Traditional Streets are Safer for People and Traffic

Street Grid's Efficiency Helps Everyone

New urbanists like connected street networks because they handle large volumes of traffic at safer speeds in people-centered environments while offering multiple ways to get from A to B. At the same time, the importance of a 4- to 6-minute response time cannot be underestimated. Firefighters swear by it for three reasons:

•Someone who has collapsed and isn't breathing typically starts suffering brain damage within 4 to 6 minutes of oxygen deprivation; except for rare cases, brain death almost always occurs after 10 minutes.

•Fires can reach an uncontrollable condition called "flashover" within 3 to 8 minutes. Fire death is certain if someone is present at that moment.

•It mitigates unavoidable lag time as firefighters don't know about emergencies until notification. And once at the scene, they must evaluate and set up before attacking a blaze.

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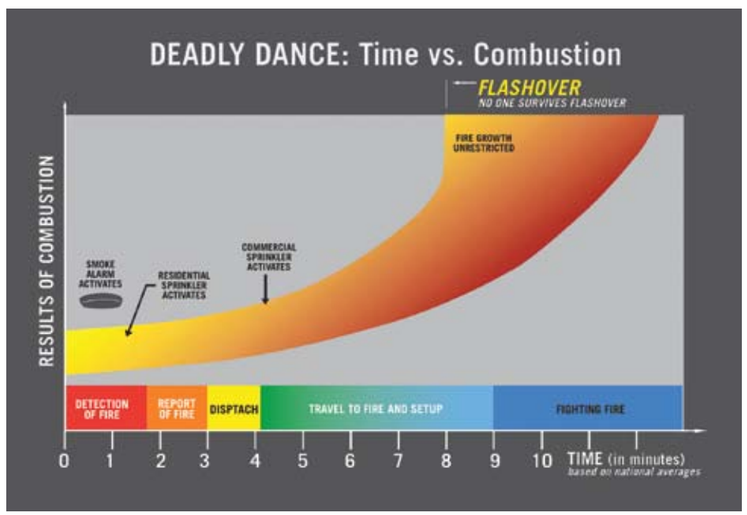
In Charlotte, N.C., the city's Department of Transportation examined connectivity and response time in a 2008 study and found the citywide average response time rose from 4.5 minutes in the mid-1970s to 5.5 minutes in 2002. This increase corresponds with the prevalence of street design patterns in conventional subdivision development.

However, the study discovered that since October 2001, when the city's subdivision ordinance began requiring street connectivity, average response time has dropped 30 seconds, to 5 minutes. This is a dramatic drop given the lag time in transforming conventional subdivisions into connected spaces.

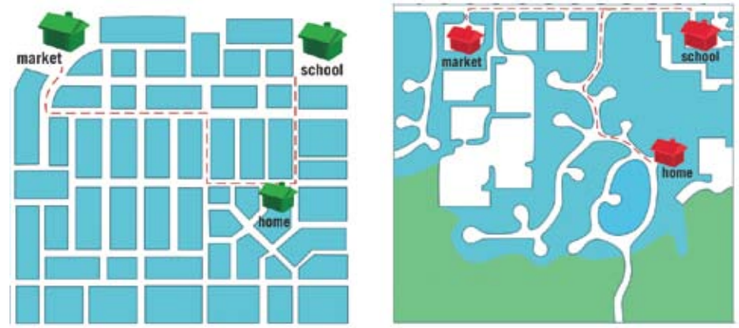
In addition, connected street networks can also improve fiscal efficiency when it comes to fire stations' fixed costs. Both Charlotte and Raleigh, N.C. studied the effects of connected versus disconnected street patterns on fire station coverage and cost efficiency. Each city concluded – in 2008 and 2000, respectively – that connected networks improve both factors.

