

Lebanon County Metropolitan Planning Organization

Congestion Management Processes

Executive Summary

PREPARED BY



WITH



June 2008

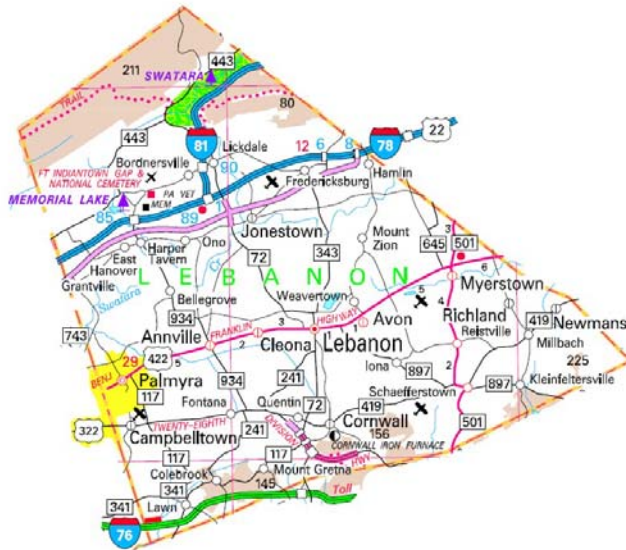
Acronyms

The following acronyms are used throughout this report:

Acronym	Definition
CCIP	Congested Corridor Improvement Program
CCTV	Closed Circuit Television
CMS	Congestion Management System
CMP	Congestion Management Processes
FHWA	Federal Highway Administration
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
ITS	Intelligent Transportation Systems
LEBCO	Lebanon County
LED	Light Emitting Diode
LRTP	Long Range Transportation Plan
MPO	Metropolitan Planning Organization
TDM	Travel Demand Model
TIP	Transportation Improvement Program
TSEI	Traffic Signal Enhancement Initiative

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Introduction

What is the CMP?

The Congestion Management Processes (CMP) represent a set of planning tools designed to manage congestion by evaluating congested corridors and recommending a range of solutions to mitigate congestion. The CMP serves as a “playbook” for Lebanon County to address congestion and provides direction to:

- Systematically monitor performance of the transportation system.
- Screen corridors to identify and prioritize problem areas.
- Identify potential solutions from a “toolbox” depending on conditions.
- Target strategies to address special needs such as special events.
- Engage stakeholders and municipalities to verify potential projects.
- Justify investments and solutions for inclusion in the LEBCO MPO’s 25-year Long Range Transportation Plan (LRTP) and the short-range Transportation Improvement Program (TIP).

Why Develop a CMP?

Federal transportation regulations call for metropolitan areas to have a process to address congestion. The Lebanon County Metropolitan Planning Organization (LEBCO MPO) was formed in 2003 based on Census designation as an urbanized densely populated area of 50,000 or more. The LEBCO MPO adopted its first Long Range Transportation Plan (LRTP) in 2006, which recommended development of the CMP.

The CMP Plan is guided by a CMP Task Force, comprised of the LEBCO MPO Technical Committee and others within the community. The plan is also heavily influenced by public comment and involvement from all sectors within Lebanon County ... citizens, elected officials, business and community leaders, special interest groups, like local trucking firms and the AAA, municipal and state police departments, organizations involved in large special events within the county, and others.

Program Goals

The long-term vision of the LEBCO MPO Policy Board is to have a transportation system that will safely, efficiently and effectively serve the mobility, access and travel needs of residents, businesses and visitors. This study provides the tools and strategies to make that vision a reality.

The following goals were established to provide a clear sense of direction:

Program Goals

1

Identify Congested Corridors and Isolated (Problem) Intersections

2

Identify Special Events and Other Causes of Non-Recurring Congestion

3

Prioritize Projects, Programs and/or Services to Mitigate Congestion

4

Measure the Effectiveness of Implemented Projects, Programs and/or Services

5

Contribute Strategies to Help Better Manage and Utilize the Existing Transportation System

Congestion

What Is Congestion?

An imbalance between the movement of people and goods and the capacity of the existing transportation system which causes delays, increased travel time, increased cost, and driver frustration and/or unsafe driving practices.

There are two basic types of congestion – **recurring and non-recurring**. Recurring congestion takes place virtually every day when and where traffic demand exceeds the existing roadway capacity. This is sometimes called peak period or “drive time” congestion. Non-recurring congestion is caused by random events like accidents, roadway hazards, highway construction, adverse weather and/or special events. Both need to be addressed in different ways to effectively deal with the full spectrum of congestion.

