of 2000, 62 percent of the

¹⁰ Garreau, 1991, 4
¹¹ Ibid., 9
¹² Ibid., 31
American population was living in the suburbs, leaving only 38 percent living in older, denser, more efficient cities. From Maine to Florida the “interstate highway system has become a continuous band of suburban development and never once do you see undeveloped countryside.”

Horizontal urbanization also wastes infrastructure due to the suburbs location far from the center city, which increase commute times and reduces productivity. This has led to the creation of the modern commute, which is a negative aspect of daily life in the collective memory of society. The average suburbanite begins the commute in the garage, a space within the suburban environment devoted to the storage of the car and other miscellaneous junk. From there, the commuter combats many others within a network of roads in their attempt to get to work.

Once the commute has ended, the typical workplace is surrounded by a vast sea of asphalt in which the suburbanite must search for a place to park where more space is wasted for storing the automobile. The journey is repeated at the end of the day and contributes to the monotony of the life of the suburban commuter.

Private transportation is likely the second most expensive purchase someone will make after their home. The financial investments of the individual, maintenance and stress of owning and driving a car may not be worth its cost to society.

In Tampa today, the only means of connectivity is by private automobile. The reliance of the automobile has led to a decentralization of goods, services and jobs which has led to the disconnection of regions and districts. There is no public space or architectural individuality that unites the edge cities, only automobile infrastructure. The existing public transit system is extremely slow and inefficient when compared to the car. The HART (Hillsborough Area Regional Transit) bus system must share infrastructure with private

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14 Escape From Suburbia, DVD. Directed by Gregory Greene, Dara Rowland: Microcinema DVD, 2007
automobiles and is very slow when traveling long distances.15 Tampa bay region expected population, employment, and housing growth, downtown area districts and landmarks are not easily connected.16

"How to describe it? Imagine an open space, a clearing in the forest, a leveled city. There are three elements: roads, buildings, and nature; they coexist in flexible relationships, seemingly without reason, in spectacular organizational diversity. Any one of the three may dominate: sometimes the ‘road’ is lost – to be found meandering on an incomprehensible detour; sometimes you see no building, only nature; then, equally unpredictably, you are surrounded only by building. In some frightening spots, all three are simultaneously absent.”17

The quality of being nowhere that Koolhaas eludes can be attributed to the type of development prevalent in Tampa today. He attempts to identify the basic components of the current shape of the urban fabric. A type of social engineering has been employed in these abstract synthetic environments. In the edge city condition not only are spaces confined to repetitive parking lot and strip store typologies, but the very syntax of use in these spaces are controlled: from the highways, to commercial, retail, and office centers, to shopping malls, social organization, habits, and mores of suburbia.18

The current suburban condition in Tampa lacks well defined spaces capable of supporting and


16 Ibid., figure 3-12


18 Koolhaas, 2000
sustaining public life. Most areas of Tampa are heavily oriented toward the automobile. Throughout Tampa, “there is little attention to the elements of good pedestrian and bicyclist environments such as continuous sidewalks, crosswalks, street landscapes and bike lanes.”19 A lack of life within a public space will result in these spaces feeling unsafe. However, the corporate spaces designed in Tampa today have often become a desolate and unappealing place because of the fear that deviant or homeless people will inhabit these spaces. The result is a space that few want to be in and the homeless often go there by default.20 A main aspect of the idea of the city is the communal feeling of safety, which one is safer inside than outside. Once that is lost people will no longer trust to live there.21

The spaces required for the functionality of the automobile, the interstates and roads are repressive to the quality of life of those outside the car. The ensuring of rapid automobile transportation circulation marginalizes the pedestrian. “As middle-class and working-class people have moved to the suburbs, where they have private outdoor spaces, their way of living and use of public space has changed. On the functional side, isolated travel in automobiles and an obsession with traffic flow have diminished and degraded the life of the street.”22 The pedestrian’s ability to navigate almost any terrain within the urban environment is diminished by the automobile.

The suburbs lack of access to public space that allows for healthy public interaction, and rarely offers functions other than home, work, and business. People have lost the ability in the auto-centric culture to enjoy the journey, which has led to a destination oriented environment. These destinations accommodate for

19 Hillsborough Area Regional Transit, 2001, s-35


21 Garreau, 1991, 48

22 Carr, 1992, 5
the automobile with vast parking lots and garages which are larger than the destination itself.

“Shopping malls have replaced parks and squares that were traditionally the home of free speech… the economic lifeblood once found downtown has moved to suburban shopping centers, which have substantially displaced the downtown business districts as the centers of commercial and social activity”

The Greek Agora was one early concept for palace of assembly. Citizens could gather freely to discuss politics and hear statements from the ruling bodies. The Agora evolved into a thriving place of commerce and public life. Merchants could gather and set up shops to collectively pool the public resource to sell goods and services. The centrality of the agora and the uses of the surrounding buildings established the relationship between commerce, government and leisure. However, the modern equivalent to the agora, since the 1960’s, has been the shopping mall.

