

**APPENDIX H
TRAFFIC IMPACT ANALYSIS**

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Foreign Affairs Security Training Center [FASTC] at Fort Pickett

Nottoway County, Virginia

Traffic Impact Analysis
for Environmental Impact Statement

October 8, 2012

Prepared For:

Cardno TEC



TIMMONS GROUP

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TABLE OF CONTENTS

TABLE OF CONTENTS	i
APPENDICES	iv
LIST OF TABLES	v
LIST OF FIGURES	vii
1 INTRODUCTION	1-1
1.1 REPORT PURPOSE AND STUDY OBJECTIVES.....	1-1
1.2 EXECUTIVE SUMMARY.....	1-1
1.2.1 <i>Site Location and Study Area</i>	1-1
1.2.2 <i>Proposed Development</i>	1-2
1.2.3 <i>Principal Findings</i>	1-3
1.2.4 <i>Recommendations</i>	1-7
1.2.5 <i>Conclusions</i>	1-9
2 BACKGROUND INFORMATION	2-1
2.1 DESCRIPTION OF ON-SITE DEVELOPMENT	2-1
2.2 STUDY AREA LIMITS	2-2
2.3 EXISTING AND PROPOSED SITE USES	2-2
2.4 EXISTING ROADWAY NETWORK	2-3
2.5 PROGRAMMED ROADWAY IMPROVEMENTS.....	2-4
3 EXISTING CONDITIONS ANALYSIS	3-1
3.1 EXISTING TRAFFIC VOLUMES.....	3-1
3.2 CAPACITY ANALYSES	3-2
3.3 PEDESTRIAN AND BICYCLE FACILITIES AND BUS ROUTE ANALYSES.....	3-6
3.4 SPEED STUDY	3-6
3.5 CRASH HISTORY NEAR SITE.....	3-6
3.6 SIGHT DISTANCE EVALUATION	3-6
4 FUTURE NO BUILD CONDITIONS ANALYSIS (WITHOUT DEVELOPMENT)	4-1
4.1 FUTURE NO BUILD TRAFFIC VOLUMES	4-1
4.2 CAPACITY ANALYSES	4-1
4.2.1 <i>2017 No Build Traffic Volumes</i>	4-2
4.2.2 <i>2020 No Build Traffic Volumes</i>	4-4

4.3 TURN LANE ANALYSES.....4-6

4.4 TRAFFIC SIGNAL WARRANT ANALYSES.....4-9

4.5 PEDESTRIAN AND BICYCLE FACILITIES AND BUS ROUTE ANALYSES.....4-9

5 TRIP GENERATION5-1

6 SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT6-1

6.1 TRIP DISTRIBUTION METHODOLOGY6-1

6.2 TRAFFIC ASSIGNMENT6-1

7 FUTURE BUILD CONDITIONS ANALYSIS (WITH DEVELOPMENT).....7-1

7.1 FUTURE BUILD CONDITIONS TRAFFIC VOLUMES.....7-1

7.2 CAPACITY ANALYSES.....7-1

 7.2.1 2017 Build Alternative 1 Traffic Volumes.....7-2

 7.2.2 2020 Build Alternative 1 Traffic Volumes.....7-4

 7.2.3 2017 Build Alternative 1 Traffic Volumes with Mitigation.....7-6

 7.2.4 2020 Build Alternative 1 Traffic Volumes with Mitigation.....7-8

 7.2.5 2017 Build Alternative 2 Traffic Volumes.....7-11

 7.2.6 2020 Build Alternative 2 Traffic Volumes.....7-13

 7.2.7 2017 Build Alternative 2 Traffic Volumes with Mitigation.....7-15

 7.2.8 2020 Build Alternative 2 Traffic Volumes with Mitigation.....7-17

7.3 TURN LANE ANALYSES.....7-20

 7.3.1 Build Alternative 1.....7-21

 7.3.2 Build Alternative 2.....7-23

7.4 TRAFFIC SIGNAL WARRANT ANALYSES.....7-25

 7.4.1 Build Alternative 1.....7-26

 7.4.2 Build Alternative 2.....7-27

7.5 FORT PICKETT MAIN GATE AND WEST GATE ANALYSES7-28

 7.5.1 Build Alternative 1.....7-29

 7.5.2 Build Alternative 2.....7-30

7.6 PEDESTRIAN AND BICYCLE FACILITIES AND BUS ROUTE ANALYSES.....7-31

8 RECOMMENDED IMPROVEMENTS.....8-1

8.1 PLANNED IMPROVEMENTS BY OTHERS8-1

8.2 PROPOSED FASTC MITIGATION MEASURES8-1

8.3	TRAVEL DEMAND MANAGEMENT MEASURES	8-2
8.4	CAPACITY ANALYSES OF FUTURE TRAFFIC VOLUMES.....	8-3
8.4.1	<i>US Route 460 at Cox Road/Yellowbird Road for Build Alternatives 1 and 2.....</i>	<i>8-3</i>
8.4.2	<i>Cox Road at Military Road for Build Alternatives 1 and 2.....</i>	<i>8-7</i>
8.4.3	<i>Darvills Road (VA Route 40) at Military Road for Build Alternatives 1 and 2.....</i>	<i>8-11</i>
8.4.4	<i>Military Road at FASTC Main Campus/West 10th Street for Build Alternative 2.....</i>	<i>8-15</i>
8.4.5	<i>Military Road at West Entrance Road for Build Alternative 1.....</i>	<i>8-17</i>
8.5	TURN LANE ANALYSES.....	8-19
8.6	TRAFFIC SIGNAL WARRANT ANALYSES.....	8-20
9	CONCLUSIONS	9-1
9.1	KEY FINDINGS.....	9-1
9.2	RECOMMENDATIONS	9-5
9.3	CONCLUSIONS.....	9-7

APPENDICES

Appendix A – TIA Scoping Documents

Appendix B – Traffic Counts

Appendix C – Town of Blackstone Traffic Signal Timings

Appendix D – Synchro[®] Analysis of 2012 Existing Conditions (on CD)

Appendix E – Synchro[®] Analysis of 2017 No Build Conditions (on CD)

Appendix F – Synchro[®] Analysis of 2020 No Build Conditions (on CD)

Appendix G – Turn Lane Analysis for 2017 No Build Conditions

Appendix H – Turn Lane Analysis for 2020 No Build Conditions

Appendix I – Supporting Data for Trip Distribution Methodology

Appendix J – Percentage of Heavy Vehicle Calculations for Build Conditions

Appendix K - Synchro[®] Analysis of 2017 Build Alternative 1 Conditions (on CD)

Appendix L - Synchro[®] Analysis of 2020 Build Alternative 1 Conditions (on CD)

Appendix M - Synchro[®] Analysis of 2017 Build Alternative 2 Conditions (on CD)

Appendix N - Synchro[®] Analysis of 2020 Build Alternative 2 Conditions (on CD)

Appendix O – Turn Lane Analysis for 2017 Build Alternative 1 Conditions

Appendix P – Turn Lane Analysis for 2020 Build Alternative 1 Conditions

Appendix Q – Turn Lane Analysis for 2017 Build Alternative 2 Conditions

Appendix R – Turn Lane Analysis for 2020 Build Alternative 2 Conditions

Appendix S – Traffic Signal Warrants for 2017 Build Alternative 1 Conditions

Appendix T – Traffic Signal Warrants for 2020 Build Alternative 1 Conditions

Appendix U – Traffic Signal Warrants for 2017 Build Alternative 2 Conditions

Appendix V – Traffic Signal Warrants for 2020 Build Alternative 2 Conditions

Appendix W – VAARNG Gate Count Data

LIST OF TABLES

TABLE 1-1: LOS FOR 2020 VOLUMES WITHOUT AND WITH RECOMMENDED MITIGATION MEASURES.....	1-5
TABLE 1-2: SUMMARY OF RECOMMENDED MITIGATION MEASURES FOR 2017 VOLUMES	1-7
TABLE 1-2: SUMMARY OF RECOMMENDED MITIGATION MEASURES FOR 2020 VOLUMES	1-8
TABLE 3-1: LEVEL OF SERVICE DEFINITIONS	3-2
TABLE 3-2: LEVEL OF SERVICE CRITERIA.....	3-3
TABLE 3-3: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2012 EXISTING TRAFFIC VOLUMES	3-5
TABLE 4-1: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2017 NO BUILD TRAFFIC VOLUMES	4-3
TABLE 4-2: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2020 NO BUILD TRAFFIC VOLUMES	4-5
TABLE 4-3: VDOT LEFT AND RIGHT TURN LANE CRITERIA.....	4-6
TABLE 4-4: TURN LANE ANALYSES SUMMARY 2017 AND 2020 NO BUILD TRAFFIC VOLUMES.....	4-8
TABLE 5-1: TRIP GENERATION SUMMARY	5-1
TABLE 7-1: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2017 BUILD ALTERNATIVE 1 TRAFFIC VOLUMES	7-3
TABLE 7-2: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2020 BUILD ALTERNATIVE 1 TRAFFIC VOLUMES	7-5
TABLE 7-3: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2017 BUILD ALTERNATIVE 1 TRAFFIC VOLUMES WITH MITIGATION.....	7-7
TABLE 7-4: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2020 BUILD ALTERNATIVE 1 TRAFFIC VOLUMES WITH MITIGATION.....	7-10
TABLE 7-5: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2017 BUILD ALTERNATIVE 2 TRAFFIC VOLUMES	7-12
TABLE 7-6: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2020 BUILD ALTERNATIVE 2 TRAFFIC VOLUMES	7-14
TABLE 7-7: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2017 BUILD ALTERNATIVE 2 TRAFFIC VOLUMES WITH MITIGATION.....	7-16
TABLE 7-8: INTERSECTION DELAY AND LEVEL OF SERVICE SUMMARY 2020 BUILD ALTERNATIVE 2 TRAFFIC VOLUMES WITH MITIGATION.....	7-19
TABLE 7-9: TURN LANE ANALYSES SUMMARY 2017 AND 2020 BUILD ALTERNATIVE 1 TRAFFIC VOLUMES	7-22
TABLE 7-10: TURN LANE ANALYSES SUMMARY 2017 AND 2020 BUILD ALTERNATIVE 2 TRAFFIC VOLUMES	7-24
TABLE 7-11: TRAFFIC SIGNAL WARRANT ANALYSES SUMMARY 2017 AND 2020 BUILD ALTERNATIVE 1 TRAFFIC VOLUMES.....	7-26
TABLE 7-12: TRAFFIC SIGNAL WARRANT ANALYSES SUMMARY 2017 AND 2020 BUILD ALTERNATIVE 2 TRAFFIC VOLUMES.....	7-27

LIST OF TABLES (CONTINUED)

