

Reconsidering the Cul-de-Sac

*There are good reasons that the
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building block of suburban
residential development.*

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FOR MORE THAN five decades developers, homebuyers, and traffic engineers have favored cul-de-sacs (“lollipops”) and looped streets (“loops”), making these the basic building blocks of suburban residential development. Despite their popularity, loops and lollipops have recently been criticized by some architects and planners, particularly New Urbanists, who strongly advocate the interconnected grid pattern instead (Figure 1). According to these critics, cul-de-sacs embody all the problems of suburbia: an isolated, insular enclave, set in a formless sprawl of similar

enclaves, separated socially and physically from the larger world, and dependent upon the automobile for its survival. However, despite these criticisms, there are several compelling reasons for the success of the cul-de-sac street as a pattern for neighborhood space.

THE CUL-DE-SAC

Cul-de-sac, which means “bottom of the sack” in French, commonly refers to a dead-end street. The *Oxford English Dictionary* defines it as “a street, lane, or passage closed at one end, a blind alley; a place having no outlet except by the entrance.” Since its early use in 1928 as part of the hierarchical circulation system in the pioneering development of Radburn, New Jersey, the cul-de-sac has been the preferred means for controlling through-traffic in new residential neigh-

borhoods. Radburn was intended to be a prototype for other subdivisions. Geddes Smith, in Clarence Stein’s 1929 book, *Toward New Towns for America*, described Radburn as: “A town built to live in—today and tomorrow. A town ‘for the motor age.’ A town turned outside-in—without any back doors. A town where roads and parks fit together like the fingers of your right and left hands. A town in which children need never dodge motor-trucks on their way to school.”

The first generation of suburban cul-de-sacs based on Radburn were short, straight streets serving few houses. These dead-end streets were intended to provide a public realm for the residents while allowing safe, slow car movement to and from the home. Today, with increased auto ownership, the cul-de-sac has grown wider and much longer, serving more houses. A circular space (often more than one hundred feet in diameter) terminates it, large

enough for service and emergency vehicles to turn around. Because cul-de-sacs offer greater privacy, quiet, and higher property values, as many houses as possible in the subdivision are situated on cul-de-sacs and as few as possible are placed on the busier and noisier collector streets.

The loop street, a close cousin of the cul-de-sac, similarly discourages through-traffic, since it leads only to the houses that line it. The loop street has two access points and is usually longer than the cul-de-sac. Loops and cul-de-sacs are often used together in the same development.

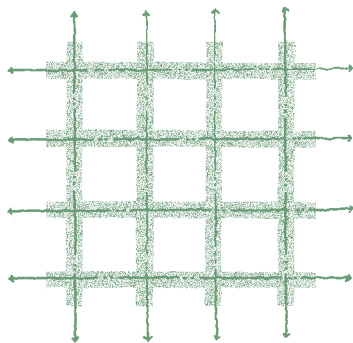
The cul-de-sac pattern has been strongly encouraged by standards for traffic engineering and local subdivision. An early engineering study on residential street safety, carried out in Los Angeles between 1951 and 1956, found that the distribution of accidents was substantially higher in grid-based subdivisions than in subdivisions with cul-de-sacs. Accordingly, the Institute of Transportation Engineers recommended hierarchical, discontinuous street systems for residential neighborhoods, and established engineering standards that encouraged cul-de-sacs. The standards also promoted limited access to perimeter highways, discontinuous local streets to discourage through-traffic, curvilinear design patterns, short streets, elbow turns, T-intersections, and a clear distinction between low-speed access streets and higher-speed neighborhood collectors.

PROS AND CONS

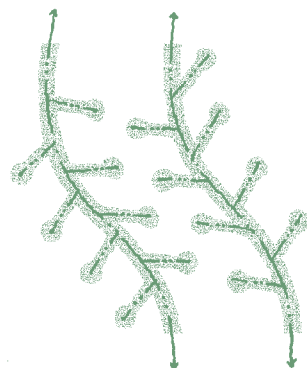
Critics object to the cul-de-sac pattern on several grounds. It lacks the interconnect- edness of the grid. On leaving a cul-de-sac or a loop street, to go anywhere drivers are obliged to follow a collector street. Route choices are minimal, so drivers are stuck using the same path day after day. Also, since so much of the street infrastructure is devoted to semiprivate dead-end streets, a heavy load of connecting and through- traffic is forced onto a relatively small collector and arterial system, contributing to congestion during peak periods of travel.

