Residential Street Topology Policy Proposal

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Introduction

Over the course of my city council campaign last year it quickly became apparent to me that District III residents are generally satisfied with their neighborhood quality of life, with one important exception. Deep Discontent with neighborhood traffic volume and speed is pervasive.

At the same time, our direct experience with several of the most obvious tactics for reducing residential traffic speeds, such as heightened enforcement, reduced speed limits and (unwarranted) stop signs has mostly served to illustrate the ultimate futility of these methods. I don't think that any of us would argue at this point that heightened enforcement has more than a temporary affect on neighborhood speeding. Unwarranted stop signs actually *increase* accident rates – we need to formally eliminate this tactic from our bag of tricks. Reducing speed limits also lessens traffic safety by increasing the variability of speeds on a street. (This is why state law *mandates* that speed limits be set at a speed that 85% of drivers on the street drive within.) As we've observed, most drivers drive at the road's design speed, not the posted speed limit. We take our clues concerning safe driving speed from the design of the roadway, not its signage. Thus, if we really want to affect neighborhood traffic speeds, it's clear that we need to focus our attention on aspects of street geometrics that affect the *design speed* of our streets.

One of the publications that I read cited the experience of a traffic enforcement official in Washington:

> *"John Moffat, the Washington Governor's Highway Safety Representative and a former Seattle police captain in charge of traffic, states that it is impossible to enforce traffic laws when the playing field has no clear rules. He compares law enforcement with the game of basketball: if the court has no defined shape and if the hoop keeps moving, then the referee cannot control the game. The same is true with police traffic work. Police cannot correct speeding behavior without help from engineering. When 50 to 85% of the public is speeding because roadway design says "It's OK to go fast," law enforcement officers have no place to begin. Only by designing roads where 85% or more of the public is compliant can the remaining motorists be corrected."*[1]

The author went on to describe an experiment in Washington where one street was "traffic calmed" while a parallel street was subjected to rigorous traffic enforcement, instead. On the calmed street, average speeds were *permanently* reduced from 44 mph to less than 30 mph, while, on the parallel street, average speeds were *temporarily* reduced by 4 mph through intensive enforcement (over 300 tickets issued over 2 weeks).

Relationship between Speed and Danger

The concerns of Bloomington neighborhood residents are well founded. The Local Government Commission brochure, *Designing Safe Streets and Neighborhoods*, summarizes the issue well:

> "As one might expect, deaths and injuries to pedestrians increase significantly as the speed of motor vehicles goes up. The reason is obvious: As vehicle speeds increase a driver's ability to respond to danger is substantially reduced. But the relationship is not linear. At 15 mph, a vehicle will be able to stop forward movement in 73 feet. But double the speed to 30 mph, and it will take 196 feet. At 40 mph., it will take over four times the distance for the car to stop.

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[1] Local Government Commission Center for Livable Communities, Dan Burden author, *Street Guidelines for Healthy Neighborhoods*, pages 25-26, January, 2002.

So what happens when a person is hit at these speeds? At 15 mph, the odds of surviving are approximately 96%. But when a person is hit by a car traveling at 31 mph, the odds are significantly reduced. And at 45 mph, the odds of survival are just 17%. "

(Statistics from the ITE publication, *Traditional Neighborhood Development Street Design Guidelines*, June 1997.)

I don't think that any of us would question that fact the higher neighborhood traffic speeds translate into more accidents, and more deadly accidents. The question is, what can we do about it?

Relationship between Street Topology and Speed

I found several studies concerning the relationship between street topology and speed and/or accident rates. The most frequently cited study is a study conducted by Swift & Associates in Longmont, Colorado[2]. This study correlated street width with accident rates and found that accident rates increased, *more than linearly*, with increases in street width beyond 24", the safest width. At 24', the accident rate was 0.32 accidents per mile per year, while at 36', Bloomington's current standard, the accident rate climbed to 1.21 accidents per mile per year, a roughly fourfold increase in accident rates. (Note: According to Shelly Pederson, current Longmont traffic officials have distanced themselves from this study, citing concerns over the quality of the raw data.)

