The Highway Roadside as an Element in Urban Design

JOSEPH C. FEDERICK, District Engineer,
New York State Department of Transportation, Binghamton, N. Y.

•THE DEVELOPMENT of most communities in America may be described as a process of natural growth in contrast to controlled evolution. The growth from a central nucleus has taken various forms depending upon restrictive physical elements. Consequently, we have circular cities and linear cities, and those presenting irregular patterns without geometric similitude. The development was generally unplanned and uncontrolled. Action was dictated by economic returns rather than the most desirable form or direction of development.

Land speculation may be considered as the generating force behind municipal development. The real estate agent rather than the city planner has determined the structure of our communities. We are now struggling with the results of the formative periods of unguided growth.

Engineers, economists, sociologists, planners, and the ordinary citizen are now talking in terms of city plans or development programs. Urban renewal, model cities, and other federally funded programs are stimulating progressive communities to action.

Irrespective of the type of agencies available for planning, the need for a community development program is fundamental. A broadly conceived and soundly executed community plan serves as a basic pattern or framework about which existing deficiencies may be adjusted and desirable growth may occur. A community plan will encompass the entire physical environment of the urban area. Segments of the design will be concerned with a circulation plan; a recreational plan including parks, playgrounds, and other recreational facilities; a transportation plan for airports, railroad terminals, bus depots, and other elements; and additional plans for neighborhoods, housing developments, public buildings, and utilities.

THE NEW EXPLORATION

The objective of the community plan is to achieve compatible land-use patterns. An organized and balanced allotment of space for residential, business, industrial, recreational, and public use is required for present conditions and future anticipated growth. Space relationships, arrangement, and organization must be in scale and harmony.

With the crisis in our cities, planning concepts are in a state of flux. Should the educational function be planned around educational parks or the traditional school orientation? Is industry to be developed in ghetto areas to bring employment to the locale or is the area to be rebuilt and the inhabitants rehoused on the scene or relocated? Is the neighborhood concept utilizing the school building as the focus of group activities to be replaced? Are new buildings to be constructed as district community centers?

It is within the urban framework that those responsible for highway planning must function. Interstate highways, expressways, and arterial routes serving metropolitan areas exert a profound influence on community values, growth, and structure. Consequently, the highway planner must be involved in the total planning process. These arteries must be an integrated element of the broad concept of a community, and the integration must be accomplished with a minimum disruption of community values. Highways are concerned with moving people and goods safely, expeditiously, and economically. Of greater importance, highways must serve the community and improve and enhance the human environment.

Paper sponsored by Committee on Roadside Development and presented at the 48th Annual Meeting.

NETWORK LAYOUT

In developing a highway network consisting of Interstate 81, Interregional Route 17, and an urban arterial system for the Binghamton, New York, metropolitan area, all the foregoing factors and values were considered. Alternate proposals were studied and evaluated in monetary and social terms. Alternate routes were analyzed with respect to present land use, population densities, neighborhoods, school sites, public buildings, church locations, recreation facilities, future land-use plans, and traffic origin and destination.

Interstate 81 through the urban area has been completed. Two sections of Route 17 are under construction. The major sections of the arterial system are completed or under construction, and the remaining connectors will be advanced to construction in the very near future.

AN URBAN ROADSIDE PARADIGM

In urban areas land values are high, and usable vacant property is at a premium. Yet it is precisely in the high-density, intensive-use locations that open space is an essential. To realize the full potential of urban highway design, as wide a marginal area should be acquired as the physical conditions and restrictive elements will permit. Such wider rights-of-way in a rural setting will help preserve the integrity of the highway by maintaining natural landscape features. In the urban environment these margins are an essential element in urban design. There is a uniqueness of the roadside in this context that needs exploration.

In accordance with Marshall McLuhan's dictum, "the medium is the message." Therefore, if the roadside is the medium, the roadside is the message. We now view the roadside as an extension of the adjacent environment or physical space. As a spatial determinant, the roadside is an element of the urban design in situ. A uniqueness is conferred by the spatial fusion of the private sector with the public domain. It is now possible to organize, mold, manipulate, and control its form and context. Monotony is avoided by treating each site as an individual design problem, but intergrating it into a dynamic cityscape. The interdependence of contiguous space and roadside transforms the physical environment into a visual entity.

