Public Comments and Responses:

Following are concerns residents have voiced about the proposed roundabout, and staff responses:

Concern: Drivers on the southwest leg of Green Meadows won't be able to enter the roundabout during peak traffic times because there will be a steady stream of vehicles on the north leg of Forum entering the roundabout to go south.

Response: The vehicles on the north leg of Forum will need to yield to vehicles already in the roundabout, such as vehicles entering from the south leg of Forum to go west on Green Meadows, and vehicles entering from the east leg of Green Meadows to go south on Forum. Southbound vehicles will need to yield to this traffic and a gap will be created in the roundabout for vehicles entering from the west leg of Green Meadows. These gaps in traffic are typically created due to slow approach speeds and drivers on other legs needing to yield to the circulating traffic. It is possible that the vehicle on the west leg of Green Meadows may have to occasionally wait a little longer than the current all-way stop configuration. However, that seems unlikely, or will be minor, given the fact that drivers currently have to come to a full stop at the intersection to proceed. Overall delay will be reduced since other movements will not all have to stop, and instead proceed into the circulating roadway after yielding. There has been some feedback that a signal would allow for a dedicated 'turn' for the west leg movement. While this is true, it should be noted that at a signalized location, that leg would have to wait at a red light for a longer period of time than at a roundabout or all-way stop.

Concern: The Insurance Institute of Highway Safety (IIHS) states that roundabouts should not be used at intersections with highly unbalanced traffic flows i.e. very high traffic volumes on the main street and very light traffic on the side streets.

Response: An intersection with a highly unbalanced traffic flow is where an all-way stop would not be warranted to begin with such as the intersection of Green Meadows Road and Doral Drive/Canterbury Drive, located just north of the intersection of Forum and Green Meadows. The significant imbalance that residents referred to is not present at Forum and Green Meadows, where some form of major intersection control is warranted and there are significant left turn movements from the main line and entry movements from the east leg of the intersection. Exhibit I provides the full IIHS study. It should be noted that the name of the IIHS study is: *Continued Reliance on Traffic Signals: The Cost of Missed Opportunities to Improve Traffic Flow and Safety at Urban Intersections".* Page 11 of the study's conclusion, states, "Despite their benefits, roundabouts may not be the best solution at all locations. Roundabouts may not be feasible at locations where topographic or site constraints limit the ability to provide appropriate geometry. Also, intersections with very unbalanced traffic flows (i.e. very high traffic volumes on the main street and very light traffic on the side street) may preclude roundabouts for reasons of traffic flow. However, as the proportion of minor street traffic volumes increase, roundabouts typically become more feasible and provide greater reductions in vehicle delays compared with traffic signals." Staff concurs with the study's conclusion that sometimes roundabouts are not the best option, but that is not the case at this location.

Concern: There are no other double-lane roundabouts in Columbia and drivers will not know how to maneuver through the roundabout.

Response: MoDOT constructed two double-lane roundabouts in Columbia, 1) the intersection of Rangeline Road with I-70 Interstate access ramps, and 2) the intersection of Creasy Springs, I-70 Drive, and the I-70 access ramps. Also, a partial double-lane roundabout has been constructed at Highway WW and Rolling Hills Road, which is very similar to the proposed roundabout at Forum & Green Meadows. The signing and pavement markings used at the roundabouts, along with the splitter islands, direct drivers to the correct lane and use of the roundabout. It should also be noted that the Forum and Green Meadows roundabout will not be a true double-lane roundabout with two circulating lanes. Two lanes are only designed on the northbound and southbound legs of the roundabout. The eastbound and westbound legs are single lanes. While full double-lane roundabouts can be more difficult to navigate, this hybrid style roundabout is

generally perceived to be very user friendly since the number of potential vehicle conflicts is reduced. There is not a need to move from the inner to outer lane of the roundabout. The City's consultant, Bartlett and West has been involved in several successful implementations of this style of roundabout.

Concern: The roundabout will not be safe for pedestrians.

