

# **DESIGNING SPEED CONTROLLED SUBDIVISIONS WITHOUT ROAD HUMPS**

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## **INTRODUCTION**

Traffic calming is a popular topic for transportation planners and engineers as we try to make residential developments more liveable. The Institute of Transportation Engineers (ITE) has even developed a special toolbox of traffic calming measures (1). A common and simple traffic calming approach is to construct road humps, traffic barriers and unnecessary stop signs. Unfortunately, these kinds of measures are often viewed as negative by drivers who are not speeders and sometimes lead to motorists ignoring important traffic control devices. Emergency services providers, especially ambulances, are severely impacted by speed controlling road humps. Road humps also cause noise and are less effective with the increasingly common sport utility vehicles. More driver-friendly solutions are needed.

The authors are an elected member of a city council and an engineer managing a prominent engineering consulting firm in Ada County (Boise), Idaho. The City is responsible for approving the design of new subdivisions and the street system. The City must respond to existing concerns over the volume and speed of vehicles on existing streets. Originally, mitigation measures such as road humps were the popular choices. Increasing public complaints have encouraged an alternative approach. The two staffs have developed a comprehensive list of curvilinear roadways, traffic chokers and discontinuous streets to reduce travel volumes and speeds for new subdivisions without the perceived impacts of road humps and unnecessary STOP signs.

This paper reports on the results of a three year local planning effort to plan for speed control in subdivision designs. The list of strategies included reduced street cross sections, curvilinear street alignments, shorter block lengths, and the installation of chokers and islands. The following discussion outlines the City's trials and experiences. A summary table is also included.

## **Street Cross Sections**

The width of the street is an obvious influence on travel speeds. The literature (2) has much discussion on the relationship between roadway width and accident rates. The relationship between roadway width and travel speed is really based more upon the width of the travel lane. The Highway Capacity Manual (3) indicates that roadway capacity drops as the travel lane and shoulder widths narrow.

Locally, the standard width of a residential street in a new subdivision is 37-feet (measured back-of-

curb to back-of-curb). This allows two 8-foot travel lanes plus the desirable 20-foot travel lane for emergency and large vehicles. A 29-foot width is allowed on low volume streets with a parking prohibition on one side. The standard residential speed limit is 25 MPH.

A traffic calming program is also in place. Traffic calming is typically imposed with road humps and otherwise unneeded STOP signs. A review of streets already inflicted with traffic calming measures has shown that even the residents of 32-foot streets with two-sided parking have concerns with excessive traffic volumes or speeds.

The concern with traffic calming has led to a proposed policy allowing 29-foot streets with two-sided parking as a new standard. Although developers are supportive of the lower construction costs and larger lots resulting from the narrower streets, they believe that 29-feet is too narrow and usually design 32-footers instead. The realtors also report that potential homeowners are uncomfortable with such narrow (e.g. 29-foot) streets.

Traffic surveys have shown that the average travel speeds are about equal for the 29 and 32-foot streets (e.g. 28 MPH) and the emergency services seem more willing to accept the larger 32-foot street section. The 85th percentile speed for the standard 37-foot street design is 30 MPH. In Kuna, neither the trash truck drivers nor the parcel delivery services have expressed a concern with 32-foot streets. One noticeable concern with narrow street sections is that some drivers will park on the sidewalk if they think that the streets are too narrow. Vertical curbs or small planter strips can prevent this from happening.

### **Street Alignment**

Similar to the narrower street sections, a curvilinear street alignment reduces the driver's sight distance and tendencies to speed. Long straight streets seem to encourage speeding. A review of streets already inflicted with traffic calming measures did not give us a clear picture of the effect of street alignment. There are too many other variables to isolate that one design feature.

The local traffic calming program calls for road humps a minimum of 600-feet apart. With 600-feet then as the goal for a maximum sight distance, the desired street curve radius was set at 350-feet. Although a smaller radius would reduce speeds even further, developers had more difficulty designing their subdivisions. The 350-foot goal seems to be an acceptable compromise between speed control and ease of design. Intermediate tangent roadway sections of less than 600-feet appear to provide the needed results.

Traffic surveys have shown that although 85th percentile of 27 MPH speed is very close to the 25 MPH signed speed limit, the curved street appears to have stopped the number of drivers exceeding the speed limit by more than 10 MPH. Because there are minimal problems with speeding, the 37-foot street sections are acceptable with this design.

### **Chokers and Islands**

Traffic chokers and median islands are alternative methods of restricting the width of both the travel

lanes and the shoulder widths. The medians place the barrier in the middle of the road. The chokers narrow the curblines and place the barrier at the roadway's edge.

