



Technology and Innovation Deployment Program (TIDP)

Accelerated Innovation Deployment (AID) Demonstration
KYTC - Roundabout Installation Project
in London, Kentucky

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KENTUCKY
TRANSPORTATION
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Final Report

Final Report Purpose

This document serves as the final report on the construction and opening of the Roundabout Project in London, Kentucky (Kentucky Item Number 11-904.1). This project (hereafter referred to as the London Roundabout) was constructed on the authority of the Kentucky Transportation Cabinet (KYTC), which received an Accelerated Innovation Deployment (AID) Demonstration grant of \$1 million to offset project construction costs. The AID Demonstration program requires that award recipients submit a final report to the Federal Highway Administration (FHWA) within six months of project completion. The purpose of this report is to document the project delivery and construction processes, benefits, and lessons learned, which includes development and/or refinement of guidance, specifications, or other tools and methods that could be used to adopt the roundabout innovation as standard practice.

At the beginning of the project, a Data Collection and Implementation (DC&I) plan was created to guide this study on the London Roundabout's construction. The research team specified performance indicators and individual project goals to help work toward best practices and to measure the project's performance, with particular focus on the relevant outcomes that were achieved through the use of the innovation (i.e., the modern roundabout intersection).

Accelerated Innovation Deployment (AID) Demonstration Information

The AID Demonstration program is part of the Technology and Innovation Deployment Program (TIDP) which provides funding and other resources to offset and mitigate the potential risks of trying an innovative approach. Any project eligible for assistance under Title 23, United States Code, may receive AID Demonstration funds. Projects eligible for funding must include practices or technologies, such as those included in the EDC initiative which have been proven innovative. Innovations may include infrastructure and non-infrastructure strategies or activities, which the award recipient intends to implement and adopt as a significant improvement from their conventional practice.

AID Demonstration – Selected Project

KYTC received a \$1 million AID Demonstration grant to offset the costs of installing a roundabout in London, KY on KY 363 at KY 1006. The amount awarded was based on the cost of the innovation used for this roadway project, not the total project cost. The AID Demonstration funds were used in lieu of other federal program funds and did not otherwise modify the federal fund match requirements.

The objective of this AID Demonstration project was to document and communicate the experiences, benefits, and challenges of installing roundabouts. Federal, state, and local transportation agencies can draw from this knowledge in their efforts to identify locations where installing roundabouts would provide an effective and appropriate solution to safety and operational challenges. More locally, increasing KYTC's institutional knowledge of roundabouts can improve the countermeasure selection process during preliminary engineering and design. Having greater institutional knowledge of roundabouts will ensure that KYTC considers the implementation of roundabouts at locations where they could be effective solutions to identified problems.

Innovation: The Modern Roundabout

KYTC supports the modern roundabout as a viable alternative for intersection design. However, several roundabout intersections in Kentucky have not performed well. Practitioner opinions about the utility of roundabouts is mixed. To help ensure that roundabouts operate as intended, KYTC has adopted guidance that may be used when evaluating whether a roundabout could serve as a feasible intersection design. KYTC plans to use the AID Demonstration award to: 1) identify circumstances when a roundabout is an appropriate intersection design to consider, and 2) demonstrate safety and operational benefits that can be achieved when roundabouts are designed and constructed properly.

Research Study and AID Documentation

KYTC asked research staff at the Kentucky Transportation Center (KTC) to evaluate the London Roundabout project and assist with creating the final report for the AID Program. This evaluation is a part of a research study entitled, *Kentucky's Innovative Intersections—Investigation and Operational Evaluations*. The objectives of this research are: 1) to evaluate the operational and safety effectiveness of roundabouts in Kentucky, and 2) to highlight innovative intersection designs that can potentially improve the operational and safety performance of Kentucky's high-crash intersection types. The documentation will provide an *Innovative Intersections Best Practices* guidebook for KYTC's Project Development and Project Delivery that describes planning and design and operational factors to consider when evaluating new intersection types.

The first phase of the research study will fulfill the AID documentation requirements by evaluating the roundabout installation project in London, Kentucky. The following tasks were completed for this evaluation.

1. Monitored construction phases of the London Roundabout Project (KYTC Item #11-904.1)
2. Collected and evaluated construction change orders
3. Evaluated issues of constructability and site selection
4. Conducted a post-construction review with key personnel who were involved in the planning, design, and construction of this roundabout. The following topics on the construction of the roundabout were considered:

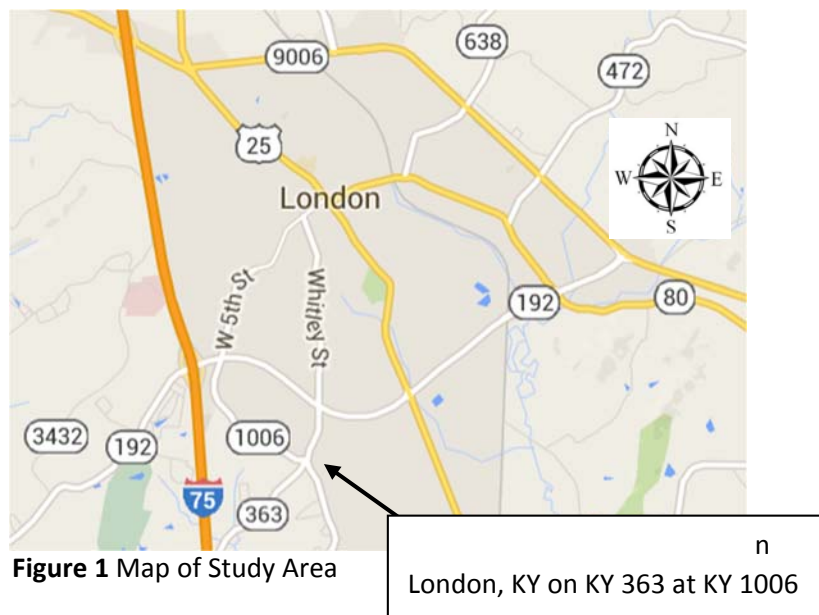
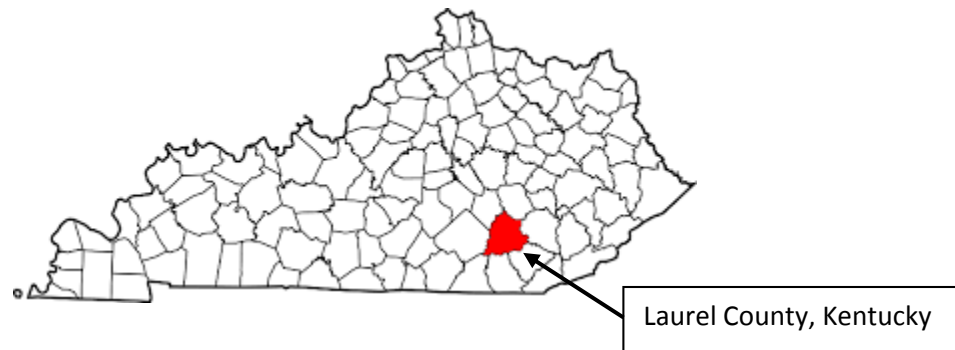
- a. Maintenance of traffic
 - b. Design plan documentation
5. Conducted Operational and Safety Evaluations

This report is the culmination of the first research phase and it documents lessons learned from the roundabout installation project in London, Kentucky. During the project's second phase, the lessons and concepts derived from Phase 1 will be used to develop a *best practices document* that includes recommendations to guide design and construction practices for roundabout intersections in Kentucky. The best practices and lessons learned will be developed as a standalone document that may be distributed to and edited by KYTC staff. The document will be circulated among consultant engineers if staff at KYTC's Division of Highway Design believe doing so is beneficial.

As part of the AID documentation, the DC&I plan outlined a strategy to collect the information needed to gauge selected performance measures. KTC's research team was responsible for gathering these data. Researchers made periodic visits to the project site throughout the construction phase and worked with KYTC's London Section Office, which was responsible for construction management, inspection, and issues related to project status and daily inspection reports. Special attention was focused on the construction change orders and maintenance of traffic notes. After construction was completed, a post- construction review was executed to gather information, discuss challenges, and enumerate the project's successes.

The London Roundabout Project Information

The London Roundabout on KY 363 at KY 1006 was programmed as a safety-hazard elimination project. The city of London is located in Laurel County in south Kentucky (see Figure 1).



The intersection at KY 363 and KY 1006 has been a high crash location for many years. The alignment of the KY 1006 southeast leg was badly skewed, which obstructed the drivers' line of sight when approaching the intersection. In the mid-90s, KYTC converted the intersection to a four-way stop. Prior to this, the intersection was two-way stop controlled, with the stop condition on KY 1006. When this intersection was a two-way stop, the crashes were frequent and often severe. When KYTC installed the additional stop signs, the crashes and their severity were reduced, and the capacity of the intersection was greatly diminished. While KYTC waited for the safety-hazard elimination project to be delivered, they chose to live with low intersection capacity in order to reduce severe crashes. This intersection continued to have a high crash rate. In the three years prior to construction, 14 crashes were recorded, with one injury crash. Figure 2 shows an aerial view before roundabout construction was underway.



Figure 2 Aerial View of Four-Way Stop Intersection at KY 363 and KY 1006 Before Construction

The London Roundabout Project Construction

The London Roundabout project was let in October 2014 and awarded to the roadway construction company Elmo Greer & Sons. According to the construction procurement documents, the fixed completion date was to be August 31, 2015. Because there are two schools in the vicinity of the intersection, KYTC's goal was for summer construction activity to complete an operational roundabout prior to the beginning of the 2015 school year.

A preconstruction conference was held on January 13, 2015, during which all parties confirmed they were ready to move ahead with project work. Project work commenced in February with utility relocation and minor site preparation. Although the original planning called for grade work to begin in May, the earthwork movement was delayed due to utility relocation and drainage box placement. Unsuitable weather delayed utility relocations and all subsurface work, such as storm sewer construction. Additionally, the prime contractor had an issue with their drainage box supplier. The fabrication and delivery of drop boxes and other drainage structures were delayed, which pushed the project further behind schedule. Above ground work could not proceed at full speed until the drainage boxes were placed. The placement of the drainage boxes became the critical path in Phase 1 of the project's construction.

Major roadway construction work began in June, however, by this point the prime contractor was behind schedule. The first major earthwork placed fill material near the existing intersection to build two legs of the roundabout; this was used to detour traffic around the intersection during the initial construction phases. Two legs of the intersection were closed during construction. The southeast leg (KY 363) and southwest leg (KY 1006) remained open, which allowed traffic to flow through the construction site. Figure 3 shows the location of the detour.

