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Engaging the freeway as urban space: Finding legibility and order in the high speed landscape

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ENGAGING THE FREEWAY AS URBAN SPACE:
FINDING LEGIBILITY AND ORDER IN
THE HIGH SPEED LANDSCAPE

by

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Engaging the Freeway as Urban Space: Finding Legibility and Order in the High Speed Landscape

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ABSTRACT

The vast and speed-swept space of the urban freeway challenges the capacity of the city to serve as a vessel for collective and individual identity. Humanist space, which once gave definition and meaning to the place of the individual in the city, has been obliterated by the vector of speed, to the detriment of the physical environment. The highway is a permanent reality in the modern city which must be dealt with as an integral part of the total urban landscape. This thesis will explore the potentials of urban space that engages the freeway. It will investigate the possibilities of establishing a reciprocity between architecture and the space of high speed movement whereby building volumes and structural rhythms might be generated by the forces of flow and movement and in turn might contribute to making the highway a meaningful and memorable "place" in the city.
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I. Introduction

The most important cognitive virtue of a civilization probably consists in the working interrelation between physical activity and so-called abstract thought. The mental life of a civilization is broken asunder when, on the one hand the meaning of walking, eating, cleaning, sleeping, exploring and making things is reduced to the material and physical gain accruing from these activities, and when, on the other hand, the principles by which we understand the nature of things and govern our conduct are reduced to intellectually defined concepts, which no longer benefit from their perceptual sources. (1)

Rudolf Arnheim

Sigfried Giedion once criticized the modern era as being plagued by a rupture between modes of thinking and modes of feeling. In contrast to the fabled “Renaissance Man,” who was well versed in both the arts and the sciences and understood the importance of cultivating a healthy synthesis of the two, modern men and women find themselves confined to the narrow realm of some specialized discipline created in response to the complex division of activity necessary to keep contemporary society running smoothly. The sciences, as the realm of abstract logic and rational thought, have been polarized from the arts, the realm of emotion and sensate experience, and the result has been a certain incongruity between technological and cultural realities which limits the scope of the individual world view. The city and its architecture, Giedion argued, should provide the bridge between the science of engineering and the art of expression and, thus, promote an organic synthesis of thinking and feeling into everyday life; such an environment, aimed at the edification of the intellect as well as the soul, would provide its inhabitants with a heightened
1. Archizoom's "Tenth City"   2. Houston's I-45

understanding of how reason and emotion might be integrated to shape the reality of a better modern existence. (2)

Certainly such a synthesis between art and science, between the intuitive value judgments of creative expression and the hard facts of functional utility, has not been achieved in the contemporary automobile city, and perhaps nothing better represents this schism than the superhighway. Like the monolithic projects of Archizoom, the highway forge its way through the city fabric and adheres to its own laws of scale and order, making no gestural inflection to its surroundings except where convenient points of entry and exit must be established. High speed travel, of course, must be safely separated from the surrounding city, and it is the first job of the highway engineer to ensure that his or her creative efforts meet the precise specifications of safe and efficient rapid movement. The form and the shape of the highway must therefore be rigorously calculated according to the laws of physics and mathematics, so that the risks of accident and injury
are minimized. What is usually lacking, however, is some greater coordination with the surrounding environment that might take into account human perception and thereby effect a more harmonious and significant connection between drivers and their city. Practical utility and public safety have been stressed at the expense of aesthetic urban design, and, more often than not, the opportunity has been lost to enhance the experience of highway driving with legibly orchestrated formal and spatial relationships that would orient the individual both physically, as he or she moves about the city, and metaphorically, by conveying in symbolic form the higher purposes and aspirations of the collective.

The highway is perhaps the most commonly shared aspect of urban existence today, and it has all but taken the place of the traditional "Main Street" as the primary means of experiencing and moving through the city. Today's freeways make possible a whole new type of urban existence based on speed and instantaneous connections across vast distances. Some have called these colossal feats of engineering "the cathedrals of our time," implying that they are monuments which have inherent cultural relevance in our era as symbols of the freedom, mobility and energy that make the modern city so exciting. (3) Indeed, it might be argued that there is nothing in the contemporary city which holds more poetic potential than the freeway. As the Urban Advisors to the Federal Highway Administrator pointed out in their report to the Department of Transportation:

The visual enjoyment of a highway is sometimes an experience beyond analysis. To sweep along a freeway and into a city at dusk, as the sunset fades against the buildings and shadows deepen while myriad lights flick on among the darkening cubes, is to see the urban landscape in a new and magical way. (4)
3. Houston skyline from I-10 West

It can hardly be denied that much of what a citizen or visitor understands of a city is observed from its arterial expressways, and many of the deepest and most significant emotional impressions of the urban landscape are imparted while one glides smoothly and continuously through its varied surroundings. But such experiences usually occur only by default, and the grandest views are a result of accident or coincidence rather than having been deliberately planned as "evolving sequences of visual impressions which reveal the rich complexity of the city." (5) The report goes on to say that "beauty on the freeway has many aspects. There are the views seen by the driver and his passengers; there is the freeway as a flowing element in the three-dimensional structure of the total city; there is the roadway itself, with its bridges and signs, colors and lights and textures; and there are the shapes of the land it is built upon." (6)

Urban highways, so often seen as despoilers of the landscape, have the potential to serve as genuine additions to the design of the city, becoming
carefully woven with the surrounding urban fabric as they harmonize with architecture and even become architecture. Elevated freeways, with their stunning physical presence and gracefully intertwining ramps, need not be viewed strictly as traffic carriers but might be reconsidered in terms of their form giving potentials as urban sculptures for motion, a new type of urban design based on the power of movement and flow and on the sequential unfolding of the cityscape in ways that reveal its character and purpose.

4. Houston’s freeways: cathedrals of our time?
Currently, however, these new "cathedrals" are conceived of as little more than utilitarian components in the larger urban infrastructure, and, as such, they are seen primarily as tools for "going someplace," rather than as compositional ordering devices used to communicate the larger significance of "being someplace" or even to celebrate the experience of movement. On the highway, one often has the sensation of being in a disengaged world in which time and space are lost, a world that lacks the visual reinforcement from its surroundings that might add definition and meaning to urban experience. It is less a work of art than a powerful monument to the scientific techniques and processes which have allowed us to travel across the city at super-human speeds and, thus, to conquer space through movement. And when the act of passage, that is, of "getting from point A to Point B," becomes more important than the visual quality of the environment traversed, then the result can only be a sense of placelessness that discourages the driver from becoming psychologically or emotionally engaged in his or her surroundings.

The failure of municipal and regional planning authorities to integrate urban transportation networks more sensitively with the city fabric is evidence that, in our cities, mechanical efficiency has become more important than meaningful visual expression. This is a deep seated tendency which solidified in the early twentieth century, when architects and city builders had eagerly embraced science and engineering as a means of advancing the modernization of western culture. As a rational, precise and systematic discipline, science not only held the key for bringing about technological wonders, but it was also seen as nothing less than the universal foundation for an emerging social and political utopia that would
be free of the qualitative value systems which created cultural differences and political factions and, thus, made war a seemingly inevitable reality. Universal logic and precision were to transcend the corrupt politics and jealous nationalism of a nineteenth century society characterized by fear and greed, and would thereby usher in the new millennium with heroic optimism. (7)

The drive towards rationality and universalization in building culminated in 1928 when Hannas Meyer of the German Bauhaus declared that architecture should be nothing more than pure "organization," dedicated only to those programmatic and structural "facts" which might honestly reveal the building's intrinsic essence as a work of purely elemental construction. The intent in abandoning all traces of individual "indulgence" or creative expression, by which buildings of the past were cloaked in a familiar, preconceived classical language of decorative artifice, was to contribute to the observer's understanding of how the artifact was made and how it was to function, thus promoting a bright future built on the promises of technology and mechanical rigor; but in denying the intuitive impulses of the artist and concentrating exclusively on the hard material evidence of building, such architecture would lose its capacity to carry larger meaning or gesture beyond itself in a critical or rhetorical way, and it would therefore be less capable of inspiring the human spirit through a familiar and culturally understood vocabulary. (8)

The ideal modern building was to be passionless and emotionally detached, an empty sign, the cold manifestation of a technological and rational society. Ludwig Hilberseimer's stark urban proposals, which envisioned the mechanical repetition of clean and precise slab towers of
glass and steel, demonstrated how these ideas were applied to the design of cities; all the "messy" vitality of the traditional city was cleaned up in favor of a chillingly rational environment which left no room for diversity, pluralism or "other" points of view. For the students of the Bauhaus and other such schools of "heroic" modernism, abstract thought, precise and without value, came to steadily eclipse subjective experience and individual interpretation, which might only deny the promise of universal, rational discourse. While these attitudes were developed essentially by a revolutionary avant-garde intelligentsia with socialist intentions, they had a tremendous effect on shaping a larger world view grounded in the unquestioned belief that science and reason could bring about social progress.

Abstract scientific analysis, of course, involves the precise and systematic study of facts, and, as such, it provides a valuable means of overcoming the "muddy" value systems and superstitions that were once used to explain the universe. Science makes the external world knowable and predictable, allowing us to travel, communicate and build in unprecedented ways, thus promoting the progressive advancement of civilization. As Lewis Mumford has suggested, the "system of dealing with mathematically analyzable fragments instead of wholes gave the first intelligible collective means of approaching such wholes." (9) Science is a useful instrument for isolating measurable increments and dealing with them independently of their context so that accurate predictions might be made about physical world. But when objective scientific analysis eclipses subjective artistic expression as the sole basis for architectural and urban design, then there is little room left for creative intuition and lyricism in
the man-made landscape, and the result is an overly mechanized environment which fails to inspire emotional and psychological attachment.

A society obsessed with mechanical techniques and processes fails to acknowledge the human dimensions of subjective sensate experience which cannot be quantified and upon which meaningful cultural expression depends. When urban design is treated scientifically and the workings of the city are dissected and examined in the manner of a lab experiment, it may be possible to maximize the functional efficiency of particular urban components but there is a danger in failing to re-synthesize and re-integrate those components as part of a visually coherent urban pattern with a clear sense of formal and spatial organization that conveys its human significance. A city composed of isolated and uncoordinated fragments may “work” on a functional level but will not present the observer with an image that gives definition and meaning to urban life.

The history of urban highway design shows that the high speed artery, while initially considered in terms of its aesthetic potential, has come to be viewed as nothing more than a mechanical “system,” isolated for the purpose of addressing the functional considerations of economics and safety, rather than as an artfully designed environment to be experienced and interpreted by the subjective observer as an integral part of the city. Perhaps more than any other urban artifact, the highway symbolizes the perpetual cycle of progress and development that technology has allowed. But given the banal placelessness of our contemporary suburban environments and the deteriorated blight of the inner city, one must question whether we have become the victims of this technological progress and not the benefactors of it. The city should be the realm of both
scientific thinking and artistic feeling; it remains to be seen how today's city, literally generated by and dependent on the highway, can transcend the quantifiable formulas of the developer and the engineer and once again be treated as a social amenity that promotes the generation of shared perspectives and communicates the significance of those perspectives in a meaningful way.
II. Urban Transformations and Highway Development:
Place versus Process

The American freeway system was first conceived through the Federal Road Act of 1916 as a means of relieving the intolerable congestion and overcrowding that had come to plague urban centers during the Industrial Revolution. (10) It would provide city dwellers with a new freedom of mobility that the older mass transit systems, such as the streetcar lines, could not offer, and, thus, it was seen as a means of stimulating business and land development, especially in the suburban periphery. The private automobile, romantically embraced by Americans as a symbol of speed and excitement, was a concrete manifestation not only of technological innovation but of a new type of liberty; it essentially freed up the individual from any constraints on his or her ability to move about and offered the driver complete control over the speed, length and direction of travel. The ramifications of auto-mobility in the twentieth century city have been staggering, and possibly nothing else in human history has had a more radical impact on urban growth and development, or on the very nature of how life is lived in the metropolitan environment.

