

Highway Location as a Problem of Urban And Landscape Design

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•RECENT YEARS have witnessed the sudden emergence of considerable public opposition to new freeway construction in several parts of this country. The arguments against urban freeways vary from the "hardships of relocation," to "withdrawal of tax base," to the "destruction of neighborhoods." But more often than not, these are in part rationalizations for a basic objection on aesthetic grounds, which frequently does become explicit.

In the days when the first parkways were built in Westchester County, on Long Island, in New York City, New Jersey, and around Washington—parkways that set a very high aesthetic standard—opposition to limited-access highways seemed inconceivable, and the first urban freeways were eagerly awaited. It was not until the first aesthetic failures hit the public eye (the Boston Central Artery, the Embarcadero Freeway, the Northwest Expressway in Chicago) that opposition began to emerge. It is also significant that the freeway program has suffered its greatest setbacks in the three places where both the need for added traffic service and the visual values at stake are the highest—San Francisco, Washington, D. C., and Manhattan. Apparently in all three places the irate public has chosen visual amenity above traffic service, however misguided their counsels might have been.

There is no valid reason why the concern with civic beauty should not occupy the highway planner from the start, without waiting for the emergence of an "anti-ugly" opposition. In functional planning, it is now axiomatic that the highway network is calculated and planned as a system related to the land use of an entire urban region. Similarly, in visual design, the freeway system must be thought of as the skeleton of a large-scale regional landscape first of all, and be related harmoniously to the surrounding natural and man-made features.

Because of its size, continuity, and use, the freeway will remain, for decades to come, a key visual design feature in many urban areas and now offers the greatest single opportunity for coherent urban design on the regional scale. It may be argued that very few cities possess anything resembling a visual design plan, and hence guidelines for an architecturally successful freeway location are lacking. But, by the same token, very few cities possess a rational and convincing land use plan, and it is highway planning that prods the others along to attempt to develop one. The fact that the same sequence can work in the realm of aesthetics is amply proven by the example of New York City where the parkway and expressway system, begun in the thirties and basically completed now in the absence of any urban design plan, proved a tremendous visual asset.

Before the era of Robert Moses, New York had its famous skyline, which could be seen only from a boat; it had large bodies of water which could be seen only from the top of some skyscrapers; and it had a few, large isolated parks accessible by subway through miles of disjointed and undifferentiated urban tissue. The series of five or six parkway and expressway belts that were built did four architecturally decisive things for New York:

1. They made New York's two greatest visual assets, its skyline and its water, accessible to public view providing an unsurpassed dynamic progression through space.
2. They linked the hitherto isolated open spaces into a continuous, interconnected



Figure 1. The freeway system (left) and the open space
few exceptions (indicated by crosshatching) the freewa



system (right) in the New York metropolitan region. With a
closely follow the topography and the basic street grid.

system eminently fitted to both the natural topography and to the man-made order of the street grid.

3. They articulated a hitherto incomprehensible urban mass into visually distinctive chunks, with a visually comprehensible silhouette or mass, cleaning up and upgrading junky and dilapidated edges of the urban tissue.

4. They provided a set of magnificent gateways and landmarks in the form of new bridges.

Needless to say, these developments did not come by accident, for the metropolitan area had a mature tradition of sound landscape design. The concept of the parkway may be traced to Frederick Law Olmsted and Calvert Vaux. In their project for Prospect Park, Brooklyn in 1865 they included a system of tree-lined boulevards (called "park ways") to join the parks of Brooklyn and New York from the Hudson River to the ocean at Coney Island. The concept was adapted to the motor age by the landscape architect Herman Merkel, whose Bronx River Parkway (1916-1924) incorporated not only grade-separated interchanges and limitation of access, but also sections of divided, independent alignment. Landscape-sensitive highway alignment was further refined by Clarke and Rapuano in the Westchester Parkway System, and by the landscape architect Clarence C. Coombs, who played an important role in the design of the parkway network on Long Island. Aside from this concentration of talent, the rugged topography of the region, with its pronounced ridges and large bodies of water, as well as the extreme variations in land value and building density made an important contribution to visually convincing design: there were only a limited number of logical corridors which the new highways could follow, and aesthetic and economic considerations, very often, went hand in hand.