The endless interiors, made possible by air conditioning, create a culture in which people feel they need conditioned and enclosed space. Shopping in our society has seen nature as unpredictable interference to commerce, thus retail centers have made natural light, air and scenery obsolete with air conditioning, fluorescent lights and plastic plants.“Austerity and economy is unjustified in civic and public space, medieval cathedrals only constraint was to inspire awe” By making interior pseudo public retail spaces larger and more comfortable with air conditioning, these large interior spaces used the equation

23 Koolhaas, 2000, 154
24 Garreau, 1991, 42
“greater comfort + greater willingness to spend an increasing amount of time indoors = greater likelihood to
buy”.26 Cold air is the basic fundamental constant of shopping centers.

“If architecture separates buildings, air-conditioning unites them. Air-conditioning has dictated mutant
regimes of organization and coexistence that leave architecture behind. A single shopping center is
now the work of generations of space planners, repairmen, and fixers, like in the middle Ages; air-
conditioning sustains our cathedrals.”27

Public epicenters should return to an architecture which main goal is to create a thriving public space
instead of a singular purposed retail space, which has led to windowless, enclosed and air conditioned
boxes away from the city.

26 Koolhaas, 2000, 128

27 Ibid.
Problems: Loss of Identity within the city

The environment’s identity cannot be determined only by geographical and economic variables/indicators, but by the image its inhabitants have of the place. The image of the city has within it the symbols of mankind’s achievements. Within the edge city, the societal achievements are diluted. The perpetual sameness creates a lack of meaning and loss of identity. No emphasis of difference, history and memory.

Identity can be qualified as society’s collective memory of place as well as the memories of the individual. Place memory is the epitome of the individual and societies collective connection with the man made and natural environment. 28 “The power of ordinary urban landscapes to nurture citizens public memory, to encompass shared time in the form of shared territory—remains untapped for most working

28 Hayden, Dolores. 1995. The power of place urban landscapes as public history. Cambridge, Mass: MIT., 46
people’s neighborhoods in most American cities. There is little identity to distinguish between the vast areas of low density.

While distinct districts exist, their relationship to the suburbs where most people now live has been severed through the physical and temporal distances between them. Towns and nodes are consumed by their regions and suffer from a lack of identity. Lack of differentiation between uses within the edge city also contributes to homogeneity.

“Will we ever be proud of this place?” We will never be tempted to show our visiting friends and relatives the edge city because typically those friends also have a similar shopping center wherever they live as well. Places are given vague meaningless names, such as ‘deer park’ and ‘the preserve’. No “welcome signs” in the edge city, everything is the same everywhere without differentiation.

29 Ibid., 8


31 Garreau, 1991, 9

32 Ibid., 6
These vast areas of low density have common roots in the strip store typology. All the Fowler Avenues look the same. They have the same feel, low density and auto centric nature which is destructive to pedestrian movement. Therefore spaces for pedestrians have been designed to accommodate the most frequent mode of travel, the automobile. Homogeneity within this environment creates a lack of identity. People often describe these edge cities as “plastic, a hodgepodge, Disneyland (used as a pejorative), sterile... lacked livability, civilization, community, neighborhood and even a soul.”

Alan Berger states in Drosscape relevant design methodologies when he calls for “a design pedagogy that emphasizes the productive integration and reuse of waste landscapes throughout the urban world,” and “the creation of a new condition in which ‘vast,’ ‘waste,’ or ‘wasteful’ land surfaces are modeled in accordance with new programs or new sets of values that remove or replace real or perceived wasteful aspects of geographical space.”

In Tampa there is a possibility to rehabilitate a landscape with no meaning, which is at the geographical center of areas needing connectivity. There is a need to link distinct areas at several scales with their own sense of place. Currently the wasted landscape is a part of Tampa’s identity.

33 Ibid., 8

Solutions

This thesis hypothesizes that connecting areas of different scales together through both rail and its subsequent stations will create a motivation for people to travel to places of civic and cultural beauty, help reduce congested roads and be a more sustainable form of transportation. Taking the existing post-industrial region that is Tampa and overlaying multiple rail systems will not only provide an efficient means of travel within the region and city, but also serve as an urban landmark suggestive of a progressive and sustainable culture. This thesis proposes the creation of a public space with multiple overlapping functions within the existing urban fabric of Tampa.

This intervention into the infrastructural landscape will also be an injection of density into the underused areas with proximities to many other districts and places of activity. The multimodal transit station will become a significant place of pedestrian circulation and social setting. The station will be a cathedral of modern transportation which denigrates the car.

The redevelopment of the surrounding areas around the transit oriented development is also crucial in creating a healthy public environment within the multimodal station. Walkability to and from the
station, as well as the qualities of place are crucial to its success as an urban public space.

Beyond these philosophical and ideological needs, as Tampa’s population and outlaying areas of development grow, there is an ever increasing need for a better transportation option. In the next 40 years there will be an estimated 300 percent increase in traffic congestion. To help offset this increase, the downtown station could potentially provide 53,000 trips per day from the light rail corridors, and 27,000 trips per day from the high speed rail.

