

HENRY CHAPEL RESIDENTIAL DEVELOPMENT

Transportation Impact Analysis *Update*

S Point Road (NC 273)/Henry Chapel Road
Belmont, North Carolina

Prepared for:
City of Belmont



August 2022

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**Transportation Impact Analysis Update for
Henry Chapel Residential Development
S Point Rd (NC 273)/Henry Chapel Rd
Belmont, North Carolina**

Prepared for:

**City of Belmont
Belmont, North Carolina**



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1.0 Executive Summary

The purpose of this Transportation Impact Analysis (TIA) Update is to re-evaluate the impacts on the surrounding transportation infrastructure as a result of the proposed Henry Chapel Residential Development. The primary objectives of the study are:

- To estimate trip generation and distribution for each phase of the proposed development.
- To perform intersection capacity analyses for each of the identified study intersections.
- To determine potential transportation impacts for each phase of the proposed development.
- To identify improvements to mitigate the proposed development's transportation impacts.

The proposed Henry Chapel Residential Development is located north of Henry Chapel Road and east of S Point Road (NC 273) in Belmont, North Carolina (<https://goo.gl/maps>). The *Henry Chapel Residential Development Traffic Impact Analysis* (referred to as the '2018 Henry Chapel TIA' throughout this TIA) was originally performed by Kimley-Horn and submitted in February 2018 to the City of Belmont and North Carolina Department of Transportation (NCDOT) for review and approval. The 2018 Henry Chapel TIA was performed for the same property with equivalent number of total proposed single-family units (628) and similar proposed access; however, there was no phasing contemplated in the 2018 TIA, in which the existing conditions was evaluated as 2017 with a single-phased build-out year of 2025. Given the amount of growth, development pressures, and changes in traffic patterns the City of Belmont, southeastern Gaston County, and specifically S Point Road (NC 273) has experienced since 2017, this TIA update was required by the City of Belmont and NCDOT and is intended to replace the 2018 Henry Chapel TIA.

The 248-acre site is currently undeveloped and zoned as GR, SR and SPP-O (General Residential, Suburban Residential, and South Point Peninsula Overlay). Based on the site plan provided by the applicant, the proposed development is currently envisioned to ultimately include 628 single-family homes. The development is proposed to be implemented through four (4) separate phases as outlined below:

- Phase 1A (2023) – 126 homes
- Phase 1B (2024) – 118 homes
- Phase 2 (2025) – 208 homes
- Phase 3 (2026) – 176 homes

For the purposes of this TIA, the development is assumed to be fully completed (built-out) in 2026 with each phase of development assumed to be built-out as listed above. Based on the provided site plan, the proposed development is currently planned to be accessed via three (3) access points, with Access 1 and Access 2 assumed to be constructed in 2023 as part of Phase 1A and Access 3 in 2025 as part of Phase 2:

Completed in Phase 1A (2023)

- Access 1 – full-movement connection to Henry Chapel Rd approximately 1,500' east of S Point Rd (NC 273)
- Access 2 – full-movement connection to Henry Chapel Rd approximately 1,400' east of Access 1

Completed in Phase 2 (2025)

- Access 3 – extension of Timber Ridge Rd east of its current terminus
 - Note that Timber Ridge Rd currently stubs for a potential future connection to the east and would provide access indirectly to S Point Rd (NC 273) via Colonial Dr and Forest Hill Rd within the South Hill Estates neighborhood.

A TIA Scoping Meeting was held with the City of Belmont, NCDOT, Gaston-Cleveland-Lincoln Metropolitan Planning Organization (GCLMPO), and representatives of the applicant on February 10, 2022, to obtain

background information and to ascertain the scope and parameters to be included in this TIA. The City's Memorandum of Understanding (MOU) was developed based on discussions from this meeting that documented all scoping parameters to be used for the TIA and was reviewed and agreed upon by the City of Belmont, NCDOT and the applicant. The approved MOU is included in the **Appendix**. Note that NCDOT indicated that evaluation of horizontal sight distance at Access 2 will be required of the applicant due to the proximity to the horizontal curve along Henry Chapel Road.

The following AM and PM peak-hour scenarios were analyzed to determine the proposed development's transportation impacts on the surrounding network through each phase of development:

- 2022 Existing Conditions
- 2023 Background Conditions
- 2023 **Phase 1A** Build-out Conditions
- 2024 Background Conditions
- 2024 **Phase 1B** Build-out Conditions
- 2025 Background Conditions
- 2025 **Phase 2** Build-out Conditions
- 2026 Background Conditions
- 2026 **Phase 3** Build-out (**Full Build**) Conditions
- 2031 Build-out Conditions + 5 years

Based on the City's TIA Ordinance along with the expected site trip generation and discussions of projected travel patterns for the proposed site trips in context with the surrounding area, this TIA evaluated operations under each of the AM and PM peak-hour scenarios above for the following study area intersections as agreed upon at the TIA Scoping Meeting:

1. S Point Road (NC 273) and Armstrong Road (NC 273)
2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road
3. S Point Road (NC 273) and Forest Hill Road
4. Forest Hill Road and Colonial Drive
5. Colonial Drive and Timber Ridge Road/Access 3
6. S Point Road (NC 273) and Belmont Middle School/Belwood Drive
7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane
8. S Point Road (NC 273) and South Point High School/Red Raider Run
9. S Point Road (NC 273) and R L Stowe Road/Nixon Road
10. Henry Chapel Road and Access 1
11. Henry Chapel Road and Access 2

Note that the Belmont Middle School driveway and Belwood Drive are currently offset by less than 100 feet along S Point Road (NC 273). As discussed in **Section 4.2**, Belwood Drive is required to be realigned to tie into the existing traffic signal at Belmont Middle School as mitigation for the approved Smith Farm residential development. Therefore, the two (2) intersections were studied as separate tee-intersections under existing conditions, but assumed to be realigned and evaluated as a single four (4)-legged intersection under all future-year conditions.

The following modifications from the background data collected were applied to the capacity analyses to meet [NCDOT Congestion Management Capacity Analysis Guidelines](#):

- Right-turn-on-red (RTOR) operations were not allowed.

- Protected-only left-turn phasing was used for analysis of future operations where protected/permitted left-turn phasing exists or is planned.
- Lost time adjust was added to the yellow and all-red times provided in the existing signal plans to maintain a total lost time of 5 seconds for each movement.

Kimley-Horn was retained to determine the potential transportation impacts of this development (in accordance with the traffic study guidelines in the [NCDOT Policy on Street and Driveway Access to North Carolina Highways](#) and set forth by the [City of Belmont Land Development Code – Section 16.14 Transportation Impact Analysis](#)) and to identify transportation improvements that may be required to mitigate these impacts. This report presents trip generation, distribution, capacity analyses, crash analyses and identified transportation improvements required to mitigate anticipated transportation demands produced for each phase of the subject development.

Based on the capacity analyses performed at each of the identified study intersections, along with review of the auxiliary turn-lane warrants and crash analyses contained herein, the following phased improvements are identified to mitigate the impact of the proposed development on the adjacent street network:

Phase 1A (2023)

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

- Westbound right-turn lane along Henry Chapel Road with a minimum of 100' of storage

7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane

- Restripe the eastbound approach of McKee Farm Lane to provide an exclusive right-turn lane with a minimum of 100' of storage

10. Henry Chapel Road and Access 1

- Single southbound egress lane and single ingress lane along Access 1
- Provide a 100-foot internal protected stem (IPS) along Access 1

11. Henry Chapel Road and Access 2

- Single southbound egress lane and single ingress lane along Access 2
- Provide a 100-foot IPS along Access 2

Phase 1B (2024):

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

- Southbound left-turn lane along S Point Road (NC 273) with a minimum of 100' of storage

7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane

- Southbound right-turn lane along S Point Road (NC 273) that extends to R L Stowe Road and serves as the additional southbound through lane along S Point Road (NC 273) between R L Stowe Road and McKee Farm Lane

8. S Point Road (NC 273) and South Point High School/Red Raider Run

- Additional northbound through lane along S Point Road (NC 273)
- Additional southbound through lane along S Point Road (NC 273)

9. S Point Road (NC 273) and R L Stowe Road/Nixon Road

- Additional westbound left-turn lane along R L Stowe Road (creating dual left-turn lanes)
 - Provide a minimum of 200 feet of storage for the westbound shared through/right-turn lane along with proper signing/stripping (*see below)
 - Additional southbound receiving lane along S Point Road (NC 273) to accommodate the dual westbound left-turn lanes that extends to McKee Farm Lane (*extends through the Belmont Middle School signalized intersection upon 2025 Phase 2*)
- Extension of the existing northbound right-turn lane along S Point Road (NC 273) to extend to McKee Farm Lane/Stowe Road to serve as the additional northbound through lane along S Point Road (NC 273) and drop as the right-turn lane at R L Stowe Road (*extends through the Belmont Middle School signalized intersection upon 2025 Phase 2*)

*Given the westbound approach volumes where the left-turn movement is significantly higher than the through/right combination, along with the existing concrete median in place for the left-over at Belmont Town Center that restricts extension of the inside left-turn lane, consideration should be given to allowing the additional left-turn lane to become the drop lane from R L Stowe Road. This would require westbound through/right lane drivers to shift over a lane as they approach S Point Road (NC 273), which would not be normal driver expectation for a through movement. Therefore, if allowed by the City and NCDOT, proper signing and striping is recommended to alleviate the potential driver expectation concern.

Phase 2 (2025):

1. S Point Road (NC 273) and Armstrong Road (NC 273)

- Southbound right-turn lane along S Point Road (NC 273) with a minimum of 100' of storage

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

- Installation of a traffic signal with the following phasing:
 - Protected phasing for the southbound left-turn movement
 - Permitted/overlap phasing for the westbound right-turn movement
- Extension of the westbound right-turn storage along Henry Chapel Road from 100' to 175'
- Extension of the southbound left-turn storage along S Point Road (NC 273) from 100' to 225'

3. S Point Road (NC 273) and Forest Hill Road

- Access modification to provide southbound and northbound left-over access, restricting side-street left-turn and through movements
- Southbound left-turn lane along S Point Road (NC 273) with a minimum of 100' of storage

5. Colonial Drive and Timber Ridge Road/Access 3

- Construct Access 3 as an extension of Timber Ridge Road

6. S Point Road (NC 273) and Belmont Middle School/Belwood Drive

- Additional northbound through lane along S Point Road (NC 273) that provides a minimum of 500' of full-width storage with appropriate taper and extends to R L Stowe Road
- Additional southbound through lane along S Point Road (NC 273) that extends a minimum of 500' south of the Belmont Middle School/Belwood Drive intersection with appropriate taper, serving as a drop lane that extends from R L Stowe Road

7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane

- Additional northbound through lane along S Point Road (NC 273)
- Additional southbound through lane along S Point Road (NC 273) (*Convert the southbound right-turn lane identified in Phase 1B to a through/right-turn lane*)

Phase 3 (2026):

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

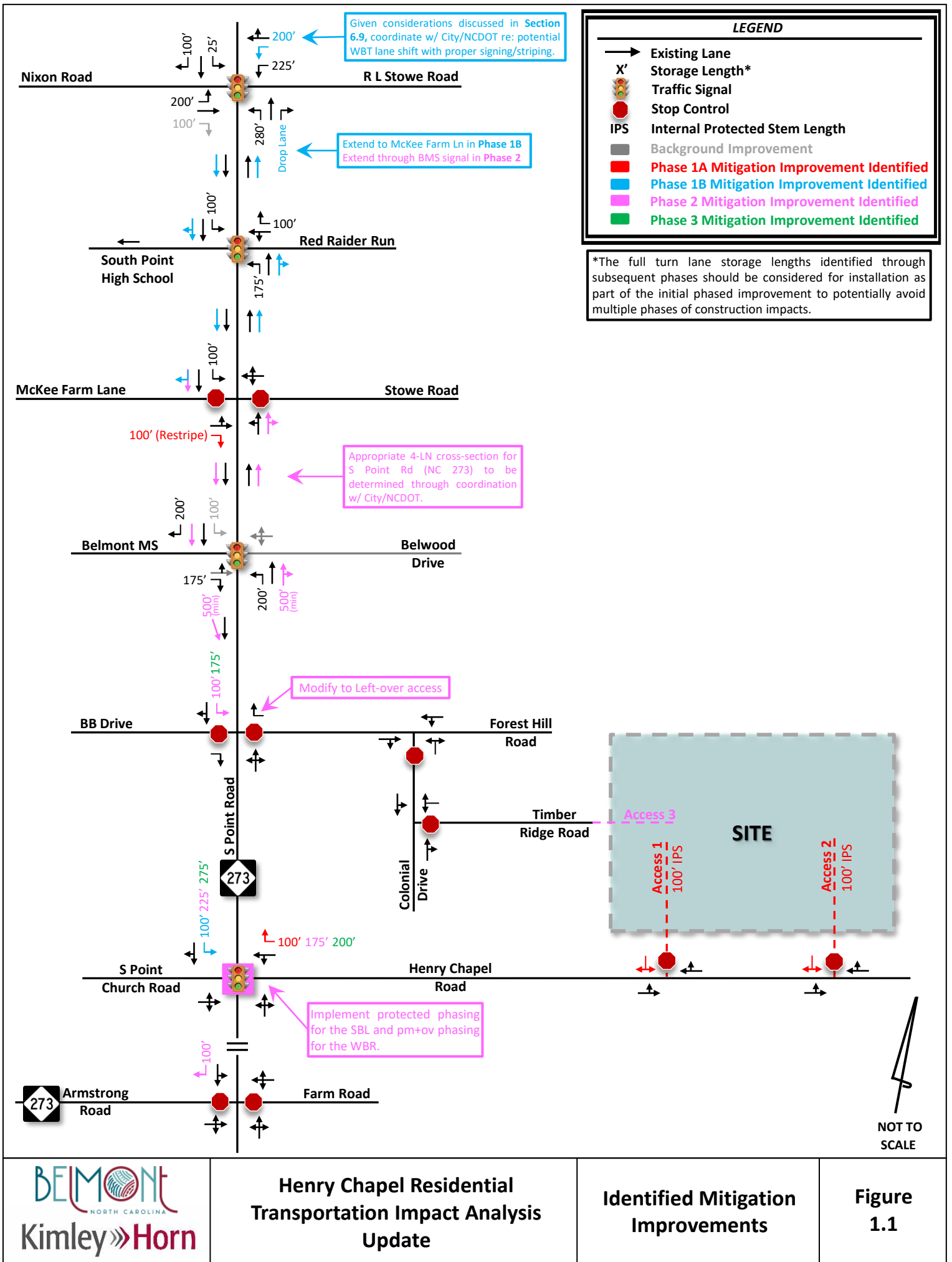
- Extension of the westbound right-turn storage along Henry Chapel Road from 175' to 200'
- Extension of the southbound left-turn storage along S Point Road (NC 273) from 225' to 275'

The full turn-lane storage lengths identified for Phase 3 should be considered for installation as part of the applicable Phase 1A, Phase 1B or Phase 2 improvements to potentially avoid multiple phases of construction impacts.

Overall Corridor

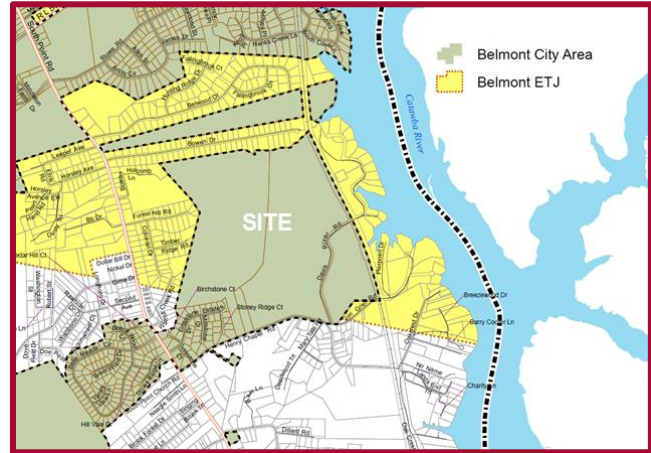
Given the northbound and southbound through-lane capacity improvements identified to mitigate the impacts of the site along S Point Road (NC 273) between Belmont Middle School and R L Stowe Road, a four (4)-lane section is identified for mitigation. Further study will be required during the design and implementation phase to determine the preferred cross-section for this ~½-mile corridor.

The mitigation improvements identified within the study area are shown in **Figure 1.1**. The improvements shown on this figure are subject to approval by NCDOT and the City of Belmont. All additions and attachments to the State and City roadway system shall be properly permitted, designed, and constructed in conformance to standards maintained by the agencies.



2.0 Introduction

The proposed Henry Chapel Residential Development is located north of Henry Chapel Road and east of S Point Road (NC 273) in Belmont, North Carolina (<https://goo.gl/maps>). The *Henry Chapel Residential Development Traffic Impact Analysis* (referred to as the '2018 Henry Chapel TIA' throughout this TIA) was originally performed by Kimley-Horn and submitted in February 2018 to the City of Belmont and NCDOT for review and approval. The 2018 Henry Chapel TIA was performed for the same property with equivalent number of total proposed single-family units (628) and similar proposed access; however, there was no phasing contemplated in the 2018 TIA, in which the existing conditions was evaluated as 2017 with a single-phased build-out year of 2025. Given the amount of growth, development pressures, and changes in traffic patterns the City of Belmont, southeastern Gaston County, and specifically S Point Road (NC 273) has experienced since 2017, this TIA update was required by the City of Belmont and NCDOT and is intended to replace the 2018 Henry Chapel TIA.



The 248-acre site is currently undeveloped and zoned as GR, SR and SPP-O (General Residential, Suburban Residential, and South Point Peninsula Overlay). Based on the site plan provided by the applicant, the proposed development is currently envisioned to ultimately include 628 single-family homes. The development is proposed to be implemented through four (4) separate phases as outlined below:

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- Phase 1B (2024) – 118 homes
- Phase 2 (2025) – 208 homes
- Phase 3 (2026) – 176 homes

For the purposes of this TIA, the development is assumed to be fully completed (built-out) in 2026 with each phase of development assumed to be built-out as listed above. Based on the provided site plan, the proposed development is currently planned to be accessed via three (3) access points, with Access 1 and Access 2 assumed to be constructed in 2023 as part of Phase 1A and Access 3 in 2025 as part of Phase 2:

Completed in Phase 1A (2023)

- Access 1 – full-movement connection to Henry Chapel Rd approximately 1,500' east of S Point Rd (NC 273)
- Access 2 – full-movement connection to Henry Chapel Rd approximately 1,400' east of Access 1

Completed in Phase 2 (2025)

- Access 3 – extension of Timber Ridge Rd east of its current terminus
 - Note that Timber Ridge Rd currently stubs for a potential future connection to the east and would provide access indirectly to S Point Rd (NC 273) via Colonial Dr and Forest Hill Rd within the South Hill Estates neighborhood.

A TIA Scoping Meeting was held with the City of Belmont, NCDOT, GCLMPO and representatives of the applicant on February 10, 2022, to obtain background information and to ascertain the scope and parameters to be included in this TIA. The City's MOU was developed based on discussions from this meeting that documented all scoping parameters to be used for the TIA and was reviewed and agreed upon by the City of Belmont, NCDOT and the applicant. The approved MOU is included in the **Appendix**. Note that NCDOT indicated that evaluation of horizontal sight distance at Access 2 will be required of the applicant due to the proximity to the horizontal curve along Henry Chapel Road.

Kimley-Horn was retained to determine the potential transportation impacts of this development (in accordance with the traffic study guidelines in the [NCDOT Policy on Street and Driveway Access to North Carolina Highways](#) and set forth by the [City of Belmont Land Development Code – Section 16.14 Transportation Impact Analysis](#)) and to identify transportation improvements that may be required to mitigate these impacts. This report presents trip generation, distribution, capacity analyses, crash analyses and identified transportation improvements required to mitigate anticipated transportation demands produced for each phase of the subject development.

3.0 Existing Traffic Conditions

Existing traffic conditions were coordinated with City of Belmont and NCDOT staff and collected through field observations and turning-movement counts to establish the existing conditions baseline analysis.

3.1 STUDY AREA

Based on the City's TIA Ordinance along with the expected site trip generation and discussions of projected travel patterns for the proposed site trips in context with the surrounding area, the study area for this TIA includes the following existing intersections as agreed upon at the TIA Scoping Meeting:

1. S Point Road (NC 273) and Armstrong Road (NC 273)
2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road
3. S Point Road (NC 273) and Forest Hill Road
4. Forest Hill Road and Colonial Drive
5. Colonial Drive and Timber Ridge Road
6. S Point Road (NC 273) and Belmont Middle School/Belwood Drive
7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane
8. S Point Road (NC 273) and South Point High School/Red Raider Run
9. S Point Road (NC 273) and R L Stowe Road/Nixon Road

Note that the Belmont Middle School driveway and Belwood Drive are currently offset by less than 100 feet along S Point Road (NC 273). As discussed in **Section 4.2**, Belwood Drive is required to be realigned to tie into the existing traffic signal at Belmont Middle School as mitigation for the approved Smith Farm residential development. Therefore, the two (2) intersections were studied as separate tee-intersections under existing conditions, but assumed to be realigned and evaluated as a single four (4)-legged intersection under all future-year conditions.

The study area was based on the [City of Belmont Land Development Code – Section 16.14 Transportation Impact Analysis](#), which states “The limits of the study area shall be based on the location, size and extent of the proposed project, and an understanding of existing and future land uses and traffic conditions surrounding the site. The limits of the study area for the TIA shall be reviewed and approved by the City and NCDOT staff at the mandatory scoping meeting. At a minimum, the study area shall include all streets and signalized intersections within a 1-mile radius of the proposed site and/or where site traffic estimated for build-out of the project will constitute 10% or more of any signalized intersection approach during the peak hour. Unsignalized intersections between the required signalized intersections will be added to the scope as directed by the City.” Given the expected site trip generation and based on discussions of projected travel patterns for the proposed site trips in context with the surrounding area, the study area listed above was agreed upon at the TIA Scoping Meeting and reviewed and approved by the City of Belmont, NCDOT and the applicant as documented in the approved MOU included in the **Appendix**.

Figure 3.1 shows the study area intersections and the site location, **Figure 3.2** shows the proposed site plan indicating the phasing for the development as provided by the applicant, and **Figure 3.3** shows the existing roadway geometry at the study intersections. A full-sized site plan to scale is provided in the **Appendix**.

The primary roadways in the vicinity of the site are S Point Road (NC 273), Armstrong Road (NC 273), R L Stowe Road, Nixon Road and Henry Chapel Road. The information below describes existing conditions for portions of these roadways within the vicinity of the site. Note that the latest daily traffic volume data

currently available is from 2018; given the impact to typical traffic patterns caused by the COVID-19 pandemic, regular biannual annual average daily traffic (AADT) counts were disrupted. Belmont Middle School relocated from the downtown Belmont area and reopened in Fall 2021 along S Point Road (NC 273) within the study area; therefore, AADTs have likely increased from the latest reported 2016-2018 AADTs discussed below.

S Point Road (NC 273) is a two-lane, undivided state highway that serves as the primary north/south route along the peninsula formed between the Catawba River and South Fork River where portions of Belmont and Gaston County exist. This route serves both North Carolina and South Carolina commuters via a nearby bridged connection to York County, South Carolina. S Point Road (NC 273) is classified as a minor arterial by NCDOT's functional classification system and classified by GCLMPO as a boulevard. Based on 2018 NCDOT AADT maps, S Point Road (NC 273) carries 17,000 vehicles per day (vpd) south of R L Stowe Road, 14,000 vpd in the vicinity of Forest Hill Road and 9,500 vpd north of Armstrong Road (NC 273). During the AM peak hour, the traffic flow is heavily distributed northbound towards I-85, Belmont, Charlotte and Gastonia, and the heavy southbound flow is experienced more during the evening peak hour. S Point Road (NC 273) has a posted speed limit of 45 mph south of Forest Hill Road and 35 mph north of Forest Hill Road.

R L Stowe Road is a two-lane, undivided roadway that connects S Point Road (NC 273) to Keener Boulevard (NC 273). R L Stowe Road has a posted speed limit of 35 mph near its intersection with S Point Road (NC 273). Based on 2018 NCDOT AADT maps, R L Stowe Road carries 10,000 vpd east of S Point Road (NC 273). R L Stowe Road is classified as a local road by NCDOT's functional classification system and as a boulevard by GCLMPO.

Nixon Road is a two-lane, undivided roadway that primarily carries residential and school traffic to-and-from South Point High School. Nixon Road has a posted speed limit of 35 mph; however, there is a 25-mph school zone near its intersection with S Point Road (NC 273). Based on 2016 NCDOT AADT maps, Nixon Road carries 3,400 vpd west of S Point Road (NC 273). Nixon Road is classified as a local road by NCDOT's functional classification system and as a minor thoroughfare by GCLMPO.

Henry Chapel Road is a two-lane, undivided roadway with a posted speed limit of 35 mph. Based on 2016 NCDOT AADT maps (the latest data available on NCDOT's database), Henry Chapel carries an AADT volume of 630 vpd east of S Point Road (NC 273). Henry Chapel Road is classified as a local roadway by NCDOT's functional classification system.

3.2 EXISTING INTERSECTION VOLUME DEVELOPMENT

Peak period (6:30-8:30 AM and 2:30-7:00 PM) turning-movement, heavy-vehicle, pedestrian and bicycle counts (TMCs) were performed by Quality Counts, LLC on Thursday, April 28, 2022 (when Gaston County Schools were in session), at the following intersections:

1. S Point Road (NC 273) and Armstrong Road (NC 273)
2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road
3. S Point Road (NC 273) and Forest Hill Road
4. Forest Hill Road and Colonial Drive
5. Colonial Drive and Timber Ridge Road
6. S Point Road (NC 273) and Belmont Middle School/Belwood Drive
7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane
8. S Point Road (NC 273) and South Point High School/Red Raider Run

9. S Point Road (NC 273) and R L Stowe Road/Nixon Road

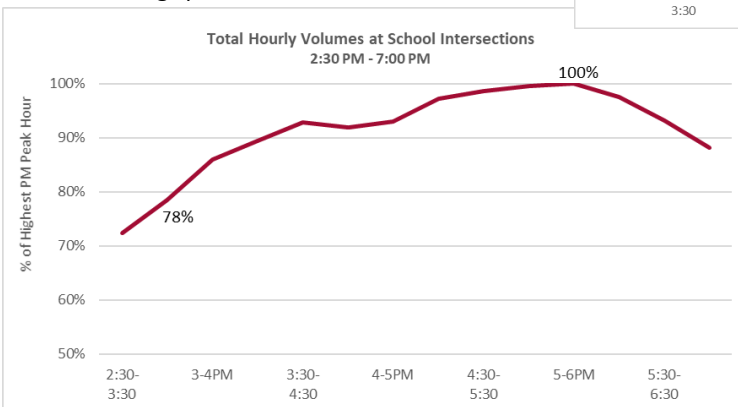
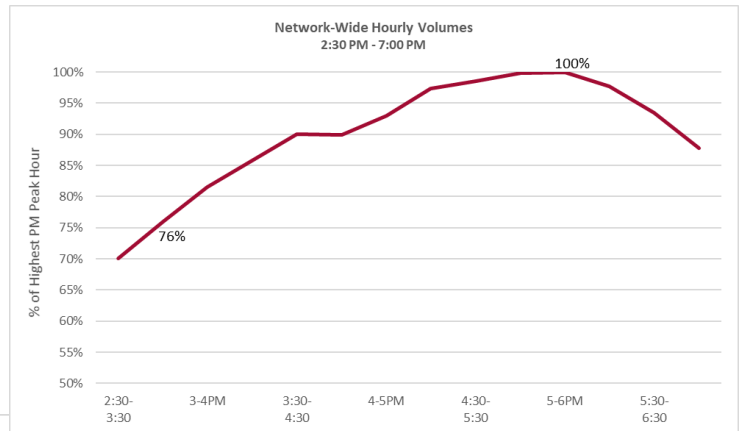
Note that TMCs were collected as a single intersection at the two (2) existing offset Belmont Middle School and Belwood Drive intersections along S Point Road (NC 273). Calculations showing the volume balancing between the existing intersections are included in the **Appendix**.

The AM and PM peak hours identified through the data collection differed amongst some of the study intersections yet were found to be relatively consistent along S Point Road (NC 273). With the exception of the two (2) low-volume intersections within the South Hill Estates neighborhood (intersection #'s 4 and 5), the AM peak hour was found to begin at 7:00 AM south of Forest Hill Road and at 7:30 AM north of Belmont Middle School/Belwood Drive. The PM peak hour was found to begin between 4:30 and 5:00 PM at all intersections along S Point Road (NC 273). The observed peak hour of each individual intersection was used as the baseline data to represent the highest collected traffic volumes within the specified count timeframes. The peak hours for each intersection are shown in **Table 3.1**.

Table 3.1 – AM & PM Intersection Peak Hours

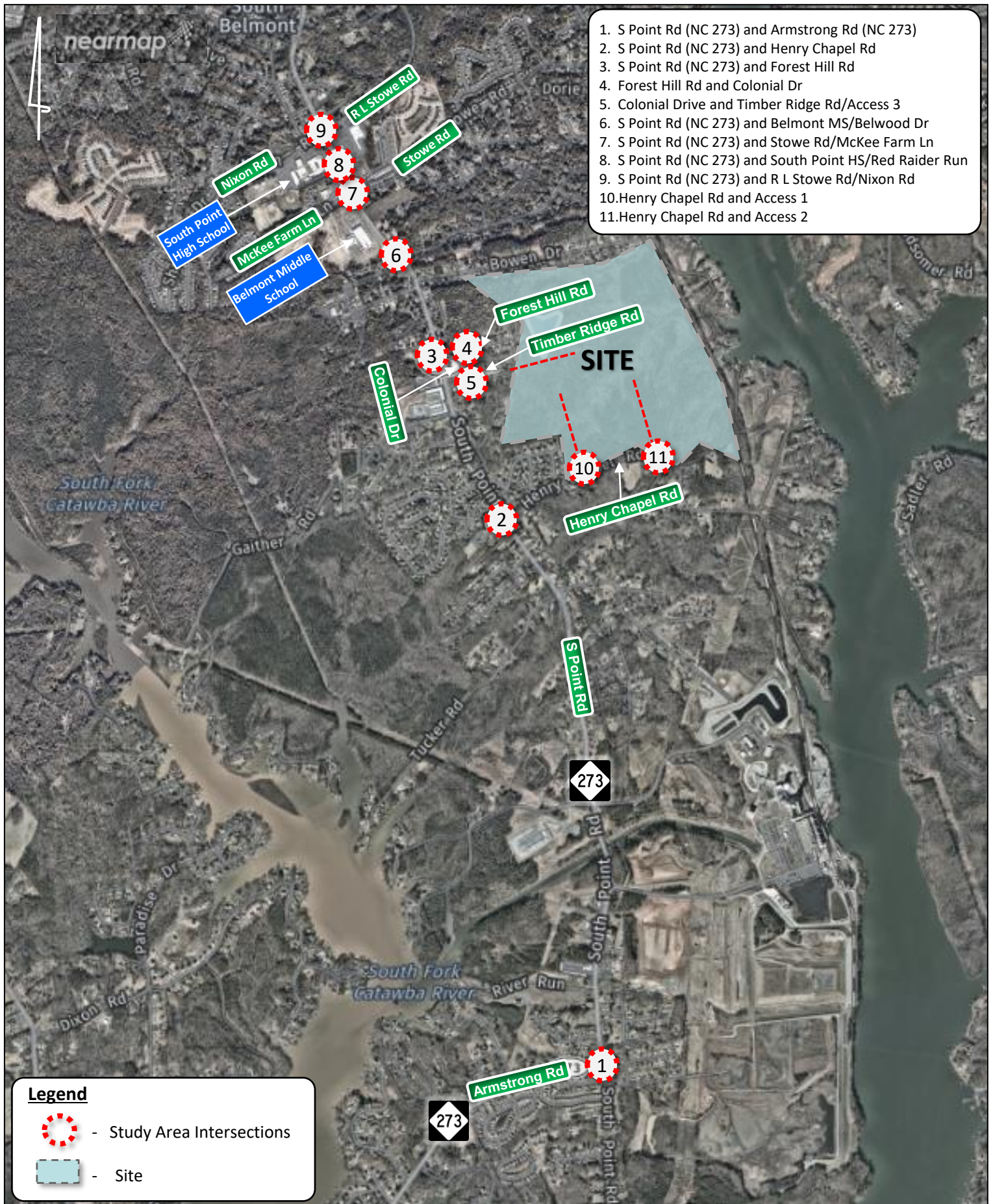
Intersection	AM Peak Hour	PM Peak Hour
1. S Point Rd (NC 273)/Armstrong Rd (NC 273)	7:00 - 8:00	4:45 - 5:45
2. S Point Rd (NC 273)/Henry Chapel Rd/S Point Church Rd	7:00 - 8:00	4:45 - 5:45
3. S Point Rd (NC 273)/Forest Hill Rd	7:00 - 8:00	5:00 - 6:00
4. Forest Hill Rd/Colonial Dr	6:30 - 7:30	3:45 - 4:45
5. Colonial Dr/Timber Ridge Rd	6:30 - 7:30	3:45 - 4:45
6. S Point Rd (NC 273)/Belmont MS/Belwood Dr	7:30 - 8:30	5:00 - 6:00
7. S Point Rd (NC 273)/Stowe Rd/McKee Farm Ln	7:30 - 8:30	5:00 - 6:00
8. S Point Rd (NC 273)/S Point HS/Red Raider Run	7:30 - 8:30	4:45 - 5:45
9. S Point Rd (NC 273)/R L Stowe Rd/Nixon Rd	7:30 - 8:30	4:30 - 5:30

The graphs show the hourly variations of the network-wide hourly volumes collected within the study area (graph on the right) during the 2:30 – 7:00 PM timeframe, along with the hourly variations of the volumes collected at only the intersections near Belmont Middle School and South Point High School (graph below on the left). As shown, the highest volumes along this corridor are experienced during the typical evening peak hour, with total volumes



during the afternoon school peak.

