Traffic Calming Device Policy for Clark County Municipalities

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INTRODUCTION

Due to recent changes in traffic calming device policy for private residential communities and commercial properties in Clark County and the City of Henderson, I’ve prepared this report to clarify these issues in all Clark County municipalities.

Pedestrian and traffic safety has become a prevalent issue in residential communities. The danger to children and pedestrians from speeding vehicles in neighborhoods has been well documented. The number of pedestrian accidents has risen dramatically the last few years.

Speeding in residential communities is often a Homeowners Association’s primary safety concern, largely because of the perceived risks to children. Many communities in Clark County lack sidewalks for pedestrians and are poorly lit; they have community parks with children at play and often long winding stretches of roadway with parked cars lining the street. These factors combine to create dangerous conditions in neighborhoods and increase the potential for a tragic accident.

The problem is not limited to aggressive drivers with a disregard for the safety of the residents in the community. It is often the residents themselves who are exceeding the posted speed limits. The fact is you have to pay close attention to drive at a safe speed of 15-20 MPH. If not, it is quite common for drivers to be traveling at speed of 30 MPH or more. Sometimes a lot more.

If you think about it, we are conditioned to drive at higher speeds than those required in residential communities. We drive 65-70 MPH on the freeways, exit onto surface streets traveling 45-50 MPH and then are expected to drive 20 MPH when we get into our neighborhood. It really requires a lot of concentration to maintain a safe slower speed.

At 30 MPH, the average braking distance (reaction time + stopping distance) is 109 feet. If a child suddenly darts out into the street from behind a parked car, there is just not enough space to brake in time to avoid an accident. This does not even factor in “residential distraction” which is a serious problem on neighborhood streets.

Rather than set up before leaving their driveways, drivers are adjusting mirrors, finding sunglasses, lighting cigarettes and adjusting the radio while they drive through the community. Even more dangerous, they are texting and talking on cell phones. One second of distraction equates to over 50 feet of braking distance.
In 2011 there were 4,432 pedestrian fatalities in the United States, with an estimated 69,000 injured of which 11,000 were under the age of 14 years old. Last year 42 people were killed in pedestrian accidents in Las Vegas, and this year so far over 40 people have been killed – which puts us on track to have more than last year.

Recently a 71 year old woman was killed by a driver in a gated community in Seven Hills. Police stated speed was not a factor but I have to wonder, “Was the driver really driving the posted speed limit or maybe a little faster like 30 MPH?” As you will learn later in this report pedestrian fatality rates are alarmingly high at this relatively slow speed.
TRAFFIC CALMING SOLUTIONS

Pavement Markings and Signage

The first issue that should be addressed is to make sure pavement markings are freshly painted and traffic signs in place.

**Stop bars and STOP stencils** should be at every stop sign. This will define a location where the driver needs to stop and also define the lane to keep approaching drivers from cutting the corner into the oncoming lane.

**Lane dividers** at curves in the street will also encourage drivers to stay in their lane and not cut the corner in order to maintain speed. These can either be in the form of painted lines (reflective double yellow is best) or raised pavement markers (RPMs) such as dots or reflectors. The problem with using RPMs is they are not indestructible and are prone to breaking and removal when vehicles do drive over them. The street is left with an ugly scar or divot when the RPM is removed which is difficult to patch.

Any location where two streets with a sidewalk intersect is considered a crosswalk. There are two types: Marked and unmarked. “Marked” crosswalks obviously have pavement markings defining the area for pedestrians to cross the street. Even if there are no pavement markings, these are “unmarked” crosswalks where pedestrians can potentially cross the street. Consideration should be given to adding crosswalk pavement markings at these locations.

**Stop signs** should be in place at least in one direction at all intersections. Make sure trees and other landscaping do not block the sign from the view of drivers. Some communities have decorative stop signs that look nothing like traditional red stop signs. Drivers have a tendency not to notice these signs rendering them ineffective. If this is an issue in a community, consideration should be given to repainting or replacing these signs with traditional stop signs.

Often, communities only place speed limit signs at the entrances to the neighborhood. Adding additional speed limit signs will help remind drivers the speed they should actually be travelling as opposed to a potentially unsafe speed. County speed limits in residential areas is 25 MPH, however many private communities have much narrower streets, lack sidewalks, are not as well lit and have winding streets creating “blind corners”. Reducing the speed limit to 15 or 20 MPH will encourage a much safer rate of speed for drivers. Some communities have even added speed limit signs with unusual numbers such as 12 ½ MPH with the intent of getting the attention of speeding drivers.
Traffic Calming Devices

Traffic calming is the slowing or reduction of vehicle traffic to improve safety for pedestrians and bicyclists and improve the environment for the residents. Visual and physical modifications to roads are made to bring about more attentive driving, reduce speeds, and crashes and along with a greater tendency to yield to pedestrians.

Traffic calming measures can be separated in two groups; volume control measures and speed control measures. Volume control measures mainly address cut through traffic while speed control measures primarily address problems associated with speeding.

Since this report is focused on traffic calming issues in private residential communities, where volume control is not a concern, it will concentrate on speed control measures. Also, there are many types of traffic calming devices for speed control; however this report will only address those that are practical and financially feasible in private HOA communities. The following are conventional traffic devices used on residential streets to control the speed of drivers:

Speed Bumps

A Speed bump is a vertical traffic-calming device that is a bump in a roadway or parking lot with heights typically ranging between 3 and 4 inches. The length of speed bumps are typically less than or near 1 foot, however some “flat top” designs are approximately 3-4 feet in length (see Table 1). Most speed bumps are asphalt, although portable rubber and plastic devices are also available.

Although speed bumps are effective at keeping vehicle speed down and are relatively inexpensive to install, their disadvantages preclude their use in Clark County private communities.

The primary concern is speed bumps hinder the response time for emergency vehicles; for this reason they are not permitted by any Southern Nevada fire department.

