University of Thi -Qar Journal for Engineering Sciences
http://www.doi.org/10.31663/tqujes.12.1.425(2022)
Vol 12.1 (April2022)

ISSN :2664- 5572 (online)
ISSN:2664-5564 (print)
Available at http://jeng.utq.edu.iq
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Utilizing GIS Application to Evaluate Speed Calming Types in Nassiriya City

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Abstract

"Traffic calming" refers to the practice of reducing the amount of accidents on the road via the use of physical design measures and other methods. The goal is to decrease excessive speeding and other potentially dangerous driving practices in residential areas. The construction of speed bumps is one of the most efficient methods of limiting the speed of moving vehicles while simultaneously improving public safety. A field survey of the road network in Nasiriyah and its surrounding facilities was carried out, in addition to a comprehensive data collection that was used in the GIS program (ArcMap 10.7) to produce maps showing the different types of bumps and the mechanism by which they are distributed in Nasiriyah, taking into consideration the facilities and surrounding structures, as well as the facilities themselves. Ultimately, it was determined that the short bump is a centralized and most appropriate bump for the Nasiriyah road network due to the ease with which it can be obtained. Furthermore, it is regarded to be less costly than other types of bumps. The nature of the study areas roadways and service center make the usage of short bumps a more appropriate solution. Utilizing bumps to calm traffic in the city of Nasiriyah enhances the reality of the streets as well as adds civilized touches to the roadways and helps to clear the city of slums by using the proper kinds in the suitable places at the appropriate time.

Keywords: Speed Calming , Traffic, Short Bump, GIS.

1. Introduction

Reducing the number of accidents on the road by using physical design measures and other means is referred to as "traffic calming." It has grown into a tool to reduce speeding and other potentially unsafe driving habits in residential zones **[1]**. This initiative reduces traffic congestion while promoting safer, more responsible driving. Constricting lanes and speed bumps are examples of calming traffic strategies that urban planners and traffic engineers might use. As defined by the Institute of Transportation Engineers, "traffic calming" is a set of standards designed to lessen the adverse effects of motor vehicle usage, influence driver behavior, enhance the safety of pedestrians and bicyclists, and Reduce vehicle speed levels **[2]**. Geographic Information Systems (GIS) are becoming increasingly important in health research. The public health industry is increasingly using GIS technology. GIS has been used to examine potential links between built environment and walking. In addition to physical location, GIS considers land use and natural elements. Thus, GIS's spatial approach may help researchers generate maps, quantify distances and transit times, and characterize the scope and nature of spatial interactions **[3]**.

2. Case Study

The governorate of Thi Qar is located in southern Iraq, and zone (38 N), Recently, the city of Nassiriya has been witnessing the emergence of some traffic problems due to congestion and slow traffic movement, especially in the popular areas, in addition to the occurrence of some accidents. The result of the lack of speed bumps when crossing pedestrians and the proximity of schools and intersections that contain large traffic volumes and are devoid of traffic signals. This is due to several reasons, including**:**

1. The significant and sustained increase in the number of automobiles registered in the country in general over the past few years.
2. Failure to apply laws that compel drivers to abide by traffic regulations
3. Engineering designs of roads that contain design or implementation errors.
4. Most of the traffic lights and signs do not perform the desired purpose or they are not present in the places supposed.
5. Absence of an effective role for speed bumps and the spread of random speed bumps that are not subject to any engineering controls.

3. Geographical Information System GIS

System of geographic data storage and retrieval Geodatabases (descriptions of events impacted by geographic location) and software tools for organizing, analyzing, and displaying geographic data are included under this category of databases **[4].** Human users and support staff, procedures and workflows, a body of knowledge of applicable concepts and methodologies, and institutional institutions are all part of such a system in a larger sense. (GIS) commonly shortened as GIS, are the most extensively used word to refer to the business and profession concerned with these systems. GIS is an abbreviation for (GIS). It is the same as geoinformatics, and it is a subset of the more considerable geospatial discipline, including GPS, remote sensing, and other GIS, among other technologies. (GIS) is a frequently used abbreviation in academic circles to refer to the academic discipline that analyzes these systems and the geographic concepts **[5]**. Growing potential of GIS makes it a crucial aspect of traffic study, and public transportation is increasingly using GIS methodologies. GIS has been used to examine probable correlations between built environment elements and walking or physical activity. In addition to physical location, GIS considers land use and natural elements. Thus, GIS spatial approach may help researchers generate maps, quantify distances and transit times, and characterize the scope and nature of spatial interactions. Several walkability measurements and GIS approaches will be covered in the following sections **[3].**