Volumes were not balanced between the study area intersections listed above due to the presence of public streets and other commercial and residential driveways. Peak-hour intersection turning-movement count data is provided in the **Appendix**. **Figure 3.4** shows the 2022 existing AM and PM peak-hour traffic volumes.



Cole Jensen & Stone
 Planning and Development
 1115 Peachtree Street NE
 Atlanta, GA 30309

Turnstone Group LLC
 1115 Peachtree Street NE
 Atlanta, GA 30309

HENRY CHAPEL
 238 DAVIS RIVER ROAD
 BELMONT, NC 28012

SCHEMATIC SITE PLAN

Project No. 028
 Date: 02/18/2020
 Scale: 1" = 100'

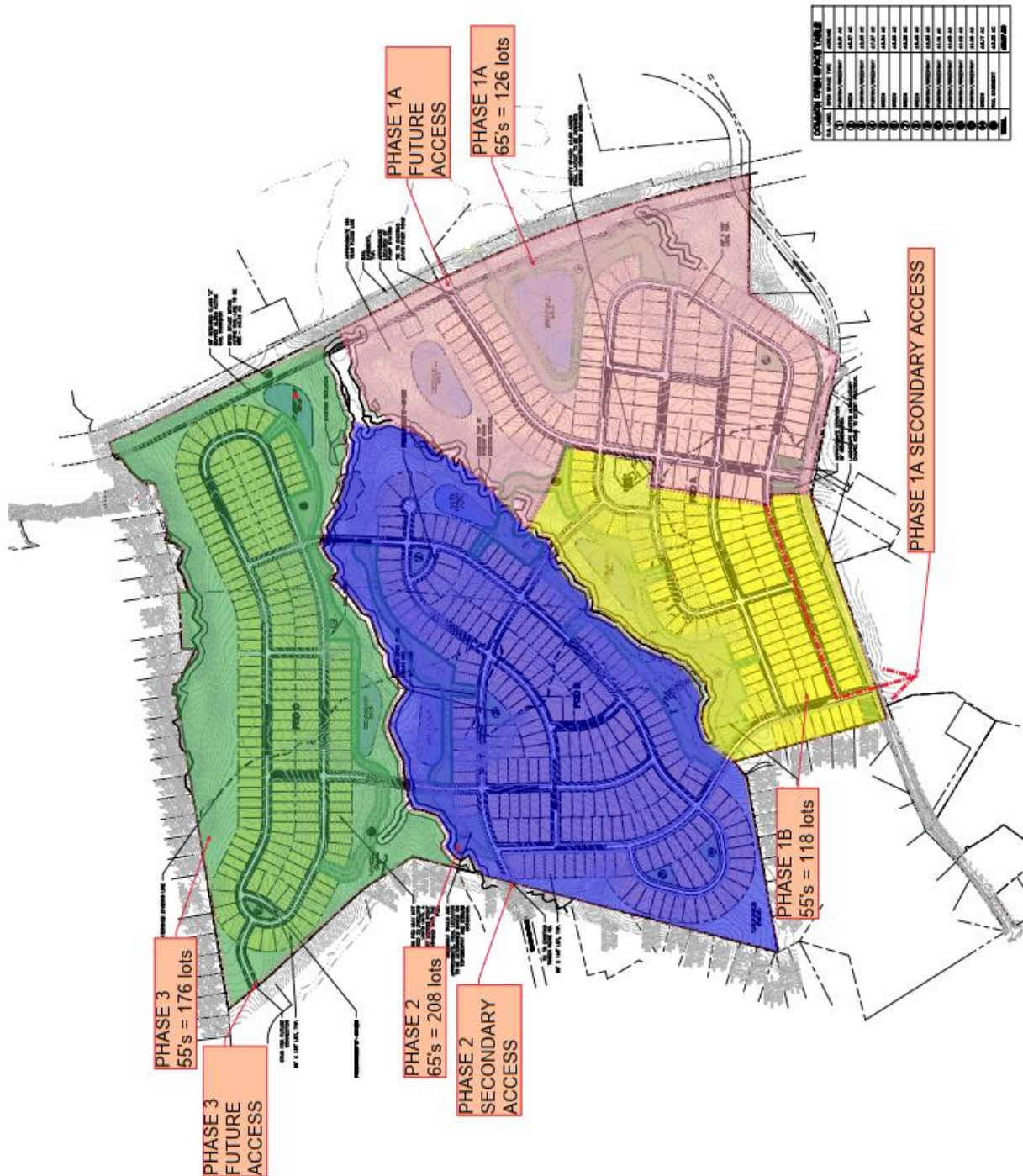
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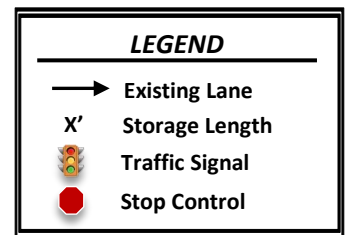
LEGEND

- PHASE 1A FUTURE ACCESS
- PHASE 1A 65's = 126 lots
- PHASE 1B 55's = 118 lots
- PHASE 2 65's = 208 lots
- PHASE 2 SECONDARY ACCESS
- PHASE 3 55's = 176 lots
- PHASE 3 FUTURE ACCESS

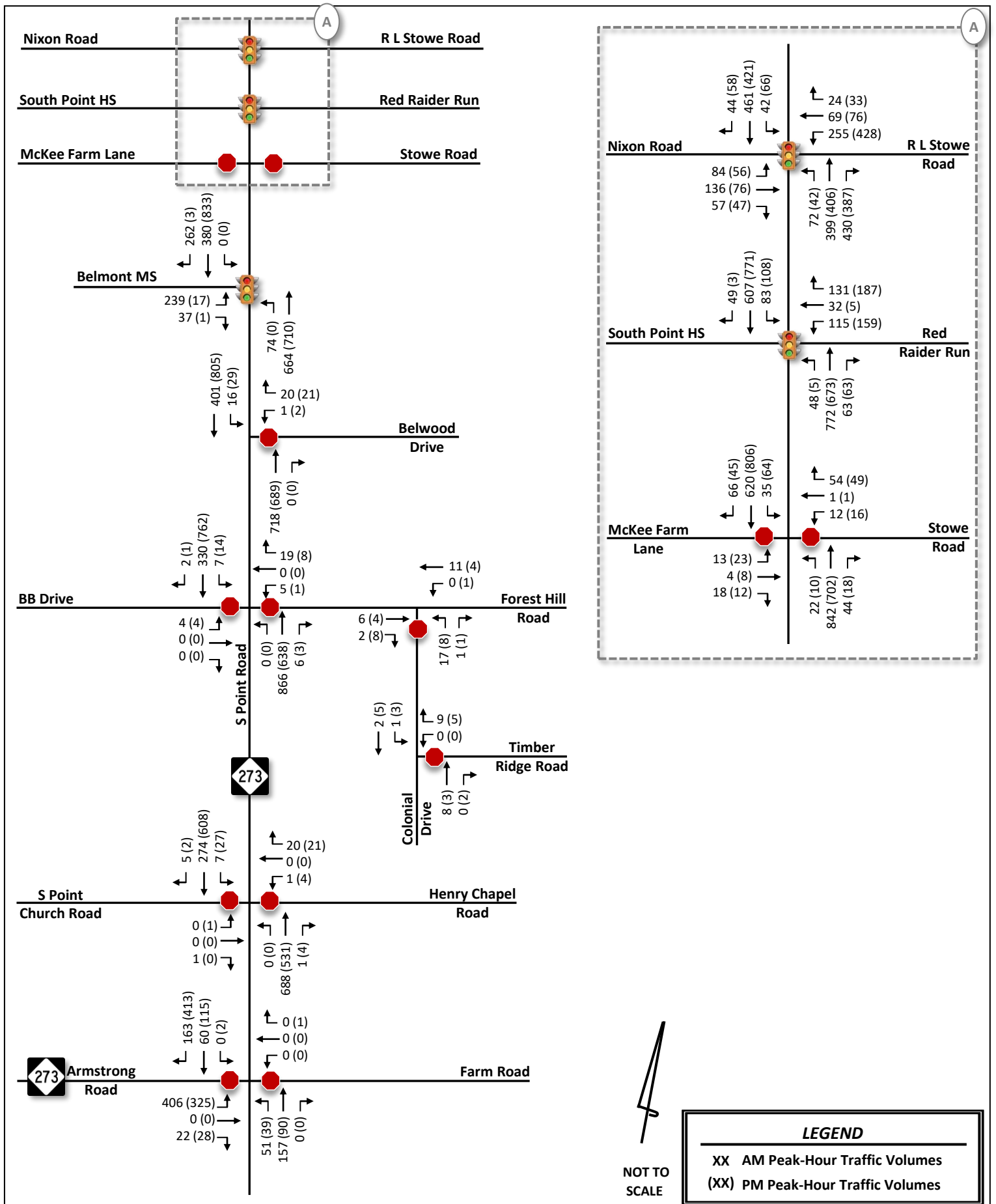
COMMON ENGINEERING TABLE

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4



4.0 Background Traffic Volume Development

Projected background (non-project) traffic is defined as the expected growth or change in traffic volumes on the surrounding roadway network between the year the existing counts were collected (2022) and the expected build-out years for each phase of development (2023-2026) absent the construction and opening of the proposed project. This includes both non-specific general growth based on historical increase in local traffic volumes (historical background growth), along with specific growth and/or change in traffic volumes caused by approved off-site developments that are not yet fully constructed, and/or planned transportation projects specifically identified within the vicinity of the proposed development.

4.1 HISTORICAL BACKGROUND GROWTH TRAFFIC

Historical background growth is the increase in existing traffic volumes due to usage increases and non-specific growth throughout the area, and accounts for growth that is independent of specific off-site developments or planned transportation projects. Historical background growth traffic is calculated using an annual growth rate, which is applied to the existing traffic volumes up to the future horizon years. As shown in the approved MOU, an annual growth rate of two and one-half percent (2.5%) was applied to the 2022 existing peak-hour traffic volumes to calculate base 2023, 2024, 2025, 2026 and 2031 background traffic volumes. This growth rate was determined based on review of historical NCDOT AADT maps, specifically along S Point Road between 2002 and 2019, in coordination with NCDOT and City of Belmont, along with consideration of the additional specific traffic being added by the six (6) approved developments discussed below.

The southern portion of Belmont is uniquely situated along a peninsula formed between the Catawba River and South Fork River, where S Point Road (NC 273) currently serves as the only north/south collector route along the peninsula. Therefore, as the southern portion of the peninsula has developed and continues to develop, most, if not all, generated traffic is forced to use S Point Road (NC 273). Additionally, this route also serves South Carolina commuters via a nearby bridged connection to York County, South Carolina. The upper state of South Carolina, and in particular York County, has experienced tremendous growth over the past decade, specifically new residential developments attracting new residents looking to commute to Gaston County and Charlotte for work. The impacts of this growth are felt in Belmont and Gaston County and along S Point Road (NC 273). Based on NCDOT AADT maps, S Point Road (NC 273) has experienced 7.7% annual growth between 2012 and 2018 south of the proposed site near Plant Allen Road, and 5.8% annual growth between the same timeframe just north of the site in the vicinity of Forest Hill Road. Considering that this study also includes growth from six (6) specific approved developments (described in **Section 4.2**), the non-specific annual growth rate determined and agreed to be used to calculate base 2023, 2024, 2025, 2026 and 2031 background traffic volumes was identified as 2.5% per year.

4.2 APPROVED DEVELOPMENTS

Based on input from the City of Belmont and NCDOT staff, six (6) nearby approved developments expected to impact traffic volumes within the study area were included in the background traffic volumes for this TIA. The land uses, intensities, approximate build-out percentages at the time the counts were collected and required transportation improvements at overlapping study intersections are outlined in **Table 4.1**.

Table 4.1 – Approved Developments

Development	Land Use/Intensity	% Build-out	TIA Included?	Required Improvements
Amberlee <u>(Nixon Rd)</u>	188 Single-Family units	55%	Yes	<i>Required IMPs at study intersections have already been constructed.</i>
Rivermist <u>(N of Bowen Rd)</u>	86 Single-Family units	0%	No	No required IMPs at study intxs. <i>(SBL on S Point Rd at site drive)</i>
McLean <u>(Armstrong Rd/S New Hope Rd)</u>	845 Single-Family units 100 Townhome units 125k SF Shopping Center 36k SF Marina/boat storage 2k SF Ship store 28k SF Restaurant	50% <i>(of approved trip gen)</i>	Yes	No required IMPs at study intxs.
Belmont Town Center <u>(Btwn Stowe Rd & R L Stowe Rd)</u>	16 Single-Family units 92 Townhome units 27,800 SF General Office 21,600 SF Specialty Retail 53,000 SF Supermarket 4,330 SF FF Restaurant 14 FP Gas Station	90% <i>(of approved trip gen)</i>	Yes	<i>Required IMPs at study intersections have already been constructed.</i>
South Fork¹ <u>(S of Armstrong Ford Rd)</u>	808 Age-restricted SF units 50k SF Grocery 15k SF Pharmacy 10k SF FF Restaurant 30k SF General Retail 25k SF Medical Office	0%	Yes	<u>NC 273/R L Stowe Rd/Nixon Rd</u> - EBR w/100'
Smith Farm <u>(NE of Belwood Dr/NC 273)</u>	19 Single-Family units 57 Townhome units	0%	No	<u>NC 273/Belwood Dr/Belmont MS</u> -Realignment of Belwood Dr to tie into signal at BMS; -SBL w/ 100'

¹Phase 1 of South Fork included in 2025 Build Phase 2 and beyond;
Phases 2+3 of South Fork included in 2031 Build +5 Conditions only.

Site volumes for approved developments were obtained from their respective TIAs with the exception of Rivermist and Smith Farm. For the approved developments that included an approved TIA, the site traffic was extracted from the approved TIAs and applied to the overlapping study intersections. Existing turning-movement splits were used to carry and assign the site volumes appropriately at study area intersections that were not included in the approved studies.

A TIA was not performed for the Rivermist and Smith Farm developments; therefore, trip generation analyses were performed for these two (2) developments using the trip generation rates published in *Trip Generation* (Institute of Transportation Engineers, Eleventh Edition, 2021) as shown in **Table 4.2** below.

Table 4.2 - Trip Generation (Approved Developments)										
ITE LUC	Land Use	Intensity	Daily	AM Peak Hour			PM Peak Hour			
				Total	In	Out	Total	In	Out	
Rivermist										
210	Single-Family Detached Housing	86	DU	878	65	17	48	86	54	32
Smith Farm										
210	Single-Family Detached Housing	19	DU	219	16	4	12	21	13	8
215	Single-Family Attached Homes - (Townhomes)	57	DU	384	24	7	17	30	17	13
Smith Farm Total				603	40	11	29	51	30	21

Site trips associated with these developments were assigned to the study area intersections based on the approved residential trip distribution for the proposed Henry Chapel development further discussed in **Section 5.3**. Based on input provided by City of Belmont and NCDOT staff at the TIA Scoping Meeting, Belwood Drive is required as mitigation for the Smith Farm development to be realigned to tie into the existing signalized tee-intersection of S Point Road (NC 273)/Belmont Middle School to create the fourth leg to this intersection. This modification was assumed to be in place under all future-year conditions.

Trip generation calculations and site trip assignments for these approved developments are included in the **Appendix**. **Figures 4.1** through **4.8** show the projected 2023 through 2026 background AM and PM peak-hour traffic volumes, respectively, that include the historical growth traffic and approved development trips.

4.3 PLANNED TRANSPORTATION PROJECTS

Based on discussions with City staff, this section only references City of Belmont transportation plans that were adopted prior to 2017 when the sketch plan application for the proposed Henry Chapel Residential Development was officially submitted to the City of Belmont for review. Other current NCDOT and GCLMPO transportation plans are provided in this section for reference. However, it is important to note that none of these future transportation projects are currently funded through construction, and therefore none were included in the future-year analyses included in this TIA.

Eight (8) future transportation projects have been identified within the study area along with a number of other surrounding roads identified as needing improvements based on review of the following adopted transportation plans for the area:

- NCDOT's [2020-2029 State Transportation Improvement Program](#) (STIP or TIP)
- GCLMPO's [2050 Metropolitan Transportation Plan](#) (MTP)
- GCLMPO's [Comprehensive Transportation Plan](#) (CTP)
- City of Belmont's [Bicycle Master Plan](#) (2013)
- City of Belmont's [Pedestrian Master Plan](#) (2009)
- [Carolina Thread Trail](#)

Below is a summary of these future transportation projects:

1. **S Point Rd (NC 273) and Armstrong Rd (NC 273) Roundabout (U-6150)**
 - Funded for ROW/Utilities FY 2028
 - Construction currently unfunded (beyond 10-year funded STIP window)
 - Based on input at TIA Scoping Meeting and given the current schedule with CNST unfunded, U-6150 will not be included in background conditions.
2. **S Point Road (NC 273) Widening (H184813)**
 - Widen to 4-lane boulevard from R L Stowe Rd to Henry Chapel Rd
 - Included in:
 - 2050 MTP (Unfunded project list)
 - GCLMPO CTP
3. **S Point Road (NC 273) Widening (H193391)**
 - Widen to 4-lane roadway from Henry Chapel Rd to Lower Armstrong Rd
 - Included in:
 - 2050 MTP (Unfunded project list)

- GCLMPO CTP

4. South Fork Parkway (Belmont-Mt Holly Loop) (H190754)

- Recommended 4-lane boulevard that ultimately connects South Point Rd (NC 273) in Belmont to N Main St (NC 273) in Mt Holly
- Multi-use path planned for new alignment
- GCLMPO has developed a Functional Design
- Included in:
 - 2050 MTP (Unfunded project list)
 - Belmont Pedestrian Plan
 - Belmont Bicycle Plan
 - GCLMPO CTP

5. Catawba Crossings

- Recommended 4-lane boulevard that connects I-485 in Mecklenburg County to S New Hope Rd (NC 279) in Gaston County
- Bike/ped accommodations planned for new alignment
- Currently undergoing [Feasibility Study](#), but no current funding for construction
- Included in:
 - 2050 MTP (Unfunded project list)
 - Belmont Pedestrian Plan
 - Belmont Bicycle Plan
 - GCLMPO CTP

6. S Point Road (NC 273) Multi-Use Path

- Recommended multi-use path along S Point Rd (NC 273)
- Included in:
 - Belmont Pedestrian Plan
 - Belmont Bicycle Plan
 - GCLMPO CTP

7. Multiuse Path through proposed site

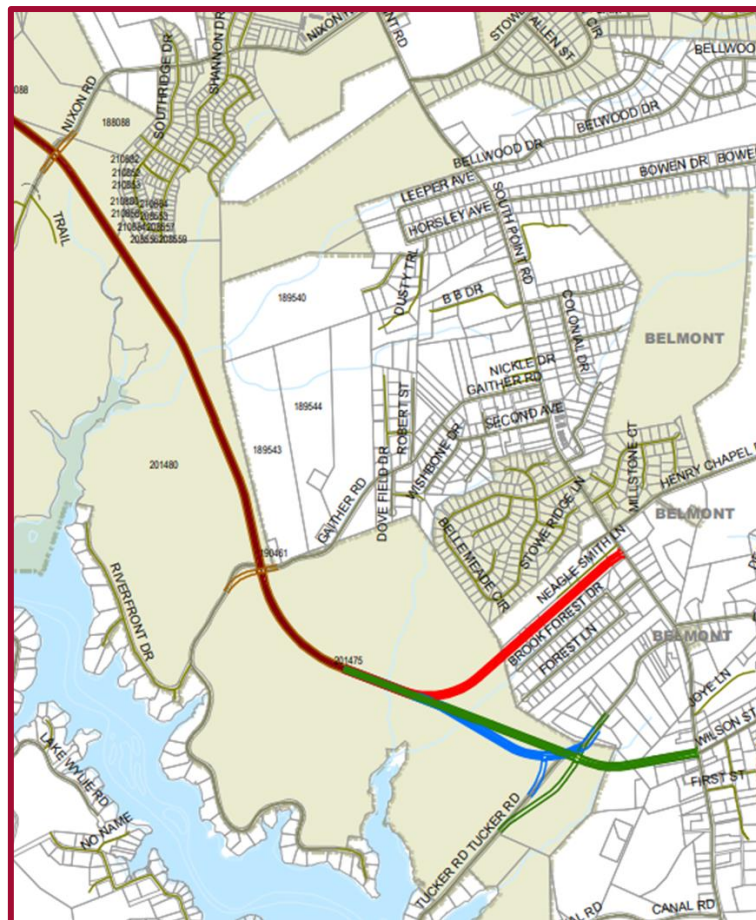
- Recommended multi-use path through proposed site connecting Timber Ridge Rd to the eastern property line
- Additional east/west multi-use path along southern portion of the site that is shown to connect to S Point Rd (NC 273) south of Gaither Rd
- Included in:
 - Belmont Pedestrian Plan
 - Belmont Bicycle Plan
 - GCLMPO CTP

8. Neighborhood Bicycle Facilities

- Recommended bicycle boulevard/neighborhood bike route along Forest Hill Rod, Colonial Dr and Timber Ridge Rd (connecting S Point Rd (NC 273) to the multi-use path connection to Timber Ridge Road listed above (where proposed Henry Chapel Access 3 would tie in))
- Included in:
 - Belmont Bicycle Plan
 - GCLMPO CTP

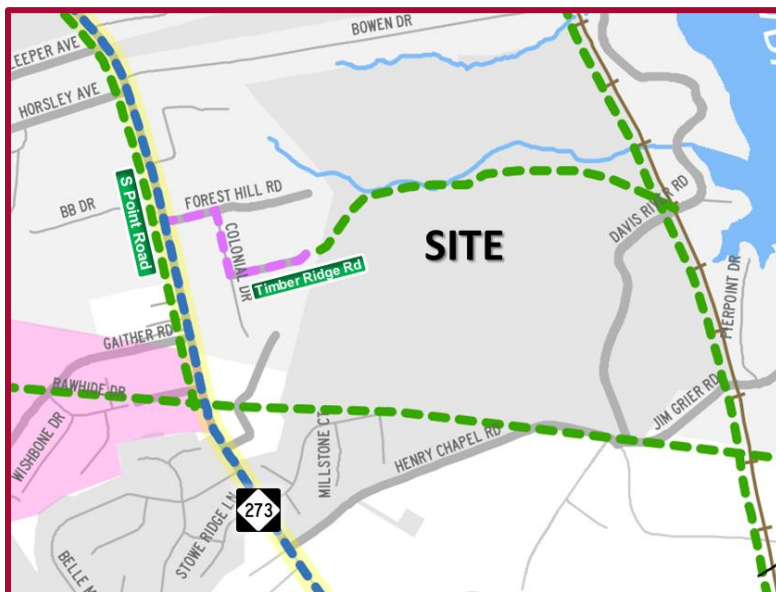
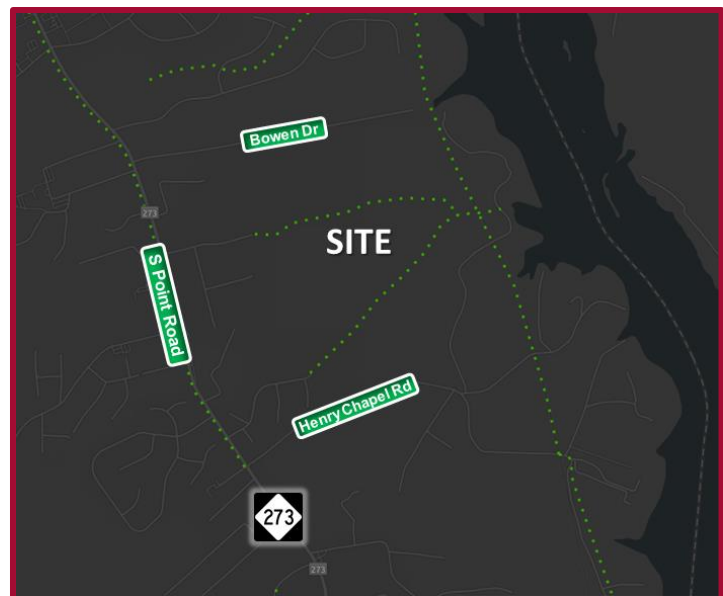
NCDOT State Transportation Improvement Program (STIP) Project No. U-6150 is planned to improve the intersection of Armstrong Road (NC 273) and S Point Road (NC 273) by constructing a single-lane roundabout. Based on the [current NCDOT STIP](#) as of July 2022, the schedule for U-6150 indicates right-of-way and utilities are funded for FY 2028 and construction is shown beyond the 10-year funded STIP window. Based on City, NCDOT and GCLMPO input at the TIA Scoping Meeting, since construction is currently unfunded, future intersection improvements associated with U-6150 were not assumed to be in place in the future year analyses summarized in **Section 6**.

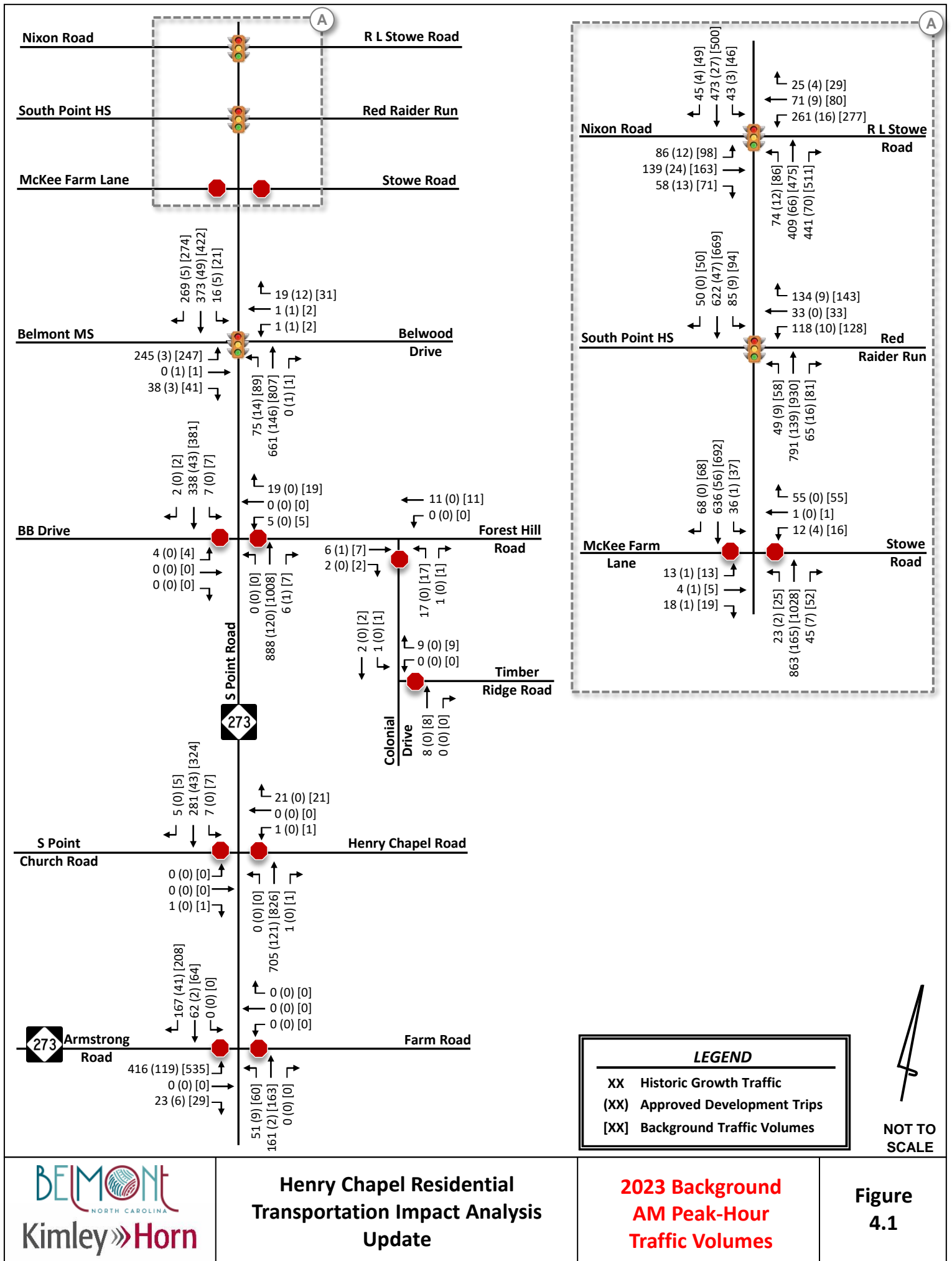
As described in GCLMPO's [2050 MTP](#), the Belmont-Mt. Holly Loop (interchangeably referred to as the South Fork Parkway) has been identified as a new four-lane boulevard and multi-use path ultimately connecting S Point Road (NC 273) in Belmont to N Main Street (NC 273) in Mount Holly. GCLMPO has previously developed a [preliminary functional design](#) (shown in the image below) for the southern portion of the Belmont-Mt. Holly Loop as it has been identified as one of the corridors most threatened by development. The intent of the boulevard is to alleviate traffic and reduce congestion along S Point Road (NC 273) by providing a new north/south alternative as the southern portion of the peninsula continues to develop. Since this project is not currently funded, the future boulevard was not included in the future year analyses summarized in **Section 6**.

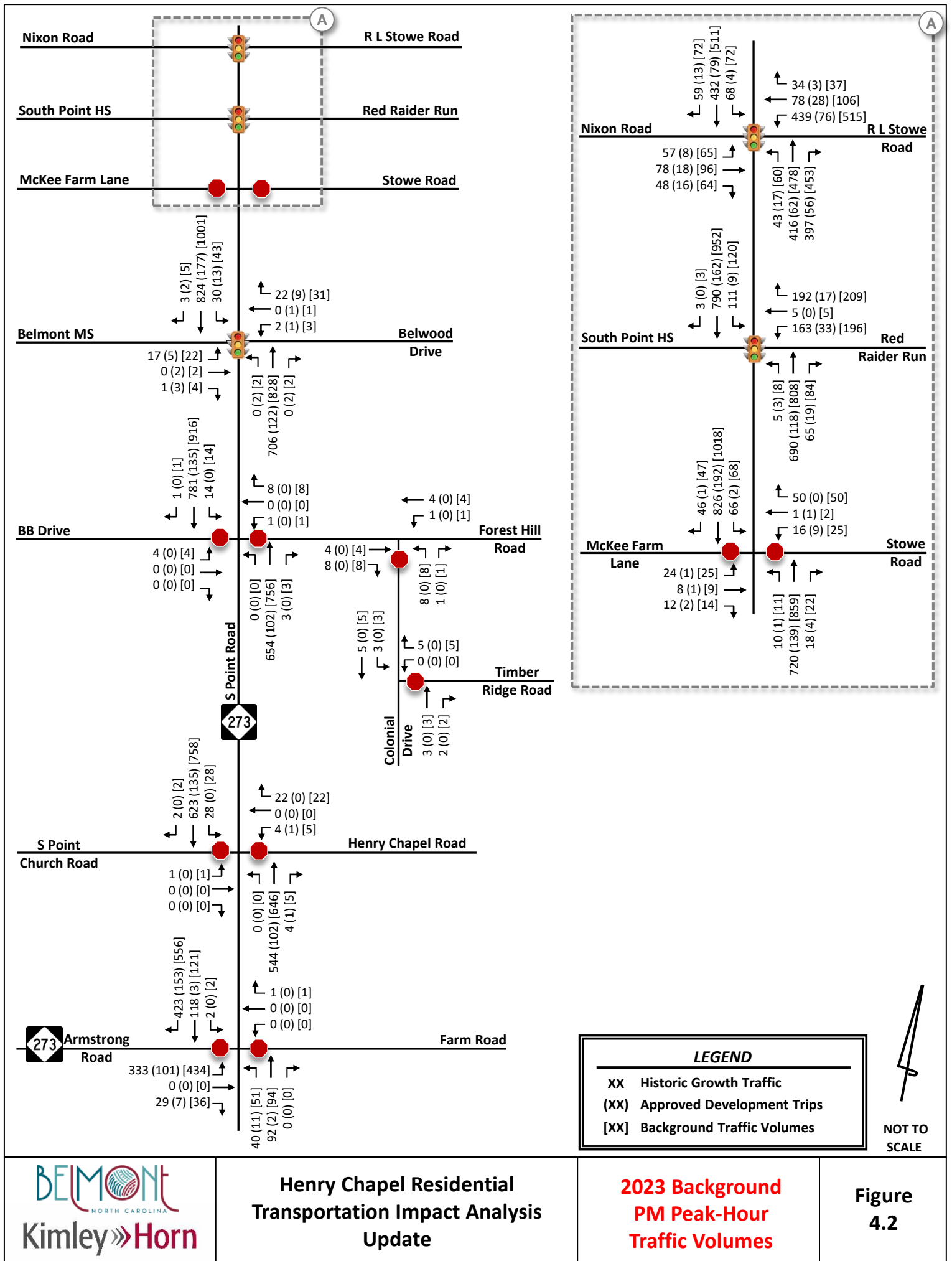


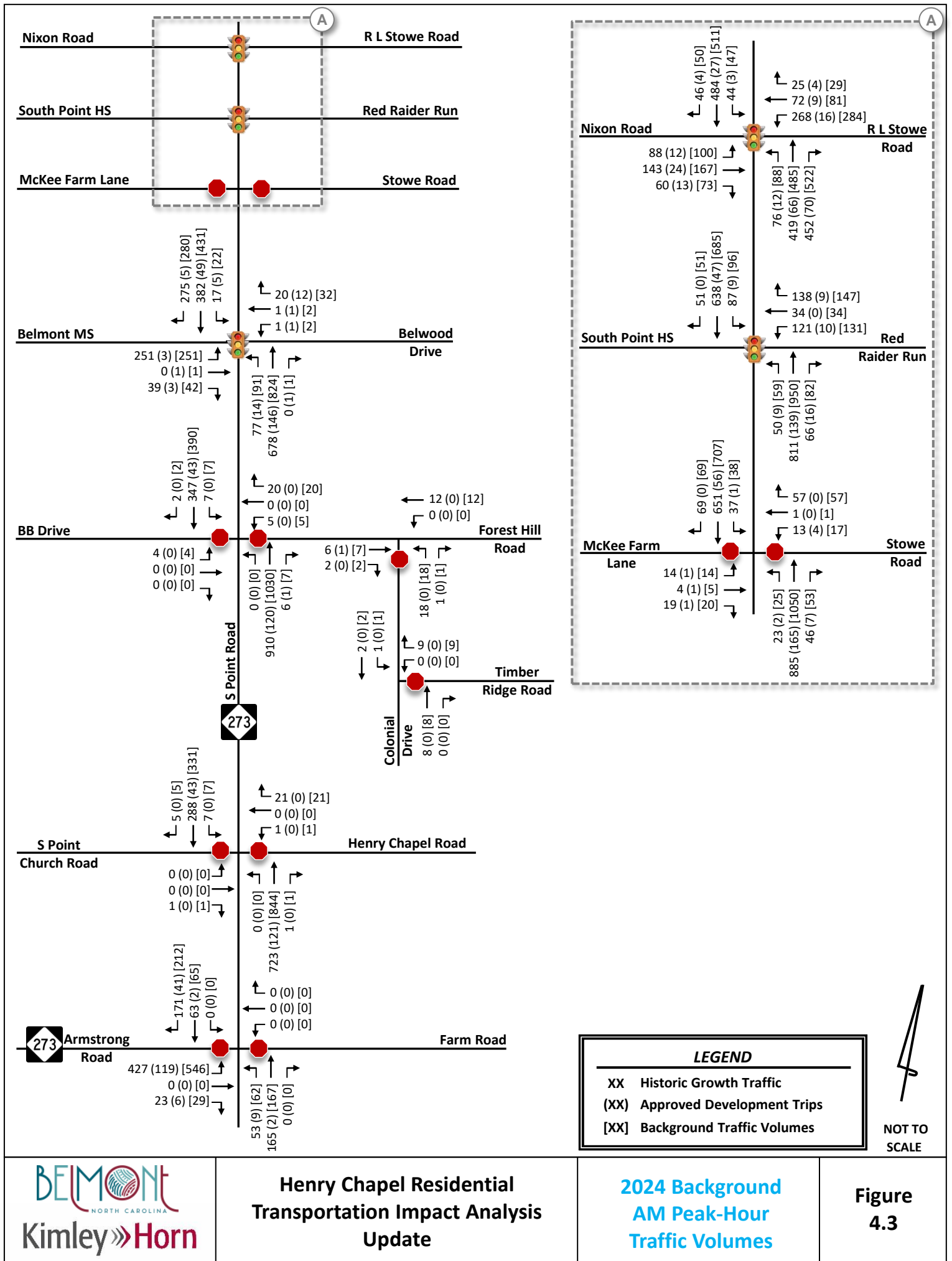
Two (2) conceptual multi-use path alignments are shown to traverse the proposed Henry Chapel site in multiple planning documents. One (1) multi-use path is shown to connect the eastern terminus of Timber Ridge Road to Henry Chapel's eastern property line as shown in GCLMPO's CTP (shown in the image below on the right, where the green dotted line indicates a recommended multi-use path) as well as the Bicycle Master Plan and Pedestrian Master Plan. The same documents show an additional multi-use path traversing the southern portion of the proposed Henry Chapel site as shown in the City of Belmont's Bicycle Master Plan (shown in the image below on the left, where the green dotted line indicates a recommended multi-use path) as well as the City's Pedestrian Master Plan and GCLMPO's CTP.

