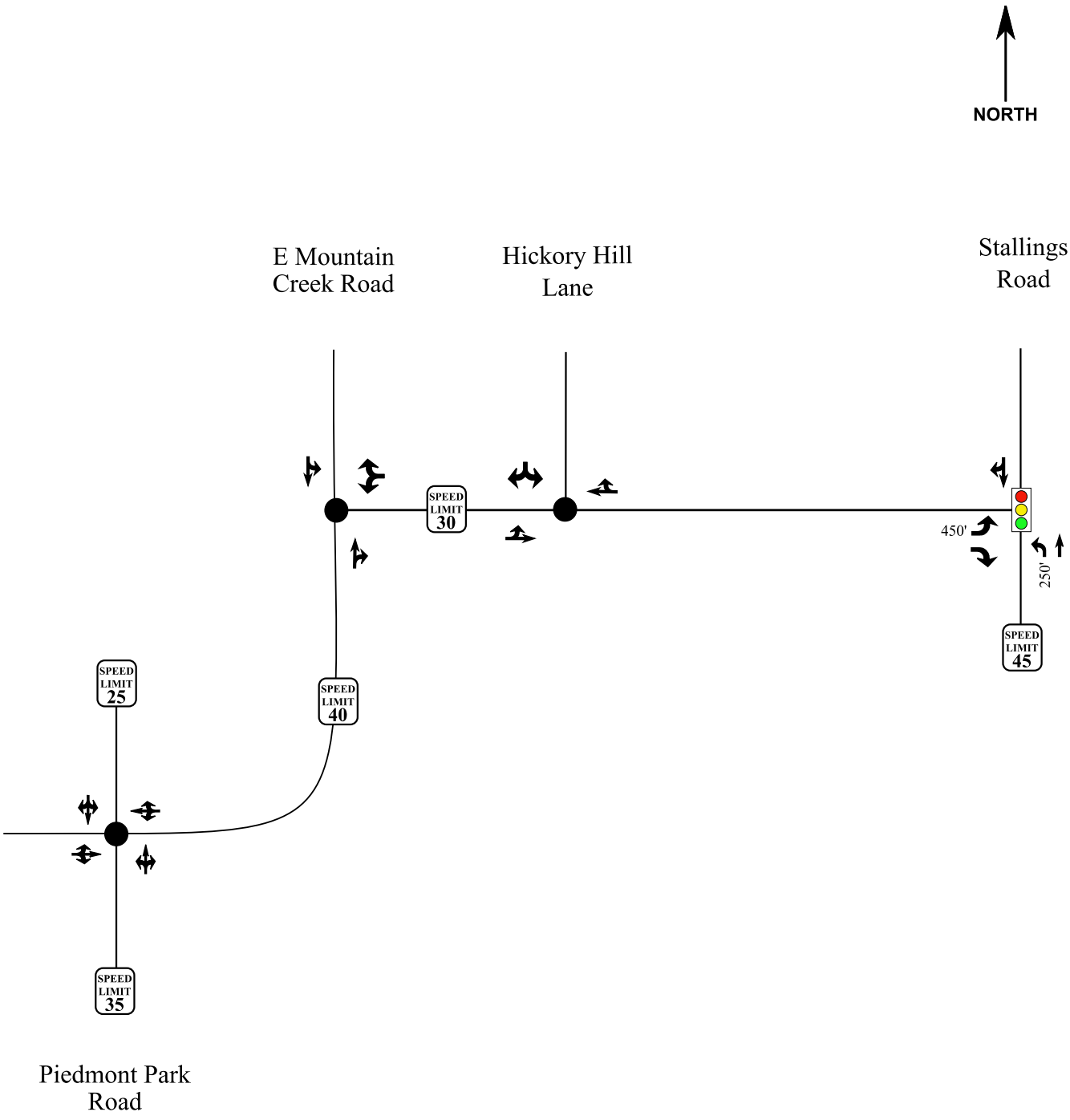

LEGEND

- Signalized Intersection
- Unsignalized Intersection
- Existing Lane
- X' Storage (In Feet)
- SPEED LIMIT XX Posted Speed Limit

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Existing Lane Configurations and Traffic Control

Scale: Not to Scale	Figure	3

2. TRAFFIC VOLUME DEVELOPMENT

2.1. Existing Traffic Volumes

Turning movement counts were conducted at the existing intersections on September 24th, 2020 during the weekday AM (7:00 AM to 9:00 AM) peak period and the weekday PM (4:00 PM to 6:00 PM) peak period. Per the memo from the SCDOT Director of Traffic Engineering data July 29th, 2020, a growth factor of 12% was applied to the raw count data to account for the lower traffic volumes due to the COVID-19 pandemic. Refer to Appendix A for the turning movement count data. The 2020 traffic volumes are illustrated in Figure 4.

2.2. Future No-Build Traffic Volumes

Based on coordination with SCDOT, a 2% annual growth was applied to the 2020 existing traffic volumes to develop the No-Build (2022) volumes. This growth rate was applied to account for all background growth in the area without any adjacent and/or the proposed developments. There were no adjacent developments identified to be included in the analysis. Refer to Figure 5 for an illustration of the No-Build (2022) traffic volumes at the study intersections.

