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TO: The Honorable Detroit City Council

FROM: David Whitaker, Director
Legislative Policy Division 

DATE: July 31, 2025

RE: **CORRELATION BETWEEN PARTICULATE MATTER AND SPEED HUMPS**

Council Member Scott Benson has requested that the Legislative Policy Division provide a report that analyzes and examines the correlation between speed humps (traffic calming devices) and increased particulate emissions. This report addresses several questions posed by Council Member Benson concerning the competing public interests, community health and safety, and related offsets.

Speed Humps, Safety, and the Distribution of Particulate Matter

Speed humps are a commonly used traffic calming measure in urban neighborhoods across the United States. According to the Federal Highway Administration, these humps physically force drivers to slow down, reducing speeds by 20% to 30% on average.¹ Historically, speed reductions through the installation of speed humps have reduced both crashes and severity of injury resulting from crashes. The City of Detroit saw a 36% reduction in crashes on residential streets where speed humps were installed in 2021.² While this is certainly a positive trend, the City must ensure that speed humps are properly installed, maintained, and marked for visibility, otherwise they could contribute to vehicle damage and potentially create unsafe road conditions.

¹ <https://highways.dot.gov/safety/local-rural/speed-management-manual-local-rural-road-owners/3-identifying-countermeasures#:~:text=A%C2%A0speed%20hump%C2%A0is%20a%20raised%20section.0.6>

² <https://detroitmi.gov/news/city-installs-1000th-speed-hump-celebrates-safer-neighborhood-streets-today>

Speed humps are a form of traffic calming that is intended to slow down vehicles and improve safety, however they can lead to frequent braking and re-acceleration. This pattern of stop and go driving has been linked to higher levels of particulate matter (PM) around these devices. Studies have found PM concentrations near speed humps to be between two to five times higher near roads with these devices compared to roads without.³ Simulations support these findings, suggesting that speed humps can contribute to increases in air pollution.⁴ Additionally, the added fuel consumption from idling, braking, and re-accelerating can also contribute to elevated PM.⁵

Speed Humps and the Distribution of Particulate Matter

PM exposure, both long and short term, is directly linked to a wide variety of chronic and acute health problems. According to the National Institute of Environmental Health Sciences,⁶ exposure to PM can cause or exacerbate health conditions such as but not limited to:

- Upper Respiratory Diseases
 - Asthma
 - COPD
 - Chronic bronchitis
 - Upper respiratory infections
 - Decreased lung function
 - Upper respiratory discomfort such as difficulty breathing and coughing
- Cardiovascular Disease
 - Nonfatal heart attacks
 - Irregular heartbeat
 - Hypertension
- Cancer
 - Leukemia
 - Lung cancer
 - Colorectal and prostate cancer
 - Breast cancer

While PM exposure can affect anyone, there are certain groups that face a higher risk of harm from prolonged exposure. These groups include individuals with respiratory conditions, the elderly, children, communities of color, and those living in low-income neighborhoods. Due to systemic factors that can contribute to long-term exposure, these populations tend to be more vulnerable to the health impacts of PM.⁷

Mitigation and Offset Strategies

Reducing vehicle-related emissions is an important strategy for addressing the health risks associated with increased PM. One effective approach to aid with mitigation is the use of vegetative buffers. Trees, shrubs, and other dense plantings are forms of vegetive buffers that can help capture and filter PM. This is

³ Hab P. Baltrėnas, T. Januėvičius, A. Chlebnikovas, Research into the impact of speed bumps on particulate matter air pollution, Measurement, Volume 100, 2017.

⁴ Obregón-Biosca, Saúl.A.. (2019). Speed humps and speed tables: Externalities on vehicle speed, pollutant emissions and fuel consumption. Results in Engineering. 5. 100089. 10.1016/j.rineng.2019.100089.

⁵ Baltrėnas 2017, *supra*.

⁶ <https://www.niehs.nih.gov/health/topics/agents/air-pollution>

⁷ <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>

done by trapping airborne particles on their surfaces reducing their spread.⁸ According to findings from the EPA, densely planted vegetation along roadways is significantly more effective at capturing PM compared to sparse plantings, which offers minimal benefit. In areas where this PM mitigation strategy is not feasible, the City should explore other potential road calming strategies such as road diets, speed-feedback signs, curb extensions, protected intersections and lanes for bicycles and pedestrians, and other strategies outlined in the City's Safe Streets for All Plan. In addition, green infrastructure such as rain gardens and bioswales can help trap dust and improve airflow.⁹

Next Steps

Though designed to enhance public safety, speed humps may have unintended impacts by increasing PM in the areas where they're installed. While PM exposure may still occur, integrating natural systems such as vegetative buffers can aid in limiting the volume and spread of PM, ultimately helping to protect community health offsetting the impacts speed bumps can have on communities.

Please contact our office if we can be of any further assistance.

⁸ Deshmukh P, Isakov V, Venkatram A, Yang B, Zhang KM, Logan R, Baldauf R. The effects of roadside vegetation characteristics on local, near-road air quality. *Air Qual Atmos Health*. 2019.

⁹ <https://www.epa.gov/system/files/documents/2025-01/recomm3.pdf>