Mobile’s Congestion Management Process

Kevin Harrison, PTP
South Alabama Regional Planning Commission

What is a Congestion Management Process (CMP)?

- Born out of Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Originally Congestion Management System (CMS)
- “To provide ongoing information on the performance of the transportation system and on alternative strategies to alleviate congestion and enhance mobility” USDOT 1995
- Requirement for all TMAs (UA Population over 200,000)
- No real guidelines in 1990’s

Mobile’s Congestion Management "System" The early years...

- Operational Improvements
  - TOPICS type projects

FHWA CMP Guidebook, 2011

- Development of congestion management objectives
- Establishment of measures of multimodal transportation system performance
- Collection of data and system performance monitoring to define the extent and duration of congestion and determine the causes of congestion
- Identification of congestion management strategies
- Implementation activities, including identification of an implementation schedule and possible funding sources for each strategy
- Evaluation of the effectiveness of implemented strategies

Mobile’s Congestion Management “System” The early years...

TOPICS:
Traffic Operations Program to Improve Capacity and Safety
655.103 Title 23 1974
“Topics projects are projects of a traffic engineering nature and are operational kinds of improvements involving limited capital construction.”

Mobile’s Congestion Management “System” The early years...

- Operational Improvements had two components:
  1. A component to measure and archive congestion, other than V/C
  2. A component to develop and implement projects that were “TOPICS type projects”
- It satisfied the Federal Regulations
- It morphed into an inefficient, time consuming, data hungry, neglected monster
Previous Method of Project Development

• Intersection type projects only since LRTP took care of midblock capacity issues
• Only arterial intersections were screened
  • Intersections with a total approach of over 45,000 ADT
  • Intersections with any two approaches exceeding 7,000 vehicles per lane.
  • Intersections with over 1.5 vehicle collisions per million entering vehicles
  • Significant Travel Time increase

Previous Method of Project Development

• Initial screening would produce about 30-40 intersections
• List would be narrowed down to about a 12-15 intersections to investigate
• Intersections would be vetted to the CMS Committee

CMS Committee inspected each intersection during PM Peak period, reviewed the traffic patterns, visualized improvements at the intersection

Examples of previous recommendations:
• Cottage Hill Rd / Hillcrest Rd apply access management techniques (centerline median, shared driveways), dual lefts for all approaches, right turn radii improvements
• Cottage Hill Rd / University Blvd dual lefts for Cottage Hill Rd
• Government Blvd / Demetropolis Rd construct northbound and southbound left turn lane and run concurrent side street phasing; construct second eastbound left turn lane
• Grelot Rd / Knollwood Rd widen Grelot to construct a second westbound left turn lane; widen Knollwood and drop added lane at entrance to municipal park
• Moffett Rd / Forest Hill Rd construct Florida-t intersection and extend northbound right turn lane

Previous Method of Project Development

Benefit / Cost analysis for each recommended project

• Benefits
  • Annual Time/Delay Savings in $
  • Annual Collision Savings in $
• Costs
  • Annual ROW Cost in $
  • Annual Const Cost in $

Previous Method of Project Development

Benefit / Cost Analysis

Time Savings:
• Projects were run in Synchro to obtain delay savings
• Converted to dollars from wage rate, veh occupancy rate, etc
From CARE Data, we averaged the previous 6 years type of collision, per type of damage, per intersection, and applied collision reduction factor per type of improvement, per type of collision, per type of damage, per intersection; converted to annual dollars saved based on K, A, B, C in current year dollars.

**Previous Method of Project Development**

**Benefit / Cost Analysis Collision Savings:**

<table>
<thead>
<tr>
<th></th>
<th>ROW</th>
<th>CN</th>
<th>Cost</th>
<th>Annual</th>
<th>Delay</th>
<th>Collision</th>
<th>Annual</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azalea Rd and Michael Blvd</td>
<td>$115,000</td>
<td>$145,000</td>
<td>$530,000</td>
<td>$125,822</td>
<td>$54,423</td>
<td>$80,831</td>
<td>$135,254</td>
<td>1.07</td>
</tr>
<tr>
<td>Cottage Hill Rd and Hillcrest Rd</td>
<td>$345,000</td>
<td>$345,000</td>
<td>$1,590,000</td>
<td>$377,466</td>
<td>$145,371</td>
<td>$153,134</td>
<td>$298,505</td>
<td>0.79</td>
</tr>
<tr>
<td>Cottage Hill Rd and University Blvd</td>
<td>$272,500</td>
<td>$272,500</td>
<td>$795,000</td>
<td>$188,733</td>
<td>$70,375</td>
<td>$54,947</td>
<td>$125,322</td>
<td>0.66</td>
</tr>
</tbody>
</table>

