Local Streets

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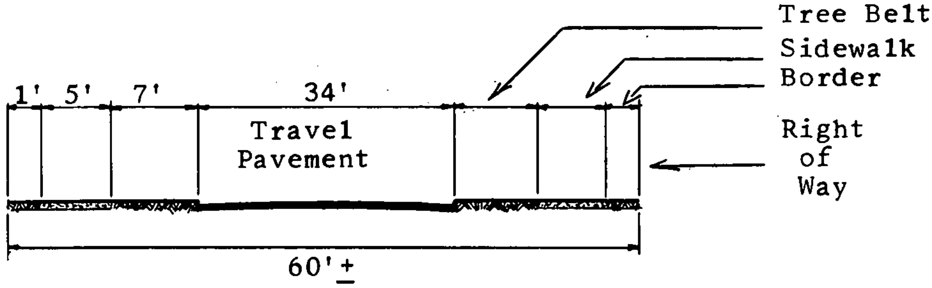
The urban "local street" generally accounts for a substantial portion of all urban street mileage. Because streets are ranked and classified from a traffic-carrying viewpoint, there is a tendency to undervalue local streets (they are often referred to as "minor streets") and short shrift is frequently given to maintenance attention, traffic control and long-range planning. The primary function of local streets is that of providing access to abutting properties. Supplying curb parking may be a secondary function of local streets, but parking should only be allowed under proper circumstances in order to minimize accident potential. Local streets may also absorb varying quantities of through traffic and truck traffic, which will tend to increase hazard, cause pavement breakdown, and adversely affect living amenities.

The critical need to understand and accommodate rising traffic loads in our intense urban centers has required that a great deal of attention properly be devoted to the major city streets—such as arterials and downtown streets. However, a fresh concern with the amenities of city living has given rise to a new examination of the role of local streets, especially an interest in their potential to exert a better environmental influence on the city dweller. This paper attempts to provide a brief insight into these streets, revealing some of their problems, and describing traffic engineering treatments which have been used for improvements.

COMPOSITION AND MAGNITUDE

Figure 1 shows a typical local street cross section. A paved roadway width of 34 ft is adequate for local street vehicular needs, while provision of sidewalks and curbs presents a full measure of pedestrian safety (1). In addition to increasing pedestrian safety, provision of sidewalks and curbs lessens fixed-object (trees, signs, etc.) accident potential to vehicular traffic by virtue of the barrier effect presented by vertical curbing and sidewalk width. Street drainage, cleaning and maintenance, and snowplowing efforts are also improved with constructed sidewalks and curbs.



Source: Institute of Traffic Engineers

Figure 1. Local street cross section.

TABLE 1

PEDESTRIAN DEATHS, ANNUAL AVERAGE

Position	Urban	Rural	Total
Walking in roadway	132	415	547
Playing in roadway	148	198	346
Standing in roadway	154	133	287
Total	434	746	1,180

Source: Accident Facts, National Safety Council.

Though some sub-division developers and individual lot owners may be reluctant to supply walks and curbs due to costs, high pedestrian generations of urban residential areas, especially children walking to and from school, fully justify sidewalk and curb provisions. In 1965, 1450 children in the 5 to 14-year age group died in pedestrian accidents (2). The incidence of pedestrian-in-roadway deaths for both urban and rural areas is given in Table 1. One study indicated that of all pedestrian fatalities in urban areas, "some 11 percent of these involve pedestrians in, but not crossing roadways" (1).

Traffic carrying ability is by no means the only available criterion for determining the value of streets. An understanding of the importance of local streets can be gained from an idea of their extent within the total street system. Table 2 gives a breakdown of the total street mileage of three typical cities. Inclusion of alleys as local streets in City C would result in a proportion of local streets, to all street mileage, of approximately 72 percent, which is similar to the smaller size City A.

CHARACTERISTICS AND FUNCTIONS

The limited service requirement of access and egress imposes only low traffic demands on local streets—generally under 3000 vehicles ADT. Normally, it can be expected that only a relatively small percentage of all traffic will be "through traffic"; that is, not having an origin or destination within the immediate locale.