For the pedestrian, walks can be long and boring, with inefficient connections to nearby destinations. It is easy to lose the sense of being in a neighborhood or town with a civic identity. Main streets and tree-lined corridors that connect places and communicate the character and structure of a community are absent, and what’s left is a string of dead- ends on faceless connectors that lead nowhere. The street pattern is difficult for a visitor to comprehend because there is little apparent structure and no unifying elements or clear describable layout. Moreover, it is usually tiresome in its repetitiveness. Grid developments can suffer from monotony, too, of course, but they are easier to visualize and navigate because they form clear logical patterns.

Figure 1: Street patterns



The traditional grid pattern



The cul-de-sac pattern

However, the cul-de-sac pattern has several important advantages. From the perspective of residents, the model offers quiet, safe streets where children can play, and people can walk, jog, and bike, with little fear of fast-moving traffic. A discontinuous short-street system, unlike the grid, may also promote familiarity and neighborliness. Cul-de-sacs, being disconnected, can adapt better to topography. Since they carry no through-traffic, they often have reduced standards for street widths, sidewalks and curbs. Most important, the cul-de-sac street pattern is supported by the market: homebuyers will pay premium prices for the most isolated cul-de-sac lots. Cul-de-sacs are popular with developers not only because they sell well, but also because infrastructure costs are significantly lower than for the traditional interconnected grid pattern, which can require up to 50 percent more road construction. In Radburn, for example, cul-de-sacs reduced street area and the length of utilities, such as water and sewer lines, by 25 percent as compared to a typical grid street plan. According to Clarence Stein, one of the planners of Radburn, the cost savings on roads and utilities paid for the construction of the extensive open spaces and parks. Such public amenities have added value; home prices in Radburn over the years have been higher than those of the conventional surrounding housing tracts, even

though the Radburn homes and lots are generally smaller.

The cul-de-sac pattern is not limited to low-density suburban development, but can serve medium-density row houses and low-rise apartments. Both Radburn and London's Hampstead Garden Suburb, for example, have relatively high densities by American standards (9.4 and 8 to 12 dwelling units per acre, respectively). Even higher densities can be found in historic neighborhoods such as the residential courts of Boston's Beacon Hill.

In ecologically sensitive sites, the cul-de-sac pattern has distinct value. Unlike the grid pattern, which blankets the site with infrastructure, the cul-de-sac pattern can work around areas of high ecological or historical value. Lawrence Halprin's 1964 plan for the Sea Ranch development on California's North Coast employed a disconnected pattern of "reaches" and "closes" to keep vehicular traffic away from the ocean bluffs and to protect the meadows of the original sheep ranch. The site design for Village Homes in Davis, California, uses a cul-de-sac pattern to protect a natural drainage system that serves as a community green space and pedestrian/bicycle connector (Figure 2). A more recent plan for Mayo Woodlands in Rochester, Minnesota, uses a similar pattern to preserve the meadows and woodlands of the former Mayo estate while allowing residential development.

Figure 2: Plan—Village Homes, Davis, California



Analysis of automobile accident data indicates that cul-de-sac and loop patterns are safer than other kinds of streets. Furthermore, hierarchical, discontinuous street systems have lower burglary rates than easily traveled street layouts; criminals will avoid street patterns where they might get trapped. For these reasons, cul-de-sac patterns have sometimes been retrofitted. For example, the troubled Five Oaks district in Dayton, Ohio, was restructured to create several small neighborhoods by con-

verting many local streets into cul-de-sacs by means of barriers. Within a short time, traffic declined 67 percent and traffic accidents fell 40 percent. Overall crime decreased 26 percent, and violent crime fell 50 percent. At the same time, home sales and values increased.