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35 Hillsborough County Metropolitan Planning Organization. 2007. TRANSIT CONCEPT FOR 2050 FINAL REPORT

36 Ibid.
Solutions: Connecting nodes within the homogeneity

The central city no longer contains the majority of housing, business, or retail, but has become a vestige of art and culture. Reconnecting the uses of home and work with the perception of art in culture within the older districts will benefit both the downtown and the suburbs. The American landscape has been designed for the automobile commute and has become a natural byproduct in American life. While some people are unwilling to give up their private automobiles in lieu of more efficient public transportation, providing a connection from edge city districts back to the city’s core areas with public transit will inevitably lead to more people going to these places with less automobile congestion.37

Since the relocation of many homes and jobs to the suburbs, the downtown areas have been transforming into civic and cultural centers instead of centers of employment. People are now going downtown for the anti-suburban experience, “seeking proximity to cultural richness”.38 The Downtown area “offers edge city visitors the amenities of a place built in an earlier era.” This is particularly beneficial for the adventurous and young seeking the kind of stimulation only a full-blown arts district can provide.”39 The light rail commuter corridor will see approximately 53,000 people per day. The street car will connect Ybor, Channelside, South Nebraska and the Downtown financial district. This transit system as a whole will help to define density, quality of growth, and provide pedestrian access to areas of development.40 The connection of districts within the city center without need of automobile traffic and storage will lead to the activation of

37 Garreau, 1991, 31
39 Garreau, 1991, 61
40 Calthorpe, 1993, 104
centers for activity. Making connections at smaller scales will encourage pedestrian travel.

This proposal at the largest scale connects Tampa’s city center to Downtown Orlando with high speed rail, which is a more efficient form of transportation over the automobile. High speed rail offers lower energy consumption per passenger per mile than automobile travel and reduced land usage for a given capacity compared to automobile infrastructure.

The most active point of convergence is the central station in Tampa’s Downtown. All travelers arriving to or departing from Tampa via the high speed rail will pass through the downtown station. The design of this civic, infrastructural and public space will be the culmination of the body of research within this document.

**Solutions : Create Identity**

The multimodal transit station will create identity of place through the memory of experience for travelers and residents. Creating a memorable journey strengthens the identity of the destination. Turning the tangible manifestation of the built landscape into valued memories through the experience
of the user is necessary in civic spaces. Sudden changes in ambience of these spaces create individual identity within the whole. Perceived qualities of place can be looked at as a sequence of events. By quickly and easily experiencing many distinct areas, the sense of place and identity in each location is reinforced. If people can see the differentiation between places quickly and with ease, the differences become strengthened within the individual’s memory.

All memory is derived from our sensorial perception. Those environments rich in stimuli will create a more vivid experience. People form attachments to places based on material, social and architectural experience. The multimodal station will create a stage for society to act out its routine and allow individuals to form place memories. The individual memories formed add to the collective memory to create meaning. Without people space has no meaning. How people move through and use the environment defines the space. The reconditioning of geographical and temporal distance between existing nodes along a new path will change the nodes identity in relation to itself and others.

Rail transit makes itself present through all our senses. It becomes a shared communal experience; unlike the often solitary automobile transportation prevalent in Tampa today. The highways allow users to bypass the poor and unwanted urban spaces. Conversely, with rail travel the riders experience a wide range of society’s members. The people on the train are a cross section of all contemporary cultures. This intermingling will create a greater cultural awareness among those who have none.

**Solutions : Creation of Place**

Multimodal transit stations cannot merely connect existing places together by making themselves a nodes along a path; the station must be a *place* as well. The idea of place cannot be distilled into parts. It is not merely a collection of all its qualities, but how they interact with the self. How can spaces be
made to supply the “human requirements, from passive relaxation, through active engagement with others, to the discovery of the unknown”\textsuperscript{41} In order to make a place with its own identity, many public spaces with a sense of grandeur have been incorporated into the program.

In Place and Placelessness, Relph discusses the meaning and significance of places for their inhabitants and users through the experiential qualities of the environment. The three main types of experience he identifies within the quality of place are the individual personal experience, the cultural and communal experience, and the experience of the transitory visitor. An environment’s ability to embrace people unfamiliar with its syntax of use and have space that accommodates groups as well as the daily user is vital in the understanding of what makes place.\textsuperscript{42}

In the design of any public space there is a need to represent the individual’s awareness of one’s own personal space and the ability to be alone in a place. It is equally important to design for the communally shared experience of the social aspect of place. Having an atmosphere that permits social interaction is important to the creation of place. “Envision a place that teenagers would instantly recognize as a fine location to promenade before the opposite sex.”\textsuperscript{43} The station and its retail components must also be thoroughly connected into the existing urban framework as well as new development yet to come. The retail areas must not be introverted or cut off from the activities of public transit. The public spaces must be put on display for those within the controlled spaces of the rail station to provide interest and visual communication across physical boundaries.