The unique conditions of the New York metropolitan area are not easily duplicated and to some extent, they do not even prevail there any more, for most of the logical freeway corridors have been occupied. Today the huge sums of money available for freeway construction permit cutting through an urban fabric or through rock ledges indiscriminately, and user cost-benefit methods allow justification of this expenditure economically. On the other hand, guilt feelings about the expenditure of public funds for aesthetic purposes too often prevent making this slash through the urban fabric really grand and convincing; for example, placing the urban freeway in a new, 600 ft wide, depressed park strip, or in a tunnel. The result of this half-hearted approach is often visually disastrous.

Very often, when a new freeway is being located, a centerline is simply drawn on paper picking up a heavily-traveled street here, avoiding somebody's backyard there, following the invisible desire lines of existing traffic for maximum use, and avoiding some likewise invisible property lines of existing real estate for minimum cost. When completed, however, the road will become a highly visible feature, and its visually arbitrary alignment resulting from the above utilitarian procedure is likely to outlast both the shifting centroid of traffic density and the shifting nature of land use. To give the road a sense of permanence and belonging in the landscape or cityscape, aesthetic factors must be given a much greater weight at the location stage, along with the usual economic, engineering and political considerations. In fact, much of the political resistance can be obviated by an aesthetically successful solution: its occasionally higher cost can bring unexpected and often tangible dividends in the future. Patterns of land development around elevated vs subway rapid transit lines, or around urban parks are an instructive example. Moreover, some indirectness of service in areas of very high traffic demand can on occasion be beneficial by relieving the freeway of purely local movements.

The aesthetic criteria in freeway design are classified elsewhere under the categories of internal and external harmony (1). The former concerns the free-flowing continuity and three-dimensional coordination of the pavement ribbon as a sculptural element in its own right, irrespective of its setting. The latter concerns a proper integration between the highway and its environment, both on the micro-scale (treatment of the roadside) and on the macro-scale (highway location). With regard to the micro-scale, significant advances in design standards have been made in this country in the past decades, both as a result of safety research (wide medians, open overpass design), and as a result of applying the landscape design lessons of the parkways (flat, rounded and warped



Figure 2. Integration with the environment: an imaginative solution under congested urban conditions (Interstate 278 in Brooklyn Heights).

slopes, and adequate planting). Visual criteria on the macro-scale, i.e., those pertaining to location, however, are less fully developed and deserve special emphasis.

A freeway cannot be aesthetically satisfying unless it looks as though it belongs where it is put. It should not look like a foreign body in the landscape or cityscape. To achieve this effect, the planner must sense the dominant visual order in its environment, and inscribe the freeway into this order. For example, a rectilinear pattern of streets demands that the freeway run parallel to it. This results in a quiet rhythm of regular, perpendicular overpasses, and the order of the surrounding buildings is strongly felt. Crossing a rectilinear street grid diagonally or on a curve looks arbitrary and disturbing (overpasses occur at haphazard angles to the centerline, odd triangles of land are left over along the right-of-way, and a motorist leaving the freeway is more likely to lose orientation, for he cannot easily relate the freeway location to the geometry of the street grid). If a diagonal or curvilinear location is necessary, the ideal right-of-way ought to be so wide as to divorce the order of the street grid from that of the freeway. This will prevent a visual friction between the geometry of the city fabric and that of the freeway.