A comparative study of street patterns indicated significant homebuyer preference for cul-de-sacs and loops. Nine California neighborhoods were examined in terms of safety performance and resi-

dents' perception of their street's livability. The neighborhoods represented three different street layouts—grids, loops, and cul-de-sacs—but were matched demographically. The findings suggested that cul-de-sac streets, and especially the lots at the end, performed better than grid or loop patterns in terms of traffic safety, privacy, and safety for play. Residents also preferred the cul-de-sac as a place to live, even if they actually lived on a through- or loop street. People said they felt cul-de-sac streets were safer and quieter because there was no through-traffic and what traffic there was moved slowly. They also indicated that they were more likely to know their neighbors. One resident's comment was typical: "Our pets and kids are safer when there is a no-outlet street; you feel kidnapping is less likely—there is more of a sense of neighborhood." Thus, the study generally corroborated earlier transportation research on the values of a hierarchical discontinuous street pattern. It also supported claims that cul-de-sacs are more frequently and more safely used by children.

However, the surveyed residents often stated that neighborhoods composed solely of cul-de-sacs were confusing and lacked a coherent structure and uniqueness. Social interaction and neighborhood sense were not necessarily stronger on the cul-de-sacs, despite perceptions to the contrary. At the neighborhood scale, problems associated with cul-de-sacs may stem more

from land-use patterns than from the street pattern itself. The single-use zoning of most cul-de-sac neighborhoods puts schools, jobs, and recreation and commercial centers at a distance from homes. Separation is further exacerbated by the lack of a well-connected pedestrian/bicycle network. Only rarely is there an interconnected pedestrian pathway system linking cul-de-sacs with adjacent streets, open spaces, and other neighborhoods.

CREATIVE CUL-DE-SACS

The cul-de-sac pattern presents a dilemma for the developer seeking the more structured and conceptually clear design offered by the grid. Is it possible to satisfy both sets of criteria—the privacy, safety, quiet, and lower construction costs of cul-de-sacs, as well as the connectedness, identity, and structure of the grid? The cul-de-sac certainly need not be an undefined street terminated by an amorphous blob. The benefits of the cul-de-sac could be achieved with more architecturally defined and ordered patterns. A review of historic urban patterns in Europe, the Middle East, and early American towns reveals a frequent use of such patterns. For example, courts, closes, and quadrangles are found in medieval English, French, and German towns. The residential court is also found in many early American towns, from

Figure 3: Residential court, Beacon Hill, Boston



Philadelphia to Boston (Figure 3). Today such spaces have become high-end real estate, prized for their sense of privacy, their intimate scale, and their charm.

A century ago, Raymond Unwin and Barry Parker consciously emulated such patterns in their designs for Hampstead Garden Suburb in London (Figures 4 and 5). "For residential purposes, particularly since the development of the motor-car, the cul-de-sac roads, far from being undesirable, are especially to be desired for those who like quiet for their dwellings," wrote Unwin. It was the first time a master-planned community systematically used the cul-de-sac and open court throughout. An act of Parliament was required to allow the use of cul-de-sacs in new development, since prior cul-de-sacs

Figure 4: View of cul-de-sac, Hampstead Garden Suburb



were associated with unplanned medieval cities and unhealthful living conditions.

In Hampstead's court and close arrangements, two- to three-story blocks of row houses or apartments border a central green space and are usually accessed by a narrow service road. This arrangement creates a relatively quiet, pedestrian-oriented environment removed from the public street. The cul-de-sacs achieve similar residential neighborhood values. Unlike American postwar cul-de-sacs, those in Hampstead are short and narrow, with no circular turn-around at the end, and with the street space defined by the houses. Mid-block pedestrian walks typically connect the end of the cul-de-sac to another street or cul-de-sac beyond, creating an attractive path network for pedestrians. Roads are designed to discourage through-traffic and vary in both layout and

cross-section design according to function. There are always sidewalks. Trees and shrubs, as well as architectural details such as walls, fences, and gates, make each street memorable for pedestrians.

Hampstead Garden Suburb influenced subdivision street design in Britain and North America. The layout of Radburn is one example (Figure 6). Houses are clustered around automobile-accessible cul-de-sacs. The pedestrian path system expands into greenways and parks, with paths connecting each home, as well as the school. Pedestrians can go almost anywhere with minimal interference from the automobile. Although the open spaces of Radburn are rather lavish, the same values could be achieved with much less open space if builders focused primarily on the pedestrian pathway system.

