

# Multiple-Purpose Freeway Land Development

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•MULTIPLE uses of highway rights-of-way, beginning with the simple roadside picnic table, have become increasingly important in the building of today's controlled-access highways. The Interstate Highway System will be supplemented by more than 1000 pairs of safety rest areas; the nation's major toll roads have constructed more than 100 service plaza pairs. Approximately 12 acres of additional right-of-way is required for the development of either a single safety rest area or a service plaza. Smaller-scale scenic overlooks have also been developed along the freeways of at least 20 states. Other multiple uses oriented toward the needs of freeway users include truck weight stations (in at least 13 states) and tandem trailer parking areas (facilitating "double-bottom" trucking operations along four toll roads).

Each of these multiple uses has been discussed in detail in a report recently completed for the National Cooperative Highway Research Program (1). The study also identifies a second broad category of multiple use, oriented principally toward the surrounding local area. These uses are of particular importance within urban areas, where the enormous land requirements of freeways suggest that multiple-purpose freeway land development may greatly increase the return on freeway investments to local areas. Urban freeways have frequently been criticized for their disruption of established neighborhoods, for the removal of valuable land from municipal tax rolls, and for the creation of substantial relocation problems for displaced businesses and households. Three other recent reports have also examined this problem of integrating urban freeways with their surrounding urban environment. Two of the studies propose air rights developments over specific freeway sections in Philadelphia and Washington (2, 3), while the third explores the notion of coordinating urban freeway development with the development of other important urban facilities (4).

This paper attempts to identify important principles and problems in multiple-purpose freeway land development within urban areas. Several additional articles and reports provide guidance for this task. For instance, "simultaneous linear redevelopment" has been suggested as a means of carrying air rights development to full potential (5). The coordination of freeways with major parks can achieve a multiple use of open space while increasing the accessibility of important recreation facilities (6). The "high-accessibility corridor" offers a useful concept for coordinating land-use planning (and urban renewal) with urban freeway route location (7). Linear rights-of-way can be effectively used for the development of both private and public transportation routes (8). Another report has studied the development of coordinated freeway-parking facilities, with principal focus on air rights both above and below urban freeways (9). The Bureau of Public Roads has recently advanced a concept of joint development of housing and freeway projects based on the public acquisition of entire blocks along the route of a planned freeway (10, 11).

## AIR RIGHTS DEVELOPMENTS

A key feature of air rights developments, and a requirement for projects developed over interstate highways, is that direct access from the freeway is not permitted. Except for multiple uses that are heavy traffic generators (such as Detroit's Cobo Hall, developed over the John C. Lodge Expressway and provided with direct ramp access),

immediate freeway connections are not particularly important or even desirable. For most air rights developments, the emphasis of project design is toward a continuity with surrounding land uses—toward eliminating the barrier-like character of freeways. In this respect it is only incidental that the land under an air rights project happens to be used for a freeway. The important point is that established urban patterns are maintained and, especially in urban renewal areas, often improved. From the point of view of freeway design, it is, of course, essential that air rights projects do not infringe on basic safety and traffic considerations.

Though the design possibilities of extensive linear air rights projects over freeways excite the imagination, actual experience to date has involved only one or two local projects in a number of cities. Subject to basic engineering requirements for straddling the freeway, the range in appropriate types of land use is broad. Actual examples include a municipal library in Hartford, a three-building City Hall complex in Fall River, Massachusetts, a four-building high-rise apartment project in New York City, a Federal Post Office building in Chicago, a proposed elementary school-park facility in Minneapolis, a trade and exhibition center in New Orleans, a medical center in St. Paul, a proposed hotel in Washington, a proposed office building in Cincinnati, and a convention center (Cobo Hall) in Detroit. In Philadelphia, it has been recommended that the Delaware Expressway be covered and landscaped over a four-block stretch, so that the continuity of related historic areas may be preserved (2). In Washington, a two-block housing project has been proposed over the Inner Loop Freeway, involving three 10-story apartment buildings, three low-rise townhouse structures, and an existing church (3). Other examples may also be found, and, in general, interest in air rights development appears to be growing. Air space under elevated freeways also offers multiple-use potential, but existing projects have usually been limited to understructure parking lots (with examples to be found in at least 26 states) or other storage uses. Understructure playgrounds have been developed in Chicago, Jersey City, and Bayonne (1).

