Land-Use Controls

WILLIAM MARSTON
Deputy Commissioner
Department of Development and Planning
City of Chicago

Today's urban problems are so grave that there can be no let up in cooperation of the traffic engineer and the land-use planner. There is a great force that is pushing new development into the suburbs. This force is powered by the effort of home and factory owners to get away from spreading slums. Countering this outward thrust is the desire of urban-oriented influences to rebuild and renew the city center. It is considered imperative that past mistakes be corrected and the city be renewed. Every effort must also be made to insure that the costly mistakes made in the older areas are not repeated in the new territories.

The city planner and the traffic engineer have great responsibility. They must develop programs for established cities that will reclaim the older areas and yet they must not make mistakes in the newer areas. In correcting past mistakes, the cure must not drive out established residents and businesses or discourage new ones from coming in.

There can be no doubt that poorly planned land areas create chaotic traffic conditions. Homogeneous commercial centers, residential areas, or industrial areas, if properly located and planned, will produce traffic patterns that are better and safer.

Fortunately there is a new awareness of the need for coordinating traffic engineering and land planning. There is less difficulty now in controlling locations of traffic generators. Traffic serving them can now be more adequately controlled. There is another very important positive trend and that is the willingness of designers of facilities such as schools, parks, parking garages, and housing to better relate them to traffic safety and efficiency.

The progress to date in this regard has been dimmed by the tremendous amount of bad planning and bad traffic engineering that exists. The process of correcting these errors will be slow and costly.

The basic objective for an urban area should be to "improve the quality of life," or to "make the city a better place to live, work, and pursue happiness." This objective implies a safer and better environment. These implications require that traffic engineering and land planning be carried out as a team effort.

Having agreed to the basic objective of improving the quality of life in a community, there are specific policies that are needed. Rules that promote these policies should be developed. These rules concern driveway design, curb controls, and so on.

Two equally important major policies that should be recognized are: land uses should be so oriented as to reduce traffic conflict and streets should be planned to improve their environmental influences. With these policies in mind it is possible to prepare a series of statements that can aid materially in achieving the major goal of improved quality of life. Such goals are a usual part of a good comprehensive plan.

A sample set of policies follows this paper. Each policy statement sets forth one or more goals that relate directly to a particular kind of traffic generator or to a particular thing that will affect traffic. For example, there are two goals contained in the statement for "Off-street Parking and Driveways in the Central Area" that reflect overall city policy. These goals are: (a) minimize vehicular and pedestrian movement conflicts within the core by decreasing unnecessary street traffic volumes, and (b) retain the compact functional development of the core area by minimizing the use of land devoted to storage space for motor vehicles.

TABLE 1

COMMERCIAL DRIVEWAY ACCIDENTS RELATED TO TURNING MOVEMENTS

Item	Left		Right		Total		All
	In	Out	In	Out	In	Out	
Number of accidents	378	271	149	137	527	408	935
Percent of total	40	29	16	15	56	44	100
Summary percent	69		31				

Source: Unpublished study, 5-year record, 31.5 miles of major traffic routes, 315 establishments, 567 driveways.

A policy statement on school access establishes school location to achieve the least traffic congestion and the greatest safety. Covered also are pedestrian access and vehicular access.

A general city-wide policy statement on parking and loading reflects goals for reducing congestion, improving environment and increasing safety. Other facilities are also covered by similar statements. These include: "Location of and Access to Police, Fire and Emergency Service Buildings," "Recreational Parking Facility Design," "Entrances to Recreational Facilities," "Periphery Treatment of Parking Facilities," "Walkways in the Public Way," and "Fire Lanes."

In addition to these policy statements some of the city codes reflect basic city policies. For example, the zoning law controls parking facilities and loading areas in connection with new construction. The traffic code includes driveway standards.

In the larger cities it would not be possible for the traffic engineer to be personally involved with every site planning activity. It would be desirable, therefore, to issue policy statements. Statements such as these will make developers, architects, and others aware of the proper design and forewarn them of delays in securing approvals. On the other hand, the traffic engineer should involve himself early in development plans. He should evaluate the site and guide the selection. Internal circulation has an effect on the entrances and exits and needs to be given close attention. He must do all possible to insure conformance with regulations and standards.

There can be no argument that driveways entering major streets create points of accident and congestion. These are actually intersections and as such are potentially dangerous. In crossing a sidewalk an automobile may interfere with pedestrians and create a hazardous condition. Much of the objection to driveways along major streets, particularly in dense urban areas, is the interference to the movement of pedestrians. The inconvenience to pedestrians who are forced to walk around autos standing across a sidewalk is an important consideration in large cities.