TABLE 7-13: GATE VEHICLES PER HOUR PER LANE 2012 EXISTING AND 2017 AND 2020 NO BUILD TRAFFIC VOLUMES	7-28
TABLE 7-14: GATE STAFFING LEVELS BY LANE 2012 EXISTING AND 2017 AND 2020 NO BUILD	7-28
TABLE 7-15: GATE VEHICLES PER HOUR PER LANE 2017 AND 2020 BUILD ALTERNATIVE 1 FASTC SITE TRIPS	7-29
TABLE 7-16: GATE VEHICLES PER HOUR PER LANE 2017 AND 2020 BUILD ALTERNATIVE 1 TOTAL TRAFFIC VOLUMES	7-29
TABLE 7-17: GATE STAFFING LEVELS BY LANE 2017 AND 2020 BUILD ALTERNATIVE 1 TOTAL TRAFFIC VOLUMES	7-29
TABLE 7-18: GATE VEHICLES PER HOUR PER LANE 2017 AND 2020 BUILD ALTERNATIVE 2 FASTC SITE TRIPS	7-30
TABLE 7-19: GATE VEHICLES PER HOUR PER LANE 2017 AND 2020 BUILD ALTERNATIVE 2 TOTAL TRAFFIC VOLUMES	7-30
TABLE 7-20: GATE STAFFING LEVELS BY LANE 2017 AND 2020 BUILD ALTERNATIVE 2 TOTAL TRAFFIC VOLUMES	7-31
TABLE 8-1: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 1 US ROUTE 460 AT COX ROAD/YELLOWBIRD ROAD.....	8-4
TABLE 8-2: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 2 US ROUTE 460 AT COX ROAD/YELLOWBIRD ROAD.....	8-6
TABLE 8-3: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 1 COX ROAD AT MILITARY ROAD	8-8
TABLE 8-4: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 2 COX ROAD AT MILITARY ROAD	8-10
TABLE 8-5: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 1 DARVILLS ROAD (VA ROUTE 40) AT MILITARY ROAD	8-12
TABLE 8-6: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 2 DARVILLS ROAD (VA ROUTE 40) AT MILITARY ROAD	8-14
TABLE 8-7: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 2 MILITARY ROAD AT FASTC/WEST 10 TH STREET.....	8-16
TABLE 8-8: LEVEL OF SERVICE AND DELAY COMPARISON BUILD ALTERNATIVE 1 MILITARY ROAD AT WEST ENTRANCE ROAD	8-18
TABLE 9-1: LOS FOR 2020 VOLUMES WITHOUT AND WITH RECOMMENDED MITIGATION MEASURES.....	9-4
TABLE 9-2: SUMMARY OF RECOMMENDED MITIGATION MEASURES FOR 2017 VOLUMES	9-5
TABLE 9-3: SUMMARY OF RECOMMENDED MITIGATION MEASURES FOR 2020 VOLUMES	9-6

LIST OF FIGURES

- FIGURE 1-1: FASTC SITE LOCATION WITHIN FORT PICKETT
- FIGURE 1-2: STUDY INTERSECTIONS AND DATA COLLECTION LOCATIONS
- FIGURE 1-3: FASTC EIS BUILD ALTERNATIVE 1
- FIGURE 1-4: FASTC EIS BUILD ALTERNATIVE 2
- FIGURE 1-5: BUILD ALTERNATIVE 1 2017 GEOMETRY WITH MITIGATION
- FIGURE 1-6: BUILD ALTERNATIVE 2 2017 GEOMETRY WITH MITIGATION
- FIGURE 1-7: BUILD ALTERNATIVE 1 2020 GEOMETRY WITH MITIGATION
- FIGURE 1-8: BUILD ALTERNATIVE 2 2020 GEOMETRY WITH MITIGATION
- FIGURE 2-1: FASTC SITE LOCATION WITHIN FORT PICKETT
- FIGURE 2-2: FASTC SITE LOCATION WITHIN REGION
- FIGURE 2-3: STUDY INTERSECTIONS AND DATA COLLECTION LOCATIONS
- FIGURE 2-4: FASTC EIS BUILD ALTERNATIVE 1
- FIGURE 2-5: FASTC EIS BUILD ALTERNATIVE 2
- FIGURE 2-6: 2012 EXISTING GEOMETRY
- FIGURE 2-7: POSTED SPEED LIMITS
- FIGURE 2-8: FUNCTIONAL CLASSIFICATION MAP
- FIGURE 2-9: VDOT SECONDARY ROADS WITHIN FORT PICKETT
- FIGURE 2-10: VDOT US ROUTE 460 BUSINESS BRIDGE REPLACEMENT PROJECT DETAILS
- FIGURE 3-1: 2012 EXISTING AM PEAK HOUR VOLUMES
- FIGURE 3-2: 2012 EXISTING PM PEAK HOUR VOLUMES
- FIGURE 3-3: 2012 EXISTING VOLUMES LEVELS OF SERVICE
- FIGURE 3-4: BLACKSTONE AREA BUS SYSTEM BABS LINE ROUTE INFORMATION
- FIGURE 4-1: 2017 NO BUILD AM PEAK HOUR TRAFFIC VOLUMES
- FIGURE 4-2: 2017 NO BUILD PM PEAK HOUR TRAFFIC VOLUMES
- FIGURE 4-3: 2020 NO BUILD AM PEAK HOUR TRAFFIC VOLUMES
- FIGURE 4-4: 2020 NO BUILD PM PEAK HOUR TRAFFIC VOLUMES
- FIGURE 4-5: 2017 NO BUILD VOLUMES LEVELS OF SERVICE
- FIGURE 4-6: 2020 NO BUILD VOLUMES LEVELS OF SERVICE
- FIGURE 6-1: 2017 BUILD ALTERNATIVE 1 TRIP DISTRIBUTION PERCENTAGES
- FIGURE 6-2: 2020 BUILD ALTERNATIVE 1 TRIP DISTRIBUTION PERCENTAGES
- FIGURE 6-3: 2017 BUILD ALTERNATIVE 2 TRIP DISTRIBUTION PERCENTAGES
- FIGURE 6-4: 2020 BUILD ALTERNATIVE 2 TRIP DISTRIBUTION PERCENTAGES
- FIGURE 6-5: 2017 BUILD ALTERNATIVE 1 FASTC SITE TRIPS AM PEAK HOUR VOLUMES
- FIGURE 6-6: 2017 BUILD ALTERNATIVE 1 FASTC SITE TRIPS PM PEAK HOUR VOLUMES
-
-

LIST OF FIGURES (CONTINUED)

FIGURE 6-7: 2020 BUILD ALTERNATIVE 1 FASTC SITE TRIPS AM PEAK HOUR VOLUMES
FIGURE 6-8: 2020 BUILD ALTERNATIVE 1 FASTC SITE TRIPS PM PEAK HOUR VOLUMES
FIGURE 6-9: 2017 BUILD ALTERNATIVE 2 FASTC SITE TRIPS AM PEAK HOUR VOLUMES
FIGURE 6-10: 2017 BUILD ALTERNATIVE 2 FASTC SITE TRIPS PM PEAK HOUR VOLUMES
FIGURE 6-11: 2020 BUILD ALTERNATIVE 2 FASTC SITE TRIPS AM PEAK HOUR VOLUMES
FIGURE 6-12: 2020 BUILD ALTERNATIVE 2 FASTC SITE TRIPS PM PEAK HOUR VOLUMES
FIGURE 7-1: 2017 NO BUILD AM PEAK HOUR TRAFFIC VOLUMES REROUTED
FIGURE 7-2: 2017 NO BUILD PM PEAK HOUR TRAFFIC VOLUMES REROUTED
FIGURE 7-3: 2020 NO BUILD AM PEAK HOUR TRAFFIC VOLUMES REROUTED
FIGURE 7-4: 2020 NO BUILD PM PEAK HOUR TRAFFIC VOLUMES REROUTED
FIGURE 7-5: 2017 BUILD ALTERNATIVE 1 TOTAL AM PEAK HOUR VOLUMES
FIGURE 7-6: 2017 BUILD ALTERNATIVE 1 TOTAL PM PEAK HOUR VOLUMES
FIGURE 7-7: 2020 BUILD ALTERNATIVE 1 TOTAL AM PEAK HOUR VOLUMES
FIGURE 7-8: 2020 BUILD ALTERNATIVE 1 TOTAL PM PEAK HOUR VOLUMES
FIGURE 7-9: 2017 BUILD ALTERNATIVE 2 TOTAL AM PEAK HOUR VOLUMES
FIGURE 7-10: 2017 BUILD ALTERNATIVE 2 TOTAL PM PEAK HOUR VOLUMES
FIGURE 7-11: 2020 BUILD ALTERNATIVE 2 TOTAL AM PEAK HOUR VOLUMES
FIGURE 7-12: 2020 BUILD ALTERNATIVE 2 TOTAL PM PEAK HOUR VOLUMES
FIGURE 7-13: BUILD ALTERNATIVE 1 GEOMETRY
FIGURE 7-14: 2017 BUILD ALTERNATIVE 1 VOLUMES LEVELS OF SERVICE
FIGURE 7-15: 2020 BUILD ALTERNATIVE 1 VOLUMES LEVELS OF SERVICE
FIGURE 7-16: BUILD ALTERNATIVE 1 2017 GEOMETRY WITH MITIGATION
FIGURE 7-17: 2017 BUILD ALTERNATIVE 1 VOLUMES LEVELS OF SERVICE WITH MITIGATION
FIGURE 7-18: BUILD ALTERNATIVE 1 2020 GEOMETRY WITH MITIGATION
FIGURE 7-19: 2020 BUILD ALTERNATIVE 1 VOLUMES LEVELS OF SERVICE WITH MITIGATION
FIGURE 7-20: BUILD ALTERNATIVE 2 GEOMETRY
FIGURE 7-21: 2017 BUILD ALTERNATIVE 2 VOLUMES LEVELS OF SERVICE
FIGURE 7-22: 2020 BUILD ALTERNATIVE 2 VOLUMES LEVELS OF SERVICE
FIGURE 7-23: BUILD ALTERNATIVE 2 2017 GEOMETRY WITH MITIGATION
FIGURE 7-24: 2017 BUILD ALTERNATIVE 2 VOLUMES LEVELS OF SERVICE WITH MITIGATION
FIGURE 7-25: BUILD ALTERNATIVE 2 2020 GEOMETRY WITH MITIGATION
FIGURE 7-26: 2020 BUILD ALTERNATIVE 2 VOLUMES LEVELS OF SERVICE WITH MITIGATION

1 INTRODUCTION

This report presents the findings of the traffic impact analysis (TIA) for a Foreign Affairs Security Training Center (FASTC) proposed to be developed by U.S. General Services Administration (GSA) and Department of State (DOS) in eastern Nottoway County. The site is located south of US Route 460 (West Colonial Trail Highway) between the Town of Blackstone and the Dinwiddie County Line. The FASTC site will be located within and adjacent to the Fort Pickett Army National Guard Maneuver Training Center (Fort Pickett), a 45,000-acre facility currently occupied by the Virginia Army National Guard (VAARNG).

