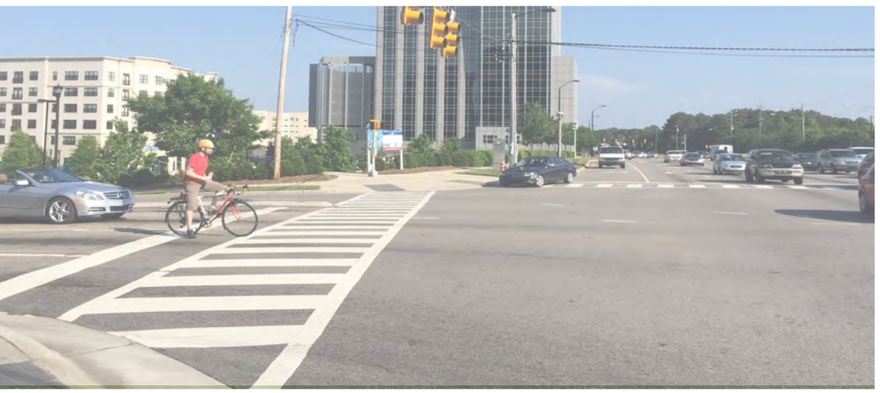
Six Forks Road Corridor Study

Raleigh, North Carolina

PROJECT STUDY DOCUMENT [DRAFT]
January 2016



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Special Thanks To
First Citizens Bank
Kane Realty Corporation
Duke Raleigh Hospital
Smith Anderson Law
Morningstar Law Group
Kilpatrick Townsend
K&L Gates
Midtown Raleigh Alliance
Trinity Baptist Church
Carroll Magnet Middle School
Church of the Apostles

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TABLE OF CONTENTS

Executive Summary

General

The Six Forks Corridor is designed to accommodate current multi-modal transportation needs. Once completed, it will become an even more attractive home for the various land uses that exist along its length and will aid its continued evolution into an important address for Midtown Raleigh. The Planning and Design Team, working with the Urban Design Center, the Community, Stakeholders and state and local agencies, have created a plan that will make the roadway safer to travel on and across. It will enable people to walk and bike its length in comfortable, separated and dedicated systems that are framed by landscapes that provide a distinct character and tie the streetscape together.

The Corridor will become more transit friendly, by simplifying the bus stop locations and by providing a regular rhythm of bus shelters that will have signage, lighting, seating and landscaping. Entrances into existing neighborhoods will become more attractive and pedestrian-scaled, with buildings that front onto streets and traffic calming devices that provide places for identity signage. The design of the stormwater system will include environmentally responsible techniques that capture and clean water in a naturalized system and light fixtures will protect the night sky and use lower amounts of electricity. Art will be integrated into the design of the various elements and will become a visible part of the experience of living and working along the Corridor. Finally, the Corridor will be designed to an adaptable aesthetic theme that is sensitive to the various environments and contexts through which the roadway travels.

Process

The plan for the Six Forks Corridor was created in front of the Community and Stakeholders and was scrutinized by state and local agencies for its technical competency. To the best of their ability, the Planning and Design Team created a master plan that interprets and consolidates the inputs received during the process into a plan that maximizes as much benefit and opportunity to as many interests as possible, while being elegant in its execution.

Theme and Character

The Corridor travels through a diverse pattern of land uses. At each end, commercial uses along with a growing mixed use community suggest a more urbanized pattern and image, whereas the center portion of the Corridor, populated by churches, schools and neighborhoods, presents a softer landscape character with large canopy trees, lawns, and varied building setbacks. The theme and character design of “Urban Boulevard” and “Parkway Boulevard” acknowledges these complimentary characters and the fact that the Corridor will evolve over time.

Multi-modal Roadway Design

The roadway design includes three lanes of travel in each direction, with dedicated left turn lanes and a continuous landscaped center median for access management. Pedestrians are better accommodated with highly visible crosswalks at all of the intersections and the addition of new signals where it is warranted. A center median extends the length of the Corridor, varying in design character depending upon the space it is traveling through, while maximizing the number of places where large trees can be planted within it.

Pedestrians, Bicycle and Transit accommodations are an important part of the Corridor’s program and use of space. Each side of the roadway includes adequately sized sidewalks and bicycle lanes that are separated from each other by planting space. The bicycle lane is actually located above the curb, creating a safer and more comfortable place for bicyclists to ride. The plan cleans up the current bus stop locations and provides regularly spaced bus shelters that have signage, benches, protection from the elements, and planting, making them an attractive and visible part of the new streetscape, which will help to promote ridership.

Redevelopment Opportunities and Long Term Planning Concepts

Several properties along the Corridor will most likely undergo change in order to take advantage of growing market potential. The plan focuses on seven of these potential properties and provides an analysis of their near and long-term potential. The plan promotes the concept that the redevelopment of these properties can enhance the quality of the Corridor and provide more interconnectivity than exists currently, which will help ease automobile pressures on Six Forks Road and allow residents more options for circulating along the Corridor. To help define this better, the master plan proposes planning frameworks consistent with the Unified Development Ordinance that suggests how these properties might link together, the heights they should build to, the nature of the internal streets, and the type of building frontage that should occur along the internal streets and Six Forks Road.

Conclusion

The Master Plan for the Six Forks Corridor accommodates, as much as possible, the desires of the Community, the requirements of state and local agencies, the realities of the existing site conditions and the potential for growth that can be expected along the Corridor. It provides a plan that if acted upon, will enhance the Corridor’s livability and identity and enable the Corridor to fulfill its destiny to become an important address for the City of Raleigh.

1

INTRODUCTION

Purpose: This chapter is to introduce the project in summarized form and to describe the key elements that need to be considered for it to be successful.

- Purpose of the Project
- Project Boundaries
- Desired Outcomes
- Summary of Issues and Opportunities
- Critical Items to Consider in the Design

Purpose of the Project

The City of Raleigh, along with the residents, institutions and businesses that call Six Forks Road home, desire an implementable vision and master plan for how Six Forks Road, between Lynn Road and I-440, should transform in the coming years to become more safe, multimodal and attractive so as to improve livability and to create an identifiable image for this important portion of Midtown.

Six Forks Road is the heart of Raleigh's evolving Midtown. It is home to many churches, schools, businesses and shopping centers. It provides access to many established neighborhoods that exist on both sides of it. Six Forks Road is also a major transportation corridor that connects I-440 and I-540 through central and north Raleigh, providing an important route for commuters. It is a destination, and the attractive shopping and mixed-use districts that are evolving along its length are bringing people from around the city to Six Forks Road to shop and to enjoy entertainment.

Six Forks Road has evolved to meet automobile demand. It has been widened in spots to accommodate new commercial and business uses and it has been altered to enable less congestion. Over time, this patchwork of improvements has created an inconsistent character along its length and has swung the pendulum more towards the automobile and less toward pedestrians and bicyclists. Neighborhood entries are becoming increasingly challenging to navigate and safe routes to schools and churches are being threatened. The ambiance of the roadway is not supporting the desires of the residents nor is it elevating the image and character of this important address within the city.

To respond to new opportunities for an exciting future and to enable Six Forks Road to appropriately fulfill its responsibility so that safety, image, quality and multimodal capacity is expanded in harmony, the City of Raleigh (City) has initiated the Six Forks Road Corridor Study (Study). The Study will identify multi-modal transportation, streetscape, and future development design options and strategies to improve the Corridor at all scales, with a particular focus on how multi-modal transportation and streetscape strategies impact placemaking and economic development. The Study will take into account previous work and initiatives that have had an impact on the Corridor, as well as the goals and priorities of the neighborhoods and communities (Community) the Corridor impacts.

Project Boundaries

The Study will cover Six Forks Road, from the intersections of Six Forks Road and Lynn Road on the north to Ramblewood Drive on the south. It not only focuses on the Right of Way, but also includes consideration for the neighborhoods and developments that flank the Right of Way. It considers each intersection that exists along its length as well as streets that extend from Six Forks Road into the surrounding communities.

In addition to creating recommendations for multimodal improvements and streetscape enhancements, it includes an analysis of seven potential redevelopment sites that may contribute to the Corridors future by reshaping its urban design quality and its potential revenue to the City.

Desired Outcomes

The Study seeks to provide detailed multi-modal transportation and streetscape recommendations, based upon Community and Stakeholder input, that improve existing conditions and promote an exciting future that makes the Corridor a center piece of this unique and vital district within Raleigh. The Study includes a detailed transportation analysis for selected portions of the Corridor based on proposed changes to the surrounding land use, density, laneage or other scenarios, conceptual streetscape designs. This study also provides an analysis of the potential impacts to community character and economic development potential as well as recommendations, cost estimates and strategies for project implementation.

The Study considers functional improvements as well as aesthetic improvements. It seeks to advance the placemaking quality, community identity, and potential for economic development as well as the environmental stewardship of the Corridor. It challenges ideas about the appropriate balance between automobile travel and other forms of travel. Finally, it makes recommendations at the landscape level that promote an image and character that is context sensitive.

Project Boundary Map

Summary of Issues and Opportunities

As an initial step, the Planning and Design Team observed and documented the many issues and opportunities that would influence the planning process and the outcome of the final design. The Team's Issues and Opportunities summary, documented on the following pages, builds upon previous work conducted by the Urban Design Center (UDC) in its Phase 1 "Visioning Workshop" public process conducted in September 2012. It also draws conclusions from data obtained through site analysis and Community input sessions conducted in April 2014 as part of the Phase 2 "Public Design Charrette" process. Workshops with the Community, meetings with stakeholders, and analysis of the existing Urban Design and Transportation systems enabled the Design Team to better understand specific issues to be overcome and opportunities that, once acted upon, would lead toward the creation of a plan that fits with the Community's documented vision for Six Forks Road, captured below:

"Our vision is to enhance the Six Forks Road corridor in a way that defines a unique sense of place with enhanced fluidity of movement, environmental sensitivity, and connectivity for residents, workers, students, and visitors using transportation modes of all types, including cars bikes, pedestrian and public transit. The Corridor should enable an active pedestrian life and integrate residential, commercial recreational, educational, faith and retail uses. Safety and accessibility are paramount in designing a distinctive streetscape that is uniquely Midtown with unifying features and green space that make it both an attractive urban thoroughfare and an irresistible gathering place".

Summary of Issues

Issues identified in Phase 1 Visioning Workshop by UDC

The Phase 1 Visioning Workshop, conducted by UDC, allowed input from the Community on the issues to be addressed in the design and planning of the Six Forks Road Corridor (Corridor). These issues range in scale and complexity and convey the hurdles that a design would need to resolve in order to be considered successful. The Community's list of issues includes items that can be easily corrected, such as repairing and connecting sidewalks. Other items require more costly solutions, such as undergrounding utilities and increasing the road's capacity for transit, cars and bicycles. The breadth of the issues expressed by the Community includes, but is not limited to:

- The lack of continuous and appropriate pedestrian and bicycling infrastructure including: narrow sidewalks that don't provide proper separation between the curb and sidewalk; a lack of street trees or other elements that separate pedestrians from passing cars; disconnections in the sidewalk along its length; sidewalks that are in disrepair; zero accommodation for bicycles; and a lack of consistent and unifying street lighting and street furniture.
- Safety concerns related to crossing Six Forks Road, which include: poor pedestrian signal timing at intersections; people crossing mid-block; pedestrian and bicycle safety conflicts with automobiles at the I-440 interchange; and a lack of traffic signals and designated cross walks at each intersection.
- Insufficient transit accommodations including a lack of bus shelters, infrequent bus service, and a lack of cross town expressway transfers.
- Traffic flow concerns, which include: congestion; cut through traffic within the neighborhoods to local businesses; inconsistent speed limits; inconsistent lane widths; tight turning radii at certain intersections; difficulty exiting driveways that front onto Six Forks Road; a lack of access control along the Corridor; and long delays at traffic signals.

Existing facilities for pedestrians and transit riders are minimal along the corridor.

This church is one of many destinations along the corridor that are accessed directly from Six Forks Road. These situations result in traffic flow issues as well as conflicts between vehicles, bikes, and pedestrians.

- Poor transitions and gateways between new development, Six Forks Road and adjacent neighborhoods; a lack of public greenspace along the Corridor; a lack of connections to local greenways; and a lack of interconnectivity, in general, adjacent to the Corridor.
- Inconsistent character and aesthetics along the Corridor (Urban vs Suburban); an incomplete aesthetic that doesn't enable the Corridor to read as a special place; lack of signage and wayfinding; and a lack of urban design quality and elements.

Issues identified in Phase 2 Urban Design and Transportation Analysis

As part of the Phase 2 process, the Planning and Design Team conducted an analysis of the existing urban design and transportation conditions of the Corridor to verify and augment the issues and opportunities already raised by the Community. In summary, following its analysis, the Planning and Design team identified the following items:

- The pedestrian environment is outdated, incomplete and insufficient to provide a pedestrian experience that would encourage people to walk. There are inadequate dimensional relationships between the curb, planting space, sidewalk and building frontage which keep it from feeling "urbane", safe and comfortable. There is limited space to provide street trees - which would make the pedestrian feel safer and more comfortable - due to the size of the current planting strips and the location of the overhead power lines. There is a lack of consistent and attractive street furniture that would enliven the streetscape and make it more enjoyable and functional.
- There is no designated accommodation for bicycles, either within the roadway or within the pedestrian space above the curb. Due to a lack of a gridded street network, there is no clear route behind the Right of Way to enable a bike route that could connect neighborhoods to each other and to the various destinations along the Corridor.
- Crossing Six Forks Road is difficult for pedestrians because of its number of travel lanes (in some cases), its width, and a lack of pedestrian amenities such as pedestrian refuge islands, clearly marked crosswalks and countdown pedestrian signals.
- It is also challenging to walk along the Corridor due to the use of "right turn pockets", which some folks use as a de facto express lane. These right turn lanes expand the width of the intersections and allow cars to roll through the turns at higher rates of speed than normal intersections.
- The topography adjacent to the Corridor is steep in places and may impact the design of the pedestrian environment . It could force the use of retaining walls if the roadway or pedestrian environment is expanded beyond its current dimensions. The topography could also create access issues to properties adjacent to the Right of Way.
- There is a general lack of controlled access management along the Corridor which is exacerbated by the lack of interconnectivity between the neighborhoods adjacent to the Corridor (lack of street grid). There are multiple access points for single properties along the Corridor that create the potential for pedestrian and automobile conflicts. Many adjacent commercial properties accessed from Six Forks Road are not interconnected, requiring motorists to pull onto Six Forks Road to access adjacent properties. The lack of a continuous street grid behind the Corridor forces local trips between neighborhoods out onto Six Forks Road.
- The existing Right of Way dimension is too narrow to allow for its expansion into a multimodal facility that includes adequate space for bicycles and pedestrians. The existing travel lanes do not enable "road diets" so that space could be reallocated to other uses and there may be a need to add travel lanes to serve the existing traffic effectively.
- There are above ground power lines that run along and across the Corridor, including a medium sized transmission line, which creates aesthetic, programmatic and dimensional issues. Roadway expansion and increasing the multimodal and streetscape potential of the Corridor will likely require these lines to be relocated or put underground.
- The lane dimensions change nine times along the Corridors length and the speed limit changes from 45 mph to 35 mph, which creates inconsistency and leads to confusion for the motorist. The 45 mph speed limit, in particular, is a concern since it is a speed threshold that affects safety and forces different roadway and streetscape design standards than 35 mph speed limits do.
- The properties adjacent to the Corridor have parking, buildings, and landscape features adjacent to the Right of Way which creates potential conflicts if Right of Way expansion is required to accommodate adequate mulit-modal facilities.
- There is a "chicken and egg" issue associated with bus transit service. The Corridor does not have attractive facilities for Bus Transit services which would raise the awareness and ease of use. However, in order to justify these facilities, riderships would need to increase from current levels.

The Phase 2 Public Workshop – Keypad and Online Polling

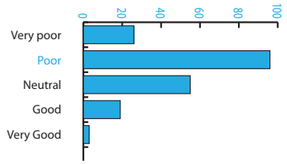
A Keypad Polling process was conducted in Phase 2 to prompt responses from the Community related to establishing priorities around the issues identified in the Phase 1 Visioning Workshop and the Phase 2 Urban Design and Transportation Analysis. The actual results tables from the keypad polling sessions are available for review in the Appendix. In summary, the keypad polling sessions created the following responses:

- The Community rated the overall user experience of Six Forks Road as being neutral to poor.
- The Community rated the safety of Six Forks Road as being poor.
- When asked to rate the overall traffic flow of Six Forks Road the public rated it poor to very poor.
- The public identified the top three safety issues of concern as 1) Safety for bicyclists; 2) Lack of crosswalks and 3) Drivers not yielding to pedestrians.
- The top three pedestrian concerns are 1) Crossing the Street; 2) Lack of separation between the sidewalk and roadway and 3) Narrow sidewalks and a lack of sidewalks.
- The top three auto transportation concerns are: 1) Traffic congestion; 2) High traffic speeds; and 3) Making left turns coming out of local businesses.

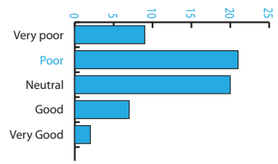
Selected examples of Keypad Polling Results

The following graphs show some of the results derived from the keypad polling process. The complete results are located in the Appendix.

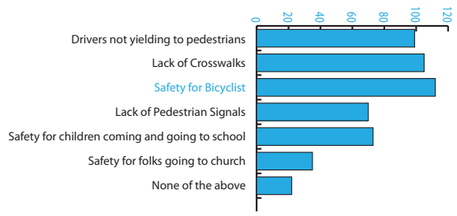
7. How would you rate the overall safety of Six Forks Road? (Choose one)



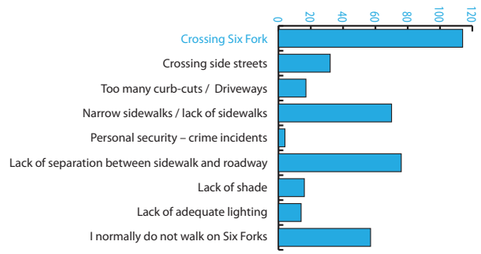
8. How would you rate the overall flow of traffic of Six Forks Road? (Choose one)



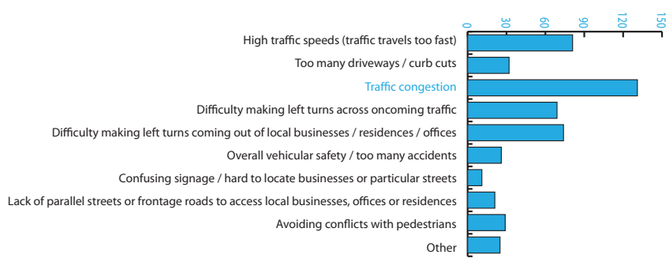
9. What safety issues concern you the most along Six Forks? (select all that apply)



10. When you are walking along Six Forks, what concerns you most? (Choose top 3)



11. Which auto transportation issues concern you most along Six Forks? (Choose your top 3)



Summary of Opportunities

The Issues determined and documented in the Phase 1 and Phase 2 planning phases create Opportunities that, if acted upon, will enable the realization of the Community's vision for Six Forks Road. Together, or in part, they respond to Community and City desires to create a "Complete Street" that enhances the mobility, image and livability of Six Forks Road. These opportunities establish an orientation for the design and planning process and create a prioritized wish list that can be evaluated in terms of cost, feasibility, return on investment (ROI) and their contribution to realizing the Community's vision for the Corridor.

Phase 1, conducted by UDC in September 2012, created a list of Opportunities that were generated by the Community in the Visioning Workshop. In general, the Opportunities were organized into several categories that included:

- Public Realm and Streetscape;
- Transit Infrastructure;
- Corridor Character;
- Roadway Capacity;
- Building Form and Height;
- Future Development.

These categories of Opportunities, created in Phase 1, formed the basis for further discussions with the Community related to validation; adding to the list where needed; and prioritizing the list so that it can provide focus for the design and planning process in Phase 2.

The Phase 2 process included four types of interactions with the Community and the actual site. The Planning and Design Team and UDC conducted two public workshops that included:

- Asking pre-determined questions in a keypad polling format;
- Posting the polling questions online so that those not in attendance could respond to the polling questions;
- Facilitating public design participation that enabled participants at the Public Design Charrette to create their preferred conceptual street cross sections;
- And as experienced professionals, analyzing the Corridor ourselves to determine potential Opportunities based on experience, the existing condition of the Corridor and the review of the work prepared to date.

Opportunities identified in Phase 1 Visioning Workshop by UDC

The Phase 1 Visioning Workshop, conducted by UDC in September 2012, provided many Opportunities that in whole or in part create the potential for a revitalized street that is achievable in the near term, as well as adaptable and scalable over the long term, depending upon available funding and support. The Community's list includes both near term "quick fixes" as well as visionary ideas. In summary, the breadth of the Opportunities expressed by the Community includes:

- Improving the streetscape and public realm to include street trees, street lights, wider and continuous sidewalks, more separation between sidewalk and curb, signage and wayfinding, bike lanes, traffic signals and signal timing, crosswalks, and placing utilities underground, amongst other things.
- Improving multimodal transit opportunities to include more bus stops, more frequent service, shuttle buses, people movers from North Hills to the future transit station, turn outs for bus shelters, transit hubs at North Hills and Millbrook, enhanced bus stops, and specialized bus service for seniors, amongst other things.
- Improving roadway capacity by adding more lanes, reducing speed limits, making lane widths consistent throughout the Corridor, creating controlled access management, and creating a continuous center median and turn lane.
- Improving neighborhood character by enhancing connections between neighborhoods, adding sidewalks within the neighborhoods, providing wider sidewalks, creating greenway connections and public parks.
- Promoting redevelopment opportunities on the Millbrook site and other vacant or under utilized lots to include new mixed-use development.

In recently developed North Hills area many of the crosswalks are high visibility and have pedestrian countdown signals. While these intersections are above average compared to other intersections in the corridor, there is still an opportunity to create pedestrian refuges and a cohesive streetscape that promotes walkablity.

Quick fix: Carroll Middle School needs a sidewalk along Six Forks Road, as evident by the worn path next to the street.

Opportunities identified during Urban Design and Transportation Analysis

As referenced earlier in the document, the Planning and Design Team conducted its own analysis of the Corridor's urban design and transportation environment. Stemming from this analysis, the Team created its own list of Opportunities:

- Design an attractive "Complete Street", even if that means expanding the Right of Way, that integrates all modes of transportation types effectively and in balance. Create efficiencies in the designs and use of space to respond to Right of Way dimensional concerns.
- Move forward with the "Quick Fixes" associated with creating a safer and clearer pedestrian environment by providing crosswalks where they are needed, fixing sidewalks, completing sidewalks, providing landscape, lighting and furniture.
- Plan for and design to a longer term vision that includes: adequate travel lane quantities and widths consistently applied along the Corridor; multimodal infrastructure; access management; a vital and safe pedestrian environment; a complete bicycle system; attractive street landscaping; branding and wayfinding; art; and neighborhood gateways amongst other things.
- Limit travel speeds to 35 MPH along the Corridor so that transportation design standards can respond to slower speed requirements, which are safer and more pedestrian friendly.
- Consider the Corridor in its entirety from an aesthetic, image and multimodal transportation mobility standpoint. In areas where it is to the Corridor's advantage, alter the design to respond to "context sensitive" nuances such as to promote the preservation of large stands of trees or the character that is created by the Churches.
- Consider creative and innovative ways of providing a "Complete Street" mindful of the costs and complexity associated with Right of Way purchase and the nature of the existing conditions of the Corridor.
- Promote infrastructure that looks toward the future and that considers potential changes in behavior related to how people may prefer to move around in the future.

The Phase 2 Public Workshop – Keypad and Online Polling

Keypad polling questions were asked of the Community related to establishing priorities associated with the Opportunities generated in the Phase 1 Visioning Workshop. It is important to note that some of the polling responses create conflicts which the Planning and Design Team will need to resolve in the design of the plan. For instance, participants wanted a more safe pedestrian environment, but also wanted more right hand turn pockets, which create a less safe pedestrian environment. They wanted the design to be mindful of costs, but also wanted a people mover, which is an expensive way to move people around. In summary the keypad polling sessions established the following priorities. The actual tables of results from these sessions are available for review in the Appendix:

1. Improving auto circulation and safety and reducing congestion was deemed the most important objective. This was closely followed by improving pedestrian safety and circulation and improving bicycle safety, access and circulation. However, all of the strategies proposed received reasonable levels of support.

2. Of the "Quick Fixes" developed by the Community in the Phase 1 Visioning Work Session, the most supported item was to adjust countdown signal timing to make walking across the street safer. This was followed closely by fixing broken or incomplete infrastructure and adding street landscaping, lighting, signage and new sidewalks. Access management and crosswalks were also strongly supported.

3. In terms of the "Visionary Ideas" promoted in the Phase 1 process, providing a grade separated pedestrian and bicycle route (over or under Six Forks Road) at North Hills received the most support. This was followed closely by the desire to purchase vacant or under utilized property to create parks along the Corridor and to place above ground power lines underground.

4. All of the "Public Realm" / Streetscape opportunities were deemed equally important. Of those, the most preferred items include making the sidewalk environment more complete and continuous; providing more space between the sidewalk and curb; and providing a multipurpose path along one or more sides of the roadway.

5. All of the "Transit Infrastructure" opportunities were deemed to be equally important. Of those, the most important ones included creating turn-outs for bus

stops; creating a people mover to a future transit station; and providing more frequent and faster bus services.

6. The most important “Roadway Capacity” fix is to make lanes and lane widths consistent along the length of the Corridor. Providing a center median was also an important priority. However, many thought that all of the proposed opportunities were equally important.

7. In terms of “Access Management” strategies, installing medians with left hand turn pockets was most preferred, followed by installing additional right turn pockets. Combining or reducing the number of driveways and curb cuts was also well-supported.

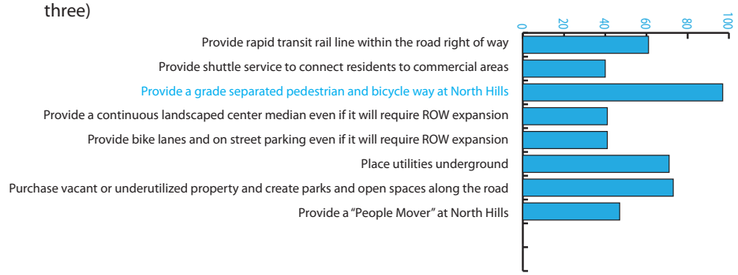
8. Most respondents wanted a balance promoting new mixed-use developments and preserving existing development along the Corridor.

9. When considering building heights for new developments, 3-5 stories achieved the most support although many people indicated a preference for a mix of development that included buildings greater than 5 stories, buildings that were 3-5 stories and the buildings that promoted the suburban character that currently exists along the corridor.

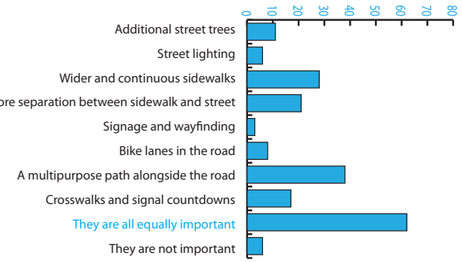
10. Almost all of the respondents thought that the Planning and Design Team should focus on a phased plan that starts with quick fixes and leads toward visionary ideas.

11. By a large margin, respondents wanted the Planning and Design Team to create a plan that was mindful of the cost of infrastructure and additional Right of Way.

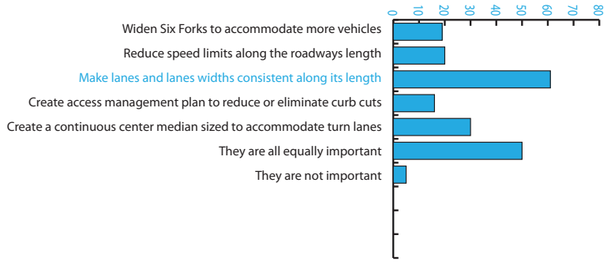
14. The public process has yielded some visionary ideas. What visionary idea(s) did you connect with in the previous meeting (Choose your top three)



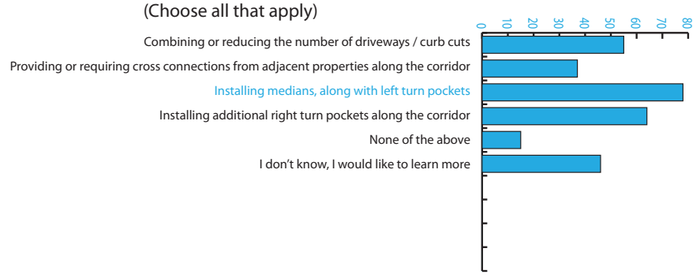
15. The most important Public Realm / Streetscape fix is: (Choose 1)



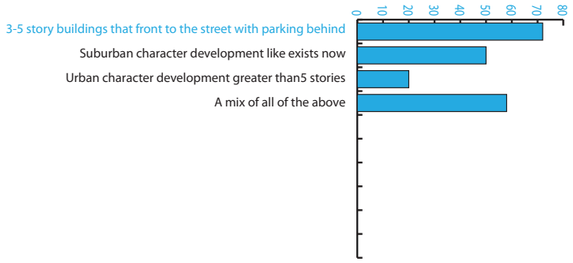
17. The most important Roadway Capacity fix is: (Choose 1)



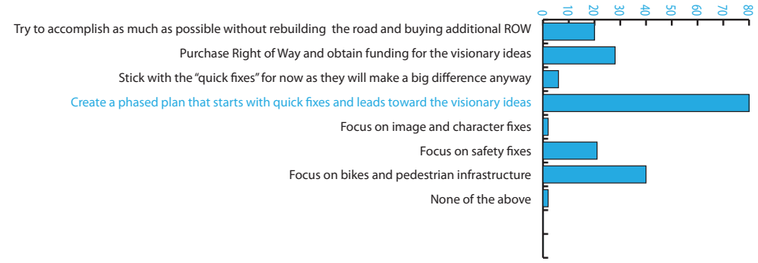
18. Which of the following access management strategies would you favor implementing along various segments of Six Forks? (Choose all that apply)



20. If redevelopment were to occur, I think the character should be: (Choose 1)



21. In order to implement the vision crafted so far for the project, I think you should: (Choose 1)



Selected examples of key pad polling results, for all results see appendix

Street Cross Section Design Exercise

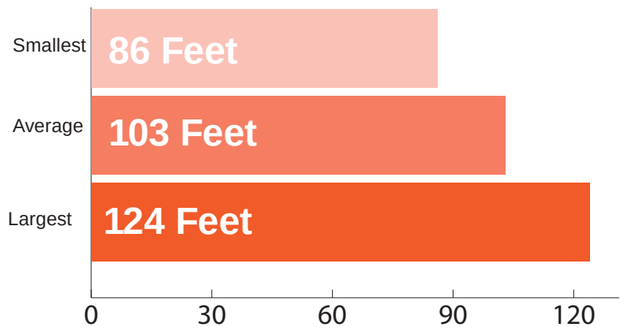
The Street Cross Section Design Exercise yielded additional insight into how the Community prioritizes their preferences, once given an opportunity to actually design a street to a set of accurate dimensions while being mindful that creating new infrastructure, buildings, new curbs, purchasing additional Right of Way, and undergrounding utilities will require a significant investment. The participants broke into teams and created a preferred street cross section that included elements that were important to them. They were asked to value the trade-offs between their desires for streetscape elements versus the cost of additional Right of Way. Some recurring themes from this exercise to consider include:

- All the teams thought that providing bike and pedestrian accommodations is important - even if it meant providing a multipurpose facility that combines bikes and pedestrians - and provided them on their plans, regardless of the impact on overall Right of Way dimensions. Proposals included combining pedestrians and bicycles into a multi-use path, creating a separated bike and pedestrian path next to each other, and including bike lanes within the roadway.
- All but two of the teams thought that a landscaped center median with a turn lane is important. One team proposed a narrower center median to save space, while another team did not provide a center median at all.
- The average Right of Way width proposed, after adding up each cross section, was 103 feet. The largest was 124 feet and the smallest was 86 feet. To achieve these dimensions the teams compromised or combined elements to keep the Right of Way as narrow as possible to avoid conflicts with existing parking lots, buildings, or to reduce the amount of Right of Way that needs to be purchased.
- One team proposed an overhead pedestrian bridge at North HIlls to connect people across Six Forks Road.
- One team proposed an “Urban” building edge to the street with buildings brought to the edge of the sidewalk.
- All of the teams thought that more space should be provided between the street and sidewalk and proposed street trees to be planted between the curb and sidewalk.

Team presenting their ideas for their cross section to the group

Common Elements

Summary of Section Widths



Critical Items to Consider in the Design Plan

As described in the previous analysis of the Phase 1 and Phase 2 Community Engagement processes, there are many relevant and supported opportunities that, in whole or in part, would make the Corridor safer, more attractive and more multimodal. There are also opportunities to express, through the design of the streetscape elements, an appropriate image and character for the Corridor that is consistent with the quality of Raleigh's streets as well as being "Uniquely Midtown".

Based on experience working on other Corridors, and analyzing the existing conditions against what the Community and City hope to achieve, the following items are highlighted as needing special emphasis in terms of analyzing feasibility, cost/benefit and broader commitment:

1. Regardless of the spatial impact, the Community desires a safe, comfortable , pleasant and adequate place to walk and bike that is separated from the roadway. Ideally, the bikes would be separate from the pedestrians.

2. The Community may accept innovative or flexible designs that lead toward an efficient use of space and an efficient use of resources.

3. The Plan needs to provide near term as well as long term improvements. Near term fixes should be prioritized and completed as soon as they are able to be funded.

4. Providing more traffic capacity, multimodal functionality, and a desirable streetscape environment will require Right of Way expansion. The Community recognizes this, and, based on their responses within the public polling process and street cross section design exercises, support the idea that the existing street width and Right of Way is inadequate. The processes that follow this Phase will determine how much additional Right of Way is needed and if efficiencies, trade-offs, prioritization, or phasing can be integrated into the design to accommodate a new Right of Way dimension that is feasible to fund and acquire.

5. In addition to the acquisition of property, the expansion of the Right of Way to a desirable dimension that enables a more safe, functional and attractive street will require the undergrounding or relocation of the above ground utilities that run parallel to the Corridor. This will require funding and coordination with Duke Energy. Doing so, however, will enable more desirable items to be included within the streetscape and will enhance the visual quality of the Corridor.

6. The ultimate design and dimension of the travel lanes, traffic signal locations, center medians, and other improvements such as street trees, landscape art, planters, etc. will require approval from NCDOT. Items which may be in conflict with their typical design standards include:

- Reduced center median dimensions to save space
- Providing street trees alongside the roadway to create a more pleasant and safe feeling pedestrian environment
- Providing street trees within the center median to enhance the landscape of the street will require NCDOT approval

The Design Team will use best practices and the NCDOT Complete Street Guidelines to develop recommendations that adhere to NCDOT policies and standards, and work corroboratively with NCDOT staff to discuss potential design exceptions that may be considered due to the restricted nature of the Corridor.

7. The design of a safe, multimodal and pedestrian friendly street cross section that accommodates traffic needs is a high priority for the Community. A potential conflict arises because the roadway width dimension required to accommodate the travel and multimodal systems may expand the distance that pedestrians will need to walk to get across the intersection. Designing adequate crosswalks, timed pedestrian signals, center refuge islands, and other devices at each intersection will help resolve the conflict between enhancing car travel while also promoting safer pedestrian crossings at the intersections.

8. Providing an adequate and continuous bicycling and pedestrian system is highly desired by the Community and City and is part of creating a "Complete Street". It will require additional Right of Way space depending upon the trade-offs between the level of functionality and safety in the system and the cost and feasibility of expanding the Right of Way, assuming it is located within the Right of Way. Finding the right balance in the design will require further design discussion amongst the Stakeholders to determine how to make it the most space efficient while also providing for a clear and safe system. In order to resolve spatial issues, other opportunities may exist to consider some or all of the bike and pedestrian system to be located outside of the Six Forks

Right of Way Widths - The above diagram shows the expansion and contraction of the existing Right of Way along the Corridor. The feasibility of the existing Right of Way to provide multimodal services will need to be addressed in the design phase.

Intersection Spacing - The above diagram shows existing intersection spacing along the Corridor. Providing controlled intersections for pedestrians to cross safely is important to a Corridor's walkablity.

Road Right of Way in a connected "back street" or greenway system, especially as part of redevelopment planning. Ideas such as this may be explored as an alternative.

9. There are places along the Corridor that are challenging from an existing conditions and/or dimensional standpoint given either the depths of the properties that front the Corridor, the location of parking lots or buildings, the location of large existing trees, and/or the varying topography that exists. The design will respond to these locations and consider changes that accommodate any or all of the above, such as; the purchase of the shallow lots for parks or public open spaces. The design will also consider the reality that the existing landscape character may need to change or evolve to accommodate the desired improvements; and that phasing may be required.

10. Given the level of investment that will be required to create a Complete Street, a strategy for how the improvements are phased, funded and implemented is required. For instance, the streetscape improvements, defined in a set of design guidelines, may be able to be funded and implemented in whole or in part by the redevelopment of the properties adjacent to the Corridor.

11. Some of the improvements desired by the Community may not be feasible or reasonably implemented by the City. For instance, there is a support for a grade separated walkway across Six Forks Road and a people mover along Six Forks Road. There was also support for a neighborhood shuttle type transit system that linked neighborhoods to each other and to the shopping centers. While it is understood that there is a relationship between these improvements and safer and more enhanced mobility, these sorts of improvements may fall outside of what is practical for the City to implement. Other funding sources may need to be considered.

12. Enhancing the transit services along the Corridor is a high value item. Given the spatial difficulties described above, creating a designated transit lane may not be possible or provide an appropriate return on investment. However, as habits change, services improve and more people shift from car dependency to using transit, lanes or medians that are being planned into the Corridor for cars in the near term may be able to shift toward using them as dedicated transit lanes if it is warranted in the future. The lane dimensions and median dimensions need to be designed to anticipate this opportunity.

13. For a more short term fix, the existing transit system should be explored to determine if some easy changes could have a positive impact along the

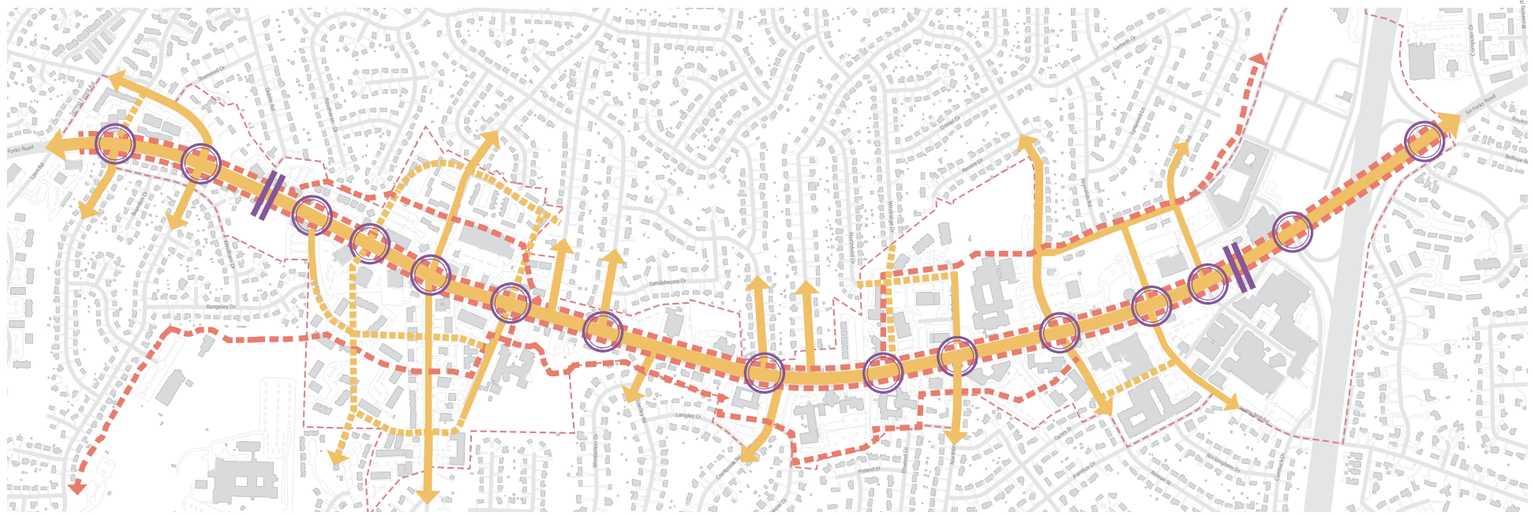
Corridor. For instance, travel times sould be reduced by implementing the following two transit route changes: 1) Operate #8 on Six Forks Road between North Hills and Wake Forest Road, south on Wake Forest Road, and express to downtown Raleigh on Capital Blvd. 2) Append the Lassiter Mill and St. Marys portion of the the current #8 route to the 24L route, operating two-way on Hardimont and St. Albans. This change would reduce the travel time between North Hills and downtown from 24 minutes to ~15 minutes. It would also improve crosstown connectivity. It would require only slightly more operating resources than the current operations, depending on the exact frequencies. 15.

Provisions will need to be made to provide maintenance along the Corridor that enables it to be consistently attractive and well maintained along its length. In our experience, NCDOT does not assume the responsibility to maintain the streetscape and landscape along its roadways.

14. Adjacent to the Corridor are several sites that have the potential to be redeveloped into higher density residential or mixed-use projects. As more investment is brought to the Corridor and as Midtown continues to grow as a destination within Raleigh, the land uses along the Corridor will change. These anticipated changes need to accounted for in the traffic modeling and in the design of the streetscape.

The successful resolution of all of the above items will result in a design that meets the needs and expectations of the Community and City as it relates to providing a Complete Street for Six Forks Road. These items will shape the strategic direction of the design and planning processes that follow.

Conceptual diagrams distill the over arching goals of the design



Create safe and attractive crossings at all intersections / Enhance connections behind the Corridor where feasible / Plan for redevelopment to enhance connectivity.

Respect neighborhood character in the center of the Corridor / Promote diverse, walkable, urban, mixed-use centers at each end of North Hills and Millbrook Roads

2

MASTER PLAN

Purpose: This chapter describes the design of the Corridor based on Community input and the evaluation of alternative scenarios.

- Creating a Master Plan
- Cross Section Design & Alternatives
- Streetscape Design Theme and Character
- Parkway Boulevard
- Urban Boulevard
- Common Corridor Elements
- Proposed Master Plan

Creating a Master Plan

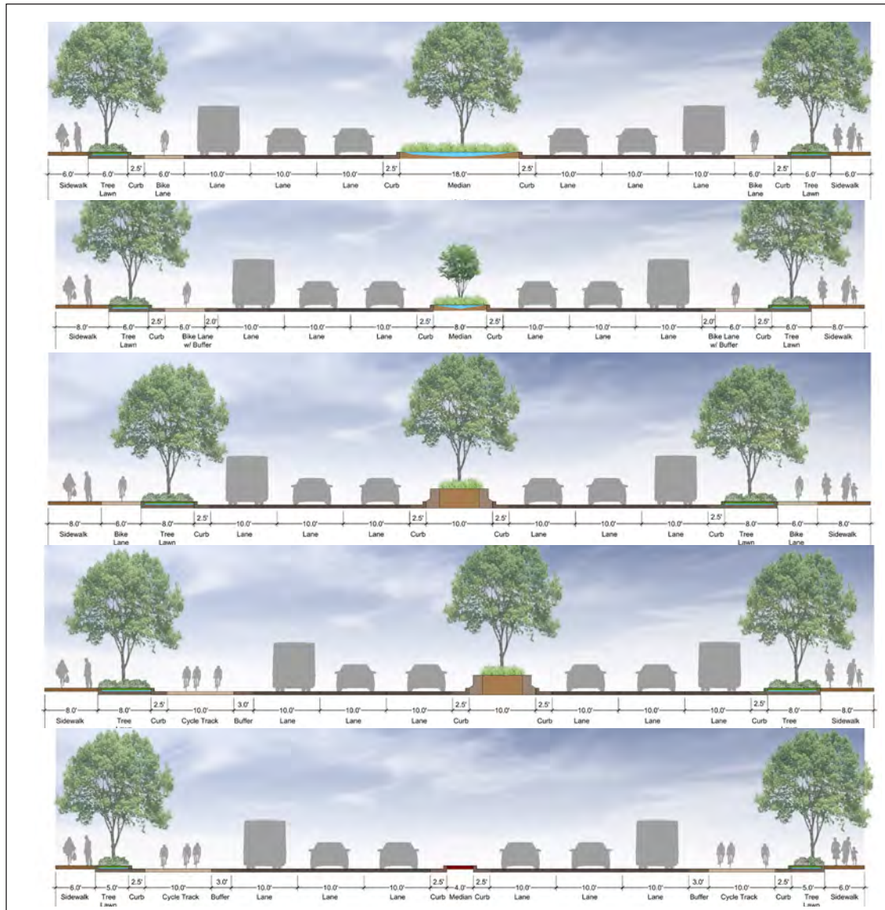
Designing a corridor like Six Forks Road requires the integration of competing technical and aesthetic interests and generally occurs in a non-linear fashion. The design gets cycled many times before an acceptable solution is created that successfully achieves the intent of the vision and the project's goals and objectives. The master plan that follows is the result of such a cyclical process of discovery.

Following the engagement with the Community and Stakeholders, and the thorough analysis of the existing conditions of the site, the Planning and Design Team proceeded to model different transportation and streetscape design concepts for input and evaluation. The team worked back and forth with the realities of the existing conditions, the desires of the Community, the realities of NCDOT regulations and the potential impacts that might occur to private properties.

The first task included conceptualizing and evaluating street cross section alternatives that accommodated the preferred design elements. Several alternatives were created and studied, including those created by the Community. These alternatives were reviewed by NCDOT and Stakeholders and it was determined that three of them effectively bracketed the design challenge and were worthy of in-depth analysis.

Once a preferred street cross section was developed and agreed to by the Stakeholders, the Planning and Design Team was able to conceptualize the master plan on a block by block basis. This included dimensioning all of the proposed improvements onto plans; preparing streetscape design concepts that conveyed design intent, landscape character, and appropriate streetscape elements; and considering alternative designs that provided environmental stewardship.

Part of creating the master plan included technical analysis and design related to the transportation system. This information, which supports the master plan, can be reviewed in Chapter 5 Transportation Analysis and Recommendations.



The Design and Planning team worked with stakeholders and the Community to develop and compare multiple configurations of streetscape cross-sections. Trade-offs between bike, pedestrian, planting, and vehicular spaces were explored and prioritized.

Cross Section Design

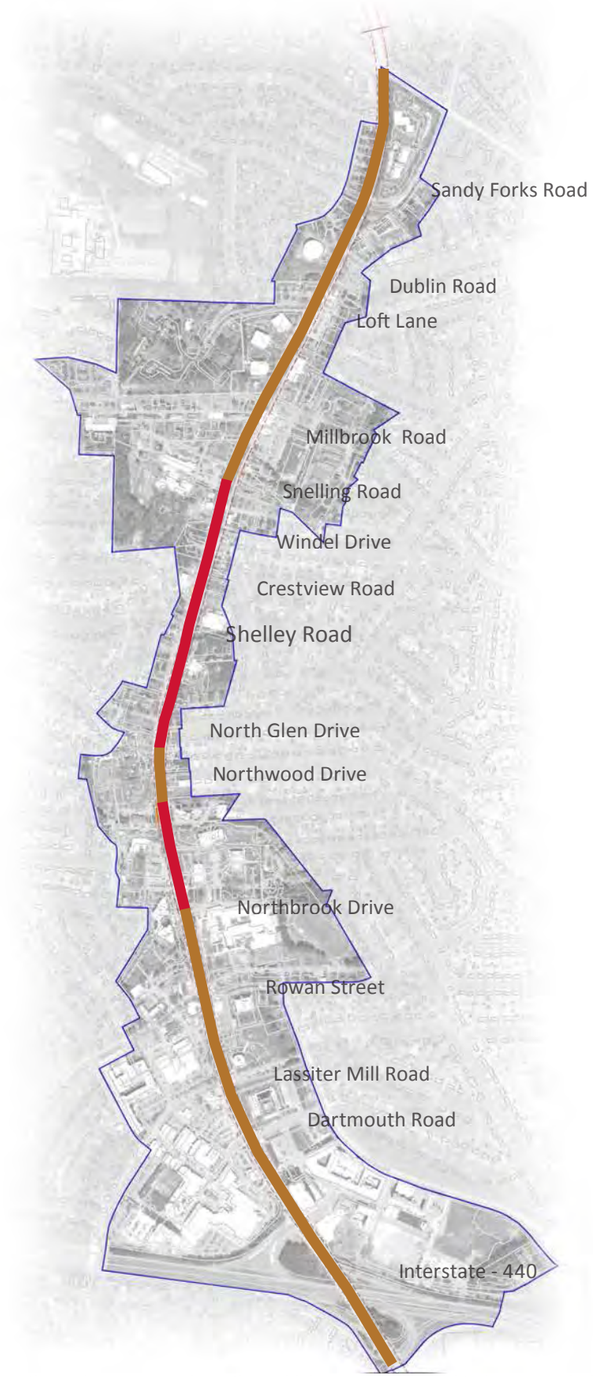
As mentioned previously in the document, the design of a new cross section for Six Forks Road that accommodates the elements that are desired by the Community and in total create a Complete Street, has to overcome some substantial issues that will affect cost and feasibility. These include:

- The Right of Way width varies along its length and in most cases is not wide enough to support all of the improvements. This will add cost for Right of Way acquisition.
- Buildings and parking lots sit adjacent to the Right of Way, which would be costly to replace.
- Topography also changes throughout the Corridor. Depending on the cross section width some areas require walls to tie back to existing grade.

Multiple configurations of how building and parking lots relate to the street exist along the Corridor

Vehicle Space in the Corridor

Responding to the feedback received in the public work sessions, we have conducted an analysis of the existing pavement widths in the corridor dedicated to vehicle travel. A misconception of expanding the road to 6 lanes is that the proposed alternative is providing increased space to the vehicle. The section in all cases is getting wider, but the additional width is to provide more space to bikes, pedestrians and landscape separation. An expansion to 6 lanes in the majority of the corridor is simply a matter of consolidating existing dedicated right turn lanes and left hand turn pockets, creating a more predictable cross section. In actuality, only 23% of the corridor will need additional space for the vehicle, as illustrated in the map to the right. Most of this expansion takes place in the central, more residential portion of the corridor. It is recommended that the cross section in this portion of the corridor be designed to respond to the surrounding context.



Red sections show areas where the vehicle space will need to be expanded. The brown shows where the vehicle space will be the same or reduced.