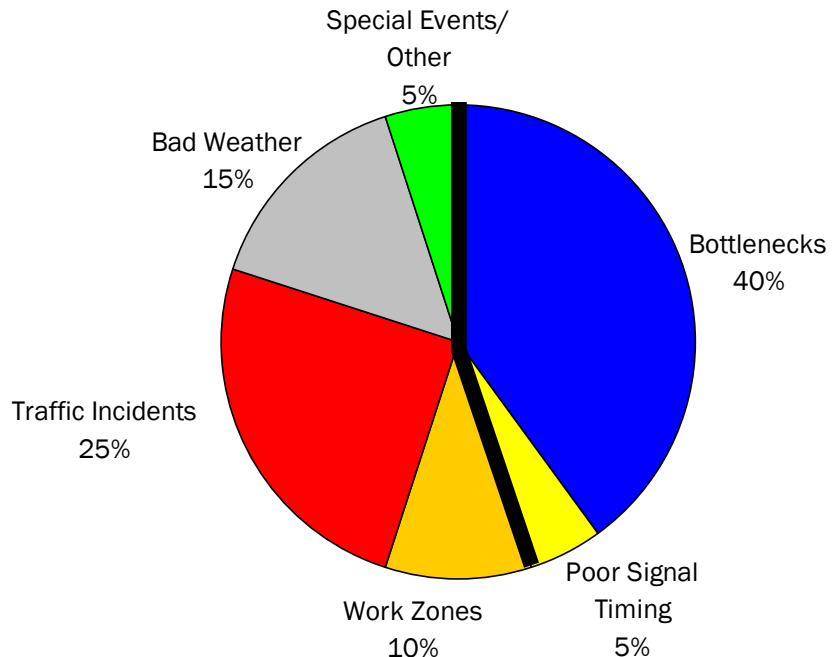
Causes of Recurring Congestion

- Inadequate Roadway Capacity (e.g., not enough lanes)
- Roadway Bottlenecks (e.g., 2 lanes to 1 lane)
- Intersections
- Train Crossings
- Roadway Tunnels

Causes of Non-recurring Congestion

- Crashes (and associated delays)
- Construction Activities
- Special Events
- Emergency Management and Incidents
- Weather

According to the FHWA Report, “Traffic Congestion and Reliability: Linking Solutions to Problems”, July 2004, only 45 percent of congestion is recurring, meaning it occurs on a regular basis. This type of congestion generally consists of poor signal timing and bottlenecks. The majority, or 55 percent of congestion, is non-recurring congestion.



Congestion in Lebanon County

Congestion in Lebanon County takes many forms. Both rural and urban areas experience periods of recurring congestion, whether it is local and applies to a specific intersection or a corridor. A lot of recurring congestion is dependent on land use practices. For example, an increasing number of access points cause more congestion. Integrated planning activities are vital in mitigating recurring congestion.

Recurring congestion is relative.

If motorists have traveled in the Philadelphia or Pittsburgh regions, especially during the morning and evening peak period driving times, they have experienced a much more severe level of congestion than we have in Lebanon. However, it is clear that recurring congestion is taking place at many locations and at given times during the day in Lebanon County, and it will be addressed through ongoing CMP initiatives that will be established by this study.

Non-recurring congestion occurs in many forms.

Rural roads (with higher than designed-for volumes) may exceed statewide crash rates. These crashes contribute to congestion. Likewise, in urban areas, congestion may result in congestion-related crashes such as rear-end and sideswipe collisions thus compounding congestion. In all areas, special events and other incidents may result in unexpected non-recurring congestion.

Trends Impacting Congestion

The Lebanon County Long Range Transportation Plan describes many of the trends impacting the transportation system of the county. Recent and projected future residential growth and business within Lebanon County continues to affect the transportation network's efficiency and changes the way residents, workers and others use the system.

The following trends are expected to continue to have future impacts on congestion in Lebanon County:

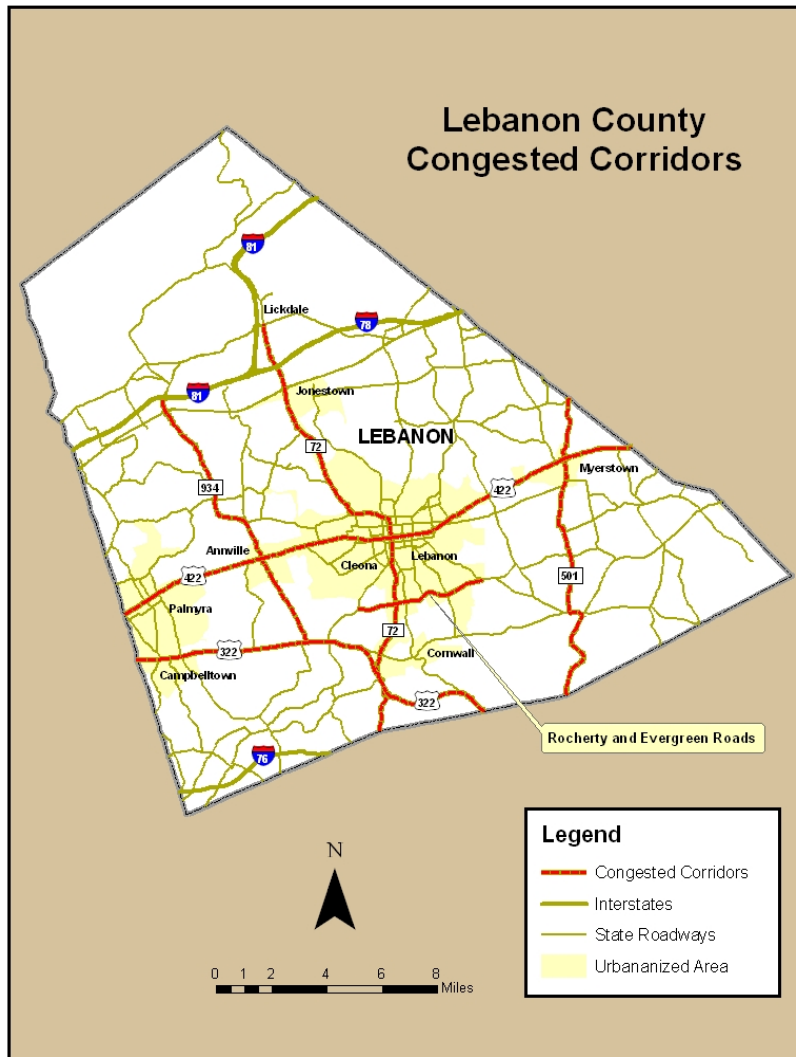
- The number of residents and jobs within Lebanon County are expected to grow until at least 2020.
- Residents are currently traveling longer and farther to work than they did ten years ago.
- Traffic pressure from increasing demand for residential and business development will continue to impact the county's roadway infrastructure.
- Traffic on the county's main roads is expected to continue to increase, creating additional delay and the potential for trip diversions onto secondary roads.

The net effect of the trends identified above reinforces the need for a coordinated planning approach that reinforces the link between land use, transportation and economic development to smartly accommodate future residential and job growth, and to maintain a safe and efficient transportation network.

Overview of Recurring Congestion in Lebanon County

The LEBCO MPO Congestion Management Processes (CMP) has identified six key transportation corridors that are experiencing various levels of recurring congestion at specific locations and at specific times of the day. These corridors are as follows and are shown on the accompanying figure:

- US Route 422 from the Berks County line to the Dauphin County line
- US Route 322 from the Lancaster County line to the Dauphin County line
- PA Route 72 from Lickdale (vicinity of I-81) to the Lancaster County line
- PA Route 501 from the Berks County line to the Lancaster County line
- PA Route 934 from I-81 to US Route 322
- Rocherty and Evergreen Roads from PA Route 241 to PA Route 897.



Isolated Intersections and Spot Locations of Concern

Isolated intersections are also a congestion concern within the county. Issues include minor operational problems (outdated signal timings/phases, malfunctioning traffic detection loops in the roadway, etc.), safety deficiencies, and poor access management (in close proximity to intersections). The CMP has identified a partial list of isolated intersections and spot locations of concern. Examples of problem areas outside of the six corridors of concern include, but are not limited to:

1. Various old traffic signals with old timing plans and outdated equipment (for example, some City of Lebanon signals)
2. The Cornwall Road intersection with Wilhelm Avenue in the City of Lebanon/South Lebanon Township
3. The Cornwall Road intersection with York Street in the City of Lebanon/North Cornwall Township
4. The PA Route 343 intersection with Kochenderfer and Kimmerlings Roads in North Lebanon Township
5. Old Jonestown Road intersection with US Route 22 in East Hanover Township
6. US Route 22 and I-78 Interchange in Bethel Township
7. High accident (crash cluster) locations on PA Route 241 in North Cornwall Township
8. High accident (crash cluster) locations on PA Route 117 in South Londonderry Township
9. Other US Route 422 CCIP Study recommendations, like Clear Spring Road and Mount Pleasant Road in North Annville and South Annville Township, respectively.