Local thoroughfares are defined by the distance between curb lines. In contrast, the area occupied by urban expressways consists of wide bands rather than restrictive narrow strips. In essence these areas are large land masses devoted to a specialized use. They must be considered in the planning process in conjunction with residence, business, industrial, and other areas. The highway-use area has a varying intensity of use similar to other land-use districts. It must be developed in conjunction with the existing and projected land-use plan to serve the area and complement the environmental features.

The highway land-use area, in addition to being a large land mass, possesses characteristics peculiar to itself—it has continuity and linearity, and may be topological. These special attributes differentiate the highway land mass from other land-use areas. The highway as a communication system has a community-wide influence. As a tactile extension of the adjacent physical environment, the highway and the roadside enter into many facets of urban planning and design.

OPEN-SPACE PLANNING AND REGULATION

The Standard City Planning Enabling Act, recommended by the U.S. Department of Commerce in 1928 and adopted by many states, specifies that the purposes of the master plan to be made and adopted by the City Planning Commission shall be to guide and accomplish "a coordinated, adjusted, and harmonious development of the municipality and its environs which will, in accordance with present and future needs, best promote health, safety, morals, order, convenience, prosperity, and general welfare . . . including, among other things, adequate provisions for traffic, the promotion of safety from fire and other dangers, adequate provision for light and air, the promotion of the healthful and convenient distribution of population, the promotion of good civic design, wise and efficient expenditure of public funds, and the adequate provision of public utilities and other public requirements."

The Standard State Zoning Enabling Act also states, "For the purpose of promoting health, safety, morals, or the general welfare of the community, the local legislative body . . . is hereby empowered to regulate and restrict the height, number of stories, and size of buildings and other structures, the percentage of lot that may be occupied, the size of yards, courts, and other spaces, the density of population, and the location and use of buildings, structures, and land for trade, industry, residence, or other purposes."

It is indicated in these two statutes that the purposes and objectives of planning and zoning are identical. The plan is authorized, developed, and established as an official document under the fiat of the planning legislation. The integrity of the adopted plan is protected by the zoning district layout and controls under the aegis of the zoning powers. Of particular interest at this juncture are those elements in community planning relating to open space.

The ownership of the natural light and air about buildings is a common right. To prevent individual monopoly of these features of our physical environment, the location, height, and size of buildings can be restricted. Such restrictions control congestion of the sidewalks and streets by reducing the load on the land.

In addition to building size and height designation, adequate open space around buildings and structures must be provided. This open space is obtained by requiring front, side, and rear yards.

Front Yard Requirements

Adequate front yards afford room for lawns and trees; keep residences farther from the dust, fumes, and noise of the street; and add to the attractiveness and comfort of a residential district. They also provide play space for children and aid in keeping youngsters out of the street. The open space in front of buildings, which is necessary for light and air, is secured by providing adequate front yards. The aesthetic values of a neighborhood are enhanced by proper landscaping in keeping with the local environment.

Considering the requirements for light and air, the width of the open space between the fronts of houses should not be less than two times the height of the buildings, and preferably two and one-half to three times the height of such structures.

In a multiple-family or apartment house district, deeper front yards may be necessary rather than shallower ones as is the customary practice. Setting appartments well back from the street line, particularly on major thoroughfares, provides insulation from noises, fumes, and street dangers, enhances appearance, and promotes safety. It has been the practice to omit front yards in business and industrial districts. In some cases it has been felt that front yards should not be required in these zones. If, according to this viewpoint, inadequate light and air resulted because of narrow streets, the building height should be restricted. This procedure does not recognize the question of safety and freedom from congestion.

Rear Yard Requirements

Rear yard requirements rest on much the same premises as front yards. Rear yards should be deep enough to allow room for light, air, and vegetation so that a pleasant outlook is obtained. They should also provide access and egress to the rear of the buildings. Privacy is provided and space made available for accessory buildings. The minimum distance between the backs of residences should be 70 feet for two-story houses and 80 to 100 feet for two and one-half or three-story houses. Each rear yard would be 35 to 50 feet. This is equivalent to the height of the building, or the 45-degree angle from the rear lot line.