Other disadvantages to the use of speed bumps are they can damage cars, can cause discomfort to drivers and passengers, are noisy and may cause speeding vehicles, particularly motorcycles, to lose control.
**Speed Humps**

**Speed humps** are a rounded vertical traffic-calming device used to reduce vehicle speed and volume on residential streets. Although similar to speed bumps, they are less aggressive at low speeds and are used primarily in streets and not parking lots. Humps are placed across the road to slow traffic and are often installed in a series of several humps in order to prevent cars from speeding before and after the hump with the intention of keeping vehicles at a safe, constant traveling speed. They are generally 3 to 4 inches high and 14 feet long (in the direction of travel), making them distinct from the shorter “speed bumps” commonly used in parking lots, condo complexes and mobile home parks.

Speed Humps are really designed for long, straight streets and roadways. It is very difficult to place the speed humps in areas of concern and also apply the required pavement markings at the specified dimension and adhere to the regulations for locations. The speed humps cannot be placed in front of driveway approaches and since most communities have alternating driveways there is a very limited amount of locations where they can be installed.

Another criticism of speed humps is they force emergency vehicles to travel at slower speeds. Clark County and the City of North Las Vegas do not permit speed humps in residential areas for this reason. Other concerns are they are difficult to construct accurately, can be expensive and require what one HOA board member described as “aesthetically obnoxious” pavement markings.
Raised Pavement Markers (RPMs)

Raised pavement markers, often referred to as RPMs are the yellow and white dots or reflectors common on streets and highways as lane dividers. RPMs can be configured in clusters to form a type of “rumble strip” designed to alert drivers of upcoming stop signs or cause them to slow down.

Raised Pavement Markers are highly visible and effective at alerting distracted drivers. They are also inexpensive install. Because of their low-profile, RPMs do not hinder the response of emergency vehicles and are permitted by Southern Nevada fire departments.

Although effective at alerting drivers, RPMs are only marginally effective at slowing vehicles. Another concern is they frequently become loose, broken or pressed into the asphalt pavement requiring frequent maintenance. Also, if a community decides to have them removed, they will leave unsightly divots in the pavement.

Paver Rumble Strips

Traffic Calming Solutions, LLC, also known as Paver Patch, has developed a traffic calming device called the “Paver Rumble Strip” as a safe and effective alternative to speed bumps and speed humps. Paver Rumble Strips are approved by the fire departments for use in private residential communities and commercial properties.

Paver Rumble Strips are a low-profile traffic calming device designed to alert drivers to impending intersections and crosswalks, as well as make drivers aware they may be travelling at an unsafe rate of speed in residential communities. Speeding is often a function of distraction as drivers have to pay close attention to drive at posted speeds of 15-25 miles-per hour.
Unlike speed bumps, Paver Rumble Strips do not impede the response of emergency vehicles. As opposed to 14-foot speed “humps” that are difficult to locate without encroaching on driveway approaches, fire hydrants, mailboxes and utilities; Paver Rumble Strips are much easier to position in established areas of concern.

Paver Rumble Strips have proven to reduce average speed, 85\textsuperscript{th} percentile speed and the percentage of drivers exceeding the posted speed limit. Observers have noticed when the Paver Rumble Strips are first installed, brake lights can be seen as drivers travel over them. After a couple of months the brake lights are seen prior to vehicles traveling over the Paver Rumble Strips as drivers have been conditioned to slow down in the established areas of concern.

Paver Rumble Strips are comprised of interlocking concrete pavers installed into an asphalt pavement. Alternating courses of flat pavers are set flush with the adjacent pavement along with three rows of rough “Rumble Stone” pavers that project approximately ¼” to ¾” above the pavement surface. They are packaged in palletized kits containing the required paver product and pre-measured material necessary to install an 8-foot wide section.

For streets without sidewalks or when access is required for bicycles, wheelchairs, strollers, etc., 24-inches of the raised Rumble Stone Pavers are replaced with flat pavers on one side of the device providing 32-inches of access plus the width of the valley gutter. The replacement pavers are the same color as the Rumble Stone pavers to present a consistent appearance to drivers.

Paver Rumble Strips are now approved by the municipal fire departments in Clark County, the City of Las Vegas, the City of Henderson and the City of North Las Vegas.
TRAFFIC CALMING DEVICE POLICIES AND GUIDELINES FOR CLARK COUNTY MUNICIPALITIES

The objectives of traffic calming include the reduction of traffic speeds and/or volume. As the objectives stated are desired, this also imposes strains on emergency response vehicles. The objectives of emergency response vehicles include minimum response times. The decreased speeds imposed by traffic calming devices, particularly speed bumps or speed humps are a concern to emergency officials.

When any traffic-calming program is being considered emergency response times must be included at the beginning of the process. Although emergency response times and their routes are a critical component of a traffic-calming concept it is beyond the scope of this report to further analyze them.

The following sections will outline the policies of the various Clark County municipalities’ fire and rescue departments for the permitting of traffic calming measures in private communities, including the types of devices allowed and the process for obtaining a permit, if necessary.

The Southern Nevada Amendments to the International Fire Code

Southern Nevada, including Clark County, Las Vegas, Henderson and North Las Vegas; has adopted, with specific consensus amendments, the 2009 International Fire Code for the purpose of prescribing regulations governing conditions hazardous to life and property from fire, hazardous materials or explosions.

The section pertaining to traffic calming measures is as follows:

503.4.1 **Speed bumps and speed humps.** Speed bumps and/or speed humps shall not be permitted within the required width of fire apparatus access roads.

**Exception:** Speed humps are allowed on private fire apparatus access roads serving commercial and industrial buildings when approved by the fire code official. The location(s), the number permitted, and the design of the speed hump(s) shall meet the approval of the fire code official.

The fire code official is authorized to require the removal from any private property of any existing traffic management or calming device, including speed bumps, that do not meet the applicable criteria, and has been determined by the fire code official to unnecessarily hinder emergency apparatus response.

**Justification:** This amendment is established to address committee concerns. The purpose of this amendment is to ban the installation of speed bumps and speed humps. The amendment allows for the removal of existing noncompliant traffic calming devices. The amendment allows for the installation of speed humps, subject to the approval of the fire code official, on private roads used for apparatus access.
The code specifies speed bumps are not allowed under any circumstance on public or private roads that are used for emergency vehicle access. Although speed bumps exist in some private community fire apparatus access roads, particularly in Clark County, they were never approved by the fire official and therefore are required to be removed.