1.1 REPORT PURPOSE AND STUDY OBJECTIVES

The purpose of this TIA is to determine the impacts of the proposed FASTC development on the transportation system as a technical study for an Environmental Impact Statement (EIS) being prepared by GSA. The TIA will also recommend improvements to lessen or negate the impacts of the proposed development. The objectives of the traffic study are as follows:

- Evaluate existing and future conditions without the proposed development in order to identify deficiencies in the existing roadway network as a result of background traffic growth.
- Evaluate future conditions with the proposed development in order to identify improvements that will lessen or negate the impacts of the proposed site on the transportation network.

This TIA has been prepared according to the procedures outlined in the Virginia Department of Transportation's (VDOT) Traffic Impact Regulations (henceforth referred to as Chapter 527). A VDOT TIA is not required for this project since the FASTC site will generate less than 5,000 vehicles per day at buildout in 2020, the threshold for a Chapter 527 study. The scope of the TIA was developed in conjunction with VDOT, the Town of Blackstone, VAARNG, GSA, and DOS. Copies of the TIA scoping documents are included in Appendix A.

1.2 EXECUTIVE SUMMARY

The purpose of the FASTC project is to establish a DOS Diplomatic Security consolidated training center that will provide hard and soft skills training for a diverse student population including foreign affairs staff, Diplomatic Security agents, Foreign Services officers, selected foreign law enforcement personnel, and other personnel in a wide array of law enforcement and security disciplines.

The FASTC project is expected to develop in three phases. Phase 1 will be completed in 2017 and Phase 2 will be completed in 2018 with full buildout of Phase 3 anticipated in 2020. Analyses were completed for Phase 1 (2017) and full buildout (2020). While additional facilities will be constructed in Phase 2, the number of instructors, staff and students will remain the same as in Phase 1. Since Phase 2 will not increase the number of FASTC site trips on the surrounding roadway network, it was not analyzed as part of this study.

1.2.1 Site Location and Study Area

The proposed FASTC site is located within and adjacent to Fort Pickett in eastern Nottoway County between the Town of Blackstone and the Dinwiddie County Line as indicated on Figure 1-1 (all figures are located at the end of the chapter after page 1-10).

The study area agreed upon by VDOT, the Town of Blackstone, VAARNG, GSA, and DOS includes the following intersections:

1. East Colonial Trail Highway (US Route 460) at Cox Road (US Route 460 Business)/Yellowbird Road (Route 609);
2. Cox Road (US Route 460 Business) at Military Road (Route 750);
3. Military Road (Route 750) at Darvills Road (VA Route 40);
4. Military Road at West 10th Street;
5. Military Road at West Entrance Road;
6. Military Road at Garnett Avenue;
7. Military Road at Dearing Avenue;
8. West 10th Street at Warehouse Street;
9. West Entrance Road (Route 643)/8th Street at South Main Street (VA Route 40/US Route 460 Business);
10. Church Street (US Route 460 Business) at South Main Street (VA Route 40/US Route 460 Business); and
11. Dinwiddie Avenue (VA Route 40) at Main Street (VA Route 40/US Route 460 Business)

The study intersections are indicated on Figure 1-2.

Two alternatives are being analyzed in the EIS. Build Alternative 1 would occupy the Nottoway County Local Reuse Authority (LRA) Parcel 9 and the Fort Pickett 21/20 Parcel. Build Alternative 2 would occupy LRA Parcel 9, LRA Parcel 10, the Fort Pickett 21 20 Parcel, and the Fort Pickett Grid Parcel. Build Alternatives 1 and 2 are shown on Figure 1-3 and 1-4, respectively. The proposed site accesses to the FASTC facilities for Build Alternatives 1 and 2 will also be included in the study.

1.2.2 Proposed Development

At full buildout in 2020, the proposed FASTC facility would train approximately 10,000 persons per year providing courses on a variety of subjects including firearms familiarization, explosives awareness, surveillance detection, antiterrorism driving, and security operations. The site will be comprised of the following uses:

- Administrative buildings including classrooms and laboratories for soft-skills training, administrative support office space, dining, and housing;
- Hard-skills buildings and training venues including driver training buildings and driving tracks, explosives and firearms training, tactical training buildings, and a vehicle maintenance shop;
- Infrastructure buildings including the data center; and
- Security buildings to provide access control to the FASTC facilities (in addition to the Fort Pickett gates).

At the completion of Phase 1 in 2017, the FASTC facilities would employ 533 persons and train approximately 400 students per day during peak periods (typically occurring during the summer months). In 2020 when the FASTC site is fully developed it is anticipated to employ 1,070 persons and train approximately 700 students per day during peak periods.

The distribution of the FASTC site traffic at the intersections in the study area was determined using data provided by the DOS and GSA along with employee surveys of VAARNG staff at Fort Pickett and FASTC staff anticipated to relocate to the Fort Pickett facility. The DOS and GSA anticipate that a majority of the students will be transported to the site by bus. Student from outside of the local area will be flown to either Ronald Reagan Washington National Airport or Dulles International Airport and then bused to the FASTC site. Local students will be bused directly from the Washington DC area. The overall trip distributions from the surrounding areas are as follows:

- 75% to/from the northeast via US Route 460 (Richmond and Washington DC);
- 2% to/from the east via VA Route 40;
- 2% to/from the south via VA Route 46;
- 2% to/from the southwest VA Route 40;
- 14% to/from the west and northwest via US Route 460 (Farmville, Burkeville, and Crewe); and
- 5% to/from within the Town of Blackstone.

1.2.3 Principal Findings

Capacity analyses were performed for the 2012 existing volumes, the 2017 Phase 1 volumes, and the 2020 volumes, which is the buildout year. The 2017 and 2020 analyses were completed for the No Build condition (without the FASTC site traffic) and for Build Alternatives 1 and 2 (with FASTC site traffic).

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. Level of Service (LOS) is a qualitative measure of the operational conditions within a traffic stream and the resulting perception by motorists and/or passengers. There are six letter grades of LOS from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. For detailed information about level of service definitions and criteria for unsignalized and signalized intersections, see Chapter 3.2 - Capacity Analyses.

The key findings from the capacity analyses are summarized below.

For the 2012 existing traffic volumes:

- The three signalized intersections within the Town of Blackstone operate at an overall LOS C or better during the AM and PM peak hours.
- All of the unsignalized movements operate at LOS B or better during the AM and PM peak hours.

For the 2017 and 2020 No Build traffic volumes:

- The three signalized intersections within the Town of Blackstone would operate at an overall LOS C or better during the AM and PM peak hours.
- All of the unsignalized movements would operate at LOS B or better during the AM and PM peak hours.

For the 2017 Build Alternative 1 and Build Alternative 2 traffic volumes:

- The three signalized intersections within the Town of Blackstone would continue to operate at an overall LOS C or better during the AM and PM peak hours with the addition of the FASTC traffic.
- With the addition of the FASTC traffic all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the southbound left-through-right movement from Yellowbird Road at US Route 460 which would operate at LOS D during the AM peak hour.

For the 2020 Build Alternative 1 traffic volumes:

- The three signalized intersections within the Town of Blackstone would continue to operate at an overall LOS C or better during the AM and PM peak hours with the addition of the FASTC traffic.
- With the addition of the FASTC traffic all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:
 - The northbound left-through-right movement from Cox Road at US Route 460 would operate at LOS E during the AM peak hour and LOS F during the PM peak hour;
 - The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
 - The northbound left turn movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour;
 - The northbound through movement from Military Road at Darvills Road would operate at LOS E during the PM peak hour; and
 - The southbound left-through-right movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour.

With the proposed mitigation measures for the 2020 Build Alternative 1 traffic volumes, all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:

- The northbound left-through movement from Cox Road at US Route 460 would operate at LOS F during the AM peak hour;
- The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
- The eastbound left turn-through movement from Darvills Road at Military Road would operate at LOS D during the AM peak hour; and
- The westbound left-through-right movement from Darvills Road at Military Road would operate at LOS D during the AM and PM peak hours.

The 2020 Build Alternative 1 traffic volumes at the intersection of US Route 460 and Cox Road/ Yellowbird Road would not warrant a traffic signal. Scheduling the FASTC arrival and departure times to avoid the VAARNG peak arrival and departure times would improve traffic operations as peak hour demand and the average delay would be reduced. The LOS results for the analyses of the 2020 Build Alternative 1 traffic volumes without and with the recommended mitigation measures are summarized in Table 1-1.

For the 2020 Build Alternative 2 traffic volumes:

- The three signalized intersections within the Town of Blackstone would continue to operate at an overall LOS C or better during the AM and PM peak hours with the addition of the FASTC traffic.
- With the addition of the FASTC traffic all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:
 - The northbound left-through-right movement from Cox Road at US Route 460 would operate at LOS E during the AM peak hour and LOS F during the PM peak hour;
 - The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
 - The northbound left turn movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour; and
 - The northbound through movement from Military Road at Darvills Road would operate at LOS E during the PM peak hour;
 - The southbound left-through-right movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour; and
 - The eastbound left-through-right movement from the FASTC Main Campus at the intersection of Military Road would operate at LOS F during the PM peak hour.

With the proposed mitigation measures for the 2020 Build Alternative 2 traffic volumes, all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:

- The northbound left-through movement from Cox Road at US Route 460 would operate at LOS F during the AM peak hour;
- The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
- The eastbound left turn-through movement from Darvills Road at Military Road would operate at LOS D during the AM peak hour; and
- The westbound left-through-right movement from Darvills Road at Military Road would operate at LOS D during the AM and PM peak hours.

The 2020 Build Alternative 2 traffic volumes at the intersection of US Route 460 and Cox Road/ Yellowbird Road would not warrant a traffic signal. Scheduling the FASTC arrival and departure times to avoid the VAARNG peak arrival and departure times would improve traffic operations as peak hour demand and the average delay would be reduced. The LOS results for the analyses of the 2020 Build Alternative 1 traffic volumes without and with the recommended mitigation measures are summarized in Table 1-1.