Local streets will typically be developed with residential land use, and indeed, most neighborhood streets will be of the local street variety. However, local streets with mixed land uses are not uncommon, as well as local streets having exclusively commercial, institutional, or industrial land uses. In City A for example, 92 percent of the mileage is abutted by residential, park or school uses, while the remaining 8 percent is business and industrial use. Exclusive residential use by no means requires that a street section be classed local street; one may find numerous examples of exclusive residential use abutting major arterial facilities.

Other valuable functions which can be provided by local streets include parking, and the potential to enrich environmental influence (social amenity). These specific functions tend to be inferiorly supplied by higher type streets. These functions are not necessarily always well supplied by locals, but obviously, there is much less likelihood of major streets, because of their traffic role, accommodating curb parking, or exerting a beneficial environmental influence on people.

TYPICAL PROBLEMS

Like water, urban traffic continually seeks lines of least resistance. This dynamic quality of urban traffic can force serious traffic pressures on sections of local streets.

TABLE 2

TYPICAL LOCAL STREET MILEAGE

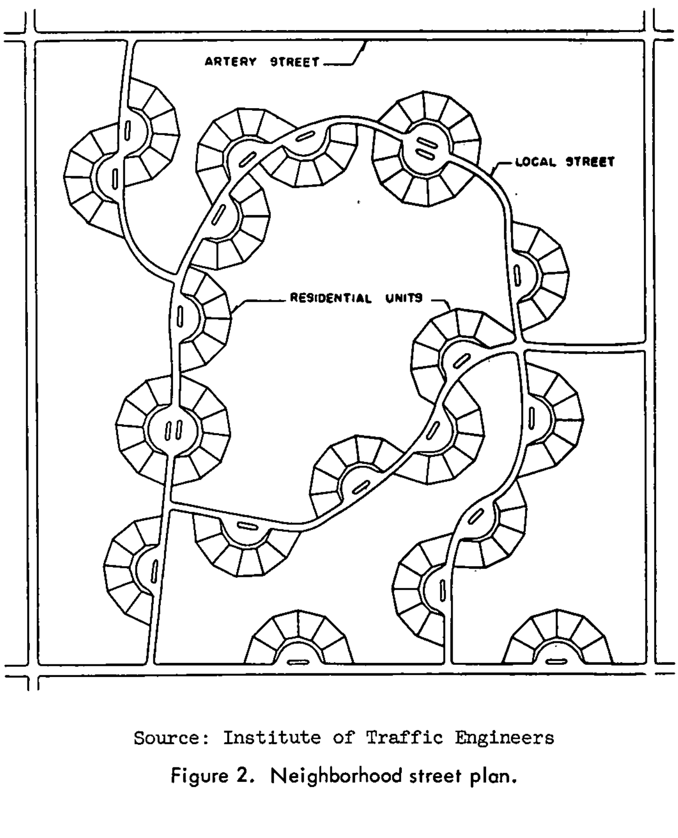
	Pop.	Land Area (sq mi)	Local Streets (mi)	Percent of Total	Alleys[a] (mi)
City A	65,000	10	115	71	—
City B	153,000	23	158	61	—
City C	950,000	79	874	63	500

[a]If public rights-of-way, should be considered as local streets. They are shown here under City C for comparative purposes and are not public rights-of-way in this case.

Such overflows can be minimized by developing and maintaining a high quality of flow on major traffic routes. However, even under ideal conditions, local streets occasionally experience problems similar in nature to those experienced by higher grade streets. Basically, these are traffic problems related to intersections (crossing flows), and problems which occur between intersections (often related to parking). There is one problem, however, unique to local streets—the problem of preserving local streets as such.

Obviously, the best way to limit unwanted traffic intrusions is to design out this potential in the original system plan. The Institute of Traffic Engineers has developed design policies for sub-divisions which seek to provide not only for the proper functioning of local streets in a traffic sense, but also strive for "maximum livability" (3). Figure 2 shows a neighborhood cluster-type street plan that assures a minimum level of through traffic flow. In intersection design considerations, for example, several studies have conclusively shown T-type intersections to be safer than "cross" types. In City A for example, the injury accident rate was found to be 5½ times greater at cross type local street intersections (Table 3).

