THE EFFECTIVENESS OF TRAFFIC CALMING MEASURES IN REDUCING ROAD CARNAGE IN MASVINGO URBAN.

Ndhlou Pardon and Chigwenya Average

Lecturers National University of Science and Technology Faculty of the Built Environment, Department of Landscape Architecture and Urban Design
chigwenyaaver@gmail.com

ABSTRACT

Traffic calming is a useful way of controlling speeds where it is unnecessarily excessive and inappropriate for the place and uses in the surroundings, (Taylor et al, 2000). There are high incidents of road carnage in Masvingo urban and its peripheral areas despite the constructed traffic calming measures. The rationality of traffic calming measures was based on the need to improve safety and enhancing quality of life in urban areas and its neighbourhoods. The motivation behind carrying out the research was to assess the effectiveness of implemented traffic calming in Masvingo Central Business District and the high density residential areas of Mucheke and Rujeko. Research methodology used was explanatory research based on formative and evaluation research to gather qualitative and quantitative data. The research found out that speed humps are the most preferred and widely used traffic calming measure in Masvingo City and had managed to reduce road accidents by about 70%. The effectiveness of the traffic calming measures was determined by nature of the problem, local community involvement and the design. In addition to humps, speed tables were found to be significant in reducing road carnage contributing about 5.9%. There is need of a holistic approach in managing road accidents to include all road users. Human error was found to be the major cause of road accidents contributing 94% and animals and road design contributing 6%. It was therefore recommended that the Government must encourage increased activity in programmes of road awareness so as to educate the motoring public about good road ethics.

Key words; traffic management, urban safety, traffic calming measures, transport management

BACKGROUND

Traffic calming has its origins in the Dutch “Woonerf” schemes of the 1960’s, and since then has been further extended and refined throughout northern Europe, particularly in Germany and the Netherlands, (Lines and Castelijn 1991). Angry residents of the Dutch City of Delft fought cut-through traffic by turning their streets into woonerven, or “living yards” (Pharaoh and John, 1989). Woonerven is when once channels for the movement of cars are changed to become shared living areas, outfitted with tables, benches, sand boxes, and parking bays jutting into the street helping to bring motorists speed down to almost “walking speeds,” of about 15km/hr. The effect was to turn the street into an obstacle course for motor vehicles, and an extension of home for residents. This was sustainable only for short distances. This was followed by the development of European slow streets (designed for 30 km/h) in the late 1970s. The Netherlands and Germany invested heavily in urban traffic calming schemes over the 1970s and this spread to Britain which used the experience from these countries to perfect their instruments (Ewing, 1999). Later traffic calming measures were used in urban arterial routes in area wide schemes, principally in Germany and France in the 1980s (McGuigan, 2004).

In the United States of America, traffic calming was practiced as early as the late 1960s and early 1970s in such places as Berkeley, Central America, Seattle, Western America and Eugene (Institute of Transportation Engineers, 1999). The first national study on traffic calming was completed in 1980 in U.S.A. It explored residentially related traffic calming measures, collected performance data on speed humps, and reviewed legal provisions. In Asian countries like Japan, traffic calming concept started in the early 1980s by the introduction of "Road-Pia"
concept to reduce vehicle speeds and reduce conflict with pedestrians. This was complimented efforts from the Police and Local Governments (Rahman et al. 2005).

Traffic calming measures in Africa were introduced partially during the colonial era when most African countries were under the rule of the white minority. South Africa was the first African country to undertake research on traffic calming devices (Ribbens, 1995; Jobanputra, 2010) and this spread to other African countries like Zimbabwe, Tanzania, Uganda, Zambia and Kenya (de Langen, 2003). This was necessitated by the increase in accident rates in cities due to high traffic volumes causing vehicular and pedestrian conflict at crossing points.

Traffic calming measures in Zimbabwe were designed and implemented to caution pedestrian and vehicle conflict in major cities such as Harare, Bulawayo, Gweru, Masvingo and Mutare (Mbara, 2002). These measures were constructed to aid the existing traffic regulatory devices such as stop and give way signs, traffic lights and speed limit signs that worked more effectively under police enforcement. Vehicle and population increase in high density areas coupled with motorists misbehavior of breaking road regulations in the absence of police officers, prompted the need to implement self-enforcing measures (traffic calming measures) to harmonize vehicle and pedestrian movement, especially at intersections and pedestrian crossing sites. These were mainly in the form of speed humps, speed tables, rumbles (grids) and roundabouts.