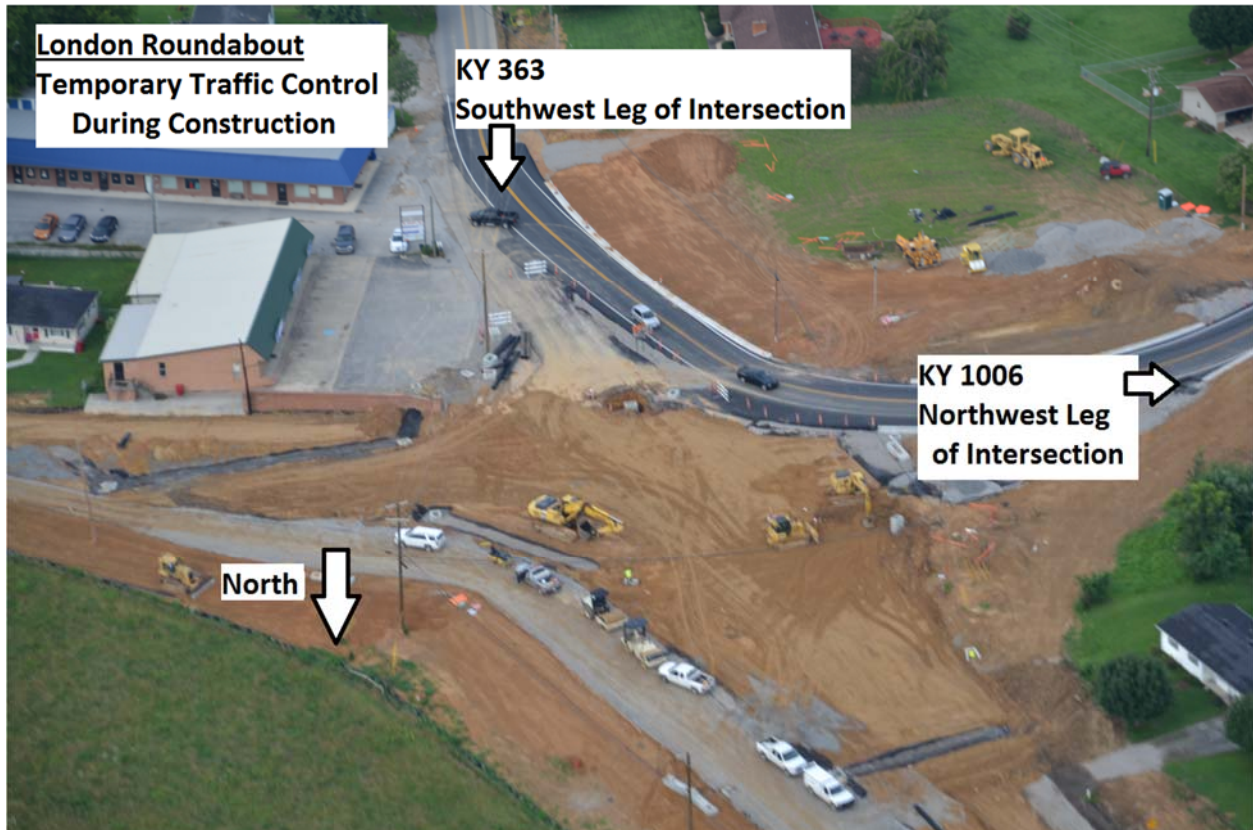


Figure 3 Location of Phase 2 Detour

Construction was underway on the roundabout itself by the third week of July. The contractor placed subgrade rock for the circulatory lanes as well as the northeast leg and southeast leg of the roundabout. The following week, concrete curb-and-gutter was constructed around the truck apron's exterior, on the northeast leg and southeast leg of roundabout. Figure 4 shows an aerial view of the site during the subgrade rock placement.



Figure 4 Aerial View of Roundabout During Subgrade Rock Placement

The London Roundabout opened to traffic on August 5th at 2 PM, and local schools opened on August 6th. While the roundabout was functionally operational at this point, however, the intersection remained under construction and in a Construction Maintenance of Traffic (MOT) phase. Base pavement and temporary pavement markings were in place, but the final striping plan was not in place. Additional construction tasks that were completed after the roundabout opened included:

- 1) Removed pavement used for the MOT diversion on the southwest leg, KY 363
- 2) Formed and placed the splitter island for the southwest leg
- 3) Completed roadside work, including signage and lighting
- 4) Placed the final surface pavement and final pavement markings

Figure 5 depicts construction of the southwest leg splitter island.

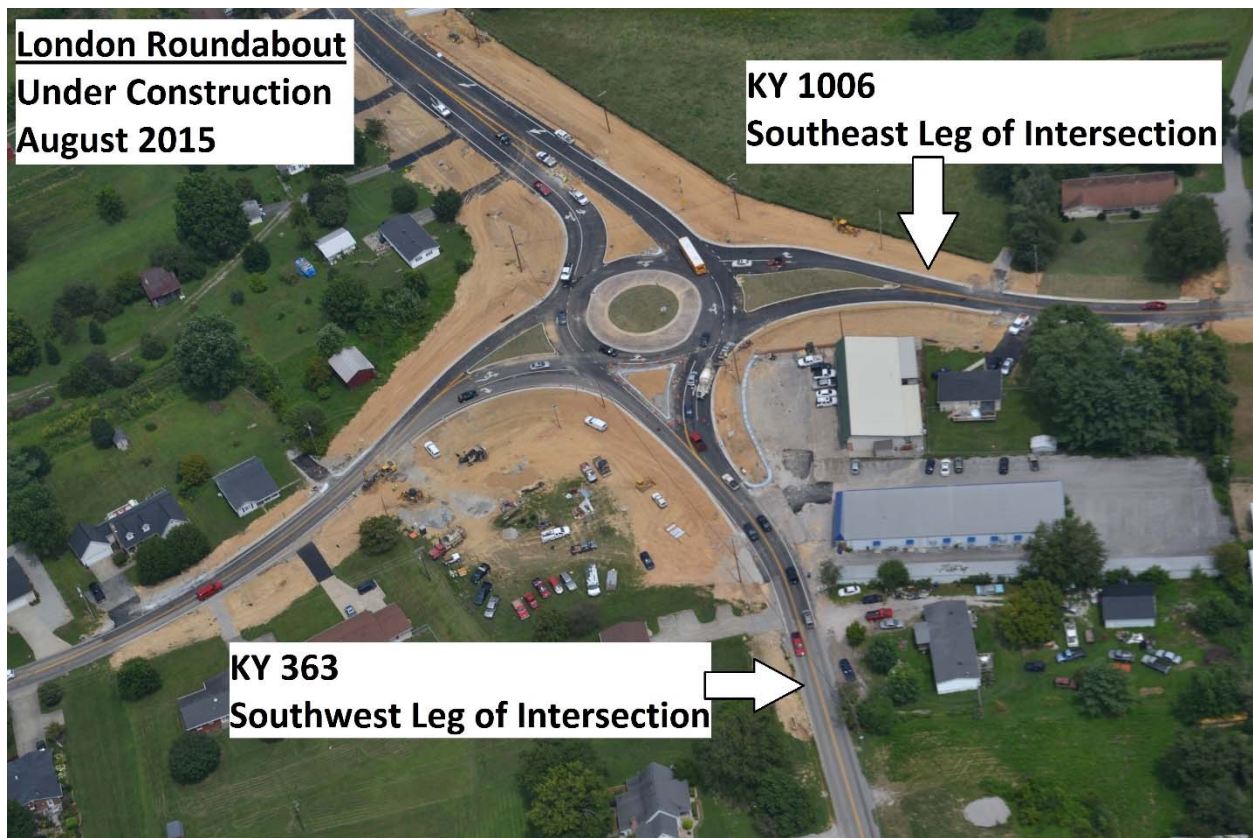


Figure 5 Work on the Southwest Leg Splitter Island

Construction was finalized on the London Roundabout by October. The final inspection walk through was held in September and the Engineer's punch list items were addressed. The project was completed and deemed closed on October 30, 2015. Figure 6 shows the roundabout as a fully operational intersection. See Appendix A for a copy of the *Project Completion Notice*.

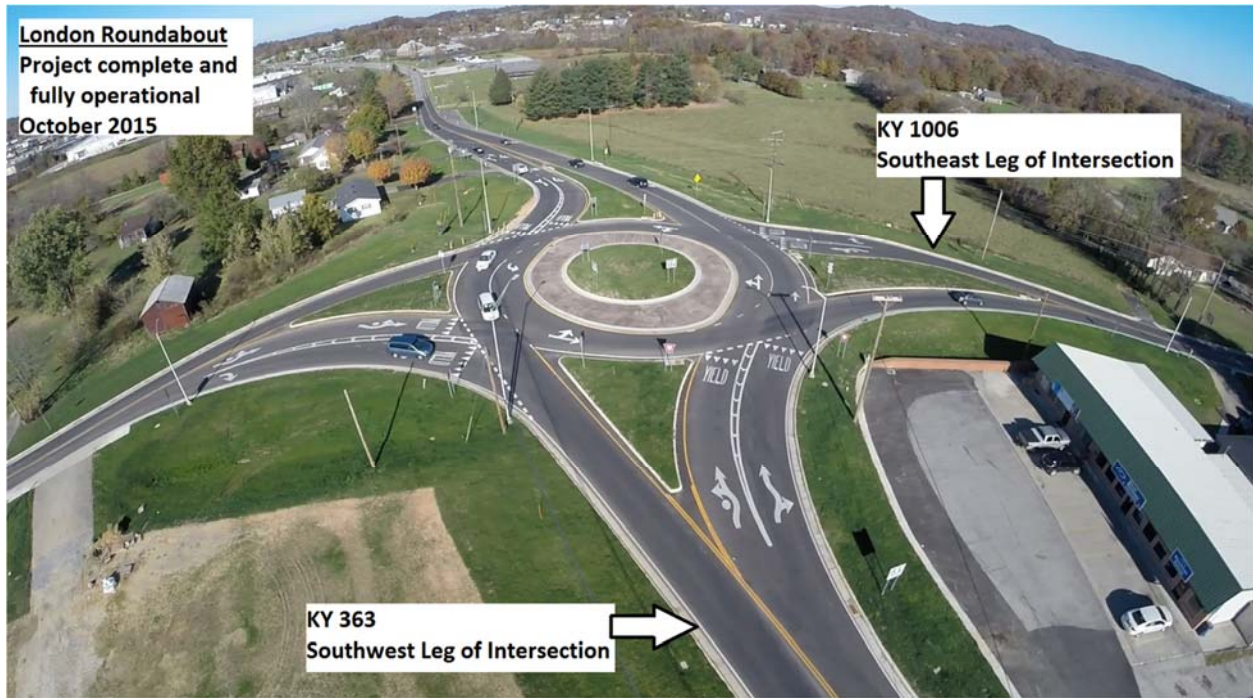


Figure 6 London Roundabout as a Fully Operational Intersection

Performance Measures for the London Roundabout

This section describes the performance metrics that were selected to qualify or quantify the effectiveness of the roundabout. The results of performance evaluations can inform the AID Demonstration program as well as guide future efforts toward best practices, programmatic performance measures, and decision making guidelines.

- Review of crash reports annually (up to five years)
 - Reduction in total crashes
 - Total crashes by severity

KYTC will monitor crash reports for the number and type of incidents that occur at the London Roundabout and use data to inform decision-making on future roundabout projects. The construction cost for this project was paid for by a combination of the AID Demonstration grant and Highway Safety Improvement Program funding, which require the state to track operational safety after project completion. Measuring performance will thus be vital for evaluating the London Roundabout's success. Initial review of crash data for the six months preceding the opening of the roundabout has identified two crashes.

- Perform post-construction operational analysis to determine the impact of the project on capacity

Baseline information for the original intersection was extensively documented in the design process. The design team used traffic microsimulation to assess the four-way stop intersection as well as several proposed intersection designs, including the roundabout.

KTC visually inspected the KY 363 and KY 1006 intersection while it still operated as a four-way stop. Figure 7 illustrates the previous four-way stop intersection during a Tuesday afternoon rush hour. The queues at the intersection were significant and led to a poor level of service.

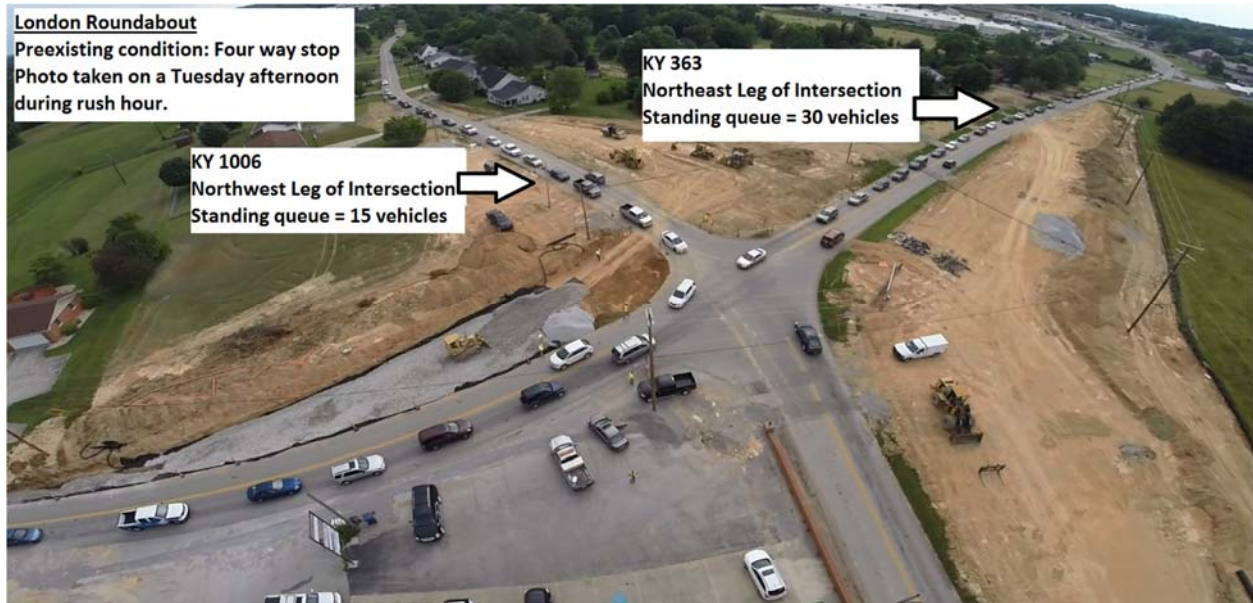


Figure 7 Queuing at KY 363 and KY 1006 When Connected by a Four-Way Stop Intersection

After the project had been opened to traffic for several months, KTC conducted a follow-up visual inspection of the roundabout's traffic operation. Portions of the visual inspection were video recorded. Figure 8 is an image that was taken on a Tuesday afternoon during the afternoon rush hour, at approximately the same time as the scene in Figure 7. Queues at the intersection were nonexistent, indicating a high level of service.