Many American cities gradually developed their street systems in grid patterns, allowing local streets to be sandwiched between major streets with frequent connections between the two, thus making the locals vulnerable to traffic diversions. When faced with an accomplished fact in street arrangement, it is possible to create by traffic engineering techniques, an artificial arrangement of neighborhood street flow which discourages through traffic movements. Figure 3 shows such a treatment in schematic fashion, using one-way sections and intersection controls to break continuity of flow—an operating feature anathema to through traffic.



Source: Institute of Traffic Engineers

Figure 2. Neighborhood street plan.

TABLE 3

MINOR STREET ACCIDENTS BY TYPE

Intersection Type	Number of Intersections	No. Accidents			Two-Year Accident Rate[a]		
		Inj.	P.O.	Total	Inj.	P.O.	Overall
90° T	168	7	42	49	0.04	0.25	0.29
90° cross	309	67	125	192	0.22	0.40	0.62
Skewed T	39	0	1	1	0.00	0.03	0.03
Skewed cross	13	1	6	7	0.08	0.46	0.54
90° L	37	1	7	8	0.03	0.53	0.22
Total	566	76	181	257	0.13	0.32	0.45

[a]Per intersection. Source: Reference (4).

One special word of caution with regard to this treatment. One-way streets and intersection control devices require the studied judgments of a competent traffic engineer; it is extremely risky business when indulged in by anyone other than specially trained people. The proliferate use of traffic control devices, such as STOP and YIELD signs, tends to breed contempt to all traffic control devices and encourages violations. The habit of violation proneness can lead to serious consequence. One study of unwarranted local street intersection stop signs found violation rates of 74 to 90 percent (5). For a number of reasons there is also no guarantee that such treatments will be successful. One study carefully developed a system of locals and majors within a large sub-division, only to encounter substantial objections from the residents it was designed to benefit (6).

Another study resulted in conversion of a local two-way street to one-way operation in order to discourage through movements. A poll of residential opinion before and after indicated that 37 residents were for and 4 were opposed to one-way streets in the before study; 68 were for and 6 opposed in the after study.

The after study also indicated an accident reduction at one intersection from 11 accidents in a 3-yr period before one-way control, to 2 accidents in the 3-yr period after one-way control (7).

INTERSECTION PROBLEMS

There are basically two types of local street intersections: a local street intersecting another local street, and a local street intersecting a major street (the threshold from

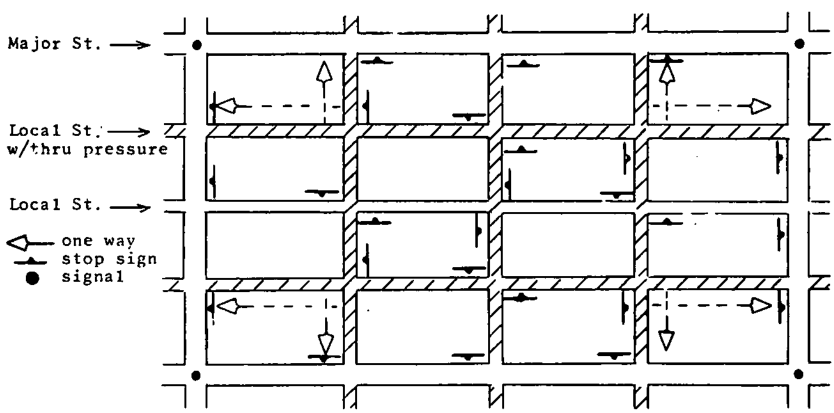


Figure 3. Schematic traffic control plan for local streets.

TABLE 4

ACCIDENTS BY TYPE INTERSECTION AND CONTROL

Type Intersection	Type Control	Number of Intersections	Number of Accidents	Annual Number Per Intersection
Major-minor	2-way stop	282	494	2.0
Minor-minor	4-way stop	3	0	0.0
Minor-minor	2-way stop	106	32	0.3
Minor-minor	Yield	111	66	0.6
Minor-minor	None	430	102	0.2

Source: Reference (5).

local system to major street system). Intersections of the latter type are understandably more susceptible to accidents because vehicles enter or cross heavier traffic levels, and traffic control measures will be correspondingly more stringent. Table 4 gives results of one study of accidents by type of control and intersection.