Figure 5: Plans of closes and cul-de-sacs, Hampstead Garden Suburb

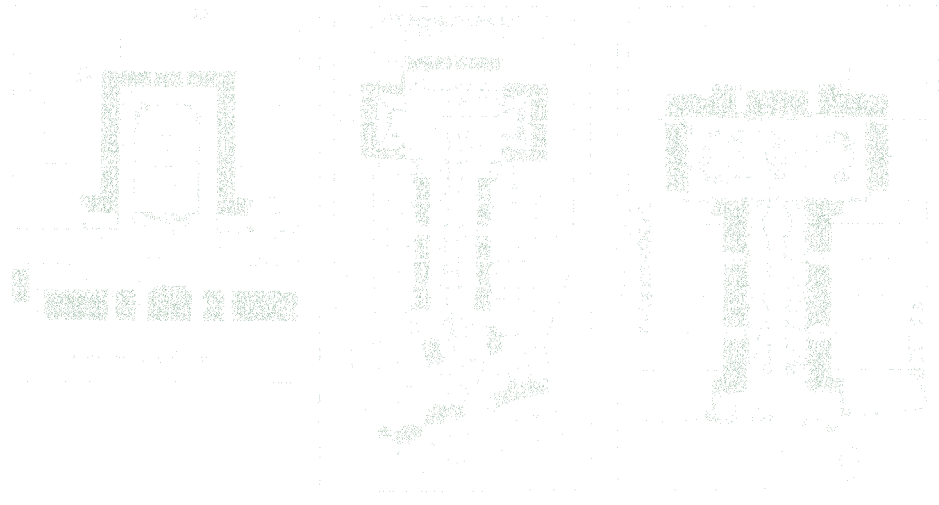
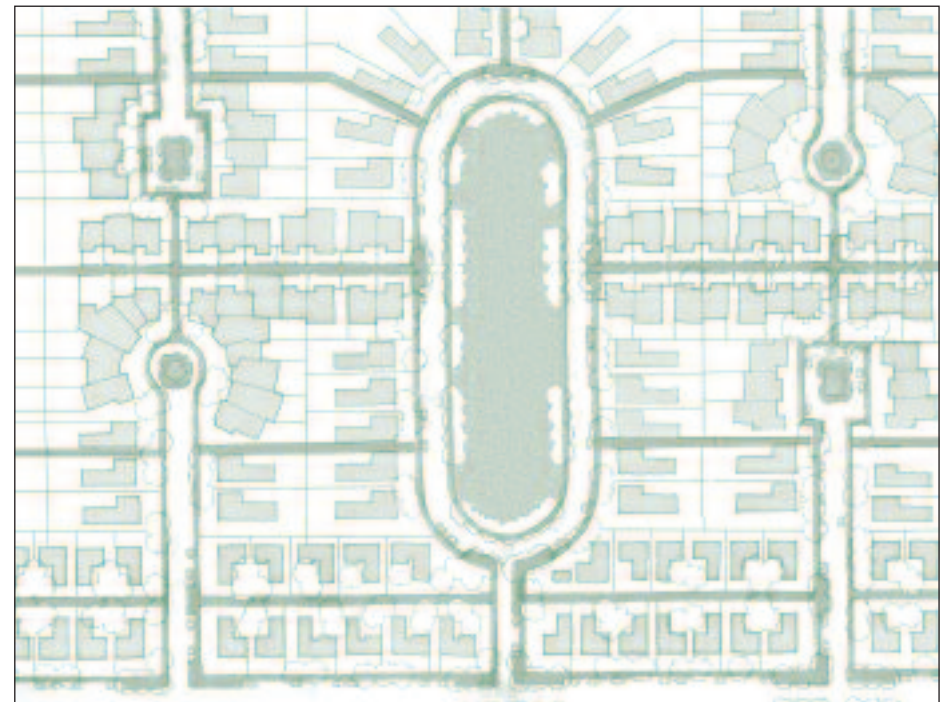


