Architecture of the Rail;
Exploring the Potential of Urban Infrastructure

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This thesis and the education which it is a direct result of is not an individual act but was made possible by many. I thank those who have contributed to its creation either directly or through their continual moral and intellectual support.

Before all others I must thank my parents for all their love and encouragement their efforts have made the greatest opportunities of my life possible. I would like to dedicate this thesis to my parents, Kenneth & Carole Iboshi. I hope I may return some of the strength they have given me.
Abstract

This thesis is the pursuit of a sensitivity for the relationship between urban infrastructure and architectural form, an attempt to restore a quality of "publicness" in the urban landscape through the implementation of a transit structure. It is the investigation of the physical qualities which could potentially incorporate rail structures as useful elements in the city fabric. Approaching the rail structure as an architectural element which will serve as a framework for the existing and potential city.

The intent of the proposal is to challenge the notion of the transit line as a solely technical feat; works of public infrastructure hold a potential to greatly affect our cities and our lives far beyond their expected utility. I suggest an alternative study of the possibilities and effects of these structures as architectural artifact in the urban context and explore the ability for transit systems to act as participants in the life of the city.
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Introduction
Our public structures and institutions are both symbol and apparatus of the collective social body; they are a barometer for the health and welfare of a city, how and to what extent we invest in these public forums will, to some degree, determine the form of our society. If we are to continue living and creating urban environments, a conscious effort must be made to maintain and develop elements that reinforce the city as an entity which conducts the life of its inhabitants, in both public and private. In the recent history of America the private life of the individual and the right to individual choice has taken precedence over the health and welfare of the society at large. This attitude and its consequences have been the main cause for the atrophy of American cities. For cities are the manifestation of what is shared in a society and above all it is the great extent to which the public life is developed in an urban environment that makes a city valuable. In cities it is this public life and its physical representation, the public structure, which is the skeleton or armature from which the private fabric or flesh of the city is supported. The American city of present is bloated and glutinous possessing too little structure to support its own weight. Enhancing the collective aspects of the city through the positive use and implementation of public structures will restate the collective purpose and function of the city, in affect affirm that which is at the very heart of its conception.
In most American cities the manifestations of the collective society, the physical evidence of what we consider the public domain has only survived as a vestige of the past. Apathy and privatization have been the recent themes of city building. This is evident in what we build in our cities today, the most significant urban projects of late have actually been anti-urban in nature, freeways, interior sports arenas, inner-city malls. Little, if any of our resources have recently been invested in projects which develop or improve the public life of our cities. Infrastructure projects such as inter-urban freeways and commuter rail lines have been promoted as urban projects which solve urban problems are actually pseudo-urban projects which only solve suburban problems. Urban infrastructure projects are (or should be) implemented to promote the good of all of its residents (not just the privileged on the fringe) and especially those living in the inner city who live with the immediacy of adjacency to these projects. Despite the consequences of these recent precedents, large infrastructural projects and mass transit projects in particular posses the potential to greatly enhance the urban environment if only they are promoted as truly urban elements. The problem in the design of transit projects lies both in their conception as suburban oriented services and their implementation as autonomous architectural anomalies. They should be conceived or planned at the city scale as an element which will promote the health of the urban core rather than extend the network of suburban sprawl. Equally in the implementation of these systems their physical qualities must be considered beyond their use as transportation and they must be realized as architectural elements of
the city.

In the development of transit systems the efficient provision of access is only one of the services they may provide for enhancing the city. There are many other potentials these projects posses, because of the public nature and the collective attributes of transit these systems act as attractors in the city. Transit structures, especially when designed as an above ground or elevated structure, may have several uses and meanings; a landmark or monument, an inhabited structure (a building of sorts), a spatial framework or reference, as well as an apparatus for transportation. A transit structure implemented in such a manner would move beyond its base purpose and may be incorporated as a participating piece of the urban landscape and thus more than an intrusive object or a buried part of the city's 'plumbing'. By changing the attitude toward the design of transit architecture and imbuing such projects with an affirmative urban quality these steel and concrete “monsters” may make a positive impact on the city. This would make possible that the same projects which have leveled whole neighborhoods and effectively fragmented the urban fabric also would have the potential to create an actual physical structure that would order and integrate the urban fabric.

This thesis is the development and design of a mass transit rail structure, or a part thereof, which will act sympathetically to the existing city structure. The intent of the proposal is not to concentrate on the transit line solely as a technical feat, but rather to study its possibilities and effects as an architectural element in the urban environment and to

(12.1) Green Line adjacent to the Boston Garden. An infamous landmark in Boston.
study it as a projective, or catalytic factor in the development of city form. The ability for transit systems and their physical structures to act as participants in the life of the city has rarely been explored. Often these systems are treated as alien to the urban fabric; overlaid or burrowed under the city. Little concern is expended on the effects of the physical presence of the rail line in the city fabric and it is never considered as a 'natural' element of the city, rather the rail line is an abstract line on a map that connects one tiny dot to another tiny dot. In the following, I propose an alternative approach to notion of traveling within a city and the design of an apparatus of transport. The idea explored in this thesis considers the rail structure as a participating urban element, useful and integrated into the city fabric yet also retaining a monumental quality which enables it to order and orientate this fabric. In short this thesis is the pursuit of a sensitivity for the relationship between urban structure and architectural intervention, an attempt to restore a quality of 'publicness' in the urban landscape through the implementation of a transit structure. It is the investigation of the physical qualities which could incorporate rail architecture as a useful element in the city fabric, an element which will serve as a framework for the existing and potential city.

The size and public magnitude of the subject requires a broad perspective. The identification of the problem of designing these large scale structures as both conceptual and experiential, that is both a problem of planning intentions and architectural design infers the process of design must integrate traditionally disparate disciplines. The methodology

"The challenge is to synthesize the relevant pieces of the past with the progressive ideas of the present. Cities have always offered the possibility for such combinations....Many strategies can be used to bring this about....In all cases the goal is balance: a balance between uses, between climate and the needs of the building, between the community and the individual."
Peter Calthorpe
Sustainable Communities
(13.1)
utilized to approach design was conceived as a dialectic process where by a juxtaposition of opposing issues or scales would create a dialogue; through this dialogue and the resolution of conflicts a reasoning or logic may be realized. In this investigation particular dialectics became central to the exploration of infrastructure types: autonomy vs. integration, monumentality vs. repetition, symbolism vs. utility, prototype vs. context, and urban scale vs. architectural scale.

The most immediate set of issues which this methodology may be applied are those related to scale; large scale planning decisions versus small scale architectural design. The dialogue between these two positions explores both the theory and design of city form and frames many other issues of infrastructure in the city. These two disciplines share a common lineage and only in recent times have they diverged into fully separate practices. At present the division and domain of each profession seem well defined; the planner makes decisions about the city and sets the relationship between the objects within it, the architect designs the object and manifests the predetermined relationship. This allocation of responsibilities may simplify the process of design at each level but does not make for the creation of a good urban environment. Interaction between decisions made at different scales is necessary. Without an open dialogue conflicts cannot be identified much less resolved; the process becomes static and awkward. Decision making is thus top-down and linear; once decisions are made at the large scale they are not changed even thorough they may be contrary to the design of physical qualities developed at the smaller scale. Little interaction exists between separate portions of what
is, in actuality, a contiguous process. This “short-sighted” approach is a problem of both planners and architects. Neither can see what the other is attempting nor can either make an impact on the decisions of the other without infringing on the others “territory”. How can a city be planned without knowing what it is made of? How can a building be designed without knowing how it fits in the city? The obvious answer is that neither a city nor a building can be designed well without intimate knowledge of its relationship to the other. To better understand the importance of urban architecture, and in particular urban infrastructure, the boundaries between planning and architecture must be scrutinized.

This design investigation was undertaken with the attitude that the city as a whole is an architectural artifact. Therefore, the process of design is continuous but not linear; and as a dialectical process, the design was approach from both ends. First, an analysis of Boston and the area of intervention, Cambridgeport, was undertaken at the urban scale. At this scale issues typically considered as urban design criteria were examined: movement, access, use, transition, connection, definition. At the opposite end a series of prototypical sections were produced at the architectural scale. These sections were representative of typical situations occurring along the transit line and were used to study the physical qualities of the structure and its relationship to its context. Through this study issues considered as matters of architectural articulation were introduced into the process: light, form, material, legibility, symbolism, inhabitation. With these two studies a set of objectives was formulated which included criteria from both the urban and architectural scales. These objectives
provided an outline from which I could attempt a synthesis which utilized both studies but also considerably modified each proposal. This last phase was conducted as a series of segments along the site which provided an array of distinct situations which the rail line could then react. The synthesis is the point of intersection between planning and design. At this point a design may resolve the conflict between the abstract notion and the physical apparatus, but must also become more than just a compromise. A certain synergy must be generated which may satisfy conditions at all scales to make a successful project. This point of synthesis is not the end of the process, but is rather the begging from which previous decisions may be reevaluated.

Within the American consciousness, the importance of the public and publicness has been diminishing at a time when a social and physical collective structure is most required. In the recent years our society has been fractured by a search for identity. The American dream and its homogenous mass consumer culture is safe and clean but is an empty promise doomed to overcome itself. In our search for what is to replace it the city is where the drama will be played out. If we are to find a shared understanding in our society the ground must be prepared for such events and physical structure of our cities must be strengthened if they are to meet the demands of this evolving society. Attention must be focused on the issue of the public life of cities, their social and physical infrastructure and in particular urban transit systems. Transit, the movement of people through the environment, structures both the physical
form of a city and many of the social relationships within its bounds, there is an undeniable intimacy between transit, city form and society. Transit projects have the potential to cause irreparable damage to the urban fabric, yet may also imbue the city with unimaginable possibilities. Though these projects may only exist as a thread on a sliver of the landscape, they can encompass the entirety of a city and traverse all its quadrants. Few projects that are carried out as a single act actually possess the ability to meaningfully impact an urban structure as does transit.
Notes form Introduction:

1 The term monumental is taken to mean both a symbolic gesture toward the public and a presence through difference.

2 The separation between Urban design from Architectural design is a fairly recent occurrence. Their formal distinction has only been recognized since the mid to late nineteenth century. Therefore these two disciplines are only separate in the twentieth century tradition.