The first major highways to be constructed were the so-called "parkways," which were limited access roads that passed through recreational parks outside of the city and provided scenic driving opportunities for Sunday vacationers and suburban commuters alike. The primary concern of the parkway designers was to create visually pleasing roads with dramatic views and smooth curves that were integrated with
5. Hutchinson River Parkway  6. Merrit Parkway

their bucolic surroundings in order to provide drivers with an “aesthetic experience of moving gently through a large public park.” (11) Boston’s seventy-eight mile parkway system had first been conceived in the nineteenth century by Frederick Law Olmsted as a series of carriage trails and was constructed in the 1920’s to accommodate the automobile with two to four lane roads. In New York, Gilmore D. Clark designed seventy-five miles of roads for the Westchester County Parkway system, which included the Saw Mill River and Cross County Parkways, both completed around 1930. Careful thought was given to making the roads work harmoniously with the topography and to providing a grade separation between these
high speed arteries and the local cross streets which bridged over them.

(12)

In 1939 the Master Plan for Free Highway Development proposed a plan for 26,000 miles of toll-free highways across the country that would be financed through gasoline taxes and other vehicular fees. This act represented a major shift in emphasis from rural to urban roadways as the new technological potentials of high speed travel were seen as a means of relieving intolerable city conditions. In the 1930's, says Peter Rowe, "better futures were imagined. Happiness was often equated with the satisfaction of material needs, and technocratic know-how was seen to be omnipotent, quickly overcoming mundane problems of contemporary life such as urban blight and traffic congestion." (13) An efficient transportation system was envisioned that would link peripheral suburbs to the city and allow a new separation between home and work.

Norman Bel Geddes' Futurama and Highways and Horizons exhibit at the 1939 World's Fair in New York gave the American populous a fantastic vision of what the highway city might look like in the year 1960. Geddes' "magic motorways" diorama consisted of completely separated lanes of traffic, each reserved for a different driving speed and corresponding to a particular travel distance and visual experience. As Rowe says, the "straightest and most direct route would be for speeds of 100 miles per hour; a curving, parkway-like road would be for travel of speeds of 50 mph." (14) Moreover, an electronically controlled driving system would compensate for all human error, freeing up the driver to enjoy the scenery. The scheme would integrate various public works with "highways running along the tops of hydroelectric dams or stacked one
7. Norman Bel Geddes's "Magic Motorways," 1940

above the other," and it proposed interchanges with curved ramps that would allow drivers to transfer from one highway to another without reducing speeds. (15) This proposal, and others like it by Ferris and Hilberseimer, embodied the romantic and optimistic embrace of engineering precision that demonstrated a firm belief in this era that technical progress was the equivalent of social progress.

By the end of the 1930's, networks of spoke highways were connecting urban hubs to their outlying rural peripheries, stimulating a wave of suburbanization as the white middle class sought to escape the squalor of the inner city. This was a continuation of trend that had begun in the late nineteenth century when railroads and streetcars had first allowed the growth of "commuter suburbs," or residential bedroom communities, for the wealthier classes. What the automobile and the highway did was to make suburban life available to the entire range of middle class residents, and it greatly accelerated the decentralization and racial segregation of the once concentrated cities.
In 1944 the Federal Aid Highway Act was proposed that would enable a comprehensive nationwide system of toll-free city-to-city, or "interstate," highways to be integrated with metropolitan freeways that would serve local needs. In 1956, this act gained congressional approval, and plans were made for 41,000 miles of interstate highways and 5,000 miles of urban freeways to be paid for at the federal level through taxes and fees. The resulting pattern that arose in cities were the now familiar "spoked wheel," whereby peripheral by-pass and loop highways are intersected by expressways radiating from the center of the city. (16)

In the cold war years following World War II, the Federal Government saw the potential of this "interstate" system as an effective means of defense against nuclear attack, and it imposed rigid standards of uniformity on the design of highways. Surprisingly, these guidelines were aimed at a synthesis between engineering and aesthetics and were not purely technocratic in nature. Highway designers at this time, Rowe suggests, were inspired by the beauty and grace of such European examples as the Italian autostrade and the German autobahnen, which tempered the "heroism of advanced engineering" with a sensitive consideration for the aesthetic beauty of the wilderness and were thus treated as works of art. (17) The American interstate highways that connected city to city and traversed unspoiled wilderness incorporated smooth gradients, spiraled curves and roadside planting for erosion control, all of which addressed both visual and technical considerations.

Under the 1956 act, state highway departments assumed the major responsibility for coordinating the interstate and expressway systems with existing urban centers, and, as Rowe says, "roadway alignments
increasingly assumed utilitarian purposes as the economic dictates of rising construction costs and higher land prices tipped the balance away from landscape principles in favor of basic engineering.” (18) These freeways came to be seen as “tools” for combating congestion and for promoting land development, and as such they were considered more as infrastructure than as positive social amenities. They were no longer designed to harmonize with their surroundings or be organically integrated with their adjacent land uses but instead were treated merely as a support system to permit access and through traffic. As Rowe suggests, “functional reasoning became too narrowly defined or overwhelmed by economic expediency,” and the ensuing emphasis on engineering led to a neglect of the possible aesthetic and social consequences that the highway was having on the surrounding city, which, unlike the rolling countryside, could not be easily manipulated and coordinated as a formal and spatial ensemble. (19) In the 1960’s, highways were coming to be seen as symbols of traffic congestion and urban blight which were destroying vital inner-city neighborhoods, and citizen protests were succeeding in halting freeway construction. Such reactions were sending the message to local authorities that the urban public did not support projects that benefited only the suburban dweller and had nothing but negative effects on the city.

Meanwhile, the suburbs were literally being planned in conjunction with freeway building, and land developers were seeking to take advantage of the rising property values that were being created by increased accessibility to previously remote areas. The natural place for commercial speculation was the interchange since it could be accessed easily from both city and suburb. These interchanges came to assume geometric shapes
which were precisely calculated to ensure the maximum comfort and safety of drivers traveling at speeds of sixty miles per hour. As Rowe explains,

Once the modern highway was sketched out in broad strokes, a period of design refinement set in. From a geometric perspective, straight roadway links and tangential curves were replaced by smoother transitions and then by spiral curves in both horizontal and vertical directions. Standards were developed from practical experience for such design constraints as the radii of road curvature, grade changes, road shoulder design and highway cross sections. Uppermost in the minds of highway engineers, designers and transportation planners was the path of least resistance that led to quick, smooth, stressless travel. (20)

The resulting spiral ramps, cloverleafs and level changes added a stunning and dramatic element to the metropolitan landscape, especially in

8. Houston's I-10 / West Loop interchange

overwhelmingly flat landscapes such as Houston where the freeways provide some of the only opportunities to experience elevational
displacement as they rise and fall swiftly and smoothly to accommodate the cross streets and connecting ramps that pass over and under them.

By the 1950's the network of highways was fundamentally changing land-use patterns and the very nature of urban life, ensuring that suburban dwellers would benefit through and increased accessibility to goods and services and, thus, a greater freedom of choice. Since driving commuters could now distance themselves from the workplace, residential neighborhoods no longer had to adhere to the central corridors of commercial development and "a much looser and less continuous mosaic of urban development occurred." (21) As the bedroom communities sprouted up along the urban periphery, developers took advantage of cheap and accessible land to provide convenient commercial and retail centers, many located near the nodal interchanges. But often the commercial development of urban land occurred in very uncoordinated and ad hoc ways which resulted in a tremendous waste of land and a fragmentation of activities.

In Houston, the Sharpstown Center was completed in 1961 and located near the intersection of the Southwest Freeway (I-59) and the 610 loop, and it was intended to be a regional commercial and shopping center that would take advantage of southwest Houston's expanding market. Sharpstown had been conceived and built by Frank W. Sharp, a real estate developer and entrepreneur who had seen the lucrative possibilities of building a residential suburban community in conjunction with the construction of the freeway. Sharp was able to alter the direction of the freeway through his property by "donating ten miles of 300 foot right of way" to the highway department. (22) He thus ensured that his land values would soar when
highway construction began in 1958 due to the convenient accessibility his property would have.

Like most of the suburban bedroom communities that were built in America during the 1950's and 60's, Sharpstown catered specifically to the white middle class, who were seeking an idyllic retreat from what they believed to be an overcrowded and crime-ridden inner city. With its meandering streets and bucolic setting, it was intended to be a community of single family houses with F.H.A. insured mortgages that would be self-contained and exclusive of minorities. But as the years went by, the character of the community would become more heterogeneous and diversified as the mall spurred other types of development such as offices, condominiums, garden apartments and commercial strip development along the frontage road of the freeway which included fast food restaurants and car dealerships. (23) As with most commercial development around highway interchanges, much of this growth as occurred in a very uncoordinated and ad hoc way which has resulted in a tremendous waste of land and fragmentation of activity. Jonathan Barnett has said:

Lewis Mumford called the highway cloverleaf America's national flower, but even Mumford at his most pessimistic and sarcastic did not imagine broad bands of highway pavement or grasslands owned by the state transportation department becoming the permanent centerpiece for so much new development. Someone with business at a suburban office park might stay overnight at a hotel in one quadrant of the cloverleaf, and face an intricate drive in the morning to reach the office park diagonally across the intersection. At lunch a cavalcade of cars takes everyone to the restaurant in yet another quadrant. The distances might be walkable, but no one should cross so many lanes of swiftly moving traffic, and the highway department usually puts up fences, removing any temptations to be a pedestrian. (24)
The failure to integrate diverse land uses more harmoniously into a single compact and clustered arrangement, say in one quadrant of the cloverleaf, has in many cities led to a disjointed and cumbersome urban pattern which not only makes travel connections difficult and dangerous but also destroys any possibility for making the type of visual connections between buildings by which denser ensembles could achieve a sense of aesthetic unity.

Houston throughout the 1960’s and 70’s was undergoing severe decentralization as “office space continued to collect in multiple centers located around the city, mostly in the western half.” (25) Immense multi-story office buildings were sprouting up in places such as Greenway Plaza, situated between interstate 59 and Richmond Avenue, and City Post Oak, located along the west loop and including Gerald Hines’ Galleria shopping, hotel and office complex. These developments were beginning to rival

9. Houston’s City Post Oak  10. Houston’s freeway network
downtown as the commercial and employment centers of the city, while the historic downtown itself was literally being bulldozed throughout the 1970’s in a frenzy of real estate speculation that anticipated skyscrapers on every block.

The freeway system in Houston, completed for the most part in 1975 by the State of Texas Highway Department, consists of three spoke highways crisscrossing through the center of the city and girdled by an inner loop of 12 miles in diameter, an outer loop of 24 miles in diameter and an as of yet incomplete peripheral loop of 40 miles in diameter. As a city that has grown in conjunction with the freeways, Houston has evolved as one of the most convenient automobile cities in the country; almost all major points of interest are within a quick ten minute drive from the inner city neighborhoods, and nearly continuous frontage roads which parallel the highways and are lined with commercial development ensure that almost everything is easily accessible by car. In Houston, city life for most residents literally revolves around the freeways, but as Joel Warren Barna has suggested, many of them have become “ordinary land despoiling paths of commerce, taking farmers to market, connecting the port to its hinterlands, collecting workers for their trudge to the still shimmering office towers downtown or the incendiary chemistry mills along the ship channel, and speeding harried salarymen to and from the airports.” (26) Moreover, the freeways have had less than beneficial effects on the visual quality of the built environment, becoming instead “levelers of humankind, the domain of off-price malls, budget motels, and used car lots, where billboards broadcast the forbidden impulses of the city’s automatic nervous
system, flashing images of whiskey and cigarettes, psychiatric hospitals for women and children, and vasectomies for men.” (27)

11. I-45 in Houston

Today “Houston remains largely and automobile precinct, particularly in areas between the small private reserves and enclaves of business, shopping and residence.” (28) The decentralized environment that pervades the city and especially exists outside of the 610 loop is a typical condition of the contemporary city which Rowe has dubbed the “middle landscape,” a uniform smear which obliterates the old distinctions between city and countryside and is punctuated by multiple centers. Typically its growth and development marks a steady decline in importance of central cities as population and economic activity are dispersed away from the core into “new growth poles in outlying less developed areas.” (29) This type of urban pattern, which is no longer “mono-centric” but instead “polynucleic,” is not exclusive to American cities but has in fact become a global phenomenon.