Most of the people who arrive at the station will be there for the sole purpose of going somewhere else. The architecture must prepare the individual, who has little knowledge of their environment, to navigate

\textsuperscript{41} Carr, 1992, 12


\textsuperscript{43} Garreau, 1991, 42
successfully to their destination. The spaces need to accommodate a large number of people moving quickly. The design also needs to provide visitors the ability to wander without way finding. Navigating the spatial field of the city depends greatly on the point of departure, and a multimodal station has the ability to orient the pedestrian in the urban context. This gives an opportunity to break the oversimplified grid of the downtown for the visitor, but still recognize its value for orientation.

Experience of the is visitor crucial to way finding and ones ability to discover. Through the dérive; which means literally “to drift”. In an *Introduction to a Critique of Urban Geography*44, French situationist Guy Debord, exploration of the built environment without preconceptions, subconsciously wandering through space, finding the true nature of your reality by active inhabitation. To let yourself go when walking around the city and having no destination sets you free. Rapid passage through the various ambiences of the city. The rail station must in some way encourage a tourist to get lost within the city.

Solutions: Random Interactions

Interaction that occurs between random people can sometimes become the most significant and memorable. These random and unforeseen human interactions in public places are crucial to the fulfillment of the communal needs stated by Relph. The deterministic quality of the path of the rail is sharply contrasted with the ability of the stations to offer random social occurrences and many possible paths.

Camilo Vergara recalls the fondness of the memories acquired from riding the subway in New York in his book Subway Memories. He cites the diversity of the riders, ordinary commuters, musicians and theatre performers, the beggars, and the mentally unstable—all of whom are impelled to act out their habitual procedures while on the train. The encounters and interactions amongst riders almost become a source of entertainment. “This leads mostly to small confrontations, from nudging, to delightful banter, to staring, to calculated avoidance and shouting matches.” He recalls the smells of the people, the destitute and the prosperous mingling together forming an ever changing olfactory environment.45

Solutions: The Indian Street

Observations on the intensity of an Indian street are to be models for the retail and social spaces. Understanding architecture as experienced through the senses, symbolically and corporeally is fundamental to the design of public space.

“The multifunctional structure of the street provides an admixture of overlapping spaces that merge public and private, work and leisure, and holy and profane activities.” Fixed shops as well as mobile retailers

and service providers inhabit this labyrinthine environment.\textsuperscript{46} “It is difficult to move in a straight line on an Indian street, The pedestrian has to weave a path by negotiating obstacles underfoot or in front...walking down the street cannot be a seamless, uninterrupted journey, but is rather a sequence of interruptions and encounters”\textsuperscript{47} The exposed facades of most retailers and workshops allow the activities within to be advertised from and spill out onto the streets.

The senses in the environment of the Indian street endure a constant assault. The smells and tastes of vendors cooking on the street. Spices used in cooking permeate the open shops. Ones visual sense is enlivened by the bright colors and intense play of light and shadow in the narrow and tall alleys. From the bartering, music, and religious sounds comes a rich auditory landscape. And last the haptic sense of touch and the tacit relation of ones body in the space.

These sensorial cues can impact the body in space and create a distinct memorable environment. Since the urban landscape stimulates sensorial memory in designing any space one must come to a sensorial consensus. “The architect has to anticipate this intermingling (of the senses), which constitutes a world that is objectively real”\textsuperscript{48} and must empathize with the end user of the building.\textsuperscript{49} “Architecture is our primary instrument in relating us with space and time, and giving these dimensions a human measure.”\textsuperscript{50}

\textsuperscript{46} Fyfe, Nicholas R. 1998. Images of the street: planning, identity, and control in public space. London: Routledge., 206
\textsuperscript{47} Ibid., 209
\textsuperscript{48} Neutra, 1989, 114
\textsuperscript{49} Ibid., 113
\textsuperscript{50} Pallasmaa, Juhani. 2005. The eyes of the skin: architecture and the senses. Chichester: Wiley-Academy., 17
Implications for Tampa

The implications of a new civic space in Tampa provide an opportunity for the creation of an architecture to be experienced through the senses, symbolically and corporeally. A public space that encourages pedestrian traffic will be located within a site currently devoid of public life. “If transit is inserted into a healthy pedestrian environment, the pedestrians can more easily become transit riders.”51 Places for people enrich existing environments must make connections, work with the landscape and be composed of mixed uses and forms.52 However, the current population densities and level of development around the project site are currently not enough to support a multi-modal station of the nature proposed and should be development congruent with the rail development.

The redevelopment of the vacant area to the north is already in the planning phases and has been titled the ‘Encore’ development and is being considered for $38 Million federal grant. Encore will offer apartments, offices, a hotel, grocery and other retail space less than one mile from the Florida Aquarium, University of Tampa, The Performing Arts Center, the Tampa History Museum, St. Pete Times Forum and the cruise ship terminal. It will also include a middle school, a church, a park, and an African American history museum that will be housed in a 90-year-old church.53 However, this development does not reach the densities required cited by the Hillsborough regional planning commission. The MPO suggests that the


52 Ibid., 31

density should reach in some areas 60-80 dwelling units per acre within central business district station area by 2050.\textsuperscript{54}

“Hillsborough county is projected to grow by 400,000 people over the next 20 years and will likely double in population by 2050.”\textsuperscript{55} The planners of developments such as Encore in Tampa’s downtown area have not realized the extent of the predicted population growth. This growth, if not planned to be absorbed through densification of already built up areas, will have no choice but to occur in the outlaying regions and increase the problem of sprawl within the region.

