Traditional Neighborhood Development Trip Study

Introduction

Traditional Neighborhood Developments (TNDs) are characterized by human-scale, walkable, and transit friendly communities with moderate to high densities and a mixed-use core. TNDs are becoming increasingly popular in the United States and North Carolina, and they are expected to encourage walking and bicycling and increase the percentage of trips performed inside the development, due to the mixture of land uses. Over the past decade, a number of Traditional Neighborhood Developments were completed in the Triangle Area. Examples include Southern Village and Meadowmont in Chapel Hill, and Carpenter Village in Cary. As these types of neighborhoods become increasingly popular, a closer assessment of the traffic impacts of TND designs becomes warranted. Conceptually, TND design encourages walking by decreasing distances to shops and businesses and creating a pleasant and safe neighborhood environment. Even without an increase in walking, TND designs intend to capture vehicular trips within neighborhood boundaries by providing amenities in the village centers, as well as, cause a mode shift towards public transportation, the implementation of which becomes more viable in a more denser development style. However, the differences in traveler behavior and the resulting effects on traffic of these developments are yet to be determined and scientific analyses are required to assess whether proclaimed benefits of the design are indeed occurring. Current forecasting models and trip generation procedures need to be tested for their applicability to these new developments. This research report assesses the impacts of a TND neighborhood by comparing trip generation and traffic impact analysis results to actual traffic counts taken at the neighborhood boundaries and by investigating the results of resident and business surveys taken in the Southern Village (TND neighborhood) and Northern Carrboro developments (conventional neighborhoods) near Chapel Hill North, Carolina.

Project Scope and Objectives

Traditional Neighborhood Developments (TNDs) are planned in a relatively high-density design and combine a mix of land uses within the boundaries of the development. Chapter 7 of the Institute of Transportation Engineers (ITE) Trip Generation Handbook defines Multi-Use Developments as “typically a single real-estate project that consists of two of more ITE land use classifications between which trips can be made without using the off-site road system”. Southern Village, a development south of Chapel Hill, NC was designed in the style of TNDs and fits the ITE definition of multi-use development because it contains houses, shops, restaurants, a grocery store, a movie theatre, offices, a day care center, and an elementary school within its boundaries. For comparative purposes, a second residential area was chosen, which was not designed in the style of TNDs. The Northern Carrboro neighborhoods, also near Chapel Hill, NC, were selected because they were determined to best represent the opposite side of the spectrum in relation to Southern Village with respect to factors that might influence the number of trips people make and how likely people are to use walking, biking or transit for trips. These factors include: mix of uses, density or “compactness” of development, availability/quality of pedestrian...
and bike features (sidewalks, bike lanes, etc.), availability/quality of transit service, street connectivity, site design/layout features, and proximity to destinations. By choosing the Northern Carrboro neighborhoods, we get to see two ends of the spectrum on these related factors for what are expected to be similar demographic groups, thus any differences in travel behavior should represent two endpoints. By comparing Southern Village with Lake Hogan Farms (a conventional development within the Northern Carrboro neighborhoods), we can compare differences in trip generation and actual traffic volumes for one example of each development form. In this study, only these two neighborhoods were assessed and all results are only proven to be applicable for these two examples. Generalizations for other TNDs in North Carolina or nationwide, therefore have to be treated with care. TNDs are expected to encourage the use of alternative modes, and increase internal trip capture rates ultimately reducing congestion, vehicle miles traveled and to improve air quality. The behavioral trip generation portion of this study assesses if indeed trip generation rates and alternative mode use are any different in Southern Village compared with more conventional developments in Northern Carrboro. The study conducted a resident survey of Southern Village TND and Northern Carrboro conventional neighborhoods (N=453 households) and also collected spatial data on the developments. In addition, data regarding trips to on-site commercial and retail offices in the Southern Village TND was collected to understand the travel characteristics of office and retail users. The study survey attempts to distinguish between trip types, such as home-based-work or home-based-other, and to estimate the effects of TND design such as trip chaining, mode choice, internal capture, and pass-by trips. For the two neighborhoods, typical traffic impact analysis (TIA) methods were also utilized to explore TND trip generation. Traffic generation was performed using the methods developed by ITE, as well as, spreadsheet implementations of these methods developed by a consultant. As an additional method to explore trip generation the study used the Triangle Regional Travel Demand Model to obtain further trip estimates. It was not the objective of this study to develop new methods for traffic forecasting, but rather to apply, verify and validate existing ones. In that regard all traffic generation estimates were compared to traffic counts taken on streets entering/exiting the neighborhood. The focus of the traffic generation portion of this study is on the total site traffic generated and overall volumes counted at the entrances and exits to the developments. The study did not look at internal distribution and did not distinguish between trip types, such as home-based-work or home-based-other. Other proclaimed features and effects of TND design such as trip chaining, mode choice, internal capture, and pass-by trips are discussed in the literature review, and are analyzed in the traffic generation portion of the document to the extent that they affect the total traffic volumes entering and exiting the neighborhood. The traffic generation estimates and methods reflect and validate current practice of consultants and public agencies.

Conclusions
In terms of traveler behavior this study finds no statistically significant difference between the total trips made by households in the Southern Village TND and the comparable conventional developments. However, TND households substituted driving trips with alternative modes, i.e., the automobile trip
generation rate for the TND was significantly lower (by 1.25 trips per day per household) than conventional neighborhoods. In addition, empirical evidence suggests that TND households have:

• Lower vehicle miles traveled—on average, the TND single-family households travel 18 miles less per day.

• Higher share of alternative modes—in the TND, 78.4 percent of the trips were by personal vehicle compared with 89.9 percent in the conventional neighborhoods.

• Lower external trips—on average, the TND households made 1.53 fewer external trips per day.

The TND examined in this study internally captured a substantial share of the total trips produced (20.2 percent). By comparison, the conventional neighborhoods internally captured a much smaller share of the total trips (5.5 percent). Therefore the difference between the internal trip capture rates for the two development types is 14.7 percent. The Southern Village TND business survey asked business managers about their employees and customers/visitors. It revealed that only 5.2 percent of the 432 employees reside in Southern Village and a large majority of the employees (92.4 percent) use personal vehicles to commute to work. This is not surprising given the free employee parking in Southern Village and relatively high levels of automobile ownership by people who work. A significant percentage of customers/visitors (39.2 percent) reside in Southern Village; about 18.1 percent of the total trips attracted to Southern Village businesses are reportedly by walking. The results show that Southern Village employees use passenger cars as often as employees in conventional facilities, but that customers/visitors are more likely to walk. Off-site employees and customers/visitors make up a majority of trips attracted to the TND businesses. Examination of the ITE methods for trip generation, and comparison of trip generation results to counts taken at both Southern Village and Lake Hogan Farms, verify the ITE methods for trip generation for mixed-use and conventional neighborhoods. The Triangle Regional Model was too aggregate to study single neighborhoods. A study of the micro-simulation VISSIM and other simulation models shows that such simulations hold promise for single neighborhood analysis, particularly with respect to internal vehicle and pedestrian circulation. A sensitivity analysis of the affect of internal capture on access traffic indicated that the reduction in vehicle trips due to the internal capture of Southern Village does not significantly improve the level of service of the intersections adjacent to the development, even during the peak hour. A development located in a more urban area may have larger internal capture effects due to the greater interconnectivity of surface streets and an increase in the number of shopping and work opportunities available to the residents of the area.