Cross Section Alternatives - Finding Balance

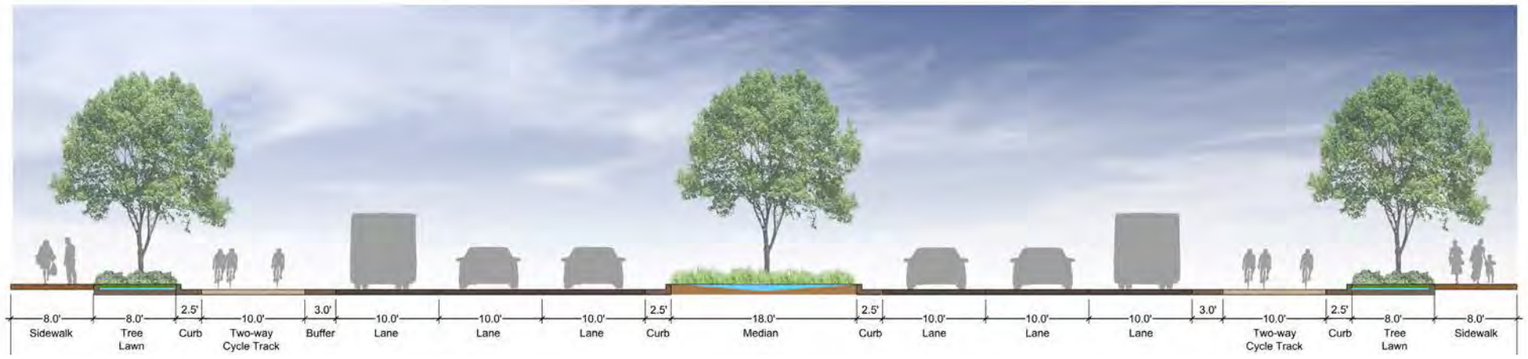
Choosing the right design prototype for the street cross section was the first step in the master planning process. After gathering input from the Community, the City, NCDOT, and local advocacy groups, a list of preferred program elements and three cross sectional alternatives were created. These three scenarios were then evaluated based on the dimensions, organization and placement of various program elements; their potential impacts to the existing conditions; their ability to help achieve the goals set forth in Chapter 1; and their costs and benefits when overlaid within the spatial realities of the Corridor.

Scenario 1 "Fully Loaded"

This scenario provides all of the preferred program elements, along with a median sized to accommodate large canopy trees, at dimensions that are considered acceptable by NCDOT according to current standards and requirements. The result, however, is a design that is difficult to achieve within the realities of the existing conditions and potentially beyond acceptable costs and impacts to private properties.

Key Features:

- 10' Two-way Cycle Track with 3' Buffer on Both Sides
- 18' Median with Trees and Rain Garden
- 8' Tree Lawn/Rain Garden
- 8' Sidewalk



SCENARIO 1 - *146' wide Section -"Fully Loaded"*

Potential Impacts

25 Structures

481 Parking spaces

14.38 Acres of ROW acquisition

4100 Linear feet of retaining wall

100% Powerlines relocated

Scenario 2 “Maximized Efficiency”

Scenario 2 was created to determine the minimum Right of Way width that would satisfy the preferred program requirements using the minimum acceptable dimensions for each program element. This alternative provides all of the program elements in minimal form, is less costly, and is more space efficient than the other two alternatives. However, many of the elements, such as the sidewalk zone, will not create improvements over the current existing condition. Other downfalls to this scenario are: although the median provides access management, it does not contribute to the overall landscape quality of the street; street trees would be located in minimal tree lawns that are less desirable for their health; the bike lane is unprotected and is next to the driving lane; and the sidewalk is of minimal dimension for two people to walk.

Key Features:

- 5’ Typical Bike Lane
- 4’ Paved Median
- 4’ Tree Lawn
- 6’ Sidewalk

Potential Impacts

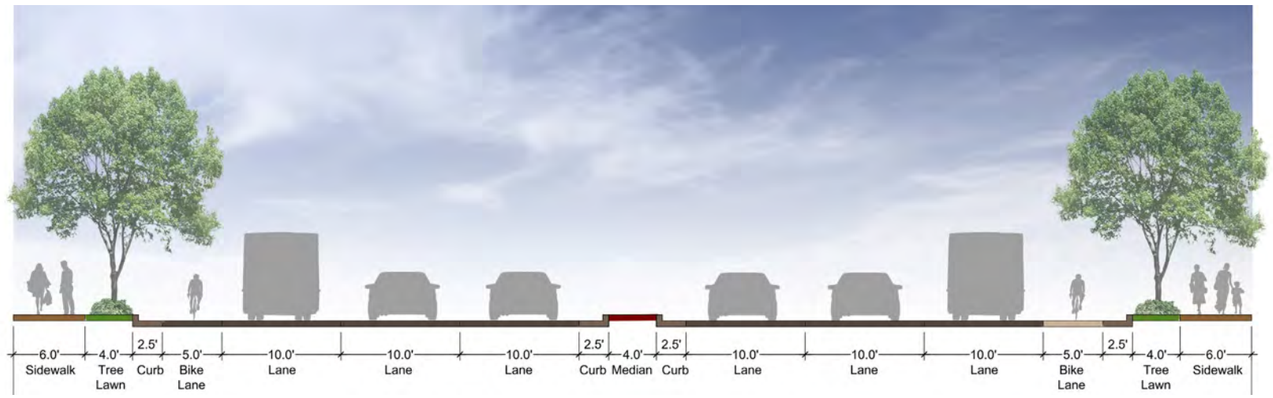
0 Structures

65 Parking spaces

3.74 Acres of ROW acquisition

750 Linear feet of retaining wall

81% Powerlines relocated



SCENARIO 2 - *104’ wide section -“Maximized Efficiency”*

Scenario 3 "Goldilocks"

The third scenario was created to determine whether the preferred program elements can be provided in an adequate dimension and relationship, while minimizing as much as possible the width of the overall Right of Way. This alternative provides a balance between program, cost and impacts, while providing a safe and attractive street that is clearly different and improved over the existing condition.

Key Features:

- 6' Bike Lane with Buffer
- 8' Median with Shrubs, Small Trees, and Rain Gardens
- 6' Tree Lawn with Rain Gardens Separating Sidewalk
- 8' Sidewalk

Cross Section Recommendation:

Based upon review with Stakeholders and the Community as well as evaluating each cross section from a cost / benefit and technological standpoint, it was determined that Scenario 3 would be pursued as the prototype for the Corridor. The chart on the following page highlights the analysis, whereby the color green represents the more preferred impacts and the color red represents less preferred.

The next step was to explore context-sensitive variations of this prototype that still maintained the desired balance of program and cost within this approximate Right of Way width.

Potential Impacts

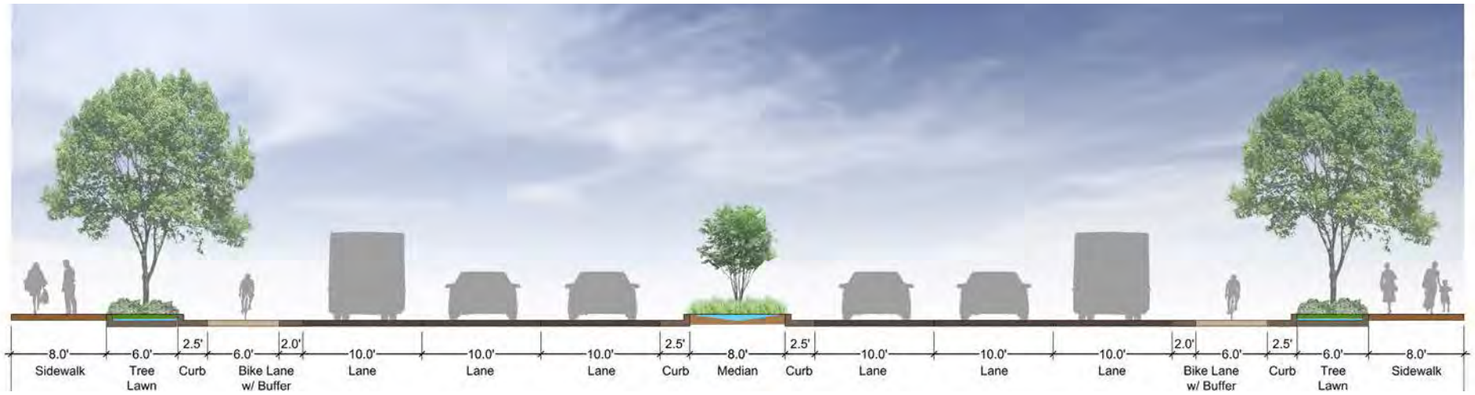
0 Structures

200 Parking spaces

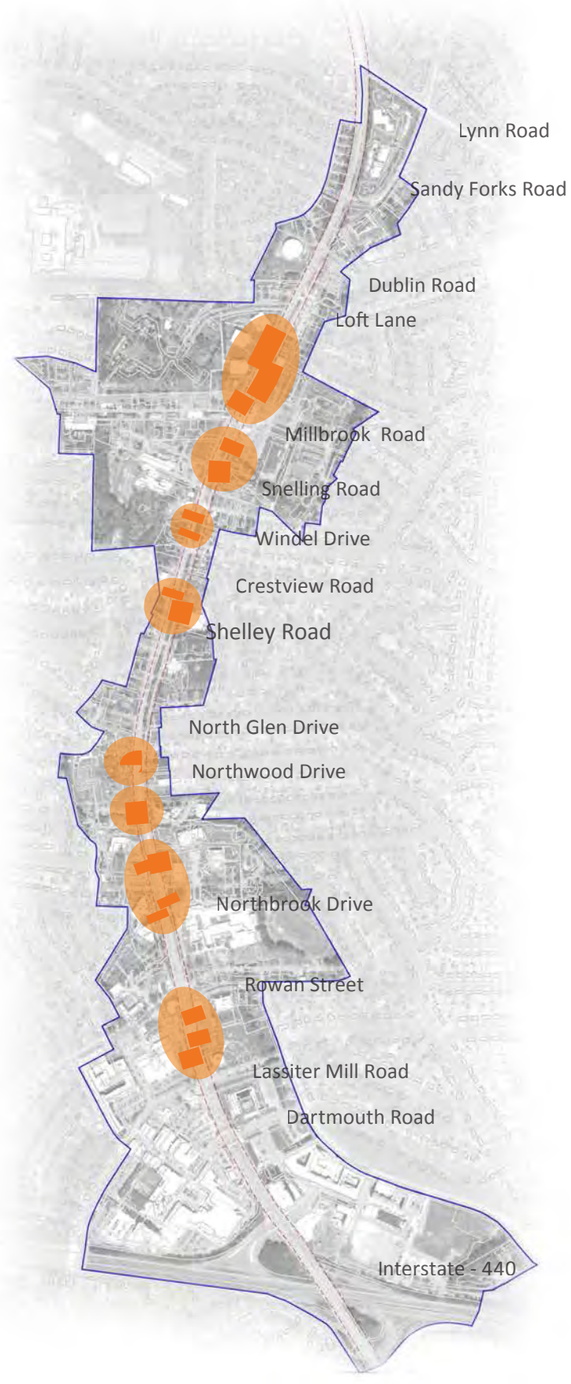
7.42 Acres of ROW acquisition

1902 Linear feet of retaining wall

100% Powerlines relocated



SCENARIO 3 - *126' wide Section -"Goldilocks"*



		5 Lane Section (Existing Condition)	6 Lane Section 106' (Maximized Efficiency)	6 Lane Section 125' (Goldilocks)	6 Lane Section 146' (Fully Loaded)
Traffic	Level of Service	The current level of service at the Millbrook Intersection is level F	All intersections would function at an acceptable LOS with a 6 lane divided cross section.	All intersections would function at an acceptable LOS with a 6 lane divided cross section.	All intersections would function at an acceptable LOS with a 6 lane divided cross section.
	Travel Time	The typical capacity of a 5-lane urban section is 26,000 vpd. 80% of the Corridor is currently over-capacity.	The typical capacity of a 6-lane divided urban section is 50,000 vpd. Only 20% the Corridor would be over-capacity by 2040.	The typical capacity of a 6-lane divided urban section is 50,000 vpd. Only 20% the Corridor would be over-capacity by 2040.	The typical capacity of a 6-lane divided urban section is 50,000 vpd. Only 20% the Corridor would be over-capacity by 2040.
	Safety	Crashes along the Corridor are currently 2.8 times above the statewide average	A median divided cross section only will reduce crashes by 21%	A median divided cross section only will reduce crashes by 21%	A median divided cross section only will reduce crashes by 21%
Multimodal	Bike Infrastructure	Currently None	Minimum infrastructure, not likely to encourage new cyclists, but will accommodate existing cyclists	Buffered bike lanes will give more space between cyclist and traffic, larger sidewalks will accommodate families with small children	Two-way cycle track on either side of the street allows for cyclists to have their own street for riding the Corridor
	Pedestrian Infrastructure	Sidewalks are narrow and close to the road, but are continuous along the entire Corridor except for one block	Aside from adding the missing sidewalk section, sidewalk will maintain the size and distance from street	Wider sidewalks and potential street trees will create a more comfortable pedestrian experience	Wider sidewalks and potential street trees will create a more comfortable pedestrian experience
	Transit Infrastructure	Changing lane configurations make navigation for buses difficult, many stops but only a couple shelters	Outside lane can be signed and marked for frequent transit stops, advocating slower speeds, section does not accommodate future rail or BRT	Simplified cross-section will make bus travel easier, section does accommodate minimum space for future rail or BRT	Simplified cross-section will make bus travel easier, section does accommodate preferred space for future rail or BRT
Neighborhood Concerns	Aesthetics and Character	Minimal space for improvement, existing aesthetic condition not rated very high by the public	Minimal space for improvement, existing aesthetic condition not rated very high by the public	Increased space for landscape allows for opportunity to plant street trees and roadside plantings	Increased space for landscape allows for street trees at the edges and center of the median
	Edge Impact	Little to no impact	Minimal impact	Moderate impact	Major impact, significant right-of-way requirements
	Connectivity	Free flow connectivity makes access easy for vehicles but creates a more chaotic environment for motorists and pedestrians alike	Reorganized connectivity with medians and enhanced crosswalks create a predictable roadscape for motorist and pedestrians	Reorganized connectivity with medians and enhanced crosswalks create a predictable roadscape for motorist and pedestrians	Reorganized connectivity with medians and enhanced crosswalks create a predictable roadscape for motorist and pedestrians
Economic Impacts	Real Estate Value	No investment, properties will continue to develop at the current status quo	Minimal investment, likely to deliver minimal gain do to the lack in perceived change and priority	Moderate investment, moderate to major return	Major investment, likely major return over a long period of time
	Business Accessibility	Business access will not be impacted, perceptions of difficult right and left turns will continue	Business access will be organized allowing for businesses to be accessed by backstreet connection or at controlled intersection	Business access will be organized allowing for businesses to be accessed by backstreet connection or at controlled intersection	Business access will be organized allowing for businesses to be accessed by backstreet connection or at controlled intersection
	Cost	Minimal Cost	Moderate Cost	Moderate to Major Cost	Major ROW and Construction costs

Streetscape Design Theme and Character

One of the advantages to Scenario 3 is that it is adaptable to the various conditions that exist along the Corridor and allows for design interpretations that address the existing context. With a preferred street cross section identified, the Planning and Design Team was able to consider the overall aesthetics, theme and character of the Corridor. Creating the aesthetic direction early in the process allows the technical design to follow and support the overall theme. The design theme was influenced by the community's desire for an identifiable character for the corridor that elevated its sense of place. But like the street cross section, the design theme also needs to be context-sensitive and adaptable to the varied and evolving conditions along the corridor, all while maximizing multi-modality. The theme and concept that resulted is described as Urban Boulevard and Parkway Boulevard.

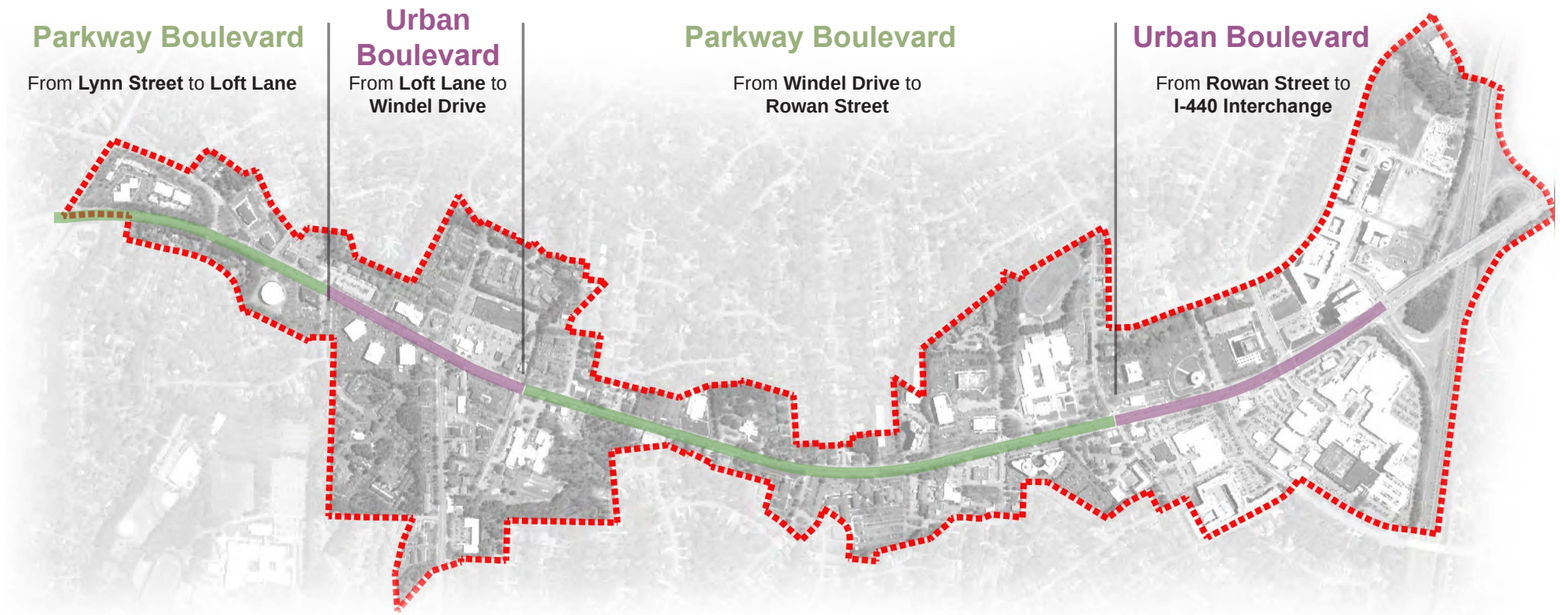
The Community values the existing landscape character and quality on portions of the Corridor. The areas between Windel Drive and Rowan Street and north of Loft Lane where schools, churches and residential uses exist, the landscape is older, with a variety of mature canopy and understory trees, and large expanses of well-maintained lawn, ground covers and shrubs that knit the various uses together. The Community believes that this landscape image, at least in this portion of the project, should be retained. For diagrammatic purposes, the streetscape concept calls this the Parkway Boulevard Area.

The North Hills Area, however, is undergoing transition and is evolving towards a more urbanized landscape with lines of street trees, screening shrub materials and more paved surfaces extending to the street. The Millbrook area is a combination of the two, given that its developments are relatively older and organized less densely than what occurs at North Hills. As the Millbrook area evolves, it is expected that it will transition to a denser and urbanized pattern similar to North Hills and that more of the property will be occupied by buildings, streets, and parking lots. The property owners that provided input into the process believe that the landscape should continue to evolve into a more upscale and urbanized pattern in these two portions of the project. This was also supported by the Community. For diagrammatic purposes, the streetscape concept calls this the Urbanized Area.

Another aspect of the existing condition that has an impact on creating a streetscape concept for the Corridor includes the reality that many properties are not going to change or be redeveloped in the near term and there are many types of uses that all have their own architectural style, massing, site organization and relationship to the street. It is generally accepted that when properties do redevelop, that this variation will generally remain along the Corridor as well, so accepting this reality and planning for it in the design concept makes sense.

The existing overhead power lines create a challenge for the streetscape design since their easements occupy space within the Corridor, and regulations do not allow the planting of large trees under them. These constraints affect tree planting choices and the ability to place trees in an organized manner. Also affecting the ease of organizing streetscape elements is the various driveways that connect to Six Forks Road. These driveways and power lines interrupt the potential for long lines of regularly spaced canopy trees, which normally would be the preferred streetscape pattern.

Finally, Six Forks Road has many users. Residents that live in its adjacent neighborhoods consider this as their main street – it is the road that connects all the neighborhoods together. Commuters roll through Six Forks Road on their way to work downtown or along the Corridor to utilize various businesses. Shoppers from around the City travel to its successful shopping centers primarily anchored by North Hills. Every Sunday, folks come to church and during the week parents drop off their kids at school. People want to walk and bike along the Corridor in a pleasant and safe atmosphere. The design, therefore, needs to accommodate all of these various users, while also establishing a unique identity for this portion of Six Forks Road.



General Design Concepts

The layered seasonal landscape of the South that includes an overhead canopy of shade trees, colorful understory trees, flowering shrubs and ground covers provides a visual identity that is highly valued by those that experience it. It is rich in tradition but can also be organized into different patterns that modernize it. It can be arranged into formal or informal patterns and is held together by the vertical layering of plant material as well as the romantic seasonal display of color. Many attractive and memorable streets or cities in the South, by design or by accident, evolve into this pattern of landscape since it is beautiful and native to the region. Many of us have an inherent attachment associated with the prototypical southern landscape of canopy trees of various oak and other species; understory trees of dogwoods, redbuds and other species; and azaleas and other flowering shrubs and ground covers.
Given the variability of the edge conditions of Six Forks Road, this landscape type provides an opportunity to promote a more park-like landscape in the center portion of the Corridor and a more urbanized landscape in the North Hills and Millbrook areas. It will allow for development transition, phasing, and character changes where it is advantageous. It enables the streetscape to blend into the existing landscape that is already established along the Corridor. A consistent palette of plant species, furniture, paving and signage will unite the overall Corridor while still allowing variability.

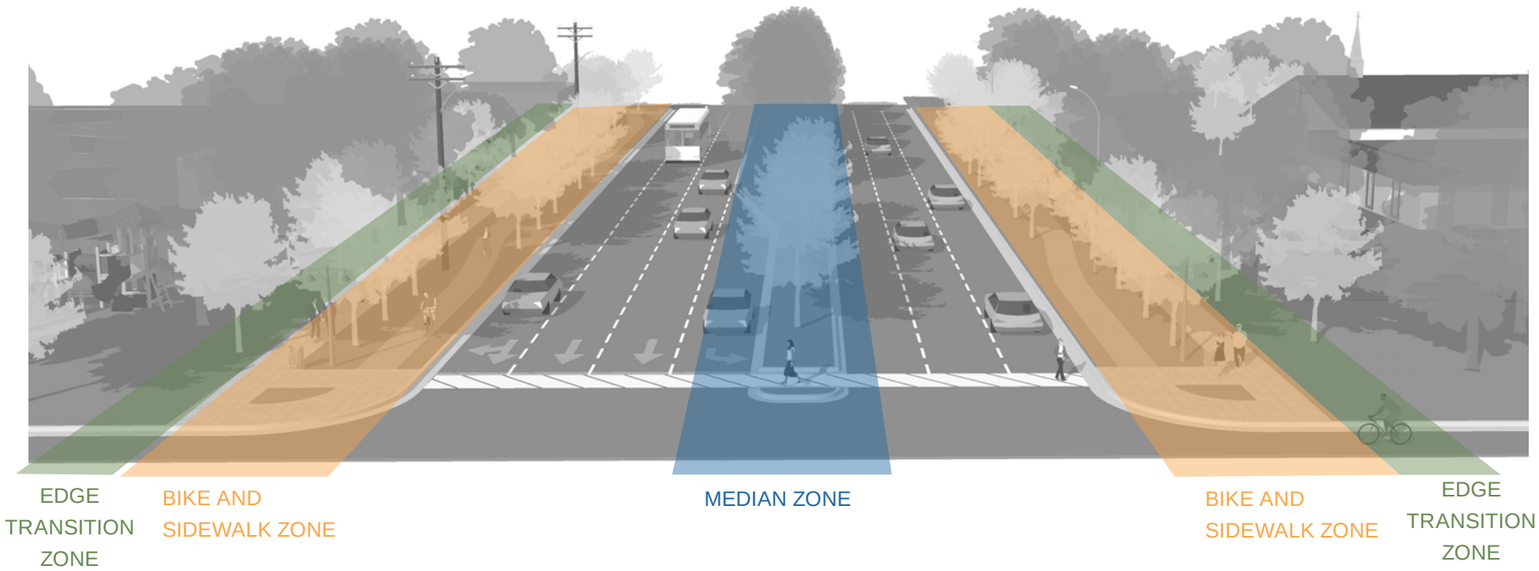
There are three zones within the Streetscape where design recommendations have been created:

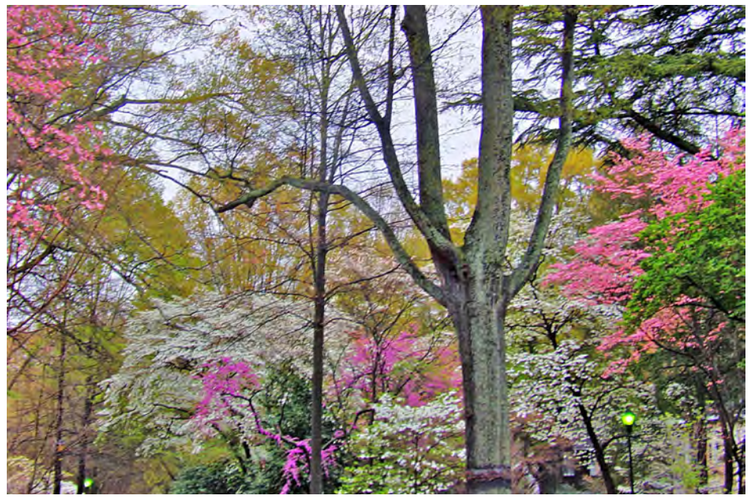
The Median Zone, which includes planted or paved spaces in the center of the roadway and provides access management. This space can also include storm water management treatments.

The Bike and Sidewalk Zone, which includes the curb, bike lane and buffer, tree lawn or tree planting space, and the sidewalk. This space can also include storm water management treatments. It may also include power lines, regulatory signs and other utilities above and below ground.

The Edge Transition Zone, which may be outside of the Right of Way but includes the space where existing and proposed uses blend into the landscape of the street Corridor. This space may include landscape and hardscape treatments.

Each of these zones within the Parkway Boulevard Area and the Urbanized Area are articulated with consistent landscape, hardscape and furniture treatments. What changes from the Parkway Boulevard Zone to the Urbanized Zone is how these elements are organized in order to respond to the existing conditions or variation in organizational theme.





A southern roadscape in spring

Parkway Boulevard Overview

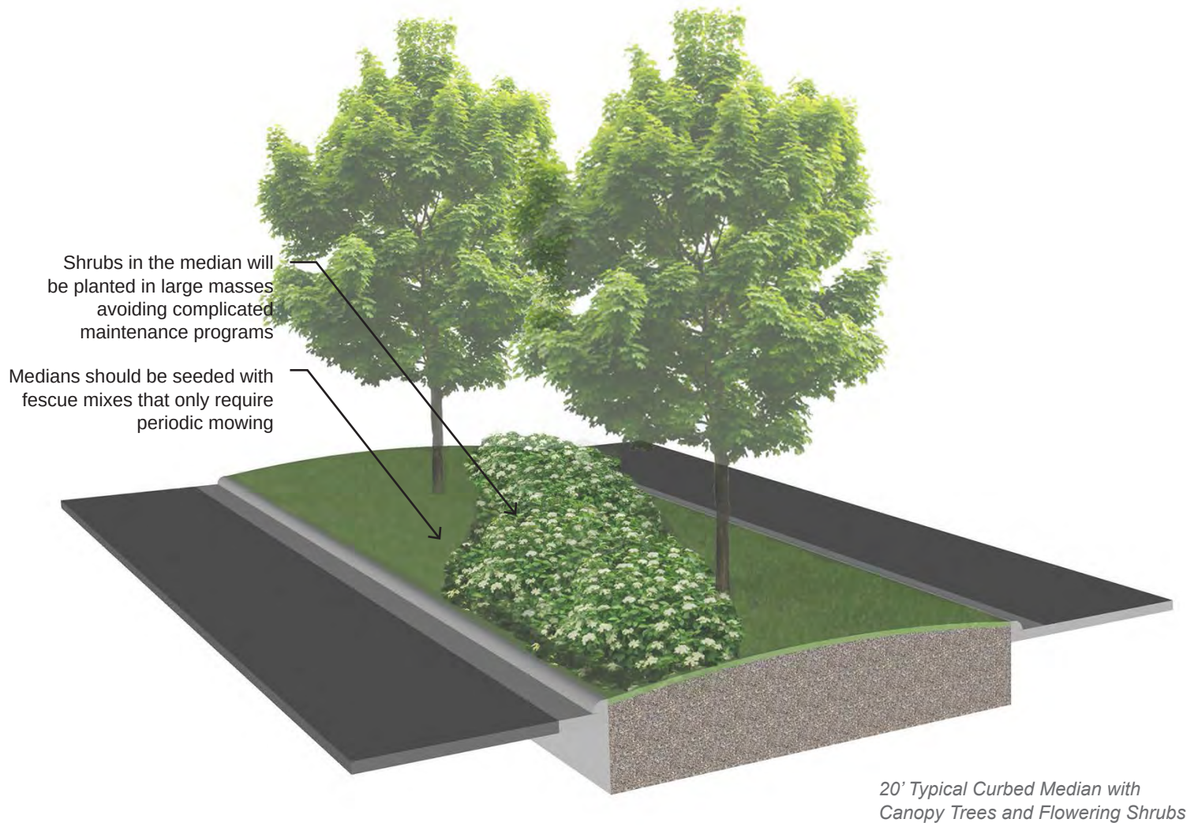
The Parkway Boulevard Streetscape is informal and less urban in character. It has a consistent median, planted with large street trees when conditions allow. Small, flowering trees occupy the tree lawn, allowing for the required clearance beneath the above ground power poles that share the space. Larger street trees are planted behind the sidewalk in the edge zone, which is designed to adapt to the many different conditions while keeping a consistent planting theme along the Corridor's length.

EDGE TRANSITION ZONE	SIDEWALK ZONE		BIKE ZONE	TRAFFIC ZONE		MEDIAN ZONE	TRAFFIC ZONE		BIKE ZONE	SIDEWALK ZONE		EDGE TRANSITION ZONE
6' -8' Planted Buffer	6' Sidewalk	8' Planting Buffer	5' Bike Lane with 3' Planted Buffer Strip	**2.5' Curb**	Three 11' Wide Travel Lanes	**1.5' Curb** 20' Shared Median and Turn Lane Optional Pedestrian Refuge Island **1.5' Curb**	Three 11' Wide Travel Lanes	**2.5' Curb**	5' Bike Lane with 3' Planted Buffer Strip	8' Planting Buffer	6' Sidewalk	6' -9' Planted Buffer

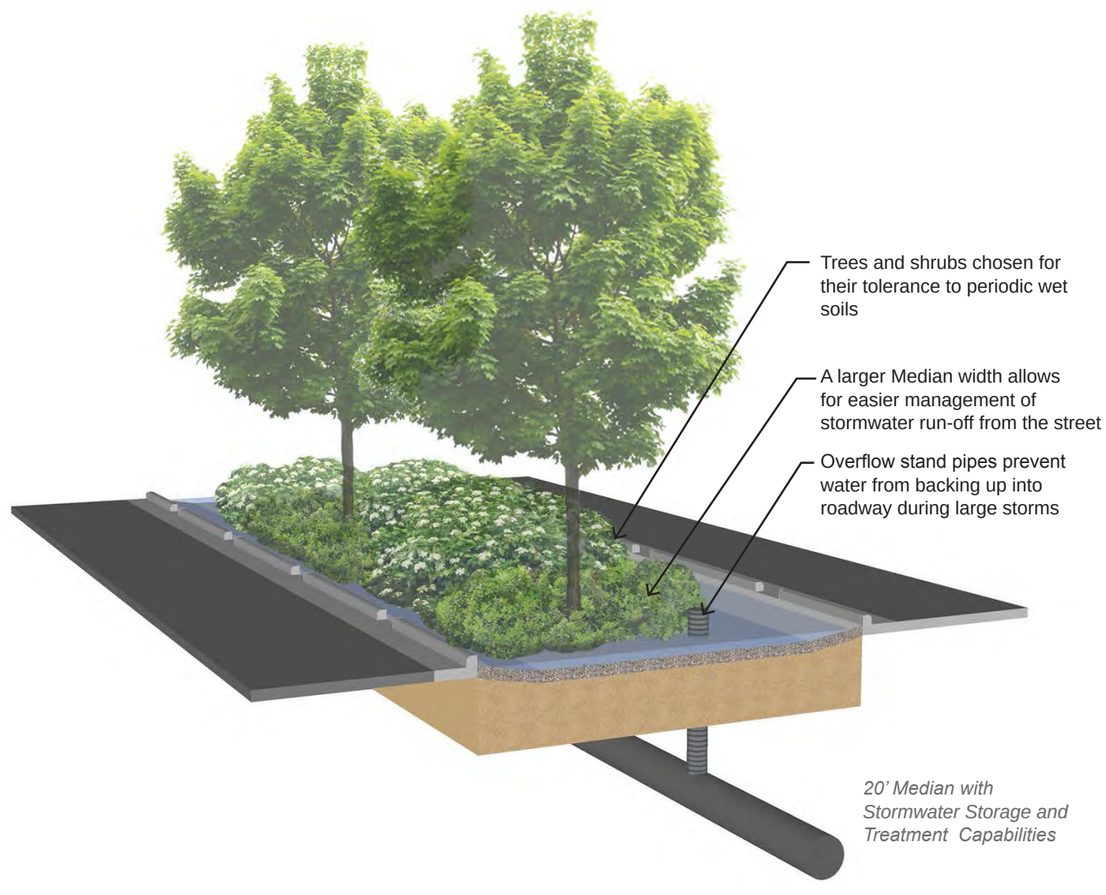
138'' ROW

Parkway Boulevard Median Zone

The Median Zone in the Parkway Boulevard Area will be primarily planted in small understory trees in compliance with NCDOT setback regulations. Where it is feasible for the median to expand to the minimal dimension that enables NCDOT to approve the planting of large trees, large canopy trees will be planted to provide pockets of canopy over the street that, over time, will support a more shady, parkway feel to the center of the street in these areas. The ground plane of the median will be mowed grass and low flowering shrubs and ground covers. Should storm water management be accommodated in the median, the plant materials will be chosen to respond to that condition. Capturing and treating stormwater in the medians will need to be evaluated for effectiveness based on locations and will require approval from NCDOT.



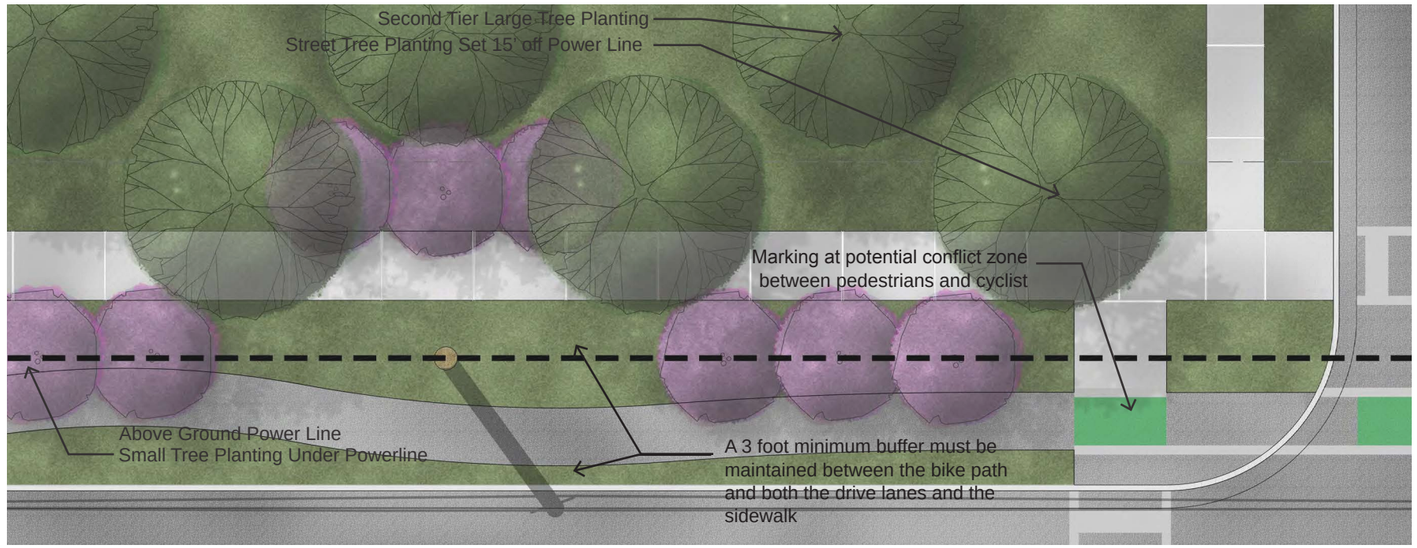
20' Typical Curbed Median with Canopy Trees and Flowering Shrubs



20' Median with Stormwater Storage and Treatment Capabilities

Parkway Boulevard Bike and Sidewalk Zone

The Bike Zone in the Parkway Boulevard Area will consist of a 5’ paved path above the curb with a 3’ planted buffer. Separating the bike path and the sidewalk will be an 8 foot tree lawn that includes an informal but organized linear massing of small flowering trees that fit under the power lines. The ground plane will be a combination of mowed grass and flowering shrubs. In the Parkway Boulevard Area only, the bike path may encroach up to 5 feet into the tree lawn in order to achieve a slight meander. This informal path alignment will help contribute to the distinctive character of the Parkway Boulevard Areas. The sidewalk in the Parkway Boulevard Areas is 6 feet wide and composed of a combination of finished concrete, decorative concrete, and pavers. Benches, trash cans, bike racks, street lights and other furnishings populate this space and will be consistent elements along the entirety of the Corridor. Should stormwater management be located in this space, it will occupy the tree lawn area and plant materials will be chosen to respond to that condition.



Parkway Boulevard Sidewalk Zone

Parkway Boulevard Edge Zone

The Edge Zone, occupying the first 6 to 9 feet at the back of sidewalk, provides the opportunity to knit existing or future land uses into the streetscape so that they appear more seamless. It enables building entrances to open to the street, allows for grade transitions, enables parking lots to be softened or screened from view, and provides space for larger canopy tree plantings – since the powerlines restrict this within the Sidewalk Zone. In response to the existing landscape patterns, large canopy trees and understory trees shall be planted in orderly informal patterns to evoke a park-like aesthetic. The ground plane will be either mowed lawn or native shrubs. Parking lots will be screened with shrub hedges sized to effectively screen the cars from view.

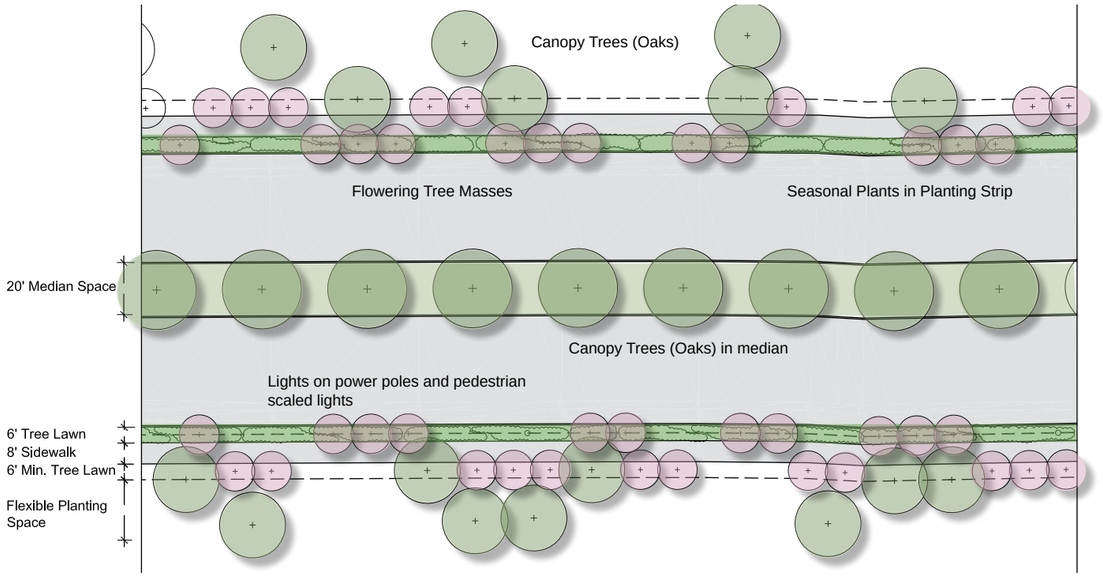
Scenario A - Building adjacent to sidewalk zone

In the Parkway Boulevard portions of the Corridor, a vast majority of buildings are set back a considerable distance from the sidewalk. In these cases the edge zone is an opportunity to add layers of landscape to further define the transition from the Sidewalk Zone to private property. In situations where the building is directly adjacent to the sidewalk, planting beds should be installed if possible to soften the building to sidewalk transition.

Scenario B - Parking lot adjacent to sidewalk zone

When parking is adjacent to the sidewalk zone, small trees and shrubs that provide screening and separation should be planted in the edge zone. When there is a disparity in grade the edge zone should also be used as a sloped transition zone to existing grade.

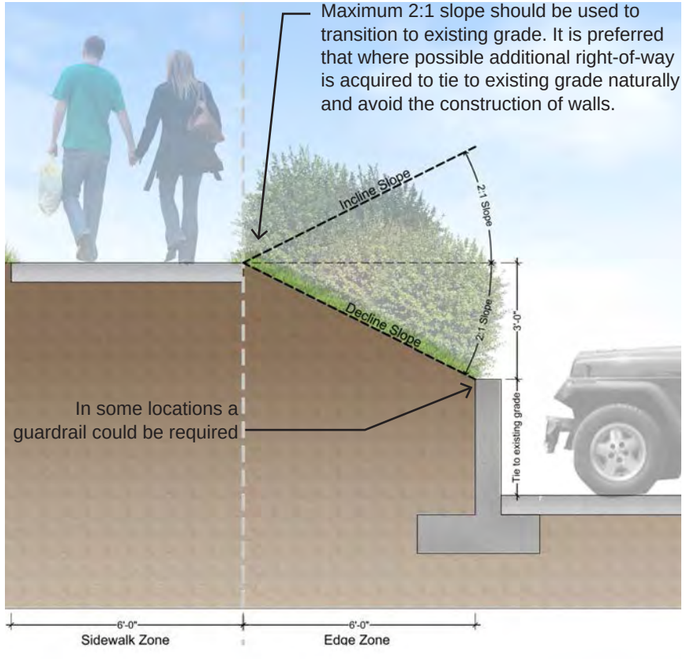
This scene represents a Scenario A edge condition



Example of basic planting pattern

Example of Parkway Boulevard seating option

This scene represents a Scenario B edge condition



Edge zone grade transition section

Urban Boulevard Overview

The Urban Boulevard Streetscape is created to adapt to both existing and future development. This streetscape creates a more predictable, consistent edge of planting, sidewalk, signage and furniture. Because the undergrounding of overhead power lines is more likely to occur in the more urbanized areas, large canopy trees are planted in the sidewalk zone. The planted median will typically be smaller and will adapt to the varying turning and width conditions needed.

EDGE TRANSITION ZONE	SIDEWALK ZONE		BIKE ZONE	TRAFFIC ZONE		MEDIAN ZONE		TRAFFIC ZONE		BIKE ZONE	SIDEWALK ZONE		EDGE TRANSITION ZONE
6' Minimum Planted Buffer and/or Pavement Extension	6' Sidewalk	6' Planting Buffer	5' Bike Lane with 3' Planted Buffer Strip	**2.5' Curb**	Three 11' Wide Travel Lanes	**1.5' Curb**	22' Shared Median and Turn Lane Optional Pedestrian Refuge Island	**1.5' Curb**	Three 11' Wide Travel Lanes	**2.5' Curb**	5' Bike Lane with 3' Planted Buffer Strip	6' Planting Buffer	6' Sidewalk	6' Minimum Planted Buffer and/or Pavement Extension

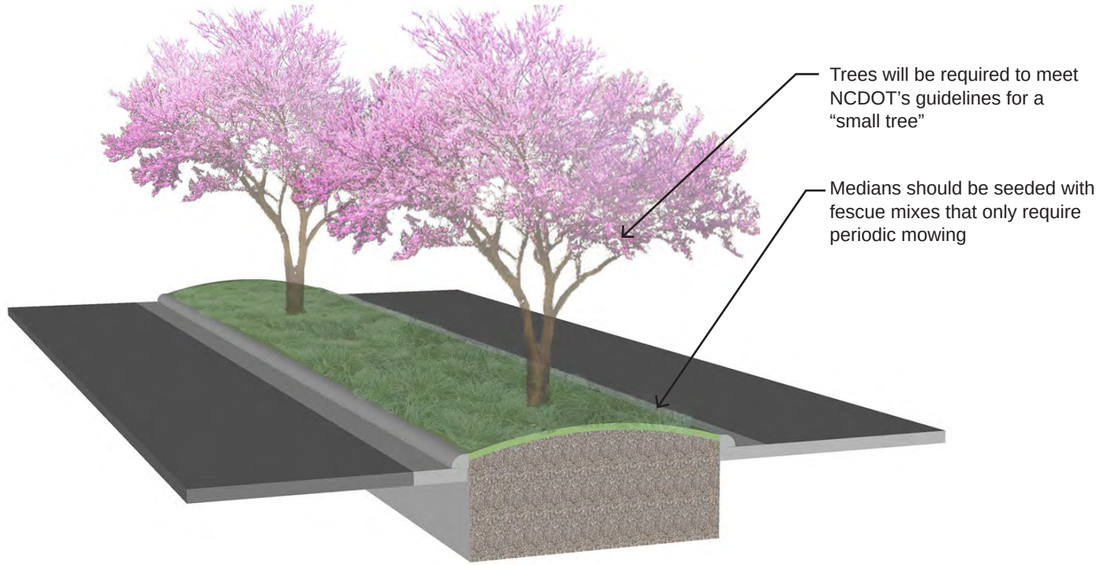
125' -136' ROW

Urban Boulevard Median Zone

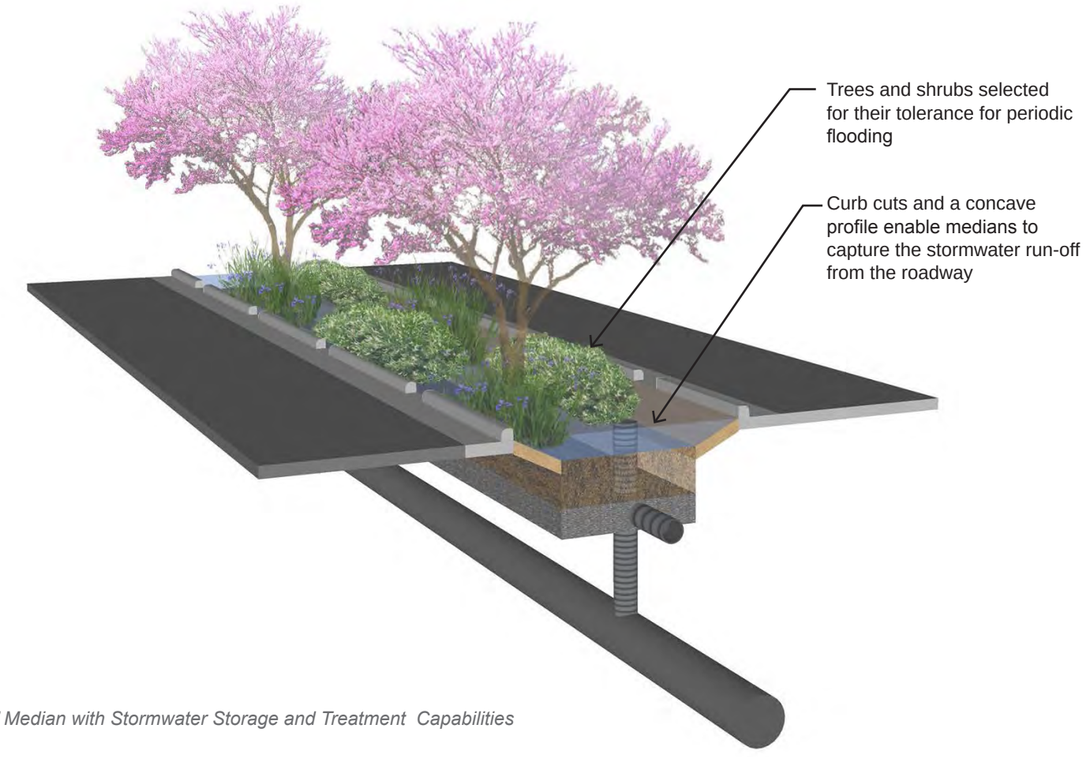
The Median Zone in the Urbanized Area will be primarily planted with understory trees in compliance with NCDOT setback regulations. The ground plane of the median will be mowed grass and low flowering shrubs and ground covers. Should storm water management be accommodated in the median, the plant materials will be chosen to respond to that condition. In constrained urban areas where space is limited, the median may need to be reduced to a dimension not conducive to the successful establishment of trees or shrubs. In these cases the median will be paved with a decorative surface.

Example of planted urban median

Example of paved urban median



10' Typical Curbed Median with Understory Flowering Trees and Shrubs



10' Median with Stormwater Storage and Treatment Capabilities

Urban Boulevard Bike and Sidewalk Zone

The Bike Zone in the Urbanized Area will consist of a 5’ paved path above the curb with a 3’ planted or paved buffer. Separating the bike lane and the sidewalk will be a 6 foot tree lawn that will include an organized linear planting of canopy trees since power lines will be located underground in this area. The ground plane will be a combination of mowed grass and flowering shrubs. In areas of high pedestrian activity, the 6 foot tree lawn space can become flexible pedestrian space, with trees in grates set in permeable paving. The sidewalk is 6 feet wide and composed of a combination of finished concrete, decorative concrete, and pavers. Benches, trash cans, bike racks, street lights and other furnishings populate this space and will be elements along the entirety of the Corridor. Should stormwater management be located in this space, it will occupy the tree lawn area and plant materials will be chosen to respond to that condition.