3 1"=100' to 1"=400' scales for urban studies.

4 1"=4' to 1"=16' Scales for architectural studies.

5 This thesis does not display a full range of the possibilities in considering a transit line that is more integrated into the urban fabric. The study concentrated on the system as it was conceived as an elevated rail line.
Urban Infrastructure
“A city based on physical proximity and free movement and a sense that the city is our best expression of a desire for collectivity”
Michael Sorkin
Variations on a Theme Park
(20.1)

In this nation, since WW II our society has put an emphasis on individual liberty, freeing the individual citizen from the constraints of societal and ecological responsibility. This emphasis on the singular has lowered our appreciation for what is shared and therefore devalued the collective experience of the city. This in turn has staged an era of unprecedented expansion beyond the previous urban limits, the result of which is overburdened, but under utilized cities and towns. We have reached a critical point in the development of our cities where, in our lifetime, we face, either their collapse as functioning entities, or a major restructuring and investment in their public infrastructure (systems, structures, and institutions).

In this thesis I look for an optimistic position on the future development of our cities; the changing attitude of individual accountability, increased awareness of environmental issues, and a renewed interest in the health of urban centers has created a demand for innovative solutions to urban problems brought about by decades of neglect. This focus of interest has been divided between efforts to improve either the private or public realm. Both strategies attempt to improve our environment and neither can exist separately from the other nor can they be designed separately without at least a cursory examination of the effect upon the other (i.e., the street must respect the house and the house must recognize
the street.), but in the urban environment, public projects and infrastructure projects in particular, possess a responsibility toward the well being of the city which at present is not recognized. Urban infrastructure acts as the public armature or skeleton of a city; it lays down the framework which orders the future growth of the city. It is the seed which holds the potential of what the city could or should be. Realizing this potential is the start of a good city.

This positive attitude must also be tempered with the knowledge of previous attempts of improving the urban landscape through the use of large scale infrastructure projects. In the recent past these projects have failed to insure a healthy urban condition and more often than not subverted their original premise of creating a better future for the inhabitant of the city. The contradiction between intention and affect calls into question the sincerity of the original proposals. Scrutiny of the physical quality of these interventions must be taken to judge as to whether they will perform as positive urban elements. The investment in infrastructure is not just a financial, economic, or social matter, but also an issue of architectural form and implementation. The fact that elements of infrastructure are supplied does not guarantee a positive affect on the urban landscape, their success is also contingent upon the manner in which they are implemented. When considering the health of the city at large the physical articulation of these projects and the relationship they make to their context is just as important as the conceptual and statistical planning of these systems.

The relationship between Urban form and Architectural form has
been largely ignored in the past few decades. Many architects and planners have turned away from this pivotal issue and concentrated on specialized interests, architecture as an object oriented artistic discipline and urban planning as policy making. This rift between architecture and planning has created a void which many large urban projects fall. Under these circumstances the decisions of design on large infrastructure projects are distanced from their relationship to the city inhabitants and instead are based on mechanical or technical issues, degenerative urban theories based on irrelevant models, or caprice. Rail lines, Freeways, bridges, viaducts are all projects which dramatically impact the physical city, but whose responsibility falls beyond the bounds of architecture. Responsibility for the form of these important structures thus becomes part of a bureaucratic or technical process. This condition only devalues the process and production of our public works and therefore our cities. To correct this, architecture must expand its domain, move beyond the role of consultant and take responsibility for the urban environment writ large. Architecture and the architect must again take on the task of analyst and innovator of the urban realm.

The public infrastructure of most American cities have undergone severe transformations over the course of the last one hundred years. The original forms and structures of our cities were defined and built previous to this century. The physical form which they had taken was based on a society whose life centered on its urban core. Trade and authority were the livelihood of these cities and thus value was placed on proximity to
the center. In such concentrated living environments public life was clearly defined and understood. The concerns, condition and well being of your neighbors and fellow citizens were of an immediate nature; issues of public life were of paramount importance. Under this previous social contract a greater level of service from public institutions and support for these institutions from its citizens was demanded. The city streets, squares, churches, schools, and other public institutions were the matter of which their public structure was constructed.

Industrialization brought on the first set of transformations which reorganized the basic social and physical form of American cities. Shifting of the centers of power, greater differentiation between the classes and specification of different areas of the city created cities whose physical form resembled the machines which caused the overturn. And yet, the cities still maintained their centers and though their forms were greatly altered they continued to serve society as a total working entity. Despite the erection of gargantuan factories, mass housing, and authoritarian public works, all the elements of these urban environments participated in the life of the city. The material of the cities public structure at that time were still streets, squares, and institutions but in addition parks and mass transportation made up the armature of the American city.

The middle of this century saw a second set of transformations of the structure of the city. Heavy industries, which are based on a cheap supply of labor and materials and are therefore dependent on the proximity of their workers and associated producers, left the cities. The change from a industrial to a service based economy enabled the city to expand into the
"Between 1815 and 1875, America's largest cities underwent a dramatic spatial change. The introduction of the steam ferry, the omnibus, the commuter railroad, the horsecar, the elevated railroad, and the cable car gave additional impetus to an exodus that would turn cities "inside-out" and inaugurate a new pattern of suburban affluence and center dispair. The result was hailed as the inevitable outcome of the desirable segregation of commercial from residential areas and the disadvantaged from the more comfortable."

Kenneth Jackson
Crabgrass Frontier
(24.1)

surrounding countryside gain land and increase the material wealth of individual citizen (at least some). In this expansion, social relationships were stretched and often ruptured, physical and social distances were too great to overcome. Public life took a back seat to private interests. The inversion of the city, both physically and socially was complete. The divestment of interest in the public structure of the city has left established urban areas with deteriorated infrastructures, unable to fully support a vital society at its core. In the city of today the public structure is to a large extent a vestige of a previous time and has not developed in proportion to the growth of the cities. Many of the Elements of infrastructure from the past still exist but most often do not retain the importance they once possessed and thus many of these have fallen into decay or misuse. The pride of the nineteenth century city now lays in the shadow of the twentieth century support systems which efficiently funnels citizens from home to work to shopping to home without ever having to dwell in the public realm.

In assessing the development of the American city and the elements which made up their public structure at different periods we can clearly see that over the course of the last half century our urban areas have been assaulted by projects which, despite their proclamations as being for the 'good of the city', are at their essence anti-urban proposals. Freeways, commuter rail, urban renewal, and housing projects made claims to relieve congestion, dispel squalor, create a better society in the city, but in all reality these projects were instituted for the benefit of the suburban developments growing at the city's edges. The involvement or detach-
ment, sensitivity or brutishness of the implementation of all elements of a city become obvious when comparing a map of any city drawn eighty years ago to one of recent construction, the former will contain a description which through its attention to detail displays the physical immediacy of the environment and potency of its public elements while the later will show a level of abstraction which betrays the lack of concern for the physical city but the reliable confer of knowledge for travel by auto.

This description of the pedagogy of American cities is abbreviated and simplified; it reveals a bleak picture of the contemporary American urban condition, but one which I believe is not beyond repair. The question then is, how and what do we fix? My short answer is: Repair the public 'structure' and the rest will follow.

If we consider again the analogy of the city to the body; the streets, squares, parks are to the city as the skeleton is to the body. What goes on beyond the domain of the public is like the flesh which completes the body and just as the forensic could reconstruct the body from the skeleton because of the basic information it contains about the whole being, the public structure of a city contains the potential and designates the propensity for how the whole city may develop. In the American city there is less and less of what may be considered public; the skeleton of our cities has weakened while the private realm has grown considerably. A strengthening of that skeleton is necessary, once it is well defined the private or 'flesh' will grow in a healthy manner. Then we must ask the question, what will, or what should compose the public structure in the future city?
To answer this we must assess what elements of infrastructure are actually enhancing the life of the city and what are the most promising of elements in the future. Of course streets, squares and parks will remain essential elements of the city but other types of public works will become important in the future city. Mass transit is an element of infrastructure which had held an importance in the functioning of cities and, at times, also held importance in the identity of a city; it is in both these roles that I see mass transit projects will again take prominence in the urban setting.

The most obvious reasons for the promotion of mass transit in metropolitan areas are the social and environmental benefits derived from these projects as a means of transportation, access into and around the city, conservation of energy, conservation of land area, independence from the automobile, etc. Besides these direct benefits there also exists a potential for these transit projects to benefit the physical quality of the city. These physical benefits have to do with the relationship of the physi-

(26.1) Bridge/Aqueduct. Infrastructure can be utilized for more than one specific purpose, more than plumbing.
cal apparatus of the transit system to the urban landscape and to the urban conscience. In these terms the transit may act as more than just circulation in the city, rather it may become a prominent feature and because of its scale acts as several important elements: landmark, monument, gateway, edge, center, park, street, etc... It can be an ordering device, both responsive and productive to its environment. If we are to expand our understanding of these infrastructure projects they may profit our cities far beyond which they were originally conceived.

An analogy, at a much smaller scale, to this expanded interpretation of the role of mass transit is the stairway. The vertical circulation within a single building can be approached in various manners; a stairway may be purely utilitarian, i.e. a firestair where egress is the overriding concern in its creation versus the grand stairway of a mansion or which serves as the heart of such a dwelling and provides much more than just a means of ascending or descending to another level. An even more extreme example is the Guggenheim Museum of Modern Art wherein the means of circulation provides not only the order but also the end form of the building. The means of circulation may be more essential than a strictly functional element, but rather be part of the meaning of the architecture.