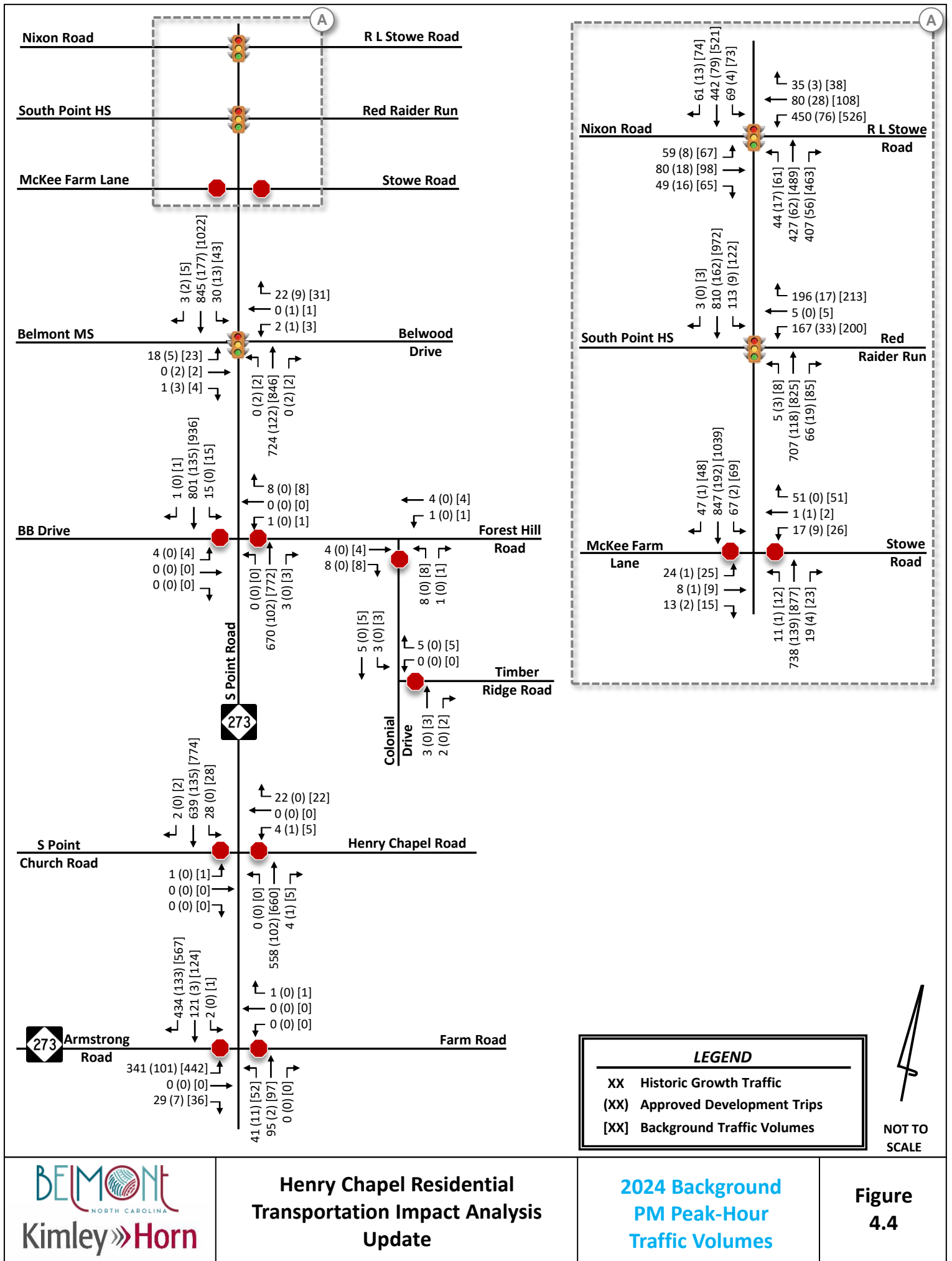
Additionally, as shown in the City of Belmont's Bicycle Master Plan (shown in the image below on the left, where the pink dashed lines indicate a recommended bicycle boulevard / neighborhood bike route) as well as GCLMPO's CTP, bicycle facilities have been identified along Forest Hill Road, Colonial Drive and Timber Ridge Road, connecting S Point Road (NC 273) to the multi-use path connection to Timber Ridge Road discussed above and where Access 3 is proposed to tie in.

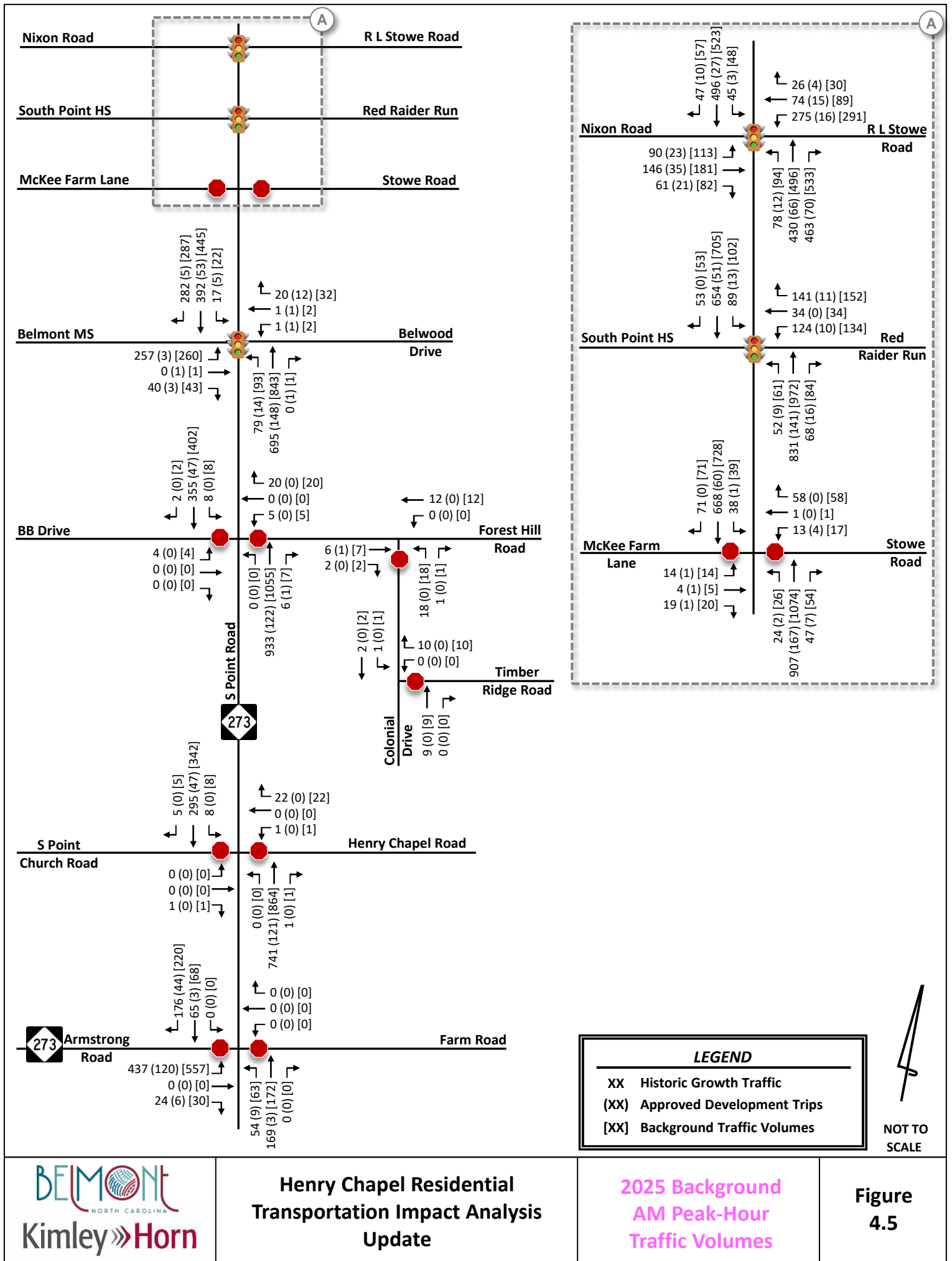


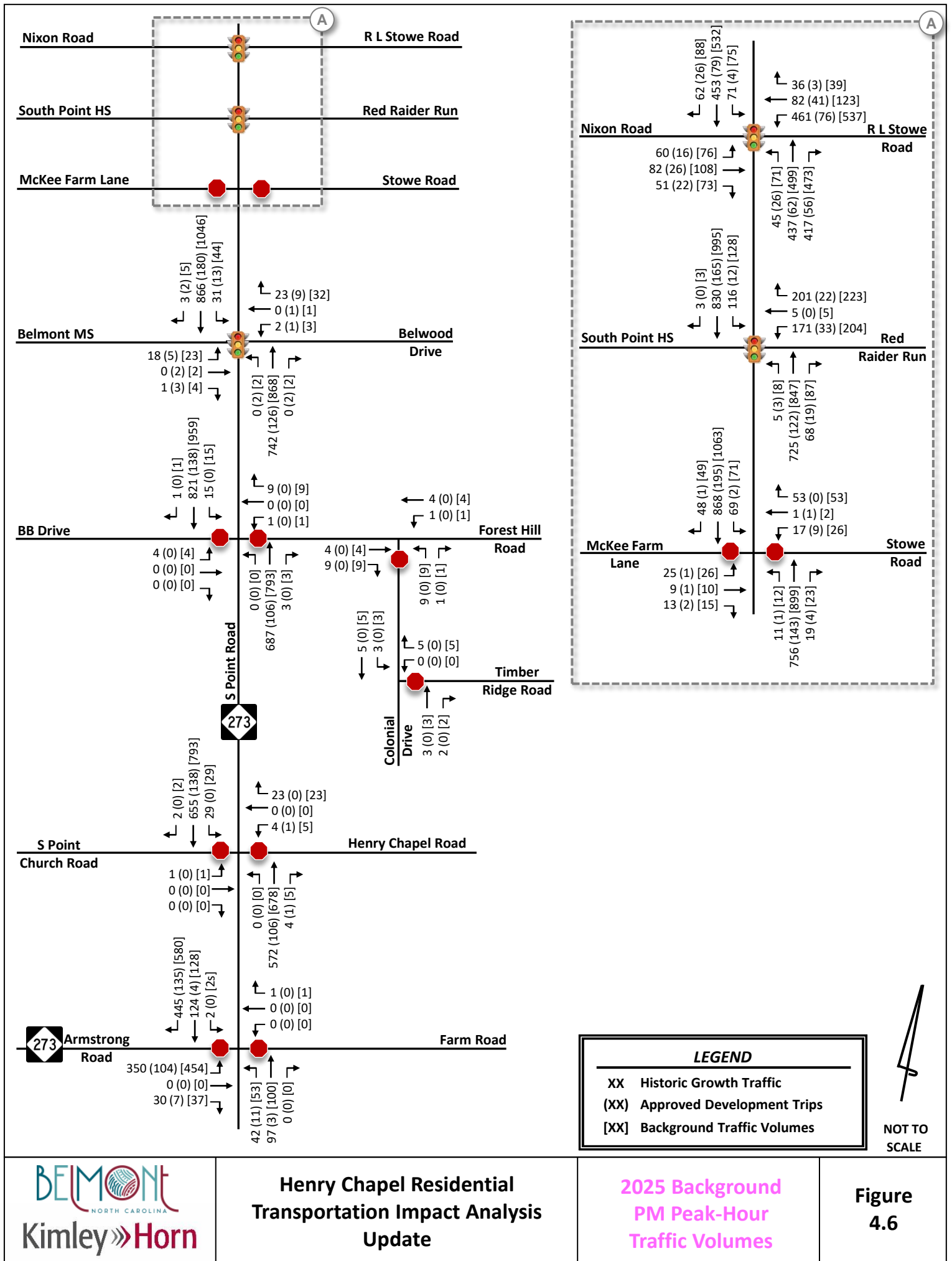


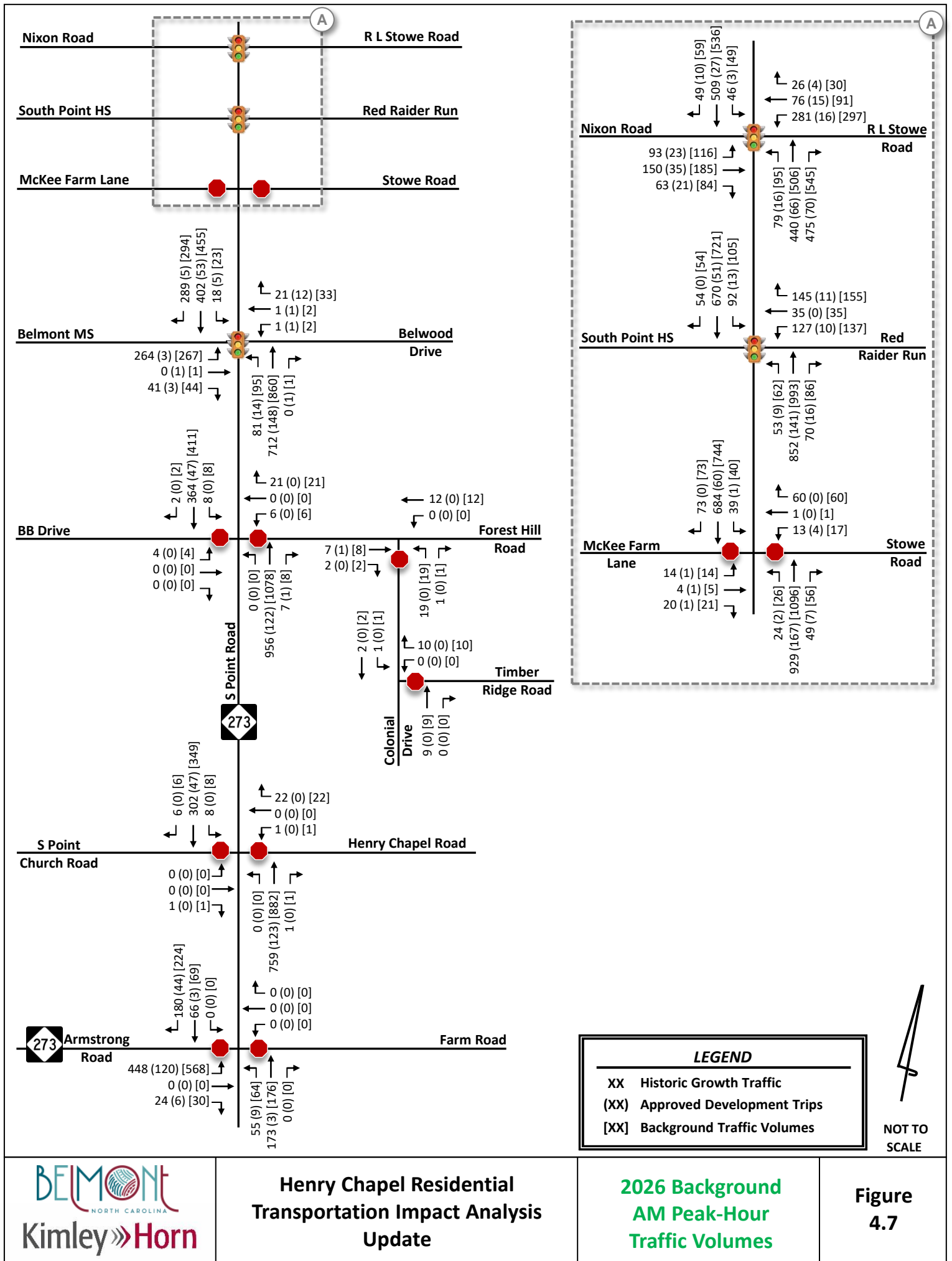


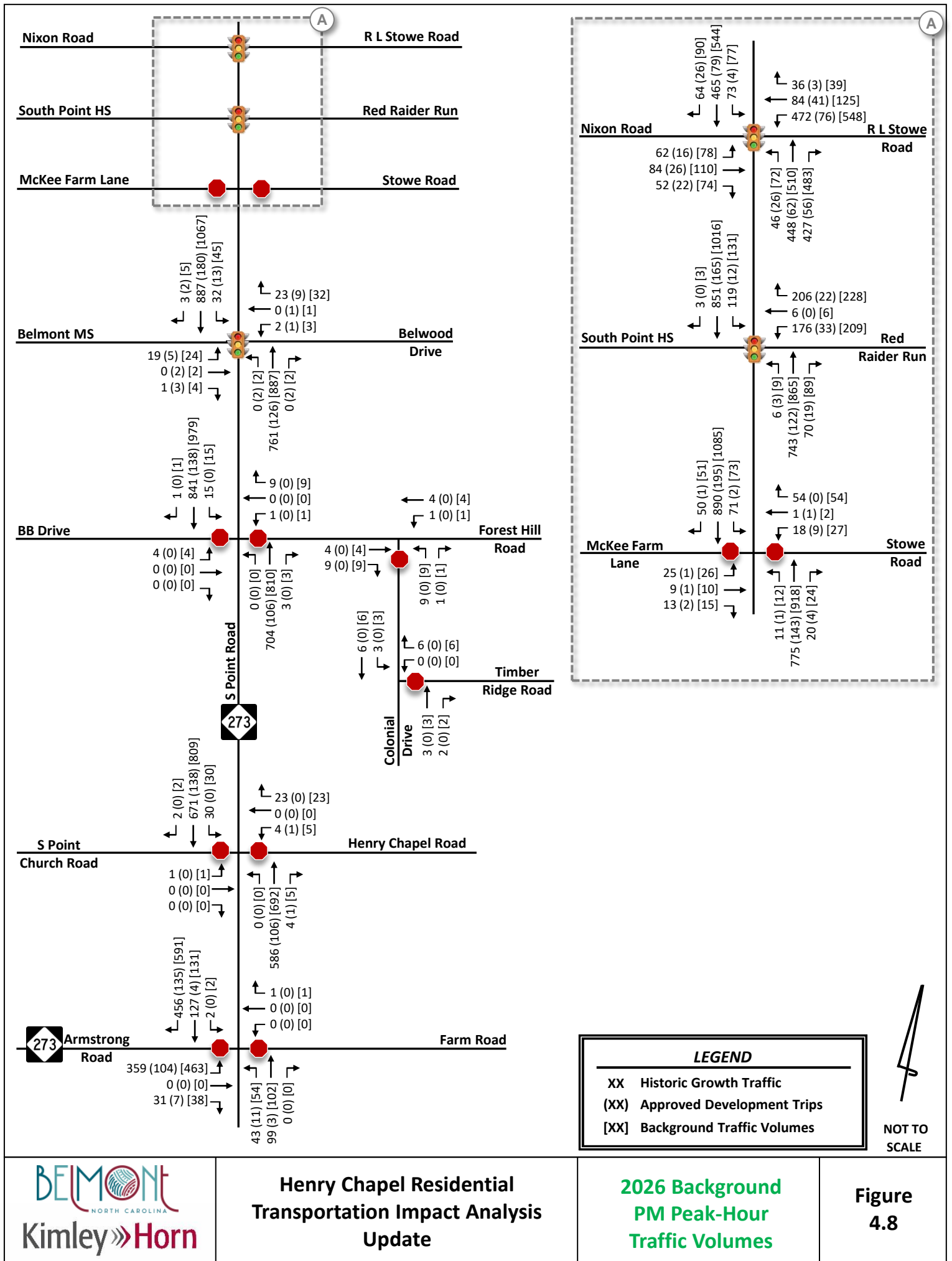












5.0 Site Traffic Volume Development

Site traffic developed for this TIA is defined as the site-generated vehicular trips expected to be added to the study area by the construction of the proposed development, and the distribution and assignment of that traffic throughout the surrounding network.

5.1 SITE ACCESS

Based on the provided site plan, the proposed development is currently planned to be accessed via three (3) access points, with Access 1 and Access 2 assumed to be constructed in 2023 as part of Phase 1A and Access 3 in 2025 as part of Phase 2:

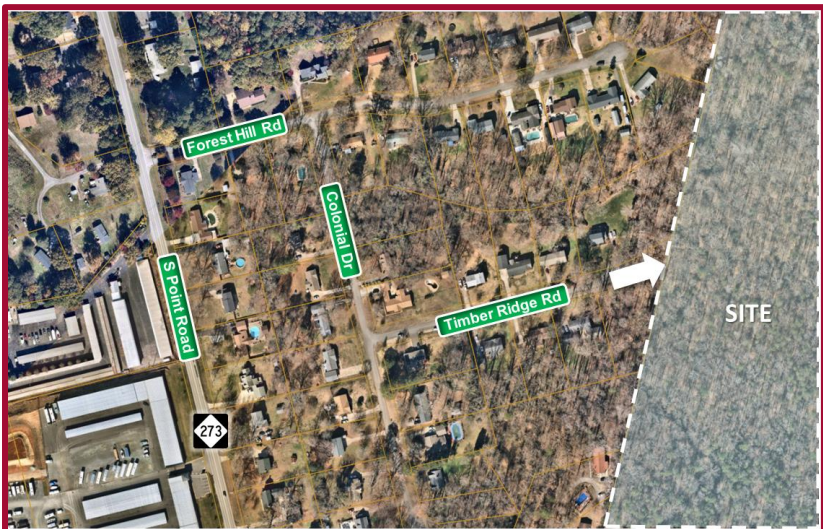
Completed in Phase 1A (2023)

- Access 1 – full-movement connection to Henry Chapel Rd approximately 1,500' east of S Point Rd (NC 273)
- Access 2 – full-movement connection to Henry Chapel Rd approximately 1,400' east of Access 1

Completed in Phase 2 (2025)

- Access 3 – extension of Timber Ridge Rd east of its current terminus

Note that Timber Ridge Road currently stubs for a potential future connection to the east. As shown in the site plan in **Figure 3.2**, Access 3 is proposed to be constructed in Phase 2 (2025) as an extension of Timber Ridge Road, providing indirect access to S Point Road (NC 273). Timber Ridge Road is a narrow residential street within the South Hill Estates neighborhood. Proposed site traffic utilizing Access 3/Timber Ridge Road would be forced to travel through the South Hill Estates neighborhood by turning onto Colonial Drive and then Forest Hill Drive to access S Point Road (NC 273). Based on input from the applicant, the intent is to design Access 1 and Access 2 along Henry Chapel Road to serve as the primary access points for the development, with Access 3 as a secondary access. However, with this being the most northern (and for most drivers, first) access from S Point Road (NC 273), if both Forest Hill Road and Henry Chapel Road intersections were signalized, the majority of traffic would likely utilize the Forest Hill Road access. This would promote heavy traffic associated with the Henry Chapel development through the South Hill Estates neighborhood. As discussed in the 2018 Henry Chapel TIA and confirmed with the applicant through this TIA update, the Forest Hill Road intersection at S Point Road (NC 273) is proposed as an unsignalized, left-over and to locate a potential traffic signal further south at the Henry Chapel Road intersection with S Point Road (NC 273). The intent of this access configuration would be to promote the majority of proposed site traffic to utilize the potential signalized, full-movement access to/from S Point Road (NC 273) at Henry Chapel Road.



5.2 TRAFFIC GENERATION

The traffic generation potential for each phase of the proposed development was determined using the trip generation rates published in *Trip Generation* (Institute of Transportation Engineers, Eleventh Edition, 2021).

Based on the site plan provided by the applicant, the proposed development is currently envisioned to ultimately include 628 single-family homes. The development is proposed to be implemented through four (4) separate phases as outlined below:

- Phase 1A (2023) – 126 homes
- Phase 1B (2024) – 118 homes
- Phase 2 (2025) – 208 homes
- Phase 3 (2026) – 176 homes

Table 5.1 summarizes the total (Phase 1A - Phase 3) projected trip generation for the proposed development. During a typical weekday under full build-out conditions, the proposed development has the potential to generate 397 and 559 net new external trips during the AM and PM peak hours, respectively. Note that the number of residential dwelling units and resulting trips are cumulative (i.e., Phase 1B reflects the 126 homes from Phase 1A plus the 118 new homes built in Phase 1B); the number of homes within each phase is listed above.

Table 5.1 - Trip Generation										
ITE LUC	Land Use	Intensity		Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
Phase 1A (2023)										
210	Single-Family Detached Housing	126	DU	1,248	92	24	68	123	77	46
Phase 1B (2024)										
210	Single-Family Detached Housing	244	DU	2,292	168	44	124	230	145	85
Phase 2 (2025)										
210	Single-Family Detached Housing	452	DU	4,042	294	76	218	410	258	152
Full Build-out (2026)										
210	Single-Family Detached Housing	628	DU	5,471	397	103	294	559	352	207

5.3 SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT

The proposed development's trips were assigned to the surrounding network based on existing peak-hour turning movements, surrounding land uses, locations of similar land uses and population densities in the area; also note that the site trip distribution is consistent with the 2018 Henry Chapel TIA. The site traffic distribution was reviewed and approved as part of the MOU by the City of Belmont, NCDOT and the applicant.

Given the changes in access and development intensities through each phase, the site traffic assignment differs amongst each phase within the vicinity of the site, while the overall distribution remains constant. The overall site traffic distribution and assignment for each phase is shown in **Figures 5.1** through **5.4**.

5.4 2023 - 2026 (PHASE 1A - PHASE 3) BUILD-OUT TRAFFIC VOLUMES

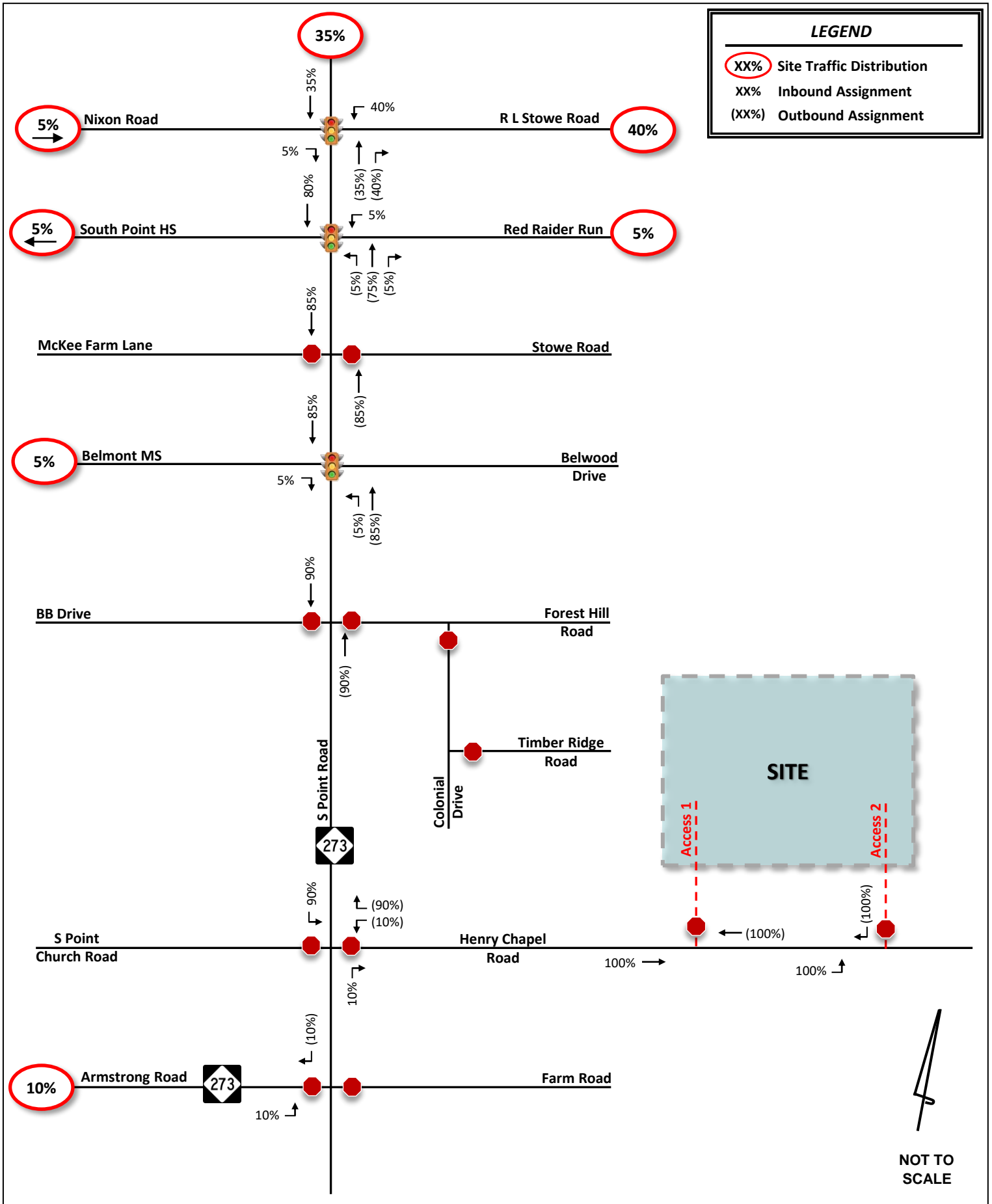
Each of the four (4) build-out traffic volume scenarios include the assignment of the site traffic generation projected for each phase of development cumulatively added to the respective background traffic volumes.

