OPTIMIZING TRAFFIC MANAGEMENT USING MODELING TECHNIQUES FOR MAJOR URBAN CONSTRUCTION

Sacramento, CA
Doubletree Hotel
March 20-21, 2007

ATTENDEES

Cathy Nicholas, FHWA
James Sorenson, FHWA (Asset Management)
James Colyar, FHWA
Catharine Jensen, Michigan DOT
Do Nam, T-Concepts
Martin Oreget, CALTRANS (Operations)
Grant Zammit, FHWA (Resource Center)
Edgar B Pansanos, CALTRANS (Traffic Management)
Changmo Kim, UC/Davis
Dennis Azevedo, CALTRANS (Dist. 3)
Tom Kane, Des Moines Area MPO
Mit Jha, Earth Tech
Stan Ching, Earth Tech
Shuming Yan, Wisconsin DOT
John Shaw, Wisconsin DOT
Steve Rogers, CALTRANS (Dist. 2)
Chung Eng, FHWA (Operations)
Mark C. Wilson, Florida DOT (Traffic Operations)
Fred Heery, Florida DOT (Traffic Operations)
Kalin Pacheco, CALTRANS (HQ Planning Microsim Branch)
Doug MacIvor, CALTRANS (HQ Planning Microsim Branch)
Nancy Knofler, CALTRANS (Traffic Operations)
Peter T. Martin, University of Utah
David Thomas, PB
Tracey Scriba, FHWA (HQ, Operations)
E. B Lee, UC Berkeley (ITS)
Jonathan Den Hartog, CALTRANS
Jacqui Ghezzi, CALTRANS (HQ, Traffic Management)
Scot Alvarez, CALTRANS (Traffic Operations)
Daniel Grate, Jr., FHWA (RC Operations)
Brian Walsh, Wisconsin DOT (HQ, Traffic)
Janice Hamil, Wisconsin DOT

'**Making Decisions from Traffic Models**' Workshop Meeting Minutes
Doubletree Hotel, Sacramento, CA March 20-21, 2007

Phil Fordyce, Wisconsin DOT
Ken Jacoby, FHWA
Tom H. Nguyen, CALTRANS (DKI)
Ramakrishna Tadi, CALTRANS (Dist. 8)
Jason Dietz, FHWA (CA)
Alex Skabardonis, UC/Berkeley
Mario Velado, CALTRANS
Michael Samadian, CALTRANS
Lianyu Chu, UC/Berkeley (CCIT)
Kyle B. Winslow, PB
Steve Hague, CALTRANS (HQ, Traffic)
Zoe Bayar, CALTRANS (HQ)
Karl Westby, Westby Consulting, LLC
Brad Stein, Stein Consulting, LLC
Syed Raza, CALTRANS
Monica Worth, Worth Associates, Inc.
Keith Platte, AASHTO

GENERAL NOTES

Following is a list of desired outcomes set out by attendees at the beginning of the workshop. Each is followed with a brief analysis by attendees at the end of the two-day session (in parentheses) vis a vis their opinion of the final outcome.

Attendee Workshop Goals *(and Outcomes)*

- Better understanding of construction needs from TM *(scratched surface)*
- Understand what other States are doing and the needs *(discussion just begun, but useful)*
- What other tools are available, not just modeling? *(mesoscopic tools, linkage opportunities between ops and planning or project development process steps, plus broader scope like public involvement and peripheral support activities; it would be helpful to have process experts with options and to explain data intensity of various development stages/modeling; could possibly have other disciplines providing input)*
- How to improve the tools we are using (*above*)
- Get contacts in modeling (*above*)
- Get appreciation for what tools are being used so we can share them with others
- How to design Work zones better and use tools to better results *(addressed by presenters)*
- How to use the tools for project delivery, program management *(analytical/application consistency is needed across modeling platforms/project development phases, to the extent advisable/possible)*
- Use this workshop as a starting point

WORKSHOP NOTES

The following notes are intended to support the full presentations available on this website. They include basic discussion items and representative questions and answers raised after each presentation. Please see the index of presentations for the full text and graphics of each presenter's material.

