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27. Redesigning Residential Streets

PETER BOSSELMANN

Because street design standards and classification systems serve only to accommodate the movement of cars and to provide access to properties, up to one-third of the surface areas in our cities are rendered unavailable to other users. Even when cars are infrequent, their speed and unpredictable presence manage to dominate the street space. Moreover, traffic volumes, noise, and emissions have suppressed other activities that could take place on streets if the automobile were bridled.

In light of the automobile's deleterious effects, this chapter proposes ways to redesign residential streets to reflect the needs and values of nonmotorized street users, such as pedestrians, transit riders, bicyclists, the handicapped, the elderly, and children at play.

TAMING CAR TRAFFIC

That residents in urban and suburban neighborhoods are concerned about the effect of car traffic on the livability of their streets was confirmed by Donald Appleyard in his empirical research during the preparation of the San Francisco Urban Design Plan (City and County of San Francisco 1971). Furthermore, his studies showed that such concern was well warranted: lower traffic volumes proportionally yielded higher livability for residents (Appleyard 1980). Although Appleyard's findings may seem obvious, the research was important enough to have been repeated in Oakland, Berkeley, and Santa Cruz, California, as well as in London, England. Generally, studies in all areas confirmed the correlation.

The results contributed to policy changes in many cities. Officials in San Francisco, for example, who supported ideas first advocated by Colin Buchanan in Britain (1963), proposed that defined areas be protected from through traffic by (1) improved public transit, (2) the concentration of traffic on the city's main arteries, and (3) the blocking of through traffic by devices such as rough pavement surfaces, "necked down" entrances, bent alignments, landscaping, lighting and sidewalk treatment, and so on. Traffic would thereby be slowed to a pace appropriate for residential areas. Other means to ameliorate conditions were proposed for streets where traffic could not be reduced.

Many cities in North America have helped to mitigate traffic volumes by installing diverters and similar control devices that filter out nonresidential traffic. Such devices as street bumps have successfully slowed the speed of car drivers (Appleyard and Smith 1981). Yet, in spite of these constructive measures, the Federal Highway Administration has in recent years withdrawn all support for the improvement of residential streets, and most states have not filled the economic void. As a result, the care of residential streets is left with municipalities, where budgets rarely allow for extensive improvements.

In Europe, by contrast, federal governments have supplied the impetus and means for street renovation programs designed specifically for enhanced residential use. The exemplary Dutch *Woonerven* and West German *Verkehrsberuhigung* provide American planners with models that can be—and, to a limited extent, have been—adopted in this country. Moreover, research following the implementation of these programs offers useful information regarding their impact (see chap. 4, by B. Eubank-Ahrens).

For example, the popularity of Dutch *Woonerven* was confirmed in a 1981 survey of residents of the

All graphics are by the author.

redesigned streets: 70 percent of respondents considered the *Woonerf* desirable or very desirable; 16 percent were indifferent; and 25 percent disliked the new design. Those who favored the *Woonerf* cited safety, the quiet atmosphere, and play areas for children as primary benefits. However, residents complained (and speed checks and measurements confirmed) that speeding moped users continued to be a problem (Vissers 1982). Not all streets would profit from redesign as *Woonerven*, but the concept has proven appropriate for local residential streets, especially because designers have sought to achieve a balance of power among all users.

Although redesigned, protected areas are still a novelty in America, the idea has spread throughout Europe to neighborhoods in West Germany, Denmark, Sweden, and the United Kingdom. West Germany, in particular, has made street renovation a municipal priority. There, 200 cities have introduced government-monitored *Verkehrsberuhigung*, or traffic-restraint, programs, which comprise adaptions of the Dutch *Woonerf* as well as designs for collector and arterial streets in residential areas.

Research conducted in six such cities shows that although the number of accidents before and after renovation remained fairly constant, the severity of accidents declined significantly. In Berlin, for example, researchers found a 60 percent reduction in accidents involving injuries that had occurred on streets where the traffic-restraint program had been implemented. Research also confirmed a reduction in the level of noise caused by automobile traffic: comparison studies of thirteen streets showed an average decline of 3 to 5 dcb and a maximum decline of 9 dcb on streets under the *Verkehrsberuhigung* program. Finally, a 10 percent reduction in automobile speeds was measured on redesigned streets, as compared with 5 percent on streets where only speed signs were posted (Keller 1985).

