

FINAL REPORT

Four Hills Speed Hump Evaluation Study

Albuquerque, New Mexico

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Executive Summary

The City of Albuquerque installed fifteen speed humps along Stagecoach Road and Wagon Train Drive in the Four Hills neighborhood during September and October of 2004. Six additional humps were installed in May 2005 along Warm Sands Drive in response to resident concerns on that street that traffic seeking to avoid the speed humps on Stagecoach Road was diverting to Warm Sands Drive. The speed humps along Stagecoach Road and Wagon Train Drive impacted the major circulating route in the Four Hills area, the route that the great majority of vehicles must take entering or leaving the neighborhood. Concerns have been raised in the general neighborhood with regard to the impact these speed humps may have on emergency vehicle access to the area and the overall impact on public health. This study was undertaken at the request of the City Council as an independent assessment of this issue.

This report contains an analysis of the public health impact of the speed humps in the Four Hills neighborhood with a new fire station to be sited on Via Posada. This addresses both lives saved by accident reduction and lives lost by delays to emergency vehicles caused by the speed humps. It also examines the overall traffic safety impact of speed humps within Albuquerque. Specific recommendations are made for the roadway sections within Four Hills now covered by speed humps.

This study also examined geometrics, operations, and safety throughout the speed hump portions of Stagecoach Road and Wagon Train Drive, especially specific conditions and current traffic turning volumes at the following intersections:

- Four Hills Road and Stagecoach Road (North “Y” Intersection);
- Four Hills Road and Stagecoach Road (South Intersection by Country Club);
- Stagecoach Road and Warm Sands Drive;
- Stagecoach Road and Stagecoach Lane;
- Wagon Train Drive and Via Posada; and
- Wagon Train Drive and Sagebrush Trail/ Cuatro Cerros Trail.

Evidence is presented that a number of alternative strategies and devices that do not cause any delay to emergency vehicles can be implemented that can also reduce traffic accidents and/or traffic speeds and may substitute for the speed humps. These alternative strategies include roadway re-striping to create narrower travel lanes, installing bulb-outs (also known as neckdowns or chokers or curb extenders) to narrow the roads at a few points, installing raised median islands to narrow the roadway at other points, employing transverse rumble strips and optical speed bars (transverse lines across the road), and applying better delineation, using mirrors, reflectors, and signage to highlight danger areas.

It is believed that the alternative measures proposed, in combination with the downward trend in accidents in this area, will result in safe traffic conditions little different than existing conditions with the speed humps on Stagecoach Road and Wagon Train Drive. The recommendations would also result in considerably less delay to emergency vehicles, thereby improving overall public health.

The analysis developed the following findings and recommendations:

FINDINGS

Roadway Accident Analysis

- Traffic accidents in the affected roadway sections have been in decline, averaging only 1.5 traffic accidents per year since 1995 and averaging only 0.5 accidents per year since 2001. In the 1990-1994 period traffic accidents in the same sections were averaging 4.6 per year.
- Only 19% (8 of 42) of traffic accidents between 1990 and 2005 on the affected roads involved injuries, most of them minor. In fact, 80% of the injuries were recorded as Class C, meaning “*Complaint of injury but none visible*”.
- Only 23.8% (10 of 42) of the traffic accidents between 1990 and 2005 involved either “*excessive speed*” or speed “*too fast for conditions*” as one of the highest contributing factors causing the accident.
- Only 20% of these 10 speed-related accidents involved injuries, none of which occurred after 2001, three years before the speed humps were installed
- While there are few accidents, 67% of those which occurred after 1995 were concentrated in two areas: 1) the horizontal and vertical curve area on Wagon Train Drive between Toro Street and Cuatro Cerros Trail; and 2) the horizontal curve area on Wagon Train Drive and Stagecoach Road between Running Water Circle and Via Posada.

Speed Humps Impacts

- Speed humps in Albuquerque were found to reduce the rate of injury accidents by about 6% and the overall accident rate by about 7%.
- Less than 1% of injury accidents in Albuquerque involve fatalities.
- Assuming 1.5 traffic accidents per year, the speed humps in Four Hills would prevent only about three or four injuries (3.4 injuries) and no deaths (0.024 deaths) over 50 years.