4. Methodology

To show the study optimally and get the best results in line with the research objectives, a methodology has been prepared that contains multiple and comprehensive steps for the whole study, as shown in the figure **(1).**

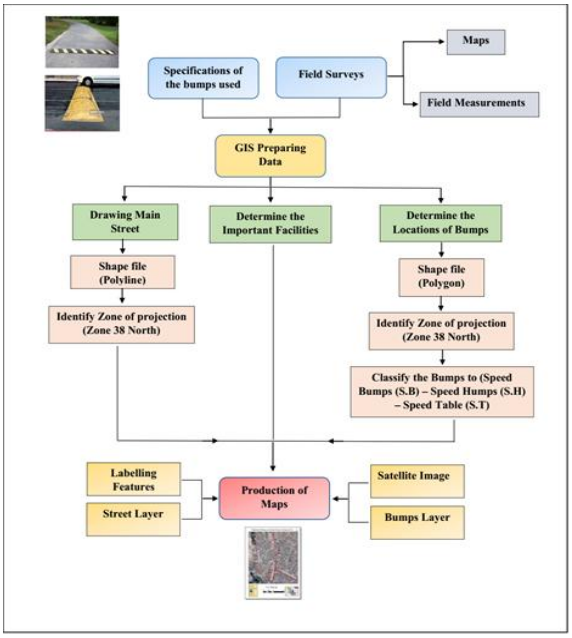

Fig.1 Methodology of using GIS to find a suitable place for bumps

5. Preparing the Shape Files of Road Network

It was necessary to prepare the shapefiles of the road network; these shapefiles were built by observing the satellite image, the master plan map of Al-Nasiriyah city shown in Figures **(2)**, and Table **(1),** which lists the collected data by Arc Catalog program two shapefiles were built of the road network, this included Roads layer was represented as Polyline and bumps layer was represented as Polyline as shown in Figure **(3).** Roads So,the GIS Preparing Data has been stated above with the three branches, including Drawing Main Street as shown in figure **(3).** After collecting the database for each shapefile, that data was inserted and organized by the Arc GIS 10.7 program to connect with these layers to execute the ArcGIS Network Analyst, determine the important facilities, and determine the locations of bumps.

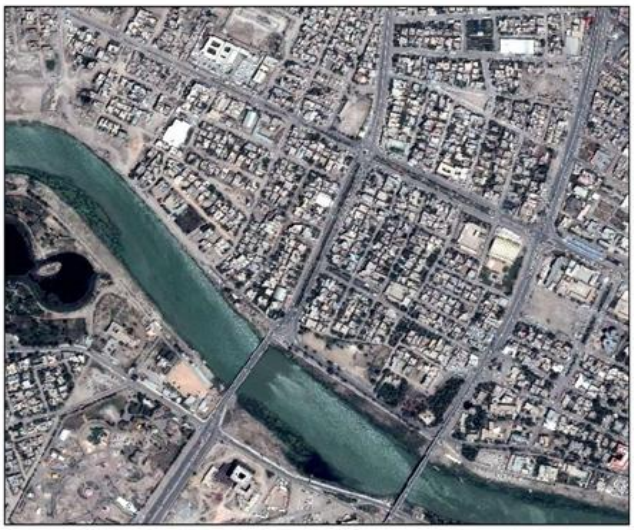

Fig.2 Satellite Image of Al-Nasiriyah City [2014].