DAY ONE

Introduction:
[A summary of opening remarks from James Sorenson, FHWA, is to come.]

Presentation:
Tracy Scriba, FHWA HQ
FHWA's Work Zone Final Rule

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: On what does the rule provide guidance and how to meet the Rule.

Notes:

Q: What is your advice re: working with contractors and the Rule?
A: Partnership and shared responsibility are the key issues.

Q: Is there a standard percentage of project cost for the Transportation Management Plan? How do you know you have a successful TMP?
A: This comes from learning, process review, and data analysis. The best best advice is to steer away from a rule of thumb percentage as it can vary from three to 40%. One basis for measurement of success is the relative delay cost to motorists.

Presentation:
James Colyar, FHWA
Traffic Model Simulation and Construction Applications

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Simulations, in general, with focus on construction applications.

Notes:

Item: Types of tools include sketch planning, deterministic, simulation.

Item: From a contractor perspective, specs will be tied to analysis, so proceed accordingly. Contractor needs to become confident enough in these tools to be true partner.

Item: Three levels of simulation: micro (useful in fixed demand settings), meso, macro (tends to adjusts to demand)

Presentation:
Tom Kane, Des Moines Area MPO, Executive Director
Case Study: Des Moines, IA I-35 Reconstruction (MITSIM)

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Case study in Iowa with MITSIM: 1-35 Reconstruction in Des Moines.

Notes:

Item: A model should be designed to be applicable and/or offer resources well beyond the project at hand

Item: A key lesson is that the MPO and DOT must develop trust.

Item: IA DOT was ultimately commended on this project for management of route diversions – "no surprises."

Item: The MITSIM experience created an important tool that will be used in MPO/IADOT future.

Q: What about one-route areas, and/or no grid system to fall into?
A: Despite public information, users were surprised for a few days at each change, but within a week they had figured out the flow through the area.

Q: What is the impact of Interstates being used as collectors, not through puts?
A: We may be forcing people onto Interstate, not using our sub road network as well as we could.

Q: What was feedback from the public?
A: No negative feedback. The Chamber of Commerce put together an "Avoid the Rush" group to go out to employers and work with businesses to inform/adjust workers. They

also offered signage to businesses as to how to get to the business with construction in place, etc.

Item: It was tremendous to get that kind of collaboration/feedback from so many stakeholders (governments, businesses, etc.).

Presentation:
Peter Martin, Associate Professor, University of UTAH, UT Traffic Lab
Case Study: Salt Lake City, UT I-15 Reconstruction (VISIM)

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Case study on I-15 Salt Lake City rehabilitation in Utah with VISIM; evaluating design-build contracting methods for Statewide Transportation Improvement Plan (STIP) projects through micro-simulation.

Notes:

Item: After the reconstruction of I-15 through the Salt Lake region, the University of Utah was asked to provide an evaluation of the construction decision to accelerate the pre-Olympic reconstruction project. VISIM was used to do so. (An ASCE paper is available for full detail.)

Item: Public information material provided a great-after action analysis resource, since it tracked the process regarding road closures, etc.

Item: Modeling as a percentage of cost in I-15 ran .02-.0005%..

Item: Modeling is a process requiring care and maintenance. Agencies should always be training new team members for succession.

Item: It is advised that agencies model for the cost impact of various staging scenarios, permutations and combinations.

Item: The impression one is left with after experiencing this project is: "There is so much more we could be doing…"

Item: Jim Sorenson reminds attendees: "They build what we buy. We have to raise the bar."

Presentation:
Jonathan Den Hartog, CALTRANS
Syed Raza, CALTRANS Dist. 8
Case Study: Ontario, CA I-5 Reconstruction (Danamaq)

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Case study on I-15 Ontario Reconstruction in CA with Dynameq; Design-TMP-Simulation

Notes:

Den Hartog:
Item: The challenge was to perform the I-15/Ontario pavement rehabilitation under traffic in a heavy commercial corridor – with pavement chosen to be as long lasting as possible. In addition, the project involved one of the largest malls in the region, a train corridor, a connector between Interstates 60 and 10; thin and deteriorating pavement under volume (a traffic increase of 18,000 vehicles is expected by 2013 from the 2003 rate of 196,500).