Adequate national studies of driveway design (width and radii related to location, major street volume and driveway volume) have not been located. Several studies in the Chicago suburb of Skokie have developed information such as given in Table 1. This study found that inbound movements caused somewhat more accidents than outbound movements. More importantly, the high significance of the left-turn accident hazard is illustrated.

One of the best methods of controlling the left-turn movement along major traffic routes is by a barrier median. To illustrate the accident difference, 5.7 miles of these

TABLE 2

MAJOR ROUTE DRIVEWAY ACCIDENT ANALYSIS

Item	Service Stations	Commercial and Industrial	Residential	Alleys
Number of openings	175	452	569	42
Annual accident frequency per opening	0.15	0.27	0.02	0.05
Percent of injury accidents involving left turns	75	81	17	0

Source: Unpublished study, 2-year record, 39.7 miles of major traffic routes, 1238 driveways.

routes having barrier median were separately analyzed. The annual accident frequency was 0. 13 per commercial driveway, compared with 0. 36 per driveway for the routes without such a median.

The ADT of the routes with barrier median ranged from 12, 000 to 15, 000, while the remaining street ADT range was 5, 000 to 25, 000. The street volumes were typical, but the driveway activities were not necessarily comparable, and thus a direct 3 to 1 accident relation is not fully established. To test the actual effect of blocking left turns a before-and-after study was made on one major route improvement project. The driveway accident frequency was 132 per mile per year in the before period, versus 12 per mile per year in the after period.

In Skokie, studies were also conducted of accident frequencies by type of establishment, and accident severity. A summary of these data is given in Table 2, which indicates the great differences between accident frequencies at residential and commercial driveways, as well as the high injury producing significance of left turns.

Data from the study are also available to compare property damage and injury annual accident per driveway frequencies along routes with and without barrier medians:

With Barrier Median		Uncontrolled	
P. D.	Inj.	P. D.	Inj.
0. 013	0. 005	0. 116	0. 05

This study showed 11 times as many property damage accidents and 9 times as many injury accidents along streets without a barrier median. As the low annual accident frequency per driveway (about 1 per 7½ years on the overall average) may be misleading, it should be pointed out that driveway accidents account for 11 percent of all major street accidents in the subject city, and 9 percent of the minor (local) street accidents.

The significance of pedestrian accidents, as related to driveways, warrants detailed study. In Skokie, only 1. 4 percent of driveway accidents involved vehicles striking pedestrians or bicycle riders. A higher rate would be certainly expected in a larger city with far greater pedestrian activity. The question of whether to design driveways about automobile needs (greater width and radii), or pedestrian needs (narrow width at the sidewalk) remains unanswered for the larger city. It may well be that different standards are needed for various areas of any city.

A reasonable standard for driveways to important generators where pedestrian travel is heavy is as follows: The width for passenger cars should be 24 ft and for commercial vehicles 35 ft measured at the property line. The minimum distance between driveways must be 10 ft and the minimum angle of entrance into the roadway should be 45 degrees. There should be ample sight distance; 20 ft between emerging point and the roadway curb and 10 ft from emerging point to the inner edge of the sidewalk being recommended as a minimum.

Driveways that exit or enter a street parallel and adjacent to the roadway are practical and can offer some advantages in certain cases. This system can be used when buildings are set well back so that there is enough space for pedestrians to walk between the driveway and the building. In this case, no pedestrian conflict is experienced and vehicles merge with the traffic stream normally.

The minimum amount of access to major streets from subdivisions is desired. Where possible, connections should exist at signal points—those which permit progressive signal timing along the major street. Where this cannot be accomplished, the entrance should be designed to restrict vehicles to right turns in and right turns out. Signal spacing of about one-fourth mile can provide reasonably good signal timing. No traffic crossing points should be permitted elsewhere either from driveways or access streets. Access points along major streets whether for driveways or minor streets create somewhat similar problems. Turn restrictions and barrier medians should improve safety in both cases. A median which would provide shadowed left-turn protection would be effective at such locations.