Figure 6: Cul-de-sac plan, Radburn



An ideal suburban residential environment might be based on similar components (Figure 7). The courts and closes, each a defined space with its own special character and limited automobile access, are situated within an overall structure of treed boulevards and public spaces that create a sense of community. Automobile movement is limited to collector and arterial streets, but pedestrians and bicyclists can take advantage of the easy interconnectedness of a classic grid. The pedestrian network parallels the vehicular routes, but also connects cul-de-sacs and loops with each other, as well as with destinations

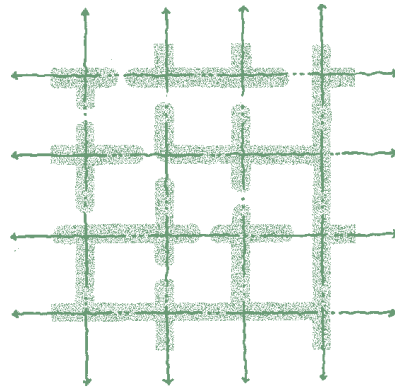
Figure 7: Neighborhood design with connected cul-de-sacs



such as parks, schools, and shops. A hammerhead, or formal square configuration, eliminates irregularly shaped lots and creates a well-defined relationship between buildings, street, and the open space at the end of the street.

Today there is much interest in traffic-calming, and many communities are taking steps to make streets more pedestrian- and bicycle-friendly. Some traditional neighborhoods based on the grid pattern found in most older American towns and cities built before the 1920s are being retrofitted to achieve some of the values of the cul-de-sac. These neighborhoods possess the connectedness, structure, walkability, and accessible land use patterns that many planners seek today in new residential developments (Figure 8). However, they often suffer

Figure 8: Pedestrian-friendly gridiron



from the noise and hazards that come with excessive traffic on local residential streets. Berkeley, California, is one community that has attempted to deal with the problem. In some neighborhoods, the grid system has been converted into cul-de-sacs and loops by the introduction of bollards, large concrete planters, and planted islands as traffic barriers across

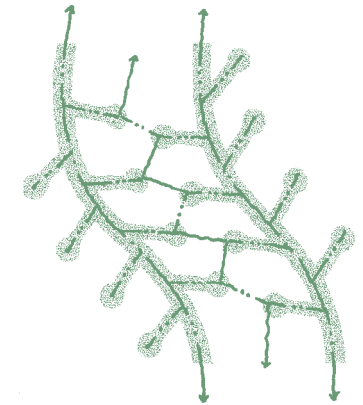
Figure 9: Pedestrian-friendly gridiron—Berkeley barriers



some intersections (Figure 9). The barriers do not interfere with pedestrians and bicyclists, who can continue to use the interconnected grid. Originally an experiment, the Berkeley scheme was strongly advocated by residents of some neighborhoods, although disliked by others because circulation patterns were more confusing and the possibility of cut-through traffic was eliminated. Nevertheless, support was broad enough to make it a permanent program.

Retrofitting an existing suburban cul-de-sac development to provide pedestrian connectedness is more difficult. New pathways would have to be designed to interconnect cul-de-sacs, but in most cases they would have to be built on private rights-of-way along lot lines (Figures 10 and 11).

Figure 10: Pedestrian-connected cul-de-sacs



To acquire such easements would probably be difficult, since residents are unlikely to give up a portion of their land and privacy. Moreover, most suburban developments of this type are single-use subdivisions so there is very little to connect besides houses.

Figure 11: Pedestrian-connected cul-de-sacs—Blacksburg, Virginia



To create walkable suburbs it is necessary to challenge the established street design standards and regulations that have emphasized vehicular access at the expense of pedestrian connectedness and community form. Traffic engineers and public officials need to review existing standards and establish new frameworks that support the pedestrian and bicyclist while taming and confining the automobile. However, rather than tossing out the cul-de-sac as an urban pattern, it is worth reconsidering its values and possibilities in creative ways. It has a long history of use in a variety of geographic and cultural contexts, and could provide options that offer safe and quiet streets as well as pedestrian and bicycle access in a new spatial framework that avoids the problems of the open grid.

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