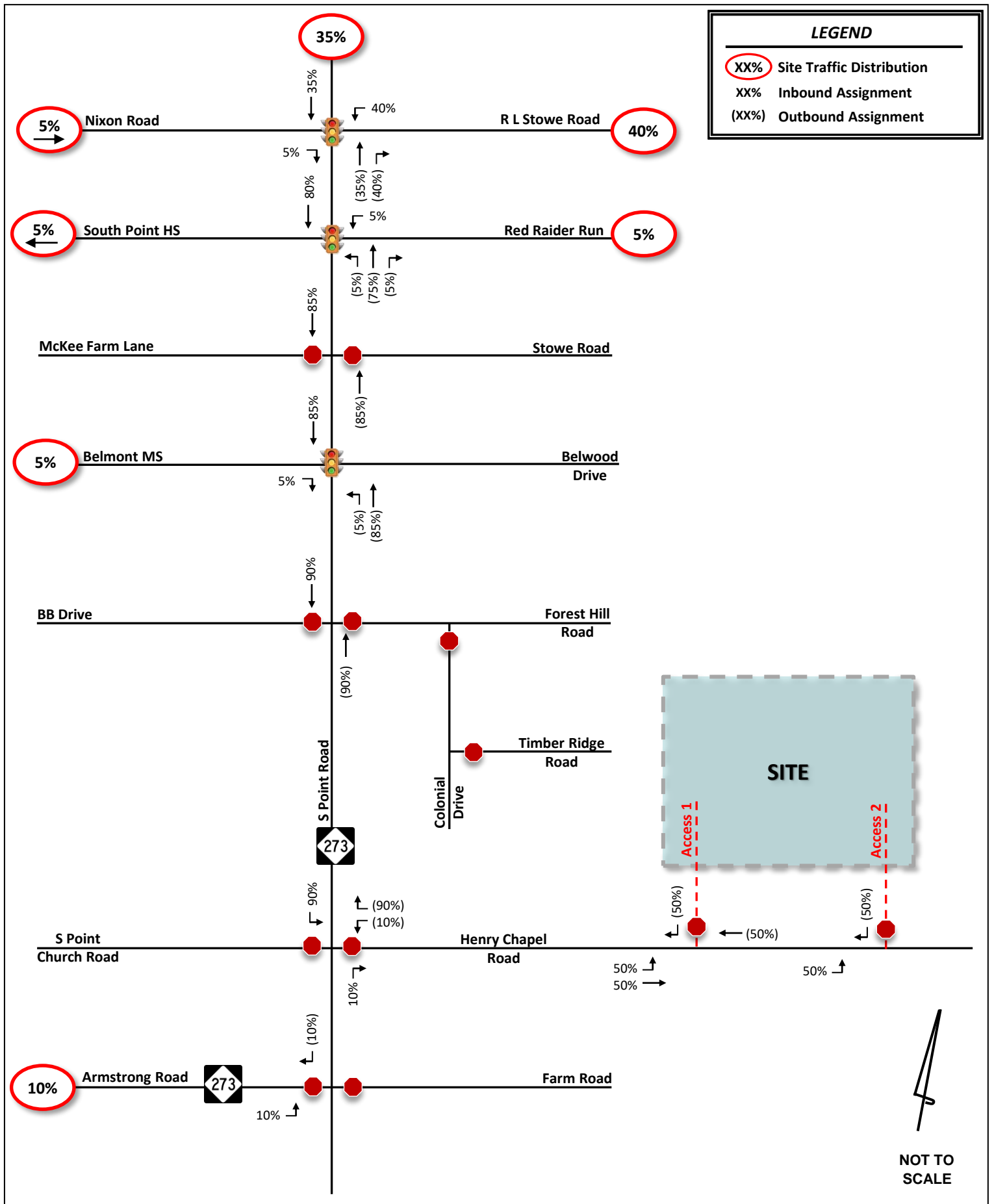
Figures 5.5 through 5.12 show the projected 2023 – 2026 (Phase 1A – Phase 3) build-out traffic volumes for the AM and PM peak hours, respectively.

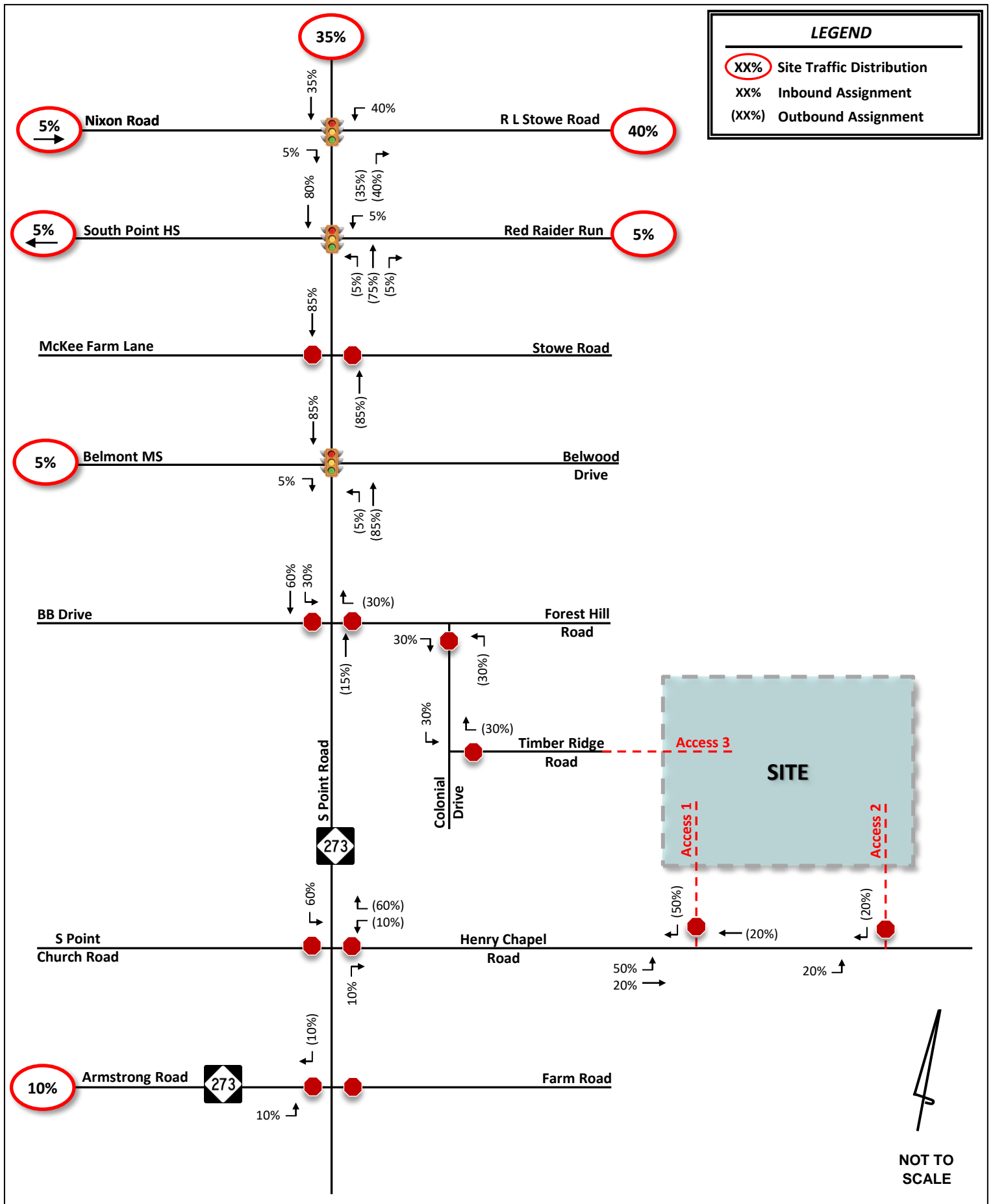
5.5 2031 BUILD-OUT +5 TRAFFIC VOLUMES

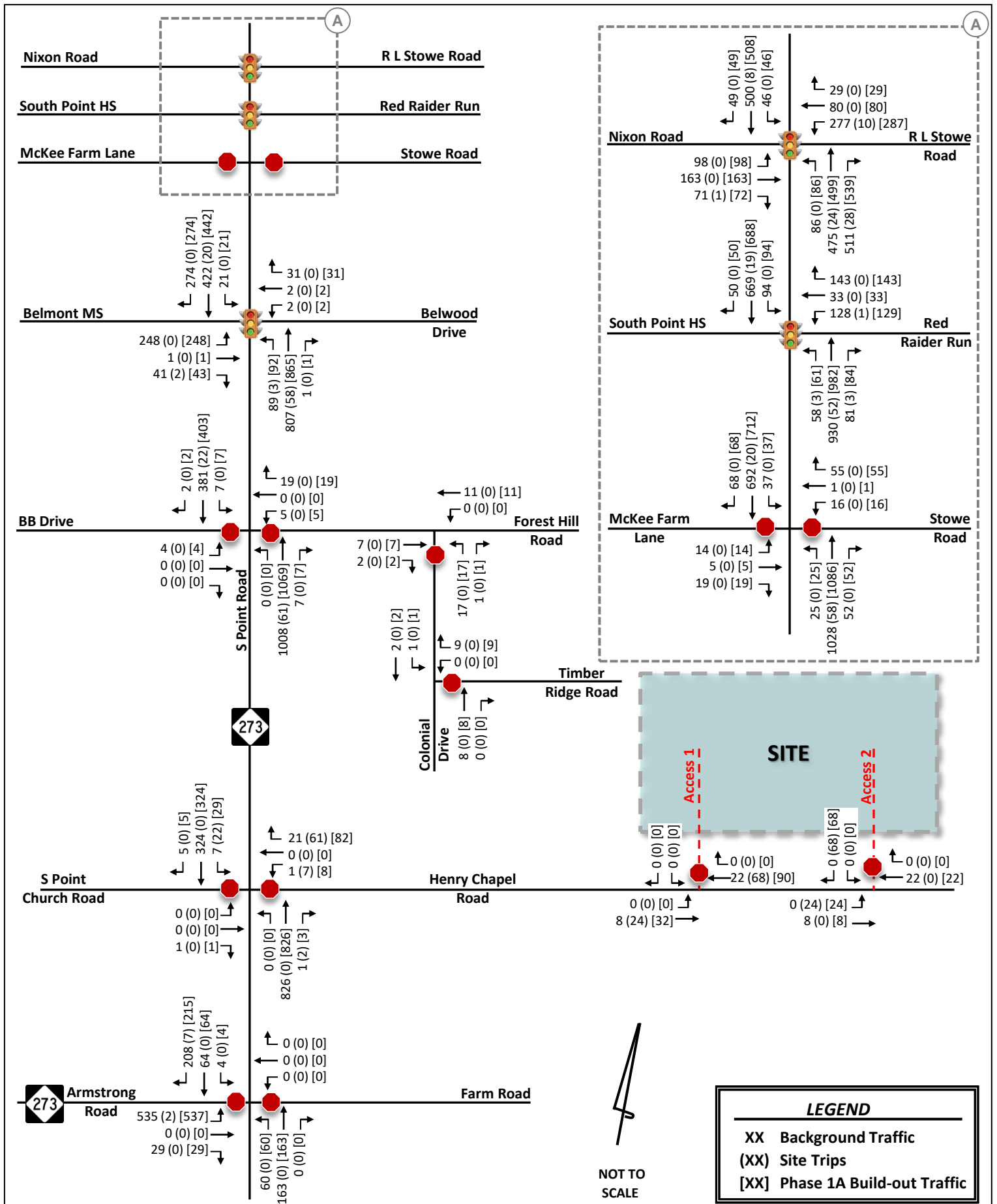
As required by the [City of Belmont Land Development Code – Section 16.14 Transportation Impact Analysis](#), an analysis scenario of five (5) years after the full build-out year was performed. The 2031 build-out +5 traffic volumes include assignment of the proposed full build-out site traffic generation along with the approved development traffic added to the 2031 base background traffic volumes. As noted in **Section 4.2**, South Fork Phases 2 and 3 were added only to the 2031 build-out +5 volumes based on the projected build-out year of 2029 for these phases.

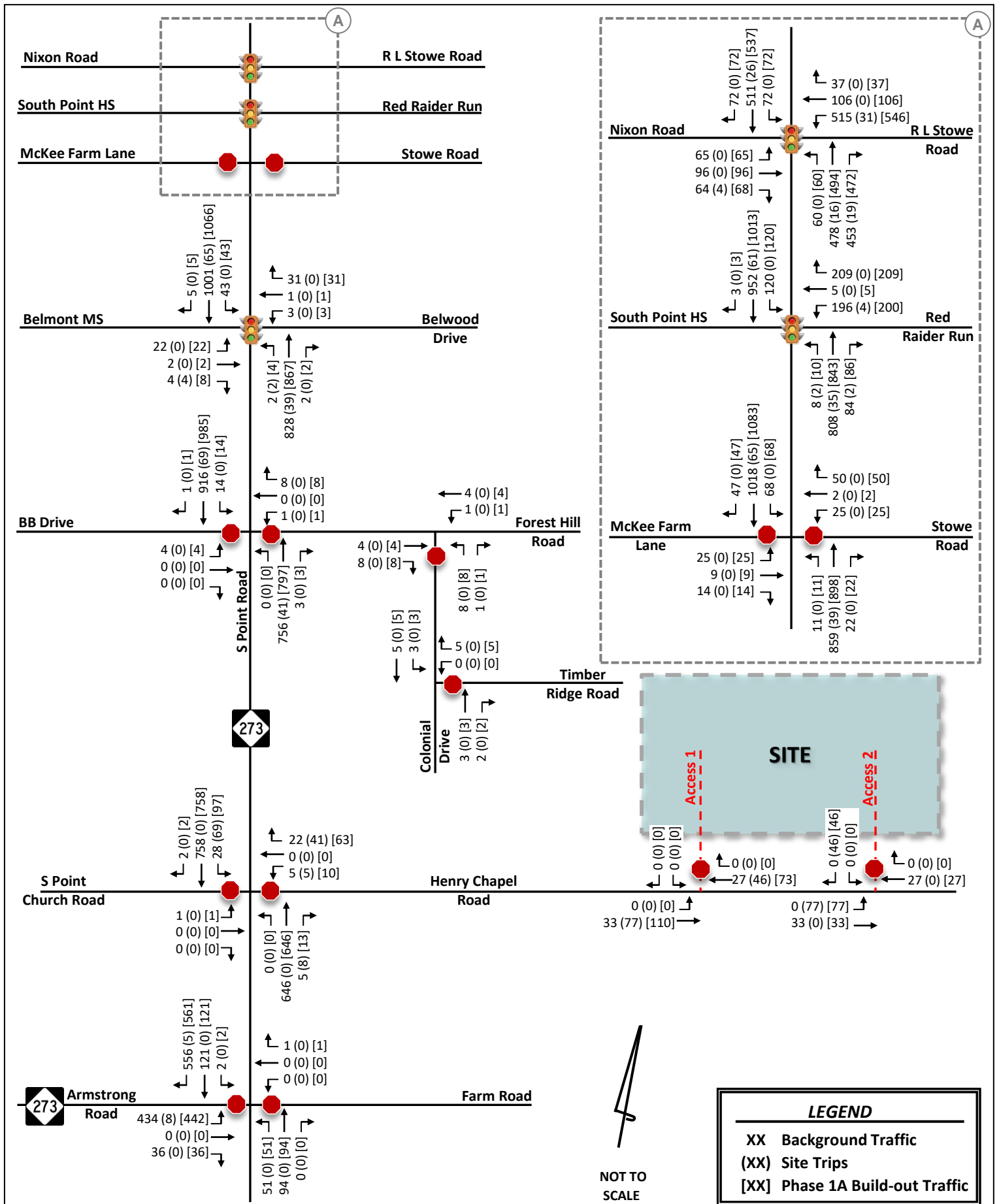
The projected 2031 AM and PM peak-hour build-out +5 volumes are shown in **Figure 5.13**. Intersection volume development worksheets for all intersections and driveways within the study network are provided in the **Appendix**.