Minor intersections (local street vs local street) should operate relatively free of serious accident frequency because of the low volume characteristic. Most intersections will be suitable, therefore, for operation under prevailing right-of-way laws, without posted control. Typical minor street volume levels are revealed by results of the study given in Tables 5 and 6. Accidents that do occur at minor intersections generally cannot be blamed on traffic pressure or insufficient crossing opportunities. Most often, they are the result of driver error or restricted visibility—the latter a typical city condition caused by the close building lines, hedge and tree growths, etc.

Improvements to sight distance, and hence a greater degree of safety, can be obtained by adoption of laws limiting the height of greenery at intersections such that the normal driving line of sight (approximately 4-ft driver eye height) is not impaired. On level streets, this sets a maximum height above sidewalk level of 24 to 30 in. for shrubbery. A similar requirement coupled with appropriate building setback regulations can be added to the local zoning code to insure proper intersection clearance. Figure 4 shows a recommended "sight triangle" provision for a zoning code.

When accidents occur at minor intersections in residential areas, residents will often seek traffic controls far more stringent than are required by traffic conditions. Traffic engineering study may raise the level of control if such need is indicated, but more often low-keyed improvements such as corner parking clearances, various signs, and paint lines are instituted.

MID-BLOCK PROBLEMS

Urban residential density most often increases as one draws closer to the central city, generally reaching a peak level in the so-called "inner city" areas which surround the urban core. Although vehicle ownership on a family or person basis will tend to decline with closeness to the core, this advantage is quickly lost to the sheer numbers of people and the fact that resident off-street parking provisions also lessen with closeness to the core. A study in City A showed mid-block accident frequency in multiple family areas with dense curb parking to be nearly four times the frequency in single-family areas (4). The study also found 71 percent of mid-block accidents to be caused by parked cars.

From these circumstances emerges the urban dilemma over street parking. On

TABLE 5

MINOR STREET VOLUMES

Item	Block Sections	
	Single-Family Areas	Multiple-Family Areas
No. locations	283	94
Avg. peak hr[a], vph	40	80
Lowest peak hr[a], vph	2	18
Highest peak hr[a], vph	117	205

[a]Two-way volume. Source: Reference (5).

TABLE 6

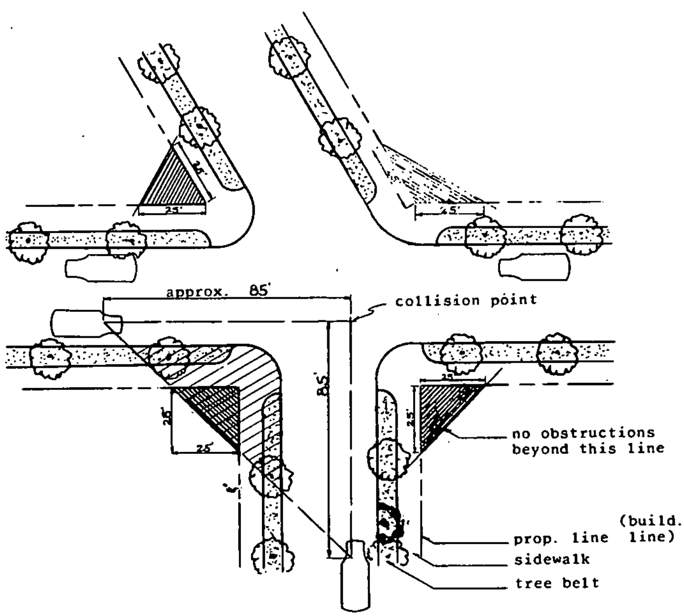
INTERSECTIONS

Control	Single-Family Area		Multiple-Family Area	
	Sample Size	Total Entering Vol. (vph)	Sample Size	Total Entering Vol. (vph)
Four-way stop	10	110	0	–
Four-way stop	9	90	3	370
Yield	13	180	2	230
None	39	90	18	150
Total	71	110	23	190

Source: Reference (5).

one hand, curb parking is nearly a necessity to residents. On the other hand (with the often limited width of urban local streets), the presence of heavy curb parking obstructs passage, raises car vs car accident potentials, presents extremely difficult street maintenance problems (cleaning and plowing), is unsightly and cluttering, and increases the potential for pedestrian accidents, especially in the highest density neighborhoods where sidewalks and streets often become play areas.

Table 7 gives data from a study which also suggests a relationship between residential density, street width, parking and mid-block accident experience. Figure 5 shows one guide (8) for the regulation of parking and traffic, with reference to a range of local street widths.