The fire code official for a municipality may permit speed humps on private roads and commercial properties. Southern Nevada municipal fire departments have differing policy regarding the installation of speed humps which will be detailed in the following chapters.
The Clark County Fire Department does not permit speed bumps or speed humps in residential areas. Speed humps may be permitted on commercial properties. Paver Rumble Strips and other types of rumble strips are permitted in private residential communities as well as commercial properties. A permit application must be submitted to the Fire Department along with five (5) copies of the design specifications and a map or civil plan identifying the proposed locations. The permit fee is $40.00 or $160.00 for an expedited permit. The Fire Prevention offices are located at the Clark County Building Department on Russell Rd.

Although there are numerous asphalt and portable speed bumps installed throughout Clark County, many of which have been in place for years, they have never actually been approved by the Fire Department. Due to concerns over emergency vehicle response time, Clark County Fire Department is requiring communities, apartment complexes and commercial properties to remove the existing speed bumps.

The Clark County traffic calming device policy is as follows:

**TITLE:** FIRE APPARATUS ACCESS ROAD PLAN – TRAFFIC CALMING DEVICES

**SCOPE:** Clark County Fire Department requirements for the plan submittal and design for the installation of traffic-calming devices on private streets.

**PURPOSE:** To standardize plan/permit requirements required by the Fire Department in accordance with 2009 International Fire Code (IFC) and local amendments for permits for the installation of traffic-calming devices. Permits are valid through the duration of construction. Work must commence within 180 days, and remain active with no period of inactivity exceeding 180 days, or the permit becomes invalid.

**DEFINITIONS:**

**Assessor’s Parcel Number (APN):** A unique number assigned to each property by the Clark County Assessor’s office.

**Private Street:** Street or roadway on private property that is maintained by the property owner.

**Public Street:** Street or roadway in a public right-of-way that is maintained by the local municipality.

**Rumble Strip:** A traffic calming device that is low-profile and achieves traffic calming by vibrating a vehicle with excessive speeds. Rumble strips may consist of grooved pavement, traffic markers, paver systems, rubber mats, or any material meeting this guideline.

**Speed Hump:** A traffic calming device that is medium profile and achieves traffic calming by gradual ramping to an elevated height above the plane of the road.
Traffic Calming Device: A device which requires vehicles to slow down to proceed further down the road; such as speed humps or rumble strips.

PERMIT PROCEDURE INFORMATION:

Permit fees shall be assessed in accordance with the Permit Fee Schedule as adopted in the Clark County Fire Code. For applications that are expedited, additional fees shall apply.

SPECIFICATIONS AND REQUIREMENTS:

An application for Fire Apparatus Road Plan must be completed for each submittal. A minimum of three sets of plans shall be submitted with the permit application. Plans shall show compliance in accordance with the International Fire Code as adopted and amended by Clark County Fire Code. Plans shall provide details of the traffic calming device, including location on the fire lane, materials used, and dimensions of and between traffic calming components. All submittals must be legible and readable or the plan shall be rejected for cause.

Submittals shall address the following:

Traffic calming devices are discouraged on fire apparatus access roads. However, if they are to be provided, installation must conform to the following:

Speed Humps
(Note: permitted in commercial or industrial areas only)

1. A speed hump must be no higher than 3 inches at the highest elevation, measured above the plane of the adjoining roadway pavement.
2. A speed hump must be a minimum of 14 feet in length, measured along the direction of vehicle travel.
3. A speed hump must be identified by striping, signage and roadway marking per the attached example.

Rumble Strips
(Note: permitted in residential, commercial or industrial areas)

1. A rumble strip must be no higher than ¾ inches at the highest elevation.
2. A rumble strip must be a maximum of 8 feet in length, measured along the direction of vehicle travel.
3. A rumble strip is not required to be identified by striping, signage or roadway markers.

PERMIT REVISION AND RESUBMITTALS:

Revisions to approved plans are required to be submitted and approved. Revisions will be assessed additional plan review fees. A copy of the previously approved plan shall accompany the revised submittal to facilitate the review. Clearly indicate all changes to the revised plans by clouding the change with a delta number to signify the date of the plan change. When several changes have been made, a detailed list of changes is required.

Re-submittals to address a Letter of Correction will require a full submittal. These plans require a copy of the red lined plan from the previous submittal to facilitate the review. Clearly indicate all changes by clouding the change with the delta number to signify the date of the plan change.
PLANS CHECK STATUS INSTRUCTIONS:

The status of the review can be checked by logging on to: www.clarkcountynv.gov/depts/fire

INSPECTIONS THAT MAY BE REQUIRED AND SCHEDULING INSTRUCTIONS:

If approved, an inspection will need to be scheduled. To schedule an inspection, also go to: www.clarkcountynv.gov/depts/fire. A fire inspector will review your site in accordance with the approved plans and this guideline.

The Clark County Fire Department Fire Prevention Bureau (FPB) may witness and accept inspection, testing and maintenance of fire & life safety systems conducted by approved individuals as required by and within the scope and authority of the Clark County Fire Code.

This Guideline does not take the place of the Fire Code and does not take precedence over any Fire Code requirement or position taken by the Fire Chief. When a conflict exists between the requirements of this Guideline and the Fire Code or the opinion of the Fire Chief, the Fire Code or opinion of the Fire Chief prevails.

Technical Assistance, when required by the Fire Chief, will require a Technical Opinion and Report prepared by a State of Nevada licensed qualified engineer, specialist, laboratory or the safety specialty organization acceptable to the Fire Chief and the owner. The Fire Chief is authorized to require design submittals to bear the Wet Stamp and Signature of a professional engineer.

Acceptance of Alternative Materials and Methods requires a Technical Opinion and Report prepared by a State of Nevada licensed qualified engineer, specialist, laboratory or the safety specialty organization acceptable to the Fire Chief and the owner. The Fire Chief is authorized to require design submittals to bear the Wet Stamp and Signature of a professional engineer.

