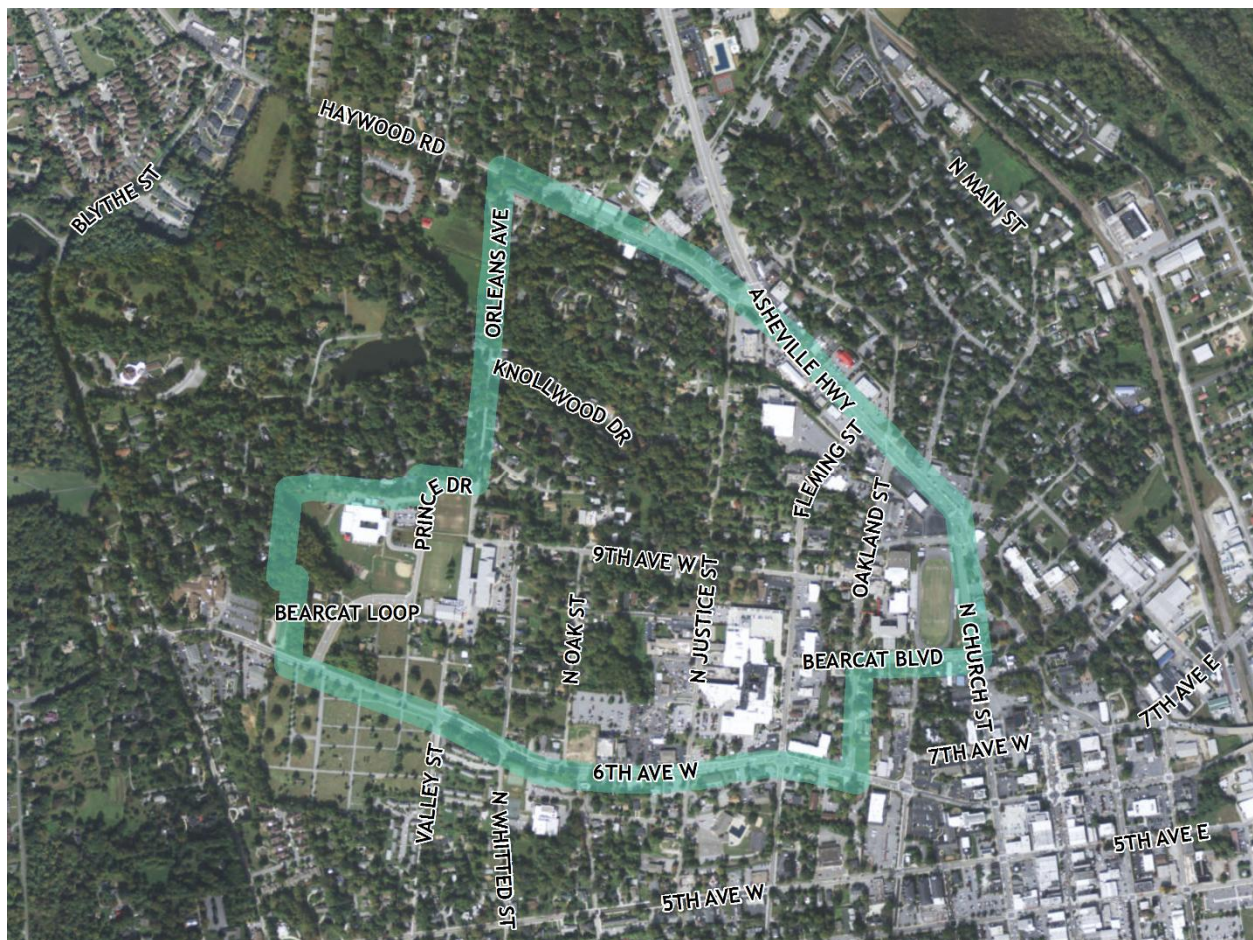


9TH AVENUE AREA CIRCULATION STUDY

TECHNICAL MEMORANDUM

INTRODUCTION

In response to growing demands on its roadways in the 9th Avenue area, shown in the map below, the City of Hendersonville commissioned a circulation study to investigate options to improve mobility and safety. The planning process included meeting with stakeholders and residents, data collection and issues identification, the development of improvement solutions and sample concept illustrations, and cost estimation. The 9th Avenue Area Circulation Study is intended to guide the City of Hendersonville's decision-making regarding the enhancement of biking, walking, and driving within, through, and around the 9th Avenue area.