Some of the problems of air rights development have been explored in a recent California study (12). These include the added costs of decking over the freeway, which are likely to increase total construction costs by 5 or 6 percent when building over an operating freeway and 3 percent when integrated with original freeway construction. These costs are for a typical 10-story structure, the scale of building generally called for in spanning eight lanes of traffic, an overall dimension of about 170 feet. Building over a completed freeway may also lead to problems in avoiding interference with traffic during construction. Air rights projects more than 300 feet in length will probably require tunnel ventilation equipment for the freeway, and consideration should also be given to the possible effects of highway fumes and traffic noise on occupants of air rights structures. The Washington housing project would result in a 1230-foot tunnel, and a combination of fresh air ducts for the freeway and vertical ducts to dissipate exhaust fumes at the 10-story roof level (through the apartment buildings) is recommended (3).

In some cases the open space provided by freeways may be more valuable to the community than possible air rights structures, while in other instances an air rights building might represent a major regional landmark and orientation point. In general, the average costs of freeway platform construction, around \$15 to \$20 per square foot, provide a useful guide in determining the feasibility of potential air rights developments. The land values of alternative sites should be competitive with this \$15 to \$20 figure, increased by the additional costs of leasing or acquiring the freeway airspace itself (12). Finally, one of the most important features of air rights developments is that much of our urban freeway mileage is not especially suitable for this kind of multiple use (13). The exigencies of route location place freeways next to rivers, harbors, swamps, parks, undevelopable areas, and as boundary lines between major shifts in land use. These situations are not particularly amenable to further right-of-way development. In addition, most of the developed areas through which freeways pass are of insufficient density to support higher-cost air rights projects. It is likely that air rights developments will be appropriate and feasible only at selected locations where surrounding land values are high or that exhibit special site advantages in relation to surrounding development.

## HIGH-ACCESSIBILITY CORRIDORS

Land in the vicinity of freeway interchanges, including the freeway land itself, is highly desirable for land-use developments requiring a good degree of exposure and accessibility. Many public and quasi-public facilities—such as libraries, cultural centers, museums, government centers, and major institutional buildings—are major traffic generators, and are particularly well-suited for multiple-purpose development in association with interchange rights-of-way. Where satisfactory lease arrangements can be worked out, private developments that require high accessibility (for instance, office centers and hotel-convention facilities) might also be appropriate. Multiple use of freeway land might involve air rights structures spanning the freeway and/or its ramp arrangements or located within the ramp interiors of cloverleaf or directional interchanges.

Examples here include the Prudential Center complex over Boston's Massachusetts Turnpike, a private redevelopment project involving residential, commercial, office, hotel, and cultural facilities; proposed air rights developments over the adjacent five-acre ramp area; administrative offices of the Richmond-Petersburg Turnpike (ramp interior); and a suggested cultural center development within the O'Hare directional interchange in Chicago (1, 6). In some instances it might be desirable to provide direct ramp access to high-accessibility multiple uses, provided there are no conflicts with basic freeway design and interchange spacing. This has occurred with both the Garden State Arts Center (Garden State Parkway) in New Jersey and the Anthony Wayne Recreation Area (Palisades Interstate Parkway) in New York (6).

The broad concept of high-accessibility corridors and corridor systems within urban areas offers an important guide in developing multiple uses of this type (7). Both freeway rights-of-way and other lands within perhaps one-half mile of interchanges should be considered as potential locations for all types of land use requiring metropolitan accessibility, including industrial districts, regional shopping centers, special commercial areas, university and college campuses, medical districts, major recreation attractions, and high-density housing. Portions of these kinds of projects, as well as the land uses mentioned above, might well be considered for development within or over freeway lands, and all require coordination with respect to overall traffic generation and interchange capacity, alternative opportunities for development, urban renewal programs, and possible rezoning actions. The notion of linear corridors comprised of a series of interchange nodes with high-accessibility project potential, connected by freeway segments more suited for locally oriented air rights or other joint development, provides a useful guideline for multiple-use planning.