The scattering of retail and office uses into once residential areas, a direct result of free-market forces of supply and demand and accelerated by the accessibility of cheap land that the highways provided, has led to the
rise of self sufficient urban realms which are no longer dependent on the central city. These mini-cities, or "autonomous subregions," are duplicating themselves across every city in the country and resulting in strikingly similar, indeed generic, urban environments that can be found wherever one goes. The conventional stereotype of the 1950's suburb, the one-dimensional "Leave it to Beaver" world of the white middle class, most certainly no longer applies. The contemporary suburban environment is a heterogeneous and diversified spatial mosaic which has all of the functional and demographic complexity of the older central city. But this diversity, Rowe points out, is not integrated in the sense that it was in the pre-industrial city; it is rather a "patchwork quilt" composed of single-use subdivisions and subdevelopments that are self-contained and homogenous, both physically and socially. (30) These highly internalized enclaves serve to stratify the population and segregate land use so that real integration is avoided. This is a condition which Rowe has called "segregated pluralism," and he describes it as a "geographical fragmentation of urban life's daily rituals which tends to work against the solidarity of image and purpose with which traditional cities were once viewed." (31)

Indeed, the city seems to have been neutralized as a collective rallying point for its citizenry because its once densely concentrated and diversely integrated fabric has been fragmented into isolated bits, held together only by the highways that lace them. One would have no sense of a coherent shape or image of Houston if it were not for the diagrammatic freeway "spider" that has been overlaid on its edgeless and centerless pattern. The inability to conceptualize the city as a whole is both a political and a moral problem, for it must be understood that the city is not simply a neutral
backdrop; it determines who we are and what we can accomplish. As J.B. Jackson has suggested, the urban landscape has the important function of serving as a background for our collective existence, and, as such, it "underscores not only our identity and presence but also our history." (32) The physical form of the city, as the embodiment of our highest civic virtues, ensures order, security and continuity, and it has the potential to inspire its citizens toward moral and ethical perfection. Participatory democracy depends on metropolitan cooperation and interchange, not merely on individualism and the right to be left alone, and the city must strive to foster a sense of pride and belonging among its citizens that encourages public duties as well as private rights.

While the freeway was consistently hailed as a means of improving urban transit, convenience and freedom of access, and thus as being a modern extension of the democratic gridiron, its larger effects on the physical and social fabric of the city were ill considered. The contemporary city is a type of environment in which mankind has never before existed or had to respond to, and it has a different kind of order than the pre-industrial city. The highway, together with electronic communication technologies, eliminates time and space so effectively that face-to-face bodily contact has nearly disappeared as an essential aspect of public street life. The infrastructural and electronic networks that establish the necessary means for human interaction are "invisible" in the sense that they have no major role to play in the organized formal and spatial relationships that visibly convey the shared values of the now atomized collective. This city is often criticized as being a chaotic and placeless environment, sprawling infinitely without center or edge and divided into
semi-autonomous enclaves which leave only a nebulous spatial residue between them. These empty “in-between” realms, these voids of “no-man’s land,” are the most distinguishing feature of the post-industrial city, and they carry social and spatial implications which demand careful consideration.

Aldo Rossi has argued that the city is the receptacle of collective memory, and, as such, its form should be founded on the shared meanings and experiences that define the cultural life of a society. (33) But the contemporary city seems to deny itself any such capacity by its lack of a larger sense of order and purpose. Wim Wenders has said of the modern urban environment: “Somehow a city is defined by its latent impact on one’s memory, and there are places where you are often given nothing to remember.” (34) The emptiness and inhospitality of the contemporary city has a certain morbid quality which only serves to remind one of the collective that is not there and no longer seems to be attached to its environment or feels the need to find definition within it. Privatization, accelerated by the highway, has led to the demise of collectivity; the public realm has been divided and conquered.

But before one can assume that such a condition is inherently negative, one must consider its potentially liberating aspects relative to the “traditional” notion of the city. The benefits of maximized convenience and the increased capacity for individual self-realization are desirable features which have been direct results of the highway and which many Americans take for granted. Fritz Neumeyer, viewing the American city through European eyes, has said:
Could it not be that, in American cities, precisely because they have eliminated from their public life all desires for emancipation, a greater degree of greater urban spontaneity has been maintained that in our European post-modern cities, where pre-industrial forms have been transposed to the present day forms of post-industrial life? Could it not be that American cities- in the sense of “positive barbarism” that so astonished Adolf Loos- are, despite everything, more “human” and more “attractive” than we Europeans would ever admit, thanks precisely to their “inhuman” side? (35)

12. The Houston skyline as seen from the I-10 / I-45 interchange

It can hardly be denied that a city like Houston offers the urban dweller a multitude of advantages over the crowded and congested centers of older American and European cities which have not grown concurrently with the automobile. Houston offers light, air, free mobility, ease of access, minimal traffic, safety, and maximized convenience, all adding up to a multiplicity of choice that cannot often be found in the pre-industrial pattern. As Kenneth Jackson has suggested, many urban dwellers argue that “the car has created a new and better urban environment and that the change in spatial scale, based upon swift transportation, has formed a new
kind of organic entity, speeding up personal communication and rendering obsolete the older urban settings." (36) In his book, *Edge City*, Joel Garreau has argued that this type of "urban" environment, facilitated by and dependent on the highway, is a direct outgrowth of democratic free choice; it is the way people want and have deliberately chosen to live, and it reflects everything that is essential to the nature of contemporary city life and the American ideals of individual self-realization. (37)

Garreau suggests that this environment is a "new frontier," a radically new mode of life that Americans are now exploring and conquering with the same rugged spirit by which the pioneers, the revolutionaries and the immigrants built this country. Edge city, he implies, represents a "search for Utopia at the center of the American Dream. It reflects our perpetually unfinished American business of reinventing ourselves, redefining ourselves, restoring ourselves, announcing that our centuries old perpetual revolution- our search for a future inside ourselves- still beats strong." (38) One must question, however, whether this perpetual need for reinvention reflects a deep-seated insecurity that results from our being a fairly rootless culture. Even Garreau concedes that in the contemporary city "great wealth may be acquired, but without a sense that the place has community, or even a center, much less a soul." (39) By the same token, however, edge city reflects the intense energy and forward-looking optimism of a society that has a very realistic need to keep pace with progress and change through constant and dynamic evolution, without the staggering force of a frozen past hanging over its head. Edge city, while it may not be a new Eden, is still in its "larval" stage and it cannot be judged adequately until it reaches further maturity.
But one could argue that the benefits of "edge city," predicated on the maximized efficiency and availability of its various "facilities," are purely functional and that there is a certain dimension of meaningful expression that is sorely lacking. When every building is an air-conditioned oasis, irrespective of its surroundings and accessed only by automobile, then one begins to sense a degree of spatial emptiness that is not only a physical but a spiritual condition as well. The individual is privileged, but there is no visible expression of collective order which might add definition and meaning to this freedom. Urban life today seems to be considered only in terms of its mechanical aspects, especially with respect to the travel distances between home, work, shopping, recreation, entertainment and services, all of which have been dispersed according to market forces and connected by communication and infrastructure networks. A city driven by the free market and built only to the standards of the engineer loses its ability to respond intelligently to human experience, much less give it meaningful and poetic expression in the built environment.

It seems as though the city today is conceptualized as a "machine" or "tool" whose purpose is not to amplify the individual through legible form and space but rather to facilitate the functionally efficient flow of information, money, people, materials and energy. While such mechanical efficiency is indispensable to any city, especially one that houses a complex modern society such as ours, it seems to have become the only goal of urban design, suggesting that our collective state of mind is concerned less with artful expression than with the maximization of utilitarian ends. These ends, which may include such things as transportation, infrastructural management, profitable land development, zoning,
convenience, security and so on, are rarely coordinated to achieve a sense of formal and spatial unity. In other words, the city is now dominated more by "process" than by "place;" it has become overrun by "technique," and it is the means for maximizing uncoordinated ends rather than an end in itself. In *The Technological Society*, Jacques Ellul defines "technique" as "the translation into action of man's concern to master things by means of reason, to account for what is subconscious, make quantitative what is qualitative, make clear and precise the outlines of nature, take hold of chaos and put order into it." (40) Nowhere has this tendency more aggressively manifested itself than in the communication and transportation networks which now dictate our current urban patterns. The form of the contemporary city is determined primarily by the functional arrangement of its complex systems and less by a concern for subjective human perception and interpretation. The functional logic that organizes this environment is beyond the experiential comprehension of the individual because it consists of two-dimensional connections across a now atomized urban field which seems unable to sustain formal and spatial definition in three dimensions. Today's city is growing as a de-centered field of isolated coordinates, whether individual buildings or clustered enclaves, connected by a maze of information, energy and transportation conduits.

The social and physical implications of the processes of flow and movement in the city have scarcely been considered in terms of how they might contribute to a visibly perceptible order which allows individuals to read the city as a poetic expression of the forces of modern life. At sixty miles per hour, the perception of the city's formal and spatial relationships is a far cry from that which could occur in the docile settings of pre-
industrial streets, where the subtleties and intricacies of the urban fabric could be studied and contemplated; the freeway is more like a raging river whereby one is swept rapidly downstream by a dangerous and constantly surging current of energy, forced to remain painfully attentive to the task of navigation and quick decision making. Such an environment, at once fearfully life threatening and intensely exhilarating, calls for a bold rather than subtle expression of architectural form and space which might channel the powerful forces of high speed movement into monumental gestures that celebrate the highway and heighten its definition.

The highway is perhaps the most powerful force in the city, both in the physical sense of energy and speed and in the psychological and emotional sense of symbolic association. It has often been likened to an "artery," a vessel along which the very lifeblood of the city pulsed, allowing it to live and breathe from day to day. But the vitality and importance of the highway is rarely translated into daily experience, and it is, instead, treated objectively and with emotional detachment as a work of engineering, resulting in banal and placeless concrete environments that assault the senses rather than edify the observer. Many of us have in fact become numb to the visual experiences that accompany highway driving and thus feel no connection with the city that surrounds us. After nearly a century of building cities according to mechanical techniques and processes, we are left with urban environments devoid of artistic composition and seemingly unable to provide the subjective observer with the means of discovering, through sensory perception, a legible manifestation in form and space of the highest ideals and purposes of urban congregation.
III. Finding Legibility and Order in the Contemporary City

The individual orient[s] him- or herself in the world through the perception of its formal, spatial and social organization, and when the abstract relationships that define the structure of a society do not find a manifestation in the physical realm of experience, then the reciprocity between the individual and the collective is undermined. The perception of the environment is not always a conscious activity, but it is the primary means by which we establish the framework of our existence, and the absence of a clear organizational structure can be a disorienting condition which leads to psychological discomfort and, ultimately, to a sense of alienation. It would be both unwise and undesirable to assume that the modern city could be unified by a single ordering strategy. But any design intervention in the city should attempt to somehow establish the formal and spatial relationships that express its connection with the larger social framework of the city and, thus, convey a legible expression of cultural identity.