Figure 8 Queuing at KY 363 and KY 1006 When Connected by Roundabout

Field observations have demonstrated that the roundabout has eliminated the rush-hour standing queue at the KY 363 and KY 1006 intersection. This outcome is consistent with those predicted by design microsimulation, which indicated the proposed roundabout would have little to no standing queue. The new roundabout is operating as predicted and traffic operations have improved significantly. Early evidence thus confirms that the roundabout innovative design solution has proven effective for an intersection which previously had a poor level of service.

- *Present lessons learned at the KYTC / ACEC Partnering Conference the year after the evaluations are completed*

The KYTC/ACEC Partnering Conference is held annually in early fall. KTC plans to submit a presentation detailing the findings on the London Roundabout to the 2016 Conference. The presentation will give an overview of safety and operational analysis and describe lessons learned during this project's implementation.

Constructability Issues

While the research team monitored construction, they made it a point to differentiate among issues of constructability and to determine whether they were directly caused by the construction of the roundabout. Several issues and challenges that emerged during this project were not necessarily attributable to the roundabout construction. The same issues would have likely arisen if the intersection was improved with traditional intersection alternatives. When a constructability issue arose, KYTC's construction engineers and researchers used their subject-matter expertise and judgment to assess

whether the issue would have occurred if the project scope had been to widen the intersection. If it would have, the issue was deemed *non-roundabout related*. While comparing the built roundabout and fictional signalized intersection was conjecture, there was value in the exercise — it sharpened our ability to delineate constructability issues related to the roundabout. Thus, constructability issues highlighted during this project are sorted into roundabout and non-roundabout related.

The discussion below also touches on the only construction change order issued during the project. As items for a change order were suggested, KYTC approved the modifications to the plans and/or specifications — allowing the contractor to act upon the agreed change. Given the project’s short duration and because the changes were not substantial, KYTC and the contractor agreed to defer the write up and official processing of the change order until the end of the project. See Appendix B for a copy of *Construction Change Order No. 1*.

Roundabout Related Constructability Issues:

- One of the plan view sheets flagged the channelized splitter-islands with elevations, but not ones with stations. The KYTC Engineer expressed that station-offset-elevation should have been denoted on the construction plans for the channelized splitter-islands. (The KYTC Engineer was the engineer responsible for inspection and construction management of this project.) The KYTC Engineer felt that more design information and detail should have been shown on the roundabout plans. Normal roadway cross-sections were illustrated in the plans for KY 363 and KY 1006 as they approached the roundabout at 50 foot stations. However, there was only one cross-section in the roundabout and one plan view showing elevations inside the roundabout, but the elevations were not tied to a baseline, centerline, or offsets. It appeared that the majority of the designers’ efforts focused on the DTM, and the contractor was satisfied with using the DTM. Checking elevations and inspecting the roundabout features was challenging due to the lack of detail in the plans. The station, offset, and elevation were contained within the detail sheets of the plan set. These were not seen by inspectors and are not traditionally utilized by the construction crew. *A recommendation should be made on how designers should document design and construction detail on the roundabout plans.*
- The original design for Phase 2 construction showed 9-foot lanes for the onsite diversion. However, the diversion curves from the southwest leg to the northwest leg and 9-foot lanes were too tight for trucks. There are local businesses along these routes that generate truck traffic. To address this, the contractor constructed wider lanes, which were later torn out to finish the roundabout’s construction. (The wider lanes occupied an area where the splitter island was eventually constructed.) The vertical difference here between the proposed and existing was significant. A plan note stated that “a minimum of two lifts of base” would be used on the diversion to construct the necessary grade. However, more than two lifts of base were needed to build on top of the old pavement and achieve the elevation needed for the diversion.
- The original design called for the roundabout’s interior circle to be flush with the plane of the intersection’s truck apron. The construction team added a standard curb and gutter to the interior circle between the truck apron and an interior circle/grass middle. The objectives were to raise the interior circle slightly by using six inch high standard curb and

gutter, deter vehicles from driving straight through the middle of the roundabout, and create green space for the City of London to landscape and maintain.

- The KYTC Engineer raised concerns about the ease of maintaining the grass in the middle of the splitter islands; specifically, the logistics of mowing and landscaping.
- The pavement striping fish-hook arrows were not specified as an independent bid item in the London Roundabout plans. Instead, they were grouped with the regular pavement striping turn-arrows. The KYTC Engineer discussed this issue with another KYTC employee who had previously worked on the Bowling Green WKU roundabout. The bid code for the regular pavement striping turn-arrows on that project's plans had two separate entries. The first entry had the regular pavement striping turn-arrows quantity. While the second had the same bid code, there was additional information — a supplemental description of the fish-hook arrows and the quantity needed for the project. Having individual entries in the plans let the contractor bid the items separately. For the Bowling Green roundabout, the regular turn arrows were bid at \$200, and the fish-hook arrows were bid at \$600. The bid for the Laurel County regular turn arrows was \$110. Because forms did not exist for the fish-hook arrows, the KYTC Engineer wrote a construction change order to cover the fish-hook arrows pavement striping. Moving forward, KYTC should create another bid item and bid code specifically for fish-hook arrows.
- During construction, maintaining the traffic flow at the existing business and residential entrances was challenging. The KYTC Engineer suggested a different maintenance of traffic plan (MOT) or changing the final positioning of the roundabout in order to allow better traffic flow into and out of the businesses — both during construction and after project completion. Businesses southwest of the roundabout on KY 363 have entrances in close proximity to the splitter island. Vehicles traveling to and from those businesses may impact the roundabout's operation and functionality. The question to ask is how far from a roundabout should access be permitted?
- The concrete subcontractor had placed concrete for other roundabouts in Kentucky. This previous experience greatly facilitated elements of construction that involved concrete. For example, KYTC specs did not specify a recommended spacing distance for Load Transfer Assemblies on the circular truck apron. The concrete subcontractor had dealt with this issue on prior jobs and laid out the London Roundabout using techniques similar to those employed on previous Kentucky roundabouts. Recommendations should be devised regarding concrete paving operations for roundabouts.
- The contractor's surveyor made a mistake when laying out the vertical profile elevations for the interior truck apron. Addition of the interior curb-and-gutter for the center island was apparently the cause of this error. The string line set for the truck apron's curb-and-gutter was set for the gutter line elevation instead of at top-of-curb. Consequently, the surveyor did not correctly account for the six inches of elevation needed for the center island interior curb-and-gutter. The concrete subcontractor poured the apron's curb-and-gutter, but then removed it because of the mistake. While this was a contractor error, the design could have included more explicit specifications about the elevations (had they known the interior curb-and-gutter was needed) or included better coordination between the DTM and modified design plans. A recommendation should be made about the use of interior curb-and-gutter for roundabout center islands.

- Initially, the construction engineer modified the parking lot design on the southwest corner business to expand the parking area closer to the roundabout approach. However, after discussions with the design engineer this was removed and curb placed along the parking area to limit vehicular parking. This action maintained the sight distance triangles on the approach. The sight triangles should be noted and demarcated on construction plans to avoid unintentional intrusions into these areas.
- The KYTC Engineer inquired why the project lacked a sidewalk. Although the previously existing roadways lacked sidewalks as well, the businesses and residences in the area would have benefitted from sidewalk construction. Additionally, sidewalk construction would have included crosswalk construction, making a safer walking area for pedestrians to cross the roadway at the roundabout. This may be a roundabout-related issue, although again, this is conjecture. If this intersection had been widened for a signalized intersection, it is likely that sidewalk would have been included. Sidewalks may have been omitted due to uncertainty of the design team and what to do in this situation.
- When the roundabout opened it was still under construction, but functionally operational. No traffic backups were observed, even though it was the first day of school and the previous four-way stop intersection had lengthy queues, especially during peak travel times. However, some drivers in the circular lanes yielded and even stopped for others coming in from the intersection approaches, although the drivers on the approaches were supposed to yield. Most drivers on the approaches did yield, although a few drove through after realizing the driver in the circle was stopped and had no intention of driving on. The research team observed one driver turning left into the circular lane against the correct flow of traffic. Prior to opening the roundabout, KYTC did significant education outreach to help drivers anticipate and understand the coming changes.
- Temporary pavement markings, particularly the fish-hook arrows, were not executed well. As noted previously, the contractor did not have forms for the fish-hook arrows. As such, the temporary fish-hooks were *free form*. This may have hindered drivers' ability to navigate the roundabout properly. On future projects, contractors should use forms when placing both temporary and permanent pavement markings.
- The contractor did not correctly install the drainage boxes at the splitter islands. For example, the northeast leg of the KY 363 approach's splitter island had a curb-box which was placed relatively flat, and not to roadway grade. The contractor pulled the box out, removed the new curb, and placed curb-and-gutter again, trying to blend it in to the roadway. This was the result of the contractor placing the box level as opposed to following the approach's grade. The KYTC Engineer expressed concern that the contractor's surveyor made a mistake when laying out elevations, due to the design DTM, which was used for construction layout.
- The contractor inadvertently switched the permanent advanced lane use signs for the north KY 1006 approach and the south KY 363 approach. The north KY 1006 should have indicated one lane through the roundabout and the south KY 363 should have indicated two lanes through the roundabout. Corrective work was scheduled to place those signs in their proper location.

- The intersection lighting was not installed at this roundabout until the final phase of construction. The roundabout had been open to traffic for several weeks before the lighting was installed. Temporary lighting was not used during construction, leaving the roundabout completely in the dark. Future roundabout projects should pay greater attention to lighting — KYTC should consider lighting new roundabouts (either with temporary or permanent installations) during construction activity. This will improve nighttime visibility once a roundabout is opened to a new traffic pattern.
- Temporary striping on the northeast leg (KY 363) approach lanes was adjusted from the final striping to open up more space for work on the roundabout during construction, allowing for construction of the splitter islands. The final striping of this approach is wider than the MOT striping. It has cross-hatching in the middle of the lanes to align traffic and to accommodate truck flow. However, the temporary striping pushed the two entry lanes together, which made for a tighter entrance and misaligned approach lanes with the circulatory lanes. The temporary striping may have negatively affected the roundabout traffic pattern during construction, reducing deflection for entering vehicles; frequently on this approach vehicles were observed to not yield upon entry.

Non-roundabout Related Constructability Issues:

- The project began slowly due to poor weather. This delayed utility relocation and storm sewer construction. The fabrication and delivery of drainage boxes was also problematic and held up progress. These problems were not necessarily attributable to the roundabout construction, and although a roundabout's footprint differs in key ways from that of a signalized intersection, either type of intersection project would have suffered impacts from utility relocation and procuring the necessary drainage boxes. Major intersection improvement projects taking place under similar circumstances would likely have encountered comparable setbacks.
- An underground sanitary sewer was struck during excavation as crews installed a new utility pole. Because the plans did not delineate the sewer lines, a construction change order was issued. The sanitary sewer manholes in the area were removed, flowable fill material was placed in the existing sewer, and a new sewer line was placed.
- During edge drain installation, contractors hit an existing below-ground waterline. The existing waterline elevation was below the pavement block, but not below the combination curb box, which was deeper than the pavement subgrade.
- At the tie-down point of the southeast leg of the project, there was a problem with storm sewer placement. The proposed storm sewer was placed 5 feet deep, next to existing utility poles, which raised concerns over whether the trench would undermine the poles' foundation. The work was discussed with the utility companies and completed without any noticeable change in poles. The KYTC Engineer remarked on many occasions that "there are tons of issues with utility relocations."
- Construction personnel wanted more right-of-way for the proposed utilities and storm sewer layout. For example, on the southwest leg, a proposed storm sewer tied to the existing drainage ditch did not meet the proposed-to-existing elevation. The contractor needed more right-of-way to tie to the existing ditch for the water line to flow.