TABLE 3

DRIVE-IN BANK OPERATIONS

Item	Example				Average Value
	A	B	C	D	
Number of windows	3	4	2	3	–
Window arrangement	in-line[a]	in-line	in-line	side[b]	–
Average transaction time	80 sec	101 sec	82 sec	60 sec	80 sec
Hourly operating capacity per window	45	36	44	60	46
Maximum observed backup[c]	7	12	8	16	11
Hours open	5½	7½			
Percent of daily activity:					
Peak 30 min	16%	14%	–	–	15%
Peak hour	29%	22%	–	–	25%

[a]Windows end-to-end.
[b]Windows side-by-side (toll booth type arrangement).
[c]During study periods.

Source: Unpublished studies, Paul C. Box and Associates.

Reservoir space for parking areas is extremely important to the proper functioning of major streets. The line of cars waiting on the main roadway to enter a facility creates serious problems. Reservoir space capacity need will depend on whether the parking area is self or attendant parking and on internal design. It is a question of how rapidly a facility can absorb the incoming cars. Experience in Chicago has indicated that for self parking, 5 percent of capacity is a minimum standard for reservoir area. Where attendant parking is used, as much as 20 percent is needed (as a practical matter, 10 percent is generally specified). In this case the design of the reservoir space is an especially important consideration.

Other examples of business activity requiring special reservoir space includes drive-in banks and theaters and car washes. Off-street storage needs (inbound) for car washes have been typically found to reach 20 to 30 spaces, while drive-in theaters need spaces equal to 10 percent or more of total operating capacity. The growth of drive-in bank facilities is continuing, and data from several studies are given in Table 3. These studies indicate a typical reservoir need of 10 to 20 spaces for drive-in banks.

CONCLUSIONS

The best results are obtained when land development and transportation improvements are planned and carried out as a unified process. The best physical planning and improvement programs are those that are carried out with control over both land and transportation. While this is not generally the case in the United States, much can be accomplished through voluntary coordination. A renewal or development plan must consider off-street parking, control of street frontage, and control of street access. The major or arterial street, because of its character, cannot be a segregated artery that will handle only through traffic. It must be, in part, a collector-type street and it is likely that it will always have to perform as an access street to some degree. Land-use control should be exercised to allow the major streets to better perform their proper function. Land planning could reduce unwanted uses.

REFERENCES

1. McGrath, William R. The Urban Thoroughfare System. Eno Traffic Quarterly, Oct. 1966.
2. Osborne, Henry. The Buffalo Truck Route System. Eno Traffic Quarterly, July 1953.
3. Wilbur Smith and Associates, Highway Classification in Illionos. Oct. 1965.
4. Public Administration Service. Procedure Manual—Standards for Street Facilities and Services.
5. Barton-Aschman Associates, Inc. Needs and Opportunities for Coordinating Renewal and Transportation Improvement.

6. Comprehensive Plan of Chicago—1966. Department of Development and Planning, City of Chicago.
7. Loutzenheiser, D. W. Coordination of Highway and General Urban Planning. Proc. ITE, 1961.
8. Hammer, Philip. Proc. ITE, 1961.
9. Engelen, Rodney B. The Opportunity Is Here. Traffic Engineering, April 1962.
10. Fagin, Henry. Transportation Systems Planning as an Influence on Urban Land Uses. Traffic Engineering, June 1963.
11. Excerpts from a Panel Discussion. Harold F. Hammond, Moderator, Traffic Engineering, June 1963.
12. Recommended Practices for Subdivision Streets. Project Committee 6E(62), Traffic Engineering. [Extensive bibliography contained] Jan. 1967.
13. Hurd, Fred W. Land Use Planning and Highway Engineering. Public Works, June 1964.
14. Carroll, J. Douglas, Jr. New Ways To See Land Use and Transportation. Civil Engineering, Aug. 1964.
15. Pollard, William S., Jr. Operations Research Approach to the Reciprocal Impact of Transportation and Land Use. Journal of the Urban Planning and Development Division, ASCE, May 1966.
16. Eberhard, John R. Technology for the City. International Science and Technology, Sept. 1966.
17. Arterial Planning Standards. Chicago Area Transportation Study, March 1967.
18. Urbanized Area Transportation Study. Manual of Street and Highway Improvement Standards and Typical Cross-Sections. Illinois Division of Highways, Bureau of Planning.
19. Paul C. Box and Associates. Selected Parking and Traffic Generation Data. Feb. 1967.
20. Marconi, William. Driveway Accidents in San Francisco. Traffic Engineering, Jan. 1967.