The Clark County Fire Department Fire Prevention Bureau is located at:
4701 W. Russell Rd., Las Vegas, NV 89118 (702) 455-3000
The City of Las Vegas

Speed bumps are prohibited installations per the fire code; however the Fire Department may allow the installation of speed humps built to their standards, as they provide a lower profile, which does not unnecessarily hinder the emergency apparatus response times. They also permit Paver Rumble Strips with the same permitting process as speed humps. The following is the traffic-calming process for Las Vegas Fire & Rescue:

PRIVATE DEVELOPMENT TRAFFIC CALMING DEVICES

In an effort to assist City of Las Vegas residents wishing to install traffic calming devices (Speed Humps) in private single family housing developments, the following process for the submittal, review, approval, permit issuance, and inspections have been developed.

Section I – Administrative Process:

A completed Fire Permit Application shall be submitted to Las Vegas Fire & Rescue Fire Prevention Engineering, located at 333 Rancho Dr., for the proposed speed hump installation by the installing contractor.

Required submittal items are as follows:

1. Scaled 1/8 inch drawings of all streets with all proposed locations of speed humps. (See Minimum criteria) including:
   a. All locations of proposed hump installation with street names and feeder street names.
   b. Locations of all required signage.
   c. Installing contractor information including: Name, local address, state contractors number and phone number.
   d. Speed hump specification drawing (See attachment A)

2. Completed Petition with at least 10 signatures of residents living along the street or streets that they are in agreement with the installation of the speed humps.

Reviews of submittal:

The following City of Las Vegas agencies will conduct a review of the proposed. This review process can take up to 10 working days.

- Fire Protection Engineering
- Land Development
- Traffic
Section II – Minimum Speed Hump Criteria

1. Street shall be posted with approved signage at 25 mph.
2. Installation of humps shall be visible from 200 feet.
3. Street grade shall not be higher than 8%.
4. Street shall not be a designated emergency response route (determined by Fire & Rescue)

Section III – Placement of Speed Humps

1. The first hump shall be within 100 feet of development entry.
2. Additional humps shall be spaced 400-600 feet apart.
3. No humps can be placed in front of driveways, fire hydrants or emergency access gates.
4. At least one hump shall be placed in each block of a control segment.
5. Speed humps shall be installed exactly at a right angle to the vehicular travel path.
6. Speed humps shall be installed with provisions made for any roadway drainage and utility access.
7. Speed humps shall be placed not to reduce the allowable on-street parking or special configuration.

Section IV – Signage

The most common warning sign is the MUTCD W-8-1 “BUMP” warning sign. The signs shall be located based on the MUTCD table II-I “A Guide for Advance Warning Sign Placement Distance”.

This document is available by accessing the Federal Highway Administration web site at: www.fwwa.dot.gov/

Section V – Markings

The speed hump shall be marked with distinctive painted markings so as to be visible to the approaching traffic. (See attachment A).

Section VI – Inspection of Installed Humps

As a result of the permitting process a code compliance inspection was created. The installing contractor will schedule the inspection by contacting the Fire Prevention Office at 229-0366 and talking to a supervisor.

Section VII – Liability Concerns

If speed humps are not installed in a proper manner and with due care, and vehicle or personal injury occurs, it is possible that the installing company could be found to be maintaining a public nuisance, i.e. a known defect in the street system which may result in increased liability exposure. Complete and proper approval documents should be retained.

Where streets with humps are expected to carry a substantial number of long wheel base vehicles or other special type such as motorcycles and bicycles, a special attempt should be made to warn and notify the drivers of such vehicles that speed humps exist and how they should be driven to minimize problems.
The City of Henderson

The City of Henderson has a newly revised traffic calming device policy that allows for speed humps and other “vertical deflections” on public streets and Paver Rumble Strips in private residential communities. Speed humps in private communities may be considered and will have to follow the same process as speed hump installations on public streets. The revised City of Henderson policy is detailed below in a report from City of Henderson Traffic Engineer, John Penuelas:

THE CITY OF HENDERSON TRAFFIC CALMING DEVICE POLICY

The City of Henderson new traffic calming policy is an expansion of the current process to include vertical deflections in the roadway. Vertical deflections include speed humps, speed cushions, speed tables, raised crosswalks, and raised pavers (approved for use only on privately maintained roads).

Other types of traffic calming measures are already in the tool box. These include chicanes, chokers (bulb outs), lane narrowing (striping), diverters, roadway narrowing (moving curbs in), increased landscaping, adding parking, addition of bike lanes, traffic circles, roundabouts, etc.

Current process for public roads:
- A person has concerns about speeding in their neighborhood and wants the City to do something about it
- They are sent to Public Works-Traffic Engineering Department
- The Traffic Engineering Department will do a field investigation to confirm all necessary regulatory signs (stop, yield, speed, etc.) are up, in good condition, and conspicuous
- Work orders are issued to correct any problems found, including adding additional speed limit signs
- Public Works will also schedule other traffic engineering studies if they are needed. All-way stop studies are the most common
- The case is cloned to the Police Department-Traffic Division who then schedules spot enforcement

When this is not enough to satisfy the person or neighborhood, the Public Works-Traffic Engineering Department will then:
- Take the issue to the Citizens Traffic Advisory Board
- In most cases, CTAB will ask Public Works-Traffic Engineering to conduct a study to determine the “nature and extent of the traffic problem”
- Public Works-Traffic Engineering will report their findings back to CTAB. It usually takes a couple of months to collect and analyze.
- If CTAB and the City Traffic Engineer agree that a significant speeding and/or cut-through problem exists and could be mitigated by the use of typical traffic calming measures Public Works-Traffic Engineering would then do the following:
  - Poll the people in the “study area” to gauge the feelings of the silent majority. Typical threshold values are 66% to 90% on the road under consideration and smaller values for nearby roads. We’ll have to decide on a number when we get to this point. CTAB will be able to help us with that.
  - Determine if we can tolerate any “spillover” to other streets or neighborhoods
  - Require submission of appropriate technical studies (drainage for sure and maybe others)
  - Create a special permit or issue encroachment and/or revocable permits. In any case, civil plans will have to be revised.
Determine a way to fund the installation of appropriate traffic calming devices. The following are some options that have been discussed. No decision has been made and probably won’t be made until we actually get to this point with a neighborhood.