A second study, conducted locally by the University of Minnesota and SRF consulting, suggests that a combination of street topology elements commonly associated with traditional neighborhood design (e.g., narrower tree lined streets with short blocks and reduced setbacks) can favorably influence vehicle speeds in residential neighborhoods[3]. I spoke with Joni Giese of SRF, one of the principal authors of this study. According to Joni, the most significant impact is not on the average speed; rather, it is in the reduced incidence of "outlier" speeds, i.e., the number of drivers traveling at greatly excessive speeds. Anecdotally, this is consistent with our Nesbitt Ave. experiment. According to Chief Willow, average speeds on Nesbitt have not declined much since we painted out a lane; however, there are far fewer drivers traveling at very high speeds. Consequently, the neighborhood perceives that the street has become much safer for local residents.

The third study, conducted in Europe, correlated street width with average speed, and found that, for street widths between 17' and 36', average speeds increased significantly with street width.[4] The average speed on 17' wide streets was 28 mph, while the average speed on 36' wide streets was 40 mph.

I've obtained copies of all three of these studies and provided them to Staff. In addition, Joni Giese of SRF told me that she recently conducted another study in this subject area for MNDOT that will shed additional light on the issue. However, she is unable to discuss the results of this study until it is released by MNDOT, in about a month.

The basic theory of why narrower street widths reduce vehicle speeds is based upon cognitive research that shows that, the faster we travel, the narrower the roadway *appears* to us. Physically narrowing the street is believed to accentuate this effect.

All of the authors of these studies emphasize that more research needs to by done on this subject. It is conceivable that in the Longmont study, for example, street widths were simply a proxy for the whole package of traditional neighborhood design elements (i.e., that 24' wide streets also tend to posses short blocks, short setbacks, etc.) and that simply narrowing streets

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[2] Swift and Associates, *Residential Street Topology and Injury Accident Frequency*, March, 1999

[3] Giese, Davis and Sykes, *The Relationship between Residential Street Design and Pedestrian Safety*, August, 1997.

[4] Farouki, Omar and Nixon, *The Effect of the Width of Suburban Roads on the Mean Free Speed of Cars*, 1976

might not have the desired affect on neighborhood vehicle speeds unless accompanied by these other design elements (which are absent in many Bloomington neighborhoods).

Given that the City's GIS staff has essentially completed its work on compiling the City's street topology data and entered it into the GIS system, I believe that we should pursue duplicating the Longmont study using our own data in order to collect the information that we need to make an empirically informed decision on this subject. In order to conduct this study, we would have to integrate the City's injury accident data from the Police Department into the GIS database, as well as general accident data that can be obtained from the insurance industry. The methodology used in the Longmont study was simple and straightforward, and will be easy to duplicate if we can acquire good data. Either a consulting firm, such as SRF, or U of MN grad students from the Center for Transportation Studies could conduct this study. (This would be a *dream* dissertation for a CTS grad student.)

Expert Recommendations

In addition to these studies, I also obtained and reviewed a number of traffic engineering publications that discuss residential street design, including publications that were published and/or sponsored by the two primary professional organizations of the traffic engineering profession, The Institute of Traffic Engineers (ITE) and the American Association of State Highway and Transportation Officials (AASHTO). Most of these publications discourage the practice of establishing "one-size-fits-all" residential street width policies, at 36' or any other "standard" width.

However, I was nonetheless struck by the fact that ***I was not able to find a single publication by <u>any</u> organization or <u>any</u> author suggesting that non-collector residential street widths in excess of 28' are <u>ever</u> appropriate.***

The following language from the AASHTO "Green Book", the traffic engineer's bible, was typical:

> *"Some streets primarily are land service streets in residential areas. In such cases, the overriding consideration is to foster a safe and pleasant environment. The convenience of the motorist is a secondary consideration."*[5]

> *"On residential streets in areas where the primary function is to provide land service and foster a safe and pleasant environment, at least one unobstructed moving lane must be ensured even where parking occurs on both sides. The level of user inconvenience occasioned by the lack of two moving lanes is remarkably low in areas where single-family units prevail. … In many residential areas a 26' wide roadway is typical. This curb-to-curb face width provides for a 12' travel lane and two 7.25' parking lanes. Opposing conflicting traffic will yield and pause on the parking lane area until there is sufficient width to pass."*[6]

Note that the "Green Book" blesses 26' non-collector residential streets, *even when parking is allowed on both sides of the street*. (On-street parking is generally prohibited on most Bloomington streets.)

The most comprehensive guide to all aspects of residential street design is the book, *Residential Streets*, published jointly by the ITE, the Urban Land Institute, the American Society of Civil Engineers and the National Home Builder's Association.[7] With respect to pavement widths, this publication states:

> *"Residential street designers should select the minimum width that will reasonably satisfy all realistic needs, thereby minimizing construction and annual maintenance costs, while at the same time maximizing the livability of the community. The tendency of many communities to equate wider streets with better streets and to*

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[5] AASHTO, *Geometric Design of Highways and Streets: Local Urban Streets*, page 428, 1994.