Rivers, lakefronts and strong ridges demand that the freeway be placed parallel to them, emphasizing an existing relationship. If a watercourse has to be crossed, a narrow spot is the visually correct place. For example, there is the contrast between the magnificent location of the George Washington or the Verrazano Narrows bridges



(a)



(b)

Figure 3. The ascent of a hill: (a) right and (b) wrong.

with the visually arbitrary location of the Tappan Zee or the Throggs Neck bridges in New York. The former frame an open space with a convincing gateway effect—the latter destroy a natural open space. A special culprit in the destruction of natural open spaces, particularly valleys, is the high embankment which is usually cheaper than a tall, open viaduct. Even when a viaduct is chosen to cross a valley, its column spacing

is often so close that the visual continuity of the valley is destroyed. A deep girder and a few heavy columns will invariably look better than the conventional I-beam deck supported by a forest of thin columns.

Crossing hills or ridges is different from crossing deep gullies or bodies of water. From the aesthetic standpoint such a crossing should not be perpendicular unless it is done in a tunnel. Rather, the freeway should ascend the hill gently, at an oblique angle to the contours, preferably on a curve, and should seek out a natural saddle. This can be deepened whenever necessary, but a straight slash through the hill should be avoided. Rock cuts look particularly disturbing and arbitrary when they occur at a high point in the ridge, especially if a nearby natural depression is visible but was left unused for the sake of a straight alignment. When the hills are surmounted with an undulating, curvilinear alignment in both plan and profile, no violence is done to the topography with excessive excavation or fill. Gentle curvature is also visually advantageous when entering a forest, even on flat land. In this way, the visual continuity of the forest is preserved, the roadside (seen ahead, rather than peripherally) is brought into view, and the optical guidance of the driver is reinforced.

Next to following, rather than violating the dominant natural or man-made geometry of the landscape, it is important that the freeway respect existing space enclosures. This was pointed out in connection with bridge design over valleys, but applies particularly to compact urban spaces where the dual visual nature of the freeway becomes apparent. It acts as a link longitudinally and a barrier transversely. Longitudinally, it gives the road user "views from the road"; transversely, it gives the non-user "views of the road." In locating the facility and selecting a particular design (at grade, elevated, depressed, tunnel) the engineer-architect team must firmly decide what the dominant visual values in a particular situation are, which of the two views is more important, and what can be done with them.



Figure 4. Integration with the landscape: Massachusetts Turnpike around Greenwater Lake. Notable are the relationship to both water and hill, the sculptural use of rock outcrops, and the treatment of existing vegetation.