- An underground storage tank was found during the project which the plans had neither shown nor accounted for.
- The utility company set a new pole and placed a pole anchor within the road construction area. The utility company had to come back to move the anchor.
- Utility pole locations were selected after road design was complete. As such, the utility company made decisions about sitting poles independently of the road design effort. The proposed pole locations caused a number of issues. For instance, some of the new poles conflicted with an underground sewer and a future sidewalk. The utility lines did not have sufficient vertical clearance over the new roadway. Design and construction of the utility poles was a process that was muddled through. Had the utility company and road designers collaborated during the design phase, the construction process and final project quality would have been improved.
- Project plans included the construction of a new fire hydrant. The plans located the hydrant at the existing ground elevation. However, the station and offset where the new hydrant was planned contained 4 feet of fill. A plan note called for the Road Contractor to consult with the utility designer on correct elevations. This plan note saved a change order.
- There was an issue with the closure note written in the MOT. The note stated that the contractor could have a detour when school was in session. Yet, there were no liquidated damages assigned to this restriction. However, the note specified that the contractor could not have a detour in place for more than 45 days. If one was in place for longer than this, they were required to pay \$10,000/day for each additional day. This penalty should have been applied to the school-in-session clause as well.
- The utility companies required a construction item — field-lock gaskets — that was not included in the contract. Quantities were specified in a construction change order, along with a quantity of storm sewer combination boxes. The latter were shown on plans but absent from the summaries.
- Overhead utility wires above the northeast leg (KY 363) hung approximately 16 feet above the new road. The KYTC Engineer voiced concerns over whether this line was included in the plans and whether the new higher profile elevation was accounted for during the design process.
- The contractor's surveyor used the designer's 3-D Digital Terrain Model (DTM) to set grade on the roundabout, with a focus on the circulatory lanes and on the center island. The research team spoke with the contractor's surveyor, who described the process for thinning out the DTM for use in their survey equipment (design DTM file sizes are usually too large to work well on field survey equipment). The surveyor expressed a need for better survey control points and wanted to see the entire job enclosed by control points (e.g., a rectangle around the proposed construction area).
- The DTM used to set the construction grade did not provide the KYTC inspectors with a way to check the elevations. Also, the contractor did not set stakes on the construction site. KYTC construction inspectors mentioned consistent struggles with checking elevations using a proposed surface DTM.
- Plans for the business parking lot in the intersection's southeast quadrant did not include barrier curb construction. This was included on the construction change order.

- One property owner was given a blacktop entrance. Another was given a concrete entrance. The first property owner expressed annoyance that he was not given a choice, and preferred concrete over blacktop.
- Another company purchased Elmo Greer (the original contractor) during construction. The fixed completion date on this job was September 31st, however, the project did not wrap up until October 30, 2015. The KYTC Engineer observed some minor issues which arose due to the company's sale, but none of these were related to the roundabout per se.

Driver Survey of the London Roundabout

The KTC research team administered a web-based driver survey to gauge the public's opinion of the London Roundabout. The survey opened in mid-December 2015 and closed on February 1, 2016. The Highway Department's District Office advertised the survey through their Facebook page, public information email, and variable message boards (VMB) which were placed near the intersection. The VMB displayed the following messages:

1st display: HOW ARE WE DOING?

2nd display: www.ky363.com

The survey contained a number of straightforward questions to evaluate the public's opinion. In total, 177 people responded to the survey, with a relatively even distribution of ages among the participants. A majority of the respondents frequently travel the London Roundabout. Most of these drivers pass through the roundabout during peak travel times (i.e., AM and PM rush hours). An overwhelming majority (93%) of respondents said they have experienced fewer and less severe delays at the roundabout compared to the original four-way stop; 77% replied that they intuitively understood how to navigate the roundabout on their first drive through it. However, only 51% of respondents thought that other drivers correctly understood how to travel through the roundabout. Finally, 70% felt that the roundabout is safer than previous four-way stop intersection.

The final question was free response and asked respondents for their comments. There were 121 comments submitted. Many of these were positive, such as "It's the best thing since sliced bread!" or "Awesome job!" Some reviews were negative (e.g., "Roundabout is too small. Signs are confusing." and "Confusing and dangerous.") Several respondents admitted they did not like the idea at first, but that driving the roundabout changed their mind: "I was a total skeptic when construction was in process. However, the results are outstanding!" and "I'm pleasantly surprised, I didn't expect the roundabout to work so well." Perhaps best of all are those who are realizing the improved efficiency the roundabout brings: "Love it!!! Only live a few hundred feet from it. It has made a huge difference in our lives!!! No more long lines in the mornings and hope someone will be nice and let me out of my drive. No backups after school ... It's just wonderful!!!" Appendix C, *Driver Survey Results*, contains all of the survey results.

Recommendations and Implementation

The research team's preliminary findings have confirmed that the roundabout has yielded significant improvements in traffic flow at the KY 363 and KY 1006 intersection. As an innovative solution, it appears that other projects could successfully adopt a roundabout and experience the dramatic safety and operational benefits that London has enjoyed. The roundabout has proven an effective countermeasure, one that has mitigated or eliminated problems, such as long queueing times and poor level of service, which hampered traffic operations at the previous four-way stop intersection. The safety performance of the project will be tracked over the coming years to determine if the safety improvements are realized over the prior condition. The research team concluded that the roundabout was designed well and constructed properly. There were, however, some minor constructability issues that arose during the implementation of the roundabout design. Based on its observations and discussion with project staff, the research team is putting forward the following recommendations:

Recommendation: Issue written guidance to designers that contains procedures for documenting roundabouts in project plans. Confusion arose during construction over the London roundabout's dimensions. This information was seemingly available, but not in a form that could be readily interpreted by KYTC Construction. Including extra documentation with roundabout plans (e.g., more cross sections of the roundabout's circular lanes, grading/paving development sheets, and site plans) will eliminate confusion on future roundabout projects.

Status of Implementation: KYTC is currently revising and updating its roundabout design guidance as part of its *Highway Design Manual* rewrite. Meetings between KYTC Construction and Design staff have been held to identify clear methods for documenting roundabouts. These meetings are ongoing — their objective is to develop common practices for roundabout design, which will be released upon completion.

Recommendation: The design and the construction contractor both relied heavily on the 3-D Digital Terrain Model (DTM). A detailed DTM should be developed for an intersection's drainage, and sight lines need to be verified. On the London project, KYTC construction inspection had difficulty verifying DTM information because they lacked the necessary survey equipment or training.

Status of Implementation: KYTC Construction staff have acknowledged the need to improve their inspection techniques for DTM designed-projects. Construction inspectors are not uniformly proficient in the use of survey techniques. The London Roundabout project was sited in an area where there was not a group with the ability to verify DTM work. KYTC Construction is using classroom training and on-the-job assistance to help inspectors become more proficient at surveying. Although KYTC Construction has a program for purchasing survey equipment, more inspectors need to build their surveying skills in order to use that equipment correctly.

Recommendation: KYTC's specifications and standards have not yet addressed a number of issues specific to roundabout projects. The following list includes challenges that emerged during the London project which are not currently attended to by KYTC's specifications and standards:

- Fish-hook arrows pavement striping should be treated as a separate bid item and be assigned an individual bid code.

- New protocols should be established to guide concrete paving operations on roundabouts — in particular, the spacing distance for Load Transfer Assemblies for use on the circular truck apron.
- Develop guidance on the use of curbing on the roundabout and on the splitter islands.
- Develop guidance that contains assessment protocols that can be used to determine whether a sidewalk should be constructed on roundabouts.
- Make driver education efforts a high priority before a roundabout opens.
- Installing temporary and permanent pavement markings and signage is critical for ensuring successful operation of a roundabout. Comprehensive striping and signage plans — for both temporary and permanent conditions — should be developed for each project. Contractors must install marking and signage with care and pay the utmost attention to detail.
- Designers and contractors should develop a phased lighting plan that specifies when lighting will be installed on a roundabout. For most projects, lighting needs to be installed while construction activity is ongoing (which sometimes coincides with the roundabout being opened to the new traffic patterns). Proper lighting is critical for ensuring that drivers have adequate visibility and will prevent crashes.
- Develop guidance on the techniques for constructing roundabouts' interior circles (e.g., identify under what circumstances it should be flush against the plane of the intersection's truck apron, or when it is appropriate to raise the circle using a standard curb and gutter). Project context will dictate the technique selected, but guidance can provide a useful — albeit non-binding — starting point.
- It was noted that KYTC guidance proposes the use of a barrier curb on splitter islands and curb and gutter on the outside of the roundabout. This policy assumes a level roundabout with drainages away from the central islands and splitter islands. However, due to the unique geometry of the roundabouts, water was shown to drain across the roundabout. It is recommended that the policy be reviewed to determine the need for barrier curb and/or curb and gutter based on the individual site conditions and final drainage plan.
- Develop guidance on landscaping roundabouts. Guidance should describe under what circumstances 1) the interior circle and splitter islands have green space, and 2) when to infill these features with concrete. Guidance needs to emphasize the importance of project context. Decisions about landscape will vary among projects, and guidance should not impose prescriptive rules that hamper the designers' and contractors' ability to choose the landscape most appropriate for a particular setting.
- How far from a roundabout should access be permitted?

Status of Implementation: The research team has communicated these issues to KYTC. Many are under consideration, and an upcoming roundabout design guidance update may incorporate changes based on the research team's feedback. Issues not addressed in the upcoming guidance update will be resolved in the future.

KYTC – Roundabout Installation Project
in London, Kentucky

Final Report

Appendix A:

Project Completion Notice

**COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
DIVISION OF CONSTRUCTION
PROJECT COMPLETION NOTICE**

Letting : **10/24/2014**
District : **11**
County : **LAUREL**
Contract ID : **141064**
Project Nbr. : **HSIP 5292 (006)**
Project Type : **GRADE & DRAIN WITH ASPHALT SURFACE**
Road Name : **KY-363 AND KY-1006 ROUNDABOUT**
Project Description : **CONSTRUCT A ROUNDABOUT ON KY-363 AT KY-1006.**

Contractor: **BIZZACK Construction LLC**

Address : **P O BOX 12530**

Address : **LEXINGTON, KY 40583**

This project was completed in conformity with the specifications, plans and proposal, including the satisfactory completion of the Section Engineer's punch list, on **10/30/2015**. Project inspections will be completed in accordance with Sections 105.12 and 212 of the 2008 Standard Specifications for Road and Bridge Construction.

The following inspections are needed on the subject project :

**Roadway Inspection
Electrical Inspection**

**Erosion Inspection
Striping/Reflect. Inspection**

Section Supervisor : Lonnie D. Morgan, P.E.