Recurring congestion is also taking place on various local/municipal streets as a result of ongoing growth and development/redevelopment. Over time, the LEBCO MPO will assist municipalities in addressing these problem areas.

Overview of Non-recurring Congestion in Lebanon County

The CMP is also identifying the causes and/or locations of non-recurring congestion.

While many causes of non-recurring congestion cannot be anticipated, processes and procedures can be established to minimize the extent and duration of the delay. For example, a **special events checklist** has been developed so that the LEBCO MPO, local elected officials, the business community, special interest groups, local police departments and others can plan more appropriately for the additional traffic and parking needs related to a special event, like the holiday parades, shows/activities at the Expo Center, Mt. Gretna Arts Show, Polar Bear Plunge

at Willow Springs Park, etc. Another example is to construct truck climbing lanes at appropriate locations to allow slow moving trucks that are going up-hill to move into the far right lane so that faster moving vehicles can pass them in the left lane. Or if a PennDOT project and work zone are known early enough, the media can be advised to alert the general public to this new traffic pattern and/or detour routes.

Coordination, communication and cooperation are the keys to minimizing the effects of many of the causes of non-recurring roadway congestion. The CMP Plan addresses many of these situations with the “toolkit” of processes, procedures, methodologies and monitoring efforts. These tools can be used by the LEBCO MPO, Lebanon County’s Emergency Management Agency, individual municipalities and police departments, special events coordinators and others to make the day-to-day operation of our transportation system safer, more efficient and more effective in moving people and goods in and through Lebanon County.

Special Event Issues

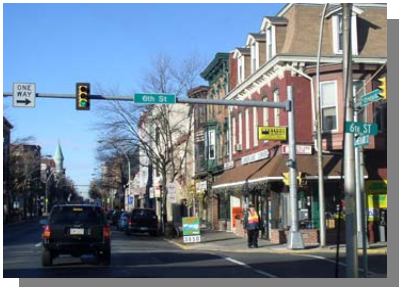
Special events (in and adjacent to Lebanon County) are a cause of congestion concern. While many of these events embody the character of Lebanon County, they also result in transportation demands that exceed available capacity. In rural areas, two-lane roads often become gridlocked due to these special demands.

Addressing special events (non-recurring) congestion is vital to the success of the CMP. Opportunities for success included outreach to the sponsors of the largest events as well as those hosting numerous events such as the City of Lebanon, Lebanon Valley College and the Lebanon Valley Expo Center.

Event	Municipality/ Location	Timeframe
Activities that occur at various times throughout the year		
Holiday Parades	City of Lebanon	various Christmas Memorial Day Halloween
Special training or events	Fort Indiantown Gap Military Reservation and Military Cemetery	various Veterans Day Memorial Day Flag Day
School (district) programs and activities	various	various
HERCO events (Hershey Park, Hershey Stadium and Star Pavilion, Giant Center, etc.)	Dauphin County	various
Renaissance Faire	Mt Hope, Lancaster County	throughout the year, but especially in the fall

Event	Municipality/ Location	Timeframe
Activities in chronological order		
Polar Bear Plunge, Willow Springs Park	Richland	Jan 1
Youth For Christ Auction	Lebanon Valley Expo Center	March (mid)
Lebanon County Builders' Show	Lebanon Valley Expo Center	March (late)
Unity Day at Lebanon High Stadium	City of Lebanon	April (not held in 2007 and 2008)
"Valley Days"	Lebanon Valley College	April
Martin's Carriage Auction	Lebanon Valley Expo Center	April (late)
Spring Crafts Festival	Lebanon	May
50+ Festival	Lebanon Valley Expo Center	May
Myerstown Craft Show	Myerstown	May and October
Lebanon County Relay for Life at Cedar Crest High School	South Lebanon Township	May (mid)
Baccalaureate and Commencement Services	Lebanon Valley College	May (mid)
Union Canal Days, 25th Street & Union Canal Drive	West Lebanon Township and North Lebanon Township	May (late)
Lebanon Street Fair	City of Lebanon	June
Cherry Fair & Early American Craft Show, Schaeffer Farm	Heidelberg Township	June
Historic Old Annville Days	Annville	June
Camp Mack and Camp Bashore (Boy Scout) events	Heidelberg Township (Mack) Union Township (Bashore)	June, July, August
Music in the Park, Coleman's Park	City of Lebanon	June, July, August
Fireworks	Coleman's Park and Mt. Gretna	July 4th
Lebanon Area Fair	Lebanon Valley Expo Center	July (late) August (early)
CLA Downtown Car Show	City of Lebanon	August (mid)
Schaefferstown Firemen's Carnivals	Schaefferstown	August

