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# Township Engineer

## Enhancing Neighborhood Safety and Livability Through Greener Road Design

Part 1 of a two-part series

BY RANDALL ARENDT / SENIOR CONSERVATION ADVISER, NATURAL LANDS TRUST

Everyone seems to be thinking green these days, whether it's the shrinking amount of green stuff in their wallets or the push to be environmentally conscious with everything from household cleaners to organic clothing. The "green" campaign has even spilled over into the engineering and construction industries, from green roofs to soy-based road sealants.

Road design in neighborhoods also provides an opportunity to incorporate environmentally friendly practices. An added benefit is that such principles can improve safety and save a township money and manpower. Township engineers can help their municipalities "green up" a number of standards that routinely appear in local subdivision ordinances.

This first installment of a two-part series will look at three of the six elements of greener road design: street width, sidewalks, and canopy shade trees. The remaining three — natural stormwater solutions, redesigned cul-de-sacs, and safer curves — will be discussed in the next issue of the *Township Engineer*.

### Old rules no longer apply

Many of the standard engineering requirements in today's local codes originated decades ago, when municipal officials reached for the most readily available sourcebooks of the time, usually produced by state highway departments. *Residential Streets*, a more recent book copublished by the American Society of Civil Engineers, the Institute of Transportation Engineers, the Urban Land Institute, and the National Association of Homebuilders, asserts that many of those state-created guidelines were reasonable for major highways but excessive for local residential streets. That may come as a revelation to township officials who wonder why their



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**Typical subdivision standards specify excessive street width, which leads to faster traffic speed, and do not require sidewalks for pedestrian safety or shade trees for neighborhood beauty.**



**In this example, the street design is the opposite of typical ordinance standards, with an appropriately scaled road and sidewalks buffered from the street by a line of shade trees planted in a proper tree lawn, as was traditionally done before the 1960s.**



# Greener Road Design (cont.)

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municipal streets must be so wide and characterless.

Excessive street width is only one of several areas where engineers can help their townships achieve safer, more attractive streets that are also less costly to maintain. The photos on Page 1 illustrate contrasting approaches to residential street design. One features wide pavements without sidewalks or shade trees, while the other is more appropriately scaled and provides places for residents to walk. It is also much more attractive and environmentally friendly.

## Improving safety with narrower streets

Determining the correct road width in a neighborhood depends on several factors. *Residential Streets* recommends that designers choose the minimum width that will reasonably satisfy all realistic needs. "The tendency of many communities to equate wider streets with better streets and to design traffic and parking lanes for free-flow traffic is a highly questionable practice," the book states.

Creating two 11- or 12-foot-wide traffic lanes that never have vehicles parked alongside can encourage

motorists to speed. Narrower streets, on the other hand, tend to slow traffic, improving safety for residents. In fact, some studies indicate that as a street becomes wider, accidents per mile increase exponentially, and that the safest residential street may be a narrow one.

An alternative to the "wider is better" model of street design is the idea that road width should be related to the number of lanes needed. The required number of lanes is a function of two factors: traffic volume, which is low in most residential subdivisions, and the need for onstreet parking, which is usually small when homes have two-car garages and parking space in the driveway.

In most subdivisions with lots larger than 15,000 or 20,000 square feet, the need for on-street parking is minimal. *Residential Streets* recommends the following width standards: 18 feet for low-volume local streets, with occasional parking on one side only, and 22 to 26 feet for higher-volume local streets, with parking on one side or staggered parking on both sides.

When smaller lots are involved, however, such as parcels 50 to 80 feet wide, local streets should be sized to accommodate one or two lanes of onstreet parking to compensate for the lack of garages. A street with one lane of parking should have a paved width of 26 feet, and a street with two lanes of parking should have a width of 32 feet. In the latter case, vehicles parked along both sides of the road would prohibit motorists from perceiving the wider road as a "microfreeway," thereby decreasing speeds.

There are several safety, financial, and environmental reasons for choosing narrower streets over wider ones, including:

- Wider streets are more dangerous than narrower streets. According to studies from Longmont, Co., the traffic accident rate on subdivision streets measuring 36 feet wide is 400 percent greater than the rate on 24-foot-wide streets.
- Wider streets are also more dangerous when all risks are considered because of the higher travel speeds they generate. The risks from being injured in traffic accidents on wide subdivision streets is 37 times greater than the risks of being injured in a burning house on a narrower street. This is because house fires are relatively rare, while traffic accidents are not.
- Wider streets are 33 to 100 percent more costly for townships to repave every seven to 10 years.
- Wider streets shed more stormwater, leading to ever-larger stormwater facilities and increasingly impaired water quality.

## Navigating narrow streets

Some streets are so wide that cars can be parked

## Township Engineer

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sideways in the middle and still allow room for vehicles to pass on either side. These streets are inherently dangerous because they encourage faster travel speeds, and they add unnecessarily to township repaving budgets. Fortunately, a new generation of engineers has begun to recognize the virtues of a narrower street, where a car parked on one side essentially blocks one travel lane.

Old-school thinking held that this constituted a hazard when two moving vehicles approached the parked car from opposite directions because only one vehicle could pass at a time. An increasing number of planners and engineers now realize, however, that such situations force the occasional oncoming vehicle to slow down and allow the other to pass. This approach works well on local access streets, such as in a residential neighborhood, but is not appropriate for more heavily traveled collector streets, which channel traffic from local access streets to major thoroughfares.