Artful urban design is, of course, a complex endeavor which must coordinate not only form and space but also politics, economics, demographics, sociology and the natural environment. Since many of these concerns are beyond the control of the designer, it is up to the architect or urban planner to concentrate on the visual aspects of the city and to articulate them in a way that reflects and promotes these other factors and, in turn, expresses the highest aspirations of the society. This thesis will be concerned primarily with the visible organization of form and space in the
city, and it will investigate the implications of human sensory perception with respect to the way larger meanings and associations (whether functional or symbolic) become attached to the physical environment through immediate experience. The goal will be to discover the means for achieving a heightened sense of "legibility" in the city, that is, the way in which its individual parts might be more clearly "read" as being part of a coherent pattern that gives definition to experience. As Kevin Lynch has said, "just as this printed page, if it is legible, can be visually grasped as a related pattern of recognizable symbols, so a legible city would be one whose districts or landmarks or pathways are easily identifiable and are easily grouped into an over-all pattern." (41) A demonstration of clarity and legibility in the external world provides the individual with an inner sense of comfort and security, and, thus, it can provide a reassuring framework which encourages engagement and interaction with the city and its inhabitants. A clear urban framework which serves as a vessel for collective activity allows meanings and associations to arise out of daily human contact and, in turn, becomes a tangible manifestation of cultural identity.

If one holds the conviction that the city, or any one of its fragments, is indeed a work of art and has the capacity to carry meaning beyond its material "facts," then it follows that the urban landscape should be designed to transcend its purely functional role and be considered as a means of expressing the more deeply significant dimensions of the human condition. Culturally relevant art, whether painting, sculpture, music, poetry, architecture or the city, has the basic task of heightening the awareness of the subjective observer and elevating him or her to a higher level of
consciousness. By manifesting ideas, emotions or aspirations through its particular medium, it makes sensate those abstract concepts which cannot be easily said, or even said at all, in words, and in doing so provides a type of intellectual or moral edification that is not possible in conventional discourse. Because all art is contingent on the psychological modes of human perception, its first and foremost task is to engage the viewer, after which he or she, with senses sharply attuned, can be more readily enlightened by the content of the work. The critical link between the observer and the work in this perceptual process is the degree of legibility that is inherent in the piece, that is, its ability to be “read.” The language of art, be it figural or abstract, communicates directly to the soul and to the intellect, the two endowments which distinguish human beings from other earthly creatures, and in this way, it can reveal a certain significance with respect to the human condition.

While every individual interprets art in a way that is personally meaningful and corresponds to a particular perspective, truly legible art must transcend the specific circumstances that define an individual or even a cultural worldview and seek to express in some way the universally understood dimensions of human existence. Before this century, western art and architecture were typically “figural” representations that used anthropomorphic forms and proportions to convey specific meanings and associations by way of metaphor. In pre-industrial European cities, the urban fabric typically incorporated some form of anthropomorphic representation; for example, the use of center, axis and symmetry made allusions to the organizational structure of the human body, which is divided equally along its vertical axis. The separate articulation of base,
middle and top also had correlations to the physical hierarchy of the body, and, in expressing a transition from ground to sky, it acknowledged the gravitational pull of the earth and its effects on all living things. Such visual devices responded to the human condition and demonstrated a type of organization that was inherently (if unconsciously) familiar.

While anthropomorphic figures are "universal," the content, or larger meaning, of artistic and architectural compositions tended to be culturally specific and meaningful only to the extent that they could be interpreted through the lens of collective tradition. Before the age of heroic modernism, says Robert Venturi, architects capitalized on the rich possibilities of iconographic representation: "Dressed in historical styles, buildings evoked explicit associations and romantic allusions to the past to convey literary, ecclesiastical, national or programmatic symbolism." (42) Thus, legibility was contingent on the cultural perspective of collective tradition. It has only been in the twentieth century that artists have come to abandon "the project of representation" in favor of a more abstract, non-figural mode of composing form and space, whereby the higher and hidden truth of "deep structure" might be discovered that transcends cultural differences and provides the foundation for a rational discourse that can be innately understood by all. (43) As Venturi says, "meaning was to be communicated, not through allusion to previously known forms, but through the inherent physiognomic characteristics of form;" by rejecting the eclectic styles and formal / spatial arrangements of the past, these designers were pursuing an elemental and objective vocabulary of lines, planes and volumes that might be better able to express the deep seated spiritual connotations of "space and form at the service of program and
structure.” (44) By abandoning preconceived forms and decorative language in order to honestly reveal the intrinsic and essential nature of construction, such an architecture was to usher in the new millennium with heroic optimism. The challenge in using such an abstract, mechanical and potentially dry grammar, grounded in the self-evidence of material facts, was to somehow find the poetry in the prose, to discover the expressive qualities of form and space which might be psychologically perceived by the subjective observer as carrying legible meaning and thus as giving the phenomenal world a sense of logic and coherence.

Venturi is a noted critic of Modern architecture, arguing that abstract compositions of functionally determined form and space lack the capacity to convey larger meanings or communicate anything that is culturally relevant. Such architecture, he says, is less frozen music than it is “frozen process,” and as such it typically becomes an empty sign, a self-referential indulgence that lacks the capacity for social responsibility and cultural engagement. (45) He argues instead for the “decorated shed,” a functionally straightforward structure dressed in bold graphics and familiar stylistic gestures that need not be derived from the essential facts of structural or programmatic necessities. But visual meaning is more complex than linguistic meaning, which requires structured relationships and recognizable symbols in order to be understood. As Arnheim suggests, three dimensional arrangements of forms perceived in the space of movement can take on more dynamic type of meaning that results from their ability to be inhabited and experienced as part of daily life. He argues that all “genuine metaphors derive from expressive shapes and actions in the physical world,” and that architecture has the capacity to convey those
“humanly relevant qualities and situations” which cannot be put into words. (46)

The most powerful type of symbolism, he implies, is abstract enough to allow for a multitude of individual interpretations. Such “open symbols,” which do not dictate a particular reading, reveal “the general in the particular” and thus raise circumstance to a higher level of relevance. (47) The true meaning of form and space, he implies, arises from the perceptual processes that accompany habitation and use, for as people interact with each other and with their built environment they attach symbolic significance to the way things are put into practice. James Gibson, a specialist in the psychological effects of visual perception, asserts that all objects take on meaning based on how we interact with them. A pair of pliers, for example, may be perceived by those unfamiliar with their handling as a relatively abstract shape with arbitrarily configured surfaces and edges; but once the pliers are used, they assume an intrinsic quality of “squeezability,” and the retinal image is forever modified by an understanding of the tool’s use and purpose. The memory of past experience thus attaches essential and inseparable properties to object perceived. (48)

In the built environment, says Arnheim, “the most powerful symbols derive from the most elementary perceptual sensations, because they refer to the basic human experiences on which all others depend.” (49) A set of stairs, for example, will have little meaning if they are perceived at a distance as a mere geometrical configuration but they may derive symbolic significance as one engages them in ascent and feels the bodily sensation of victoriously overcoming gravity and rising to a higher plane. Architecture
conveys its relevance as a vessel for human activity through the abstract relationships of its visual and spatial dynamics, making use of such qualities as openness or enclosure, outgoingness or withdrawal, flow or pressure, transparency or opaqueness, straightness or flexibility, expansion or contraction, all of which are understood (whether consciously or not) as a means of giving definition and meaning to the spatial presence and movement of the observer. In this way, daily sensory experience is endowed with metaphoric overtones.

When dealing with the high speed movement that occurs on the highway, bold expression is obviously necessary, but inflected shapes may still convey meaning by responding to the dynamic forces acting on them and by promoting new types of engagement with the surrounding city and with the people who move through and experience that city. Symbolic value should be generated if the architectural intervention makes a vital contribution to its context, both visually and programmatically, and succeeds in fitting comfortably and logically into its setting so that overall orientation and legibility in the built environment are promoted.

There is no easy definition of "legibility" as it applies to the urban landscape, but one can begin with the basic assumption that an environment becomes legible when the human mind can comprehend or "make sense" of it, and, thus, read its significance with respect to the human condition. The ability of the human intellect to understand the external world depends on that world having a transparent order which can be perceived through direct experience and empirical observation and then reconstructed in the mind. As Rudolf Arnheim has suggested in *Entropy and Art*.
Order is a necessary condition for anything the human mind is to understand. Arrangements such as the layout of a city of building, a set of tools, a display of merchandise, the verbal exposition of facts or ideas, or a painting or piece of music are called orderly when an observer or listener can grasp their overall structure and the ramification of structure in some detail. Order makes it possible to focus on what is alike and what is different, what belongs together and what is segregated. When nothing superfluous is included and nothing indispensable left out, one can understand the interrelation of the whole and its parts, as well as the hierarchic scale of importance and power by which some structural features are dominant, others subordinate. (50)

Thus, if a system is to be perceived as having order, we must be able to recognize the connections that exist between a set of integrated elements, for we can only grasp the significance of a particular entity in terms of how it functions in relation to other things. Since “all perception involves a desire to understand,” a system in which a set of distinct entities can be easily understood as a coordinated whole will convey its purpose and meaning most clearly to the observer. (51) Legibility is essentially a matter of perceiving relationships and understanding organization.

The order which is visible to us, in terms of experiential perception, is always a reflection of an underlying organization, an intrinsic functional logic which imposes structural definition on that which is sensate. This can be demonstrated in physics by setting three repellant magnets afloat in a dish of water and introducing an attracting magnet above them; the three floating magnets will arrange themselves in a perfect triangle and, thus, form a highly ordered visual constellation which results from the invisible forces at work. Arnheim says that this type of ordered repose in both inorganic and organic nature is so fundamental that:
Order comes about unless special circumstances prevent it...In any situation, as much order will obtain as circumstances permit. If a situation is a closed system of forces, these forces will arrange themselves so that the tension in the system is at a minimum. At that level of lowest tension all action ceases and the system holds itself in equilibrium unless new forces are introduced from outside to change conditions. (52)

This process of tension reduction will continue indefinitely if there are no constraints at all until "a state of complete homogeneity is attained- a state exemplified by a perfectly shuffled deck of cards, a well shaken mix, or the distribution of molecules in boiling water." (53) In this state of absolute entropy, structural organization disappears and along with it functional relationships and meaningful locations; the same condition exists at all points in the field and each component can exchange its position without disrupting the system. Such a condition is not a state of disorder but of shapeless order without an underlying "theme" or logic to give it definition.

13. The sprawl of the "middle landscape:" Houston's Sharpstown
Certain parts of the modern city, such as subdivisions, highway strips and freeways, seem to have sunken to such a state of homogeneous “white noise,” whereby the buildings and spaces are so generic as to be interchangeable and the urban dweller “finds himself in the same place wherever he goes.” (54) This type of environment lacks a larger organization in which its parts would be hierarchically related to exhibit a semblance of integrated cooperation. As Arnheim argues; “Ordering serves to organize the parts in the whole and to avoid redundancy, conflict, self contradiction- all those deficiencies that would prevent the work from being truly itself and fulfilling its various psychological and physical functions.” (55)

In his book, The Image of the City, Kevin Lynch contends that the individual comes to understand the organizational logic of the urban pattern by acquiring a sense of geographical orientation through movement in time. Since one’s experience of moving through the city is always a subjective and temporal phenomenon which can provide only a fragmented and often unpredictable sequence of images, a sense of coherence is only possible when the isolated events can be mentally reconstructed into an organized pattern that reveals the significance of larger urban relationships and connections.

