GIS Application to Build a New Parking in East Lansing City

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Abstract  Geographic Information Systems (GIS) is being widely applied to official construction activities nowadays. This technique can not only display graphs for each spatial data displayed, but also provide a broad prediction and decision tool. The purpose of this paper is to describe the capabilities of GIS application in building a new parking facility in the city of East Lansing through wide analysis of the surrounding data. The results are displayed in maps and graphs. Finally, the recommendation area is selected using three criteria: proximity to the downtown area; the degree of VACANT; and distance from all buffers.

Keywords GIS; parking; east Lansing; downtown

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Introduction

East Lansing, a city in Michigan, USA is located directly in the east of Lansing, Michigan, the state’s capital. The downtown is an important junction of two major Native American trails: the Okemah Road, and the Park Lake Trail\[1\]. In recent years, the pressure of parking has been gradually increasing due to economic development and the needs of students from MSU.

GIS technology is widely used in the broad prediction and decision of official construction activities nowadays, from data collection to surrounding analysis. The history of applying GIS technology to official construction activities work can be traced back to the early 1990s, some 15 years ago, when we have predicted constructing results \[2\].

1 Issue of concern

The purpose of this study is to help the Committee in the city of East Lansing to find a suitable site for a new parking area. A parking analysis was completed to look at how the parking demands for the land uses might fit together. Visual impacts, compatibility of land uses, roadway and intersection improvements, and construction and utility requirements need to be considered when examining potential sites. Parking demand estimates also have to note parking rates for retail, restaurant, and office spaces and follow strictly city zoning code requirements in this area \[3\].

2 Cartographic map and criteria

There are three main criteria for building this new parking: 1) Proximity to the downtown area; 2) The degree of VACANT (\(>6\)); 3) distance from buffers, including CataBustops (150 meters, light grey areas), LUST (50 meters, light blue areas), Places (50 meters, deep blue areas), Addresses (20 meters, mauve areas), and Floodplain (pink areas).

First, we choose the downtown of East Lansing. Next we set the new parking area to be in the 200
meter buffer of the downtown area and select the area by its VACANT > 6. Then, we get the area of “dt parcels_v”. Later, it had a problem because data was off so selected parcels needed to eliminate options for “switch select”. We get the area of “dt parcels_v2”. Next is buffer. We set a 150 meter buffer of CataBus-tops (light grey areas), 50 meter buffer of LUST (blue areas), 50 meter buffer of Places (deep blue areas), 20 meter buffer of Addresses (mauve areas), and buffer of Floodplain (light blue areas). Finally, we get the black recommendation area for four parts (Fig.1).

From Fig.2 and Fig.3, the new parking should be built on four parts (Black areas: 1, 2, 3, and 4) of East Lansing. Part 2 is recommended. There are four main reasons for the selection of this part based on the analysis of surroundings. First, although Parking Ramp lot 9 was built on the East Grove Street, it keeps a certain distance from Part 2 (Fig.4). A new parking will provide convenient parking for City Hall, Martin Luther Chapel, and other nearby buildings; Second, this area neighbors with the main road–Grand River and Trails Sidewalks–Abbott Rd for faster access to vehicles and persons; Third, Part 4 is close to Parking lot 1 and Parking Ramp lot 9. It is not necessary for repeat construction; Finally, Part 3 is directly along the main road–Grand River. If a new parking space is built on it, the cost of construction and clearance will be very high.
Providing a new parking area on Part 2 of East Lansing is necessary and the planning commission should have this responsibility in the future development of downtown East Lansing. However, we believe that it is not necessary to compel businesses in the downtown area to provide new parking space. We can use economic leverage and market instruments, even tax policy, to settle this problem and simultaneously care for beneficial aspects in this district to the maximum extent.

### 3 Results

The pressure of traffic in the downtown area of East Lansing has been increasing in the past years. Building a new parking area in appropriate and needy regions will mitigate this pressure and improve residents’ quality of life. East Lansing’s leaders and citizens should engage in a dialogue about the future of East Lansing’s parking, particularly in the downtown area. The city government and citizens need to discuss openly what is happening in various parts of traffic and evolve new policies and programs to ensure that new parking will make all groups share the benefits of urban renewal.[4]

Apart from being useful in predicting and deciding official construction activities, GIS is a useful tool for helping researchers and managers better understand and interpret problems.[5]. For the general public, it enables them to better understand the urban community that they live in. Applying GIS techniques to perform spatial analysis is certainly a potential area for further development in various kinds of work.

### References

[1] The city of East Lansing (2008) To live in East Lansing [OL]. http://www.cityofeastlansing.com/

[2] Annie Y W CHAN (2006) Application of GIS techniques in Hong Kong’s population census[C]. 22nd Population Census Conference, Seattle, Washington

[3] Monahan M, Monahan J (2006) Wayzata bay center revised parking analysis [R]. No. 0055525, SRF Consulting Group, Inc.

[4] The city of Lansing (2003) Community government neighborhood indicators report [C]. Michigan Community and Local Government Development Conference 2003, Lansing, Michigan, USA

[5] Rosilawati Z (2006) Applying GIS application in analyzing socio-spatial disparities in the state of Selangor[C]. National Statistics Conference 2006, Kuala Lumpur, Malaysia