INVENTORY OF RESOURCES

Introduction

In discussing resources connected with the freeway it seems most appropriate to begin in a general way with the freeway and the landform themselves and then move on to more specific elements occurring on and about these larger forms - elements that support and are applied to the right-of-way.

The Interstate Highway has its own form, different from other roads, that is largely an expression of the speed of travel in the modern world. Its character, impact and import is obviously that of a system made necessary by a technological invention - the automobile. The mild grades and gradual curves, its integration or lack of it with the city fabric, its demand for great land areas and its flying over or diving under obstructions are all manifestations of speed.

The freeway is a linear form, parallel to the movement on it. Take away static objects from the view of the motorist and the road itself and the experience of movement down it would become static. That is, the static objects along the way move relative to the motorist while the road seems static and immobile.

The topography of the land has characteristics which are either
in conflict or agreement with the highway's linear form. Rivers, lakes, ridges, oceans and mountain ranges have edges which are linear or define linear paths. To integrate the freeway is relatively easy because it is also linear and can follow natural pathways. Plains, wide valleys, plateaus, etc., are planar and will accept the linear roadform readily. Hills, gullies, mountains, canyons, rock outcroppings, etc., are volumetric and will resist efforts to integrate them with the linear road. Of course man insists on connecting two points with the straightest path possible, leading to clashes of dissimilar forms, i.e., the two dimensional road with the three dimensional volumetric landforms.

The land is discontinuous in its form. Unlike the freeway ribbon, the land is always changing for the motorist and is experienced kinetically. It is the relatively static objects and forms along the way that move by and rotate within the field of vision.

Roadform

The highway can, in general, be positioned four different ways: elevated, at-grade, recessed and as a tunnel. As general types they have a lot to do with the existing environment they pass through.

Elevated roads can go just about anywhere and are successful, albeit expensive, solutions to situations where the grade could not ordinarily support a freeway. This is just as true in many
urban settings as well as sensitive natural sites. A certain drawback is its visual impact and its overbearance on its surroundings, especially in the city.

At-grade is the least expensive position for a freeway. It is easiest and fastest to build. However, it is visible and requires many attendant structures to respond to cross traffic. It is characterized by large earthmoving to produce the roadbed. It is most easily integrated with planar or linear landforms. In the city it is too visible and noisy and disrupts the textures and patterns of neighborhoods.

Depressed freeways are common in the city because they are generally out of view, noise is controlled and it is easy to bridge across local traffic. However, because of access requirements, it requires a wider right-of-way than the at-grade type, often cutting a swathe up to 400 feet across. The area given in large cities such as Chicago to the recessed freeway is staggering. Especially so considering the value of vertical space in such settings.

Tunnels are great solutions to many kinds of problems relating to integration of highway and landform. The land form remains, the highway moves directly where it wishes. Gateways, exploding panoramas, anticipation, processions, tension and release - in short, the ability to control drivers' experience is built in to the tunnel type. The integration comes from virtual avoidance and acceptance of the topography. Tunnels are expensive and only
realistic where there is no real need for frequent access. But they are excellent answers for the designer and the users where the landform or cityscape clearly resist the linear, high speed freeway.

Sections of Roman, Macadam, and modern Interstate road construction reveals a reliance on steel reinforcement today. The use of this tensile material makes possible daring forms, thinness of construction, considerable short-term savings on material, time and cost. But in the long run the modern technology cannot compare to the massive beds of antiquity still usable today. Much of the substructure of the modern freeway is in need of replacement because of the effects of road salts on concrete, steel reinforcement and steel structures.

A great deal has been done in the way of developing the shape of the roadbed in terms of curvature and grading. The radii of curves and the transitions leading into and out of them are well documented. Every effort has been made to make the road "read" properly and "drive" safely. These concerns are, again, a response to the higher speeds of freeway travel and the needs inherent to that. The form the ribbon of pavement and the landform strip takes is the natural result of its function.

As limited access roads, freeways depend on large, specialized exits, entrances and interchanges. These large forms are necessary elements which often determine location of the freeway, positioning of the freeway relative to grade, amount of
right-of-way acquisition, landscaping, overall costs, driver's views, etc. A few basic types can be shown to influence specific choices, but all relate through their form, the importance of providing smooth transitions during speed and direction changes. Interchanges especially often require very large areas and extensive structure.

Large structures such as bridges, viaducts and tunnels have real impact on the motoring experience. Whether driving over, under or through such linear forms, the motorist is affected by their magnitude and potential for altering the environment. Many receive a lot of attention in design and contribute significantly to the enjoyment of a drive - many are merely generic types that go unnoticed. These roadway structures certainly represent opportunities to act upon drivers' perceptions in a kinetic way as they are used as elements that often counteract the normality of view. They leave behind the banal at or below-grade perspective and route the motorist into a sense of corridor or restrictive view that in turn heightens the driver's awareness of his normal reference point. They are a visual, sculptural result of man's favorite mode of transportation.

