Institute of Transportation Engineers Inc.
1627 Eye Street, NW • Suite 600 • Washington, DC 20006 USA • Tel: 202-785-0060 • Fax: 202-785-0609 • www.ite.org

April 7, 2014

The Honorable Marie Waldron
California State Assembly
P.O. Box 942849
Sacramento, CA 94249-0075
Via email: andrea.gutierrez@asm.ca.gov

Dear Ms. Waldron:

Thank you for your leadership in drafting *AB 1447 California Global Warming Solutions Act of 2006.* The bipartisan legislation will expand funding eligibility for traffic signal synchronization, which provides greater opportunity for transportation professionals to access funds to reduce greenhouse gas emissions AND decrease traffic congestion—thereby better serving the travelling public and the environment.

The Institute of Transportation Engineers (ITE) has long touted traffic signal synchronization as a low-cost operational approach to alleviate congestion and reduce energy consumption and greenhouse gas emissions. We know that investment in traffic signal timing programs leverages 40:1 cost benefits. Accordingly, ITE strongly supports your efforts to move AB1447 through the California Assembly. You will also see this demonstrated by the commitment of support from local ITE chapters.

Attached please find a Traffic Signal Optimization Brief. It provides data from around the country that supports your efforts and highlights the mobility, environmental, economic and community impacts of signal synchronization (the term used in the brief is optimization). I hope you find the resource to be useful in your efforts.

Founded in 1930, ITE is an international educational and scientific association of 17,000 transportation professionals practicing in more than 90 countries who are responsible for meeting mobility and safety needs. ITE facilitates the application of technology and scientific principles to research, planning, functional design, implementation, operation, policy development and management for any mode of ground transportation. Through its products and services, ITE promotes professional development of its members, supports and encourages education, stimulates research, develops public awareness programs and serves as a conduit for the exchange of professional information.

Sincerely,

W. Hibbett Neel
International President

Att: *Traffic Signal Optimization* In Brief

Traffic Signal Optimization *In Brief*

Introduction

Traffic signal optimization generally refers to the practice of sequencing the timing of traffic signals along a corridor, or within a geographic area, to improve traffic flow. With the average benefit-to-cost ratio for traffic signal timing at 40:1, investment in traffic signal optimization is an opportunity to improve customer service, reliability, and environmental impacts.[1]

Traffic signals can be sequenced, so that a majority of vehicles traveling at the posted speed limit will encounter green lights as they progress along a corridor. Traffic signal optimization seeks to maximize this "green band" for roadway users during peak periods or in peak directions.

Stopping for red lights creates delays for all users of a transportation network. The *2012 National Traffic Signal Report Card* states that delays at traffic signals cause five to 10 percent of traffic delay.[1]

Traffic signal optimization seeks to reduce the amount of time spent waiting at a red light, thereby reducing such side effects as increased delays, increased emissions, increased frustration, reduced productivity, and potential for rear-end collisions.

Traffic signal optimization can be improved through intelligent transportation systems that use software applications, detectors, and camera systems for observation and validation of conditions to respond to real-time changes in traffic patterns.

A study of traffic signal optimization needs in the six-county Pittsburgh, PA metropolitan region noted that 37 percent of traffic signals would benefit from retiming, 13 percent needed minor equipment improvements, and another 13 percent required major equipment improvements.[2]

Georgia Department of Transportation's Regional Traffic Operations Program, a program to optimize and manage traffic signal operations along corridors that cross multiple jurisdictional boundaries, measured the following benefits in the first two years of operation:

- Reduced number of stops by 8.3 percent
- Reduced stopped time delay by 12 percent
- Increased traffic volume throughput by nine percent
- Eliminated 1.2 million hours of delay
- Saved 700,000 gallons of fuel.[3]

Effect on Travel

A survey of various traffic signal optimization projects implemented in the United States and Canada showed reductions in travel delays between 13 and 94 percent, a reduction in vehicle stops between 10 and 77 percent, and a decrease in travel times between seven and 25 percent.[4] These data are consistent with other data collected over the past nearly 20 years. For example:

- In Nashville, TN metropolitan area, a study of traffic signal optimization identified a 20-percentage reduction in travel delay for the seven studied corridors, with the greatest delay reduction of approximately 37 percent.[5]
- Other agencies have identified travel time reductions of as much as 30 percent, noting that achieving this level of reduction requires an increase in traffic engineering staff to actively manage the traffic signal system.[6]
- In Seattle, WA, a traffic signal optimization project increased efficiency on three major arteries by 26 percent, 22 percent, and 16 percent to 18 percent, respectively.[7]
- Field studies conducted after 41 California cities had optimized 1,535 signals showed that vehicle stops and delays were cut by more than 14 percent; travel time was reduced by 6.5 percent.[7]
- In Abilene, TX, a new signal system and traffic signal optimization produced a 13-percentage reduction in travel time and a 37-percentage reduction in delay.[7]
- Implementation of traffic signal optimization along 76 corridors in California cities reduced vehicular delay when traveling those corridors by 25 percent.[8]

Environmental Impact

Emissions Reductions

Traffic signal optimization can greatly reduce emissions by reducing the number of vehicles stopping and starting, or excessive idling, at traffic signals. For example, a traffic signal optimization program in Portland, OR found that in the program's first six years, more than 157,000 metric tons of carbon dioxide emissions were prevented, the equivalent of the emissions generated from burning 17.7 million gallons of gasoline.[9]

Other studies have found that traffic signal optimization efforts can result in carbon monoxide reductions of 13 percent.[10] In the Nashville, TN metropolitan area, a study of traffic signal optimization found the following improvements to air quality: volatile organic compounds were reduced by three percent,

nitrogen oxides by approximately one percent, and carbon monoxide by nearly one percent.[5]