GUIDELINES FOR DESIGN

Not all residential streets are the same. Some serve high-density inner-city neighborhoods, others suburban or rural districts. Many streets in older cities were laid out prior to the invention of the automobile and are often narrow and congested. Others were installed after the automobile became the dominant mode of transportation and are frequently too wide in relation both to the densities they serve and to appropriate traffic speeds. Furthermore, in each setting, individual streets can have different traffic volumes, ranging from those with only an occasional car to collector streets and traffic arteries.

Street design needs to respond both to traffic volumes and to the character of the neighborhood. All designs, however, should be guided by a common objective, namely, a balance of power between nonmotorized and motorized users, which is essential in making residential streets truly public places.

Figures 27-1 through 27-3 illustrate the redesign of six residential streets that have been selected in three different contexts: a pre-automobile city street laid out before the turn of the century in San Francisco; one developed in the first quarter of this century in the "streetcar suburb" of Berkeley; and, finally, a street in a 1950 "automobile suburb." Redesign for each of these streets considers both low and high traffic volumes. All figures are drawn to the same scale.

PRE-AUTOMOBILE CITY

Because residents of high-density inner-city neighborhoods frequently have little access to private open space, streets in those areas can be shared equally by cars and pedestrians (fig. 27-1*a*). Ideally, the street would have to serve a dual set of corresponding needs: playing, relaxing, and socializing, as well as driving, parking, and delivering goods and services. To that end, a raised intersection or an adapted Dutch *Woonerf* is an appropriate design solution by which car drivers would enter a street space whose design, paving, and alignment would all signal the need for greater caution.

Naturally, all design changes would take into account access for emergency vehicles and garbage trucks, as well as for delivery vans to stores, restaurants, and other commercially used properties. In general, designs need to allow for the turning radius of fire engines, and pavings would have to be designed to bear the weight of garbage trucks. However, it can be a serious design limitation if these dimensions are taken too much for granted. Small emergency equipment is available. Communities in hilly areas with steep and winding roads have always had a need for small fire trucks. If many streets in inner-city neighborhoods are converted, fire and public works departments can acquire more suitable equipment.

It is far easier to improve the livability of streets with low rather than high traffic volumes. Figure 27-1*b* illustrates a situation where residents typically would be concerned about the continuous noise, visual presence, and perceived and real dangers of the many cars moving by. The concerns of elderly and disabled persons would be especially acute. Indeed, higher percentages of less-mobile population groups live on heavily trafficked streets than on streets with low traffic volumes in the same neighborhood (Appleyard 1981). The livability of residential streets, however, should be enhanced for all users, and several measures would go far in achieving that objective.

First, moving lanes could be narrowed to a maximum width of 11 feet, or even, in some cases, 9 or 10 feet. Traffic flow and noise levels could be reduced further if intercity truck traffic were routed onto nonresidential streets and if delivery by trucks were permitted only at restricted hours.

Widened sidewalks and tall trees (whose heights were selected proportionally to street widths) would offset some of the negative effects of remaining traffic. Generous sidewalks could accommodate separate bicycle lanes, low light fixtures, and bus shelters. Trees would screen the street from the view of residents, who would otherwise gaze from their windows onto a vista of cars and asphalt.

Finally, where space permits, a double row of trees could be planted at intersections. By suggesting a narrowed street space, this measure would not only induce drivers to slow down at intersections, but would deemphasize the traffic-oriented function of the street as a long channel of movement.

STREETCAR SUBURB

Streets like those illustrated in figure 27-2 were laid out at a time when the automobile was still a novelty. Nevertheless, neighborhoods in this category were designed to accommodate the car; many homes have driveways, with separate garage structures frequently in the rear of the property.

On streets with light traffic (fig. 27-2*a*), the introduction of speed bumps would impel the occasional car to slow down to a pace suitable for the welfare of playing children. The speed bumps could be designed as protected crossings and sitting areas—thereby making them more apparent to the driver—and constructed of brick and concrete, with short ramps striped for even better visibility. An inexpensive street bump could be made from a roll of asphalt up to 12 feet long and no more than 4 inches at its highest point. These dimensions would ensure, ideally, that the bump would not span the street, thus leaving enough room for bicycles to pass between it and the curb. They would also allow for water runoff without changing the curb drains.

Because many residents of such neighborhoods can rely on public transit to commute to nearby inner cities, public transportation should be a primary focus of new design on streets with high traffic flows (fig. 27-2*b*). Bus stops need to be sheltered and should have convenient and safe crossing in their vicinity. If blocks are long, additional crossings that are clearly marked through striping or pavement changes might be required at midblock locations. Clusters of tall trees would signal from a distance the narrowing of the street at the crosswalk. On intersections without traffic signals, bus stops should be located *across* the intersection so that pedestrians who are crossing the street will be visible to oncoming traffic.