2.3. Proposed Development Traffic Volumes

As mentioned previously, the proposed development is expected to consist of up to 83 single family residential units and 64 townhome units. The trip generation potential for the Shinnecock Hills development was estimated utilizing methodology contained within the ITE's *Trip Generation Manual*, 10th Edition. Utilizing ITE equations [for the peak hour of adjacent street traffic] and the number of dwelling units as the independent variable, traffic volumes for ITE Code 210 (Single-Family Detached Housing) and ITE Code 220 [Multifamily Housing (Low Rise)] were generated for the weekday daily, the weekday AM peak hour, and the weekday PM peak hour. Refer to Table 2 for a summary of the trip generation potential of the proposed development.

Table 2 – Trip Generation

ITE Land Use (Code)	Density	Independent Variable	Daily Traffic	AM Peak		PM Peak	
				Enter	Exit	Enter	Exit
Single-Family Detached Housing (ITE Code 210)	83	Dwelling Units	876	16	48	54	31
Multifamily Housing (Low-Rise) (ITE Code 220)	64	Dwelling Units	443	7	24	25	15
Total			1,319	23	72	79	46

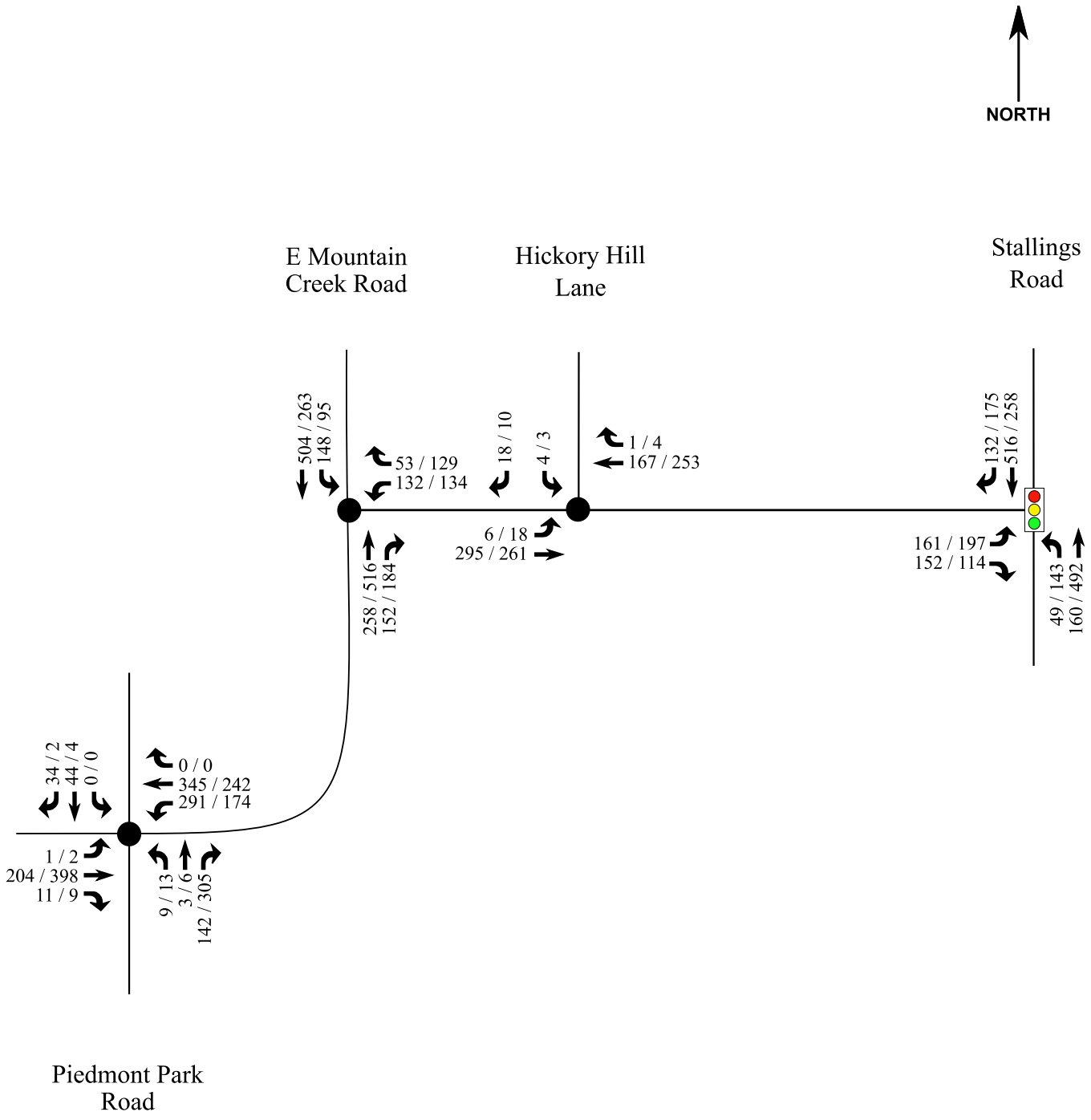
Site traffic associated with the proposed development was distributed and assigned to the roadway network based upon existing travel patterns and are summarized below:

- 20% to/from the north via Stallings Road
- 65% to/from the south via Stallings Road
- 5% to/from the north via E Mountain Creek Road
- 5% to/from the west via E Mountain Creek Road
- 5% to/from the south via Piedmont Park Road

Refer to Figures 6 and 7 for the site trip distribution and assignment, respectively.

