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Traffic Sheds: A Market Friendly Approach to Effective Growth Management

by Stephen Tocknell, AICP

As the effects of the great recession linger into 2011, there seems to be a widely held political belief that a recovery in land development can be induced by relaxing or removing many of the development controls that were in place prior to the collapse of the real estate market in 2007 and 2008. That belief persists in spite of a glut of existing housing and commercial developments in many areas of the United States. In support of that belief, efforts are under way in many jurisdictions to reduce or eliminate impact fees and other forms of exactions, and to replace them with more "market friendly" techniques for growth management. In this context, instituting a system of traffic sheds may be worth a fresh look by planners.

Overview of Traffic Sheds

The concept of traffic sheds is not new. A comprehensive overview of traffic sheds is provided in Kendig with Tocknell (1999) in a Planning Advisory Service Report documenting implementation of the approach in Williamson County, Tennessee. A session on traffic sheds was held at the APA National Planning Conference in 2002 in Chicago. In addition, the "Rural Traffic Shed Model" is one of 32 tools included in the Federal Highway Administration (FHWA) Tool Kit for Integrating Land Use and Transportation Decision-Making. Although the use of traffic sheds to directly regulate development has been somewhat limited, traffic sheds have been used as a planning tool by jurisdictions in Massachusetts, Virginia, Kentucky, Arkansas, Missouri, Kansas, and other states.

The basic concept is simple. With traffic sheds, each roadway link is associated with an area that is directly served by that link, and the total amount of development within that area is limited to match the capacity of its associated roadway link(s). New development cannot occur within an area unless sufficient roadway capacity is shown to be available that would directly serve that area. On the other

hand, traffic sheds promote new development within areas where adequate roadway capacity is available by proactively identifying those areas and steering new development into those same areas.

When a development is proposed that would exceed the capacity of a traffic shed, a potential developer has essentially two options: scale back the development to fit within the capacity as determined through the traffic shed analysis, or implement a roadway project that would increase the capacity(ies) of the affected traffic shed(s). If capacity is added to an existing roadway, then the capacity of each affected shed is increased. If a new roadway or roadway link is added to the network, then the number of traffic sheds is increased and traffic shed capacities are increased in roughly inverse proportion to the smaller sizes of the new traffic shed(s).

The traffic shed concept is most directly applicable in areas where travel patterns are primarily one dimensional (i.e., back and forth) and where roadway networks are relatively sparse. In jurisdictions that include urban and suburban areas along with rural and previously undeveloped areas, one or more other approaches should be used in combination with the traffic shed approach.

Figure 1 shows an example of how traffic sheds work. The shaded area represents a proposed new development. To reflect construction of a new collector roadway, a new traffic shed is created. If it is determined that the capacity of the new traffic shed is sufficient to support the proposed new development, then the new development is allowed to proceed.

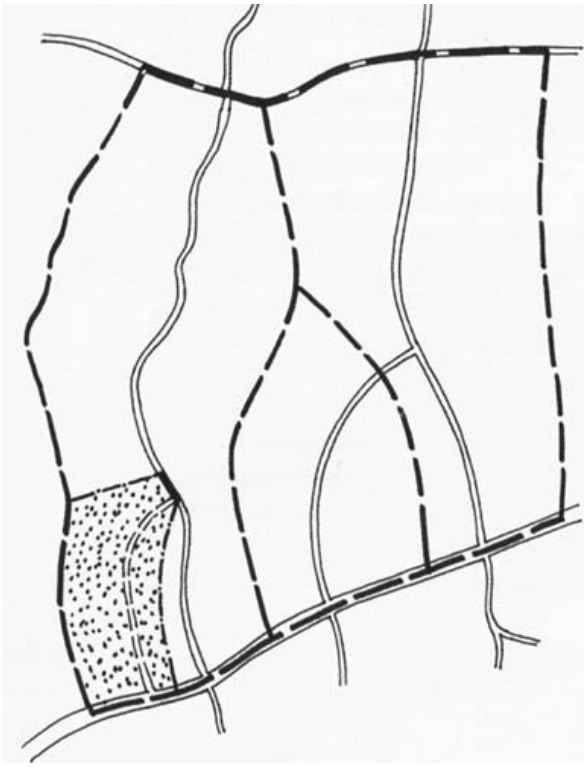


Figure 1
Road construction shrinks a traffic shed.
Source: Kendig with Tocknell 1999.

