City of Madison

DEPARTMENT OF

TRANSPORTATION

Speed Humps and Transit Operation

(Revised October 24, 2019)

Introduction

Speed humps have become popular traffic calming measures with many installations in Madison as well as around the US. Their goal is to force traffic to 20 to 25 mph in low-speed neighborhood streets. However, they can have adverse impacts on the operation of larger vehicles, including transit buses (both fixed route and paratransit). The negative impacts for transit fall into three general categories: On-time performance, passenger ride comfort, and increased maintenance costs.

Current Status

Speed humps are found in locations throughout the City of Madison, including on streets on which bus routes operate. These routes were generally in place before the speed humps were installed. When planning any new routing, Metro staff attempt to avoid proposing operation over streets with speed humps.

In the current system, Metro buses are negotiating approximately 15,000 speed humps and other raised traffic calming features per week (this number does not include supplemental school day service). The proposed speed humps on Spaight Street would increase this total by about 1,100 encounters per week since Spaight Street is served by a core route (Route 3) and a commuter route (Route 38).

Effect on On-time Performance and Schedule Adherence

While it is difficult to determine precisely how much time is lost from operating over speed humps, additional time is required to negotiate them. As a bus approaches a speed hump, it first decelerates, then continues slowly across it, and finally accelerates again as the rear wheels clear the speed hump. A series of speed humps will have a greater impact.

The Federal Highway Administration (FHWA) compiled data from various municipal sources and found the impact be in the range of four to ten seconds per speed hump for emergency vehicles (1). Bus operators are trained to drive in a smooth fashion so that passengers are comfortable and also to reduce the number of falls and injuries on the bus, buses likely experience a delay in the range of 10-15 seconds for each speed hump. Metro relies on timed transfers at its transfer points, and if people miss their transfers, they may be delayed by up to an hour.

A further consideration is that many mainline buses in Madison operate on streets with speed humps because of the limited geography. People in cars should be driving on arterial streets designed for higher speeds and volumes free of traffic calming devices for most of their trips, but people in buses do not have that choice, and may spend an hour or more riding at low speeds, making many turns, and going over speed humps.

Passenger Comfort

Operating over a speed hump affects the ride for the passengers and driver of any vehicle but in the case of a bus, there are more passengers affected. Unless they are in a mobility device tie-down position, the passengers are not secured in any way. The seats of transit buses are typically made of molded plastic with a thin cover and does not offer the same protection offered by a typical car seat. Whether secured or not, passengers, seated or standing,are subjected to the jolts as the suspension

compresses and then expands again. This is especially concerning for seniors and other vulnerable passengers. There is an increased risk of a fall or a mobility device tipping over.

Maintenance Considerations

The suspension of a transit bus is based on large pneumatic air bags at each wheel, rather than metal springs. These provides the bus with an extra measure of stability, an important consideration given the size of the vehicle and the loads and conditions under which it operates. The cycling of compression and expansion of these air bags as speed humps are traversed has an impact on the longevity of these air bags, as well as other parts of a bus's suspension system and even the frame network.

It is nearly impossible to study the correlation between speed humps and wear on buses because buses change through the years, drivers act differently, speed humps have been around for a long time, and there are many factors that affect the life of bus parts. Metro's Maintenance Manager states that, based on his experience, the speed humps can be attributed to an increased number of maintenance issues, particularly frame cracks when the buses bottom out.

Conclusion and Metro Recommendation

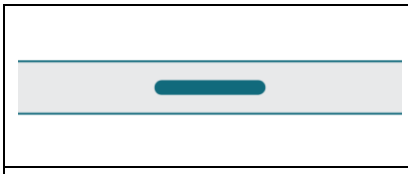
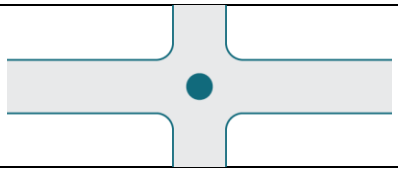
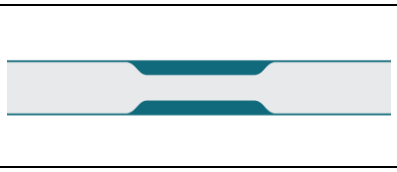
Over time, Metro buses are encountering more speed humps and other traffic calming measures within the route system. These features have negative impacts on transit service, affecting on time performance, ride quality, and exacerbating maintenance issues. Other transit systems in the US have developed policies against the placement of speed humps along bus routes because of the adverse impacts. Examples include:

The South Carolina DOT says that speed humps are not desirable "on a primary emergency response or bus route." (2)

Delaware State DOT states that, "Raised crosswalks/speed tables … should not be used on the primary routes for emergency vehicles and transit buses." (3)

Virginia State DOT says, "Streets on major transit routes or that experience significant use by such vehicles should consider use of non-intrusive devices" (4)

There are several possible traffic calming solutions to reduce speeding on neighborhood streets. Metro recommends that speed humps be considered on streets that see 10 or fewer buses on a typical weekday and that no speed humps or speed tables be used on arterial streets. For neighborhood streets with more than 10 buses per day, Metro recommends strategies like median islands, traffic circles, and pinch points.

		
Median	Traffic circle	Pinch point

Source: NACTO

Sources

(1) *Traffic Calming ePrimer.* Federal Highway Administration. https://safety.fhwa.dot.gov/speedmgt/ePrimer_modules/module5.cfm

(2) *SC DOT Traffic Calming Guidelines.* FHWA, sourced from South Carolina DOT. https://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa09028/resources/SCDOT%20Traffic%20calming%20guidelines.pdf (page 12)

(3) *Delaware Traffic Calming Design Manual.* National Association of City Transportation Officials, sourced from Delaware DOT. https://nacto.org/wp-content/uploads/2015/04/DE-Traffic-Calming-Manual_2012.pdf (pg II-28)

(4) Traffic Calming Guide for Neighborhood Streets. Virginia Department of Transportation. http://www.virginiadot.org/programs/resources/Traffic-Calming-Guide-For-Neighborhood-Streets.pdf (pg 18)