



Department Source: Public Works

To: City Council

From: City Manager & Staff

Council Meeting Date: September 18, 2017

Re: Setting a Public Hearing – Nifong Boulevard Intersections Improvement Project

Executive Summary

Setting a public hearing for October 16, 2017, for the construction of the Nifong Boulevard Intersections Improvement project (Nifong/Sinclair and Nifong/Vawter School Road/Old Mill Creek Road). This improvement project was identified in the 10-year plan for the 0.25 percent Capital Improvement Sales Tax ballot initiative passed in August of 2015. The Interested Parties (IP) meeting was held on June 20, 2017. Staff recommends construction of a single-lane roundabout as the preferred improvement option for each intersection.

Discussion

Nifong Boulevard and Vawter School Road are both classified as major arterials, Sinclair Road a major collector, and Old Mill Creek Road a neighborhood collector, in both the Columbia Area Transportation Study Organization (CATSO) 2030 Major Thoroughfare Plan and the City Major Roadway Plan. Currently, an all-way stop is present at the intersections of Nifong/Sinclair and at Nifong/Vawter School Road/Old Mill Creek Road. A site location map is included as [Exhibit A](#). Both intersections were identified for improvement due to safety and traffic congestion concerns on the 2015 CIP Sales Tax Ballot Initiative.

On June 6, 2016, Council adopted Resolution 67-16 authorizing a professional engineering services agreement with Bartlett & West, Inc for Phase 1 design services relating to the improvements. Both intersections were analyzed for roundabout and signal options, and the proposed layout and cost estimate for each improvement option is identified in [Exhibit B](#).

A traffic study was completed by CBB Traffic & Transportation Engineers for each intersection, with traffic counts taken during the morning and evening peak traffic hours in December 2016 and January 2017. The traffic counts were used to model each intersection with the current traffic volume and with a 20-year forecasted traffic volume for the existing all-way stop, for a roundabout improvement, and for a signal improvement. The PTV VISSIM software was used for the evaluation. Modeling the current configuration of each intersection (all-way stop) showed that each intersection currently operates at a Level of Service (LOS) F during peak hours. Modeling a proposed roundabout for each intersection showed that the intersections would need to operate at a LOS A for current conditions and at a LOS A/B for the 20-year forecasted traffic volumes. Modeling a proposed signal for each intersection showed that the intersections would operate at a LOS A/B for current conditions and at a LOS B for the 20-year forecasted traffic volumes. See attached [Exhibit C](#) for Level of Service definitions.

Upon reviewing the existing conditions, the proposed improvement options, and the adoption of Vision Zero, staff recommends the design of a 120-foot diameter single lane roundabout for



City of Columbia

701 East Broadway, Columbia, Missouri 65201

each intersection. The diameter is designed to accommodate large size vehicles and school buses. The roundabouts will also be designed such that they can be widened to 150-foot diameter partial dual lane roundabouts in the future, when Nifong is widened to four lanes. The roundabout designs include splitter islands, five-foot wide sidewalks on all four sides, and lighting. A water quality cell may be included in the design at each intersection to attenuate stormwater peak runoff rates and improve the stormwater runoff water quality from the intersection pavement.

The roundabout is considered overall the **safest** improvement at each intersection for all modes of transportation (motorized and non-motorized) for the following reasons.

- The roundabout has fewer vehicle and pedestrian conflict points as compared to a signalized intersection. The intersection conflict diagram ([Exhibit D](#)), graphically shows the conflict locations for vehicles and pedestrians.
- The severity of a collision is determined largely by the speed and angle of impact. A roundabout changes the geometry of the roadway in a way that forces drivers to slow down and alter their direction. Thus, with roundabouts the most severe types of crashes (right-angle, left-turn, and head-on) are unlikely to occur because of the geometry of the roundabout. Signalization relies on driver's obedience of the traffic signal to eliminate collisions and the most severe collisions at signalized intersections occur when motorists run the red light designed to separate conflicts by time.
- A pedestrian crossing a leg of the roundabout will face two potential vehicular conflicts. The first potential conflict will be coming from the left, with a refuge on the median island, before facing the other potential conflict, which will both be coming from the right. A pedestrian crossing a signalized intersection will need to know what all the vehicles at the intersection are doing while crossing the intersection and will not be protected with islands for most of the vehicle movements.
- Due to roundabout geometry, vehicular speeds are lower (15-20 mph) in a roundabout allowing more time for vehicles and pedestrians to react, which reduces the consequences of error. Also, the crosswalks are set back at the roundabout to allow drivers more time to react to pedestrians while merging into or out of the roundabout. For the proposed signalized intersection, vehicles on Nifong will not need to stop or slow down at the intersection unless making a turning movement or stopping for a red light; thus, resulting in higher vehicle speeds and more severe collisions through the intersection.
- In a study completed by the Transportation Research Board (TRB), it was found that following the conversion of 23 intersections from either a stop sign or a traffic signal to a roundabout, there was approximately a 40% decrease in crashes of all severities, about an 80% reduction of injury crashes, and about a 90% reduction of fatal and incapacitating injury crashes. An abstract of this paper is attached as [Exhibit E](#). Ongoing research by the Federal Highway Administration (FHWA), the National Highway Traffic Safety Administration (NHTSA), the TRB, the Insurance Institute for Highway Safety (IIHS), and other industry sources continues to indicate roundabouts are one of the safest types of intersection control (see [Exhibit F](#) for a list of papers). Improvements have been made to some specific elements of roundabout design over the years, but the principal of providing physical deflection in order to reduce speeds remains a key component for driver, pedestrian, and cyclist safety.



