

CDOT Improves Traffic Operations and Saves Residents Millions Using Adaptive Signal Control

CASE STUDY

QuicTrac™ Adaptive Reduces Stop Delays by 39% and Improves Travel Time by 6% on US 50 in Pueblo, CO

EXECUTIVE SUMMARY:

CDOT Reduces Travel Time and Fuel Consumption Estimated to Save Drivers \$5.2 Million Each Year

The Colorado Department of Transportation (CDOT) decided to use real-time data to adjust signal timing on the fly to meet unpredictable traffic demands. Choosing to use McCain's *QuicTrac* Adaptive rather than the traditional time-of-day signal timing plans delivered the following results:

- 39% decrease in stop delays
- 6% improvement in travel times
- Reduced fuel consumption by 461 gallons/day
- \$5.2 million saved each year

THE SITUATION:

Erratic, Unpredictable Traffic Conditions Expose Limitations of Traditional Time-of-Day Signal Timing

The US 50 corridor in Pueblo, CO primarily serves commuters during the week and recreational travelers on the weekend. The eight-mile project area faced rapidly changing weekday traffic patterns due to elementary and secondary schools. Weekend and holiday traffic was just as unpredictable as tourist schedules and weather conditions vary widely. Another issue affecting the route is a short storage lane for left-turning vehicles at one of the mid-corridor intersections.

The study was conducted for a typical weekday during five peak periods:

- Morning Peak
- Mid-Morning Off-Peak
- Midday Peak
- Mid-Afternoon Off-Peak
- Evening Peak

Project at a Glance

CORRIDOR

The US 50 corridor is approximately 8.2 miles long and includes 10 signalized intersections.

- Average daily traffic flow of 38,000 - 48,000
- Five travel periods studied
- Significant congestion levels
- Major & minor intersections

SOLUTION

McCain's *QuicTrac* Adaptive utilized real-time data to positively impact and smooth traffic patterns at any given time.

TOP BENEFITS / RESULTS

- ✓ Delay reductions as high as 39%
- ✓ \$5.2 million in annual savings to weekday drivers
- ✓ Minimal displacement to traffic going opposite the optimized direction
- ✓ Daily savings of 1,013 vehicle travel hours
- ✓ Delivered maximum public benefit at minimal cost

CASE STUDY

THE SOLUTION:

McCain's Adaptive Signal Control System Chosen to Replace Traditional Time-of-Day Programming

Prior to implementation, CDOT relied on traditional signal timing that leverages time-of-day plans to control signals along a corridor. Because unpredictable demand limits the effectiveness of traditional timing, CDOT chose adaptive as a good alternative for signal control. Adaptive signal timing relies on real-time traffic data to create signal timing plans on-the-fly to respond to demand.

System Deployment: Corridor operations were evaluated pre and post implementation using the following measures of effectiveness:

- Travel time, stop delay, and speed
- Fuel consumption and vehicle emissions
- Average number of stops

THE RESULTS:

QuicTrac Adaptive Decreased Travel Time and Reduced Stop Delays

Based on a benefit analysis by an independent consulting firm, the system was estimated to save users of US 50 at least \$5.2 million per year.

Overall, travel times improved by six percent with 39 percent less stop delays and seven percent higher corridor speeds.

- 1,013 travel hours saved each day
- 253,250 travel hours annually

The average number of stops at signalized intersections saw a reduction of nearly one-third along the corridor, resulting in 100,000 fewer stops per day for the ten intersections studied.

As travel time and delays along the corridor decreased, fuel consumption and emissions also decreased. In this case, motorists consumed one percent less fuel each day, translating into a savings of 461 gallons per day.

Time and fuel savings estimated to save drivers in excess of \$5.2 million per year.

Results at a Glance

AVERAGE REDUCTION IN WEEKDAY STOPS: 31%

Eastbound (optimized)	Benefits (% reduction)
Peak Period	Decrease in Number of Stops
Morning Peak (6:00 a.m. - 9:00 a.m.)	3%
Mid-Morning Off-Peak (9:00 a.m. - 11:00 a.m.)	30%
Mid-Day Peak (11:00 a.m. - 2:00 p.m.)	36%
Mid-Afternoon Off-Peak (2:00 p.m. - 4:00 p.m.)	40%
Evening Peak (4:00 p.m. - 7:00 p.m.)	31%
Overall Weekday	31%