Response Time: When a Short Wait Saves Lives



The 4- to 6-minute response time is critical for emergency responders, given the inevitable lag between a blaze starting, or someone falling unconscious, and the fire department being alerted. When present, sprinklers help control the fire early, lengthening the time before deadly, uncontrollable "flashover" occurs. That response window also gives emergency medical technicians the best chance to treat unconscious victims before brain damage or brain death occurs. (Courtesy of Austin, Texas, Fire Department, Northern Illinois Fire Sprinkler Advisory Board, Chicago Sprinkler Fitters Local 281, Orland Fire Protection District, Orland Professional Firefighters, Sprinklerfitters Local 669, and National Fallen Firefighters Foundation)

Grid vs. Sprawl: The Power of Connectivity

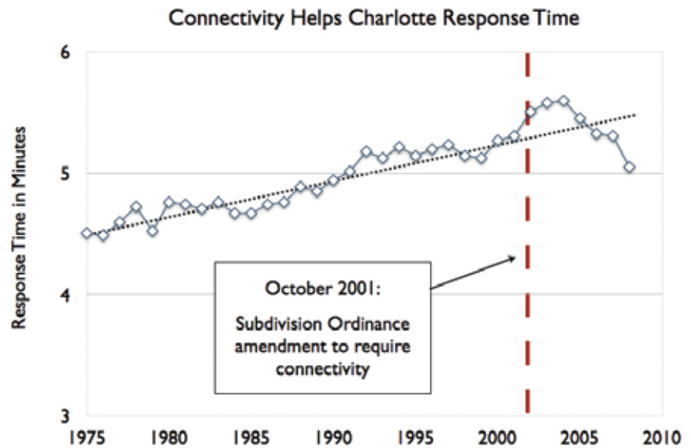


In traditional New Urbanist neighborhoods like the one at left, pedestrians, automobile drivers, and emergency responders can take myriad routes to any destination on streets designed to accommodate both vehicles and people. Suburban sprawl, center, excludes pedestrians in favor of cars, and funnels traffic onto a limited number of routes. Here, if this one route is blocked, emergency responders trying to reach the house must travel miles around to the subdivision's other access point.(Image by Paula Salhany, courtesy of Duany Plater-Zyberk & Co.)

"...since October 2001, when the city's subdivision ordinance began requiring street connectivity, average response time has dropped 30 seconds, to 5 minutes. This is a dramatic drop given the lag time in transforming conventional subdivisions into connected spaces"

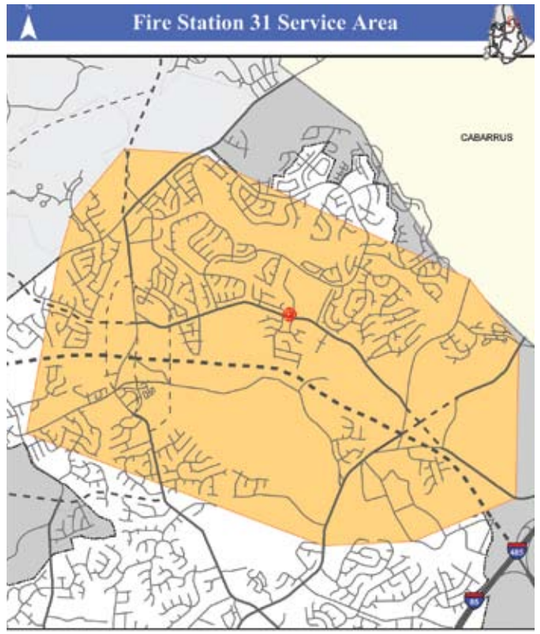
Charlotte compared eight fire stations from near downtown to a newer neighborhood at the city's periphery (See "Saving Lives and Money: A Charlotte Case Study", page 8).The study confirmed that higher street connectivity means that a single station can serve more households at a lower per capita cost. For example, Station 2 in Dilworth, a neighborhood begun in the 1890s as a streetcar suburb, scored best, serving 26,930 households in 14.1 square miles at an annualized per capita life cycle cost of $159. Station 31 near Highland Creek, which developed in the 1980s and 1990s, scored worst, serving just 5,779 households in 8 square miles at an annualized per capita life cycle cost of $740.