Table 1-1: LOS for 2020 Volumes Without and With Recommended Mitigation Measures

Intersection and Improvement	Build Alternative 1	Build Alternative 2	2020 Build LOS (by Approach)		2020 Build LOS (by Approach) with Improvement	
			AM	PM	AM	PM
West Entrance Road/8th Street at South Main Street						
Modify traffic signal timings for westbound left/through movement	✓	✓	E	D	C	D
US Route 460 and Cox Road/Yellowbird Road						
Extend the westbound left turn lane to provide a 500-foot storage lane with a 200-foot taper ¹	✓	✓	B	A	B	A
Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper (to serve left turns and through movements)	✓	✓	E	F	D ²	C
Cox Road and Military Road						
Install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper	✓	✓	N/A	N/A	A	A
Darvills Road and Military Road						
Extend the eastbound right turn lane to provide a 200-foot storage lane with a 200-foot taper ³	✓	✓	EB: A WB: A NB: F SB: F	EB: A WB: A NB: E SB: C	EB: C ⁵ WB: D ⁵ NB: A SB: A	EB: D ⁵ WB: D ⁵ NB: A SB: A
Extend the northbound left turn lane to provide a 200-foot storage lane with a 200-foot taper ⁴						
Extend the northbound right turn lane to provide a 200-foot taper ⁴						
Switch the stop control from Military Road approaches to the Darvills Road approaches; remove the existing red flashing beacon and replace with a yellow and red flashing beacon (yellow for Military Road and red for Darvills Road) and install "STOP AHEAD" signs on both approaches of Darvills Road						
West Entrance Road and Military Road						
Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper	✓	N/A	A	A	A	A
Install an eastbound right turn lane with a 200-foot storage lane and a 200-foot taper	✓	N/A	C	B	B	B
FASTC Main Campus/West 10th Street and Military Road						
Install a southbound right turn lane with a 200-foot storage lane and a 200-foot taper	N/A	✓	EB: C WB: B	EB: F WB: B	EB: A WB: A	EB: C WB: B
Convert the existing two-way stop to a four-way stop and install "STOP AHEAD" signs on both approaches of Military Road	N/A	✓	NB: A SB: A	NB: A SB: A	NB: A SB: A	NB: B ⁶ SB: A

¹ needed to meet VDOT standards; required for future traffic conditions with FASTC

² averaged left turn lane and right turn lane delay times reduce approach delay time so approach would operate at LOS D; left turn movement would operate at LOS F during the a.m. peak hour even with mitigation; low traffic volumes would not warrant a traffic signal

³ needed to correct an existing deficiency; required for future traffic conditions with or without FASTC

⁴ needed to correct an existing deficiency; required for future traffic conditions with FASTC

⁵ decline in LOS on Darvills Road approaches (EB and WB) due to switch from free-flow movement to stop controlled movement; decreases in delay on Military Road approaches (NB and SB) would outweigh increases in delay on Darvills Road approaches (EB and WB) and result in improved traffic operations at the intersection

⁶ decline in LOS due to switch from free-flow movement to stop controlled movement; with conversion to four-way stop, decreases in delay on FASTC Main Campus/West 10th Street approaches (EB and WB) would outweigh increases in delay on Military Road approaches (NB and SB) and result in improved traffic operations at the intersection

Note: EB = eastbound, WB = westbound, NB = northbound, SB = southbound

1.2.4 Recommendations

Within the study area there is one VDOT planned improvement; however, this improvement (to replace the existing bridge on Cox Road over the Norfolk-Southern railroad tracks) will not impact operations at the intersections within the study area.

The mitigation measures recommended to accommodate the 2017 Build Alternative 1 and Build Alternative 2 volumes are summarized in Table 1-2.

Table 1-2: Summary of Recommended Mitigation Measures for 2017 Volumes

Intersection and Movement	Recommended Mitigation Measure	Reason(s) for Mitigation						
		VDOT Requirement	No Build LOS	No Build Volumes	Build Alt 1 LOS	Build Alt 1 Volumes	Build Alt 2 LOS	Build Alt 2 Volumes
US Route 460 at Cox Road								
Westbound Left	Extend existing lane to provide minimum 350-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Cox Road at Military Road								
Westbound Left	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Darvills Road at Military Road								
Eastbound Right	Extend existing lane to provide minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Yes	No	Yes*	No	Yes	No	Yes

Shaded cells denote mitigation measures recommended due to the addition of FASTC traffic.

* Required to accommodate 2017 No Build Traffic Volumes.

As indicated in Table 1-2, all of the recommended turn lane improvements are required per VDOT's regulations. With the addition of FASTC Phase 1 site trips in 2017, all signalized and unsignalized movements will operate at LOS D or better and no mitigation is required to address unacceptable levels of service.

The mitigation measures recommended for the 2017 Build Alternative 1 traffic volumes are identified on Figure 1-5 and the mitigation measures recommended for the 2017 Build Alternative 2 traffic volumes are identified on Figure 1-6.

The mitigation measures recommended to accommodate the 2020 Build Alternative 1 and Build Alternative 2 volumes are summarized in Table 1-3.

Table 1-3: Summary of Recommended Mitigation Measures for 2020 Volumes

Intersection and Movement	Recommended Mitigation Measure	Reason(s) for Mitigation						
		VDOT Requirement	No Build LOS	No Build Volumes	Build Alt 1 LOS	Build Alt 1 Volumes	Build Alt 2 LOS	Build Alt 2 Volumes
US Route 460 at Cox Road								
Westbound Left	Extend existing lane to provide minimum 500-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Northbound Left-Through	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	No	No	No	Yes	Yes	Yes	Yes
Cox Road at Military Road								
Westbound Left	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Darvills Road at Military Road								
Eastbound Right	Extend existing lane to provide minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Yes	No	Yes*	No	Yes	No	Yes
Northbound Left	Extend existing lane to provide minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Northbound Right	Extend existing lane to provide minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Overall Intersection	Switch the stop control from the Military Road approaches to the Darvills Road approaches	No	No	No	Yes	Yes	Yes	Yes
Overall Intersection	Remove the existing red flashing beacon and replace with a yellow and red flashing beacon	No	No	No	Yes	Yes	Yes	Yes
Overall Intersection	Install "STOP AHEAD" signs on both approaches of Darvills Road	No	No	No	Yes	Yes	Yes	Yes
FASTC Main Campus Access/West 10th Street at Military Road (Build Alternative 2 Only)								
Southbound Right	Install a minimum 200-foot Right Turn Lane with minimum 200-foot Taper	N/A	No	No	N/A	N/A	No	Yes
Overall Intersection	Switch the intersection control from two-way stop to four-way stop (all approaches stop controlled)	N/A	No	No	N/A	N/A	Yes	Yes
Overall Intersection	Install "STOP AHEAD" signs on both approaches of Military Road	N/A	No	No	N/A	N/A	Yes	Yes
West Entrance Road at Military Road (Build Alternative 1 Only)								
Northbound Left	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	N/A	No	No	No	Yes	N/A	N/A
Eastbound Right	Install a minimum 200-foot Right Turn Lane with minimum 200-foot Taper	N/A	No	No	Yes	Yes	N/A	N/A
Military Road/FASTC Entrance at Dearing Avenue (Build Alternative 1 Only)								
Westbound Approach	Provide 2 Egress Lanes from FASTC	N/A	No	No	No	Yes	N/A	N/A
South Main Street and 8th Street/West Entrance Road								
Westbound Left-Through	Modify signal timings (intersection split times)	N/A	No	No	Yes	Yes	Yes	Yes

Shaded cells denote mitigation measures recommended due to the addition of FASTC traffic.

* Required to accommodate 2020 No Build Traffic Volumes.

As indicated in Table 1-3, all of the recommended turn lane improvements to VDOT-maintained facilities are required per VDOT policy. With the addition of FASTC Buildout site trips in 2020, additional mitigation measures are needed to address poor levels of service at one signalized intersection and several unsignalized intersections.

The mitigation measures recommended for the 2020 Build Alternative 1 traffic volumes are identified on Figure 1-7 and the mitigation measures recommended for the 2020 Build Alternative 2 traffic volumes are identified on Figure 1-8.

1.2.5 Conclusions

The existing intersection geometry within the study area is generally sufficient to accommodate the 2012 existing traffic volumes as well as the 2017 and 2020 No Build traffic volumes.

For Phase 1 of FASTC, the 2017 volumes for Build Alternatives 1 and 2 have negligible impacts on traffic operations within the study area. The only mitigation measures identified for FASTC Phase 1 site volumes are the turn lane improvements required per VDOT's regulations (see Table 1-2); no mitigation is required to address unacceptable levels of service.

The addition of the 2020 FASTC site traffic will have minor impacts on the operations of the three signalized intersections within the Town of Blackstone. A majority of the FASTC traffic (85%) is anticipated to arrive via US Route 460 (10% from the west and 75% from the east) and use Cox Road to Military Road to access the FASTC facilities via the Fort Pickett Main Gate. For Build Alternatives 1 and 2, at buildout of the FASTC facilities in 2020, the overall intersection delay is anticipated to increase by less than 4 seconds during the AM and PM peak hours when the FASTC site traffic is added to the network.

The recommended modifications to the signal timing at the intersection of South Main Street at 8th Street/West Entrance Road (see Table 1-3) address the LOS E for the westbound through-left movement during the AM peak hour at buildout in 2020. With the proposed mitigation, the westbound through-left movement would operate at LOS D at buildout of Build Alternatives 1 and 2.

With the addition of the 2020 FASTC site traffic, a majority of the movements at the unsignalized intersections would operate at LOS C or better. For Build Alternatives 1 and 2, at buildout of the FASTC facilities in 2020, most of the unsignalized movements operating at LOS E or F will be improved to LOS D or better with the implementation of the recommended mitigation measures.

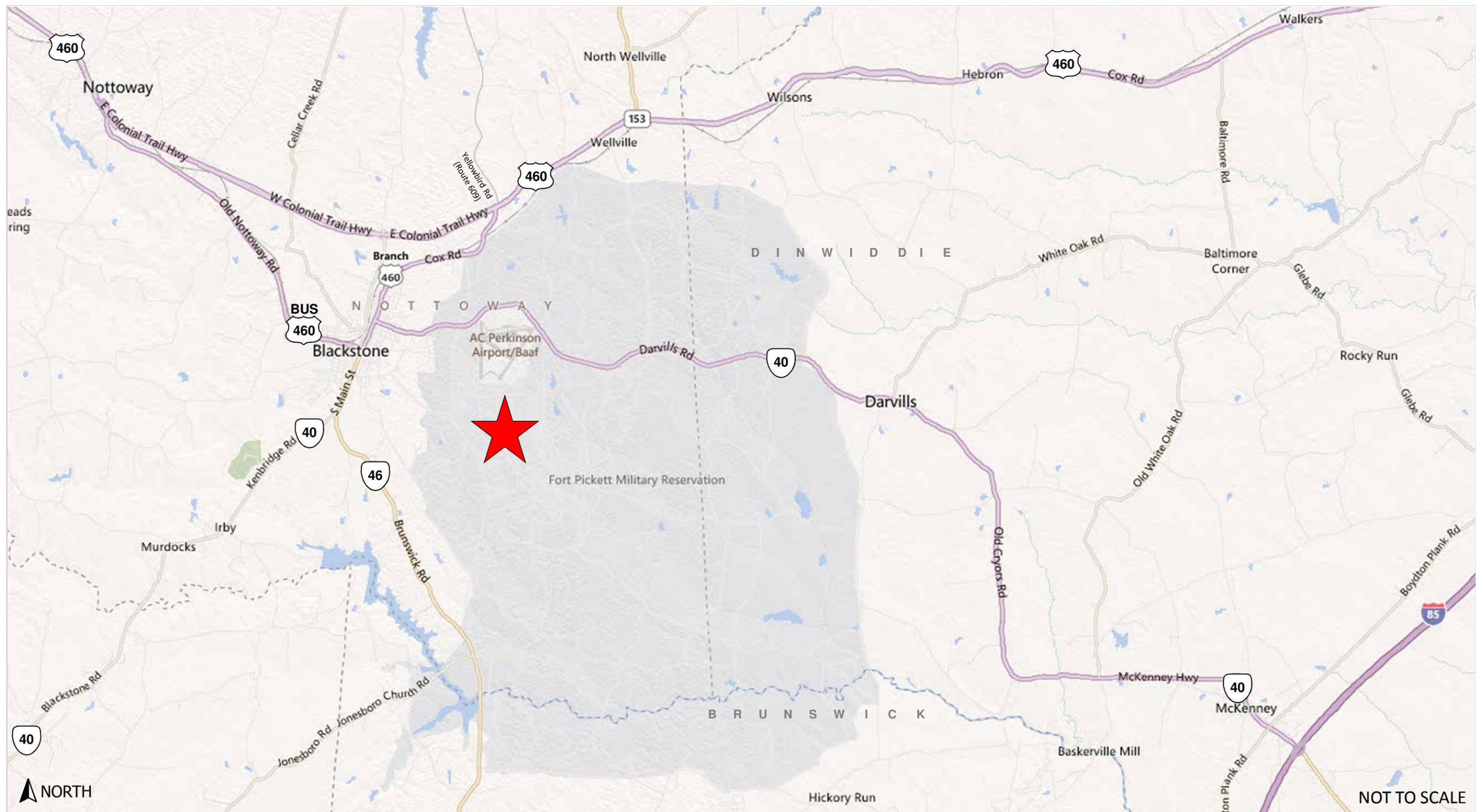
The recommended northbound left turn lane on Cox Road at US Route 460 would allow the northbound right turns to operate at LOS A during the AM peak hour and LOS C during the PM peak hour at buildout of Build Alternatives 1 and 2. The northbound left-through movement from Cox Road and the southbound left-through-right movement from Yellowbird Road would operate at LOS F during the AM peak hour even with mitigation; however, due to low volumes for these movements, a traffic signal is not recommended or warranted (see Chapter 7.4).