STAKEHOLDER ENGAGEMENT

The study area encompasses a place in Hendersonville where long-time residents live, students attend school, and employees go to work. The diversity of stakeholders representing the area necessitated an engagement strategy that effectively identified the needs and desires of the users of the street network.

STAKEHOLDER WORK SESSION

On January 30, 2016, the project team hosted a stakeholder work session. Attendees included local residents and representation from Henderson County Public Schools, Blue Ridge Community College, Wingate University, Pardee Hospital, Blue Ridge Bicycle Club, Hendersonville City Council, North Carolina Department of Transportation (NCDOT) Division 14, and staff from the City's administration, development assistance, engineering, police, and public works departments. The discussion focused on the identification of problems and documented stakeholders priorities for improvements. Generally, these priorities aligned with four broad categories:

1. Crossing Safety
2. Walkability & Bikeability
3. Driver Behavior
4. Intersection Operations

CITY COUNCIL PRESENTATION

On April 7, 2016, the project team presented the preliminary findings of the 9th Avenue Area Circulation Study to City Council at the regularly scheduled monthly meeting. The presentation included an explanation of the objectives of the study, the outcomes of the stakeholder work session, and a set of options that respond to the identified problems.

STAKEHOLDER MEETING

On May 19, 2016, the project team called a meeting of stakeholders representing Henderson County Public Schools, Blue Ridge Community College, Pardee Hospital, Hendersonville Family YMCA, Henderson County, NCDOT Division 14, and the City's administration, engineering, and public works departments. The purpose of the meeting was to discuss potential crosswalk improvements at the intersection of 6th Avenue and N Oak Street.

MOBILITY ISSUES

Through the engagement process, local stakeholders explained that there are several challenges facing those who travel within and around the 9th Avenue Area. The most frequently mentioned issues are shown in the table below.

| Existing Issues | Crossing Safety | Walkability & Bikeability | Driver Behavior | Intersection Operations |
|--|-----------------|---------------------------|-----------------|-------------------------|
| School speed zone flashing beacons don't flash during start delays and early dismissals. | ✓ | ✓ | ✓ | |
| Drivers ignore the school speed zone flashing beacons even when they are active. | ✓ | ✓ | ✓ | |
| There are no marked crosswalks at US 64 and Valley Street. | ✓ | ✓ | | |
| There are no bike facilities or safe roads to bike on. | | ✓ | ✓ | |
| Most students are driven to school by their parents. | | ✓ | | |
| The sidewalks on 9 th Avenue are narrow and poorly maintained. | | ✓ | | |
| There are sidewalk gaps on N Justice Street and Fleming Street. | | ✓ | | |
| Speeding is a major issue on 6 th Avenue, 9 th Avenue, and Orleans Avenue. | | | ✓ | |
| N Whitted Street isn't wide enough for on-street parking on both sides. | | | ✓ | |
| Motorists don't stop at the stop signs at Orleans Avenue and Knollwood Drive. | | | ✓ | |
| The intersection of 6 th Avenue and N Oak Street is unsafe. | | | | ✓ |
| The intersection of N Church Street and N Main Street gridlocks during rush hour. | | | | ✓ |
| The Hendersonville High School expansion will close 9 th Avenue at N Church Street. | | | | ✓ |



WALKING STUDENTS

More than 230 pedestrians were counted on 9th Avenue near Knollwood Drive on Tuesday, October 20, 2015. Approximately 62% of those pedestrians were counted between 2pm and 4pm which implies that more than 140 students and their parents walked home after school that day.

SPEEDING ON 9TH AVENUE

Traffic counts and speed measurements were conducted in December 2015. Based on this data, approximately 2,000 vehicles per day travel on 9th Avenue near Knollwood Drive. While the posted speed limit is 20 mph, the 85th percentile speed was measured at 34 mph. Generally speaking, posted speed limits are set so that 85% or more of the drivers traveling the road do not exceed the speed limit.

JOINT HEALTH EDUCATION CENTER

The Joint Health Education Center, located in the northeast quadrant of the intersection of 6th Avenue and N Oak Street, is currently under construction. Once open, the building will include classrooms and laboratories for Wingate University and Blue Ridge Community College students in addition to a cancer center and infusion therapy clinic that will be used by Pardee Hospital. The Joint Health Education Center is expected to generate over 300 trips in both the morning and evening peak hours.