This expanded definition for the role of infrastructure is nothing new; elements laid out to supply basic services for communities have often played a larger role in the functioning of the settlement. It seems only recently has there been such great selectiveness in the purpose of our public works. Projects of infrastructure and in particular transit projects have often been utilized by governments as instruments to shape the city,
catalysts to trigger growth (or abandonment). The use of these instruments has not only enacted a formal change in the urban structure, they have also been used to shape the social and political landscape of the city, often with results of questionable intentions toward the whole community. Projects of this scale and type inherently possess the power to dramatically affect the dynamics of a city. Whether or not this potential is recognized in the planning of these projects, in their implementation their effects are felt throughout a city.

Often the most effective of urban projects are the result of an intervention not expressly created for the purpose of improving the city for its inhabitants, but in the cases where these effects are positive there is always a foreknowledge of these effects. An example is the Ringstrasse in Vienna. The boulevard which encircles the old city core and locates many of the city’s public institutions is a remnant of the medieval city wall and the large amount of area retained for the boulevard was insisted upon by the military to defend against rebellion. Despite this less than humanist conception the design and realization of the Ringstrasse has created one of the most potent urban spaces. The emperor Franz Joseph and the planner Ludwig Forster instituted the plan with an intent beyond the original purpose of defense; to create a public venue which would be the link between the old city and the new one beyond the wall “...for the purpose of the suitable connection of the same (the city) with the suburbs”.

In the mid nineteenth century Paris underwent a transformation which would greatly affect city planning and was seminal to projects such as the Ringstrasse. Baron Haussman, the prefect of the Seine, imposed a
Diagram of the Ringstrasse, Vienna. Shows the tree-lined semi-circular boulevard with civic buildings and spaces shown as dark. The design specified more than just the street area, it also described the intervention as a system of public lands and institutions.
The Eiffel Tower from a Distance. The tower is a unique landmark, it is both an orienting device and a civic symbol.
set of physical alterations to the city specifically to diffuse the volatile political situation which existed between the government and the population. He thus gave advantage to the government by razing the districts of Paris considered potentially dangerous. The main vehicle for this transformation were the new boulevards: straight and wide, they provided a network of thoroughfares “well suited to troop movements”\(^3\) and replaced the tight and convoluted medieval street pattern which served the rebellion so well. Beyond these political objectives of this reconfiguration of the city Haussman’s boulevards also provided Paris a new public structure which transformed it from a medieval to a modern city; being both the impetus and the foundation of change. The boulevards are now a symbol and a function of Paris; without them the city would have an entirely different reality today.

Another Parisian structure from the nineteenth century which transformed the city but in a decisively symbolic manner was the Eiffel tower. While this monument serves little practical function or utility in Paris it serves as a symbol and landmark which represents and defines the city. Unlike other monuments or buildings which commemorate the power of an individual, government, or enterprise, the Eiffel tower was made to commemorate the ingenuity of human kind. This distinction allows it to be a marker like no other in a city of monuments, and thus transforming an imperial city to one which celebrates its public life. The tower describes a territory, public in nature, above all others; it marks this at an incredible size and scale yet it also makes an effort at the ground to have a relationship to the pedestrian. This example may stretch the limits...
of what is considered infrastructure, but the Eiffel tower displays character and potential that must be considered in the design of any public work.

The preceding are examples of how the nineteenth century approached some works of infrastructure, in comparing this to the twentieth century we can see a conscious shift in attitude especially in the post W.W.II. decades. The public projects which have consumed the most expense and effort in the past half century are the interstate freeways and their urban counterpart the beltways which in some form encircle almost every major city in North America. It seems a paradox that the best kept of our public structures are not schools or city halls but instead are strips of paved passages which we roll our private carriages along. It seem there could be a better appropriation for our collective earnings to improve the place rather than the road to it.

The evolution of Boston is similar to the previous prototypical description, it developed as a commercial port, then was transformed into an industrial center. It is at present a megalopolis composed largely of a thick encrustation of suburbs. Unlike many other American cities Boston still retain a active urban core, still used for more than just corporate headquarters or a dumping ground for the city's underclass. For this reason Boston is one of the best places to attempt a reversal of the trend of outward expansion and to concentrate efforts to bolster the inner city.

In examining the physical construct of the city of Boston a correlation between some of the most immediate social problems of the day can be
detected. The structure of Boston is based on radial growth and segregated relationships. The center of the city, though quite compact, is composed of discreet districts: the North End, the Back Bay, Roxbury, Beacon Hill, Chinatown, South Boston, etc..... Each of these districts has an identifiable ethnic mix and/or economic class. From these origins in the center city radiates the path of movement each group has taken sometimes but rarely crossing. This could be said to be true of most modern cities, but in Boston the division are more clearly defined than in most. The social and economic phenomenon which has cultivated this situation is reinforced by the public infrastructure; streets, roadways, bus routes, and subway lines all follow this radial pattern. Only two publicly implemented systems are aligned in a circumferential pattern, the Emerald Necklace and the Central Artery expressway.

The Emerald Necklace is the best attempt made to create a meaningful system which acts continuously across the urban fabric of Boston. F. L. Olmstead began the Necklace in the mid 1800’s, it was designed as a continuous parkway system; a crescent of green which would define the southern edges of the city. Olmstead hoped it to be a prominent and lasting piece of Boston’s public infrastructure, unfortunately the Necklace, for all intensive purposes, no longer survives as a single element but rather as discrete parks. Its demise as a connected system can be blamed on the changing attitude of the purpose of cities, its ‘non-essential’ nature, its invasion by road pavement, the insufficient dimension of its width, or possibly the lack of integration with its immediate context. In any extent, the Emerald Necklace today does not fulfill its potential to link the city in
(34.1) The Central Artery, Boston. 
Showing the elevated expressway under construction. 
Much of the area beneath and adjacent to the construction has since been blighted by the oppressive affects of the Artery.
an actual chain. The Central Artery on the other hand has a sufficient size and monumental scale to visibly tie the city together, but it was never conceived as such and in its current form never will. The artery is currently undergoing a major alteration, as to whether its future form will be successful depends on the quality of relationship which it creates with its context. There are actually two other systems which circumnavigate Boston, Route 128 and I 495. These two super freeways form rings around the city at ten and thirty miles respectively, but their distance from the central urban core dismisses them as urban elements. We can then surmise that the physical, radial structure of Boston has no real element which effectively connects the city as a whole, and we may thus speculate that the creation of such a connecting structure will produce the potential for the city to advance toward a healthier and more sustainable state.

The proposal of an infrastructure ‘Ring’ encircling Boston is not a new idea, but the purpose and demonstration of how the ‘Ring’ should be manifest has gone through many iterations, the Inner Ring Expressway, the “New Urban Ring”. This thesis poses yet one more possibility in this series. The alignment of this proposal shows the transit line circumnavigating Boston at approximately two to three miles from its downtown core. The lands along this corridor are varied in use and character. In general, much of this land was developed at the end of the last century, at that time industries in search of cheap land located in these areas, just beyond the city’s edge. Today derelict freight railroad right of ways make up a large portion of this alignment; railroads located in this area around
the mid nineteenth century in order to serve the new industries which
developed factories along this corridor. Charlestown, East Cambridge,
Cambridgeport, Allston Landing, and The Fort Point Channel all devel-
oped heavy industrial districts usually stretched along the rail lines with
worker residential areas flanking one or both sides. The corridor is also
comprised of some of the earliest suburbs; Brookline, Jamaica Plain,
Roxbury, and Revere all lie along this perimeter. Today the character of
this corridor is quite different. Most industries have either relocated or
dissolved leaving a deserted landscape along much of the old tracks, but
in other sections other uses have supplanted the old industries. Several
educational and cultural institutions are located on or adjacent to the
proposed 'Ring'; M.I.T., Boston University, Harvard Medical School,
Charlestown Community College, and the Museum of Fine Arts are all
directly accessible from this alignment. Two other major components of
the 'ring' are the Longwood Medical center, a large employment center
for the health service industry, and Logan Airport. There is an extensive
range of conditions along the 'Ring', from Affluent residential areas to
abandoned industrial zones. The intervention of a light rail line will not
equalize or homogenize these conditions, but it will serve to enrich these
areas by their connection.

The large tracts of derelict industrial land is not a phenomenon
particular to the Boston area, nearly every American city possesses these
remnants of the industrial era and in all cities these areas are sluggish to
adapt to the socio-economic change over the last thirty years. Becauces of
the similar course of events enacted in each American city these post
Industrial zones are usually located in areas near the city core, outside the old city boundaries but well within the definition of the contemporary city. In cities which have approximated the outlined transformations these circumstances are comparable and often in a more severe condition. Chicago, Detroit, and New York have immense expanses of post-industrial wasteland to such a large extent that a like proposal would seem absurd in these blighted zones, while other cities like Pittsburg, Milwaukee, San Francisco, or Toronto retain areas akin to the old industrial corridor of Boston which possess a potential for redevelopment.

The redevelopment of these post-industrial zones may be undertaken as a full fledged urban renewal project of the 50's and 60's, but as we have been witness to the disastrous outcome of these actions we can see a more sensitive approach may be more successful. These areas have a physical structure or pattern which supported the factory culture of its time. The railroad was the lifeline which supplied new materials and carried away products and waste, factories located along these supply lines and dwellings were arranged in close proximity to the factories. This model of growth is typical to any settlement based on commerce. The factory served as the center of these settlements and the railroad determined the location of the factory. New uses and activities must be sought and the conversion of the old freight railroads to urban transit may provided the impetus for their location. The old patterns of use have momentum which must be utilized; the reuse of the existing patterns with adjustments and amendments will effect better results.

This proposal at the urban scale attempts to affect a change upon the

(37.1) Western Frontier Town. Many of the cities and towns of the Western United States developed as clusters along the railroad, vestiges of these forms often remain today.
(38.1) Boston Transportation Map w/Proposed Transit "Ring". Double lines show segment of transit corridor to be studied in detail.