Date : 11/03/2015

cc : Central Office Liaison Engineer

District Project Delivery & Preservation Branch Manager

KYTC – Roundabout Installation Project
in London, Kentucky

Final Report

Appendix B:

Construction Change Order No. 1

Commonwealth of Kentucky
Transportation Cabinet

Contract ID	141064	District	MANCHESTER (11340)
Change Order No.	001	County	LAUREL
Contractor	BIZZACK CONSTRUCTION LLC	Project Number	HSIP 5292 (006)
Contractor Address	3009 ATKINSON AVENUE SUITE 200 ,LEXINGTON, KY 40509	Road Name	KY-363 AND KY-1006 ROUNDABOUT

Prj_Nbr	Catg.	LIN	Item Code	Item Description	Quantity	Unit	Unit Price	Net Change
DE06303631464	0001	0009	01810	STANDARD CURB AND GUTTER	402.000	LF	18.500	\$7,437.00
DE06303631464	0001	0010	01815	BARRIER CURB AND GUTTER	-62.000	LF	25.500	\$-1,581.00
DE06303631464	0001	0048	06574	PAVE MARKING-THERMO CURV ARROW	-2.000	EACH	110.000	\$-220.00
DE06303631464	0001	0049	06575	PAVE MARKING-THERMO COMB ARROW	-7.000	EACH	145.000	\$-1,015.00
DE06303631464	0002	0060	00078	CRUSHED AGGREGATE SIZE NO 2	-2,534.434	TON	14.480	\$-36,698.60
DE06303631464	0005	0110	24589ED	LED LUMINAIRE	2.000	EACH	780.000	\$1,560.00
DE06303631464	0007	0132	21346ND	WATER SERVICE RECONNECT-3/4 IN-1 IN	10.000	EACH	1,014.000	\$10,140.00
DE06303631464	0001	8000	02690	SAFELOADING	22.000	CUYD	200.000	\$4,400.00
DE06303631464	0001	8001	02404	SEPTIC TANK TREATMENT	1.000	EACH	500.000	\$500.00
DE06303631464	0007	8002	20969ND	FIELD LOK GASKET-8 IN	6.000	EACH	114.000	\$684.00
DE06303631464	0007	8003	24800EX	FIELD LOK GASKET-6 IN	8.000	EACH	86.000	\$688.00
DE06303631464	0001	8004	06574	PAVE MARKING-THERMO CURV ARROW Roundabout Curve Arrows and Combination Arrows (Fish Hooks)	9.000	EACH	425.000	\$3,825.00
DE06303631464	0001	8005	02091	REMOVE PAVEMENT	327.000	SOYD	10.500	\$3,433.50
DE06303631464	0003	8006	24698ED	COMBINATION CURB BOX INLET	1.000	EACH	2,439.000	\$2,439.00
DE06303631464	0003	8007	24697EC	METAL END SECTION TY 1-18 IN EQUIV	2.000	EACH	1,890.000	\$3,780.00
DE06303631464	0004	8008	06401	FLEXIBLE DELINEATOR POST-M/W	5.000	EACH	125.620	\$628.10

Change Order Amount: \$-0.00

CHANGE ORDER TIME ADJUSTMENT DAYS: 5

Time Adjustment Explanation

Change the Specified Date of Completion from August 31, 2015 as Specified in the contract to September 5, 2015. "A Net Increase of 5 Days." The increase in time is base upon Kentucky Standard Specification 108.07.04 which states to divide the value of the additional work by the value of the original contract and multiply the ratio by the number of calender days from the Notice to Begin Work to the original fixed completion date. The total amount of this change order is \$39,514.60 and the original contract amount is \$1,977,962.31. [$\$39,514.60 / \$1,977,962.31 \times 233 = 4.65$ days].

Explanations That Apply To Specific Line Items

[0048],[0049],[8004] 7 Thermoplastic Combination Arrows and 2 Thermoplastic Curve Arrows on KY 363 from Sta. 104+50 to Sta. 109+00 and on KY 1006 from Sta. 205+00 to Sta. 208+00 will be replaced with the "Fish Hook" Arrows that are shown on the plans but we not separated in the pay items. Therefore 7 Thermo Combination Arrows and 2 Thermo Curve Arrows will be deleted and 9 Thermoplastic Curve and Combination Arrows (Fish Hooks) will be added.

[8001] A septic tank was discovered on Parcell 11 at Lt. Sta. 205+20 that had to be pumped out and filled in.

[8002],[8003] London City Utilities requested that all water lines that were placed through encasement pipe have Field Lok Gaskets placed on them in case of work needed to be done to these lines in the future. As per their request, the contractor placed 8 each of the 6 Inch Gaskets and 6 each of the 8 Inch Gaskets on the newly installed waterlines.

[0009],[8005] Rt. Sta. 103+82 to Rt. Sta. 105+33 on KY 363, 327 Square Yards of Pavement was removed and 150 linear feet

of Standard Curb and Gutter was placed. This curb and pavement removal was not included on the plans, but was an oversight by the designers in order to restricted parking with in the sight triangle for the roundabout.

[0009] 190 linear feet of Standard Curb and Gutter was added in the center of the Roundabout at Sta. 106+09 in order to hold the sod and material in the center of the roundabout for future maintenance issues.

[0009],[0010] 62 linear feet of Standard Curb and Gutter was added to the plans in place of the 62 feet of Barrier Curb and Gutter at Rt. Sta. 103+09.92 to Sta. 103+65.35. This was done for ease of construction and the fact that people would be parking up against this curb and the Standard Curb is 3 inches shorter than the Barrier Curb which could have caused damage to vehicle that pulled up next to that type of curb.

[0110] On Sheet T19 in the plans, only 10 LED Luminaires are called for but 12 poles are to be placed on the project. Due to this oversight, 2 LED Luminaires will need to be added.

[8007] 2 each Metal End Sections Type 1 - 18 Inch Equivalent were set up in the plans to be at Lt. Sta. 111+21.00 and Lt. Sta. 111+98.91, but we not included in the pay items. Therefore they are included in this change order.

[0132] 10 each of Water Service Reconnect - 3/4 to 1 Inch was not included on the plans, but had to be done in order to hook all the property owner to the new water service. The majority of this connections was on KY 1006 from Sta. 211+00 to Sta. 217+00 were a new 18 inch Storm Sewer Pipe was placed and none of these connections were accounted for.

[0060] (020) Contract Item underrun.

[0060] The contract quantity for this item was underrun due to the fact that this quantity included stone for soil stabilization in case poor soil conditions were encountered.

[8000],[8001],[8002],[8003],[8004],[8005],[8006],[8007],[8008] (004) Contract Omission - Extra Work is required as a result of a Contract Omission.

[0009],[0110],[0132] (006) Contract Item Overrun - Extra Work is required as a result of a Contract Item Overrun.

[0010],[0048],[0049] (020) Contract Item underrun.

[8000],[8001],[8007],[8008] (014) Cost is less than or equal to 110% of the average unit bid price.

[8002],[8003],[8004],[8005],[8006] (015) Itemized cost breakdown supplied by the contractor including equipment, labor materials, and time needed to perform proposed work.

[8006] 1 each of Combination Curb Box Inlet was placed at Lt. Sta. 102+50.96 as per the plans but was not included in the bid items. Therefore this item was placed on this change order.

[8000] 22 cubic yards of Flowable Fill as used to Safeload 7 existing manholes that were located with the pavement structure on this project. These manholes were not removed prior to construction and had to be filled to eliminate voids.

[8008] 5 Flexible Delineators were set up to be placed on KY 363 from Rt. Sta. 109+51 to Rt. Sta. 111+75, but were not included in the bid items. Therefore these have been added to this change order.

(027) All items shall include all labor, equipment, materials, and overhead necessary to complete all items of work.

Commonwealth of Kentucky
Transportation Cabinet

FUNDING INFORMATION STRIP

Contract ID 141064 - **001** **District** MANCHESTER (11340)
Contractor BIZZACK CONSTRUCTION **Project Number** HSIP 5292 (006)
LLC

Fund	Function	Dept	Dept Object	Location	Sub-Funct	Activity	Object	Task Order	Route	Reporting Code	Federal Project	Program	PO2 Line	Total Amount
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0001-ROADWAY									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$16,779.50
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0002-PAVING									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$-36,698.60
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0003-DRAINAGE									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$6,219.00
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0004-SIGNING									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$628.10
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0005-LIGHTING									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$1,560.00
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0006-SEWER									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$0.00
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0007-WATERLINE									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$11,512.00
PROJECT: DE06303631464 11-00904.01					CATEGORY: 0008-DEMOBILIZATION									
12F0	FD52	625		11	063	4580	E797		363		HSIP 5292(006)	6754901C	1	\$0.00

Change Order Amount: \$-0.00

CO Liaison Construction Review

CO Construction Director or Assistant

DSHE

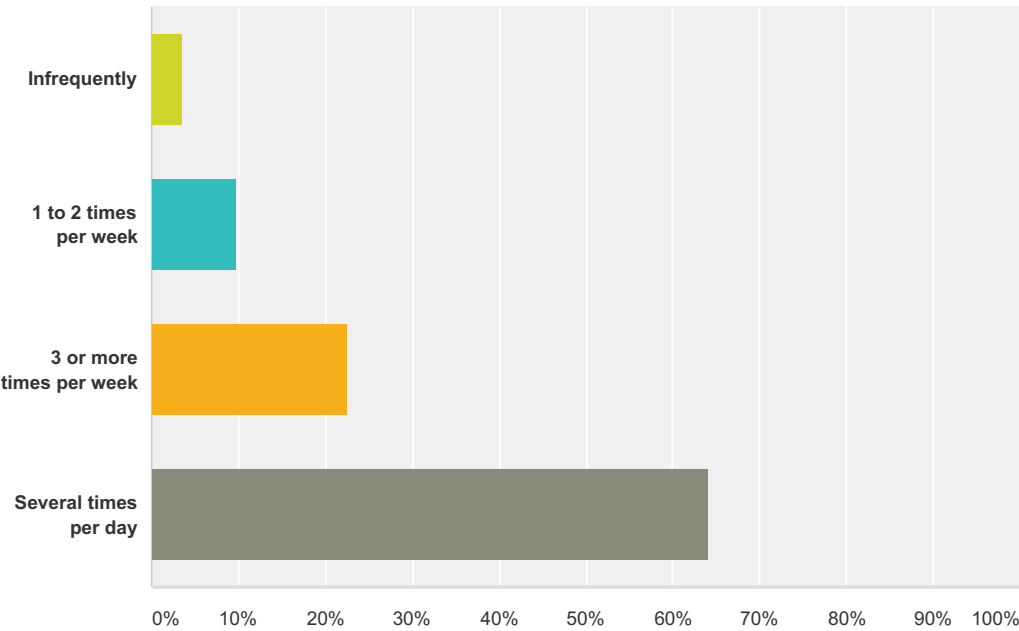
Federal Oversight Project Please obtain FHWA review

KYTC – Roundabout Installation Project
in London, Kentucky

Final Report
Appendix C:
Driver Survey Results

Q1 How frequently do you travel through the London, KY Roundabout?

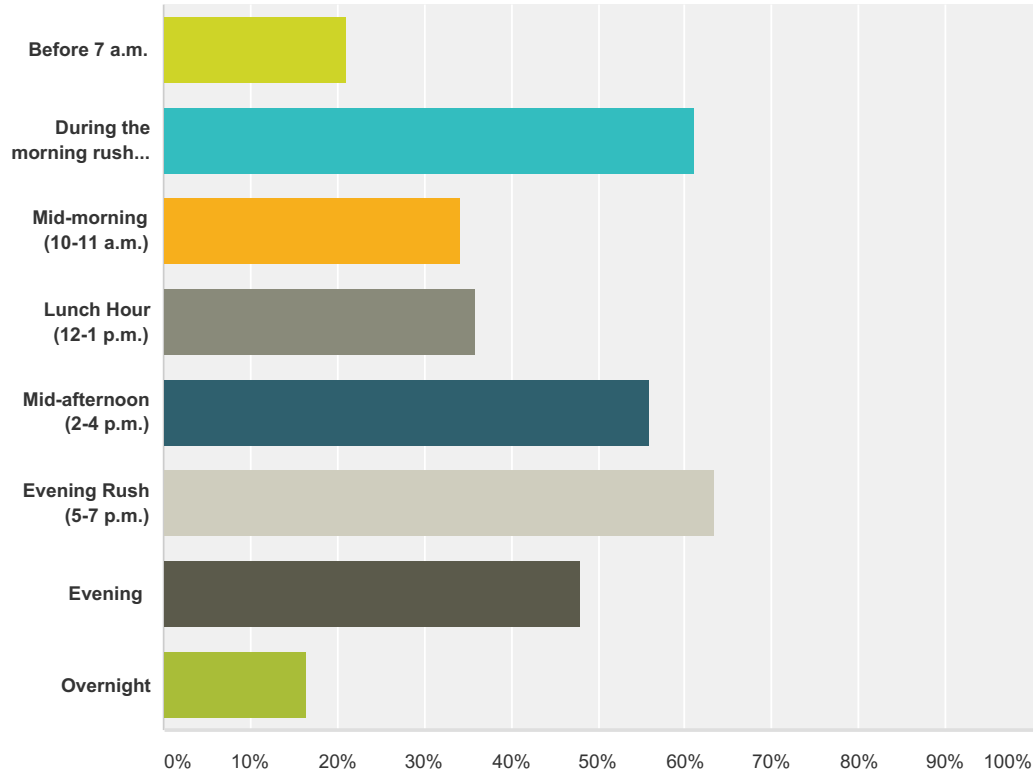
Answered: 175 Skipped: 2



Answer Choices	Responses
Infrequently	3.47%6
1 to 2 times per week	9.83%17
3 or more times per week	22.54%39
Several times per day	64.16%111
Total	173

Q2 During what times of the day do you typically travel through the roundabout? (check all that apply)