HENDERSONVILLE HIGH SCHOOL EXPANSION

About 700 students are currently enrolled at Hendersonville High School. An expansion is planned for the high school which will increase its capacity to 800 students. The expansion will include the closure of 9th Avenue between Oakland Street and N Church Street and a new gymnasium and cafeteria on the triangular parcel north of 9th Avenue. The high school currently utilizes 3 buses and most high school students park on-street.

IMPROVEMENT OPTIONS

The table below summarizes the improvement options developed as a part of this study and is followed by descriptions that include implementation considerations and planning-level cost estimates as well as concept illustrations for a sample of the improvements.

| Improvement Options |
|--|
| Crossing Safety |
| Install high visibility crosswalk and curb ramps at 6 th Avenue and N Valley Street. |
| Upgrade crosswalks with high visibility markings and install signs at 6 th Avenue and N Oak Street. |
| Walkability & Bikeability |
| Establish a local Safe Routes to School program. |
| Plan and execute Walk to School Day and Bike to School Day events. |
| Provide bike racks at Hendersonville Elementary School and Hendersonville High School. |
| Regularly maintain sidewalks on 9 th Avenue. |
| Construct sidewalks to fill-in gaps on N Justice Street and Fleming Street south of 9 th Avenue. |
| Driver Behavior |
| Periodically enforce the 20 mph posted speed limit during school zone hours. |
| Implement variable schedules for school speed zone flashing beacons. |
| Install speed humps on 9 th Avenue and Orleans Avenue. |
| Intersection Operations |
| Analyze traffic on Asheville Highway and N Church Street from Fleming Street to N Main Street. |
| Assess the impact resulting from the closure of 9 th Avenue at N Church Street. |
| Study the potential realignment of N Oak Street at 6 th Avenue. |

CROSSING SAFETY

Elementary and middle school students who walk to school primarily cross 6th Avenue at Valley Street and N Whitted Street. While there are marked crosswalks at N Whitted Street, there are no marked crosswalks at Valley Street where a greater number of students cross. Sidewalks are present on the northeast and southeast corners of this intersection. Installation of a high visibility crosswalk connecting the northeast and southeast corners would increase the safety of crossing pedestrians by clearly delineating the crosswalk and alerting motorists to the potential presence of pedestrians. Installation of ADA-compliant curb ramps should also accompany the marked crosswalk.

N Oak Street is offset at its intersection with 6th Avenue. The Hendersonville Family YMCA is located in the southwest quadrant and the under construction Joint Health Education Center is located in the northeast quadrant. Marked crosswalks exist on all approaches of the intersection. There are several options for improving crosswalk safety at this intersection including improving the existing crosswalks; consolidating the eastern and western crosswalks and constructing a median refuge with rectangular rapid flashing beacons; and consolidating the eastern and western crosswalks and constructing a median refuge with an offset and rectangular rapid flashing beacons. Described in the *Intersection Operations* section, realignment of the intersection, installing a traffic signal, or constructing a roundabout would also improve crosswalk safety. While a median refuge would enable pedestrians to cross one direction of traffic at a time, it would not accommodate trucks turning left from N Oak Street. Stakeholders expressed their preference for upgrading the existing crosswalks with high-visibility markings and crosswalk signs.

Figure 1 shows the intersection configuration of 6th Avenue and N Oak Street once the Joint Health Education Center is complete. Figures 2-4 show concept illustrations of the crosswalk improvement options.

PLANNING-LEVEL COST ESTIMATES

- Install high visibility crosswalk at 6th Avenue and N Valley Street: \$10,000
 - Upgrade existing crosswalks at 6th Avenue and N Oak Street: \$25,000
- OR
- Consolidate crosswalks and install median refuge and RRFB: \$50,000