Comparing Traffic Shed Systems with Concurrency and Impact Fees

As the basis for most impact fee programs, and concurrency and adequate public facilities requirements, the fundamental underlying premise has been that public investments in "adequate" new infrastructure facilities would be made "concurrently" with new developments that would be consistent with locally adopted comprehensive plans. In the absence of sufficient public investments in new infrastructure, new developments have instead been forced into fringe areas where marginal amounts of infrastructure capacity have appeared to be available. Sprawl has been an unintended consequence.

Traffic sheds are fundamentally different from these other approaches in that traffic sheds assign the primary responsibility for new infrastructure investments to the landowners and developers who would benefit from them most directly. Traffic sheds also limit sprawl by incorporating a more realistic assessment of the adequacy of existing infrastructure facilities within rural and previously undeveloped areas.

In theory, impact fees are intended to supplement local government investment in infrastructure facilities. Under current economic conditions, the gap between the cost of infrastructure improvements and the ability of local governments to pay those costs has increased. An increase in impact fees would help to fill this growing gap, but in the current political climate, impact fees are far more likely to be reduced or eliminated than increased. Traffic sheds avoid this limitation by assigning the full cost of roadway improvements to those who own the land within the areas that would benefit from these improvements.

Within areas where new development is widely dispersed, impact fees are even less likely to yield revenues that would be sufficient for the completion of any new major roadway projects within a reasonable time. The developments are approved, but roadway capacities remain more or less the same, and the impact fees do not serve their intended purpose.

Like other growth management systems, the traffic shed approach allows for new development to occur within areas where adequate infrastructure capacity is shown to exist. But unlike those other systems, the traffic shed approach recognizes that rural roadway networks typically are not designed to support urban or suburban development.

Other growth management systems typically overestimate the capacities of rural roadways along with the capacities of other roadways that may have been built incrementally to support minimal levels of daily traffic. Most commonly used roadway capacity or service volume tables, such as those developed by the Florida Department of Transportation (FDOT), are derived from evaluations of the capacities of state highways, which are far more likely to meet accepted alignment and cross-section standards. Existing rural roadways typically do not meet these standards and, therefore, have significantly lower capacities or service volumes. In Williamson County, Tennessee (discussed below), rural roadway capacities or service volumes have been tabulated that are significantly lower than the capacities or service volumes typically shown in current FDOT service volume tables.

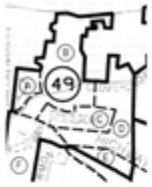
Even if the roadways themselves are designed to meet accepted standards, the capacities of individual roadway links are more likely to be overwhelmed by new development if a rural roadway network is sparse. The density of roadway network coverage is directly addressed by traffic sheds, whereas under other growth management systems roadway network densities may be addressed indirectly or not at all.

Where traffic sheds allocate roadway capacities without regard for existing traffic levels, the amount of capacity available is more easily determined and does not vary much over time. This approach is intuitively preferable over an approach that allows one development to proceed in a given year but does not provide for the approval of a similar development a year or two later. Because it is more stable over time, this approach is a more useful tool for steering new development into areas where adequate roadway capacities are more likely to be found.

The traffic shed system, as applied in Williamson County, is a hybrid of these two approaches, with collector traffic sheds that do not account for existing traffic, and with arterial traffic sheds that do.