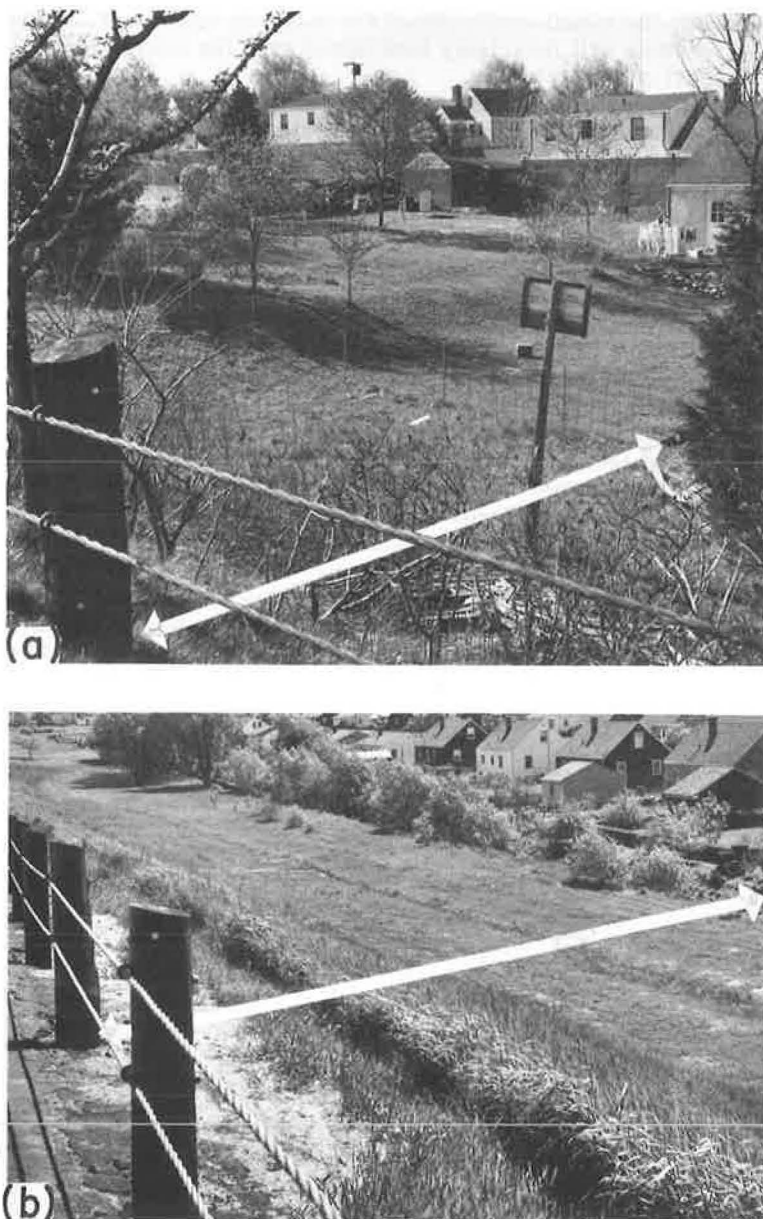


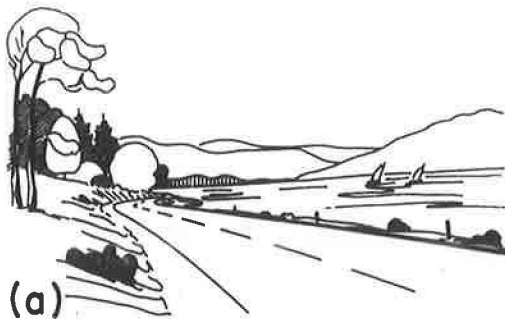
Figure 5. Right-of-way width: (a) 50 ft vs (b) 100 ft roadside border in a suburban area.

For example, a residential section of a city might be blighted because of haphazard blending with an industrial area. This may call for a boundary that will frame the former, or for a firm barrier between the two which a landscaped highway embankment can provide. At the same time, it will give the road user an interesting panorama of the urban skyline.

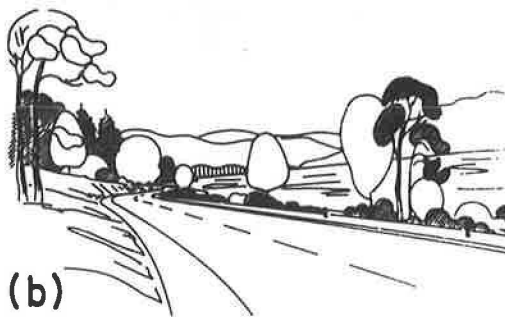
In another situation, such as within a purely industrial area, a barrier as strong as an embankment may be undesirable, but a lighter barrier, such as an elevated structure, might do no harm since the non-use space it traverses on the ground is aesthetically of no value. Some of the most breathtaking views are offered to motorists from elevated



Figure 6. Alternation of openness (a) and enclosure (b) on the Taconic Parkway.



(a)



(b)

Figure 7. (a) Suggested landscape treatment between highway and body of water, from recent German landscaping standards; (b) the use of the planting veil to increase depth perception is similar to that employed on the Henry Hudson Parkway.