“How can transportation investments be used to further quality of life goals, economic development strategies and sustainable growth?”\textsuperscript{56} The MPO transit concept final report for the Hillsborough region offers goals for any transit oriented development in the Tampa Bay region.\textsuperscript{57}

\textsuperscript{54} Hillsborough County Metropolitan Planning Organization. 2007. TRANSIT CONCEPT FOR 2050. appendix H.1., 3

\textsuperscript{55} Ibid., 1

\textsuperscript{56} Ibid., 1

\textsuperscript{57} Ibid., 1
Implications for Tampa: MPO Transit Final Report Conclusions

- Alternative mobility options within congested corridors
- Greater travel capacity within major transportation corridors during peak hours
- Enhanced connectivity between major activity centers (e.g., USF, Downtown and Tampa International Airport)
- Promotes transit supportive land use pattern and walkable mixed use neighborhoods
- Quick and convenient commutes between major residential areas and job centers
- Mix of transit service for local trips and long trips
- Integration of local and regional transit systems

In addition to setting goals, the MPO has identified six main community values statements that emerged from series of public focus groups to discover common values amongst local residents:

- “I want more quality time spent with my family and friends, and less time in traffic.”
- “Give me more reliable travel times.”
- “I like a growing economy, but if traffic grows with it, will gridlock choke the economy?”
- “Let’s grow our small towns and save some open space rather than sprawling everywhere.”
- “Traffic cuts through my community. I want to feel safe on my street, and I want my child or elderly parent to be safe, too.”
- “I want goods, services, and jobs to be more accessible, especially if I don’t or can’t drive.”

58 Ibid., 4
This thesis proposal of incorporating public rail transit at several scales into the urban fabric and increasing the density in regions existing underdeveloped regions will satisfy these goals and value statements. According to the Hillsborough county planning commission; by 2050 the downtown station could potentially see 53,000 trips per day from the light rail corridors, and 27,000 trips per day from the high speed rail.59

For a healthy pedestrian environment to exist, all other forms of transportation must yield to the person on foot or bicycle. Public rail lines going through suburban areas are often dominated by “park and ride” users, thereby destroying pedestrian traffic at the station site.60 The design of the public spaces in and around the station connecting to the districts around downtown must not be dominated by the typical “park and ride” typology prevalent in the design of other multi-modal transit stations. The automobile must be pushed to the fringe of the environment and parking structure must be surrounded by retail or other uses to avoid active street edges from being improperly used.61

59 Hillsborough County Metropolitan Planning Organization. 2007. TRANSIT CONCEPT FOR 2050 FINAL REPORT
60 Calthorpe, 1993, 104
61 Ibid., 112
## Case Studies

<table>
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<th>Case Study</th>
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<tr>
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<td>Office for Metropolitan Architecture</td>
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![Figure 9. Euralille TGV station](image)

![Figure 10. Stadelhofen Station](image)

![Figure 11. Yokohama Port Terminal Public Space](image)
Pennsylvania Station
  McKim, Mead and White
  New York, 1910

Figure 12. Penn Station

Grand Central Terminal
  Warren and Wetmore
  New York City, 1913

Figure 13. Grand Central Terminal
Lille is at the center of nearly an area of 50 million people.

Hypothesis that the ‘experience’ of Europe will change beyond recognition through the combined impact of the tunnel that links Britain and the Europe, and the extension of the French TGV network to include London with high speed rail.
Overlap of program and modes of transportation creates intensity. Station acts as a node along the path, but also a place in its own right.
Building over the TGV station creates a bold architectural statement for the commuter who will always pass through the station. This allows Lille itself becomes an appendix for the journey of the passerby. The intervention that was required could not rely on the context of the city.

The node along the path must also have the qualities of place because many riders will never leave the station.
- Overlap of program creates intensity.
- Infrastructure and program determined footprint.
- History (near the city’s old center) VS modernity of the high speed rail and surrounding complex
- Injection of peripheral activities near the heart of the city
- Rise in land value due to the station, has driven the poor to the cities edge.
- Infrastructure of rail and roads determines the layout of buildings and movement patterns for pedestrians

Figure 19. Euralille multi modal transit diagram
Originally the TGV station was to be buried. However, OMA quickly realized the object that was to permanently change the city of Lille should be exposed for all to observe. The station is an expression of the light, flowing, tectonic tensile roof resting on the stereotomic rail platform; embedded into the earth.
Small components re-establish human scale in large subterranean station

Structural / material elements

Repetition of elements gives the station an identity and offsets it from historic buildings which surround it.