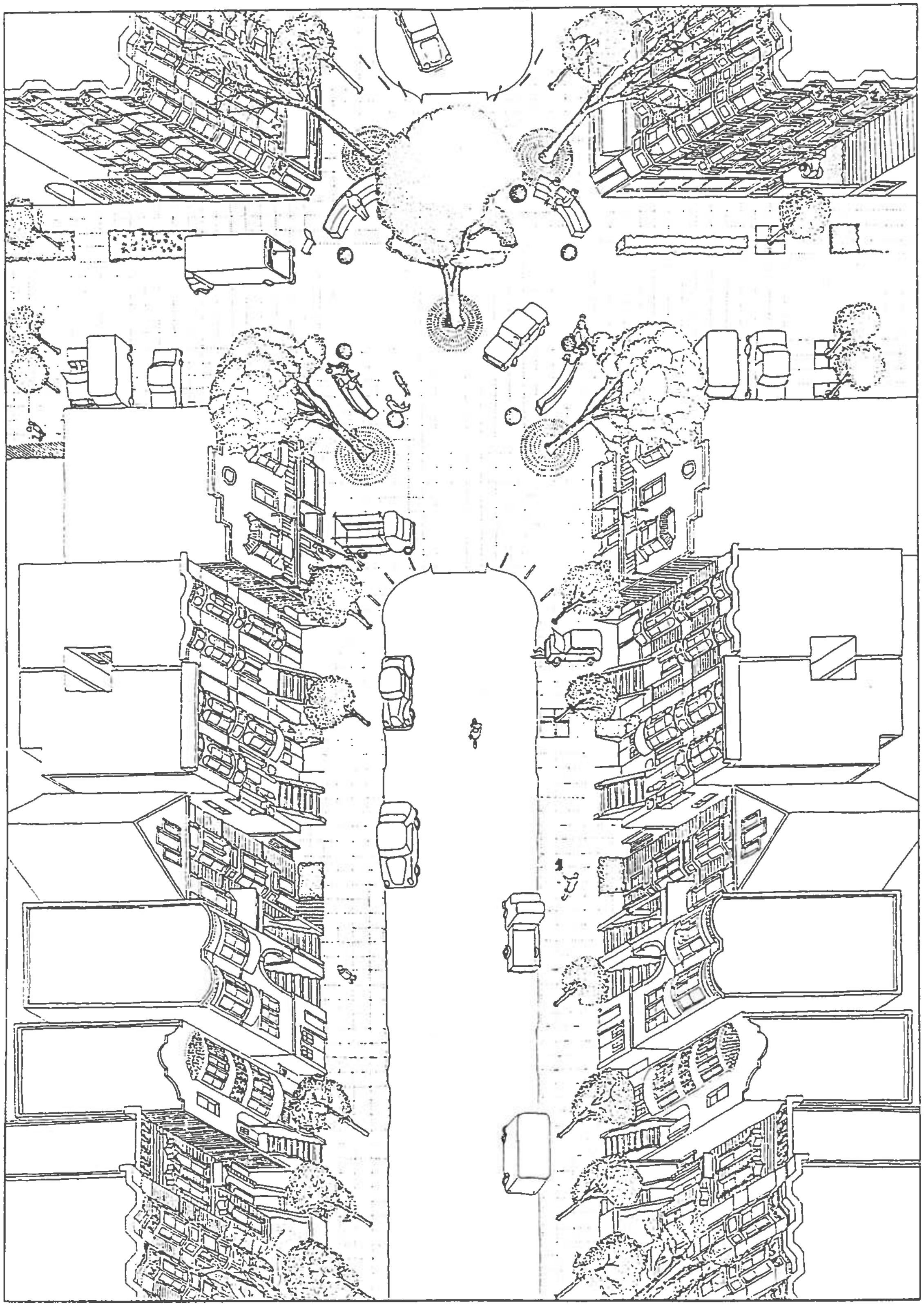
If space permits, cycle trails should be provided at the sidewalk level. However, space must be sufficient to ensure, on the one hand, that trails are located well apart from pedestrian walkways, and, on the other, that cyclists avoid colliding with opening car doors. Cross traffic at intersections should be slowed to allow cyclists better continuity and speed. This could be achieved by "necking down" intersections: not only would the distance for pedestrian and bicycle crossings be minimized, but an area could be created for bus shelters or sitting.

