Keeneland Traffic Data Collection & Trip Generation

KENTUCKY TRANSPORTATION CABINET

Location

Lexington, KY

Services

- Traffic Data Collection
- Trip Generation Study
- Access Improvement

Client

Keeneland Association

John Howard, Project Manager

(859) 254-3412

Project Duration

2009

URS was contracted by the Keeneland Association to perform specialized traffic data collection to determine a custom trip generation rate for the race course. This data was used by Keeneland and their sports venue consultant to improve internal circulation and develop a predictive parking model based upon daily attendance estimates. Also, the data was desired to ascertain the potential need for additional access points or lengthening existing turn lanes into the race course.

Services included extensive traffic volume data collection during two weekends of the Fall 2009 meet. URS determined origin-destination data for each entrance, tracked drive-through betting window traffic, and developed a comprehensive traffic model.

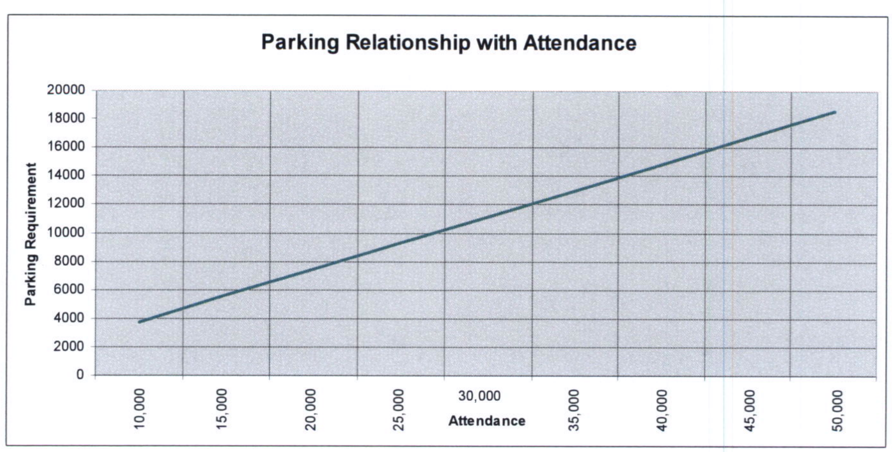
URS also performed a very basic parking study. The percent of the parking lot occupancy at particular times of the day were noted. In addition, vehicle occupancy for the parking vehicles was determined. An estimate was made on the number of race patrons that arrived by tour and shuttle busses, taxies, limousines, etc.

URS Project Staff

Paul Slone, PE, PTOE, Project Manager

William Madden, PE, PTOE, Traffic Engineer

Vanessa Fritsch, PE, PTOE, Traffic Engineer



KYTC District 5 Traffic Services Contract

KENTUCKY TRANSPORTATION CABINET

Location

Louisville, KY

Services

Traffic Data Collection

Signal Optimization

Signal Programming

Field Support

Client

Dan O'Dea, PE, Project Manager (Currently employed at Louisville Metro Government)

(502) 574-3777

Project Duration

2007-2009

Project Description

This project was awarded to update coordinated traffic signal timing on several corridors in Jefferson County. URS was assigned a total of 59 intersections on the following corridors to update.

- Dixie Highway (US 31W)
- Poplar Level Road (KY 864)
- Preston Highway (KY 61)
- Outer Loop (KY 1065)
- US 42
- Blankenbaker Parkway (KY 913)
- Newburg Road (KY 1703)

URS is collecting peak hour traffic data at each intersection and developing Synchro models for each corridor. URS provided traffic signal database files for direct downloading into the controllers, and provided on-site implementation support and field adjustment. Before and after travel time runs were performed with a GPS unit and the KYTC's internally developed software to evaluate actual driving conditions.