Rear yards are also necessary in business and industrial districts. Rear yard dimensions in such districts are often stated as a proportion of the building height. As previously stated, the preferred depth is equal to the height of the building.

Side Yard Requirements

A distance between buildings of twice the height of the building will provide adequate light and air irrespective of orientation. This is equivalent to stating that the side yard

Figure 1. Front yard enhancement, roadside separator.

Figure 2. Side yard enhancement, urban connection.

Figure 3. Rear yard enhancement, urban arterial.

shall equal the height of the building, which is the minimum desirable dimension. Side yards are needed to provide access in case of fire, to insure privacy, and to give an appropriate setting to the building.

Multiple-family dwellings require side yards for access in case of fire, for deliveries, for privacy, and for light and air. Half the height of the building is also the desirable side yard width in such a district.

This discussion of open space as provided by front, side, and rear yards has been made because it is in this area of urban design that the highway and its roadside make a major positive contribution to the living environment. The roadside is truly the "front yard of the nation."

Where buildings front on the highway, a properly landscaped, wide roadside margin extends the front yard legally required in the land-use control regulations with a consequent enhancement of this environment. All the benefits previously indicated accrue to the parcel so situated.

Similarly, a highway with its roadside traversing an alignment wherein the rear yards of the buildings are adjacent to it affords an improved outlook, adds to the dimension of the rear yard, and with greenery, trees, and shrubs, provides amenities otherwise not obtainable.

In some cases, urban expressways must traverse an area whereby the sides of the houses face the artery. In this situation the roadside adds to the side yard of this adjacent parcel. This is an increase in the side yard dimension insofar as the building is concerned. The benefits of side yards are enhanced accordingly. Figures 1, 2, and 3 show front, side, and rear yard enhancement.

URBAN DESIGN ELEMENTS

In the Binghamton metropolitan area (Fig. 4), the highway network and the roadside have been woven into the urban design fabric to achieve the following benefits and objectives: Buffer between disparate land uses; land-use transition; neighborhood delineation; miniparks and play areas; river-front park; sitting areas; automobile parking sites; open-space enhancement, front, side, and rear yards; daylight and sunlight zoning; marginal greenbelt; governmental complex, site planning; cultural center, site planning; multiple land use; pedestrian safety—bridge and underpass; highway interchange aesthetics; roadside landscape; marginal and environmental controls; wetlands preservation; embankment noise buffer; community services accessibility; and general

Figure 4. Interstate 81, Route 17, and urban arterial highways, Binghamton, New York.

community revitalization. The remainder of this paper consists of an illustration of these urban design elements.

Land-Use Transition

A challenging urban land-use problem is how to treat the borders of differing districts. The situation is particularly acute where industries abut residences. It is not a simple task to effect the transition from a higher intensity of use to a lower intensity, relieving detrimental characteristics in the process.

An urban highway roadside is a distinct asset in this situation. In such a setting it is desirable to acquire an adequate bordering area. An example of beneficent step-down land-use transition is shown in the marginal roadside of the Brandywine highway urban arterial route where it intersects Bevier Street (Fig. 5). The area between a fronting street of a residential district and an entering ramp affords a green lawn outlook and a location for local recreation space.

This arrangement is an effective transitional control with respect to prohibited activities within a specified distance of a residence district, which is a usual specification in zoning ordinances. The restrictive distance may vary from 50 to 200 feet for such uses as gasoline filling stations, public garages, dining cars, parking lots, and others.

Where a district is in a state of transition or change from a higher use classification to a less restricted one, the highway can be an arresting and adjusting instrument if the

Figure 5. Land-use transition, North Shore Boulevard.

Figure 6. Multiple land use, river front park, Interstate 81.

area is the proper location for the artery. The North Shore Boulevard arterial along the Susquehanna River is an excellent illustration. The residences and other structures were in a state of disrepair. Buildings were idle and deteriorating. The acquisition of the right-of-way and subsequent construction of the arterial highway removed most of the poor structures and improved the quality of the environment (Fig. 5).