1950 AUTOMOBILE SUBURB

Neighborhoods that were laid out at a time when planners sought above all to accommodate the automobile are characterized by wide streets offering extensive visibility. Both features encourage fast driving.

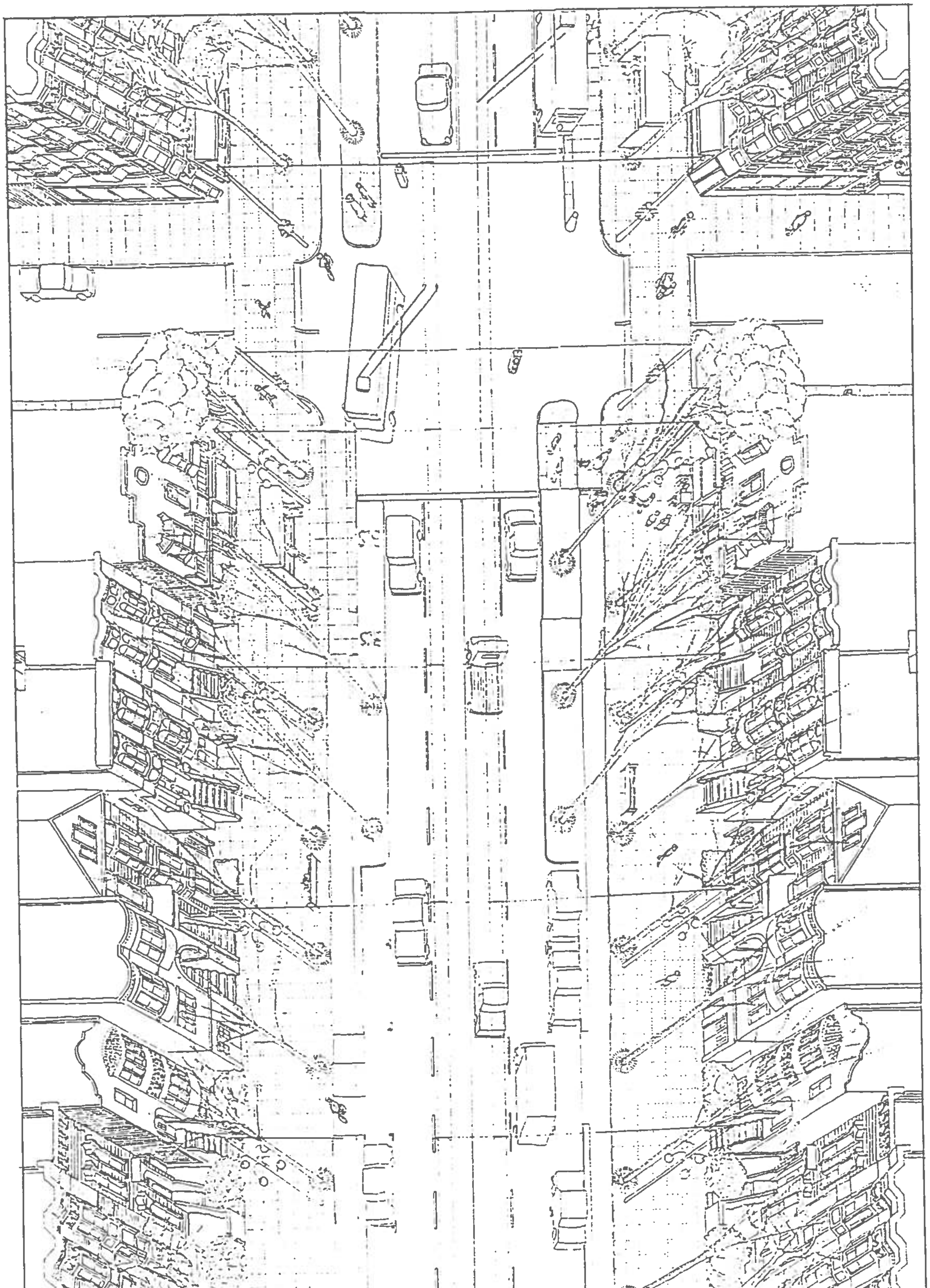
In figure 27-3*a*, a street that was typically 38 feet wide, that is, equivalent to the combined widths of six average cars, has been narrowed to 16 feet at the intersections. Abrupt rather than gradually curved corners discourage fast turns, and a single large tree causes changes of direction to appear more sudden than they actually are. Trees also form a gateway that enhances the street's character and identity. Chokers formed by the trees could be designed for midblock locations, dividing long streets into indentifiable segments of 200 feet or so. They could also provide a place where children could play yet be visible to drivers entering the street.