Fatality Increase Due to Speed Humps Involving Cardiac Arrest

- Because of its high proportion of the aged, the general Four Hills area (Census Tract 7.10) population is 40% more susceptible to cardiac arrest.
- Cardiac arrest requires rapid treatment as brain damage occurs after three minutes and the likelihood of survival diminishes rapidly after five minutes; a delay of even a fraction of a minute significantly decreases the chances of survivability.
- The American Heart Association’s Survivability Curve for intervention in sudden cardiac arrest was applied to the entire area that would be served by the new fire station on Via Posada and impacted by the existing speed humps. The impact area was sub-divided into 48 zones, each coded for travel time from the fire station at 30 mph, for the number of speed humps that emergency vehicles would have to traverse en route, and for its population. The Survivability Curve model was then applied to gauge the number of fatalities induced by speed hump delay. The impact area consists of Four Hills Village, Winterwood Park, and the eastern portion of Tijeras Arroyo south of Singing Arrow Park.
- Using data developed by the Portland, Oregon Fire Department, fire trucks would be delayed an average of 4.8 seconds per speed hump while the smaller rescue squad vehicles would be

delayed an average of 2.6 seconds per speed hump. The average emergency vehicle would be delayed 4.0 seconds per speed hump.

- Under existing conditions but with a new fire station on Via Posada with 21 speed humps in the impact area, the average emergency vehicle would go over 5.3 speed humps incurring 21 seconds of delay. If the Southeast Detour via Wagon Train Drive is used, the average emergency vehicle would go over 4.0 speed humps incurring 16 seconds of delay.
- A conservative estimate of delays due to the existing speed humps would be 18.7 additional fatalities (with a standard deviation of 11.7) in the Four Hills impact area over 50 years with a new fire station to be sited on Via Posada. This is about one additional death every two and a half years or about 800 times the lives estimated saved by the speed humps.
- Delays due to speed humps under the recommended plan would reduce additional fatalities to 7.8 (with a standard deviation of 11.8) over 50 years or about 300 times the lives estimated saved by the speed humps with the new fire station. This reduction would be because most of speed humps on primary emergency routes would be eliminated. Were all speed humps removed, there would be no additional fatalities due to delay.
- Without the new fire station on Via Posada, emergency service from Fire Station #12 would take longer to reach the Four Hills and overall fatalities would be higher, with the impact of the speed humps only adding to the long trip. Therefore, there would be fewer fatalities attributable to speed hump delay.
- Switching emergency service from Fire Station #12 to a new station on Via Posada would reduce the trip to Four Hills by over a mile with the faster response estimated to save nearly 130 lives over 50 years (with a standard deviation of 10.3).

Other Emergency Medical Problems

- Delays induced by speed humps would tend to increase the spread of fires, increasing the likelihood of burns and damage to lungs.
- Because of its high proportion of the aged, the general Four Hills area (Census Tract 7.10) population is 52% more susceptible to stroke.
- Delays induced by speed humps would tend to increase the damage from stroke, drowning, hypothermia, heat stroke, heat exhaustion, seizures, septic shock, burns, drug overdose, and reactive airway disease.

More Limited Use of Speed Humps

- Speed humps have a long distance “shadow” effect in reducing speeds up to 3,500 feet away and were found to do so by 2-11% in Four Hills Village. Therefore, a wider spacing of speed humps would also be effective in restraining vehicle speeds.
- It is widely recommended that speed humps should not be employed on primary emergency response routes such as Stagecoach Road or Wagon Train Drive.
- It is recommended by many jurisdictions that speed humps should not be employed on bus routes, a point applicable to parts of Stagecoach Road and Warm Sands Drive.
- It is also recommended by many jurisdictions that speed humps should not be employed on collector or major local routes. Many jurisdictions have guidelines that they should not be

placed on routes with weekday volumes exceeding 3,000 vehicles, a level exceeded on Stagecoach Road as far east as Warm Sands Drive and on Wagon Train Drive at Via Posada.