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William Madden, PE, PTOE, Traffic Engineer

Vanessa Fritsch, PE, PTOE, Traffic Engineer

Lexington Congestion Management System

Personal Experience of Paul Slone

Location

Louisville, KY

Services

Traffic Data Collection
Trip Generation Study
Access Improvement

Client

Max Conyers, Director Division of Planning

(859) 258-3167

Project Description

While working with his previous employer, Mr. Slone was the Project Manager for developing the Lexington MPO's Congestion Management System (CMS). A report published by the Lexington MPO in 2002 revealed that many routes through the Lexington area experienced high levels of congestion. This report was the beginning of the CMS for the Lexington area.

A CMS is a systematic process that provides information on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods to levels that meet state and local needs. It is a tool to improve the planning and programming process and integrate with other programs that are part of an existing Transportation Management System.

Key tools used for this CMS include:

- Access Management
- Reversible Traffic Lanes
- Traffic Signal Improvements
- Intersection Improvements
- Increased Multimodalism

Phase I of the CMS process involved recommending policy framework and analytical methodologies through a decision matrix. In phase II of the process, an initial round of analysis on seven of the region's most congested routes was performed.

A study work group has been formed to provide direction and guidance during the CMS development process. Phase II of the CMS process identified conceptual projects to improve congested conditions and prioritized these projects based upon benefit/cost ratio, future funding availability, anticipated lifespan of project benefits, as well as geographical balance of projects.

Project recommendations included a list of numerous, small operational improvement projects as well as project concepts for consideration in the Transportation Improvement Program. Also as part of this project, one CMAQ grant was submitted and approved by the Kentucky Transportation Cabinet and one Six Year Plan project was revised saving millions of dollars. Analysis included interchanges along New Circle Road and Interstate 75.

Through the initial CMS, a project was identified to improve the bottleneck at the Harrodsburg Road/New Circle Road interchange. Today, that interchange is the site of Kentucky's Double Crossover Diamond interchange.

Project Approach

URS has developed the following Plan of Action to demonstrate our understanding of the project and planned level of effort, to complete the Scope of Services for all the routes to be awarded.

1. Data Collection Plan

Every traffic signal optimization project begins with a thorough inventory of the existing field conditions. The detail in the part of the proposal is necessary to convey the amount of pre-planning and detailed discussions that have taken place in preparation of this project. **Quality data collection is essential to the success of the project.**

The data collection specification in the RFP require numerous hours of data collection for each intersection. The data collection times for a weekday plus Saturday and Sunday total up to 38 hours of data collection per intersection. Typically the traffic counting portion of a signal retiming project ranges from 20 to 25 percent of the project costs. Therefore, to help manage costs, the URS Team has developed a traffic counting plan that strategically identifies the critical intersections that should be fully counted and some less busy intersections where off-peak and weekend counting hours could be reduced.

Our DBE partner, is Abbie Jones Consulting, LLC (AJC). Abbie and her staff understand that the traffic data is the basis for the traffic signal optimization. URS has received multiple endorsements from other consulting firms recommending AJC for their responsiveness and the quality of the products they provide.

The URS Team proposes to have a kickoff meeting immediately following selection to refine the data collection plan. At this meeting, the URS Team would like clearly identify the expectations of the LFUCG and detail the exact hours of counting for each intersection. This must be decided up front for cost estimating purposes and cannot become an after thought after the project has started.

The number one consideration for the data collection program is the requirement to collect data while school is in session. Assuming a May 1, 2013 notice to proceed, there will be only three counting weeks available before the end of the school year and Memorial Day weekend (May 25th through 27th). Given that Versailles Road is currently undergoing a pavement rehabilitation project, we propose to work on the other three routes first.

If a notice to proceed is not received by May 1, 2013, an alternative project schedule, beginning when Fayette County Public Schools restart, is presented later in the schedule section.