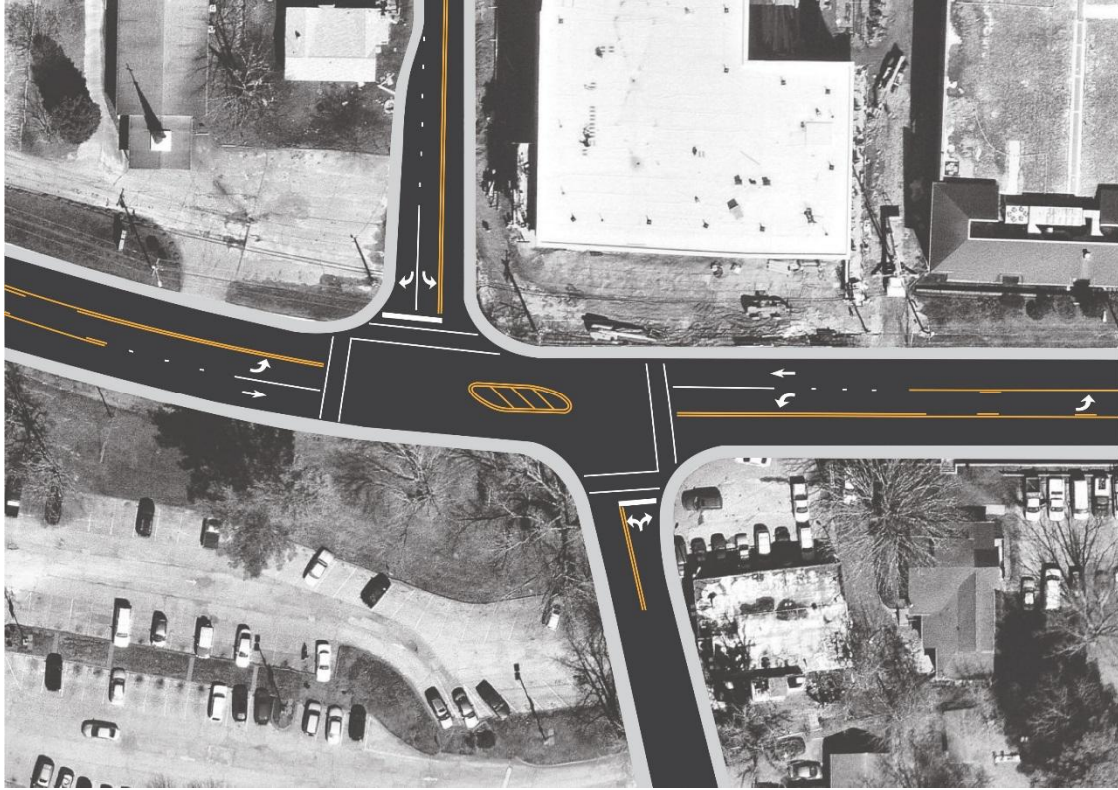


FIGURE 1. 6TH AVE AT N OAK ST - EXISTING CROSSWALKS

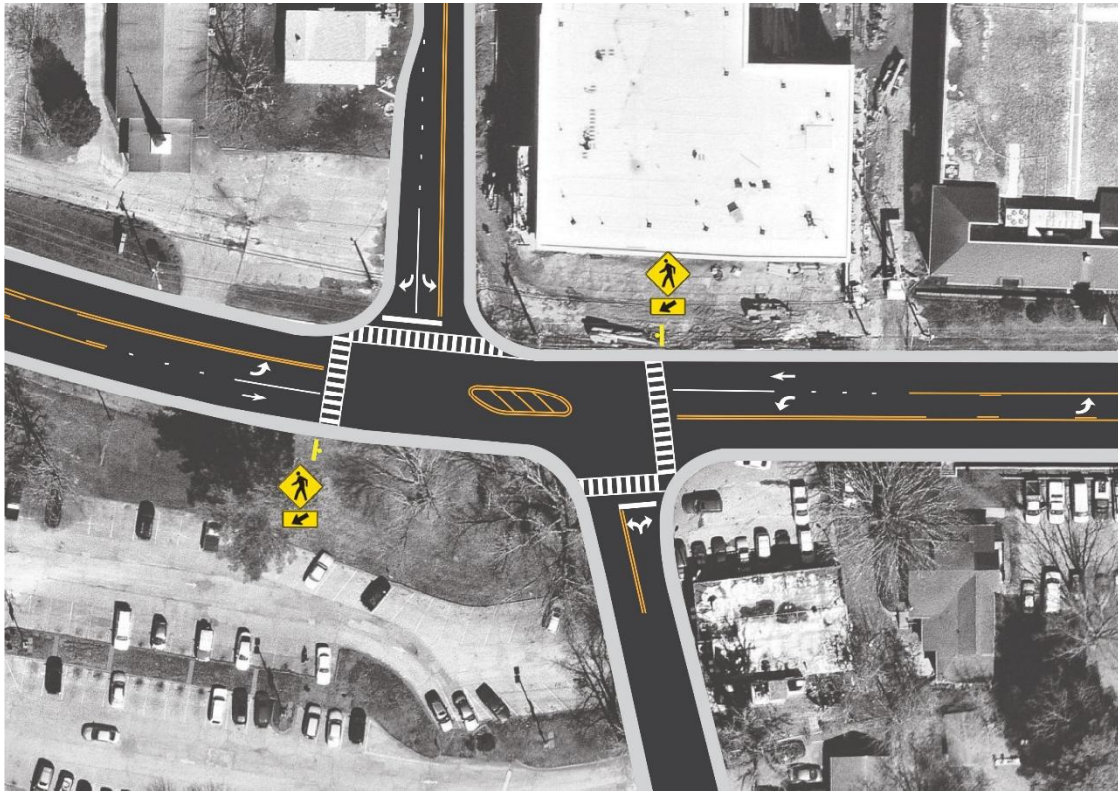


FIGURE 2. 6TH AVE AT N OAK ST - HIGH-VISIBILITY CROSSWALK CONCEPT

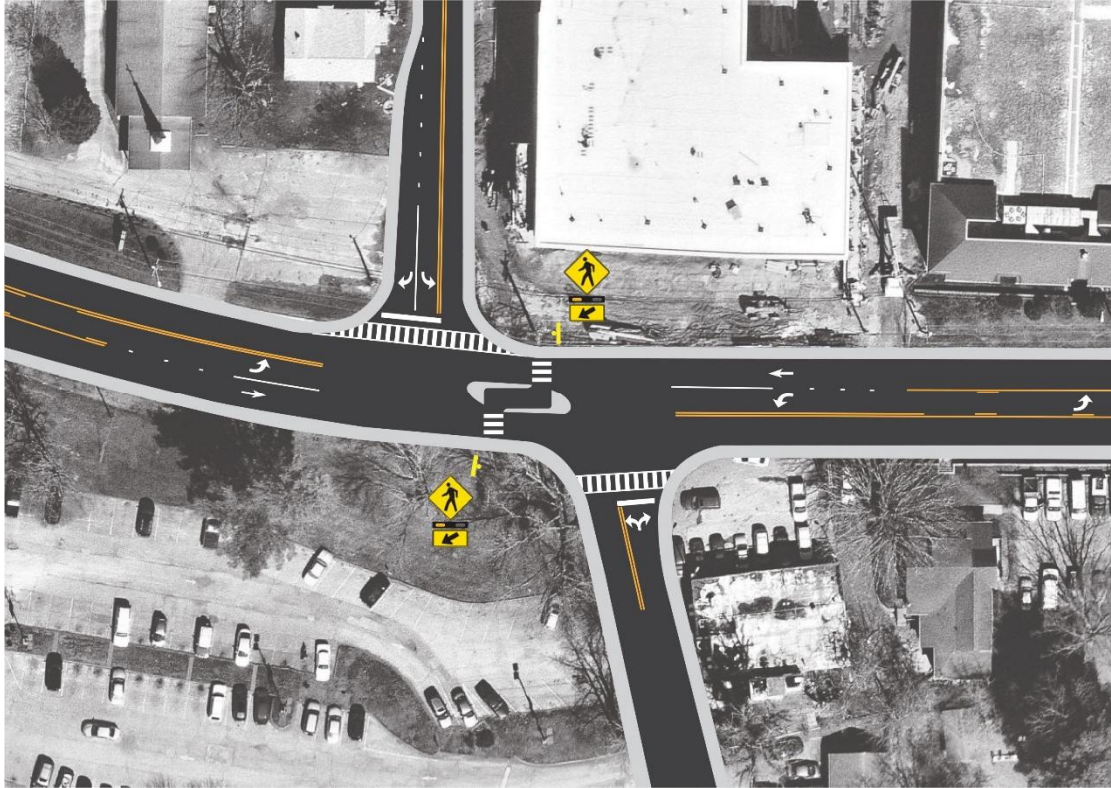


FIGURE 3. 6TH AVE AT N OAK ST - OFFSET MEDIAN REFUGE CROSSWALK CONCEPT

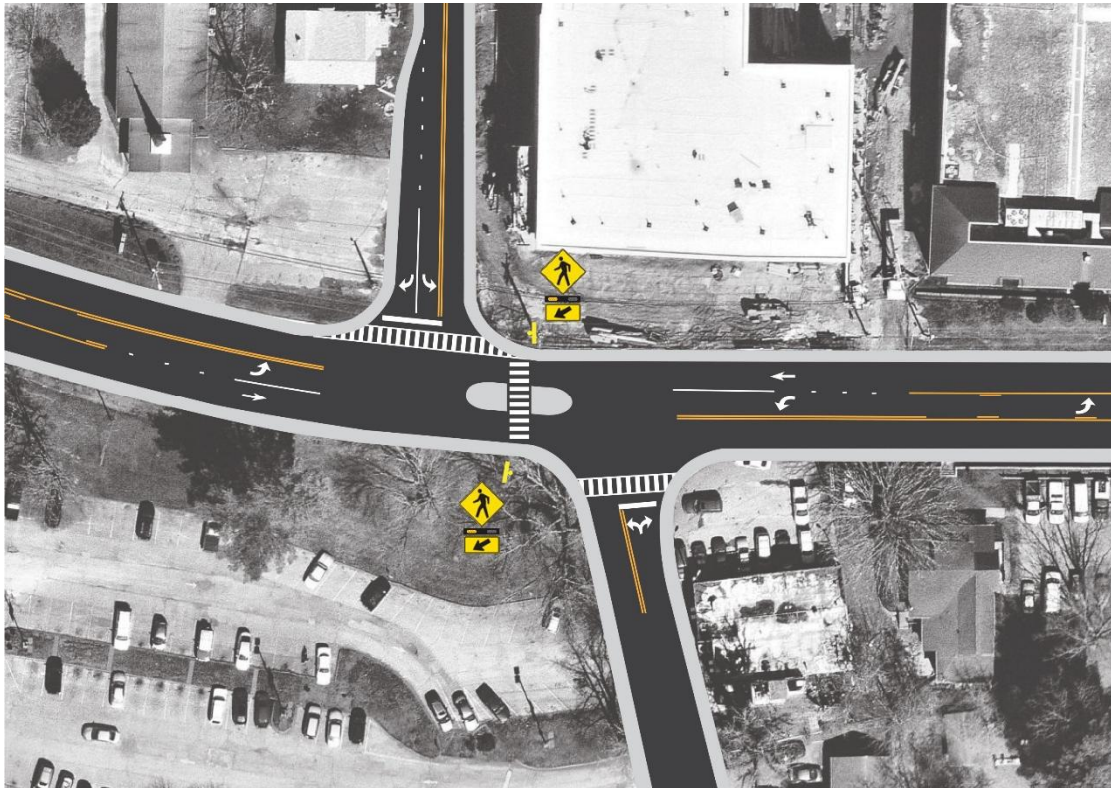


FIGURE 4. 6TH AVE AT N OAK ST - MEDIAN REFUGE CROSSWALK CONCEPT

WALKABILITY & BIKEABILITY

In addition to crosswalk enhancements, the addition of bicycle racks at the schools, a Safe Routes to School (SRTS) program, and Walk and Bike to School Day events would improve the walkability and bikeability in the 9th Avenue area. While these improvement options are directly related to the schools, their influence extends beyond the schools by creating a more walkable and bikeable environment for students and non-students alike.

Safe Routes to School¹ is a national program that encourages children to walk or ride their bike to school by planning, designing, and implementing projects (e.g., sidewalks and