Event	Municipality/ Location	Timeframe
Blue Mountain Gospel Festival, annual event that covers multiple days	Lebanon Valley Expo Center	August (late), September
Firemen’s Carnivals	Campbelltown and Bellegrove	August, September
Mt. Gretna Arts Show	Mt. Gretna	August (late)
Hinkelfest	Fredericksburg	September
Lebanon Valley College football games	Lebanon Valley College	September, October and November
Wildfowl Show, Middle Creek Wildlife Management Area	Lancaster County	September (mid)
Fall Crafts Show	City of Lebanon	September (late)
Brethren Relief Auction	Lebanon Valley Expo Center	September (late)
Halloween Parades	Schaefferstown and Myerstown	October (late)
Bologna Drop	City of Lebanon	December 31st



Congestion Management Processes

Measuring and Monitoring System Performance

Performance measurement is the use of statistical evidence to determine progress toward specifically defined organizational objectives. This includes both evidence of actual fact, such as measurement of travel time, and measurement of customer perception such as would be accomplished through a customer satisfaction survey. The purpose of performance measurement is to:

- Set goals and standards
- Detect and correct problems
- Manage, describe and improve processes and
- Document processes

Based on an evaluation of performance measures as they relate to national guidance and Lebanon County's goals and objectives, **the following performance measures are selected for system monitoring:**

Measure of existing recurring congestion: **Travel time and delay** – travel time and delay provides a good measure of existing system performance. Travel time combined with delay indicates the amount of time to travel a highway segment and the additional time associated with congestion.

Measure of future recurring congestion: **Volume to capacity ratio** – volume to capacity ratio can provide a good measure of the volume compared to capacity of the roadway under existing and future conditions. Therefore, volume-to-capacity can be used as a measure of future performance through basic calculations using available PennDOT data. Where accurate future land use data is available, growth can be estimated based on anticipated development activity versus anticipated PennDOT growth rates.

Measure of non-recurring congestion due to incidents – **Crash rates** (vs. state-wide) can be used as a quantitative measure of non-recurring congestion. Facilities that exceed state-wide averages may warrant evaluation. Additionally, a correlation between crash rates and congestion can be developed by applying incident durations and roadway blockage assumptions to delay calculations.

Measure of recurring congestion due to special events – **Number of Special Events** – Many of Lebanon County's roadways have or serve special events or uses. While quantifying the congestion associated with these needs is challenging, documenting the number of special events / uses can serve as a guide for future evaluations.

Corridor Screening

After a corridor, a segment of a corridor, or a specific location is identified, a preliminary screening is conducted to complete the following:

- Gather basic data
- Engage stakeholders
- Identify Issues and concerns
- Identify possible solutions
- Identify what additional evaluations are needed

The *Preliminary Corridor Screening Worksheet* can be used to conduct a preliminary assessment of priority corridors and intersections.

**Lebanon County Metropolitan Planning Organization
Congestion Management Processes**

Preliminary Screening Worksheet – page 1 of 3

Route Description

Route	
Common Name	
Segment	
Functional Class	Traffic Class Group
Typical Speed Limit (range)	Number of Lanes (per direction)

Background Information

Was a travel time and delay study completed? When?	Are crash rates higher than rates for similar roadways?
Does the roadway have special uses?	Check those that apply o Evacuation purposes o Detour routing o Special events o Multi-modal usage (transit, pedest o Other
Has the community raised concerns about the roadway? Are concerns multi-jurisdictional?	Is there planned growth development in the area? Is the growth quantifiable?

Issues and Concerns

What are some of the issues and concerns related to recurring congestion?
<ul style="list-style-type: none"> • Inadequate Roadway Capacity (i.e., not enough lanes) • Roadway Bottlenecks (i.e., 2 lanes to 1 lane) • Intersections • Train Crossings
What are some of the issues and concerns related to non-recurring congestion?
<ul style="list-style-type: none"> • Crashes (and associated delays) • Construction Activities • Special Events • Emergency Management • Weather

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Congestion Management Processes**

Preliminary Screening Worksheet – page 2 of 3

Issues and Concerns (continued)

Are there other concerns?