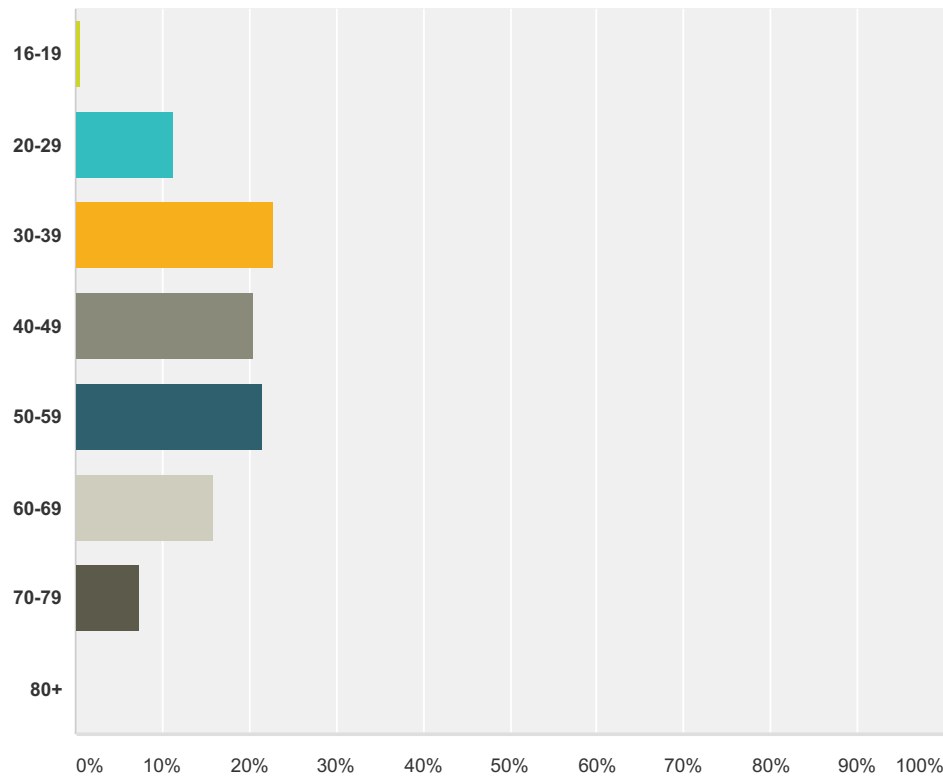
Answered: 175 Skipped: 2



Answer Choices	Responses
Before 7 a.m.	21.14% 37
During the morning rush hour (7-9 a.m.)	61.14% 107
Mid-morning (10-11 a.m.)	34.29% 60
Lunch Hour (12-1 p.m.)	36.00% 63
Mid-afternoon (2-4 p.m.)	56.00% 98
Evening Rush (5-7 p.m.)	63.43% 111
Evening	48.00% 84
Overnight	16.57% 29
Total Respondents: 175	

Q3 What is your age?

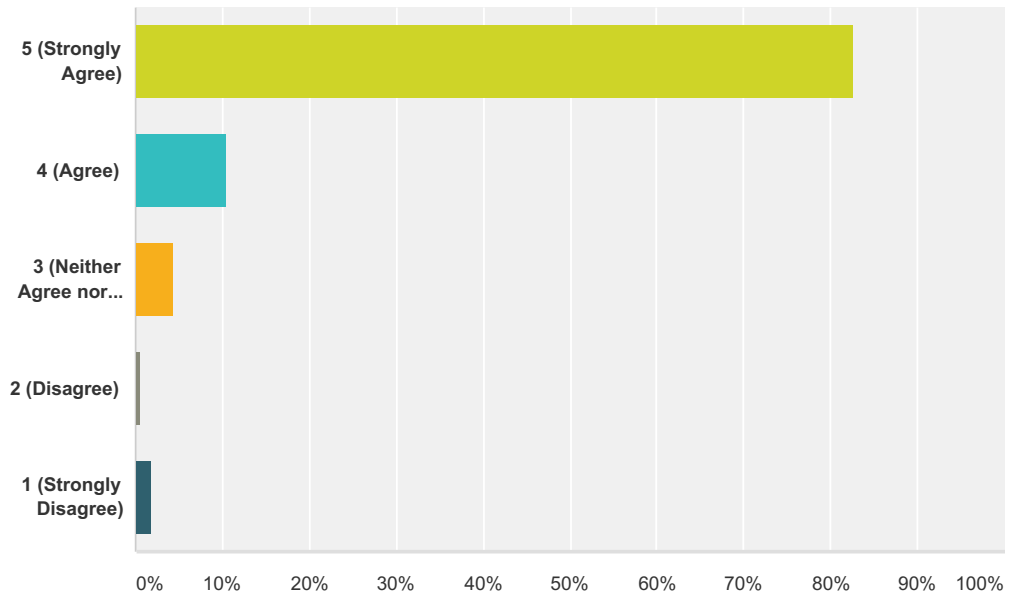
Answered: 176 Skipped: 1



Answer Choices	Responses	
16-19	0.57%	1
20-29	11.36%	20
30-39	22.73%	40
40-49	20.45%	36
50-59	21.59%	38
60-69	15.91%	28
70-79	7.39%	13
80+	0.00%	0
Total		176

Q4 I experience less delay at the roundabout than the previous 4-way stop intersection

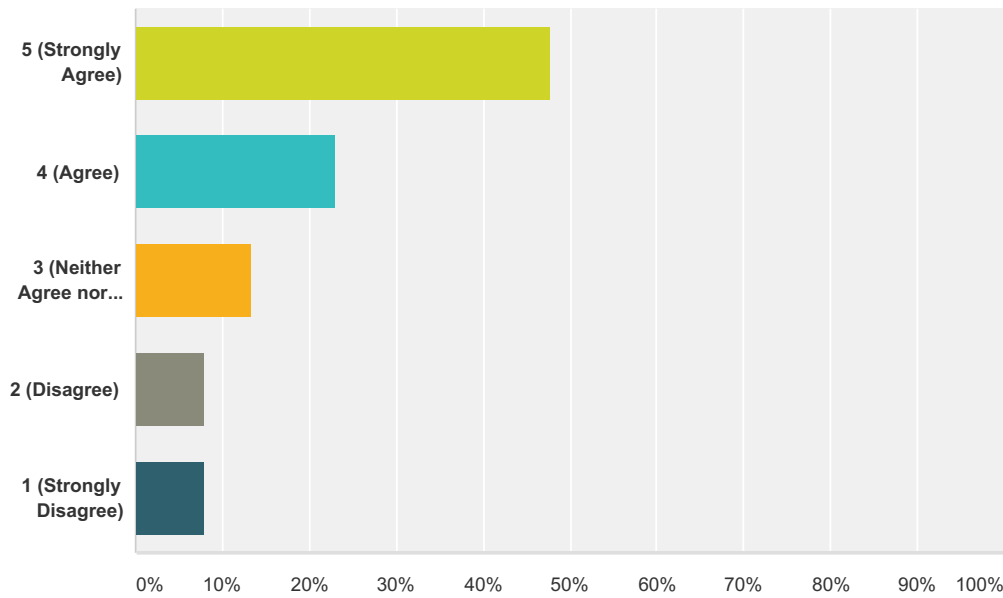
Answered: 162 Skipped: 15



Answer Choices	Responses	
5 (Strongly Agree)	82.72%	134
4 (Agree)	10.49%	17
3 (Neither Agree nor Disagree)	4.32%	7
2 (Disagree)	0.62%	1
1 (Strongly Disagree)	1.85%	3
Total		162

Q5 The intersection is safer with the roundabout than the 4-way intersection.

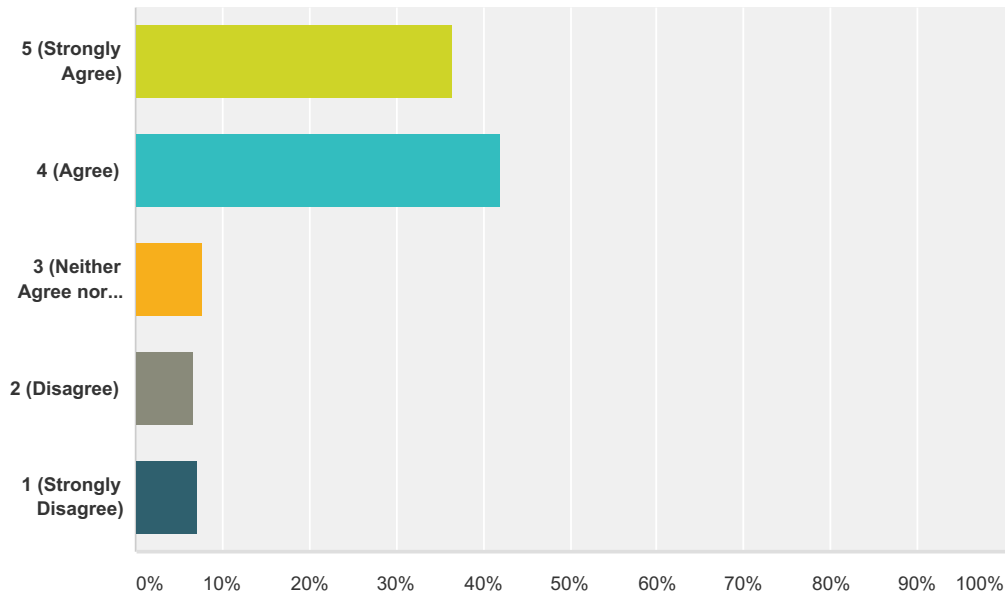
Answered: 165 Skipped: 12



Answer Choices	Responses	
5 (Strongly Agree)	47.88%	79
4 (Agree)	23.03%	38
3 (Neither Agree nor Disagree)	13.33%	22
2 (Disagree)	7.88%	13
1 (Strongly Disagree)	7.88%	13
Total		165

Q6 When first driving through the roundabout, I easily understood how to travel through the intersection.

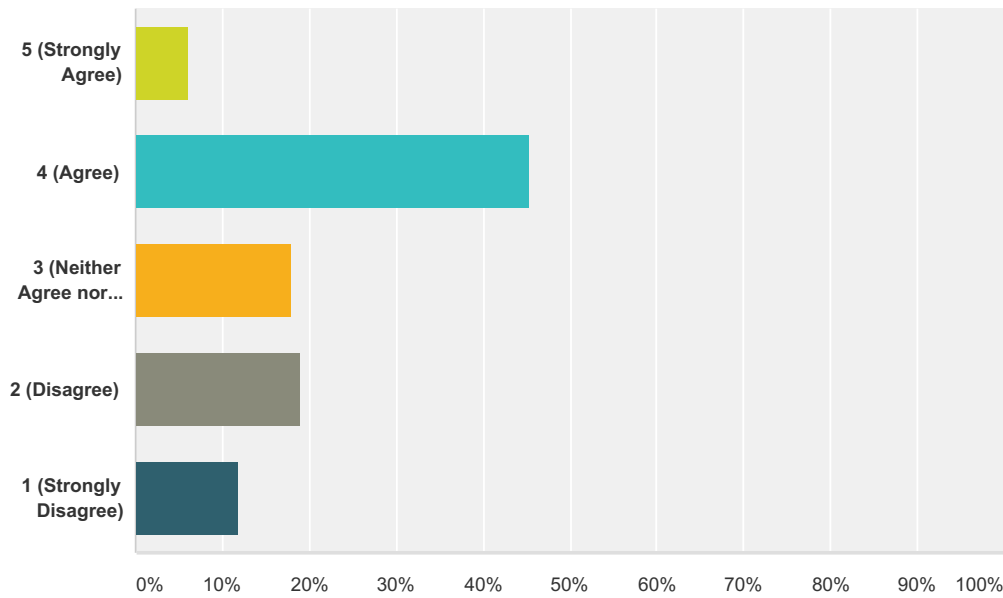
Answered: 167 Skipped: 10



Answer Choices	Responses	
5 (Strongly Agree)	36.53%	61
4 (Agree)	41.92%	70
3 (Neither Agree nor Disagree)	7.78%	13
2 (Disagree)	6.59%	11
1 (Strongly Disagree)	7.19%	12
Total		167

Q7 Other drivers appear to understand how to travel through the roundabout.