**Previous Method of Project Development**

**Benefit / Cost Analysis Examples:**

- Desktop Reference for Crash Reduction Factors (FHWA SA-07-015)
- Percent Improvement Reduction
- Add median all approaches 15%
- Extend Left Turns 15%
- Install Right Turns 25%
- Add protected Left Turns 30%
- 2 approach extend Right Turns 15%
- Etc, etc, etc, etc,

**Previous Method of Project Development**

**Benefit / Cost Analysis Examples:**

- Benefits: Congestion Management Projects are eligible to be funded with Mobile MPO STP Attributable Funds; already a full schedule
- If a CMP Project is to be funded, Performance Measures are required at sponsors expense
- Since they were federally funded projects, all federal requirements for ROW, CN, Etc. had to be met
- NOT ONE recommended project was ever funded under the “previous” Congestion Management System/Process in Mobile

**Previous Method to Measure Congestion**

- Developed to monitor trends
- Numerical index – VMT weighted travel speed
- Roads being monitored carry about two thirds of Mobile’s Urban Area total daily Vehicle Miles Traveled (VMT)
- Part of screening process for intersections / project development
Previous Method to Measure Congestion

Congestion Management Network
- Freeways
- Principal Arterials
- Selected Minor Arterials

Network changed slightly since 2000
- UA Changed
- added some arterials

Previous Method to Measure Congestion

- Travel times were collected on Tuesday, Wednesday & Thursday
- PM peak was considered to be 4:30 – 6:00 PM
- No rain, no incidents, no Mardi Gras parades
- Travel Times were collected using GPS transponders and the ITE floating car technique and methodology for collecting travel time
  - Driver has to stay in between car in front and car behind
  - Driver has to pass as many cars that pass driver
- A sample was needed (4 runs) to determine the number of travel time runs required, based on range of speeds of 4 runs

Volkert and Assoc. contracted to do initial work, 2000
- Conducted initial travel time runs
- Developed ArcView Extensions / Scripts in Avenue
- Averaged all six runs to: Road, Link, and every 528 ft segment (archived intersection queues)

Average pm Peak Roadway Speed, 2000-2011

2002  2007  2011

Average PM Peak Link Speed, 2000-2011

2002  2007  2011

Average PM Peak Segment Speed, 2000-2011

2002  2007  2011
Previous Method to Measure Congestion

Travel Time Index

<table>
<thead>
<tr>
<th>Year</th>
<th>Avg Veh Weighted</th>
<th>Travel Speed</th>
<th>Freeways</th>
<th>Arterials</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>51.72 mph</td>
<td>69.0 mph</td>
<td>35.8 mph</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>50.41 mph</td>
<td>67.3 mph</td>
<td>34.4 mph</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>51.42 mph</td>
<td>69.0 mph</td>
<td>35.5 mph</td>
<td></td>
</tr>
</tbody>
</table>

Time to change the way we do things

- Previous Method of Project Development
  Not one project was ever funded under the CMS. The B/C analysis was an extreme amount of work. Getting everyone in van to go look at traffic at 5:00 was...difficult

- Previous Method to Measure Congestion
  21 roads, 6 travel time runs in each direction, only on Tuesday, Wednesday, Thursday; Averaging the PM Peak MPH to every road, Section and Segment; Roughly 21 weeks, assuming no rain, incidents or parades; EXPENSIVE

Mobile’s Congestion Management “Process”

The Future years...

- Operational Improvements has two components:
  - A component to measure and archive congestion other than V/C
  - A component to develop and implement projects that are “TOPICS type projects”; adaptive signals, signal upgrades, roundabouts, access management
- It satisfies the Federal Regulations
- It will morph into an efficient, time saving, data driven, monster... WITH FUNDING

Reinvention of the CMP - Funding

Congestion Management was not successful b/c no funding:

LRTP has two large arterial interchange/intersection planned resulting from Volkert’s Airport Blvd Capacity Improvement Study
  - Florida T type Improvement at Malls
  - Grade separated interchange at Airport / McGregor
    - $13.3 for Interchange over Azalea / McGregor
    - Large private investment at that intersection
    - McGregor Ave. is about to be improved
    - Businesses will oppose interchange
    - Politically difficult to do