City of Columbia

701 East Broadway, Columbia, Missouri 65201

For a local source (University of Missouri, Columbia) on roundabout safety, [Exhibit G](#) "Safety Benefits of Modern Single-Lane Roundabouts", identifies the safety benefits of a roundabout. For optimal **traffic flow and maintenance** reasons, staff recommends a roundabout over the signal to improve each intersection:

- Roundabouts bring conflicting traffic streams into a steady flow and allow vehicles to merge without the stop-and-go conditions. Roundabouts provide greater traffic flow benefits by reducing average vehicle delay and vehicle queuing compared to a signal. Roundabouts eliminate left turns; thus, eliminating the delays caused by left-turning vehicles.
- A roundabout keeps traffic flowing even during non-peak periods since vehicles would not have to wait at a red light when little or no traffic is coming from the conflicting direction.
- From the traffic study modeling, the expected delay time for the proposed signal scenario is slightly higher than the expected delay time for the proposed roundabout scenario.
- The roundabout is designed to be constructed as a single lane roundabout with the sidewalks set back so that it can be expanded to a partial double-lane roundabout in the future. The signal is designed to be constructed with additional pavement and islands needed to address widening of Nifong in the future.
- The location of a roundabout doesn't necessarily have to be placed in the middle of the intersection; it can be adjusted to minimize impacts to utilities. The proposed roundabout at Nifong/Sinclair can be shifted to the southwest to city-owned property in order to lessen the impact to private property. The location of a signalized intersection must align with the existing street layouts and cannot be adjusted to minimize utility and property impacts.
- Long-term maintenance costs are lower for a roundabout than a signal due to the electrical cost and operation/maintenance cost of a signal.

Mill Creek Elementary school is located at the southwest corner of the Nifong and Sinclair intersection and a middle school is proposed to be constructed further south on Sinclair; therefore, City staff has been coordinating the proposed improvements with Columbia Public Schools (CPS). Residents have voiced concerns about the existing crosswalk across Nifong at Woods Edge Road because vehicles don't always stop for pedestrians in the crosswalk. Mill Creek Elementary has a crossing guard stationed there before and after school. As part of this project, staff will incorporate improvements to the crosswalk, which may include adding the rectangular rapid flashing beacon (RRFB) to the crosswalk signage and constructing a pedestrian safety island in the middle of the crosswalk.

An IP meeting was held on June 20, 2017. Thirty-seven people signed in at the meeting and staff received 12 comments (see [Exhibit H](#)). Most of the comments consisted of recommendations for the design of the roundabouts and concerns with the traffic during times when the elementary school starts and ends. Two comments suggested a signal instead of a roundabout at each intersection.



City of Columbia

701 East Broadway, Columbia, Missouri 65201

The estimated total project cost for improving both intersections is \$2,450,000, which includes design, right of way acquisition, utility relocation, and construction. Additional street right of way, temporary construction easements (TCE), permanent utility easements (PUE), and permanent drainage easements (PDE) may be necessary. Construction of the improvements is anticipated to begin in 2019. Based on the analysis of the intersection improvements for both safety and traffic movement and the adoption of Vision Zero by Council, staff recommends the roundabout as the best improvement for each intersection.

Fiscal Impact

Short-Term Impact: The estimated total project cost for improving both intersections is \$2,450,000 (design, right of way, utilities, and construction). Funding for the project will be from the 0.25% Capital Improvement Sales Tax

Long-Term Impact: Routine maintenance for each roundabout is estimated at \$2,000 per year.

Strategic & Comprehensive Plan Impacts

[Strategic Plan Impacts:](#)

Primary Impact: Infrastructure, Secondary Impact: Secondary, Tertiary Impact: Tertiary

[Comprehensive Plan Impacts:](#)

Primary Impact: Infrastructure, Secondary Impact: Mobility, Connectivity, and Accessibility, Tertiary Impact: Tertiary

Legislative History

Date	Action
06/06/2016	R67-16-Agreement with Bartlett & West for Phase 1 design services related to Nifong/Sinclair Road and Vawter School Road/Old Mill Creek Road Intersections improvements project.
06/20/2017	Interested Parties Meeting

Suggested Council Action

Adopt the resolution setting a public hearing for October 16, 2017 for the Nifong Boulevard Intersections Improvement project.