Table 1 The Satellite imagery specifications

Product Type:	Standard	Product Option:	Natural Colour
Bit Depth:	8	File Formal:	Geo TIFF
Tiling:	No	Map Projection:	UTM
Delivery Method:	DVD	UTM Zone:	38N
License Type:	Single	Datum:	WGS84
Quick Bird Standard Imagery 4-band pansharpend, radiometically corrected, sensor corrected, and mapped a geographic projection, RMSE 14 meters, resolution 0.5 meters, acquisition data ** is for 2014 or newer for the 18 major cities in Iraq. Up to 20% cloud cover for new imagery			

Fig.3 Preparing the database for the road network

6. Preparing the Data Base of Road Network

After reviewing the types of bumps in Nasiriyah and analyzing them in terms of construction and location, it was noted that most of the bumps do not achieve the desired and that their negatives are greater than their positives and their inappropriate location

we will discuss in this appropriate axis to reduce Speed problems and placing bumps in the appropriate places in the city with the inclusion of a GIS image showing their locations with the coordinates in Figure **(4)** and **(5)** We explain how to create the database and define the database.

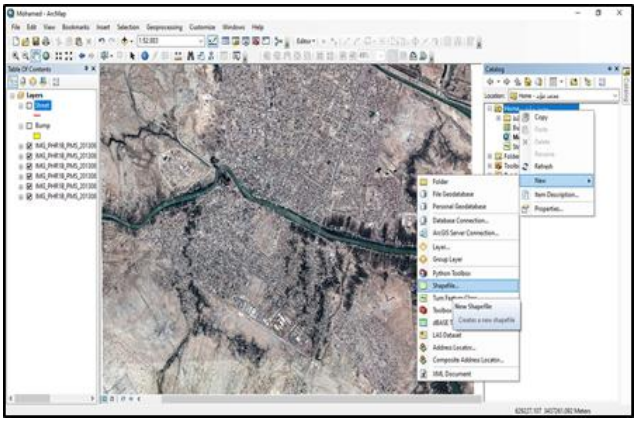

Fig.4 lists the collected data by Arc Catalog

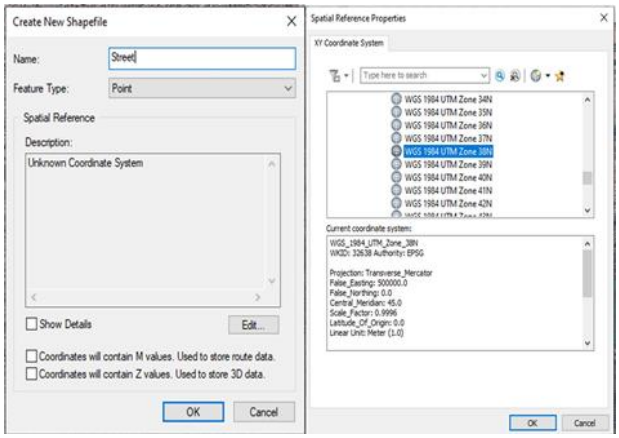

Fig.5 Road network study area in Nasiriyah

7. Suggested Bump Locations

After completing the database, the network has chosen the sites required to work, and how it works to show the Figure **6, 7, 8**, and 9 Bumps where the type is distributed (speed bump) In the streets close to the areas (such as schools, intersections, service departments, and commercial centers) and type (speed table) on the roads near the centers where pedestrian traffic is high, as in hospitals and courts. It is graded to the last type (speed hump). The streets were also close to hospitals and schools, where only samples of maps containing different types of bumps were included.

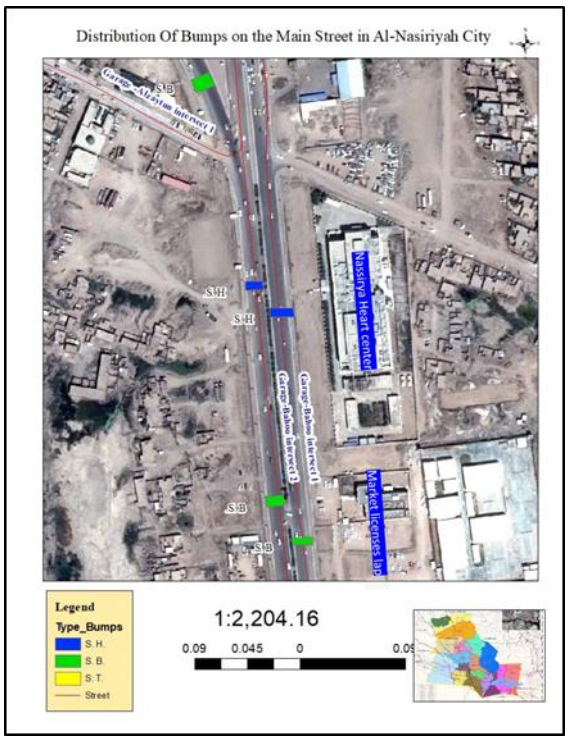

Fig.6 The proposed bump(the main Baghdad garage street)