2.4. Future Build Traffic Volumes

The site generated traffic volumes were added to the No-Build (2022) traffic volumes to determine the Build (2022) volumes. The Build (2022) volumes are illustrated in Figure 8.



LEGEND

- Signalized Intersection
- Unsignalized Intersection
- X / Y → AM / PM Peak Hour Traffic

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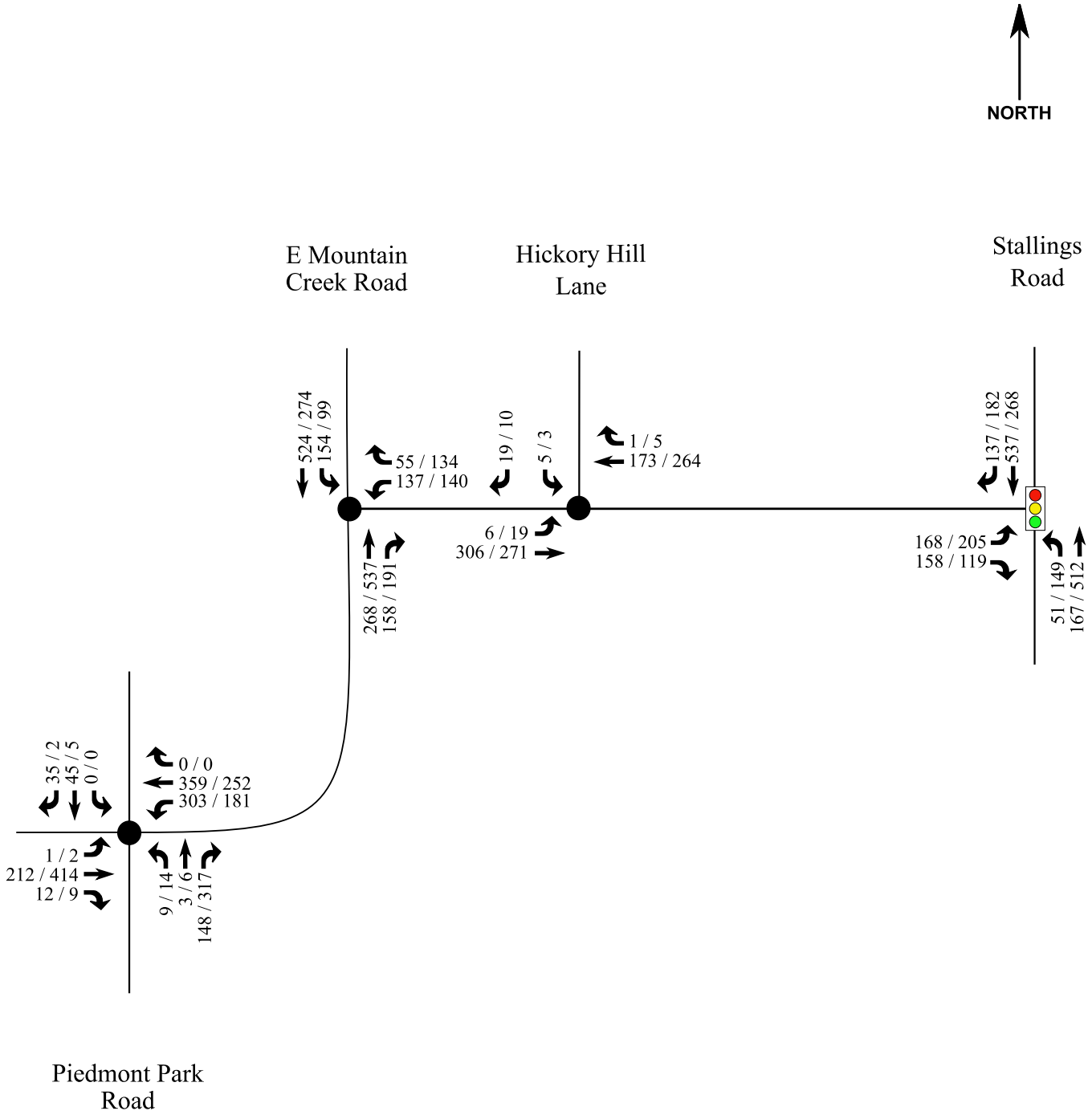
Greenville County, SC

Existing (2020)
Traffic Volumes

Scale: Not to Scale	Figure	4



LEGEND

- Signalized Intersection
- Unsignalized Intersection
- X / Y → AM / PM Peak Hour Traffic