Traffic calming measures studies is largely still at its infancy in Zimbabwe although much information is now available on accidents reports kept by the Zimbabwe Republic Police (ZRP), (Mbara, 2002). The police reports failed to find an answer as to why people die on country’s roads (Sunday mail, 16 June 2012). Reports generated by police after attending the scene of accidents have not been adequately studied to ascertain the exact causes of accidents. Police investigations lack the engineering aspect of the analysis there by under estimating the role of that can be played by road engineering on accidents (Sethi and Zwi, 1999). This has hindered road traffic authorities adequately deal with the problem of accidents and coming up with proper measures and planning to curb accidents.

Although Zimbabwe has introduced some traffic calming measures, they are not yet fully developed. There are still some variations in designs due to lack of proper design guideline to facilitate standard adherence. There is no written procedures and documented methodology to use in setting priorities for traffic calming device. Several traffic calming devices are installed in some areas but they are not assessed to ascertain their effectiveness in remedying the increasing road carnages. Some studies (Rahman et al. 2005, Ewing 1999, Hakkert and Gitelman, 2003), carried out in Europe, United States and Asia find out that traffic calming measures are effective in bringing road safety but the findings may not be wholly applicable to Zimbabwean challenges. The effectiveness of traffic calming measures was said to vary depending on the nature of the problem and behaviour of drivers. For example, the study by Rahman et al (2005) in Japan revealed that the improper design of these devices created more problems for residents than solving them as they increased noise and vibration levels.

The broad aim of the study is to examine the effectiveness of traffic calming measures in the city of Masvingo and is directed by the following specific objectives: to find out if the traffic calming measures in Masvingo, To assess the suitability of designs, construction and placement and then come up with ways and strategies that should be put in place in order to promote road safety in the city. Research methods used was explanatory research. This is an evaluative research method that appraises the effectiveness of what exists. The evaluation can be formative or summative. Formative evaluation sets to gain information to improve/change the traffic calming measures installed in Masvingo since problems of road carnage are experienced at traffic calmed sites. The summative looks at the impact of an intervention in terms of effectiveness.

Explanatory research involves the examination of why the accidents occurred and the cause-effects relationships of the occurrences. This will be achieved by understanding the underlying causes, examines the reasons for, and the associations between what exists.

The significance of the research is based on reducing high accident prevalence rates at intersections, crossing areas and other sections of the city roads. It is an attempt to harmonize vehicular and pedestrian
movement in Masvingo city. Most current accidents reports do not provide adequate information to determine basic causes of accidents, except for undetailed, reports from police who are unlikely to have no engineering background and hence underestimate the contribution of road engineering to the cause of accidents (Sethi and Zwi, 1999). The sources of information available are unpublished accident records compiled by police after occurrence of accidents that are not for public use. It is therefore imperative that a study of this nature be undertaken to ascertain the real causes of road accidents in Masvingo urban and to assess the effectiveness of the existing traffic calming measures in curbing road carnage. The research also seeks to establish other factors that could be contributory to road carnage in the present circumstances, and to plan measures to protect the motoring public by reducing the frequency and severity of accidents.

TRAFFIC CALMING MEASURES: THE CONCEPTUAL FRAMEWORK

There are many studies that had been carried out on traffic calming especially in Europe where the idea originated. Various scholars and researchers (ITE, 1999; Ewing, 1999; Taylor et al., 2000, van Schagen, ed. 2003) came up with different definitions of traffic calming, but they all converge at the general understanding that their major goal is to reduce vehicle speeds, improve road safety, and enhancing quality of life. There are 3 “E”s that traffic engineers often refer to when discussing traffic calming and these are education, enforcement, and engineering (Montgomery County, Maryland, trafficcalming.org). Other definitions (Institute of Transportation Engineers 1999, Harvey 1999) emphasize on only one ‘E’, that of engineering and they emphasized on devices that involve changes in street alignment, installation of barriers, and other physical measures that can adequately reduce traffic speeds and/or cut-through volumes, to attain street safety, livability, and other public purposes. The most effective traffic calming plans will however entail all three components (engineering, education and enforcement), as engineering measures alone will not produce satisfactory results.

