



# 2016 Countywide Signal Timing Optimization EXECUTIVE SUMMARY



Submitted to:  
**Metro Nashville Department of Public Works**

Submitted by:  
**NEEL-SCHAFFER**  
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In association with:





## EXECUTIVE SUMMARY

Mobility and traffic congestion has become a leading concern as the Metro Nashville area continues its unprecedented growth and status as an “It” city. As one of Mayor Barry’s initiatives and as part of a broader strategy to address the issue, Metro Government commissioned the Department of Public Works to conduct a county-wide traffic signal optimization project in 2016.

This traffic signal optimization project updated and optimized the operation of over 550 traffic signals, reaching all corners of Davidson County. Eighteen separate corridors were impacted, covering nearly 90 miles of Nashville arterial roadways. The challenging one-year project timeline was implemented to provide relief to drivers as soon as possible. This project was not intended to “fix” all transportation problems in Nashville but to act as the first step toward addressing the many transportation challenges the rapidly growing City of Nashville faces.

### SNAPSHOT OF PROJECT RESULTS

- ✓ Nashville drivers will save an estimated 1,720,000 gallons of gasoline having a value of \$3,870,000 in the next year
- ✓ Average travel delay was reduced by approximately 14%. The value of this delay reduction to Nashville drivers is approximately \$73 million in the first year alone
- ✓ The benefit to cost ratio of this project is approximately 38:1. This means the benefits (fuel and delay reduction) provided by the project exceeds the project cost by 38 times
- ✓ The project improved air quality by reducing vehicle emissions. The reduction of Carbon monoxide (CO) and Hydrocarbons (HC) emissions provided cleaner air for Davidson County motorists and visitors
- ✓ The benefits of signal timing optimization generally continue for 3 years, at which time the process is repeated as part of a comprehensive approach to traffic management recommended by the FHWA

The Metropolitan Government of Nashville and Davidson County, Public Works Department–Engineering Division (MPW) selected the Neel-Schaffer, Inc (N-S) team to perform the traffic signal optimization study. The consultant team included staff from Neel-Schaffer, Inc, R.G. Phillips Consulting, LLC, Volkert, Inc, Booker Engineering Inc, All Traffic Data Services, Inc and Quality Counts, LLC.





# METRO NASHVILLE 2016 Countywide Signal Timing Optimization



## PROJECT RESULTS

### Travel Time and Delay Study

By comparing traffic characteristics recorded under existing conditions to those found after implementing the new signal timings, project officials have the capability of evaluating the changes occurring as a result of the study effort. The study measures data inherently associated with traffic flow operations and performance indicators: total travel time, average travel speeds, number of stops, and duration of stopped delay.

The 18 corridors optimized can be seen in Table 2, which depicts the average travel time reduction per corridor.

Travel Time (% Change)	No. of Stops (% Change)	Avg. Speed (% Change)	Total Delay (% Change)
-11%	-19%	13%	-14%

Corridor	Travel Time Reduction (% Change)
Charlotte Pike	-16%
Korean Veterans Blvd/Shelby Ave	-16%
21st Ave South	-6%
West End	-8%
Nolensville Pike	-15%
Lebanon Pike	-18%
Gallatin Pike	-6%
Rosa L Parks Boulevard	-13%
Central Business District	-18%
Hillsboro Road	-12%
Harding Place	-3%
Donelson Pike	-7%
Bell Road	-7%
Haywood Lane	-8%
Clarksville Pike	-7%
Highway 70 South	-16%
Franklin Road	-7%
Dickerson Pike	-8%
<b>TOTAL PROJECT</b>	<b>-11%</b>

### Economic Analysis Results

One of the primary sources of the economic benefit is due to reduced road user cost resulting from reduced delays experienced by the motoring public. Other economic benefits include reduced fuel consumption. The change in fuel usage and delay was obtained directly from reports created when before and after travel times runs were completed. **Nashville drivers will save an estimated 1,720,000 gallons of gasoline having a value of \$3,870,000 in the next year.** The overall economic benefit provide by the project is approximately \$77 million with a one year benefit to cost ratio of 38:1 seen below in Table 3.

Time Frame	Delay Reduction	Fuel Consumption Reduction	Total	Cost	Benefit-to-Cost Ratio
Year 1	\$73,665,630	\$3,870,840	\$77,536,470	\$2 million	38:1



## FHWA Guidance

FHWA<sup>1</sup> provides guidance for conducting a systematic approach to traffic signal timing optimization: **Traffic signal timing should be reviewed every three to five years, and more often if there are significant changes in traffic volumes or roadway conditions.** This frequency of signal timing optimization is particularly important for jurisdictions or localized areas experiencing significant or rapid changes in development and land use patterns.

Due to the rapid population growth and property redevelopment the City of Nashville is currently experiencing, we recommend the signal timing plans be optimized following FHWA's guidelines, on average every three to five years.

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<sup>1</sup> "Traffic Signal Timing Manual", U.S. Department of Transportation Federal Highway Administration (FHWA), June 2008: Section 7.1.2



## QUESTIONS

For detailed information on this project, contact the Metro Nashville Department of Public Works, Engineering Division.