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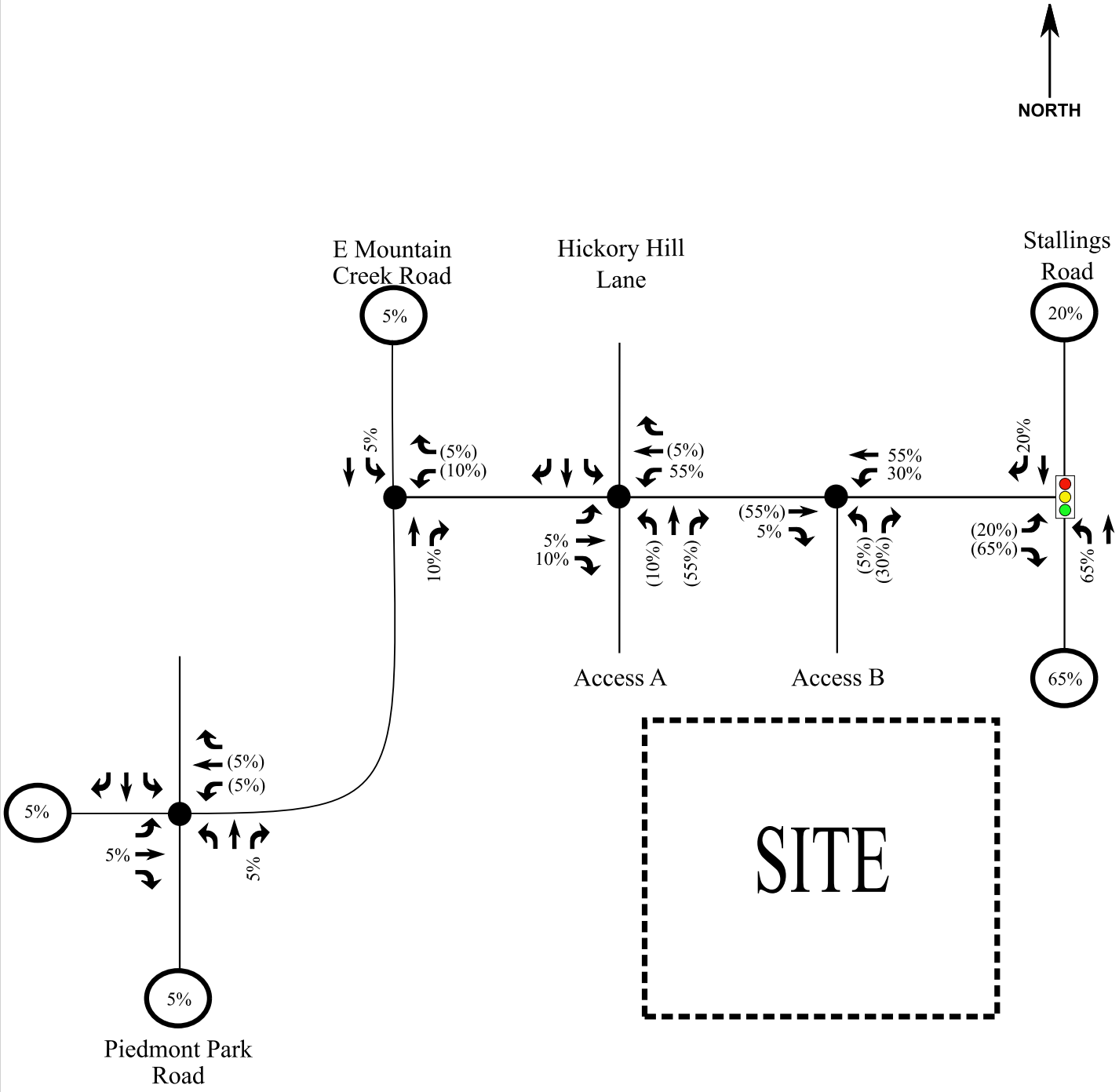
No-Build (2022)
Traffic Volumes

Scale: Not to Scale	Figure	5



LEGEND

- Signalized Intersection
- Unsignalized Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- X% Regional Trip Distribution

