Complete Streets: We Can Get There from Here

THIS FEATURE EXPLAINS THE COMPLETE STREETS MOVEMENT AND EXPLORES WAYS TO MAKE URBAN THOROUGHFARES MORE PEDESTRIAN AND BICYCLE FRIENDLY AND RESPECTFUL OF THE SURROUNDING COMMUNITY WHILE NOT UNDULY COMPROMISING MOTOR VEHICLE TRAVEL. TECHNIQUES FOR DESIGNING AN ARTERIAL STREET THAT CAN CONTROL TRAFFIC SPEEDS AND PERMIT MORE COMFORTABLE AND SAFE PEDESTRIAN AND BICYCLE ACCESS ARE DESCRIBED.

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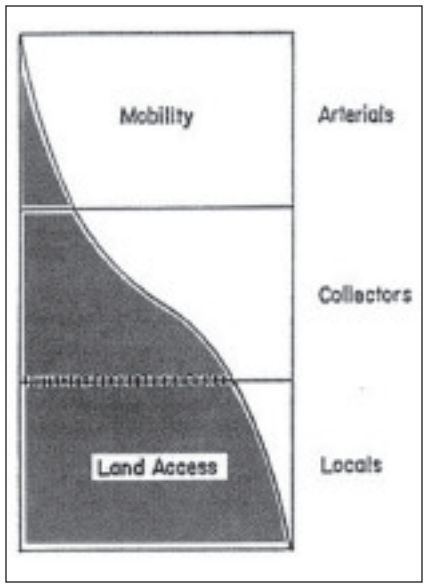
A COMPLETE STREET IS A ROAD that is designed to be safe for drivers; bicyclists; transit vehicles and users; and pedestrians of all ages and abilities. The complete streets concept focuses not just on individual roads but on changing the decision-making and design process so that all users are routinely considered during the planning, designing, building and operating of all roadways. It is about policy and institutional change.

This may seem simple enough. Over the last 30 years, a lot of planning and engineering energy have gone into learning to create beautiful streets that work well for everyone. Standards from *A Policy on Geometric Design of Highways and Streets* have been changed to reflect a multimodal approach, but many roads continue to be built as if private motor vehicles and freight are the only users.[1] Too many urban arterials feature a well engineered place for cars to travel next to a homemade pedestrian facility—a "goat track" tramped in the grass—with a bus stop that is no more than a pole in the ground uncomfortably close to high-speed traffic.

This stems in large part from entrenched planning and design practices. Transportation projects typically begin with an automobile-oriented problem—increasing average daily traffic or deteriorating level of service (LOS). The performance of the right of way for bicyclists, pedestrians and transit riders or transit vehicles often is not measured. Roadway classification is similarly oriented toward auto mobility.

THE FUNCTIONAL CLASSIFICATION TRAP

Using the standard functional classification system, streets designated as arterials are, by definition, intended primarily to provide mobility, with emphasis placed on operating speed and traffic-carrying capacity (see Figure 1). This leads to other design requirements that stress access management, wider lane widths, increased turning radii and minimum interference with traffic movements. This, in turn, often leads to urban roadways dividing neighborhoods, destroying local businesses in established communities and creating sterile, inhospitable streetscapes in developing suburbs.



Source: *A Policy on Geometric Design of Highways and Streets*. Washington, DC, USA: American Association of State Highway and Transportation Officials, 2001, pp. 1–7.

Figure 1. Proportion of service.

CONTEXT-SENSITIVE SOLUTIONS (CSS)

As a reaction to this unhealthy trend, context-sensitive design concepts and techniques have developed. Within ITE, a new arterial street design paradigm for urban areas is being adopted in the Recommended Practice entitled *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*. The document is being developed in conjunction with the Congress for New Urbanism and the Federal Highway Administration.[2]

How do complete streets initiatives relate to CSS? CSS is a project-oriented and location-specific process and is aimed at making sure a road project fits into its context. Early projects tended to be large roadway improvements and featured extensive public meetings, stakeholder out-

reach and plenty of extra work. More recently, CSS practitioners have recognized that this process can be applied to every project and that early public involvement does not necessarily lead to expensive and time-consuming outreach efforts.