Appendix

PROPOSED POLICIES

POLICY ON OFF-STREET PARKING AND DRIVEWAYS IN THE CENTRAL AREA

In planning for a city it is recognized that the valuable lands at the core of the Central Business District should be devoted to the primary function of the CBD rather than to storage space for motor vehicles. The development of off-street parking facilities is and will continue to be of importance for accessibility to the CBD. Poorly planned parking development will prevent proper arrangement of land uses, impede the movement of mass transit, cause serious traffic congestion, and impair the safety and convenience of pedestrians. It is apparent, therefore, that proper location and operation of parking facilities are essential considerations if planning goals for the CBD are to be achieved.

Two goals which directly affect parking policy for the CBD are:

1. Minimize vehicular and pedestrian movement conflicts within the core area by decreasing unnecessary vehicular street traffic volumes; and
2. Retain the compact functional development of the core area by minimizing the use of land devoted to storage space for motor vehicles.

To attain these goals certain actions must be taken, among which is the limiting of nearly all types of off-street parking facilities to the periphery of the CBD.

For the purpose of planning and regulating parking facilities, the central area as herein referred to shall be divided into three areas:

1. Core area
2. Periphery area
3. Intermediate area—the area between the periphery area and those areas bordering the near-in expressways.

Core Area

Area within the CBD which comprises the highest commercial and shopping density.

Parking Facilities. It is in the public interest that the provision of additional off-street parking in the core area be minimized. Therefore it shall be the practice to:

1. Discourage the voluntary provision of off-street parking in connection with new structures; and
2. Discourage the construction of any additional commercial (fee) off-street parking facilities.

Driveways. To attain the goal of minimizing pedestrian and vehicular movement conflicts in the core area, driveway permits will be issued only where the use of the driveways would not create unreasonable and unjustified interference with pedestrians and with vehicular movement. Unreasonable interference with pedestrians will be considered to result when more than 14, 000 pedestrians use the sidewalk, on a typical weekday between the hours of 8 a. m. to 6 p. m., that must be crossed by a driveway. Unreasonable and unjustified vehicular interference will be considered to result when the adverse effects of such interference are not offset by advantage gained by elimination of curb use through use of the driveway. When such a driveway will affect more than 9, 000 but less than 14, 000 pedestrians on a typical weekday between the hours of 8 a. m. to 6 p. m., driveways may be considered acceptable, but special pedestrian protection, such as warning devices, may be a requirement of the driveway permit when issued. In this latter case and in all other instances there may be other requirements, such as restrictions on turning movements in and out of a driveway and restrictions as to hours of use.

Periphery Area

The area adjacent to and beyond the core area, but still a part of the central area.

1. Encourage the provision of parking facilities connected to the core area by convenient means of pedestrian movement.
2. Encourage the vehicular access and egress to lower level streets.

Intermediate Area

In all other portions of the central area and for the area one block on either side of expressways.

1. Encourage the construction of large capacity parking facilities for long-term parking with convenient access and egress to expressways.
2. Provide mass transit connections from these parking facilities directly to the CBD core area.

POLICY ON SCHOOL ACCESS

All schools and related educational facilities such as playgrounds and libraries should be carefully located and designed to provide convenient access and maximum traffic safety for pupils and visitors.

Location of School Sites

Elementary schools should be located so that the pupils are required to cross as few major thoroughfares as possible. These schools should be located on local streets

and have connections with a system of park malls whenever possible. High schools should be located on major thoroughfares to provide access to public transportation and to avoid generating heavy traffic on local streets.

Location of Playgrounds

Whenever possible, a school building and local playground and park area should be combined on one site which is not divided by streets. If a street does divide an otherwise desirable site, the possibility of closing this street should be carefully studied. When such a combination is not feasible, the divided site should be linked by a pedestrian grade separation of adequate and attractive design.

Pedestrian Access to Schools and Playgrounds

1. School and playground entrances and exits should be located and designed so that pupils are encouraged to cross streets at controlled intersections or at points where a planned system of park-malls connect with the school site. Both students and non-students should be encouraged to use cross-walks which are protected by traffic signals, crossing guards, or pedestrian grade separations. Sidewalks should be designed to standards adequate to handle the heavy volumes of school traffic.
2. Playgrounds fronting on major streets should be designed with barriers such as fencing or plant material walls to deter those at play from running into the street. These barriers should be designed so that they protect those at play but do not unduly restrict the visibility of motorists or interfere with police surveillance. The playgrounds should contain space and facilities adequate to meet recreational requirements.

