MPC-393
January 1, 2012- June 30, 2013

Project Title:
Traffic Modeling of Transit Oriented Development

University:
University of Utah

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Research Needs:

As our urban network traffic grows, we address congestion in a variety of ways. We increase the capacity of the network through improved traffic management, and we apply Intelligent Transportation Systems to optimize our resource. This capacity based approach is overshadowed by the near default approach is simply to expand our roads with extra lanes and larger intersections. This serves to meet increasing traffic demand through increasing highway capacity. Collectors become Distributors, which grow into Arterials, which evolve into major highways. At a certain level, roads sever communities rendering pedestrian movements infeasible.

So while this oft repeated development has been shown to accommodate traffic growth, at least for a while, it does little to promote Transit, bikes, and walking. We know that Transit Oriented Development (TOD) helps communities to grow in a way that promotes accessibility and mobility, but we do not understand the traffic implications. Reid Ewing is a pioneer in establishing quantitative links between urban planning approaches and travel impacts.

Research Objectives:
This project takes a partially developed urban network in West Valley as its field case, and models the relationship between TOD and traffic impacts. Taking contemporary principles of urban design, the study will take an existing network as a control, and compare its traffic characteristics to a proposed network. This new network will embrace the best practices of TOD and livable streets.

Research Methods:

Task 1: Review the publications (see References) and summarize their relevance to the project.

Task 2: Draft, submit, and agree with UTA a set of design principles drawn from Task 1 to shape Transit Oriented Development.

Task 3: Define base network, submit, and agree using the Preliminary Sketch as the basis of the study network.

Task 4: Survey study network to acquire comprehensive set of road layouts, traffic controls, lane use, permitted maneuvers, flow conditions, and turning movements.

Task 5: Establish base network in VISSIM (PTV America).

Task 6: calibrate and validate microsimulation model.

Task 7: model base network under a variety of flow conditions to establish base traffic metrics.

Task 8: Drawing on the 5600 West BRT – Phase 2 Innovative Intersection Evaluation memorandum, Avenues Consultants, 2/25/2011, as a resource, draft, submit, and agree with UTA a set of proposed innovative intersection designs for the Proposed Network. Add modeling of emergency routes for large emergency vehicles.

Task 9: Taking the agreed network designs from task 8, draft, and consult Reid Ewing on a set of internal network modifications that would render the Proposed Network to improve its potential for TOD.

Task 10: Taking the network designs from task 9, draft, submit, and agree with UTA a set of internal network modifications that would render the Proposed Network to improve its potential for TOD.

Task 11: Experiment Design - draft, submit, and agree with UTA a set of "Proposed Network" traffic scenarios (peak and off-peak, future growth combinations). Incorporate assessment of land use connectivity patterns. Model traditional "Road Widening" approaches. Assess traffic safety impacts.

Task 12: Formulate statistical tests – identify parameters, controls, statistical tests, sample adequacy.

Task 13: Model experiments and extract traffic metrics.

Task 14: Analyze metrics from task 13.

Task 15: Report findings on paper, in presentation, and through model demonstration.

Expected Outcomes:

Seven of the tasks generate deliverables. The format may be as simple as an e-mailed approval of a PDF or the deliverable will result from a meeting. The University will meet to discuss each deliverable, if required. The deliverables and associated tasks are tabulated.

Relevance to Strategic Goals:
The proposed project and its expected outcomes are related to the following goals: Environmental Sustainability, and Livable Communities. T.O.D. make better use of limited road capacity obviating the imperative to build more highways. T.O.D. reduce queues and congestion contributing to environmental sustainability./

Educational Benefits:
If applicable, describe how students will be involved in the project and any expected classroom or instructional uses of procedures, examples, or discoveries derived from the project. In not applicable, state "Not Applicable" below Educational Benefits, no quotes.

Work Plan:
Small numbers of graduate students and larger numbers of undergraduate students will participate in the project. Their contributions will be rewarded in both assistantships and in academic credit. Undergraduates will incorporate their work into the required class CVEEN3520 Transportation Engineering and CVEEN3100 Technical Communication. Graduate students will write papers, make presentations, and incorporate their work into dissertations and theses.

Project Cost:
Total Project Costs: $57,790
MPC Funds Requested: $31,790
Matching Funds: $26,000
Source of Matching Funds: Utah Transit Authority

TRB Keywords:
Congestion, control devices, signal control systems, Capacity

References:

1. Ewing, Chen & Chen "Experimental Study of Traffic Calming Measures in New York City" Journal of Accident Analysis & Prevention: the first large-scale, comprehensive, and rigorous evaluation of traffic calming projects in the United States.
2. Ewing and Cervero "Travel and the Built Environment, A Meta-Analysis" Journal of the American Planning Association: empirical results on associations between the built environment and travel.

3. Ewing and Handy "Measuring the Unmeasurable": Journal of Urban Design: operational definitions to measure the street environment and test for significant associations with walking behavior.
4. Ewing et al. "Traffic Generated by Mixed-Use Developments - A Six-Region Study Using Consistent Built Environmental Measures" Journal of Urban Planning and Development: a new methodology for more accurately predicting the traffic impacts of MXDs