- Put area on a prioritized list for construction as “City funds become available”
- Carve out a budget from a source yet to be determined and spend the money until gone. We would go as far down the list each year as possible given the available funds
- Require the HOA (Home Owners Association) or NA (Neighborhood Association) to foot the entire bill
- Some sort of cost sharing program between the HOA/NA and the City

Assuming the physical modifications are made we will then need to follow-up in a year or so to determine effectiveness and report to CTAB or Council. We would also have to create a process in which the people can petition to have the devices removed if they become unnecessary or a point of real neighborhood angst. Who pays for removal would then have to be settled.

Here are the minimum thresholds for vertical deflections:

- The street must not be designated as an emergency response route, bus route, truck route, or identified as a major or minor arterial.
- There must be physical room for the devices
- All drainage impacts must be fully mitigated
- There must not be an adverse impact to street maintenance activities
- Spill over to other streets must be “non-noticeable” as defined by the City of Portland’s traffic calming policy.
- Engineering judgment must be maintained and used
- The 85% speed must be 10 mph over posted speed. This number could be less in some circumstances.
- The average daily traffic volume must exceed 1000 vehicles per day. Again, this number could be less in some instances.
- A certain percentage of traffic on a residential street is “cut-through”. This number needs to be worked out with the help of CTAB.
- Fire Department has veto power.

This is the policy on public roads and would also be the policy on private roads if the neighborhood wanted to pursue any type of vertical deflection device other than raised pavers/rumble strips.

Raised Pavers/Rumble Strips:

If a private neighborhood wanted to try raised pavers/rumble strips then Traffic Engineering would only need them to submit and have approved a revision to the civil improvement plans showing the installation. Plans can be had from the Records Department for a nominal charge (typically $10.00). The neighborhood would also need to receive permission from the Engineer of Record (the civil engineer that stamped the plans) to make the revisions. If the EOR cannot be located or is no longer living we can deal with that. Some engineers may require that they prepare and submit the revision. The City charges $380 to review and approve plan revisions for each revision processed.

If the private neighborhood wanted to pursue other types of vertical deflections the process is as outlined above. The difference is that they would have to hire an engineer to prepare and stamp a plan for the City’s review. Public Works-Traffic Engineering would then make the determination if there is a need to go to CTAB and go down the path as outlined above.
In the opinion of John Penuelas, “The bottom line is I feel the pavers would be an excellent place to start for the private streets. I also feel they would be effective in controlling 90% or more of the problem. The pavers combined with an aggressive speed watch program administered by the HOA would knockout close to 100% of the problem in most cases.”
The City of North Las Vegas

North Las Vegas follows the Southern Nevada Amendments to the International Fire Code and does not permit speed bumps or speed humps in residential areas. The North Las Vegas Fire Department does not have an issue with Paver Rumble Strips they may be permitted with permission from the Traffic Engineering Department.

Clark County Traffic Calming Device Policy Matrix

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<tr>
<th></th>
<th>Speed Bumps</th>
<th>Speed Humps</th>
<th>Paver Rumble Strips</th>
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<tbody>
<tr>
<td>Clark County</td>
<td>NO</td>
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<td>City of Henderson</td>
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</tr>
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<td>City of North Las Vegas</td>
<td>NO</td>
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</tr>
</tbody>
</table>
ELECTRONIC TRAFFIC ANALYSIS

I’m not necessarily suggesting you install Paver Rumble Strips in your community. I don’t know enough about the conditions in your neighborhood to recommend them. When I meet with homeowner associations I always ask them to discuss their concerns with me so I have a better understanding of the situation.

I’m often told about speeding drivers, pedestrians and children in the street due to lack of sidewalks, near misses, poor lighting, long straight-aways and drivers running through stop signs. Sound familiar? I hear these same concerns all the time from Home Owner Associations and Community Managers.

Although the consensus is always drivers are speeding through the community, no one knows exactly how many drivers are speeding or how fast they are going. It’s just speculation and opinion.

I always recommend conducting an electronic traffic analysis in the community to quantify whether or not there is a need for any type of traffic calming device and if so, help determine the most effective locations. After completing the study I meet with the board and homeowners to discuss the data. In most cases I find they are right, they do have a problem. Even modestly higher speeds than those posted can spell the difference between life and death for pedestrians struck by a vehicle.

Communities with speed limits of 15 to 20 miles-per-hour will have 85th percentile speeds (the speed drivers are comfortable traveling) of around 30 MPH or more. Now someone will invariably say, “20 MPH, 30 MPH what’s the big deal?” Well, the “big deal” is if a pedestrian is hit by a car traveling at 20 MPH the fatality rate is only about 5% but at 30 MPH, only 10 MPH faster, the fatality rate jumps to 45%. At 40 MPH, the fatality rate is an alarming 85%! It’s not unusual to have data showing speeds of 40, 50, even over 60 MPH in these residential communities.

<table>
<thead>
<tr>
<th>Pedestrian Injuries at Impact Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>40 mph</strong></td>
</tr>
<tr>
<td>85% death</td>
</tr>
<tr>
<td>15% injured</td>
</tr>
<tr>
<td><strong>30 mph</strong></td>
</tr>
<tr>
<td>45% death</td>
</tr>
<tr>
<td>50% injured</td>
</tr>
<tr>
<td>5% uninjured</td>
</tr>
<tr>
<td><strong>20 mph</strong></td>
</tr>
<tr>
<td>5% death</td>
</tr>
<tr>
<td>65% injured</td>
</tr>
<tr>
<td>30% uninjured</td>
</tr>
</tbody>
</table>

...
These fatality rates increase for children and seniors and the injuries sustained are often long term disabilities that are devastating to families. Although these communities may never have had an incident, if they do there is a very good chance someone is going to die or be very seriously injured.

The electronic analyzers are small devices that are attached to the pavement with a black rubber cover. They are hardly noticeable. Most people assume they are those rubber tubes attached to a metal box, but that’s not the case.