If the automobile was a key influence in the design of suburban streets, it continues to be the essential form of transportation for current residents. Low population densities result in the absence, or, at best, infrequent service, of public transit. Yet a second generation of suburban residents is taking over the homes from the first, and as their needs change, so change the issues regarding transit and other public amenities. For instance, today's young working couples require services such as child care and markets that are



a.

27-1. Redesign of an inner-city street in a preautomobile neighborhood should a. effectuate cautious driving where pedestrians and automobiles share the street space—even on streets with low traffic volumes, and b. include measures that mitigate heavy traffic flow.



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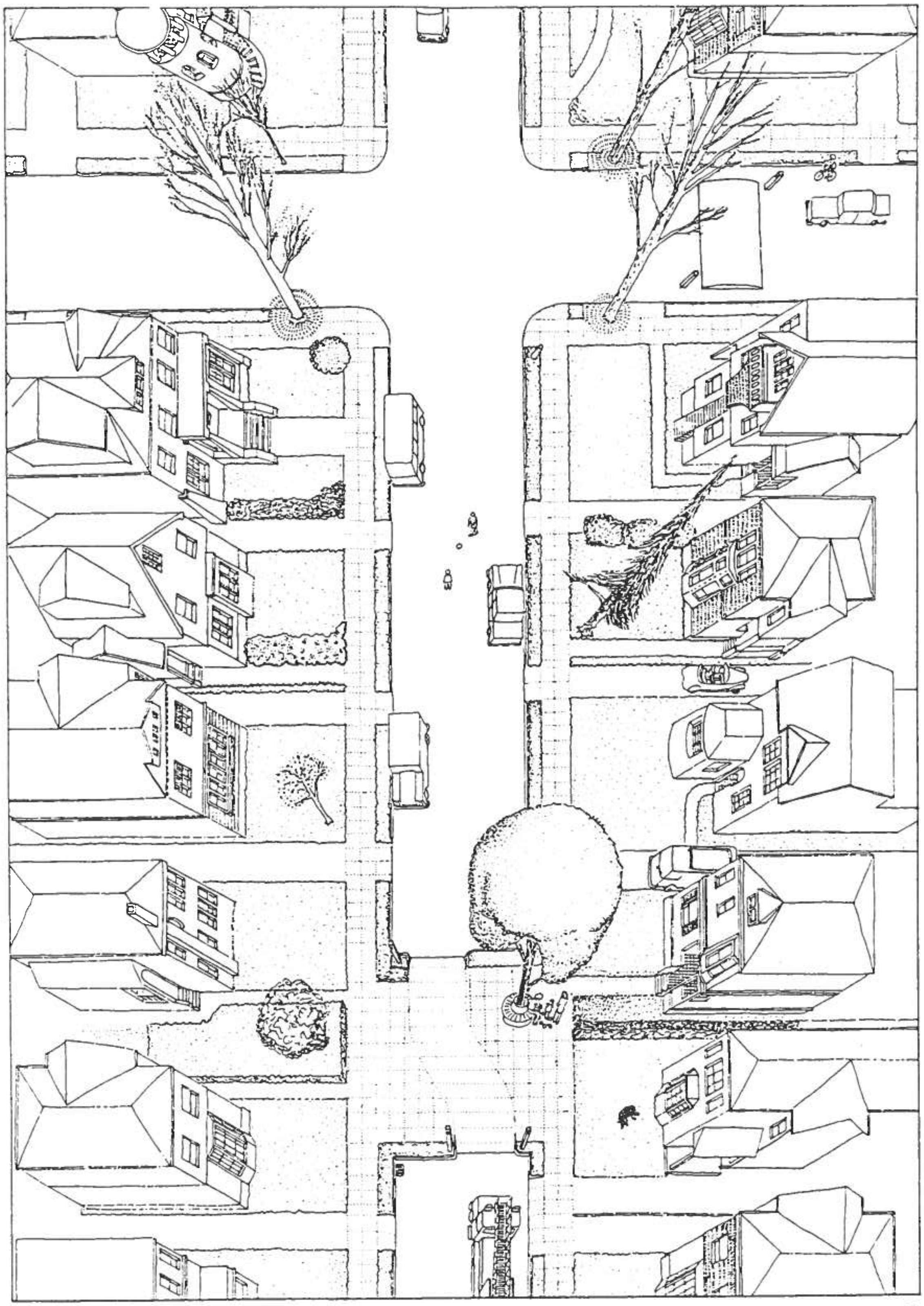
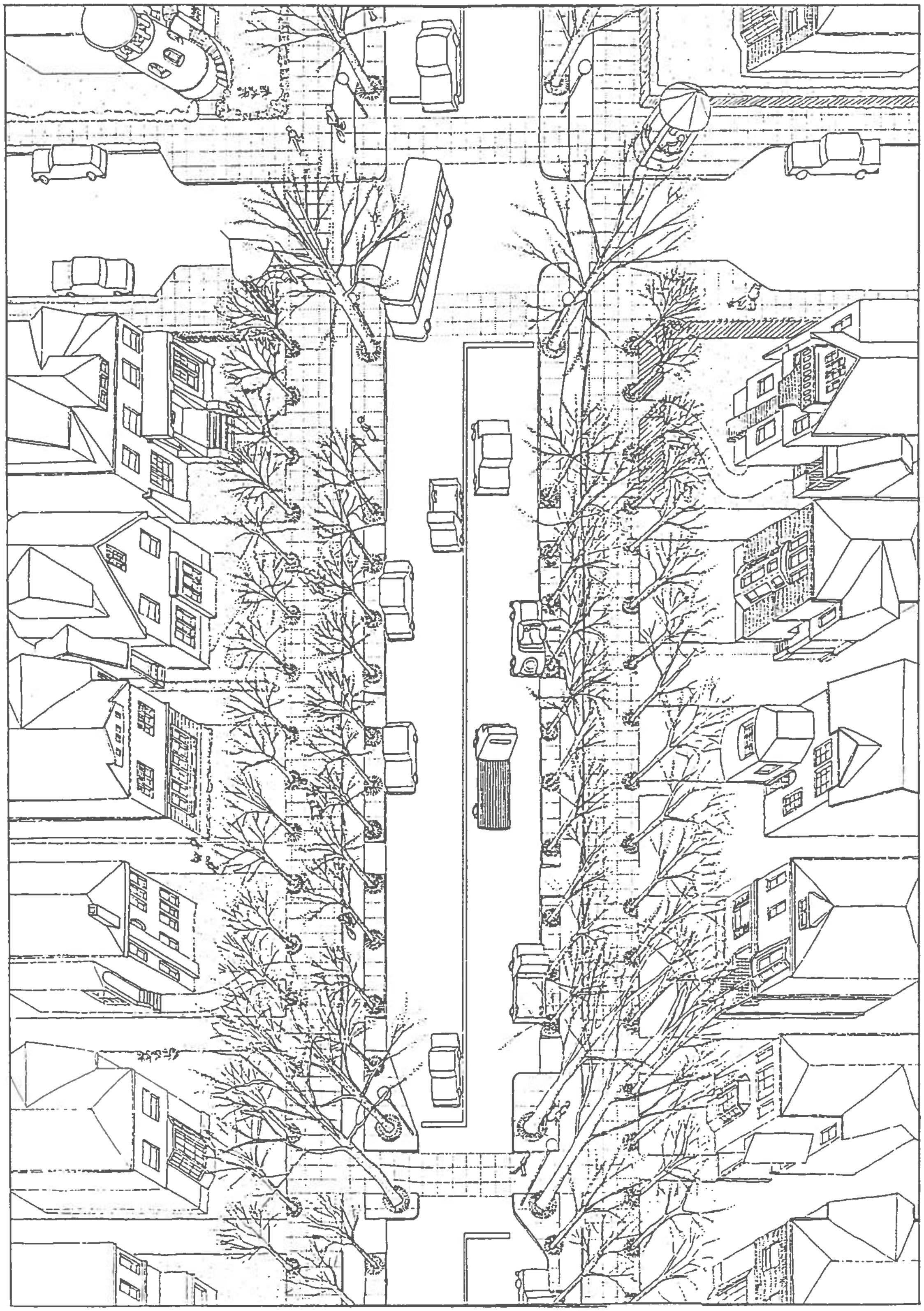


a.

27-2. Streetcar suburbs with a. lightly trafficked, and b. heavily trafficked streets would benefit from attractively designed speed bumps that could also serve as pedestrian rest areas, and from amenities, such as bus shelters, that would enhance residents' use of public transit.