Formerly fragmented area gains cohesion from 300 meter datum cut into the landscape
Calatrava’s intervention in Stadelhofen allows a formerly fragmented area to gain cohesion from 300 meter arc cut into the landscape. The new station carved out of existing hillside following natural topographical contours. The station is hidden from residents and allows for views of the city and has high transparency towards the urban environment.
Figure 26. Stadelhofen rail and platform waiting areas

Figure 27. Stadelhofen pedestrian access points
Glass block in the floor of the waiting platform area allows natural light to enter concourse retail area. As trains pass by overhead a thunderous roar echoes through the concourse and light flickers through below. Transparent ceiling/floor allows for natural light to enter as well as the shadows of waiting passengers and trains.
The structure allows the materials to express their true nature. The heavy interlocking concrete piers contrast the lightness of the steel. The repetition of small components re-establish the human scale in a large suburban rail station.
Yokohama Port Terminal

Architecture is deployed on the functional programmatic relationship and circulation diagram.
Floor planes become a continuous surface for vertical and horizontal circulation. Circulation and program arise from folded surfaces. Single surface can create multiple spaces and functions, aided by folding and material boundaries.
Figure 36. Yokohama Port Terminal Bifurcation Diagram

Figure 37. Yokohama Port Terminal Bifurcated planes create circulation
Figure 38. Yokohama Port Terminal circulation of passenger and baggage
Pennsylvania Station

The station gave value to an area that been dilapidated and neglected. Demolished in 1963 due to in part its own success. The station had caused such an increase in density around the site, property values deemed its site was suited for better purposes and the station was relocated underground. Also it cost too much to keep the ceiling clean. "One entered the city like a god... one scuttles in now like a rat"1

There is a dialogue between ornament and structure with the classicist philosophy of the waiting room vs. structure as ornament of the concourse. The ornamental historic veneer of the waiting room is sharply contrasted with the clear expression of structural logic in the concourse. The general waiting room was a place of theater and congestion of public life that needed a grand imperialistic feel. Structure is hidden behind

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2 Ibid.
3 Ibid.
walls of thin stone veneer to convey heaviness and importance. Circulation is amorphous and uncertain. The waiting room space signifies arrival to the city.

The concourse however was a utilitarian machine. Forces are directly visible within the concourse. The circulation, trains, structure and light are immediately visible because they want to be. The stylistic architectural approach to the waiting room provides contrast with the functional nature of the concourse.

The waiting room has ornamental Corinthian columns whereas the only ornaments within the concourse are massive clocks hung from the ceiling, functionally celebrating time itself.

Figure 41. Penn Station Duality of Structural and ornamental logic.
Importance of providing memorable entrance to the city.

Intensity of place created through overlap of use.

Played an integral part in shaping the urban landscape of Manhattan.

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Figure 42. Grand Central Terminal


Ibid.
Trains enter from below. Immediately exiting the train there is a compression reflecting the scale of the train. The main concourse is at first hidden, then revealed and the tension from the journey on the train is released by the monumental scale of the concourse. On the lower level there are concessions for the long distance travelers, above are places more suited for daily commuters needs.
CIRCULATION BETWEEN AUXILIARY AREAS WITHIN HUGE CLERESTORY WINDOWS

OVERLOOKING TRAIN STATION ACTIVITIES

LIBRARY

TO PLATFORMS

OFFICES

TICKETS

Figure 44. Grand Central Terminal circulation diagram
The Site

Tampa, Florida
28° N. Latitude

Figure 45. Site pages intro
This thesis proposal at the largest scale connects Orlando to Tampa through Lakeland, with a more efficient form of transportation, high speed rail. The Tampa High Speed Rail station alone will expect 27,000 daily riders going to and from Lakeland and Orlando.¹

¹ Hillsborough County Metropolitan Planning Organization. 2007. TRANSIT CONCEPT FOR 2050 FINAL REPORT.
by 2050, the downtown station could potentially see 53,000 trips per day from the light rail corridors.  

Rail transit lines will define density, quality of growth and provide pedestrian access to redevelopment sites and existing areas of cultural significance.

Transit travel times between areas will help define them and create regional connectivity.

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2 Ibid.

Overlapping layers of rail transit converging into one place.
The site must be within walking distance of as many districts as possible.
Site 1 - at the center of 3 districts- downtown, channelside, south nebraska and Ybor and easily connects to light rail

Site 2 - building between the existing union station, the causeway, over the station

Site 3 - adjacent to cemetery, will worsen the division between the north and south of the interstate, how will this site be connected to the light rail line?
Site 1 has the closest relationship to areas with differing uses.

Adjacent to business, civic/institutional, industry and residential.

Site 1 has the greatest chance to encourage street level, face to face interactions between real people.
Figure 53. South Tampa Existing Housing Density In Dwelling Units Per Acre
Figure 54. Site 1 Photo - corner of Nebraska and Cass

Figure 55. Site 1 Photo - the commuter cultures wasted landscape
Figure 56. Site 1 pedestrian boundaries
Figure 57. Site 1 pedestrian / path / automobile
Figure 58. Site 2 Photo - Union Station

Figure 59. Site 2 Photo - rail along Nuccio Parkway
Figure 60. Site 2 pedestrian boundaries
Figure 61. Site 2 pedestrian / rail / automobile
Figure 62. Site 3 Photo Existing infrastructural boundaries
Figure 63. Site 3 pedestrian boundaries
Figure 64. Site 3 pedestrian / bus / automobile
Site 1 was chosen partly because it connects the three major districts adjacent to downtown. Creating a node within walking distance of four existing districts will attract more pedestrians.
Multi-modal station feasibility depends on the increase in density of housing units around the station from 8 du/acre to 20-30 du/acre within 1/4 mile radius and 15-20 du/acre within 1/2 mile.