Preliminary Evaluation of Strategies

CMP Strategy	Suitability (A - D)	Benefit (1-3)
Capacity Enhancements		
New SOV Facilities (new roads)		
Lane Additions		
Elimination of Bottlenecks		
Intersection/ Geometric Improvements		
Operational Improvements		
Traffic Signal Improvements		
One-way Streets / Circulation Adjustments		
Incident Management Systems		
Intelligent Transportation Systems		
Institutional Programs and Procedures		
Special Events Management		

CMP Strategy	Suitability (A - D)	Benefit (1-3)
Demand Management		
Growth Management		
Access Management		
Transit-Oriented Development Policies		
Employer-based Programs		
Public Relations & Education for Demand Management		
Public Relations & Education for Transportation-Supportive Development		
Modal Options		
Improved Transit Service		
Transit Capital Improvements		
Park-n-Ride & Other Intermodal Facilities		
Rideshare Programs		
Pedestrian Facilities and Information		
Bicycle Facilities & Information		

The suitability of each congestion management strategy is given a letter rating as follows:

- A – Techniques that are feasible and would be relatively easy to implement
- B – Techniques that are feasible and could be implemented with a moderate amount of effort
- C – Techniques that are feasible but would be very difficult to implement
- D – Techniques that would not be appropriate for a particular corridor

The potential benefit of strategy implementation is rated as follows:

- 1 – Techniques that are expected to have a significant impact on reducing congestion
- 2 – Techniques that are expected to have a moderate impact on reducing congestion
- 3 – Techniques that are expected to have little impact on reducing congestion

Benefit	A	B	C	D
Suitability	High	Moderate	Low	None
1				
2				
3				

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Evaluation Toolbox and Checklists

Twelve evaluation techniques have been developed. Selection of the appropriate evaluation technique(s) is dependent on the performance measures, issues and concerns identified and available resources.

Evaluation	Level of Concern					Est. Cost (1)	Est. Time (1)
	Existing Recurring Congestion	Future Recurring Congestion	Non-Recurring Congestion Due to Safety and Crashes	Non-Recurring Congestion Due to Special Needs	Community Concerns		
Special Events Coordination			Limited	Yes	Yes	\$5K	1 month
Incident Management Coordination			Yes	Yes	Yes	varies	varies
<u>Intersection</u> Operational and Safety Evaluations	Yes (int.)		Yes (int.)		Yes (int.)	\$5K	1 month
Safety Audits			Yes		Yes	\$5K	1 month
Operational Audits	Yes				Yes	\$5K	1 month
Access Management Assessments	Yes	Yes	Yes	Limited	Yes	\$20K	3 months
Traffic Signal Enhancement Initiative (TSEI)	Yes				Yes	\$50-125K	6 months
Congested Corridor Improvement Program (CCIP)	Yes	Yes	Limited	Yes	Yes	\$50-125K	6 months
Transportation and Land-use Study		Yes		Yes	Yes	\$100-200K	12-18 months
TDM Evaluation (multi-modal, trip reduction, etc) Study		Yes		Yes	Yes	\$100-200K	12 months
Conceptual and Feasibility Design Studies		Yes			Yes	\$100-200K	12-18 months
Regional Mobility Plan		Yes			Yes	\$100-200K	12-18 months

Note 1 - Cost and timeframe estimated for planning purposes only. Actual cost and timeframe is variable and dependent on scope of work and available resources.

Congestion Management Strategies

Methods to Address Congestion

Strategies to mitigate congestion generally fall into three categories - Building Capacity, Reducing Demand, and Managing Capacity. There are numerous mitigation techniques associated with each category, and the most successful approach may be to implement a combination of appropriate strategies from all three categories.

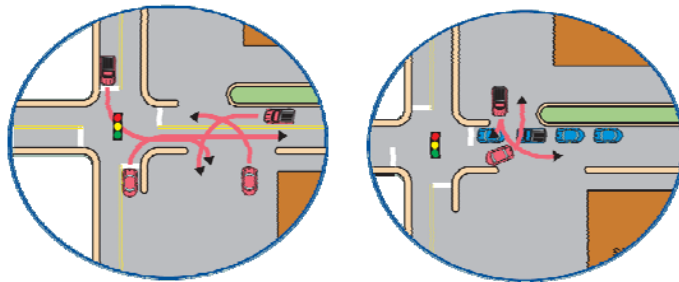
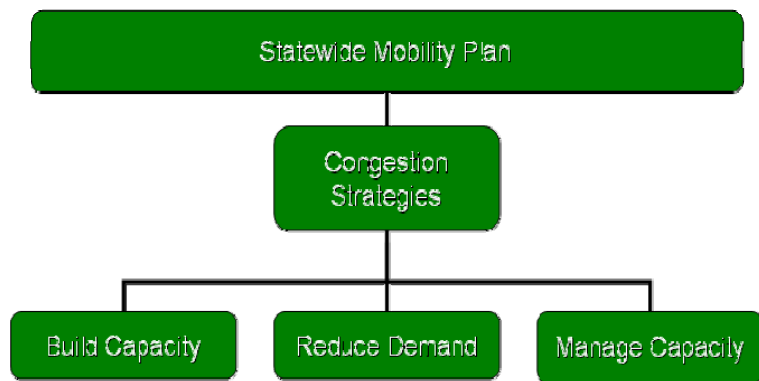
Building roadway capacity can refer to new roads or widened roads, but can also include new bus routes or rail lines. However, funding realities will severely limit any new capacity.