Alternatives to Speed Humps

- Many other measures have been proven to be effective at reducing speeds or reducing accidents or both. While each is generally less drastic than speed humps are in reducing speeds, the cumulative effect of employing several of these measures should result in keeping speeds at acceptable levels and at making drivers more alert and safer.
- The re-striping already implemented in the southern sections of Stagecoach Road and Wagon Train Drive achieved a slight reduction in speed even where traffic was moving along very near the speed limit to begin with.
- The perception by motorists of a narrower roadway by re-striping generally tends to reduce speeds and make driving a bit safer.
- The use of bulb-outs (also known as chokers, neckdowns, or curb extenders) also makes the street narrower and generally results in speed reduction.
- Two studies have demonstrated that the use of bulb-outs makes streets safer, with dramatic reductions in accident rates relative to sites without these devices.
- Raised median islands also make streets narrower, generally resulting in a reduction of both accidents and speeds.
- Transverse rumble strips and optical speed bars (transverse lines across the road) have also been found to cause speed reduction and promote safety.

RECOMMENDATIONS

The following measures are recommended for the affected roadway sections in Four Hills so as to reduce delay to emergency vehicles while simultaneously retaining or adding safety features that would tend to slow general traffic and foster driver safety:

- Remove 10 of the 15 speed humps on Stagecoach Road and Wagon Train Drive and 2 of the 6 speed humps on Warm Sands Drive.
- Under the recommended plan with a new fire station on Via Posada and nine speed humps in the impact area, the average emergency vehicle would go over 2.0 speed humps incurring eight seconds of delay. If the Southeast Detour via Wagon Train Drive is used, the average emergency vehicle would go over 1.7 speed humps incurring seven seconds of delay.
- None of the speed humps recommended for removal are in the two problem sections where 75% of all vehicles involved in accidents have experienced collisions.
- To address one of the two prime problem areas, install two raised median islands in the curve on Wagon Train Drive between Toro Street and Cuatro Cerros Trail while retaining the one speed hump there.
- To address the other prime problem area, install a raised median island in the curve on Wagon Train Drive and Stagecoach Road between Running Water Circle and Via Posada

along with enhanced signage and delineation (including reflectors, mirrors, and striping) on this curve while retaining both speed humps there.

- Add measures to slow traffic on the west part of Stagecoach Road between the “Y” at Four Hills Road and the western end of Lamp Post Circle by installing two raised median islands there, with a bulb-out just west of the “Y”.
- On the eastern part of Stagecoach Road between the “Y” and Four Hills Court, install another bulb-out just east of the “Y” while retaining the speed hump east of Four Hills Road.
- Extend the re-striping already in place on the southern sections of Wagon Train Drive and Stagecoach Road onto all of the affected street sections.
- Consider installing transverse rumble strips at intervals along the affected street sections, subject to an examination of noise levels.
- Install optical speed bars at approaches to the curve in the northwest section of the roadway.
- Prior to the opening of the new fire station on Via Posada, ensure that emergency vehicles can unlock the metal gate now barring through movement on Calle Verda to permit faster emergency vehicle access to the neighborhood to the north.
- At the Four Hills Road and Stagecoach Road North intersection (the “Y”), extend the sidewalk along the western side of Four Hills Road through the intersection, tapering out northeast of Lamp Post Circle.
- Also at the “Y” intersection, add arrow signs and painted arrows on the pavement to better delineate the inbound left turn movement and add “Merge” signs to warn of the merge between the two inbound turning movements.
- At the Four Hills Road and Stagecoach Road South intersection (by the Country Club), trim the bushes to ensure adequate sight distance to and from the east while also adding arrow signs and painted arrows on the pavement to better delineate the inbound left turn movement and add “No Entry” and “Merge” signs to prevent collisions.
- The City should consider re-classifying Four Hills Road north of Stagecoach Road as a Minor Arterial and re-classifying Stagecoach Road and Wagon Train Drive as Minor Collector streets.
- The ABQ Ride #1 Juan Tabo bus route should not operate on Stagecoach Road and Warm Sands Drive because of the presence of speed humps there.
- The City might consider a general policy of de-centralized emergency medical response service from more stations to reduce response times and, in areas where speed humps have been allowed to proliferate, make greater use of lighter rescue squad vehicles.
- The City might monitor before and after speeds and accident trends on Stagecoach Road and Wagon Train Drive if the recommended plan in this report is adopted.
- The City should adopt guidelines not to install speed humps where weekday volumes are less than 500 vehicles a day or greater than 3,500 vehicles a day or on collector or primary emergency response routes or where 85th percentile speeds do not exceed 30 miles per hour.