Item: EB Lee of U.C./Berkeley studied the options for CALTRANS w with CA4PRS software. The original option was paving the median, widening the under crossings and not reducing lanes of traffic. Under the plan, two lanes would shift to the median; outside lanes would be rehabilitated with weaving traffic areas on weekdays. The final decision was to use Dynameq (Mit Jha) to model six of 26 total stages required for this scenario as it is a mesoscopic model, is equilibrium-based, and is good for large-scale applications.

Raza:

Item: District 8 includes San Bernardino County, the largest in the nation in square miles. Riverside County is the second fastest growing in the U.S. A sales tax level was recently held over by 80% of the vote, so limited money and time were not acceptable arguments to this population. A need existed to model for detour traffic and impacts on other projects as well. It became clear that the public would no longer tolerate detours without full advanced planning. Thus, modeling allows the best scenarios.

Q: When was network simulation construction modeling done?
A: (Dave Thomas/PB) The decision for simulations for this project was made early, based on previous late-stage modeling experience. Modeling was started before 30% plans stage and was completed before plans went out. This model was done before the EIP, since environmental impacts were involved.

Q: How much time does *not* modeling add?
A: Modeling doesn't have to be done in sequence. It can be concurrent. It's a chicken or egg process.

Q: Does the model include how it affects pavement structure?
A: The model provides additional volumes and travel times on arterials and diversion routes, but not pavement impact.

Presentation:
Do Nam, Ph.D., P.E., T-Concepts Corp.
Case Study: MI Paramics
Advances in Practice on I-465 West Leg Reconstruction: Work Zone Mobility

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Case Study in Michigan with Paramics; advances in traffic modeling for freeway construction mobility applications.

Notes:

Item: The Southeast Michigan Metro Simulation involved passenger cars, international trucks, and domestic trucks

Item: On the Ambassador Gateway MOT Simulation (a Maintenance of Traffic Simulation), there were more nodes and zones, though less area, than in the Southeast Michigan Metro Sim.

Q: Was the model dynamic or steady with PRIMEX?
A: When the model is calibrated, fixed is used; when the scenario is run, dynamic is used. Simulation is by nature dynamic.

Presentation:
Catharine Jenson, MI DOT
Case Study: MOTSIM, Michigan
Fitting Simulation to DOT Business Processes

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Case study in Michigan; MOTSIM program (I-75, I-94 and I-96).

Notes:

Item: Simulation is a series of processes. It is not a tool, but a process. MI DOT seeks an agency-friendly progression that will work for it and wants to automate some of these processes. Without such process improvement, it may not be cost effective for MI DOT

to continue to do large scale simulation. Simulation presents a huge organizational process challenge.

Item: Simulation is radically new. It is unrealistic to expect a bureaucracy with all of its "chimneys" of power and control to simply accept this "new kid on the block." Each area of an agency has a culture, processes, paradigms. Integration of these divisions/purposes/roles is taking place – but it is difficult. All involved will need to be more traffic engineering literate. Responsibilities will shift and power will shift.

Item: Colleagues comment that simulation is "data hungry." The premise is to salvage what can be salvaged from existing simulations to save cost/development activity on new projects. An average of 45% of simulation data can be salvaged, bringing new project investment/activity to 50%. But platform components must be consistent.

Item: Michigan is among the largest truck and passenger portals to Canada. Neighboring Ohio is its largest domestic trading partner and is impacted by diversions.

Item: Institutional memory doesn't exist on the project management plan/flow because MI DOT hasn't done this before. So the agency can't guide consultants. The consultants haven't done this before either, so there is a great deal of uncertainty. Thus it is important to develop institutional memory and capture what the consultants are doing and what they know.

Item: The recommendation of Michigan's Performance Excellence Division is to hire a supply chain expert to be a fly on the wall of these projects, for process improvements. That cost should be approximately $200,000 per project.