Figure 66. Redevelopment areas adjacent to site
Figure 67. existing week day site activity

- No Activity

- Enough people to create communal feeling of safety
Figure 68. Pedestrian marginalization within the auto-centric culture
Figure 69. Existing fire station
Figure 70. Implicit street space looking down Zack street

Figure 71. Site sections

Figure 72. Site section - heat island
Figure 73. Rail infrastructure to be re-purposed for commuters

Figure 74. Blur public and private boundaries
Quantitative Program Analysis

- **Light Rail**
  - Platforms: 3 units @ 12,000 ft² each
  - Mezzanine: 3 units @ 7,000 ft² each
  - Rail: 4 units @ 6,000 ft² each
  - Mechanical/Electrical: 8,000 ft²
  - Restrooms: 4 units @ 1,200 ft² each
  - Security/Info desk: 4 units @ 1,000 ft² each
  - Ticket vending areas: 12 units @ 200 ft² each
  - Elevators/Escalators: 12 / 18

- **High Speed Rail**
  - Concourse: 34,000 ft²
  - Platform: 2 units @ 17,000 ft² each
  - Rail: 2 units @ 10,000 ft² each
  - Main Lobby: 5,200 ft²
  - Zack St. Lobby: 4,200 ft²
  - Union Lobby: 3,200 ft²
  - Mechanical/Electrical: 6,000 ft²
  - Restrooms: 3 units @ 1,400 ft² each
  - Security/Info desk: 4 units @ 800 ft² each
  - Cafe: 3 units @ 1,000 ft² each
  - Elevators/Escalators: 24 / 20
- Market / Retail / Cafe: 15,000 ft²

- Bus
  - Parking: 8 lanes @ 1,000 ft² each
  - Covered Waiting area: 7,600 ft²

- Admin / Office: 7,000 ft²

- Covered Bicycle Storage: 500

- Automobile
  - Parallel parking: 80 spaces
  - Garage: 300 spaces
Qualitative Program analysis

Intensity of place is created by overlap of program and understanding the peak hours of every activity to achieve best use of infrastructure.¹

“Propose a complimentary spectrum of events to fill the 24 hour cycle with a montage of successive and simultaneous peaks – a maximum exploitation of the location and its infrastructure – to create a 24 hour peak, a mosaic of heterogeneous 21st century life.”²

- Public space – inviting and comfortable – paths 6’ minimum width
  - Public park folds into station and retail areas
  - Infinite space – space between the pedestrian and the horizon
  - Vertical and horizontal circulation elements – stairs, ramps, escalators, elevators - NFPA 130

- High speed rail
  - Aerial platform
  - Increased safety benefit from raised platform
  - Less restrictive land use patterns


² Ibid., 1225
- less vulnerable to right of way conflicts
- Larger visual impact to create identity
- Creates shaded space below
- Greater noise amplification

- ticket services/fare collection areas
  - luggage sorting areas
  - Vertical and horizontal circulation elements
  - natural light and ventilation
  - multi leveled spaces for better orientation with the station and city.
  - partial vegetative occupied roof

- light rail – on grade or aerial platform
  - Vertical and horizontal circulation elements – stairs, ramps, escalators, elevators -
  - Support space for commuter rail platform

- Bicycle space
  - overnight lockers/storage, bicycle lanes, encourage use of bicycles on trains
■ Bus space
  - 25' turning radius, 42' length, 9’7” height, 10’ wide
  - covered drop off area for several busses .... how many?

■ Automobile space
  - drop off area differentiated from the street
  - short term parking
  - parking garage- un-monumental

■ Retail space
  - Very small stores ~500-1000 ft² each, idea is to leave the station and explore.
  - Indian concepts of street overlap of sensorial landscapes.
  - Stores must comply with peak hours of different activities.
  - Have a constant stream of pedestrians.
  - bars, cafe, restaurant, newsstand, market,

■ Common space
  - meditation area in park, urban rooms adjacent to retail, community garden
Figure 75. Program relationship diagram
Figure 76. Approximate Program to scale with site
Light and Nature

"the only sense that is fast enough to keep pace with the astounding increase of speed in the technological world is sight. But the world of the eye is causing us to live increasingly in a perpetual present, flattened by speed and simultaneity."¹

"Homogeneous bright light paralyses the imagination in the same way that homogenization of space weakens the experience of being, and wipes away the sense of place."²

"In order to think clearly, the sharpness of vision has to be suppressed, for thoughts travel with an absent-minded and unfocused gaze."³

Clear vision leaves nothing to the imagination, importance of shadow in the environment, creates activity within the mind to fill in gaps of the unknown with creativity.