Fuel Savings

A primer from the Institute of Transportation Engineers (ITE), titled *Improving Traffic Signal Operations*, notes that each dollar spent optimizing signal timing could yield a 15- to 20-gallon savings in fuel.[7]

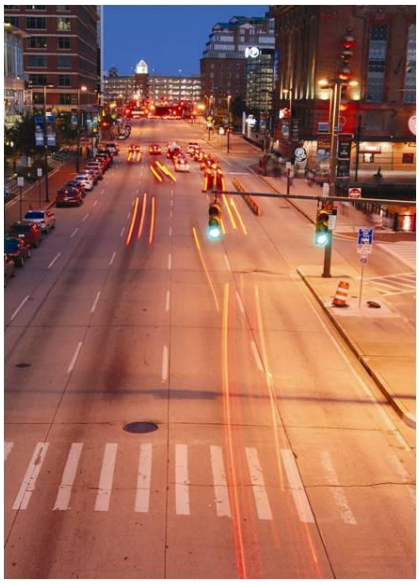
Other examples include:

- In the Nashville, TN metropolitan area, a traffic signal optimization study identified a reduction of nearly six percent in fuel consumption.[5]
- Field studies conducted after 41 California cities had optimized 1,535 signals showed that fuel use declined by approximately 6.4 million gallons.[7]
- In Abilene, TX, a new signal system and traffic signal optimization produced a six-percentage savings in fuel use.[7]

ECONOMIC IMPACT

Funding

Traffic signal optimization projects are typically funded by the government agency responsible for maintaining the roadway network. At the local level, local governments fund improvements for city corridors and traffic signals. Many County governments implement traffic optimization efforts through multi-jurisdictional projects for corridors that cross multiple agency boundaries. Federal funding is available through a variety of grant programs, such as the Congestion Management and Air Quality program, and is typically applied to projects that provide for traffic signal optimization along interstate



highway routes and parallel state, county, and/or local roads.

Effect on Existing Maintenance and Operations Resources

Based on data from six separate studies, the costs to retime a traffic signal range from $2,500 to $3,100 per intersection, per update.[11] A signal retiming program should take around 20 to 25 staff hours per intersection.[12] A general guideline is that it takes one traffic engineer to properly operate and maintain every 75 to 100 signals and one signal technician to operate and maintain every 40 to 50 signals.[7]

Cost-Benefit

When an agency embarks on a traffic signal optimization effort, members of the community may raise questions regarding the cost and benefits of the program. Traffic signal optimization is one of the lowest cost improvements an agency can make to its transportation system with some immediate benefits. For example:

- Traffic signal optimization of the Richmond, VA signal system at a cost of $4.7 million yielded benefits of $4.2 million annually.[8]
- A traffic signal optimization project in the Nashville, TN metropolitan area achieved a one-year benefit-to-cost ratio of 21:1 and a three-year benefit-to-cost ratio of 62:1.[5]

COMMUNITY IMPACT

All Road Users

Signal optimization does not have to be implemented for the sole purpose of increasing vehicle throughput. It can be implemented as a part of an overall integrated corridor management strategy to ensure that all roadway users, including pedestrians and bicyclists, can use the transportation network as efficiently as possible.

In situations where improvements to bicycle and pedestrian mobility are desired, traffic signals can be optimized, so that signal timings reflect the travel speeds of bicyclists or pedestrians. In other cases, an agency may identify certain corridors as primarily serving through vehicles, while other corridors are designated primarily for bicycle and pedestrian mobility.

Safety

Traffic signal optimization reduces vehicle crashes by reducing the likelihood of vehicles stopping short for a signal changing from green to red. For example, a study of traffic signal optimization along a Phoenix, AZ corridor resulted in a 6.7-percentage reduction in crash risk.[8]

REFERENCES

1. 2012 National Traffic Signal Report Card. *Executive Summary*. National Transportation Operations Coalition, 2012. Accessible via http://www.ite.org/reportcard/ExecSummary.pdf
2. French, L. J. and M. S. French. "Benefits of Signal Timing Optimization and ITS to Corridor Operations." August 2006.
3. Georgia Department of Transportation Regional Traffic Operations Program information. Accessible via http://www.dot.ga.gov/travelingingeorgia/trafficcontrol/Pages/Operations.aspx
4. Sunkari, S. "The Benefits of Retiming Traffic Signals." *ITE Journal*, April 2004.
5. Traffic Signal Timing Optimization Study for the Metro Nashville Signal System, Metropolitan Government of Nashville and Davidson County Department of Public Works, April 2006.
6. http://www.honolulutraffic.com/ALTtrafficsignals.pdf
7. Paulson, S. L. "Managing Traffic Flow through Signal Timing." *Public Roads* Magazine, January/February 2002.
8. Maccubbin, R., B. Staples, and M. Mercer. "Intelligent Transportation Systems Benefits and Costs: 2003 Update," FHWA-OP-03-075, Federal Highway Administration, Washington, DC, 2003.
9. Smarter transportation case study #5: Traffic signal optimization; Portland, Oregon. Transportation for America, October 13, 2010. Accessible via http://t4america.org/blog/2010/10/13/smarter-transportation-case-study-5-traffic-signal-optimization-portland-oregon/
10. McShane, W., and R. Roess. Traffic Engineering, New Jersey, Prentice Hall, Inc, 1990, pp 509-548.
11. ITS Joint Program Office, Cost Database, Costs for Traffic Signal Retiming, 2004-2006.
12. *Traffic Control System Operations: Installation, Management and Maintenance*. Institute of Transportation Engineers, Washington, DC. January 2000.