Answered: 168 Skipped: 9



Answer Choices	Responses	
5 (Strongly Agree)	5.95%	10
4 (Agree)	45.24%	76
3 (Neither Agree nor Disagree)	17.86%	30
2 (Disagree)	19.05%	32
1 (Strongly Disagree)	11.90%	20
Total		168

Q8 Comment:

Answered: 121 Skipped: 56

#	Responses	Date
1	It's the best thing since sliced bread!	2/24/2016 12:43 PM
2	well some people drive always yeild then run almost wreck front my car cause people always yield then run so fast without vision to my car that why they ignore then run its not right and not safe..... why not put cam " video " roundabout set up cam	2/24/2016 12:15 PM
3	I'm pleasantly surprised, I didn't expect the roundabout to work so well, but I feel badly for those who had to sacrifice their land. It was a little confusing at first, not as straightforward as others I have used in other locstions, but overall, I think it has made a positive difference in the traffic flow.	2/4/2016 10:34 PM
4	Very skeptical at 1st about a roundabout. I live in Cross Keys- have for the past 12 years. An example of how successful it is: prior to the roundabout, I left to drop my kids off at SLHS and then went on to Sublimity Elem (down US25S and Middleground Way) at 7:10 A.M. And arrived at Sublimity usually at 7:30-7:35 AM. If left the house after 7:22 AM, I would not make it to work until after 8 AM- this included dropping kids off at SLHS. The first day of the roundabout, we timed our travel from the house to SLHS- made it in 3 min! Now, we leave at 7:20 and I arrive at Sublimity by 7:30 no later than 7:35. The only problem now on 363 is that the intersection at 192 & 363 is really backed up at times! Thanks for the roundabout- can u put one at the 363 & 192 intersection? We are spoiled now by the one we have LOL! Thank you, if loving a roundabout is wrong, I don't wanna be right!! LOL	1/31/2016 11:00 PM
5	It is extremely confusing. In addition, it should have been two lanes rather than 1. There is very little time to decide when to turn to get out and it is hard to tell which turn will put me on the road I want to end up on.	1/28/2016 2:09 PM
6	Roundabout is too small. Signs are confusing	1/25/2016 5:00 PM
7	Great Job want to see more.It really works. .Had used them before in Europe and the Caimans didn't think it would work that well here but it is doing great .	1/21/2016 8:15 PM
8	The roundabout saves an hour per week of time. I spent approximately 12 minutes each time I had to wait for morning traffic. I am not even counting the time saved at the evening rush hour-I use to take another route to avoid that intersection. Well worth the money.	1/20/2016 10:56 PM
9	Huge improvement! Very happy with the new intersection.	1/17/2016 2:24 PM
10	It would be helpful if there was a sign that said interstate this way or something!! Because people that don't always drive that way sometimes have trouble understanding how to get to the interstate.	1/17/2016 1:21 PM
11	I love the roundabout. great improvement.	1/16/2016 10:38 AM
12	I would strongly suggest a posted speed limit sign because people are busting through it at 45-50 miles an hour. Also immediately coming out of roundabout on 363 going North needs to be widened. Or a longer and wider merging lane. Thank you	1/15/2016 5:07 PM
13	Traffic coming into the round about from the Keavy side of 363 going towards 192 Bypass do not yield. The sign may be positioned where it is not visible and gives them the impression they do not have to yield. In fact, in most cases some drivers appear to think they have a continuous green light and do not attempt to yield.	1/14/2016 6:03 PM
14	I just came from 1006 to turn right onto 363. A car traveling north from 363 turned into "my" lane and made a left turn onto 1006 toward town. Don't know if that was her first time, but glad I was in my truck. Since I don't go the "wrong way", I am not sure if WRONG WAY signage would help. I remember the black and white chevron signs, but hopefully she will understand next time she travels through she will approach the correct way. Luckily other traffic was far enough away to let her through.	1/14/2016 1:13 PM
15	I was a total skeptic when construction was in process. However, the results are outstanding! Now you need to work on an access lane from 192 to Hardees and stop that dangerous intersection.	1/13/2016 1:34 PM
16	Works well . Reduces delays . probably safer (although possible to still be T-boned if incoming traffic failed to stop) - I have had a few close calls with drivers coming into the roundabout too fast and failing to yield to people in the roundabout.	1/13/2016 8:35 AM
17	People still don't understand it needs more monitoring to help people for example when they're going the wrong way or yielding or not yielding appropriately	1/13/2016 7:41 AM
18	love it!! it has really helped.	1/12/2016 3:55 PM

19	Back up of travel in morning at 192. Need turn lane for East bound traffic.	1/12/2016 2:32 PM
20	A wider, longer approach to the roundabout would help direct traffic a bit more smoothly.	1/12/2016 1:56 PM
21	Whom ever came up with the idea to put in the roundabout is an absolute Genius!!	1/11/2016 3:10 PM
22	Love it !!! Only live a few hundred feet from it . It has made a huge difference in our lives !!! No more long lines in the mornings and hope someone will be nice and let me out of my drive. No back ups after school ... It's just wonderful !!	1/9/2016 10:15 PM
23	Great! Prior to the roundabout the public was very courtesy and moved very quickly & safely. I travel over fifty thousand miles yearly on Ky. Roads and this is the best engineered of any I have traveled on.i have noticed many drivers are slow to yeiled the right of way. Vehicles that are in the circle have right of way.	1/8/2016 10:32 PM
24	I feel like, for once, the state traffic engineers have actually studied problem and conceived a solution which is good for all parties. It is safer, more expedient and traffic flows normally throughout my experiences. I live on 1006, I hit the roundabout numerous times a day and throughout the evenings and weekends. I would like to see this same concept applied to other traffic situations in and around Laurel County. I'm an avid bicycle rider and runner - most of our rural road plans are far from beneficial to those two activities. A section of pavement was roughened two years ago in the curves near my house in an effort to keep people from leaving the roadway. Of course, the engineers failed to think what it's like to hit that rough surface on a road bike when the pavement is even remotely wet --- it's dangerous. Guest riders to the area comment routinely about how they 'almost lost it' in that area. Of course, it didn't seem to slow the vehicular traffic down at all. And, they still run through my yard routinely. But the roundabout works. It's worth every penny it cost. Now apply that approach to some of our other problem areas. And maybe add a few inches of paved surface for us bicycle riders - sans the rumble edges which takes away our maneuvering room!!!! In this instance - it's a job well done.	1/8/2016 6:42 PM
25	N/A	1/8/2016 6:35 PM
26	I think it has been an excellent solution to the traffic issue that once existed! A job well done!!	1/8/2016 6:34 PM
27	Thanks	1/7/2016 3:28 PM
28	I love it we go that way early to the gym and back from the gym 5 days a week . With the school traffic it was terrible . You hardly have to stop and I think the traffic flows is great. We go that well if we go to the groceries , or out to eat or shopping. Or out to eat in London.	1/7/2016 12:13 AM
29	I highly doubted that the Roundabout would be a good idea in Laurel County, but I've been very pleasantly surprised with how smoothly traffic flows through. Only wish that we could have had it sooner!	1/6/2016 2:58 PM
30	Very nice improvement and great job....Thanks	1/6/2016 1:08 PM
31	The roundabout is great but it seems to have caused a problem since traffic on 363 is flowing at a better pace. Traffic at the intersection of 363 and 192 backs up due to increased traffic at that intersection at one time. The right hand turn lane backs up and causes traffic to back up past Lowes and it does not allow someone turning left or going straight to get through the light. It seems that a the right turn lane onto 192 from 363 needs to be extended so traffic does not back up at that intersection.	1/5/2016 7:57 PM
32	I thought over all the construction of the roundabout was done in a timely manner, and is performing well.	1/5/2016 9:20 AM
33	Very safe and efficient. Like it very much. Thanks for eliminating a bottleneck .	1/4/2016 10:16 PM
34	I have noticed that the traffic coming in from the Keavy direction seem to think they never have to yield. I have seen many people about hit and I have been almost hit in side a few times. We would also like to see white lines painted on the outside of lanes on 1006....makes night travel easier....and also where the asphalt in the curves use to be ruffed up, maybe put guardrails there (airport curve)	1/3/2016 5:43 PM
35	I have lived here all my life ease to get thru now than ever	1/2/2016 4:38 PM
36	It has greatly improved traffic flow in this area! Great job!	1/1/2016 11:05 PM
37	Confusing and dangerous. One of the Worst design of a roundabout I've seen/used.	1/1/2016 7:00 PM
38	You did an excellent job of improving traffic flow in a very esthetic way. Thanks for making our day better	1/1/2016 3:35 PM
39	I prefer the roundabout over the 4-way stop.	1/1/2016 9:18 AM
40	I still see a lot of people stop when they don't have to. Maybe some more signs with instructions would be useful.	12/31/2015 12:48 PM
41	I think the roundabout is the best thing that has happened to this intersection since i moved to sublimity area 42 years ago. Some people still don't know how to navigate yet, but give them time.	12/30/2015 7:15 PM
42	Would be nice if people knew not to get in the circle and then stop to motion people out in front of them!	12/29/2015 7:53 PM
43	I love it. no delays or back-ups since it opened,	12/28/2015 3:32 PM

44	People learned pretty fast consider they had never seen one before. It took me a Lil bit to learn it	12/27/2015 5:39 PM
45	It should be better lit for at night.	12/27/2015 1:57 PM
46	I would like to see something added to the middle of the roundabout. Maybe a modern art installation or an Appalchian inspired monument. Water fountain? Flowers?	12/26/2015 7:11 PM
47	Good concept but too small. Cars entering have to stop and wait on cars in circle because there is no room to merge on so it is functioning basically as a 4 way with turning lanes. Also, Lane turning to right from 1006 could have been angled to merge in so cars don't have to stop when going right.	12/26/2015 5:15 PM
48	I think it's one of the absolute best intersections I've ever experienced. I take that route just to drive through the roundabout. We have no traffic congestion at this intersection now.	12/26/2015 3:17 PM
49	I love it. I thought I'd hate it at first because it looked complicated on the diagram but it is so simple and easy. We need more of these in laurel county. Thank you so much for putting it in. Way better than a stop light or 4 way stop.	12/25/2015 7:42 PM
50	Very please with the roundabout. However it would look nice if you would actually use the street sweeper on it. I have used mine several times for free just to keep the grass clippings off of the roundabout my direction to keep it looking nice.	12/24/2015 5:43 PM
51	The only time it slows down is when a driver does not know how to drive in it.	12/23/2015 9:23 PM
52	I believe the roundabout is a net positive, but will take more time before others understand the difference between a yield and stop sign.	12/23/2015 6:18 PM
53	I know you did your best to educate the public on the use of the roundabout. BUT I've recently had 2 occasions where I was IN the roundabout and drivers did not yield to me. I believe many people think you should never stop at a roundabout. Perhaps they've heard you shouldn't ever stop once IN the roundabout and confused that it applies to when entering also. I'm wary of others understanding the rules and fortunately was able to slow down and avoid a collision but facts are people just do not see them often and are unaware of the rules.	12/23/2015 11:47 AM
54	This is a completely better idea for 363. The traffic moves so much more smoothly. My daughters go to Wyan Pine Elem. and I hated taking them to school bc on the way back it was always so far backed up it would take 20 to 30 mins. just to get through. Thanks it's a lot faster now.	12/23/2015 11:10 AM
55	It's great. Only problem is operator error.	12/23/2015 10:33 AM
56	I believe the roundabout is a great improvement.	12/23/2015 9:22 AM
57	Love it! Let's have more of them in London, and fewer red lights.	12/22/2015 4:40 PM
58	Love it!	12/22/2015 1:06 PM
59	I have nearly been hit a couple times because people don't know to yield to traffic already in the roundabout.	12/22/2015 11:44 AM
60	Wish ever heavy traffic 4 way had one. I love it. Some people still struggle but getting better	12/22/2015 12:52 AM
61	Great job on this improvement	12/21/2015 5:50 PM
62	There should be a police Officer stationed there. He would have a field day writing tickets. At lease 60 % of the drivers don't slow down left alone yield to other drivers.	12/21/2015 4:29 PM
63	Great improvement. Been wanting this for years. Now, the traffic flows nicely and it keeps moving. My wife and I love it. One comment: Not everyone seems to know that they are to yield when another vehicle is in the inner circle. Also, when approaching the yield stopping point I have observed if one vehicle continues to move through , then other follow rather than stopping and taking turns for others to proceed from the three other yield approaches. I would suggest one of these roundabouts be placed at crossroads similar to the one at Ky 363 and Ky 1006 wherever the traffic flow warrants. AND FUNDS PERMIT.	12/21/2015 12:53 PM
64	It's great. Traffic is 100 times better now!	12/21/2015 5:40 AM
65	I am very pleased with the way this has improved traffic flow. The only thing is have observed some people tend to speed thur, especially on KY 363 , North an South. However, they were never been happy with the 4 way stop, that slowed them down on their travels to an fro. Often times 2 cars would go thur at a time or go out of turn when there were 4 vehicles there. The round- a-Bout has made the intersection more efficient an safer in my opinion.	12/20/2015 9:59 PM
66	Great Work! This is very well designed and saves time!	12/20/2015 9:18 PM
67	At first I didn't think this would work. Actually thought it would be a joke., I think after the locals have gotten more use to it it is working and smoothly flowing. I always enjoy going through it. Actually think it is fun.	12/20/2015 5:03 PM
68	I would suggest wider inter-circle lane for large semi trucks. They seem to occupy part of the other lane as well but is perfect for those in private vehicles. Best thing London has ever done for traffic!!	12/19/2015 4:55 PM