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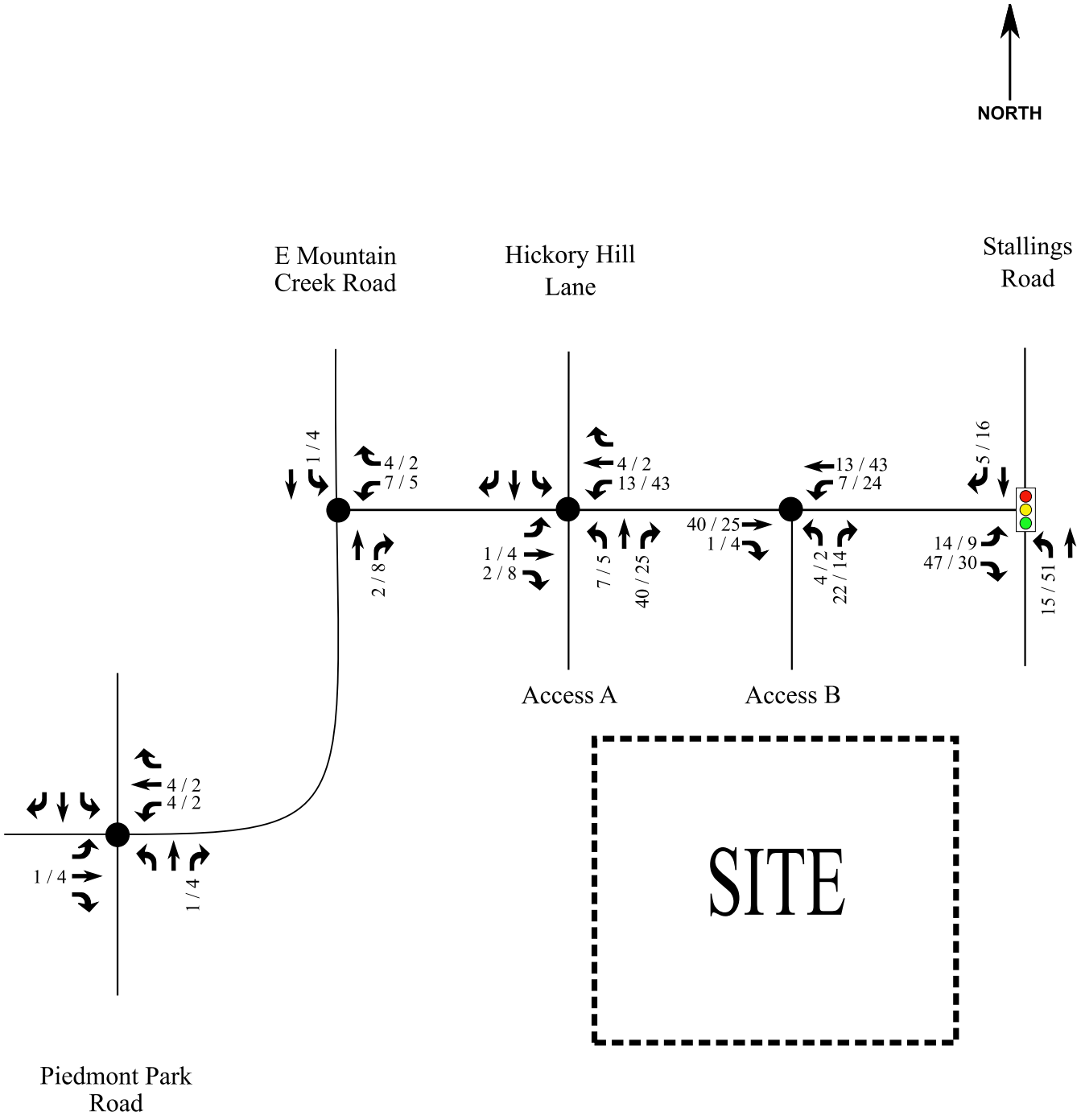
Site Trip Distribution

Scale: Not to Scale	Figure	6



LEGEND

- Signalized Intersection
- Unsignalized Intersection
- X / Y → AM / PM Peak Hour Traffic

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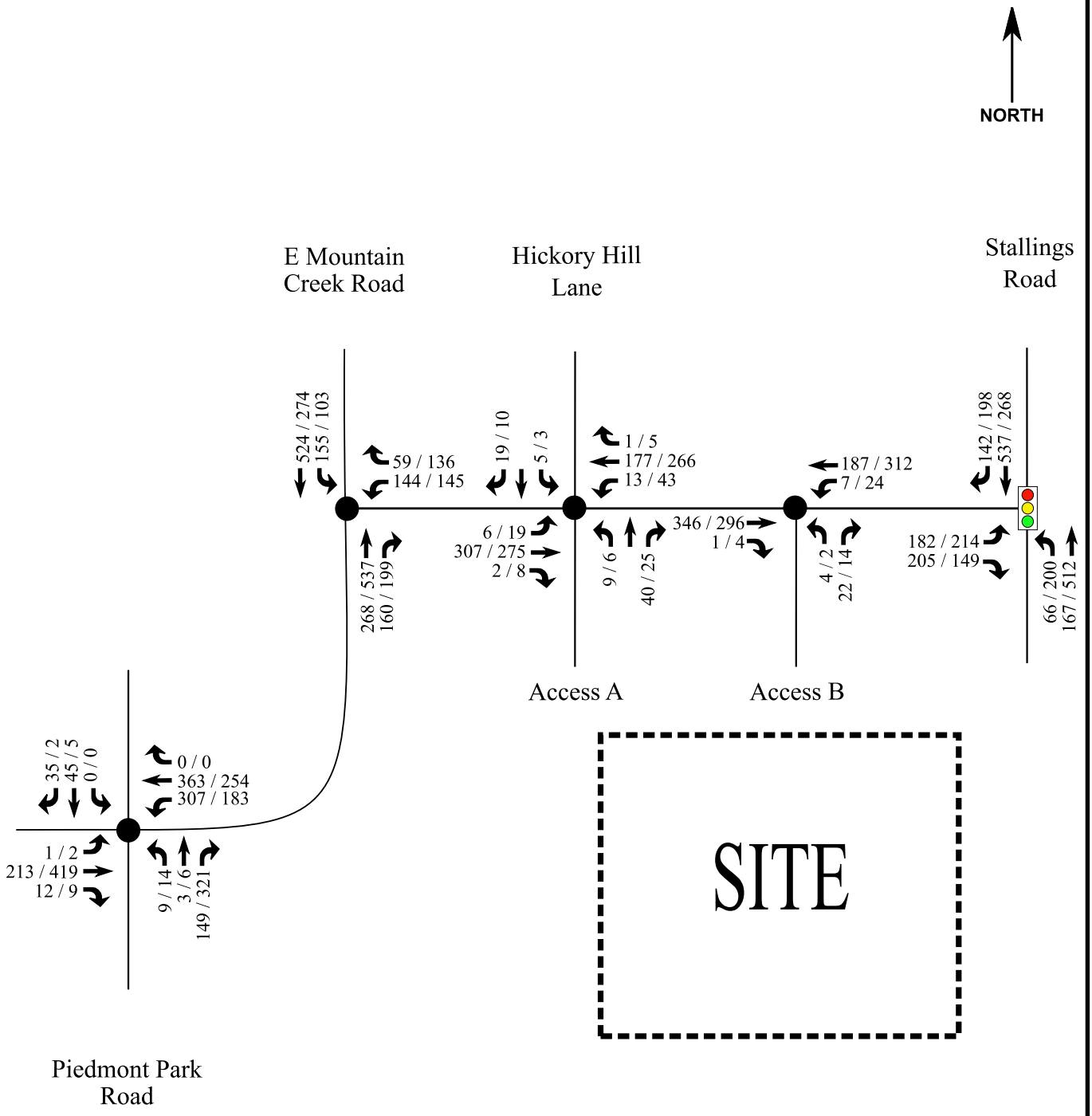
Site Trip Assignment