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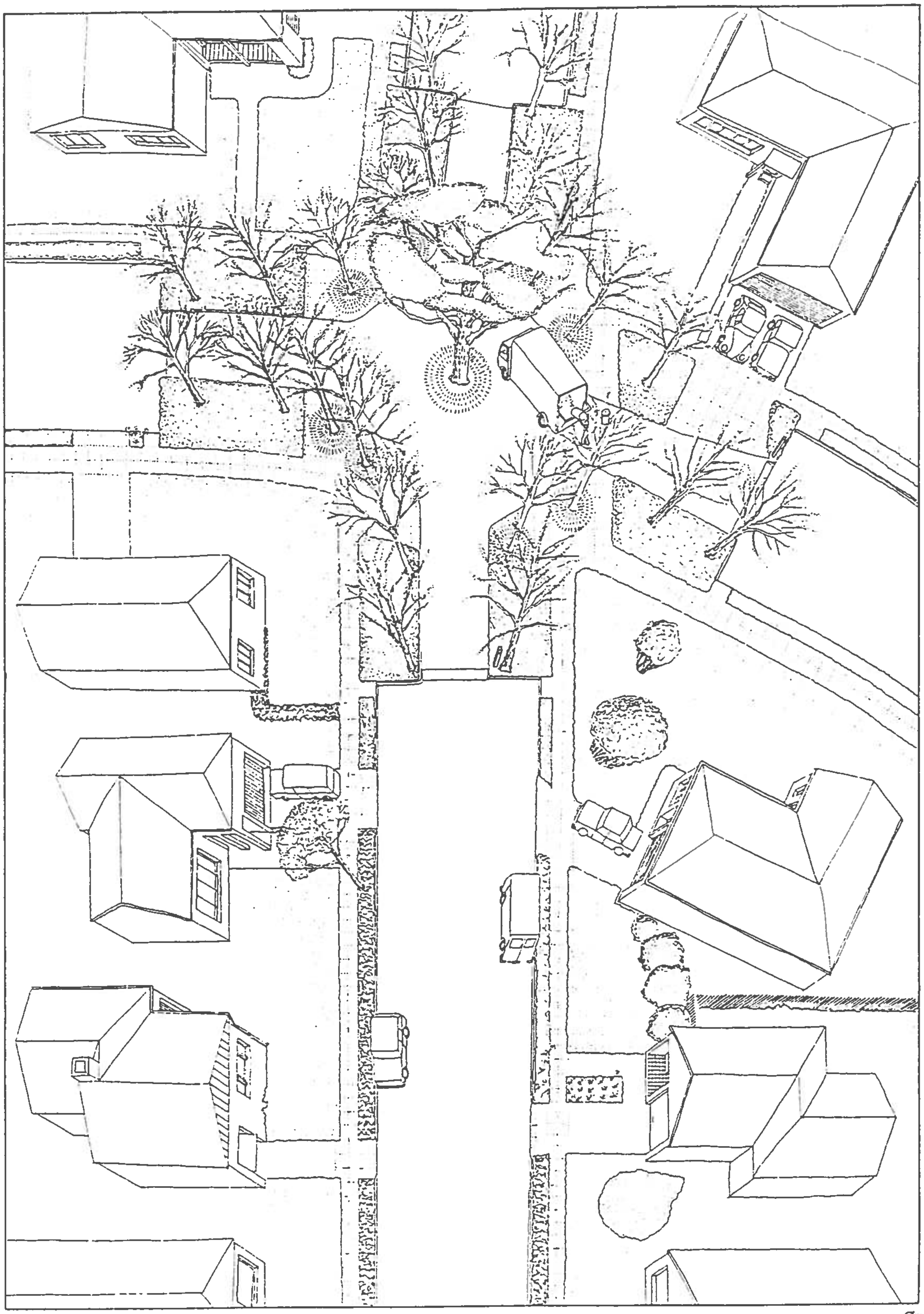
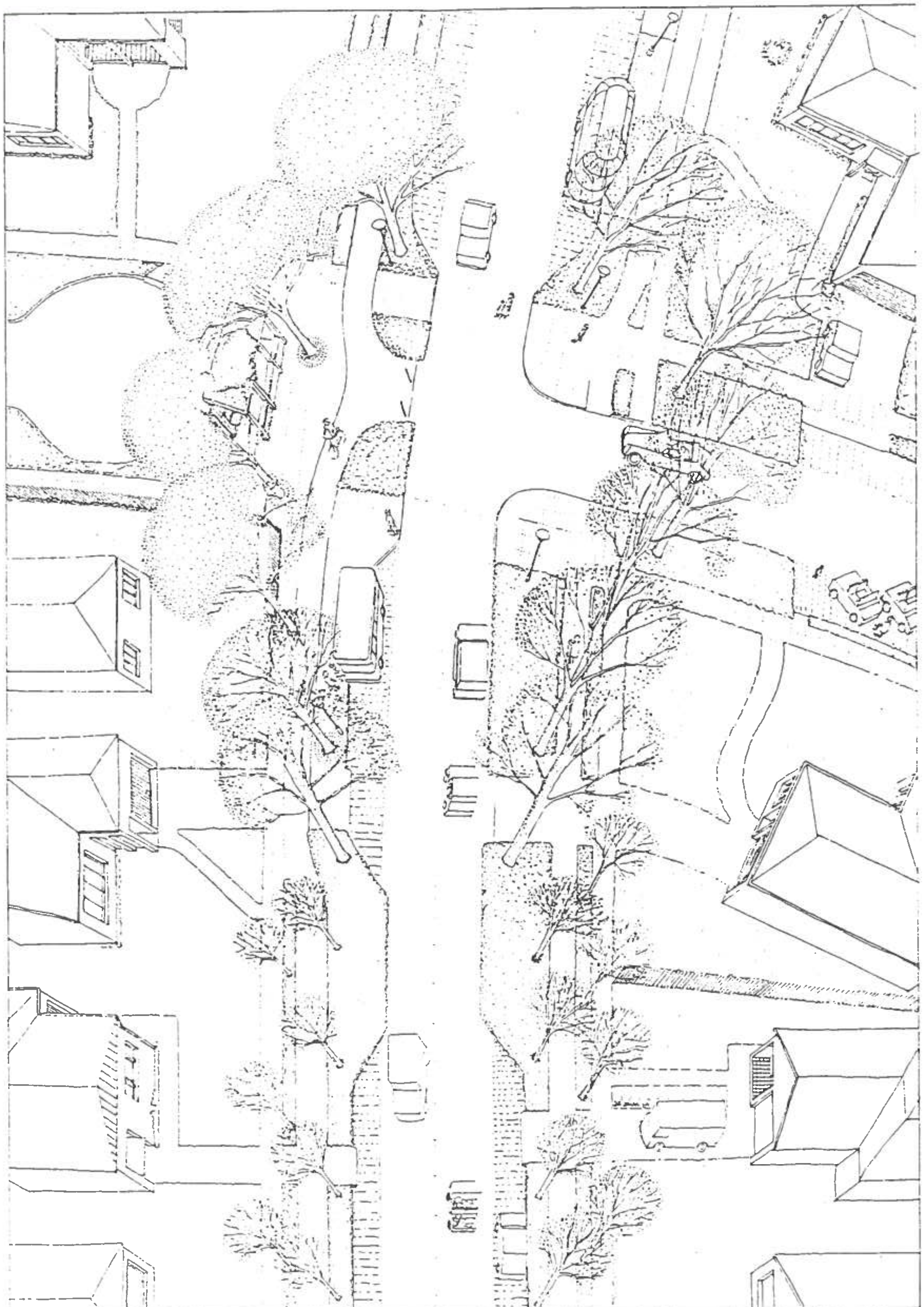