They align themselves with the earth’s magnetic field and detect metal traveling in one direction through an area about three feet in radius from the device. Placed in various locations throughout the community, they collect traffic data including: Vehicle volume, speed and classification (length). The information includes the following data consolidated into reports and graphs:

- Vehicle Volume by Location and Time Range
- Average Annual Daily Traffic Volume (AADT)
- Peak Hourly Traffic Volume
- Vehicle Speed by Location and Time Range
- Percentage of Drivers Exceeding the Posted Speed Limit
- Average, Mode and 85th Percentile Speeds
- Braking Distance at 85th Percentile Speeds
- Vehicle Count for Speed Bins (0-5MPH, 6-10MPH, 11-15MPH... 66-70MPH)

This data will eliminate any contentiousness among residents who may disagree whether there is a safety issue with drivers speeding in the community. The traffic study will also help to identify specific locations where traffic calming devices will be most effective.

Oftentimes the data will eliminate locations where residents perceive the need for a traffic calming device is required but low traffic volume or vehicle speed does not justify the expense. In some cases, the data shows the vast majority of drivers are travelling at safe speeds and even though there is a perceived need for traffic calming, the data suggests otherwise.
There is a sample Traffic Analysis Summary Report and Data Spreadsheet included in the appendix to this report. The Master Reports include a massive amount of detailed data and graphs (for those prone to over analysis, like myself) is not included due to space restrictions. However, if you would like a sample report I’ll be glad to send you a copy via email.

I have found the most effective process is for me to attend the Homeowners Association meeting and discuss with residents and board members concerns about pedestrian and traffic safety in their community and answer any questions they may have regarding the traffic analysis, Paver Rumble Strips and the permitting process. If they feel it would be a benefit to proceed with the traffic analysis, I will present a proposal at that time. Once the traffic analysis reports are complete I meet again with the board to discuss the results of the study and if necessary recommend potential locations for Paver Rumble Strips based on the data and the layout of the community.
ABOUT MATT KREUZ

Although my background was in contracting sales, in particular concrete pavers, when we all but stopped construction in Las Vegas I went to work for an asphalt maintenance company. I figured you have to maintain asphalt, right?

While I was there, I noticed there was a lot of confusion regarding speed bumps and humps in residential communities. There really weren’t any practical options available for private communities to address the issue of drivers speeding through their neighborhoods.

There was another type of traffic calming device I was familiar with called textured pavement. A textured pavement is a rough or raised pavement, typically stamped concrete or paving stones. When drivers transition from a smoother concrete or asphalt pavement they involuntarily slow down when the vibration and sound from the textured pavement becomes noticeable.

As a contractor, we used textured pavements at the entrances to communities and commercial properties as well as certain areas of the streets. Most people thought this was for decorative purposes but it was also functional.

I had an idea... maybe I could create an extreme textured pavement using concrete pavers that could be an alternative to speed bumps and humps. Much to the dismay of the asphalt and concrete guys, I began cutting up the parking lot and installing pavers in various configurations until finally after several tries I drove my truck over the pavers and spilled my coffee. Eureka! I called my new traffic calming device “Paver Rumble Strips”.

I presented my design along with a permit application to Las Vegas Fire and Rescue for the Queensridge community and they were approved by the Fire Prevention Department as a low profile traffic calming device. It would be three more years before the City of Henderson approved the Paver Rumble Strips for use in private communities.

As the Paver Rumble Strips were installed in various communities it became apparent they actually worked very well. When first installed vehicles brake lights could be seen as the driver went over the Paver Rumble Strips, after a few months the brake lights went on as the driver approached meaning drivers were being conditioned to slow down in the areas the community was concerned about speeding drivers. Electronic traffic analysis conducted prior to and after
installation of Paver Rumble Strips showed a decrease in the percentage of drivers exceeding the posted speed limit and a reduction in average, mode and 85th percentile speeds.

I started thinking maybe I was on to something. Maybe my new little business venture could turn into something big and make a lot of money someday, but then something happened that changed my life and my whole perspective on the Paver Rumble Strips.

In October 2011, three little girls were crossing a street in North Las Vegas in a marked crosswalk after a car in the lane closest to them stopped. A car driven by an elderly woman in the outer lane did not stop. She crashed into the children and continued driving for 60 yards.

All three of the little girls were in very critical condition from their injuries and three days after being run down, six year old Mia Decker was taken off life support. The newspaper reported the family sang “You Are My Sunshine” as the girl drifted away. It was heartbreaking.

I attended an event called “Shine a Light for Mia” where Mia’s mother Michelle Terry hoped to raise money to install flashing lights at the crosswalk where her daughter was killed. She spoke at the event unable to hold back tears as she described how she will never get to see her daughter graduate high school or get married. About birthdays spent at her gravesite. Along with many of those in attendance, I was unable to hold back tears as well.

Remarkably, Michelle Terry forgave the woman that killed her daughter. You see, she wasn’t impaired, speeding or driving recklessly. She just wasn’t paying attention.

I realized then if a Paver Rumble Strip had been installed 80 to 100 feet prior to that crosswalk, it would have got her attention and she would have noticed the other car had stopped and the girls in the crosswalk. Maybe this horrible tragedy could have been prevented.

My little business venture is no longer about making money. It’s now about making streets and communities safer for pedestrians. Paver Rumble Strips can potentially save lives when installed in the streets of our residential communities.

I am currently working with the City of Las Vegas for approval of installation of Paver Rumble Strips on public streets and look forward to working with the other municipalities to make our streets safer for pedestrians.
Appendix

Electronic Traffic Analysis Summary Report

A sample Traffic Calming Solutions Electronic Traffic Analysis Summary Report from an actual location along with a sample Data Spreadsheet from multiple locations.