Multiple Land Use

Illustrative of the multiple-use concept to achieve the full potential of a land resource consistent with community needs and values is a 200-acre river-front park to be developed bordering the Chenango River and adjacent to Interstate 81. The development includes open grassed areas for active recreation, the seclusion and shade of natural and created groves, picnic areas, the inspirational aspects of created ponds and wildlife, and the dominant feature of sweeping views of the river.

The landscape park exploits an idle land mass. It furnishes a need not otherwise available without usurping land required for community growth.

This roadside area is also an excellent illustration of the concept of level of service as applied to land use. The roadside in this particular use is at an optimum level of service. It will be devoted to highway, roadside rest areas, parking, recreation, and park use, and provide erosion control, scenic overlooks, and over-bank flood protection (Fig. 6).

Additional examples of multiple land use are a play area and parking facilities underneath the overhead highway structures of the North Shore urban arterial spanning Henry and Pine Streets. Tree plantings border the alignment (Fig. 7).

Figure 7. Under-structure parking area, urban arterial.

Figure 8. Arterial roadside minipark.

Arterial Roadside Minipark

Small park areas are a welcome respite from the heat of the summer's sun. The minipark shown in Figure 8 serves as an open space and buffer between the Brandywine arterial and a residential district. The arterial roadway at this location is a separator between an industrial district and a residential area.

Roadside Playground

Small neighborhood playgrounds are at a premium in urban areas. A marginal strip between the Brandywine arterial on-ramp and a local street affords an excellent location for a playground that includes a small pool (Fig. 9).

Figure 9. Brandywine arterial neighborhood playground.

Roadside Sitting Areas

To prevent ramp areas from becoming points of traffic congestion, it is desirable to acquire strips along intersecting marginal streets whenever possible. Where local environmental conditions permit, such open space may be advantageously utilized as frontage sitting areas for the immediate residences. Figure 10 shows a sitting area at an off-ramp of the Brandywine arterial. Also shown is a parklike strip developed in the area between a flood control wall and an arterial connection. Apartment houses, residences, and businesses on the opposite side of the street face the area.

Figure 10. Roadside sitting area, Brandywine arterial.

Governmental Center and Cultural Center Site Planning

The urban renewal program for the central core area of Binghamton, New York, includes the construction of a governmental center consisting of a municipal hall, a county office building, and a state office building. Adjacent to these structures will be a new YMCA building now under construction. These structures, including the necessary parking facilities, occupy most of the site. A landscaped loop ramp of an arterial and the bordering roadside provide desirable greenery and open space. This open area is an extension of the sites of these buildings (Fig. 11).

Figure 11. Governmental center, site extension.

A cultural center consisting of an auditorium and a performing arts theatre will occupy a site opposite a loop ramp in the adjacent quadrant. An obsolete and closed shoe factory and attendant structures were removed from this area now used for the

Figure 12. Cultural center, municipal auditorium, site extension.

Figure 13. Urban arterial, court street area, landscaped loop interchange park.

Figure 14. Urban arterial, landscaped loop, industrial plant location.

Figure 15. Landscaped re-entrant area, arterial ramp connection.

Figure 16. Typical gore planting between frontage road and urban arterial.

Figure 17. Landscaped approaches, Bevier Street Bridge.

loop ramp. The areas within the loop and along the bordering streets have been landscaped with trees and shrubs. In an architectural competition for the design of the cultural center this landscaped open space was included as a part of the site for the development. The facilities will be built in the near future (Fig. 12).

These two illustrations are excellent examples of how an urban controlled-access artery can serve as a site extension providing amenities that would otherwise be lacking.

Landscaped Loop Interchanges

Urban arterial routes in central city industrial areas afford opportunities for revitalization of the region and for aesthetic enhancement of the environment. The characteristic atmosphere of the older areas is usually drab, dreary, and depressing. Smoke contaminates the air, and untreated industrial wastes pollute the streams. The North Shore and McKinley Avenue arterials provided the means for achieving a radical change in the local environment. At each location where an interchange was made with the local main thoroughfares, the loop open

Figure 18. Interstate 81 landscaped ramp, and cul de sac frontage road.