bike lanes) and programs (e.g. Walk and Bike to School Day events and walking school buses). NCDOT and the North Carolina Division of Public Health have partnered to create Active Routes to School, which is a North Carolina Safe Routes to School² project focused on physical activity for children. The Active Routes to School project is supported by regional coordinators who help communities create local Safe Routes to School programs. The North Carolina Safe Routes to School program has also published a document entitled *An event planning guide for Walk to School Day and Bike to School Day*³ that provides a framework for prospective event organizers to create Walk and Bike to School day events in their communities.

Convenient and secure bike parking at the schools would encourage more students to ride their bikes to school. A single grid-style bike rack exists at Hendersonville Middle School. The Blue Ridge Bicycle Club has offered to partner with the Elementary School and the High School to provide additional bike racks.

9th Avenue only has sidewalks on the north side of the street and its effective width is reduced by utility poles, sign posts, and fire hydrants located in the sidewalk as well as vegetative debris. Regular maintenance to remove the debris and repair broken sidewalk segments will improve the functionality of the sidewalk.

Gaps in the sidewalk along N Justice Street and Fleming Street south of 9th Avenue force pedestrians to walk across parking areas and wide driveways. Completing the sidewalks on these streets will enhance pedestrian connectivity between 9th Avenue and 6th Avenue.

PLANNING-LEVEL COST ESTIMATES

- Provide bike racks at schools: \$1,000 each
- Construct sidewalks on N Justice Street and Fleming Street: \$20,000

DRIVER BEHAVIOR

Stakeholders reported that drivers traveling on 6th Avenue frequently violate the 20 mph speed limit during school hours. Additional police enforcement as well as the implementation of variable schedules for the school speed zone flashing beacons will likely yield greater driver compliance, potentially reducing the number and severity of crashes.