Scale: Not to Scale	Figure	7



LEGEND

- Signalized Intersection
- Unsignalized Intersection
- X / Y → AM / PM Peak Hour Traffic

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Build (2022)
Traffic Volumes

Scale: Not to Scale	Figure	8

3. TRAFFIC IMPACT ANALYSIS

3.1. Turn Lane Analysis

A left turn lane analysis was conducted utilizing the Build (2022) volumes at both access drives. The volumes depicted on Figure 15.5G from the SCDOT Highway Design Manual can be found in Appendix B. Based on the volumes, left turn lanes are not recommended at Site Access A or Site Access B.

3.2. Intersection LOS Analysis

Using the existing [Figure 4], no-build [Figure 5], and build [Figure 8] traffic volumes, intersection analyses were conducted for the study intersections under Existing (2020) conditions, No-Build (2022) conditions, and Build (2022) conditions. This analysis was conducted using the Transportation Research Board's *Highway Capacity Manual 2010 (HCM 2010)* methodologies of the *Synchro*, Version 10 software. The existing signal plan and timing information can be found in Appendix B.

Intersection level of service (LOS) grades range from LOS A to LOS F, which are directly related to the level of control delay at the intersection and characterize the operational conditions of the intersection traffic flow. LOS A operations typically represent ideal, free-flow conditions where vehicles experience little to no delays, and LOS F operations typically represent poor, forced-flow (bumper-to-bumper) conditions with high vehicular delays, and are generally considered undesirable. Table 3 summarizes the *HCM 2010* control delay thresholds associated with each LOS grade for signalized and unsignalized intersections.

Table 3 – *HCM 2010* LOS Criteria for Signalized & Unsignalized Intersections

Signalized Intersections		Unsignalized Intersections	
LOS	**Control Delay per Vehicle (seconds)**	**LOS**	**Control Delay per Vehicle (seconds)**
A	≤ 10	A	≤ 10
B	> 10 and ≤ 20	B	> 10 and ≤ 15
C	> 20 and ≤ 35	C	> 15 and ≤ 25
D	> 35 and ≤ 55	D	> 25 and ≤ 35
E	> 55 and ≤ 80	E	> 35 and ≤ 50
F	> 85	F	> 50

A PHF of 0.90 was applied and a heavy vehicle percentage of 2% was utilized for the purpose of this analysis.

The results of the capacity analysis for the study intersections under existing traffic control are summarized in Table 4 and Table 5.

Table 4 – Signalized Intersection Analysis Results

Intersection	Approach	LOS (Delay in seconds)					
		Existing (2020) Conditions		No-Build (2022) Conditions		Build (2022) Conditions	
		AM	PM	AM	PM	AM	PM
W Mountain Creek Church Road & Stallings Road	EB	C (19.5)	B (15.6)	C (20.0)	B (16.3)	C (22.5)	B (18.6)
	NB	A (6.5)	B (10.6)	A (6.8)	B (11.3)	A (7.3)	B (11.8)
	SB	B (12.8)	B (10.1)	B (13.9)	B (10.6)	B (13.9)	B (10.2)
	Overall	**B (13.5)**	**B (11.6)**	**B (14.3)**	**B (12.2)**	**B (15.3)**	**B (12.9)**

Capacity analysis indicates the signalized intersection is expected to operate at LOS B during both peak hour for all existing and future year scenarios. The addition of the development traffic is expected to have minimal impacts on the operations of the signal. Refer to Appendix C for more detailed capacity analysis reports for the unsignalized intersections.