Urban Boulevard Edge Zone

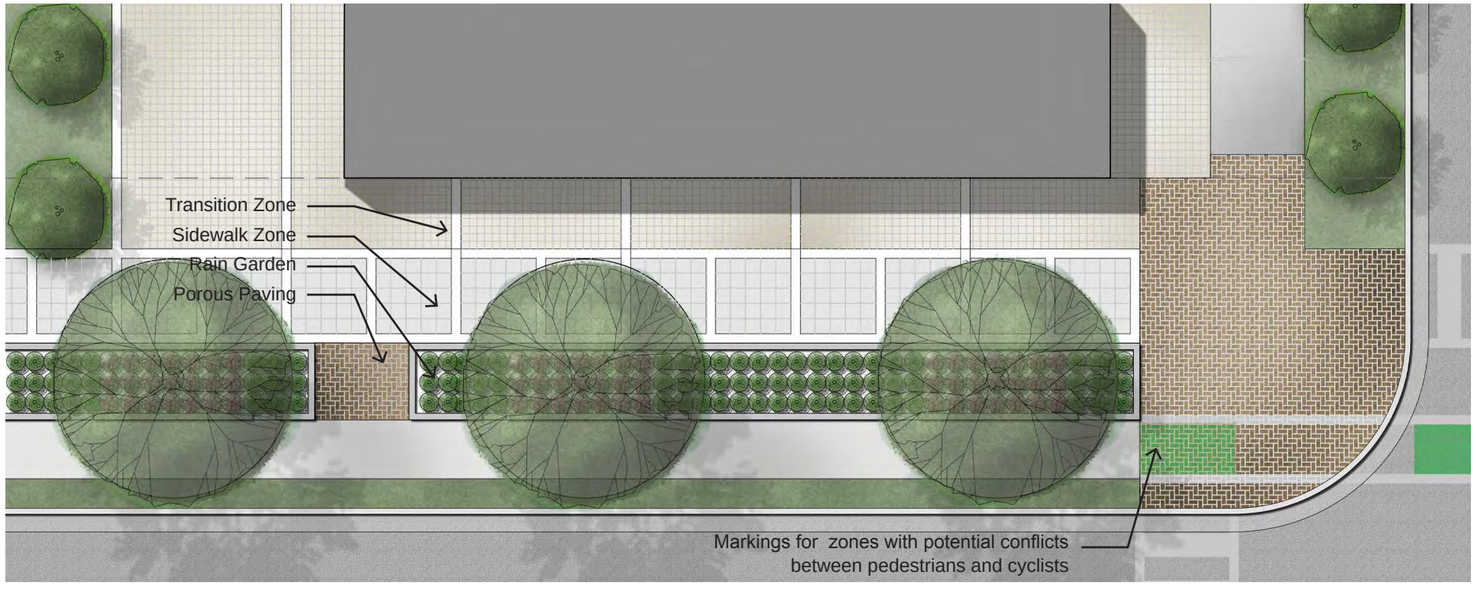
The Edge Zone, of 6 to 9 feet, provides the opportunity to knit existing or future land uses into the streetscape so that they are made more seamless. This zone should be more durable in nature in the Urban Areas, as it will see more pedestrian use. Where building entrances open to the street, the Edge Zone can function as an extension of the sidewalk, providing additional paved space for outdoor seating or plazas. Paving materials in the Edge Zone should complement those used in the Sidewalk Zone. The Edge Zone also allows for grade transitions and enables parking lots to be softened or screened from view with appropriately sized shrub hedges. Large canopy trees and understory trees shall be planted in orderly patterns. The ground plane will be native shrubs or pervious paving.

Scenario A - Building adjacent to Sidewalk Zone

In situations where existing or future buildings sit in close proximity to the Sidewalk Zone, the adjacent property owner could choose to pave this zone to provide additional pedestrian space or create an entry plaza. This space could also be landscaped providing a softer transition from the sidewalk into the building. When buildings are set back from the sidewalk, a second row of large or small trees should be planted in the Edge Zone to create a buffer and tree rhythm on the outside of the sidewalk.

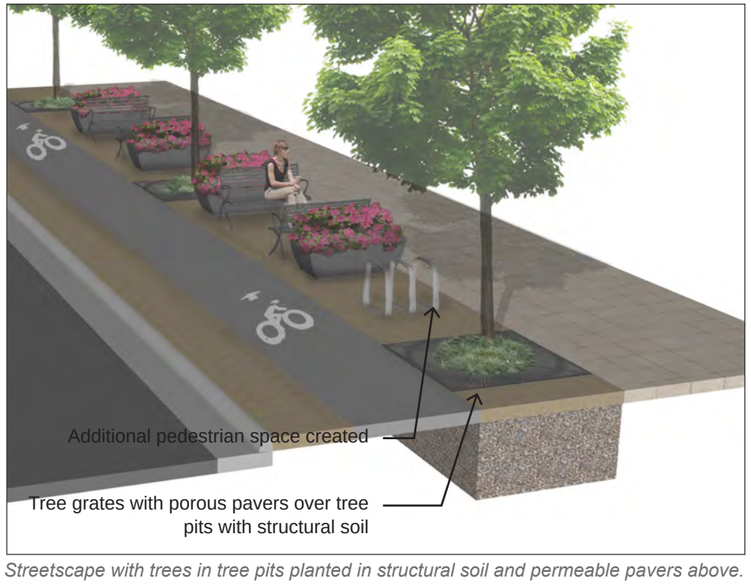
Scenario B - Parking lot adjacent to Sidewalk Zone

When parking is adjacent to the Sidewalk Zone, the Edge Zone will be used to create a landscape buffer and separation between the cars and the sidewalk.



This scene represents a Scenario A edge condition

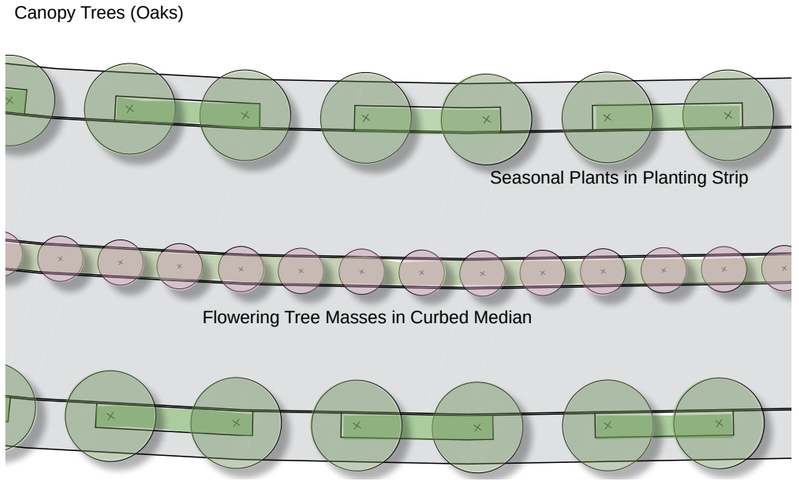
Streetscape with typical tree lawn and plantings



Streetscape with trees in tree pits planted in structural soil and permeable pavers above. This configuration provides maximum space for street furnishings, seating areas, etc.

Streetscape with bio-swale to capture, treat and drain stormwater

This scene represents a Scenario B edge condition



Example of basic planting pattern

Common Corridor Elements

Bus Stops

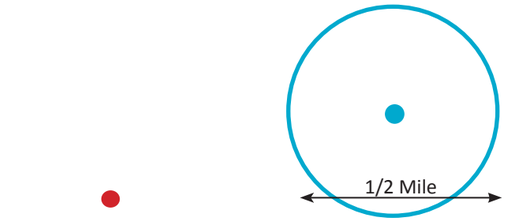
The placement and design of new Bus Shelters can promote bus usage as a viable and attractive alternative to the automobile. They can create rhythmic architecture along Six Forks Road and a positive image for the transit system. They provide shelter from the elements and can establish “places” along the Corridor that are like small plazas. All bus stops will have consistently designed shelters, consistent paving treatments, benches, trash and recycling receptacles, bike racks, lighting and large route information maps.

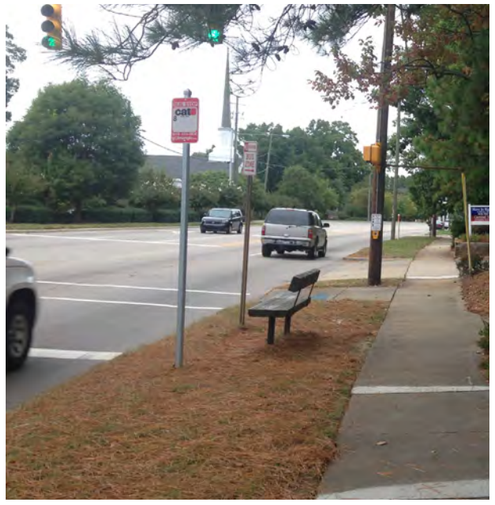
Bus shelters are generally located at ½ mile spacing, and are planned for the following locations:

- Lynn Road
- Millbrook Road
- Shelley Road
- Capital Towers Pedestrian Crossing
- North Hills

Although the overall number of bus stops will be reduced, the result will be an improved and faster service, with a higher level of amenities at each stop. The consolidation of bus stops also paves the way for a Bus Rapid Transit ready corridor. This is the first step in this corridor to improve transit as is outlined in the Wake County Transit Plan.

Bus Stop Spacing Creates a BRT ready Corridor





Example of Existing Conditions

Example of Proposed Condition

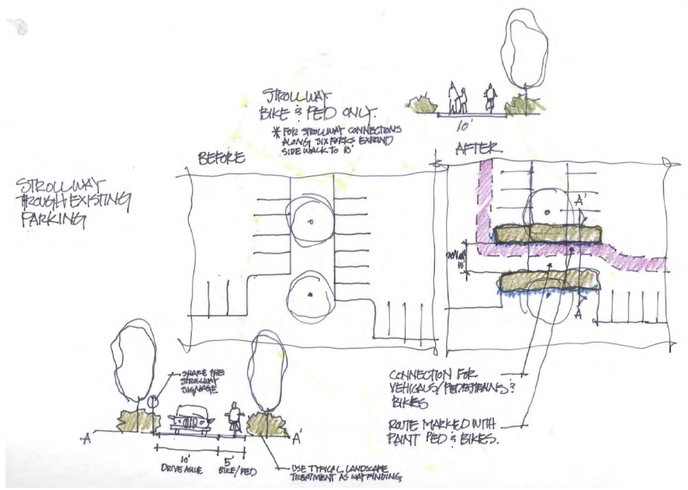
Common Corridor Elements

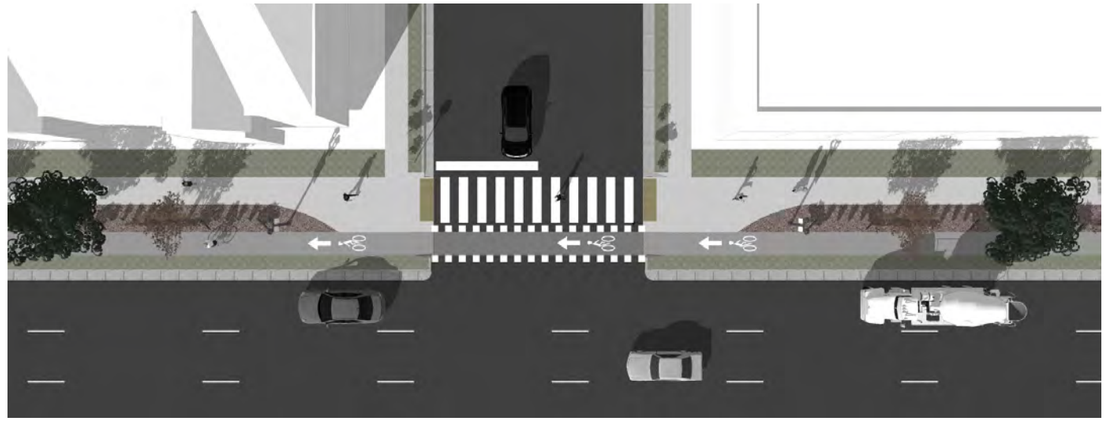
Bike Lane / Conflicts

The bike lanes along Six Forks Road are above the curb and separated from the traffic with a 3' planting strip. Where possible, such as at bus stops, the bike lane should be routed around pedestrian and auto conflict zones. In some cases, this will be unavoidable and additional striping and signage of areas of potential conflict will be required. First, additional striping and signage is required at driveways with direct access on to Six Forks Road. The signs and additional striping will notify motorist of the bike lane's location so that they do not block bike access while waiting to turn onto Six Forks Road. Also, at intersections, bike lanes will need additional striping to notify motorists where the bike lane crosses the intersection. This will be done at grade adjacent to the high visibility pedestrian crossing.

"Strollways" and Strollway Cross Sections

In addition to streets, pedestrian and bicycle friendly strollways have the potential to connect adjacent properties to each other behind the Corridor. These strollways are essentially multipurpose paths that create a safe environment for less experienced or younger bicyclists, or for folks that want to walk in a pathway that is separate from the bike and pedestrian networks designed into Six Forks Road. These strollways could occur primarily where street connectivity wouldn't be practical outside the Right of Way.





At minor intersections and driveway curb cuts onto Six Forks Road, bike lanes shall be painted a visible color with safety striping.

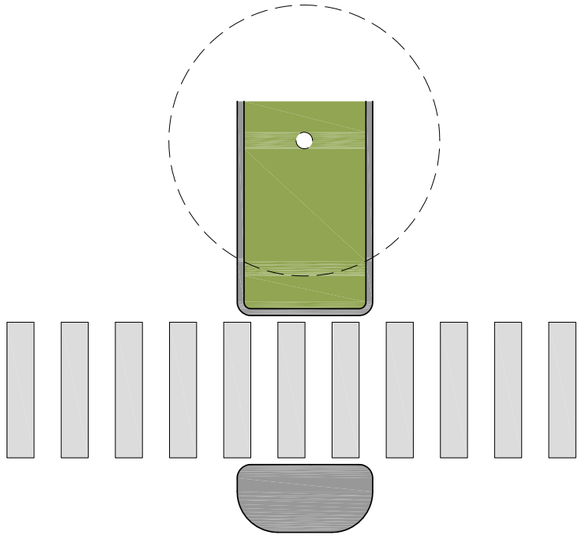
Bike lanes should receive similar treatment at major intersections.

Bike lanes should be routed around the rear side of bus stops, and should be clearly marked to alert pedestrians of potential collision areas.

Common Corridor Elements

Intersections

Intersection crossings are the places where the potential for conflict is the greatest. Creating an environment where pedestrians feel safe and comfortable to cross is critical to the success and overall connectivity of Six Forks Road. All intersections will provide clear and bold marked crosswalks and bike lanes through the intersection. All intersections will have pedestrian crossing signals with count down beacons. Where possible and practical, intersections with large crossing distances will have a pedestrian refuge island. These islands will be at a minimum 8’ wide and comfortably located adjacent to the landscaped median.



20’ Typical Pedestrian Refuge Island

Alternative Crossings

The crossings at North Mills and Millbrook Roads are two of the most heavily travelled by pedestrians. To strengthen connections across the Corridor and to provide a safer, more comfortable crossing, an above ground or below ground pedestrian connection should be explored. While the cost of such a structure would be sizeable, the continuous connection across Six Forks Road could provide great benefit and value as these areas continue to develop and grow into urban centers.

A pedestrian bridge across Six Forks Road would not only improve pedestrian safety and connectivity, but could also serve as an iconic piece of public art, further strengthening the identity of the Corridor.

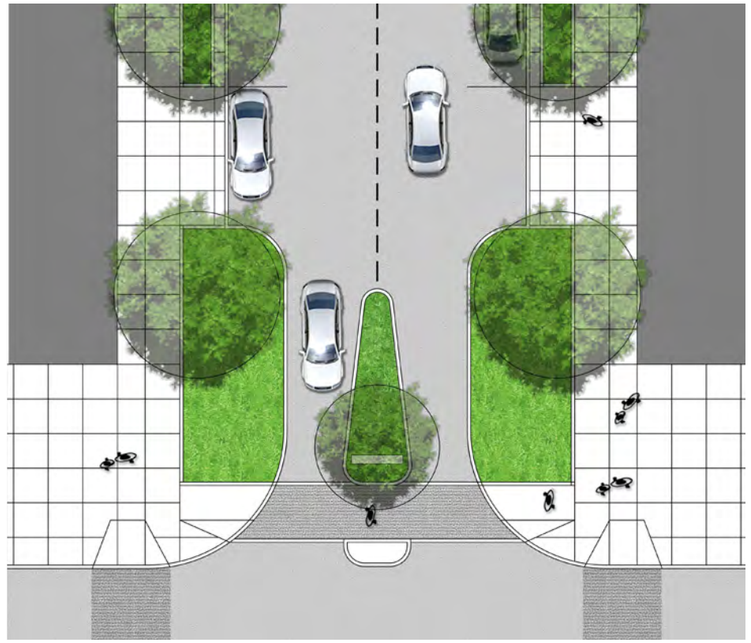
Special treatment of the crosswalks, such as the utilization of brick pavers with concrete banding, would be appropriate on neighborhood side streets crossings.

Common Corridor Elements

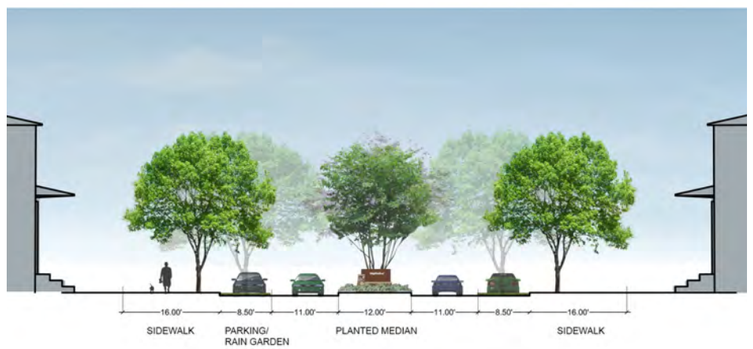
Neighborhood Gateways

Many established neighborhoods exist adjacent to the Corridor that were developed before Six Forks Road became the type of roadway that it is currently or will be in the future. As part of the design of the future Six Forks Road, the Corridor plan promotes the implementation of a consistent gateway experience into these neighborhoods. These entries will be visual clues to motorists to distinguish the main connector cross streets from the cross streets that lead into residential neighborhoods, and will promote a pedestrian oriented neighborhood scale and an attractive streetscape. The Neighborhood Gateways include expanded curb extension intersection treatments along Six Forks Road at the neighborhood entry streets. The curb extensions shorten the distance for pedestrians to cross the side streets that intersect with Six Forks Road, bring the scale of the street down, and provide a place for landscape, seating, art, signage, lighting and other streetscape features. Gateways in new development areas shall be planned so that new buildings front directly onto the side street with pedestrian entries to provide a pedestrian orientation to the street. Cross walks located across the side streets are to be designed with decorative or artful paving or paint treatments. Finally, street trees and sidewalks extend into the neighborhoods to join the neighborhood to Six Forks Road with an attractive streetscape.

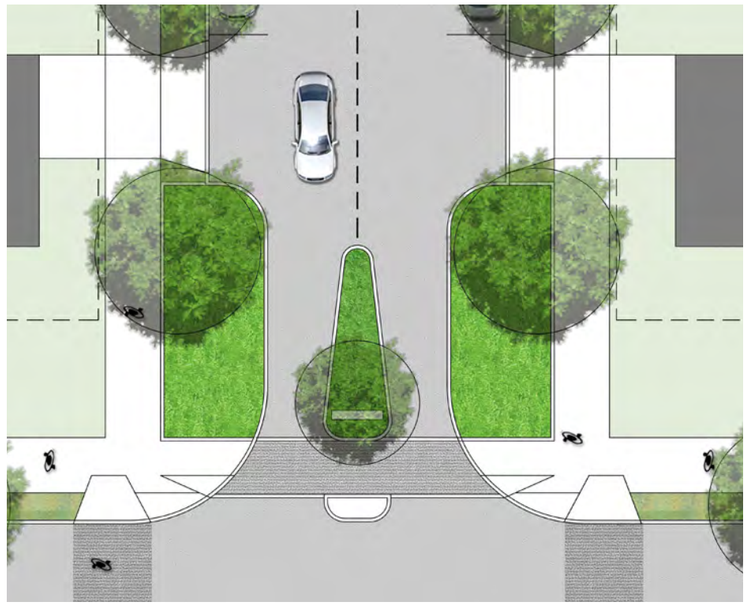
Urban Boulevard Neighborhood Entry



Urban Boulevard Neighborhood Entry



Parkway Boulevard Neighborhood Entry



Parkway Boulevard Neighborhood Entry

Common Corridor Elements

Street Lights

Street lights can contribute to the aesthetics and pedestrian quality of the street, while also providing acceptable levels of light for safe passage. Street lights can also contribute to the environmental design by reducing energy use and protecting the night sky.

Street lights will occur in two forms along the Corridor: roadway fixtures and pedestrian fixtures. Roadway fixtures should be mounted 25'-35' high with a spacing of 100'-150'. Pedestrian fixtures should be mounted 12'-15' high and spaced 30'-50'. When possible roadway and pedestrian lighting should share poles. Currently, standard roadway fixtures occur on the power poles that exist along the Corridor. Where above-ground power is to remain, it is recommended that existing fixtures be replaced with attractive light fixtures consistent with the design of the streetscape. New, coordinating poles and fixtures will be needed where the power will be located underground. In both situations, decorative pedestrian scaled poles and fixtures are recommended to supplement the roadway fixtures at intermediate locations, particularly due to the separation of the pedestrian facilities from the roadway. Street light fixtures should be consistent throughout the Corridor and be of low energy use technology (LED) and use full cut off shades.

Power Poles

Above ground power lines align with and cross Six Forks Road in multiple locations. It is assumed for planning purposes that the power lines will remain above ground in the Parkway Boulevard Zone, given that many of these properties will not redevelop any time soon. In the Urbanized Zone it is assumed that the power lines will be placed underground to time with redevelopment adjacent to the Corridor or construction of the roadway. During the construction of the road within the Parkway Boulevard Zone, however, power lines will be organized along one side of the street and be located within the sidewalk zone.

Metronomis Bordeaux

Duke Energy Light Alternatives

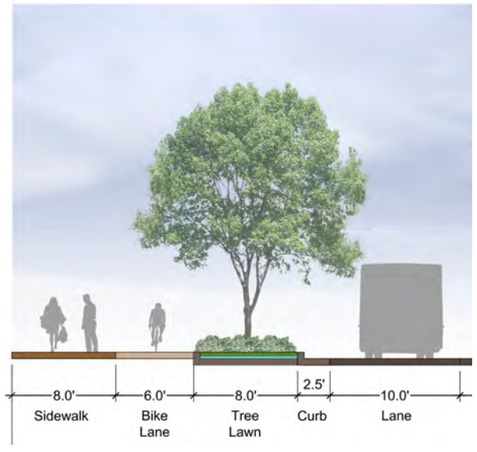
Ped/Bike Option

LED Sanibel, 15' Mounting Height

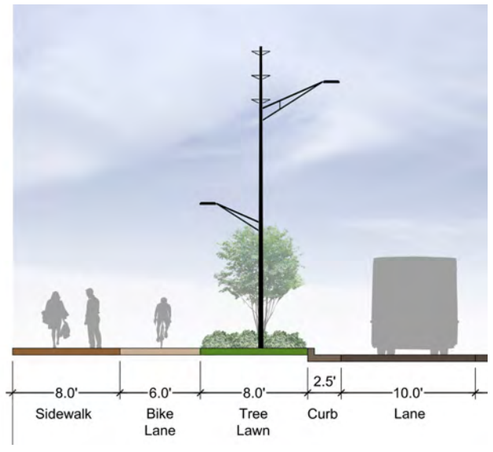
Roadway Option

LED Roadway, 35' Mounting Height

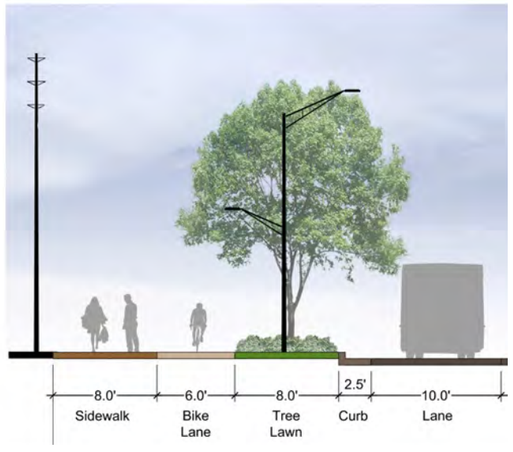
Power Reduction Alternatives



UNDERGROUND POWER LINES



CONSOLIDATE POWER LINES IN TREE LAWN



PURCHASE ADDITIONAL RIGHT OF WAY AND LOCATE POWER LINES ON EDGE

Common Corridor Elements

Signage and Monumentation

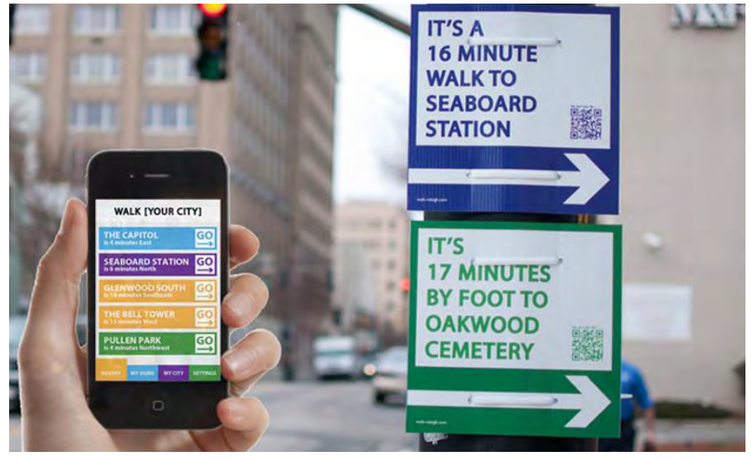
Signage in the Six Forks Road Corridor can be another element that brings unity and consistency to the design. It will also provide clear directions to destinations, making the Corridor a more user-friendly experience for the Motorist, Pedestrian and Cyclist.

A note about district directional, Walk [Your City] brings citizens, community groups, and local government together in support of more walkable communities, with a suite of online tools that produce offline actions. Users create pedestrian signage using the Sign Builder, which generates highly legible, human-scale wayfinding signs incorporating street-level guidance via QR codes. Once signs are created, users organize, visualize, and analyze their projects with the Campaign Manager, which also offers opportunities for social feedback as campaigns are installed. Municipalities can easily integrate the WYC platform in participatory planning processes, such as public outreach for the Six Forks Corridor project.

Corridor Directional - This sign directs motorists to retail centers, amenities and places along and adjacent to the Corridor.

Example of a Corridor directional sign that incorporates the Corridor's branding

District Directional - Using Walk Raleigh format, these signs will direct people to places within the district. These signs will be scaled and oriented to direct pedestrians and cyclists.



Example of current district directional signage by Walk Raleigh

Monument / Icon - Use a bold iconic sign or sculpture to build upon the Corridor's brand "Uniquely Midtown".

Example of Monument Signage reflecting a place's identity

Educational Signage - Signs can be temporary or permanent to illustrate the environmental elements that are integrated into the streetscape design.

Example of Temporary Educational Sign

Neighborhood Gateway- At entrances to residential areas, monument signs will identify the name of the neighborhood, provide a consistent look, and differentiate neighborhood streets from east-west connector streets.

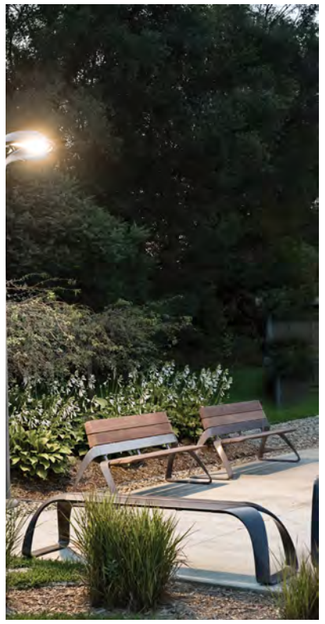
Example of Neighborhood Gateway Sign

Common Corridor Elements

Furniture

Street furniture and bus stops should be consistent throughout the entire Corridor. Urban style with simple lines is preferred and will give the Corridor a look that will be timeless and less likely to be tied to a specific era. Bus stops need to provide a comfortable shelter from the elements, ample seating, litter and recycling receptacles, and clear signage describing the transit options.

Example of coordinating family of street furnishings



Rest Bench

Emerson bike rack and Poe litter receptacle

Bus Shelters

Common Corridor Elements

Art

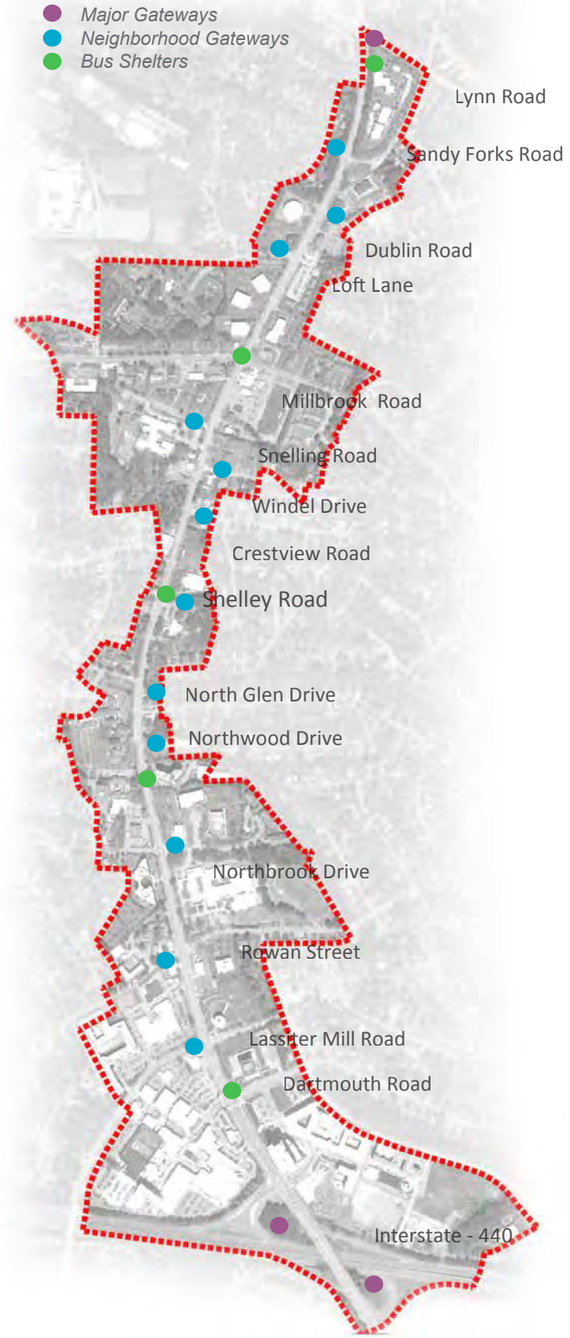
Integrating public art into the streetscape will provide the Corridor a unique sense of place and identity. Public art has successfully been integrated into the design of bridges, roadways and gateways for centuries and has elevated the perception of public infrastructure around the world. Art should be considered at the front end of the design process and not as an afterthought. It is highly recommended that artists be integrated with engineers, landscape architects, urban designers and others into a holistic design process, so that art, design and engineering are integrated seamlessly in the execution of the various elements that make up the Corridor. Achieving this requires rethinking the typical design process and a commitment to adequate funding as a percentage of construction, but doing so yields special results. In addition to being integral to the design of the various elements, art can also be considered as freestanding pieces that populate the streetscape in unique ways.

There are many places along the Corridor where public art should be considered. These include:

- At major gateways and interchanges
- At neighborhood gateways
- Within the medians where there is adequate space
- As part of the bus shelter designs
- Within the intersection “bulb-outs” in high pedestrian traffic areas
- Within the public open spaces that line the Corridor
- Within crosswalks and within other paved surfaces
- As part of pedestrian bridges and overpasses

Pedestrian Bridge by Barbara Grygutis integrates art into the design

Sculptural elements by Cliff Garten in the center median



Some of the potential locations for public art along the corridor

Common Corridor Elements

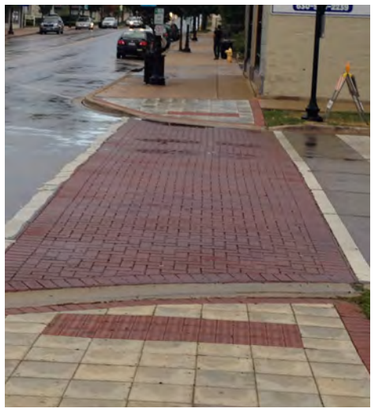
Materials and Paving

Establishing a family of paving materials will play an important role in defining the character of the Six Forks Road Corridor. There is a wide range of durable and attractive material choices, including various concrete treatments and paver types. The family of materials chosen for the sidewalk zone would be consistent in both the Parkway Boulevard and Urban Boulevard areas. Paving patterns and details should respond to intersection bulbouts, bus stops, seating areas and other typical elements in the Sidewalk Zone. In the Edge Transition Zone, sidewalk extensions installed by developers should respond to the chosen family of materials to create a consistent and harmonious streetscape experience. Crosswalks also provide an opportunity for a change in material to enhance the pedestrian crossing experience.

When choosing materials, full life-cycle costs should be considered. The cost of initial installation should be weighed against the durability and long-term maintenance costs of the material. Environmental impacts should also be considered. Permeable pavers are recommended for use in tree grate areas to allow water and oxygen into the root zone. Permeable pavers could be used in additional sidewalk locations as cost allows.

Crosswalks

Typical High Visibility Crosswalk with Reflectors and Signs



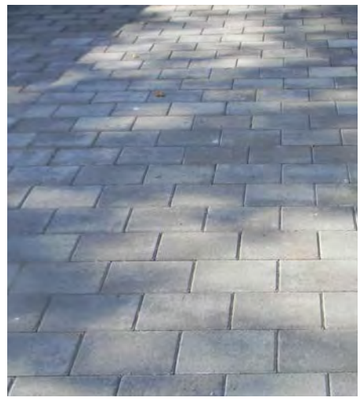
Stamped Asphalt Crosswalk

Brick Crosswalk (neighborhood streets and driveways)

Sidewalks

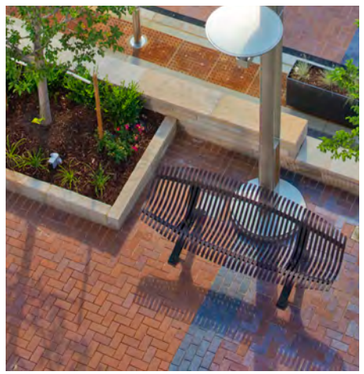
Concrete and Exposed Aggregate Concrete

Colored Concrete



Concrete Pavers

Clay Pavers



Assorted Fired Pavers

Porous Pavers

DESIGN RECOMMENDATIONS				
MATERIAL	SIDEWALK	BIKE LANE	CROSSWALK	MEDIAN
asphalt		A	A	
concrete	A	P	A	A
colored and/or stamped concrete	A	P	A	A
exposed aggregate concrete	P			
brick	P		P	P
stamped asphalt			A	
concrete pavers	P		P	P
permeable pavers	P			

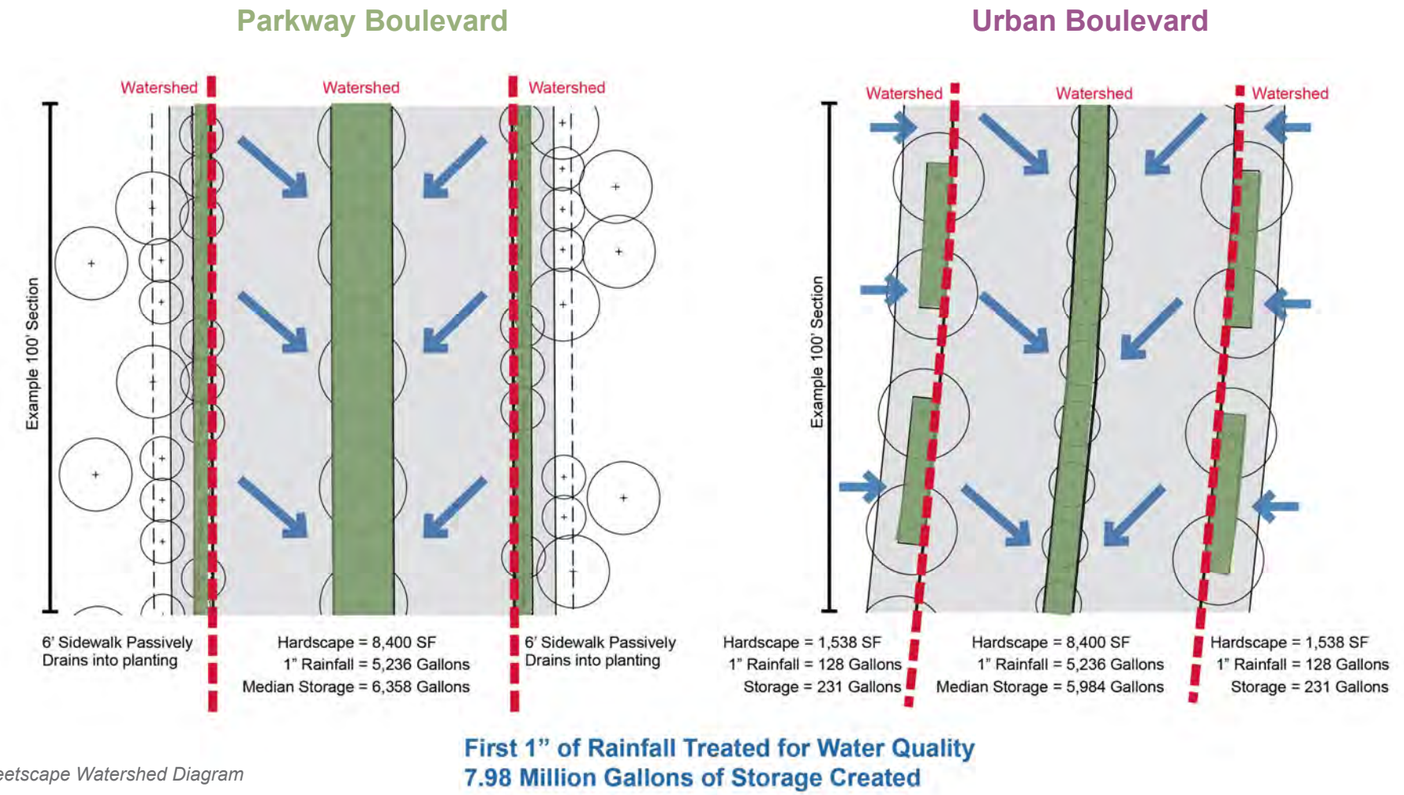
P Preferred Materials A Acceptable Alternatives

MATERIAL	DURABILITY (years)	COST (per SF)
asphalt	4 - 8	$3.50 - $6.50
concrete	15 - 30	$6 - $9
colored and/or stamped concrete	15 - 30	$8 - $15
exposed aggregate concrete	15 - 30	$8 - $12
brick	20 - 40+	$10 - $16
stamped asphalt	4 - 8	$7 - $10
concrete pavers	20 - 40	$6 - $14
permeable pavers	20 - 40	$6 - $14

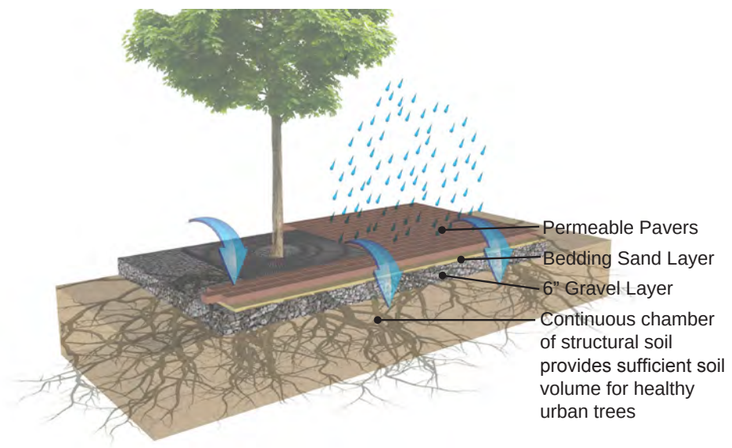
Common Corridor Elements

Stormwater management

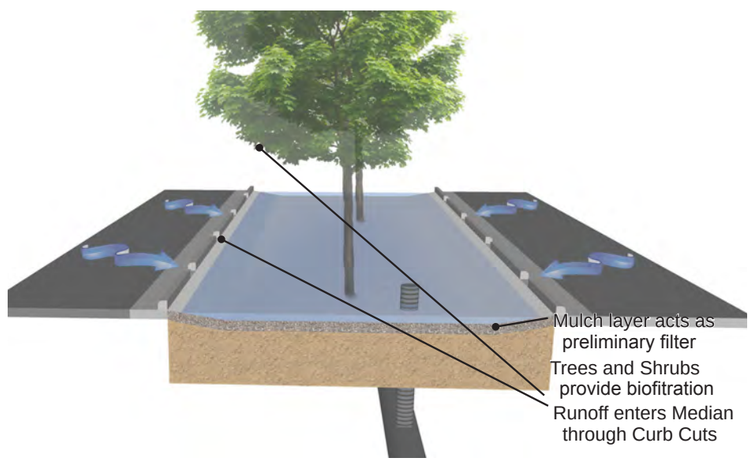
Storm water management can become an identifiable part of the landscape of Six Forks Road. It can be an observable commitment to environmental design, while also providing an attractive landscape. It can be applied corridor-wide, or can be integrated into portions of the Corridor. Ideally, it will enable the reduction of underground pipes. Based on preliminary calculations, storm water quality BMPs can be managed in two areas of the streetscape: the Sidewalk Zone and the Median Zone. Within the tree lawn space that is part of the sidewalk zone, storm water BMPs can be accommodated for the sidewalk and possibly the bike lane. Within the median, BMPs can be accommodated for portions of the roadway depending upon the size of the median. These stormwater management areas are envisioned as rain garden troughs that sit at back of curb and allow for the collection and filtering of the first 1” to 1-1/2” of rain water, which accommodates approximately 90% of day to day rain events. This “first flush” of stormwater contains a high concentration of pollutants that if left untreated would enter surface waters. The rain garden troughs are filled with approved DEMLR soil mix that allows for filtering and infiltration. Overflow devices are located within the rain garden trough to mitigate larger rain events. Plants that fit with the overall planting theme of the Corridor and are able to thrive in the wet and dry conditions of the rain garden will soften the rain garden and enable it to contribute to the aesthetics of the street. Further design and engineering are needed to verify the actual design and capacity of the system.



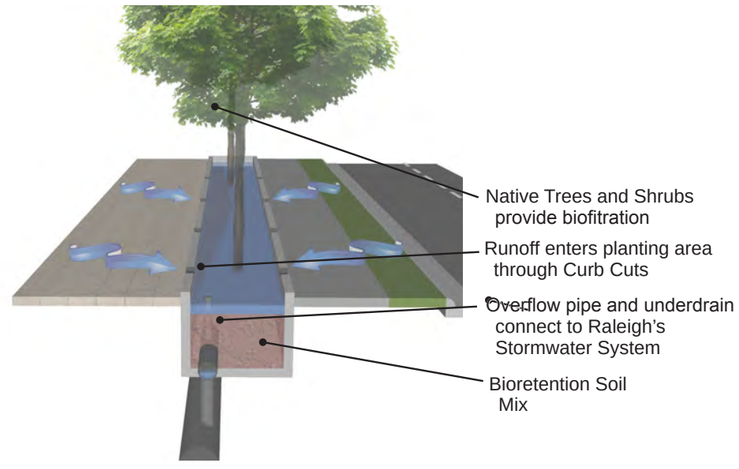
Streetscape Watershed Diagram



Permeable Pavers in Sidewalk Zone



20’ Median with Stormwater Storage and Treatment Capabilities



6’ Tree lawn with Stormwater Storage and Treatment Capabilities

Common Corridor Elements

Planting

The planting concept for Six Forks Road Corridor of a layered, seasonal southern landscape can be achieved regardless of whether stormwater BMPs are utilized in the planting areas. Plants with similar forms, textures and colors can be found on both lists below. While not exhaustive, these sample lists represent a palette of vegetation that when used appropriately, can convey the idea of the quintessential southern landscape. Native plantings are preferred, though non-invasive, adapted non-natives are acceptable, especially when they evoke the appropriate landscape image and are tolerant of urban conditions.

Maintenance

It should be noted that while most of these plants are low maintenance species they still do require a higher level of maintenance then what is currently on Six Forks Road. If the full vision of this corridor is realized, maintenance must be planned for within city budgets.

General Plant Palette

Canopy trees:

Swamp Oak – *Quercus alba*
Shumard Oak – *Quercus shumardii*
Bur Oak – *Quercus macrocarpa*
Lacebark Elm – *Ulmus parvifolia*
Green Ash – *Fraxinux pennsylvanica*
Red maple – *Acer rubrum*
Sugar Maple – *Acer Saccharum*

Understory trees:

Redbud - *Cercis canendensis*
Flowering dogwood - *Cornus florida*
Washington Hawthorn -*Crataegus phaenopyrum*
Hawthorne - *Crataegus viridis 'Winter King'*
Ironwood– *Carpinus caroliniana*
Serviceberry - *Amelanchier arborea*
Crabapple – *Malus spp.*
Witch Hazel - *Hamamelis virginiana??*

Shrubs:

Viburnum – (multiple species/cultivars)
Oakleaf Hydrangea – Hydrangea quercifolia
Azalea – azalea spp. (multiple species/cultivars)
Virginia Sweetspire – *Itea virginica*
Inkberry – *Ilex glabra*
Yaupon holly - *Ilex vomitoria*

Groundcover:

Fescue
Dwarf crested iris - iris cristata
Liriope spp.
Pennsylvania sedge - Carex pennsylvanica

Plant Palette for Bioretention areas

Canopy trees:

Nutall Oak – *Quercus nuttalii*
Swamp White Oak – *Quercus bicolor*
Willow Oak – *Quercus phellos*
Swamp Laurel Oak – *Quercus laurifolia*
Red Maple – *Acer rubrum*
River Birch – *Betula nigra*
Black Gum – *Nyssa sylvatica*

Understory trees:

Redbud– *Cercis canadensis*
Washington Hawthorn – *Crataegus phaenopyrum*
Fringe Tree – *Chionanthus virginicus*
Red Buckeye – *Aesculus pavia*
Ironwood– *Carpinus caroliniana*

Shrubs:

Beautyberry – *Callicarpa americana*
Sweet Shrub – *Calycanthus floridus*
Buttonbush – *Cephalanthus occidentalis*
Pepperbush – *Clethra alnifolia*
Winterberry – *Ilex verticillata*
Virginia Sweetspire – *Itea virginica*
Possumhaw Viburnum – *Viburnum nudum 'Winterthur'*
Inkberry – *Ilex glabra*

Groundcover:

Blue flag iris - Iris virginica
Creeping lily Turf - Liriope spicata
Lily Turf - Liriope muscarii
Fringed Sedge – Carex crinita

**Plants recommended for stormwater applications have variable tolerances for the depth and frequency of water inundation. Exact plant species should be chosen based on the final design and engineering of these stormwater treatment areas. Bioretention areas should be designed to drain within 1-2 days, in order to maximize the number of species suitable for that environment.

Generally appropriate plants


BurOak


Flowering Dogwood


Azalea


Oakleaf Hydrangea

Appropriate plants for stormwater BMPs


Swamp Laurel Oak

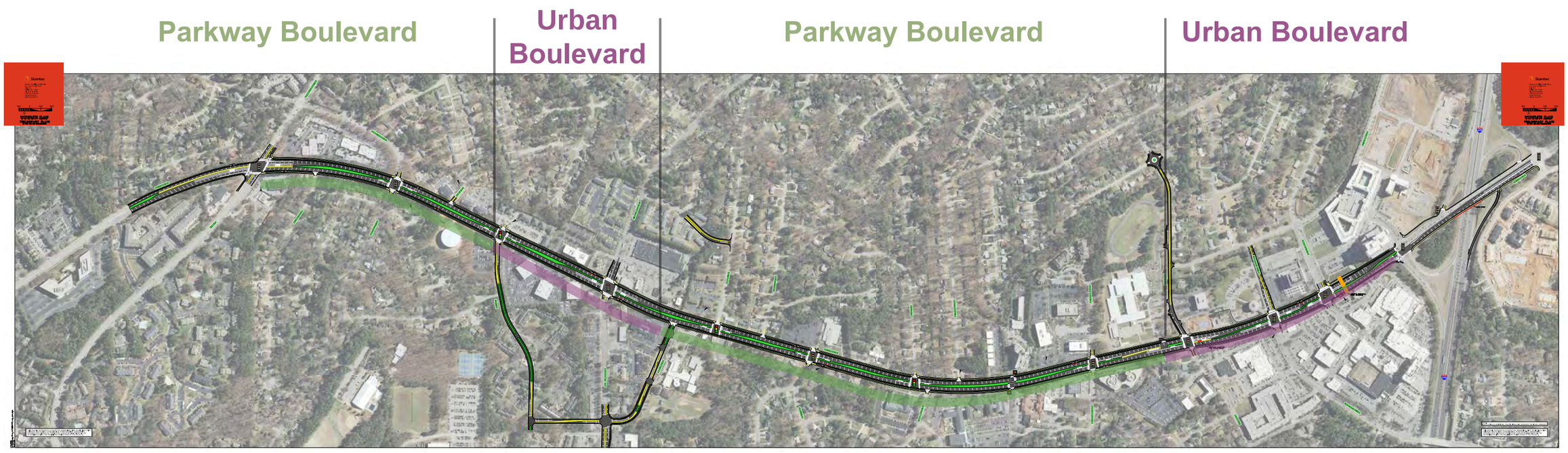

Eastern Redbud


Summersweet Clethra 'Ruby Spice'


Possumhaw Viburnum 'Winterthur'

Proposed Master Plan

Utilizing the design concepts and standards set forth in this chapter, along with the engineering design standards of the North Carolina Department of Transportation, the Design and Planning Team have developed a detailed Master Plan for the Six Forks Road Corridor. The proposed streetscape cross sections for both the Urban Boulevard and Parkway Boulevard areas have been applied on the ground, and adapted as necessary to accommodate real-life conditions. The spreads on the following pages depict the Corridor Master Plan from North to South, block by block, showing existing conditions on the left hand page and the proposed design treatments on the right for ease of comparison.



1. No existing crosswalks
2. Ramps not ADA compliant
3. Power pole between sidewalk and curb
4. Narrow Sidewalk 5’ or less
5. Wide curb cut for drive
6. Above ground control cabinets
7. Large trees outside and on edge of right-of-way
8. Crosswalk (non-high visibly)
9. Fence
10. Wall
11. Lighting on poles, 25’ mounting height
12. Trees underneath and/or growing into power lines
13. Irrelevant curb cut
14. Bus stop with shelter
15. Topography that potentially will impact roadway expansion
16. Median

Legend

- Major power line route
- Current right-of-way
- Power pole
- Existing Street Trees
- Road Center Line Offsets
- 100-120 feet wide
- 120-140 feet wide
- 140-160 feet wide
- Crosswalks

Notes

This section of road way has mature trees along both sides of the road and single family homes.

Power poles in this section are mostly back of curb.