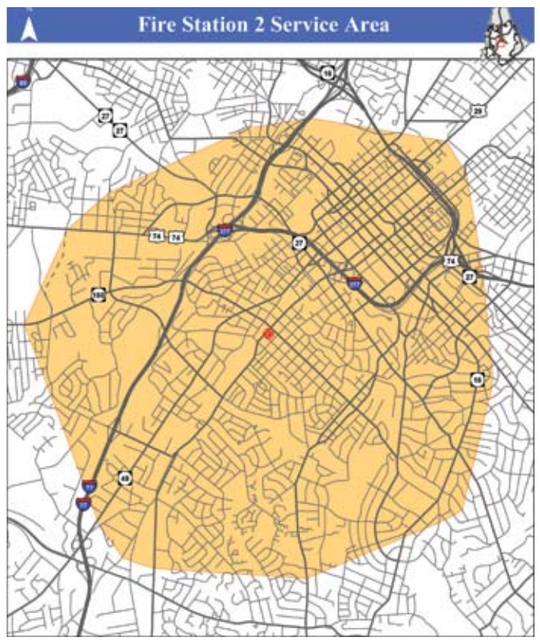
Raleigh's study, cited in *Planning for Street Connectivity: Getting from Here to There* (Handy, Paterson & Butler, 2003), looked at response area coverage within a 1.5-mile radius of fire stations. The authors concluded that older neighborhoods had greater service efficiencies due to their greater street connectivity – "…a fire station in the most interconnected neighborhood could provide service to more than three times as many commercial and residential units as the least connected neighborhood."



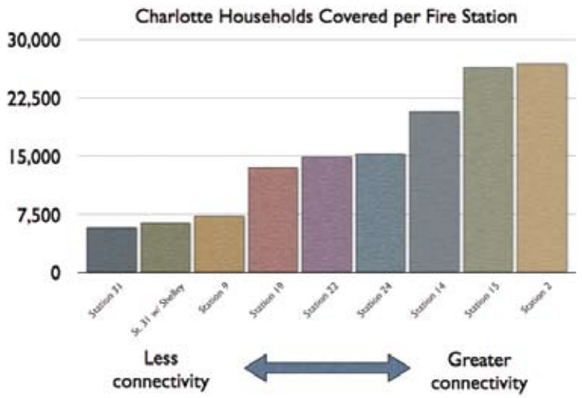
In a 2008 study, the city of Charlotte, NC, found that average response times decreased as street connectivity increased after a connectivity ordinance became law in October 2001. (Chart courtesy, City of Charlotte, NC)

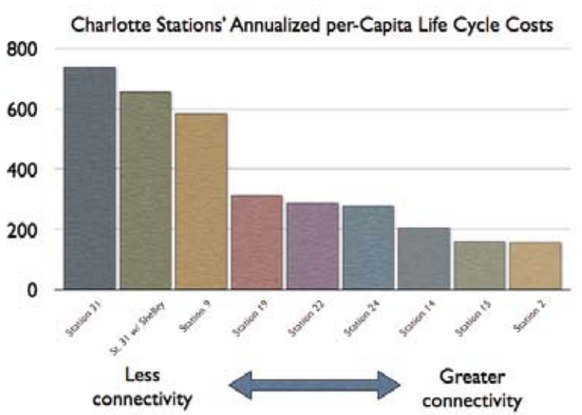
Saving Lives and Money: A Charlotte Case Study