Studies currently under way in Baltimore and Chicago are aimed at identifying joint development opportunities within the corridors of pending Interstate freeway projects. Preliminary work in both cities indicates that the framework for these studies will involve the use of thoroughgoing methods for evaluating alternative route locations. For example, comprehensive planning for the Crosstown Expressway in Chicago has been built around achieving a balance between transportation goals and other community impacts and goals (14). Given that the need for an expressway within the crosstown corridor can be established, three different levels of evaluation of alternative alignments are identified: (a) engineering aspects in terms of traffic movement and highway economics; (b) impact on existing communities, including relocation loads, displacement of community facilities, and the disruption of neighborhood social patterns; and (c) potential land-use improvements, including multiple-purpose development opportunities as well as the achievement of such land-use objectives as the elimination of blight and the separation of noncompatible land uses. In Baltimore, a similar approach has been used in evaluating alignments for the Southwest Expressway (15). Two broad types of evaluation criteria are distinguished: (a) accessibility factors dealing with trip desires and traffic volumes, and (b) environmental factors dealing with the impact of the freeway on surrounding neighborhoods. Seven different kinds of environmental factors are considered: neighborhood and social impacts, city and regional impacts, open space and nature, cultural assets, amenities of environs, amenities from the road, and economic factors.

The integration and coordination of freeways with surrounding urban areas, including the investigation of specific multiple-purpose or joint development opportunities, is the subject of continuing research in both cities. The concept of high-accessibility corridors can be used as a means for identifying and evaluating joint development possibilities. The joint project concept, or the idea of planning and developing two or more land uses within a unified project, with consequent gains in land conservation and coordinated design, is also of importance. As applied to major transportation right-of-way, the concept can lead to multiple-purpose freeway projects as well as improved relationships between freeways and adjacent land uses (4). Opportunities for joint project development involving freeways include recreation, public buildings, utilities, transit and parking, housing, and private development. Related concepts useful in joint project planning, in addition to high-accessibility corridors, include linear renewal projects and interchange districts. Freeway and renewal coordination can lead to key redevelopment opportunities associated with new rights-of-way, while the interchange district can ensure that land uses requiring high accessibility are appropriately developed in relation to interchange design and capacity. Other important facets of the joint project concept include basic planning procedures, problems in interagency coordination, financial feasibility, and legal authority and limitations (4).

### COORDINATED TRANSPORTATION FACILITIES

There are three kinds of multiple-purpose freeway land development that involve related transportation facilities: (a) exclusive transit lanes with stations (either bus or rail), (b) passenger stop turnouts for buses operating in the mixed traffic stream, and (c) interchange area parking facilities used both for car pooling and as transit park-and-ride lots. In each instance, the encouragement of these kinds of multiple use is likely to benefit freeway traffic by reducing peak-period volumes and/or increasing the overall capacity of the transportation corridor. This effect, in turn, enhances the accessibility of land uses in the vicinity of interchanges. In general, it appears that exclusive transit lanes are appropriate and feasible within metropolitan areas of more than one million population, while freeway bus operations make sense in areas with populations of roughly 200,000. Interchange parking facilities could be developed in either of these situations (1).

The most widely known examples of exclusive transit lanes are those in Chicago, where median rail transit is in operation along one freeway and programmed for two others, and median express bus lanes are planned for a fourth (8). Median transit facilities are also under construction, programmed, or seriously proposed in Baltimore, Boston, Miami, San Francisco, and Washington. In San Francisco, the Bay Area Rapid Transit District will locate portions of its transit system within freeway medians and sidestrips at four different locations. Los Angeles and St. Louis have each located 10 turnout bus stops along their freeway systems, mostly within interchange areas. Experience with interchange parking facilities has been limited, but single facilities have been established along the Garden State Parkway (35 miles south of Newark), the Massachusetts Turnpike (10 miles from downtown Boston), and in association with the New Jersey approach to New York City's Lincoln Tunnel (1).

### LAND ACQUISITION PROBLEMS

Most significant multiple uses (except for coordinated transportation facilities) involve the development of adjacent land parcels in addition to normal freeway rights-of-way. This has represented one of the major stumbling blocks for further application of the multiple-purpose development concept. State highway departments are currently limited to the acquisition of rights-of-way which will serve "highway purposes," with land for very few of the important, urban-oriented multiple uses falling into this category. As a result, though air rights development over Interstate highways is permitted by federal legislation, it is usually difficult for interested public or private agencies to acquire the necessary additional parcels in coordination with highway acquisition. Inadequate parcel size, the possible need for land on both sides of the freeway, timing and legal problems, adjustments to be required in sidestrip width, possible

redesign of interchange areas, and, in general, the need for unusual cooperation from the highway agency have all served to discourage more widespread multiple-use developments. In addition, of course, the increased costs of air rights structures tend to encourage only projects of considerable size, while the joint development concept for lands adjacent to the freeway has only recently been advanced.