Surrounding and interlacing the hard surfaced built forms is the median and right-of-way. This "soft" surface is often designed but is clearly of secondary or "left-over" importance. In rural settings the better roads seem to move through landscape that seems relatively untouched or natural. Too frequently however, especially noticeable in urban settings, the median and

Kellog Hill Interchange of the San Bernadino and Orange Freeways.
right-of-way are obviously shaped and scaped as a subservient space to the road and show obvious signs of large-scale earth moving.

Some places remind one of the after effects of strip mining or quarrying and seem to have been the result of expedient solutions to such problems as grade, drainage and noise abatement. Today's technology in earth-moving is overwhelming. There is nothing on the surface of the earth that can stop leveling efforts when machines and explosives are brought to bear. Too frequently scars are left on the land that testify to an impatient, insensitive and aggressive human desire to conquer nature for economic reasons.

The Interstate Freeway construction from 1956 to about 1970 was almost frantic in its effort to complete the system as planned. This attitude was certainly somewhat responsible for an environmental conscience which arose in the 60's and 70's. Many lives and properties were touched by freeway construction. Comments of environmental activists during this time period, were published quite extensively by the national media, eventually reached the ears of federal legislators and can be given much of the credit for some of the more sensitive, careful projects undertaken more recently. Today most states have designers and architects on staff in their Highway Departments or Departments of Transportation who are members of divisions expressly concerned with protecting, restoring and enhancing the environment touched by the freeway. The intro-
duction of an expanded design aesthetic has been reflected in some recent highway construction.

**Landform**

Underlying the obvious and visible exterior layer of top soil and vegetation is the geology that characterizes the true shape of the land. Occasionally it projects through and displays itself - usually in dramatic fashion. Where erosion is severe exciting sculptural shapes can result and dominate panoramas. Whenever man tampers with these natural enduring formations the result is obvious and disturbing.

Surface water is one of the great shapers of the land. Rivers, lakes and oceans delineate natural pathways for travel and commerce. They offer level paths of little resistance across the surface of the globe. Very often their shores are natural routes for wheeled vehicles. People are attracted to the dynamic qualities of water - the ever changing textures, colors and moods, and its recreational possibilities. Man has done much to shape and control waterways in the name of progress. Often one defect in their plans has been the loss of a certain natural quality, that dynamic interplay between opposing forces in nature. The freeway system has produced many small lakes by excavating fill for roadbeds or enbankments, sometimes creating recreational spots or areas of potential scenic beauty, often absurdly irregular shaped ponds or wetlands with no ecological niche.
In an undisturbed area of land there exists an interrelated pattern of separate systems such as soil, flora, fauna, etc. which depend on each other for existence. It is often described as a textile with many threads. Any thread broken or removed tends to weaken the strength of the fabric and jeopardizes the integrity of the whole. Each ecological niche has natural boundaries yet depends on surrounding systems for life support. Something as large in scale, linear in form and unnatural as a superhighway obviously destroys many parts of the ecology and becomes an unnatural barrier between interdependent parts. The man-made ecology of the city is also weakened by the freeway unless it is carefully planned not to break apart neighborhoods and to route goods and services into areas where they are needed.

Intimately tied to the landform is the weather with its many patterns and affects. The landform plays a critical part in the making of weather systems. Thermal patterns, humidity, wind velocities and solar orientation are crucial to weather conditions. Geographical areas with special characteristics invariably have unique weather patterns as a result. The weather in turn is constantly altering the surface of the land. Thaw and freeze cycles and water and wind erosion are strong forces acting upon and creating landforms.

Mentioned earlier was the notion of cities as man-made ecology. A number of fine books have illustrated this idea. The term "cityscape" has been coined to describe that kind of environ-
ment which man creates and experiences in urban settings. The city’s ecology is much more than surficial shapes and massing. The ecology includes such things as traffic patterns, trade and shipping patterns, Government and social outreach patterns, recreational areas, ethnic and economic patterns, age demographics, industrial areas, etc. The city has a real textile-like patterning to it, a crazy quilt kind of a design that is indicative of the history of that place. The cloth has varied textures, densities and colors. Very obvious from an airplane or a tall building are the great stitched seams that are the freeways. It can be seen that the scale and form of the freeways is not easily integrated with the scale at which man lives in his built forms within the city.

