The induced traffic volume generated by new land use developments often results in increased traffic congestion and vehicular delay on the existing road network. This is typically assessed by conducting traffic impact studies (TISs). With recent advancements in technology, it is possible to capture continuous and comprehensive travel time data for most major roads in a city. As travel time influences travel patterns, activities of travelers, and can be easily understood by system managers and motorists, it is important to quantify the influence of new land use developments on travel time. This can be used as an alternate to currently adopted TIS approach. Therefore, the goal of this research is to research and understand the influence of land use developments on travel time to improve the mobility of people and goods.

Study Methods
This research study comprised of two phases. In the first phase, the relationship between land use developments and travel time variations was examined using before and after analysis. The effect of spatial dependency was incorporated by considering the land use developments within 0.5 miles, 1 mile, 2 miles, and 3 miles of the selected road links. In the second phase, the relationship between land use developments and travel time was quantified using statistical models by considering spatial dependency, by classifying the road links based on area type [Central Business District (CBD), CBD Fringe / Other Business District (OBD), and urban area], and by classifying the road links based on the speed limit (< 45mph, 45 to 50 mph, and > 50mph). Along with the land use developments,
road network characteristics, day-of-the-week, and time-of-the-day were considered when generating the statistical models to understand their relationship with travel time. Data for the city of Charlotte, North Carolina (NC) was used for evaluation, analysis, and model development.

The developed statistical models indicate that the magnitudes of connections between land use developments, road network characteristics and travel time vary over space and time.

Findings
Some of the key findings are listed as follows.

1. Land use developments have a significant influence on travel time at link-level. The influence of land use characteristics on the travel time of a link varies by the area type and posted speed limit.

2. Classifying road links by the posted speed limit (< 45 mph, 45 to 50 mph, and > 50 mph), capturing the land use developments within 1 mile from a road link, and then developing the statistical models would aid in better understanding the relationship between land use developments and travel time.

3. Typically, travel time on a selected road link is higher during the evening peak period compared to the morning peak and the afternoon off-peak period.

4. The results obtained indicate that the number of lanes and the posted speed limit are negatively associated with the travel time of the selected road links.

Policy Recommendations
The influence of land use type, road network characteristics, time-of-the-day, and day-of-the-week on travel times based on the statistical models’ aid professionals and planners in land use planning decisions and can proactively improve the mobility. The method can be used as an alternate or to complement findings from currently adopted TIS approach.

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To Learn More
For more details about the study, download the full report at transweb.sjsu.edu/research/1702A

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