Response: In most studies it has been determined that roundabouts are actually safer for pedestrians than an all-way stop or a signal. A pedestrian crossing a double-lane signalized intersection or an all-way stop faces seven potential vehicular conflicts, each coming from a different direction, when trying to cross from one side of the road to another. A pedestrian crossing the double-lane of the roundabout will face four potential vehicular conflicts. The first two potential conflicts will both be coming from the left, with a refuge on the median island before facing the other two potential conflicts, with both coming from the right. In addition, the vehicle speed going through a green light or running a red light can be much faster than the speed of a vehicle traversing the roundabout because the islands/design of the roundabout forces the vehicle to slow down, which allows drivers and pedestrians both more time to react. This subsequently reduces the consequence of any errors and accidents tend to be less severe. The crosswalks are set back in a roundabout to allow the drivers more time to react before merging into or out of traffic. Ongoing research is being pursued by the Federal Highway Administration (FHWA), Transportation Research Board (TRB), and the National Highway Transportation Safety Administration (NHTSA) to improve roundabouts for all modes, but results consistently indicate that roundabouts are one of the safest forms of intersection control and produce consistently safer results than signalized intersections. Collisions at roundabouts can and do occur; however, they generally occur less often and are less severe. The Bicycle/Pedestrian Commission voted to support the roundabout as the best option.

Concern: The roundabout will not be safe for bicyclists.

Response: Bicyclists can choose to ride through a roundabout with traffic or walk their bicycles through the pedestrian crosswalks; much like a bicyclist would at other intersections. If navigating the roundabout with traffic, cyclists must obey the rules of the roundabout as they proceed through the intersection, but the speed of the vehicles are slower in the roundabout than vehicle speeds passing through a signalized intersection. The slower speed makes it easier for a bicyclist to ride with the traffic. In addition, the sidewalk can be designed with bike ramps to allow the bicyclist access to the sidewalk once the bike lane ends, should the bicyclist choose to use the sidewalk instead. The Bicycle/Pedestrian Commission voted to support the roundabout as the best option.

Concern: The intersection improvement project is not necessary.

Response: The Highway Capacity Manual (HCM) is a publication of the Transportation Research Board (TRB) and is used by engineers to assess roadway capacity and quality of service. It contains concepts, guidelines, and procedures for determining capacity and quality of service for various roadway types including roundabouts, signalized, and un-signalized intersections. From the 2000 version of the HCM, the Intersection Control Type and Peak-Hour Volumes graph (Exhibit J) can be used as guidance to visually determine the type of control warranted for the intersection. From the graph it can be determined that with the peak-hour traffic counts, the intersection warrants a roundabout or a traffic signal control. In addition, this intersection improvement project was identified in the list of needed capital street improvement projects included in the August 2015 sales tax renewal ballot initiative, and discussed and voted on by Council on May 18, 2015. The intersection is located in Ward 5, with1,036 Ward 5 residents voting in favor of the sales tax renewal and 374 Ward 5 residents opposed the sales tax renewal. Improving this intersection would be consistent with goals and principles of the CATSO 2040 Long Range Transportation.

Concern: The amount of delay at the intersection is not enough to warrant the improvement.

Response: Staff utilized an industry standard software program called Synchro/SimTraffic to analyze and estimate the vehicle delay time at the intersection during the peak hour (Exhibit K). Synchro utilizes the Highway Capacity Manual for modeling signalized and un-signalized intersections. The traffic counts collected in January of 2016 were used in the model to calculate the delay during the peak afternoon traffic. The southbound legs of Forum had the longest delay time with an average of 75 seconds per vehicle for both lanes and 107 seconds per vehicle for the inside lane. The Forum southbound inside lane is utilized by drivers for both through and left turn movements. The average overall delay time for the entire intersection during the peak time was 46 seconds per vehicle. This average delay time includes all legs of the intersection. Overt delay causes issues with driver frustration, delivery of goods and services, lost time, impacts to transit routes, and greater fuel consumption.

Concern: The section of Forum between Nifong and Green Meadows is two lanes.

Response: No matter which intersection improvement is selected, if funding is available, staff recommends coordinating design and construction for widening Forum to a four-lane section between Green Meadows and Nifong, with the Nifong Improvement project planned for the year 2020. Without this additional widening, traffic will continue to be forced to transition between four lanes and two lanes. This merging maneuver may lead to imbalanced lane usage with one lane taking the bulk of the traffic in each direction, as it currently exists.