Vehicular Access to Schools

1. Vehicular access to parking facilities and service drives should be designed to maximize pupil safety and to minimize the impact on the amount of space devoted to play areas.
2. Provision should be made for safe emergency access. Fire lanes at school sites should provide both ingress and egress from two or more boundaries of the site. Parking restrictions and site planning should allow an unobstructed clearance of 35 feet from the buildings so that fire fighting and rescue equipment can operate effectively.
3. School bus loading and unloading areas should be located so that passengers may be facilitated with safety.

POLICY ON PARKING AND LOADING

Terminal facilities must be considered an integral part of the transportation system of any urban area. Inadequate parking and loading facilities can produce traffic congestion on streets and highways, economic losses to commerce and industry, hazards for pedestrians, and undesirable conditions on residential streets.

Parking spaces and loading berths should be located completely off the public way wherever possible. All parking and loading facilities must be designed and operated so that they do not result in interference with the proper movement of vehicular and pedestrian traffic on public streets, alleys or sidewalks.

Parking

On-Street Parking. The magnitude of the parking problem and the lack of off-street parking in older areas of the city is such that on-street parking must be allowed. However, on-street parking should be allowed only on those roadways which can accommodate their required traffic demand in addition to the parking. The allowed parking should be designed for maximum safety to moving vehicles, parkers, and pedestrians.

1. In accordance with the city code, "The parking of vehicles diagonal to the roadway may be permitted only on the streets at their termini beyond the last cross-street intersection and on streets which serve only as service drives...." On those streets which serve only as service drives, and where high parking demand cannot be met

through off-street parking, angle parking should be allowed if constructed and operated in accordance with Department of Traffic designs and standards. In these cases the street must be designated a service drive by City Council ordinance after a traffic study indicates that it is not required for through traffic. The angle parking design must include adequate provision for pedestrians and two moving traffic lanes in addition to the parking lanes. Proper signing and paint markings must accompany the parking lay-out. (This type of parking is particularly well suited for high-density industrial areas.)

2. Parking and standing shall be prohibited at all designated bus stops for a distance of sufficient length to properly curb a bus. The bus stop shall be used for unloading and loading of passengers only.

3. Parking restrictions shall be installed on all routes where traffic engineering studies indicate a periodic or full-time necessity.

4. All preferential streets must be kept clear of stalled and parked vehicles during periods of heavy snowfall.

5. In redevelopment areas and in areas of new development, off-street parking should be provided and curb parking prohibited whenever possible.

Off-Street Parking. The provision of off-street parking should be encouraged. Zoning ordinances, building codes, etc., should be revised to include adequate requirements for the quantity of off-street parking and these requirements should be stringently enforced. Property owners have the responsibility for providing vehicular storage space off the public way.

Off-street parking for residential use should be located within 500 feet of the dwelling unit and connected to the dwelling unit by a safe and lighted walkway.

POLICY ON LOCAL STREET DESIGN AND LOCAL STREET SYSTEMS

Local streets should serve as direct access to properties abutting them. They should be devoid of through traffic, but the system must be convenient, efficient, understandable and safe.

Local Street Design

Right-of-Way. The desirable local street right-of-way is 66 ft; minimum right-of-way for a conventional local street is 50 ft. Whenever the full right-of-way is available, the full street shall be considered. In areas where one-half or 33 ft of right-of-way is dedicated, every effort must be made to secure the remaining 33 ft of right-of-way. In the event it becomes impossible to secure the full right-of-way before a street pavement is needed, the street shall be constructed to one-half its ultimate width. However, in cases where anticipated traffic demands or safety considerations dictate, pavement widths in excess of one-half the ultimate width shall be required.

Pavement. The minimum desirable local street pavement width is 34 ft in residential areas and 38 ft in industrial and commercial areas. Lesser widths may be acceptable in special cases if parking can be restricted, but two moving lanes of adequate width must be available at all times.

Sidewalks. Sidewalks must be at least 6 ft wide if separated from the roadway by a parkway, and at least 8 ft if located immediately adjacent to the curb. In residential areas parkways should be provided wherever possible.

Through Traffic. Through traffic may be discouraged from using local streets by any of the generalized methods, subsequently described, providing location and design are approved by the Commissioner of Traffic.

Dead-Ending. Dead-ending local streets without adequate terminal provision will not be allowed. Absolute minimum radius dimension for a cul-de-sac pavement is 31 ft with a minimum right-of-way width of 78 ft.

Easements. A right-of-way for utilities, emergency lanes and/or sidewalks should be provided to connect culs-de-sac to other streets or other culs-de-sac. The emergency lane and/or sidewalk should be constructed in conjunction with the cul-de-sac construction.