Reducing demand includes encouraging alternate modes of transportation, such as bicycle, pedestrian, and transit modes. Shared access and smart land use strategies that minimize vehicular trips are other means of reducing vehicular demand.

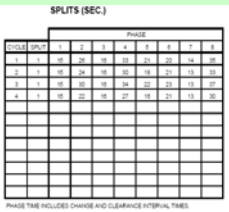


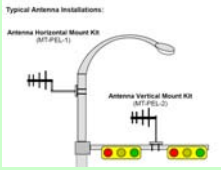


Demand can also be reduced through access management. Access management is the controlling of access points along a roadway such that the impact to traffic operations is minimized, while maintaining reasonable access. As more conflict points are introduced (see graphic above) to a segment of roadway, driving becomes more complex and motorists are more likely to make mistakes. As a result of poor access management, congestion increases and safety deteriorates. Effective access management preserves roadway capacity and reduces crashes.

Managing capacity can be accomplished through improving safety, the upgrade or retiming of traffic signals and transportation systems operations (institutional relationships and intelligent transportation systems).

Improved safety not only results in fewer injuries, but also reduced congestion. When the volume of a roadway exceeds its capacity congestion results, which increases crash potential, particularly rear-end types. Driver frustration also increases when congestion occurs resulting in aggressive driving, e.g. red-light running. By improving mobility and access, congestion may be reduced and crash rates may decrease. Likewise, by implementing low-cost safety initiatives/programs, congestion associated with crashes may be reduced.



The simplest means of improving traffic signal operations is to implement optimal signal timings. Opportunities also exist to implement timing plans to address non-recurring needs (such as special events, emergency detours, etc). Other traffic signal enhancements include intelligent interconnect, LED signals, countdown pedestrian signals, signal support replacement, and transit priority. These enhancements and their benefits are described in the following table.

Element and Benefit		Element and Benefit	
<p>Periodical Phasing and Timing Evaluations- Traffic signals should be retimed every three years or so. Delay reductions from eight to 40 percent have been documented, with benefit costs ranging from 20:1 to 80:1</p>	 <p>SPLITS (SEC.)</p> <p>PHASE</p> <p>PHASE TIME INCLUDES CHANGE AND CLEARANCE INTERVAL TIMES</p>	<p>Transit Priority- Typical delay reduction of 9 to 16 percent, even higher in some cases, when detection identifies buses and gives priority to them by changing their signal indication to green.</p>	
<p>Addressing Special Timing Needs- An FHWA report stated that a system deployed in Minneapolis reduced special event delays by 19 percent. Similar reductions may be possible for special events at the colleges.</p>	<p>Uses:</p> <ul style="list-style-type: none"> Incident Management Evacuation Routing Special Events Special Land-use Demands 	<p>Emergency Preemption- Decreased response times from between 16 and 23 percent.</p>	
<p>Multi-jurisdictional Signal Systems- FHWA study concluded that implementation of cross-jurisdictional signal systems can reduce delay by eight to 25 percent.</p>	<p>Typical Antenna Installations:</p> 	<p>Light emitting diode (LED) indications- 40 percent energy savings versus using incandescent signal bulbs, reduced maintenance costs, and improved visibility.</p>	
<p>Adaptive Control Strategies- Uses algorithms that perform real-time optimization of traffic signals based on current conditions. Delay reductions of 19 to 42 percent were experienced at 5 test deployments.</p>		<p>Countdown Pedestrian Indications- Improved pedestrian awareness at crossings since the sign is more active.</p>	

Transportation operations includes traditional traffic engineering activities, intelligent transportation systems (closed circuit television (CCTV), message boards, etc), software development and information management, as well as planning and programming activities.