Most of the studies (ITE, 1999; Ewing, 1999; Taylor et al., 2000; van Schagen, 2003, Ribbens, 1995, Harvey 1999) focused on vertical deflections (i.e. speed humps, speed tables, raised intersections and rumbles) although there are a range of other measures (horizontal deflections, narrowing and central islands) which can be used to calm traffic. (Harvey, 1999). Traffic calming measures are designed to be self-enforcing, although the effectiveness of this varies according to the measures employed and the design standards employed, (Taylor et al. 2000). They are a useful way of controlling driver’s speeds where they might unnecessarily over-speed putting other road user at risk, (ITE, 1999). Changes in speed can drastically reduce accidents and injuries. A 1.6km/hr reduction of speed can reduce the occurrence of accidents by an estimated rate of 5%, (Taylor et al. 2000). However, van Schagen (2003) argues that this reduction varies according to road type, and can be 6% for urban roads with low average speeds and 4% for medium-speed urban roads or lower-speed rural main roads and 3% for higher-speed urban roads.

Rahman et al (2005) in Japan justified the efficacy of traffic calming measures on the grounds of promoting pedestrian safety, reduction of noise and local air pollution. They emphasized the need to include design factors of traffic calming measures to broaden traffic engineering. The study showed that the rationality behind traffic calming measures is reducing of speed and volume of motor vehicles, reducing crash occurrence and severity, protecting neighborhood areas from the unwanted through traffic, reducing the environmental pollution caused by motor vehicles, reducing the noise caused by speeding vehicles, ensuring road safety for all users, especially for non-motorized users as pedestrians and cyclists, reducing the need for police enforcement and creating a safe and attractive streets while enhancing the street environment. However, despite the diverse views and definitions brought about on the field of traffic calming measures, almost all scholars have shared the same sentiments that they improve safety for pedestrians, motorists, bicyclists and the environment for residents.

TRAFFIC CALMING MEASURES IN MASVINGO.

Traffic calming measures are physical barriers that alter driver’s behaviour to reduce speed without the enforcement of the police. Whilst there are diverse traffic calming measures (vertical deflection, horizontal deflection, road narrowing and central islands) that have been designed and implemented in European countries, Masvingo City Council resorted to vertical deflections(speed humps, tables and
rumbles). Speed humps are the most widely used traffic calming measures in the city. They constitute 85% of erected traffic calming measures, while speed tables constitute 13% and rumbles are only 2%. Figure 1.1 below shows the implemented traffic calming measures in Masvingo City.

Widely constructed speed humps, were done according to the European standards as explained by Ewing (1998) in the United States. Preference for humps emanate from the points that they are cheap to construct and that they are more effective in reducing vehicle speed and accidents. Studies carried out in Great Britain (Webster and Mackie, 1996, Webster 1993) found out that an average of 22% decrease in the 85th percentile travel speeds (from a sample of 179 sites) and an average of 11% decrease in accidents. Speed hump is a ‘silent policeman’ operating 24 hours daily, (Rahman et al. (2005). Owing to their advantages of reducing speed, Masvingo City Council prefers to construct them. Also the council is facing perennial challenges of shortage of funds and expert personnel in the department of engineering. This led to preference of construction of humps as compared to other measures such as chicanes that are very expensive and requires expert skills in implementing them.

Masvingo city council indicated that due to financial handicaps construction of expensive traffic calming measures are of less priority as they focus on more pressing issues such as road maintenance, garbage collection sewer and water reticulation maintenance. The council indicated that it had prioritised sewer rehabilitation especially at Dikwindi primary school which needs a total overhaul for the infrastructure as it can no longer cope with the existing population. Road maintenance is also a pressing issue that calls for urgent attention (e.g. pothole filling,) and the council has very little money to do other jobs. The District Development Fund (DDF) is also facing the same problems where money allocated to them is inadequate and is prioritising refurbishment of national roads (Masvingo-Beitbridge). The highway is said to be in a state of disrepair, littered with dangerous potholes as a result of years of neglect and increased volume of traffic, which is exceeding the carrying capacity and is now regarded as a ‘death trap’ nationwide.