Culs-de-sac. Culs-de-sac should not be allowed where the length of street, density of frontage development, design of frontage, and/or traffic generation of frontage is such that provision of a cul-de-sac will result in traffic volumes on the local street in excess of 2, 500 vehicles per day.

Lighting. Lighting of all local streets and sidewalks should be in accord with standards established by the Illuminating Engineering Society.

Curbs, Gutters and Sidewalks. All local streets, including culs-de-sac, must have curbs, gutters and sidewalks.

Sidewalk and parkway design should incorporate landscaping wherever possible. Landscaping should be designed so that it does not restrict the visibility of motorists or pedestrians. Public services (hydrants, post office boxes, light standards, etc.) should be located so that they do not reduce the effective sidewalk widths to less than 5 ft. Traffic signing, street lighting, etc., should be coordinated so that a minimum of utility poles is required.

Off-Sets. Right-of-way jogs and intersectional off-sets will not be allowed.

Local Street Systems

Continuity. Both ends of all local streets should connect with other streets by a continuous pavement or by a utility-emergency easement.

Fire Hydrants. The street system should be such that fire hydrants can be located at a maximum spacing of 300 ft, and so that water lines can be interconnected.

Access for Fire Protection. Access roadways or fire lanes must be provided to anything that will burn and to any location where people may have to be rescued.

Bus Stops. The design of street systems should allow for the maintenance of bus stops so that the maximum distance to a bus stop over a reasonably direct course will be no more than $\frac{3}{8}$ mile.

Rapid Transit Access—Pedestrian. Pedestrian access to and from present and proposed rapid transit stations via walkways or streets should be convenient and direct.

Rapid Transit Access—Vehicular. Present and proposed rapid transit stations must be provided with vehicular access.

Neighborhood Access. Major access points to neighborhoods should be at quarter-mile traffic signal points on preferential streets.

Alley Connections. Combining the local street system with an alley system is not acceptable. Streets must not terminate at alleys unless a turnaround facility is provided.

Through Traffic. Discouraging through traffic from local streets should not take precedence over convenience, safety and efficiency considerations.

Approval. Location and design of all streets and alleys must be approved by the Commissioner of Traffic.

Special Considerations

The previously mentioned standards apply to conventional subdivisions and neighborhoods. In special instances, such as planned developments, housing projects and areas where local service is provided by private streets, some of the restrictions may be modified. In these cases, plans will be reviewed and approved by the city departments concerned to insure compliance with reasonable standards of safety, traffic capacity and aesthetics.

POLICY ON LOCATION OF AND ACCESS TO POLICE, FIRE AND EMERGENCY SERVICE BUILDINGS

The location of and access to police, fire, and emergency service facilities is dictated by the nature of the service they provide. They are treated separately according to the way in which the community is served.

Emergency Service Buildings

This classification is primarily emergency medical facilities. Those who are served by this type of facility are served at the location. It must therefore be readily accessible.

1. Emergency service facilities should be located on or near a main street which carries the greatest volume of traffic to the facility.
2. Emergency entrances should be accessible from a street, rather than an alley, by means of a driveway with separate entrance and exit. If the driveway terminates at the emergency entrance, a turnaround facility should be provide.
3. Emergency entrances should be located so that there is no conflict with vehicles using other facilities of the hospital or building (delivery, visitors, etc.).
4. Emergency entrances must be kept clear at all times. Off-street parking should be provided for emergency vehicles whose operators must remain at the facility following use of the emergency entrance.
5. Parking should be restricted in the area of the emergency entrance when it is necessary to maintain clear access.
6. The emergency entrance should be clearly lighted and marked with identifying signs.

Fire Department Facilities

Fire stations and other fire department facilities are used primarily for the storage of emergency equipment and housing and training of personnel. The facilities also have limited use as emergency first aid stations. The general locations are determined by the fire department's administrative policy regarding distribution of forces. The specific location and its arrangement should be guided by the following:

1. Fire stations should be located on a preferential street or a street which will provide access to a preferential street.
2. There should be traffic control signals when necessary to permit rapid egress from the station.
3. On-street parking should be restricted adjacent to and opposite the entrance to the station.
4. The station should be clearly lighted at all times.
5. There should be distinctive marking and signs to properly identify the station.