Turning Movement Counts

Abbie Jones Consulting will perform the intersection movement counts manually by first recording video of the intersections and then manually counting traffic in the office with the COUNTcam system. AJC is prepared to collect intersection counts for one corridor per week. The largest corridors, in terms of number of signals, are Versailles Road, Georgetown Road, and Newtown Pike with 12, 11, and 8 signals, respectively. AJC can collect data up to 12 intersections at once. This is important for two reasons:

1. We do not need to purchase or lease additional equipment for this project; keep project costs down.
2. We are able to collect all Saturday and Sunday counts per corridor on the same weekend; maintaining aggressive project schedule. There are multiple weekdays where data can be collected, but there's only one Saturday and one Sunday per week. Therefore, we will have no delays for needing multiple weekends to count any one corridor.

The ideal data collection schedule is illustrated below.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			Install Equipment	Record Video		Record Video
Record Video	Pickup Equipment, begin re-charging bat-teries, begin in office pro-cessing		Repeat pro-cess on next route			

The video is recorded in the field using a weatherproof, battery powered camera assembly, shown at left. The video is then observed using a combination of the PC-TAS software and a specialized keypad. The count is collected manually while watching the video. PC-TAS is the industry leading video viewing/counting software that allows the user to toggle the video playback speed up to 20 times normal speed when traffic is light or slowed down to half-speed for heavy, congested conditions. This allows for maximum efficiency while always maintaining accuracy. Use the pause feature to take regular breaks through the workday and saving work for continuation the next day. Counts can be checked, even redone, if errors are suspected.

COUNTcam equipment

Video recorder

COUNTpad

PC-TAS

AJC recognizes that many of the routes will pass through major interchanges with New Circle Road and/or Interstate 75. Queuing and spillback between closely spaced intersections and interstate ramps is not ideal under any scenario. AJC workers are trained to note any such occurrences with specific details such as time and duration of the occurrence. By noting field observations during the count, the Consultant will be better prepared to address the "demand" volumes in their respective modeling, rather than just the "supply" volumes that are collected.

All respective intersection data collection will be merged into a single PetraPro (ppd) file for submittal. The data files will be reviewed for quality and accuracy prior to submittal. Space for field personnel to make notes associated with unusual events will be provided in the "Comments" portion of the (ppd) file.

In addition to the turning movement counts, URS will also collect the following supplemental data at various points in the network:

- Direct measurement of saturation flow rates per in the Highway Capacity Manual
- Percentage of heavy vehicles
- Number of busses, bus stop locations, and frequency of stops
- Travel time data
- Platoon length measurement

This additional data will be collected in order to produce optimized signal timing and simulation models that are as realistic as possible.

Proper calibration produces a good end product

Saturation flow rate will be field measured since it represents one of the most critical network calibration variables required for traffic model development. **There is no other network variable that has a bigger impact on model results than saturation flow rate.** The procedure for measuring this is outlined in the Highway Capacity Manual Appendix C of Chapter 16. The benefits of performing these measurements are that they will include any friction from narrow lanes and heavy congestion, pedestrian activity, road terrain, and heavy vehicles. URS has had great success on modeling projects this year using this model calibration methodology.

Travel Time Studies

URS is on the cutting edge of transportation data collection. Our regional ITS engineers in the Indianapolis office are developing Bluetooth receivers that collect a time stamped log of median access control (MAC) addresses from passing Bluetooth enable devices (i.e. cell phones, wireless ear pieces, car consoles, enabled GPS units, etc.). Because MAC addresses are unique to a device (there are over 1 trillion possible addresses), this provides an anonymous hot spot for vehicle identification.

Our system is a collection of off-the-shelf equipment and not a trademarked. URS uses AirCable Bluetooth receivers attached to common netbook computers. Our ITS engineers have written a web based analysis tool specifically for determining arterial travel times and speeds. This same system was used for our Bluetooth pilot project on Versailles Road last year (highlighted in the similar projects section).

Our system is installed at the intersection signal cabinet due to the need for a power source. Our units are equipped to email status updates three times hourly and full data files twice daily, so that we can remotely monitor the quality of the data. This gives us the opportunity, if necessary to make adjustments to improve data capture.