¹ <http://www.saferoutesinfo.org/>

² https://connect.ncdot.gov/projects/BikePed/Documents/NCDOT_SRTS_Description.pdf

³ <https://connect.ncdot.gov/projects/BikePed/Documents/NCHowToPlan.pdf>

Motorist speeding is also an issue on 9th Avenue and Orleans Avenue and can be addressed by a number of traffic calming measures. Installing intermittent speed humps would regulate the speed at which motor vehicles can travel along the street.

On-street parking is permitted on both sides of N Whitted Street. However, the street is too narrow to accommodate motor vehicles parked on both sides and traffic traveling in both directions. While this street configuration naturally slows motor vehicle traffic, some stakeholders stated that it reduces the predictability of the street for drivers. Investigation of only permitting on-street parking on the east side of N Whitted Street should include additional coordination with residents, parents, and Hendersonville Middle School.

PLANNING-LEVEL COST ESTIMATES

- Install speed humps on 9th Avenue and Orleans Avenue: \$3,000 each

INTERSECTION OPERATIONS

There are three closely spaced signalized intersections along Asheville Highway / N Church Street at Fleming Street, Oakland Street, and 9th Avenue / N Main Street. High traffic volumes, short spacing distances, skewed intersection angles, and a five-legged intersection at N Main Street introduce complexity along the roadway. A traffic operations study that also considers the closure of 9th Avenue and its resultant traffic diversions will guide decisions to improve safety and mobility along Asheville Highway and N Church Street.

Beyond crosswalk safety improvements at the intersection of 6th Avenue and N Oak Street, the potential exists for a realignment of the intersection into a traditional four-legged intersection or a roundabout. Stakeholders expressed that a traditional intersection is preferred, and signalization would improve safety for motorists, pedestrians, and bicyclists. While a roundabout would provide a symbolic gateway into the 9th Avenue area, it would require a significant amount of land.

Figure 5 shows a concept illustration of an intersection realignment with signalization. Figure 6 shows a concept illustration of a roundabout offset to avoid impacting the Joint Health Education Center.

PLANNING-LEVEL COST ESTIMATES

- Realign intersection of 6th Avenue and N Oak Street: \$400,000
AND
Signalize realigned intersection of 6th Avenue and N Oak Street: \$250,000
OR
Realign and construct roundabout at 6th Avenue and N Oak Street: \$950,000