One solution to these problems is to turn the acquisition of both highway rights-of-way and required adjacent parcels over to another public agency (10). In the Washington study, this task has been assigned to the local renewal agency (3), which would acquire all the land needed for the joint housing-freeway development project. The highway department would then purchase a permanent three-dimensional easement—an "air tunnel" for the freeway—at a cost equal to its planned right-of-way expenditure. The total cost of this procedure is likely to be about the same as the cost of acquiring freeway rights-of-way (plus severance damage payments) under present practices, so that multiple-purpose sites would, in effect, be nearly cost-free (10). These savings could conceivably be passed on to multiple-use developers, to be applied against the increased expense of possible air rights structures. The concept could be extended to include the acquisition of block-wide strips at several points along planned freeway routes, so that the close coordination of freeway route location with urban renewal planning takes on added significance.

In some cases, the acquisition of rights-of-way might be similarly handled by metropolitan park districts (or state recreation agencies), where a freeway alignment passes through an area proposed for major park development. Early cooperation here might enable land acquisition while such sites (for instance, along river basins) are still suitable for recreation purposes. Several coordinated freeway-park examples illustrate how compatible development might be achieved, particularly within elongated linear park arrangements (6). Major parks and recreation represent a multiple-purpose development where the continuity of freeway sidestrips with adjacent parkland is essential and easily achieved. In some instances, existing parks have been coordinated with new freeways passing through them (as in the Long Island, New York, park and parkway system), whereas in other cases freeway developments themselves have created new park opportunities (for instance, along the Chenango River in Binghamton, New York) (6).

Not all multiple-purpose project sites could be assembled with the aid of renewal or recreation agencies, and, in general, a coordinated land acquisition program among all public agencies appears desirable in identifying multiple-use opportunities. This should be directly tied to the capital improvement programming process within metropolitan areas. Such a procedure might overlook potential private development projects not involving renewal land, but would include certain low-accessibility public facilities not yet mentioned—such as local primary and secondary schools, local parks and playgrounds, reservoirs, water purification and sewage treatment facilities, and pumping stations. Under the joint project concept, appropriate lands along planned freeway routes would be thoroughly examined to locate possible sites for both these kinds of public facilities and those discussed earlier (4). The emphasis would be on coordinating the timing and location of all public land investments, rather than strictly on achieving a multiple use of freeway lands.

It also appears desirable for existing Federal-Aid Programs concerned with coordinated metropolitan development—including highway, open space, urban renewal, land and water conservation, water and sewer, housing, and mass transportation—to encourage and financially assist joint development and multiple-use projects. For instance, the Delaware Expressway study recommends that 60 percent of the cost of covering the freeway should come from the Federal Highway Trust Fund, and that much of the remainder should come from the Open Space program of the U. S. Department of Housing and Urban Development, and the Land and Water Conservation Fund of the U. S. Department of the Interior (2).

#### INTERCHANGE DEVELOPMENT PROBLEMS

A serious problem affecting the feasibility of multiple uses within interchange areas is the question of providing access. In nearly every case, it is preferable to limit

access points to locations along the interchange cross-route, simply for reasons of freeway safety. Furthermore, these access points must be spaced far enough from ramp connections to avoid interchange confusion or congested operation. In the case of cloverleaf and directional interchanges, the use of frontage roads and indirect grade-separated access across ramps will usually be necessary. Ramp interior parcels of two acres or more in size are common within these larger interchanges and offer considerable development potential (1). The additional costs of providing ramp underpasses or overpasses are likely to be offset by the locational advantages of interchange sites.

Given that access from the freeway to such sites would be rather circuitous, and that grade-separated local access (pedestrian or vehicular) would be required, the principal remaining barrier to multiple-purpose interchange developments is a legal one. Problems here have not been thoroughly explored (and are complicated by the possible involvement of air rights over or under ramps), but the main difficulty lies in the "highway purpose" restriction. Present legislation in nearly all states will not permit the use of ramp interiors for appropriate (but non-highway) multiple purposes. Existing ramp interior development has consequently been limited to such uses as maintenance areas, highway offices, and parking (1). If these restrictions were to be relaxed, it would also be desirable to consider the expansion of interchange designs to create larger and more attractive ramp interior development sites. This possibility could be coordinated with a joint development program of freeway corridor land acquisition (at some points well in excess of normal right-of-way widths), conducted by an appropriate public agency or agencies. Such a program, in providing for multiple-purpose freeway land development, both at interchanges and along the mainline right-of-way, offers considerable promise for enhancing the environmental impact of urban freeways.

