PA 8202 Week 8 Policy Brief
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The Grid Versus the Cul-de-Sac: Implications for Neighborhood and Local Travel Patterns

Neighborhood and urban landscape design in the post-war era has increasingly centered around the automobile through the government-subsidized construction of highways and the movement of homes and employment into suburban areas. While the automobile provides independence, speed, and the ability to travel greater distances than other modes of travel, its negative side effects are beginning to rise in relation to its benefits. Increased levels of pollution and congestion along with reductions in the use of other modes of travel are no longer problems confined to urban areas. From work commutes to shopping trips, suburban dwellers are relying on the automobile to satisfy their travel needs.

As a result of increased automobile reliance in suburban neighborhoods, planners and architects are reverting to pre-war era neighborhood designs to promote other means of travel. Neo-traditional neighborhood designs and local connectivity policies embrace traditional grid street patterns and promote pedestrian travel as opposed to conventional curvilinear street patterns that promote automobile use. Part I of this paper provides background information related to neo-traditional neighborhood design and discusses the problems it seeks to address, particularly the implications for efficiency, equity, the environment, and individual experience. In addition, Part II of this paper reviews the literature on local connectivity policies and discusses their impact thus far in reducing automobile travel and reconnecting neighborhoods to one another and to other travel destinations.

Part I: Background and Motivation

At the heart of neo-traditional neighborhood design is improving connectivity between neighborhood residents and their travel destinations. Its advocates contend that by improving accessibility among neighborhood subdivisions and between residents and schools, retail centers, and public amenities, automobile use will decline, while use of other modes of travel will increase. To illustrate the concepts of neo-traditional design a distinction between traditional (1920s) and conventional (1950s) design proves informative. Common characteristics of traditional neighborhood design include

connected grid street patterns, narrow residential streets, small lot sizes, and a center district with mixed commercial and office use (Friedman, Gordon and Peers, 63). On the other hand, conventional suburban neighborhood elements include a hierarchical road network, curvilinear and cul-de-sac street patterns, little accessibility between residential and commercial areas, and little transit service (Ibid, 64).

Proponents of neo-traditional neighborhood design cite many benefits to improved local connectivity. These benefits are discussed in turn highlighting implications for efficiency, equity, the environment, and individual experience.

- Efficiency: The efficiency of neo-traditional design lies in its ability to connect residential and commercial areas and in its focus on the pedestrian (Gramenos and Tasker-Brown 2002, 3). The grid street pattern encourages walking and makes it easier to navigate through a neighborhood to one's destination. It is the hope that by improving connectivity among travel destinations fewer car trips will be necessary and if necessary, will likely be shorter reducing overall vehicle miles traveled (VMT).
- Equity: By encouraging modes of travel other than the automobile such as pedestrian and bicycle pathways and transit, reliance on the automobile becomes less necessary. Local connectivity policies and neo-traditional neighborhood designs may make it easier for persons of lower incomes to travel to various destinations without the added expense of an automobile.
- Environment: By discouraging car use and incorporating parks and green spaces into neighborhood design, neo-traditional neighborhoods create a cleaner and safer environment for residents. In addition, incorporating bicycle and pedestrian paths connect subdivisions to one another, creating a greater sense of community than conventional design patterns that are more segregated.
- Experience: Individual experiences become more pleasant as neo-traditional neighborhood design elements are incorporated into residential areas. Increasing accessibility to travel destinations by pedestrian and bicycle path eliminates the hassle of having to drive one's car. In addition, less car traffic makes neighborhoods safer and quieter and allows residents to enjoy green space and parks without the noise of automobile traffic.

Part II: Review of the Literature and Data Analysis

Several studies have been conducted to determine the effectiveness of connectivity policies and neo-traditional neighborhood design in meeting its goals. However, because neo-traditional neighborhoods are relatively new, little data exists to draw firm conclusions. Data collection will improve over time as the implications of this design become clearer. Several studies have attempted preliminary analyses and at this point the results are somewhat mixed and inconclusive.

Cervero and Gorham (1995) analyzed the impact of commuting by transit by comparing "transit" neighborhoods to "automobile" neighborhoods in the San Francisco Bay Area and Los Angeles-Orange County. Transit neighborhoods are those that resemble the traditional and neo-traditional designs (gridded streets) and were once served by a streetcar. Automobile neighborhoods, on the other hand, are post-World War II suburbs designed primarily for automobile use, consisting of poor transit layout design and random street patterns (213). In each city, a transit and automobile neighborhood were matched (seven in San Francisco and six in Los Angeles) that had similar demographic and topographic characteristics, but differed in terms of neighborhood design. Results of the study were mixed. In San Francisco, pedestrian/bicycle and transit mode shares were all higher in transit than in automobile neighborhoods, and in addition had lower single occupancy vehicle rates (217). In Los Angeles, however, the results were less clear-cut. While transit neighborhoods had higher walking and lower solo-commute rates, two transit neighborhoods had lower transit modal commute shares and transit trip generation rates than their matched automobile counterparts (220). Cervero and Gorham conclude the differences between San Francisco and Los Angeles could be the result of the Los Angeles region being more spread out and oriented to automobile use (221). They state that, "… the form of the macro-region may be too auto-dependent for the micro-pattern of any particular neighborhood to matter. Islands of neotraditional development in a sea of freeway-oriented suburbs will do little to change fundamental commuting habits" (222). Cervero and Gorham do suggest that while neo-traditional neighborhood design may not impact commuting trips, it may have a bigger impact on non-work, within neighborhood trips. For a region like the Twin Cities with many sprawling suburbs surrounded by freeways, this study suggests that auto-commute trips

are unlikely to change as a result of traditional neighborhood design. Within neighborhood trips, however, may see a larger impact.