Source: Zoning Code, 1963
New Haven, Conn

Figure 4. Sight distance regulation, typical zoning code.

TABLE 7

RESIDENTIAL DENSITY AND MID-BLOCK ACCIDENT INFLUENCE

Study Block	Length (ft)	Width (ft)	Rate Per 100 Ft		Mid-Block[a] Accidents
			Residents	Cars	
1	400	60	32.5	10.0	1
2	300	60	33.0	7.5	-
3	350	36	40.6	12.2	3
4	300	36	43.0	13.0	2
5	600	35	9.8	3.0	-
6	900	30	6.6	2.8	-
7	800	23	40.5	12.0	2
8	400	29	14.0	4.2	-
9	400	36	8.2	2.5	-
10	300	30	5.6	1.6	-

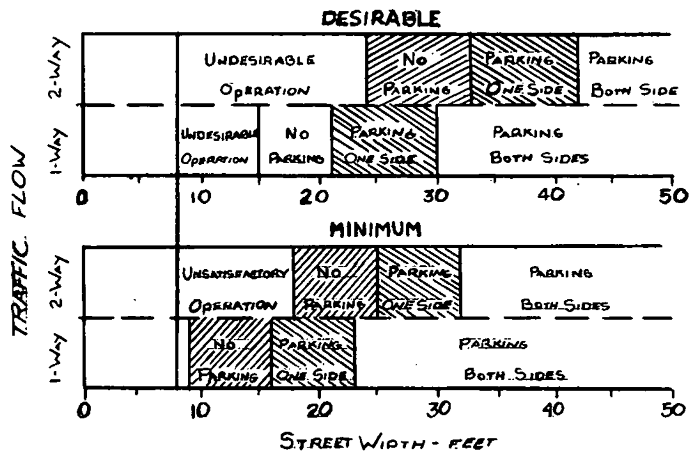
[a]24 months.

Source: Unpublished study, Department of Traffic and Parking, City of New Haven.

When serious off-street parking deficiencies exist, it is worth considering adoption of neighborhood one-way patterns which can provide more street area for curb parking while requiring less street area for the passing of traffic. As a rule of thumb, with a rate of 12 or more family units per 200 ft of residential street, full use of both curbs for parking still will not satisfy demands, and some off-street parking must be provided. Also, these areas will tend to experience higher mid-block accident rates. Creating residential off-street parking lots in high density areas, via spot clearance of depreciated structures, can be one solution to this problem.

CONCLUSIONS

Much can be said about the impact of the automobile on urban living. In the residential areas of urban society the auto touches closest to our lives, this particular reason, more so than essentially superficial problems relative to accidents or parking needs, suggests that more deliberate and objective attention be focused on the management of local streets. This increasing need to guide and shape our urban environment should



Source: Traffic Engineering Magazine March, 1967

Figure 5. Local street traffic regulation.

Figure 6. Court Street rehabilitation, Wooster Square Renewal Project, New Haven, Connecticut.

be recognized as sufficient justification to view the function of local urban roadways from the perspective of effect on urban living, rather than solely from the viewpoint of traffic function. This is illustrated in Figure 6.

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Addendum

CHICAGO, ILL.

A consultant working for the North Beverly Improvement Association, a community organization within the City of Chicago, found that the community was experiencing an excessive amount of through traffic, and they recommended a number of street closings and culs-de-sac to divert this traffic. This plan ran into considerable opposition from both the residents and the city. The reasons for this opposition were as follows:

1. The construction costs for these changes would be excessive for the results attained, and no doubt this work would have to be financed through special assessment.
2. The changes would result in a street pattern which would be very confusing and inconvenient to both visitors and area residents. A large number of residents were strongly opposed to the plan for this reason.
3. There would be inadequate access to many parts of the North Beverly area by fire department vehicles.
4. The positive approach of encouraging the use of preferential streets by improving them should be used instead of trying to discourage through traffic from using minor streets without alleviating the traffic problems that put them there in the first place.

The solution finally recommended was a system of one-way streets which could be put into effect almost immediately. It was expected that such a system would eliminate almost all of the rush-period through movements being made. Further studies were made and showed that no modifications in the one-way system or more radical solutions were necessary.