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## *Discussion*

V. SETTY PENDAKUR, Associate Professor of Planning, and TERRENCE W. JOHNSTON, Richard King Mellon Fellow, School of Community and Regional Planning, University of British Columbia, Vancouver—Mr. Stuart's paper outlines the important principles and problems in multipurpose freeway land development in urban areas. The topic is of particular value to those interested in the comprehensive planning of the urban environment and are concerned about the efficient use of space within urban areas.

Mr. Stuart has, however, chosen to limit his discussion to the multiple use of freeway land. The reader is left with the impression that multipurpose land development is a fringe benefit of urban freeway construction rather than a concept of civic design that may aid in abating the problems of congestion and overcrowding in urban areas. Buchanan (16) suggests that urban areas consisting of buildings set along vehicular streets is only a convention. If buildings and streets are thought of together as constituting the basic unit of cities, then they can be combined and molded in a way that is more advantageous than the conventional street. Therefore, multipurpose land development should be considered as a part of comprehensive urban planning rather than at isolated points along an urban freeway only.

Some aspects of air space development should be studied in greater detail. Utilization of air space above railway rights-of-way has been practiced with considerable success for many years. To date, we have acquired little experience in the multiple use of freeway land, particularly where freeways and residential uses are combined. Joint development of freeway and urban renewal projects is promoted as a highly economic solution to the critical problems of transportation and renewal in urban areas. It is conceivable people could find living above an urban freeway highly undesirable. It would be valuable to compare attitudes of persons living in housing projects constructed above freeways with attitudes of persons living in other comparable redevelopment projects.

Another useful study could be directed toward the technical problems associated with air space utilization. Detailed study of noise, pollution and vibration problems could determine if the current precautions being taken to eliminate these hazards are adequate. The installation of ventilating systems capable of exhausting combustion gases above air space structures do not necessarily mean the air pollution problem has been solved. Similarly, precautions taken to dampen noise and vibration may not be adequate. Conversely, these problems may not be as serious as anticipated. Construction costs may be reduced, thereby making air space utilization more feasible.

Mr. Stuart has briefly discussed the additional costs of freeway platform construction and the evaluation of air space. It has been traditional to evaluate air rights by considering such factors as the value of comparable land, anticipated loss of residual value from economic or functional obsolescence, added capital costs of air rights platform construction, savings in excavation foundations, demolition, tenant relocation, income losses during relocation and demolition, and added interest and carrying charges as a result of added capital improvement (17). There appears to be a weakness in this method of evaluation in that public benefits such as additional tax revenues and factors of safety and convenience are not considered. These considerations could be of particular importance where the multiple use concept is applied to central business areas to effect separation of transportation modes and to utilize previously vacant air space.

Multipurpose development above high accessibility corridors may provide a useful source of revenue to assist in paying for improved transportation facilities. Traditionally, properties adjacent to high-capacity transport arteries appreciate in value and generally experience redevelopment. By locating new development directly above transportation facilities, the transportation authority collects revenues gained from increased property values and variegated use of land.

There are excellent examples of this in Montreal, Canada, where impressive commercial complexes are being developed above the subway stations (Place Ville Marie, Place Bonaventure, Place Victoria). As well as providing residential, office and retail accommodation that is highly accessible to subway patrons, it also provides a valuable source of revenue to the rapid transit system.

Mr. Stuart's discussion of multipurpose land development as related to coordinated transportation facilities has not included the pedestrian. Utilization of the multiple use concept provides means of separating transportation modes, thereby increasing the safety, convenience and efficiency of an urban transportation system. The City of Montreal has developed a system of underground pedestrian malls connecting major business complexes and subway stations. The subway system operates below the mall level and the surface streets are left relatively free to vehicular traffic. In Calgary, Alberta, planners are preparing plans for an elevated pedestrian circulation system that will free street surfaces in the downtown area for vehicle use. In Edmonton, Alberta, a plan is being developed for an underground pedestrian circulation system. Particularly in high density urban centers, consideration of pedestrian needs in any multiple use concept is of particular importance.

It is interesting to compare powers of public domain in Canada and the United States in matters of land acquisition. Mr. Stuart has described the limitations of state power in expropriating land for other than highway purposes. In Canada provincial and municipal governments have power to acquire land for any public purpose and dispose of surplus acquisitions as they see fit. The possibility of developing air space above publicly owned rights-of-way is therefore considerably less complicated in Canada than in the United States. On the other hand, legislation comparable to the United States Highway Act of 1961 or the United States Housing Act of 1964 that specifically encourages multiple use development and utilization of air space is needed to provide an impetus to planned development.

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