Item: For the MI DOT Metro Region (Detroit), costs so far have been $750,000 for the network project and $200,000 or less for "baby" projects, plus the cost of a supply chain expert. The tool can be used throughout the DOT, if the process is done well.

Presentation:
Kyle Winslow, PB
David Thompson, PB (formerly of CAL TRANS)
Case Studies: I-80/Saddle Brook, NJ and US 101/San Francisco, CA
Toolbox Approach to Modeling

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Case study in CA and NJ with Paramics; using operational models to measure corridor level impacts of congestion.

Notes:

Item: Construction lane impacts were the issue on I-80/Saddle Brook Project. PB was asked by NJ DOT to evaluate the scenario in terms of traffic impact construction modeling proposed by the contractor that differed from PB recommendations (3 months vs. 6 months).

Item: Planning the 3.5 mile Pulaski Skyway rehabilitation under traffic impacts the region and ultimately 15-20 other construction projects. Issues include ongoing emergency construction needs for functionality during project.. The project design includes center ramps (up and down) with 50-75' acceleration/deceleration lanes and 11' widths.

Q: Explain 3 month vs. 6 month timeframes in I-80 modeling.
A: PB not asked to address the situation in terms of duration.

Q: Elaborate on bottleneck analysis as a tool.
A: Analysis of one bottleneck shows Pulaski Highway is not the issue, for instance, but rather its connecting roadways.

Summary: Day One

Michael Samadian, CALTRANS:
We have this array of tools. You have been invited because of your expertise. By the close of this meeting, can we identify one or two tools that will be useful across the board? Is uniformity available? Can the planning/construction/demand tools be integrated into one package? Can we more clearly understand the advantages and disadvantages? Can we put all these tools into one big toolbox?

Cathy Nicholas, FHWA:
Ongoing meeting/s are needed. The goal for Day One is information sharing.

DAY TWO

Moderator: Phil Fordyce

Presentation:
John Shaw, WSDOT
WSDOT Modeling Applications on I-405
WSDOT Experience with Traffic Models

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Using microsimulation to help make policy decisions.

Presentation:
Karl Westby, Ph.D., Westby Consulting, LLC
Brad Stein, Stein Consulting
Applications on I-405
I-405/SR 167 Corridor, Seattle
Mithilesh (Mit) Jha, Earth Tech
A Comprehensive Approach to Programming, Managing and Delivering Construction Projects in the Puget Sound Region

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Two presentations regarding tools to examine congestion-related impacts and to tie those impacts into project management decisions on the I-405 corridor.

Notes:

Westby:

Item: The System Mobility Investment Process (SMIP™) is a tool for the project development phase. It represents process/tools/process methodology, which translates to: decisions outcome, then modeling results analysis, then messaging for decision-making.

Jha:

Item: Cost/benefit ratios compare tools and that is not necessarily the answer: modeling is needed, regardless.

Item: In terms of scale, the top level is a demand model, the middle level is a large scale dynamic model, and the bottom level is a detailed micro model. Can they be integrated? It isn't clear. The micro might be difficult to integrate with the macro, for instance, due to the high level of detail in the micro.

Item: Within agencies, project decision making is often based on traditional processes, experience, etc. Modeling, on the other hand, provides analytical support for decision making.

Item: From project concept (macro) through to design (micro) and work zone mobility, a process is necessary. It would be great if one could define an effective interface between these types of modeling processes, but moving from macro to micro seems problematic.

Presentation:
E.B. Lee, UC Berkeley
David Thomas, PB
Application of CA4PRS in Traffic Modeling
CA4PRS (Construction Analysis for Pavement Rehabilitation Strategies)

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Case study on I-15 reconstruction in Devore, CA.

Notes:

Item: CA4PRS has been used in five southern California projects. It is a demand-capacity tool. CA4PRS was used with other simulation tools in Devore in 2004. It takes less time to set up and use than other products – for example, CA4PRS required one week for set up vs. twenty with the Paramics process on the Devore project.

Item: Project involved weekday commuter traffic and weekend leisure travel to and from Las Vegas. Outreach to commuter traffic is easier than outreach to leisure travelers, so weekdays were the logical choice for high impact activity.