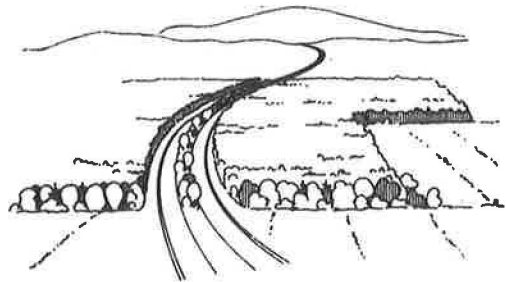
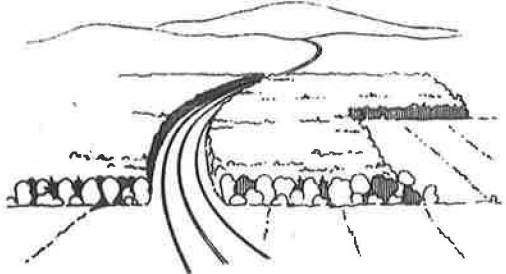
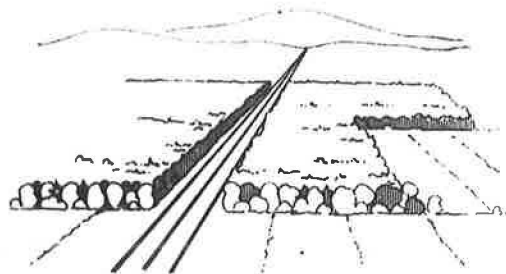


Figure 8. Adaptation of curvilinear alignment to penetrate a forest on flatland—another recommendation from 1960 German landscaping standards.

structures through industrial areas—the Queens-Midtown tunnel approach, or several structures on the New Jersey Turnpike are well known examples. However, even in industrial areas, a clean and open structural design of these facilities is desirable (such as that of the elevated Bruckner Expressway in New York.) On the other hand no amount of good design will save an elevated structure if it is incorrectly located. Structurally, the Embarcadero Freeway is quite clean and attractive; what makes it an eyesore is the fact that it separates San Francisco from the sea. In an analogous situation in New York, the elevated highway dips into a tunnel under Battery park, preserving the unity of the dominant visual space which, in this case, belongs to the non-user exclusively.

There are many high-density urban situations, particularly in central business districts, where the continuity of existing streets and squares cannot be violated by a viaduct, and where the compactness of the urban fabric makes a wide, open cut intolerable as well. In these cases, a tunnel or tunnel-like structure (such as the George Washington Bridge approach in Manhattan) is the only visually appropriate solution. Then too, there are situations in which a positive barrier would do harm, but an open space separating two sections of a city merely by distance and not by a wall is harmless or even desirable. In this case, which is so frequent, a depressed freeway design is needed. Aside from its well-publicized operational advantages at on- and off-ramps and its noise-abating qualities, a depressed freeway offers a good compromise between the visual values of the user and the non-user; both are given adequate light and air, and neither has to suffer from claustrophobia.



Figure 9. Urban skyline opened up by an elevated highway through an industrial and harbor area: Interstate 95 in New Haven.

The value of a depressed freeway as a new kind of urban open space (so sorely lacking in most central cities) can be greatly enhanced by a wide right-of-way properly landscaped and integrated with parks and playgrounds. The frequency with which even narrow and fenced-off rights-of-way are used as play or picnic areas by children or adults in spite of the law testifies to the need to integrate highway and recreational planning regardless of administrative obstacles. Again, the New York parkway tradition has been responsible for some, though often modest, experiments in this area.

Visually, the value of a wide, landscaped right-of-way in an urbanized area is manyfold. For the non-user, it provides a park-like green open relief from the sameness of an urban pattern, be it older apartment houses or new one-family house subdivisions. It can be used to delineate neighborhoods or other visually or functionally coherent areas of urban activity and at the same time to connect isolated reservoirs of open space into a continuous "matrix" of green—as mentioned in the example of Olmsted's plan. It also shields abutting properties from noise and glare. For the highway user, visual separation from adjacent uses is most important. In suburban areas, a wide right-of-way will eliminate the unpleasant sensation of driving through private backyards. In downtown areas it will preclude the encroachment of high-rise structures upon the space that visually belongs to the freeway. Moreover, the most objectionable aesthetic feature in many new urban freeways is the excessive amount of shiny metal—guiderails, fences, railings, lampposts, sign standards, etc. A wide, gently graded, right-of-way eliminates the need for some of these, and helps to make the others less prominent.