Williamson County's Traffic Shed Approach

In Williamson County, individual "collector" traffic sheds have been grouped together into "arterial" sheds that are primarily served by the same arterial roadway link. For arterial traffic sheds, the level of existing development is represented by the observed level of service on the designated arterial roadway link, and the capacity for new development is limited by the marginal capacity of the designated arterial roadway. The applicable traffic shed capacity is either the arterial shed capacity or the collector shed capacity, whichever is more restrictive. Two examples based on the Official Williamson County Traffic Shed Map are described below and illustrated in Figure 2.



Shed No.	Road Name	Acres	Highway Capacity	DU* per Acre*
49-D	Oxford Glen Dr	500	1,500	3.00

Shed No.	Road Name	Acres	Highway Capacity	DU* per Acre*
18-C	Burke Hollow Rd	3,000	550	0.18

* DU: Dwelling Units

Figure 2
Sample traffic shed capacities, Williamson County, Tennessee.
Source: Tocknell Planning Services.

Traffic Shed 49-D is one of at least four collector sheds grouped together in Arterial Shed 49. It is located in a suburban area with a relatively dense network of relatively high capacity roadways. This traffic shed has 500 acres and its designated collector road has a roadway capacity of 1,500 peak hour trips, which equates to 3.0 trips per acre. A standard trip generation table was used to convert the capacity of the roadway, in trips per acre, to a corresponding intensity of land-use development, shown here as detached single family dwelling units per acre. In this example the number of peak hour trips per acre and dwelling units per acre is the same, because the trip generation table that was used indicates that detached single-family dwelling units generate approximately 1.0 trips per dwelling unit per peak hour.

Traffic Shed 49-D could therefore support development at a level of 3.0 dwelling units per acre, as shown in Figure 2.

One of at least three collector sheds that constitute Arterial Shed 18, Traffic Shed 18-C is located in a rural area with a sparse network of low capacity roadways (Figure 2). Because the roadway network is sparse, the area of this traffic shed is much larger (3,000 acres vs. 500 acres in Traffic Shed 49-D). As might be expected in a rural area, the capacity of the roadway that serves this traffic shed is much lower — 550 peak hour trips vs. 1,500 peak hour trips in Traffic Shed 49-D. Given that the area of Traffic Shed 18-C is much larger and the capacity of the roadway serving this traffic shed is much lower, the traffic shed capacity for Traffic Shed 18-C is only 0.18 dwelling units per acre, compared with 3.0 dwelling units per acre in Traffic Shed 49-D.

Refining Williamson County's System

Pursuant to an update of the Williamson County comprehensive plan a few years ago, an update of the county's zoning ordinance is currently nearing completion, including a comprehensive update of traffic shed maps, tables, and texts. The author's firm has been responsible for Williamson County's traffic shed update.

As initially developed, the county's traffic shed analysis procedures included a provision that has allowed the county to require a traffic study to be conducted if either the county or the applicant determined that a traffic shed analysis would not be appropriate. As a component of the traffic shed update that is currently under way, Williamson County's consultant is developing complementary traffic study guidelines for application in the urban and suburban areas that are within the county's planning jurisdiction, including areas within the urban growth boundaries that have been designated for each of the municipalities in the county.[1]

Traffic study guidelines also may be developed for application in the unincorporated "suburban infill areas" that are generally located adjacent to the boundary between Williamson County and Metropolitan Nashville and Davidson County. In keeping with its current policies regarding traffic studies, the county's new traffic study guidelines are expected to include requirements for analyzing potential design deficiencies on roadways that provide access to proposed new developments, along with requirements for addressing potential intersection and roadway capacity deficiencies.

Williamson County is also considering the incorporation of new procedures that would allow for the consideration of multimodal improvements. One option under consideration would allow marginally higher land-use intensities in developments designed to promote greater use of pedestrian, bicycle, or transit facilities. The actual amount of increased development would be based on the reduction in vehicular travel that might be expected as a result of an increase in the number of nonvehicular trips.