At the intersection of Cox Road and Military Road, the recommended westbound left turn lane is required per VDOT's regulations. This mitigation measure will result in a minor increase in delay for the westbound approach for Build Alternatives 1 and 2 at buildout of the FASTC facilities in 2020 since westbound through movements will no longer be impeded by vehicles waiting to turn left onto Military Road.

The recommended mitigation at the intersection of Darvills Road and Military Road (see Table 1-3) would eliminate the failing levels of service on the northbound and southbound approaches resulting from the addition of the 2020 FASTC traffic for Build Alternatives 1 and 2. By providing the VDOT-required turn lane treatments and switching the stop control from Darvills Road (the minor street based on volumes) to Military Road (the major street based on volumes), all movements would operate at LOS D or better.

At the intersection of FASTC Main Campus/West 10th Street and Military Road, the recommended mitigation would eliminate the failing level of service on the eastbound approach due to traffic generated by FASTC Build Alternative 2 at full buildout. By converting the intersection from a two-way stop to a four-way stop and installing a southbound right turn lane, all movements would operate at LOS B or better.

The turn lane improvements at West Entrance Road and Military Road are recommended to mitigate the increased delay due to traffic generated by FASTC Build Alternative 1 at full buildout even though the LOS remains acceptable. The FASTC trips increase the southbound through movement volume by 400% during the AM peak hour and the northbound through movement volume by 625% during the PM peak hour. The additional through volumes on Military Road make the northbound left turn onto West Entrance Road and the eastbound left turn onto Military Road more difficult.



★ FASTC Location

**FOREIGN AFFAIRS SECURITY TRAINING CENTER
[FASTC]**
An American Recovery and Reinvestment Act of 2009 Project

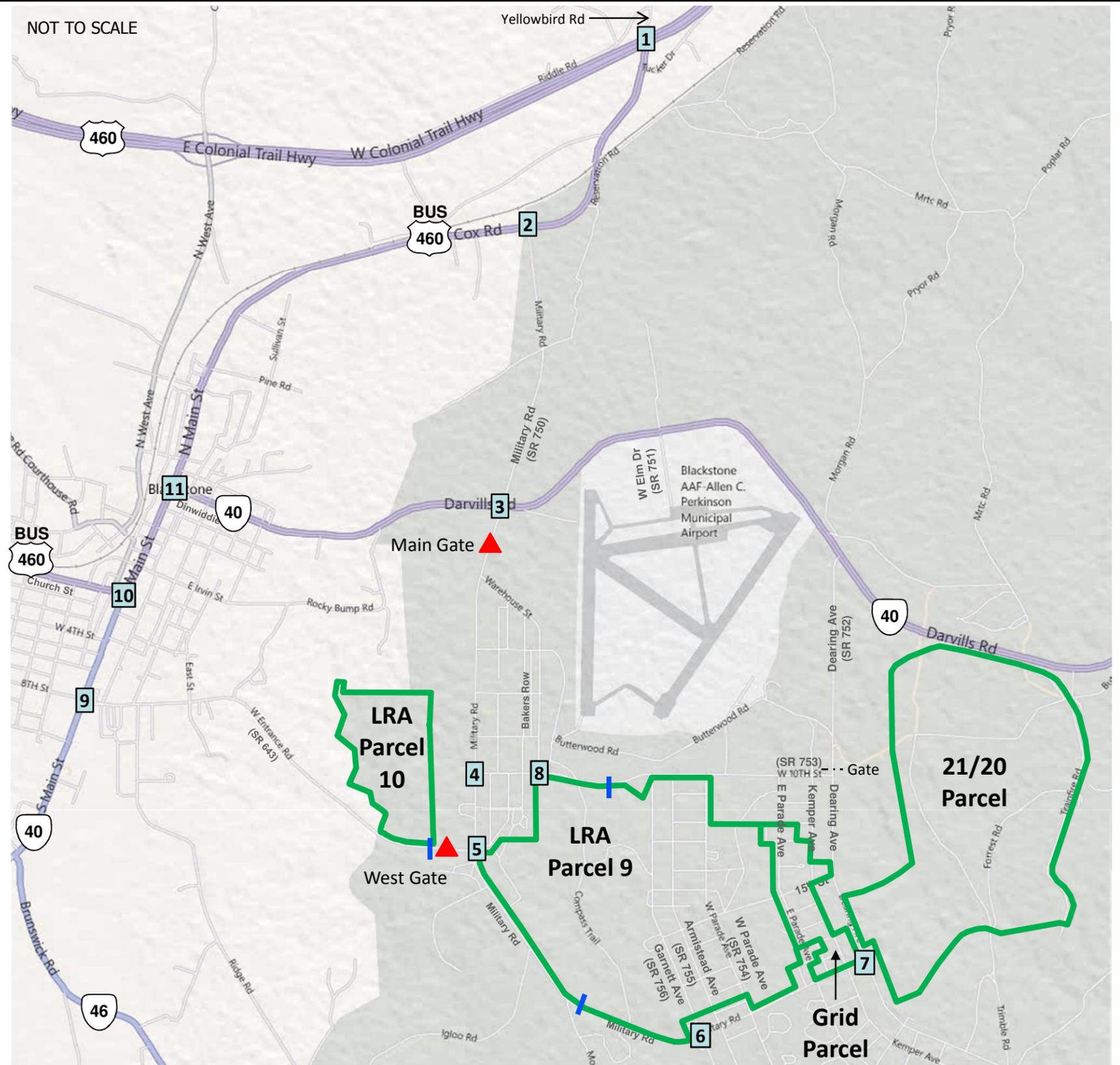


Figure 1-1

FASTC Site Location within Fort Pickett

Directional Turning Movement Count Locations:

1. East Colonial Trail Highway (US Route 460) at Cox Road (US Route 460 Business)/Yellowbird Road (SR 609)
2. Cox Road (US Route 460 Business) at Military Road (SR 750)
3. Military Road (SR 750) at Darvills Road (VA Route 40)
4. Military Road at West 10th Street
5. Military Road at West Entrance Road (SR 643)
6. Military Road at Garnett Avenue (SR 756)
7. Military Road at Dearing Avenue
8. West 10th Street (SR 753) at Warehouse Street
9. West Entrance Road (SR 643)/8th Street at South Main Street (VA Route 40/US Route 460 Business)
10. Church Street (US Route 460 Business) at South Main Street (VA Route 40/US Route 460 Business)
11. Dinwiddie Avenue (VA Route 40) at Main Street (VA Route 40/US Route 460 Business)

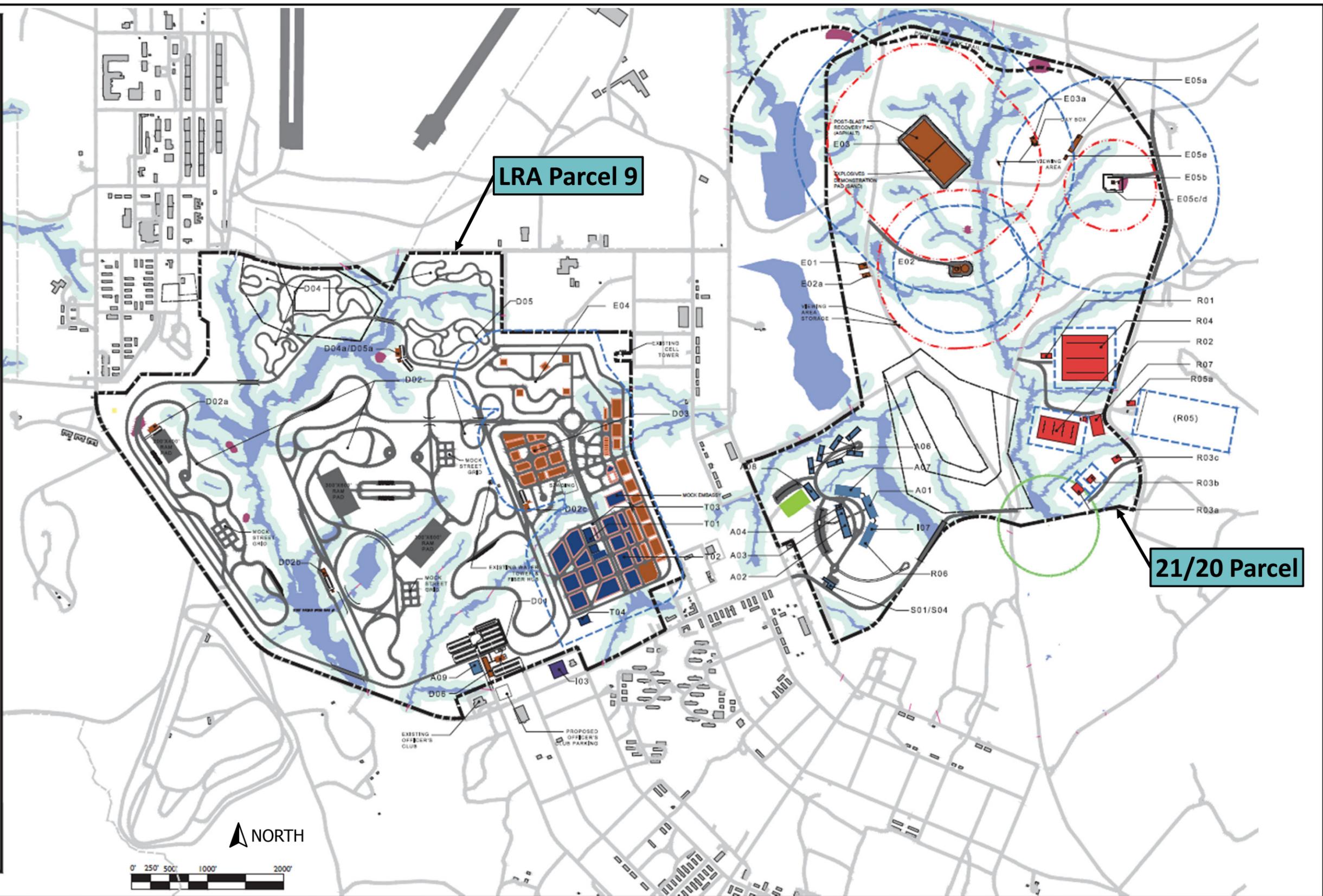


-  Proposed FASTC Facilities (LRA Parcel 10 and Grid Parcel apply only to Build Alternative 2)
-  Existing Security Gate (Fort Pickett Access)
-  Traffic Study Intersection Directional Turning Movement Count Location
-  48-Hour Tube Count Location