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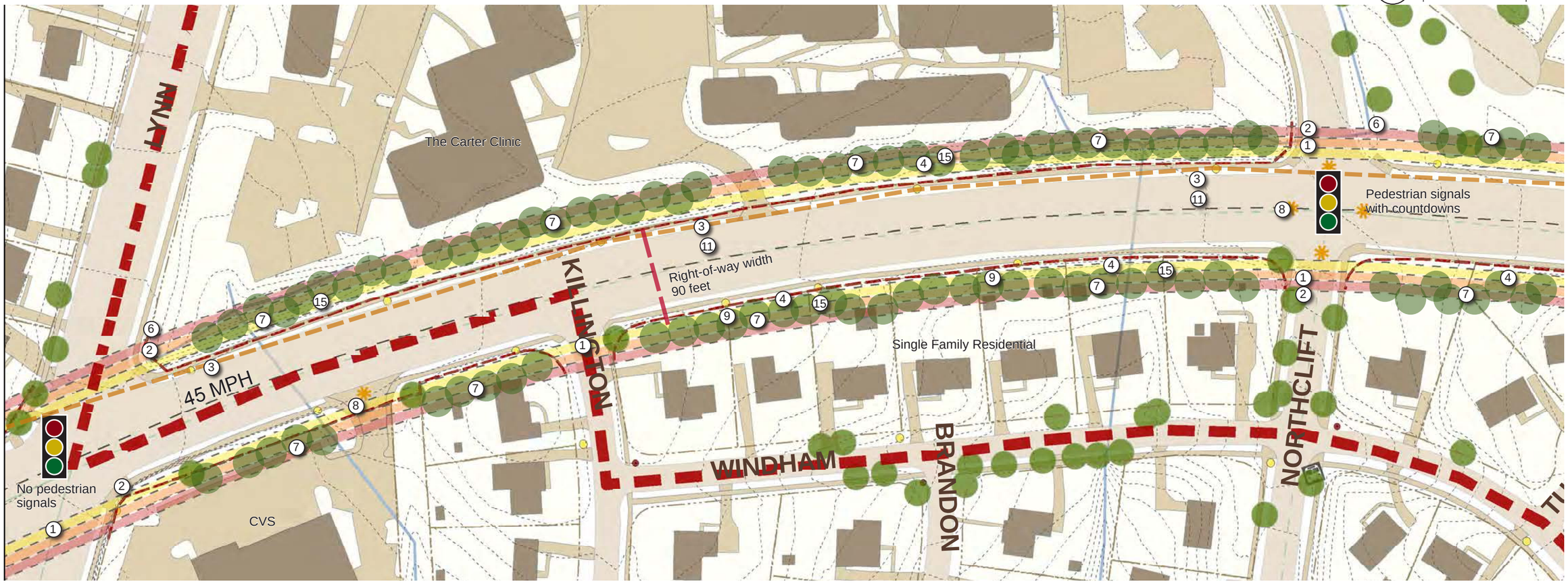

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2. Planted Median
3. Pedestrian Refuge
4. Neighborhood Gateway
5. Bus Stop
6. Potential Pedestrian Bridge Crossing
7. Bike Lane
8. Power Line Underground Location

Legend

Major power line route

Traffic Signal

N

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Notes

This section of road way has some mature trees and recent redevelopment.

Opportunities for redevelopment exist along this section of the Corridor.

There are topographic challenges along side the road which may impact road expansion.

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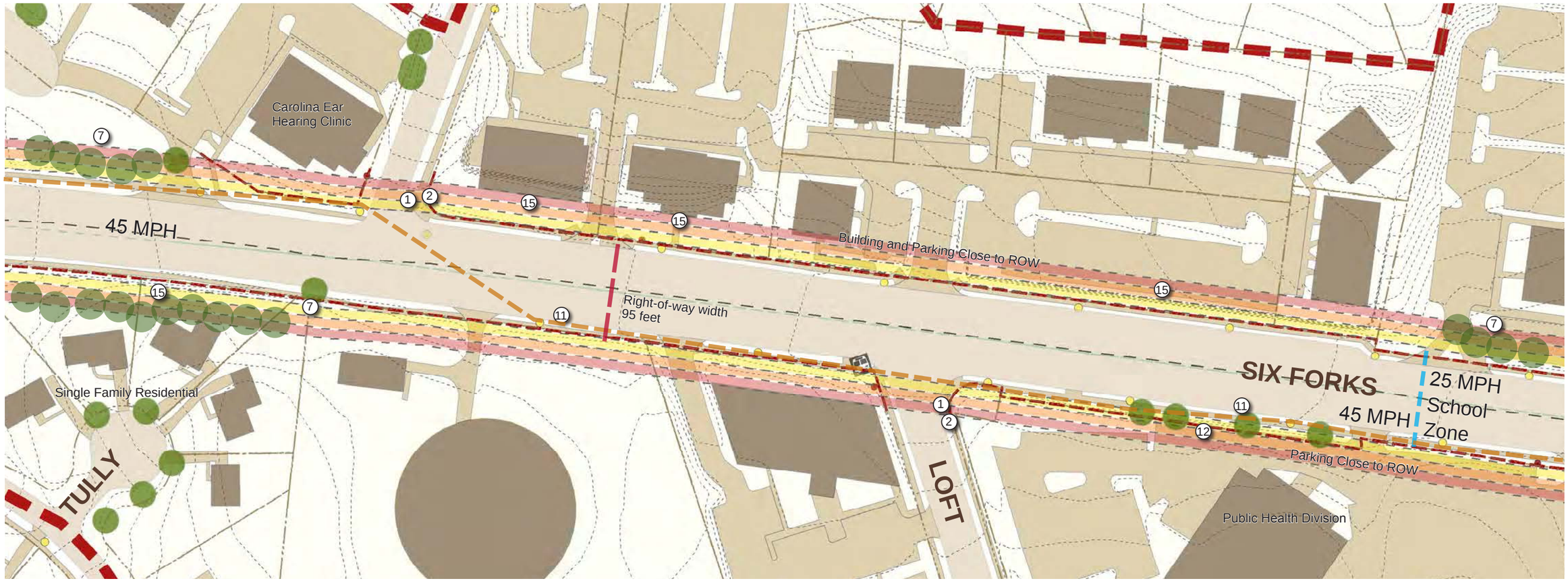

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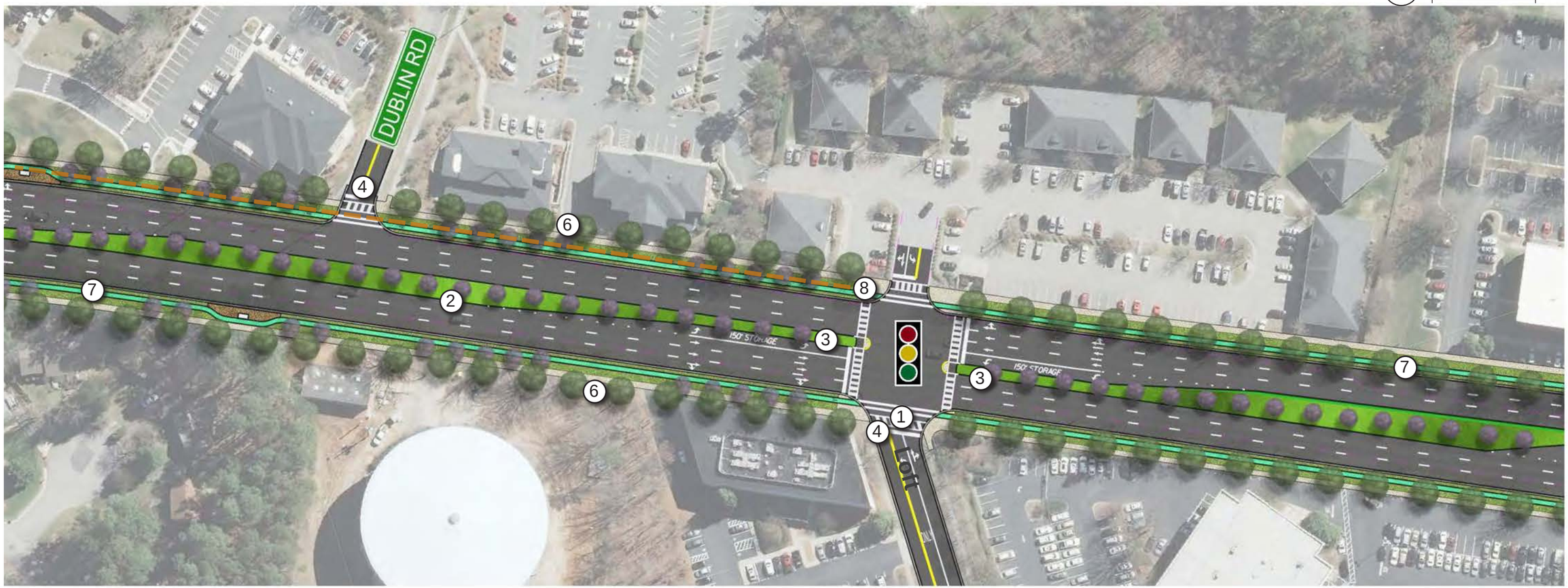

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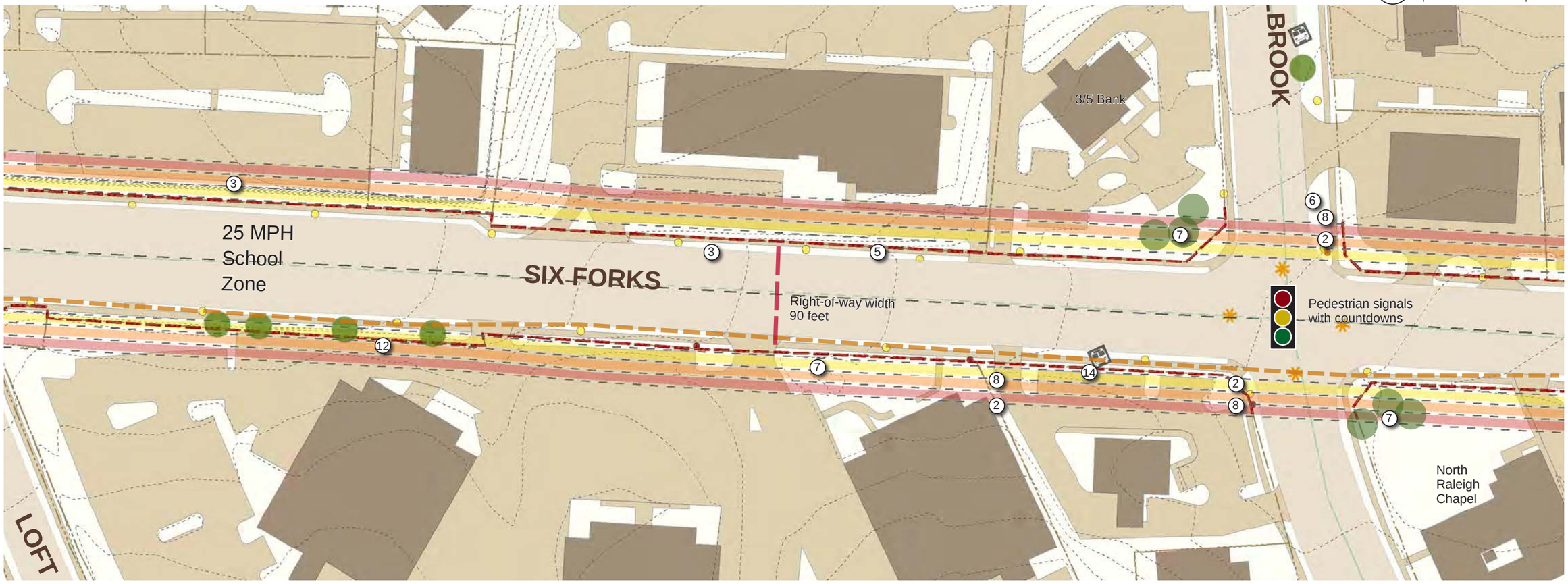
Notes

This section of road way has many opportunities for redevelopment.

Millbrook is a busy intersection that is difficult to cross.

N 0 80



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Notes

The Food Lion in this section of road creates more pedestrian traffic in this area. While in the Corridor we noticed several pedestrians crossing at the mid-block.

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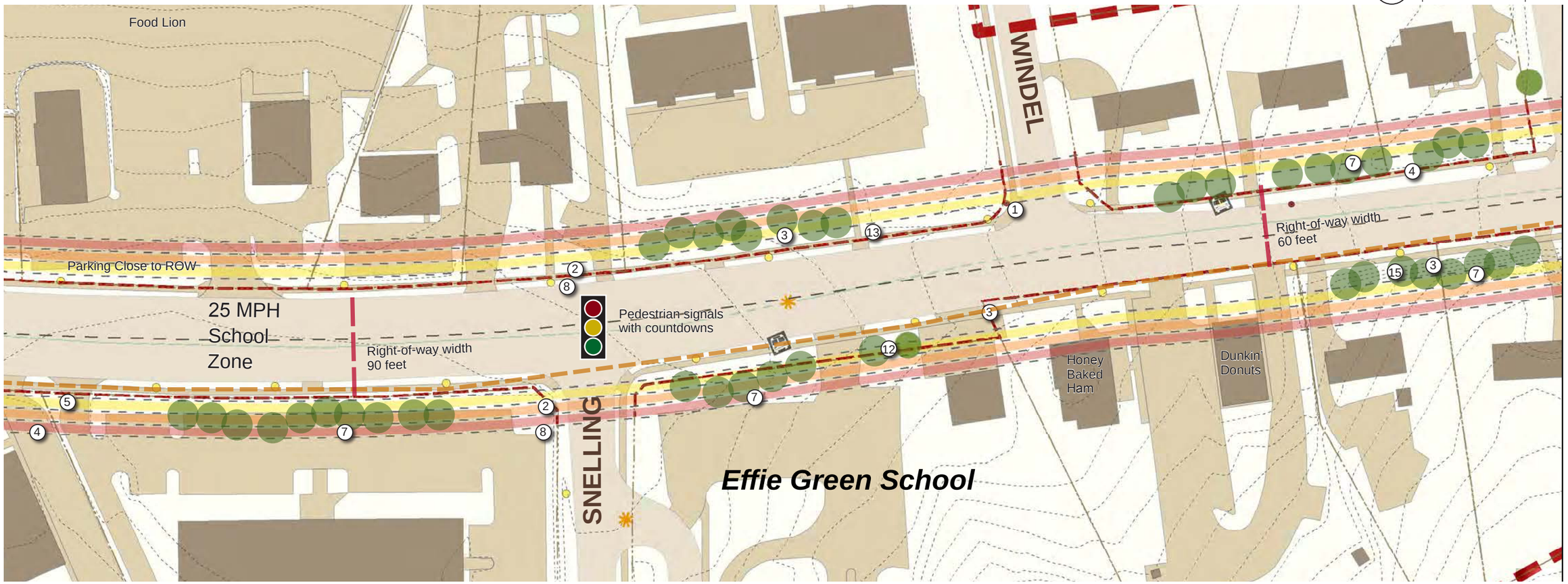

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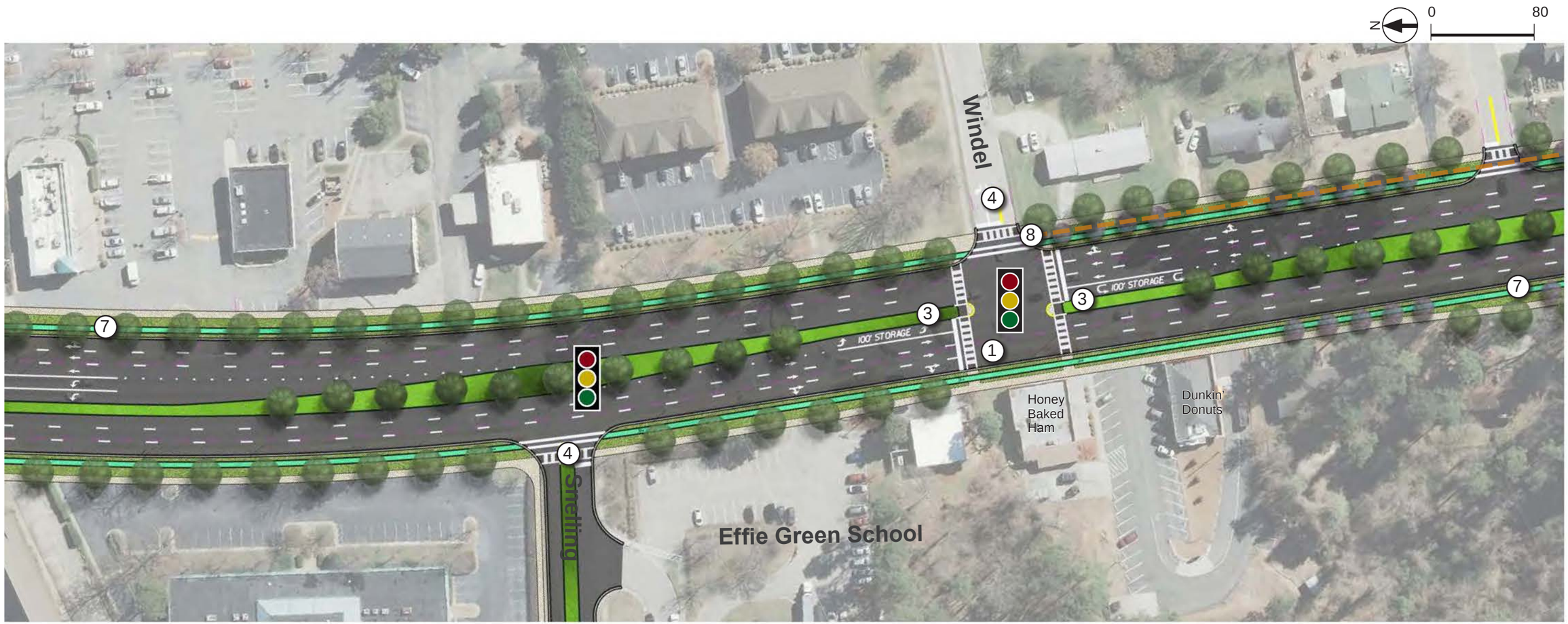

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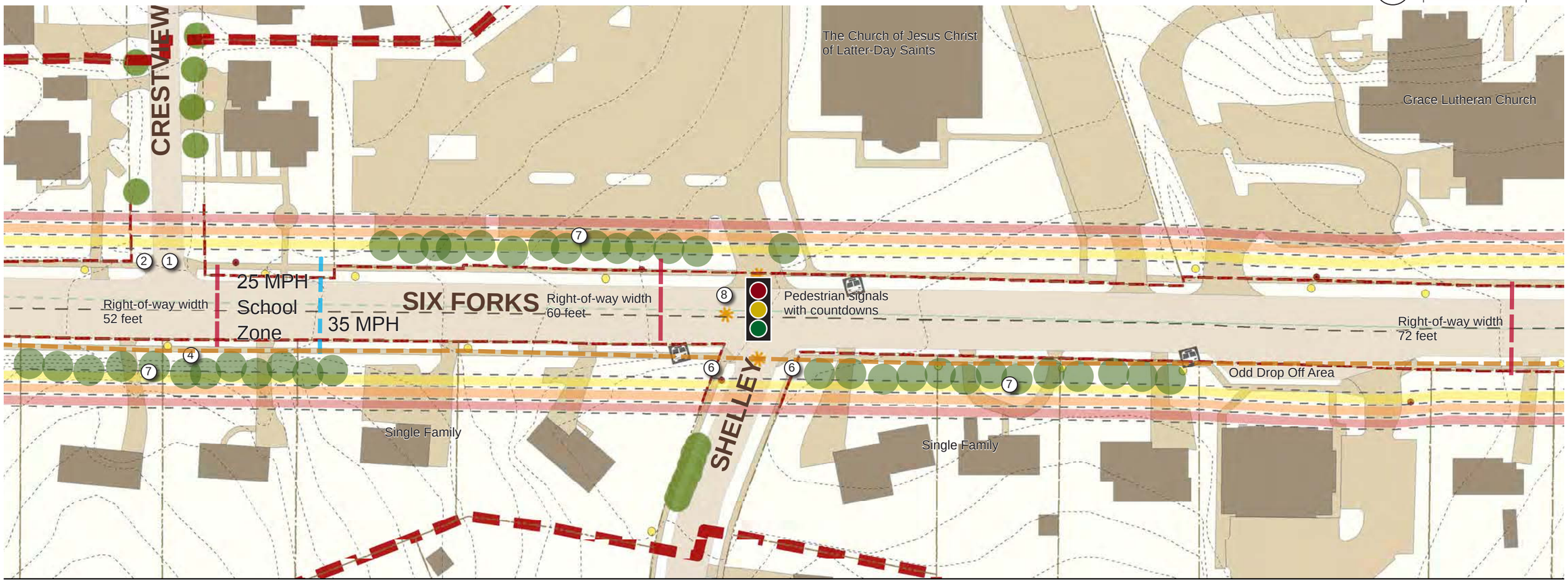
Notes

This middle section of the Corridor has more churches, schools and single family residential then any other section. Traffic can be briefly heavy Saturdays, Sundays and Wednesday evenings.



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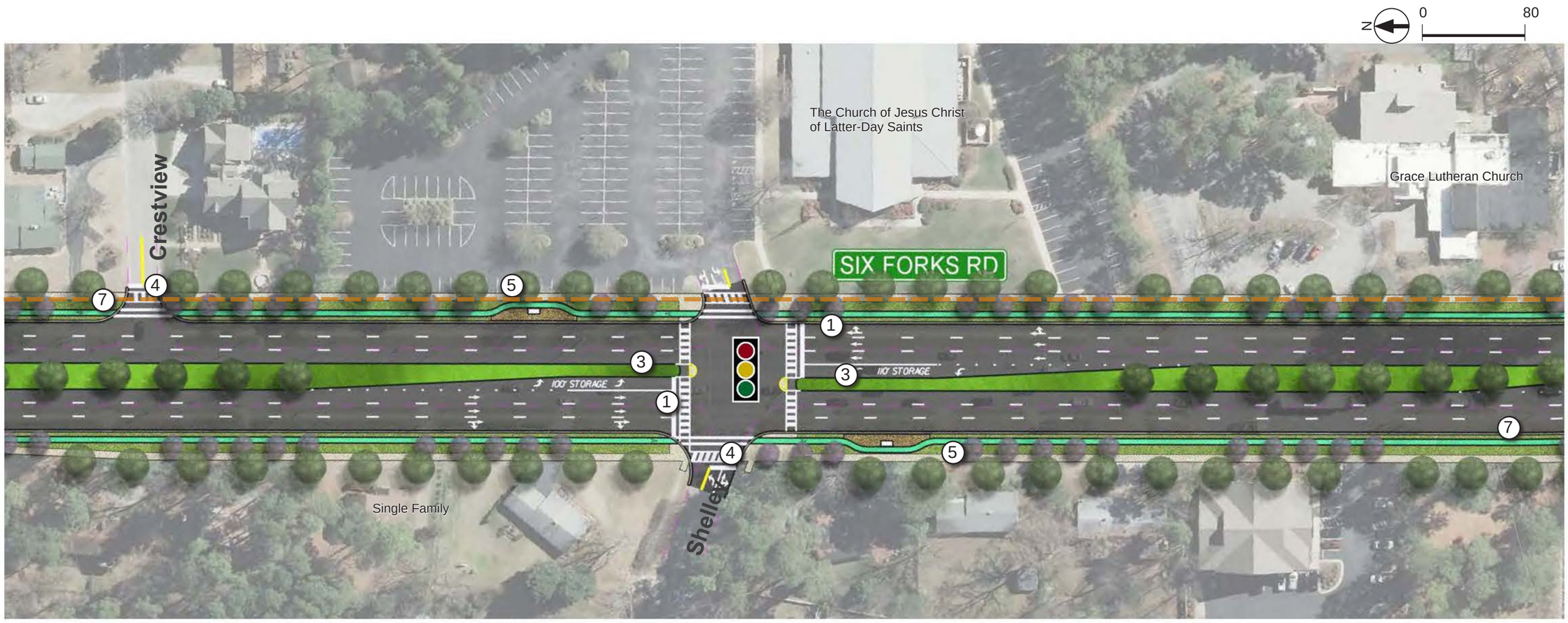

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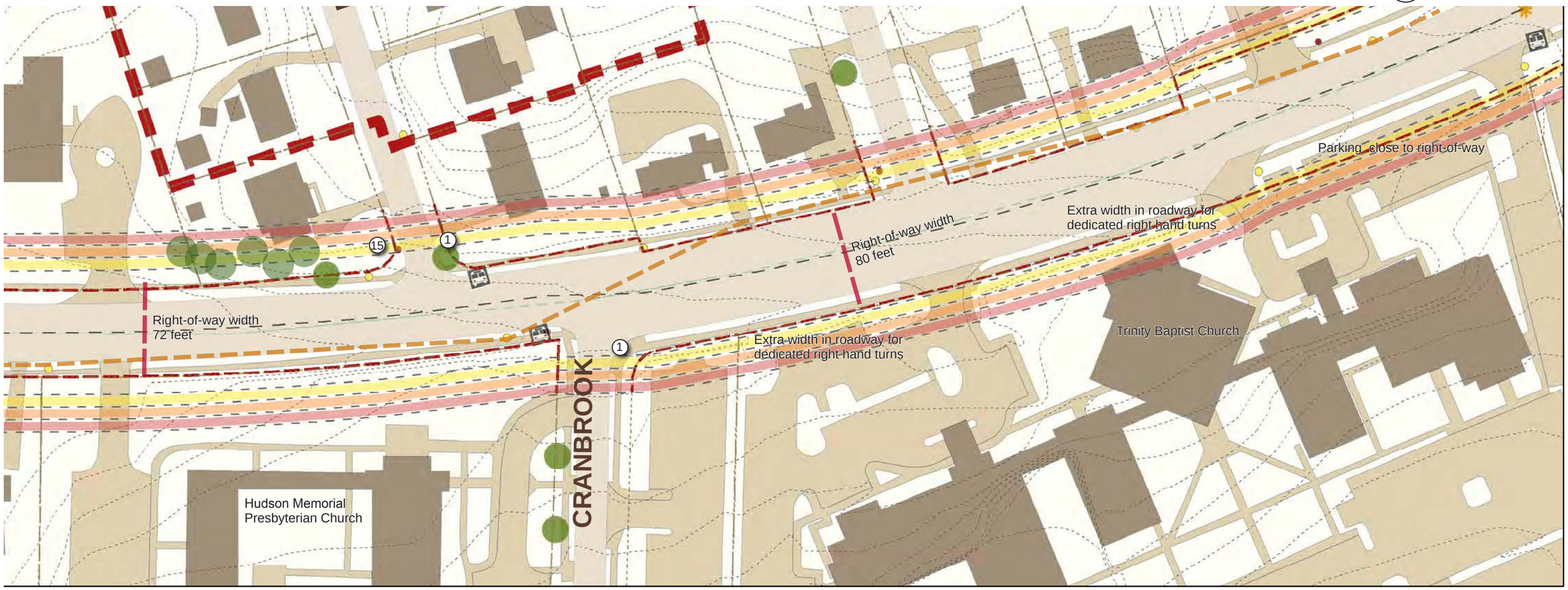
Notes

This continues the middle section of the Corridor which is predominantly churches, schools and single family residential.

N 0 80



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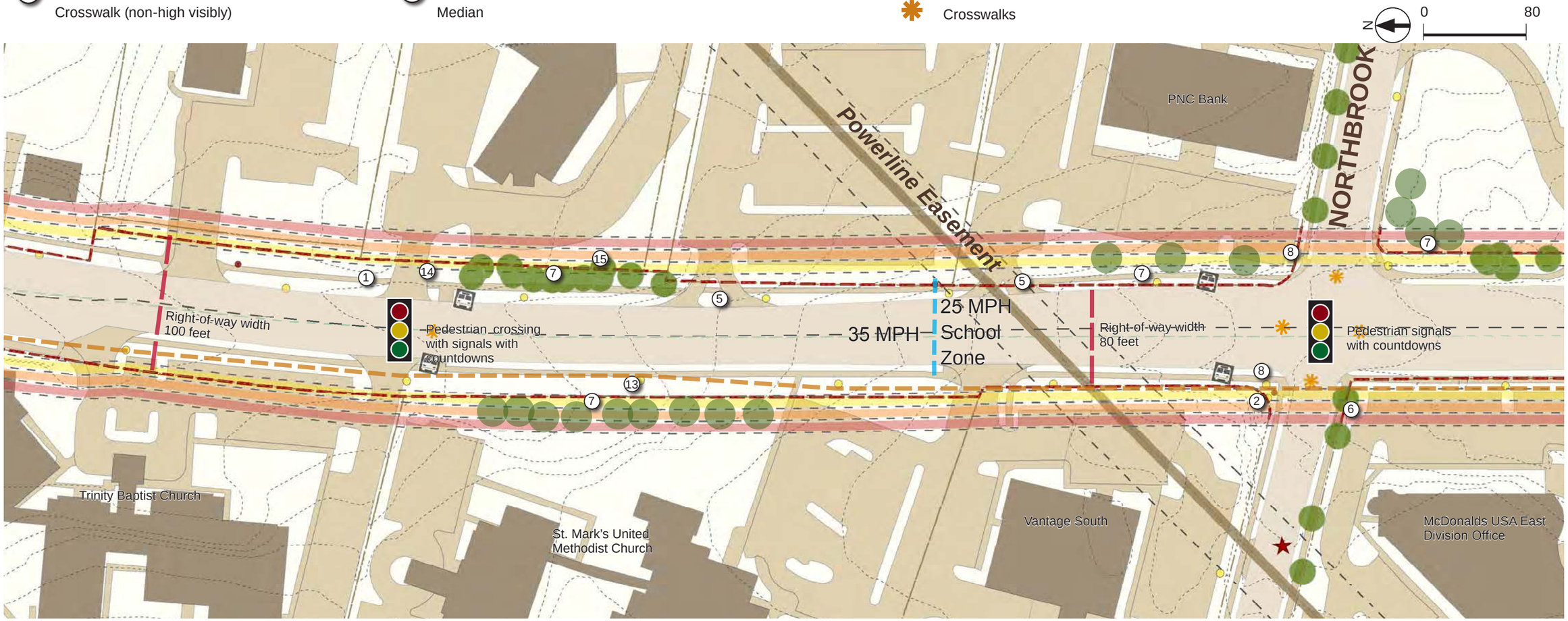
Notes

Churches continue to flank the west side of the road with well establish landscapes.

Redevelopment is occurring on the east side of the road where there are also properties with potential for higher and better use.



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Road Center Line Offsets

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Notes

Carroll Middle School has several access challenges.

The private schools associated with the local churches also generate a considerable amount of trip during the morning rush hour period.

The intersection of Rowan and Six Forks is critical for pedestrians traveling to and from the schools.

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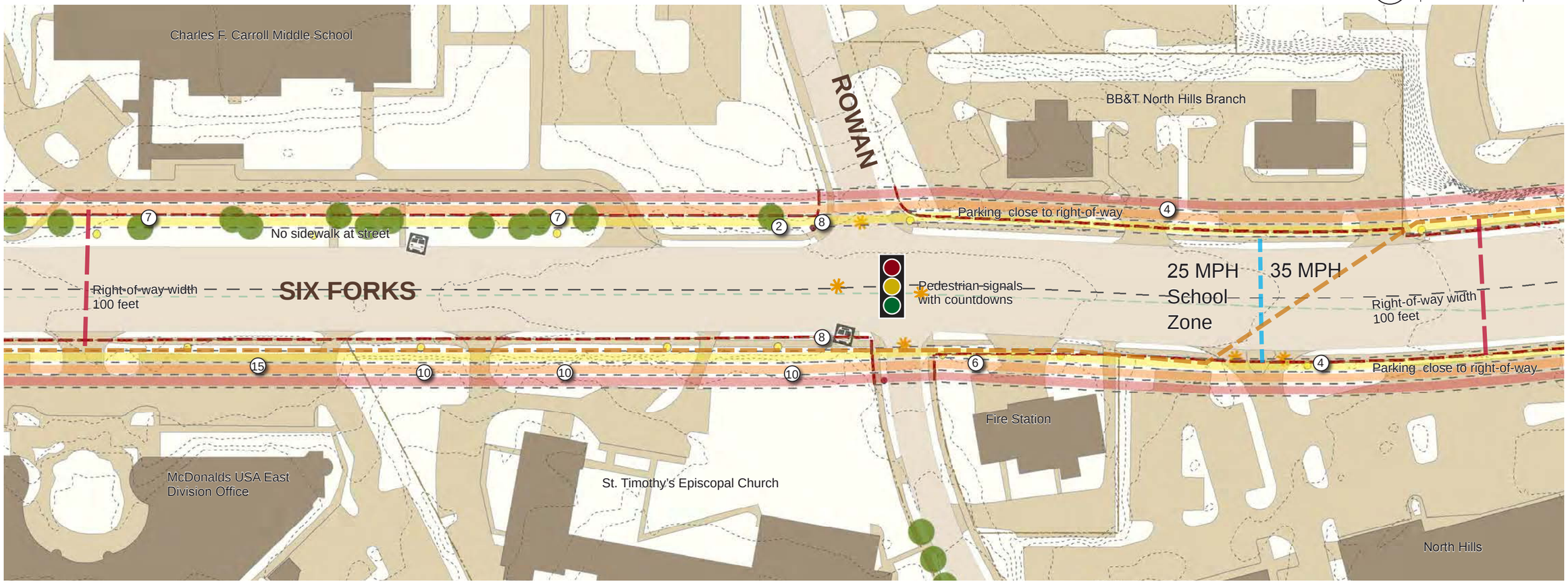

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Notes

North Hills is a popular destination in the Mid-town and the greater Raleigh areas. It has created attractive internal streets and upgraded the intersections that turn into North Hills.

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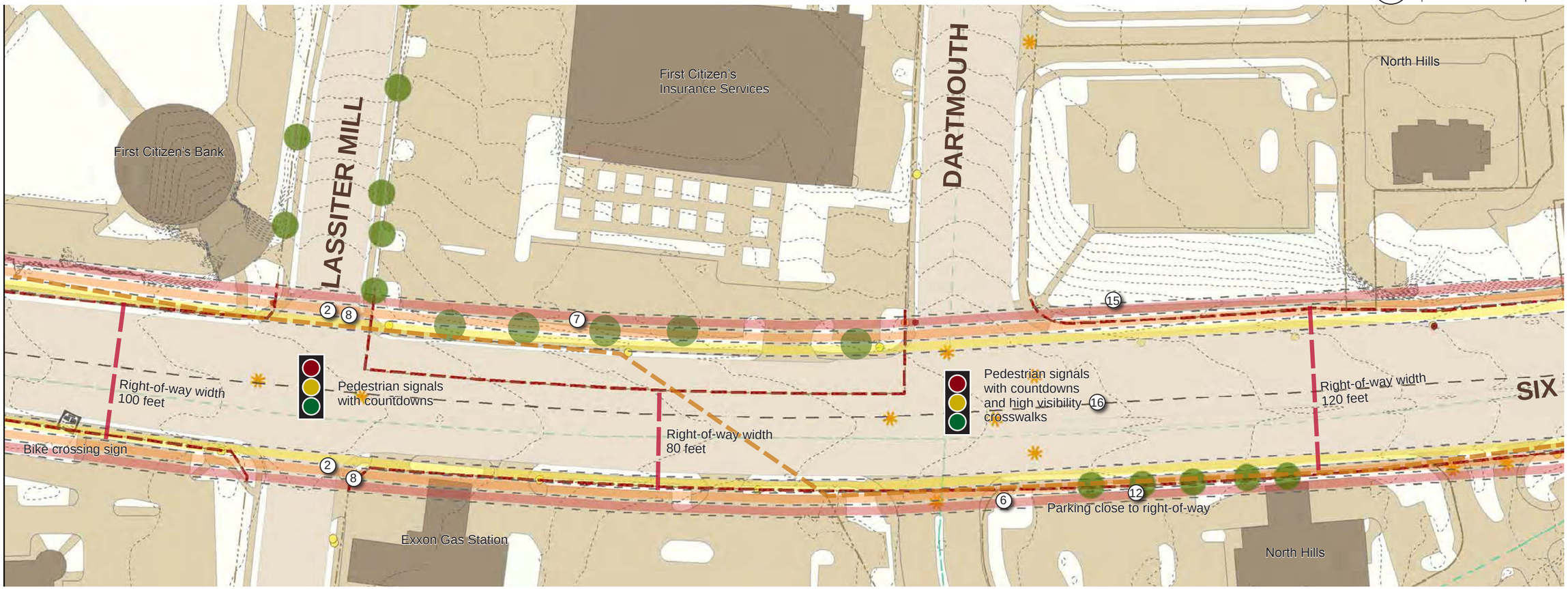

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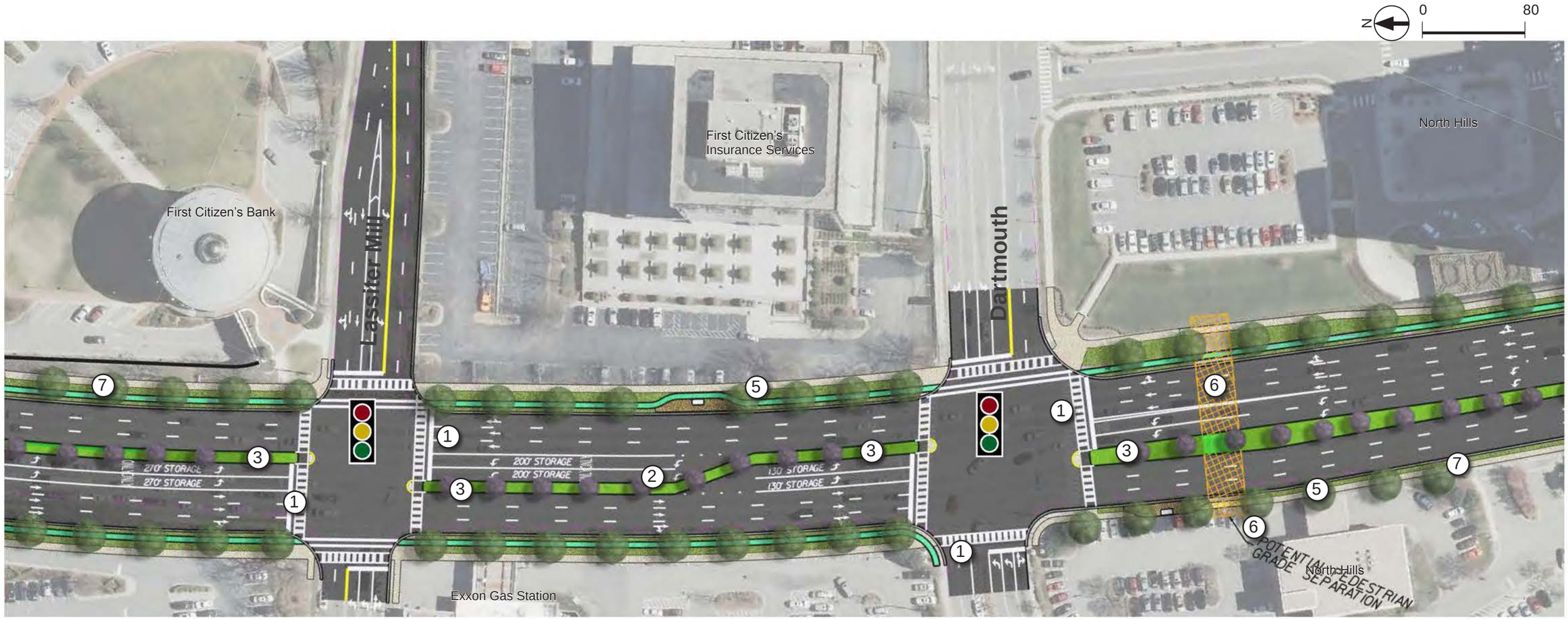
Legend

Major power line route

Traffic Signal



1. No existing crosswalks
2. Ramps not ADA compliant
3. Power pole between sidewalk and curb
4. Narrow Sidewalk 5’ or less
5. Wide curb cut for drive
6. Above ground control cabinets
7. Large trees outside and on edge of right-of-way
8. Crosswalk (non-high visibly)
9. Fence
10. Wall
11. Lighting on poles, 25’ mounting height
12. Trees underneath and/or growing into power lines
13. Irrelevant curb cut
14. Bus stop with shelter
15. Topography that potentially will impact roadway expansion
16. Median

Legend

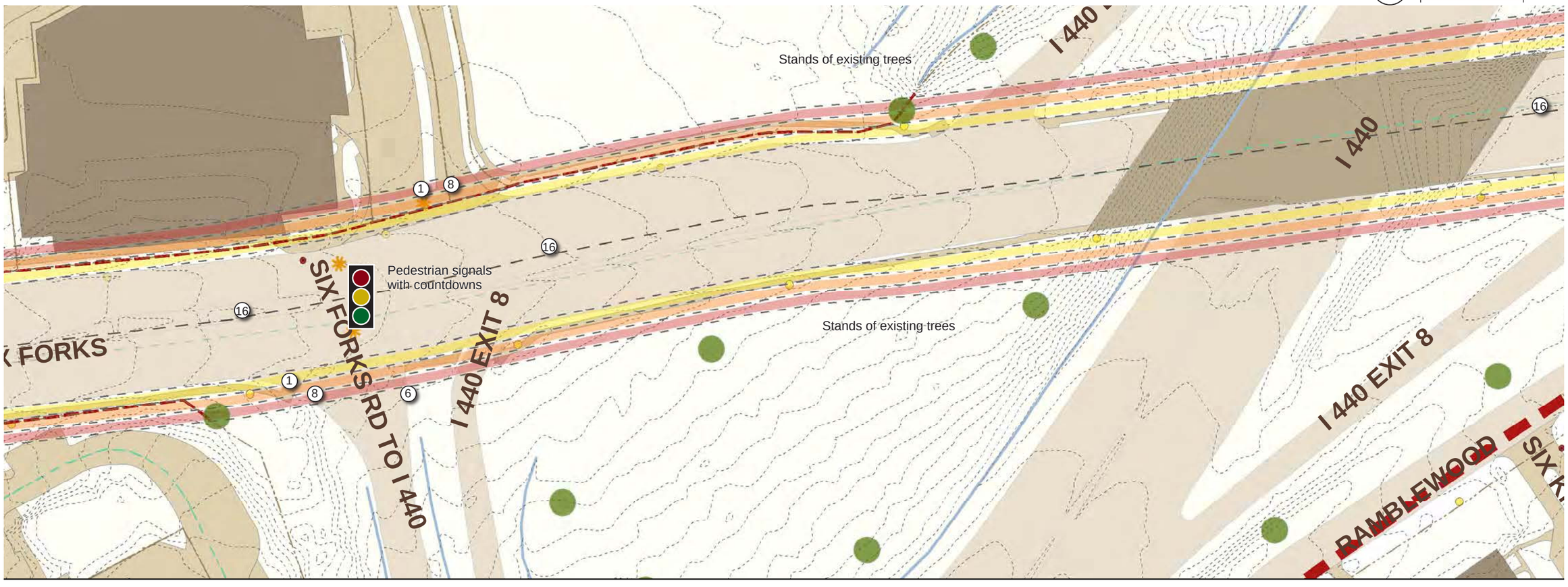
- Major power line route
- Current right-of-way
- Power pole
- Existing Street Trees
- Road Center Line Offsets
  - 100-120 feet wide
  - 120-140 feet wide
  - 140-160 feet wide
- Crosswalks

Notes

Conditions at the on and off ramps for I-440 vary. Treatment should be consistent and ideally all turning movements be inside a controlled intersection.

This exit off of I-440 could have a much stronger identity with signage and planting.

N 0 80



1. High Visibility Crosswalks
2. Planted Median
3. Pedestrian Refuge
4. Neighborhood Gateway
5. Bus Stop
6. Potential Pedestrian Bridge Crossing
7. Bike Lane
8. Power Line Underground Location

Legend

Major power line route

Traffic Signal

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2. Ramps not ADA compliant
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Legend

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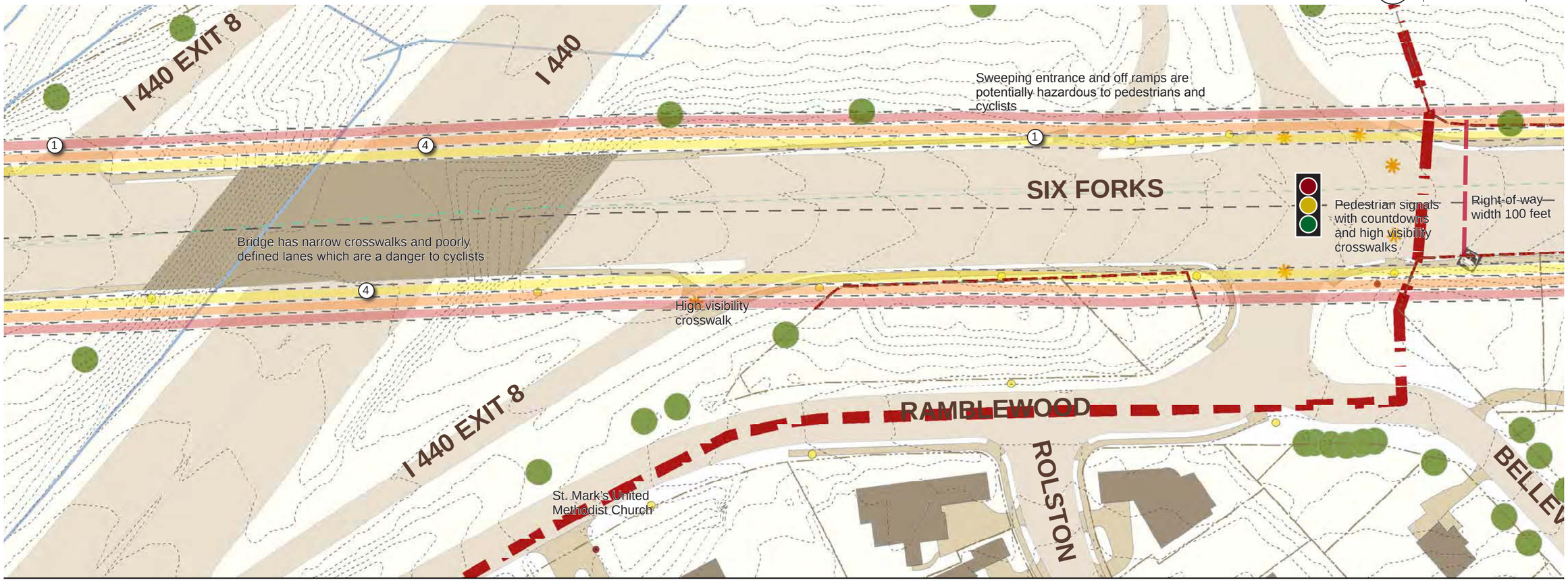

1. High Visibility Crosswalks
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5. Bus Stop
6. Potential Pedestrian Bridge Crossing
7. Bike Lane
8. Power Line Underground Location

Legend

Major power line route

Traffic Signal

N 0 80

Interchange Gateway Planting

Off-Corridor Improvements

A – Tralee Place-Windell Drive Connection

B – Loft Lane Connection Stub

C – Snelling Road Extension

D – Rowan Street Roundabout and Turn Lane

The plan also outlines potential street improvements and connections located in close proximity to Six Forks Road. The proposed street connections surrounding the Six Forks/Millbrook intersection of Six Forks could provide additional interconnectivity, helping ease automobile pressures on the intersection and allowing users additional options for circulating along the Corridor. The roundabout and turn lane improvements to Rowan Street could help with access to and from Carroll Middle School and queuing for pickup and drop off.

The Tralee-Windell connection and Loft Lane connection and stub would most likely be part of private redevelopment of property in those locations, while the connection of Snelling Road to Millbrook Road would likely be a City-initiated project. Suggested improvements to Rowan Street could be funded by either the City or Wake County Schools, or a combination of the two.

Tralee-Windell Connection

A

B & C

Rowan Street Roundabout

D

3

PLANNING FRAMEWORKS

Purpose: This chapter describes planning concepts at a framework level that can be implemented over time behind the Right of way and within redevelopment sites to enable the Corridor to become better connected and to enhance its long term value and potential.

- Redevelopment Opportunities
- Future Land Use Review
- UDO Zoning Review
- Transportation Frameworks
- Urban Design Frameworks

Redevelopment Opportunities

As part of understanding the long term potential of the Six Forks Corridor to redevelop toward a higher and better future use, along with possible increased revenue to the City in the form of sales and property tax, the Master Plan considers seven sites along the Corridor's length that appear to be the most likely candidates to change or evolve. These sites, chosen from the public process and the planning team's existing conditions analysis, have been studied by Noell Consulting Group (NCG) for their ability to support a higher and better use based on: 1) their location along the Corridor; 2) their physical condition relative to size, frontage, depth and access; 3) their current and expected near and long term market potential; 4) the existing land uses located along the Corridor and the existing Comprehensive Plan and UDO regulations; 5) the age and quality of the existing land uses; 6) and finally the nature of the land ownership and issues and opportunities associated with consolidating properties for redevelopment.

The analysis, in summary, revealed several important considerations. First, considering current market conditions, the nature of land ownership along the Corridor, and the relatively young age of many of the developments, there is limited near-term potential to create redevelopments that would further urbanize or consolidate the Corridor. Secondly, there does appear, however, to be long-term redevelopment potential on many of the sites. That being said, the residential properties along the Corridor are not of a reasonable depth to be able to support much more than townhouse level density or lower density office uses given that parking will have to be provided off-street. Finally, further planning of some of the larger sites, such as sites #2 and #3 in particular, may create an incentive for property owners to work toward a common idea about development form, land use and circulation so that a framework of redevelopment is created and followed that leads toward a greater outcome for the Corridor.