27-3. Streets laid out in the 1950 automobile suburb were designed foremost as speedy and efficient channels for car traffic. The strategic placement of trees on a. a street with low traffic volumes, and b. the same street redesigned for high volumes, can enhance the aesthetic and recreational character of the street, while improving its safety.



b.

close to home. Population densities continue to dwindle as families have fewer children and people marry later in life. Whereas fifteen to twenty people would have lived on an acre of land in 1960, today, the same acre would house no more than twelve people. Even so, the number of cars has increased, as more women have joined the work force and as an increasing number of unrelated adults are sharing homes. In California, ordinances that allow a second unit on single-family properties in many communities will further increase the number of car trips made in and out of these neighborhoods each day. And the trend will continue unless other means of transportation become feasible, such as neighborhood bus or van services to central transfer points located on public transit routes. Also, one can encourage bicycle travel to transit stops and markets by providing safe and interesting cycle trails and secure storage places at destinations.

In all of the changes shown in these figures, public participation is essential for a successful street improvement plan and design. Local traffic schemes arouse powerful emotions and have widespread impact. Politically, neighborhood traffic management and street improvements are controversial because some people inevitably gain while others lose. A participation process that involves the public allows for assessment and exposure of potential tradeoffs before implementation. Communication with potential opposition raises the possibility of working out compromises during the planning stage. And if adverse effects are not publicized in advance, their very existence may be used to discredit the planning process. People are also far more likely to accept a plan or take responsibility for making it successful if they have participated in its development.

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