Complete streets focuses more on road users and is about making multimodal accommodation routine so that multimodal roads do not require extra funds or extra time to achieve. The intent is to change the everyday practice of transportation agencies so that every mode should be part of every stage of the design process in just about every road project—whether a minor traffic signal rehabilitation or a major road widening. The ultimate aim is to create a complete and safe transportation network for all modes. CSS and complete streets can be seen as complementary, not competitive movements.

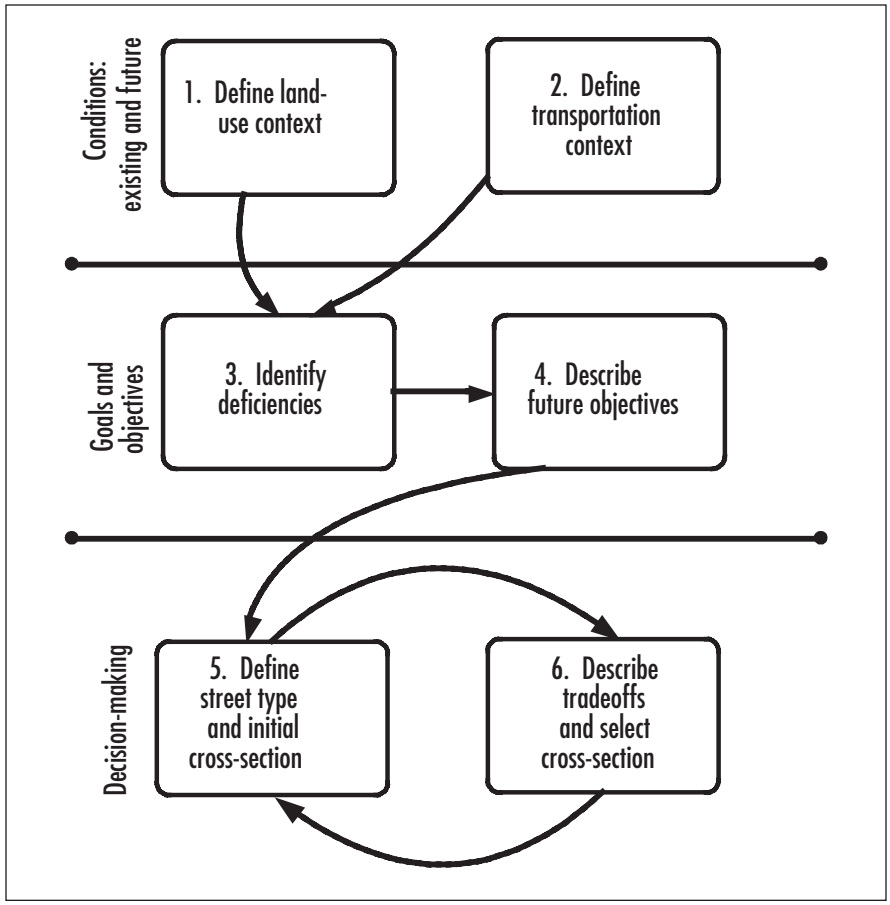
NATIONAL COMPLETE STREETS COALITION

The National Complete Streets Coalition has been working for three years to promote policy and procedural changes at the federal, state and local levels. In addition to ITE, the coalition includes the American Public Transportation Association, the American Planning Association, AARP and many others.[3]

The coalition has succeeded in gaining national media attention and policy adoption across the country. More than 50 jurisdictions, from states to small towns, have adopted some type of complete streets policy, most over the last few years. In 2007, several cities adopted notable policies, including Salt Lake City, UT, USA, through a simple executive order; Seattle, WA, USA, through a comprehensive ordinance; and Charlotte, NC, USA, through adoption of its *Urban Street Design Guidelines*.

At the state level, a new law in Illinois requires the state department of transportation to accommodate bicycle and pedestrian travel on all its roads in urbanized areas. It is effective immediately for project planning and required in construction beginning in August 2008. Other places have been building complete streets for a while, including Oregon; Florida; Arlington, VA, USA; and Boulder, CO, USA.