Table 5 – Unsignalized Intersection Analysis Results

Intersection	Approach	LOS (Delay in seconds)					
		Existing (2020) Conditions		No-Build (2021) Conditions		Build (2021) Conditions	
		AM	PM	AM	PM	AM	PM
E Mountain Creek Road & W Mountain Creek Church Road	WB[1]	F (138.1)	F (143.4)	F (194.9)	F (197.7)	F (220.9)	F (225.1)
	NB	-	-	-	-	-	-
	SB[2]	A (8.8)	A (9.9)	A (8.9)	B (10.1)	A (8.9)	B (10.2)
Piedmont Park Road & E Mountain Creek Road	EB	B (12.5)	C (23.6)	B (12.8)	D (28.8)	B (12.9)	D (30.0)
	WB	F (64.1)	D (25.3)	F (81.3)	D (31.3)	F (86.2)	D (32.8)
	NB	B (11.6)	C (16.9)	B (12.0)	C (19.0)	B (12.0)	C (19.6)
	SB	B (10.9)	B (10.6)	B (11.2)	B (11.0)	B (11.2)	B (11.1)
W Mountain Creek Church Road & Hickory Lane / Access A	EB[2]	A (7.6)	A (7.9)	A (7.6)	A (7.9)	A (7.6)	A (7.9)
	WB[2]	-	-	-	-	A (8.0)	A (8.0)
	NB[1]	-	-	-	-	B (11.4)	B (11.4)
	SB[1]	A (9.9)	B (10.6)	B (10.1)	B (10.1)	B (10.6)	B (11.7)
W Mountain Creek Road & Access B	EB	-	-	-	-	-	-
	WB[2]	-	-	-	-	A (8.1)	A (8.0)
	NB[1]	-	-	-	-	B (11.1)	B (10.8)

1. *Indicates the stop-controlled approach*
2. *Indicates the delay and LOS reported is the left turn movement's*

Capacity analysis indicates that stop-controlled westbound approach at the intersection of E Mountain Creek Road and W Mountain Creek Church Road is expected to operate at LOS F and experience significant delays

during both peak hours for all scenarios. The addition of the site traffic is expected to increase delay by 13% during the AM peak hour and 14% during the PM peak hour on the westbound approach.

The westbound approach of the all way stop controlled intersection of Piedmont Park Road and E Mountain Creek Road is expected to operate at LOS F during both peak hours for all scenarios. Under the Build AM conditions the EB, NB, and SB approaches are expected to operate at LOS B. From the No-Build PM to the Build PM conditions, the LOS for each approach is expected to remain consistent. The addition of site traffic is expected to have minimal impact to the intersection of Piedmont Park Road and E Mountain Creek Road

Both site accesses and the opposing stop-controlled approaches are expected to operate at acceptable LOS for the Build conditions. Refer to Appendix D for more detailed capacity analysis reports for the unsignalized intersections.

At the request of SCDOT, a traffic signal warrant analysis was performed at the intersection of E Mountain Creek Road and W Mountain Creek Church Road. The Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) has national standardized criteria for determining the warrants for traffic signals. Some warrants are based on actual or historical data such as accident history, pedestrian activity, or minor street delay. Other warrants compare the major street and minor street volumes to volume thresholds for various lengths of time for an average weekday.

Signal warrants criteria are based primarily on traffic volumes and vary based on the number of travel lanes on both the major and minor streets and the travel speed on the major street. A full 13-hour traffic count was conducted at the intersection on September 24th. The analysis reviewed MUTCD's Eight Hour Warrant (Warrant 1), Four Hour Warrant (Warrant 2), and Peak Hour Warrant (Warrant 3).

Based on the results of the signal warrant analysis, a signal would be warranted under existing conditions [Warrant 1-3]. Since the signal was warranted under existing conditions no additional analysis was conducted. Refer to Appendix E for detailed information related to the signal warrant analysis.

Since the signal is warranted under existing conditions and the residential development is adding only 20% of site traffic to this intersection (~20 peak hour trips), it is not recommended for the developer to install a traffic signal at this intersection.

4. SUMMARY OF FINDINGS AND RECOMMENDATIONS

A traffic impact study was conducted for the proposed Shinnecock Hills development in accordance South Carolina Department of Transportation (SCDOT) guidelines. The proposed development is located on the

south side of W Mountain Creek Church Road west of Stallings Road in Greenville County, South Carolina. The development is expected to consist of up to 83 single family dwelling units and 64 townhomes.

Access to the development is proposed via two full movement driveways. Access A is proposed on W Mountain Creek Church Road across from Hickory Hill Lane. Access B is proposed on W Mountain Creek Church Road 425 feet east of Access A. The site is expected to be constructed by the year 2022.

The study area was determined through coordination with SCDOT and consists of the following intersections:

- W Mountain Creek Church Road & Stallings Road
- W Mountain Creek Church Road & E Mountain Creek Road
- E Mountain Creek Road & Piedmont Park Road
- W Mountain Creek Church Road & Hickory Hill Lane / Access A
- W Mountain Creek Road & Access B

For the purpose of this analysis, the study intersections listed above were analyzed under the following scenarios:

- Existing (2020) Conditions
- No-Build (2022) Conditions
- Build (2022) Conditions

Traffic operations during the AM and PM peak hours were modeled for each scenario. The results of each scenario were compared in order to determine impacts from background traffic growth and the proposed development.