(39.1) opposite: Massachusetts Bay Area Transportation Authority-Rail Transit Map. "T" map showing new transit line dashed in.
entire city through the implementation of a circumferential light rail line. The rail line, through appropriate design, acts as a catalyst for the development of the ring or zone it occupies. This act is undertaken in hopes to provide an stimulus for an influx to the city and to reconstruct the notion of the city as a place of community.
Notes for Urban Infrastructure:

1 ie. the central artery built during the middle of this century passes over an important link in the Emerald Necklace parkway system, effectively severing the larger portion of it from the city center.

2 History of Modern Architecture, Bonovolo, pg84-85

3 ibid.

4 At the moment the Central Artery is being submerged and the old elevated structure will be dismantled. The new surface treatment is still under speculation. If treated properly the “memory” of the artery may a useful part of the city, if not treated as a genuine urban element the situation will remain the same.

5 A proposal during the 1940’s to create an elevated freeway ring around the center of Boston. The Central Artery is the only portion of the proposal which was realized.

6 The “New Urban Ring” is a joint proposal by a coalition of groups including the Boston Society of Architects and the Boston Metropolitan Business Commission. The Proposal suggests the development of the perimeter of the city core centering on transit as a stimulus.

7 This is true from the cities of the silk route to the railroad towns of the old American frontier.

(41.1) opposite: New York Central Railroad
Trains in the City
"By architecture of the city we mean two different things: first, the city seen as a gigantic manmade object, a work of engineering and architecture that is large and complex and growing over time; second, certain more limited but still crucial aspects of the city, namely urban artifacts, which like the city itself are characterized by their own history and thus by their own form. In both cases architecture clearly represents only one aspect of a more complex reality..."

Aldo Rossi
_The Architecture of the City_ (42.1)

The means of movement within a city is a defining element of its social and physical form. In studying the genesis and evolution of cities it may be noted that the form any settlement takes is, to a large extent, derived from the mode or pattern of circulation within and around that settlement. These patterns have a direct effect on the city’s propensity for the development of particular social and physical relationships. Therefore transit systems not only affect the physical qualities of the city they also affect our relationships within the city; man creates his environment and in turn his environment creates him. The implementation of new patterns or means of movement will have tremendous impact on the social workings of the city and therefore transit systems have the potential to make a vital qualitative difference on life in the city. This ability of transit to markedly alter the city could derive positive or negative effects depending on the sensitivity taken toward the existing city. The patterns of circulation in cities have a lasting influence; even as the economic or political dynamics of a city change over time, the major patterns of movement rarely do. Therefore the introduction of any major path must observe the existing patterns if it is to be successful.

Mass transit rail systems can have a meaningful impact on the urban landscape, both their direct and associated physical forms have a profound affect on the urban structure, but despite the potential for positive
development the implementation of transit systems in recent years has often negatively impacted urban areas, especially when associated with the automobile or elevated trains. Their disruptive quality is not an entirely inherent characteristic of these projects, but is in a large part due to the mindset in which they were designed. In most cases the integration of the transit systems into an existing urban structure was not well considered, rather concentration is focused on these systems as expedient, efficient, autonomous solutions; reactionary to congestion, but not synthetic to the total form of the resultant environment. Technical issues tend to predominate in the design of these structures, often to such an extent their end form becomes entirely self-referential. The original objective of these projects, to improve the urban condition, is overshadowed by a desire to fulfill statistical and policy objectives. Part of the mission of this thesis is to challenge the notion of urban transit as an autonomous technological phenomenon and to concentrate on how it effects the urban structure as a work of architecture.

Trains and transit systems have long been considered urban elements but have never been truly part of the city. They have at times been more intimate with urban life but more recently they are seen as technical feats, 'wonders of modern engineering', unconnected to the cultural or social phenomenon of the city. The image of urban mass transit in the public mind is that of massive steel structures suspending train cars high above the surface of the city or a labyrinth of tunnels burrowed beneath the city stratum. In either case there is a distancing of transit from the life...
and very nature of the city. This lack of intimacy between the transit system and its context has resulted in a strictly pragmatic and superficially functional view toward the movement of people through their environment. Under this reasoning, the efficient movement between destinations is the only criteria for assessing transit systems; the experience of traveling or the quality of the apparatus by which one travels is not directly evaluated, rather they are byproducts of the installation of an 'efficient system'. Contrary to the assumption that efficient transportation is the prime objective of transit systems I pose the notion of a transit system which places equal value on the experience of travel and the effects the artifice of travel induces upon the city.

I find the most potent experiences of a city to be not the destination points or the designed attractions but are instead the casual experience of relationships, physical and social, perceived while traversing the city. The act of traveling through a city allows one to realize its width and breadth, traversing it reveals its depth and its multi-layered juxtaposition of relationships. The method and apparatus by which one moves through a place determines both its experience and the ability of it to accommodate the various needs of its users. Compare the monotony and autonomy of a super freeway to the richness and intimacy of a city boulevard; both allow for the movement of people but in the case of the former transportation is its only aim while the latter is an integral part of its environment and is thus both a transportation system and a place or destination. The apparatus for transport is more than just a device which carries people (i.e., trains, cars, bicycles, shoes), it is the whole physical system of objects
and spaces (i.e., train tracks, roads, paths, walks) which allows one to move through an environment. The act of moving through an urban environment is what sustains the life of the city, without the possibility for casual and undetermined encounters the city has little potential beyond the preprogrammed determinations of its planning. Under a revised criteria which considers the cumulative effects of the transit system, the apparatus for transit in a city should create a richness of experience for those who utilize it as a system of transportation as well as those who encounter it as part of the urban landscape.

(44.1) opposite: Decending Subway Escalator.
Subways deny the city from the train passenger

(45.1) Paris Boulevards.
The boulevard is an element of the city transit system yet it is a major element of urban life.
There have been many projects which have explored the capacity for transit systems to impact the form of settlements. Though these explorations are wide ranging most examine the transit system as the generator of a complete form. That is to say these projects rarely examine the intervention as an element which is ‘naturalized’ or integrated into the existing city fabric. Rather, these projects usually display a comprehensive urban complex or even the whole of a city generated from the alignment of a rail line or other transit type. This approach was dominant in the planning efforts of the high modernist; Le Corbusier’s plan for Algiers, Paul Rudolph’s proposal for a megastructure predicated on transit in New York City, Yona Friedman’s proposals for elevated cities, and Kenzo Tange’s floating city in Tokyo bay are all examples of this paradigm. This shift in logic reexamined transit as more than transportation, yet it still considered the implementation as an autonomous act and did not make the connection between the artifact and the city.

Le Corbusier’s excursions into the practice of urban planning, like many of his contemporaries and followers in CIAM, had a decidedly didactic, polemical quality. His urban proposals are marked by a clear functionalist style and thick with analogies to the machine. Their visions showed a technology based or technology ruled future. Shining and new these images were seductive, technology promised to be the savior of the future and under such a theme it may have seemed appropriate to leave human desires out of the equation. We have learned from the mistakes of those projects. Learned so well that we now shy far from the visionary role these architects had taken on. Corbusier’s plans have incredible
(46.1) opposite top: Plan for Algiers, Le Corbusier
(46.2) opposite bottom: "Plug-in-City" in Tokyo bay, Tange

(47.1) above left: Linear town, Novogrod
(47.2) above: Superstructure City, Y. Friedman
(47.3) left: Brazilla, Niemeyer
foresight, but they suffer from the afore mentioned schism between planning and architecture. Le Corbusier the architect displayed a facile hand in the design of buildings, synthesizing function, experience and symbolism. Le Corbusier the Planner was unable to incorporate the same sense of experience in his urban designs, only a raw functionalism and a machine symbolism were manifest. In the plan for Algiers\(^1\) the rather traditional city zoning proposal also includes an innovative plan for expanding the city with one enormous structure, a linear element extending several kilometers in a sinuous pattern along the Mediterranean shoreline. Within this one structure exists all the functions of a city: dwellings, markets, civic institutions, topped by a high speed roadway, and seated on a rail line as the foundation. This structure is conceptually enticing, but as rendered in the proposal its monolithic and insular nature promises little relation to human experience or its context except that of a stark contrast. Though this plan was never executed it succeeded in challenging the singularity of infrastructure projects by incorporating it as an architectural element. Other projects which followed this model often expanded the division of the intervention from the context. Megastructure and strip city proposals would only be realized as the genesis of new urban entities rather than adaptations or reconfigurations of the real city.

Searching beyond references of this century reveals a number of instances of positive urban infrastructure, but few are sufficiently similar in nature or scale to the contemporary transit project to draw relative observations. The Aqueduct in Segovia, Spain (though not a system for transporting people) posses many characteristics pertinent to the present
discussion; it is a physically autonomous structure, fully concentrated on its objective of transporting water. Despite this singularity of purpose the aqueduct acts as much more, it is an essential and integral piece of the city structure. The major formal difference between Segovia and the modernist proposals is the treatment of the edge condition, the interface between city and monument. In the rendering of Rudolph’s New York megastructure attention is concentrated on the articulation of the physical structure while little effort is expended on understanding the relationship between the intervention and the city fabric. Portrayed are innocuous strips of greenery flanking the “building”, devoid of any urban character or value. The city is shown as a backdrop for the notion of augmenting transit with housing and other uses. Conversely in Segovia the spaces arrayed along the aqueduct vary in response to the adjoining fabric; streets, squares, and crossings are created by this variation. The result is a significant landmark which serves as the definition and connector of a system of public spaces, the core of the public structure in Segovia. The interface between the aqueduct and the city fabric is appropriated by this system of spaces rather than through any extension or augmentation of building form. Of course the aqueduct’s influence is also derived from its historical symbolism and monumental construction. In the design of a new infrastructural element this model has a limited relevance; the definition and continuity of the aqueduct as a spatial system is an observation worth considering.