"The idea that auto travel will decrease with more compact land-use has proven so appealing that almost all discussions of the new designs report it as though it were a proven fact" (Randall Crane 1998, 2). Crane examines the fundamental premise of local connectivity and neo-traditional neighborhood design policies—its ability to curb automobile use and VMT. Crane agrees that traditional grid street patterns likely shorten trip lengths by bringing trip origins and destinations closer together (4). However, Crane points out shorter trips, because they cost less, may result in greater trip frequencies and therefore actually increase overall VMT. The cost, therefore, of one mode of travel relative to another is important in determining travel behavior. Genevieve Giuliano (1995) also considers cost an important factor in determining travel behavior. She points out that at the turn-of-the-century commuters were investing 20 percent of their daily wages on travel, while auto commuters today spend only seven percent (5). Because of its low cost, automobile travel receives political backing as well, something neo-traditional designs will need in order to gain credibility and sustainability.

Individual behavior and preferences are also important factors in trip decision-making processes. Crane points out that most people living in suburban areas are self-selected; in other words, choice of residency in part reflects one's travel preferences. Giuliano agrees. "Transportation is of declining importance in the locational decisions of households and firms" (9). For example, people who live in bicycle and pedestrian friendly neighborhoods do so because they value such amenities. Following this logic, those who live in conventional suburban neighborhoods may value automobile travel or may value other amenities suburban neighborhoods offer over their transportation options. Crane concludes that grid street designs are likely to increase the frequency of car trips, may either increase or decrease overall VMT, and may increase or decrease the likelihood of walking rather than driving (6). In other research with Richard Crepeau a regression analysis found "no evidence that the neighborhood street pattern affects either car-trip generation or mode choice" (7). Finally, similar research conducted by Luscher (1995) assumes that the impact of gridded street patterns in reducing congestion is likely negligible (60). It seems as though most people are making trips outside of the vicinity of their neighborhoods and street patterns are unlikely to change this.

While some of the literature indicates that neo-traditional neighborhood design and connectivity policies do little to reduce car travel and traffic congestion, other studies have indicated that such designs are likely to improve neighborhood safety and increase pedestrian/bicycle trips. Randall and Baetz (2001) use levels of pedestrian connectivity*, or how accessible a neighborhood is to its residents with respect to walking, and ArcView GIS to simulate how more direct pedestrian routes (as opposed to curvilinear ones) significantly improve the walkability of a neighborhood in Ontario, Canada. An addition of just 1.1 km of pedestrian paths to the neighborhood network resulted in acceptable pedestrian connectivity conditions for nearly 87 percent of total residents (14). Randall and Baetz conclude that this is a good method for also reducing automobile use.

Finally, the Local Government Commission Center for Livable Communities in Sacramento, California show that traditional residential streets, because they are narrower and have shorter blocks, also have less traffic volume. By contrast, conventional streets are wider, encouraging higher speeds making them less safe for pedestrians. Also, because houses are set back from the street and sidewalks are attached to the curb, pedestrians do not feel safe walking on them. Neo-traditional designs and connectivity policies, therefore, seem to encourage walking by reducing automobile through-traffic.

On a scale of one to four, with one being high, local connectivity policies and neo-traditional neighborhood design warrant a score of three in their ability to meet efficiency, equity, environmental, and individual experience goals. These policies have been successful in creating neighborhoods with narrower streets, less car traffic and environmental benefits such as additional green space and less car pollution. In addition, such neighborhood designs are safer due to fewer and slower automobiles, and are successful in creating a greater sense of community by connecting residents to one another and to other travel destinations. But while grid street patterns improve connectivity between subdivisions and neighborhood destinations, and may increase pedestrian/bicycle activity within neighborhoods, there is little evidence to date of their ability to reduce automobile use and traffic congestion. This is particularly likely in areas such as the Twin Cities that have little transit availability and extensive freeway systems that encourage automobile use. Regional changes and political backing will likely be

* Pedestrian route directness (PRD) is calculated by dividing the route distance by the geodetic (straight-line) distance. Route distance is the formal route distance around existing sidewalks. The closer the route distance to the geodetic distance, the more direct the path to a given destination.

necessary to affect travel behaviors and individual preferences enough to impact automobile usage, promote trips to nearby locations, and reduce the gridlock plaguing our streets.

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