Reinvention of the CMP - Funding

- Remove $13.3 Million Airport Blvd / McGregor Interchange project from LRTP, replace it with an annual $500,000 (fed) Congestion Management Process Program
- We will have the ability to program $625,000 annually for CMP Projects in the TIP, starting this year
- STP attributable had a slight increase in annual apportionment allowing for minimal impact in the TIP; $6.67M to $7.14M (fed)
There is a new way to measure congestion

National Performance Management Research Data Set is provided by HERE under the FHWA Contract. It is a vehicle probe-based travel time data set acquired by the Federal Highway Administration (FHWA) to support its Freight Performance Measures (FPM) and Urban Congestion Report (UCR) programs.

The NPMRDS contract began with the July 2013 monthly archive. The monthly archives are provided on an Electronic Data Download site approximately 3 weeks after the end of the previous month.

HERE is owned by Audi/BMW, sources come from on board GPS of Audi/BMW and others, phone Apps, and delivery data; Amazon, FedEx, etc.

Data is presented as a travel time, per TMC link, 24 hours a day, in 5 minute intervals.

It is a large amount of data, almost 14 million records for the month of October for the State of Alabama.

We obtained 24 hour travel time data for January, 2015 – October, 2015, without plugging in a single GPS unit 😊

2015 PM Peak MPH per TMC Link

- 4:30-6:00PM
- 3rd Quartile
  - reduces anomalies
  - mirrors rain, incident, etc. of manually collected TT
  - was a natural break in data

How does the data compare?

10% + over median

Industrial Pkwy
+ Demetropolis Rd/
University Blvd

-Hank Aaron Loop

Comparing 6 runs vs 10 months of data
Measure and Archive Congestion Component

Trends in Congestion

<table>
<thead>
<tr>
<th>Year</th>
<th>Avg Veh Weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Travel Speed</td>
</tr>
<tr>
<td>2002</td>
<td>51.72 mph</td>
</tr>
<tr>
<td>2007</td>
<td>50.41 mph</td>
</tr>
<tr>
<td>2011</td>
<td>51.42 mph</td>
</tr>
<tr>
<td>2015</td>
<td>52.39 mph</td>
</tr>
</tbody>
</table>

There is a new way to develop projects

- Use HERE data to determine actual free flow speed, and ratio of peak speed to free flow speed
- Use HERE data to look at corridors with high travel time at off peak. Schools, Shift work, etc.
- Seasonal travel time issues:
  - Government Street eastbound into the Bankhead Tunnel. In the Fall congested, In the Summer it is facility failure.
  - July Avg PM Peak MPH 12.76
  - November Avg PM Peak MPH 23.61

24 Hour travel times allows us to determine a Free Flow Speed January – October, 2015

Free Flow / Peak
Flagged if under .75
(example)
Road with a 45 mph free flow, Yet 33 mph or lower at peak

Focusing on one type of collision

We cannot publish data, but we can identify problem areas, rank the problem areas, and provide funding under CMP

Volume to Capacity Ratio
Remove some areas
Peak to Free Flow  Rear End Collisions  Volume / Capacity

Several intersections/corridors to concentrate on, some meeting all three thresholds:
- Govt St; Broad St to Causeway
- Airport Blvd / Schillinger Rd
- Airport Blvd; University Blvd to Hillcrest Rd
- Hillcrest Rd and Cottage Hill Rd
- US 43; Springhill Blvd to Prichard Ave
- Shelton Beach Rd and I-65
- Cottage Hill Rd; Azalea Rd to University Blvd
- Dauphin St / I-65

• Intersections/Corridors are eligible for funding through CMP program at $625,000 annually ($500k fed, $125k match)
• Projects require performance measures (TT through HERE)
• LRTP and TIP must be modified and approved by TCC/CAC and MPO

Summary
• A CMP that is not implementing projects, is not successful
• A CMP with no real funding, is not successful
• Sometimes one can over analyze a process
• The new Mobile CMP recommends congested corridors to be improved. The sponsor will have an idea of the type of project, but let the PE develop best scenario and cost estimates.

Questions?
Kevin Harrison, PTP
Director of Transportation
kharrison@sarpc.org
(251)706-6435

Anthony Johnson
Transportation Planner
ajohnson@sarpc.org
(251)706-6483

South Alabama Regional Planning Commission
110 Beauregard Street, Suite 207
Mobile, AL 36602
(251)433-5541