Lynch argues that a coherent urban environment which provides orientation and memorable experiences is the basis for the emotional security and psychological well being of the individual; it defines the position of that individual in space, amplifies his or her presence and encourages his or her participation in the life of the city. An ordered environment acts as “a broad frame of reference, and organizer of activity
or belief or knowledge” which, in turn, “gives the individual a possibility of choice and the starting point for the acquisition of further knowledge. A clear image of the surroundings is, thus, a useful basis for individual growth.” (56) Chaos and monotony in the city evoke feelings of disorientation which, in extreme cases, can lead to anxiety, fear and a sense of abandonment. As Lynch suggests, “the very word ‘lost’ in our language means more than simple geographical uncertainty; it carries overtones of utter disaster.” (57) Thus, a recognizable demonstration of order and legibility in the built environment gives the individual mental bearings and a sense of belonging; it allows one to identify with one’s surroundings and to see them as an extension of oneself.

If the city is understood as the vessel for purposeful human interaction and the instrument for generating cultural identity, then it should be organized not merely for the purpose of establishing functionally efficient relationships between its various parts, but more importantly for the purpose of expressing the formal, spatial and social relationships that give a greater definition and meaning to human experience. The city conveys its significance through an interplay of form and space whereby the individual is offered a sense of both geographical placement in the built environment and social placement in collective culture. Thus, a truly legible urban landscape employs a visual order to orient the individual both physically and metaphorically in the framework of the city.

Without legibility, the urban landscape becomes placeless and empty, and its inhabitants grow increasingly detached from the environment in which they live. Houston might be described as an “illegible” city because it prevents the individual from defining his position within the spatial and
social order of the larger collective; its often hostile environment is perceived as being without structure or definition and, thus, as alienating. This is not, of course, to say that the city is without order altogether. Its underlying structure is highly organized according to very clear functional relationships, and direct connections between various parts of the landscape are made in very straightforward ways by means of all types of infrastructural connections, but especially by the highways. Rem Koolhaas has said:

Urban spaces are being generated simply by the extent, service and almost beauty and dignity of these highways. Landscape is now a bizarre combination of virgin nature with these giants. Downtown has exploded, has broken up into millions of fragments that have landed in a primeval forest, the highways remaining as the only connection, the only coherence between them. (58)

Presently, however, this coherence is on a strictly functional level, and it is neither expressed with any sense of hierarchical order nor coordinated in any way that might enhance the experience of the city and edify its inhabitants.

In the constantly evolving and chaotic landscape of the contemporary city, the freeway network is perhaps the most “fixed” and immobile feature, and it thus provides the greatest potential starting point for establishing an identifiable framework of order in the urban pattern. But due to their lack of integration with the surrounding city, these freeways are often unable to contribute to any sense of visual coherence. Lynch found that, in Los Angeles, “surface streets were conceptually part of the grid,” while elevated or depressed arteries, because of their complete
physical disengagement from the ground plane, assumed a "relative invisibility" which "conspired to erase these freeways from the image.

14. The Hollywood Freeway

Many subjects had difficulty making a mental connection between the fast highway and the remainder of the city structure. . . They would, in imagination, even walk across the Hollywood Freeway as if it did not exist." (59) Similarly, those driving on the freeway were rarely found to feel any direct connection with the surrounding city, a condition that became most acute when drivers had to make a transition from the high speed artery to slower city streets. Lynch describes the feelings of misalignment and confusion experienced by Los Angeles drivers as follows:

The freeways were not felt to be "in" the rest of the city, and coming off an exit ramp was typically a moment of severe disorientation. . . this disassociation from the surroundings causes each turning decision to be made under pressure and without adequate preparation. Even familiar drivers showed a surprising lack of knowledge on the freeway system and
its connections. General orientation to the total landscape was the greatest need of these motorists. (60)

While the highway itself is a clearly defined spatial corridor, it fails to integrate with the space of the city at its nodal connections. Physical shapelessness at these interchanges, due to a lack of middle ground building volumes that might provide spatial definition and guide movement, adds to their degree of unintelligibility. Robert Venturi has noted the difficulty of maintaining a sense of one's bearings at highway interchanges, and the resulting indispensability of bold graphic communication:

A driver thirty years ago could maintain a sense of orientation in space. At the simple crossroad, a little sign with an arrow confirmed what was obvious. One knew where one was. When the crossroads becomes a cloverleaf, one must turn right to turn left, a contradiction... But the driver has no time to ponder paradoxical subtleties within a dangerous sinuous maze. He or she relies on signs for guidance—enormous signs in vast spaces at high speeds. (61)

It can be said that the visual disorder of the contemporary city “is not the absence of all order but rather the clash of uncoordinated orders.” (62)

The challenge of architects and planners today is to be critical of the "invisible" order of the city by re-establishing the visible connections and relationships between urban object and urban context and between the individual and the collective. These are the links that express legible structural organization, and, thus, give definition and meaning to human experience within the built environment.
IV. Formal and Spatial Perception in the Built Environment: The Street as a Vehicle for Visual Communication

The city and its buildings, unlike paintings or sculptures, are experienced only by being inhabited and used in the course of daily life. As Lewis Mumford has said, the physical environment cannot "be adequately described in terms of its two dimensional pattern; for it is only in the third dimension, through movement in space, and in the fourth dimension, through transformation in time, that the functional and esthetic relationships come to life." (63) Not even photographs can convey the actual feelings and sensations that are generated by an immediate interaction with form and space. This chapter will be concerned with the psychological implications of formal and spatial perception, and namely with the sensory cues that make the environment legible and comprehensible. It will thus establish the basic arguments which will be further developed in the following discussion of an ordering strategy for the highway.

Visual perception, of course, is the primary means by which we experience and interpret the city. In many ways, vision is perhaps the least "concrete" of our senses; it feeds the mind with visual stimuli which, because they are informed by previous experiences of the other senses, allow us to formulate a basic understanding of our surroundings without actually coming in direct contact with them. A distant view of the Houston skyline can trigger the memory of a number of different sensations, and even emotions, without our ever coming near it. As any advertiser knows,
visual images can be a powerful means of generating other than purely visual sensations (we can “almost taste” that hamburger). In terms of the city and its buildings, as seen from the street in the course of movement, sight primarily becomes an extension of our sense of touch. Thus, a building can be seen as something very “sensate” which confronts us with its materiality.

Like any object, a building is a finite entity with material properties. As Steen Eiler Rasmussen has suggested, our interaction with inanimate objects gives us an empirical and instinctive feeling for forms; tangible objects, including buildings, have an inherent tactile quality that we can “touch” with our eyes and that we can take hold of and “feel” visually, based on our experiential knowledge of handling materials. The surface character of materials conveys to us a certain sensation, and it allows us to perceive some buildings as being “hard” forms and others and being “soft” depending on their articulation. (64) When buildings and other urban artifacts are combined to form streets, they provide a very sensate fabric or “middle ground” between the individual and the world which serves as a tangible container for guiding movement and structuring activity.

The formal characteristics of this middle ground define the overall “feeling” of the city. A city composed of dark and narrow alleys, such as the medieval village, may feel claustrophobic because it seems to literally cave in on the observer. The opposite condition, found in the contemporary city, may feel agoraphobic because its atomized dispersal of buildings disrupts the visual continuity of the middle ground and makes the city feel empty. The middle ground of city fabric, to varying degrees of success, “foregrounds” the individual by mediating between the immediate
space of the body and the sense of infinite space beyond. (65) The human body, infinitesimally small in comparison with the surrounding environment, has a certain form and measure which is extrapolated by the mind into a sense of personal space, and buildings that are visually “within reach” provide tangible boundaries which give the world a human scale. The middle ground of urban fabric, therefore, becomes the crucial bond between the individual and the physical form of the city.

The sense of middle ground created by fabric points up an important aspect of formal perception; while architectural forms are, in themselves, objects with tactile qualities, their formal characteristics are never perceived independently of the spatial relationships they generate. Solids and voids are always perceived simultaneously, and each is necessary to give the other definition. Thus, it is not only the street edge which has figural qualities but the space of the street itself. As Rudolf Arnheim suggests, space is not simply a vast expanse of “nothingness” into which objects are inserted. Space can take on a definite form, and even a “substance,” depending on the way it is shaped by the objects around it. It can be argued, in fact, that, in terms of human perception, space does not exist of its own accord but is only “created” when natural and man made objects come together within the visual field to form a constellation. In other words, “space perception occurs only in the presence of perceivable things.” (66)

As Arnheim asserts, our perception of an object depends entirely on its relationship to the objects that are adjacent to it in space. Material things take on relative significance only in the visual presence of other things, when hierarchical relationships between forms can be discerned in the
spatial configuration. Visual tension between objects can be increased or
decreased depending on the distance between them. One could conduct
experiments to demonstrate this using any two objects, moving them closer
together or further apart. At greater distances, the interspace becomes
"looser," while close proximity will make it "denser," and, in this way,
"the observer experiences perceptual compression or decompression in the
interval." (67) Thus, a narrow street or alley can feel confining because it
exerts a certain spatial pressure, while a wide boulevard or square may feel
liberating due to its dissipation of visual energy; each has different
ramifications with respect to human sensory perception because each
evokes a distinct psychological impression.

The perceived "density" of space is not simply a function of sheer
distance but also of the relative sizes of the objects; that is, if the
proportional relationship of the height and width of the objects corresponds
to the dimensions of the space between them, this interspace tends not to
look empty but begins to take on figural qualities. The means of
determining the correct ratio between object and space are by no means
quantitative, and we must ultimately rely on intuition to judge what "feels
right." To some extent, this perception is influenced by the observer's own
personal sense of "elbow room," that is, the comfortable distance at which
social intercourse between two people is considered polite. But inanimate
objects have their own visual dynamics. Like a magnet, an object or
building has a visual force field generated by its relative size, mass, shape,
location and direction which influences its degree of mutual dependence or
independence with respect to other objects.
Objects that look "too close" to each other display mutual repulsion; they want to be moved apart. At a somewhat greater distance, the interval may look just right or the objects may seem to attract each other. (68)

The mind intuitively perceives the pushes and pulls between objects, and such sensations suggest the changes in location that might bring about a more "comfortable" state of equilibrium. Visual balance is achieved when the height and width of the objects establish a "pleasing" relationship with the space between them, but there is no scientific way of determining the proper relationship. Proportional relationships are not objective increments but rather are generated by the pressure of visual shapes, and they "would not provide us with any standard if they were only measurable quantities and not carriers of force." (69) Size relationships are thus a function of the complex counterbalancing of the visual dynamics that exist between forms.

Obviously, when two objects are moved further and further apart, the visual connection between them decreases and eventually disappears altogether. When this occurs, the interspace is seen as "empty" because it is no longer given definition or substance by form. A spatial interval can be "filled" by the objects around it, like in a musical composition, where small pauses may be perceived as silences but maintain an integral relationship with the sounds that border them and, thereby, take on a sense of tension and weight that has meaning. The degree to which an urban space becomes filled or defined is contingent on the visual dialogue between the forms that surround it. That is, it depends on the formal reciprocity by which buildings "speak" to each other and depend on one another for mutual
completion. If two buildings flanking a street or square are formally autonomous and do not compliment each other visually, then the space between them loses its definition and identity. As Arnheim suggests, this phenomenon has a strong correlation to the way human beings interact with their environment and find definition within it.