**STAKEHOLDER PARTICIPATION IN DRAWING THE NEEDED TRAFFIC CALMING MEASURES**

The designing and implementation of traffic calming measures is a process that needs the contributions from various stakeholders, proper management and assessment. The determination of the feasibility and applicability of traffic calming measures follows the whole project circle starting from: i) Problem identification and Needs Assessment, ii) Plan Development, Public Meetings, iii) Plan Implementation and Evaluation. This art of managing projects is to bring about consistency in achieving stated objectives within limits of time, budget and stakeholders’ satisfaction by directing and coordinating human and material resources. Rahman et. al. (2005) argued that the benefits which can be gained from traffic calming depend on the choice of appropriate traffic calming measures and proper design and implementation strategies employed. They further asserted that not all situations require the same type of traffic calming measures but the City Engineer has to determine the best measures to calm traffic in order to meet the severity of the problem. The nature of a problem determines the practicality and achievability of the intended objectives. Transport operators, school headmasters and pedestrians revealed that all road users need to be consulted on matters concerning implementation or alterations of road that will affect them. Figure 1.2. below shows the stakeholder perceptions about the need for their involvement in the design and implementation of traffic calming measures.
All the interested people showed that they are interested in having an input into what should be done on their roads. This instils a sense of ownership of projects into the beneficiaries especially the affected neighbourhood. This is also important because these are the people who are directly in contact with the problem and therefore are better placed to offer the best solution. Despite these strong sentiments, almost all traffic calming measures erected in Masvingo urban neighbourhoods were done in a blue print approach, where the technocrats from Masvingo City Council and ZINARA did the designs and implemented the traffic calming measures without consultation of stakeholders. They only consult other technocrats such as the engineers from ZINARA and the Road Traffic Safety Board. They argued that the consultation process needs a lot of resources, which they do not have.

DESIGN AND IMPLEMENTATION OF TRAFFIC CALMING MEASURES

The benefits which can be gained from traffic calming depends on the choice of appropriate traffic calming measures, nature of the problem, design standards and proper implementation of the selected traffic calming measures,(Sethi and Zwi, 1999). The applicability of traffic calming measures in reducing traffic accidents in Masvingo urban roads requires careful evaluation to ascertain the appropriateness, cost-effectiveness, affordability, and sustainability of the proposed device. The residents and motorists said that most of the erected measures have been borrowed from European countries. The standard profile of a hump developed and tested by Watts (1973) in the USA has a height of 76-100mm, a length of 3.6m-4.2m with a ramp gradient of 1:10 or steeper and built at a spacing of 80m to 150m. They do not suite Masvingo city’s environment as they are not deterrent enough to reduce speeding behaviour of motorists especially commuter drivers. There were considered to have been erected without proper needs assessment criteria resulting in them being inappropriate and ineffectively rectify the road carnage problem.

In Rujeko high density, along Mhizha street which collects most of traffic from Rujeko A, B and C was a death trap to all pedestrians crossing the road especially at Rujeko Clinic, Rujeko A Shopping Centre and Rujeko Primary School. Also Charumbira Street servicing Don Bosco primary and Dikwindi Primary School is regarded as a busy road having high volumes of both vehicles and human beings thereby increasing conflict and the prevalence of accidents. Charumbira road road passing through Don Bosco Primary school is heavily congested with traffic from Mucheke Bus Terminus and commuter omni-buses (combis) servicing the whole of Mucheke. During peak hours (0600hrs to 0800 hours)
‘combis’ were reported to be travelling at a speed of 40 – 50 km/h at these crossing points putting pupils at the risk of clashing with vehicles. Masvingo City Council was forced to construct the speed humps at Don Bosco primary and Runyararo Primary School and speed tables along Mhizha road using the American Watts standard in order to reduce vehicle speed. 1.1 below shows the impacts of construction of traffic calming measures at various points in Masvingo.

After the construction the first generation of devices they only managed to reduce vehicle speed to an average of between 40-50 km/h as shown in the table 1.1. These speeds were considered by Pasanen (1991) as unsafe and still had the likelihood of causing fatalities. Council redesigned the hump to have a height of 100-200 mm, length of 2m and spacing of 85m. These were erected in series rather than singular leading to an 85 percentile speed of 30km/h. Vehicle speed was significantly reduced thereby reducing the occurrence of accidents. This enhances safe crossing points for pupils and teachers at Don Bosco, Mucheke High and other crossing areas as indicated in Table 1.1 below