Fig.7 The proposed bump
(Imam Ali Street to the intersection althawra)

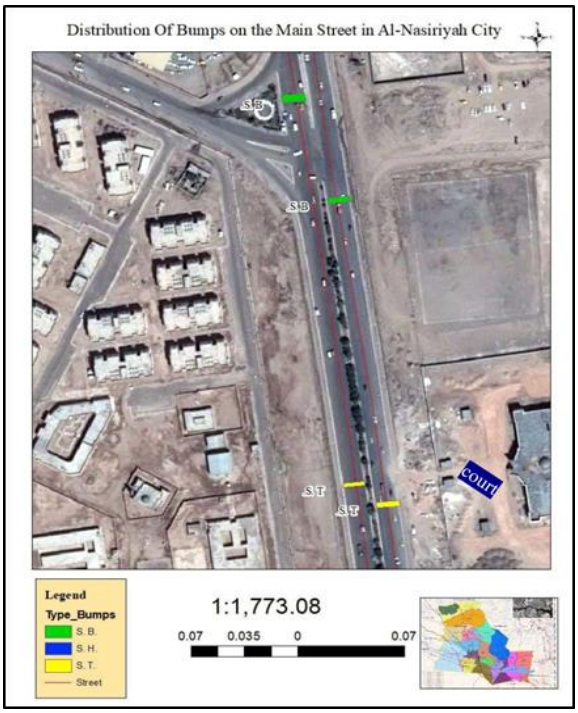

Fig.8 The proposed bump (the main Baghdad garage street opposite the court)

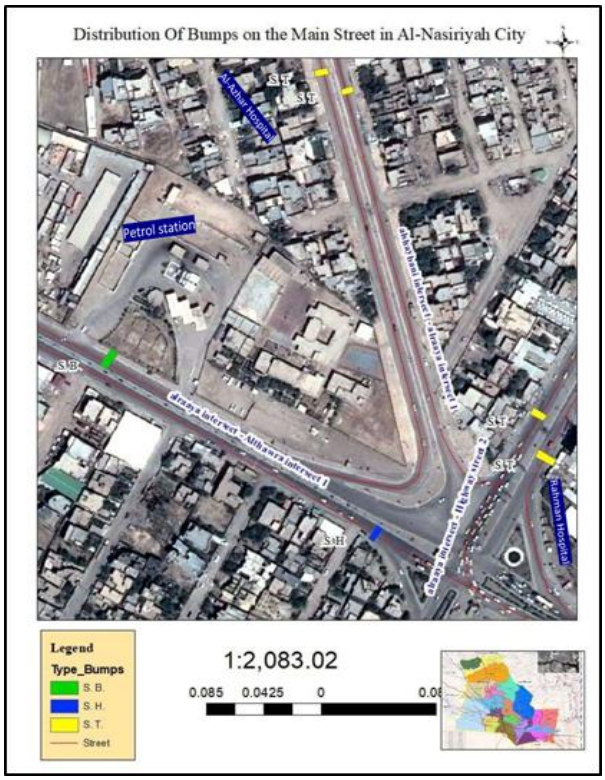

Fig.9 The proposed bump (alraaya)

Conclusions

The following recommendations should be considered:

1 Geographical information systems were used to create maps of the locations of the bumps.

2 Through the GIS program, the best type of road specifications for the city of Nasiriyah was found, and it is the most suitable short bump for the city's streets.

3 Nasiriyah lacks the bump of the table, which is used in most of the developing countries of the world.

4. Lack of traffic signals that warn of a speed bump.

5 Lots of plastic bumps with low durability.

6 The distances between one bump and another are not subject to engineering specifications.

7 Failure to perform maintenance on available bumps.

8 The lack of a comprehensive guide to the city's roads that includes all the details of the road, including branches, signs, and illustrations that facilitate The user has to navigate.

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