### Encouraging a healthy pastime

Part of the “green” movement is a push toward more environmentally friendly modes of transportation and healthy activity, such as walking and biking. Sidewalks are an ideal place for neighborhood residents to practice these activities safely.

The prevailing wisdom about sidewalks, however, is that they should be provided when there are more than three homes per acre or when the subdivision is located near schools, shops, and churches. Because few subdivisions are built in such areas now, and many require at least a one-acre lot, sidewalks are rarely seen in newer neighborhoods.

Ordinances that exclude sidewalks under the old criteria miss the most important point and fail to recognize the benefits of such amenities. Numerous surveys have revealed that walking is the No. 1 recreational pastime of Americans. Sidewalks encourage this activity and give residents a safe place to walk.

Sidewalks provide basic separation between motor vehicles and pedestrians, including children walking to or from the school bus, kids on tricycles or scooters, parents pushing strollers, older couples out for an evening stroll around the neighborhood, and joggers.

Waiving subdivision sidewalk requirements can have long-term implications for families and seniors living in these new neighborhoods. Local officials can either require that safe off-street paths be provided for walking and playing or they can effectively force all these folks onto travel lanes where they must dodge cars, trucks, motorcycles, and sport utility vehicles. The only safe and “green” choice is to require sidewalks in every new housing development.



**Without sidewalks, children, seniors, and parents with strollers must share the travel lanes with cars, trucks, and other vehicles.**



**This street in Phoenixville, Chester County, would look much different without its canopy shade trees, which act as a buffer between traffic and people on the sidewalks. Although opponents of street trees argue that as “fixed deadly objects” they pose a hazard to motorists, the argument doesn’t hold up considering that utility poles are placed right along the pavement edge.**

### Beautifying and purifying the environment

There is more to an environmentally friendly street than just the road and sidewalks. Canopy street trees are one of the most important improvements any community can require of developers. They not only beautify the roadway, but their leaves also absorb carbon dioxide emissions, and their roots help filter stormwater by taking up pollutants.

Street trees should be hardy deciduous varieties capable of attaining a mature height of at least 60 feet, as opposed to flowering ornamentals, which are more suited to courtyards and lawns. The trees’ diameter should be at least 2½ inches when measured about 4½ feet from the ground. They should be planted at intervals of 40 feet or less on both sides of the street in “tree lawns” that are at least 6 feet wide and located between the sidewalk and the curb or edge of the pavement. ➤

# REGISTER TODAY!

## Township Engineers Association Annual Fall Seminar

### Two dates and locations to choose from:

- **October 14** — **Best Western Reading Inn, Shillington, Berks County**
- **October 22** — **Cranberry Township Municipal Building, Butler County**

Sponsored by the Pennsylvania State Association of Township Supervisors and the Pennsylvania State Association of Township Engineers

### Tentatively scheduled topics include:

- Gas and oil well drilling — legal and environmental issues; posting and bonding of local roads
- Stormwater management — Act 537 regulations, maintenance agreements, best management practices, and an update on a draft ordinance
- Working with PennDOT — drainage, rights of way, and compliance with the Americans with Disabilities Act
- Working with developers — maintenance agreements and planned residential developments

The seminar runs from 9 a.m. to 3 p.m., with registration starting at 8:30 a.m. The registration fee is \$100 for Engineers Association members and \$150 for nonmembers and includes admittance to all sessions, plus handouts, continental breakfast, and lunch. To register, call PSATS at (717) 763-0930 or complete this form and send it, along with your registration fee, to PSATS at the address below.

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## Greener Road Design (cont.)

Opponents of street trees raise many objections to them, including their danger as obstacles. The argument that trees are “fixed deadly objects” doesn’t carry much weight, however, considering that telephone and utility poles are placed right at the edge of the road. Trees also act as a buffer between traffic and residents on sidewalks.

Another argument against street trees is that their roots may crack and lift sidewalks or rupture footpaths after decades of growth. This potential can be greatly diminished — if not altogether eliminated — by new techniques developed by urban foresters. One approach involves installing vertical barriers 12 inches deep along the outer edge of sidewalks to deflect root growth down deep under the walk. The second approach involves planting the trees in a special structural soil mix developed at Cornell University. The mix consists of large stones with sizable gaps or spaces between them, through which the tree roots grow. (*For more information on this practice, log onto [hort.cals.cornell.edu](http://hort.cals.cornell.edu) to download the publication “Using Porous Asphalt and CU-Structural Soil.”*)

The common practice of allowing existing trees to substitute for new shade tree plantings is a poor policy. The presence of many trees on a thickly wooded site should never be taken as proof that proper shade tree planting is unnecessary along new streets.

When swaths are cleared through existing woodlands in preparation for street grading and construction, the trees remaining along the edges tend to be tall and spindly, having grown in a forested situation with sunlight coming only from above. Consequently, such trees are not round and full and will not become so for many years, if ever, after being exposed to more sun. Existing trees along the road are therefore no substitute for new canopy shade tree plantings. ❖

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Part 2 of this article will appear in the *Fourth Quarter 2009 Township Engineer*, which will be published in October.

**About the author:** Randall Arendt is senior conservation adviser for the Natural Lands Trust in Media, Pa. A town planner with more than 35 years of experience working with municipal engineers, he has designed subdivisions in more than 20 states and several Canadian provinces and has written five books. To view his Web site, log onto [www.greenerprospects.com](http://www.greenerprospects.com).