Occasionally, we encounter unsignalized or midblock locations that are ideal for data capture, but lack a power source. Examples of these locations are the I-75 southbound ramps and the New Circle Road interchange on Newtown Pike. We will supplement our data collection units with equipment from BlueFax. BlueFax provides a battery powered option that provides eight to ten days of continuous data collection.

Please feel free to visit our data processing site at bluetooth.ursconnect.com

2. Existing Conditions Analysis

URS will utilize existing Synchro 7 models as the basis for this project. Each route presently has models for all current timing plans that, with updated traffic data and some calibration checks, will serve as the existing conditions models.

URS will perform an intersection by intersection quality check of the model to confirm its accuracy. In order to deliver accurate intersection programming, we must check and recheck that our models are using the proper signal phasing and intersection geometry.

As part of model checking, the URS Team will use the LFUCG's online GIS resources to perform a variety of intersection measurements. These measurements will be used to adjust vehicular clearance intervals to meet the current KYTC policy. In additional the crosswalks will be measured to calculate pedestrian crossing times using the newer 3.5 feet/second criteria in the Manual on Uniform Traffic Control Devices.

We will extract system performance measures from the existing conditions, as determined by Synchro, to serve as a baseline for evaluating the potential improvements of the optimized timing plans.

3. Development of New Timing Plans

URS will develop optimized timing for the advertised corridors. Each corridor has its set of unique set of challenges relative to traffic demands, signal spacing, variable travel speeds and number of heavy vehicles.

URS will present the optimized performance measures and animated simulation models to the Division of Traffic Engineering. The simulations will illustrate benefits of any recommended operational changes to the existing traffic signals as well as the overall improvements in traffic flow from the newly optimized plans. The simulation models will be presented during one of the scheduled project review meetings to demonstrate both the project status and gain concurrence on the proposed signal timing.

All optimized timing output will be input into a spreadsheet form similar to the coordination data table used by the OASIS controller firmware. The spreadsheet will automatically calculate forceoffs from the Synchro model output for implementation. Customized forms will be created for each intersection.

URS will work jointly with the Division of Traffic Engineering to program the new timing plans into Centracs, the central signal system database. This effort will be immediately scheduled after Traffic Engineering has reviewed and approved the proposed timing plans. We will provide phasing diagrams and any necessary controller programming for recommended signal phasing alterations.

Project Specific Strategies

With our familiarity of the project areas, we know there are unique circumstances and characteristics associated with each route. Due to the mix of commuter routes, office and medical buildings, factories, the airport, commercial and residential areas, each route will have its own identity and set of solutions.

Some basic strategies that will make each timing plan successful in reducing congestion and improving traffic flow through the various study areas include:

1. Keep short blocks clear. There are multiple blocks where the distance between signals is less than optimal. Working to reduce congestion on these blocks will provide more storage space for vehicles turning from side streets. Also, smaller platoons queued at signals can accelerate more quickly and move more efficiently through intersections thereby improving vehicle progression.
2. When developing the new signal timing, we will do our best to account for near term traffic growth, planned developments adjacent to project intersections and the occasional random spike in traffic. To accomplish this, we will set a goal volume/ capacity ratio (v/c) limit of 0.85 (or 85 percent capacity) every lane group at most intersections. At the higher volume, more congested intersections, this is not realistic without creating timing plans that are unnecessarily long.
3. Another strategy for improving capacity is using alternative phasing or phase rotation. The use of the "flashing yellow arrow," lead-lag left turn phasing and omitting phases by time of day give traffic engineers more tools to improve capacity and flow, without investing in physical roadway changes. We know that Traffic Engineering has the approval of the KYTC to begin implementing these creative signal timing congestion countermeasures.
   a. We will evaluate the use of **lead/lag by time to day** to develop the best bidirectional fit of the progression bands for each timing plan.
   b. Another operational tool to reduce left turn delay is a "**reservice phase**." This is where a movement is served twice in the same cycle provided certain minimums are satisfied for the other movements.