4.8.4. MODEL STREET CONNECTIVITY STANDARDS ORDINANCE

Street connectivity ordinances are designed to increase the number of street connections in a neighborhood and to improve the directness of routes (Handy 2003, 68). The purpose is to achieve an open street network that provides multiple routes to and from destinations. Such a network is key to supporting walking and bicycling as a convenient, safe, and healthy form of transportation. It also discourages the proliferation of limited access street designs where residential subdivisions have but one or two points of entry and exit, and where commercial developments have access only onto arterial streets with no connections to adjacent properties.

The growing trend in cities enacting connectivity requirements is reflective of several larger trends and forces shaping planning and land development. These trends include the following:

- Acknowledgment that bicycling and walking need to be routinely accommodated as transportation modes in regional and local transportation plans, models, and funding formulas

- Recognition that the traditional street hierarchy of arterial, collector, and local streets has reinforced the problems caused by conventional single-use zoning, including neighborhood isolation and inaccessibility (by all modes, but in particular walking) between origins and destinations.

- Inclusion of traditional town planning principles (i.e., New Urbanism) in the mainstream of community planning and design whether on a communitywide or project-level scale.

- Growing recognition of the relationship between neighborhood design and residents' level of physical activity and rates of overweight and obesity (Dannenberg, Jackson, et al. 2003; Frank, Andresen, & Schmid 2004; Frank, Engleke, and Schmid 2003).

- The desire of residents, local officials, and others to tame the effects of the automobile on communities and to provide alternative transportation modes at the neighborhood, city, and regional levels.

In general, connectivity requirements have the purposes of creating multiple, alternate routes for automobiles and creating more route options for people on foot and on bicycles. Additional requirements can be added to the ordinances to establish pedestrian routes and passageways between land uses that can link isolated subdivisions to each other and create the shortest, safest routes possible between origins and destinations. Almost all communities that have pursued street connectivity also prohibit or greatly limit gated streets or gated communities.

Handy (2003) describes what supporters of connectivity point to as its potential benefits and what those who oppose it see as its potential detriments.

- Perceived benefits:

- Decreased traffic on arterial streets
- Continuous and more direct routes for travel by walking and biking
- Greater emergency vehicle access
- Improved utility connections, easier maintenance, and more efficient trash and recycling pick up

- Perceived detriments:
  - Increased traffic on residential streets
  - Increased infrastructure costs and impervious cover
  - The need for more land for development, thus increasing housing costs and threatening the profitability of housing development

Handy says these potential outcomes have not been adequately studied to fully determine which assertions are most supportable. Furthermore, what research there is on connectivity has generally compared the extremes—the traditional grid with a conventional suburban curvilinear pattern—ignoring the fact that many communities have a hybrid of the two systems. She concludes that connectivity requirements should be aimed at increasing connections without significantly increasing through-traffic in residential areas. This can be done by avoiding long, straight streets that may encourage speeding, using curves to slow traffic, and allowing cul-de-sacs as well as bicycle cut-throughs where natural or built features prevent connectivity.

Connectivity ordinances generally use one of two methods to evaluating proposed developments. The first and most common method is to establish a maximum block length. In Portland, Oregon, the maximum block length is 530 feet; in Austin, Texas, 600 feet; and in Ft. Collins, Colorado, 660 feet. The appropriate block length for any community can be determined by examining and measuring the dimensions of blocks in residential areas of the city that reflect the desired scale, character, and connectivity the municipality is hoping to achieve within new developments. For example, consider the specific block lengths of identifiable areas of these cities: the mean block length in San Francisco's city center is 353 feet; in Lower Manhattan, 274 feet; and in areas of Boston built as of 1895, 190 feet (Jacobs 1993).

The second measurement method is a connectivity index. Such indices are calculated by dividing the number of streets links (i.e., street sections between intersections, including cul-de-sacs) by the number of street nodes (i.e., intersections and cul-de-sacs). The city of Cary, North Carolina, for example, requires a street connectivity index of 1.2 or higher. That means a neighborhood with 50 street links would need to have approximately 41 street nodes to meet the standard.

The model ordinance below uses the more common block-length approach rather than the index approach. The model is sufficiently flexible for a jurisdiction to apply the index measurement if it so desires.