Supporting Forms

Along the freeway are built structures that can be easily identified as supporting forms to the travel process. Human and machine needs require such things as rest stops, gas stations, motels, restaurants (as fast as possible) and certain types of stores. Rest stops are legislated, officially required adjuncts to the road. When done best, they seem to be part of the road and yet put people in touch with the characteristics of that region - things that are not noticed from within a car traveling 55 m.p.h.. They are real opportunities to integrate for the traveler his experience of passing through a region with its history, geography, culture, etc.
Gas stations, motels and restaurants have shown a response to automobile travel in their architecture. The automobile has shaped, in an erosion-like way, the forms attending it. Discussed earlier was the way the road is shaped by its use. Similarly, whether consciously or not, designs within the strip along the road have an identifiable quality related to their servant role to the car. Generally, in the U.S., not enough attention has been paid to consciously designing structures which respond to and express the linear, speed-oriented modern freeway.

**Applied Forms**

There are a number of elements applied to the overall form that is the highway. These elements are technical necessities required by safety and driver orientation. They include signs, reflectors, line patterns, barriers and lights. They also include larger scale elements such as abutments, walls, ceilings (in tunnels) and any building that might be integrated directly with the road.

Signs are important as a topic because they compete for the attention of the driver. They are placed where the driver will look and they are designed to be easily read and understood. Some signs are official, relatively small, close to the road, concise, standardized and placed unobtrusively. Other signs are commercial, gigantic, off to the side on private land, gaudy and placed as obtrusively as possible. The Highway Beautification
Act during the Johnson administration did little to keep aggressive commercial interests from despoiling the horizon along the freeway. Any areas zoned as light-industrial, a common zoning along the freeway, can support huge, overbearing billboards. Despite the obvious intention of the Act to remove obnoxious billboards from view, the courts and local governments have failed to carry out the spirit of the law. It can be demonstrated that fewer and smaller signs provide adequate information. Travel on the freeways today includes a chaotic, dissonant, abrasive string of commercial advertising. Official signage does not have to be boring. There is a great potential for exciting graphics that accentuate important information. Graphics that work kinetically as the viewer moves by are especially promising and present information over a greater viewing time period.

Reflectors, an obvious safety feature, create a kinetic experience when they are placed regularly down the road. Interesting rhythms and progressions that could influence drivers' perceptions can be composed. Color, size and shape could also be used to develop motifs. This process, like the lively arts, is experienced through time.

Lights can do the same thing. There is the added potential of their ability to light areas and take forms. Everyone recognizes the esthetic affect of graceful light poles marching down the road, enhancing perspective. They are surrounded by fields, cones of light. Lights can also be shaped - i.e. globes, tubes etc.
Linear displays, flashing choreography, color, shape and size used in creative ways suggest that special events along the way at special places could have dynamic effects.

Barriers are important and have functional characteristics. There are crash, sight and sound barriers. The form of crash barriers has been determined experimentally. They generally are very unobtrusive. They are standardized and become almost invisible through familiarity. Sight barriers can take many forms and be constructed of many diverse materials. Often trees and shrubs are the best solutions.

Sound barriers, however, need to be solid enough to reflect or absorb noise without transmitting any. Vegetation is very inefficient. Berming soil works well. Sight and sound barriers are generally large elements which line the road, blocking views and altering perceptions of space and speed. Because of their size and impact both on the road and off, they should be used carefully. Citizens should be included in the planning stages.

Like sound and crash barriers, abutments and retaining walls are large elements that can intrude on and dominate the driver's perception of space. These elements ask for some kind of architectural treatment to enhance and unify the road. The forms should respond to human scale and human responses to the kinetic experience.

There have been attempts to integrate buildings directly with
the freeway. It is surprising that more of the air space over freeways is not used. In a place like Chicago, where property downtown is sold by the square inch, that vertical space is very valuable. The french architect Le Corbusier drew an idea for a very long linear building on top of which were freeways. The freeway was intended to connect the interior of the city with the ground on the outside of the city proper. Frank Lloyd Wright proposed a new configuration for the freeway within the city grid. Louis Kahn proposed a complete renewal of the highway and traffic movement systems in Philadelphia.

Actual projects have proven to be very successful, which leads one to wonder again why there is so little of it. The freeway in the city should run through, under and over buildings. The driver experiences the building approaching, the building engulfing him, and the release when he catapults out the other side. This would be the most powerful and purposeful integration between the highway and the cityscape.

Man-made landscape surrounding man-made pathways. In the country the strip next to the freeway is being built up to the extent that there are linear communities forming. It makes sense for those communities to engulf, enframe and straddle the road. This relationship, along the strip roadway, often results in visual blight. The potential interaction between the highway and public transportation is enormous but untapped.

Recessed roads in large cities are perfect candidates for
bridging by buildings. It would be imperative that this integration takes into account and designs for the road user. Extensive bridging of the road creates a tunnel-like effect which, as mentioned earlier, has the potential to be the most dynamic and intense of all driving experiences.