### Table 1.1: Comparison of vehicle speeds at control sites

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatment</th>
<th>Before (85 percentile vehicle speed km/h)</th>
<th>After 1st Treatment (85 percentile vehicle speed km/h)</th>
<th>After 2nd Treatment (85 percentile vehicle speed km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don Bosco</td>
<td>Speed Hump</td>
<td>57-65</td>
<td>40-50</td>
<td>30</td>
</tr>
<tr>
<td>Rujeko Primary</td>
<td>Speed Table</td>
<td>55-63</td>
<td>45-51</td>
<td>32-35</td>
</tr>
<tr>
<td>Runyararo Primary</td>
<td>Speed Hump</td>
<td>55-65</td>
<td>42-50</td>
<td>30-32</td>
</tr>
<tr>
<td>Craft centre</td>
<td>Rumble Strip</td>
<td>60-64</td>
<td>55-58</td>
<td></td>
</tr>
<tr>
<td>Mucheke High</td>
<td>Speed Hump</td>
<td>55-65</td>
<td>42-50</td>
<td>30-32</td>
</tr>
</tbody>
</table>

Source: Survey 2012

At Don Bosco Primary School, which is along Charumbira Street, the rate of accidents involving pedestrian especially pupils was high constituting 24% before revising the standard profile of the speed humps. These were caused by public motorist who did not give right of way to pupils on pedestrian zebra crossings. Also they are some pupils who were not crossing the road at designated sites risking being run-over especially by combi drivers. Also the constructed humps was not deterring drivers to reduce speeds to the required 30km/h. 85% of the accidents were attributed to driver error and 15% to pedestrian error according to police reports. However, Masvingo City Council Engineering department attributed the accidents to engineering factors leading to the redesigning and erection of the speed humps. The same epidemic was experienced at other crossing areas such as Rujeko Primary and Runyararo Primary. The revised standards and proper implementation of the traffic calming measures reduced accident rates by an average 33% at Don Bosco, 37% Rujeko Primary, 38.4%Runyararo Primary and 40% Mucheke high school. However at Craft center the rate of accidents remain very high and increasing by about 50% and the fatalities also remains very high recording a 100% increase

Pedestrian crashes on the zebra crossing area at the Craft Centre were presumed to be resulting from drivers who ignore the zebra crossing sign. This caused high accidents (63%). The crossing point is used by both pupils to and from schools in Rujeko and Mucche and it also the only link to the only bus terminus, the market and the city centre. It is also along the Masvingo –Beitbridge road, which also very busy. The area is very busy hence the high incidents of accidents. The area had shown an ever increasing number of accidents despite erection of traffic calming measures..
### Table 1.2: Road Accidents Recorded Before and After Redesigning of Speed Humps (%)

<table>
<thead>
<tr>
<th>Place</th>
<th>Accidents Before</th>
<th>Accidents After</th>
<th>Fatalities Before</th>
<th>Fatalities After</th>
<th>Injuries Before</th>
<th>Injuries After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don Bosco Primary</td>
<td>24</td>
<td>16</td>
<td>36</td>
<td>18</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Rujeko Primary</td>
<td>16</td>
<td>10</td>
<td>13</td>
<td>9</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Runyararo Primary</td>
<td>13</td>
<td>8</td>
<td>17</td>
<td>5</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Mucheke High</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Craft Centre</td>
<td>42</td>
<td>63</td>
<td>30</td>
<td>68</td>
<td>46</td>
<td>70</td>
</tr>
<tr>
<td><strong>Total %</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Survey 20112

Fatal accidents are as a result of excessive speed, failure to give right of way, driving on the wrong lane and failure to give enough braking distances from the vehicles in front. Speeding is a deliberate and calculated behaviour where the driver knows the risk but ignores the danger. Research conducted by Pasanen (1991) revealed that, when a pedestrian walks out in front of a car traveling at 48 km/h and the driver brakes when the pedestrian is 14 metres away, there will be enough distance to stop without hitting the pedestrian. If the vehicle speed is increased by just 8 km/h, the situation changes dramatically. At 56 km/h, with the pedestrian 14 metres away and the driver braking at the same point, the car will be traveling at 30 km/h when it hits the pedestrian. At this speed the vehicle can seriously injure or even kill the pedestrian. Pasanen (1991) indicated that the likelihood of surviving a crash depends on collision speed as shown in Figure 1.3. below.
Adopted from Pasanen (1991)

**Figure 1.3: The effect of the Collision Speed on the probability of pedestrian death.**

Figure 1.3 showed that there is positive correlation between the collision speed and the probability of death. Reducing the collision speed to around 30 km/h reduces the likelihood of crashes that lead to death. This reduces road carnage thus ensure pedestrian safety.