Perceptual emptiness can be described as a quality of an area whose spatial characteristics are not controlled by the surrounding objects. Extreme emptiness is experienced when there are no objects at all. In darkness, on the ocean, or in outer space, the absence of all points of reference and orientation, the lack of attraction and repulsion, the undefined distances, can cause ultimate terror. Its social equivalent is the experience of a person who feels totally abandoned: the environment is complete without him, nothing refers to him, needs him, calls him or responds to him. This lack of external definition destroys the internal sense of identity, because a person defines the nature of his own being largely by his place in a network of personal relations. (70)

This passage conveys the powerful psychological influences that are inherent in one’s experience of the environment, and it suggests just how placeless and alienating undefined “empty” space can be. Obviously, the effect of indeterminate space has significant ramifications with regard to the contemporary city, and the sense of forlornness that arises when one’s surroundings fail to provide structural organization will be discussed later in this paper. But this passage is useful in pointing out the degree to which the traditional city, with its dense concentration of forms, was inherently suited to the creation of legible environments. An anonymous expanse of space which does not define the position of the viewer or establish any reciprocity with him tends to make him feel lost; he drifts aimlessly and has the sensation of being abandoned by his surroundings because they have
no structural order and no “place.” One was unlikely to feel such disorientation in the traditional city due to the clarity of edges and boundaries established by the middle ground of the street wall.

It can be argued that the pre-industrial “walking city,” as it existed before the decentralizing forces of communication and transportation technologies became cultural realities, adhered to certain general methods of organizing form and space which were dedicated to giving a sense of definition to human experience. Dense urban environments, where proximity was a necessary condition for communication and interchange, were able to achieve a strong sense of visual unity almost by default. Arrangements of buildings and spaces were cohesive simply because their concentration allowed clear visual readings to be made of the relationships between one building and another, and, thus, between individual buildings and the city as a whole. The built structures of the city formed a dense mass of urban “poche” out of which streets and squares seemed to literally be carved. This poche consisted of the various “building blocks,” or typological pieces (dwellings, shops, palaces, churches, government buildings, etc.) each conforming to a shape and size appropriate to its function in the city.

Dense adjacency allowed the structures of the city to work in a coordinated way to form a cohesive fabric whereby the repetition of common physical characteristics, such as scale, proportion, material, color and rhythm, established a unifying visual framework within which certain elements could convey their relative importance according to how they differed from the normal texture. In this way, a dialogue was possible between edge and object, or fabric and monument, whereby important
institutions, such as church and government buildings, could take on a greater visual significance by breaking the uniformity of the street edge, and in some cases, becoming isolated free-standing objects.

Before the age of skyscrapers, it was a simple fact that the biggest and tallest buildings in the city were the most important to collective life, and their relative size made them apprehensible as such. Perhaps the clearest example of legible formal hierarchy can be seen in medieval Florence; here, the image of the city is dominated by the cathedral dome and city hall campanile, while the towers of the noble palaces assert their relative importance within a homogeneous poche of dwellings and shops. The fabric of this city provided its citizens with a closely knit formal / spatial dialogue whereby the individual was in constant sensory contact with the physical and social hierarchies of the city. There was an inherently close relationship between the buildings and the streets and squares they created, and spatial sequences could assume a sense of orchestration and figural definition simply because the buildings flanking them were perceptually within reach and hierarchically differentiated. The fabric thereby became a very sensate middle ground which established a crucial bond between the individual urban dweller and the larger collective, and by constantly reminding its citizens of the importance of their institutions, it fostered the shared perspectives and common purposes that gave definition and meaning to daily life. Thus, the city became a tangible manifestation, cast in stone and experienced in space, of the relationship between public and private spheres, and it conveyed the values and aspirations of the collective in a way that was legibly perceptible from the street.
15. The city as a physical manifestation of collective values:

Florence, Italy
In the traditional sense, the street wall, aside from providing spatial definition, also had the symbolic function of delineating the exact threshold between private and public realms of existence, that is the point at which the inner world of the home or shop interfaced with the outer world of the city. The street, thus, was not only a means of circulation but an arena in which the public faces of buildings and people could be displayed. As the vessel for public life, the street provided the primary means by which the excitement and unpredictability of the collective activity could be experienced, and its role, both architecturally and socially, was to give definition and coherence to this experience. Through a strong sense of formal and spatial clarity that reflected collective purposes and fostered emotional and psychological involvement in the affairs of the community, the city thereby became the physical medium for teaching individuals how to live well together.

Arnheim contends that a street with strong spatial definition can play an important role in establishing a relationship between the individual and the city. Visually, we perceive the space of the street as “a three-dimensional canyon, an elongated duct, formed by the buildings and the ground” whereby the walls to either side “add an upright dimension to the path” and make it visible as a figural entity. (71) The height of the building walls will even give the street corridor a spatial “ceiling,” an illusion whereby the “underside” of the sky is perceived as forming an overhead boundary located just above the roof line of the facades. When the hollow of the street canyon is clearly defined by its walls,
it acts as an exhilarating extension of man into surrounding space. Although man is only a small creature in comparison with the openness around him, he generates perceptual forces that permeate the environment. This enables him to experience the street channel as filled by a blown up self image, which invades space in all directions and also anticipates forward movement. The street canyon is the realm of man's amplified presence. (72)

Thus, a street space that has strong figural qualities engages the viewer and establishes a reciprocity with him, thereby lending definition to his position in the space of the city. This sensation is heightened through movement in time, especially when driving as “the increased speed emphasizes the penetration of empty space” and makes that space more dynamic, encouraging one to pay more attention the surrounding environment. (73)

One might argue, however, that the introduction of the car, that is, of mechanized “auto-mobility,” into the city has resulted in nothing less than the complete demise of “humanist” urban space. The automobile, of course, has completely altered the way we experience the city and move around in it, and it permits buildings and activities to be distanced from one another without increasing travel time. The modern city is no longer predicated on the spatial and temporal scale of the pedestrian but on that of the car, and the result has been a loss of anthropomorphic coherence that makes it difficult for us to “read” the built environment as it relates to us. High speed travel significantly changes the sensory perceptions of the driver or passenger and impairs one's ability to observe the fine details of the city fabric or use the senses of smell or hearing while traveling on the street. Instead, the street is seen as a series of constantly changing images
and fragmented perspectives viewed in isolation through the insular frame of the windshield.

As Paul Virilio has suggested in *The Aesthetics of Disappearance*, the contemporary urban dweller’s insatiable quest for speed and instantaneous connections in time has undermined not only the visual cohesiveness of the physical environment but the very nature of waking consciousness. Speed, he asserts, “perverts the illusory order of normal perception, the order of the arrival of information...With speed, the world keeps coming at us, to the detriment of the object.” (74) The world viewed at sixty miles per hour is seen as fleeting, transitory and continuously transforming, like a fire burning before our eyes, and we are unable to grasp the endless mutations of this fluid and ephemeral landscape. The accelerated voyage, where one is unable to remember the sequence of random events or to put them into any sort of organized structure, represents the driver’s innate desire to identify with the spatial and temporal power of the motor and to “become the vector.” (75) The city as seen from the highway is less like an urban “theater,” where drama and tension could be cultivated slowly through a carefully orchestrated spatial narrative; it is more akin to a montage or film, where one is merely along for the ride and in which sharp juxtapositions in scale and in time operate without logic or reason. Here, the only “suspense” is in the sheer danger of the accident.

Whereas the pre-industrial street could serve as a theater for human interaction, today’s freeway is a dangerous, noisy and polluted traffic artery which, out of necessity, is physically disengaged from its surroundings. High speed corridors are not seen as integral parts of the buildings that are adjacent to them but merely as a support system, a
component of utilitarian infrastructure. The dispersal allowed by the automobile, together with the vast amounts of space required for parking, have atomized the once concentrated city, resulting in a disconnected fabric of isolated objects which precludes the possibility of any one building or space taking on figural or hierarchical importance; the space between objects has assumed the same relative proportions as the objects themselves, and things are simply too spread out to convey any semblance of a connected tissue, leaving only the perception of autonomous objects floating in a residue of uncoordinated space.

In the “middle landscape” of the contemporary automobile city, the fabric has all but disappeared from the built environment, making it difficult to sustain any sense of visual order or coherence. It is as if the “cloth” of the old tightly woven fabric has been stretched to its absolute limit so that the gaps between the “threads,” the empty spaces of light and air, dominate the landscape, while the threads themselves are becoming frayed and severed. Connections between things exist in time, through movement, but not in space, as seen visually. Space no longer seems to be conceived as a figural entity, molded and sculpted by mutually reciprocal volumes for the purpose of providing perceptual orientation and meaningful relationships. A unified system of organization which might serve to coordinate all of the built artifacts of the city into a homogenous spatial matrix has given way to an infinite and empty space into which objects and people are merely inserted at random, their locations being arbitrary or expedient.

The car, like a turtle’s shell, is at once a mobile piece of architecture and an extension of the driver, and as such it mediates between the space of
the city and that of the individual, providing the only possible means of personal control and empowerment within an otherwise scaleless environment. But in a car, a person is no longer a "subject" in the traditional sense, taking in all the sights, sounds and smells of the city and able to move freely in and about its buildings; instead, he or she is more like an "object," an anonymous trajectory moving along a predetermined path and contributing to the mechanized character of the city. In the contemporary city, spatial sequences are becoming less and less dependent on strong formal enclosures which once served to define the position of the individual in space and in society; orchestrated three dimensional movement in time is neglected in favor of functional two dimensional linear connections across the urban field. In this atomized environment, the freeway corridor is no longer able to "amplify" the individual, and he or she must depend on other, more direct types of orientation and reciprocity with the surrounding landscape.

Robert Venturi has argued that, in this "megatexture" of vast open spaces and fast movement, the subtle relationships between form and space that once existed in pre-industrial urban patterns are no longer effective as a means of orienting the individual or communicating larger meanings and purposes. Today, architecture defines very little in the man-made landscape of freeways and parking lots, and more overt forms of communication are necessary, such as the overblown iconography and big flashing signs of highway strip architecture. As Venturi suggests:

This architecture of styles and signs is antispatial; it is an architecture of communication over space...The commercial persuasion of roadside eclecticism provokes bold impact in the vast and complex setting of a new
landscape of big spaces, high speeds and complex programs. Styles and signs make connections among many elements, far apart and seen fast. (76)

While clearly orchestrated spatial sequences once guided movement and provided legible orientation, Venturi argues that they are obsolete in the automobile city where “complex programs and settings require complex combinations of media...They suggest an architecture of bold communication rather than one of subtle expression.” (77) The visual graphics of the highway billboard have displaced the touches, sounds and smells of the medieval bizarre and have become the primary means of persuasive communication by which merchants advertise their merchandise to the urban populous. Meanwhile, the vast spaces that exist between buildings mean that the highway cannot be grasped in a single glance; “its enormous spaces must be seen as moving sequences,” though these spaces rarely add up to a coherent whole and are usually arranged according to a complex order (based on movement, communication and land values) which approaches visual chaos if one ignores the symbolic messages being communicated through words and images. (78)

Appleyard, Lynch and Myer, in The View From the Road, describe the driving experience as “a sequence played to the eyes of a captive, somewhat fearful, but partially inattentive audience, whose vision is filtered and directed forward.” (79) Venturi adds:

Movement perception along a road is within a structural order of constant elements- the road, sky, lamppost spacing and yellow stripes. A person can orient to this while the rest just happens! Lynch found that more than half the objects sighted along a road by both drivers and passengers are seen straight ahead and narrowly to the sides as if with blinders (that is why the sign must be big and must be along the road). About one-third of the
attention is off to the immediate sides. Attention is also more focused on "moving objects" than on "stable" ones, except when the observer passes a visual barrier and, in order to re-orient, surveys a new landscape. Speed is the determinant of the focal angle, both for drivers and passengers. Increases of speed narrow the focal angle (as those things further ahead begin to arrive more quickly) with a resulting visual shift from detail to generality. (80)

The visual datum of the highway is the only constant point of reference amidst a chaotic landscape of uncoordinated individual competition where land is considered to be the sacred commodity in the capitalist free market. Venturi questions seriously the ability of abstract formal and spatial arrangements to convey significant meaning along such high speed roads, asserting that the only realistic means of communication and expression in the city today is through visually "loud" graphics and symbols. But it is here that one must challenge his arguments, for in denying the poetic potentials of orchestrated formal and spatial sequences, Venturi fails to acknowledge the fact that movement itself can be given definition and meaning through its sheer perceptual and psychological interpretation. One can hardly deny that the experience of driving on a highway that is well thought out in terms of its integration with the surrounding landscape,
its dramatic revelation of breathtaking vistas and its artfully considered spatial sequences can be exhilarating and inspirational. High speed movement does not mean that the subtleties of the visual surroundings disappear altogether; it only means that they must be considered on a different scale (though most certainly in conjunction with the various forms of graphic communication which are absolutely necessary for orientation on these high speed arteries).