Looking beyond modernist theory or ancient models we can find a
wealth of examples from the late nineteenth century. This period was an economically prosperous time for western nations, intense investment was focused on cities and public transportation was recognized as the best way to promote their development. This was the golden era for inner city rail transit, new technologies were being tested from Berlin to New York to Los Angeles. For a time elevated rail systems became the most desirable choice; they were quicker, cleaner and less disruptive than streetcars, and less costly than underground subway systems. Elevated rail lines were implemented in many major American cities around the turn of the century, since then most have been demolished and replaced.
with underground lines. The destruction of the elevated lines were in reaction to the blighting physical effects of these structures. Since that time the focus of urban rail transit has been concentrated almost solely on the development of subways, stigmatization of elevated rail systems has disallowed further exploration of the elevated rail type. Only recently has there been the consideration of it as being a viable option and then only in a banal manner, concentrating on the methods of minimizing the intervention and negating its impact. The positive effects of these types are rarely considered and the qualities of these structures as an articulate and powerful image of the public presence is never addressed. The explorations of the past century are good examples of both how and how not to employ these effects.

In Chicago the ‘L’ or elevated train lines are deeply rooted in the structure and consciousness of the city, they serve the city in both a symbolic and functional manner. The population of Chicago holds an affection towards these structures, yet the actual physical presence of the ‘L’ is not accommodating to the city inhabitant. In downtown Chicago the ‘L’ loops around the city core creating a strong edge along the perimeter thus defining a highly imageable city center. The loop structure supports a track platform approximately one and a half stories above the street level. This makes for a kind of wall which one must pass through to enter or exit the city core, an effect not undesirable, but this suspended platform virtually blocks out all light to the streets along which it is aligned. The experience of walking a street with a massive steel structure looming above is at first sensuous, one is enshrouded in shadow and the street
seems a different world from that experienced a block away. Images of Corbu’s urban dreams and machine analogy come to life in a distorted and very real form. After this alien quality of experience passes one may realize the true hostility of an environment continually deprived of light and frequented by activities which prefer darkness.

The elements of this system which are most complementary to the city are the stations. They are located directly above the center of the intersections of many of the most prominent intersection in Chicago. The station houses are solid, bulky elements with a similar forms yet varied in detail. They float above the streets like small temples or ediculi commemorating important spots. The effect is a highly identifiable form which is incorporated into one’s mental map and thus orients the city. Over time, the loop has retained its form as a autonomous element, this may account for some of its more adverse affects. Its original design did not have a propensity for addition or integration, along with this its singular nature the transformation from a utilitarian transportation system into a cognitive symbol in the city should be noted.

Boston’s elevated rail system, the Orange Line, which extended from east Charlestown (Sullivan Square) through Boston along Atlantic Avenue and down through Jamaica Plain and Roxbury. Like most others, it was torn down in the mid seventies. The old Orange line was suspended above many major streets which, despite of, or because of, the elevated line, were very active elements of the city framework. The installation of the new Orange Line as a subway and dismantling of the Old Elevated was intended to restore these streets to their former prominence and
pedestrian orientation but most of the affected areas have not assumed their previous stature or even the level of activity which was encouraged by the elevated. Why this happened one can only speculate, but I would assert that despite the adverse effects of elevated transit structures that existed in Boston or still exists in Chicago, they provide an urban landmark and a very real representation of what is public domain.

One of the few projects which has achieved both a synthesis and prominence in its context is Otto Wagner's Metropolitan in Vienna, the inner city rail transit system of Vienna, designed by Otto Wagner in 1894 to 1897. This transit system is an outstanding example of an integration of architecture and urban design as well as a union of technology and culture. Wagner designed the Metropolitan as an above ground, partially elevated, and entirely dedicated transit system. It was designed and implemented as an architectural element and works elegantly as a service and physical entity of Vienna. This attitude toward its design is evident in many of its characteristics which display a sensitivity to the city environment. The position of the train in the landscape considers the experience
(54.1) above: Rendering of Rail Bridge, Vienna, Otto Wagner
(54.2) right: Detail of Bridge, Vienna, Otto Wagner
of the pedestrian and the transit user, a number of sectional studies shows the relationship of the train to the environment and a conscious effort to create a positive affect on the part of both. The Sections of the rail line which are elevated are handled deftly by incorporating them into understood forms of the city. Some stations are built to fit into the block structure, while others that require more prominence are designed as pavilions which stand apart. One section of the elevated structure is a heavy masonry arched viaduct which was designed to be inhabited beneath the arch supports with public utilities, such as police and fire stations. This innovative approach embraces and celebrates this public service and thus elevates it to an amenity to be used and seen.
This investigation of urban rail transit is just one proposal of what is an evolving urban ‘building’ type. The point of departure from previous models begins with a change in the attitude toward these structures, alien and autonomous. As is revealed in this study, elevated rail systems are a comparatively young transit technology which has resisted adaptation to a ‘domestic’ situation. The twentieth century fascination with technology and the identification of transit structures as a purely technological phenomenon has promoted their divorce from the social and cultural aspects of the city. If we cease to think of the train as foreign, technological gadgetry, and consider the rail structure as a matter architecture it will evolve into a more useful form within our cities.

To institute a shift in attitude we must focus attention on the physicality of the transit structures relative to the city, the experiences which comprise the architecture of the city include streets, buildings, monuments, plazas, gateways, etc.... The design of a transit line must include a variation of experience which can relate to these specific conditions, imitate them, and transform them. Therefore the object is designed not as a complete ‘building’, but rather as the framework from which urban experiences can be developed.
(58.1) opposite far: Sketch of New Street. Rail structure absorbed into street facade.

(58.2) opposite near: Sketch of Massachusetts Avenue Crossing. Attempt to span street without adversely affecting the area below.

(59.1) left: Sketch of interior Arcade. Rail structure used as superstructure for infill of commercial uses.
Note for Trains in the City:

1 The Plan for Algiers is actually one of Le Corbusier’s less radical urban proposals. Others, such as the Ville Radiuse are even less sensitive to the architectural and experiential qualities of the designs.

2 As Kevin Lynch explores in his treatise “The Image of the City” one of the key elements of creating places is defining the edge.

3 Dedicated refers to the separation of a transit system from any other interference.
Site Discussion
"Just to consider this area in itself means to recognize that there are both specific and disparate qualities within parts of the more general urban whole. This aspect of urban artifacts is extremely important; the recognition of their specificity allow us to understand their structure better."

"The second proposition concerns the spatial continuity of the city. To accept this continuity means to assume that all those element which we find in a certain region or within a certain urban area are artifacts of a homogenous nature, without discontinuities. This is a very controversial assumption, and we must continually return to it and its implications. (For example, it would deny that there is a qualitative leap from the historical city to the city of the industrial revolution. It would also deny that the open city and the closed city are different kinds of artifacts.)"

Aldo Rossi
*The Architecture of the City*
(62.1)

With any project the larger the size the lesser the depth of the design; this is also true in the design of a large scale project the magnitude of a transit line. This thesis investigation is an attempt to comprehensively explore the architecture of urban infrastructure. Therefore in order to ‘dig’ as deeply as possible over the course of one semester I have limited the extent of design to a section of the transit ring sufficient to study various general conditions, yet small enough to comprehend as a cohesive city district. Limiting the size of the study area to an identifiable district allows one a better understanding of how the area is structured and thus a more precise design reaction.

Forms produced in the process of design are derived from the conditions existing on a site, but these forms are always resultant of a synthesis between ideas and realities. Under the auspices of a thesis the idea is of central concern, thus in approaching this thesis I considered the site a foil through which the investigation of transit potential could be undertaken. The reasoning applied to the design on this site may be utilized on other sections of the transit line or in application to other sites and infrastructure types. My hope is to make the design as transparent as possible so as to clarify the thinking process and polemical meaning. Despite the precedence of concept over site in the thesis process it does not excuse one from rigorously studying the site, especially when the concept is contingent on
The selected section for study is an existing rail right of way located between the campus of the Massachusetts Institute of Technology and a residential area of the City of Cambridge known as Cambridgeport. The rail road tracks within this corridor are currently used as a storage spur of the Boston & Albany Rail Road company, but for the most part it is a derelict rail line. The history of this site is typical of many areas in American cities which have gone through the transformation outlined in an earlier chapter. Though the site is adjacent to a major institution of higher education and a stable residential area, the lands immediately adjacent to the rail line fall under the definition of a post industrial remnant.

The site was originally a marshy area of little value. The original settlement of Cambridge was located in the area now considered Harvard Square, approximately one mile west of the site and Boston lay approximately one mile north and west. Despite the close proximity of two major town centers the area was largely ignored until industrialization arrived in Boston. Most of the development that did occur before the mid nineteenth century was toward the north edge of the study area where there was existing dry land, the bulk of the activity was clustered along Main street (now Massachusetts Avenue). This avenue lead to the West Boston Bridge, the main connection between old Cambridge and Boston. Cambridgeport remained an area of slow growth with only a small portion of it settled as a residential suburb, the rest being marsh and farm land. This all changed with the coming of industrialization; the rail road was built over the marshy mud flats between 1848 and 1855. With this act
the area was transformed in quick succession. Following the implementation of the railroad, the marshlands were filled in to the line of the railroad embankment. Heavy industries located in the area building factories adjacent to the rail road (the life line of supplies and materials). The sleepy residential area west of the new tracks was soon transformed into a densely populated residential district, mostly occupied by the incoming factory workers. The most intense industrial growth took place in the area between 1860 and 1915. The growth was so intense and pressure placed on the area was so great at the begging of this period of expansion that by 1880 there was a keen interest in developing the marshland east of the rail road embankment. The mud flats were filled and a sea wall was built in hopes of duplicating the type of development which took place concurrently across the river in Boston’s Back Bay. The infill was completed by 1910, but due to a change in the cities economic base the dreams of creating an upscale, residential enclave was never realized. In 1912 MIT made a decision to relocate its facilities to the newly filled lands, an action which set in motion a new dynamic between Cambridge and the district of Cambridgeport.