The efficiency and usefulness of the erected traffic calming measures are measured by the extent to which they have managed to reduce road carnage. The research revealed that accidents on selected road sections were threatening the lives of people. Masvingo City Council’s Department of Engineering and Roads is responsible for managing local distributor roads and maintaining them i.e. road furnishings. Sometimes it works in collaboration with Zimbabwe National Road Authority (ZINARA) in ensuring that all roads are safe to travel and there is harmony between vehicular and pedestrian movement. Table 1.3 shows the traffic calming measures designed and erected in Masvingo urban roads and their usefulness in promoting road safety.

**Table 1.3 Traffic calming measures and their rated performance.**

<table>
<thead>
<tr>
<th>Type of measure</th>
<th>Impact of traffic speeds</th>
<th>Impact on traffic flows</th>
<th>Impact to emergency services</th>
<th>Impact on injury accidents</th>
<th>Relative public acceptability</th>
<th>Impact on vehicle emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>xxx = largest reduction</td>
<td>xxx = largest reduction</td>
<td>xxx= shortest delay</td>
<td>xxx = largest reduction</td>
<td>xxx = most acceptable</td>
<td>xxx = smallest increase</td>
</tr>
<tr>
<td></td>
<td>xx= medium reduction</td>
<td>xx= medium reduction</td>
<td>xx=medium delay</td>
<td>xx= medium reduction</td>
<td>xx= more acceptable</td>
<td>xx= medium increase</td>
</tr>
<tr>
<td></td>
<td>x= least reduction</td>
<td>x= least reduction</td>
<td>x= least delay</td>
<td>x= least reduction</td>
<td>x= less acceptable</td>
<td>x= largest increase</td>
</tr>
</tbody>
</table>
OTHER PROBLEM AREAS IN MASVINGO URBAN

The junction at Masvingo Polytechnic is of great concern to Masvingo city council and the entire road traffic users since it is plied by both local and international vehicles. Accident records complied by Masvingo Central Traffic Section Department showed that the intersection is very dangerous. The intersection is now regarded as a black spot and local road users are worried about the rate at which accidents are occurring at the point despite the existence of speed humps and other road signs. From January 2012 to 31 May 2012, a total of 30 accidents have occurred at the intersection, of which 11 were fatal where 5 people die and 19 injured.

Figure 1.4 shows the trends of accidents at Masvingo Polytechnic College junction as from January 1997 up to 31 December 2011. The figures are so frightening and calls for immediate action by responsible authorities.

<table>
<thead>
<tr>
<th>Speed hump</th>
<th>Xxx</th>
<th>Xxx</th>
<th>X</th>
<th>Xxx</th>
<th>xxx</th>
<th>xx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rumble device</td>
<td>Xx</td>
<td>Xxx</td>
<td>Xxx</td>
<td>Xx</td>
<td>x</td>
<td>xxx</td>
</tr>
<tr>
<td>Speed table</td>
<td>Xxx</td>
<td>Xx</td>
<td>X</td>
<td>Xx</td>
<td>xx</td>
<td>xx</td>
</tr>
</tbody>
</table>

Source: survey 2012
The junction is very busy one because it’s the junction that lead to most parts of Mucheleke and Rujeko high density and it is also along the busy Masvingo- Beitbridge highway. In an attempt to alleviate the situation, the Department of Roads in collaboration with Masvingo City Council constructed speed humps in 2003 in addition to the already existing stop signs. This managed to reduce vehicle speed will result in reduced rate of accidents by approximately 70%.

From 2009 to 2011 a slight increase in accident rate was recognised at this intersection despite the erected speed humps. This increase was attributed to bad driving, increase in the volume of traffic and poor enforcement mechanisms. During pick hours, the junction experiences long winding queues of vehicles as the traffic controlling measures are overwhelmed by traffic volumes. Some impatient drivers suicidally entered the junction disregarding the control systems thereby risking their lives, and this irresponsible behaviour usually results in fatalities and high injury accidents. This raises accident rates calling for a more effective traffic calming measure such a modern roundabout. Modern roundabout are said to be the “medicine” to the rampant problem of motorists that have a tendency of running red lights and disregarding stop signs thereby causing accidents and killing people. They control and promote vehicular movements at intersections with minimal enforcement from police. Modern roundabouts have been proven to be safer than traffic signals, (Centre for Transportation Research and Training, 2009, Mackie et.al.1993) as they can keep speeds at very minimal thereby ensuring safety.