But given the fact that visual communication along a highway has more to do with the mundane realities of navigation and advertising than with the more artful expression of collective values and aspirations, one must wonder what the possibilities are for turning these high speed landscapes into more meaningful and poetic environments that acknowledge the presence of the subjective observer and legibly convey the shared perspectives that define the modern urban experience. The contemporary city is characterized primarily by flux and movement rather than stasis, and it must be designed in a way that celebrates the complex realities of its intricate daily rhythms. But the question remains as to how the designer can begin to reshape the vast empty spaces of the freeway network in a way that effectively communicates a sense of civic “place” when these technologically determined environments seen at sixty miles per hour seem to defy the presence of the individual.

An obvious starting point lies with the re-conceptualization of visual perception itself, and with taking a critical look at how the experience of high speed travel affects one’s ability to observe the subtleties of the surroundings. Without the existence of a traditional middle ground to give definition and meaning to the space of the freeway, one must rely on those
perceptual tools which inform the mind the spatial and temporal experience of movement. James Gibson, in his book *The Perception of the Visual World*, explains that the primary means by which human beings orient themselves in space and discern depth relationships is through the so-called "motion parallax." (81) This is a condition in which the contours and relative locations of objects in space continually shift as we move past them. This is so essential to everyday perception that it is an entirely unconscious activity, but it is greatly accentuated at high speeds and becomes an important tool for orientation. As we drive along the street and glide past the objects around us, those that are closest to us seem to "move" by the fastest, while those further away advance at slower speeds, and the points of "infinity," such as the stars or sun, seem to remain fixed. From this movement gradient we can draw conclusions as to the distance of things with respect to ourselves. (82)

A person driving on an open road will perceive the horizon and the sky as being motionless, "but the world and the ground flow past in a continuous stream. The flow vanishes at the horizon, but it increases downward and reaches its maximum on the road beneath...it is a continuous deformation of the surface, not a movement in the ordinary sense of that term." (83) This sensation allows one to see a "perspective" of motion whereby the rate of flow is inversely proportional to the distance from the observer. As the ground seems to rush by of its own volition, there is a "continuous gradient of velocity" present in the surrounding field of vision, by which the objects whizzing by at closest range provide the greatest sense of speed and movement. (84)
17. Motion perspective in the visual field: looking ahead and to the right

Peripheral vision allows the driver to perceive "a great deal more of the scenery than that which lies directly ahead," and even if the head is turned away from the point of aim, one still has the ability to sense where the car is headed. (85) The surrounding landscape becomes the source of visual clues as to how fast one is traveling and how far away things are. A clear sky, however, will provide almost no reference data since "there is no texture, no surface, no motion, and accordingly no determinate world and no visual sense of one's own motion." (86) Clouds aid somewhat, but are at too great a distance to provide the senses with immediate information.

When one is driving, Gibson suggests, the eyes are rarely fixed squarely on the horizon but rather are constantly roving the landscape. "Pursuit movements" are those drifts of the eye which follow a particular point in order to "maintain the image of a selected moving spot or object at the center of the retina;" "Saccadic movements," on the other hand, are those rapid eye jerks which scan the surroundings in order "to establish a new fixation." (87) If one is looking out of a side window while in a car and fixates on a spot in the terrain below the horizon and follows it, that spot will appear not to move. The gradient velocity flow of the terrain increases up and down from this point and all points above it will seem to flow in the opposite direction of those below. If a person approaches a
wall with his eyes fixed on one spot, "the flow is zero at that spot and increases symmetrically around it...When he approaches it at a slant, the flow is correspondingly asymmetrical, the velocity becoming greater on the near side." (88)

All of these examples show that visual perception of motion gradients, or "parallax," provides drivers with the most effective means of judging distances. The eyes, however, are less suited to perceiving acceleration, which is a force felt most acutely by the body. The forces acting in acceleration and deceleration are mediated by the muscles and by the inner ear, and not primarily by the eyes since they are insensitive to force. There is, however a certain sensation that is conveyed through vision, as anyone knows who has viewed a "Cinema 180" film of a roller coaster ride; one definitely "feels" one's stomach drop out as the car clears the peak and plummets toward the ground. Uniform motion provides the inner ear with no stimuli, and it is here that we depend most on sight for orientation. Driving a car, Gibson suggests, is an effortless and "artificial" means of locomotion in comparison with other more "natural" types of travel such as walking, and, thus, for the driver "visual stimulation becomes proportionally much more important than bodily stimulation." (89)

Since humans are mobile animals, the city is almost always perceived through locomotion along a street or highway. Depth perception allows us to see the street channel as being distorted by perspective, its lines converging to a single vanishing point on the distant horizon. This image, being more dynamic than a frontal view of a building in which lines are seen as parallel, invites forward movement. At the same time, however,
a convergence offers the prospect of a gradual narrowing and ultimate blocking of the road, which inhibits forward progress. Yet, paradoxically, that convergence remains at the same distance. It never comes closer, but offers instead an unchanging image, a visual standstill, which contradicts the walker’s or drivers sensation of moving forward. All this adds up to a subtly frustrating experience, which counteracts the exhilarating freedom of the open road. The effect is the opposite of what we feel when there opens ahead of us a crescendo, a gradually expanding vista. (90)

As we move through the city, our minds tend to see the world ahead as “a map of potential paths,” and it surveys the formal and spatial configurations intensely for possibilities of making progress. (91) Monotonous surroundings which lack visually distinct images fail to communicate with the viewer and induce the sensation that no progress is being made. Such perception can occur in a dense fog, in a city with repetitive streets and buildings, or on a highway that has limited views of surrounding landmarks. This situation can be alleviated when the street corridor takes into account our ability to see and translates physical movement into a visual “event” composed of an orchestrated sequence of thresholds, short term goals or destinations. As Arnheim says,

This perspective unfolding is an essential part of the experience that transforms the simultaneity of space into a sequence in time. As we walk or drive, the environment becomes a happening, in which things follow one another and change shape while they change position. (92)

In The View from the Road, Lynch poses several strategies by which urban designers might begin to approach the problem of creating legible and artfully composed environments along urban freeways. His basic message is that, when considering the experience of the highway driver, one must
begin to think more in terms of time than of space. A degree of order can be given to the pure act of movement in time by manipulating and coordinating the rhythmic intervals of infrastructural elements (painted stripes, guard rail and sign posts, pavement joints, light posts, road textures, etc.); such a sense of cadence might provide a continuous temporal index against which a succession of short term and long term visual goals (in the way of important landmarks and other lasting visual impressions) could be played as a form of overlapping "counterpoint." As Lynch says, the aim of such an approach would be to "present the viewer with a rich and coherent sequential form, a form which has continuity and rhythm and development, which provides contrasts, well joined transitions and a moving balance." (93) A greater sense of orientation within the city might also be achieved when the path of movement is coordinated more harmoniously with the city's most important civic landmarks, such as when "a tower rooted in community history is the visible goal of a trip and the visible pivot about which the road turns." (94) Such a reciprocity between the highway and the city might

clarify and strengthen the driver's image of the environment and give him a picture which is well structured, distinct and as far ranging as possible. He should be able to locate himself, the road and the major features of the landscape, to recognize those features with surety, and to sense how he is moving by or approaching them. (95)

Given the scale and complexity at which such design strategies should operate, they constitute no small order. But if the highway could be re-conceptualized in terms of how it acknowledges and amplifies the presence of the subjective observer and takes into account his or her need to make
sense of the cityscape, then it might begin to facilitate a stronger sense of emotional and psychological attachment between the individual and the collective, and, thus, strengthen the capacity of the city to serve as a receptacle for cultural identity and solidarity. By helping to reveal the purpose, history, character and symbolic significance of the urban landscape, the freeway might provide the urban traveler with "a fascinating book to read on the run." (96)

In The Freeway in the City, a report to the Department of Transportation by the Urban advisors to the Federal Highway Administrator, similar proposals are suggested along with others that concern residential and commercial development over and along the highway corridor right-of-way. Such strategies would involve wrapping the traffic artery with built structures - over, under and along side- in order to shape the space of the highway into an integrated whole while at the same time providing for the multiple use of the right-of-way; neighborhood amenities, such as parks, plazas, residential towers and retail and office uses, could be used as a sort of "fabric" which both channelizes the space of the freeway and serves as a buffer to ameliorate its overbearing presence in the city. (97) In such a way, the "necessary evil" of the freeway might be turned into a positive element in the landscape, one that makes a contribution to its surrounding communities while simultaneously offering highway drivers a greater sense of spatial rhythm.

What all of these strategies begin to suggest are ways of recapturing the highway as a meaningful and memorable urban space and of harnessing the poetic potentials of high speed travel. As they stand now, our freeways constitute a technological force of almost mythic proportions, one which
we as individuals have difficulty conceptualizing and reading as a whole. As a constantly surging river of mechanical energy, the highway is rarely a place in which one feels at home, a place which allows us to relate to, identify with and mentally comprehend the urban landscape; it is more often than not a testament to the fact that the efficiency of the machine has displaced the aspirations of the citizen as the primary focus of urban life. The highway is a permanent reality in the city; it is here to stay and it must be dealt with as a vital and integral part of the visual environment.

As yet we seem unable to come to grips with the powerful and superhuman forces of modernization, to “humanize” speed and “put a face on it,” so to speak. The engineer is able to make the city “work,” but one gets the uneasy sense that we are being smothered by a technology over which we have lost all control, and we seem to have become the victims of our own progress. After nearly a century of building cities according to mechanical techniques and processes, we are left with urban environments devoid of artistic composition and seemingly unable to convey any sense of collective identity. Perhaps be the most important challenge that awaits architects and urban designers in the coming years will be how to harness the awesome forces that the highway embodies and channel them into artfully composed environments.
Footnotes


5. Ibid.

6. Ibid.

7. Elyzabeth Yates-Burns McKee, ARCH 625 Modernity and Modernism, Department of Architecture, Rice University, class lectures.

8. Ibid.


11. Ibid. p. 189.

12. Ibid.

13. Ibid. p. 192.


15. Ibid.

17. Ibid. p. 191.

18. Ibid. p. 196.

19. Ibid. p. 213.

20. Ibid. p. 209.

21. Ibid. p. 11.

22. Ibid. p. 20.

23. Ibid.


25. Rowe, p. 25.


27. Ibid.

28. Rowe, p. 25.

29. Ibid. p. 28.

30. Ibid. p. 30.

31. Ibid. p. 35.


38. Ibid. p.15.


43. McKee, Ibid.

44. Venturi, Ibid.

45. Venturi, p.133.

46. Arnheim, p. 208.

47. Ibid.


49. Arnheim, p. 209.

51. Ibid. p. 3.


53. Ibid.

54. Ibid.

55. Ibid. p. 165.

56. Lynch, p. 4.

57. Ibid.


60. Ibid. p. 56-57.


65. Albert Pope, ARCH 641, Contemporary Issues in Architecture, Department of Architecture, Rice University, class lectures.