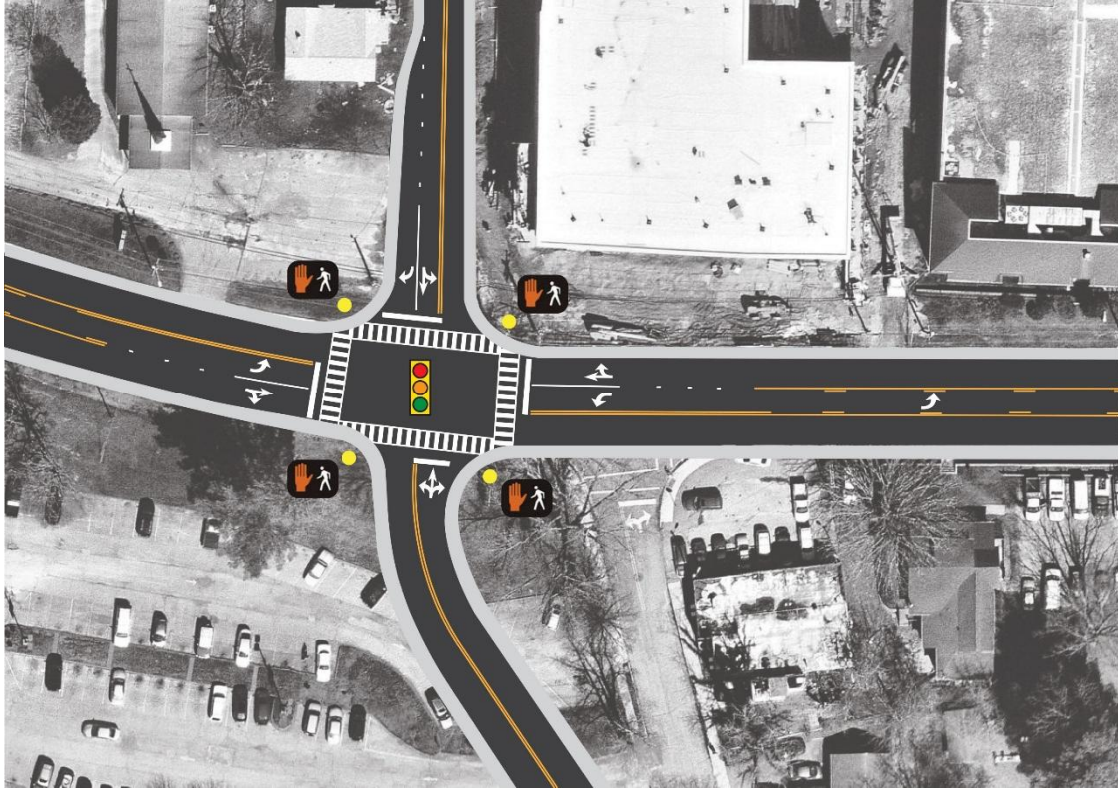


FIGURE 5. 6TH AVE AT N OAK ST - INTERSECTION REALIGNMENT CONCEPT

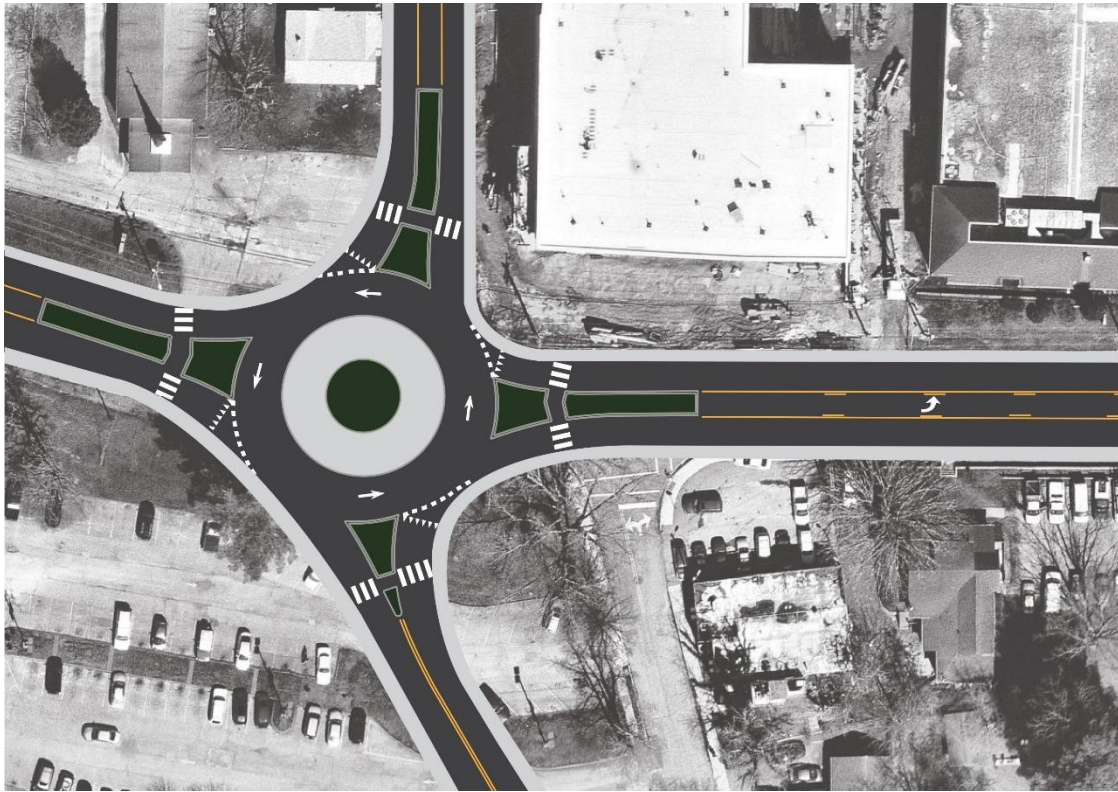


FIGURE 6. 6TH AVE AT N OAK ST - ROUNDABOUT CONCEPT

CONCLUSION

There exists many opportunities to improve mobility and safety in the 9th Avenue area, and Hendersonville's growth underpins the need for investment in its streets, sidewalks, intersections, and crosswalks. Coordination between City of Hendersonville staff and key stakeholders paired with strategic implementation of the improvement options included in the 9th Avenue Area Circulation Study will bolster the area's crossing safety, walkability and bikeability, driving behavior, and intersection operations.