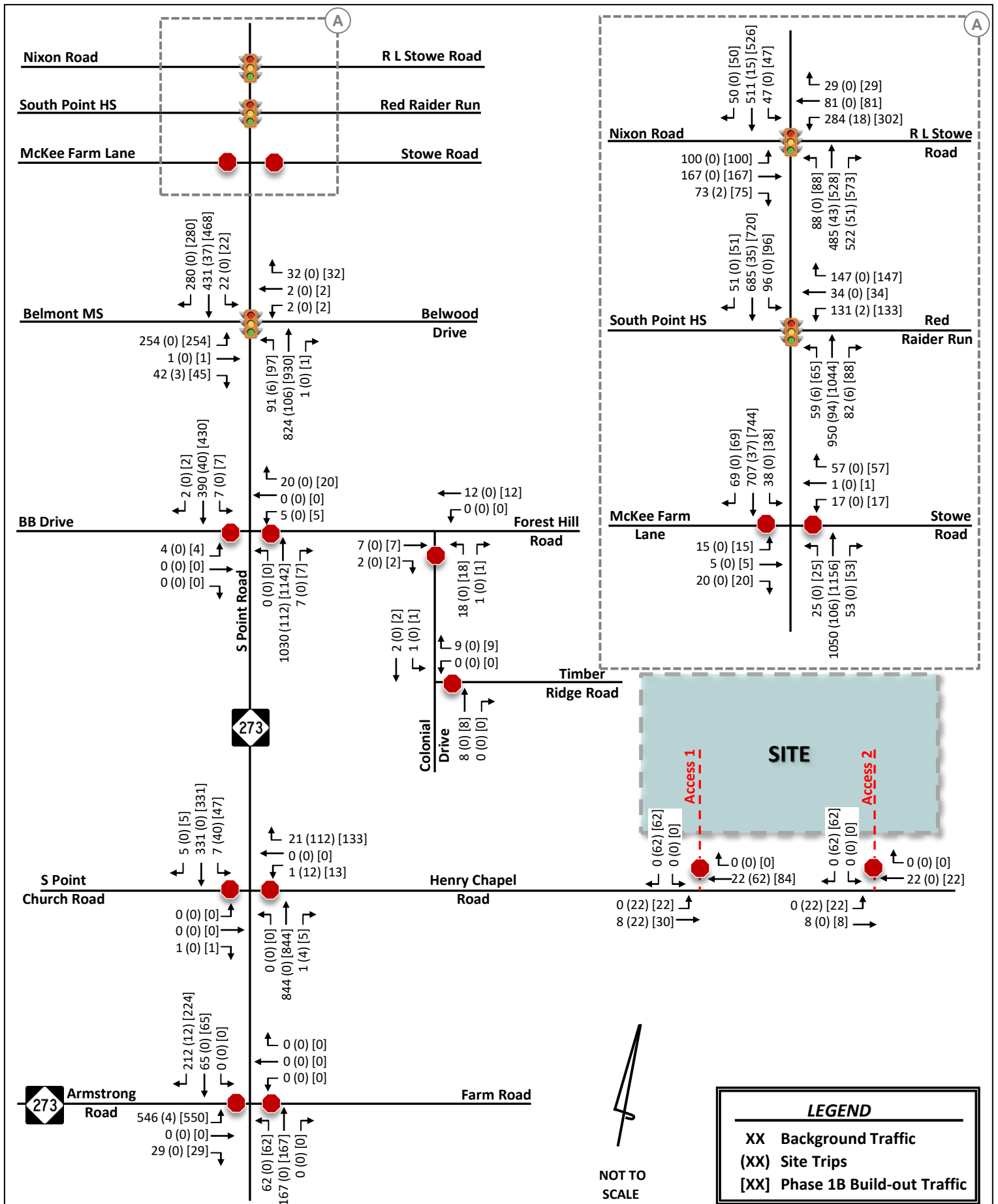


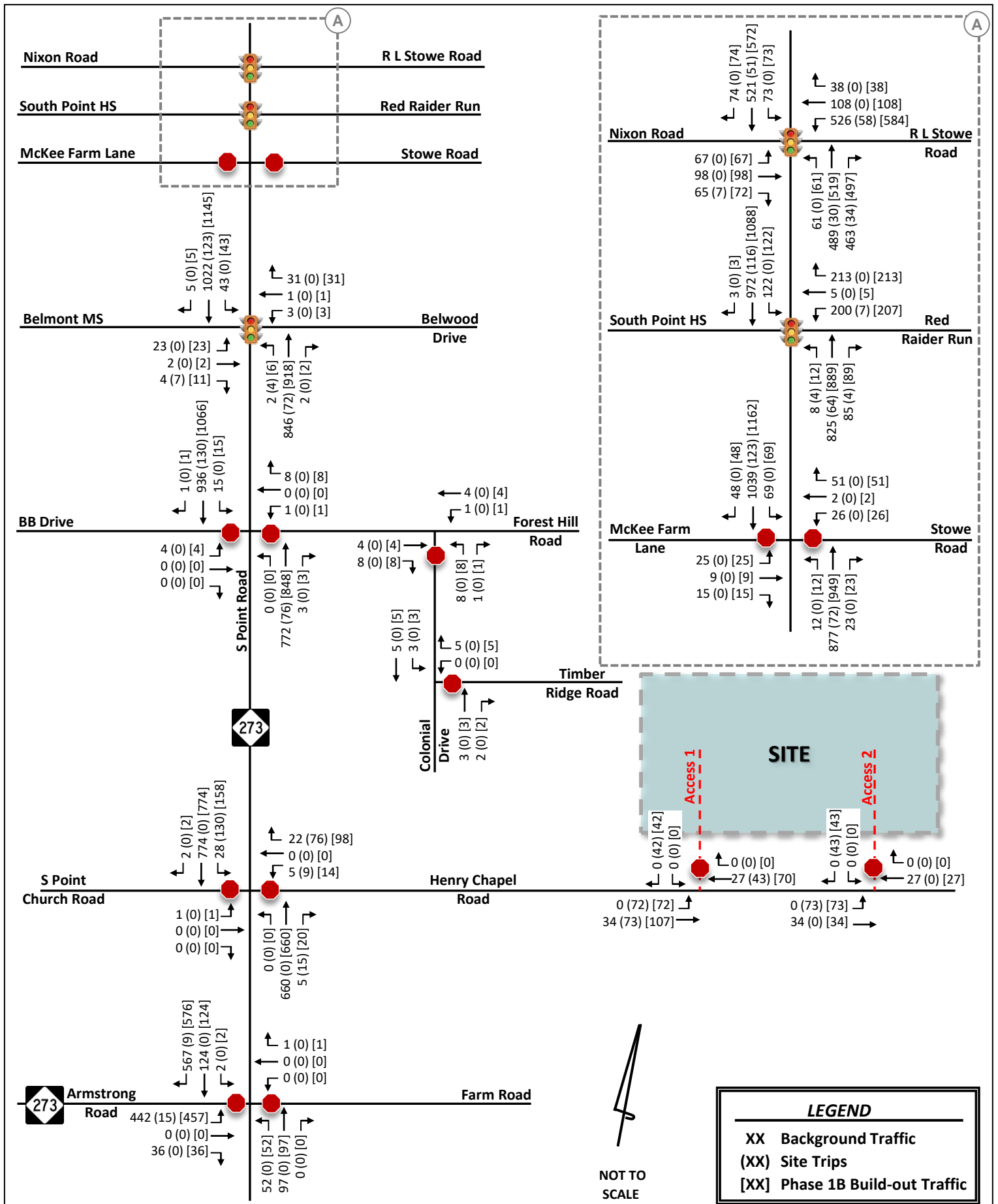


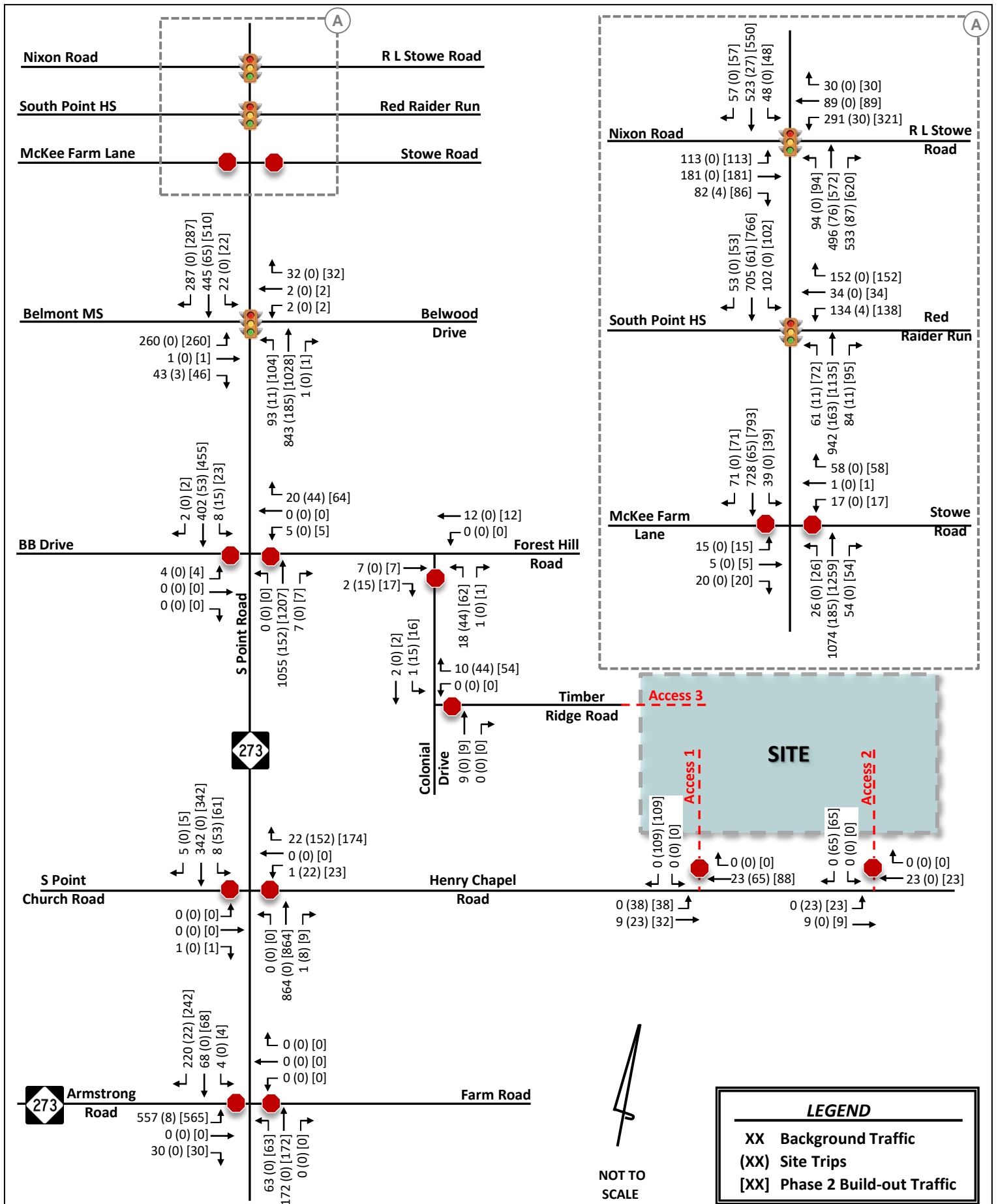


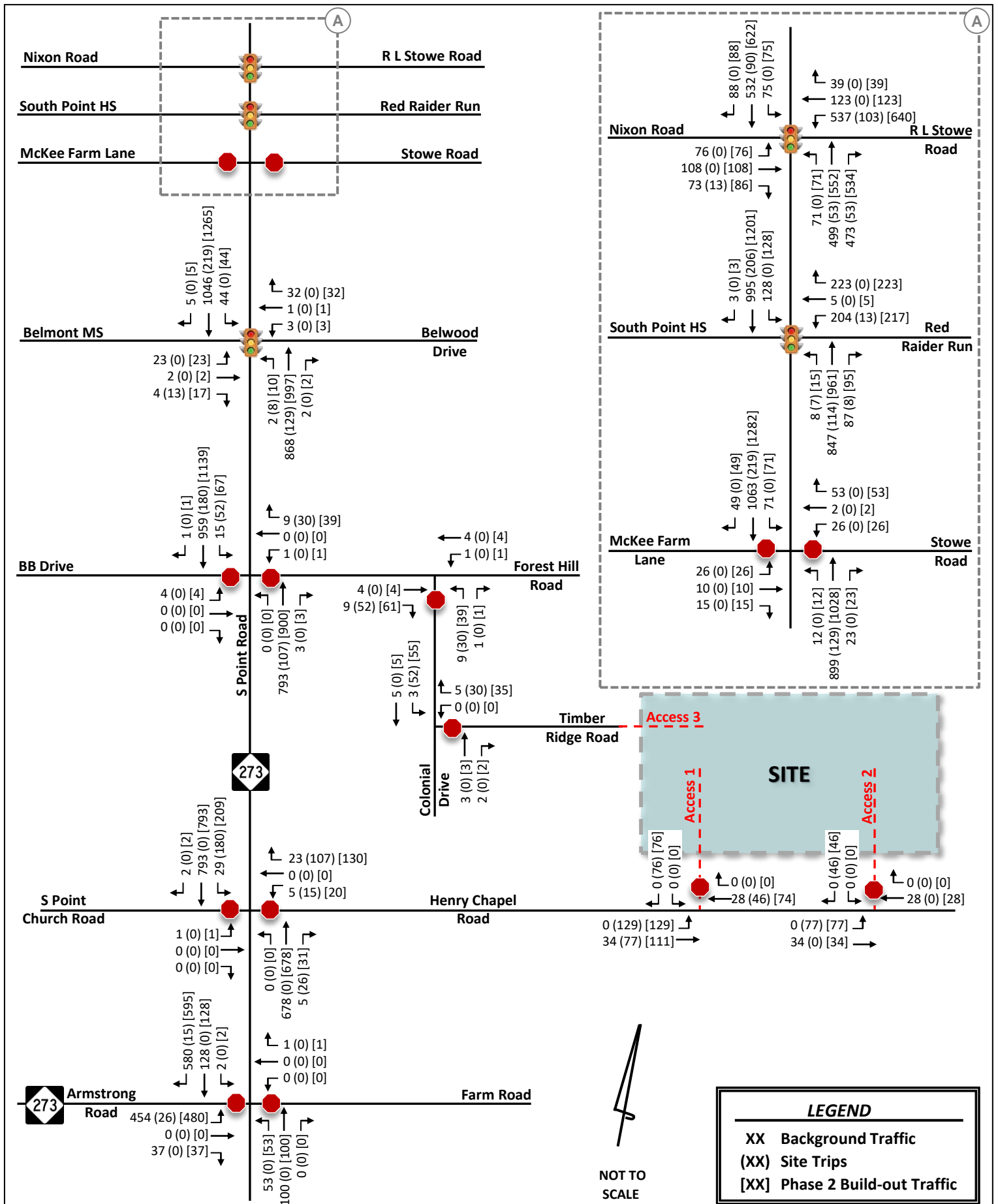


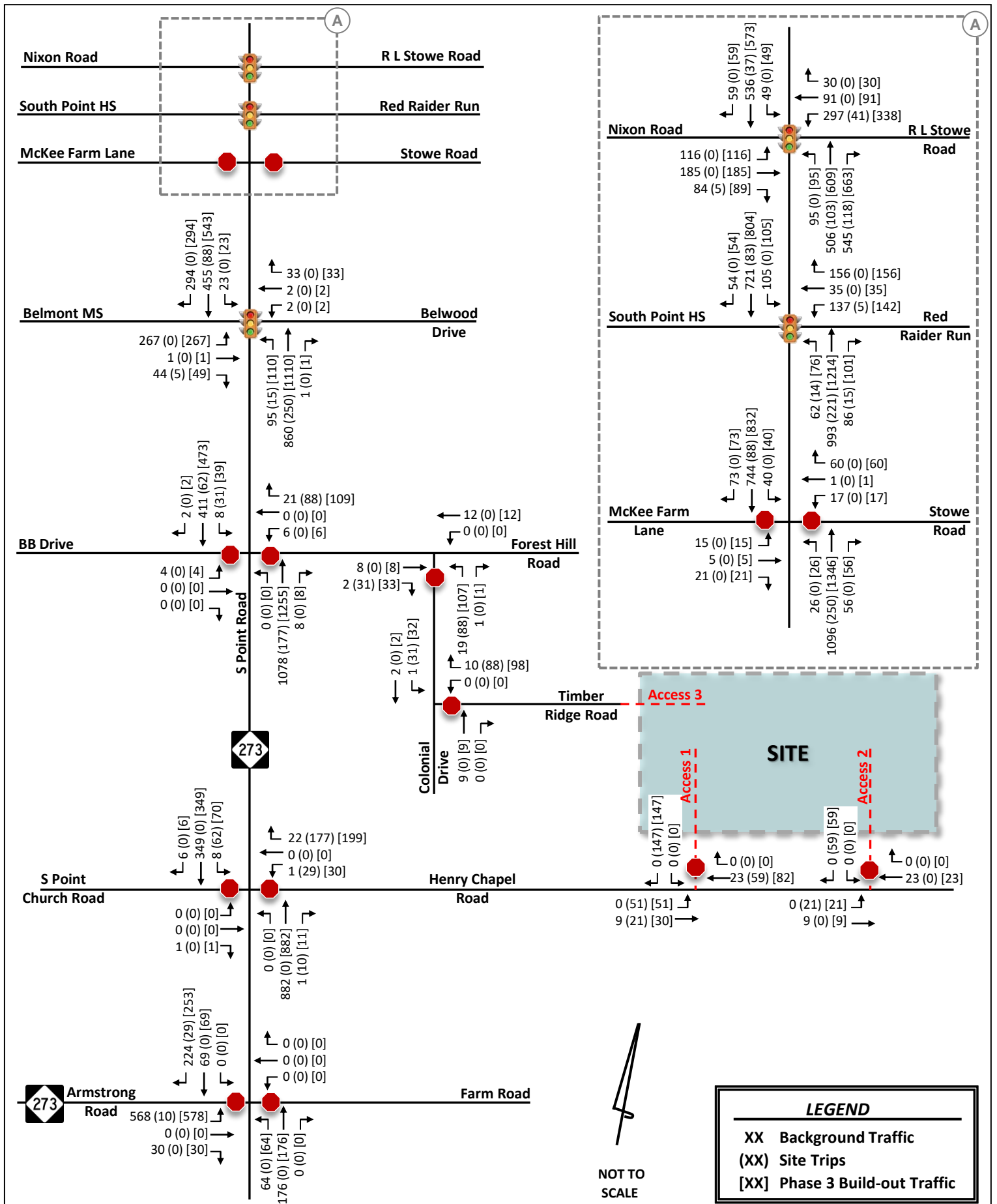


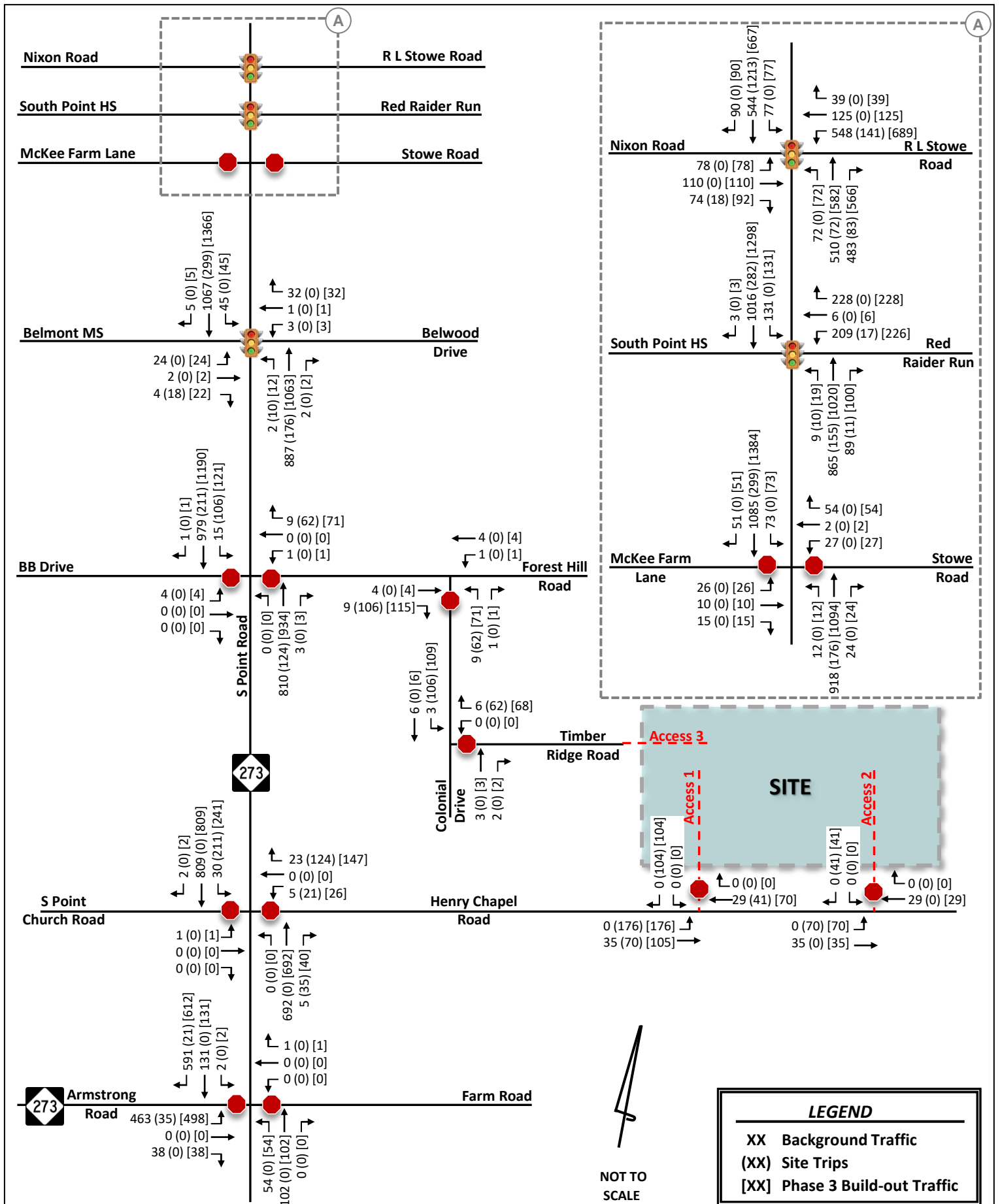


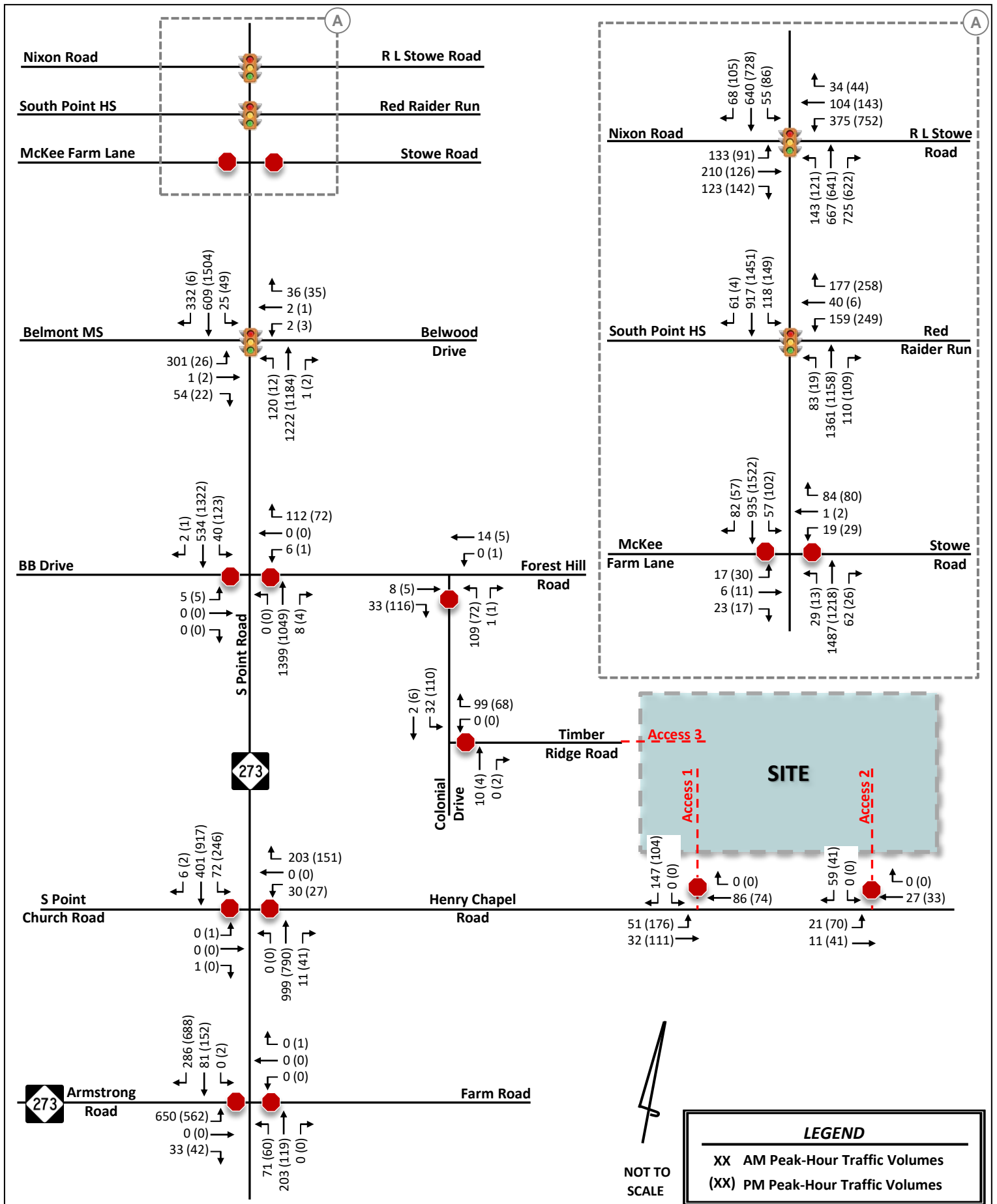












6.0 Capacity Analysis

Based on the requirements set forth by the [City of Belmont Land Development Code – Section 16.14 Transportation Impact Analysis](#) and in accordance with the traffic study guidelines in the [NCDOT Policy on Street and Driveway Access to North Carolina Highways](#), capacity analyses were performed at the study area intersections for each of the following AM and PM peak-hour scenarios:

- 2022 Existing Conditions
- 2023 Background Conditions
- 2023 **Phase 1A** Build-out Conditions
- 2024 Background Conditions
- 2024 **Phase 1B** Build-out Conditions
- 2025 Background Conditions
- 2025 **Phase 2** Build-out Conditions
- 2026 Background Conditions
- 2026 **Phase 3** Build-out (**Full Build**) Conditions
- 2031 Build-out Conditions + 5 years

Capacity analyses were performed for the AM and PM peak hours using the Synchro Version 11 software to determine the operating characteristics at the signalized and stop-controlled intersections of the adjacent street network and to evaluate the impacts of the proposed development. Capacity is defined as the maximum number of vehicles that can pass over a particular road segment, or through a particular intersection, within a specified period of time under prevailing operational, geometric, and controlling conditions within a set time duration. SIDRA 9 software was used to determine operating characteristics, level-of-service (LOS), and delay for a potential roundabout requested to be evaluated at the intersection of S Point Road (NC 273) and R L Stowe Road/Nixon Road. SIDRA is typically used to analyze roundabout operations using a macroscopic model that uses gap acceptance and lane utilization to determine capacity, where capacity is based on the size of time gaps between vehicles that motorists choose when entering a roundabout. These software programs use methodologies contained in the *Highway Capacity Manual* (HCM) to determine the operating characteristics of an intersection.

The HCM defines LOS as a “quantitative stratification of a performance measure or measures representing quality of service” and is used to “translate complex numerical performance results into a simple A-F system representative of travelers’ perceptions of the quality of service provided by a facility or service”. The HCM defines six (6) levels of service, LOS A through LOS F, with A having the best operating conditions from the traveler’s perspective and F having the worst. However, it must be understood that “the LOS letter result hides much of the complexity of facility performance”, and that “the appropriate LOS for a given system element in the community is a decision for local policy makers”. According to the HCM, “for cost, environmental impact, and other reasons, roadways are typically designed not to provide LOS A conditions during peak periods but instead to provide some lower LOS that balances individual travelers’ desires against society’s desires and financial resources. Nevertheless, during low-volume periods of the day, a system element may operate at LOS A.”

LOS for a two-way stop-controlled (TWSC) intersection is determined by the control delay and is reported for the side-street approaches, typically during the highest volume periods of the day, the AM and PM peak periods. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. With respect to field measurements, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time the vehicle departs from the stop line. It

is typical for stop sign-controlled side streets and driveways intersecting major streets to experience long delays during peak hours, particularly for left-turn movements. The majority of the traffic moving through the intersection on the major street experiences little or no delay.

LOS for signalized intersections is reported for the intersection as a whole and typically during the highest volume periods of the day, the AM and PM peak periods. One or more movements at an intersection may experience a low level-of-service, while the intersection as a whole may operate acceptably.

LOS for roundabout intersections is also reported for the intersection as a whole but uses the same control delay thresholds as the stop-controlled intersections. However, if the volume-to-capacity ratio on an approach of the intersection is greater than 1.0, that approach or intersection is reported as LOS F regardless of the reported control delay.

Table 6.0 lists the LOS control delay thresholds published in the HCM for unsignalized (TWSC and roundabout) and signalized intersections, along with the operational descriptions for each LOS rating. The LOS grades shown below quantify and categorize the driver's discomfort, frustration, fuel consumption, and travel times experienced as a result of intersection control and the resulting traffic queuing.

Table 6.0 – Vehicular LOS Descriptions				
LOS	Avg Control Delay [sec/veh]		Description	
	Unsignalized	Signalized		
A	Short Delays	≤ 10	≤ 10	Minimal control delay; traffic operates at primarily free-flow conditions; unimpeded movement within traffic stream.
B		> 10 – 15	> 10 – 20	Minor control delay at signalized intersections; traffic operates at a fairly unimpeded level with slightly restricted movement within traffic stream.
C		> 15 – 25	> 20 – 35	Moderate control delay; movement within traffic stream more restricted than at LOS B; formation of queues contributes to lower avg travel speeds.
D	Moderate Delays	> 25 – 35	> 35 – 55	Considerable control delay that may be substantially increased by small increases in flow; average travel speeds continue to decrease.
E		> 35 – 50	> 55 – 80	High control delay; average travel speed no more than 33 percent of free flow speed.
F	Long Delays	> 50	> 80	Extremely high control delay; extensive queuing and high volumes create exceedingly restricted traffic flow.

NCDOT provided the signal geometric plans for each of the following signalized intersections, which were used in the development of the existing conditions Synchro network:

- S Point Road (NC 273) and Belmont Middle School
- S Point Road (NC 273) and South Point HS/Red Raider Run (**NC 273 CLS**)
- S Point Road (NC 273) and R L Stowe Road/Nixon Road (**NC 273 CLS**)

Based on the provided signal plans, the recently added signal at Belmont Middle School is operating as an isolated signal, while the other two (2) are operating as part of the NC 273 Closed Loop Signal System (CLS). The cycle lengths and splits for these two (2) signalized study intersections were optimized as a system given the timing inputs in the existing conditions network and in accordance with [NCDOT Congestion Management Capacity Analysis Guidelines](#). Cycle lengths for the coordinated system were maintained through each phase, while splits and offsets were re-optimized as appropriate under each future-year scenario to account for the changes to the roadway network as a result of the background and previous

phased build-out mitigation improvements. The cycle lengths and splits at the isolated intersection were optimized under existing conditions given the timing inputs and in accordance with NCDOT guidelines. Note that, as discussed in **Section 4.2**, Belwood is required to be realigned to tie into the existing traffic signal at Belmont Middle School as mitigation for the approved Smith Farm residential development. Signal plans for this future four (4)-legged intersection were not available at the time of this analysis; therefore, intersection laneage was assumed based on the approved Smith Farm site plan and the cycle lengths and splits were re-optimized at this intersection under 2023 background conditions in accordance with NCDOT guidelines. Splits were also re-optimized at this intersection as appropriate under each future-year scenario to account for the changes to the roadway network as a result of the background and previous phased build-out mitigation improvements.

Based on [NCDOT Congestion Management Capacity Analysis Guidelines](#), protected only left-turn phasing was used for analysis of future operations where protected/permitted left-turn phasing currently exists at the following intersections:

8. S Point Road (NC 273) and South Point High School/Red Raider Run
9. S Point Road (NC 273) and R L Stowe Road/Nixon Road

Signal geometric plans are included in the **Appendix**.

It should be noted that due to site traffic and subsequent mitigation measures accumulating through each of the build-out phases, mitigation identified from previous build-out phases were included in the roadway network in subsequent build-out year(s). However, identified mitigation was not included in background conditions since the site traffic from previous phases is not included in background conditions. Therefore, for example, Phase 1A site traffic and Phase 1A mitigation are not included in 2024 background conditions, but both Phase 1A site traffic and mitigation are included in 2024 Phase 1B build-out conditions.

The following modifications from the background data collected were applied to the capacity analyses to meet [NCDOT Congestion Management Capacity Analysis Guidelines](#):

- RTOR operations were not allowed.
- Protected-only left-turn phasing was used for analysis of future operations where protected/permitted left-turn phasing exists or is planned.
- Lost time adjust was added to the yellow and all-red times provided in the existing signal plans to maintain a total lost time of 5 seconds for each movement.

Note that not all movements were modified to include a minimum of four (4) vehicles per hour in this analysis. Increasing volumes on low-volume, stop-controlled approaches that intersect high-volume major streets (such as S Point Road (NC 273)) can result in significant deviations in anticipated delay on those approaches.

Field-observed peak-hour factors (PHFs) were used in the 2022 existing conditions analysis, whereas a 0.9 PHF was used in all future-year conditions in accordance with [NCDOT Congestion Management Capacity Analysis Guidelines](#). Heavy-vehicle percentages collected with the counts were used and maintained for all scenarios, subject to a two-percent (2%) minimum.

Mitigation for traffic impacts caused by the proposed development were identified based on City of Belmont and NCDOT mitigation requirements. When determining the proposed development's transportation impact to the study area intersections, each phased horizon-year build-out conditions was

compared to the respective horizon-year background conditions. Based on the [City of Belmont Land Development Code – Section 16.14 Transportation Impact Analysis](#), “the applicant shall be required to identify mitigation improvements to the roadway network if at least one of the following conditions exists when comparing future year background conditions to future year build-out conditions:

- a) the total average delay at an intersection or individual approach increases by 25% or greater, while maintaining the same LOS,
- b) the LOS degrades by at least one level,
- c) or the LOS is “D” or worse in background conditions and the proposed project shows a negative impact on the intersection or approach”.

Capacity analysis reports generated by Synchro Version 11 software are included in the **Appendix** along with queuing and blocking reports generated by the SimTraffic microsimulation model.

6.1 S POINT RD (NC 273) AND ARMSTRONG ROAD (NC 273)

Table 6.1 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized TWSC intersection of S Point Road (NC 273) and Armstrong Road (NC 273).

This intersection is currently unsignalized with TWSC on the eastbound and westbound approaches of Armstrong Road (NC 273) and Farm Road and operates similar to a tee-intersection. The westbound approach of Farm Road is not platted, is privately-fenced, and serves as a low-volume, residential driveway. As shown in **Figure 3.4**, the highest demand is seen on the southbound and eastbound approaches, which align with the Highway 273 designation that runs from north to south along S Point Road until it intersects Armstrong Road where it turns and runs from east to west towards S New Hope Road (NC 279) and South Carolina. **Table 6.1** highlights the issue in which the heavy eastbound left-turn volume (primarily serving traffic from South Carolina, McLean, and other parts of Gaston County commuting to Charlotte and eastern Gaston County for work) is forced to stop, creating long delays and queues. As discussed in **Section 4.3**, this intersection is planned to be converted to a single-lane roundabout as part of NCDOT TIP Project No. U-6150 to better accommodate the unbalanced approaches. However, based on the current NCDOT STIP as of July 2022, although right-of-way and utilities are funded for FY 2028, there is no current funding for construction as it is shown beyond the 10-year funded STIP window. Based on City, NCDOT and GCLMPO input at the TIA Scoping Meeting, since construction

Table 6.1 - S Point Road (NC 273) and Armstrong Road (NC 273)								
Condition	Measure	EB	WB	NB		SB		
		EBLTR	WBLTR	NBL*	NBTR	SBL*	SBT	SBR
AM Peak Hour								
2022 Existing	LOS (Delay)	F (85.4)	A (0.0)	A (8.1)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	383'	0'	5'	0'	0'	0'	-
Phase 1A								
2023 Background	LOS (Delay)	F (192.5)	A (0.0)	A (8.2)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	708'	0'	5'	0'	0'	0'	-
2023 Build-out	LOS (Delay)	F (198.2)	A (0.0)	A (8.2)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	720'	0'	5'	0'	0'	0'	-
Phase 1B								
2024 Background	LOS (Delay)	F (216.3)	A (0.0)	A (8.2)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	765'	0'	5'	0'	0'	0'	-
2024 Build-out	LOS (Delay)	F (225.9)	A (0.0)	A (8.3)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	788'	0'	5'	0'	0'	0'	-
Phase 2								
2025 Background	LOS (Delay)	F (242.7)	A (0.0)	A (8.3)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	828'	0'	5'	0'	0'	0'	-
2025 Build-out	LOS (Delay)	F (266.2)	A (0.0)	A (8.3)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	878'	0'	5'	0'	0'	0'	-
2025 Build-out IMP SBR	LOS (Delay)	F (143.8)	A (0.0)	A (8.3)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	633'	0'	5'	0'	0'	0'	0'
Phase 3 (Full Build)								
2026 Background	LOS (Delay)	F (266.4)	A (0.0)	A (8.3)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	880'	0'	5'	0'	0'	0'	-
2026 Build-out	LOS (Delay)	F (162.4)	A (0.0)	A (8.4)	A (0.0)	A (0.0)	A (0.0)	
	Synchro 95th Q	688'	0'	5'	0'	0'	0'	0'
2031 Build-out +5	LOS (Delay)	F (293.0)	A (0.0)	A (8.6)	A (0.0)	A (0.0)	A (0.0)	
	Sidra 95th Q	1043'	0'	5'	0'	0'	0'	0'
PM Peak Hour								
2022 Existing	LOS (Delay)	F (71.7)	A (8.8)	A (9.0)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	303'	0'	5'	0'	0'	0'	-
Phase 1A								
2023 Background	LOS (Delay)	F (267.5)	A (8.8)	A (9.7)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	725'	0'	5'	0'	0'	0'	-
2023 Build-out	LOS (Delay)	F (254.6)	A (8.8)	A (9.7)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	708'	0'	5'	0'	0'	0'	-
Phase 1B								
2024 Background	LOS (Delay)	F (267.5)	A (8.8)	A (9.7)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	725'	0'	5'	0'	0'	0'	-
2024 Build-out	LOS (Delay)	F (295.4)	A (8.8)	A (9.8)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	783'	0'	5'	0'	0'	0'	-
Phase 2								
2025 Background	LOS (Delay)	F (\$304.9)	A (8.8)	A (9.8)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	793'	0'	5'	0'	0'	0'	-
2025 Build-out	LOS (Delay)	F (\$352.2)	A (8.8)	A (9.9)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	888'	0'	5'	0'	0'	0'	-
2025 Build-out IMP SBR	LOS (Delay)	F (72.0)	A (8.8)	A (9.9)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	390'	0'	5'	0'	0'	0'	0'
Phase 3 (Full Build)								
2026 Background	LOS (Delay)	F (\$338.4)	A (8.8)	A (9.9)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	848'	0'	5'	0'	0'	0'	-
2026 Build-out	LOS (Delay)	F (88.3)	A (8.8)	B (10.0)	A (0.0)	A (7.4)	A (0.0)	
	Synchro 95th Q	448'	0'	5'	0'	0'	0'	0'
2031 Build-out +5	LOS (Delay)	F (191.7)	A (8.9)	B (10.6)	A (0.0)	A (7.5)	A (0.0)	
	Synchro 95th Q	748'	0'	8'	0'	0'	0'	0'

\$ Delay exceeds 300s

*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.

is currently unfunded, future intersection improvements associated with U-6150 were not assumed to be in place in the future year analyses.

2023 Phase 1A

Already operating with long delays, the stop-controlled eastbound approach of Armstrong Road (NC 273) is expected to continue to operate with long delays during both peak hours under 2023 background conditions. When the proposed Phase 1A site traffic is added to the 2023 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2023 background conditions with minimal increases in approach delay; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1A.

2024 Phase 1B

When the proposed Phase 1B site traffic is added to the 2024 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2024 background conditions with relatively minor increases in eastbound approach delay of 4% and 10% during the AM and PM peak hours, respectively; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1B.

2025 Phase 2

Table 6.1 shows that when the proposed Phase 2 site traffic is added to the 2025 background volumes, available gaps for the eastbound approach traffic to be able to turn onto the mainline are further reduced, increasing the eastbound approach delay by 10% and 16% during the AM and PM peak hours, respectively. Given the increase in delay and potential safety impacts caused by limiting available gaps for the minor street traffic, identification of potential mitigation improvements is required. **The following improvement was identified to mitigate the operational and safety impact and accommodate the added site traffic:**

- **Southbound right-turn lane along S Point Road (NC 273) with a minimum of 100' of storage**

Table 6.1 shows that with this improvement in place, the proposed site's traffic impact is shown to be fully mitigated with the delay along the eastbound approach improved beyond 2025 background conditions. Note that the identified storage is based on observation of the maximum SimTraffic queues along with NCDOT minimum storage requirements.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes (along with the Phase 2 improvement identified above), the stop-controlled eastbound approach is expected to operate with less delay than 2026 background conditions (which does not include the turn lane improvement from Phase 2 build). Since the capacity improvements identified in Phase 2 are shown to mitigate the operational impact and accommodate the addition of Phase 3 (full build) site traffic, no additional mitigation improvements are recommended for capacity purposes as part of Phase 3.

6.2 S POINT RD (NC 273) AND HENRY CHAPEL RD/S POINT CHURCH RD

Table 6.2 summarizes the LOS, control delay and 95th percentile queue lengths at the currently unsignalized TWSC intersection of S Point Road (NC 273) and Henry Chapel Road/South Point Church Road.

This intersection is currently unsignalized with TWSC on the eastbound and westbound approaches of South Point Church Road and Henry Chapel Road and operates similar to a tee-intersection. As shown in **Figure 3.4**, the eastbound approach of South Point Church Road serves as a low-volume driveway with only one (1) vehicle observed during both peak hours; therefore, note the LOS and average delay reported for the eastbound approach in **Table 6.2** reflects low volume.

As discussed in **Section 5.1**, Access 1 and Access 2 along Henry Chapel Road are intended to serve as the primary access points for the development, with Access 3 as a secondary access to promote the majority of Henry Chapel residents to utilize Henry Chapel Road and limit the site traffic through the South Hill Estates neighborhood via Access 3. As part of the proposed Henry Chapel development, this intersection is being considered for a potential traffic signal to provide proposed site traffic a safe and efficient means to access S Point Road (NC 273) via Henry Chapel Road. Signal warrant calculations are discussed further in **Section 7.2** and are included in the **Appendix**.

2023 Phase 1A

As shown in **Figures 5.5** and **5.6**, the proposed site is projected to more than triple the westbound approach volume during the AM and PM peak hours. **Table 6.2** shows that when the proposed Phase 1A site traffic is added to the 2023 background volumes, the

Table 6.2 - S Point Road (NC 273) and Henry Chapel Road/S Point Church Road									
Condition	Measure	EB	WB		NB		SB		Intersection LOS (Delay)
		EBLTR	WBLT	WBR	NBL*	NBTR	SBL*	SBTR	
AM Peak Hour									
2022 Existing	LOS (Delay)	B (10.0)	C (16.5)		A (0.0)	A (0.0)	A (9.4)	A (0.0)	-
	Synchro 95th Q	0'	8'	-	0'	0'	0'	0'	
Phase 1A									
2023 Background	LOS (Delay)	B (10.3)	C (17.8)		A (0.0)	A (0.0)	A (9.9)	A (0.0)	-
	Synchro 95th Q	0'	8'	-	0'	0'	0'	0'	
2023 Build-out	LOS (Delay)	B (10.3)	C (24.6)		A (0.0)	A (0.0)	B (10.1)	A (0.0)	-
	Synchro 95th Q	0'	38'	-	0'	0'	3'	0'	
2023 Build-out IMP WBR	LOS (Delay)	B (10.3)	C (21.9)		A (0.0)	A (0.0)	B (10.1)	A (0.0)	-
	Synchro 95th Q	0'	5'	28'	0'	0'	0'	0'	
Phase 1B									
2024 Background	LOS (Delay)	B (10.3)	C (18.2)		A (0.0)	A (0.0)	A (10.0)	A (0.0)	-
	Synchro 95th Q	0'	8'	-	0'	0'	0'	0'	
2024 Build-out	LOS (Delay)	B (10.3)	D (27.7)		A (0.0)	A (0.0)	B (10.3)	A (0.0)	-
	Synchro 95th Q	0'	13'	60'	0'	0'	5'	0'	
2024 Build-out IMP SBL	LOS (Delay)	B (10.3)	D (27.6)		A (0.0)	A (0.0)	B (10.3)	A (0.0)	-
	Synchro 95th Q	0'	10'	60'	0'	0'	5'	0'	
Phase 2									
2025 Background	LOS (Delay)	B (10.4)	C (18.7)		A (0.0)	A (0.0)	B (10.1)	A (0.0)	-
	Synchro 95th Q	0'	8'	-	0'	0'	0'	0'	
2025 Build-out	LOS (Delay)	B (10.4)	E (37.7)		A (0.0)	A (0.0)	B (10.6)	A (0.0)	-
	Synchro 95th Q	0'	25'	100'	0'	0'	8'	0'	
2025 Build-out IMP Signal	LOS (Delay)	C (35.0)	D (35.5)		B (17.7)		A (7.0)		B (17.1)
	Synchro 95th Q	5'	39'	161'	595'		79'	69'	
Phase 3 (Full Build)									
2026 Background	LOS (Delay)	B (10.5)	C (19.1)		A (0.0)	A (0.0)	B (10.2)	A (0.0)	-
	Synchro 95th Q	0'	8'	-	0'	0'	0'	0'	
2026 Build-out	LOS (Delay)	D (37.0)	D (37.3)		C (21.3)		A (8.8)		C (20.2)
	Synchro 95th Q	5'	47'	183'	#669'		87'	71'	
2031 Build-out +5	LOS (Delay)	D (37.0)	D (42.6)		C (26.9)		A (8.7)		C (24.0)
	Synchro 95th Q	5'	47'	188'	#884'		89'	84'	
PM Peak Hour									
2022 Existing	LOS (Delay)	E (38.6)	C (18.5)		A (0.0)	A (0.0)	A (8.8)	A (0.0)	-
	Synchro 95th Q	3'	10'	-	0'	0'	5'	0'	
Phase 1A									
2023 Background	LOS (Delay)	F (56.5)	C (23.0)		A (0.0)	A (0.0)	A (9.2)	A (0.0)	-
	Synchro 95th Q	0'	10'	-	0'	0'	3'	0'	
2023 Build-out	LOS (Delay)	F (95.2)	D (32.3)		A (0.0)	A (0.0)	A (9.7)	A (0.0)	-
	Synchro 95th Q	3'	43'	-	0'	0'	10'	0'	
2023 Build-out IMP WBR	LOS (Delay)	F (95.2)	D (26.0)		A (0.0)	A (0.0)	A (9.7)	A (0.0)	-
	Synchro 95th Q	3'	18'	15'	0'	0'	10'	0'	
Phase 1B									
2024 Background	LOS (Delay)	F (58.8)	C (23.7)		A (0.0)	A (0.0)	A (9.3)	A (0.0)	-
	Synchro 95th Q	3'	13'	-	0'	0'	3'	0'	
2024 Build-out	LOS (Delay)	F (177.2)	E (38.6)		A (0.0)	A (0.0)	B (10.3)	A (0.0)	-
	Synchro 95th Q	5'	40'	28'	0'	0'	20'	0'	
2024 Build-out IMP SBL	LOS (Delay)	F (144.0)	D (33.0)		A (0.0)	A (0.0)	B (10.3)	A (0.0)	-
	Synchro 95th Q	3'	33'	28'	0'	0'	20'	0'	
Phase 2									
2025 Background	LOS (Delay)	F (63.2)	C (24.8)		A (0.0)	A (0.0)	A (9.4)	A (0.0)	-
	Synchro 95th Q	3'	13'	-	0'	0'	3'	0'	
2025 Build-out	LOS (Delay)	F (246.2)	F (55.7)		A (0.0)	A (0.0)	B (11.0)	A (0.0)	-
	Synchro 95th Q	5'	63'	43'	0'	0'	28'	0'	
2025 Build-out IMP Signal	LOS (Delay)	D (36.0)	C (24.1)		C (21.0)		A (9.8)		B (15.2)
	Synchro 95th Q	5'	35'	107'	502'		#220'	233'	
Phase 3 (Full Build)									
2026 Background	LOS (Delay)	F (67.2)	D (25.8)		A (0.0)	A (0.0)	A (9.5)	A (0.0)	-
	Synchro 95th Q	3'	13'	-	0'	0'	3'	0'	
2026 Build-out	LOS (Delay)	D (36.0)	C (26.4)		C (21.3)		B (11.6)		B (16.5)
	Synchro 95th Q	5'	42'	120'	#536'		#271'	242'	
2031 Build-out +5	LOS (Delay)	D (37.0)	C (26.9)		C (30.4)		B (14.0)		C (21.3)
	Sidra 95th Q	5'	43'	123'	#737'		#280'	325'	

95th percentile volume exceeds capacity, queue may be longer

*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.

westbound approach of Henry Chapel Road is expected to drop from LOS C to LOS D with a 40% increase in delay during the PM peak hour. Given the LOS degradation and increased delay, identification of potential mitigation improvements is required. **The following improvement was identified to potentially mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Westbound right-turn lane along Henry Chapel Road with a minimum of 100' of storage**

Table 6.2 shows that with this improvement in place, the westbound approach of Henry Chapel Road is expected to operate similar to 2023 background conditions. Note that the identified storage is based on observation of the maximum SimTraffic queues along with NCDOT minimum storage requirements.

Also note that as shown in **Section 7.2**, a traffic signal is not warranted at this intersection under 2023 Phase 1A build-out conditions.

2024 Phase 1B

Table 6.2 shows that when the proposed Phase 1B site traffic is added to the 2024 background volumes (along with the Phase 1A improvement identified above), the westbound approach of Henry Chapel Road is expected to drop from LOS C to LOS D during the AM peak hour and LOS C to LOS E during the PM peak hour. Given the LOS degradation and increased delay, identification of potential mitigation improvements is required. **The following improvement was identified to potentially mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Southbound left-turn lane along S Point Road (NC 273) with a minimum of 100' of storage**

As shown in **Section 7.2**, a traffic signal is not warranted at this intersection under 2024 Phase 1B build-out conditions. As shown in **Figures 5.7** and **5.8**, the proposed site is projected to significantly increase the southbound left-turn volume (adding 130 vehicles to the 28 background vehicles during the PM peak hour). Based on review of the figure titled 'Warrant for Left and Right-Turn Lanes' found on page 80 in the [NCDOT Policy on Street and Driveway Access to North Carolina Highways](#), typically used as a safety evaluation for mainline turning movements at unsignalized intersections, a southbound left-turn lane is warranted with 100 feet of storage (included in the **Appendix**). Therefore, this improvement is identified as both a safety and capacity improvement under 2024 Phase 1B build-out conditions.

2025 Phase 2

Table 6.2 shows that when the proposed Phase 2 site traffic is added to the 2025 background volumes (along with the Phase 1A and Phase 1B improvements identified above), the westbound approach of Henry Chapel Road is expected to drop from LOS C to LOS E during the AM peak hour and LOS C to LOS F during the PM peak hour. Given the LOS degradation and increased delay, identification of potential mitigation improvements is required. **The following improvements were identified to potentially mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Installation of a traffic signal with the following phasing:**
 - **Protected phasing for the southbound left-turn movement**
 - **Permitted/overlap phasing for the westbound right-turn movement**
- **Extension of the westbound right-turn storage along Henry Chapel Road from 100' to 175'**
- **Extension of the southbound left-turn storage along S Point Road (NC 273) from 100' to 225'**

Note that Access 3 is proposed to be introduced in 2025 Phase 2, which is planned to serve as an extension of Timber Ridge Road, providing indirect access to S Point Road (NC 273) through the South Hill Estates neighborhood. As previously discussed, the S Point Road (NC 273)/Henry Chapel Road intersection is proposed to be signalized to promote Access 1 and Access 2 (along Henry Chapel Road) as the primary access points and Access 3 as the secondary access. As shown in **Section 7.2**, a traffic signal is warranted under 2025 Phase 2 build-out conditions.