Figure 1-2
 Study Intersections and Data Collection Locations

LEGEND	
NATURAL CONSTRAINTS	
	STREAMS / WETLANDS WITH 100' BUFFER
	WATER BODY
	ARCHEOLOGICAL SITE
	BALD EAGLE NEST BUFFER
BOUNDARIES, SETBACKS, SITE CIRCULATION	
	PROPOSED TANK TRAIL
	TEST FIT PROPERTY LINE
	HAZMAT AREA BOUNDARY
	FRAGMENT SAFETY DISTANCE
	140 dB ACOUSTICAL RANGE
	EXISTING ROAD/ TANK TRAIL TO REMAIN
	PROPOSED SECURITY FENCE
	100' CLEAR ZONE AROUND HIGH-SPEED DRIVING TRACKS
ACTIVITY AREAS	
MAIN CAMPUS AREA	
A01	ADMINISTRATIVE BUILDING
A02	TECHNICAL SECURITY TRAINING
A03	MOCK EMBASSY
A04	TRAINING CAC
A06	DORMITORIES
A07	DINING FACILITY
A08	FITNESS CENTER
I07	DATA CENTER
R06	SIMULATIONS BUILDING
S01/S04	MAIN CASVISOR CENTER
DRIVING TRACK AREA	
D01	DRIVER TRAINING
D02	HIGH-SPEED DRIVING COURSE
D02a/b/c	CLASSROOMS (3)
D03	MOCK URBAN DRIVING COURSE
D04	UNIMPROVED-ROAD DRIVING COURSE
D04a	CLASSROOM BUILDING
D05	OFF-ROAD DRIVING COURSE
D05a	CLASSROOM BUILDING
D06	VEHICLE MAINTENANCE WAREHOUSE
D09	WAREHOUSE
MOCK URBAN TACTICAL TRAINING AREA	
T01	TACTICAL TRAINING
T02	MOCK URBAN TACTICAL TRAINING
T03	RAFFEL TOWER
T04	TACTICAL MAZE
EXPLOSIVES RANGE AREA	
E01	EXPLOSIVES TRAINING
E02	EXPLOSIVES DEMO RANGE
E02a	CLASSROOM
E03	POST-BLAST TRAINING RANGE
E03A	CLASSROOM
E04	EXPLOSIVES SIMULATIONS ALLEY
E05a	EXPLOSIVES BREACHING CLASSROOM
E05b	BREACHING HOUSE
E05c/d	BREACHING WALLS
E05e	BREACHING STORAGE
FIRING RANGE AREA	
R01	FIREARMS TRAINING
R02	50M INDOOR FIRING RANGE
R03a	LIVE FIRE SHOOT HOUSE (2-STORY)
R03b	LIVE FIRE SHOOT HOUSE (2-STORY)
R03c	LIVE FIRE SHOOT HOUSE CLASSROOM
R04	150 M INDOOR/OUTDOOR FIRING RANGE
R05	EXISTING 330m OUTDOOR FIRING RANGE
R05a	CLASSROOM
R07	ARMORY