Site 1: Sandy Forks Site

Site 2: Loft Road / Millbrook Road Site

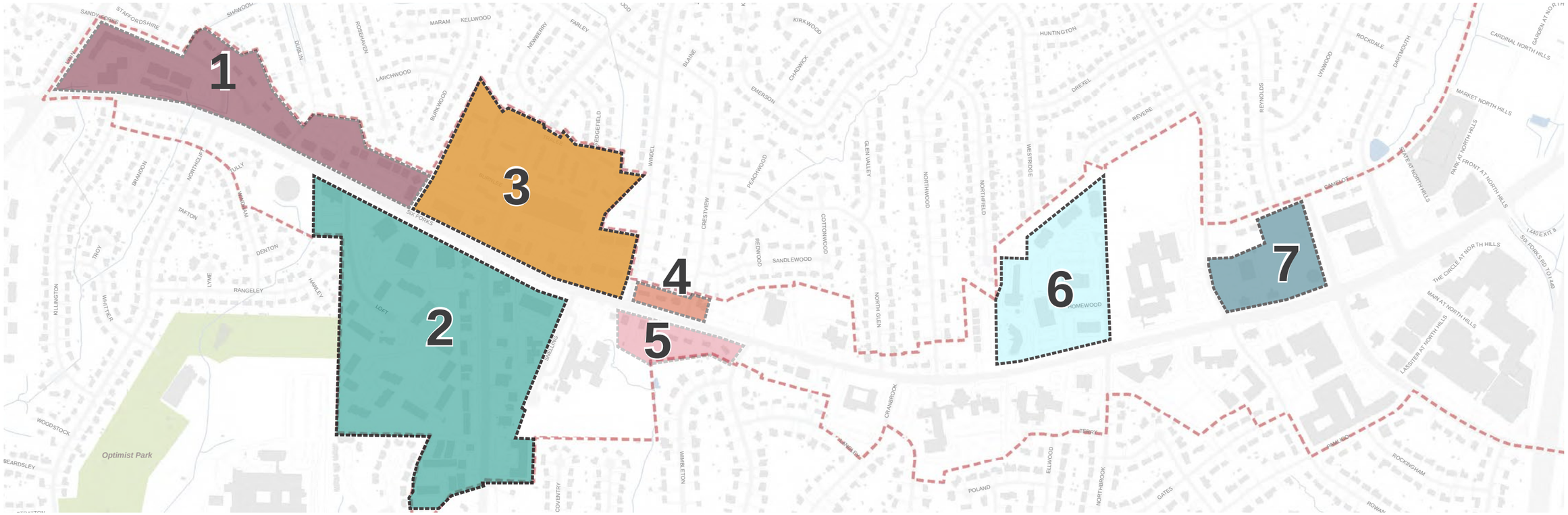
Site 3: Millbrook Shopping Center Site

Site 4: Effie Green School Site

Site 5: Shelley Road Site

Site 6: Northbrook Drive Site

Site 7: Homewood Road Site



Examples of areas that potentially could be redeveloped in the future. Other sites in the Corridor could exist and should be investigated.

Redevelopment Opportunities

Site 1: Sandy Forks Site

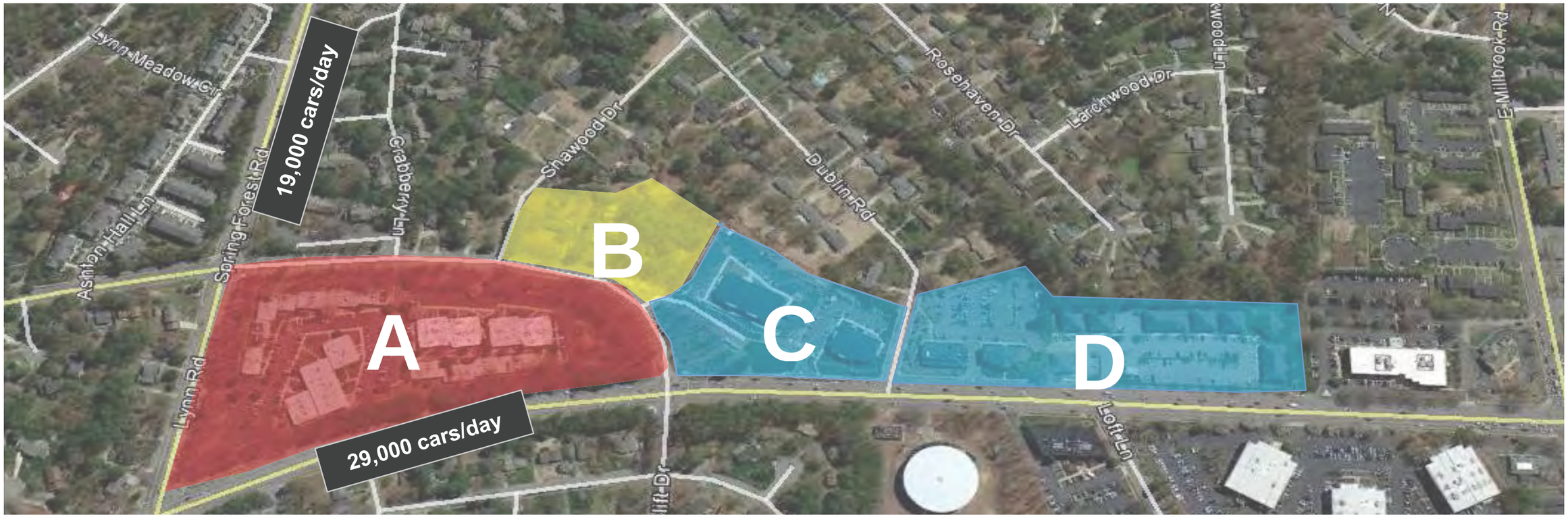
Parcels A & B have been identified as mid to longer-term redevelopment opportunities, replacing an aging office park and single-family homes in the Corridor.

NCG envisions A being potentially redeveloped as a freestanding grocery with possible ancillary retail and a street-oriented rental apartment community with rear surface parking.

Parcel B represents a solid opportunity to be redeveloped as for-sale townhouses.

Parcels C & D are more challenging and are not candidates for near or mid-term redevelopment.

	Parcel A	Parcel A	Parcel B	Parcel C	Parcel D
Current Land Use	Office		Single-Family	Office	Office
Estimated Current Value	$7,400,000		$675,000	$8,600,000	$16,000,000
Approximate Acres	10.5		2.7	3.5	5.2
Price per Acre	$705,000		$250,000	$2,457,143	$3,076,923
Redevelopment Feasibility	5 - 10 Years Out		Now	Not Feasible	Not Feasible
NCG Recommended Land Use	N'hood Retail	Rental Apartments	Townhouses		
Intensity (SF or DU/Ac)	10,000 SF/acre & 32 DU/AC		12/Acre		
Height	Single-story retail, 4-story MF		3-Story		
Yield	20,000 SF retail, 270 MF units		32		
Max Land Price per SF/Door	Retail: $400k/ac,	MF: $835k/ac	$30,000		
Estimated Value/SF	$215/SF	$207/SF	$160/SF		
Total Value	$4,300,000	$44,712,000	$10,368,000		
2014 City of Raleigh Prop. Tax Rate	$0.4038	$0.4038	$0.4038		
Annual Property Taxes Generated	$17,363	$180,547	$41,866		



Source : Noell Consulting Group

Redevelopment Opportunities

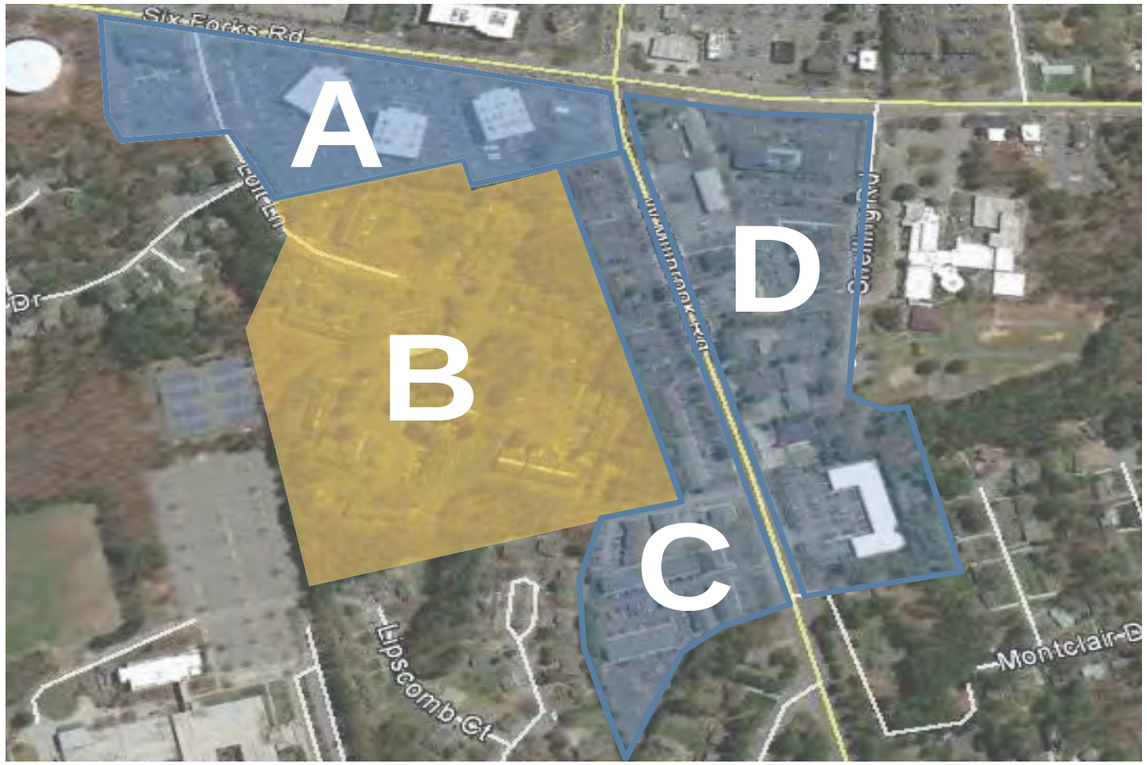
Site 2: Loft Road / Millbrook Road Site

Site 2 represents perhaps the most challenging redevelopment site of the seven being examined.

Office uses on the property are either achieving significant enough lease rates to make redevelopment prohibitive (as in the case of Parcel A), or are fractured into condominium ownership, making parcel assembly unrealistic and expensive (Parcels C & D).

Parcel B, an aging rental apartment community, has just undergone a significant renovation and bumped rents by 30% in the last few years, making any type of redevelopment in the near or mid-term infeasible.

	Parcel A	Parcel B	Parcel C	Parcel D
Current Land Use	Office	Rental Apartments	Office Condos/ Multiple Ownership	Office Condos/ Multiple Ownership
Estimated Current Value	$27,450,000	$15,000,000		
Approximate Acres	9.1	21.0		
Price per Acre	$3,016,000	$714,286		
Redevelopment Feasibility	Site undergoing due diligence for redevelopment	Site undergoing due diligence for redevelopment	Not Feasible (multiple owners)	Not Feasible (multiple owners)
NCG Recommended Land Intensity (SF or DU/Ac)				
Height				
Yield				
Max Land Price per SF/Doc				
Estimated Value/SF				
Total Value				



Source : Noell Consulting Group

Current office uses make redevelopment not feasible for the near future.

Redevelopment Opportunities

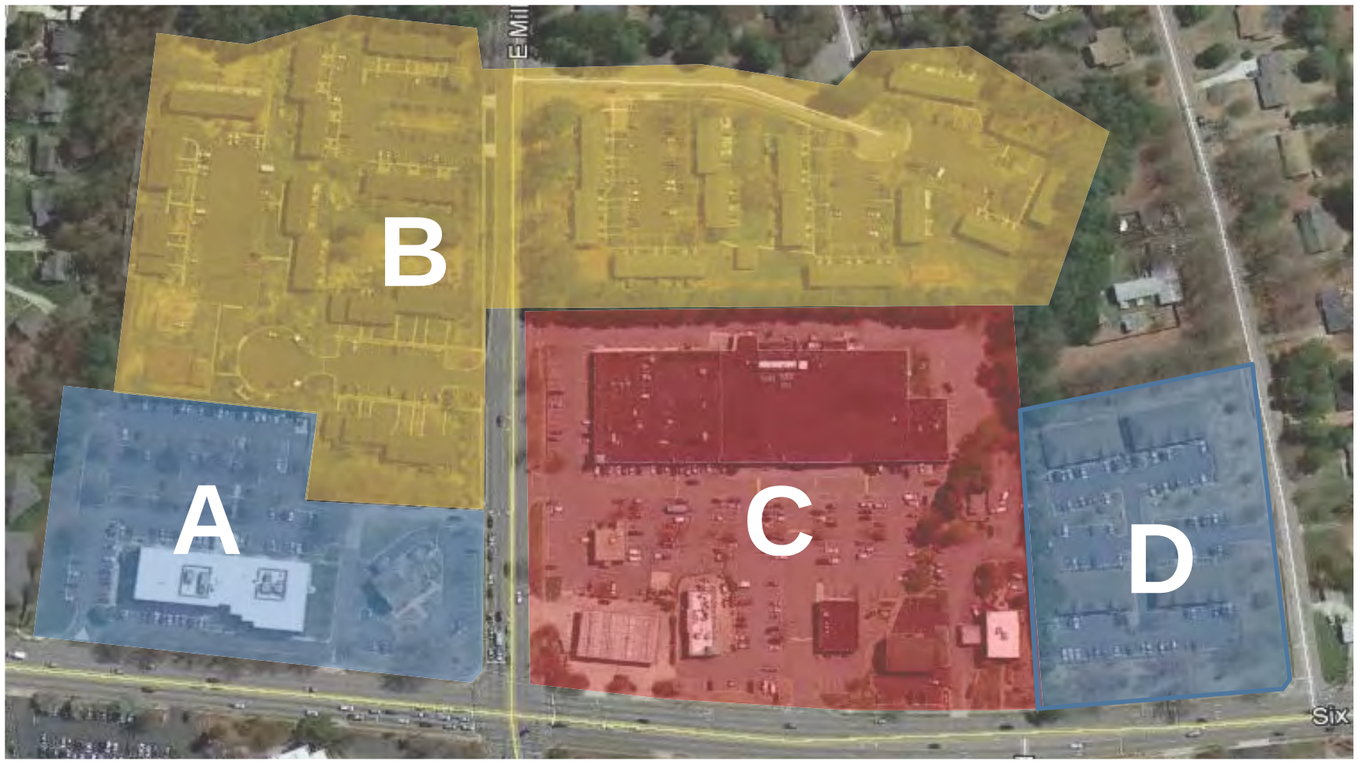
Site 3: Millbrook Shopping Center Site

Parcels A & C in Site 3--office and retail uses--appear too expensive for redevelopment in the next decade, with Parcel C becoming a candidate for eventual redevelopment into urban rental apartments with some ground floor retail.

Parcel D, which is currently office condos, offers the same challenges as those noted in Site 2, mainly the high costs of parcel assembly.

Parcel B, however-- two aging rental apartment communities-- does represent an opportunity for redevelopment in the coming 5 - 10 years as a more urban garden product. It would be surface parked, but would offer a street-orientation and more urban feel.

	Parcel A	Parcel B	Parcel C	Parcel D
Current Land Use	Office	Rental Apartments	Shopping Center	Office Condos/ Multiple Ownership
Estimated Current Value	$8,700,000	$10,115,000	$12,070,000	
Approximate Acres	3.8	13.4	6.0	
Price per Acre	$2,264,000	$757,678	$2,011,667	
Redevelopment Feasibility	Not Feasible	5 - 10 Years	10 Years	Not Feasible (multiple owners)
NCG Recommended Land Use		Rental Apartments	Urban Rental Apts.	
Intensity (SF or DU/Ac)		32.0	75.0	
Height		Four-story	Five-Story	
Yield		427	623	
Max Land Price per SF/Door		MF: $835k/ac	MF: $1,070k/ac	
Estimated Value/SF		$207/SF	$220/SF	
Total Value		$70,744,320	$109,560,000	
2014 City of Raleigh Prop. Tax Rate		$0.4038	$0.4038	
Annual Property Taxes Generated		$285,666	$442,403	



Source : Noell Consulting Group

The Millbrook Shopping Center could provide both retail and housing opportunities upon redevelopment.

Redevelopment Opportunities

Sites 4 & 5: Effie Green School Site and Shelley Road Site

Sites 4 & 5 (Parcels A & B, respectively) are very low density single-family units today and are solid redevelopment opportunities as low-intensity office and for-sale townhouse uses.

Site 4 (Parcel A), is quite small and, given its size, likely is best suited for redevelopment as a two-story office building (about the only intensity that will work on the site).

Site 5 (Parcel B), is somewhat larger, but the current uses-- a new veterinary clinic on the southern end of the parcel and various commercial uses (Dunkin Donuts/Baskin Robbins and Honeybaked Ham stores)-- will likely be cost-prohibitive to redevelop into for-sale townhouses--the logical land use for the site.

	Parcel A	Parcel B
Current Land Use	Single-Family	Single-Family
Estimated Current Value	$750,000	$1,000,000
Approximate Acres	1.5	2.5
Price per Acre	$500,000	$400,000
Redevelopment Feasibility	5 - 10 Years	5 Years
NCG Recommended Land Use	Office	Townhouses
Intensity (SF or DU/Ac)	15,000	12.0
Height	Two-story	Three-story
Yield	22,500	30
Max Land Price per SF/Door	$480k/ac	$30,000
Estimated Value/SF	$206/SF	$160/SF
Total Value	$4,635,000	$9,600,000
2014 City of Raleigh Prop. Tax Rate	$0.4038	$0.4038
Annual Property Taxes Generated	$18,716	$38,765

Source : Noell Consulting Group

Single-family homes located between commercial uses are currently for sale, providing opportunity for redevelopment.

Redevelopment Opportunities

Sites 6 & 7: Northbrook Drive Site and Homewood Road Site

Sites 6 & 7 are quite different in terms of their redevelopment potential.

Site 6 (parcel A), is heavily developed, particularly Capital Towers on the site's northern end. The most significant development opportunity is the potential decking of some of the surface parking (namely the lot behind 4800 Six Forks Road) which would free up the front lot for development of an office building on the property. The condos in the back of the property feature multiple ownerships and a less visible location and are unlikely to be redeveloped .

Easily the most attractive redevelopment site of the seven studied, Site 7 is grossly under-utilized and is close to some of North Raleigh's most intense and expensive product. Assuming the two First Citizen buildings remain on-site, the balance of the 9 or so acres could be developed as high-rise office and a mid-rise rental apartment community, The site could be better integrated and could build on the value creation occurring just to the south.

	Parcel A	Parcel B	Parcel C
Current Land Use	Office Parking	Office/Parking	SFD, Vacant
Estimated Current Value		$4,707,989	$3,250,000
Approximate Acres	0.8	2.5	6.5
Price per Acre		$1,877,197	$500,000
Redevelopment Feasibility	5 - 10 Years	5 Years	5 Years
NCG Recommended Land Use	Office	Office	Rental Apartments
Intensity (SF or DU/Ac)	125,000	110,000	75.0
Height	5-Story	10 floors +/-	5-Story
Yield	100,000	276,000	488
Max Land Price	$480k/ac	$1M+	$30,000/Unit
Estimated Value/SF	$206/SF	$334/SF	$240/SF
Total Value	$20,600,000	$92,184,000	$93,600,000
2014 City of Raleigh Prop. Tax Rate	$0.4038	$0.4038	$0.4038
Annual Property Taxes Generated	$83,183	$372,239	$377,957

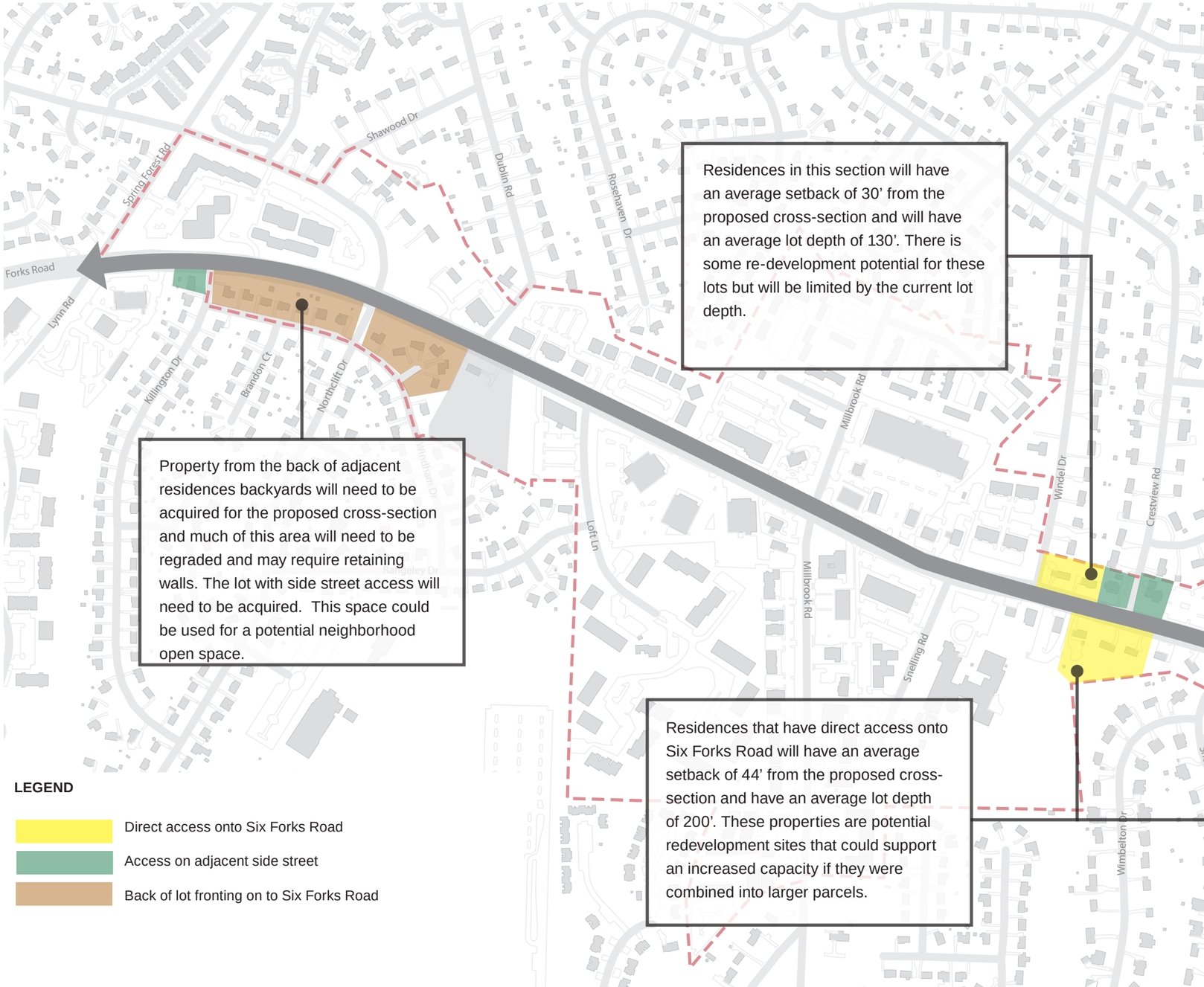
Source : Noell Consulting Group

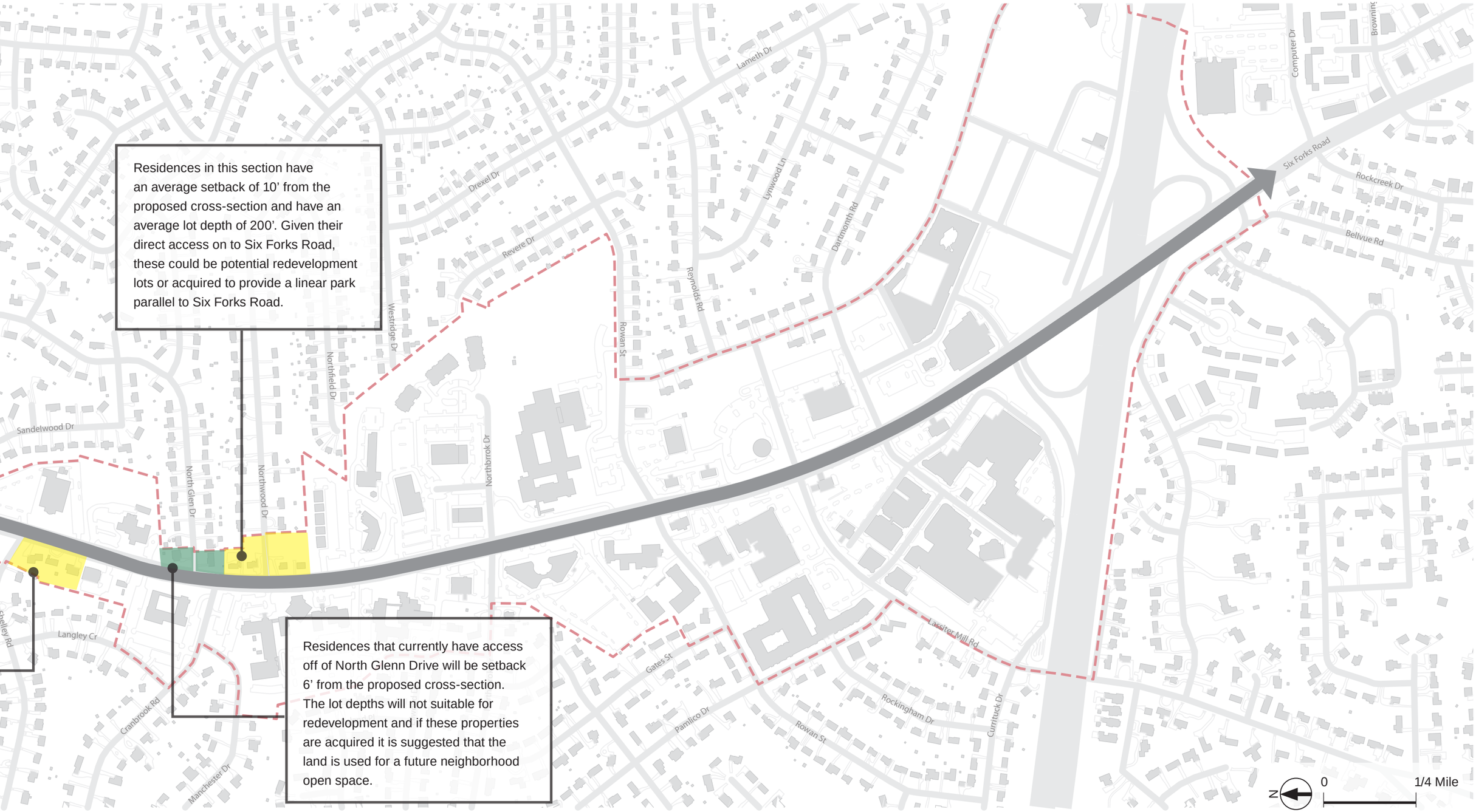
The vacant land behind the First Citizen's bank is a prime opportunity for development along the Corridor.

Other Redevelopment Opportunities

Single Family Residential

In addition to the 7 Redevelopment Sites identified on the previous pages, the single family residential that is adjacent to Six Forks Road is likely to transition to other uses over time. For the residential lots that front and have driveway access onto Six Forks Road, it would be preferable if, over time, these lots were combined and redeveloped to a higher use more appropriate to the scale of Six Forks Road. Single family lots that have access from an adjacent side street are appropriate but are often do not have the proper side setback to accommodate the cross-section expansion. Single family lots that back onto Six Forks Road will likely remain, but portions of their backyards will need to be acquired for cross-section expansion. Single family residential lots that do not have the proper lot depth to permit future development would be ideal for creating neighborhood open space.

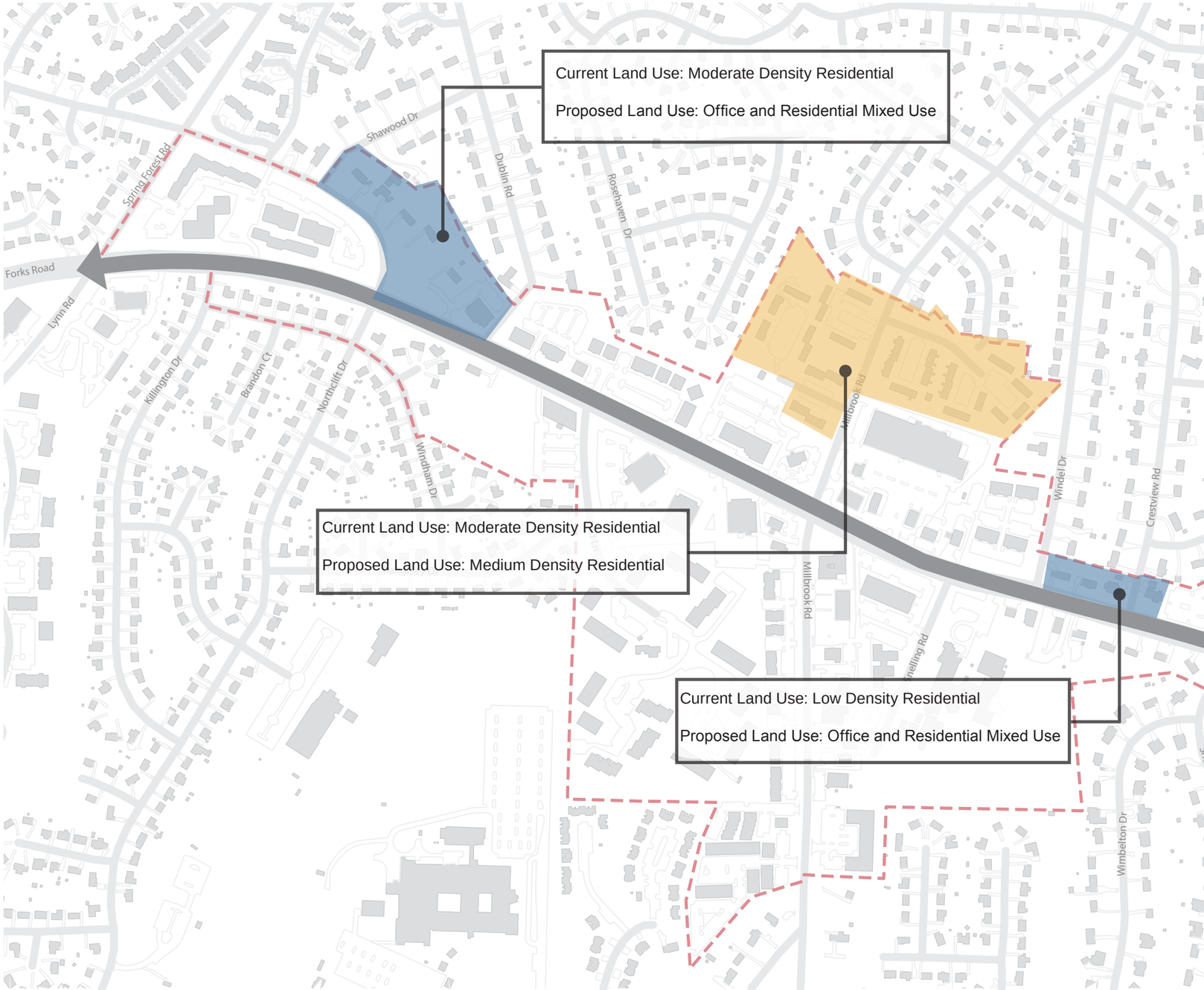


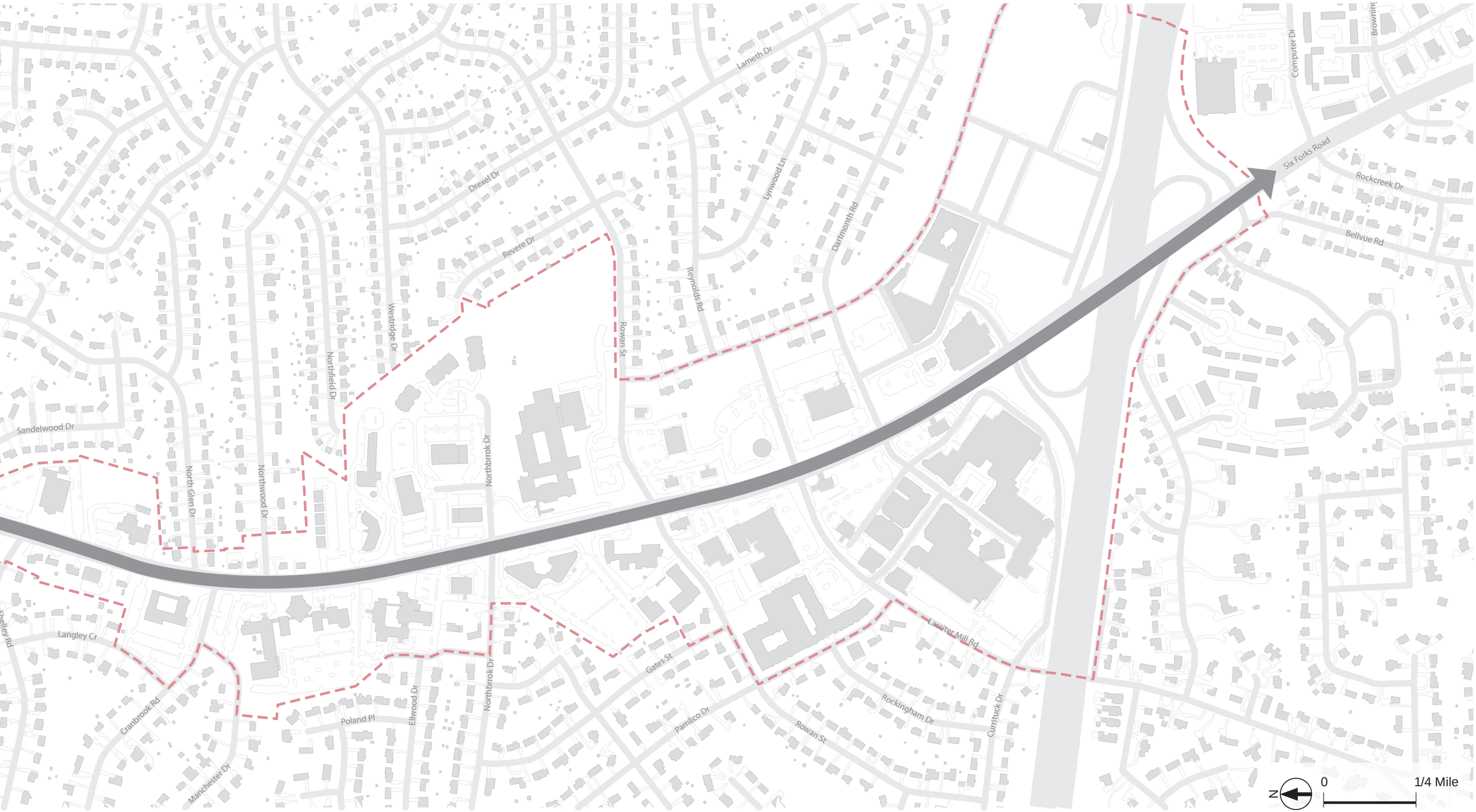

Residences in this section have an average setback of 10’ from the proposed cross-section and have an average lot depth of 200’. Given their direct access on to Six Forks Road, these could be potential redevelopment lots or acquired to provide a linear park parallel to Six Forks Road.
Residences that currently have access off of North Glenn Drive will be setback 6’ from the proposed cross-section. The lot depths will not suitable for redevelopment and if these properties are acquired it is suggested that the land is used for a future neighborhood open space.
Six Forks Road
Lameth Dr
Drexel Dr
Revere Dr
Westridge Dr
Northfield Dr
Reynolds Rd
Rowan St
Lynwood Ln
Dartmouth Rd
Computer Dr
Rockcreek Dr
Bellvue Rd
Sandelwood Dr
North Glen Dr
Northwood Dr
Northbrrok Dr
Langley Cr
Cranbrook Rd
Manchester Dr
Gates Sr
Pamlico Dr
Rowan St
Lassiter Mill Rd
Rockingham Dr
Currituck Dr
N
0
1/4 Mile

Future Land Use Review

Potential Modifications to the Future Land Use Map of the 2030 Comprehensive Plan

The Six Forks Corridor will continue to develop over time. In anticipation of this development we have identified several properties whose current land use classifications do not fit with the anticipated future development adjacent to the Six Forks Road Corridor. These recommendations are illustrated on the map to the right to be a guide for future requests for change of land use classification for these properties.




Lameth Dr
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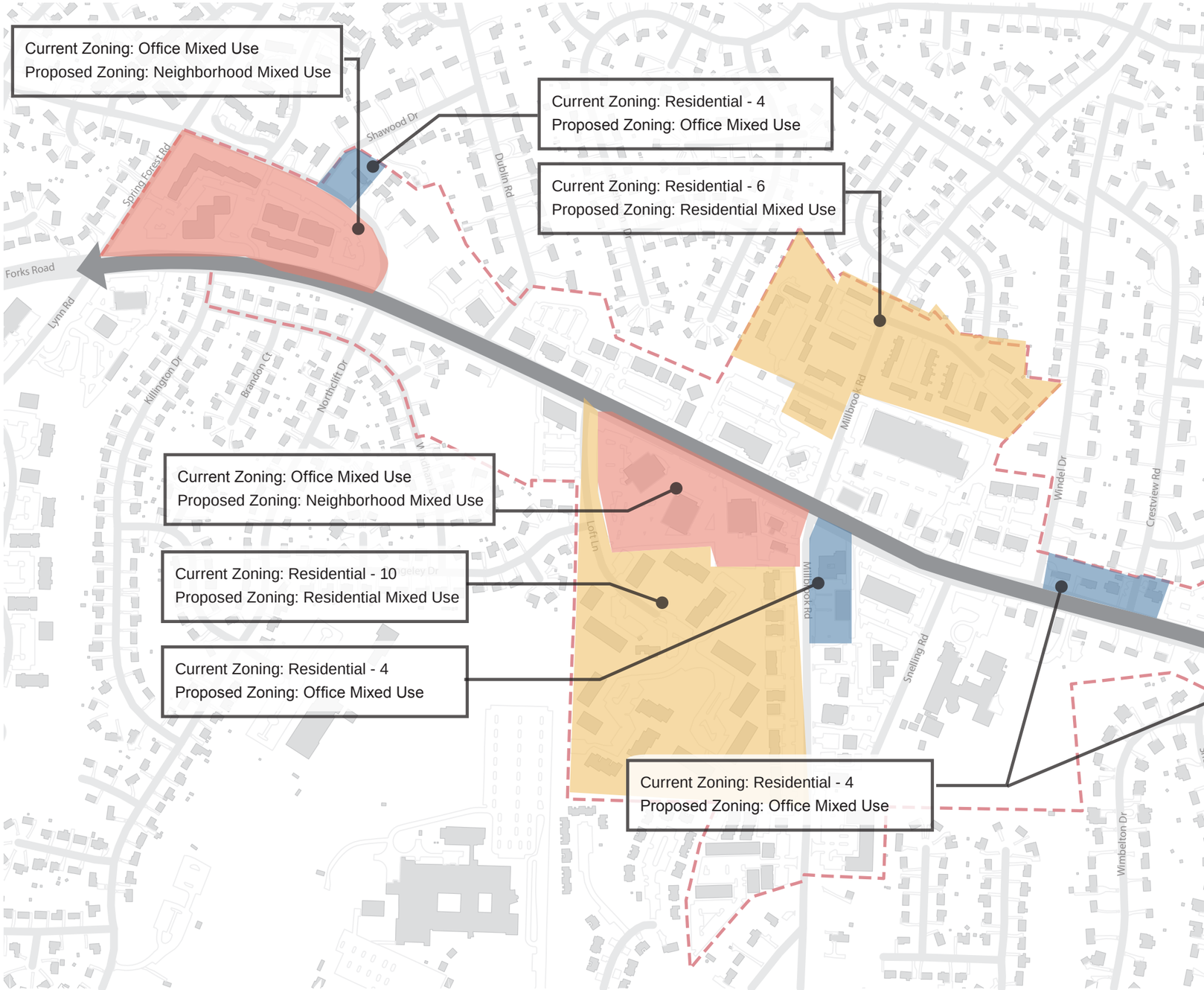
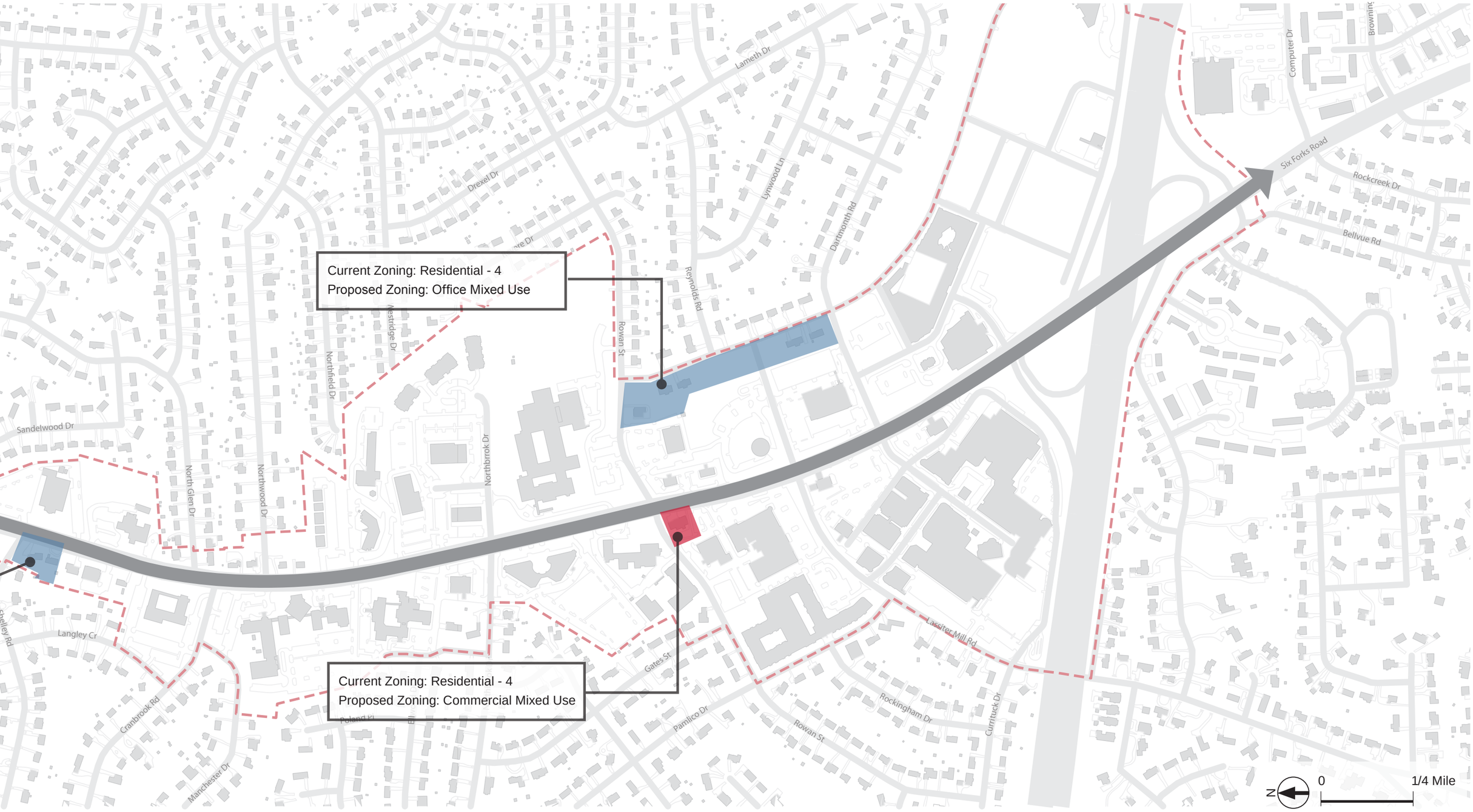
Northfield Dr
Reynolds Rd
Rowan St
Lynwood Ln
Dartmonth Rd
Computer Dr
Six Forks Road
Rockcreek Dr
Bellvue Rd
Sandelwood Dr
North Glen Dr
Northwood Dr
Northbrrok Dr
Langley Cr
Cranbrook Rd
Manchester Dr
Poland Pl
Ellwood Dr
Gates St
Pamlico Dr
Rowan St
Lassiter Mill Rd
Rockingham Dr
Currituck Dr
N
0
1/4 Mile

UDO Zoning Review

Potential Future Zoning Modifications

To compliment the suggested future land use map changes, the map to the right outlines recommendations for changes to UDO zoning to accommodate the anticipated redevelopment adjacent to Six Forks Road.

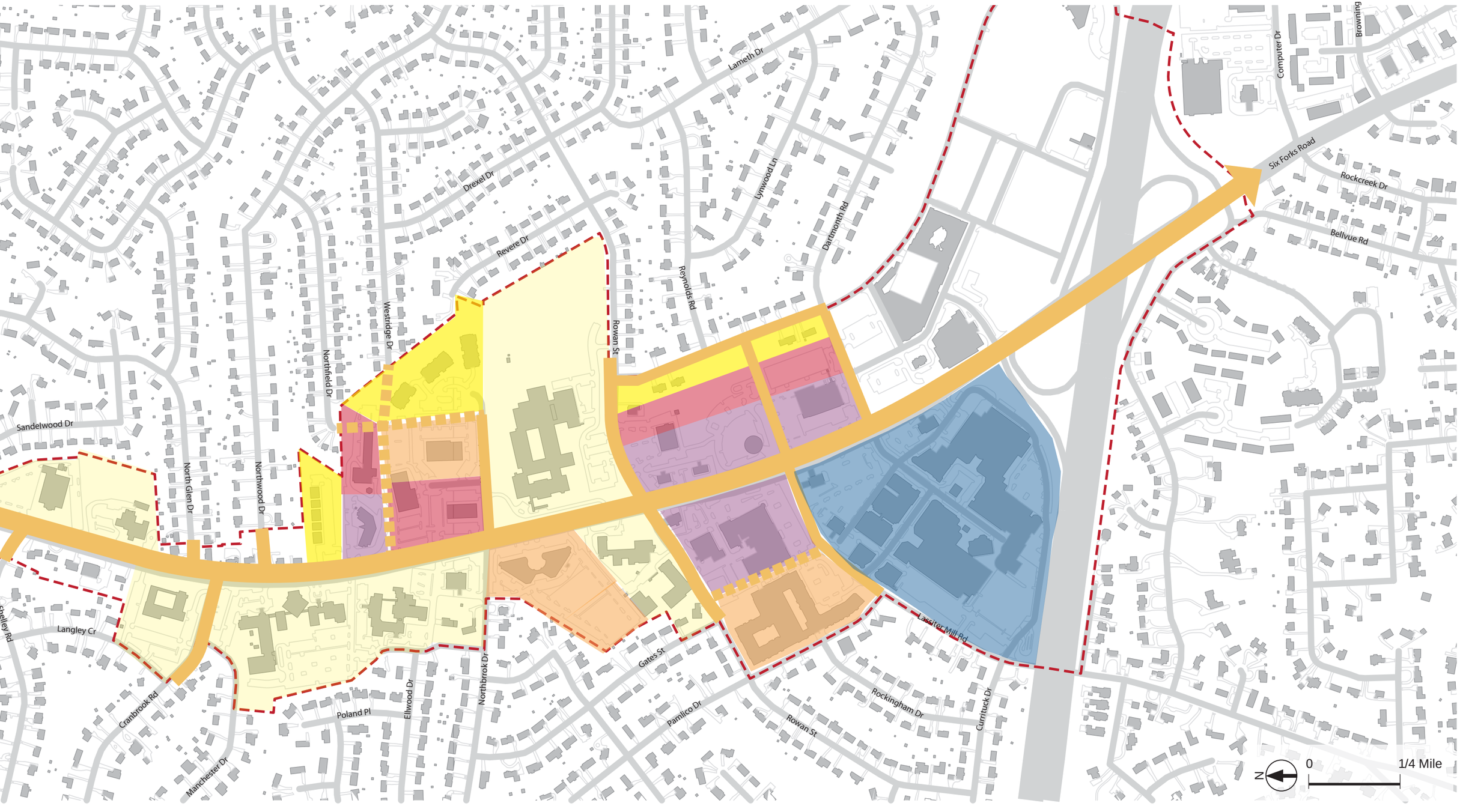



Current Zoning: Residential - 4
Proposed Zoning: Office Mixed Use
Current Zoning: Residential - 4
Proposed Zoning: Commercial Mixed Use
Lameth Dr
Drexel Dr
Lynwood Ln
Dartmonth Rd
Reynolds Rd
Rowan St
Westridge Dr
Northfield Dr
Sandelwood Dr
North Glen Dr
Northwood Dr
Northbrrok Dr
Computer Dr
Six Forks Road
Rockcreek Dr
Bellvue Rd
Langley Cr
Cranbrook Rd
Manchester Dr
Gates St
Pamlico Dr
Rowan St
Rockingham Dr
Currituck Dr
Lassiter Mill Rd
N
0
1/4 Mile

Urban Design Frameworks

Building Height Standards

In order to maximize redevelopment potential, create an urban image, and mitigate adjacency to existing neighborhoods, each of the redevelopment parcels has a building height standard associated with it that includes buildings that range from 4-5 stories along residential edges, to 4-20 stories along Six Forks Road.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Rowan St
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Dartmouth Rd
Computer Dr
Browning PL
Six Forks Road
Rockcreek Dr
Bellvue Rd
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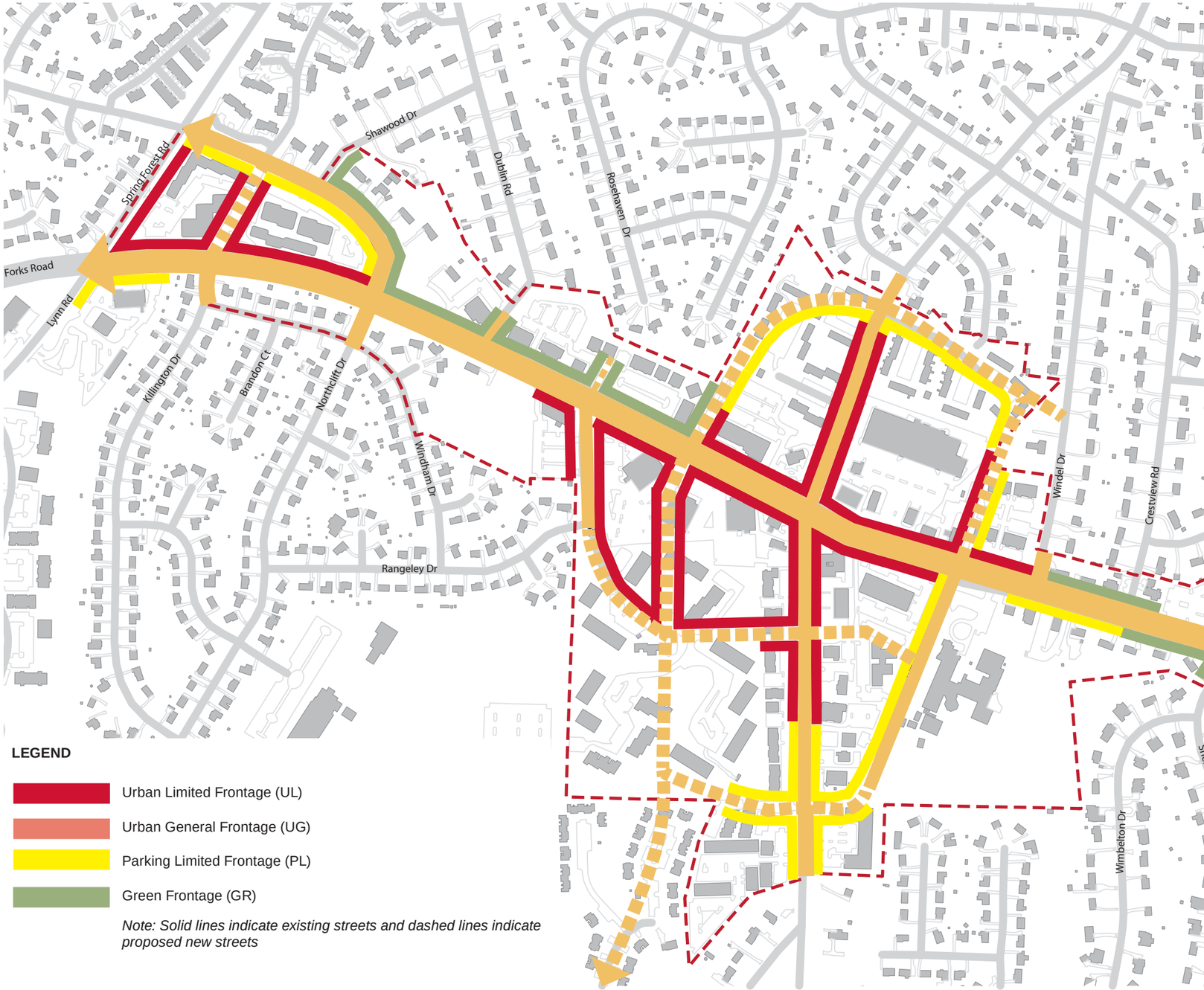
North Glen Dr
Northwood Dr
Shelley Rd
Langley Cr
Cranbrook Rd
Manchester Dr
Poland Pl
Ellwood Dr
Northbrrok Dr
Gates St
Pamlico Dr
Rowan St
Rockingham Dr
Currituck Dr
Lassiter Mill Rd
N
0
1/4 Mile

Urban Design Frameworks

As redevelopment occurs along and adjacent to Six Forks Road, the urban design standards that guide this development will play a role in the overall character and sense of place of the Corridor as a whole.