Table 6.2 shows that with these improvements in place, the overall intersection is expected to operate at LOS B during both peak hours, while the westbound approach delay is improved and the mainline northbound/southbound approaches are expected to operate acceptably at LOS C or better during both peak hours. Note that the identified turn lane storage extensions are based on Synchro 95th percentile queues.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes (along with the signalization and turn-lane improvements identified above in previous phases), the overall intersection and all approaches are expected to continue to operate acceptably with the overall intersection and mainline approaches at LOS C or better and the side-street approaches at LOS D or better during both peak hours. Since the capacity improvements identified in Phase 2 are shown to mitigate the operational impact and accommodate the addition of Phase 3 (full build) site traffic, no additional mitigation improvements are recommended for capacity purposes as part of Phase 3. However, **based on review of the Synchro 95th percentile queues, the following turn lane extensions are identified for mitigation of Phase 3 site traffic:**

- **Extension of the westbound right-turn storage along Henry Chapel Road from 175' to 200'**
- **Extension of the southbound left-turn storage along S Point Road (NC 273) from 225' to 275'**

The full turn lane storage lengths identified for Phase 3 should be considered for installation as part of the applicable Phase 1A, Phase 1B or Phase 2 improvements to potentially avoid multiple phases of construction impacts.

6.3 S POINT ROAD (NC 273) AND FOREST HILL ROAD

Table 6.3 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized TWSC intersection of S Point Road (NC 273) and Forest Hill Road.

This intersection is currently unsignalized with TWSC on the eastbound and westbound approaches of BB Drive and Forest Hill Road and operates similar to a tee-intersection. The eastbound approach of BB Drive is not platted and serves as a low-volume, residential driveway with only four (4) vehicles observed during both peak hours as shown in **Figure 3.4**. Therefore, note the LOS and average delay reported for the eastbound approach in **Table 6.3** reflects low volume.

As discussed in **Section 5.1**, Access 3 is proposed to be constructed as part of Phase 2 and serve as an extension of Timber Ridge Road, providing indirect access to S Point Road (NC 273) at Forest Hill Road through the South Hill Estates neighborhood. This access is intended to serve as the secondary access to limit the amount of proposed site traffic through this neighborhood.

2023 Phase 1A

When the proposed Phase 1A site traffic is added to the 2023 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2023 background conditions with minimal increases in approach delay; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1A.

2024 Phase 1B

When the proposed Phase 1B site traffic is added to the 2024 background volumes, the westbound approach is expected to increase in delay and drop from LOS D to LOS E during the AM peak hour and from LOS C to LOS D during the PM peak hour.

Table 6.3 - S Point Road (NC 273) and Forest Hill Road							
Condition	Measure	EB	WB	NB		SB	
		EBLTR	WBLTR	NBL*	NBTR	SBL*	SBTR
AM Peak Hour							
2022 Existing	LOS (Delay)	E (47.3)	D (25.3)	A (0.0)	A (0.0)	B (10.4)	A (0.0)
	Synchro 95th Q	8'	18'	0'	0'	3'	0'
Phase 1A							
2023 Background	LOS (Delay)	F (52.6)	D (28.3)	A (0.0)	A (0.0)	B (10.9)	A (0.0)
	Synchro 95th Q	5'	13'	0'	0'	0'	0'
2023 Build-out	LOS (Delay)	F (60.7)	D (31.7)	A (0.0)	A (0.0)	B (11.2)	A (0.0)
	Synchro 95th Q	5'	15'	0'	0'	0'	0'
Phase 1B							
2024 Background	LOS (Delay)	F (56.0)	D (29.4)	A (0.0)	A (0.0)	B (11.0)	A (0.0)
	Synchro 95th Q	5'	15'	0'	0'	0'	0'
2024 Build-out	LOS (Delay)	F (74.8)	E (36.7)	A (0.0)	A (0.0)	B (11.7)	A (0.0)
	Synchro 95th Q	5'	18'	0'	0'	0'	0'
Phase 2							
2025 Background	LOS (Delay)	F (60.7)	D (31.0)	A (0.0)	A (0.0)	B (11.2)	A (0.0)
	Synchro 95th Q	5'	15'	0'	0'	0'	0'
2025 Build-out	LOS (Delay)	F (156.4)	F (50.1)	A (0.0)	A (0.0)	B (12.4)	A (0.0)
	Synchro 95th Q	13'	60'	0'	0'	5'	0'
2025 Build-out IMP Left-over + SBL	LOS (Delay)	B (11.4)	E (38.2)	A (0.0)	A (0.0)	B (12.4)	A (0.0)
	Synchro 95th Q	0'	48'	0'	0'	5'	0'
Phase 3 (Full Build)							
2026 Background	LOS (Delay)	F (64.4)	D (34.2)	A (0.0)	A (0.0)	B (11.3)	A (0.0)
	Synchro 95th Q	5'	18'	0'	0'	0'	0'
2026 Build-out	LOS (Delay)	B (11.6)	F (71.7)	A (0.0)	A (0.0)	B (13.1)	A (0.0)
	Synchro 95th Q	0'	120'	0'	0'	8'	0'
2031 Build-out +5	LOS (Delay)	B (12.2)	F (130.8)	A (0.0)	A (0.0)	B (14.5)	A (0.0)
	Synchro 95th Q	0'	168'	0'	0'	8'	0'
PM Peak Hour							
2022 Existing	LOS (Delay)	F (54.3)	C (21.1)	A (0.0)	A (0.0)	A (9.0)	A (0.0)
	Synchro 95th Q	8'	8'	0'	0'	3'	0'
Phase 1A							
2023 Background	LOS (Delay)	F (83.9)	C (22.5)	A (0.0)	A (0.0)	A (9.6)	A (0.0)
	Synchro 95th Q	8'	3'	0'	0'	3'	0'
2023 Build-out	LOS (Delay)	F (106.0)	C (24.9)	A (0.0)	A (0.0)	A (9.8)	A (0.0)
	Synchro 95th Q	8'	5'	0'	0'	3'	0'
Phase 1B							
2024 Background	LOS (Delay)	F (91.5)	C (23.2)	A (0.0)	A (0.0)	A (9.7)	A (0.0)
	Synchro 95th Q	8'	5'	0'	0'	3'	0'
2024 Build-out	LOS (Delay)	F (139.7)	D (29.0)	A (0.0)	A (0.0)	B (10.1)	A (0.0)
	Synchro 95th Q	10'	5'	0'	0'	3'	0'
Phase 2							
2025 Background	LOS (Delay)	F (100.6)	C (23.6)	A (0.0)	A (0.0)	A (9.8)	A (0.0)
	Synchro 95th Q	8'	5'	0'	0'	3'	0'
2025 Build-out	LOS (Delay)	F (\$387.9)	D (27.4)	A (0.0)	A (0.0)	B (10.8)	A (0.0)
	Synchro 95th Q	23'	20'	0'	0'	10'	0'
2025 Build-out IMP Left-over + SBL	LOS (Delay)	C (22.9)	C (19.4)	A (0.0)	A (0.0)	B (10.8)	A (0.0)
	Synchro 95th Q	3'	13'	0'	0'	10'	0'
Phase 3 (Full Build)							
2026 Background	LOS (Delay)	F (108.8)	C (24.6)	A (0.0)	A (0.0)	A (9.9)	A (0.0)
	Synchro 95th Q	10'	5'	0'	0'	3'	0'
2026 Build-out	LOS (Delay)	C (24.3)	C (22.9)	A (0.0)	A (0.0)	B (11.7)	A (0.0)
	Synchro 95th Q	3'	28'	0'	0'	18'	0'
2031 Build-out +5	LOS (Delay)	D (28.9)	D (28.2)	A (0.0)	A (0.0)	B (12.8)	A (0.0)
	Sidra 95th Q	3'	38'	0'	0'	23'	0'

\$ Delay exceeds 300s

*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.

As shown in **Figures 5.7** and **5.8**, the westbound approach serves relatively low volume during both peak hours (25 AM and 9 PM vehicles) prior to the construction of Access 3 in Phase 2. Given the low volumes under 2024 Phase 1B and based on review of the analysis, the addition of turn lanes provides minimal operational benefit; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1B.

2025 Phase 2

Access 3 is proposed to be constructed as part of Phase 2 and serve as an extension of Timber Ridge Road, providing indirect access to S Point Road (NC 273) at Forest Hill Road through the South Hill Estates neighborhood, as evidenced in **Figures 5.9** and **5.10** where proposed site traffic is added to the westbound right- and southbound left-turn movements. As discussed in **Section 5.1**, this access is intended to serve as a secondary access by modifying the Forest Hill Road intersection at S Point Road (NC 273) to an unsignalized, left-over configuration and locating a potential traffic signal further south at Henry Chapel Road. The intent of this access configuration would be to promote the majority of proposed site traffic to utilize the potential signalized, full-movement access to/from S Point Road (NC 273) at Henry Chapel Road rather than Forest Hill Road and Access 3.

Table 6.3 shows that when the proposed Phase 2 site traffic is added to the 2025 background volumes, the westbound approach of Henry Chapel Road is expected to drop from LOS D to LOS F during the AM peak hour and LOS C to LOS D during the PM peak hour. Based on the access discussion above along with the LOS degradation, the following improvement was identified to **potentially mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Access modification to provide southbound and northbound left-over access, restricting side-street left-turn and through movements**
- **Southbound left-turn lane along S Point Road (NC 273) with a minimum of 100' of storage**

Table 6.3 shows that with this improvement in place, the westbound approach of Forest Hill Road is expected to operate similar to 2025 background conditions. As shown in **Figures 5.9** and **5.10**, the proposed site is projected to significantly increase the southbound left-turn volume (adding 52 vehicles to the 15 background vehicles during the PM peak hour). Based on review of the figure titled 'Warrant for Left and Right-Turn Lanes' found on page 80 in the [NCDOT Policy on Street and Driveway Access to North Carolina Highways](#), typically used as a safety evaluation for mainline turning movements at unsignalized intersections, a southbound left-turn lane is warranted with 100 feet of storage. Therefore, this improvement is identified as both a safety and capacity improvement under 2025 Phase 2 build conditions.

2026 Phase 3 (Full Build)

Table 6.3 shows that when the proposed Phase 3 site traffic is added to the 2026 background volumes (along with the Phase 2 improvements identified above), the westbound approach of Forest Hill Road is expected to operate with long delays during the AM peak hour and continue operating with moderate delays during the PM peak hour. Given the intent to promote proposed Access 3 (via the South Hill Estates neighborhood) as the secondary access for the proposed Henry Chapel development, additional mitigation improvements to this intersection are not suggested. As regular commuters, if Henry Chapel residents experience long delays to access S Point Road (NC 273) during the AM peak hour as shown in **Table 6.3**, alternative access via Henry Chapel Road will be promoted, thus reducing site traffic through this neighborhood. As shown in **Section 6.2**, signalization of the Henry Chapel Road access to S Point Road (NC 273) is expected to provide a safe and efficient means to exit the proposed site. Given this, no additional mitigation improvements are recommended at this intersection for capacity purposes as part of Phase 3.

6.4 FOREST HILL ROAD AND COLONIAL DRIVE

Table 6.4 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized tee-intersection of Forest Hill Road and Colonial Drive.

2023 Phase 1A

When the proposed Phase 1A site traffic is added to the 2023 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2023 background conditions with no increases in approach delay. Note that no proposed site traffic is added to this intersection ahead of proposed Access 3 being constructed in 2025; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1A.

2024 Phase 1B

When the proposed Phase 1B site traffic is added to the 2024 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2024 background conditions with no increases in approach delay. Note that no proposed site traffic is added to this intersection ahead of proposed Access 3 being constructed in 2025; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1B.

2025 Phase 2

When the proposed Phase 2 site traffic is added to the 2025 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2025 background conditions with minimal increases in approach delay; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 2.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2026 background conditions with minimal increases in approach delay; therefore, **no mitigation improvements are recommended for the proposed Henry Chapel Residential Development.**

*Henry Chapel Residential Development
Transportation Impact Analysis Update*

Table 6.4 - Forest Hill Road and Colonial Drive					
Condition	Measure	EB	WB		NB
		EBTR	WBL*	WBT	NBLR
AM Peak Hour					
2022 Existing	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	3'
Phase 1A					
2023 Background	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	3'
2023 Build-out	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	3'
Phase 1B					
2024 Background	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	3'
2024 Build-out	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	3'
Phase 2					
2025 Background	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	3'
2025 Build-out	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.9)
	Synchro 95th Q	0'	0'	0'	5'
Phase 3 (Full Build)					
2026 Background	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	3'
2026 Build-out	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (9.2)
	Synchro 95th Q	0'	0'	0'	10'
2031 Build-out +5	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (9.3)
	Synchro 95th Q	0'	0'	0'	10'
PM Peak Hour					
2022 Existing	LOS (Delay)	A (0.0)	A (7.3)	A (0.0)	A (8.8)
	Synchro 95th Q	0'	0'	0'	3'
Phase 1A					
2023 Background	LOS (Delay)	A (0.0)	A (7.2)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	0'
2023 Build-out	LOS (Delay)	A (0.0)	A (7.2)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	0'
Phase 1B					
2024 Background	LOS (Delay)	A (0.0)	A (7.2)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	0'
2024 Build-out	LOS (Delay)	A (0.0)	A (7.2)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	0'
Phase 2					
2025 Background	LOS (Delay)	A (0.0)	A (7.2)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	0'
2025 Build-out	LOS (Delay)	A (0.0)	A (7.4)	A (0.0)	A (9.0)
	Synchro 95th Q	0'	0'	0'	3'
Phase 3 (Full Build)					
2026 Background	LOS (Delay)	A (0.0)	A (7.2)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	0'
2026 Build-out	LOS (Delay)	A (0.0)	A (7.5)	A (0.0)	A (9.4)
	Synchro 95th Q	0'	0'	0'	8'
2031 Build-out +5	LOS (Delay)	A (0.0)	A (7.5)	A (0.0)	A (9.4)
	Sidra 95th Q	0'	0'	0'	8'
*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.					

*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.

6.5 COLONIAL DRIVE AND TIMBER RIDGE ROAD/ACCESS 3

Table 6.5 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized tee-intersection of Colonial Drive and Timber Ridge Road. Note that Timber Ridge Road currently stubs for a future connection to the east, where it is proposed to serve as Access 3 upon 2025 Phase 2 build-out conditions.

2023 Phase 1A

When the proposed Phase 1A site traffic is added to the 2023 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2023 background conditions with no increases in approach delay. Note that no proposed site traffic is added to this intersection ahead of proposed Access 3 being constructed in 2025; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1A.

2024 Phase 1B

When the proposed Phase 1B site traffic is added to the 2024 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2024 background conditions with no increases in approach delay. Note that no proposed site traffic is added to this intersection ahead of proposed Access 3 being constructed in 2025; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1B.

2025 Phase 2

When Timber Ridge Road is extended to the east to serve as proposed Access 3 and the proposed Phase 2 site traffic is added to the 2025 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2025 background conditions with minimal increases in approach delay; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 2.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2026 background conditions with minimal increases in approach delay; therefore, **no mitigation improvements are recommended at this intersection for the proposed Henry Chapel Residential Development.**

Table 6.5 - Colonial Drive and Timber Ridge Road/Access 3					
Condition	Measure	WB	NB	SB	
		WBLR	NBTR	SBL*	SBT
AM Peak Hour					
2022 Existing	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 1A					
2023 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2023 Build-out	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 1B					
2024 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2024 Build-out	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 2					
2025 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2025 Build-out	LOS (Delay)	A (8.6)	A (0.0)	A (7.3)	A (0.0)
	Synchro 95th Q	5'	0'	0'	0'
Phase 3 (Full Build)					
2026 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2026 Build-out	LOS (Delay)	A (8.7)	A (0.0)	A (7.3)	A (0.0)
	Synchro 95th Q	8'	0'	3'	0'
2031 Build-out +5	LOS (Delay)	A (8.8)	A (0.0)	A (7.3)	A (0.0)
	Synchro 95th Q	8'	0'	3'	0'
PM Peak Hour					
2022 Existing	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 1A					
2023 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2023 Build-out	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 1B					
2024 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2024 Build-out	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 2					
2025 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2025 Build-out	LOS (Delay)	A (8.5)	A (0.0)	A (7.3)	A (0.0)
	Synchro 95th Q	3'	0'	3'	0'
Phase 3 (Full Build)					
2026 Background	LOS (Delay)	A (8.4)	A (0.0)	A (7.2)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
2026 Build-out	LOS (Delay)	A (8.6)	A (0.0)	A (7.4)	A (0.0)
	Synchro 95th Q	5'	0'	5'	0'
2031 Build-out +5	LOS (Delay)	A (8.6)	A (0.0)	A (7.4)	A (0.0)
	Sidra 95th Q	5'	0'	5'	0'
*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.					

*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.

6.6 S POINT RD (NC 273) AND BELMONT MIDDLE SCHOOL/BELWOOD DR

Note that the Belmont Middle School driveway and Belwood Drive are currently offset by less than 100 feet along S Point Road (NC 273). As discussed in **Section 4.2**, Belwood Drive is required to be realigned to tie into the existing traffic signal at Belmont Middle School as mitigation for the approved Smith Farm residential development. Therefore, the two (2) intersections were studied as separate tee-intersections under existing conditions, but assumed to be realigned and evaluated as a single four (4)-legged intersection under all future-year conditions.

Tables 6.6A and **6.6B** summarize the LOS, control delay and 95th percentile queue lengths under 2022 existing conditions at the existing unsignalized tee-intersection of S Point Road (NC 273)/Belwood Drive and signalized tee-intersection of S Point Road (NC 273)/Belmont Middle School, respectively.

Table 6.6A - S Point Rd (NC 273) and Belwood Dr (2022 Existing)					
Condition	Measure	WB	NB	SB	
		WBLR	NBTR	SBL*	SBT
AM Peak Hour					
2022 Existing	LOS (Delay)	C (17.8)	A (0.0)	A (9.9)	A (0.0)
	Synchro 95th Q	10'	0'	3'	0'
PM Peak Hour					
2022 Existing	LOS (Delay)	C (22.5)	A (0.0)	A (9.5)	A (0.0)
	Synchro 95th Q	13'	0'	3'	0'

*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.

Table 6.6B - S Point Rd (NC 273) and Belmont Middle School (2022 Existing)								
Condition	Measure	EB		NB		SB		Intersection
		EBL	EBR	NBL	NBT	SBT	SBR	LOS (Delay)
AM Peak Hour								
2022 Existing	LOS (Delay)	C (28.9)		B (17.4)		B (13.2)		B (18.1)
	Synchro 95th Q	194'	31'	35'	371'	247'	48'	
PM Peak Hour								
2022 Existing	LOS (Delay)	C (30.1)		A (3.0)		A (6.1)		A (5.1)
	Synchro 95th Q	28'	3'	0'	156'	449'	2'	
Existing Storage			175'	200'			200'	

Table 6.6 on the following page summarizes the LOS, control delay and 95th percentile queue lengths under future-year conditions at the realigned, four (4)-legged signalized intersection of S Point Road (NC 273) and Belmont Middle School/Belwood Drive. As shown in **Section 4.2**, a southbound left-turn lane with 100 feet of storage is also required as mitigation of the approved Smith Farm development in addition to the realignment of Belwood Drive. These mitigation improvements are reflected in all future-year conditions analyses summarized below.

Table 6.6 - S Point Road (NC 273) and Belmont Middle School/Belwood Drive										
Condition	Measure	EB		WB	NB		SB			Intersection
		EBLT	EBR	WBLTR	NBL	NBTR	SBL	SBT	SBR	LOS (Delay)
AM Peak Hour										
Phase 1A										
2023 Background	LOS (Delay)	D (42.7)		D (50.6)	C (30.7)		B (19.9)			C (28.9)
	Synchro 95th Q	#317'	40'	66'	132'	743'	34'	390'	122'	
2023 Build-out	LOS (Delay)	D (45.4)		D (53.1)	C (33.3)		B (19.7)			C (30.4)
	Synchro 95th Q	#317'	41'	66'	136'	#929'	38'	414'	122'	
Phase 1B										
2024 Background	LOS (Delay)	D (45.6)		D (52.4)	C (30.3)		B (19.5)			C (29.0)
	Synchro 95th Q	#329'	40'	67'	133'	776'	36'	406'	129'	
2024 Build-out	LOS (Delay)	D (51.2)		E (56.8)	D (35.5)		C (21.2)			C (32.9)
	Synchro 95th Q	#329'	42'	67'	141'	#1050'	43'	455'	129'	
Phase 2										
2025 Background	LOS (Delay)	D (47.2)		D (53.5)	C (31.4)		B (19.8)			C (29.8)
	Synchro 95th Q	#341'	40'	67'	135'	#838'	37'	424'	132'	
2025 Build-out	LOS (Delay)	E (58.5)		E (59.1)	D (43.7)		C (21.5)			D (38.0)
	Synchro 95th Q	#341'	43'	67'	150'	#1229'	#51'	514'	132'	
2025 Build-out IMP Dual NBT + SBT	LOS (Delay)	C (30.3)		D (39.7)	C (20.1)		C (21.0)			C (22.1)
	Synchro 95th Q	252'	26'	60'	126'	368'	36'	230'	147'	
Phase 3 (Full Build)										
2026 Background	LOS (Delay)	D (48.6)		D (54.6)	C (32.5)		C (20.3)			C (30.8)
	Synchro 95th Q	#357'	41'	69'	137'	#921'	43'	445'	141'	
2026 Build-out	LOS (Delay)	C (31.7)		D (39.9)	C (20.8)		C (20.9)			C (22.5)
	Synchro 95th Q	259'	28'	59'	128'	385'	38'	231'	147'	
2031 Build-out +5	LOS (Delay)	C (34.3)		D (43.7)	C (23.5)		C (23.8)			C (25.3)
	Synchro 95th Q	#332'	33'	64'	143'	443'	42'	261'	168'	
PM Peak Hour										
Phase 1A										
2023 Background	LOS (Delay)	D (49.2)		D (49.5)	A (8.7)		B (14.7)			B (13.2)
	Synchro 95th Q	50'	11'	65'	10'	448'	33'	#1085'	4'	
2023 Build-out	LOS (Delay)	D (50.2)		D (53.5)	A (8.7)		B (18.6)			B (15.5)
	Synchro 95th Q	50'	19'	65'	15'	493'	33'	#1202'	4'	
Phase 1B										
2024 Background	LOS (Delay)	D (49.9)		D (50.1)	A (8.8)		B (15.1)			B (13.5)
	Synchro 95th Q	52'	11'	65'	10'	469'	33'	#1124'	4'	
2024 Build-out	LOS (Delay)	D (51.4)		E (55.8)	A (9.7)		C (21.7)			B (17.6)
	Synchro 95th Q	52'	23'	65'	21'	564'	34'	#1346'	4'	
Phase 2										
2025 Background	LOS (Delay)	D (50.9)		D (51.8)	A (9.0)		B (15.5)			B (13.9)
	Synchro 95th Q	52'	11'	67'	10'	494'	34'	#1165'	4'	
2025 Build-out	LOS (Delay)	D (52.0)		E (57.5)	B (11.3)		D (35.1)			C (25.7)
	Synchro 95th Q	53'	31'	67'	28'	701'	37'	#1568'	4'	
2025 Build-out IMP Dual NBT + SBT	LOS (Delay)	C (32.7)		D (36.7)	A (7.3)		B (12.6)			B (11.1)
	Synchro 95th Q	45'	24'	56'	24'	210'	38'	428'	5'	
Phase 3 (Full Build)										
2026 Background	LOS (Delay)	D (51.8)		D (52.8)	A (9.3)		B (16.1)			B (14.3)
	Synchro 95th Q	54'	11'	67'	10'	521'	35'	#1204'	4'	
2026 Build-out	LOS (Delay)	D (35.5)		D (40.5)	A (6.5)		B (13.8)			B (11.6)
	Synchro 95th Q	47'	30'	57'	27'	205'	37'	450'	5'	
2031 Build-out +5	LOS (Delay)	D (41.1)		D (45.9)	A (6.4)		B (13.7)			B (11.5)
	Synchro 95th Q	54'	35'	67'	30'	236'	40'	525'	5'	
Background Storage			175'		200'		100'		200'	

95th percentile volume exceeds capacity, queue may be longer.

2023 Phase 1A

When the proposed Phase 1A site traffic is added to the 2023 background volumes, this intersection is expected to continue to operate at LOS C during the AM peak hour and LOS B during the PM peak hour with minimal increases in approach delay as compared to 2023 background conditions; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1A.

2024 Phase 1B

When the proposed Phase 1B site traffic is added to the 2024 background volumes, this intersection is expected to continue to operate at LOS C during the AM peak hour and LOS B during the PM peak hour with minimal increases in approach delay as compared to 2023 background conditions. Note that the LOS degradations shown for multiple approaches are each a result of the LOS demarcations (LOS B/C demarcation at 20 seconds, LOS C/D demarcation at 35 seconds, and LOS D/E demarcation at 55 seconds). In each instance, the LOS degradation is a result of the site traffic pushing the approach delay just beyond (less than two (2) seconds) these demarcations; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1B.

2025 Phase 2

Table 6.6 shows that when the proposed Phase 2 site traffic is added to the 2025 background volumes, the overall intersection is expected to drop from LOS C to LOS D during the AM peak hour and drop from LOS B to LOS C during the PM peak hour with LOS degradations for all approaches during the AM peak hour and all approaches with the exception of the eastbound approach during the PM peak hour. Note that the site is expected to particularly impact the approaches that currently serve the heaviest volumes; the northbound approach that serves over 1,100 vehicles during the AM peak hour is projected to drop in LOS with a significant increase in queuing, whereas the southbound approach that serves over 1,300 vehicles during the PM peak hour is projected to more than double the average delay per vehicle and drop two (2) LOS grades with a significant increase in queuing. Currently only being served by a single through lane along S Point Road (NC 273), severe congestion can build up along the corridor as the maximum available green time for the mainline is not able to fully serve the vehicular demand during a given cycle. As shown in the **Appendix**, Synchro is reporting that the volume is exceeding capacity for both of these approaches, and therefore the queue is theoretically infinite (note that this is shown in 2025 build conditions and not in 2025 background conditions). Given the increased delay, LOS degradation and queueing impacts, identification of potential mitigation improvements is required.

With the mitigation improvements added as part of the approved Smith Farm development, turn lanes are already provided along all approaches where significant volume is seen (minimal northbound right-turn volume and low westbound approach volume). Therefore, any improvement options that would provide measurable mitigation would require additional through lanes (or receiving lanes) along S Point Road (NC 273) – dual eastbound left-turn lanes, dual northbound through lanes, and/or dual southbound through lanes.

The capacity deficiencies along this corridor are further evidenced based on review of the volume to capacity (v/c) ratios, in which the northbound through movement is shown to project a 0.99 v/c during the AM peak hour and a 1.10 v/c for the southbound through movement during the PM peak hour (based on HCM 6th Edition). A v/c ratio of greater than 1.0 is considered over capacity. The volume, LOS/delay, and v/c ratios for these approaches support the need for additional through lanes along S Point Road (NC 273) to significantly improve operations at this intersection and along this corridor. Three (3) potential mitigation options were each initially evaluated in isolation:

1. Dual eastbound left-turn lanes exiting Belmont Middle School
2. Dual northbound through lanes along S Point Road (NC 273)
3. Dual southbound through lanes along S Point Road (NC 273)

Table 6.6C below summarizes the LOS, control delay and 95th percentile queue lengths for each of these three (3) potential mitigation options in isolation under 2025 Phase 2 build-out conditions. These options were included in a separate table given the limited space available to provide these options in **Table 6.6**.

Table 6.6C - Phase 2 Individual Mitigation Options										
Condition	Measure	EB		WB	NB		SB			Intersection
		EBLT	EBR	WBLTR	NBL	NBTR	SBL	SBT	SBR	LOS (Delay)
AM Peak Hour										
Phase 2										
2025 Background	LOS (Delay)	D (47.2)		D (53.5)	C (31.4)		B (19.8)			C (29.8)
	Synchro 95th Q	#341'	40'	67'	135'	#838'	37'	424'	132'	
2025 Build-out	LOS (Delay)	E (58.5)		E (59.1)	D (43.7)		C (21.5)			D (38.0)
	Synchro 95th Q	#341'	43'	67'	150'	#1229'	#51'	514'	132'	
2025 Build-out IMP Opt 1 - Dual EBLs	LOS (Delay)	E (58.5)		D (54.9)	C (28.7)		B (16.3)			C (28.6)
	Synchro 95th Q	#223'	50'	67'	147'	#1080'	40'	432'	141'	
2025 Build-out IMP Opt 2 - Dual NTBs	LOS (Delay)	D (41.7)		D (50.8)	B (18.9)		C (25.0)			C (24.6)
	Synchro 95th Q	-	42'	67'	#154'	347'	32'	522'	128'	
2025 Build-out IMP Opt 3 - Dual SBTs	LOS (Delay)	E (72.3)		E (60.6)	D (45.3)		B (15.3)			D (38.4)
	Synchro 95th Q	-	48'	67'	#169'	#1167'	44'	182'	124'	
2025 Build-out IMP Dual NBT + SBT	LOS (Delay)	C (30.3)		D (39.7)	C (20.1)		C (21.0)			C (22.1)
	Synchro 95th Q	252'	26'	60'	126'	368'	36'	230'	147'	
PM Peak Hour										
Phase 2										
2025 Background	LOS (Delay)	D (50.9)		D (51.8)	A (9.0)		B (15.5)			B (13.9)
	Synchro 95th Q	52'	11'	67'	10'	494'	34'	#1165'	4'	
2025 Build-out	LOS (Delay)	D (52.0)		E (57.5)	B (11.3)		D (35.1)			C (25.7)
	Synchro 95th Q	53'	31'	67'	28'	701'	37'	#1568'	4'	
2025 Build-out IMP Opt 1 - Dual EBLs	LOS (Delay)	D (50.4)		E (57.5)	B (11.3)		D (35.0)			C (25.7)
	Synchro 95th Q	34'	31'	67'	28'	701'	37'	#1568'	4'	
2025 Build-out IMP Opt 2 - Dual NTBs	LOS (Delay)	D (51.7)		E (57.3)	A (5.0)		D (35.2)			C (23.1)
	Synchro 95th Q	-	31'	67'	28'	181'	33'	#1562'	4'	
2025 Build-out IMP Opt 3 - Dual SBTs	LOS (Delay)	D (41.9)		D (46.4)	B (13.2)		A (9.9)			B (12.4)
	Synchro 95th Q	-	31'	67'	28'	701'	41'	383'	4'	
2025 Build-out IMP Dual NBT + SBT	LOS (Delay)	C (32.7)		D (36.7)	A (7.3)		B (12.6)			B (11.1)
	Synchro 95th Q	45'	24'	56'	24'	210'	38'	428'	5'	

95th percentile volume exceeds capacity, queue may be longer.

As shown in **Table 6.6C**, widening only the northbound approach or providing dual eastbound left-turn lanes do not mitigate the impacts caused by the site traffic during the PM peak hour, while widening only the southbound approach does not mitigate impacts of the site traffic during the AM peak hour. Therefore, both mainline approaches along S Point Road (NC 273) are in need of additional capacity in order to mitigate the site traffic impacts.

The following improvements were identified to mitigate the operational impact and accommodate the addition of proposed Phase 2 site traffic, while minimizing disruption to the background traffic:

- **Additional northbound through lane along S Point Road (NC 273) that provides a minimum of 500 feet of full-width storage with appropriate taper and extends to R L Stowe Road**

- **Additional southbound through lane along S Point Road (NC 273) that extends a minimum of 500 feet south of this intersection with appropriate taper, serving as a drop lane that extends from R L Stowe Road**

Tables 6.6 and 6.6c show that with these improvements in place, the operational impacts caused by the proposed site at this intersection are mitigated during both peak hours and capacity along S Point Road (NC 273) is significantly improved. The overall intersection is expected to operate at LOS C during the AM peak hour and LOS B during the PM peak hour. This mitigation improvement addresses the mainline capacity issues discussed above, improving the v/c ratio for the northbound through movement during the AM peak hour to 0.67 and the southbound through movement during the PM peak hour to 0.72.

Additionally, with consideration for the improvements identified for Phase 2 described in **Sections 6.7 through 6.9** along S Point Road (NC 273), the benefit from the increase in throughput capacity would only be fully realized if the additional through lanes along S Point Road (NC 273) were extended to a logical terminus where a significant amount of traffic is dispersed. Northbound traffic volumes do not significantly disperse away from S Point Road (NC 273) until the R L Stowe Road intersection. Furthermore, two (2) southbound receiving lanes are required to accommodate the improvements at R L Stowe, in which the two (2) southbound lanes should extend through the Belmont Middle School signal to provide the necessary capacity to accommodate and mitigate the added site traffic at this intersection.