At the request of SCDOT, a traffic signal warrant analysis was performed at the intersection of E Mountain Creek Road and W Mountain Creek Church Road. Based on the results of the signal warrant analysis, a signal would be warranted under existing conditions [Warrant 1-3]. Since the signal was warranted under existing conditions no additional analysis was conducted. Since the signal is warranted under existing conditions and the residential development is adding only 20% of site traffic to this intersection (~20 peak hour trips), it is not recommended for the developer to install a traffic signal at this intersection.

4.1. Recommendations

Based on the analysis results, minor impacts can be expected by the proposed development. The following improvements are recommended to be completed by the developer:

W Mountain Creek Church Road & Stallings Road

- No recommendations.

W Mountain Creek Church Road & E Mountain Creek Road

- No recommendations.

E Mountain Creek Road & Piedmont Park Road

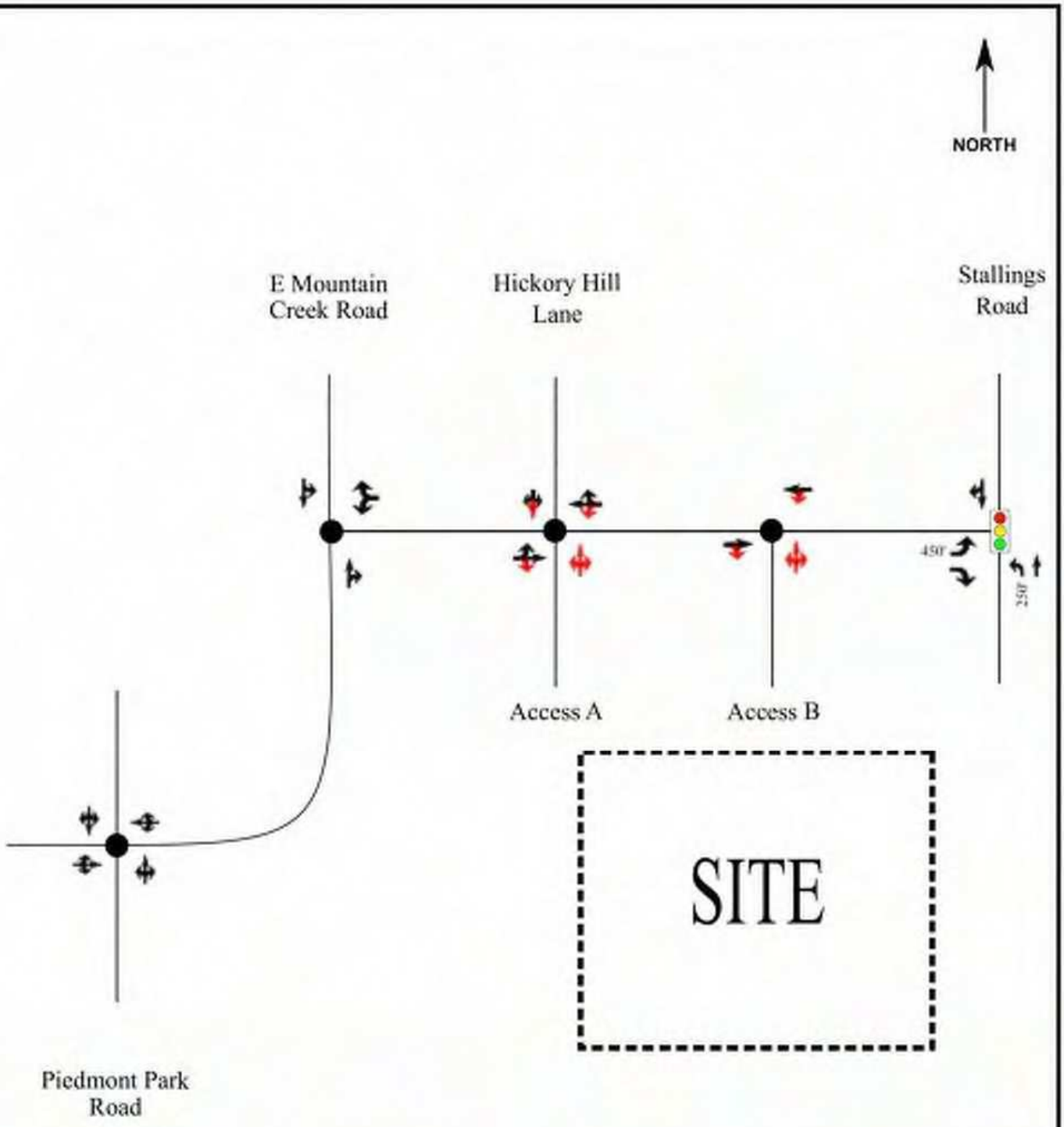
- No recommendations.

W Mountain Creek Church Road & Hickory Hill Lane / Access A

- Construct access with one ingress lane and one egress lanes (left-thru-right).

W Mountain Creek Road & Access B

- Construct access with one ingress lane and one egress lanes (left-thru-right).



LEGEND

- Signalized Intersection
- Unsignalized Intersection
- Existing Lane (Proposed)
- X' Storage (In Feet)

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Greenville County, SC

Proposed Lane Configurations and Traffic Control

Scale: Not to Scale	Figure	9

TECHNICAL APPENDIX