Building Frontage Types

The City of Raleigh Unified Development Ordinance Chapter 3, Article 3.4 “Building Frontages” describes how building frontages are to be developed so that a favorable set of context-sensitive urban design relationships are created between the building and the street. Each of the proposed streets shown in the planning frameworks diagrams that are part of this study have a specific building frontage type that addresses neighborhood gateways, where parking should be located, and the nature of the building frontage along the street.

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Cranbrook Rd
Manchester Dr
Poland Pl
Elwood Dr
Northbrrok Dr
Gates St
Pamlico Dr
Rowan St
Rockingham Dr
Currituck Dr
N
0
1/4 Mile

Transportation Frameworks

Overall Connectivity

One of the fundamental issues affecting the multi-modal function and experience along the Corridor is the lack of connectivity for adjacent neighborhoods. Each time a resident needs to move north and south, they are forced out onto Six Forks Road, which adds to traffic congestion and the potential for conflicts and safety issues.

In addition to the impact on function, the need to maximize Six Forks Road for its transportation potential creates issues for cross connectivity to desired destinations. It also reduces the presence and sense of gateway into the neighborhoods that are accessed form Six Forks Road.

The transportation planning frameworks that follow suggest the potential to create a higher level of connectivity over time as properties are redeveloped and as coordination happens with property owners. This connectivity includes the concept of an interconnected “back street” network, a pedestrian oriented “strollway” and a neighborhood “circulator” transit system. Each of these opportunities can support the mobility and multi-modal function and quality of the Six Forks Road Corridor and can be phased in whole or in part as funding or redevelopment opportunities occur.


Lameth Dr
Drexel Dr
Revere Dr
Reynolds Rd
Lynwood Ln
Dartmouth Rd
Computer Dr
Browning PL
Six Forks Road
Rockcreek Dr
Bellvue Rd
Rowan St
Westridge Dr
Northfield Dr
Sandelwood Dr
North Glen Dr
Northwood Dr
Shelley Rd
Langley Cr
Cranbrook Rd
Manchester Dr
Poland Pl
Ellwood Dr
Northbrook Dr
Gates St
Pamlico Dr
Rowan St
Rockingham Dr
Currituck Dr
Lassiter Mill Rd
N
0
1/4 Mile
Existing Pedestrian Signal
Proposed Traffic Signal
Existing Traffic Signal
Schools
Retail Destinations
Churches
Parks

Transportation Frameworks

Street Connectivity and Street Types

As properties redevelop along the Corridor, opportunities are created to complete an interconnected street network that begins to stitch adjacent neighborhoods and land uses together behind the Corridor. The street designs include considerations for neighborhood gateways, retail frontage, streetscapes and multi-modal mobility. Unless otherwise noted, the proposed street types mirror the design prototypes described in the City of Raleigh Unified Development Ordinance Chapter 8, Article 8.4 “New Streets”. Other local street connections may be rquired with redevelopment based on block perimeter standards depending on density and conditions.

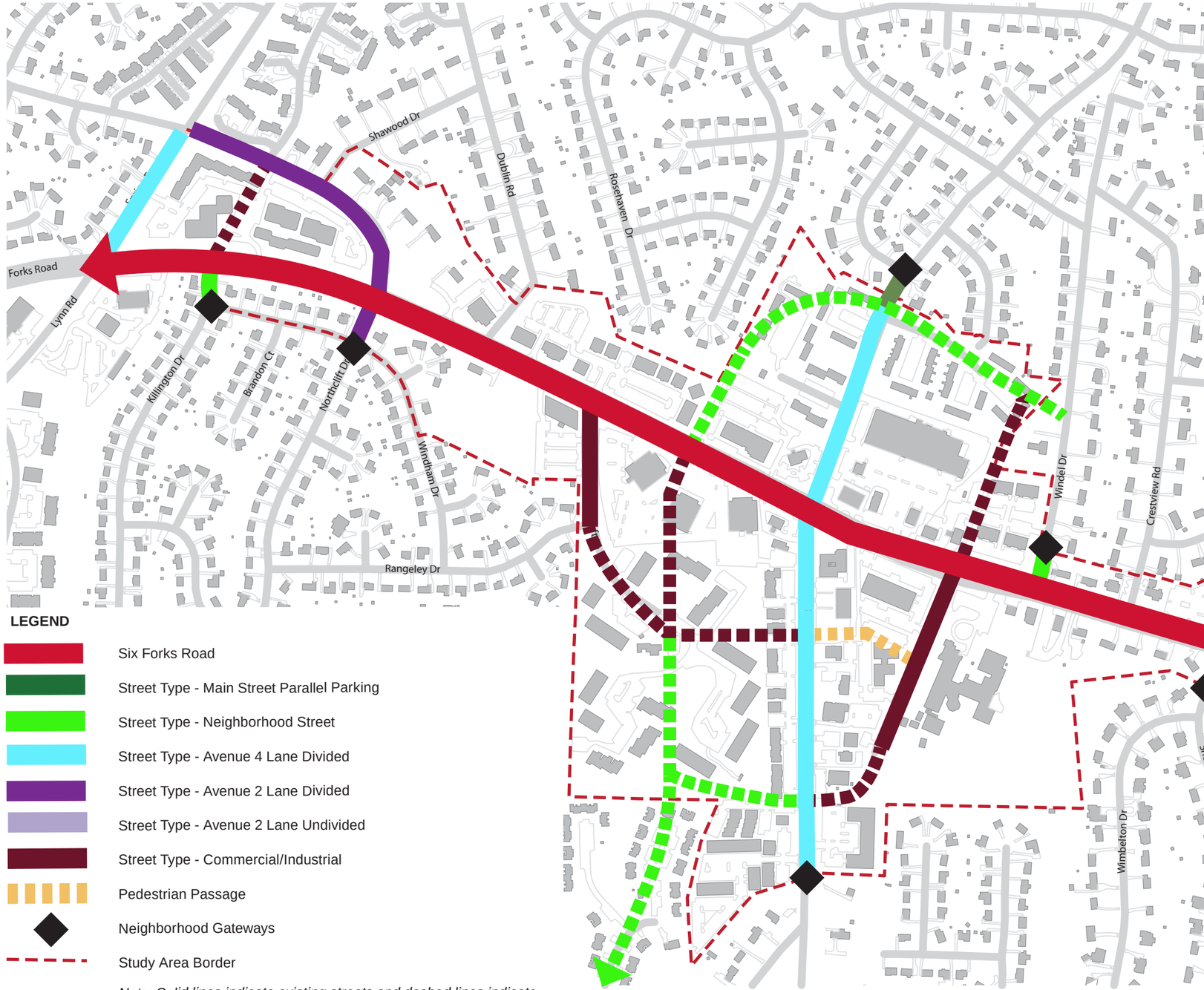
Local Transit

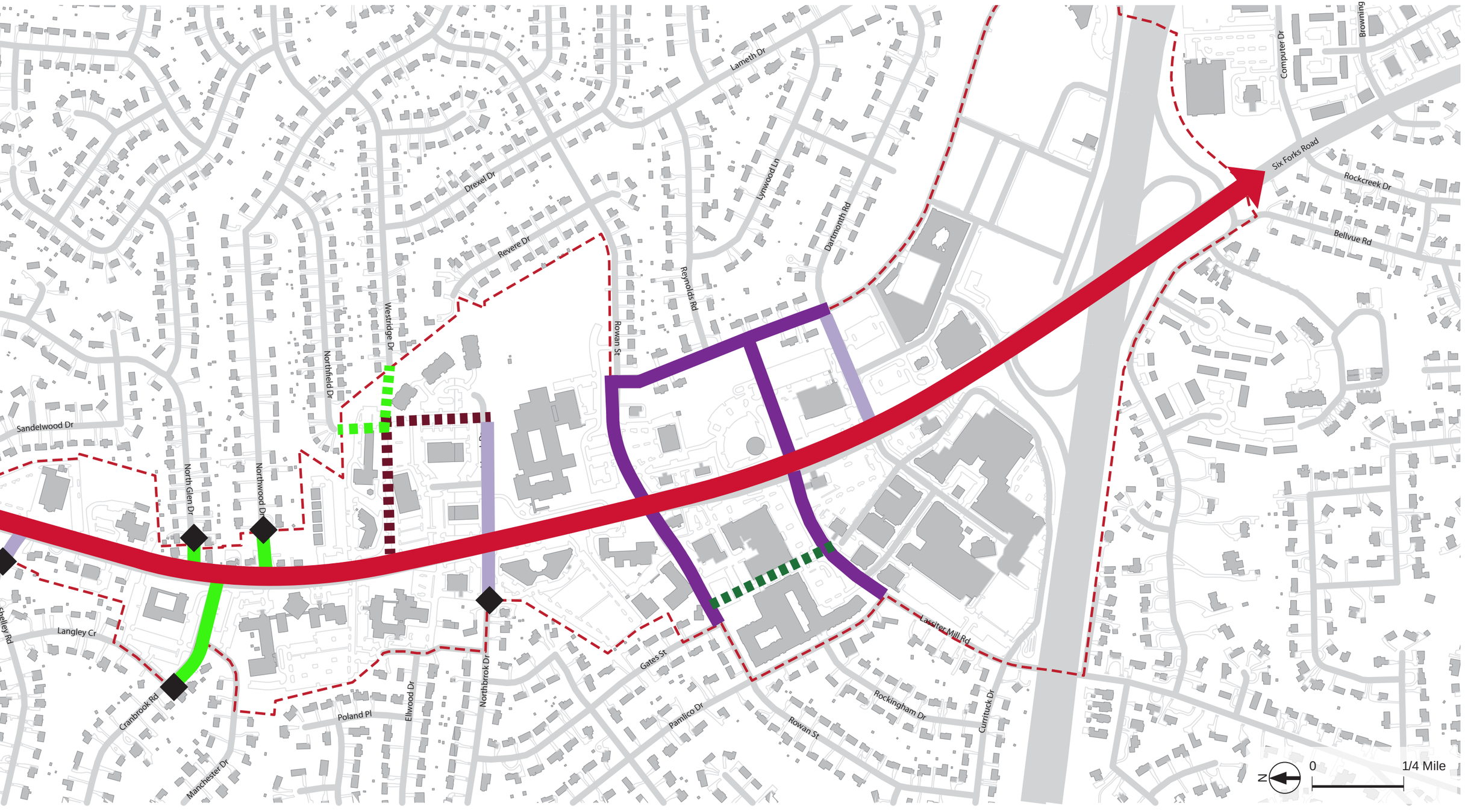
The idea of a neighborhood circulator service was raised by the Community as a way to better circulate around the Corridor. A circulator would connect the varied mixed land uses in and beyond the study area and facilitate more non-automobile based trips to occur.

The term “Circulator” often elicits a service that runs 7-days-per-week at a frequency of 15 minutes or better beginning early in the morning and running late at night. GO Raleigh Transit operates a single route that fits this description – the R-Line – which connects a diverse range of popular destinations in the downtown area. The R-Line has been successful in large part because downtown attracts a large amount of people to a wide range of activities and events at all times of day in a very dense part of the City. Circulator services like the R-Line can be found across the country in cities such as Washington DC, Charlotte, Austin, Cleveland, Las Vegas, Portland, and many more.

Circulator services are costly to operate due to the very nature of what makes them desirable and convenient: very high-frequency service. They are most successful if developed and operated in very dense, walkable areas that have variety of mixed land uses. And while the Six Forks Road corridor is beginning to develop with some of these characteristics, the study area at large hasn’t reached a threshold of density, activity, walkability and diversity in land uses to be able to support a high-frequency Circulator service like the R-Line.

The study area however already benefits from a strategic location within CAT’s local bus network and this provides a great value to the community both from the perspective of citywide and regional access to internal circulation. The #8 Six Forks is the most frequent route servicing the study are and provides frequent service between the study area and downtown.

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North Glen Dr
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Langley Cr
Cranbrook Rd
Manchester Dr
Poland Pl
Ellwood Dr
Northbrook Dr
Gates St
Pamlico Dr
Rowan St
Rockingham Dr
Currituck Dr
Lassiter Mill Rd
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0
1/4 Mile

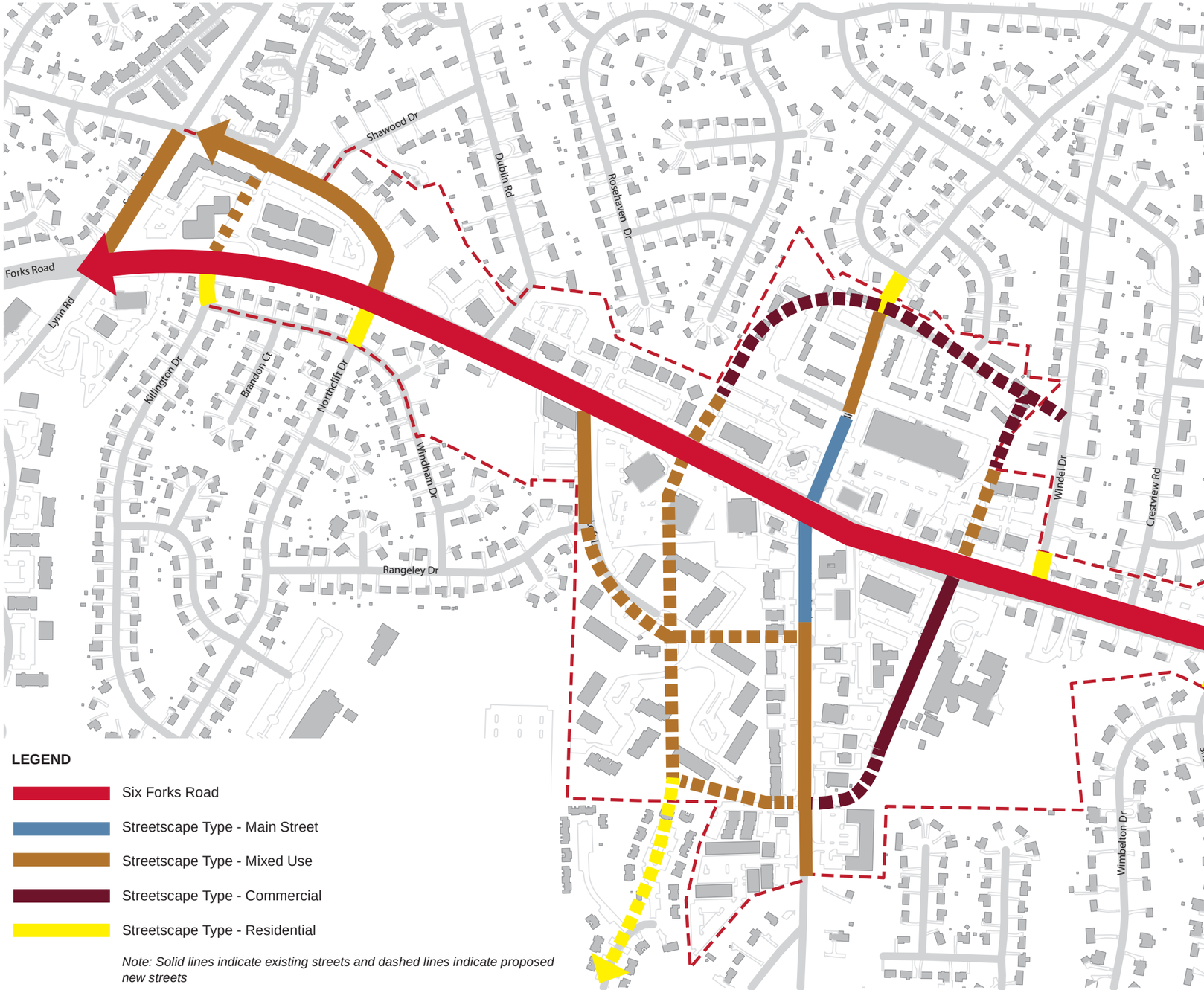
Transportation Frameworks (cont'd)

The #23L Millbrook Connector is the primary east-west connection in north Raleigh and provides quick access to major retail destinations such as Crabtree Valley Mall and Triangle Town Center as well as an opportunity to transfer to routes on Wake Forest Rd, Capital Blvd, and Creedmoor Rd. These services will likely continue to play an important role in the future Raleigh transit network in the future.

The draft Wake Transit Plan may make talk about a Six Forks circulator moot considering the plan proposes four 15-minute, high-frequency routes running from North Hills to points such as Crabtree Valley, Cameron Village, Downtown Raleigh, WakeMed Hospital and points beyond. Coupled with continued 30-minute service or better on Six Forks Road, the plan offers considerable higher levels of transit service to the area.

Streetscape Types

As part of creating complete streets and aesthetically pleasing gateways into the neighborhoods, each proposed and existing street within the Corridor Planning Area is keyed to a streetscape design in the City of Raleigh Unified Development Ordinance in Chapter 8, Article 8.5, Section 8.5.2 "Streetscape Types". The streetscapes include design standards for sidewalks, landscape, street trees and street lighting, amongst other things.

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Northwood Dr
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Ellwood Dr
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Gates St
Pamlico Dr
Rowan St
Rockingham Dr
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4

TRANSPORTATION ANALYSIS AND RECOMMENDATIONS

Purpose: This chapter documents the technical traffic analysis, recommendations for traffic improvements and outlines the level of service before and after proposed improvements.

- Existing Transportation Analysis
- Multi-Modal Level-of-Service Analysis
- Intersection Queues and Median Development Analysis
- Transportation Recommendations

Transportation Analysis

Summary

Six Forks Road is a major arterial facility that provides mobility for daily commuters as well as a destination for residents and visitors to a multitude of shopping, restaurant, and civic amenities. The corridor is a link that connects suburban residential communities north of Raleigh to I-440 and downtown business district and includes several major pedestrian, bicycle, and transit crossings. It experiences congested conditions during traditional peak hour periods with off-peak congestion coinciding with North Hills attractions and entertainment schedules.

Safety in the corridor is a concern. Traffic volumes and congestion levels are increasing, as are the number of pedestrian and bicycle trips crossing Six Forks Road. The adjacent neighborhoods and development, “Midtown” is committed to creating a pedestrian-friendly entertainment and retail district as one of its guiding principles and, but looks to create a safe and effective way to redirect the majority of pedestrian/bike movements along and across Six Forks Road onto facilities that would separate those trips from general vehicular traffic. This will aid Six Forks Road in becoming a healthy and more active corridor.

Existing Conditions, Data Collection, Review and Analysis

Existing conditions represent years of decision-making that focused on maintaining the dominance of motorized forms of travel, even in areas where many pedestrians, cyclists, and transit users share the same space. This section provides key information to help inform the development of alternatives and justify the means for change. The intent is to ensure the vision and need for the surrounding area are understood and seeks a collaborative vision for improved safety and mobility. The following provides essential information to understand existing conditions.

Field Reconnaissance

A full-day in-field inventory of the corridor was conducted to document existing conditions, operations, and issues. Occurring at the kick-off of the project, this initial collaboration of the team members provided a rich context and understanding with regard to the public perception (memorialized during the visioning process in 2012) of the problems, issues, needs, and limitations within the corridor. The team walked the corridor, took field measurements, and made extensive notes on what they observed. Project team participants noted the following list of issues to consider and discuss:

- Sight distance
- Ramps
- Sidewalk conditions
- Pedestrian push buttons
- Crosswalks
- Signage
- Land uses
- Origins and destinations
- Non-motorized comfort levels
- Transit stops and accessibility
- Barriers to walking
- Lighting features
- Conflict points

Pedestrian and Bicycle Safety Comments

- Unpleasant experience trying to walk or bike the corridor
- Lack of pedestrian-level lighting along corridor
- Gateway and pedestrian/cyclist signage is needed within corridor to alert motorists of the heavy crossing traffic by pedestrians.
- Adjust traffic signal timing and pedestrian signal timing to prioritize pedestrian flow
- Lack of bike facilities along entire corridor
- Develop and install wayfinding signage for bicycle, pedestrian and vehicular users along the corridor
- Install sidewalk in gaps on streets in the study area, including the portion of Six Forks Road in front of Carroll Middle School
- Long pedestrian wait time crossing Six Forks Road at Dartmouth Road
- Narrow sidewalks without adequate separation between pedestrians and vehicle travel lanes
- Poor connectivity between residential neighborhoods and Six Forks Road commercial and civic district, represented by the lack of streets connecting residential development with commercial areas.
- Lack of marked crosswalks and signal countdown timers
- Pedestrian and bicycle safety on I-440 bridge over Six Forks Road
- Lack of maintenance of ped/bike facilities along corridor

Transit Comments

- Relocate bus stop locations closer to intersections and install additional shelters
- Bus turning radii and integrating them into the rest of the transportation system is a key element in design/planning.
- Big demand for connecting transit to Wake Forest Road and smaller buses with shorter routes, as expressed by meeting participants.
- Priority at-grade transit opportunities should be explored, and improvements to bus stop furniture and signing.
- Make bus stop shelters attractive facilities with possible public art pieces
- More frequent bus service – 15 minute headways
- Interest in a people mover from North Hills to future transit station

Traffic Oriented Comments

- Analyze opportunities for access management along the corridor
- Need for driveway consolidation and access control (median use) along entire corridor
- Drivers using right turn lanes as passing lanes
- Traffic congestion on Six Forks Road
- No adherence to school traffic zones/restrictions by commuters
- Excessive vehicular speed measurements
- Limited collector street connectivity

- Long delay for minor street movements
- Egress issues – vehicular traffic entering and exiting individual driveways on corridor
- Limited sight distance visibility in locations
- Cut-through traffic concerns
- Lack of traffic calming and gateway treatments for surrounding neighborhood entrances
- Inconsistent cross section along entire corridor

These field observations, combined with public involvement work and data collection, provided a more nuanced understanding of the character of Six Forks Road. More information is presented in the following section.

Character of Six Forks Road

Baseline data including topography, lighting, crash analysis, and vehicular travel (AADT, LOS, travel speeds and behavior) information provided a foundation for understanding the conditions and perceptions that comprise the character of Six Forks Road. The following topics are represented in graphical format and described below.

Topography

Six Forks Road is generally a level ride (or walk), descending only by 100 feet over its approximately 2.3 mile length traveling from south to north. In some areas, the road follows a ridge line, but predominantly it is relatively flat. Steep grades occur between Dartmouth Road to Rowan Street, “falling away” from the roadway. This topography actually presents some moderate ascents towards Six Forks Road and poses some challenges to designers seeking to improve or modify Six Forks Road.

Crash Analysis

Crash data from 9/1/2010 – 8/31/2013 is illustrated in Figure 1. This figure provides a view of the crash data by intersection location and injury type. Although crossing at intersections is generally the safest point for pedestrians to cross, this result is not surprising since intersections are also the places where the most pedestrian crossings occur and hence present the highest rate of exposure for conflicts between pedestrians, cyclists and automobiles. Seven (7) pedestrian and four (4) bicycle crashes were recorded during this period within the study area, none of which were fatal. All of these crashes were infrastructure-related occurrences. High visibility crosswalks, lighting, and proper bicycle lanes and signage would increase the visibility, safety, and comfort of pedestrian and cyclists and assist motorists in identifying non-motorized travel as a key mobility component in the corridor. Figure 2 indicates that the majority of bicycle, pedestrian, and auto crashes within this corridor happen at intersections between I-440 and Northbrook Drive and focus on the intersections at Lynn Road and at Dartmouth Road.

The vehicular crashes are very different than the pedestrian and cyclist crashes reported. Figure 2 highlights the crash type and severity for different sections along the corridor. There were over 700 vehicle crashes reported over a three year period. This translates to a crash rate of 783 Crashes per 100 million vehicle miles (MVM) along the corridor compared to an average crash rate of 274 (MVM) for a similar roadway statewide. The increase between the Six Forks Road crash rate is 2.86 times the State average crash rate. Unlike the crash frequency, the crash severity rate was relatively low at an average of 2.52 for the corridor. According to the NCDOT Division of Mobility and Safety’s Traffic Engineering Accident Analysis System (TEAAS) User Manual , a severity index of 8.4 or higher indicates that the area is likely to have more serious crashes and therefore warrant mitigation measures. The highest crash severity occurred within the section between I-440 and Northbrook. Crash types ranged considerably between each section. The predominant crash type was rear-end crashes at 53% followed by 47% were represented by angled crashes (15%), side-swipe crashes (16%), and other (16%). Although the crash frequency is surprising, the types of crashes (predominantly rear-end) and low rate of severity is not. These types of crashes are indicative of high volumes of traffic traveling at slower speeds and distracted driver behavior. Limiting conflicts like left turn demand will have a profound impact on the frequency of crashes along the corridor.

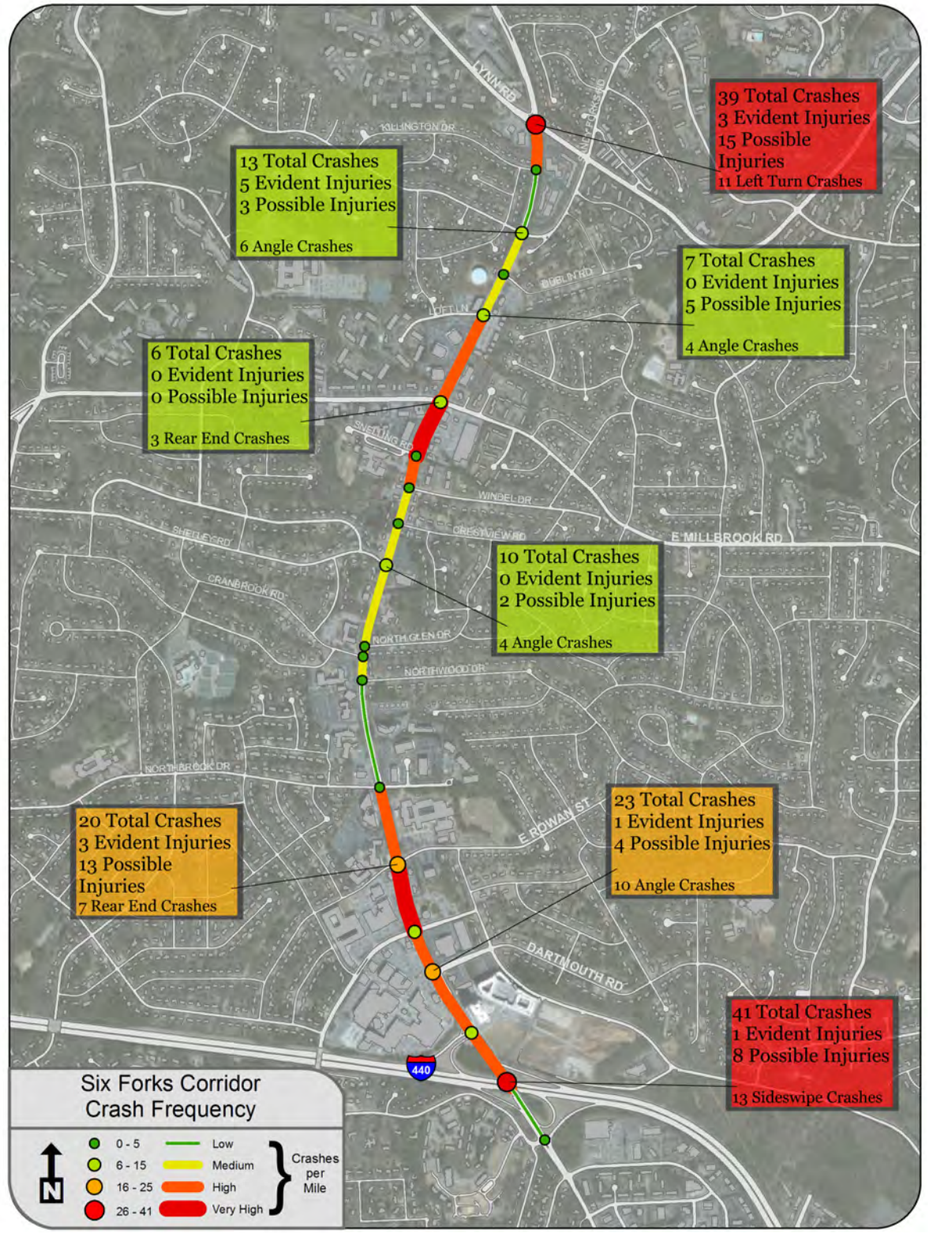


Figure 1. 2010-2013 Crash Frequency and Injury Type Figure 2 provides an alternative view of the crash data by intersection location and injury type.

Vehicular Travel (Daily Traffic, Speeds and Behavior)

Six Forks Road serves approximately 29,000 – 42,000 annual average daily trips (AADT), with the heaviest volume in proximity to I-440 and North Hills Shopping Center.

The posted speed limit along the section of Six Forks Road between Lynn Road and Millbrook Road is 45 mph with the remaining section at 35 mph. Speed studies were completed over two weekday periods from 7:30 am until 11 am. The corridor travel speeds shown in Figure 3 represent the free-flow conditions considering traffic lights and platooning of vehicles. Data was collected by dynamic flow-speed observations (traveling with traffic through the corridor multiple times) and static observations (a radar speed gun was used at intersections and mid-block locations along the corridor to observe speeds). The recorded speeds throughout the corridor dropped to 68% of the posted speed limit during the AM and PM peak hours on average, an indication of high levels of congestion and commuting demand.

The character of driving is the most critical element of data observed. The race car mentality of drivers and the unexpected pedestrian crossings within this corridor make mobility unpredictable and dangerous. Lane shifts occur between I-440 and Rowan Street for northbound vehicles pose a danger as weaving is occurring at a very high volume in this short roadway segment.

Traffic analyses for intersection operations and corridor conditions for 2013 traffic volumes for the AM and PM peak hours along Six Forks Road corridor were provided by the City of Raleigh to further detail information on the vehicle delay and operation. (Figure 4, Average Daily Traffic and Intersection LOS and Delay for more information.) This data confirmed the field observations of our team that congestion and delay are lengthy at the intersections of Lynn Road, Millbrook Road and I-440. That is, the average delay per vehicle at the intersection with Millbrook is 97 seconds during AM peak period.

Overall, the corridor's volume-to-capacity ratio ranges from 0.95 – 1.41, warranting consideration for improvements such as widening or signal improvements. The addition of new development and redevelopment along the corridor will push the limits of the Six Forks Road corridor towards widening to a six lane facility. The long delays and queues at the major intersections are complicated by fact that peak hour congestion is no longer predominantly, one direction. The average directional split for both the AM and PM peak hours are only 45% – 55%. This is an indication of Six Forks Road becoming more of destination corridor.

Transit Ridership

Overall, two Capital Area Transit bus routes travel along Six Forks Road. Route 8-Northclift travels along the entire Six Forks Road Corridor, beginning in downtown Raleigh and ending at Strickland Road just south of I-540. Route 24L is primarily an east-west route, but does have two stops near North Hills Mall along Six Forks Road just north of I-440.

In terms of transit ridership, the largest portion of people get on and off at the North Hills Mall stop, with 43 people boarding the bus at this station and 75 people alighting from the bus on the outbound trip of Route 8-Northclift. The same is true on the inbound route, with 70 people boarding the bus and 27 alighting from the bus at the North Hills Mall stop. The Millbrook stop also has a substantial number of boardings (14 Outbound, 18 Inbound) and alightings (24L Outbound, 16 Inbound). With only two stops along Six Forks Road, Route 24L-North Crosstown has substantial boardings and alightings at Six Forks Road and North Hills Mall, with 52 people boarding the bus and 69 alighting. Figure 5 provides all of the boardings and alightings for both transit routes in the study area.

Transit service in the study area is configured partly into a grid pattern. 8-Northclift is the major radial route to downtown Raleigh, operating on Six Forks Road and Lassiter Mill. East/West lines exist at three places along the study area. 24L-North Crosstown connects Six Forks Road to Wake Forest Road and Capital Blvd. It operates in a one-way loop along Wake Forest, Six Forks, St. Albans, and Hardimont, connecting to 8 at North Hills. 23L-Millbrook Crosstown operates on Millbrook Rd., connecting to Capital Blvd at the east end and Crabtree Valley Mall at the west. 54L-Spring Forest Road Crosstown crosses Six Forks Road at Lynn Road. The most direct transit service from Six Forks Road to downtown Raleigh (8-Northclift) services a number of inside the beltline neighborhoods instead of taking a more direct route along radial arterial streets.

Within this framework, nodes at Lassiter Mill, Millbrook, and Lynn provide opportunities for transit-oriented development where major radial service intersects crosstown service.

This data indicates that, as the Six Forks Road corridor continues to develop in the Midtown area, it is likely that transit ridership will increase. The provision of safer, more comfortable accommodations for pedestrians and bicyclists will also stimulate transit ridership in the corridor.

Transportation Needs Assessment

"What needs improvement?" was a fundamental question asked throughout the planning process, one which solicited insights, opinions, and opportunities for meeting the goals of this project from stakeholders, decision-makers, and planners alike. The base for our "needs" started in 2012 through a well-attended Visioning process. This information was augmented with a second phase public outreach session, data analysis, and a full day field reconnaissance and was summarized in three main categories of improvement:

•Facility

•Safety/Access Management

•Aesthetics/Signage

A quick list of main needs noted include the following:

•Widen Six Forks Road from I-440 to Lynn Road to a 6-lane divided with planted median

•Improve the visibility and crossing provisions for bicyclists and pedestrians at all major intersections

•Increase driver awareness of bicycle/ pedestrian crossings

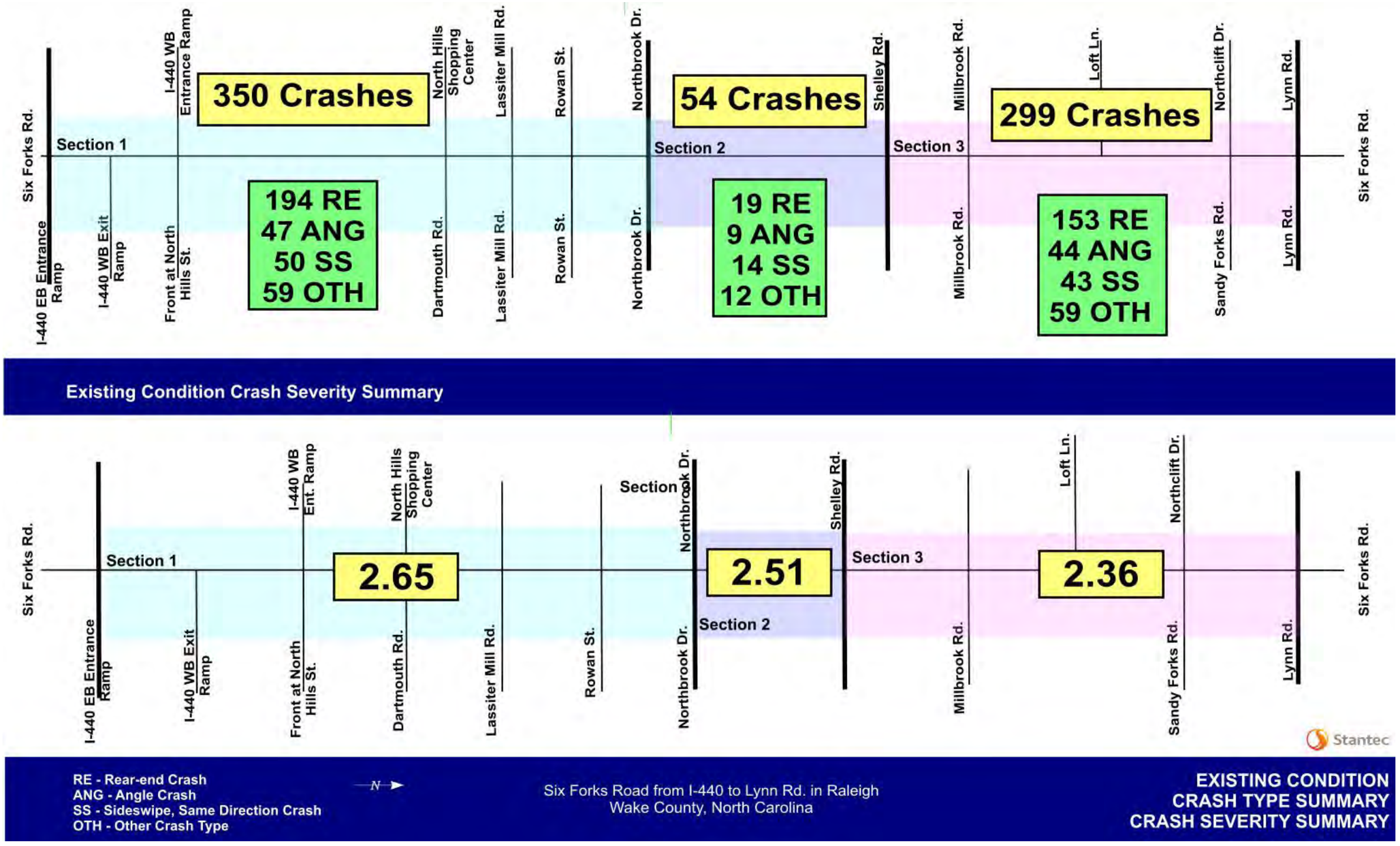
•Provide continuous wide sidewalks and separate bicycle facilities

•Implement access management strategies throughout corridor (driveway consolidation, median use, cross access between complimentary uses

•Incorporate traffic calming (street trees, bollards, plantable median, etc.) to limit speed differentials

•Improve transit stops, frequency and amenities

These needs provided direction for the corridor-level improvements and the consideration of a grade separation and how it will interface and connect with the existing transit, pedestrian, and cycling infrastructure and travel patterns.



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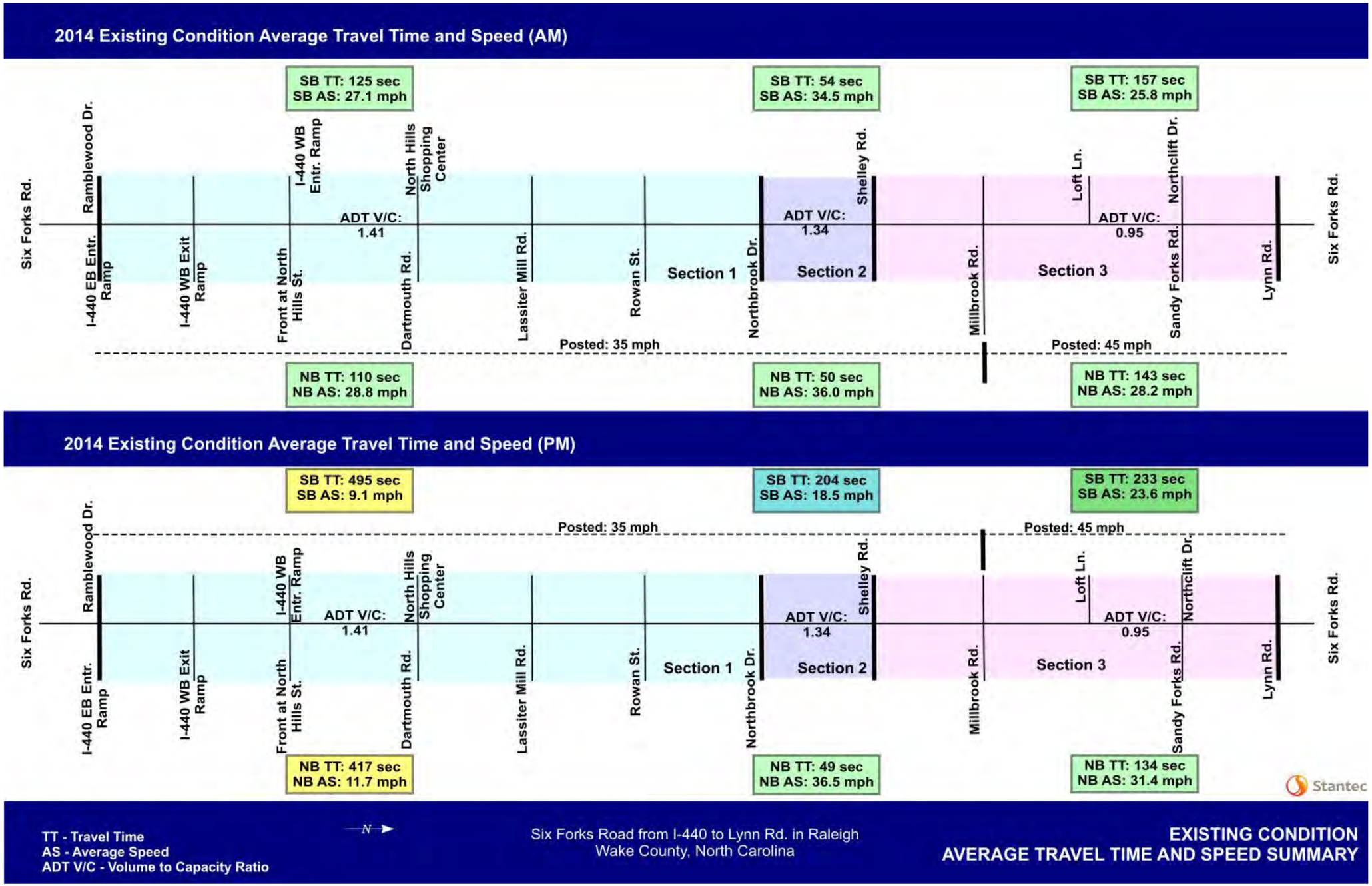


Figure 3. Average Travel Time and Speed - The corridor travel speeds represent the free-flow conditions considering traffic lights and platooning of vehicles. Data was collected by dynamic flow-speed observations (traveling with traffic through the corridor multiple times) and static observations (a radar speed gun was used at intersections and mid-block locations along the corridor to observe speeds).

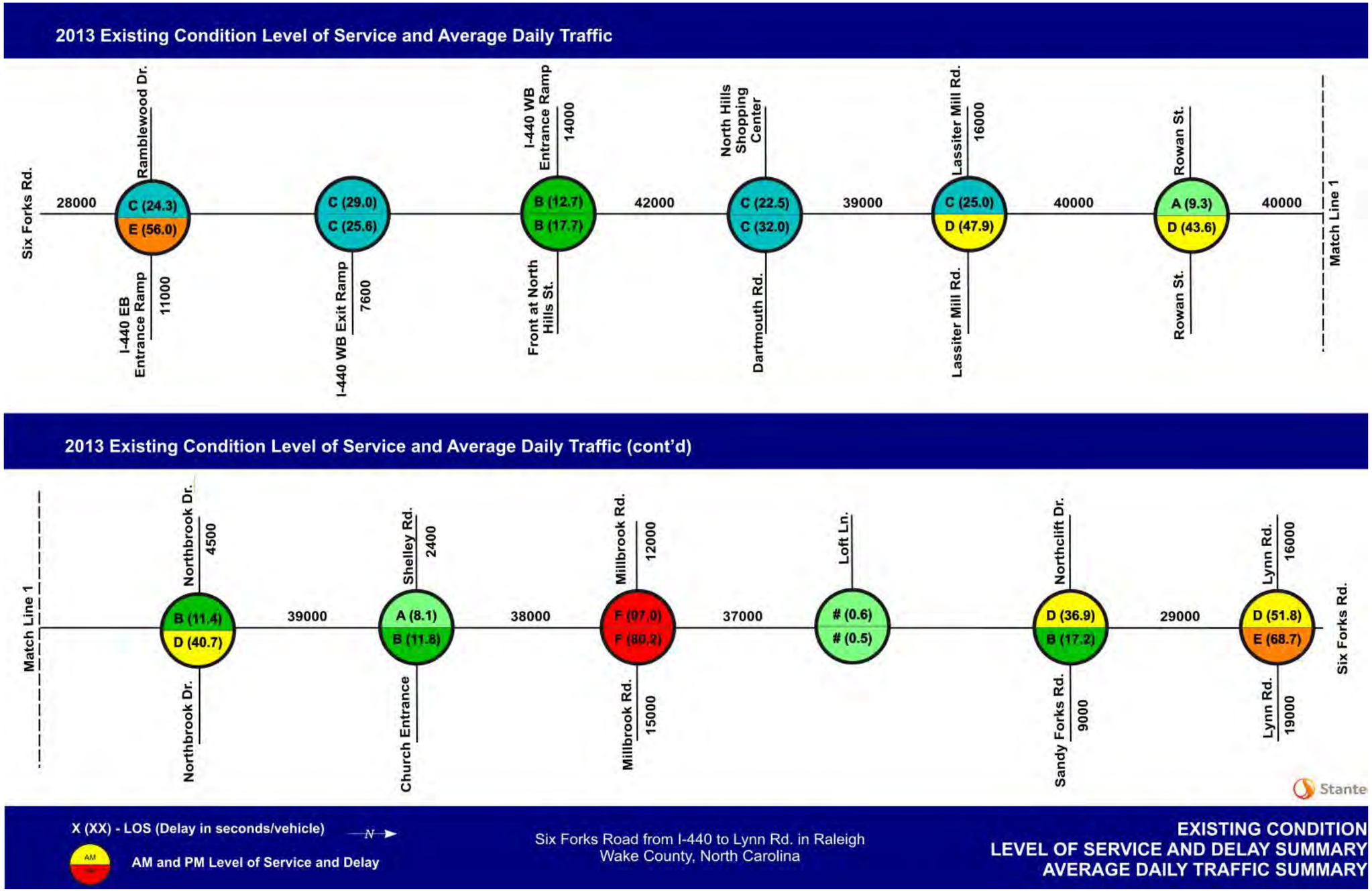


Figure 4. Average Daily Traffic and Intersection LOS & Delay Figure 4 - Traffic analyses for intersection operations and corridor conditions for 2013 traffic volumes for the AM and PM peak hours along Six Forks corridor were provided by the city of Raleigh to further detail information on the vehicle delay and operation. This data confirmed the field observations of our team that congestion and delay are lengthy at the intersections of Lynn Road, Millbrook Road and I-440. That is, the average delay per vehicle at the intersection with Millbrook is 97 seconds during AM peak period. Overall, the intersections seem to be operating acceptably. However, the corridor volume to capacity exceeds acceptable limits. Based on the historical traffic volumes along Six Forks corridor, the volumes have increased by 2% over the past decade (2003-2013), Although, this represents a slight increase, the low number can be attributed to the effects of the recession. In fact, over the past three years, we have seen a healthy increase in volumes. Today Six Forks Road carries an average of 37,000 vehicles per day (VPD). As a comparison, other radial routes within proximity to Six Forks are carrying similar traffic volumes, including Creedmoor Road at 30,000 vpd and Falls of the Neuse at 34,000 vpd, on average.

Figure 5. Transit Boarding and Alighting for both transit routes in the study area. As expected, the North Hills Mall location has the highest level of ridership.

Route 8-Northclift			
Outbound		On	Off
8449	North Hills Mall	43	75
8451	Six Forks and Rowan	2	3
8919	Six Forks and Northbrook	0	2
8452	Six Forks and Capital Towers	8	18
8453	Six Forks and North Glen	0	0
8454	Six Forks and Grace Lutheran Church	0	1
9400	Six Forks and Windel	0	7
9131	Six Forks and Millbrook	14	25
8785	Six Forks and Sandy Forks	3	10
8786	Six Forks and Lynn	4	9
Inbound			
8854	Six Forks and Lynn	10	5
8809	Six Forks and Northcliff	5	2
8470	Six Forks and Loft	3	0
8471	Six Forks and Millbrook	18	16
8472	Six Forks and Snelling	5	1
8473	Six Forks and Shelley River	2	0
8456	Six Forks and Grace Lutheran IB	0	0
8474	Six Forks and Cranbrook	0	0
8475	Six Forks and Trinity Baptist Church	12	4
8476	Six Forks and Northbrook	0	0
8477	Six Forks and Rowan	0	0
8920	Six Forks and Lassiter Mill	1	3
8450	North Hills Mall	70	27
Route 24L-North Crosstown			
9671	Lassiter Mill and Six Forks	0	0
8449	North Hills Mall	52	69

Multi-Modal Level-of-Service Analysis

Stantec created a Quality/Level-of-Service model for Six Forks Road to describe the level of existing performance of transit, bicycle, and pedestrian conditions throughout the roadway corridor. This method also helps to identify the specific deficiencies in each mode of travel that would quantitatively improve the Q/LOS score. An updated version of this technical memorandum will be provided with future-year build and no-build multi-modal performance assessments to illustrate the degree to which our recommendations impact non-auto forms of travel. Only non-auto travel performance is addressed in this memorandum; automobile levels-of-service are being calculated through other methods (i.e., microsimulation modeling).

General Methods

The Quality/Level-of-Service model (ARTPLAN module) was chosen for this analysis, as the method is based upon broadly accepted practice for quantitatively measuring the performance of various travel modes at a preliminary planning level, such as utilizing the Landis Model (Sprinkle Consulting Engineers) for bicycle level-of-service. Bicycle and pedestrian modes of travel consider truck volumes, total volumes, roadway separation and dedicated facilities as primary inputs into the Q/LOS score. The transit module considers the quality of transit stops (e.g., covered or uncovered, seating area, and so forth) as well as frequency of service as the primary inputs.

As this analysis was concerned with existing year conditions, the most recently available average annual daily traffic (AADT) counts were used, as were existing geometrical and signalization conditions. In order to create a more accurate picture of alternative mode performance, the Six Forks roadway corridor was subdivided into seven segments, with each segment corresponding to a section of roadway between signalized intersections. The overall and segment-by-segment performance is addressed in this technical memorandum, as are general field observations.