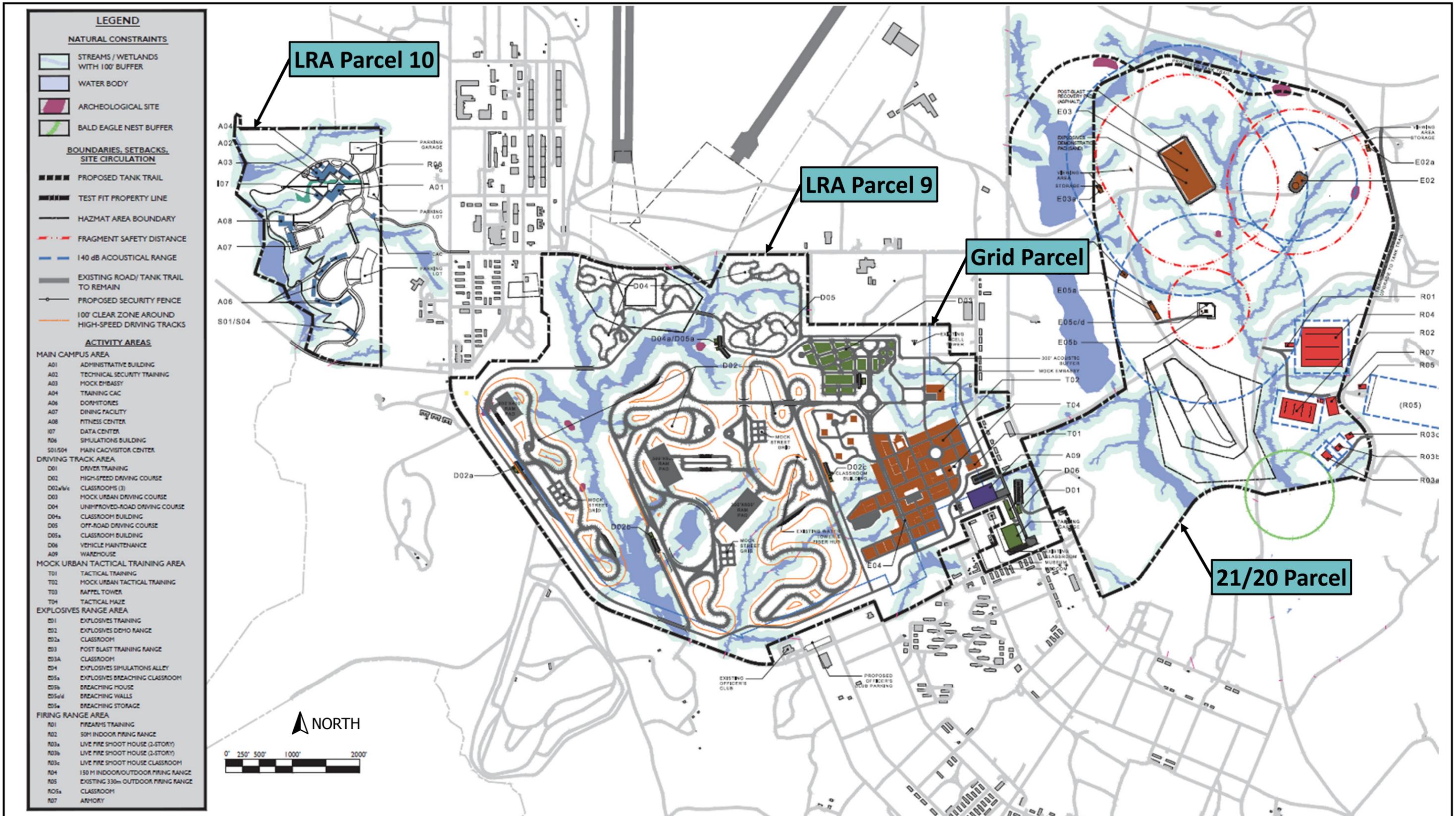


Figure 1-4

FASTC EIS Build Alternative 2

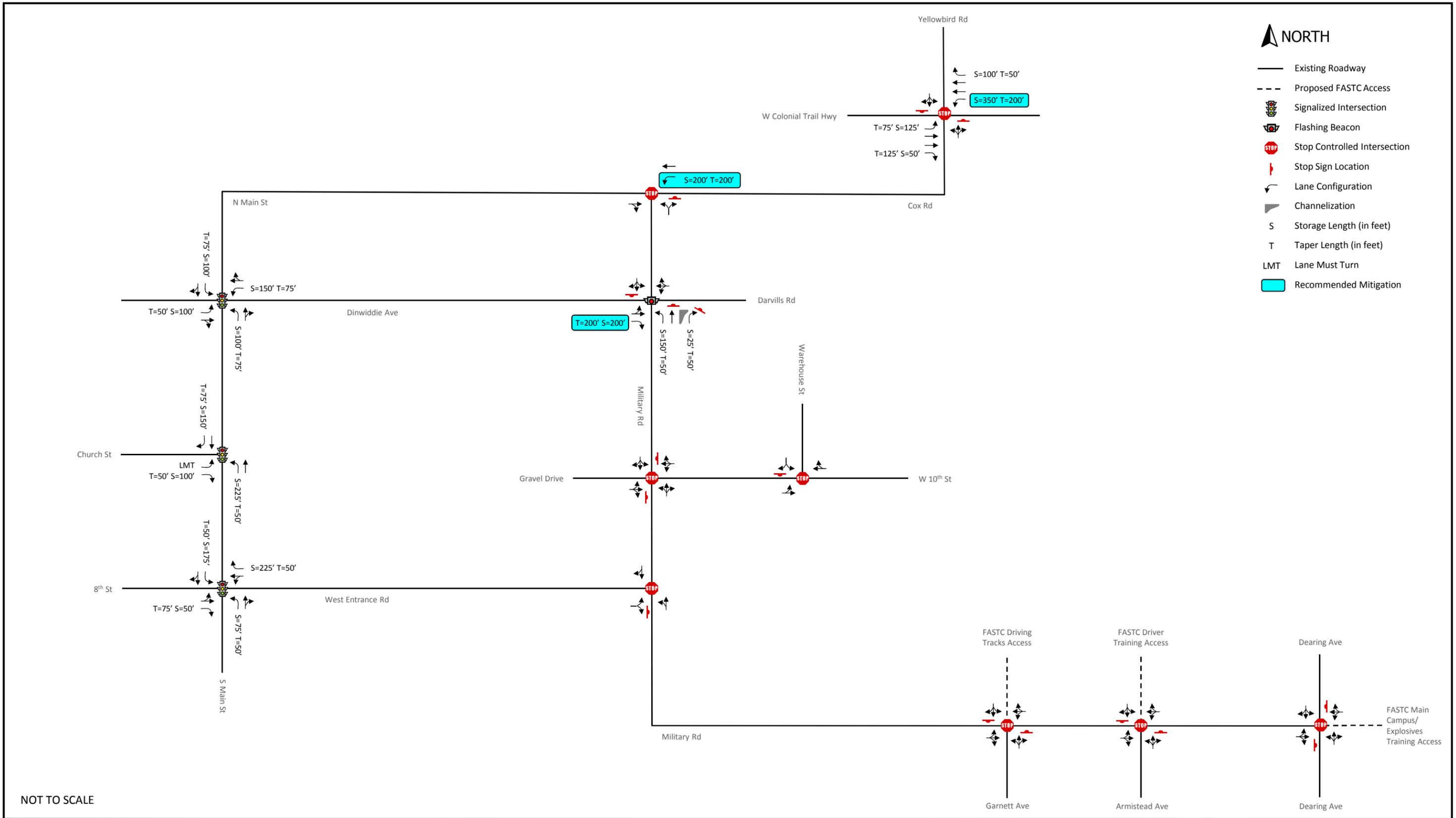
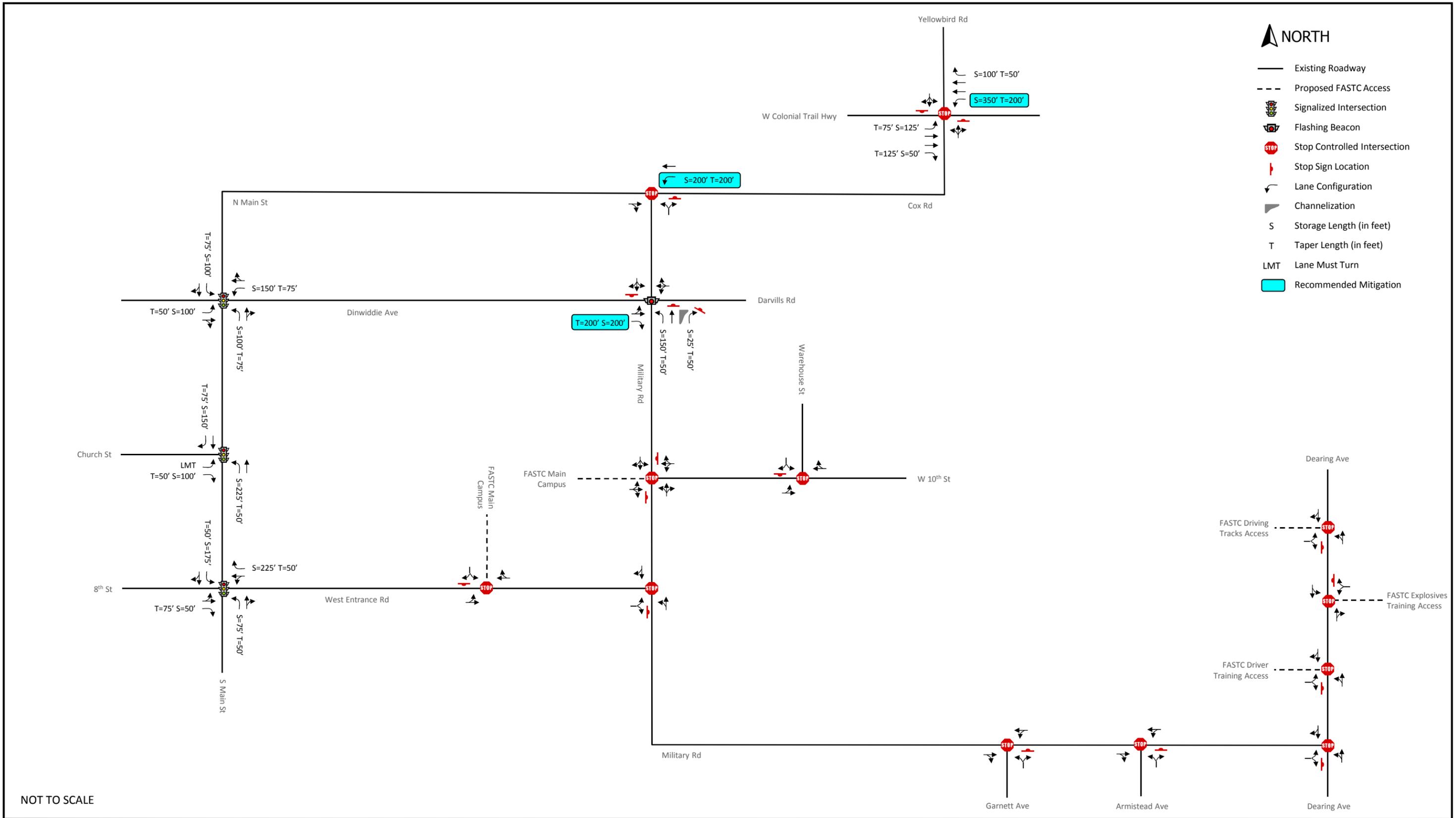
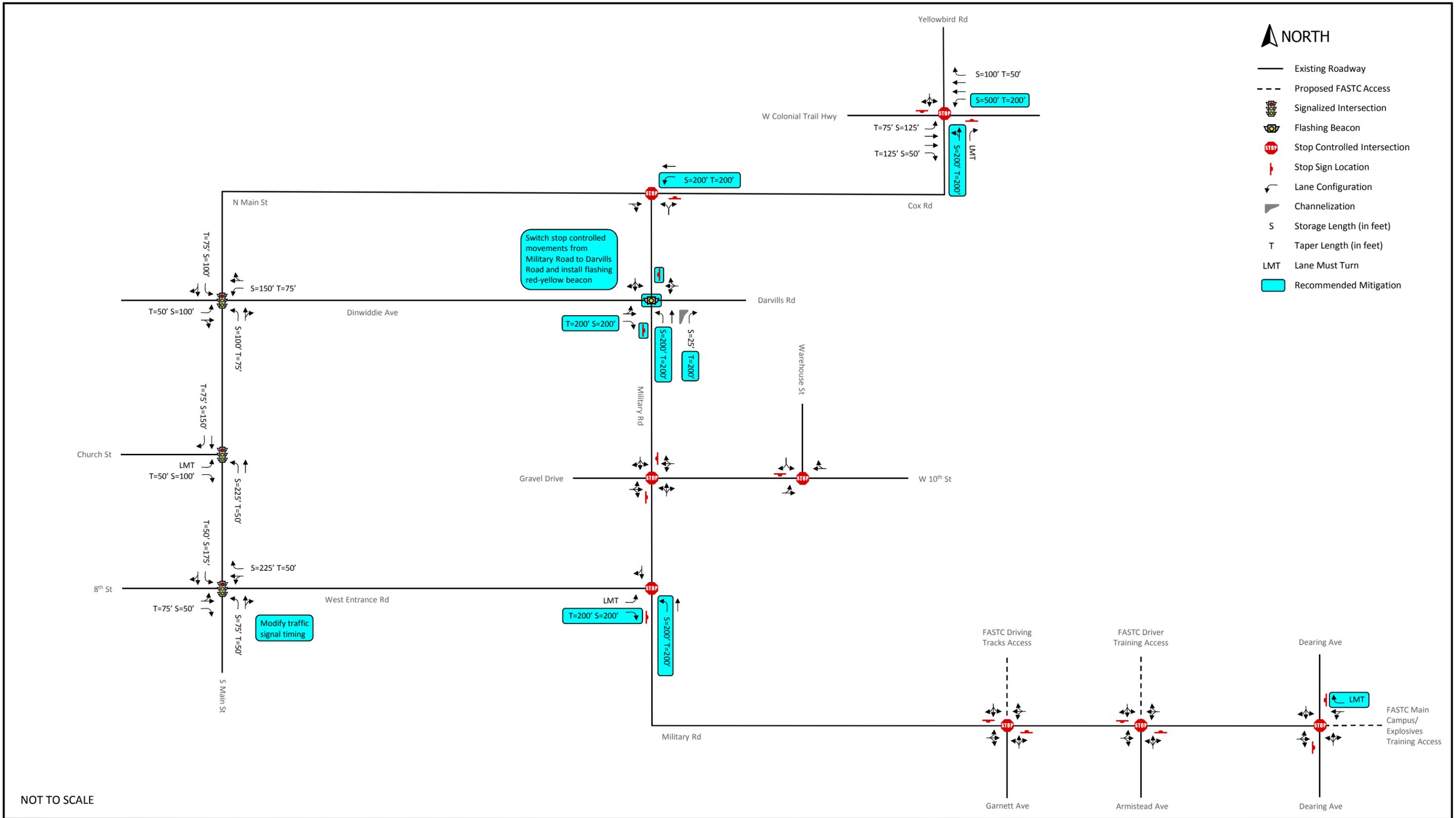