The movement of MIT to Cambridge around 1915 and it subsequent expansion marked the decline of industry in the area and as a trend on a much larger scale around the nation. The small technical institute of MIT underwent a period of unimpeded expansion from 1915 to the mid 1920’s the campus enlarged to claim most of the land along the filled embankment, a triangle of land defined by Main street, the Charles river, and the rail road tracks. The block created by MIT never allowed the infilled river
embankment to integrate with the larger structure of the city effectively creating a highly dynamic economic force within an inert physical presence, a description still true today. The expansion of MIT applied pressure on the heavy industry adjacent to the campus eventually squeezing out many of the already faltering factories. The exodus of industry immediately made the rail line, which did not exist as a direct connection between destinations, an inefficient and obsolete entity. Thus this rail corridor which was a major organizing feature of the area’s development now serves as more of an obstacle than a participating element in the city structure.

These historic events have shaped the resultant city and the qualities it now exhibits. How well we may guide its future depends on how well we interpret these resultant qualities and organization. At present the area is still reacting to the actions which took place in the early part of this century. The fall of industry has left a void filled only by the rusting and vacant artifacts of its existence; the once vital factory district formed and fed by the rail road corridor now lies impotent, sitting like the skeleton of an enormous and powerful creature. Though sometimes seemingly invisible this forgotten corridor has a huge effect on its neighboors. MIT (an already insular institution) is isolated, like an island, by the rail road, but this dividing element is without the positive qualities of a waterway. The residential area of Cambridgeport has again transformed from worker housing to a highly varied set of neighborhoods with a large population of students. As housing for the workers, the neighborhoods were aligned to easily access the factories and therefore did not develop
Approaching a City, Edward Hopper

This painting has a strange similarity to the site of study, if not exact in form close in feeling.
(68.1) opposite far: Rail Corridor looking South West
(68.2) opposite near top: Massachusetts Avenue, near Central Square
(68.3) opposite near bottom: Rail Corridor looking North East

(69.1) top: Site Graphitti
(69.2) bottom: Cambridgeport Residential Area
strong ties to the larger urban structure, except for those created to connect to the nineteenth century city. As a result Cambridgeport has few connections to outside the area via public transport or major roadways. The neglected industrial zone acts like a wedge between its neighbors and the larger urban whole; it previously acted as the spine and life line for this area and still holds this potential. Slowly other uses are occupying the factory structures, but a sustainable life will not return to the area until its central element is retained as an active participant. The railroad served private interests but was the center of the community at large, reviving it as a public entity would endow it with an even greater utility and meaning. The intent of this proposal is to reinvigorate the area utilizing the existing city structure; the conversion of the original freight rail line to a light rail transit system will act as a catalyst in reactivating the urban structure.
The following analysis is compiled from research and observations conducted by the author during the time in which he was in residence in Cambridgeport. The perception of a city is always dependent on the situation and disposition of the individual and will vary between individuals and over time. To arrive at an unobjective analysis, inclusion of a large study group must be made. Such an exercise would involve an enormous amount of time and effort, and as an academic exploration was not deemed necessary. The following analysis and subsequent urban proposal is prefaced by the understanding that these are observation of an individual who was a resident of both the neighborhood of Cambridgeport and the Massachusetts Institute of Technology.
(74.1) above: Diagram of Cambridgeport’s Public Buildings and Spaces. Note the lack of interaction of MIT with the city’s public structure.

(74.2) above right: Diagram of the Area’s Potential. Growth areas and crossings.

(74.3) right: Diagram of the area’s Problems. Barriers and blighted areas.
(75.1) Cambridge Land Use Map, 1915.
Recreation Area
New Canal
Community Park

Cambridgeport Neighborhood Station
Allows additional dwelling in area.
Center for residential area.

New street
Adjacent to rail structure.
New Street Crossings
Encourages movement through new "enterprise" zone

Commercial Arcade
Major station stop above arcade

First Urban Design Proposal
Site Plan
Includes Cambridgeport and MIT West Campus
(76.1 + 77.1)
(78.1) top set: 1"=100' scale Model Showing the First Proposal

(78.2) bottom set; Diagram showing the various sectional relationships of the rail line along its length.

(79.1) opposite: 1"=100' scale Model looking North East
Urban Objectives

- Positive reuse of the industrial urban structure.
- Create a new spine which has a definite public quality and will serve as a framework for later development.
- Develop nodes which can be both collectors and 'gateways'. Crossings at Massachusetts ave. and Putnam ave. will define the edge as well as create connections between areas.
- Facilitate connections between M.I.T. and Cambridgeport to normalize the relationship between these specific areas.
Notes for Site Discussion:

1 This particular length of the Boston and Albany Railroad was never a major route of travel. It was a destination and transferal point for goods and material, but does not connect any major service destinations directly.

2 Dates and events of the history of Cambridgeport taken from the Survey of Architectural History in Cambridge, Cambridgeport volume.
Rail Prototypes
The architectural implications of planning decisions made at a very large scale often do not complement design decisions made at a very small scale. This disparity is caused by adjustments and amendments which cannot be foreseen at the start of a linear design process and is the result of the schism between the practice of urban and architectural design which excludes participation from the architect in the conception of a project and discourages continued input from the planner in the design of a project. In the production of large and extensive projects such as transit, both ends of the scale should be investigated and understood before hard and fast decisions are made. If an interaction between the scales of design is not attained and the process is divided into discrete segments the conflicts which arise between the projects conceptual basis and its realities of implementation may never be resolved. To avoid difficulties of this sort, tentative exercises could be utilized to study design phenomenon at all scales. As mentioned earlier, a dialectic method is utilized in this thesis to address the process of designing the proposed light rail structure. The previous chapter examines the project at the city size, the following study outlined in this chapter examines the transit structure at an architectural scale. At this size issues of form, light, and inhabitation are central to the investigation and the experiential quality (both physical and symbolic) is revealed. Gained from this study is a
knowledge and insight of what physical form the rail line may take and the consequences of it as a work of architecture. From this a better grasp of the effects of the urban design is realized.

Focusing on a small section of the total design opens avenues of possibilities not perceived at a less intimate scale. Designing at a large scale, birdseye view will provide an understanding of the scope and intent of the project in regards to the city, but will reveal little about its experiential qualities; the condition of the pedestrian within the realities of the intervention is thus unknown. The quality of the physical apparatus is limited to pre-existing images and models held in the mind of the designer; such is the death of innovation. If desired experiences are not incorporated in a project's conceptual genesis then larger urban moves (no matter how innovative) will only be hollow gestures.

The notion of transit and what describes its physical qualities can be constructed from greatly disparate sources, a foot path to a interstate freeway. If we are to limit the range of these sources to elevated rail transit systems we are still left with a large array of interpretations. Examples from this category date as far back as the mid-nineteenth century and they range from wooden to suspended steel to reinforced concrete structures. This diversity of forms has a common attribute which almost every elevated rail transit system displays; this commonalty is not based on a physical articulation of the structure, but rather is a shared conceptual process in the generation of the form. Most of these structures are designed as autonomous urban forms and stand apart from the city fabric, divorced from the city they serve. This is understandable, for
reasons of noise, vibration, and movement, some separation is necessary; the act of elevating the train is in its first impulse, an effort to distance ourselves from the adverse effect of the moving train. Common train and rail technology has reduce the disruptive quality of modern systems to a point where only a minimal amount of separation is required for acoustical and vibration abatement, but elevated structures main benefit is the provision of free movement. Displacement from the urban surface allows for unobstructed movement of the train above and separate activities at the ground below.

It is not the separation of the transit vehicle which is problematic. In fact by elevating the system a greater urban potential is produced than is present in either ground or subterranean systems. The problem or missed opportunity, resides in the design of the structures which actually elevate the trains and tracks. These structures tend to be self referential, products of engineering and technique. Far too little emphasis is placed on the experiential quality of the structures. The designers must observes the fact that these objects sit on the ground, hang above our heads, and do have an intense interaction with the city and its inhabitants. Since these structures are of a public nature one could assume that their interaction with the public is sympathetic, but such is not the case.

As discussed in a previous chapter most of the elevated rail systems built in the nineteenth century possessed a singularity which in their juxtaposition upon the city gave them some seductive qualities, but for the most part these systems were incompatible with a pedestrian presence. Another model, though not of a public nature, is the monorail
systems built in the Disney theme parks. These sleek and minimal structures also inhabit many fantasy images of the future city. Monorail systems reduce the track platform to a thin rail which when supported high above the ground surface will cast very little shadow. The high elevation also offers a different perspective of the surrounding landscape. This is a strategy which attempts to solve the problems of the previously discussed systems through minimal impact. This is a logical approach, but is again predicated on the denial of the transit system as an integral urban element. Transplanting such a structure into an urban context may reduce
the adverse affect of other elevated transit types, but it also negates the potential of utilizing the structure for any other purpose than transportation and increase the image of the trains as an alien object in the city. Rather than further the division between transit and the city these public works should increase their intimacy.

Boston’s light rail transit system or the ‘T’ demonstrates the closeness possible between city fabric and rail transit, though in an ad hoc manner. The older lines display these characteristics more often than the more recently installed routes; most likely because the city has had time to ‘grow in’ around them or possible because of a change in the perception of their relationship to the city. Both the red and the green lines make themselves an integral part of the city by weaving in and out of the urban fabric. They do not strictly adhere to the street pattern instead they invade the city’s block structure and are run immediately adjacent to buildings. These two lines achieve an intimacy with the city rarely seen in American examples, unfortunately they do little with this situation. Though physically knit into the city neither line proposes or infers a change in the environment, except by their presence as a transportation service.

This exercise explores the design of a typical section of the elevated transit structure and entails the development of a series of iterations carried out in model form. The models were designed at 1"=8’ scale, a scale sufficient to examine physical effect pertinent to the pedestrian or inhabitant. The typical section is an abstracted portion of the transit line where it is located adjacent to the street and in which case the structure
would effectively act as street frontage, a street wall of sorts. This situation offers potential for inhabitation of the area below the tracks and between the structural supports and also requires thought as to how the image or public face of this structure should rendered.