A new complete streets policy adopted by a legislature or city council is likely to make any engineer nervous. If well written, the impact should be gradual and reasonable. These policies are not prescriptive. Complete streets will look different in different places. They must be appropriate to their context and to the modes expected on that corridor.



Source: *Urban Street Design Guidelines*. Charlotte, NC, USA: Charlotte Department of Transportation, October 2007. Accessible via www.charmeck.org/departments/transportation/urban+street+design+guidelines.htm.

Figure 2. Charlotte, NC, USA, street design standards: A six-step process for considering and balancing the needs of all users.

A bustling street in an urban area may include features for buses, bicycles and pedestrians as well as private cars; in a more rural area with some walkers, a paved shoulder may suffice. Low-traffic streets need few treatments. Places with existing complete streets policies are successfully building a variety of roads that meet the varied needs of children, commuters and other users while creating an overall network that serves all modes.

IMPLEMENTATION CHALLENGES

In order for complete streets to be truly effective, the following implementation measures should be considered:

- Rewrite and/or refocus agency policies and procedures to serve all modes.
- Rewrite and/or adapt design guidelines.
- Train and develop staff skills in serving all modes.
- Collect data on all users and modes for performance improvements.

The policy change should result in an institutionalization of the complete streets approach in all aspects of the transportation agency and beyond and often means a restructuring of everyday procedures, beginning with scoping. For example, in Charlotte, transportation planners are using a new six-step complete streets planning process that systematically evaluates the needs of all modes (see Figure 2).[4] The National Complete Streets Coalition is offering a Local Implementation Assistance Program to help jurisdictions with this task.

An effective policy should lead to the rewriting of design manuals. The best example of this in the United States is Massachusetts. A complete streets policy statement became one of three guiding principles for the new award-winning design guide—context-sensitivity is another. The new manual has no chapters for bicycling, walking, transit,

or disabled users. Every mode is integrated into every chapter, with new tools to help engineers make decisions about balancing the modes.[5]

The third of the four implementation steps is the need for additional training for planners and engineers. Balancing the needs of all users is a challenge, and doing so with every project requires new tools and skills. For example, South Carolina has used its policy to launch a comprehensive training program.

Complete streets policies also should result in new ways to track the success of the road network in serving all users. Florida; Ft. Collins, CO; and other jurisdictions have adopted multimodal level of service standards to do that.

SPEED MATTERS

Complete streets is about more than simple allocation of street space. One of the major components of this new design paradigm is selecting a design speed that is appropriate to the actual street typology and location and that allows safe movement by all road users, including more vulnerable pedestrians and bicyclists. From a safety and community livability standpoint, speed does matter.

Everyone should be familiar with the chart that shows that a pedestrian hit by a car traveling at 20 miles per hour (mph) (32 kilometers per hour [km/hr.]) has an 85-percent survivability rate. That same collision with a car going twice as fast, 40 mph (65 km/hr.), will lower the survivability likelihood to 15 percent (see Figure 3).

Current practice is to use a design speed based on a somewhat arbitrary functional classification and then post a speed limit based on the 85th-percentile of speeds engendered by this artificial street designation. This practice is based on the conventional wisdom that to maintain mobility to and through communities, some arterial streets have to be designated as major traffic carriers or the entire regional economy will grind to a halt. Travel speed has always been equated as a necessary component of this mobility.

Source: *Guide to Recommended Pedestrian Safety Planning*. Washington, DC, USA: Federal Highway Administration, 1989.

Figure 3. Vehicle speed versus injury and death.

REDEFINING MOBILITY

Given that speeds much over 30 mph (50 km/hr.) in urban areas are incompatible with pedestrians (including transit passengers) and bicyclists, if not downright dangerous, is the only choice to sacrifice mobility for community livability? The answer to this question depends on how mobility is defined. One aspect of mobility is travel speed or, more accurately, total travel time.

