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16. Abstract

We as researchers should continuously ask how to improve the models we rely on to make financial decisions in terms of the planning, design, construction, and maintenance of roadways. This project presents an alternative tool that will supplement local decision making but maintain a full appreciation of the complexity and sophistication of today's regional model and local traffic impact study methodologies. This alternative method is tailored to the desires of local agencies, which requested a better, faster, and easier way to evaluate land uses and their impact on future traffic demands at the sub-area or project corridor levels. A particular emphasis was placed on scenario planning for currently undeveloped areas. The scenario planning tool was developed using actual land use and roadway information for the communities of Johnston and West Des Moines, Iowa. Both communities used the output from this process to make regular decisions regarding infrastructure investment, design, and land use planning. The City of Johnston case study included forecasting future traffic for the western portion of the city within a 2,600-acre area, which included 42 intersections. The City of West Des Moines case study included forecasting future traffic for the city's western growth area covering over 30,000 acres and 331 intersections. Both studies included forecasting a.m. and p.m. peak-hour traffic volumes based upon a variety of different land use scenarios. The tool developed took GIS-based parcel and roadway information, converted the data into a graphical spreadsheet tool, allowed the user to conduct trip generation, distribution, and assignment, and then to automatically convert the data into a Synchro roadway network which allows for capacity analysis and visualization. The operational delay outputs were converted back into a GIS thematic format for contrast and further scenario planning. This project has laid the groundwork for improving both planning and civil transportation decision making at the sub-regional, super-project level.

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EXECUTIVE SUMMARY

Introduction

We as researchers should continuously ask how to improve the models we rely on to make financial decisions in terms of the planning, design, construction, and maintenance of roadways. This project presents an alternative tool that will supplement local decision making but maintain a full appreciation of the complexity and sophistication of today's regional model and local traffic impact study methodologies.

Background

Local agencies within Iowa, which are dealing with growth, trying to provide for future roadway capacity needs, and under pressure from fiscal limitations, have expressed the desire for more options in developing traffic forecasts at the city network level. These agencies have expressed the desire for a tool that meets the following criteria:

- Local agencies requested that this new scenario planning tool be based upon land use classification, which is similar to the predication of future water and sewer needs, rather than more traditional regional planning socioeconomics.
- The tool was anticipated to provide planning at a more detailed level than a regional model, but not at the driveway level of detail, as with a traffic impact study.
- The tool was to be focused on the arterial level, and the desire was to be able to input various potential future land use scenarios and evaluate a.m. and p.m. peak-hour roadway operations under these conditions.
- The tool was expected to provide an alternative to traditional planning methods, particularly in new growth and fringe sub-area locations.
- The tool was expected to improve the ability to forecast future right-of-way needs, given the merging of planning and operations capabilities.

Objective

The objective of this research is to develop a supplementary tool that would assist in the forecasting of future peak hour vehicle traffic demand at the local roadway level. This project lays the groundwork for improving both the efficiency and effectiveness of transportation planning and civil design/operations. Agencies asked that this tool serve both planning and engineering staff needs, and it was to rely on common traffic capacity, visualization, and calculation tools.

State of the Practice

The state-of-practice information provided is by no means a comprehensive description of transportation planning and traffic modeling. Rather, this summary selectively highlights planning and forecast issues relevant to developing and using an alternative forecasting tool and

to other issues of interest to local agencies. Examples of model accuracy are provided for regional models and traffic impact studies.

Analysis of Growth and Demand

The ability to forecast travel within high-growth areas relies on the ability to predict land uses and population change. This is especially true when forecasting travel to plan for the development of areas that currently include large tracts of land with an unknown use. Traffic forecasts, whether using a travel demand model or the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, can vary widely by type of use. The traffic forecast tool developed as part of this research predicts travel as a function of land use, as defined by ITE land use codes. This report provides state and community development and growth information in an effort to understand rates and types of growth occurring within the central Iowa market place. This effort also examined rates of growth and land uses as developed along specific high-profile corridors.