¹ Pallasmaa, 2005, 21
² Ibid., 46
³ Ibid., 46
Material and Texture

Architecture of tactility and materiality, interlocking with the viewers senses, insightful details and revealing of space. Metal hardness of the train cars.
Inside the trains and outside become a canvas for the unwanted artist. Graffiti on trains has often been seen by people within the community as art, not vandalism.

Auditory

"buildings do not react to our gaze, but they do return sounds back to our ears." Doorbell rings as the train’s door opens. The doorbells specific sound has associations with the concept of home. Smells of people.

Scale

Perception of scale is always by association. With our own bodies, scale of the train, scale of the city. Scale of the individual space. Scales of group space. Scale of the high speed rail Resolving conflicts of scale Penn station as example of appropriate scale of civic buildings

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5 Pallasmaa, 2005, 47
- connecting greenscape across station to channelside
- surface as roof, as ground, as third realm for skateboarders/people watchers
- greenspace folds over LRT, becomes main circulation sorting area for LRT and HSR
Plaza and high speed rail relationship

shade from HSR creates environmental comfort for plaza in front of retail

surfaces delineate varied public program
- high speed rail circulation from street, from public greenscape, from historic Tampa union station
- high speed rail crossing a main street through Tampa (Nebraska Ave.) becomes an urban transit landmark over the linear street.
- Zack street turns into pedestrian ave. with square, axially with union station
Figure 78. Creation of multiple spaces and functions from a single structural element

Figure 79. Conceptual diagram
Figure 80. Conceptual diagrams, Roof, Plan, Section
Figure 81. Visual connectivity across physical boundaries

- Retail component and rail platforms, visual connectivity of control and loose space
  - Alignment to Cass Ave.
  - Depth of view alternates for people on platforms
Figure 82. 1:200 Model_A

- Ground floor Public Space (green & yellow) VS. Control Space (blue & red) LRT platforms
Ground floor Public Space (green & yellow) VS. Control Space (blue & red) LRT roof space
Continuity of park space (green) and station massing providing shade to public spaces
Figure 85. 1:200 Model_D
Figure 86. 1:200 Model_E

- Continuity of park space (green) and development of the vacant site to the north
Figure 87. 1:200 Model_F
- Structural aesthetic, honesty of materials
- Spatial definition arising from porosity of structure.
- Single surface to define ceiling, roof and floor.
Figure 89. Conceptual model on existing site 1:100 scale
The site and program began as a kit of parts to be arranged by circulation, light, and the negative space created by adjacent buildings.
Implicit space encompassing all transportation components signifies entrance into the city.
Commuter rail (blue) and retail (red) are physically separated and connected visually through a transparent boundary. The visual proximity between control space of the commuter rail platform and the pseudo public consumer/retail space will add complexity and provide both realms with a burlesque show of the other for the delight of the voyeurs.

High speed rail (orange) circulation to occur above commuter rail station, within implied space of the city.
Negative space created between the buildings drove design of plazas and market spaces. The implied entry volume becomes the threshold to the city and needs to compete within the framework of existing and future buildings and public spaces.
Schematic Design

Parametric Design & Digital Fabrication
Rhino + Grasshopper

The Grasshopper plug-in for Rhino allows for parametric, generative modeling. Throughout the design and fabrication process Grasshopper has provided a means to further the design and production of systems within this thesis. In the design of this multimodal transit facility there is a strong need for smart components that adapt instantly with changes in the design. Grasshopper is instantaneously interactive when you change any input geometry or parameter or when you change the definition. This also represents the authors personal exploration in parametric and generative digital modeling and fabrication techniques as they relate to this thesis. These tools will also be valuable for future architectural explorations.
Figure 99. Sectional kit of parts model as explorations in structural rhythm and circulation
Figure 100. Section slices define spatial boundaries and pedestrian circulation
Figure 101. Light exploration model_A
Figure 102. Light exploration model_B
Figure 103. Light exploration model_C
Figure 104. Light exploration model D
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CONCOURSE LEVEL

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The under use of public space in Tampa can by no means be solved by a singular architectural intervention. The final manifestation of a civic space within the city is only one of many possible solutions to this problem. This thesis set out to correct the lack of accessible, public and pedestrian space in Tampa. The multi-modal transit facility solution provides a means of social transportation from the disconnected regions around Tampa to the downtown core. The main focus was the design of the public pedestrian realm and how it reacts to privately controlled space. This thesis has achieved the goal of creating a secular cathedral of pedestrian space and transportation on what was previously only automobile surface parking infrastructure.

Initial research, case studies, site analysis, program and typology analysis only informed what the project had to do to be successful. What the project could be was up to the designer. The explorations in digital fabrication, tectonic connections, light, sound, smell, touch and other purely architectural investigations were valuable to the advancement of the design. Some challenges faced were that of scale, resolution of small details, integration of vertical circulation elements and program development. Further areas of research and design include investigating reusable form work, structural analysis, pedestrian flow analysis, integration of High Speed Rail into the existing Union Station and more investigations into Rhino & Grasshopper in order to fully express the design and construction.
References


*Escape From Suburbia*, DVD. Directed by Gregory Greene, Dara Rowland: Microcinema DVD, 2007