[6] Ibid, page 431

[7] ITE, ULI, ASCE and NAHB, Walter Kulash, principal author, *Residential Streets*, Third Edition.

design traffic and parking lanes for free-flow traffic is a highly questionable practice. Certainly, providing for the free flow of traffic in two 11- or 12-foot lanes that are never occupied by parking can encourage traffic to speed. Encouraging slower traffic speeds through narrower streets can improve the safety of streets for residents. Some studies indicate that as a street becomes wider, accidents per mile increase exponentially; and that the safest residential street may be a narrower street.

On most local streets, a 24- to 26-foot wide pavement is the most appropriate width. This provides either two parking lanes and a traffic lane (yield flow operation) or one parking lane and two moving lanes (slow flow operation). For lower volume streets with limited parking, a 22- to 24 –foot wide pavement is adequate.

For low volume streets where no parking is expected (for example, large-lot, rural communities), an 18-foot pavement is adequate. Widening access streets a few more feet does not significantly increase capacity, but it does permit wider moving lanes that tend to encourage higher driving speeds. A wide access street also lacks the intimate scale that makes an attractive setting for housing."[8]

The last sentence makes an important point. Whenever the City proposes to widen an existing neighborhood street, the neighborhood residents rise up in arms. This is because they intuitively know that widening their street will "disturb its quiet residential character" and negatively affect their property values. In fact, several of the publications that I read make this point explicitly: widening quiet residential streets *can* negatively affect property values.[9] This raises an important legal issue with respect to the City's assessment policy (25% of the cost) on the Pavement Management Program: It is only legal for the City to assess property owners for street improvements if the City can show that the improvements will commensurately *increase* property value. To add insult to injury, the City's current policy also inflates the amount of the assessment that will be incurred by neighborhood property owners. *Residential Streets* points out that a 36' street is almost 50% more expensive to build than a 24' street.[10]

Finally, I would like to note that not all Twin Cities suburbs have consistent 32-36' street width policies. In the City of Golden Valley's PMP brochure, under the heading "Are you going to Widen my Street?" it states: "Not necessarily. The PMP is set up so maintaining the existing width of roadways is a priority."

Policy Indications

My research indicates the following neighborhood traffic calming policy direction for the City of Bloomington.

Focus on Design Speed

The overall impression that is conveyed by these publications is that, at the policy level, cities should focus on design speed rather than street width, per se. "Design speed is the speed selected by planners for determining the various geometric design features in a planned roadway."[11] The authors of Residential Streets recommend a design speed policy of 20 mph for

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[8] Ibid, pages 22-23.

[9] Local Government Commission Center for Livable Communities, Dan Burden author, *Street Guidelines for Healthy Neighborhoods*, Introduction, page 1, January, 2002.

[10] ITE, ULI, ASCE and NAHB, Walter Kulash, principal author, *Residential Streets*, Third Edition. page 24.

[11] Ibid, page 29

local streets, and 30 mph for residential collectors.[12] The authors list a number of street design features that can be used to influence a neighborhood street's design speed.[13]

I believe that the Bloomington City Council should establish a "Design Speed Policy" along these lines for inclusion in the City's formal Transportation Policy document. Instead of dictating how this policy objective is to be met, we should commission City Staff to work with, and through, the City's Traffic and Transportation Advisory Commission to develop a menu of specific design elements that can be used, as appropriate, to implement the City Council policy. I have obtained a copy (as has Staff) of the City of Minneapolis' draft "Traffic Calming for Neighborhoods" guide, which consists of just such a menu. This guide has been developed out of several years of direct research into the effectiveness of various traffic calming devices by the City of Minneapolis. Once this guidebook has been established, its guidelines should be implemented over time as part of the PMP program.

Involve the Emergency Response Community

It is important that the City's emergency response community (both fire and police) participate in the development of this guide. The publications that I have read are in basic agreement that the fundamental requirement for adequate emergency response in residential neighborhoods is to ensure at least one free travel lane at least 10' wide, plus corners that are free of parked cars and other obstructions. However, these publications are also unanimous in stressing the importance of securing "buy-in" from the emergency response community for any formal street geometry policy.[14]

Interim PMP Policy

In the meantime, I believe that the City Council should adopt an interim policy for this year's Pavement Management Program to the effect that no non-collector residential street should be widened to more than the greater of its current width or 26' as part of this year's PMP.