Various choker widths have been tried between 20-feet and 28-feet on residential streets. Before a design was approved, temporary curbing was used to test the results. The initial chokers were installed only at intersections, believing that property owners would object to the irregular curblines and parking restrictions in front of their homes. Results showed that the chokers creating a 28-foot street width had no impact on travel speeds. Restrictions down to 20-feet were needed before any appreciable speed reduction was noted. Unfortunately, the narrow chokers caused problems for larger vehicles such as trash trucks and moving vans when located adjacent to an intersection.

Chokers at the corners are also viewed as pedestrian amenities. They improve visibility for both the drivers and pedestrians and the reduced roadway width minimizes the pedestrian's crossing time.

A revised plan relocated the chokers to midblock locations. The restrictions had the desired effect of speed reduction without impacting the turning radius at the street corners. The midblock chokers are only used in new subdivisions, thus minimizing the homeowners' concerns with on-street parking. Some special design considerations are needed to ensure compatibility with the surrounding neighborhood.

Median islands presented similar impacts and results to those found with the traffic chokers. The roadway width was set at 21-feet adjacent to the islands. This allows for a 12-foot travel lane and on-street parking. Speeds were reduced in most cases. The only problems encountered with left-turn restrictions at residential driveways. Careful planning is needed to retrofit existing subdivisions. For new subdivisions, the islands are planned to be small enough that at least some part of the individual lots has left turn access. The builders can probably figure out how to fit the homes on the lots.

## **Block Lengths**

The final design strategy was to examine the impact of shorter block lengths within the subdivision. Some developers want a grid street system and some parcel sizes are too restrictive to allow curvilinear roadways. We've explored the use of shorter block lengths, believing that more frequent intersections increase driver expectation and result in lower speeds. Unfortunately, this design change really impacts the development cost and one example was available for review.

The developers, of course, wanted longer block lengths. The fewer number of cross streets increases the number of saleable lots and decreases the amount of roadway that has to be constructed. The developers typically build to the greatest block length allowed under the existing subdivision ordinance.

Very little data is available from local traffic counts for the various block lengths. The limited data show minimal speed differences for subdivisions with long and short block lengths. Block length was not viewed as a major determinant of travel speed.

## Conclusions

The authors examined four strategies for designing subdivision streets without road humps. Narrower streets result in lower travel speeds and also cost less to construct and allow larger building lots. Although 29-foot streets were found to be acceptable, the 32-foot streets section resulted in similar travel speeds and had much greater acceptance by emergency services providers, the home builders and residents.

Street alignment was also found to affect driver behavior. In general, the straighter the road, the higher the speed. However, curves as gentle as a 350-foot radius were enough to reduce the average speed, mostly through the elimination of travel speeds more than 10 MPH over the posted speed limit. The most effective method is more curves with shorter radii.

Traffic chokers and median islands are both effective. The median islands are more difficult to design and maintain but they add unique design features and can help to support other subdivision amenities. Maintenance of the islands has not proven to be much of an issue although even a small island can cost \$2,000 to construct and reduces the adjacent lot sizes..

Curbside traffic chokers are also effective. However, they must be located away from intersections to minimize their impact upon the larger vehicles. The midblock locations do nothing to minimize their effectiveness. Unlike the median islands, there are no special maintenance issues with the traffic chokers. Chokers have an insignificant cost if designed into a new subdivision and have no impact upon the adjacent lot sizes. Retrofitting chokers into an existing subdivision can cost up to \$2,500 per location

Block lengths were also examined with the belief that more frequent intersections increase driver expectation and result in lower speeds. Residential streets cost approximately \$100 per linear foot for construction. Each new street may also remove to potential buildable lots. Although there is no direct cost to the jurisdiction, these costs are typically passed into the costs of the remaining subdivision lots.

## REFERENCES

1. Institute of Transportation Engineers. Traffic Engineering for Neotraditional Neighborhoods. ITE Education Foundation Seminar. Washington, D.C. 1995.
2. Swift and Associates. Residential Street Typology and Injury Accident Frequency. 1997.
3. Transportation Research Board Special Report 209. Highway Capacity Manual, 1995.
4. Institute of Transportation Engineers. DRAFT Traffic Engineering for Neotraditional Neighborhoods. ITE Technical Committee P.-8. Washington, D.C. 1992.
- 4 Szplett, David, and Larry Sale. An Acceptable Neotraditional Neighborhood Design. ITE Journal. (July. 1997): 42-48.
- 5 Szplett, David, and David Butzier. "Design Guidelines for Transportation Elements of Neotraditional Neighborhoods." Institute of Transportation Engineers' 1998 Annual Meeting Compendium of Technical papers.
- 6 Ada County (Idaho) Highway District. Development Policy Manual. Boise, Idaho. 1996.