Of course, the essential price that has to be paid for these visual amenities is the acquisition of more land. The AASHO policy on landscape development for the Interstate System recommends a minimum 50-ft roadside border. Meanwhile, the same document rightly advocates 1:3 slopes to permit mechanical mowing, and rounded edges 1.5 times depth of cut. On this basis, for the typical 20-ft deep cut, so frequent in urban areas where the freeway is depressed, a roadside border of at least 80, and more likely 100 ft is essential. If frontage roads or an additional landscaped buffer are to be provided, 150-ft becomes necessary. This suggests rights-of-way at least 400-ft wide or wider,

depending on the width of the median. It appears that only such width can do justice to the inherent visual strength of the freeway and provide amenity to adjacent development. Experience suggests that roadside borders narrower than 100 ft usually result in visual conflicts. The only exceptions are probably areas of flat farmland which can encroach on the freeway quite closely (provided that no development in the area is ever anticipated), arid areas where no roadside planting can be provided, and extraordinary tunnel-like urban situations.

Although a wide right-of-way will generally provide a much more pleasant spatial sequence for the road user than a narrow one, added effort is needed to make it interesting. The three recognized devices for achieving this end are varying the width of the median and the elevations of the separate roadways, providing a sequence of open and enclosed spaces, and providing opportunities for long views in the line of sight of the driver—not peripherally. Again, the opportunities for employing any one of these devices have to be spotted in the location stage—they cannot be fully exploited once the centerline of the road is established. It is an irreparable loss that only a few short glimpses of Long Island Sound, lasting less than four minutes, are to be seen while driving for more than two hours on Interstate 95 from the New York City line to New London, hardly ever more than two miles away from the coast. The longest one of these views—at New Haven—is also the only one that was deliberately designed. The others, a few seconds each, are more or less accidental. By contrast, one of the most exhilarating freeway rides on this continent is the drive along Henry Hudson Parkway. It does not simply parallel the Hudson River, but due to changes in vertical and horizontal alignment, it brings that expanse of water and the panorama of the river into the driver's forward cone of vision. It makes adroit use of planting between the river edge and the roadway to create a veil effect that gives depth to the panorama, and it varies the driver's vantage point from near sea level to high above. With regard to varying openness and enclosure, the Taconic State Parkway is probably the most successful. Flat open meadows are deliberately alternated with dense forest growth. This contrasts favorably with the somewhat monotonous "green corridor" design of the Merritt Parkway.

Aside from the provision for long-distance views, from the alteration of openness and enclosure, the location of individual landmarks is also important. The most ordinary structures—a water tank, a telephone relay tower, a tall building—can become prominent landmarks if properly located at an elevation near a horizontal curve in the line of sight of oncoming traffic. They help the driver to orient himself and to measure his progress. Unlike advertising signs, often located in similar situations, these large-scale, abstract technological structures will neither distract nor irritate the driver. A detailed study of the desirable frequency and progression of roadside views has been recently carried out by others (2). It shows how orienting the freeway alignment toward heretofore unseen views, and anchoring it to prominent landmarks can enrich the driver's experience.

Needless to say, the aesthetic location principles of close adherence to topography, respect for an existing man-made geometry, preserving the continuity of existing spaces, separating the freeway from adjacent development and providing a deliberately designed succession of views are not presented here to supersede familiar economic and engineering considerations. Aesthetics and economics do have to be balanced. But the compromise should be the result—not the starting point of a design.

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