The best way to resolve the issue at hand is by redesigning the intersection and constructs a modern roundabout, which is considered as the “crown jewel” of traffic calming regime (Mao 2010). Masvingo City Council Engineering department affirms that roundabout is the best option since it slows down traffic and completely avoids problem drivers running through red lights and stop signs. According to Mao (2010) there was 73% reduction in all pedestrian crashes and 89% reduction in injury crashes can be achieved by constructing roundabouts. This makes the modern roundabouts the most effective traffic control device.

THE CAUSES OF ROAD ACCIDENTS IN MASVINGO URBAN

The Masvingo Central Police Station and Masvingo Traffic Safety Council showed that the major cause of accidents is human error and engineering designs. The human error is responsible for 94%, and engineering responsible for 5.95% of accidents. Those due to animals is only a mere 0.05%. Table 1.4 below shows the major causes of accident in Masvingo City.

The respondents argued that the driver is the major contributing factor to accident cases. This is because the drivers speed without paying attention to road signs, the condition of the vehicle and the condition of the road and weather. Further accusations were that drivers especially kombi drivers who operate under pressure from the owners to meet set targets are the chief culprits in causing road accidents. This causes fatigue which the cause accidents. The owner of the transport press too much on the issue of meeting the set targets and this cause driver to overwork and in the end drive dangerously disregarding road rules. Proper measures must be enforced to reduce reckless and negligent driving. Most accidents involve vulnerable pupils and this call for proper education to these children to make them good users of the road.

The state of the roads is also contributing to the ever ballooning road accidents. They are infested with pot holes and this causes accidents. An average of 5% accidents had been due to pot holes when drivers will be trying to negotiate pot holes. These sentiments were also echoed by the Engineer of Masvingo who acknowledged that their roads are severely damaged especially most active roads such as Charumbira and Mhizha Streets that carry volumes of traffic. In addition to the poor state of roads, some stretches of the roads do not have road markings contributing to road carnage. Some unroad worth vehicles are also contributing to road accidents as people use defective cars some with poor tyres or malfunctioning brake and all this increases the chance of accidents. Accidents due to animals are very insignificant as they are as a result of disturbances by pet animals such as dogs and cats that cannot overturn a vehicle unless if the driver tries to avoid it and lose control. This data has to be treated with caution since police investigating the accidents are unlikely to have been trained as engineers. Therefore, they
underestimate the contributions made by road engineering problems complementing the arguments by Sethi and Zwi (1999).

CONCLUSIONS

Traffic calming measures reduced road accidents in Mucheke and Rujeko significantly, though there are still other points that remain experiencing high prevalence of accidents such as the intersection at Masvingo Polytechnic College and the pedestrian crossing point at the craft centre. Traffic calming measures if properly designed, constructed, and placed can effectively reducing road carnage and afford the public a safe passage and harmonious core existence of people and traffic. There are no major problems with the placement of these devices but there was need for engineering reforms to build more suitable humps as the standards borrowed from developing countries were not effective in reducing the speeds at certain points. In some places it was a problem of recommending the wrong control system which led to continued occurrence of accidents for example at the craft centre the Zebra crossing sign is overwhelmed by the volume of traffic such that motorists are not taking note of them. The intersection at the Polytechnic college need a more effective device such as a roundabout as the give way signs are not able to control the traffic volume. Most of the traffic calming measures in the high density area were properly designed and constructed and are effectively regulating the movement of both people and vehicles. Slight changes might be needed to design devices that effectively calm traffic movements. The redesigned measures reduced accident rates by an average of 72% at Don Bosco, Rujeko Primary, Runyararo Primary and Mucheke high school. It was also found that the impact of traffic calming measures is significant effective in reducing road carnage especially at crossing points in the residential neighbourhood. Of the recorded accidents, human error was said to be the major cause of accidents contributing about 94%. The research also found out that it is important to consider the nature of the problem and community involvement when designing traffic calming measures. Further, financial constraints were cited as hindering successful implementation of traffic calming measures in the City of Masvingo as the city if facing a lot of other problems that require urgent attention such as provision of water and maintenance of roads. The study finally asserted that although implemented traffic calming measures in the City of Masvingo were effective in reducing road carnage, a holistic approach (traffic engineering, traffic enforcement and community education) must be engaged to effectively reduce road carnage.

REFERENCE