Certain properties of this section were assumed to make the studies useful as a comparison exercise. The structure is to allow two or three inhabited stories, the first of which is to be of a public nature. The uses to fill these spaces created by the intervention would range from civic to institutional, from commercial to light industrial. In reference to this particular site, the expected uses are offices and labs on the upper floors with retail and commercial on the ground. Dwelling units could possibly be incorporated into the structure, but probably not directly beneath the rail platform.

The strategy considered for implementing a system with infill uses entail the design of support structures adaptable enough to accommodate many uses and allow for a large amount of flexibility. The specific details of the infill would not be directly designed except where the use is civic by nature or is associated with functions of the rail system, such as station stops.

The use of this exercise greatly altered my original conceptions of what would be an appropriate architectural form for the rail structure and made me aware of issues I did not consider at the outset of this process. This series of models shows a transformation from a section which is an alteration of the existing condition to an invention of a new urban type.

I began the exercise with a rather conventional and somewhat awk-

(87.1) First Prototype Model.

(87.2) Garfield Boulevard, Chicago
(88.1) above: Second Prototype Model. Wall like center support acted as a facade.

(88.2) above right: Third Prototype Model. Center support with more articulation.

(88.3) right: Fourth Prototype Model. Center support reduced to a facade wall, steel columns added.
ward interpretation. The model shows a very high track platform raised on a heavy steel structure which is inhabited beneath, the propensity for use is realized only through the articulation of the ground plane and the first floor. This first model displayed my preconceived image of how I could see existing rail structures to be inhabited and was only a small step towards a shift attitude. I then progressed through several iterations which concentrated on the quality of the intervention as a facade. The scale and quality of the street frontage was studied in regards to the pedestrian experience. Though an interesting idea I found these models to be self contained and not so applicable to the objective of integrating the

(89.1) above: Inhabited Viaduct, Metropolitan
(89.2) left: Elevation of Fourth Model.
(90.1) above: Fourth Prototype Model.
“Support” model, supports are perpendicular to transit line and act as access for the infill uses below.

(90.2) right: Elevation of Fourth Model.
Supports are highly articulated for identification as a public element.

(91.1) opposite: Elavation Study.
structure into the city fabric. These studies centered on the articulation of the object, as if it were a entire building rather than a framework for potential buildings. The final prototype in this series is the one I brought with me in the continuing design exploration. It was actually the most quickly and roughly crafted of these models, but the concept behind it is the furthest evolved. This scheme proposed the structure to extend into the adjacent areas, changing the emphasis of the project from an inward to an outward focus. Instead of utilizing a continuous linear structure the supports were turned perpendicularly to the line of the train tracks and extended beyond the limits of the rail corridor. This move allows the structure to interact with its context rather than act as a strictly distinct
object. These supports are comprised of two reinforced concrete planes spread apart with sufficient dimension to allow light and air into the resultant space. Infill uses are placed in the area between these pairs of supports and is configured so as to provide for a variety of uses. The supports function as more than structural members, they provide lateral and vertical access for the spaces above and behind the areas with immediate street frontage. They effectively act as a service cores for the infill uses adjacent to each support, they may be utilized for circulation, hard utilities, or connections through the site; an idea gleaned from the housing systems developed by John Habraken in the Netherlands. In his designs heavy structural and utility elements are combined and arrayed so as to allow for a varied and coherent environment. Beyond this utilitarian aspect of the supports they may also be seen as a spatial pattern or language which will be consistent but varied throughout the city. This spatial language is the begging of a meaningful expression of the public quality of the structure, it will enable the transit line to define and identify distinct portions of the city.
Architectural Objectives

- Create a useful structure, more than just an apparatus for raising a train off the ground.
- Develop a structure responsive to human scale.
- Provide other services to encourage inhabitation (electricity, communications, water and waste).
- Create a structure able to adapt to several situations and fulfill various functions - station, façade, street edge, gate, bridge, wall.
- Provide a stable and identifiable element in the urban landscape (a horizontal monument or landmark of sorts).

(92.1) opposite: Axonometric of exploded Support Element.

(93.1) left: Sketch looking into a "Support"
Notes for Rail Prototypes:

1 Recent train technology such as monorails, have very little noise disruption. Research is being conducted on magnetic levitation technology which virtually eliminates noise and vibration. Also despite the perception disruption associated with rail vehicles, studies show the relative distraction caused by train noise is far less than that caused by automobile noise.

2 Though residential uses are not the primary tenant of these structures it is possible to locate dwellings in close proximity to the train line, as is seen in figures (85.1), (85.2), and (86.1). These dwellings are not typical in the city, but they are of standard market value and have a novel aspect about them.

(95.1) opposite: Train & Cow, Bimmelbahn
Transit Architecture
The previous two chapters were discussions of process from the opposite ends of the design scale, as an urban plan and as an architectural prototype. Each examined the potentials of transformation upon the subject of infrastructure, either as a part of the urban landscape or as an urban archetype. In this further design exploration the knowledge and objectives derived from these two studies are brought to bear upon the design of a specific architectural intervention in a specific context. The following chapter discusses the final act of bringing the two dialectical exercises into a dialogue and resolution.

With the knowledge of both the intentions of the large scale plan (an awareness of the appropriate needs for the specific context) and the intricacies of the small scale intervention (an understanding of the physical potential of the architectural form) I attempted to resolve their conflicts through design. This process requires the continual alternation between scales and issues. Fluctuating between sizes allows a full grasp of the whole, adjusting the design with each shift, like a radio indicator needle wavering back and forth until homing in on a particular signal. Unlike the radio tuner the process of design has no preset channels, with every swing of the needle, design adjustments may open up new possibilities. This would seem an endless process where each study would add a new set of design paths infinitely increasing the number of design
solutions. The judgment of the designer is the limiting factor in this continuous purification of ideas, thus the values of the designer have a direct bearing on the track taken in any design process. We as designers must take it upon ourselves to examine our values in light of society and the environment at large. If we are to take a large role in the creation of our cities we must take responsibility for our action which affect these larger issues.

The production of the previous exercises was not a concurrent process, the urban proposal preceded the investigation of prototypes. Therefore the most immediate task was to adjust the urban design in accordance with the physical and experiential aspects of the architectural prototype. This reworking of the larger decisions concentrated on adapting the idea explored in the last model of the series of prototypical sections: extending the transit structure into the urban fabric, creating a legible spatial structure, and devising a system of supports and infill which may sustain and simulate appropriate inhabitation. Also affecting the revision of the urban plan was knowledge of the physical attributes of the proposed structure, how it affects and is affected by light, movement, and perception. These ideas were conceived in terms of a small scale architectural model and needed adjustment to the specific site conditions. Transferring these forms to the urban scale changed the dynamics of the original proposal. The system of supports and infill which were oriented perpendicularly to the direction of the train tracks created new potentials for this design which would have an even greater impact on its context than previously considered. It was observed that the most important of
"...its use of rhythmic patterns that are continually establishing yet departing from regularity. The quest for rough spontaneous freedom rather than elaboratory cultivated tradition, which reverberates through the entire gamut of American culture, has been powerfully expressed in that most American of music — Jazz....Like a Jazz session of free acting individuals with their own "voices" and "sounds", this house is an ensemble of many differentiated parts, all loosely organized into contrasting domains like units of a musical group..."

Henry Plummer
"The Potential House"

these potentials was the connective quality of the structure and is felt that the form of this system should encourage the interaction between the opposite sides of the site, or at least define their relationship\(^1\). The orientation of the supports may be thought of as lines of opportunity, similar to column lines on a set of architectural construction documents. The force of these lines extend far beyond the boundaries of the building site and are built upon or left unrealized depending on the specific instance\(^2\). The placement of these support elements at an equal distance produces a rhythm along the entire length of the project. The rhythm is kept consistent except where conditions demand or accept a deviation, like a musical score there is a selected tempo within which the piece is constructed, if considered correctly the tempo should be synchronous with that of its context. The American city does not act as the work of a classical composer where each note is in harmony with a larger intent, rather the city is more akin to an interpretive jazz session, a base rhythm is kept in union but each performer may take liberties in the interpretation of the theme. In a like manner this intervention establishes a basic theme that may be departed from as it is infilled or as it comes in contact with particular situations. The richness of a jazz performance comes from the individual interpretations of the performers, the richness of this project is actualized by the variation built within the system.

The main objectives of the previous design were retained, but the physical articulation of these concepts were altered, some fairly dramatically. The south east end of the site, near the river crossing was only altered slightly. Modifications were made to the canal and community
(99.1) Large Scale Gesture Model, Plan
center/rail station to encourage more activity and use of the area; Shortening and widening of the canal for better navigation of recreational watercrafts, inclusion of a recreation center, and the development of the terminus for the new street addition.

The new street proposed in the first design was relocated from the north to the south side of the structure, taking advantage of the sun orientation and improving the relationship to MIT. The realignment lets the new street “face” the institute. The larger mass of the transit structure is placed on the east side of the street, allowing the structure to present a facade toward MIT and extend into Cambridge. These extensions may act as tentacles or veins infiltrating the now vacant lands. They will serve as a support and organizing system (as it was conceived as a prototype) for future development.

Special consideration must be taken for areas with existing buildings, the transit structure may weave between integrate with the existing buildings. The area of the site where such potential exists is occupied by several large industrial buildings on either side of the tracks. The track location and unusual depth of the block are a result of the previous industrial use. The insertion of a new structure within the block opens the possibility for passages crossing the block and activation of the unutilized interior.