Item: The time of year is important with this tool, not just in terms of demand, but because a consistent weather pattern is needed.

Item: CA4PRS can show how long reconstruction will take based on different pavement scenarios. As one example, an overnight scenario could use a four-hour cure to 400 PSI, with a 15 year life expectancy; in that scenario the key is to get traffic back onto the road. Other closure scenarios allow 12-hour cures, but involve a 30-year lifecycle cost. The next generation of CA4PRS will include total life cycle cost factor/s.

Item: Travel time through a construction zone is reported using real time analysis tools. Detours are directed via portable variable message signs.

Item: The Advanced Work Zone Information System (AWIS) produced favorable media attention and comments from the public. The public affairs effort boosted this, as did bus routes that were added (though they did not receive heavy use, they provided a public relations benefit). The team also made a strategic decision to reach out to the most vocal objectors at a public meeting and make them an advisory committee. Their issues were dealt with and they became involved supporters.

Presentation:
Lianyu Chu, CCIT (CA Center for Innovative Transportation),
UC Irvine
Emerging Technologies
Using Micro Simulation to Evaluate Traffic Delay Reduction for Work Zone Information Systems

Visit http://www.minitooth.com/wz/index.htm for full presentation.
Thumbnail: Simulation and ITS in California; evaluation of traffic delay reduction from automatic work zone information systems using microsimulation.

Summary: Day Two

Workshop Outcomes Analysis

"Plus"	***"Minus"***
Popular topic	Too short
Good information sharing	Larger room
Good Presenters	More Q&A time
Focused on some app's applications	Break outs for technical v. project management

"Plus"	***"Minus" (cont'd)***
Very affirming to hear of other uses/experiences	Need strategic planning/programming discussion
Helped meet FHWA encouragement increase knowledge and use of these tools	Wider diversity of audience (construction to and design)
	Technical vs. Management Focus (suggest 1st day technical/2nd day management)

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NEXT STEPS

- Distribute notes/contact information.
- FHWA to finalize and distribute a primer w/guidance on tool selection and tool application.
- FHWA to begin a peer-to-peer network for work zone decisions.
- Add to FHWA's knowledge base of tools. Use FHWA one-pagers as template (vendors can fill out template). Prepare fact sheets/one-page info sheets for all products.
- Host an annual workshop.
- Interim highly-focused teleconferences for technical professionals, with other teleconferenced focused on issues/needs of managers.
- Develop case studies for compendium.
- Consider monthly or frequent user-driven electronic conferencing to prime the pump for further development and adoption.

GENERAL DISCUSSION NOTES:

Clarifications Needed:

- Need clarification on difference between different products (advantages/disadvantages) – who can provide? Or can we do this matrix?
- Need clarification on scope of CAST task. Just promote a set of good modeling tools, or the use of modeling overall, or how to integrate various types of modeling into the rest of the development process?. What is scope/limit of the modeling we're to cover?
- Need clarification/decision: Can we/should we focus this on guidance for how to apply tools to new rules?

- Need clarification: Most of the systems discussed are not used during construction. So, does "CAST," or "Construction Analysis" cover the full range of project development?

Key Concepts:

- CAST = "Try before you buy (or bid or build)."
- Does saving time save money? Does saving time worsen impacts?
- Is modeling a process and a tool, or one, or the other?

Key Ideas

- Models are easier for the public to understand and help demonstrate the decision options/process, building agency credibility.
- Some modeling software may be useful for employee training (i.e., AWIS).
- Is modeling producing a high level of intelligence, and if so, if that because of the tool or is it a combination of issues and mechanics?
- Modeling facilitates comprehensive mobility analysis and decision making. It may allow simultaneous critical staging of multiple construction projects (i.e., corridors, multiple corridors, cross jurisdiction projects)

Key Challenges:

- Getting DOT's to cooperate internally for change ("Getting Planning to talk to Traffic")
- Micro vs. Macro (Micro allows us to say this is our opinion based on probability).
- Adopters face the complaint: "It costs too much and you have to keep doing it." (Response: Roads cost too much and you have to keep "doing" them.)

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