Scenario Planning Using Existing Models

Land use models are available specifically to forecast land use at the regional level, a level similar to many urban transportation network models. However, a key difference is that land use models take the transportation system as an input, whereas the transportation network models take land use as an input. This difference is a manifestation of the classic land use-transportation relationship and is a criticism of both types of models. Recent efforts in some high-growth states attempt to integrate both of these objectives, at least at the regional level. There is significantly more activity along these lines in air quality non-attainment areas. In general, the level of detail to be expected from these models is not sufficient to facilitate the local traffic engineering and design decision making process. This task considered whether existing land use or demand models could be used directly for scenario planning and whether a densified TransCAD model could be used to replicate the higher level of roadway detail desired and used by the scenario planning tool. The first step was to identify the relevant land use planning models and to discuss their capabilities. The second step was to complete a case study using a densified TransCAD network using parcel-level development and planning data from a real community.

Alternative Forecast Technique

This research developed an alternative method to forecast traffic that is tailored to the desires of local agencies. These agencies requested a better, faster, and easier way to evaluate land uses and their impact on future traffic demands at the sub-area or project corridor levels. This method should be considered as a supplement, and does not replace the need for either the regional model or local traffic impact studies. A particular emphasis was placed on scenario planning for currently undeveloped areas. The discussions for a scenario planning tool originated from issues within two different central Iowa communities (Ankeny and West Des Moines). The scenario planning tool was developed using actual land use and roadway information for the communities of Johnston and West Des Moines. Both communities used the output from this process to make regular decisions regarding infrastructure investment, design, and land use planning.

The City of Johnston case study included forecasting future traffic for the western portion of the city. This study area was approximately 2,600 acres and included 42 intersections. Both a.m. and p.m. peak hour forecasts were made based upon different land use scenarios.

The City of West Des Moines case study included forecasting future traffic for the city's western growth area. This study area was ten times that of Johnston's, and included 30,000 acres and 331 intersections. Both a.m. and p.m. peak hour forecasts were made based upon different land use scenarios. The tool was then able to process this information to allow an analysis of demand and trip generation, distribution, and assignment using the Synchro capacity and SimTraffic visualization programs. The delay information was brought back into the GIS format.

Conclusions

This project has laid the groundwork for improving both planning and civil transportation decision making at the sub-regional, super-project level. The research provided the following:

- A response to local agencies' desire to have an intermediate planning tool that would provide quick answers to changes in land use at the local roadway level
- Support to practitioner decision making through a graphical representation of land use and network capacity information
- A tool that has been demonstrated at multiple scales within growing communities (Johnston case study at 2,600 acres, West Des Moines case study at over 30,000 acres)
- A tool that can use the same land use database as water and sewer modeling to conduct land use and roadway capacity scenario planning
- A planning tool that functions at a more detailed level than a regional model, but not at the driveway level of detail, as with a traffic impact study
- A tool focused on the arterial level, with the ability to input various potential future land use scenarios and evaluate a.m. and p.m. peak-hour roadway operations under these conditions
- A tool that serves as an alternative to traditional planning methods, particularly in new growth and fringe sub-area locations
- A tool to improve sub-area traffic forecasting through an analysis of multiple scenarios and to allow for an assessment of future right-of-way needs, given the merging of planning and operations capabilities
- A tool that serves both planning and engineering staff needs and that relies on common traffic capacity, GIS visualization, and calculation tools

The scenario planning tool was developed and tested for one large developing sub-region and applied successfully to another. The tool could be considered for application in other similar high-growth or infill areas. Interested analysts should contact the research team or the city staff of West Des Moines or Johnston, Iowa, for more details on applicability and resource requirements.

Future Efforts

The work of the task force should be continued and focused on making the tool interface easier to use. These efforts would benefit all users, including local agencies and consultants. Professionals from both groups have expressed a strong desire to use the tool on a variety of projects; however, training would be a requirement at this point. Since the tool is very graphical, these future efforts could add documentation to the input screens and simplify input and viewing of critical output information. This research effort focused on developing the tool. Future efforts should focus on the usability of the tool in terms of user interface and convenience.