Figure 19. North Shore Drive urban arterial, river scene.

Figure 21. Route 17 expressway, wetlands preservation.

Figure 20. North Shore Drive, Vestal Parkway urban arterial, and Susquenanna River earth levee pedestrian walkway.

areas were landscaped. Additional bordering margins were taken for trees and shrub plantings. The Court Street area is a landscaped loop interchange park (Fig. 13). The Main Street interchange provides a spacious, parklike setting for the IBM plant in the background (Fig. 14).

Figure 15 shows the landscape treatment at a re-entrant area bordering an entry ramp connection to the North Shore urban arterial. Although the additional width of right-of-way has extended the side yard of the abutting property, it has exposed the junked pile of tires. The shrubs partially screen the rear yard from view.

Figure 16 shows a typical gore planting between a frontage road connection and the North Shore arterial.

Figure 17 shows the landscaped approaches bordering the Bevier Street Bridge in Binghamton. The open area contributed by the additional width of the right-of-way provides light and air to the adjacent properties.

Figure 18 shows a landscaped ramp to Interstate 81 with a cul de sac frontage road to serve adjacent residences.

Figure 19 shows a typical view of the Susquehanna River along the North Shore Drive and Route 17 in Binghamton. The bridge in the distance was awarded first prize in its class as the most beautiful steel bridge by the American Institute of Steel Construction.

Pedestrian Walkways

The North Shore and Vestal Parkway arterials for a portion of their length are protected from flood waters from the Susquehanna River by earthen flood control levees. The top of the earth levee provides a footpath for pedestrians who are just out for a stroll or who wish to fish from the water's edge. The levee affords attractive near and distant views of the river (Fig. 20).

Wetlands Preservation

Areas bordering the Susquehanna River in some locations are brush-covered and swampy. These marsh areas are the habitat for wildlife that are of interest with the changing seasons. Whenever the urban arterials and expressways are not too remote from the river's edge, these wetlands have been included in the highway roadside limits. Their acquisition preserves them for a natural ecological balance in addition to providing marginal and environmental controls (Fig. 21).

REFERENCES

1. Lewis, Harold M. Planning the Modern City. 2 volumes. John Wiley and Sons, New York, 1949.
2. Gallion, Arthur B. The Urban Pattern. D. Van Nostrand Co., New York, 1950.
3. Hegemann, Werner, and Peets, Elbert. Civic Art, The American Vitruvius. Architectural Book Publishing Co., New York, 1922.
4. Lynch, Kevin. Site Planning. Massachusetts Institute of Technology Press, Cambridge, 1962.
5. Simonds, John O. Landscape Architecture, the Shaping of Man's Natural Environment. F. W. Dodge, New York, 1961.
6. Cullen, Gordon. Townscape. Reinhold Publishing Corp., New York, 1961.
7. Davie, Maurice R. Problems of City Life. John Wiley and Sons, New York, 1932.
8. Perry, Clarence E. Neighborhood and Community Planning. Regional Survey of New York and Its Environs. Vol. 7, Monograph 1, Regional Plan of New York and Its Environs, New York, 1929.
9. Federick, Joseph C. Zoning in New York State: A Guide to the Preparation of Zoning Ordinance. Dept. of Commerce, State of New York, Albany, 1946.
10. Advisory Committee on City Planning and Zoning. A Standard City Planning Enabling Act. U. S. Department of Commerce, Govt. Printing Office, 1928.
11. Advisory Committee on Zoning. A Standard State Zoning Enabling Act. U.S. Department of Commerce, Govt. Printing Office, 1926.
12. Freeways in the Urban Setting. Hershey Conference, Automotive Safety Foundation, June 1962.
13. Highways and Urban Development. Report on the Second National Conference on Highways and Urban Development, Williamsburg, Va., 1965.
14. Rapuano, Michael, et al. The Freeway in the City. A Report to the Secretary, Dept. of Transportation, by the Urban Advisors. U.S. Govt. Printing Office, 1968.
15. McLuhan, Marshall. Understanding Media. The New American Library, New York, 1964.