City of Las Vegas 14’ Local Speed Hump Drawings

City of Las Vegas detail drawings for a 14’ speed hump including pavement markings and signage.
Traffic Analysis for Sample Home Owner’s Association

Prepared by:

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Las Vegas, Nevada 89123
(702) 216-1212
matt@paverpatch.com
What is the 85th percentile speed?
The eighty-fifth percentile is a calculation used by traffic departments and agencies as a means of determining a normal range of vehicle speeds. If one hundred vehicles pass through the location, the function would rank the speeds from lowest to highest. The speed of the 85th vehicle would then constitute the 85th percentile. Many agencies post speed limits at the 85th percentile as opposed to the average speed. The average speed separates the fastest 50% and slowest 50% of motorists in a normal speed distribution. In other words, the average speed is typically the 50th percentile speed. Most motorists travel at about the same speeds, so setting the speed limit at the 85th percentile legalizes the vast majority of motorists. About 70% of motorists travel in a 10-mph grouping (called the "pace"), which generally covers all but the fastest 15% and slowest 15%. If the speed limit were set at the average speed, only 50% of motorists would be legalized.

Braking Distance

<table>
<thead>
<tr>
<th>Miles per Hour</th>
<th>Feet per Second</th>
<th>Reaction Time (1.5 Seconds) (In Feet)</th>
<th>Automobiles (In Feet)</th>
<th>Trucks (In Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>14.7'</td>
<td>22'</td>
<td>27'</td>
<td>28'</td>
</tr>
<tr>
<td>15</td>
<td>22.0'</td>
<td>33'</td>
<td>44'</td>
<td>47'</td>
</tr>
<tr>
<td>20</td>
<td>29.3'</td>
<td>44'</td>
<td>63'</td>
<td>69'</td>
</tr>
<tr>
<td>25</td>
<td>36.7'</td>
<td>55'</td>
<td>85'</td>
<td>95'</td>
</tr>
<tr>
<td>30</td>
<td>44.0'</td>
<td>66'</td>
<td>109'</td>
<td>123'</td>
</tr>
<tr>
<td>35</td>
<td>51.3'</td>
<td>77'</td>
<td>135'</td>
<td>155'</td>
</tr>
<tr>
<td>40</td>
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<td>190'</td>
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<td>45</td>
<td>66.0'</td>
<td>99'</td>
<td>195'</td>
<td>228'</td>
</tr>
<tr>
<td>50</td>
<td>73.3'</td>
<td>110'</td>
<td>229'</td>
<td>269'</td>
</tr>
<tr>
<td>55</td>
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<td>265'</td>
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<td>88.0'</td>
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<td>303'</td>
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<td>344'</td>
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<td>0</td>
<td>102.7'</td>
<td>154'</td>
<td>387'</td>
<td>465'</td>
</tr>
</tbody>
</table>

Pedestrian Injuries at Impact Speeds

- **40 mph**: 85% death, 15% injured
- **30 mph**: 45% death, 50% injured, 5% uninjured
- **20 mph**: 5% death, 65% injured, 30% uninjured
A study of vehicle traffic was conducted with HI-STAR unit number 2309. The study was done in the NBD lane at Private Community Street in Las Vegas, NV in Clark county. The study began on 09-23-2011 at 05:00 PM and concluded on 09-25-2011 at 05:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 30 minute time periods. The total recorded volume showed 500 vehicles passed through the location with a peak volume of 21 on 09-24-2011 at [11:00-11:30] and a minimum volume of 0 on 09-24-2011 at [00:30-01:00]. The AADT count for this study was 250.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 26 - 31 MPH range or lower. The average speed for all classified vehicles was 28 MPH with 81.56% vehicles exceeding the posted speed of 20 MPH. The HI-STAR found 0.82 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 26MPH and the 85th percentile was 37.35 MPH.

<table>
<thead>
<tr>
<th>SPEED</th>
<th>&lt; 6</th>
<th>6 to 10</th>
<th>11 to 15</th>
<th>16 to 20</th>
<th>21 to 25</th>
<th>26 to 30</th>
<th>31 to 35</th>
<th>36 to 40</th>
<th>41 to 45</th>
<th>46 to 50</th>
<th>51 to 55</th>
<th>56 to &gt;</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>3</td>
<td>17</td>
<td>70</td>
<td>108</td>
<td>125</td>
<td>82</td>
<td>53</td>
<td>17</td>
<td>3</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Problem with the battery detected. Try discharging and fully charging it

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 428 which represents 88 percent of the total classified vehicles. The number of Vans & Pickups in the study was 43 which represents 9 percent of the total classified vehicles. The number of Busses & Trucks in the study was 9 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 8 which represents 2 percent of the total classified vehicles.

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>&lt; 19</th>
<th>19 to 25</th>
<th>25 to 37</th>
<th>37 to &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>428</td>
<td>43</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

**HEADWAY**

During the peak traffic period, on 09-24-2011 at [11:00-11:30] the average headway between vehicles was 81.818 seconds. During the slowest traffic period, on 09-24-2011 at [00:30-01:00] the average headway between vehicles was 1800 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 48.00 and 105.00 degrees F.
NOTES:
1. LOW PROFILE TRAFFIC CALMING DEVICE DESIGNED TO REDUCE EXCESSIVE SPEEDS AND NOTIFY DRIVERS OF IMPENDING CHANGES IN TRAFFIC CONDITIONS SUCH AS STOP SIGNS, INTERSECTIONS, OR CROSSWALKS.

2. BASE THICKNESS DETERMINED BY THICKNESS OF EXISTING ASPHALT ALONG WITH TRAFFIC, CLIMATE, AND SUB-GRADE CONDITIONS.

3. THIS DETAIL IS NOT RECOMMENDED FOR OTHER THAN LOW VOLUME RESIDENTIAL STREETS WITH A POSTED SPEED LIMIT OF 25 MPH OR LESS.