Residential Collector Street Policy Review

With respect to residential collector streets (e.g., Nesbitt, 9 Mile Creek Parkway, etc) the literature suggests that painting out lanes, as we did on Nesbitt, is an effective strategy for reducing speeds without necessarily reducing traffic flows, since traffic throughput is maximized at speeds of about 35 mph.[15] There are numerous examples from around the country of cases where lane reductions reduced speeds *without decreasing traffic volumes* on the affected collector streets.[16] Staff and TTAC should also be charged with looking for opportunities to extend the "Nesbitt Ave. solution" to additional residential collectors. This part of the examination should include a consideration of lane widths, since the literature suggests that the width of the lanes may be as important a determinant of speed as the number of lanes (with 10' being a commonly recommended lane width).

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[12] Ibid, page 30. See also American Planning Association and State of Florida, Reid Ewing author, *Best Development Practices*, page 67, 1996

[13] Ibid, page 29

[14] Local Government Commission Center for Livable Communities, Dan Burden principal author, *Emergency Response, Traffic Calming and Traditional Neighborhood Streets*, and

Oregon Neighborhood Streets Project Stakeholders, *Neighborhood Street Design Guidelines*, November, 2000

[15] American Planning Association and State of Florida, Reid Ewing author, *Best Development Practices*, page 67, 1996

[16] Dan Burden and Peter Lagerwey, *Road Diets – Fixing the Big Roads*, March, 1999.

Related Policy Issues

In addition to issues of design speed and street width, my research, including discussions with residents of the Lakeview Road neighborhood, have revealed several other related policy issues that we need to address.

Curb and Gutter

There is significant neighborhood opposition to the imposition of "curb and gutter" as part of the PMP on streets where it has not previously existed. Objections seem to center on the additional expense, the additional right of way that is consumed, as well as a sense there will be a loss of rural character to the streetscape. However, all of my research indicates that curb and gutter is important because it promotes pavement longevity, improves drainage and more clearly delineates the boundary between the pedestrian and vehicular portions of the right of way. I've stumbled across a Golden Valley brochure that does an excellent job of explaining why curb and gutter is necessary. I believe that we should produce a similar informational piece for our citizenry and formalize our current policy of including curb and gutter in all PMP projects.

Sidewalks

Until I started my research into residential street width policies, I had long been convinced that Bloomington's most serious historical policy failure was its failure to require sidewalks in new residential developments. While I now feel that the City's 36' residential street width policy is an even more egregious policy failure, I still feel that the City should do everything within its power to rectify the sidewalk mistake. Specifically, I believe that we should direct Staff and TTAC to examine the feasibility of gradually turning 36' residential streets without sidewalks into 26' streets with at least one sidewalk, within the existing carriageway, as part of the PMP in future years, thereby killing two birds with one stone.

"Opt Out policies"

The City's current PMP policies include a provision that allows neighborhoods to "opt out" of participation in the PMP on a block-by-block basis, as long as all of the households on the block unanimously petition the City to be exempted. In the Lakeview Road neighborhood, the 4-6 households on Itzaak Walton Road have taken this route rather than see their street widened from about 2_ feet to 32 feet. Now that the rest of the residents of this neighborhood are aware of this option, several of them are out busily collecting signatures on opt-out petitions for their own blocks. This bothers me on several levels.

First, I am bothered by what appears to be a "take-it or leave-it" attitude on the part of the City: Either you allow the City to build your street out to the City's excessive standard widths, or you get nothing at all.

Second, I do not believe that it is in the City's self-interests to allow these streets to continue to deteriorate out of what looks like spite to the objecting residents. If, in fact, some of these streets are too narrow to meet emergency response requirements, then the City is perpetuating a dangerous situation by allowing the current situation to continue.

Third, taking the Lakeview Road neighborhood as an example, allowing residents to opt-out on a block-by-block basis is likely to result in a crazy quilt of improved and unimproved streets in affected neighborhoods.

At the same time that we amend our street width policies to make them more sensitive to legitimate neighborhood concerns, I believe that we should eliminate the "opt out" policy. Starting with the Lakeview Road neighborhood this year, all PMP priority streets should rebuilt under the City's new, more flexible pavement width policies, with no opt-out exceptions. In the specific example of Itzaak Walton Road, I believe that the right thing to do is to rebuild it at its current width, with curb and gutter (and I'm prepared to personally take this message to the affected households).