67. Ibid. p. 18.
68. Ibid. p. 19.
69. Ibid. p. 221.
70. Ibid. p. 21.
71. Ibid. p. 76.
72. Ibid. p. 78.
73. Ibid.


75. Ibid. p. 75.
77. Ibid. p. 9.
78. Ibid. p. 20.


80. Venturi, p. 74.


82. Ibid.
83. Ibid.

84. Ibid. p. 120.
85. Ibid. p. 122.
86. Ibid. p. 124.
87. Ibid.

88. Ibid. p. 128.

89. Ibid. p. 135.


91. Ibid. p. 155.

92. Ibid. p. 156.


94. Ibid.

95. Ibid.

96. Ibid.

97. The Urban Advisors to the Federal Highway Administrator, *The Freeway in the City*. passim.
Figure Credits


2. Photo by author.

3. Photo by author.

4. Photo by author.

5. Rowe, p. 189.

6. Ibid. p. 190.


8. Photo by author.

9. Rowe, p. 25.


11. Photo by author.

12. Photo by author.

13. Rowe, p. 22.


15d and e. Kevin Lynch, p. 98.

16. Photo by author.

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V. Conclusion: Final Thesis Presentation

The following is a summary of the final review of this project which was held on April 23, 1993. The jury consisted of visiting critics Sanford Kwinter, Michael Bell and Rodolfo Machado; Rice School of Architecture professor John Casbarian and assistant professors Elyzabeth Yates-Burns McKee and Danny Samuels; and Lars Lerup, Dean of the Rice School of Architecture.

I began by stating the principle intention of the thesis, which was to engage the freeway as a meaningful urban space by establishing a reciprocal relationship between the high speed corridor and the architecture that fronted it. The essential goal was to arrive at an ensemble of buildings whose sculptural massing and structural rhythms would be generated by the forces of flow and movement, and which would, in turn, contribute to making the space of the highway more legible as a poetic expression of contemporary urban realities. I noted that the site I had chosen was the interchange just north of downtown Houston where I-10 (running E-W from Florida to California) and I-45 (running N-S from Dallas to Galveston) come together. I had decided to site the project at a central interchange rather than at some other more anonymous point along the freeway system because the interchange was already a memorable event in the network and it had the most potential for accommodating an architecture of powerful gestures; not only is it a place of intense decision making and, thus, of a heightened awareness of one's surroundings, but it also has a strong visual presence and sense of drama due to its sweeping
overpasses. This particular interchange had the added benefit of being visually engaging due to its proximity to downtown and its stunning views of the Houston skyline, thus suggesting a direct connection with the city's most recognizable landmarks. I pointed out the unusual configuration of this interchange, which was not in the form of a cloverleaf but rather consisted of a more elongated and stretched out configuration whereby the two highways become "entangled" then run parallel for about a half-mile before they "unravel" again.

After explaining my basic intentions and presenting the site, I then played a video tape showing footage shot from all four highway approaches to the site. While the tape played, I elaborated on some of the central issues that I had been developing in the document and throughout the design process. These can be summarized as follows:

As an urban monument with cultural significance and symbolic potential, the highway represents a striking paradox; on the one hand it embodies the fluidity, mobility and freedom that define the essential nature of modern life, but on the other it stands as one of the most permanent and physically oppressive features in the urban landscape. It crashes through the city on its own terms, physically disengaged and almost violently juxtaposed with the surrounding city for which it seems to show little concern. The highway is a harsh reality which must be dealt with as an essential part of the total visual environment.

Traditionally the street has always served as not only a transportation network but a communication network as well, providing the means by
which urban dwellers interact and conveying the shared perspectives that defined collective life and amplified the presence of the individual within the larger social framework. Strongly defined formal and spatial enclosures and the hierarchical placement of institutions and landmarks provided both geographical and sociopolitical orientation within the city.

Today's highways are more about "getting there" than about "being there." Though they are the primary means by which we experience and move through the city, they are rarely conceived as an artfully composed visual experience in which the sequential unfolding of space in time might reveal the larger relationships that connect the individual with the city. The highway is about speed, convenient access and instantaneous connections across vast distances, and it stands as a testament to the engineering mindset which has turned the humanist city into the technological and mechanical "city of process," based only on the efficient flow of materials and energy. The spaces of our freeways, scoured by speed, serve only to dull the senses rather than to give a sense of definition and meaning to urban life.

Whereas the traditional street consisted of a series of "points of arrival," the freeway is more like a raging river, where one is swept downstream in a surging current and must remain painfully attentive to the task of navigation. At sixty miles per hour the landscape becomes fleeting and ephemeral, like a burning fire; in this endless rush of mutations, one is unable to grasp the relationships and connections between things seen over time.
With speed perception is altered as the angle of vision is narrowed and attention must remain focused on those things immediately ahead of the driver, such as the road surface and other drivers. Lynch found that two thirds of all objects typically noticed by drivers are directly ahead or obliquely forward, while only one third are to the right or left. Distant objects seem to grow as one approaches, while those closest to the road whiz by out of focus.

Venturi contends that architecture can define very little in the megatexture of vast space of the freeway where bold graphics are essential for orientation. This thesis challenges Venturi’s position by contending that architecture, when conceived at the scale of the highway and rhythmically coordinated with the tempo of high speed travel, can lend a sense of definition and meaning to the experience of driving, and can begin to transform the space of the highway into a more poetically orchestrated environment.

After touching on these central issues, I then proceeded to explain the project itself and the design strategies I had incorporated. The program essentially consisted of two transit terminals; one to accommodate the Texas TGV, or high speed train, which is being planned to connect Dallas, San Antonio and Houston, and the other to serve as a rest stop and welcome center for highway drivers. I began by determining where the views of the skyline were to be preserved and accentuated, and, thus, where the buildings should be placed. I then organized the site by means of a grid,
using a 40’ module derived from the interval of the painted stripes that
divide the highway lanes. This grid was laid out across the portion of the
interchange where the highways run parallel to each other, and it
establishes the basic ordering system to which all of the infrastructural and
structural elements conform, thereby giving a three dimensional expression
to the basic rhythm of the stripe. The road is also scored at the same
interval so that the visual tempo is given an audible and tangible dimension.
This grid is skewed thirty degrees from the direction of travel in order that
visual connections might be made across the site from both directions and
within the driver’s cone of vision; the resulting pattern would heighten the
sensation of motion parallax, creating a visual experience that would be
akin to driving alongside a corn field or an orchard where vistas
continually open up and disappear. More significantly, this grid, as a type
of metronome, provides an index of time whereby the driver at sixty miles
per hour passes two stripes per second and becomes conscious of a constant
rhythm.

The TGV terminal, including a parking garage to accommodate 1700
cars, was placed along the east end of the site between the highways and
White Oak Bayou in order to preserve views of the skyline for southbound
traffic. Its structural and parking grids are skewed to correspond to the
freeway grid so that the rhythm of movement is reinforced, and the
existing train tracks are diverted to run under the building, parallel to the
highway. This building and the ramps that serve it begin to define edges
and walls for the northbound freeways (heading away from the skyline),
giving them a sense of spatial definition. As the ramps serving the garage
peel off and pass over the freeway, the building undergoes a linear transformation, "unraveling" as it moves through the landscape.

In contrast to this edge building, which is meant to be experienced as a linear sequence, two "object buildings" are placed at either end of the interchange and serve as visual targets which mark its nodal points. One is a circular building located at the southern node which is to be seen by southbound drivers heading toward the skyline. This building houses the rest stop / welcome center, and it includes a grand lobby, a cafe, a theater, offices and conference rooms. Its roof serves as a viewing platform and is accessed by a spiraling automobile ramp which encircles the building. Parking is located in the lower levels. The round form of the building echoes the visual forces of the existing ramps and it is able to respond equally to the four highways that approach it. It is to be read as a perfect, self-contained form from a distance, a strong visual landmark seen in the foreground of the skyline, while at closer range it begins to break down into a series of transparent layers. It stands directly across the highway from the train terminal, and together these two buildings form a monumental gateway for all traffic entering and exiting downtown. For southbound traffic, this building takes on the added function of a clock tower, traditionally a civic landmark, here reinterpreted as a digital read-out which ticks off each second as approaching drivers traverse the temporal index of the structural and infrastructural grid. It thereby establishes a strong connection between time, space and movement, and it heightens the awareness of the driver with regards to his or her speed and cadence.
At the opposite end of the site (the northern node) stands a triangular building which houses no program but is instead meant to serve as a pavilion and viewing platform for the park that filters under the highway ramps. Like the welcome center, this structure is meant to operate as a scaffold for billboards and electronic message boards, and it is to be read as a self-contained volume at a distance which becomes more transparent as it is approached. Unlike its counterpart, however, this structure does not act as a visual pivot seen in relation to the skyline and train terminal; its triangular shape, which corresponds to the geometry of the grid, is meant to split or divert outbound traffic heading away from the skyline.

Together, these three buildings, and the ramps that serve them, are intended as an architectural ensemble operating at the scale of the highway and whose shapes are generated by the forces of flow and movement in and around them. The design aims at a reciprocity between the structural rhythms of the buildings and the infrastructural intervals of the highway in order celebrate movement through the site and to foster a heightened awareness of the driver’s connection to the surrounding city.

The jury comments were generally positive and, for the most part, sympathetic to the basic intentions of the thesis. Michael Bell wanted me to clarify my reasons for choosing a TGV station and wanted to know why exactly it was an appropriate program for such an exploration. I said that it was primarily a vehicle for exploring the larger formal and spatial issues, but that it did seem appropriate to use a transit center in this case since it could be easily accessed from the highway. Bell then said that I had perhaps missed an opportunity to enrich the dialogue between the car and
the train, since both had played an important role in shaping the city throughout this century.

Lars Lerup added that the visual perception of motion from a train is markedly different from that of a car, and that the design could have taken this into account. Instead of looking forward, the train passenger must look out of a side window, and thus sees the world rushing by laterally in an entirely different type of parallax. He also remarked that the video footage of the highway (which was shot from the passenger seat) would have been more effective if from the view of the driver, or better yet, if the camera had been mounted on the front bumper close to the road.

Lars Lerup liked the shapes I had generated, calling them very "contemporary" and noting that they were well suited to a speed swept landscape. But in his opinion the points of arrival, or "stoppages" as he called them, were not articulated strongly enough. He also said that I could have been more bold in embracing the freeway by building directly over it rather than mostly to the sides of the traffic lanes.

Sanford Kwinter remarked that he liked the form of the linear building, especially the way it unfolded and seemed to regenerate itself as it "moved" along the highway. He also thought the idea of building a space dedicated to the perception of time was a good way to approach this problem. He said that in the years to come, we will depend more on time than on space to define the nature of "being" and to structure our lives and identities.

Lars commented that he was glad to see someone resurrecting such a valuable resource as Kevin Lynch, and he was surprised to see both Lynch and Virilio being evoked in the same argument.
Rodolfo Machado noted that the questions raised by this thesis regarding the nature of contemporary urban space and the automobile were questions he had dealt with in the past, and he believed that the design was headed in the right direction.

Michael Bell criticized the monotony of the grid and its constant rhythm, noting that I could have had a much richer variety of overlapping tempos. I agreed, saying that I had intended to take the project to that level but was not able to due to time constraints. John Casbarian said that the rhythms did lack modulation but that I had provided the basic system of order, the essential infrastructure, on which a more sophisticated composition of "counterpoint" and overlapping rhythms could be easily overlaid.

In closing, Danny Samuels said that he was pleased to see the amount of progress that had been made in the last three weeks of the design, and that the formal relationships between the buildings and their ramp connections (a point of contention at all previous reviews due to certain axial relationships in the design) had finally seemed to be resolved in a convincing way.
Site Location
Motion / Time Graphs from 610 Loop to Downtown
View From I-45 Looking North

View From I-10 Looking North