



Department Source: Public Works

To: City Council

From: City Manager & Staff

Council Meeting Date: October 16, 2017

Re: Public Hearing – Nifong Boulevard Intersections Improvement Project

## Executive Summary

A public hearing for construction of the Nifong Boulevard Intersections Improvement project (Nifong & Sinclair and Nifong/Vawter School Road & Old Mill Creek). 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

Improvement of the Nifong/Sinclair intersection and the Nifong/Vawter School Road and Old Mill Creek Road intersection were identified in the 10-year plan for the 0.25 percent Capital Improvement Sales Tax ballot initiative passed in August of 2015. Currently, an all-way stop is present at each intersection. A site location map of the intersections is included as [Exhibit A](#), and a layout of each existing intersection is included as [Exhibit B](#). A roundabout and a signal were both analyzed as improvement options for each intersection, and [Exhibit C](#) includes the proposed layout and cost estimate for each improvement option. Nifong Boulevard and Vawter School Road are both classified as major arterials, Sinclair Road is classified as a major collector, and Old Mill Creek Road is classified as a neighborhood collector, in both the Columbia Area Transportation Study Organization (CATSO) 2030 Major Thoroughfare Plan and the City Major Roadway Plan.

A traffic study was completed by CBB Traffic & Transportation Engineers for each of the intersections and the technical memorandum summarizing the study is included as [Exhibit D](#). Traffic counts were taken by CBB during the morning and evening peak traffic hours in December 2016 and January 2017. The counts were used to model each intersection with the current traffic volume and with a 20-year forecasted traffic volume. The 20-year forecasted traffic volume included a one percent annual background growth rate for each intersection. The forecasted traffic volume also included development of a 200-home subdivision and a middle school along Sinclair. When modeling the intersections, operating conditions were graded as a Level of Service (LOS) A through F. LOS A was considered “Free Flow” and LOS F was considered “Fully Saturated”. LOS C was the overall intersection target grade for peak period traffic operations. The PTV VISSIM software was used for the modeling.

Each intersection was modeled as the existing all-way stop, as a roundabout, and as a traffic signal. Under current peak traffic conditions; modeling the all-way stop showed that the intersections currently operate at an overall LOS E/F; the roundabout would operate at an overall LOS A, and the signal would operate at an overall LOS A/B. Under the 20-year forecasted peak traffic conditions; modeling the roundabout showed that the Nifong/Sinclair intersection would operate at an overall LOS B/C and the Nifong/Old Mill Creek



intersection would operate at an overall LOS of A. Under the 20-year forecasted peak traffic conditions; modeling the traffic signal showed that each intersection would operate at an overall LOS B.

It should be noted that the 20-year traffic volumes for roundabout scenario shows a LOS D for the northbound approach at Sinclair during the AM Peak. The intersection still operates at an overall LOS C. The modeling accounts for the new middle school and 200 homes. The attendance boundaries of the proposed middle school have not been set at this time and there could be some changes to traffic patterns and movements that have been assumed with this study. Adding a bypass lane for the northbound right turn at Sinclair would likely improve this movement during the AM Peak if the 20-year volumes reflect the modeling. In addition, the 20-year time frame includes the potential for Nifong to be widened to four lanes between Green Meadows Road and Scott Boulevard. The proposed roundabouts are to be designed as a single lane that can be modified to a partial double lane roundabout when Nifong is widened to four lanes.

Upon reviewing the existing conditions, the proposed improvement options, and the adoption of Vision Zero; staff recommends construction of a 120-foot diameter single lane roundabout for 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 partial double-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 recommended for improving each intersection because of safety, traffic flow, and maintenance benefits. The following summarizes these benefits.

- The roundabout has fewer vehicle and pedestrian conflict points as compared to a signalized intersection. The intersection conflict diagram ([Exhibit E](#)), graphically shows the conflict locations for vehicles and pedestrians.
- The 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. This results in fewer and less severe collisions. 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.
- 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.
- 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



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median island, before facing the other potential conflict, which will both be coming from the right.

- 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.
- The roundabout is designed such that it will be constructed as a single lane with the sidewalks set back so that it can be expanded to a double-lane roundabout in the future. The signal is designed such that it will be constructed with additional pavement and islands needed now to address widening of Nifong in the future.
- The location of the roundabout is adjusted to minimize impacts to utilities. Also, at the Nifong and Sinclair intersection, the roundabout location is shifted to City owned property. The location of the 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.

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. 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. An abstract of TRB paper and a list of other roundabout study references are attached as [Exhibit F](#). 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.

Mill Creek Elementary school is located at the southwest corner of the Nifong and Sinclair intersection and a middle school is proposed to be located further south on Sinclair; therefore, the City has been coordinating with Columbia Public Schools (CPS) on the proposed improvements. 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/or 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 G](#)). 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.

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 safety and traffic movements, maintenance, 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 projects cost for improving both the 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/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 Professional engineering services agreement with Bartlett and West
06/20/2017	Interested Parties meeting held
09/18/2017	Setting a public hearing for 10/16/17 for proposed construction of single lane roundabout at Nifong/Sinclair and Nifong/Vawter School Road & Old Mill Creek

### Suggested Council Action

After the public hearing and Council discussion, direct staff to move forward with final plans and specifications for the construction of the Nifong Intersections Improvement project.