Police Department Facilities

Police stations and other police facilities contain administrative and service units of the police department, prisoner detention facilities, and court units. The general location would be determined by the department policy regarding location of facilities. The specific location should be guided by the following:

1. Police stations should be located on main streets to provide convenient access.
2. There should be off-street parking which would conform to the pertinent provisions of parking policies.
3. The station should be clearly lighted at all times.
4. There should be distinctive markings and signs to properly identify the station.

POLICY ON PERIPHERY TREATMENT OF PARKING FACILITIES

All parking facilities should be carefully planned and designed to provide for the convenience and maximum safety of the patrons and public with a minimum of interference to adjacent uses, both public and private.

Acceptable safety and aesthetic treatment of the periphery should include the following design concepts:

1. The periphery of the facility shall have barriers. These barriers may be in the form of guardrails, retaining walls, or other protective obstructions structurally sufficient to stop and contain any vehicle within the facility.
2. Adjacent to public ways, some type of open fencing in addition to the barrier described above should be provided where pedestrian control is necessary.
3. Adjacent to private property, and type of fencing or screening conforming to the Municipal Code and good design practice shall be used.

4. Screening with plant material should be encouraged, particularly when the parking facility is located in a residential area. Planted border strips are desirable and should be provided wherever possible. All landscaping shall be of a type that does not interfere with the safe operation of the facility.

5. The peripheral treatment adjacent to public ways of all unattended parking facilities shall be of a type that will tend to discourage criminal activity and not interfere with police surveillance.

POLICY ON WALKWAYS IN THE PUBLIC WAY

Walkways are an integral part of the street system of an urban community. They should provide the pedestrian with a safe and efficient means of movement and may also be used to guide pedestrian traffic. Their construction should be required whenever and wherever a new street or thoroughfare is built. Guide lines, which should be followed in determining their location and construction, are as follows:

1. There should be continuous public walkways in all new developments, subdivisions, and renewal projects.

2. Elevated walkways should be encouraged where separation of pedestrian and vehicular traffic is desirable or where special amenities or design considerations are desirable. Pedestrian tunnels should be utilized as a device for separating pedestrians and vehicles only when other means are not applicable or where the tunnels are part of a specially designed system. Appropriate barriers should be erected to preclude at-grade crossings where grade separated facilities are available.

3. Space for walkways shall be reserved on both sides of the public way, according to the schedule set forth in the Municipal Code.

4. Walkways must be a minimum of 6 ft in width, if separated from the roadway by a parkway, and at least 8 ft wide if located immediately adjacent to the curb.

5. Where pedestrian volumes are exceedingly large, such as at transit stops and in shopping areas, walkways should be of sufficient width to accommodate pedestrian traffic.

6. Walkways shall be kept free and clear of all unnecessary obstructions. Public services (hydrants, post office boxes, light standards, etc.) should be located so that they do not reduce the effective sidewalk width to less than 5 ft.

7. All walkways shall be adequately lighted.

8. Where culs-de-sac are constructed, a right-of-way should be provided for the construction of a walkway lane to connect it to another street or cul-de-sac.

9. Walkways not to exceed 2 ft in width may be constructed parallel to and adjoining the curb, where necessary for access to and from vehicles.

10. Construction of carriage walks leading from the curb to the sidewalk should be encouraged.

11. All sidewalk construction shall conform to the standards as provided in the Municipal Code.

12. Bus loading areas shall be provided with paved surfaces.

POLICY ON FIRE LANES

In view of the hazards to life and property due to fires it is mandatory that adequate access to building structures be provided where public rights-of-way do not readily afford such. Ideal exterior accessibility is where a building or structure can be approached on all sides by fire and/or rescue apparatus. Use of properly located fire lanes will accomplish this accessibility. The following standards are required for the fire lanes:

1. Fire lanes shall be so located as to accommodate ladder and rescue work, as determined by the fire department. Fire hydrants shall be readily accessible from the fire lanes.

2. The fire lanes shall be of sufficient width and strength to accommodate and support fire and emergency vehicles, and shall be designed with adequate turnaround facilities.

3. The fire lanes shall be kept clear at all times from vehicles other than those of emergency nature. Approved barriers shall be provided at entrances to fire lanes and posted to discourage use by non-emergency vehicles.

4. No parking shall be allowed in front of fire lane entrances. Appropriate signs shall be erected in accordance with city traffic ordinance.

5. Site plans for proposed developments requiring fire lanes shall be submitted to the municipal agencies concerned for approval.