Conclusion

Although traffic sheds might still seem like a new idea to many planners and appointed and elected officials, Williamson County has had more than 20 years of experience with traffic sheds, and the county is fully committed to building on the successes of its traffic shed system. Over the 20-plus years that traffic sheds have been used for growth management in the county, officials have been generally pleased with their performance. Although the county's population has roughly doubled over this same

period, sprawl within the county's planning jurisdiction has been relatively well controlled. Most new development in the county has occurred within a north-south corridor along the "ladder" through the midsection of the county, which is generally framed by Interstate 65 and US Highway 31. Traffic sheds contribute substantially to the confidence of Williamson County officials in the zoning decisions they make.

When the traffic sheds approach was developed for use in Williamson County two decades ago, Geographic Information Systems (GIS) were not nearly as developed as they are today. With current GIS capabilities, a traffic shed system can be set up and maintained with a significantly lower commitment of labor and technical expertise. Compared with other growth management systems that typically require more data (e.g., annual traffic counts), the enactment of a traffic shed system could have the added benefit of allowing an ongoing growth management system to be successfully maintained in the face of cutbacks in local budgets and planning staffs.

By more clearly identifying existing deficiencies in local roadway networks, and by assigning the responsibility for new infrastructure investments to those who would benefit the most from these investments, a traffic shed system can help local governments avoid public expenditures in support of new developments that may be unsustainable or that may never occur.

As the proprietor of Tocknell Planning Services, Stephen Tocknell, AICP, is an independent transportation planning consultant with more than 35 years of experience. He is a former president of APA's Tennessee Chapter, and is currently serving as First Coast Section Chair for APA's Florida Chapter. From 2001 to 2005, Tocknell served on the APA Chapter Presidents Council as the CPC liaison to the APA Legislative and Policy Committee.

Note

1. Urban growth boundaries were designated pursuant to the provisions of Public Chapter 1101 of the Tennessee Code Annotated, which was enacted in 1998, and which requires that all municipalities in Tennessee shall have designated urban growth boundaries.

Reference

Kendig, Lane, with Stephen Tocknell. 1999. *Traffic Sheds, Rural Highway Capacity, and Growth Management*. Planning Advisory Service Report Number 485. Chicago: American Planning Association.

Tocknell Planning Services
Transportation and Growth Management

Many people have good ideas about transportation problems, but it takes special skills to turn good ideas into solutions that work in the real world. Stephen Tocknell, AICP, has been applying these skills on behalf of successful communities for nearly 40 years.

Mr. Tocknell is recognized as a national leader in traffic and transit impact studies, as well as for developing innovative approaches to land use and transportation coordination.

Mr. Tocknell's article on traffic impact studies is included in *Planning and Urban Design Standards,* the primary reference handbook for professional planners. He is the past chair of the First Coast Section of the American Planning Association (APA), and the past president of the APA Tennessee Chapter. From 2001 to 2005, Mr. Tocknell served as a member of the APA Legislative and Policy Committee.

Mr. Tocknell is currently the Chair of the newly formed Context Sensitive Streets Standards Committee for the City of Jacksonville FL. This committee has been charged with developing distinct sets of roadway design standards for the urban, suburban, and rural areas of Jacksonville, the largest city (in land area) in the continental United States.

Stephen Tocknell formed Tocknell Planning Servicers (TPS) early in 2009. TPS clients have included Williamson County TN, Riverside Avondale Preservation, Inc., the City of Jacksonville FL, Baker County FL, and the Jacksonville Transportation Authority.

From its office in downtown Jacksonville FL, TPS offers transportation and comprehensive planning assistance to community leaders and stakeholders who are seeking a high level of professionalism and dependability.

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stevetock@clearwire.net
904 638 6629 v
615 337 4578 c

220 East Forsyth Street, Suite D
Jacksonville FL 32202