PAVER PATCH  TRAFFIC CALMING PAVER RUMBLE STRIPS  INSTALLED IN EXISTING ASPHALT PAVEMENT  RESIDENTIAL COMMUNITIES
### Sample HOA Traffic Analysis Data

<table>
<thead>
<tr>
<th>LOC#</th>
<th>LOCATION</th>
<th>DIR</th>
<th>PER</th>
<th>AADT</th>
<th>PEAK</th>
<th>AVG</th>
<th>MODE</th>
<th>% EXC</th>
<th>85TH%</th>
<th>BRK &lt; 6</th>
<th>6-10</th>
<th>11-15</th>
<th>16-20</th>
<th>21-25</th>
<th>26-30</th>
<th>31-35</th>
<th>36-40</th>
<th>41-45</th>
<th>46-50</th>
<th>51-55</th>
<th>55+ &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>#01</td>
<td>Main 75FT E Oak</td>
<td>EBD</td>
<td>72-HR</td>
<td>284</td>
<td>189</td>
<td>25 MPH</td>
<td>21 MPH</td>
<td>96%</td>
<td>31 MPH</td>
<td>114 FT</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>129</td>
<td>249</td>
<td>145</td>
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<td>Main 75FT E Oak</td>
<td>WBD</td>
<td>72-HR</td>
<td>202</td>
<td>62</td>
<td>27 MPH</td>
<td>21 MPH</td>
<td>98%</td>
<td>35 MPH</td>
<td>135 FT</td>
<td>0</td>
<td>0</td>
<td>13</td>
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<td>96</td>
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<td>4</td>
<td>9</td>
</tr>
<tr>
<td>#03</td>
<td>Oak 300FT N Main</td>
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<td>72-HR</td>
<td>33</td>
<td>8</td>
<td>26 MPH</td>
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<td>91%</td>
<td>33 MPH</td>
<td>126 FT</td>
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<td>4</td>
<td>13</td>
<td>25</td>
<td>8</td>
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<tr>
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<td>10</td>
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<td>21 MPH</td>
<td>82%</td>
<td>28 MPH</td>
<td>99 FT</td>
<td>3</td>
<td>7</td>
<td>10</td>
<td>26</td>
<td>42</td>
<td>16</td>
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<td>92%</td>
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<td>130 FT</td>
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<td>21 MPH</td>
<td>21 MPH</td>
<td>86%</td>
<td>27 MPH</td>
<td>94 FT</td>
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<td>88</td>
<td>135</td>
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<td>76%</td>
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<td>18</td>
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<td>90 FT</td>
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<td>18</td>
<td>53</td>
<td>53</td>
<td>8</td>
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<td>20 MPH</td>
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<td>72%</td>
<td>29 MPH</td>
<td>104 FT</td>
<td>6</td>
<td>13</td>
<td>60</td>
<td>99</td>
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<td>89%</td>
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<td>119 FT</td>
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<td>22 MPH</td>
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<td>80%</td>
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<td>104 FT</td>
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<td>31</td>
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<td>99 FT</td>
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<td>16</td>
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<td>73%</td>
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<td>85 FT</td>
<td>1</td>
<td>4</td>
<td>12</td>
<td>26</td>
<td>14</td>
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<td>0</td>
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<tr>
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<td>Center 300FT N Water</td>
<td>NBD</td>
<td>72-HR</td>
<td>21</td>
<td>4</td>
<td>22 MPH</td>
<td>16 MPH</td>
<td>79%</td>
<td>31 MPH</td>
<td>114 FT</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>14</td>
<td>6</td>
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<tr>
<td>#16</td>
<td>Center 225FT N Water</td>
<td>SBD</td>
<td>72-HR</td>
<td>26</td>
<td>4</td>
<td>23 MPH</td>
<td>16 MPH</td>
<td>79%</td>
<td>31 MPH</td>
<td>114 FT</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>15</td>
<td>13</td>
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**DIR** - DIRECTION OF TRAFFIC  
**PER** - DURATION OF ANALYSIS  
**AADT** - ANNUAL AVERAGE DAILY TRAFFIC  
**PEAK** - PEAK VOLUME FOR 60 MINUTE PERIOD  
**AVG** - AVERAGE SPEED  
**MODE** - MOST COMMON SPEED  
**% EXC** - PERCENT EXCEEDING POSTED SPEED LIMIT  
**85TH%** - 85TH PERCENTILE SPEED  
**BRK** - BRAKING DISTANCE

**AVG**  
30 MPH  
109 FT  
19

**57**  
254

**516**  
548  
298  
110  
50  
21  
17  
11  
2

AVERAGE BRAKING DISTANCE  
21 FT  
37 FT  
55 FT  
76 FT  
99 FT  
118 FT  
153 FT  
183 FT  
216 FT  
251 FT

Prepared By Matt Kreuz - Traffic Calming Solutions, LLC.
**PARABOLIC CROWN**

**SECTION A-A**

**Speed hump design is based on ITE GUIDELINES TENC STF-01 JUNE 1997.**

**NOTES:**

1. SIGN LOCATION TO BE DETERMINED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DIVISION.

2. THE 3.50' SPEED HUMP HEIGHT SHALL NOT EXCEED THE MAXIMUM TOLERANCE OF ±1/4".

3. ADVANCE WARNING SIGNS SHALL BE INSTALLED PRIOR TO INSTALLATION OF NEW HUMPS AND BAGGED UNTIL HUMP IS PAVED.

4. INLAID SPEED HUMP MARKINGS AND "BUMP" LEGEND MARKINGS SHALL BE INSTALLED IMMEDIATELY AFTER HUMP IS INSTALLED.

**REVISIONS**

<table>
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<tr>
<th>Date</th>
<th>Revision Notes</th>
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<tr>
<td>01/29/03</td>
<td>REVISED MARKINGS AND SIGNS AS PER MUTCD 2003.</td>
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<tr>
<td>05/04/05</td>
<td>ADDED NEW DETAILED FOR 3 1/2&quot; HUMP HEIGHT.</td>
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<td>05/16/05</td>
<td>CHANGED ADVISORY SPEED FROM 25 MPH TO 20 MPH.</td>
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<tr>
<td>06/07/06</td>
<td>ADDED NOTES 3 AND 4.</td>
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<tr>
<td>04/06/07</td>
<td>CHANGED NOTE 2 TO NEW 3.50&quot; HUMP HEIGHT.</td>
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<tr>
<td>04/06/07</td>
<td>MODIFIED PARABOLIC CROWN DETAIL TO REFLECT 3.50&quot; HUMP HEIGHT AND ADDED INLAH HUMP DESIGN NOTE.</td>
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<tr>
<td>06/25/07</td>
<td>CLARIFIED TYPE 1 FILM</td>
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**UNIFORM STANDARD DRAWINGS**

**CITY OF LAS VEGAS**

**14' LOCAL SPEED HUMP**