(A note regarding one-way streets: *Although not addressed in the ordinances reviewed for this model, the use of one-way streets can affect street connectivity and more importantly pedestrian, bicyclist, and motorist safety. On the one hand, one-way streets can simplify crossings for pedestrians, who must look for traffic in only one direction; however, studies have shown that conversion of two-way streets to one-way generally reduces pedestrian*

crashes, but one-way streets tend to result in higher auto speeds, which creates other safety problems.)

As a system, one-way streets can also increase travel distances for motorists and bicyclists, and can create confusion, especially for nonlocal residents. For pedestrians, provided they are on a grid or modified grid pattern, one-way streets should not increase the length of a route. One common factor that can make a one-way street system confusing to pedestrians is signage identifying street names. Often cities will install street signs that face only in the direction of oncoming traffic.

According to the Pedestrian and Bicycle Information Center, one-way streets operate best in pairs, separated by no more than 0.4 km (0.25 mi) (www.pedbikeinfo.org, 2004/). If one-way streets are being present in the area in which street connectivity requirements are being applied, this standard should be considered.

Primary Smart Growth Principle Addressed: Walkable neighborhoods
Secondary Smart Growth Principle Addressed: Variety of transportation choices

101. Purpose

(1) The purpose of this ordinance is to support the creation of a highly connected transportation system within the [municipality name] to:

(a) provide choices for drivers, bicyclists, and pedestrians;

(b) promote walking and bicycling;

(c) connect neighborhoods to each other and to destinations, such as schools, parks, shopping, libraries, and post offices, among others;

(d) provide opportunities for residents to increase their level of physical activity each day by creating walkable neighborhoods with adequate connections to destinations;

(e) reduce vehicle miles traveled and travel time to improve air quality and mitigate the effects of auto emissions on the health of residents;

(f) reduce emergency response times;

(g) increase effectiveness of municipal service delivery; and

(h) restore arterial street capacity to better service regional long-distance travel needs.

102. Definitions

As used in this ordinance, the following words and terms shall have the meanings specified herein:

"Arterial street" means a street that primarily accommodates through-traffic movement between areas and across the local government, and that secondarily provides direct access to abutting property.

"Connectivity" means a system of streets with multiple routes and connections serving the same origins and destinations.

"Development" means a subdivision, resubdivision, planned unit development, [insert name of any other type of development], or any other type of land-use change that results in the creation of public or private streets.

"Local Street System" means the interconnected system of collector and local streets providing access to a development from an arterial street.

"Resubdivision" means [cite to definition of resubdivision in local subdivision regulations].

"**Subdivision"** means [cite to definition of "subdivision" in subdivision regulations].

103. Relationship to other Adopted Plans and Ordinances

The design and evaluation of vehicular, bicycle, and pedestrian circulation systems built in conjunction with new residential and nonresidential development and the application of the street connectivity requirements to those developments shall conform to [list all applicable ordinances and plans].

104. General Standards

(1) A proposed development shall provide multiple direct connections in its local street system to and between local destinations, such as parks, schools, and shopping, without requiring the use of arterial streets. Each development shall incorporate and continue all collector or local streets stubbed to the boundary of the development plan by previously approved but unbuilt development or existing development.

(2) To ensure future street connections to adjacent developable parcels, a proposed development shall provide a local street connection spaced at intervals not to exceed [660] feet along each boundary that abuts potentially developable or redevelopable land.

(3) A proposed development shall provide a potentially signalized, full-movement intersection of a collector or a local street with arterial street at an interval of at least every 1,320 feet or one-quarter mile along arterial streets. A proposed development shall provide an additional nonsignalized, potentially limited movement, intersection of a collector or local

street with an arterial street at an interval not to exceed 660 feet between the full movement collector and the local street intersection.

(4) The [local government] engineer may require any limited movement collector or local street intersections to include an access control median or other acceptable access control device.

(5) The requirements of paragraphs (1), (2), and (3) above may be waived if, in the written opinion of the [local government] engineer, they are infeasible due to unusual topographic features, existing development, or a natural area or feature.

(6) Gated street entryways into residential developments are prohibited.

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