## DESIGN ELEMENTS OF SPEED CONTROLLED SUBDIVISIONS

### - Summary of Strategies -

Traffic Calming Strategy	Effects of the Design Element	Cost	Comments
Street Cross Section	<ul style="list-style-type: none"> <li>· Can reduce typical street section to 29-foot and allow two-sided parking.</li> <li>· The 32-foot street section has same benefits with higher user acceptance.</li> </ul>	<ul style="list-style-type: none"> <li>· \$100 per linear foot.</li> <li>· Little cost savings for narrower streets</li> </ul>	<ul style="list-style-type: none"> <li>· Savings come from larger buildable lots and less paved surface area.</li> <li>· Suggest parkway strips to prevent sidewalk parking.</li> </ul>
Street Alignment	<ul style="list-style-type: none"> <li>· Create curved streets with 350-foot radii seem to be a good compromise.</li> <li>· Any curves help.</li> <li>· Straighter streets result in higher speeds</li> </ul>	<ul style="list-style-type: none"> <li>· \$100 per linear foot.</li> <li>· Little change in cost for curved roadways.</li> </ul>	<ul style="list-style-type: none"> <li>· Benefit comes from better visual impact.</li> <li>· Eliminates drivers more than 10 MPH over the limit.</li> <li>· Straighter streets result in higher speeds.</li> <li>· Tight curves may complicate subdivision design.</li> </ul>
Traffic Chokers	<ul style="list-style-type: none"> <li>· Benefit comes from narrower traffic lanes.</li> <li>· 20-foot width ideal for residential streets.</li> <li>· Midblock locations are effective but require special site planning.</li> <li>· Corner locations affect turning radii.</li> </ul>	<ul style="list-style-type: none"> <li>· No extra cost for new design</li> <li>· \$2,500 for retrofit conditions</li> </ul>	<ul style="list-style-type: none"> <li>· Does not affect adjacent lot sizes.</li> <li>· Requires no special maintenance.</li> <li>· Assists pedestrian movements.</li> </ul>
Median Islands	<ul style="list-style-type: none"> <li>· Benefit comes from narrower traffic lanes.</li> <li>· 20-foot width needed with on-street parking.</li> <li>· Midblock locations are effective but require special site planning.</li> <li>· Corner locations affect turning radii.</li> </ul>	<ul style="list-style-type: none"> <li>· \$2,000 for typical construction (\$50 per sq ft)</li> </ul>	<ul style="list-style-type: none"> <li>· Smaller medians often maintained by homeowners.</li> <li>· Larger medians require funded maintenance program.</li> <li>· Reduces adjacent lot sizes.</li> <li>· Can be integrated with other design subdivision elements.</li> </ul>
Block Length	<ul style="list-style-type: none"> <li>· Has little impact upon travel speeds.</li> </ul>	<ul style="list-style-type: none"> <li>· \$200,000 per street segment.</li> <li>· May also reduce number of lots.</li> </ul>	<ul style="list-style-type: none"> <li>· Not a cost effective solution.</li> </ul>

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## **ABSTRACT**

Traffic calming is a popular topic for transportation planners and engineers as we try to make subdivisions more liveable. ITE has even developed a special toolbox of traffic calming measures. A common and simple traffic calming approach is to construct road humps, traffic barriers and unnecessary stop signs. Unfortunately, these kinds of measures are often viewed as negative by drivers who are not speeders or by emergency services providers. Road humps also cause noise and are less effective with sport utility vehicles. More driver-friendly solutions are needed.

The authors are an elected member of a city council and an engineer managing a prominent engineering consulting firm in Ada County (Boise), Idaho. The City is responsible for approving the design of new subdivisions and the street system. The City must respond to existing concerns over the volume and speed of vehicles on existing streets. Originally, mitigation measures such as road humps were the popular choices. Increasing public complaints have encouraged an alternative approach. The two staffs have developed a comprehensive list of curvilinear roadways, traffic chokers and discontinuous streets to reduce travel volumes and speeds for new subdivisions without the perceived impacts of road humps and unnecessary STOP signs.

## **STUDY PROCEDURE**

The program included nearly fifty streets with various traffic calming controls. Reported are the traffic speeds, traffic volumes and local residents calls with complaints or support. The data show that some passive solutions are just as successful as the more punitive solutions. The passive approach also results in fewer citizen complaints and have lower overall costs.

## **VALUE TO OTHER RESEARCHERS**

Traffic engineers, site planners and citizen groups are all interested in planning and implementation of traffic calming measures. A cookbook list of low cost and effective solutions should lead to better planning and a happier public.