Highlights of the Results

The quality of service for pedestrians varies somewhat throughout the corridor, although sidewalk is generally present on both sides of Six Forks Road for almost its full length. LOS letter grades ranged from “C” to “E” with the higher-performing segments in the vicinity of Dartmouth and Lassiter Mill Road. Separation in terms of both distance and, in one instance adjacent to the North Hills development, a landscaped (trees) barrier does vary along the length of the roadway corridor. A second section of sidewalk offset appears adjacent to Carroll Middle School, where the sidewalk is adjacent to the school instead of the road (note that there is a prominent worn path made by pedestrians in the landscaped area between the street and the school). Less obvious in the modeling effort, but apparent from field observations, is the discomfort created by higher-speed right-turning movements at several locations, including the I-440 (Beltline) ramps at the south end as well as several smooth right turn accommodations at some business entrances. Pedestrian crossing accommodations at signalized intersections are present, although only the south end of the corridor in the vicinity of the North Hills developments are there high-visibility crosswalks in place now, presumably due to the higher numbers of pedestrians making crossings. Pedestrian crossing phases are adequate and, if not overly generous, do appear to meet both standards and the majority of people crossing the wide swath of pavement in front of the North Hills developments. To improve pedestrian service, wider sidewalks and greater offsets from the roadway would be necessary to improve the Q/LOS score; higher-visibility crosswalk markings, broader refuge areas in the median, and reducing the number of higher-speed right-turning opportunities would be improvements to pedestrian conditions not recognized by the Q/LOS model.

Bicycle travel is not contemplated at any point along Six Forks Road, with only minor variations in Q/LOS scores dictated by adjacent automobile traffic volumes. Bicycle-safe drainage grates are common throughout, and outside lane widths of 12’ are typical. The lack of bicycle accommodations, along with automobile travel speeds and frequency of driveways / street intersections, combine to create challenging conditions for most cyclists. Improvements to on-road bicycle travel would require separated facilities for bicycle travelers; enhanced crossing provisions; and reducing both left and free-flow right-turns. The addition of traditional bicycle lanes or wide shoulders, while making bicycle travel potentially safer from overtaking crashes, would likely not attract many new, non-expert cyclists due to the volumes, speeds and turning frequencies of adjacent automobile traffic. Measures to separate bicycle traffic would improve the Q/LOS score, as would slower speeds; changes like additional crossing provisions or signal activation would be improvements to the cycling environment that the Q/LOS model wouldn’t be able to incorporate.

Transit conditions at the stops are generally fair, although only one fixed-route service, Capital Area Transit’s #8/Northclift route runs almost the full the length of the corridor (one Triangle Transit route and three cross-town connectors cross the corridor). South of the North Hills development there is no fixed-route service provided on Six Forks Road, translating into a Q/LOS letter grade of “F” for these segments of the roadway. The Northclift route runs on 30-minute headways during peak periods of the service day which lasts from nearly 6:00am to 11:00pm during weekdays, with shorter service periods on both Saturday and Sunday. It features a stop inside the North Hills development that requires the full-size vehicles to navigate at slow speeds through some

challenging geometry to reach and exit the covered stop. Other stops include Carroll Middle School, Grace Lutheran Church and Lynn/Spring Forest Road. Grace Lutheran and Optimist Park are designated as park-and-ride locations. Existing transit stop amenities are what the Q/LOS model would classify as “good,” although some stop locations do include benches and covered shelter (“excellent”).

Improving the frequency (shorter headways) would clearly improve the transit Q/LOS score; other changes that might include lighting, bicycle parking racks, and real-time information (particularly in the case of the North Hills stop) would be improvements not recognized by the Q/LOS model.

Table 1A. Q/LOS Model Results, Existing Conditions Northbound*

Northbound Q/LOS	Bicycle On-Street		Pedestrian		Bus	
Street Segment	Score	LOS	Score	LOS	Adj. Buses	LOS
1 (to I-440 WB Ramps)	4.68	E	4.02	D	0.00	F
2 (to Dartmouth Road)	4.59	E	3.59	D	0.00	F
3 (to Lassiter Mill Road)	4.50	E	4.47	E	0.00	F
4 (to Rowan / E. Rowan St)	4.66	E	4.15	D	2.19	D
5 (to Northbrook Drive)	4.72	E	4.22	D	2.39	D
6 (to Shelley Road)	4.85	E	4.78	E	2.03	D
7 (to Millbrook Road)	4.95	E	4.60	E	1.70	E
8 (to Sandy Forks Road)	4.94	E	4.51	E	2.03	D
9 (to Lynn / Spring Forest)	4.88	E	4.36	E	1.70	E
Corridor Level-of-Service	4.83	E	4.44	E	1.59	E

Table 1B. Q/LOS Model Results, Existing Conditions Southbound*

Southbound Q/LOS	Bicycle On-Street		Pedestrian		Bus	
Street Segment	Score	LOS	Score	LOS	Adj. Buses	LOS
1 (to Lynn/Spring Forest)	4.61	E	4.17	D	2.00	E
2 (to Sandy Forks Road)	4.63	E	4.24	D	2.00	E
3 (to Millbrook Road)	4.68	E	4.39	E	1.70	E
4 (to Shelley Road)	4.55	E	4.17	D	2.39	D
5 (to Northbrook Drive)	4.63	E	4.62	E	2.03	D
6 (to Rowan / E. Rowan St)	4.33	E	3.45	C	1.80	E
7 (to Lassiter Mill Road)	4.27	E	3.31	C	1.98	E
8 (to Dartmouth Road)	4.14	D	3.36	C	1.80	F
9 (to I-440 WB Ramps)	4.37	E	3.68	D	1.80	F
Corridor Level-of-Service	4.55	E	4.18	E	1.61	E

**Note: Higher scores indicate worse performance for bicycle and pedestrian modes; lower adjusted number of buses indicates worse performance for transit. Level-of-Service scores range from A (best) to F (worst).*

Tree-Separated Sidewalk Barrier and a “Wide” Planting Strip, both factors in a Q/LOS Model

High-Visibility Crosswalk

Higher-Speed Right-Turn at Commercial Entrance

According to Q/LOS Model Standards an excellent bus stop provides covered seating; note the pedestrian crossing signal and trash receptacle. This stop is also ADA-accessible.

Intersection Queues and Median Development Analysis

A traffic simulation was created at the request of NCDOT and the lead consultant to assess (1) the queue lengths (or “spillback”) from the major intersections along the Six Forks Road Corridor; and (2) use this queuing information to evaluate the impacts to median placement. The following describes the methods used to achieve these preliminary findings, pending final QA/QC checks and review by NCDOT.

General Method

Volumes of traffic for the base year of 2014 were acquired from the Triangle Regional Model, with some adjustments sanctioned by the City staff to create more realistic current volumes. Future-year (2035) traffic volumes were based on a 1.0% annual, compounded growth rate north of Northbrook Drive, and a 1.5% annual, compounded growth rate south of Northbrook Drive. Traffic turning movements were obtained from the City of Raleigh, and were kept constant from the base year in the future-year scenarios.

The simulation models were prepared using Synchro and SimTraffic (to assess operational impacts) for the base year, 2035 No-Build, and 2035 Build conditions. Traffic signals are not optimized for the No Build conditions to help reflect a consistent comparison between current and future-year scenarios; queuing lengths represented in this assessment are therefore more conservative than if optimization had been employed. However, the 2035 Build conditions are optimized. Tables (2) representing all of the left-turning movements for all three scenarios is attached for the major intersections of Lynn Road, Millbrook Road, and Lassiter Mill Road. A map is also included in this transmittal indicating both 50th percentile and 95th percentile queueing lengths and the resulting impacts to median location. This map shows the longest AM or PM peak queuing value on each approach, and assumes an additional 150’ of taper at the end of each queue.

Highlights of the Results

The longest, average queue is 826’ (1,000’ during the 95th percentile worst condition) at the eastbound approach (not along the Six Forks corridor) of the Lassiter Mill Road intersection in the 2035 Build scenario. This queue would, in the worst periods, pose conflicts with turning movements into and out of the shopping center driveways on both sides of Lassiter Mill Road (an area where some conflicts already occur in the base year). The southbound left-turn movement at this same intersection (Lassiter Mill/Six Forks Road) is also the location of the longest north-south left-turn queue at 372’, although this same queue is less than 100’ in length for the average (50th percentile) condition.

Tables 1 and 2 on the following pages provide additional information on both the existing (Table 1) and future year (Table 2) conditions.

The north-south left-turn movements do restrict (on a limited basis) the extent of any proposed median. However, other constraints, such as where to allow crossovers in-between major signals and if median U-turns would be permitted to help facilitate left-turns, also play a central role in the opportunities for medians. The map shown in this memorandum helps to illustrate these concepts, based in part on the location of existing, major signalized intersections as well as the queues for the three major cross-streets discussed previously. The map indicates that there might be one or two locations, in addition to the existing signal locations, that a mid-block U-Turn may be desirable. The exact number and location of median U-Turns should be discussed and analyzed in further detail. In addition to providing direct access to adjacent properties behind the corridor, additional crossing points are important to traffic performance at other intersections, since they help reduce the number of slower-moving U-turn movements (which also conflict with right-turning moves coming from the cross-streets) at the major intersections detailed in this memorandum.

Table 1. Base Year (2014) Left-Turn Performance at Three Intersections (AM and PM)

	AM				PM			
	Six Forks Road & Lynn Road				Six Forks Road & Lynn Road			
	Existing				Existing			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	71	165	95	86	207	259	156	89
Laneage								
95th Percentile Queue (ft)	**120**	**352**	**122**	**107**	**315**	**474**	**208**	**143**
Average Queue (ft)	**49**	**160**	**63**	**48**	**165**	**306**	**119**	**64**
Left Turn Lane LOS	F	F	E	E	E	F	F	D
Approach LOS (Through Movements)	D	D	E	E	E	E	E	F
Approach Delay (Turn Movements)	109.4	95.7	59.7	67.9	67.4	108.8	128.4	53
	Six Forks Road & Millbrook Road				Six Forks Road & Millbrook Road			
	Existing				Existing			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	114	84	97	117	103	189	141	188
Laneage								
95th Percentile Queue (ft)	**324**	**175**	**172**	**180**	**253**	**338**	**260**	**358**
Average Queue (ft)	**157**	**54**	**76**	**98**	**127**	**199**	**141**	**218**
Left Turn Lane LOS	F	D	F	F	F	F	F	F
Approach LOS (Through Movements)	D	F	F	F	F	E	F	F
Approach Delay (Turn Movements)	89.8	45.6	104.9	114.6	94.6	144.5	108.7	113.9
	Six Forks Road & Lassiter Mill Road				Six Forks Road & Lassiter Mill Road			
	Existing				Existing			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	110	52	217	13	236	28	514	33
Laneage								
95th Percentile Queue (ft)	**175**	**97**	**200**	**56**	**296**	**96**	**1018**	**105**
Average Queue (ft)	**79**	**44**	**131**	**27**	**171**	**35**	**727**	**43**
Left Turn Lane LOS	F	F	F	F	F	F	F	F
Approach LOS (Through Movements)	B	B	E	E	D	D	E	F
Approach Delay (Turn Movements)	108	98.9	85.3	81.7	104.1	90.4	84.5	106.7

Table 2. Future Year (2035) Left-Turn Performance at Three Intersections

	AM								PM							
	Six Forks Road & Lynn Road								Six Forks Road & Lynn Road							
	No Build				Build				No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	93	216	124	113	93	216	124	113	271	339	204	117	271	339	204	117
Laneage																
95th Percentile Queue (ft)	**117**	**352**	**235**	**173**	**58**	**149**	**158**	**146**	**424**	**808**	**380**	**222**	**202**	**298**	**272**	**123**
Average Queue (ft)	**57**	**169**	**111**	**93**	**20**	**82**	**87**	**71**	**217**	**530**	**259**	**115**	**85**	**196**	**159**	**57**
Left Turn Lane LOS	F	F	E	E	F	F	E	E	F	F	F	E	F	F	F	D
Approach LOS (Through Movements)	E	E	E	E	D	D	E	E	F	F	F	F	E	E	E	F
Approach Delay (Turn Movements)	100.8	103.6	68.8	77.4	98.3	87.7	57.2	67.9	166.3	143.2	227.4	56.2	83.2	116.5	103.6	44.3
	Six Forks Road & Millbrook Road								Six Forks Road & Millbrook Road							
	No Build				Build				No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	149	110	127	153	149	110	127	153	135	248	185	246	135	248	185	246
Laneage																
95th Percentile Queue (ft)	**302**	**253**	**298**	**486**	**267**	**210**	**252**	**336**	**271**	**483**	**346**	**560**	**294**	**333**	**341**	**560**
Average Queue (ft)	**166**	**67**	**157**	**290**	**106**	**52**	**153**	**232**	**129**	**285**	**228**	**340**	**92**	**181**	**228**	**408**
Left Turn Lane LOS	F	E	F	F	F	E	F	F	F	F	F	F	F	F	F	F
Approach LOS (Through Movements)	D	F	F	F	D	E	F	F	F	F	F	F	F	E	F	F
Approach Delay (Turn Movements)	100.2	62.8	129.2	173.4	141.7	66.3	133.8	150	107	273.3	117.3	152.3	95.5	163.2	166.9	132.5
	Six Forks Road & Lassiter Mill Road								Six Forks Road & Lassiter Mill Road							
	No Build				Build				No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	164	77	323	19	164	77	323	19	352	42	766	49	352	42	766	49
Laneage																
95th Percentile Queue (ft)	**180**	**222**	**586**	**50**	**162**	**372**	**1000**	**53**	**250**	**149**	**838**	**124**	**188**	**241**	**835**	**103**
Average Queue (ft)	**85**	**89**	**284**	**18**	**92**	**96**	**568**	**24**	**146**	**40**	**825**	**71**	**125**	**38**	**826**	**50**
Left Turn Lane LOS	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Approach LOS (Through Movements)	C	F	F	E	B	F	F	E	F	F	F	F	E	F	F	F
Approach Delay (Turn Movements)	112.5	122.2	100.3	83.5	101.4	82.7	108.3	85.3	161.1	90.7	355.7	115.6	136.7	99.3	164	113.2

Six Forks Road & Lynn Road	AM							
	No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	93	216	124	113	93	216	124	113
Laneage								
95th Percentile Queue (ft)	**117**	**352**	**235**	**173**	**58**	**149**	**158**	**146**
Average Queue (ft)	**57**	**169**	**111**	**93**	**20**	**82**	**87**	**71**
Left Turn Lane LOS	F	F	E	E	F	F	E	E
Approach LOS (Through Movements)	E	E	E	E	D	D	E	E
Approach Delay (Turn Movements)	100.8	103.6	68.8	77.4	98.3	87.7	57.2	67.9
Six Forks Road & Lynn Road	**PM**							
	No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	271	339	204	117	271	339	204	117
Laneage								
95th Percentile Queue (ft)	**424**	**808**	**380**	**222**	**202**	**298**	**272**	**123**
Average Queue (ft)	**217**	**530**	**259**	**115**	**85**	**196**	**159**	**57**
Left Turn Lane LOS	F	F	F	E	F	F	F	D
Approach LOS (Through Movements)	F	F	F	F	E	E	E	F
Approach Delay (Turn Movements)	166.3	143.2	227.4	56.2	83.2	116.5	103.6	44.3

Six Forks Road & Millbrook Road	AM							
	No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	149	110	127	153	149	110	127	153
Laneage								
95th Percentile Queue (ft)	**302**	**253**	**298**	**486**	**267**	**210**	**252**	**336**
Average Queue (ft)	**166**	**67**	**157**	**290**	**106**	**52**	**153**	**232**
Left Turn Lane LOS	F	E	F	F	F	E	F	F
Approach LOS (Through Movements)	D	F	F	F	D	E	F	F
Approach Delay (Turn Movements)	100.2	62.8	129.2	173.4	141.7	66.3	133.8	150
Six Forks Road & Millbrook Road	**PM**							
	No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	135	248	185	246	135	248	185	246
Laneage								
95th Percentile Queue (ft)	**271**	**483**	**346**	**560**	**294**	**333**	**341**	**560**
Average Queue (ft)	**129**	**285**	**228**	**340**	**92**	**181**	**228**	**408**
Left Turn Lane LOS	F	F	F	F	F	F	F	F
Approach LOS (Through Movements)	F	F	F	F	F	E	F	F
Approach Delay (Turn Movements)	107	273.3	117.3	152.3	95.5	163.2	166.9	132.5

Six Forks Road & Lassiter Mill Road	AM							
	No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	164	77	323	19	164	77	323	19
Laneage								
95th Percentile Queue (ft)	**180**	**222**	**586**	**50**	**162**	**372**	**1000**	**53**
Average Queue (ft)	**85**	**89**	**284**	**18**	**92**	**96**	**568**	**24**
Left Turn Lane LOS	F	F	F	F	F	F	F	F
Approach LOS (Through Movements)	C	F	F	E	B	F	F	E
Approach Delay (Turn Movements)	112.5	122.2	100.3	83.5	101.4	82.7	108.3	85.3
Six Forks Road & Lassiter Mill Road	**PM**							
	No Build				Build			
Direction	NB Left	SB Left	EB Left	WB Left	NB Left	SB Left	EB Left	WB Left
Volume	352	42	766	49	352	42	766	49
Laneage								
95th Percentile Queue (ft)	**250**	**149**	**838**	**124**	**188**	**241**	**835**	**103**
Average Queue (ft)	**146**	**40**	**825**	**71**	**125**	**38**	**826**	**50**
Left Turn Lane LOS	F	F	F	F	F	F	F	F
Approach LOS (Through Movements)	F	F	F	F	E	F	F	F
Approach Delay (Turn Movements)	161.1	90.7	355.7	115.6	136.7	99.3	164	113.2

Future Year 2035 Left-Turn Performance

Lynn

Millbrook

Lassiter Mill

Preliminary Six Forks Corridor Average and 95th Percentile Left-Turn Lane Queuing

2035 Average Queuing Length

2035 95th Percentile Queuing Length

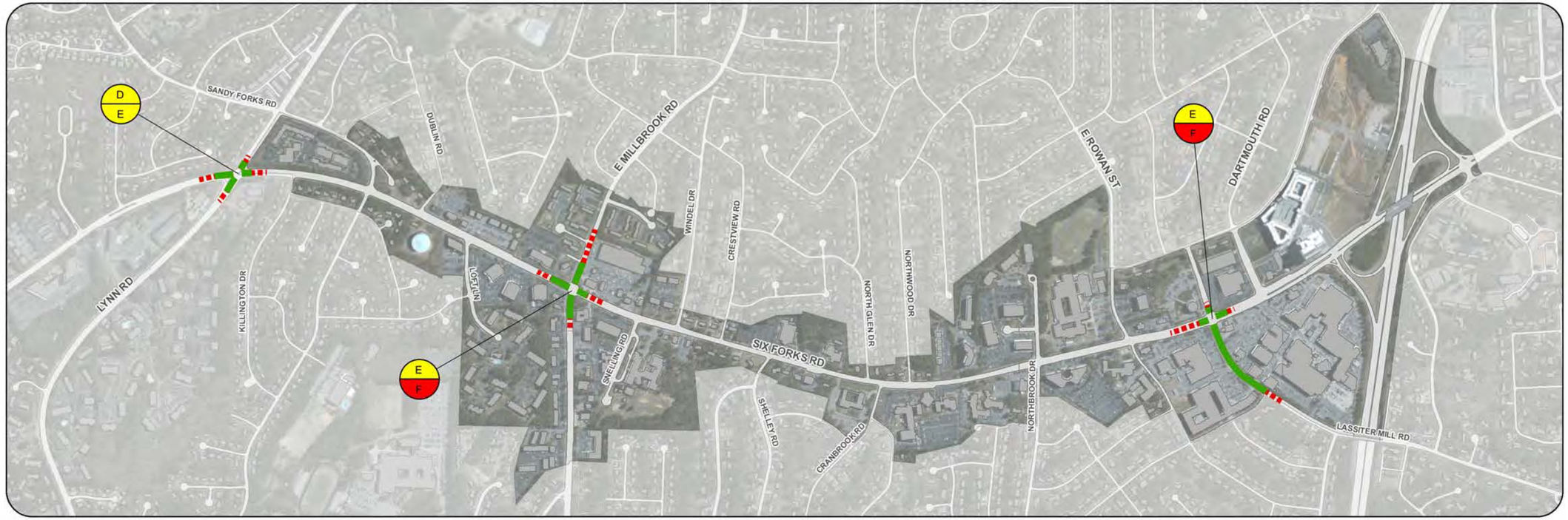
AM / PM Future Year 2035 Overall Intersection Level of Service

Raleigh Roads

Building Footprints

Updated on: 11/20/2014

0 450 900 1,800 Feet



TRANSPORTATION RECOMMENDATIONS

TRANSPORTATION PHILOSOPHY

As a major arterial providing mobility for daily commuters as well as a destination for residents and visitors to a multitude of shopping, restaurant and civic activity, there is no doubt of the importance Six Forks Road plays in regional mobility and as a destination corridor. The fact remains, within its 2.3 mile length, the cross section changes nine (9) times, adding to driver confusion and inconsistent design. This issue is compounded by the fact that the corridor is one of most unsafe facilities within the County having a crash rate 2.86 times higher than the state average for a similar roadway. What to do with a road that has high expectations for mobility and multimodalism was the focus of many discussions.

The Idea

To support the total transformation for Six Forks Road is by all accounts inevitable. Community leaders are advocating a new vision for the Six Forks corridor into a Complete Street that is multimodal, vibrant, and attractive to ALL users. Predictable to the driver, controlling speeds through better design and encouraging transit patrons as well as those who choose to walk or ride their bike. With this in mind, the following brief write-up provides a recap of the needs for the corridor while describing the recommendations for bicycle, pedestrian, transit and vehicular needs along Six Forks Road from I-440 to Lynn Road.

As envisioned by the Six Forks community, the corridor should enable an active pedestrian life and integrate residential, commercial, recreational, educational, faith, and retail uses. Safety and accessibility are paramount in designing a distinctive streetscape that is uniquely Midtown with unifying features and green space that make it both an attractive urban arterial and an irresistible gathering place.

ROADWAY

As mentioned earlier, the Six Forks corridor is a regional destination for shopping, business and civic activity, entertainment, and a mix of housing. However, the travel demands along this corridor outweigh its ability to maintain quality level of service. With daily traffic volumes ranging from 29,000 – 42,000, the corridor's volume to capacity ratio (0.95 – 1.41) is overcapacity. And, with impending development and redevelopment along the corridor, Six Forks will require widening to a six lane facility.

Speed differential is also a concern. The recorded speeds throughout the corridor dropped to 68% of the posted speed limit during the AM and PM peak hours on average, an indication of high levels of congestion and commuting demand.

ROADWAY OBSERVATIONS

Many of the discussions regarding Six Folks Road centered on the capacity and safety problems of the facility. Although there is a high crash rate (2.86 times the State average), the severity of crashes are low, indicating high levels of congestion at low travel speeds. In addition, the inconsistent cross sections and lack of access controls (i.e., plethora of driveways and lack of median) add to driver confusion and frustration.

RECOMMENDATIONS

Six Forks Road is recommended to be widened from I-440 to Lynn Road to a 6-lane divided with plantable median (see proposed cross section in chapter 2). It should be noted that dedicated right turn lanes at key intersections are not preferred due to increased pedestrian walk time. The typical cross section should have the following features, with varying widths depending on the segment of roadway. The typical right-of-way width along the corridor varies approximately 125' to 136'.

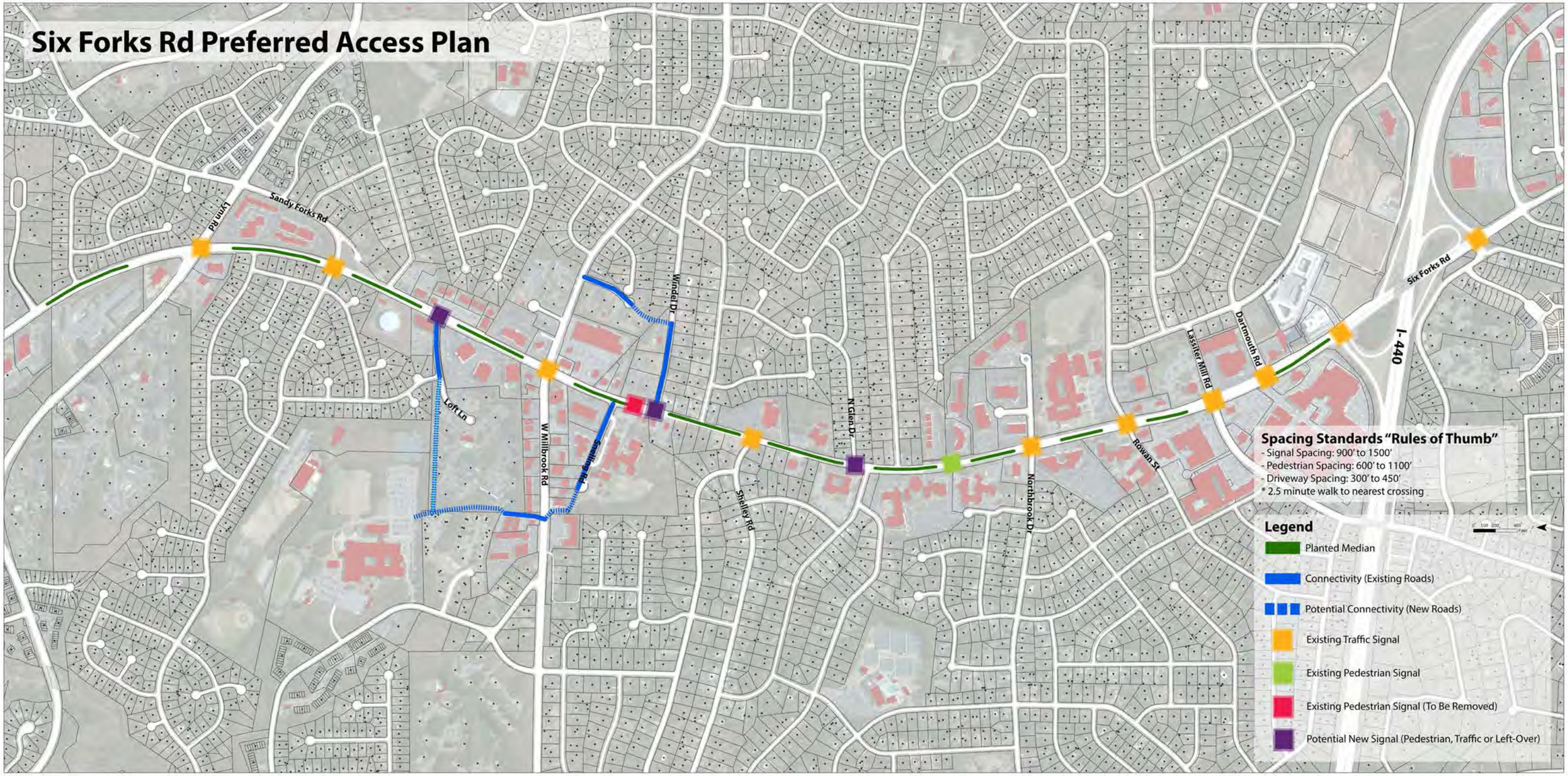
- Six (6) – 10' travel lanes
- Plantable median (6' – 20' width)
- Curb and gutter edge of pavement
- Plantable verge area (6' – 8')
- Buffered 5' bike lane
- Buffered 6' – 10' sidewalk

PREFERRED ACCESS PLAN

Access Management is one of the key components of a quality mobility corridor. Controlling curb cuts and left turns will limit confusion and conflicts for drivers. In turn, corridor carrying capacity and predictability improves. A Preferred Access Plan (see next page) was developed to identify system-level spacing standards for intersections, signals and driveways. It also identifies potential connectivity improvements (near Millbrook intersection) through redevelopment as well as the placement of a plantable median. By spacing signals and intersections at appropriate intervals, progression controlled traffic becomes more manageable. That is, the signals can be timed (and phased) so that vehicular platoons can traverse the corridor in a more consistent manner. This allows the greatest efficiency for travel along the Six Forks corridor. It is also recommended that the posted speed limit be a consistent 35 mph along the entire corridor. The following spacing standards are being recommended for the Six Forks corridor. Please note that these are ideal standards and are dependent upon design constraints.

- Signal Spacing 900' to 1500'
- Pedestrian (cross access) Spacing 600' to 1100'
- Driveway Spacing 300' to 450'

Six Forks Rd Preferred Access Plan



TRAFFIC OPERATIONAL PERFORMANCE

Traffic operations were analyzed to compare 2035 Build versus NoBuild conditions. Based on this information, six of the twelve signaled intersections show a substantial improvement, while the remaining intersections have LOS values that remain unchanged. However, majority of the signalized intersections for the Build conditions are anticipated to experience reduced vehicle delays. The intersection of Shelley Road and Six Forks improved dramatically, from a LOS D in the 2035 No Build AM to LOS A in the 2035 Build AM. Lastly, key Intersections, such as Six Forks and Lynn and Six Forks and Rowan, improve by one LOS level between the No Build and Build scenarios.

CORRIDOR DESIGN CONCEPT

A Corridor Design Concept (see Chapter 2) was developed using CADD computer software to highlight the complete street design features, determine the physical footprint and identify potential right-of-way impacts of the improvements. Once complete, the Six Forks Road complete streets corridor will include safe and convenient amenities for bicycle, pedestrian, transit and vehicular mobility. "Build in" traffic calming (street trees, bollards, plantable median, etc.) can be used to limit speed differentials between competing modes. The roadway design standards used to develop the concept include the following:

- Classification: Urban Arterial
- Design Speed: 45 mph
- Lane Width: 11'
- Maximum Grade: 7%
- Minimum Grade: 0.3%
- Maximum Super Elevation: 6%
- Minimum Radius: 485'

2035 Build versus NoBuild Level of Service (LOS)

Six Forks Intersection LOS	Lynn	Northcliff/ Sandy Forks	Millbrook	Shelley	Trinity Baptist	North-brook	Rowan	Lassiter Mill	Dartmouth	Front	I-440 Outer Beltline WB	Ramblewood
2035 No Build - AM	E	D	F	D	A	B	D	E	D	D	F	D
2035 No Build - PM	F	C	F	B	A	F	F	F	F	D	F	F
2035 Build - AM	D	D	E	A	A	B	C	E	D	D	F	D
2035 Build - PM	E	D	F	A	A	E	E	F	E	D	F	F

MULTIMODAL

To travel by foot or bike along Six Forks road is a daunting and almost unnerving venture. The lack of design provisions and safety measures for pedestrians makes it a difficult choice. Safe cross-access is limited by the lack of quality crosswalks and technology that brings more awareness of the pedestrian or cyclist. Transit users suffer from a lack of amenities like bus shelters as well as frequency of service. However, there remain ample opportunities to improve the safety and convenience for non-motorized travel along the Six Forks corridor.

BICYCLE AND PEDESTRIAN OBSERVATIONS

Today, the quality of service for bicycle and pedestrian users along the Six Forks corridor ranges from a LOS D to LOS E. Fast-moving cars and confusion as to who has the right-of-way continue to be challenges for those who choose to be on foot or two wheels. Based on community input, there continues to be a need for improved visibility and crossing provisions for bicyclists and pedestrians, an increase in driver awareness of non-motorized users and separated spaces to accommodate wide sidewalks and bicycle facilities. There is a lack of amenities and design provisions at key intersections and a need for dedicated pathways for bicyclists and pedestrians. Ultimately, the vision for the corridor is to not only improve safety for bicyclists and pedestrians, but, to create a healthy environment that encourages all types of users from the beginner to the expert cyclist.

RECOMMENDATIONS

The Six Forks corridor is vehicular dominated as there are limited design features that cater to bicyclists and pedestrians. Due to the speed differential between vehicles-bicycles, it is recommended that the following separate facilities be implemented for pedestrians and cyclists. Each design provision applies to all signalized intersections and along the entire Six Forks Road corridor. See intersection diagrams below.

- Dedicated 6' – 10' wide buffered (6' – 8') sidewalks (width dependent on segment/context of roadway)
- Dedicated 5' wide buffered (3 feet) bike lane on back of curb and gutter
- Street trees (shade)
- Pedestrian level lighting at adequate spacing intervals (50' urban and 100' suburban)
- High-visibility crosswalks with pedestrian countdowns
- Parallel and painted bike lanes through intersections
- ADA compliant ramps
- Pedestrian refuge (where appropriate)

SIGNALIZED INTERSECTION TREATMENT

MINOR UNSIGNALIZED INTERSECTION TREATMENT

TRANSIT OBSERVATIONS

Only two Capital Area Transit (CAT) bus routes travel along Six Forks Road. After a review of ridership data, many of the bus stop locations have less than 5 total riders per day, with a few locations having zero riders. In addition, many of these locations only have a sign indicating that it is a CAT stop location. No other amenities or conveniences are provided. Study participants voiced a concern with bus limited bus frequency as well as the need to extend service or direct access to preferred destinations like downtown and Wake Forest Road. The City, local residents, along with Midtown representatives desire to have a high priority transit corridor that allows the opportunity for future premium service like bus rapid transit (BRT).

Example of Bus Rapid Transit

RECOMMENDATIONS

The City of Raleigh has designated this as a high priority transit corridor. Increasing the transit level of service is critical to increasing ridership in the Six Forks Road corridor. This will be accomplished by improving transit in three categories. First, improve bus facilities by creating a consistent and attractive bus shelters. Each quality bus shelter would have the following design attributes and safety features to encourage transit ridership

- Covered (sheltered) bench seating
- Pedestrian level lighting
- Trash receptacle
- Shade Trees
- Relocate bus stop locations closer to intersections
- Make bus stop shelters attractive facilities with possible public art pieces
- Each bus shelter would be conveniently located in back of curb for direct access to the bus
- App-based arrival time technology

Secondly, we recommend reducing headways (15 minute) by consolidating the bus stops into a consistent spacing that maximizes efficiency while still providing stops at a spacing that is convenient for pedestrians in the surrounding neighborhoods. With this in mind, the project team, in collaboration with CAT representatives, recommends locating high-quality bus shelters along the Six Forks corridor at 1/2 mile spacing intervals. This would allow transit patrons access to a bus shelter within a 1/4 of a mile radius or a five (5) minute walk distance.

Example of Bus Stop

Lastly, adding additional routes available to the Six Forks Corridor will make more locations throughout the city more easily accessible.

QLOS PERFORMANCE

A “before and after” quality level-of-service analysis was performed to determine the impacts to non-motorized (bicycle, pedestrian and transit) travel. With the recommended complete streets improvements, the Six Forks Road multimodal LOS is expected to dramatically improve. The tables below highlight the anticipated QLOS before and after the implementation of the complete streets improvements. Pedestrian LOS values typically improve by a grade level for most intersections. Along the Six Forks corridor, pedestrian LOS increases in most cases and remains the same in others. As pedestrian LOS is improved by the presence of buffers, including on-street parking (not programmed for Six Forks) and low traffic volumes, this rating is not as high as it possibly can be, but is substantially improved. Bicycle LOS improves substantially for every segment along the Six Forks corridor, based on the presence of dedicated bicycle facilities. And, bus LOS improves dramatically with the increase of headways and provision of high quality bus stop amenities.

2035 Build versus NoBuild Quality Level of Service (QLOS) Results

2035 QLOS Segment Analysis Results - Six Forks Road SB	Lynn/Spring Forest to Sandy Forks	Sandy Forks to Millbrook	Millbrook to Shelley	Shelley to Northbrook	Northbrook to Rowan	Rowan to Lassiter Mill	Lassiter Mill to Dartmouth	Dartmouth to I-440 WB Ramps	I-440 WB Ramps to I-440 EB Ramps
Pedestrian Link LOS - Existing 2014	D	E	D	E	C	C	C	D	D
Bicycle Link LOS - Existing 2014	E	E	E	E	E	E	D	E	E
Transit Link LOS - Existing 2014	E	E	D	D	E	E	F	F	F
Pedestrian Link LOS - Future 2035	C	C	C	C	C	C	C	C	C
Bicycle Link LOS - Future 2035	B	B	B	B	B	B	B	B	B
Transit Link LOS - Future 2035	B	B	B	B	B	B	C	F	F

2035 QLOS Segment Analysis Results - Six Forks Road NB	I-440 EB Ramps to I-440 WB Ramps	I-440 WB Ramps to Dartmouth Roand	Dartmouth to Lassiter Mill	Lassiter Mill to Rowan	Rowan to Northbrook	Northbrook to Shelley	Shelley to Millbrook	Millbrook to Sandy Forks	Sandy Forks to Lynn
Pedestrian Link LOS - Existing 2014	D	D	E	D	D	E	E	E	E
Bicycle Link LOS - Existing 2014	E	E	E	E	E	E	E	E	E
Transit Link LOS - Existing 2014	F	F	F	D	D	D	E	D	E
Pedestrian Link LOS - Future 2035	D	C	C	C	C	C	C	C	C
Bicycle Link LOS - Future 2035	B	B	B	B	B	B	B	B	B
Transit Link LOS - Future 2035	F	F	B	C	B	B	B	B	B

5

IMPLEMENTATION PLAN

Purpose: This chapter takes the proposed plan and creates a framework for planning funding and future probable costs

Implementation

Summary

Following or in conjunction with the study's approval, City staff will bring forward amendments to the 2025 Raleigh Comprehensive Plan for the Future Land Use Map and Street Plan as recommended by this study. Implementation of these improvements should be approached in a phased manner, identified in the matrix on this page.

Phase 1 would include the design, right-of-way acquisition, and construction of Six Forks Road between Lynn Road and Rowan Street. Funding for design is currently programmed as part of the City's Capital Improvement Program (CIP) for FY 2017 as part of the City's 2013 Transportation Bond. Property acquisition and construction were not included in the bond and therefore are not programmed at this time. These costs could be included as part of an upcoming transportation bond referendum.

Phase 2 would continue the improvements south from Rowan Street to Interstate 440; and then be followed by Phase 3 and the I-440 interchange improvements. It is anticipated that private redevelopment along the Phase 2 section would trigger the City to commence this work. Right-of-way dedication and improvements associated with any redevelopment would help defray public sector costs for this section. For Phase 3, NCDOT will be responsible for future improvements at the Interstate 440 interchange.

Outside the phased priority segments of the main corridor, the implementation matrix also highlights potential off-corridor projects identified in the study. Improvements to Rowan Street adjacent to Carroll Middle School could be undertaken by the Wake County Public School System (WCPSS) as part of a future redevelopment of the school property, potentially with some financial support from the City. The extension of Snelling Road to Millbrook Road would likely be a City-initiated project or partnered with private redevelopment in the area. City funding for these improvements would need to programmed and approved as part of future CIP budgets. The final two items, the Loft Lane Extension/New Street and Tralee Place Extension/Connection would not be public sector projects, but borne by private developers as required in the city's development code.

Six Forks Road Corridor Study - Implementation Plan

Priority	Description		Responsible Party	Anticipated Timeline (with Study Approval)	Estimate of Publicly-Funded Costs (2019 $)
0	Comprehensive Plan Amendments - Future Land Use Map (FLUM) & Street Plan Updates		COR	Summer 2016	n/a
1	Lynn Road to Rowan Street	Design	COR	FY 2017	$2,000,000
		ROW & Construction		FY 2019+ with Future Transportation Bond Approval	$28,500,000
2	Rowan Street to I-440	Design	COR	Future Capital Improvement Program (CIP) Project	$945,000
		ROW & Construction	COR / Private Development	Future CIP Project / With Redevelopment	$12,295,000
3	I-440 Interchange Improvements	Design	NCDOT / COR	Future NCDOT Project	$65,600
		Construction			$683,000
--	Off-Corridor Improvements - Rowan Street		COR / WCPSS	Potential Partnership with School Redevelopment	$898,300
--	Off-Corridor Improvements - Snelling Road		COR / Private Development	Potential Partnership with Redevelopment	$1,895,000
--	Off-Corridor Improvements - Loft Lane Extension/Connection		Private Development	With Redevelopment	n/a
--	Off-Corridor Improvements - Tralee Place Extension/Connection		Private Development	With Redevelopment	n/a

LEGEND

COR - City of Raleigh
NCDOT - NC Department of Transportation
WCPSS - Wake County Public School System

6

APPENDIX

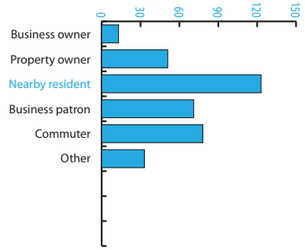
- Public Meeting Feedback
- Cost Estimates

Public Involvement - Keypad and Online Polling Results

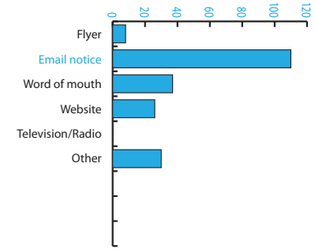
Public meetings and website polling was conducted to gather the public's opinion about the Six Forks Corridor project. The purpose of these meetings was to kickoff Phase 2 of the project and to reintroduce the Community to the conclusions of the Visioning Work Sessions that were part of Phase 1.

The results below are an aggregate of the polling collected. In total we had 205 respondents.

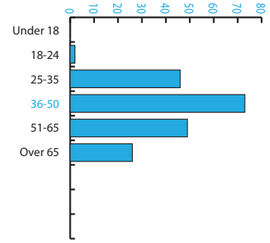
1. My affiliation with the Six Forks Corridor is? (choose all that apply)



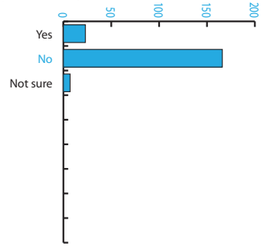
2. I found out about this meeting from… (choose all that apply)



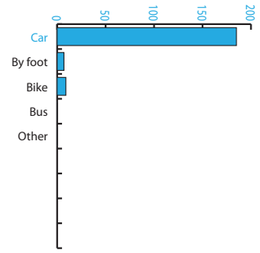
3. What is your age? (Choose one)



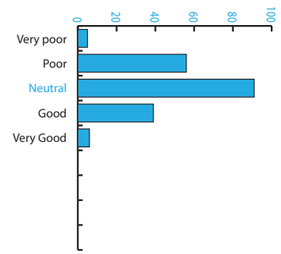
4. Were you involved in the previous meetings? (Multiple Choice)



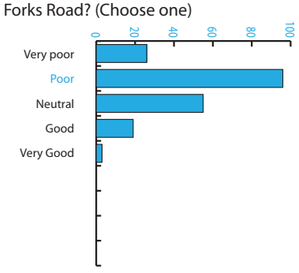
5. My primary mode of travel along Six Forks is: (Choose one)



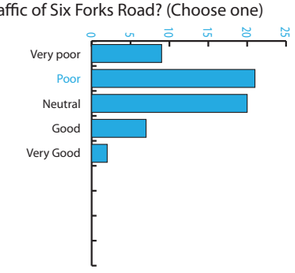
6. How would you rate the overall appearan of Six Forks Boulevard? (Choose one)



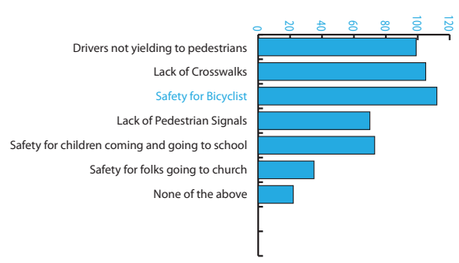
7. How would you rate the overall safety of Six Forks Road? (Choose one)



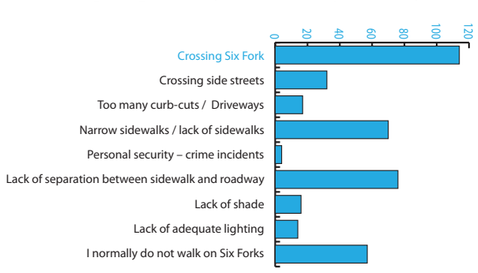
8. How would you rate the overall flow of traffic of Six Forks Road? (Choose one)



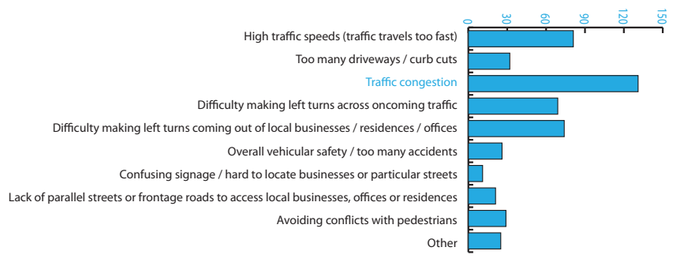
9. What safety issues concern you the most along Six Forks? (select all that apply)



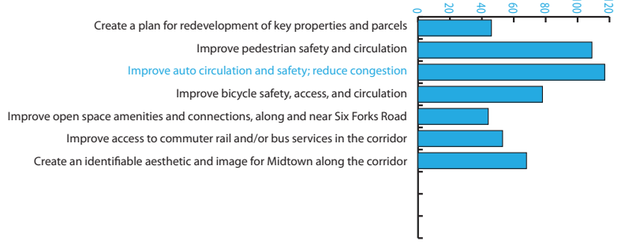
10. When you are walking along Six Forks, what concerns you most? (Choose top 3)



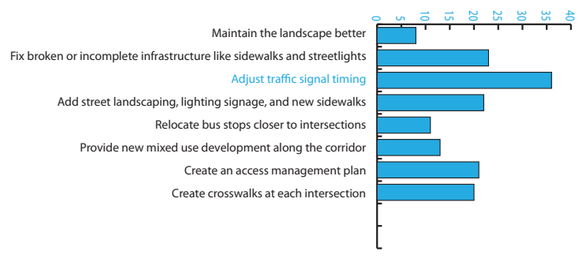
11. Which auto transportation issues concern you most along Six Forks? (Choose your top 3)



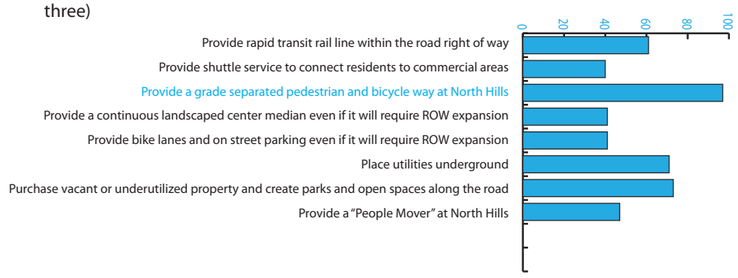
12. Which objectives are the most important for Six Forks Road? (Choose your top 3)



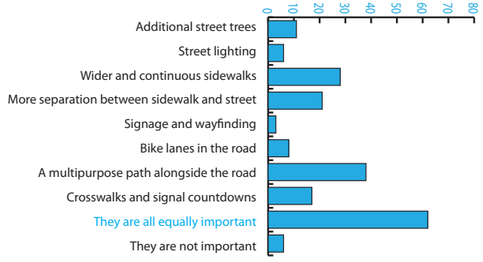
13. The public process has outlined some "Quick Fixes":: (Choose your top three)



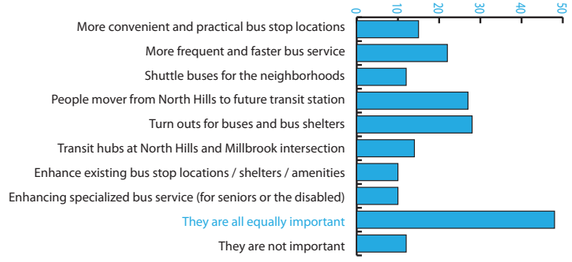
14. The public process has yielded some visionary ideas. What visionary idea(s) did you connect with in the previous meeting (Choose your top three)



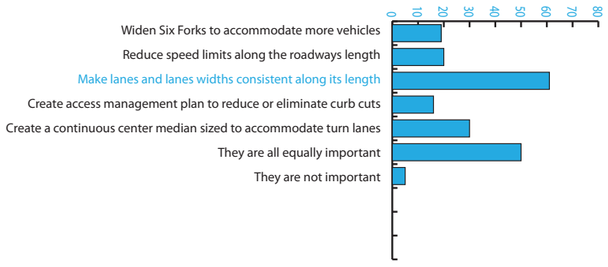
15. The most important Public Realm / Streetscape fix is: (Choose 1)



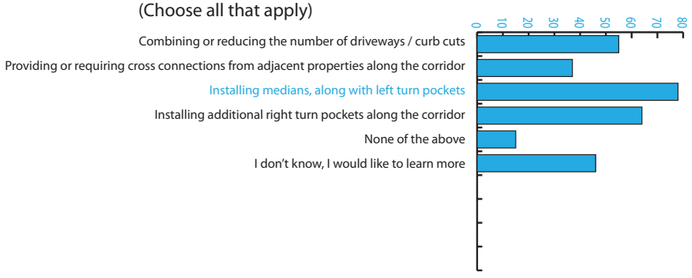
16. The most important Transit Infrastructure fix is: (Choose 1)



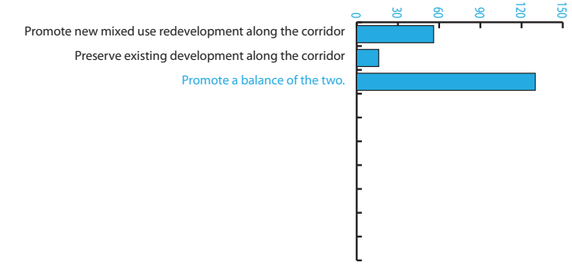
17. The most important Roadway Capacity fix is: (Choose 1)



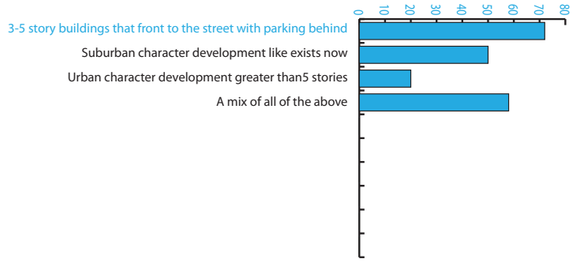
18. Which of the following access management strategies would you favor implementing along various segments of Six Forks? (Choose all that apply)



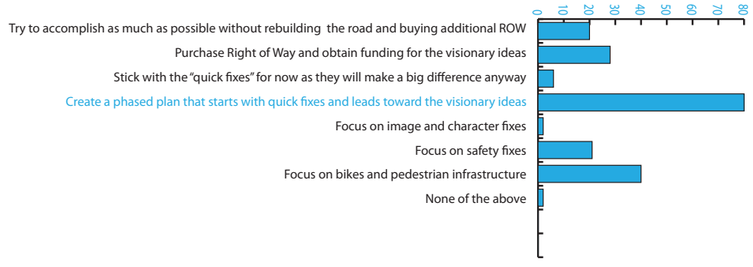
19. The most important Land Use fix is: (choose 1)



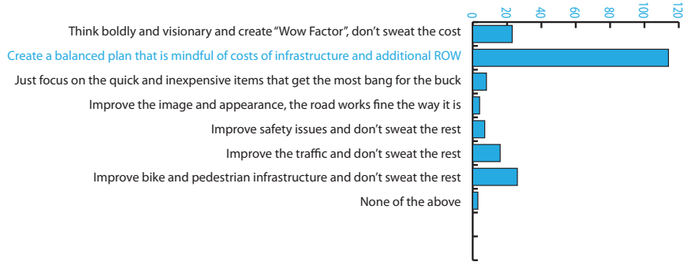
20. If redevelopment were to occur, I think the character should be: (Choose 1)



21. In order to implement the vision crafted so far for the project, I think you should: (Choose 1)



22. The most important mind-set that the planning team should bring to this study is: (Choose 1?)



Public Involvement - Street Section Exercise

First Session Results

During the public work sessions the public was broken into groups and tasked with building their ideal street section for Six Forks Road. before the exercise their was a discussion around the width constraints within the corridor. Prior to building their street sections the public was asked to carefully decide which elements were most important to be included in the corridor.