69	It has really helped morning traffic.	12/18/2015 8:47 PM
70	I think this is a great addition to our community. And really glad it was completed before school started.	12/18/2015 4:12 PM
71	I think it is a shame that the Superintendent that was over the roundabout did an awesome job working 7 days a week, 10-15 hours a day and ATS couldn't find him a job after they bought out Greers. So I have nothing to say about that company.	12/18/2015 2:30 PM
72	I am driver for local bus line. I travel this roundabout several times day. After drivers learned when to yield etc. It was safer. Now drivers are not yielding and I have to be more cautious. Drivers will not yield if vehicle in front of them goes then several behind them go too. Cause drivers on other sides have to stop and yield longer due to this carelessness. I think cops should be there to pull drivers over. I and many others I talk to think it was waste to dig up people property when a redlight is all that was needed. It has helped traffic flow but drivers are getting careless now they are used to it and not yielding properly.	12/18/2015 2:22 PM
73	The roundabout was the best thing to ever happen to this intersection. Prior to its installation I would sit most every weekday morning & evening for 10-15 minutes to get through the intersection. Now I rarely have to even stop.	12/18/2015 11:01 AM
74	Great job. I can't believe the idiots can drive through this. Need more of these.	12/17/2015 10:30 PM
75	No long delays, good job	12/17/2015 9:55 PM
76	My family dreaded having to go through that intersection prior to the roundabout but now it's great. This is the greatest improvement in traffic flow I've EVER experienced and I've lived in 6 states and driven for 44 yrs. Great Job!	12/17/2015 9:20 PM
77	When it was first done I took a video on the proper way to travel through the roundabout and posted it on my Facebook page. I was trying to show people that when you are in the roundabout you have to keep going because traffic has to yield to you. But as the video shows that people will pull out in front of you because they think that you have to stop at every intersection. Also people need to know that traffic in roundabout does not stop and needs to be posted very clearly. But as far as I know no accidents	12/17/2015 5:05 PM
78	Should have been bigger area because you are right in it and not enough space to see what other vehicles are going to do. Because you have to stop when other cars are entering .The turns are to sharp when coming south on 1006 and north on 363.. See many cars coming head on at you not knowing what to do... A new engineer could prob have done better at design.. Should have used more of the field. I have lived here 14 years. But does help the traffic backup but seems very dangerous because drivers just don't know what the signs mean... Uneducated on roundabout . People still stop in circle..	12/17/2015 4:53 PM
79	I think they need the arrows back farther back and not waiting til you are up one it and I also think they need some rumbles to slow the traffic before and at the yield sign ... Reason being is because 363 think they have the right a way and I'm not just saying that because I live on 1006 but I also travel 363 and have had cars to pass me when we didn't have right a way....thanks but I do agree it's better than the 4 way	12/17/2015 2:47 PM
80	Very nice improvement.	12/17/2015 2:16 PM
81	I think more information needs to be available to drivers about the proper procedures for driving through the round about safely. Older drivers seemed to struggle with the concept.	12/17/2015 1:38 PM
82	I have lived 1/2 mile S. of the roundabout for 38 years and this is the best traffic flow I have seen. I thought it was the wrong thing to do, but the state new best. It is great.	12/17/2015 1:06 PM
83	Most people use it correctly now that it has been open awhile, its just people who haven't traveled it before	12/17/2015 12:44 PM
84	I love the roundabout. It greatly decreases the wait and traffic in this intersection. Having previously driven through many roundabouts, I understand how they work and navigated with ease. However, I have witnessed many people who still, after all these months, do not understand how it is supposed to function. I have almost been hit several different times by people who do not want to yield to those already in the roundabout and decide to shoot on out despite the yield signs! I also encountered a lady a few days ago who refused to proceed once in the roundabout because she did not know the people not yet in the roundabout were to yield to her. She just sat there, at a dead stop waiting right in the middle of it. :) I have also witnessed, thankfully not during a busy time, people going the wrong direction. None of those things are any fault of anyone in charge of the planning or execution of the roundabout, as the signs are clear (at least to me). I believe it is mostly due to the inattentiveness of the drivers. Overall, it is great as long as you watch out for other drivers who just don't get it!	12/17/2015 12:32 PM
85	Great job relieving traffic ... Took awhile for some to get the hang of it but overall great!	12/17/2015 10:55 AM
86	Of course some drivers bully their way thru without observing status of roundabout. Many drivers speed thru the roundabout. I've noticed some drivers are startled when other drivers make the turn left inside the roundabout at high rates of speed >25mph. Otherwise I like it. :)	12/17/2015 7:53 AM
87	I live in Sublimity Springs the roundabout is a life saver for me, no backups traffic moves steady as I travel through more than once a day. Good job!!!	12/16/2015 9:47 PM

88	Thank you! Well designed and constructed. This is such a vast improvement over the four-way stop. Although, there is an occasional impatient driver who fails to yield, traffic flows smoothly. I do encounter drivers who are overly cautious and hesitate to enter the roundabout even when there is no visible traffic.	12/16/2015 8:53 PM
89	The roundabout has been a huge success in my option,I was highly judgemental at first thinking it was going to bad however the outcome has been great there is no traffic back up like before and it's extremely fast to travel thru versus the old intersection. Thank you	12/16/2015 8:45 PM
90	The improved flow in traffic going through the intersection has caused an increase in the traffic waiting to turn onto Hwy 192 causing delays that previously weren't there. This happens turning from both 363 and 1006 onto 192.	12/16/2015 7:22 PM
91	It great before from 4 to 5.30 pm it took 30 mi. now no time at all. thank you ky.	12/16/2015 6:45 PM
92	It is wonderful!!!! No waiting; steady flow of traffic.	12/16/2015 5:15 PM
93	I was skeptical at first and thought it would create confusion, therefore more delays. I am very surprised and pleased with the operation of the roundabout. People adapted better than I anticipated. I have come across some that appear confused in traffic, but I believe they will adapt in due time. I have not got held up in traffic, at all, since construction was completed. Prior to the roundabout, I would leave for work an hour early, in anticipation of delays up to half hour getting thru the KY363/KY1006 intersection. I am very pleased with how well it worked.	12/16/2015 5:02 PM
94	I travel thru the round about 4 to 6 times a day. I never experience a delay. Most drivers have it figured out. It is functional and it looks good, nice green space instead of a cluttered 4 way intersection. It's an asset to the neighborhood. One concern, there is no safe pedestrian crossing. Sidewalks and crossings should be a part of all projects within the city.	12/16/2015 4:08 PM
95	It seems like the older drivers are the ones who don't understand how the roundabout is supposed to work. It isn't all of them, but the majority I've seen using the roundabout improperly are elderly. I don't know if it's a courtesy thing or they simply don't know. They are going to get someone in a serious accident as they treat the roundabout entry as a 4-way stop and also stop while in the roundabout at each intersection to let cars stopped waiting on them to go through. I don't know how people figure the triangle Yield signs mean Stop, but they do.	12/16/2015 9:39 AM
96	I think the roundabout works great. Now that people have learned to negotiate it, it has really reduced the congestion at the intersection.	12/16/2015 7:44 AM
97	There is not a day that goes by that at least one person fails to yield to oncoming traffic. I do not see why they tore up all that land and wasted so much time when they could have just put in a stoplight.	12/16/2015 12:35 AM
98	Traffic flows much better	12/15/2015 9:29 PM
99	Great design and quick construction. Good job.	12/15/2015 8:29 PM
100	The only current danger spot is cars traveling north on 363 barreling through the entry point without yielding. Have observed at least 6 near misses all at that point.	12/15/2015 7:19 PM
101	most people do not understand what it is to yield to other traffic.Now that you no longer have to stop , the traffic on 1006 going south are going even faster than before!	12/15/2015 6:29 PM
102	Whoever planned that roundabout is a saint. I can't possibly think of a better design. Give those workers a raise. And yes, I'm serious.	12/15/2015 6:03 PM
103	This project was a perfect example of throwing money away. The intersection used to have a caution light on 363 and a stop light for 1006. This worked fine until some idiot decided to make it a four way stop. Now because of obvious Lexington envy we have an expensive joke. I enjoy driving through just to watch the Sunday drivers stop in the middle of the circle to motion drivers to enter the roundabout. On numerous occasions I have almost been hit because of ignorance. Way to go Kentucky/Laurel County for another stupid idea.	12/15/2015 5:54 PM
104	Very impressed how it has relieved the traffic problem. The round about is nice looking and seems that everyone that had a driveway or yard torn up has been completely fix and looks very good. Thank for the great work	12/15/2015 5:30 PM
105	I LOVE the roundabout. I feel it should have been a little larger and more in the center of the 4 way.	12/15/2015 4:44 PM
106	Thank you for all your hard work on this project!	12/15/2015 8:35 AM
107	Great addition to our road system.	12/15/2015 8:28 AM
108	The roundabout is the best thing ever to happen to Sublimity, Kentucky!!!!!! We need more roundabouts in Laurel County!	12/15/2015 1:14 AM
109	People do not know what yield means. They think they don't have to stop when a car is currently traveling in the circle. Almost been hit several time and know many other that have also. A light would have worked much better.	12/14/2015 8:52 PM
110	Wise decision to implement this.	12/14/2015 6:12 PM

111	It made my commute shorter coming and going to work what use to take me 30 minutes of the evening now takes me 10 minutes.	12/14/2015 4:13 PM
112	So far everything has went smoothly for us except we met an older man coming the wrong way. He was coming from the Lowes side of 363 and we were coming from the other side of 363. We got into the right hand lane of the roundabout and he was trying to turn down the Sublimity side of 1006 so instead of going right all the way around the roundabout he went left at the roundabout.	12/14/2015 3:05 PM
113	Overall, a good idea. However, there are some set backs. People play follow the leader instead of yielding. The easy disbursement of traffic creates huge traffic backups at the traffic lights in the mornings. May need another round about at Hardee's? Mostly the biggest flop is the disrespectful drivers not yielding, thinking they have the right away.	12/14/2015 11:37 AM
114	the four way stop was better then the roundabout. It is causing too much confusion and that is not an appropriate place for it.	12/14/2015 11:07 AM
115	I would like to say that I am pleasantly surprised by the roundabout. I had nicknamed it the "wheel of death" before it opened. Now I'm thankful for it everyday. There are still some drivers who have trouble knowing what to do, but I think that would happen no matter what the intersection looked like. Thank you for the great work and improvement.	12/14/2015 11:01 AM
116	This was a great idea, that took too long to implement because of Democrat foot dragging. Typical government policy. Simple idea that takes years to transpire. Now, all it needs is a patrolman to clean up the pill heads, and welfare scum in this community.	12/14/2015 10:47 AM
117	I just wish people would stop stopping in the circle. They aren't the ones who have to yeild! And I wish south bound 363 had two lanes lime north bound has	12/14/2015 10:35 AM
118	I have never traveled this roundabout, but I have traveled several others in Kentucky, most recently the one at US 27 and US 62 near Cynthiana. I do not like roundabouts. Many drivers do not know how to use them, and if there is heavy traffic already in the roundabout, it can take longer to get through the intersection than with a traffic signal or four-way stop. I prefer traditional means of traffic control to roundabouts.	12/14/2015 10:29 AM
119	It has drastically improved the travel time from home to work by at least 30-45 minutes. I do feel like it forces people to slow down in that area and I have yet seen an accident. A must needed improvement in this area that truly improved traffic.	12/14/2015 10:25 AM
120	Awesome job!	12/14/2015 10:23 AM
121	This is a test. Sincerely, Jeff Jasper	11/19/2015 9:14 AM





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