Based on further evaluation of the SimTraffic model, the four (4)-lane section (two northbound through and two southbound through lanes) is recommended to extend a minimum of 500 feet south of the Belmont Middle School signalized intersection. This determination was based on an iterative process of reviewing the operations of several storage lengths at 100-foot increments in order to determine the effects on lane utilization through SimTraffic simulation runs during both peak hours. This process showed that increasing the northbound full-width storage beyond 400' and the southbound full-width receiving lane beyond 600' south of the intersection resulted in similar and consistent operations, and vehicles were shown to enter the added lane at a steady rate to be effectively used as additional capacity through the intersection. Since it is most appropriate for the widening on both sides of the highway to correspondingly begin at the same point, the four (4)-lane section should extend a minimum of 500 feet south of this intersection with appropriate through lane taper. This distance should be coordinated with NCDOT staff to meet minimum standards.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes (along with the Phase 2 improvements identified above), the overall intersection is expected to operate with less delay than 2026 background conditions (which does not include the improvements from Phase 2 build). Since the capacity improvements identified in Phase 2 are shown to mitigate the operational impact and accommodate the addition of Phase 3 (full build) site traffic, no additional mitigation improvements are recommended for capacity purposes as part of Phase 3.

6.7 S POINT ROAD (NC 273) AND STOWE ROAD/MCKEE FARM LANE

Table 6.7 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized TWSC intersection of S Point Road (NC 273) and Stowe Road/McKee Farm Lane.

Table 6.7 shows the stop-controlled eastbound and westbound approaches of McKee Farm Lane and Stowe Road currently experience long delays during both peak hours. The side street delay is expected to worsen between existing and background conditions due to the reduction in the gaps available to turn onto the mainline, primarily caused by the approved development traffic and other non-specific growth in traffic volume along S Point Road (NC 273).

2023 Phase 1A

Table 6.7 shows that when the proposed Phase 1A site traffic is added to the 2023 background volumes, available gaps are further reduced and the side-street delay is projected to increase while already operating at LOS F. Given the increased delay, identification of potential mitigation improvements is required. **The following improvement was identified to potentially mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Restripe the eastbound approach of McKee Farm Lane to provide an exclusive right-turn lane with a minimum of 100' of storage**

As shown in the aerial image on the following page, the eastbound approach of McKee Farm Lane is approximately 22 feet wide at its intersection with S Point Road (NC 273). This width is maintained for more than 100 feet west of S Point Road (NC 273). This provides an opportunity to restripe the eastbound approach to accommodate two (2) separate lanes without requiring significant impacts to existing overhead and underground roadside utilities and other potential tree and property impacts, and would allow the right-turn traffic to bypass the longer-delayed left-turn vehicles to reduce

Table 6.7 - S Point Road (NC 273) and Stowe Road/McKee Farm Lane									
Condition	Measure	EB		WB		NB		SB	
		EBLT	EBR	WBLTR	NBL*	NBTR	SBL*	SBTR	
AM Peak Hour									
2022 Existing	LOS (Delay)	F (125.6)		F (86.2)		A (9.5)		B (10.4)	
	Synchro 95th Q	85'	-	103'	3'	0'	5'	0'	
Phase 1A									
2023 Background	LOS (Delay)	F (236.2)		F (182.4)		A (9.7)		B (11.8)	
	Synchro 95th Q	93'	-	135'	3'	0'	5'	0'	
2023 Build-out	LOS (Delay)	F (\$328.8)		F (247.1)		A (9.8)		B (12.3)	
	Synchro 95th Q	105'	-	153'	3'	0'	5'	0'	
2023 Build-out IMP EBR	LOS (Delay)	F (235.8)		F (247.1)		A (9.8)		B (12.3)	
	Synchro 95th Q	70'	5'	153'	3'	0'	5'	0'	
Phase 1B									
2024 Background	LOS (Delay)	F (\$319.5)		F (228.5)		A (9.8)		B (12.0)	
	Synchro 95th Q	108'	-	190'	3'	0'	5'	0'	
2024 Build-out	LOS (Delay)	F (\$359.4)		F (\$413.9)		A (10.0)		B (12.9)	
	Synchro 95th Q	83'	5'	190'	3'	0'	8'	0'	
2024 Build-out IMP SBR	LOS (Delay)	F (\$330.5)		F (\$413.9)		A (10.0)		B (12.9)	
	Synchro 95th Q	80'	5'	190'	3'	0'	8'	0'	
Phase 2									
2025 Background	LOS (Delay)	F (\$348.5)		F (268.5)		A (9.9)		B (12.2)	
	Synchro 95th Q	110'	-	163'	3'	0'	8'	0'	
2025 Build-out	LOS (Delay)	F (\$658.2)		F (\$757.8)		B (10.2)		B (13.8)	
	Synchro 95th Q	95'	5'	228'	3'	0'	8'	0'	
2025 Build-out IMP Dual NBT + SBT	LOS (Delay)	F (168.3)		F (260.9)		B (10.3)		B (14.1)	
	Synchro 95th Q	65'	3'	163'	3'	0'	8'	0'	
Phase 3 (Full Build)									
2026 Background	LOS (Delay)	F (\$451.3)		F (\$342.5)		A (10.0)		B (12.4)	
	Synchro 95th Q	123'	-	183'	3'	0'	8'	0'	
2026 Build-out	LOS (Delay)	F (275.0)		F (\$530.8)		B (10.5)		C (15.1)	
	Synchro 95th Q	78'	3'	210'	3'	0'	10'	0'	
2031 Build-out +5	LOS (Delay)	F (+)		F (+)		B (11.2)		C (17.7)	
	Synchro 95th Q	+	5'	+	5'	0'	18'	0'	
PM Peak Hour									
2022 Existing	LOS (Delay)	F (\$404.9)		F (152.4)		A (9.9)		A (9.8)	
	Synchro 95th Q	188'	-	133'	3'	0'	8'	0'	
Phase 1A									
2023 Background	LOS (Delay)	F (\$726.6)		F (\$618.8)		B (11.2)		B (10.7)	
	Synchro 95th Q	158'	-	218'	3'	0'	10'	0'	
2023 Build-out	LOS (Delay)	F (\$1019.4)		F (\$900.6)		B (11.6)		B (11.0)	
	Synchro 95th Q	170'	-	240'	3'	0'	10'	0'	
2023 Build-out IMP EBR	LOS (Delay)	F (\$795.2)		F (\$900.6)		B (11.6)		B (11.0)	
	Synchro 95th Q	135'	5'	240'	3'	0'	10'	0'	
Phase 1B									
2024 Background	LOS (Delay)	F (\$873.7)		F (\$765.1)		B (11.4)		B (10.8)	
	Synchro 95th Q	168'	-	238'	3'	0'	10'	0'	
2024 Build-out	LOS (Delay)	F (\$1013.7)		F (\$1453.4)		B (12.2)		B (11.3)	
	Synchro 95th Q	140'	8'	273'	3'	0'	10'	0'	
2024 Build-out IMP SBR	LOS (Delay)	F (\$1013.5)		F (\$1453.4)		B (12.2)		B (11.3)	
	Synchro 95th Q	140'	8'	273'	3'	0'	10'	0'	
Phase 2									
2025 Background	LOS (Delay)	F (\$1084.8)		F (\$1036.5)		B (11.5)		B (11.0)	
	Synchro 95th Q	183'	-	260'	3'	0'	10'	0'	
2025 Build-out	LOS (Delay)	F (\$1918.0)		F (\$3542.7)		B (13.1)		B (11.9)	
	Synchro 95th Q	160'	8'	313'	3'	0'	13'	0'	
2025 Build-out IMP Dual NBT + SBT	LOS (Delay)	F (\$904.3)		F (\$1420.1)		B (13.2)		B (12.0)	
	Synchro 95th Q	143'	3'	278'	3'	0'	13'	0'	
Phase 3 (Full Build)									
2026 Background	LOS (Delay)	F (\$1153.7)		F (\$1211.2)		B (11.7)		B (11.2)	
	Synchro 95th Q	183'	-	273'	3'	0'	10'	0'	
2026 Build-out	LOS (Delay)	F (\$1323.1)		F (+)		B (14.1)		B (12.6)	
	Synchro 95th Q	153'	5'	+	3'	0'	13'	0'	
2031 Build-out +5	LOS (Delay)	F (\$4541.3)		F (+)		C (15.6)		B (14.5)	
	Synchro 95th Q	188'	5'	+	3'	0'	23'	0'	
Background Storage								100'	

\$ Delay exceeds 300s

+ Delay/queue well over theoretical capacity and cannot be calculated

*Conflicting left-turn movements for unsignalized intersections broken out per NCDOT guidelines.

the average delay and queueing along the approach. **Table 6.7** shows that restriping the eastbound approach of McKee Farm Lane to provide a separate right-turn lane with 100 feet of storage and a shared through/left-turn lane is expected to improve operations along the eastbound approach to nearly 2023 background conditions during both peak hours. Note that the identified storage is based on observation of the maximum SimTraffic queues along with NCDOT minimum storage requirements.



2024 Phase 1B

Table 6.7 shows that when the proposed Phase 1B site traffic is added to the 2024 background volumes (along with the Phase 1A improvement identified above), available gaps along S Point Road (NC 273) are further reduced and the side-street delay is projected to increase while already operating at LOS F. Given the increased delay, identification of potential mitigation improvements is required. **The following improvement was identified to potentially mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Southbound right-turn lane along S Point Road (NC 273) that extends to R L Stowe Road and serves as the additional southbound through lane along S Point Road (NC 273) between R L Stowe Road and McKee Farm Lane**

Note that this improvement facilitates the dual westbound left-turn lanes identified in Phase 1B in **Section 6.9** from R L Stowe Road onto S Point Road (NC 273), requiring two (2) receiving lanes. Dropping the second receiving lane at McKee Farm Lane would provide approximately 1,000 feet for drivers to merge into a single lane. Note that the need for the dual westbound left-turn lanes at R L Stowe Road is to serve the PM peak hour volume (584 left turns). As shown in **Figure 5.8**, little to no traffic is turning into South Point High School 500 feet south of R L Stowe Road during the PM peak hour; therefore, extending the receiving lane to McKee Farm Lane would provide both a longer distance (1,000 feet) to merge as well as better use of the right-turn drop lane during the PM peak hour.

Also note that the recent construction of a new roadway connection as part of the Belmont Town Center east of the Harris Teeter provides drivers along the westbound approach of Stowe Road an alternative route to travel north between Stowe Road and R L Stowe Road.

2025 Phase 2

Table 6.7 shows that when the proposed Phase 2 site traffic is added to the 2025 background volumes (along with the Phase 1A and Phase 1B improvements identified above), available gaps along S Point Road (NC 273) are further reduced and the side-street delay is projected to significantly increase while already operating at LOS F. Given the increased delay, identification of potential mitigation improvements is required. **The following improvements were identified to mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Additional northbound through lane along S Point Road (NC 273)**

- **Additional southbound through lane along S Point Road (NC 273) (Convert the southbound right-turn lane identified in Phase 1B to a through/right-turn lane)**

Table 6.7 shows that with these improvements in place, the operational impacts caused by the proposed site at this intersection are mitigated during both peak hours and capacity along S Point Road (NC 273) is significantly improved.

Additionally, with consideration for the improvements identified for Phase 2 described in **Sections 6.6 through 6.9** along S Point Road (NC 273), the benefit from the increase in throughput capacity would only be fully realized if the additional through lanes along S Point Road (NC 273) were extended to a logical terminus where a significant amount of traffic is dispersed. Two (2) northbound through lanes are needed to accommodate the site traffic at Belmont Middle School, whereas northbound traffic volumes do not significantly disperse away from S Point Road (NC 273) until the R L Stowe Road intersection. Furthermore, two (2) southbound receiving lanes are required to accommodate the improvements at R L Stowe Road as well as the improvements at Belmont Middle School; therefore, the two (2) northbound and two (2) southbound through lanes should extend between the two (2) intersections to provide the necessary capacity to accommodate and mitigate the added site traffic along this corridor.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes (along with the previous phased improvements identified above), the stop-controlled eastbound approach of McKee Farm Lane is expected to operate with similar delay as compared to 2026 background conditions. As an unsignalized intersection, modifying access control at this intersection, such as installing a traffic signal, would be required to significantly reduce the side-street delay further than the reduction shown with the previous phased improvements identified above. However, given the proximity to the adjacent traffic signal at S Point High School/Red Raider Run, allowance of a traffic signal by NCDOT at this intersection is unlikely. Additionally, as previously stated, the recent construction of a new roadway connection as part of the Belmont Town Center east of the Harris Teeter provides drivers along the westbound approach of Stowe Road an alternative route to travel north between Stowe Road and R L Stowe Road. Given these considerations, no additional mitigation improvements are recommended for capacity purposes as part of Phase 3.

6.8 S POINT ROAD (NC 273) AND SOUTH POINT HS/RED RAIDER RUN

Table 6.8 summarizes the LOS, control delay and 95th percentile queue lengths at the signalized intersection of S Point Road (NC 273) and South Point High School/Red Raider Run. Red Raider Run serves as a signalized driveway to the developing Belmont Town Center. Note that the eastbound approach serves as an entrance only for South Point High School; therefore, there is no exiting volume, and thus no operations reported for the eastbound approach.

2023 Phase 1A

When the proposed Phase 1A site traffic is added to the 2023 background volumes, this intersection is expected to continue to operate with similar operations as compared to 2023 background conditions, with an overall intersection drop from LOS C to LOS D during the AM peak hour, primarily attributable to the lack of through lane capacity for the northbound approach along S Point Road (NC 273), in which the proposed site is projected to increase the northbound through volume by approximately 5% during the AM peak hour. Note that the LOS C/D demarcation is at 35 seconds, in which the site traffic pushes the approach delay just beyond this demarcation.

Based on review of potential mitigation options at this intersection, limited options are available given the current laneage, surrounding constraints and the areas of capacity deficiencies (northbound/southbound through lanes). Given the relatively minor impact to peak-hour delays and considerations discussed above, no mitigation improvements are recommended for capacity purposes as part of Phase 1A.

2024 Phase 1B

When the proposed Phase 1B site traffic is added to the 2024 background volumes, the overall intersection is expected to drop from LOS C to LOS D during both peak hours with significant increases in delay and LOS degradation shown for the mainline approaches. Note that the site is expected

Table 6.8 - S Point Road (NC 273) and South Point High School/Red Raider Run									
Condition	Measure	WB		NB		SB		Intersection	
		WBLT	WBR	NBL	NBTR	SBL	SBTR	LOS (Delay)	
AM Peak Hour									
2022 Existing	LOS (Delay)	E (57.1)		B (18.8)		B (10.6)		C (21.9)	
	Synchro 95th Q	108'	146'	18'	694'	m29'	m421'		
Phase 1A									
2023 Background	LOS (Delay)	D (54.1)		D (35.9)		C (20.1)		C (32.6)	
	Synchro 95th Q	206'	162'	95'	#1124'	m#132'	491'		
2023 Build-out	LOS (Delay)	D (54.2)		D (44.9)		C (20.4)		D (37.1)	
	Synchro 95th Q	139'	133'	#308'	#3133'	m63'	m450'		
Phase 1B									
2024 Background	LOS (Delay)	D (54.2)		D (39.7)		B (18.9)		C (34.0)	
	Synchro 95th Q	211'	166'	97'	#1162'	m#134'	454'		
2024 Build-out	LOS (Delay)	D (54.6)		E (62.2)		B (19.3)		D (45.5)	
	Synchro 95th Q	213'	166'	104'	#1345'	m#124'	m481'		
2024 Build-out IMP Dual SBT	LOS (Delay)	D (54.6)		E (62.2)		B (15.3)		D (44.1)	
	Synchro 95th Q	213'	166'	104'	#1345'	m#167'	135'		
2024 Build-out IMP Dual NBT + SBT	LOS (Delay)	D (50.8)		B (18.2)		B (14.4)		C (21.1)	
	Synchro 95th Q	207'	141'	101'	435'	m125'	257'		
Phase 2									
2025 Background	LOS (Delay)	D (54.2)		D (46.1)		B (17.6)		D (36.5)	
	Synchro 95th Q	214'	171'	#111'	#1206'	m#135'	m408'		
2025 Build-out	LOS (Delay)	D (54.6)		B (17.6)		B (15.6)		C (21.6)	
	Synchro 95th Q	219'	171'	#138'	376'	m#165'	215'		
Phase 3 (Full Build)									
2026 Background	LOS (Delay)	D (54.5)		D (52.7)		B (18.0)		D (39.9)	
	Synchro 95th Q	219'	176'	#114'	#1248'	m#138'	m417'		
2026 Build-out	LOS (Delay)	D (54.9)		B (18.6)		B (15.9)		C (22.1)	
	Synchro 95th Q	225'	176'	#146'	419'	m#163'	m225'		
2031 Build-out +5	LOS (Delay)	E (56.9)		C (21.4)		B (17.5)		C (24.4)	
	Synchro 95th Q	#268'	199'	#162'	511'	m#169'	m227'		
PM Peak Hour									
2022 Existing	LOS (Delay)	E (60.2)		B (15.4)		A (6.0)		B (19.6)	
	Synchro 95th Q	154'	219'	4'	548'	m10'	m466'		
Phase 1A									
2023 Background	LOS (Delay)	E (63.6)		C (27.9)		B (19.9)		C (30.4)	
	Synchro 95th Q	#312'	245'	26'	899'	m118'	m548'		
2023 Build-out	LOS (Delay)	E (64.4)		C (31.2)		C (22.1)		C (32.6)	
	Synchro 95th Q	#319'	245'	30'	#1068'	m112'	m551'		
Phase 1B									
2024 Background	LOS (Delay)	E (64.2)		C (29.6)		C (20.6)		C (31.5)	
	Synchro 95th Q	#319'	250'	26'	#979'	m119'	m548'		
2024 Build-out	LOS (Delay)	E (65.2)		D (39.0)		D (40.4)		D (43.9)	
	Synchro 95th Q	#335'	250'	33'	#1164'	m106'	m554'		
2024 Build-out IMP Dual SBT	LOS (Delay)	E (65.3)		D (36.2)		B (14.7)		C (31.0)	
	Synchro 95th Q	#335'	253'	33'	#1152'	m#160'	304'		
2024 Build-out IMP Dual NBT + SBT	LOS (Delay)	D (52.8)		B (18.6)		B (13.1)		C (21.6)	
	Synchro 95th Q	268'	201'	33'	418'	m117'	391'		
Phase 2									
2025 Background	LOS (Delay)	E (64.7)		C (32.5)		C (22.4)		C (33.5)	
	Synchro 95th Q	#330'	263'	26'	#1077'	m121'	m546'		
2025 Build-out	LOS (Delay)	E (67.1)		B (15.3)		B (15.8)		C (23.6)	
	Synchro 95th Q	#358'	263'	40'	336'	m#171'	m347'		
Phase 3 (Full Build)									
2026 Background	LOS (Delay)	E (65.6)		D (35.3)		C (24.9)		D (35.9)	
	Synchro 95th Q	#342'	269'	27'	#1117'	m122'	m547'		
2026 Build-out	LOS (Delay)	E (69.4)		B (16.2)		B (16.6)		C (24.4)	
	Synchro 95th Q	#379'	269'	46'	365'	m#150'	m358'		
2031 Build-out +5	LOS (Delay)	E (78.7)		B (18.2)		B (14.9)		C (25.8)	
	Synchro 95th Q	#431'	309'	46'	445'	m#149'	m355'		
Background Storage			100'	175'		100'			

95th percentile volume exceeds capacity, queue may be longer
m Volume for 95th percentile queue is metered by upstream signal

to significantly impact the approaches that currently serve the heaviest volumes; the northbound approach that is projected to accommodate approximately 1,200 vehicles during the AM peak hour is expected to drop from LOS D to LOS E with a 57% increase in average delay per vehicle; similarly, the southbound approach that is also projected to accommodate approximately 1,200 vehicles during the PM peak hour is expected to double the average delay per vehicle and drop from LOS C to LOS D. Currently only being served by a single through lane along S Point Road (NC 273), severe congestion can build up along the corridor as the maximum available green time for the mainline is not able to fully serve the vehicular demand during a given cycle. As shown in the **Appendix**, Synchro is reporting that the volume is exceeding capacity for the northbound approach during the AM peak hour, and therefore the queue is theoretically infinite (note that this is shown in 2024 build conditions and not in 2024 background conditions). Given the increased delay, LOS degradation and queueing impacts, identification of potential mitigation improvements is required.

Note that given the proximity to the adjacent signalized intersection of S Point Road (NC 273) and R L Stowe Road/Nixon Road, improvements identified in Phase 1B in **Section 6.9** would need to be considered to be accommodated at this intersection. As discussed in **Section 6.7**, the dual westbound left-turn lanes from R L Stowe Road onto S Point Road (NC 273) will require two (2) receiving lanes. The need for the dual westbound left-turn lanes is primarily to serve the PM peak hour volume (584 left turns). As shown in **Figure 5.8**, little to no traffic is turning into South Point High School 500 feet south of R L Stowe Road during the PM peak hour; therefore, extending the receiving lane to McKee Farm Lane would provide both a longer distance (1,000 feet) to merge as well as better use of the right-turn drop lane during the PM peak hour. This would require an additional southbound through lane at this intersection.

The capacity deficiencies along this corridor are further evidenced based on review of the volume to capacity (v/c) ratios, in which the northbound through movement is shown to project a 0.99 v/c during the AM peak hour and a 0.92 v/c for the southbound through movement during the PM peak hour (based on HCM 6th Edition). The volume, LOS/delay, and v/c ratios for these approaches support the need for additional through lanes along S Point Road (NC 273) to significantly improve operations at this intersection and along this corridor. Two (2) potential mitigation options were evaluated at this intersection to potentially mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:

- Option 1: Two (2) southbound through lanes
- Option 2: Two (2) southbound and northbound through lanes

Option 1: Two (2) Southbound Through Lanes

Option 1 evaluated two (2) southbound through lanes to facilitate the dual westbound left-turn lanes at the adjacent intersection from R L Stowe Road onto S Point Road (NC 273), yet maintained only a single northbound through lane. With two (2) southbound through lanes in place, **Table 6.8** shows the impact to the southbound approach during the PM peak hour to be mitigated; however, it provides no benefit to the northbound approach during the AM peak hour. Since Option 1 does not fully mitigate the proposed site's impact, Option 2 was evaluated.

Option 2: Two (2) Southbound and Northbound Through Lanes

As shown above, widening only the southbound approach does not mitigate impacts of the site traffic during the AM peak hour; similarly, widening only the northbound approach does not mitigate impacts of the site traffic during the PM peak hour. **The following improvements were identified to mitigate the**

operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:

- **Additional northbound through lane along S Point Road (NC 273)**
- **Additional southbound through lane along S Point Road (NC 273)**

Table 6.8 shows that with these improvements in place, the operational impacts caused by the proposed site at this intersection are mitigated during both peak hours and capacity along S Point Road (NC 273) is significantly improved. The overall intersection is expected to operate at LOS C during both peak hours.

Note that these improvements facilitate the dual westbound left-turn lanes from R L Stowe Road onto S Point Road (NC 273) and the northbound right-turn lane extension identified in Phase 1B in **Section 6.9**.

2025 Phase 2

When the proposed Phase 2 site traffic is added to the 2025 background volumes (along with the Phase 1B improvements identified above), the overall intersection is expected to operate at LOS C during both peak hours and with less delay than 2025 background conditions (which does not include the improvements from Phase 1B build). Since the capacity improvements identified in Phase 1B are shown to mitigate the operational impact and accommodate the addition of Phase 2 site traffic, no additional mitigation improvements are recommended for capacity purposes as part of Phase 2.

Additionally, with consideration for the improvements identified for Phase 2 described in **Sections 6.6 through 6.9** along S Point Road (NC 273), the benefit from the increase in throughput capacity would only be fully realized if the additional through lanes along S Point Road (NC 273) were extended to a logical terminus where a significant amount of traffic is dispersed. Two (2) northbound through lanes are needed to accommodate the site traffic at Belmont Middle School, whereas northbound traffic volumes do not significantly disperse away from S Point Road (NC 273) until the R L Stowe Road intersection. Furthermore, two (2) southbound receiving lanes are required to accommodate the improvements at R L Stowe Road as well as the improvements at Belmont Middle School; therefore, the two (2) northbound and two (2) southbound through lanes should extend between the two (2) intersections to provide the necessary capacity to accommodate and mitigate the added site traffic along this corridor.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes (along with the Phase 1B improvements identified above), the overall intersection is expected to operate at LOS C during both peak hours and with less delay than 2026 background conditions (which does not include the improvements from Phase 1B build). Since the capacity improvements identified in Phase 1B are shown to mitigate the operational impact and accommodate the addition of Phase 3 (full build) site traffic, no additional mitigation improvements are recommended for capacity purposes as part of Phase 3.

6.9 S POINT ROAD (NC 273) AND R L STOWE ROAD/NIXON ROAD

Table 6.9 summarizes the LOS, control delay and 95th percentile queue lengths at the signalized intersection of S Point Road (NC 273) and R L Stowe Road/Nixon Road.

Table 6.9 - S Point Road (NC 273) and R L Stowe Road/Nixon Road													
Condition	Measure	EB			WB		NB			SB			Intersection LOS (Delay)
		EBL	EBT	EBR	WBL	WBTR	NBL	NBT	NBR	SBL	SBT	SBR	
AM Peak Hour													
2022 Existing	LOS (Delay)	F (82.2)			E (76.4)		B (10.4)			D (37.4)			D (40.2)
	Synchro 95th Q	108'	#300'	-	#369'	106'	30'	176'	122'	38'	#533'	33'	
Phase 1A													
2023 Background	LOS (Delay)	D (52.2)			E (61.2)		B (14.6)			D (36.4)			C (32.8)
	Synchro 95th Q	133'	208'	52'	#377'	136'	m83'	m229'	m105'	49'	#579'	37'	
2023 Build-out	LOS (Delay)	D (52.2)			E (61.9)		B (14.6)			D (37.5)			C (32.9)
	Synchro 95th Q	133'	208'	53'	#398'	136'	m79'	m227'	m103'	50'	#593'	37'	
Phase 1B													
2024 Background	LOS (Delay)	D (52.4)			E (62.2)		B (16.3)			D (37.0)			C (33.9)
	Synchro 95th Q	135'	214'	54'	#391'	137'	m84'	m229'	m133'	50'	#589'	37'	
2024 Build-out	LOS (Delay)	D (52.3)			E (63.3)		B (16.1)			D (39.9)			C (34.2)
	Synchro 95th Q	135'	214'	55'	#428'	137'	m78'	m224'	m131'	52'	#616'	37'	
2024 Build-out IMP Dual WBLs	LOS (Delay)	D (52.5)			E (55.1)		B (12.9)			C (29.2)			C (28.9)
	Synchro 95th Q	135'	214'	63'	180'	151'	#147'	101'	93'	42'	518'	32'	
Phase 2													
2025 Background	LOS (Delay)	D (53.4)			E (63.0)		B (17.8)			D (39.9)			D (35.9)
	Synchro 95th Q	151'	230'	58'	#406'	146'	m87'	m229'	m158'	52'	#622'	42'	
2025 Build-out	LOS (Delay)	D (53.1)			D (45.2)		B (17.2)			D (39.5)			C (31.9)
	Synchro 95th Q	151'	230'	61'	173'	146'	m#164'	524'	152'	54'	#675'	42'	
Phase 3 (Full Build)													
2026 Background	LOS (Delay)	D (53.8)			E (64.1)		B (18.0)			D (42.1)			D (36.7)
	Synchro 95th Q	154'	235'	60'	#418'	148'	m87'	m228'	m156'	53'	#648'	44'	
2026 Build-out	LOS (Delay)	D (53.4)			D (45.1)		B (17.7)			D (43.8)			C (33.0)
	Synchro 95th Q	154'	235'	63'	182'	148'	m#151'	556'	162'	58'	#719'	44'	
2031 Build-out +5	LOS (Delay)	D (54.0)			D (45.3)		C (22.8)			F (81.9)			D (44.5)
	Synchro 95th Q	174'	#290'	84'	203'	168'	m#240'	573'	172'	80'	#845'	49'	
PM Peak Hour													
2022 Existing	LOS (Delay)	E (68.7)			E (64.3)		B (14.1)			D (37.7)			D (39.3)
	Synchro 95th Q	86'	179'	-	#605'	137'	m29'	263'	77'	74'	482'	50'	
Phase 1A													
2023 Background	LOS (Delay)	D (54.6)			D (49.9)		C (23.8)			E (71.3)			D (45.6)
	Synchro 95th Q	105'	145'	48'	#707'	155'	m73'	m497'	m78'	103'	#721'	66'	
2023 Build-out	LOS (Delay)	E (55.9)			D (53.7)		C (24.5)			F (96.1)			D (53.5)
	Synchro 95th Q	105'	145'	50'	#772'	155'	m72'	m498'	m79'	109'	#775'	66'	
Phase 1B													
2024 Background	LOS (Delay)	D (54.8)			D (49.5)		C (24.1)			F (84.5)			D (49.1)
	Synchro 95th Q	106'	146'	49'	#719'	156'	m73'	m500'	m71'	112'	#753'	69'	
2024 Build-out	LOS (Delay)	E (60.2)			E (60.0)		C (25.6)			F (108.9)			E (59.3)
	Synchro 95th Q	106'	146'	53'	#840'	156'	m69'	m504'	m73'	#138'	#860'	69'	
2024 Build-out IMP Dual WBLs	LOS (Delay)	D (54.0)			D (54.2)		B (14.0)			C (34.7)			C (33.4)
	Synchro 95th Q	106'	146'	61'	338'	184'	#127'	184'	105'	77'	#685'	53'	
Phase 2													
2025 Background	LOS (Delay)	E (55.7)			D (54.1)		C (25.4)			F (89.6)			D (52.3)
	Synchro 95th Q	117'	158'	52'	#768'	176'	m83'	m491'	m90'	117'	#763'	78'	
2025 Build-out	LOS (Delay)	D (52.8)			D (48.2)		C (24.9)			D (54.5)			D (41.3)
	Synchro 95th Q	117'	158'	59'	330'	178'	#143'	629'	384'	104'	#949'	78'	
Phase 3 (Full Build)													
2026 Background	LOS (Delay)	E (56.5)			E (57.0)		C (25.7)			F (94.9)			D (54.6)
	Synchro 95th Q	120'	160'	52'	#793'	179'	m82'	m494'	m93'	#134'	#788'	78'	
2026 Build-out	LOS (Delay)	D (52.6)			D (47.7)		C (26.8)			E (77.2)			D (47.9)
	Synchro 95th Q	120'	160'	62'	358'	179'	m#153'	#711'	423'	118'	#1040'	78'	
2031 Build-out +5	LOS (Delay)	D (50.7)			D (47.8)		D (35.7)			F (179.3)			E (77.0)
	Synchro 95th Q	135'	178'	102'	403'	206'	m#271'	#836'	516'	#195'	#1164'	89'	
Background Storage		200'		100'	225'		280'		225'	25'		100'	

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

The operations and LOS for this intersection play a vital role in the overall mobility along the peninsula because of its location. This intersection is located where a major portion of northbound traffic disperses away from S Point Road (NC 273), either east towards Charlotte (turn onto R L Stowe Road) or north/west towards downtown Belmont or Gastonia (continue north along S Point Road). It is also the intersection where two (2) heavy traffic streams combine onto S Point Road (NC 273) heading southbound. This combination creates a capacity issue in which these two (2) heavy movements (the southbound through and westbound left) conflict with one another. The heavy southbound volume demands green time from the signal, which reduces the amount available for the westbound approach, and vice versa. As traffic increases from the proposed Henry Chapel Residential Development, nearby approved developments and other non-specific growth throughout the area (including South Carolina traffic), the congestion at this intersection will continue to worsen under its current configuration.

2023 Phase 1A

When the proposed Phase 1A site traffic is added to the 2023 background volumes, this intersection is expected to continue to operate at LOS C during the AM peak hour and LOS D during the PM peak hour with similar operations as compared to 2023 background conditions, with a drop in LOS along the southbound approach during the PM peak hour. This is primarily attributable to the lack of capacity for the southbound and westbound approaches, in which the proposed site is projected to increase the traffic volumes by less than 5% on either approach during the PM peak hour. With the eastbound right-turn lane mitigation improvement planned to be constructed as part of the approved South Fork development, turn lanes are already provided or planned along all approaches where significant volume is seen (minimal westbound right-turn volume). Therefore, any improvement options that would provide measurable mitigation would require additional through lanes (or receiving lanes) along S Point Road (NC 273). Given the relatively minor impact to peak-hour delays and considerations discussed above, no mitigation improvements are recommended for capacity purposes as part of Phase 1A.

2024 Phase 1B

When the proposed Phase 1B site traffic is added to the 2024 background volumes, the overall intersection is expected to drop from LOS D to LOS E during the PM peak hour with significant increases in approach delays, LOS degradation and extensive queueing. Note that the site is expected to significantly impact the approaches and specific movements that currently serve the heaviest volumes during the PM peak hour; both the southbound through movement and the westbound left-turn movements (each projected to serve over 500 vehicles each during the PM peak hour) show more than a 20% increase in average approach delay per vehicle with significant increases in the Synchro 95th percentile queues.

Currently only being served by a single through lane along S Point Road (NC 273), severe congestion can build up along the corridor as the maximum available green time for the mainline is not able to fully serve the vehicular demand during a given cycle. As shown in the **Appendix**, Synchro is reporting that the 50th percentile volume is exceeding capacity for the southbound approach during the PM peak hour, and therefore the queue is theoretically infinite. Given the increased delay, LOS degradation and queueing impacts, identification of potential mitigation improvements is required.