POLICY ON RECREATIONAL PARKING FACILITY DESIGN

While design requirements for recreational parking coincide generally with requirements for any other type of parking, there are some aspects to recreational parking which merit special consideration. One such aspect is involved with the extremely large fluctuation in parking demand due to the seasonal or periodic qualities inherent in attendance at many recreational activities. Another aspect is the frequent association of recreational parking with non-commercial land developed to high landscape standards.

Since attendance reaches large volumes on occasion, recreational areas should be serviced by mass transit facilities wherever possible. Accommodating peak attendance demands solely by automobile transportation results in the creation of abnormally large paved areas which are only sporadically used.

The following special considerations should be applied in the design of recreational parking facilities:

1. The design of large recreational parking facilities should minimize potential conflict with mass transit operations. Ingress and egress features, as well as reservoir space, should be planned to maintain reasonable access for mass transit service to the recreational facility involved, even when congestion exists at the associated parking facility, and on the roadways servicing it. Terminal facilities for mass transit vehicles should be included in recreational parking design if the storage of such vehicles is involved with the operation of the recreational facility.

2. In order to induce economy in land usage, dual use of recreational parking areas—such as shopper parking combined with stadium parking or employee parking combined with some other type of recreational parking—should be considered wherever possible.

3. Recreational parking facilities which are located in a park-like setting should be aesthetically compatible with their surroundings.

4. The location of recreational parking facilities should take into consideration the capability of the adjacent roadway system to absorb the traffic generated by the recreational activities.

5. The layout of any large parking facility should allow for flexible use so that the area of the parking lot to be used for any event which induces less than total capacity parking demand can be restricted to the area needed for that event.

6. To avoid the unnecessary paving of land, consideration should be given to the use of lawn or other unpaved areas for the storage of vehicles at recreational activities occurring infrequently. The potential difficulities occasioned by inclement weather do not justify the existence of large expanses of paved areas which rarely would be utilized for parking.

7. If suitable unpaved acres exist adjacent to recreational parking areas constructed to accommodate normal parking demands, the design of the parking facility should allow for their utilization in handling overflow parking occasioned by abnormal demands.

POLICY ON ENTRANCES TO RECREATIONAL FACILITIES

All recreational facilities, such as parks, playgrounds, zoos, conservatories, and similar areas, should be carefully planned to provide maximum safety for patrons. Pedestrians, especially children, should be encouraged to use protected crosswalks, and wherever possible, those protected by traffic signals. Vehicular and pedestrian access to recreational areas should be separated and designed for safe operation and

for minimal interference with through traffic movement on adjacent streets. The following standards should be applied to recreational facilities:

1. Pedestrian entrances and exits should be located and designed to encourage use of protected locations such as crosswalks, passerelles and pedestrian tunnels.
2. Active play areas fronting on streets should be designed with barriers such as fencing, walls, or plant materials to deter those at play from running into the street. These barriers should be designed so that the visibility of motorists and pedestrians is not restricted.
3. Pedestrian entrances at grade should be located at signalized intersections where feasible. The use of pedestrian crossing signals should be considered when pedestrian volumes warrant.
4. Automobile access points to large city-wide recreational facilities should be located on major streets wherever possible. Automobile access to small neighborhood recreational facilities should be on local streets.
5. Off-street parking and off-street passenger loading and unloading zones should be considered where recreational uses generate a need for these facilities.
6. All entrance drives and parking areas should be visible and lighted to facilitate police surveillance.
7. Bus stops which serve these facilities should be located so that unprotected street crossings by pedestrians are minimized.
8. Entrances for pedestrian and vehicular traffic should be well defined for the purpose of alerting pedestrians and motorists to the use of the area.
9. Fire lane policy provisions will apply to recreational facilities.

Addendum

PHOENIX, ARIZ.

The following is a comparison of mid-block accident experience on two portions of Central Avenue, Phoenix, Ariz., for a two-year period ending January 1, 1966. One section, from McDowell to Thomas, does not have median islands, while the second section, from Thomas to Indian School, does have median islands.

Comparative Measures	No Median	Median
Total Mid-Block Accidents	279	238 (14% lower)
Accident Rate	11.2 Acc./MVM	8.9 Acc./MVM (20% lower)
Personal Injuries	94	63
Estimated Economic Loss	$340,000	$240,000 (30% lower)
Volume—ADT	36,000	38,500

These median islands cost about $48,800, including landscaping and decorative lighting. This comparison demonstrates the fact that median islands substantially reduce the accident rates of high-volume streets by eliminating random mid-block conflicts.