The north end of the site at the intersection of the transit line and Massachusetts Avenue the interior arcade of the original design is replaced with more decidedly urban intervention. A small plaza space is placed to one side of the structure which acts as the “foyer” to a perfor-
mance hall created by an extension into the adjacent industrial warehouse.3

There are many variations that occur on the site, but these descriptions typify the general areas which constitute the length of the transit line under study. Beyond this length many other situations are likely to occur, the design of the particular intervention must be considered separately yet be based on the rhythm and theme of the whole.
Final Urban Design Proposal
Site Plan
Including Cambridgeport
and MIT West Campus
(102.1 + 103.1)
After examining the interface between the urban plan and architectural model at the larger scale, there was sufficient knowledge of the urban intentions and relationships to approach a detailed architectural design of the specific intervention. Again, the work required a shift in scale to study the appropriate issues. This set of models were designed at 1"=16′ scale, a scale in which both architectural detail and urban relationships may be explored. The full size of the site being approximately one mile in length discouraged the design of the entire site at this scale, instead a number of sections were selected to be explored in detail. Each section was taken at an area along the transit line that displayed different characteristics. Choosing a variation of situations was intended to explore how the project would react to differing conditions, the flexibility displayed in the system portrays the project in a larger arena, lessons learned here apply to many other urban settings.

The sections selected for this detailed study are described in the preceding urban design in this section. The four areas are most typical and applicable in the site of study: the intersection at Massachusetts Avenue, the inner block infill, the streetfront condition, and the waterfront recreation center. The following describes the particular attributes of the section studies and their design logic.
(106.1) above: Rail Bridge at South end of Site.

(106.1) right: Ponte Vecchio, Inhabited Bridge
Example of an element of infrastructure turned cultural amenity.
At this location the rail connects to the new/old canal which will serve as an amenity for both the Cambridgeport and M.I.T. residential areas. At this point the rail structure makes a transition from building to landscape. In all situations the rail structure can be utilized as an apparatus to enhance the function and experience of the city. Where the rail is incorporated into building forms it may serve as an ordering structure (as is seen more clearly in other sections) and where it moves into the landscape it may also order the environment as well it will create a spatial understanding of the landscape and signify a public quality of the space.

The proposal at this location presents itself at once an object and an element in the field. As a recreation center the rail structure may stand apart from the fabric as an important building. As a landscape element the rail structure serves to facilitate access to and use of the water.

The physical presence of the rail structure approaches a minimum in this section yet its use is possibly most explicitly public. As a prototypical response this illustrates the potential of the rail structure to participate in the city, even where it stands alone.
(108.1) above: Waterfront at Night
(108.2) above right: Waterfront Model, from West
(108.3) right: Waterfront Section

(109.1) opposite: Waterfront Model, from East
The infill of uses beneath rail structure activates the street, effectively re-inventing the rail line as a building and streetfront.
**Streetfront**
Adjacent Street
(111.1) Site Plan

In this section a new street is introduced along the south east side of the elevated structure thus giving the rail a street frontage. The allocation of street space exposes the physical structure of the rail and designates it as a facade thus incorporating it as a actual piece of the city. The structural supports for the elevated rail can act as 'supports' for the uses which infill between them. They also present an open or public quality to the street representing the public nature of that which it supports.

The structure of the rail may act as a strictly pragmatic or highly symbolic element. In this proposal it acts as a spatial reading of the city foremost then from this function and symbol are synthesized. The supports are paired and the space provided by each pair is a semi-public space which supply access and other services to the infill between the pairs. This system develops an understanding and association with a physical apparatus of the transit system as the point where the public realm and the private domain meet in the city.

This section is the most common condition which may occur along the transit line. This response as a prototype considers most carefully the rhythm and reading of the urban fabric and the interface between public and private.
(112.1) above: Streetfront at night.
(112.2) above right: Streetfront model, Elevation.
(112.3) right: Streetfront Section

(113.1) opposite: Streetfront Model, Aerial form east.
(114.1) above: Elevated Station, Chicago
(114.2) right: Site at center of the "Industrial Block".
Inner Block
Infill and Crossing
(115.1) Site Plan

At this location the rail is contained between existing buildings and possesses limited points of contact with adjacent streets. The depth of the inherited industrial block does not allow for crossing or access to the interior of the block. The rail structure if only aligned with the direction of travel of the transit vehicle would not inherently counter the problems of the deep block, rather it would compound the division. The perpendicular arrangement and substantive quality of the rail supports encourages their use as connective elements.

The proposal demonstrates the ability of these support structures to reach out and make physical connections to the adjacent public areas and utilization of the inner block. As a prototype this scenario explores the development of sites which are resultant of a previous industrial use or unresolved conditions.
(116.1) above top: Inner Block Model, center block.

(116.2) above: Inner Block Model, Extention of crossing piece

(116.3) right: Inner Block Section.
(117.1) left: Inner Block Model, from west

(117.2) above: Inner Block Model, night
The train Viaduct at a major crossing acts as a gateway into the central city of London.

Site, looking toward MIT.
Massachusetts Avenue
Station and Plaza
(119.1) Site Plan

In this section the rail structure crosses a major traffic artery, is located at the edge of an important institution, and has a station stop located at this juncture. These attributes alone make this site significant in the city but, at present its potential is unrecognized. The freight rail and industrial remnants put this area in a state of ambiguity, there is no continuity between M.I.T. and the area of Cambridge on the 'other side of the tracks' and there is no physical recognition of this site as the edge of M.I.T.

The proposal attempts to introduce the rail structure as an element which serves as both an edge definer and a point of connection. The rail structure itself and the siding of the station platform present a face or gateway into and from the M.I.T. campus. The rail structure also connects and infiltrates a large industrial warehouse which is slated to be renovated and reused as a public building (possibly a performance hall). In this manner the rail structure becomes an extension and facade of the existing building, the new facade frontage possesses a public character by its scale and association with the rail. A small public space is provided adjacent to the rail to act as a foyer to the performance hall and as a transitional and collective space between M.I.T. and the city.

As a prototype this response can be considered at points where the rail intersect a major route in the network of the city. There is a need for access across the city and a need for the definition of the 'edges'.
(120.1) above top: Gateway Model, from West
(120.2) above: Gateway Model, View east on Massachusetts Ave.
(120.3) right: Wilson Avenue Station, Chicago
(122.1) above: Gateway, Detail
(122.2) above right: Gateway, Elevation
(122.3) right: Gateway, Plaza at Night

(123.1) opposite: Gateway, Plaza and Station
Notes for Transit Architecture:

1 Per discussion with Jan Wampler. This observation was particularly helpful in the development of the structure as a system of "supports" with varied and flexible infill capabilities, rather than a continuous and static structure.

2 Per discussion with Richard Tremaglio. This discussion suggested the investigation of the rail system as aspatial structure throughout the city, thus pushing the project beyond the bounds of specific design gestures.

3 The proposition to convert the Metropolitan Warehouse to a public performance hall has been considered by both the City of Cambridge and MIT. The building's monumental size and character already make it a landmark, but the development of the warehouse into a public structure will probably not occur without an external influence.
Transit Futures
Embodied in any sketch, model, drawing, rendering, or building is an attitude or idea. This idea is paradoxically the most fleeting yet the most permanent aspect of any work, the reason and logic of existence. Long beyond the life of its creator, or residence of its original use, the idea is resonant. Deeper than any pronounced meaning, the idea is that which is left when a piece of work must stand separate from external explanation and face the raw truth in contact with the world. Such is true in the creation of a thesis. The models, drawings, illustrations, and explanations furthered my understanding of the thesis, in leaving them, they serve to communicate the idea rather than the image.

This thesis explores in depth the intricacies of a particular intervention and the process of deliberate and specific form making. The results of this work should be considered for its formal value, for architecture in its finality cannot be judged separate from its actual physical presence. Despite this “solitude” of architecture, I would invite attention towards the begging of this exploration. My concerns lie in the welfare of the city, and especially in the American context. The city is a product of human endeavor. It is an entity created by and for our intentions, and despite the encompassing nature and the manifold producers of its form, the city may still be understood as a work of architecture. It is not a natural system; it is
(126.1) Church Street El, C. Sheeler
based on society and culture and must be continually maintained and redressed. We do not only inhabit our cities we must also invent them. As an architectural entity, the design of a city is dependent on its constituent parts; the material, form, and organization of these parts create an architectural experience. Every element within a city, whether intentional or not, shapes its form and experience. Unlike most works of architecture the city does not have a singularity of intent, it exists for all and for all reasons. Therefore not every element of a city will work in harmony with every other element. This juxtaposition of intentions is what makes a city more exciting, stimulating, and inspiring than any work of architecture by a single designer. The variation in the urban fabric displays the richness of a society and their collection into a singular identity signals the need for us to live as a collective.

The American city in the past has been a prime example of diversity in assemblage. Today our cities have grown more homogenous in form yet less coherent as a collective. The population possesses increasing tension between its diverse groups, our only common ground is the commodified mass media. The actual physical presence of community is scarce in the American landscape. To reinstate a diverse and coherent society we must investment in the basic functions which we all share. This rehabilitation would not require a full renovation of our cities, in total and utopian efforts never achieve such ends. To revive the collective nature of the city only need a re-delineation of its existent urban structure. The thread which ties us together need not be so thick it is unbending yet not so thin it is unseen.
Again considering the city as a work of architecture, all elements in its construction take a role in its experience, including infrastructure. If we are to include a transit line in the design of a city there are implications it will serve the public interest in all capacities, at all scales. I assert the affects of our works of public infrastructure are not total, but the thinking and knowledge present in its design must be total. In order to take the reigns from the hands of fate and claim responsibility for the urban environment, we must these project into the realm of the architect. We will only achieve this goal by taking ourselves beyond the self imposed role of the architect.
Note for Transit Futures:

1 Solitude is used in term of Moneo's definition in "The Solitude of Buildings". Once architecture is built the physical artifact is the full content of the design, not the intentions and concepts unrealized in the transfer from paper to stone.
Appendices

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(53.1) Section of Metropolitan Viaduct, Vienna, Otto Wagner - *Otto Wagner: La Metropolitana Di Vienna*

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End of the Line

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