Note that given the proximity to the adjacent signalized intersection of S Point Road (NC 273) and South Point High School/Red Raider Run, improvements identified in Phase 1B in **Section 6.8** would need to be considered to be accommodated at this intersection. As discussed in **Section 6.8**, an additional northbound through lane along S Point Road (NC 273) is identified to mitigate the Phase 1B impact caused by the proposed site. Therefore, the existing northbound right-turn lane at on S Point Road (NC 273) at R L Stowe

Road should be extended to both facilitate the Phase 1B improvement identified in **Section 6.8** as well as to provide additional capacity for the heavy northbound right-turn volume (shown in **Figures 5.7 and 5.8** to serve 573 AM and 497 PM vehicles upon 2024 Phase 1B build-out). **The following improvements are identified to mitigate the operational impact and accommodate the added site traffic, while minimizing disruption to the background traffic:**

- **Additional westbound left-turn lane along R L Stowe Road (creating dual left-turn lanes)**
 - **Provide a minimum of 200 feet of storage for the westbound shared through/right-turn lane along with proper signing/stripping (see discussion below)**
 - **Additional southbound receiving lane along S Point Road (NC 273) to accommodate the dual westbound left-turn lanes that extends to McKee Farm Lane (*extends through the Belmont Middle School signalized intersection upon 2025 Phase 2*)**
- **Extension of the existing northbound right-turn lane along S Point Road (NC 273) to McKee Farm Lane/Stowe Road to serve as the additional northbound through lane along S Point Road (NC 273) and drop as the right-turn lane at R L Stowe Road (*extends through the Belmont Middle School signalized intersection upon 2025 Phase 2*)**

Given the westbound approach volumes where the left-turn movement is significantly higher than the through/right combination, along with the existing concrete median in place for the left-over at Belmont Town Center that restricts extension of the inside left-turn lane, consideration should be given to allowing the additional left-turn lane to become the drop lane from R L Stowe Road. This would require the westbound through/right lane drivers to shift over a lane as they approach S Point Road (NC 273), which would not be normal driver expectation for a through movement. Therefore, if allowed by the City and NCDOT, proper signing and striping is recommended to alleviate the potential driver expectation concern.

Table 6.9 shows that with these improvements in place, the operational impacts caused by the proposed site at this intersection are mitigated during both peak hours and the overall intersection is expected to operate at LOS C during both peak hours. Note that by providing additional capacity for the westbound left-turn movement, the southbound approach is significantly improved as more green time can be allocated to the major street through movements (northbound/southbound).

Note that the minimum storage for the westbound through/right-turn lane is based on review of the Synchro 95th percentile queues.

Also note that based on review of the simulation, queueing issues were still seen on the southbound approach due to the existing 35' left-turn lane, which is operating under permitted phasing and opposing a heavy northbound through volume. An alternative analysis was performed to evaluate this movement under protected phasing. The delay for the overall intersection and remaining approaches is shown to greatly increase since another phase is added to the signal, thus taking away green time from other approaches. Therefore, protected phasing is not recommended. An extension of the southbound left-turn lane would be expected to address this background issue; however, this is not recommended as mitigation for the proposed site since the mitigation identified above is shown to fully mitigate the traffic impact caused by the proposed site.

2025 Phase 2

When the proposed Phase 2 site traffic is added to the 2025 background volumes (along with the Phase 1B improvements identified above), the overall intersection is expected to operate at LOS C during the AM peak hour and LOS D during the PM peak hour, with less delay than 2025 background conditions (which

does not include the improvements from Phase 1B build). Since the capacity improvements identified in Phase 1B are shown to mitigate the operational impact and accommodate the addition of Phase 2 site traffic, no additional mitigation improvements are recommended for capacity purposes as part of Phase 2.

Note that the four (4)-lane section along S Point Road (NC 273) that is identified in 2024 Phase 1B above to extend between R L Stowe Road/Nixon Road and McKee Farm Lane/Stowe Road is identified to extend further south through the Belmont Middle School intersection in 2025 Phase 2. This is based on consideration for the identified improvements described in **Sections 6.6 through 6.9** along S Point Road (NC 273), in which the benefit from the increase in throughput capacity would only be fully realized if the additional through lanes along S Point Road (NC 273) were extended to a logical terminus where a significant amount of traffic is dispersed. Northbound traffic volumes do not significantly disperse away from S Point Road (NC 273) until the R L Stowe Road intersection. As discussed in **Sections 6.6 and 6.7**, additional through-lane capacity is needed upon Phase 2 build to accommodate the added site traffic along this corridor.

2026 Phase 3 (Full Build)

When the proposed Phase 3 site traffic is added to the 2026 background volumes (along with the Phase 1B improvements identified above), the overall intersection is expected to operate at LOS C during the AM peak hour and LOS D during the PM peak hour, with less delay than 2026 background conditions (which does not include the improvements from Phase 1B build). Since the capacity improvements identified in Phase 1B are shown to mitigate the operational impact and accommodate the addition of Phase 3 (full build) site traffic, no additional mitigation improvements are recommended for capacity purposes as part of Phase 3.

Supplemental Analysis – Roundabout

Though not recommended as mitigation for the proposed Henry Chapel Residential Development based on the discussion and results shown above, a supplemental analysis was performed at the request of City staff to determine if the installation of a roundabout at this intersection instead of a traffic signal could operate acceptably. This supplemental analysis is for information purposes only.

Table 6.9A summarizes the supplemental analysis performed at this intersection under 2026 Phase 3 (full build) conditions under two (2) laneage alternatives, one as a single-lane roundabout and the other with additional lanes based on the resulting approach operations shown as a single-lane roundabout.

Table 6.9A - S Point Road (NC 273) and R L Stowe Road/Nixon Road										
Supplemental Analysis - Roundabout										
Condition	Measure	EB	WB		NB		SB		Intersection*	
		EBLTR	WBL	WBLTR	NBLT	NBR	SBLT	SBR	LOS (Delay)	V/C
AM Peak Hour										
Phase 3 (Full Build)										
2026 Build-out IMP Single Lane RAB	LOS (Delay)	F (65.7)	C (22.4)		F (305.5)		F (53.4)		F (169.1)	1.64
	Sidra 95th Q	367'	-	213'	5399'	-	748'	-		
2026 Build-out IMP Multi Lane RAB	LOS (Delay)	D (30.3)	B (13.4)		B (10.3)		C (23.5)		C (16.5)	0.82
	Sidra 95th Q	170'	56'	56'	378'	0'	320'	8'		
PM Peak Hour										
Phase 3 (Full Build)										
2026 Build-out IMP Single Lane RAB	LOS (Delay)	D (31.8)	F (186.0)		F (156.7)		F (215.6)		F (169.0)	1.42
	Sidra 95th Q	130'	-	2398'	3566'	-	2532'	-		
2026 Build-out IMP Multi Lane RAB	LOS (Delay)	D (30.7)	C (21.0)		A (6.9)		F (169.8)		F (55.3)	1.35
	Sidra 95th Q	112'	159'	159'	210'	0'	1994'	17'		

*Highest approach V/C is reported for unsignalized intersections

Table 6.9A shows the installation of a single lane roundabout at the intersection of S Point Road (NC 273) and R L Stowe Road/Nixon Road would not be able to accommodate the projected volumes at this intersection. Therefore, a second supplemental analysis was performed that included:

- Northbound right-turn lane
- Dual westbound left-turn lanes
- Southbound right-turn lane
- Two (2) circulating lanes for the east, west and southbound approaches

Under this scenario, the roundabout is projected to operate over capacity, primarily due to the heavy westbound left-turn volume during the PM peak hour that would enter the roundabout and make it difficult for the heavy southbound volume to find a gap, as the southbound traffic would be forced to yield to the westbound left-turn traffic. Two (2) southbound through lanes would be needed to accommodate the projected volumes at this intersection, requiring two (2) receiving lanes south of the intersection, along with two (2) entering lanes northbound, thus requiring a four (4)-lane section along S Point Road (NC 273) south of this intersection.

6.10 HENRY CHAPEL ROAD AND ACCESS 1

Table 6.10 summarizes the LOS, control delay and 95th percentile queue lengths at the proposed full-movement, stop-controlled tee-intersection of Henry Chapel Road and Access 1, located approximately 1,500 feet east of S Point Rd (NC 273).

The southbound egress was assumed to operate unsignalized with single-lane approaches based on the width provided in the current site plan and based on the assignment of site traffic where little to no site traffic is expected to turn left out of the site.

2023 Phase 1A

Based on input from the applicant, Access 1 is assumed to be constructed in 2023 as part of Phase 1A.

Table 6.10 shows that the stop-controlled southbound approach of Access 1 is expected to operate with short delays during both peak hours.

Therefore, no additional improvements beyond construction of Access 1 with a single egress and single ingress lane with a minimum internal protected stem (IPS) of 100 feet are recommended at this intersection for capacity purposes.

Note that the recommended IPS length is based on review of the SimTraffic maximum queue lengths and NCDOT minimum requirements. The IPS is defined as the length required to be protected along the driveway stem from Henry Chapel Road before any crossing or left-turn conflicts are allowed.

2024 Phase 1B

Table 6.10 shows that the stop-controlled southbound approach of Access 1 is expected to continue to operate with short delays during both peak hours upon Phase 1B build; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1B.

2025 Phase 2

Table 6.10 shows that the stop-controlled southbound approach of Access 1 is expected to continue to operate with short delays during both peak hours upon Phase 2 build; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 2.

2026 Phase 3 (Full Build)

Table 6.10 shows that the stop-controlled southbound approach of Access 1 is expected to continue to operate with short delays during both peak hours upon Phase 3 (full build); therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 3.

Table 6.10 - Henry Chapel Road and Access 1					
Condition	Measure	EB		WB	SB
		EBL*	EBT	WBTR	SBLR
AM Peak Hour					
Phase 1A					
2023 Build-out	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 1B					
2024 Build-out	LOS (Delay)	A (7.4)	A (0.0)	A (0.0)	A (9.0)
	Synchro 95th Q	3'	0'	0'	5'
Phase 2					
2025 Build-out	LOS (Delay)	A (7.5)	A (0.0)	A (0.0)	A (9.3)
	Synchro 95th Q	3'	0'	0'	10'
Phase 3					
2026 Build-out	LOS (Delay)	A (7.5)	A (0.0)	A (0.0)	A (9.5)
	Synchro 95th Q	3'	0'	0'	15'
2031 Build-out +5	LOS (Delay)	A (7.5)	A (0.0)	A (0.0)	A (9.5)
	Synchro 95th Q	3'	0'	0'	15'
PM Peak Hour					
Phase 1A					
2023 Build-out	LOS (Delay)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
	Synchro 95th Q	0'	0'	0'	0'
Phase 1B					
2024 Build-out	LOS (Delay)	A (7.5)	A (0.0)	A (0.0)	A (8.8)
	Synchro 95th Q	5'	0'	0'	3'
Phase 2					
2025 Build-out	LOS (Delay)	A (7.6)	A (0.0)	A (0.0)	A (9.0)
	Synchro 95th Q	8'	0'	0'	8'
Phase 3					
2026 Build-out	LOS (Delay)	A (7.7)	A (0.0)	A (0.0)	A (9.2)
	Synchro 95th Q	10'	0'	0'	10'
2031 Build-out +5	LOS (Delay)	A (7.7)	A (0.0)	A (0.0)	A (9.2)
	Synchro 95th Q	10'	0'	0'	10'

* Conflicting left-turn movements are broken out NCDOT Congestion Management guidelines

6.11 HENRY CHAPEL ROAD AND ACCESS 2

Table 6.11 summarizes the LOS, control delay and 95th percentile queue lengths at proposed full-movement, stop-controlled tee-intersection of Henry Chapel Road and Access 2, located approximately 1,400 feet east of Access 1.

The southbound egress was assumed to operate unsignalized with single-lane approaches based on the width provided in the current site plan and based on the assignment of site traffic where little to no site traffic is expected to turn left out of the site.

2023 Phase 1A

Based on input from the applicant, Access 2 is assumed to be constructed in 2023 as part of Phase 1A.

Table 6.11 shows that the stop-controlled southbound approach of Access 2 is expected to operate with short delays during both peak hours. **Therefore, no additional improvements beyond construction of Access 2 with a single egress and single ingress lane with a minimum IPS of 100 feet are recommended at this intersection for capacity purposes.**

Note that the recommended IPS length is based on review of the SimTraffic maximum queue lengths and NCDOT minimum requirements. The IPS is defined as the length required to be protected along the driveway stem from Henry Chapel Road before any crossing or left-turn conflicts are allowed.

2024 Phase 1B

Table 6.11 shows that the stop-controlled southbound approach of Access 2 is expected to continue to operate with short delays during both peak hours upon Phase 1B build; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 1B.

2025 Phase 2

Table 6.11 shows that the stop-controlled southbound approach of Access 2 is expected to continue to operate with short delays during both peak hours upon Phase 2 build; therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 2.

2026 Phase 3 (Full Build)

Table 6.11 shows that the stop-controlled southbound approach of Access 2 is expected to continue to operate with short delays during both peak hours upon Phase 3 (full build); therefore, no mitigation improvements are recommended for capacity purposes as part of Phase 3.

Table 6.11 - Henry Chapel Road and Access 2					
Condition	Measure	EB		WB	SB
		EBL*	EBLT	WBTR	SBLR
AM Peak Hour					
Phase 1A					
2023 Build-out	LOS (Delay)	A (7.3)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	3'	0'	0'	5'
Phase 1B					
2024 Build-out	LOS (Delay)	A (7.3)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	5'
Phase 2					
2025 Build-out	LOS (Delay)	A (7.3)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	5'
Phase 3					
2026 Build-out	LOS (Delay)	A (7.3)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	5'
2031 Build-out +5	LOS (Delay)	A (7.3)	A (0.0)	A (0.0)	A (8.7)
	Synchro 95th Q	0'	0'	0'	5'
PM Peak Hour					
Phase 1A					
2023 Build-out	LOS (Delay)	A (7.4)	A (0.0)	A (0.0)	A (8.6)
	Synchro 95th Q	5'	0'	0'	5'
Phase 1B					
2024 Build-out	LOS (Delay)	A (7.4)	A (0.0)	A (0.0)	A (8.6)
	Synchro 95th Q	5'	0'	0'	3'
Phase 2					
2025 Build-out	LOS (Delay)	A (7.4)	A (0.0)	A (0.0)	A (8.6)
	Synchro 95th Q	5'	0'	0'	5'
Phase 3					
2026 Build-out	LOS (Delay)	A (7.4)	A (0.0)	A (0.0)	A (8.6)
	Synchro 95th Q	5'	0'	0'	3'
2031 Build-out +5	LOS (Delay)	A (7.4)	A (0.0)	A (0.0)	A (8.6)
	Synchro 95th Q	5'	0'	0'	3'

* Conflicting left-turn movements are broken out NCDOT Congestion Management guidelines

7.0 Turn Lane and Signal Warrants

As discussed at the TIA Scoping Meeting and documented in the approved MOU included in the **Appendix**, the potential need for auxiliary turn lanes at proposed driveways were evaluated along with a signal warrant analysis at the intersection of S Point Road (NC 273) and Henry Chapel Road/S Point Church Road.

7.1 AUXILIARY TURN-LANE WARRANT ANALYSIS

Warrants for additional turn-lane improvements for unsignalized driveways beyond those necessary for capacity were determined based on a review of the figure titled ‘Warrant for Left and Right-Turn Lanes’ found on page 80 in the [NCDOT Policy on Street and Driveway Access to North Carolina Highways](#). The results of the warrants for left- and right-turn lanes under each phase of development, including 2026 Full Build conditions, indicates that **turn lanes are not warranted at any of the three (3) proposed site access points, including the intersection of Colonial Drive and Timber Ridge Road (extension of Timber Ridge Road for Access 3)**. Turn-lane warrant figures are included in the **Appendix**.

7.2 SIGNAL WARRANT ANALYSIS

As discussed in **Section 5.1**, Access 1 and Access 2 along Henry Chapel Road are intended to serve as the primary access points for the development, with Access 3 as a secondary access to promote the majority of Henry Chapel residents to utilize Henry Chapel Road and limit the site traffic through the South Hill Estates neighborhood via Access 3. As documented in the approved MOU and consistent with the 2018 Henry Chapel TIA, the applicant has requested a 13-hour traffic signal warrant analysis for the existing TWSC intersection of S Point Road (NC 273) and Henry Chapel Road/South Point Church Road under each proposed phase of development with the intent to provide a safe and efficient means to access S Point Road (NC 273) via Henry Chapel Road, while configuring the Forest Hill Road access as an unsignalized left-over to further promote Access 3 as a secondary access.

Existing weekday traffic volumes were collected at this intersection over a 13-hour period (6:00 AM-7:00 PM) by Quality Counts, LLC on Thursday, April 28, 2022. As shown in **Section 5.2**, the proposed Henry Chapel Residential Development is projected to generate the following number of daily trips through each phase of development (note that the number of trips is cumulatively added through each phase):

- Phase 1A (2023) – 1,248 daily trips
- Phase 1B (2024) – 2,292 daily trips
- Phase 2 (2025) – 4,042 daily trips
- Phase 3 (2026) – 5,471 daily trips

The daily distribution factors, or k-factors, provided by ITE were used to convert daily traffic volumes to hourly volumes throughout the day and were added to the background traffic volumes based on the site trip distribution and assignment for each phase of development as shown in **Section 5.3**. Note that the background traffic volumes include the approved development traffic that was also factored throughout the day by the k-factors provided by ITE.

A signal warrant analysis was performed under each proposed phase of development based on criteria published by the Federal Highway Administration (FHWA) in the *Manual on Uniform Traffic Control Devices (MUTCD)*, 2009 Edition. The MUTCD provides the following standards for signal warrant analyses:

- An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether the installation of a traffic control signal is justified at a particular location.
- The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following signal warrants:
 - Warrant 1, Eight-Hour Vehicular Volume
 - Warrant 2, Four-Hour Vehicular Volume
 - Warrant 3, Peak Hour
 - Warrant 4, Pedestrian Volume
 - Warrant 5, School Crossing
 - Warrant 6, Coordinated Signal System
 - Warrant 7, Crash Experience
 - Warrant 8, Roadway Network
 - Warrant 9, Intersection Near a Grade Crossing

Warrant 1 (Eight-Hour Vehicular Volume) Condition A is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. Warrant 1 Condition B is intended for application where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street. Warrant 1 Condition C may be satisfied by a combination of Condition A and B if both are 80% satisfied.

Warrant 2 (Four-Hour Vehicular Volume) is intended to be applied where the volume of the intersecting traffic is the principal reason to consider installing a traffic signal.

Warrant 3 (Peak Hour) is intended for use at a location where traffic conditions are such that for a minimum of one hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

A traffic control signal should not be installed unless one (1) or more of the above warrants are met. However, the satisfaction of a traffic signal warrant or warrants should not in itself justify the installation of a traffic control signal. Final approval for a new traffic signal installation on an NC route, such as NC 273, will be made by NCDOT in coordination with the City of Belmont and Gaston County.

Note that the MUTCD states “The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgement should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants”. Since the proposed westbound approach of Henry Chapel Road is recommended to potentially include an exclusive right-turn lane, 50% of the minor-street right-turn traffic was removed for purposes of the signal warrant calculations.

Table 7.1 shows the results of the signal warrant analysis for S Point Road (NC 273) and Henry Chapel Road/South Point Church Road under background (Bkgd) and build-out (Build) conditions for each phased horizon year (2023-2026), along with number of hours satisfied compared to the minimum number of hours required to satisfy.

Table 7.1 – S Point Rd (NC 273) and Henry Chapel Rd/S Point Church Rd Traffic Signal Warrant Analysis Results									
Warrant		Criteria Satisfied (2023-2026 Phase 1A-Phase 3) Yes / No (hours satisfied/required)							
		2023 Phase 1A		2024 Phase 1B		2025 Phase 2		2026 Phase 3	
		Bkgd	Build	Bkgd	Build	Bkgd	Build	Bkgd	Build
Warrant 1	1A (Eight Hour)	No (0/8)	No (0/8)	No (0/8)	No (0/8)	No (0/8)	No (1/8)	No (0/8)	No (4/8)
	1B (Eight Hour)	No (0/8)	No (0/8)	No (0/8)	No (6/8)	No (0/8)	Yes (13/8)	No (0/8)	Yes (13/8)
	1C (Eight Hour)	No (0/8), No (0/8)	No (0/8), No (0/8)	No (0/8), No (0/8)	No (0/8), No (3/8)	No (0/8), No (0/8)	No (0/8), Yes (13/8)	No (0/8), No (0/8)	No (2/8), Yes (13/8)
Warrant 2	2 (Four Hour)	No (0/4)	No (0/4)	No (0/4)	No (3/4)	No (0/4)	Yes (13/4)	No (0/4)	Yes (13/4)
Warrant 3	3 (Peak Hour)	No (0/1)	No (0/1)	No (0/1)	No (0/1)	No (0/1)	Yes (6/1)	No (0/1)	Yes (10/1)

Based on results shown in **Table 7.1**, Warrants 1, 2 and 3 are all met under 2025 Phase 2 build-out conditions as well as 2026 Phase 3 build-out conditions. As discussed in **Section 6.6**, signal warrants are not met prior to Phase 2 build-out conditions. Signal warrant calculations can be found in the **Appendix**.

8.0 Crash Data Analysis

Crash data was obtained at the study intersections for crashes that occurred between May 1, 2019, and April 30, 2022. Over this three-year period, 38 total crashes were reported at the existing study intersections. The breakdown of crashes at these study intersections by severity, frequency and crash type are shown in the tables below. Note that the intersection of Belmont Middle School and S Point Road (NC 273) was not constructed until late 2020; however, the data reflects crashes at Belwood Drive given the close proximity between the two (2) intersections.

Table 8.1 – Crash Severity Summary

Crash Type	Number of Crashes
Fatal Crashes	0
Class A	0
Class B	1
Class C	3
Property Damage Only	34
Total	38

Table 8.1 above shows the total number of crashes by severity type from most to least severe. As shown, 89% of the crashes over the past three (3) years at the study intersections had no injury reported. The crash types are defined as follows:

- Class A - crashes where serious injury is suspected and can include significant loss of blood or broken bones.
- Class B - crashes where minor injury is suspected, such as bruises or minor cuts.
- Class C - crashes wherein possible injuries occur, which are injuries reported by the person or indicated by his/her behavior, but no wounds or injuries are physically present, such as limping or complaint of neck pain.
- Property Damage Only (PDO) – crashes where no injury is reported.

Table 8.2 – Crash Frequency Summary

Location	Crashes/100 MEV
1. S Point Rd (NC 273) and Armstrong Rd (NC 273)	19.63
2. S Point Rd (NC 273) and Henry Chapel Rd	19.01
3. S Point Rd (NC 273) and Forest Hill Road	0.00
4. Forest Hill Rd and Colonial Dr	0.00
5. Colonial Dr and Timber Ridge Rd/Access 3	0.00
6. S Point Rd (NC 273) and Belmont MS/Belwood Dr	22.95
7. S Point Rd (NC 273) and Stowe Rd/McKee Farm Ln	23.64
8. S Point Rd (NC 273) and South Point HS/Red Raider Run	49.31
9. S Point Rd (NC 273) and R L Stowe Rd/Nixon Rd	53.01
Average	29.79

Table 8.2 shows the crash rates at the study area intersections resulted in a weighted average crash rate of 29.79 crashes per 100 million entering vehicles (MEV), with the highest rates occurring at the signalized intersections along the northern portion of the S Point Road (NC 273) corridor. Of the 38 total reported crashes, 24 occurred at these intersections.

Table 8.3 – Crash Type Summary

Crash Type	1. S Point Rd (NC 273) & Armstrong Rd (NC 273)	2. S Point Rd (NC 273) & Henry Chapel Rd	3. S Point Rd (NC 273) & Forest Hill Rd	4. Forest Hill Rd & Colonial Dr	5. Colonial Dr & Timber Ridge Rd	6. S Point Rd (NC 273) & Belmont MS/Belwood Dr	7. S Point Rd (NC 273) & Stowe Rd/McKee Farm Ln	8. S Point Rd (NC 273) & S Point HS/Red Raider Run	9. S Point Rd (NC 273) & R L Stowe Rd/Nixon Rd
Angle	0	2	0	0	0	0	1	1	4
Animal	0	0	0	0	0	1	0	0	0
Fixed Object	0	1	0	0	0	0	0	0	0
Head On	0	0	0	0	0	0	1	1	0
Left-Turn, Different Roadways	2	0	0	0	0	0	2	1	1
Other Non-Collision	0	0	0	0	0	0	0	0	1
Ran off Road - Right	0	0	0	0	0	0	0	0	1
Rear End, Slow or Stop	0	0	0	0	0	3	1	6	7
Sideswipe, Same Direction	0	0	0	0	0	0	0	1	0
Total	2	3	0	0	0	4	5	10	14

The most common crash type within the study area was rear-end collisions caused by slowing or stopping vehicles, making up 45% of total crashes. As shown in **Table 8.3**, rear end collisions were most prevalent at the signalized intersections along the northern portion of the S Point Road (NC 273) corridor (Nixon Road/R L Stowe Road and South Point High School/Red Raider Run).

Rear-end collisions are often associated with higher levels of congestion at signalized intersections and lack of available turn-lane storage at either signalized or unsignalized intersections.

As discussed in **Section 6.8** and **6.9**, both of these intersections have a lack of available capacity and mitigation improvements have been identified along this corridor, which are expected to address safety issues by increasing capacity and improving mobility. Additionally, as discussed in **Section 4.3**, these intersections are included in the S Point Road (NC 273) corridor that has been recommended to be widened in multiple planning documents through the City of Belmont, GCLMPO and NCDOT.

Crash data provided by NCDOT is included in the **Appendix**.

9.0 Mitigation Improvements

Based on the capacity analyses performed at each of the identified study intersections, along with review of the auxiliary turn-lane warrants and crash analyses contained herein, the following phased improvements are identified to mitigate the impact of the proposed development on the adjacent street network:

Phase 1A (2023)

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

- Westbound right-turn lane along Henry Chapel Road with a minimum of 100' of storage

7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane

- Restripe the eastbound approach of McKee Farm Lane to provide an exclusive right-turn lane with a minimum of 100' of storage

10. Henry Chapel Road and Access 1

- Single southbound egress lane and single ingress lane along Access 1
- Provide a 100-foot internal protected stem (IPS) along Access 1

11. Henry Chapel Road and Access 2

- Single southbound egress lane and single ingress lane along Access 2
- Provide a 100-foot IPS along Access 2

Phase 1B (2024):

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

- Southbound left-turn lane along S Point Road (NC 273) with a minimum of 100' of storage

7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane

- Southbound right-turn lane along S Point Road (NC 273) that extends to R L Stowe Road and serves as the additional southbound through lane along S Point Road (NC 273) between R L Stowe Road and McKee Farm Lane

8. S Point Road (NC 273) and South Point High School/Red Raider Run

- Additional northbound through lane along S Point Road (NC 273)
- Additional southbound through lane along S Point Road (NC 273)

9. S Point Road (NC 273) and R L Stowe Road/Nixon Road

- Additional westbound left-turn lane along R L Stowe Road (creating dual left-turn lanes)
 - Provide a minimum of 200 feet of storage for the westbound shared through/right-turn lane along with proper signing/stripping (*see below)
 - Additional southbound receiving lane along S Point Road (NC 273) to accommodate the dual westbound left-turn lanes that extends to McKee Farm Lane (*extends through the Belmont Middle School signalized intersection upon 2025 Phase 2*)
- Extension of the existing northbound right-turn lane along S Point Road (NC 273) to extend to McKee Farm Lane/Stowe Road to serve as the additional northbound through lane along S Point Road (NC 273) and drop as the right-turn lane at R L Stowe Road (*extends through the Belmont Middle School signalized intersection upon 2025 Phase 2*)

*Given the westbound approach volumes where the left-turn movement is significantly higher than the through/right combination, along with the existing concrete median in place for the left-over at Belmont Town Center that restricts extension of the inside left-turn lane, consideration should be given to allowing the additional left-turn lane to become the drop lane from R L Stowe Road. This would require westbound through/right lane drivers to shift over a lane as they approach S Point Road (NC 273), which would not be normal driver expectation for a through movement. Therefore, if allowed by the City and NCDOT, proper signing and striping is recommended to alleviate the potential driver expectation concern.

Phase 2 (2025):

1. S Point Road (NC 273) and Armstrong Road (NC 273)

- Southbound right-turn lane along S Point Road (NC 273) with a minimum of 100' of storage

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

- Installation of a traffic signal with the following phasing:
 - Protected phasing for the southbound left-turn movement
 - Permitted/overlap phasing for the westbound right-turn movement
- Extension of the westbound right-turn storage along Henry Chapel Road from 100' to 175'
- Extension of the southbound left-turn storage along S Point Road (NC 273) from 100' to 225'

3. S Point Road (NC 273) and Forest Hill Road

- Access modification to provide southbound and northbound left-over access, restricting side-street left-turn and through movements
- Southbound left-turn lane along S Point Road (NC 273) with a minimum of 100' of storage

5. Colonial Drive and Timber Ridge Road/Access 3

- Construct Access 3 as an extension of Timber Ridge Road

6. S Point Road (NC 273) and Belmont Middle School/Belwood Drive

- Additional northbound through lane along S Point Road (NC 273) that provides a minimum of 500' of full-width storage with appropriate taper and extends to R L Stowe Road
- Additional southbound through lane along S Point Road (NC 273) that extends a minimum of 500' south of the Belmont Middle School/Belwood Drive intersection with appropriate taper, serving as a drop lane that extends from R L Stowe Road

7. S Point Road (NC 273) and Stowe Road/McKee Farm Lane

- Additional northbound through lane along S Point Road (NC 273)
- Additional southbound through lane along S Point Road (NC 273) (*Convert the southbound right-turn lane identified in Phase 1B to a through/right-turn lane*)

Phase 3 (2026):

2. S Point Road (NC 273) and Henry Chapel Road/South Point Church Road

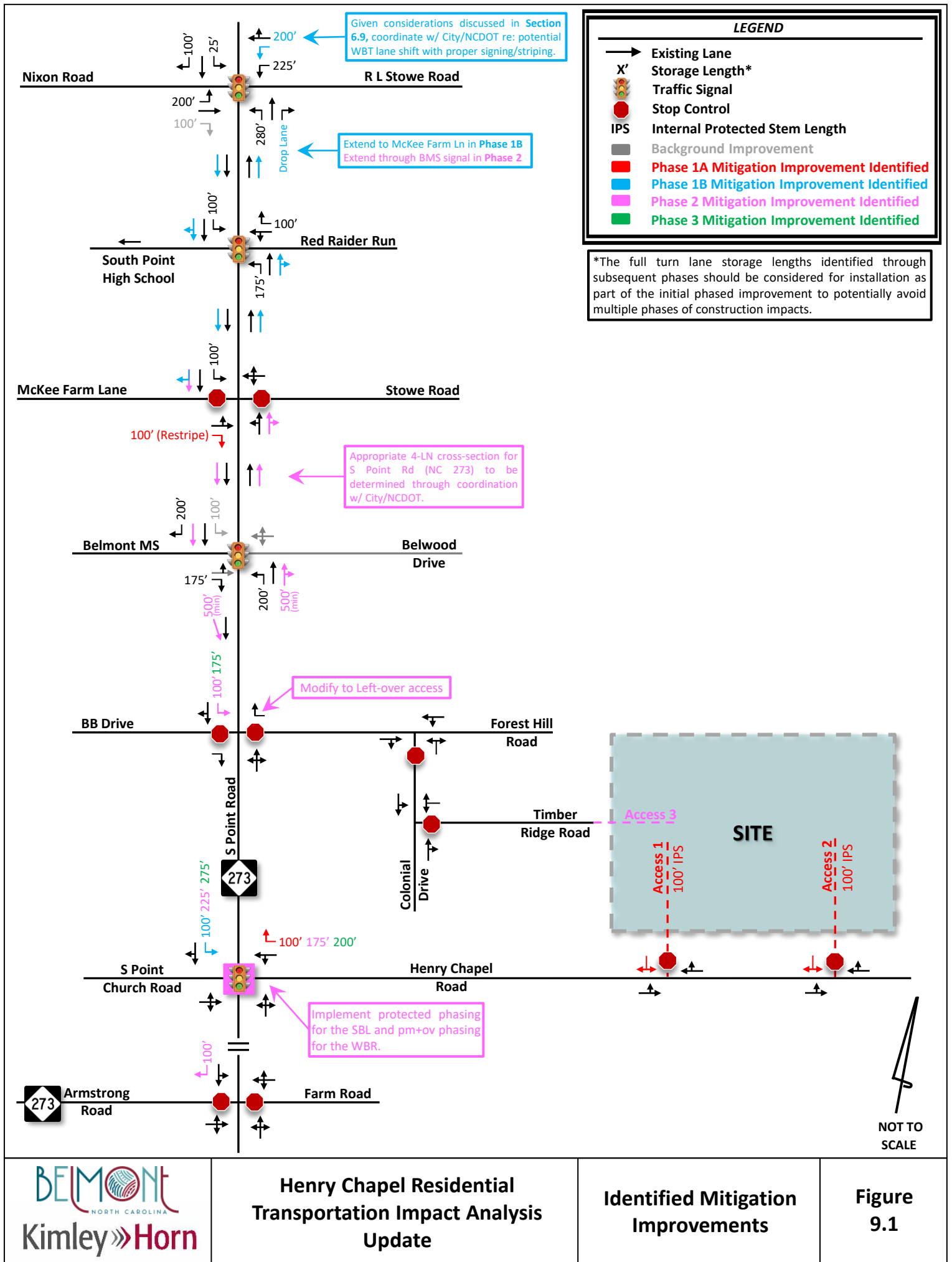
- Extension of the westbound right-turn storage along Henry Chapel Road from 175' to 200'
- Extension of the southbound left-turn storage along S Point Road (NC 273) from 225' to 275'

The full turn-lane storage lengths identified for Phase 3 should be considered for installation as part of the applicable Phase 1A, Phase 1B or Phase 2 improvements to potentially avoid multiple phases of construction impacts.

Overall Corridor

Given the northbound and southbound through-lane capacity improvements identified to mitigate the impacts of the site along S Point Road (NC 273) between Belmont Middle School and R L Stowe Road, a four (4)-lane section is identified for mitigation. Further study will be required during the design and implementation phase to determine the preferred cross-section for this ~½-mile corridor.

The mitigation improvements identified within the study area are shown in **Figure 9.1**. The improvements shown on this figure are subject to approval by NCDOT and the City of Belmont. All additions and attachments to the State and City roadway system shall be properly permitted, designed, and constructed in conformance to standards maintained by the agencies.



APPENDIX