For a 5-mile (8 km) trip along an arterial corridor with a 45 mph (70 km/hr.) travel speed, the added travel time for a reduced speed of 30 mph (50 km/hr.) would be 2.5 minutes. In the overall scheme of things, how important is this potential delay compared to the proven safety benefits and the city livability advantages that come with the slower traffic speeds?

Some will quote the standard benefit-cost travel-time delay litany that multiplies these 2.5 minutes times an average daily traffic of 30,000 vehicles times 365 days per year times $20 per hour in time costs, equaling $600,000 in lost wages to the economy. However, in reality, the loss is still under 3 minutes per individual for this one trip, for which he or she is probably not being paid and which is less than the time he or she willingly will spend in line for morning coffee.

Take this scenario one step further, to the all-too-common suburban arterial traffic experience of driving 45 mph (70 km/hr.), stopping for up to 2 minutes at a traffic signal, accelerating back up to 45 mph (70 km/hr.), only to stop and wait again one-half-mile (0.8 km) down the road. This uncoordinated signal system wastes time and fuel, and the many stops increase crash rates. If these signals can be coordinated to permit two-way progression at a constant speed of 25 or 30 mph (40 or 50 km/hr.), the total travel time ends up being roughly the same.

The other part of the mobility equation is capacity, with the number of lanes acting as the primary surrogate measurement. It should be recognized by now that LOS D is a reasonable peak period LOS in an urban area, provided the above-mentioned signal progression can be maintained. However, some state departments of transportation or regional planning organizations still recommend LOS C (or even B) in an urban setting whenever possible.

Not only is this a waste of tax dollars constructing unneeded pavement, it also increases pedestrian crossing distances (and thus pedestrian crossing times, which impact negatively on signal timing for vehicular traffic) and encourages faster vehicular speeds during the other 22 hours of the day in each direction.

ARTERIAL TRAFFIC CALMING MEASURES

The remainder of this feature deals with specific design measures that may be used to retrofit urban arterials into complete streets. These roads present one of the biggest challenges to engineers in that they tend to be the most hostile to bicyclists, pedestrians and transit riders, but all of these modes are usually present in significant numbers.

Arterial traffic calming first must deal with controlling vehicular speeds. In addition to timing the traffic signals for a 25 or 30 mph (40 or 50 km/hr.) operating speed, other possible speed control measures include:

- Narrower travel lanes: Based on the results of a recent National Cooperative Highway Research Program study, 11-foot (3.3-meter [m]) or 10-foot (3.0-m) lanes in urban areas are just as safe as 12-foot (3.6-m) lanes for posted speeds of 45 mph (70 km/hr.) or less.[6]
- Road diets: A four-lane to three-lane road diet can work for average daily traffic volumes as high as 20,000. This makes the more prudent driver the "pace" car for that roadway and greatly improves left turning safety.
- Tightening corner curb radii: Selecting the appropriate design vehicle and using the minimum needed to provide the "effective" turning radius from the closest approach lane into

any lane in the departure roadway will slow down turning vehicle speeds.

- Elimination of any free-flow right-turn lanes: This specifically includes freeway entry and exit ramp connections. Encouraging freeway speeds onto or off arterial streets is particularly dangerous for both pedestrians and bicyclists.
- Raised medians: Raised medians visually narrow the roadway and provide a median refuge for mid-block crossings.
- Median and parkway landscaping: Appropriate low-maintenance landscaping further visually narrows the roadway and provides a calming effect.
- Curb parking: Retaining curb parking provides for community access while creating a significant traffic calming effect.
- Curb bulb-outs: Where on-street parking exists, curb bulb-outs shorten pedestrian crossing distances, improve sight lines and help control parking.

PEDESTRIAN CROSSINGS

The other important element in creating a pedestrian-friendly arterial street is making pedestrian crossing locations safe, comfortable and more frequent. On any road where there is transit service, a pedestrian will cross wherever there is a transit stop, whether it is provided for or not. In a dense downtown case with signals spaced every 300 to 600 feet (90 to 180 m), crossing at a traffic signal is a reasonable expectation. However, along most urban and suburban arterials, these signals usually are spaced no closer than every one-quarter mile.