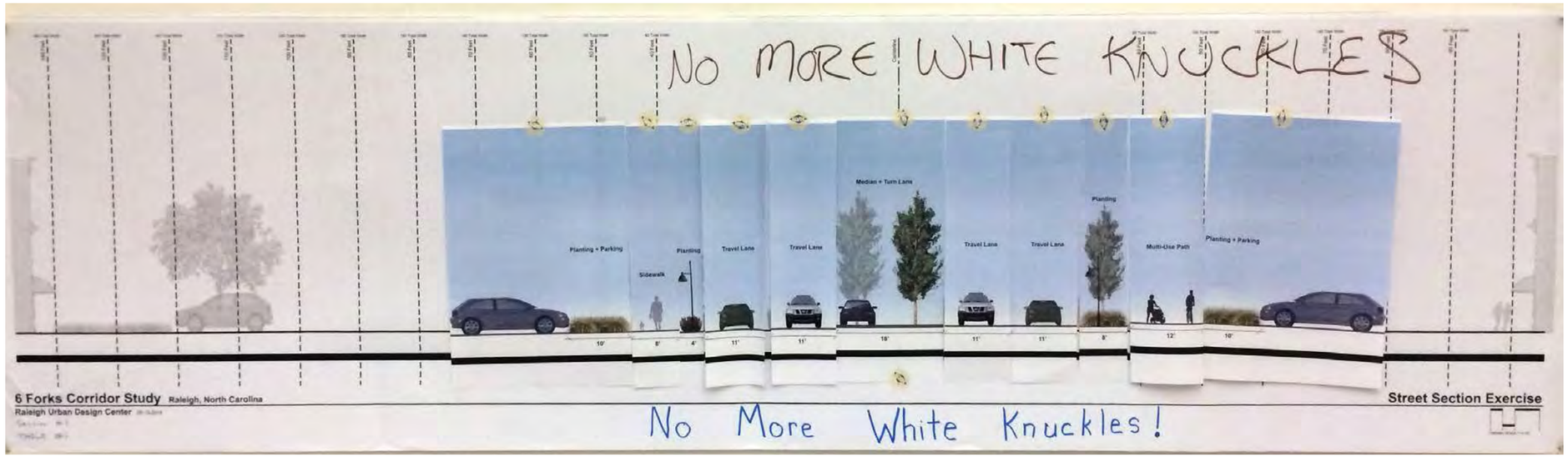


Table 1 - Total Width 94 Feet

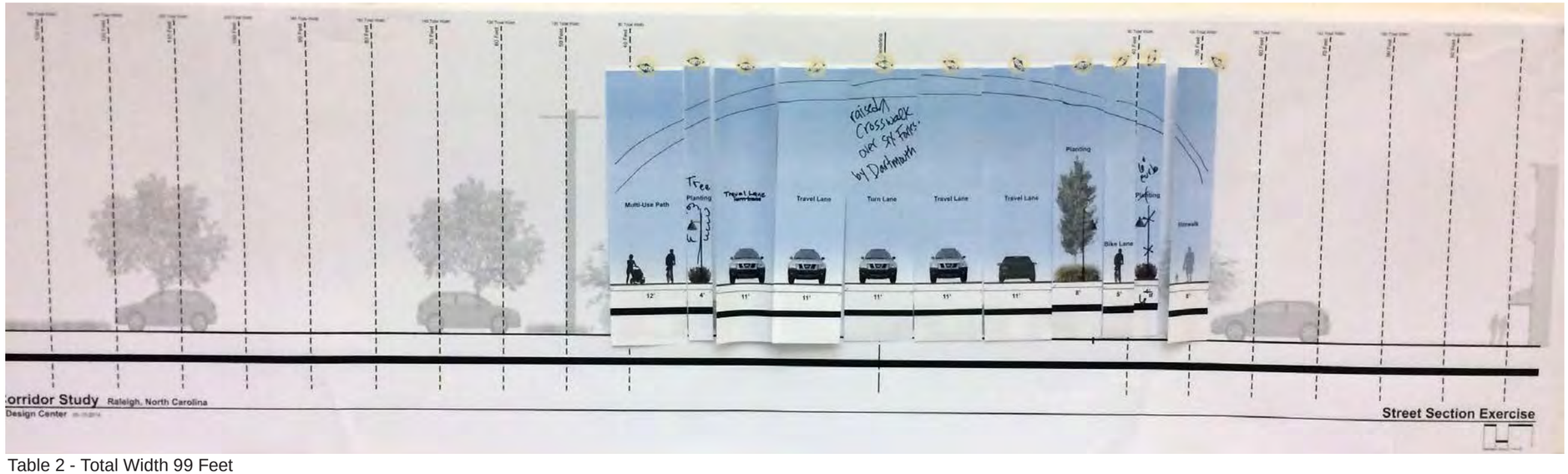


Table 2 - Total Width 99 Feet

Public Involvement - Street Section Exercise

First Session Results

Table 3 - Total Width 106 Feet

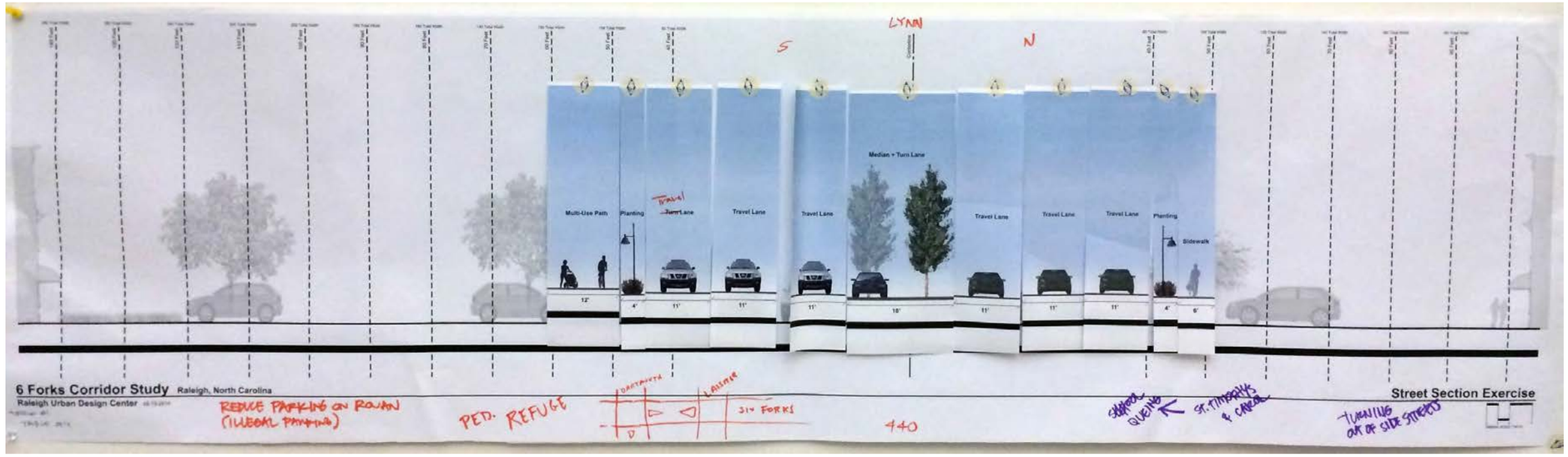


Table 4 - Total Width 110 Feet

Public Involvement - Street Section Exercise

First Session Results

Table 5 - Total Width 120 Feet

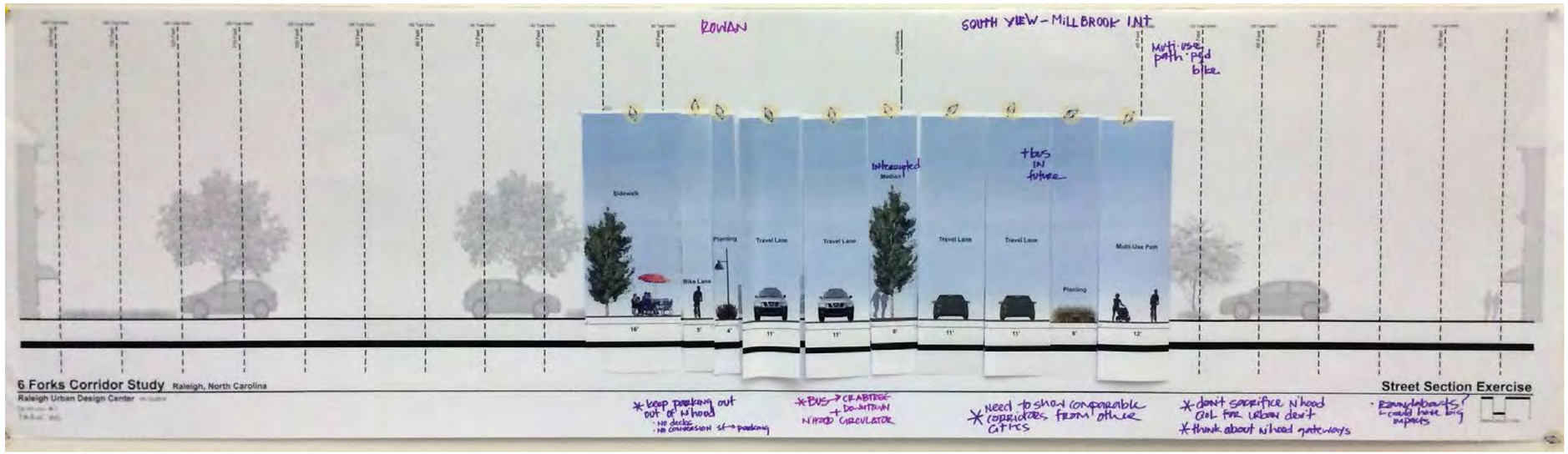


Table 6 - Total Width 97 Feet

Public Involvement - Street Section Exercise

Second Session Results

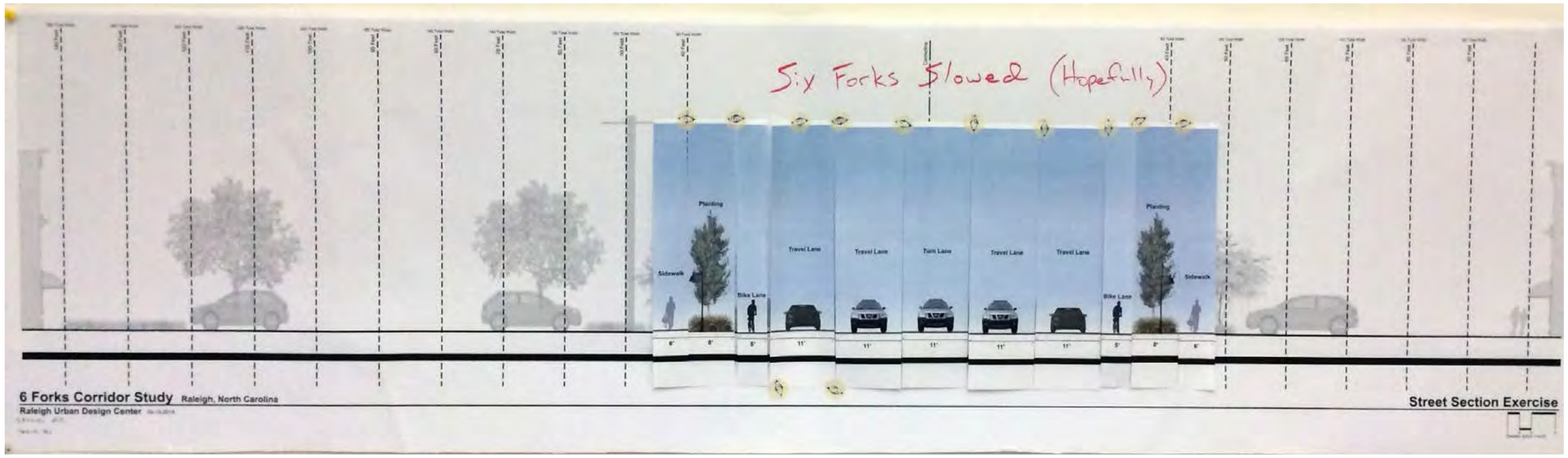


Table 1 - Total Width 93 Feet

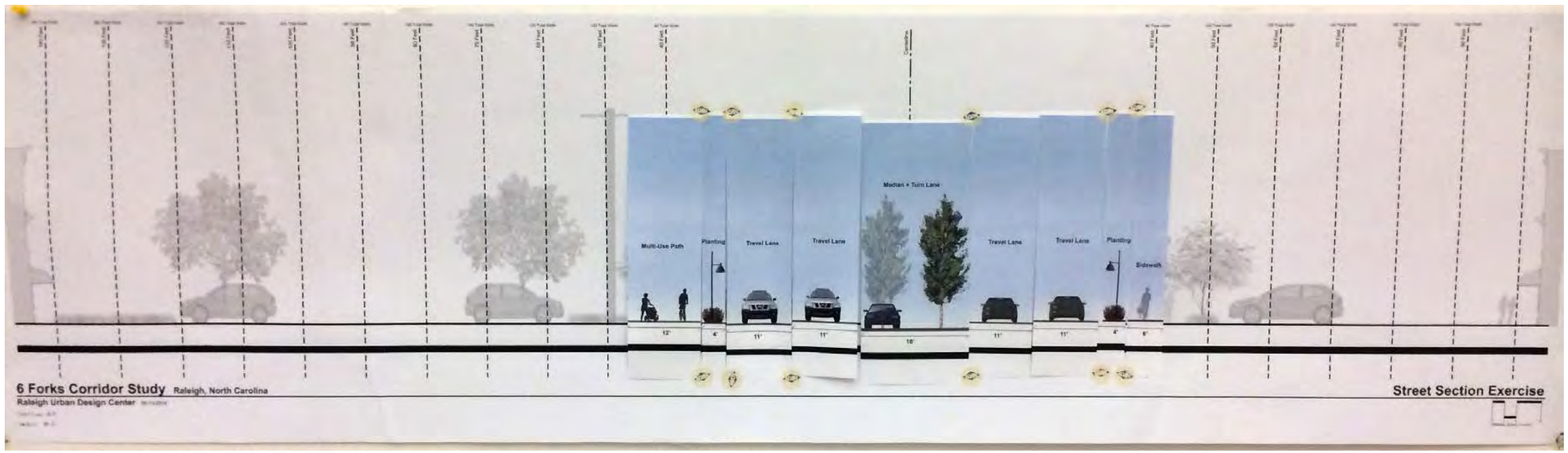


Table 2 - Total Width 88 Feet

Public Involvement - Street Section Exercise

Second Session Results

Table 3 - Total Width 124 Feet

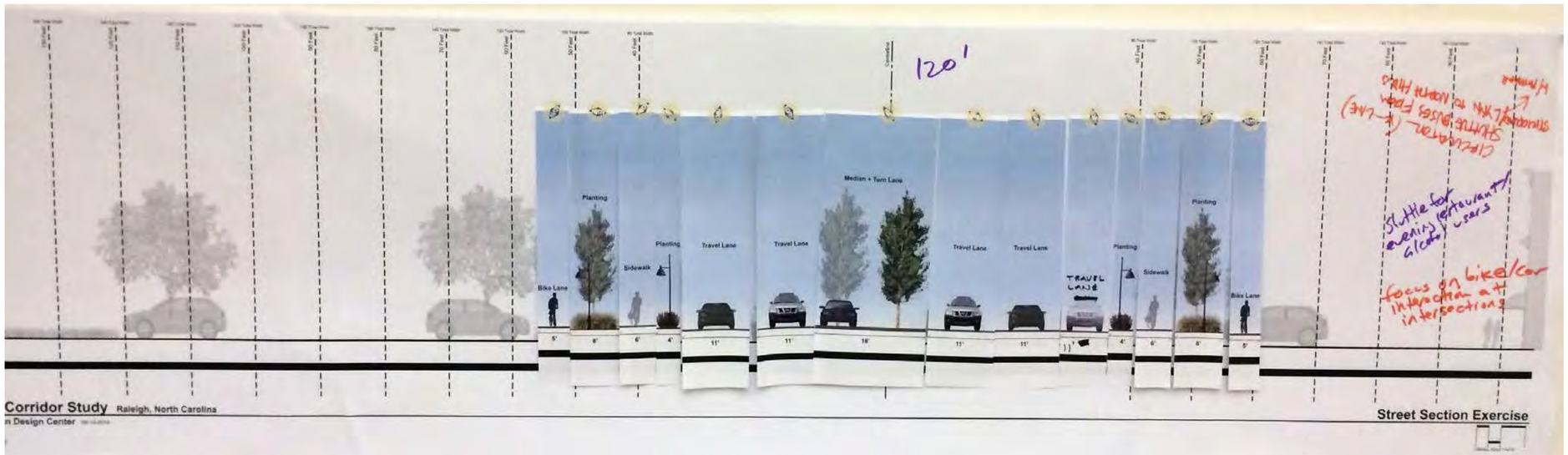


Table 4 - Total Width 119 Feet

Public Involvement - Street Section Exercise

Second Session Results

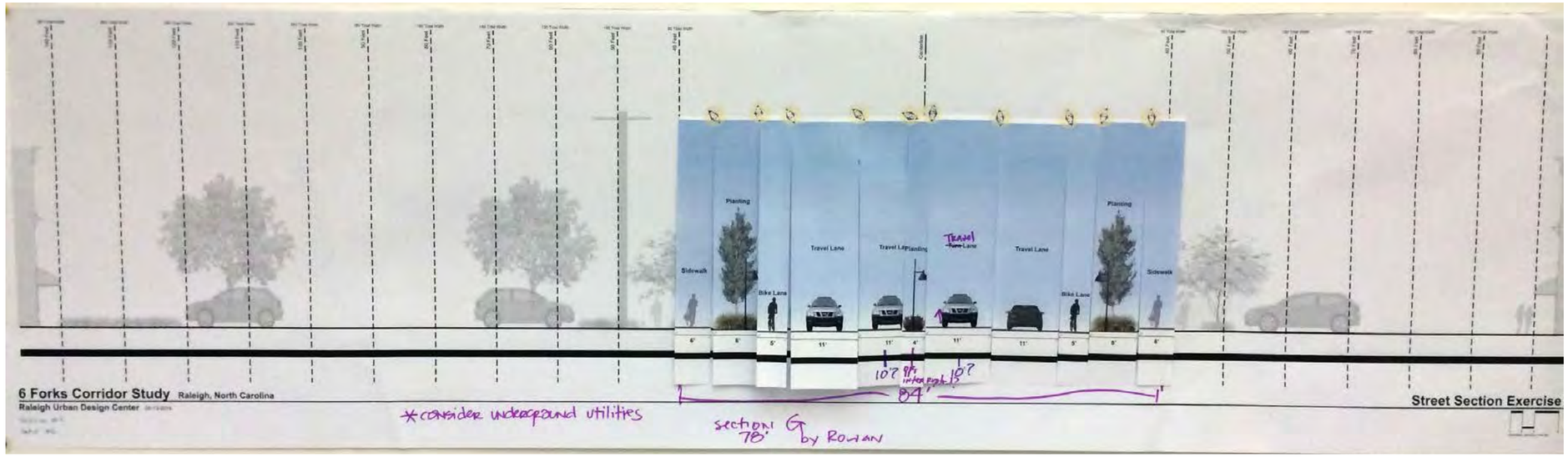


Table 5 - Total Width 86 Feet

Cost Estimate

Summary

The Cost Estimate for the Six Forks Road Corridor was developed by quantifying the elements in the proposed plan and applying units costs for each improvement. Unit costs were derived through a city interdepartmental collaboration and from the consultant teams recent project experience on similar projects. The following cost estimate is only an opinion of probable costs, shifts in demand and market forces will cause costs to shift.

The cost estimate has broken the corridor into the North, Central and South Sections. The estimate also covers off-corridor elements .

Six Forks Road Corridor Study - Estimate of Probable Costs

PHASE 1 - SIX FORKS ROAD - NORTH SECTION (Lynn Road to Windel Drive)						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Phase**	**2016 (Base)**	**2017**	**2018**	**2019**
ROW Acquisition - Residential	0.83	AC	$400,000.00	$332,000.00	1.2%	$332,000.00	$341,960.00	$352,218.80	$362,785.36
ROW Acquisition - Office / Industrial	2.17	AC	$700,000.00	$1,519,000.00	5.4%	$1,519,000.00	$1,564,570.00	$1,611,507.10	$1,659,852.31
ROW Acquisition - Commercial / Retail	1.26	AC	$1,000,000.00	$1,260,000.00	4.5%	$1,260,000.00	$1,297,800.00	$1,336,734.00	$1,376,836.02
ROW Acquisition - Parking Impacts	14,380	SF	$50.00	$719,000.00	2.6%	$719,000.00	$740,570.00	$762,787.10	$785,670.71
Demolition - Pavement milling	69,441	SF	$1.50	$104,161.42	0.4%	$104,161.42	$107,286.27	$110,504.85	$113,820.00
New Pavment - Widening	122,530	SF	$6.00	$735,179.83	2.6%	$735,179.83	$757,235.22	$779,952.28	$803,350.85
Grading (Lump Sum)	1	LS	$50,000.00	$50,000.00	0.2%	$50,000.00	$51,500.00	$53,045.00	$54,636.35
Pavement - Asphalt Overlay	380,355	SF	$3.00	$1,141,064.35	4.1%	$1,141,064.35	$1,175,296.28	$1,210,555.17	$1,246,871.83
1-'6" Concrete Curb & Gutter	8,328	LF	$13.20	$109,935.51	0.4%	$109,935.51	$113,233.58	$116,630.59	$120,129.51
2-'6" Concrete Curb & Gutter	12,538	LF	$16.20	$203,120.17	0.7%	$203,120.17	$209,213.78	$215,490.19	$221,954.90
Retaining Walls	15,000	SF	$50.00	$750,000.00	2.7%	$750,000.00	$772,500.00	$795,675.00	$819,545.25
Bike Lane - Asphalt	36,089	SF	$3.00	$108,267.14	0.4%	$108,267.14	$111,515.15	$114,860.61	$118,306.43
4" Concrete Sidewalk	70,162	SF	$4.50	$315,726.96	1.1%	$315,726.96	$325,198.76	$334,954.73	$345,003.37
Restriping - (LF of Road)	5,759	LF	$9.00	$51,832.89	0.2%	$51,832.89	$53,387.88	$54,989.51	$56,639.20
Crosswalk treatment (High Vis)	11,942	SF	$14.00	$167,187.94	0.6%	$167,187.94	$172,203.58	$177,369.69	$182,690.78
NEW Traffic Signal Installation w/ mast arms	2	EA	$150,000.00	$300,000.00	1.1%	$300,000.00	$309,000.00	$318,270.00	$327,818.10
Signal Upgrade	3	EA	$50,000.00	$150,000.00	0.5%	$150,000.00	$154,500.00	$159,135.00	$163,909.05
Ped Countdown Beacons (15k / per intersection)	5	EA	$15,000.00	$75,000.00	0.3%	$75,000.00	$77,250.00	$79,567.50	$81,954.53
Roadway Lighting (200 Ft Spacing)	45	EA	$15,000.00	$667,500.00	2.4%	$667,500.00	$687,525.00	$708,150.75	$729,395.27
Pedestrian Lighting (100 Ft Spacing)	45	EA	$12,000.00	$534,000.00	1.9%	$534,000.00	$550,020.00	$566,520.60	$583,516.22
Storm water edge- Add (extended curb, drain, soil mix)	21,300	LF	$3.00	$63,900.00	0.2%	$63,900.00	$65,817.00	$67,791.51	$69,825.26
Storm water median-Add (drain, soil mix)	66,300	LF	$1.00	$66,300.00	0.2%	$66,300.00	$68,289.00	$70,337.67	$72,447.80
Planting Median - Large Canopy Trees (3" caliper)	19	EA	$550.00	$10,450.00	0.0%	$10,450.00	$10,763.50	$11,086.41	$11,419.00
Planting Median - Small Flowering Trees (2" caliper)	38	EA	$250.00	$9,500.00	0.0%	$9,500.00	$9,785.00	$10,078.55	$10,380.91
Planting Median - Shrubs (3 gal)	1,470	EA	$25.00	$36,750.00	0.1%	$36,750.00	$37,852.50	$38,988.08	$40,157.72
Planting Median - Seeding	53,040	EA	$1.50	$79,560.00	0.3%	$79,560.00	$81,946.80	$84,405.20	$86,937.36
Planting Median - Bed Preparation (6" top soil)	13,260	SF	$8.00	$106,080.00	0.4%	$106,080.00	$109,262.40	$112,540.27	$115,916.48
Planting Edge - Large Canopy Trees (3" caliper)	197	EA	$550.00	$108,350.00	0.4%	$108,350.00	$111,600.50	$114,948.52	$118,396.97
Planting Edge - Small Flowering Trees (2" caliper)	98	EA	$250.00	$24,500.00	0.1%	$24,500.00	$25,235.00	$25,992.05	$26,771.81
Planting Edge - Shrubs	2,366	EA	$250.00	$591,500.00	2.1%	$591,500.00	$609,245.00	$627,522.35	$646,348.02
Planting Edge - Seeding	53,400	EA	$1.50	$80,100.00	0.3%	$80,100.00	$82,503.00	$84,978.09	$87,527.43
Planting Edge - Bed Preparation	21,300	SF	$8.00	$170,400.00	0.6%	$170,400.00	$175,512.00	$180,777.36	$186,200.68
Site Element - Bus Shelter (complete)	6	EA	$40,000.00	$240,000.00	0.9%	$240,000.00	$247,200.00	$254,616.00	$262,254.48
Site Element - Benches	12	EA	$2,000.00	$24,000.00	0.1%	$24,000.00	$24,720.00	$25,461.60	$26,225.45
Site Element - Trash/Recycle	14	EA	$1,500.00	$21,000.00	0.1%	$21,000.00	$21,630.00	$22,278.90	$22,947.27
Site Element - Bike Racks (5 bike capacity)	6	EA	$1,500.00	$9,000.00	0.0%	$9,000.00	$9,270.00	$9,548.10	$9,834.54
Site Element - Directional Signage	12	EA	$1,500.00	$18,000.00	0.1%	$18,000.00	$18,540.00	$19,096.20	$19,669.09
Underground Power Lines	4,500	LF	$300.00	$1,350,000.00	4.8%	$1,350,000.00	$1,390,500.00	$1,432,215.00	$1,475,181.45
Other Utility Relocations	1	LS	$750,000.00	$750,000.00	2.7%	$750,000.00	$772,500.00	$795,675.00	$819,545.25
Mobilization	1	LS	$187,500.00	$187,500.00	0.7%	$187,500.00	$193,125.00	$198,918.75	$204,886.31
			Construction Subtotal	$9,409,866.22	33.7%	$9,409,866.22	$9,692,162.21	$9,982,927.07	**$10,282,414.88**
			25% Contingency Subtotal	$2,352,466.56	8.4%	$2,352,466.56	$2,423,040.55	$2,495,731.77	**$2,570,603.72**
			12% Design/Engineering Fees Subtotal	$1,129,183.95	4.0%	$1,129,183.95	$1,163,059.46	$1,197,951.25	**$1,233,889.79**
			ROW Acquisition Subtotal	$3,830,000.00	13.7%	$3,830,000.00	$3,944,900.00	$4,063,247.00	**$4,185,144.41**
			North Section Subtotal	$16,721,516.72	59.9%	$16,721,516.72	$17,223,162.22	$17,739,857.09	**$18,272,052.80**

Six Forks Road Corridor Study - Estimate of Probable Costs

PHASE 1 - SIX FORKS ROAD - CENTRAL SECTION (Windel Drive to Rowan Street)						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Phase**	**2016 (Base)**	**2017**	**2018**	**2019**
ROW Acquisition - Residential	2.82	AC	$400,000.00	$1,128,000.00	4.0%	$1,128,000.00	$1,161,840.00	$1,196,695.20	$1,232,596.06
ROW Acquisition - Office / Industrial	1.59	AC	$700,000.00	$1,113,000.00	4.0%	$1,113,000.00	$1,146,390.00	$1,180,781.70	$1,216,205.15
ROW Acquisition - Commercial / Retail	0.24	AC	$1,000,000.00	$240,000.00	0.9%	$240,000.00	$247,200.00	$254,616.00	$262,254.48
ROW Acquisition - Parking Impacts	13,040	SF	$50.00	$652,000.00	2.3%	$652,000.00	$671,560.00	$691,706.80	$712,458.00
Demolition - Pavement milling	54,517	SF	$1.50	$81,775.78	0.3%	$81,775.78	$84,229.06	$86,755.93	$89,358.60
New Pavment - Widening	118,165	LF	$6.00	$708,992.80	2.5%	$708,992.80	$730,262.59	$752,170.46	$774,735.58
Grading (Lump Sum)	1	LS	$50,000.00	$50,000.00	0.2%	$50,000.00	$51,500.00	$53,045.00	$54,636.35
Pavement - Asphalt Overlay	135,625	SF	$3.00	$406,876.07	1.5%	$406,876.07	$419,082.36	$431,654.83	$444,604.47
1-'6" Concrete Curb & Gutter	6,461	LF	$13.20	$85,288.15	0.3%	$85,288.15	$87,846.80	$90,482.20	$93,196.67
2-'6" Concrete Curb & Gutter	7,050	LF	$16.20	$114,202.97	0.4%	$114,202.97	$117,629.06	$121,157.93	$124,792.67
Retaining Walls	6,000	SF	$50.00	$300,000.00	1.1%	$300,000.00	$309,000.00	$318,270.00	$327,818.10
Bike Lane - Asphalt	32,431	SF	$3.00	$97,291.74	0.3%	$97,291.74	$100,210.49	$103,216.80	$106,313.31
4" Concrete Sidewalk	42,468	SF	$4.50	$191,105.67	0.7%	$191,105.67	$196,838.84	$202,744.00	$208,826.32
Restriping - (LF of Road)	3,421	LF	$9.00	$30,785.76	0.1%	$30,785.76	$31,709.33	$32,660.61	$33,640.43
Crosswalk treatment (High Vis)	4,768	SF	$14.00	$66,747.54	0.2%	$66,747.54	$68,749.96	$70,812.46	$72,936.84
NEW Traffic Signal Installation w/ mast arms	1	EA	$150,000.00	$150,000.00	0.5%	$150,000.00	$154,500.00	$159,135.00	$163,909.05
Signal Upgrade	1	EA	$50,000.00	$50,000.00	0.2%	$50,000.00	$51,500.00	$53,045.00	$54,636.35
Ped Countdown Beacons (15k / per intersection)	3	EA	$15,000.00	$45,000.00	0.2%	$45,000.00	$46,350.00	$47,740.50	$49,172.72
Roadway Lighting (200 Ft Spacing)	35	EA	$20,000.00	$700,000.00	2.5%	$700,000.00	$721,000.00	$742,630.00	$764,908.90
Pedestrian Lighting (100 Ft SPacing)	35	EA	$12,000.00	$420,000.00	1.5%	$420,000.00	$432,600.00	$445,578.00	$458,945.34
Storm water edge- Add (extended curb, drain, soil mix)	0	LF	$3.00	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Storm water median-Add (drain, soil mix)	57,650	LF	$1.00	$57,650.00	0.2%	$57,650.00	$59,379.50	$61,160.89	$62,995.71
Planting Median - Large Canopy Trees (3" caliper)	36	EA	$550.00	$19,800.00	0.1%	$19,800.00	$20,394.00	$21,005.82	$21,635.99
Planting Median - Small Flowering Trees (2" caliper)	0	EA	$250.00	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Planting Median - Shrubs (3 gal)	1,281	EA	$25.00	$32,025.00	0.1%	$32,025.00	$32,985.75	$33,975.32	$34,994.58
Planting Median - Seeding	46,120	EA	$1.50	$69,180.00	0.2%	$69,180.00	$71,255.40	$73,393.06	$75,594.85
Planting Median - Bed Preparation (6" top soil)	11,530	SF	$8.00	$92,240.00	0.3%	$92,240.00	$95,007.20	$97,857.42	$100,793.14
Planting Edge - Large Canopy Trees (3" caliper)	178	EA	$550.00	$97,900.00	0.4%	$97,900.00	$100,837.00	$103,862.11	$106,977.97
Planting Edge - Small Flowering Trees (2" caliper)	89	EA	$250.00	$22,250.00	0.1%	$22,250.00	$22,917.50	$23,605.03	$24,313.18
Planting Edge - Shrubs	0	EA	$250.00	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Planting Edge - Seeding	33,600	EA	$1.50	$50,400.00	0.2%	$50,400.00	$51,912.00	$53,469.36	$55,073.44
Planting Edge - Bed Preparation	0	SF	$8.00	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Site Element - Bus Shelter (complete)	3	EA	$40,000.00	$120,000.00	0.4%	$120,000.00	$123,600.00	$127,308.00	$131,127.24
Site Element - Benches	6	EA	$2,000.00	$12,000.00	0.0%	$12,000.00	$12,360.00	$12,730.80	$13,112.72
Site Element - Trash/Recycle	11	EA	$1,500.00	$16,500.00	0.1%	$16,500.00	$16,995.00	$17,504.85	$18,030.00
Site Element - Bike Racks (5 bike capacity)	3	EA	$1,500.00	$4,500.00	0.0%	$4,500.00	$4,635.00	$4,774.05	$4,917.27
Site Element - Directional Signage	12	EA	$1,500.00	$18,000.00	0.1%	$18,000.00	$18,540.00	$19,096.20	$19,669.09
Underground Power Lines	3,500	LF	$300.00	$1,050,000.00	3.8%	$1,050,000.00	$1,081,500.00	$1,113,945.00	$1,147,363.35
Other Utility Relocations	1	LS	$584,000.00	$584,000.00	2.1%	$584,000.00	$601,520.00	$619,565.60	$638,152.57
Mobilization	1	LS	$146,000.00	$146,000.00	0.5%	$146,000.00	$150,380.00	$154,891.40	$159,538.14
			Construction Subtotal	$5,890,511.48	21.1%	$5,890,511.48	$6,067,226.82	$6,249,243.63	**$6,436,720.94**
			25% Contingency Subtotal	$1,472,627.87	5.3%	$1,472,627.87	$1,516,806.71	$1,562,310.91	**$1,609,180.23**
			12% Design/Engineering Fees Subtotal	$706,861.38	2.5%	$706,861.38	$728,067.22	$749,909.24	**$772,406.51**
			ROW Acquisition Subtotal	$3,133,000.00	11.2%	$3,133,000.00	$3,226,990.00	$3,323,799.70	**$3,423,513.69**
			Central Section Subtotal	$11,203,000.73	40.1%	$11,203,000.73	$11,539,090.75	$11,885,263.47	**$12,241,821.38**

PHASE 1 - SIX FORKS ROAD (NORTH AND CENTRAL SECTIONS) TOTALS				Escalation of Estimates of Probable Costs (3% per year)			
Item		**Estimate**	**% of Phase**	**2016 (Base)**	**2017**	**2018**	**2019**
Phase 1 Totals	**Construction Total**	$15,300,377.70	54.8%	$15,300,377.70	$15,759,389.03	$16,232,170.70	**$16,719,135.82**
	25% Contingency Total	$3,825,094.43	13.7%	$3,825,094.43	$3,939,847.26	$4,058,042.68	**$4,179,783.96**
	12% Design/Engineering Fees Total	$1,836,045.32	6.6%	$1,836,045.32	$1,891,126.68	$1,947,860.48	**$2,006,296.30**
	ROW Acquisition Total	$6,963,000.00	24.9%	$6,963,000.00	$7,171,890.00	$7,387,046.70	**$7,608,658.10**
	Phase 1 Total	**$27,924,517.45**		$27,924,517.45	$28,762,252.97	$29,625,120.56	**$30,513,874.18**

Six Forks Road Corridor Study - Estimate of Probable Costs

PHASE 2 - SIX FORKS ROAD - SOUTH SECTION (Rowan Street to I-440)						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Phase**	**2016 (Base)**	**2017**	**2018**	**2019**
ROW Acquisition - Residential	0.00	AC	$200,000.00	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
ROW Acquisition - Office / Industrial	1.43	AC	$700,000.00	$1,001,000.00	8.3%	$1,001,000.00	$1,031,030.00	$1,061,960.90	$1,093,819.73
ROW Acquisition - Commercial / Retail	0.72	AC	$1,200,000.00	$864,000.00	7.1%	$864,000.00	$889,920.00	$916,617.60	$944,116.13
ROW Acquisition - Parking Impacts	7,600	SF	$50.00	$380,000.00	3.1%	$380,000.00	$391,400.00	$403,142.00	$415,236.26
Demolition - Pavement milling	24,384	SF	$1.50	$36,576.72	0.3%	$36,576.72	$37,674.02	$38,804.24	$39,968.36
New Pavment - Widening	45,062	LF	$6.00	$270,374.62	2.2%	$270,374.62	$278,485.85	$286,840.43	$295,445.64
Grading (Lump Sum)	1	LS	$50,000.00	$50,000.00	0.4%	$50,000.00	$51,500.00	$53,045.00	$54,636.35
Pavement - Asphalt Overlay	325,859	SF	$3.00	$977,577.79	8.1%	$977,577.79	$1,006,905.12	$1,037,112.27	$1,068,225.64
1-'6" Concrete Curb & Gutter	3,821	LF	$13.20	$50,434.58	0.4%	$50,434.58	$51,947.61	$53,506.04	$55,111.22
2-'6" Concrete Curb & Gutter	9,334	LF	$16.20	$151,211.64	1.2%	$151,211.64	$155,747.99	$160,420.43	$165,233.04
Retaining Walls	5,000	SF	$50.00	$250,000.00	2.1%	$250,000.00	$257,500.00	$265,225.00	$273,181.75
Bike Lane - Asphalt	23,248	SF	$3.00	$69,742.83	0.6%	$69,742.83	$71,835.12	$73,990.17	$76,209.87
4" Concrete Sidewalk	47,975	SF	$4.50	$215,885.63	1.8%	$215,885.63	$222,362.20	$229,033.06	$235,904.05
Restriping - (LF of Road)	4,506	LF	$9.00	$40,552.65	0.3%	$40,552.65	$41,769.23	$43,022.31	$44,312.98
Crosswalk treatment (High Vis)	11,206	SF	$14.00	$156,889.15	1.3%	$156,889.15	$161,595.83	$166,443.70	$171,437.02
NEW Traffic Signal Installation w/ mast arms	0	EA	$150,000.00	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Signal Upgrade	5	EA	$50,000.00	$250,000.00	2.1%	$250,000.00	$257,500.00	$265,225.00	$273,181.75
Ped Countdown Beacons (15k / per intersection)	5	EA	$15,000.00	$75,000.00	0.6%	$75,000.00	$77,250.00	$79,567.50	$81,954.53
Roadway Lighting (200 Ft Spacing)	40	EA	$20,000.00	$800,000.00	6.6%	$800,000.00	$824,000.00	$848,720.00	$874,181.60
Pedestrian Lighting (100 Ft Spacing)	40	EA	$12,000.00	$480,000.00	4.0%	$480,000.00	$494,400.00	$509,232.00	$524,508.96
Storm water edge- Add (extended curb, drain, soil mix)	17,280	LF	$3.00	$51,840.00	0.4%	$51,840.00	$53,395.20	$54,997.06	$56,646.97
Storm water median-Add (drain, soil mix)	24,300	LF	$3.00	$72,900.00	0.6%	$72,900.00	$75,087.00	$77,339.61	$79,659.80
Planting Median - Large Canopy Trees (3" caliper)	0	EA	$550.00	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Planting Median - Small Flowering Trees (2" caliper)	49	EA	$250.00	$12,250.00	0.1%	$12,250.00	$12,617.50	$12,996.03	$13,385.91
Planting Median - Shrubs (3 gal)	2,670	EA	$25.00	$66,750.00	0.6%	$66,750.00	$68,752.50	$70,815.08	$72,939.53
Planting Median - Seeding	0	EA	$1.50	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Planting Median - Bed Preparation (6" top soil)	24,300	SF	$8.00	$194,400.00	1.6%	$194,400.00	$200,232.00	$206,238.96	$212,426.13
Planting Edge - Large Canopy Trees (3" caliper)	175	EA	$550.00	$96,250.00	0.8%	$96,250.00	$99,137.50	$102,111.63	$105,174.97
Planting Edge - Shrubs	1,920	EA	$250.00	$480,000.00	4.0%	$480,000.00	$494,400.00	$509,232.00	$524,508.96
Planting Edge - Seeding	0	EA	$1.50	$0.00	0.0%	$0.00	$0.00	$0.00	$0.00
Planting Edge - Bed Preparation	17,280	SF	$8.00	$138,240.00	1.1%	$138,240.00	$142,387.20	$146,658.82	$151,058.58
Site Element - Bus Shelter (complete)	3	EA	$40,000.00	$120,000.00	1.0%	$120,000.00	$123,600.00	$127,308.00	$131,127.24
Site Element - Benches	6	EA	$2,000.00	$12,000.00	0.1%	$12,000.00	$12,360.00	$12,730.80	$13,112.72
Site Element - Trash/Recycle	13	EA	$1,500.00	$19,500.00	0.2%	$19,500.00	$20,085.00	$20,687.55	$21,308.18
Site Element - Bike Racks (5 bike capacity)	3	EA	$1,500.00	$4,500.00	0.0%	$4,500.00	$4,635.00	$4,774.05	$4,917.27
Site Element - Directional Signage	20	EA	$1,500.00	$30,000.00	0.2%	$30,000.00	$30,900.00	$31,827.00	$32,781.81
Underground Power Lines	4,000	LF	$300.00	$1,200,000.00	9.9%	$1,200,000.00	$1,236,000.00	$1,273,080.00	$1,311,272.40
Other Utility Relocations	1	LS	$666,000.00	$666,000.00	5.5%	$666,000.00	$685,980.00	$706,559.40	$727,756.18
Mobilization	1	LS	$166,500.00	$166,500.00	1.4%	$166,500.00	$171,495.00	$176,639.85	$181,939.05
Phase 2 Totals			**Construction Total**	$7,205,375.60	59.5%	$7,205,375.60	$7,421,536.86	$7,644,182.97	**$7,873,508.46**
			25% Contingency Total	$1,801,343.90	14.9%	$1,801,343.90	$1,855,384.22	$1,911,045.74	**$1,968,377.11**
			12% Design/Engineering Fees Total	$864,645.07	7.1%	$864,645.07	$890,584.42	$917,301.96	**$944,821.02**
			ROW Acquisition Total	$2,245,000.00	18.5%	$2,245,000.00	$2,312,350.00	$2,381,720.50	**$2,453,172.12**
			Phase 2 (South Section) Total	$12,116,364.57		$12,116,364.57	$12,479,855.50	$12,854,251.17	**$13,239,878.70**

PHASE 3 - I-440 INTERCHANGE ELEMENTS						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Phase**	**2016 (Base)**	**2017**	**2018**	**2019**
Bridge Enhancements	1	LS	$400,000.00	$400,000.00	58.4%	$400,000.00	$412,000.00	$424,360.00	$437,090.80
Interchange Improvements	1	LS	$100,000.00	$100,000.00	14.6%	$100,000.00	$103,000.00	$106,090.00	$109,272.70
Phase 3 Totals			**Construction Total**	$500,000.00	73.0%	$500,000.00	$515,000.00	$530,450.00	**$546,363.50**
			25% Contingency Total	$125,000.00	18.2%	$125,000.00	$128,750.00	$132,612.50	**$136,590.88**
			12% Design/Engineering Fees Total	$60,000.00	8.8%	$60,000.00	$61,800.00	$63,654.00	**$65,563.62**
			Phase 3 (I-440 Interchange) Total	$685,000.00		$685,000.00	$705,550.00	$726,716.50	**$748,518.00**

SIX FORKS ROAD CORRIDOR (PHASES 1, 2, AND 3) TOTALS					Escalation of Estimates of Probable Costs (3% per year)			
Item		**Estimate**	**% of Total**	**2016 (Base)**	**2017**	**2018**	**2019**
Six Forks Road Corridor Totals	**Construction Grand Total**	$23,005,753.30	56.5%	$23,005,753.30	$23,695,925.89	$24,406,803.67	**$25,139,007.78**
	25% Contingency Grand Total	$5,751,438.32	14.1%	$5,751,438.32	$5,923,981.47	$6,101,700.92	**$6,284,751.95**
	12% Design/Engineering Fees Grand Total	$2,760,690.40	6.8%	$2,760,690.40	$2,843,511.11	$2,928,816.44	**$3,016,680.93**
	ROW Acquisitiion Grand Total	$9,208,000.00	22.6%	$9,208,000.00	$9,484,240.00	$9,768,767.20	**$10,061,830.22**
	Six Forks Road Corridor Grand Total	$40,725,882.02		$40,725,882.02	$41,947,658.48	$43,206,088.23	**$44,502,270.88**

Six Forks Road Corridor Study - Estimate of Probable Costs

OFF-CORRIDOR IMPROVEMENTS (Rowan Street - Turn Lane and Roundabout)						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Total**	**2016 (Base)**	**2017**	**2018**	**2019**
ROW Acquisition	0.10	AC	$480,000.00	$48,000.00	5.8%	$48,000.00	$49,440.00	$50,923.20	$52,450.90
Construction - Roundabout (100' inscribed diameter)	1	LS	$500,000.00	$500,000.00	60.8%	$500,000.00	$515,000.00	$530,450.00	$546,363.50
Construction - Right Turn Lane	1	EA	$65,000.00	$65,000.00	7.9%	$65,000.00	$66,950.00	$68,958.50	$71,027.26
			Construction Subtotal	$565,000.00	68.7%	$565,000.00	$581,950.00	$599,408.50	**$617,390.76**
			25% Contingency Subtotal	$141,250.00	17.2%	$141,250.00	$145,487.50	$149,852.13	**$154,347.69**
			12% Design/Engineering Fees Subtotal	$67,800.00	8.2%	$67,800.00	$69,834.00	$71,929.02	**$74,086.89**
			ROW Acquisition Subtotal	$48,000.00	5.8%	$48,000.00	$49,440.00	$50,923.20	**$52,450.90**
			Rowan Street Total	$822,050.00		$822,050.00	$846,711.50	$872,112.85	**$898,276.23**

OFF-CORRIDOR IMPROVEMENTS (Snelling Road Extension/Connection)						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Total**	**2016 (Base)**	**2017**	**2018**	**2019**
ROW Acquisition	0.45	AC	$400,000.00	$180,000.00	10.4%	$180,000.00	$185,400.00	$190,962.00	$196,690.86
Property Acquisition	1	LS	$650,000.00	$650,000.00	37.5%	$650,000.00	$669,500.00	$689,585.00	$710,272.55
Construction	1,100	LF	$600.00	$660,000.00	38.1%	$660,000.00	$679,800.00	$700,194.00	$721,199.82
			Construction Subtotal	$660,000.00	38.1%	$660,000.00	$679,800.00	$700,194.00	**$721,199.82**
			25% Contingency Subtotal	$165,000.00	9.5%	$165,000.00	$169,950.00	$175,048.50	**$180,299.96**
			12% Design/Engineering Fees Subtotal	$79,200.00	4.6%	$79,200.00	$81,576.00	$84,023.28	**$86,543.98**
			ROW and Property Acquisition Subtotal	$830,000.00	47.9%	$830,000.00	$854,900.00	$880,547.00	**$906,963.41**
			Snelling Road Total	$1,734,200.00		$1,734,200.00	$1,786,226.00	$1,839,812.78	**$1,895,007.16**

OFF-CORRIDOR IMPROVEMENTS (Tralee Place Extension/Connection)						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Total**	**2016 (Base)**	**2017**	**2018**	**2019**
ROW Acquisition	0.80	AC	$250,000.00	$200,000.00	12.7%	$200,000.00	$206,000.00	$212,180.00	$218,545.40
Property Acquisition	1	LS	$1,014,000.00	$1,014,000.00	64.6%	$1,014,000.00	$1,044,420.00	$1,075,752.60	$1,108,025.18
Construction	500	LF	$520.00	$260,000.00	16.6%	$260,000.00	$267,800.00	$275,834.00	$284,109.02
			Construction Subtotal	$260,000.00	16.6%	$260,000.00	$267,800.00	$275,834.00	**$284,109.02**
			25% Contingency Subtotal	$65,000.00	4.1%	$65,000.00	$66,950.00	$68,958.50	**$71,027.26**
			12% Design/Engineering Fees Subtotal	$31,200.00	2.0%	$31,200.00	$32,136.00	$33,100.08	**$34,093.08**
			ROW and Property Acquisition Subtotal	$1,214,000.00	77.3%	$1,214,000.00	$1,250,420.00	$1,287,932.60	**$1,326,570.58**
			Tralee Place Total	$1,570,200.00		$1,570,200.00	$1,617,306.00	$1,665,825.18	**$1,715,799.94**

OFF-CORRIDOR IMPROVEMENTS (Loft Lane Extension/New Street)						Escalation of Estimates of Probable Costs (3% per year)			
Item	**QTY**	**Unit**	**Unit Cost**	**Estimate**	**% of Total**	**2016 (Base)**	**2017**	**2018**	**2019**
ROW Acquisition	4.06	AC	$400,000.00	$1,624,000.00	8.6%	$1,624,000.00	$1,672,720.00	$1,722,901.60	$1,774,588.65
Property Acquisition	1	LS	$14,927,468.00	$14,927,468.00	79.4%	$14,927,468.00	$15,375,292.04	$15,836,550.80	$16,311,647.33
Construction	2,525	LF	$650.00	$1,641,250.00	8.7%	$1,641,250.00	$1,690,487.50	$1,741,202.13	$1,793,438.19
			Construction Subtotal	$1,641,250.00	8.7%	$1,641,250.00	$1,690,487.50	$1,741,202.13	**$1,793,438.19**
			25% Contingency Subtotal	$410,312.50	2.2%	$410,312.50	$422,621.88	$435,300.53	**$448,359.55**
			12% Design/Engineering Fees Subtotal	$196,950.00	1.0%	$196,950.00	$202,858.50	$208,944.26	**$215,212.58**
			ROW and Property Acquisition Subtotal	$16,551,468.00	88.0%	$16,551,468.00	$17,048,012.04	$17,559,452.40	**$18,086,235.97**
			Loft Lane Total	$18,799,980.50		$18,799,980.50	$19,363,979.92	$19,944,899.31	**$20,543,246.29**

Maintenance

Future Costs

The ultimate long term success of the corridor will weigh on the continued care and maintenance the fixtures and landscape receive from the city. Improperly planning for on going maintenance would potentially waste the investment put into this corridor. The design has picked plants that are resilient and has limited the use of turf grass. It is recommended that the corridor be maintained on a twice a month maintenance regime. This level of maintenance would cost an estimated $48,000 per mile, per year.