The benefits of connectivity and traditional neighborhood development become clear in these maps showing the coverage areas of Charlotte Fire Stations 2, bottom left, and 31, top left: Station 2 covers 4.5 times more addresses in highly connected Dilworth than Station 31 does in sprawling Highland Creek, and at a much lower annualized per capita cost ($159 vs. $740).
Moreover, the charts, below, show how this pattern holds true with other fire stations, too. They also show that Station 31 and nearby subdivisions would benefit from a proposed, but not yet built 300-foot connection on Shelley Avenue that could shave a mile off the 1 1/2-mile route firefighters must currently drive.
Station 31 could then cover approximately 12.5 percent more households and 17 percent more area for a lower annualized per capita cost ($659), yet still vastly under-perform Station 2. (Charts, maps courtesy of City of Charlotte, NC)





States and Towns Embracing Reform

Connectivity, Choice are Key for New Approaches

Street width is mainly a matter of local and state jurisdiction. Most local ordinances discuss street width variances or focus on connectivity requirements.

Only Oregon and Washington allow local jurisdictions to override the 20-foot clear rule. Oregon gave local communities increased flexibility in a 1997 law developed with the state's fire service (Oregon Revised Statutes, 368.039). The statute empowers local governments to design their own street standards in consultation with the local fire department. Washington's updated code is very similar to Oregon's, with the local government allowed to adopt street standards that differ from the state uniform fire code (see Revised Code of Washington, 19.27.060 [5]).

The Commonwealth of Virginia is moving to reduce street width on a statewide basis. Virginia is a unique case because its Department of Transportation is responsible for local road maintenance. In 2008, they adopted new connectivity requirements based on the link-node ratio – the number of links (stretches of streets or alleys) divided by the number of nodes (intersections) in a given area; the higher the ratio, the more connected the street network (a perfect grid's ratio is 2.5). Starting this year, VDOT requires new developments to meet minimum ratios of 1:4 for suburban areas and 1:6 for urban, or compact areas.

Assistant Secretary of Transportation Nicholas Donohue said those ratios will be a vast improvement, as most developments in Virginia since the 1970s offer minimal connectivity. The new connectivity standards will allow the curb-to-curb width of future neighborhood through streets will be much less than the current 36 feet, Donohue added. The pending new standards are 29 feet with parking on both sides or 24 feet with parking on one side. "Increased connectivity allows reduced street widths because it provides firefighters with at least two paths to respond to any emergency", he said.

Fire departments welcome increased connectivity. Carl Wren, senior engineer of the Austin (Texas) Fire Department says the biggest concern with connectivity ordinances is the willingness of future county commissions, city councils or village boards to follow them in the face of developer and/or residents' resistance. The question becomes how communities ensure that connectivity goals are not short circuited while discrete projects are developed over the years by different people and in various neighborhoods. This is an especially important topic in an era where developers are designing the streets – not like in the past where the local governments had general street plans.

Most fire departments can identify long dead-end roads or road stub-outs in adjacent subdivisions resulting from abandoned plans for connectivity during phased construction of developments. Fire departments and street designers alike can cite examples of connectivity being defeated by the refusal of adjacent communities to cooperate on the alignment and connection of neighborhood streets.

A trio of North Carolina communities, Davidson, Cornelius and Huntersville have pioneered connectivity requirements. Davidson attempts to address neighborhood resistance to increased connectivity through signage. Its 2001 ordinance requires that signs be posted on cul-de-sacs and dead-end streets that "have the potential to connect" to adjacent properties where future development may go, declaring: "This cul-de-sac is temporary. The street will be extended when the adjacent property develops." Huntersville, recently mandated similar signs for dead-end streets that will one day be connected to the next subdivision. See *Planning for Street Connectivity: Getting from Here to There* for more information.

Potential emergency response problems from the failure, or inability to connect streets are clearly seen in this aerial photo of the Barton Hills neighborhood in Austin, Texas. While geography and the city's concerns about impervious cover helped prevent this connection in the red circle, residents' opposition influences decisions to stop other connections, even though neighborhood traffic flow and emergency response may be hampered. (Photo courtesy of Carl Wren)