The goal of many of these transportation operations initiatives include:

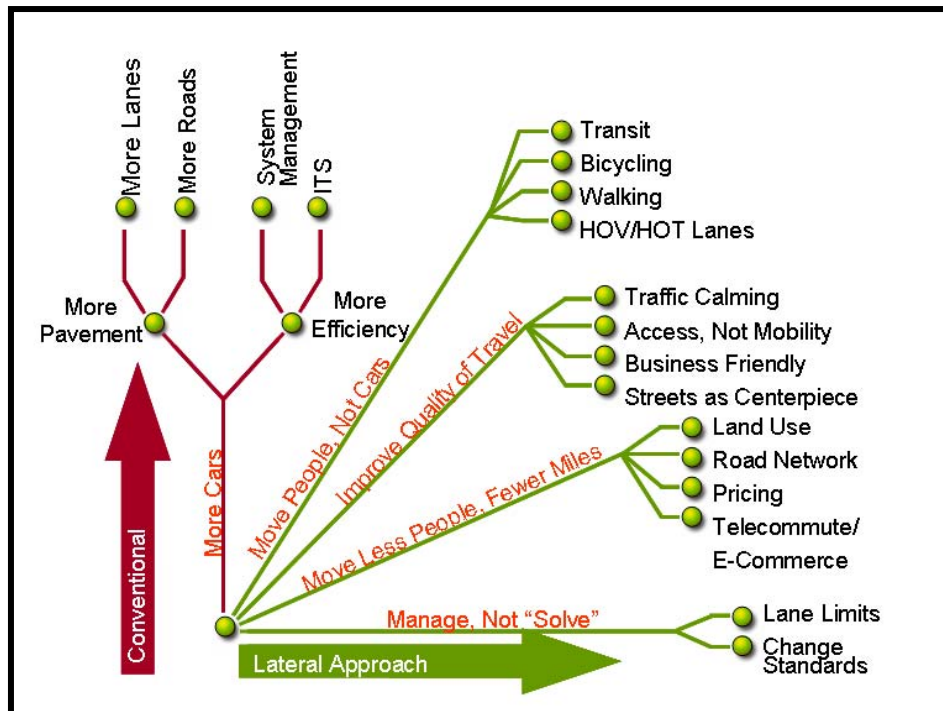
- Improving incident management
- Improving traveler information
- Improving safety



- Building an operations foundation
- Improving operational performance
- Improving security
- Improving interagency communication
- Promoting multi-modal operations

Ultimately, many of these initiatives are intended to address recurring congestion and safety issues as well as non-recurring incidents including special events and activities, crashes, weather events, and homeland security events. In other words, we need to have transportation operations to respond to “all hazards” whether that is daily congestion or another homeland security threat.

There are **many tools to address congestion**. An effective CMP must not only identify the appropriate methodology to assess an area of concern, but also guide the County in identifying mitigation treatments that are practical and feasible.



Conclusions and Recommendations

Conclusions

The intent of these Congestion Management Processes is to develop a systematic approach to assessing and addressing both recurring and non-recurring congestion while engaging stakeholders and gauging community input.

Depending on the conditions encountered during preliminary screening, various evaluation approaches may be appropriate. Ultimately, the range of solutions may include a combination of capacity enhancement, operational improvements, demand management and modal options to include projects, programs and services.

Ideally, the process will assist in advancing projects, programs and services into the LEBCO MPO's 25-year Long Range Transportation Plan (LRTP) and the short-range Transportation Improvement Program (TIP).

Next Steps

The purpose of this document was to identify and document a systematic approach to monitor and address congestion in Lebanon County. The logical next steps associated with this plan include:

- Develop the baseline performance measurement worksheet
- Conduct and coordinate initial/test preliminary screening activities
- Conduct, coordinate and support initial/test detailed evaluations
- Identify needed refinements to the CMP

Signal Inventory and Needs Assessment

While congestion in Lebanon County includes a wide variety of recurring and non-recurring congestion, there was some consensus (among the Task Force and public) that much congestion in Lebanon County can be attributed to inefficient traffic signal operations. With advancing traffic signal technologies there may be opportunities to improve operational efficiency more economically and with some environmental sensitivity. These advancements can help address both recurring and non-recurring congestion. Logical steps include:

1. Inventorying existing signal systems in order to assess the condition of traffic signals and opportunities to improve efficiency
2. Identifying comprehensive signal improvement strategies
3. Establishing a county-wide traffic signal timing optimization model

4. Developing a county-wide strategy for traffic signal maintenance/operations in order to reduce stakeholder costs and promote preventative maintenance practices

Comprehensive Signing Strategy

Another near-term opportunity is the development of a comprehensive signing strategy. The goal of the strategy would be to identify clear, concise and consistent signing for motorist unfamiliar with the area such as visitors to special events as well as truck traffic. Logical steps include:

1. Reviewing key corridors in order to identify the condition of route and directional signage as well as wayfinding signing
2. Identifying corridor route and directional signing needs
3. Identifying strategies for implementation of wayfinding and tourist signing