Requiring travel just 1,200 feet (360 m) or more out of the way to cross a street will add 5 minutes to the travel time of a pedestrian walking at the average 4.0 feet per second (1.2 m per second) walking speed. If a 5-minute detour for all automobile traffic were suggested, this would be the equivalent of adding a distance of 2.5 miles (4 km) for a car traveling at 30 mph (50 km/hr.). The outrage would be loud and instantaneous.

Many of the suggested pedestrian crossing improvements flow directly out of the traffic speed control measures noted above. They include:

Source: Ben Miller, Charlotte Department of Transportation.

Figure 4. Redesigned intersection of Kenilworth and Romany in Charlotte, NC, USA.

- Narrower travel lanes: Shorten the pedestrian crossing distance and roadway exposure time.
- Road diets: Reduce the number of lanes to be crossed.
- Tighter corner curb radii: Shorten pedestrian crossing distances and provide space for perpendicular curb ramps.
- Adding corner "pork chop" islands where design vehicle turning radii do not permit a small corner radius: Also shorten pedestrian crossing distances.
- Raised medians: Provide pedestrian refuge and allow pedestrians to cross half the street at a time.
- Curb bulb-outs: Shorten pedestrian crossing distances, improve sight lines and provide space for curb ramps.
- Continental-style crosswalks and pedestrian crossing warning signs: Effective for lightly-traveled arterials posted for urban speed limits.
- Pedestrian-actuated crosswalk warning signs: For heavier traffic flows.
- Pedestrian-actuated HAWK-style signals: Will be in the new *Manual on Uniform Traffic Control Devices* (MUTCD).
- Full signalization: All pedestrian signals should now be timed using the new MUTCD pedestrian walking speed of 3.5 feet per second (1.05 m per second) to set the Flashing Don't Walk pedestrian clearance time and 3.0 feet per second (0.9 m per second) to determine the total Walk/Flashing Don't Walk time.
- Countdown clocks: The new MUTCD will not only require countdown clocks at all new pedestrian signal installations, but there will be a 10-year compliance date for retrofitting all existing pedestrian signal locations, finally correcting the longstanding confusion surrounding the traditional but counter-intuitive Flashing Don't Walk.

TRAFFIC "TAMING"

In conclusion, instead of the concept of traffic calming used in discussing the design of residential streets, the term "traffic taming" should describe the concept of making arterial streets more pedestrian, bicycle and community friendly. This compilation of suggestions for retrofitting arterial streets into complete streets is not meant to be all-inclusive. Many more solutions are available once the task of designing arterial roadways for community livability while retaining a reasonable level of mobility along the most important travel corridors is taken seriously.

Complete streets is both evolutionary and revolutionary. A growing awareness of other transportation modes has led to a trend toward accommodating a wider

variety of users. Complete streets is simply the latest evolutionary step in this process. At the same time, stepping beyond how design typically is done today by greatly increasing travel options, flexibility and usability, a revolutionary new network of travel can be created for all modes.

Largely through the work of the transportation industry, the United States has succeeded brilliantly over the last century in building better roads for farmers, national security and economic growth. It is now time to achieve the same success in the challenge of completing U.S. streets for everyone. ■

References

1. *A Policy on Geometric Design of Highways and Streets.* Washington, DC, USA: American Association of State Highway and Transportation Officials, 2001, pp, 1–7.

2. *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, A Draft Recommended Practice.* Washington, DC: ITE, 2006.

3. To see a complete list of coalition members, visit www.completestreets.org/whoweare.html.

4. *Urban Street Design Guidelines.* Charlotte, NC, USA: Charlotte Department of Transportation, October 2007. Accessible via www.charmeck.org/departments/transportation/urban+street+design+guidelines.htm.

5. *Massachusetts Highway Department Project Development & Design Guide*. Accessible via www.vhb.com/mhdGuide/mhd_GuideBook.asp.

6. National Cooperative Highway Research Program Project 3-27: *Preliminary Report, Urban and Suburban Lane Widths.* Kansas City, MO, USA: Midwest Research Institute, 2007.

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