Figure 1-5

Build Alternative 1 2017 Geometry with Mitigation



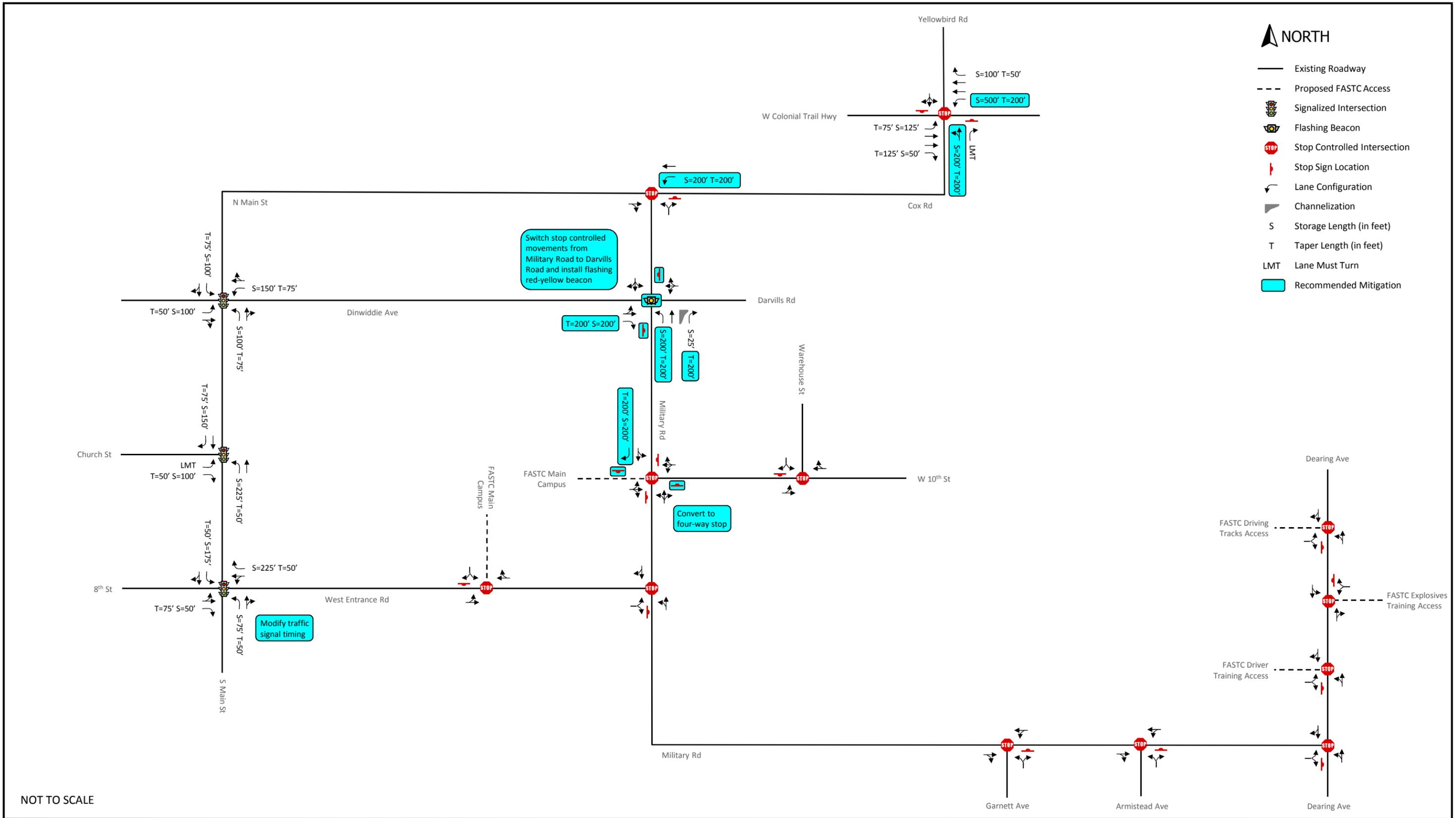


NOT TO SCALE



Figure 1-7

Build Alternative 1 2020 Geometry with Mitigation



NOT TO SCALE



Figure 1-8

Build Alternative 2 2020 Geometry with Mitigation

2 BACKGROUND INFORMATION

The proposed FASTC site is located within and adjacent to Fort Pickett in eastern Nottoway County between the Town of Blackstone and the Dinwiddie County Line as indicated on Figure 2-1 (all figures are located at the end of the chapter after page 2-4). The FASTC project is expected to develop in three phases. Phase 1 will be completed in 2017 and Phase 2 will be completed in 2018 with full buildout of Phase 3 anticipated in 2020. Analyses were completed for Phase 1 (2017) and full buildout (2020).

2.1 DESCRIPTION OF ON-SITE DEVELOPMENT

The FASTC site is located within and adjacent to Fort Pickett in eastern Nottoway County. The overall site is roughly bounded by VA Route 40 (Darvills Road) to the north, the Dinwiddie County Line to the east, the Brunswick County Line to the south, and the Town of Blackstone Corporate Limits to the west as indicated on Figure 2-1. The site is located southwest of the Richmond and Washington DC metro areas as indicated on Figure 2-2.

The FASTC site consists of two parcels for Build Alternative 1 (LRA Parcel 9 and the Fort Pickett 21/20 Parcel) and four parcels for Build Alternative 2 (LRA Parcels 9 and 10 and the Fort Pickett 21/20 and Grid Parcels). The bounds of each parcel are shown on Figure 2-3 and are generally described below:

- LRA Parcel 9 – West 10th Street to the north, East Parade Avenue to the east, and Military Road to the south and west.
- LRA Parcel 10 – Military Road to the east and West Entrance Road to the south and west.
- Fort Pickett 21/20 Parcel – Darvills Road (VA Route 40) to the north, Trainfire Road to the east, and Dearing Avenue to the south and west.
- Fort Pickett Grid Parcel – East 12th Street to the north, Dearing Avenue to the east, Military Road to the south, and East Parade Avenue to the west.

The purpose of the FASTC project is to establish a DOS Diplomatic Security consolidated training center that will provide hard and soft skills training for a diverse student population including foreign affairs staff, Diplomatic Security agents, Foreign Services officers, selected foreign law enforcement personnel, and other personnel in a wide array of law enforcement and security disciplines.

The FASTC facility will provide courses on a variety of subjects including firearms familiarization, explosives awareness, surveillance detection, antiterrorism driving, and security operations. At full buildout in 2020, the proposed FASTC would train approximately 10,000 persons per year. The site will be comprised of the following uses:

- Administrative buildings including classrooms and laboratories for soft-skills training, administrative support office space, dining, and housing;
- Hard-skills buildings and training venues including driver training buildings and driving tracks, explosives and firearms training, tactical training buildings, and a vehicle maintenance shop;
- Infrastructure buildings including the data center; and
- Security buildings to provide access control to the FASTC facilities (in addition to the Fort Pickett gates).

At the completion of Phase 1 in 2017, the FASTC facilities would employ 533 persons and train approximately 400 students per day during peak periods (typically occurring during the summer months). In 2020 when the FASTC site is fully developed it is anticipated to employ 1,070 persons and train approximately 700 students per day during peak periods.

2.2 STUDY AREA LIMITS

The study area agreed upon by VDOT, the Town of Blackstone, VAARNG, GSA, and DOS includes the following intersections:

1. East Colonial Trail Highway (US Route 460) at Cox Road (US Route 460 Business)/Yellowbird Road (Route 609);
2. Cox Road (US Route 460 Business) at Military Road (Route 750);
3. Military Road (Route 750) at Darvills Road (VA Route 40);
4. Military Road at West 10th Street;
5. Military Road at West Entrance Road;
6. Military Road at Garnett Avenue;
7. Military Road at Dearing Avenue;
8. West 10th Street at Warehouse Street;
9. West Entrance Road (Route 643)/8th Street at South Main Street (VA Route 40/US Route 460 Business);
10. Church Street (US Route 460 Business) at South Main Street (VA Route 40/US Route 460 Business); and
11. Dinwiddie Avenue (VA Route 40) at Main Street (VA Route 40/US Route 460 Business).

The study intersections are indicated on Figure 2-3. Access to the FASTC facilities within Fort Pickett will be provided via Military Road and Dearing Avenue. For Build Alternative 2, an additional access will be provided from West Entrance Road. The proposed site accesses to the FASTC facilities for Build Alternatives 1 and 2 are also included in the study.

2.3 EXISTING AND PROPOSED SITE USES

The LRA Parcel 9 is currently zoned general industrial by Nottoway County and is part of Pickett Park, an industrial park located south of the Blackstone Army Airfield/Allen C. Perkinson Municipal Airport. The eastern half of LRA Parcel 9 contains numerous buildings currently leased by residential and commercial tenants. The existing buildings are served by a gridded street network, including several roadways that are currently maintained by VDOT.

The LRA Parcel 10 is not currently zoned by Nottoway County and is located in the County along the western edge of Fort Pickett. The parcel is not developed.

The Fort Pickett 21/20 Parcel and Grid Parcel are currently zoned for government uses and are part of Fort Pickett. The 21/20 Parcel is generally undeveloped and contains tank trails used by VAARNG for training and a closed landfill. The Grid Parcel abuts several VAARNG buildings, contains a gridded street network and is otherwise vacant.

The proposed FASTC site will be comprised of a mix administrative, hard-skills training, infrastructure, and security buildings along with training venues. At buildout in 2020 the site would employ 1,070 persons and will generate approximately 3,512 trips per day. The trip generation for the proposed development is detailed in Chapter 5.

Two EIS alternatives for FASTC are under consideration. Build Alternative 1 would occupy LRA Parcel 9 and Fort Pickett Parcel 21/20. Build Alternative 2 would occupy the LRA Parcel 9, LRA Parcel 10, Fort Pickett Parcel 21/20, and the Grid Parcel. Build Alternatives 1 and 2 are shown on Figures 2-4 and 2-5, respectively.

The following access points will be provided for the FASTC facilities for Build Alternative 1:

- Access to FASTC driver training facilities from Military Road roughly opposite Garnett Avenue;
- Access to FASTC driving tracks from Military Road roughly opposite Armistead Avenue; and
- Access to FASTC Main Campus and explosives training facilities from Dearing Avenue opposite Military Road.

All access to FASTC facilities for Build Alternative 1 will be provided from roadways within Fort Pickett.

The following access points will be provided for the FASTC facilities for Build Alternative 2:

- Access to FASTC driver training facilities from Dearing Avenue approximately 500 feet north of the Military Road intersection;
- Access to FASTC explosives training facilities from Dearing Avenue approximately 1,500 feet north of the Military Road intersection;
- Access to FASTC driving tracks from Dearing Avenue approximately 2,000 feet south of the West 10th Street intersection;
- Access to FASTC Main Campus from Military Road opposite West 10th Street; and
- Access to FASTC Main Campus from West Entrance Road approximately 2,000 feet west of the Military Road intersection.

Four of the five accesses to FASTC facilities for Build Alternative 2 will be provided from roadways within Fort Pickett. The access to the Main Campus from West Entrance Road is located outside of the West Gate for Fort Pickett.

2.4 EXISTING ROADWAY NETWORK

Timmons Group conducted a review of the study intersections and adjacent roadways that will be most impacted by site-generated traffic. The existing intersection geometry within the study area is summarized on Figure 2-6 and posted speed limits are summarized on Figure 2-7.

US Route 460 (West Colonial Trail Highway) is functionally classified as a rural principal arterial as indicated on Figure 2-8. Within the study area, US Route 460 is a four-lane, divided facility with a posted speed limit of 60 mph.

Cox Road/North Main Street (US Route 460 Business) is functionally classified as a rural minor arterial and Church Street (US Route 460 Business) is functionally classified as a rural major collector as indicated on Figure 2-8. Within the study area, US Route 460 Business is a two-lane, undivided facility with a posted speed limit of 55 mph in Nottoway County and 25 mph within the Town of Blackstone.

Darvills Road/Dinwiddie Avenue/South Main Street (VA Route 40) is functionally classified as a rural minor arterial as indicated on Figure 2-8. Within the study area, VA Route 40 is a two-lane, undivided facility with a posted speed limit of 45 mph in Nottoway County and 25 mph within the Town of Blackstone.

West Entrance Road (SR 643) is functionally classified as a rural major collector as indicated on Figure 2-8. Within the study area, West Entrance Road is a two-lane, undivided facility with a posted speed limit of 35 mph in Nottoway County and 25 mph within the Town of Blackstone. The VDOT maintenance of SR 643 ends at Fort Pickett. Within Fort Pickett, West Entrance Road remains a two-lane, undivided facility with a posted speed limit of 35 mph.

Military Road (SR 750) is not functionally classified. Within the study area, Military Road is a two-lane, undivided facility with a posted speed limit of 45 mph in Nottoway County. Within Fort Pickett, Military Road remains a two-lane, undivided facility with a posted speed limit is 45 mph from the Main Gate to west of Garnett Avenue where the speed limit drops to 35 mph.

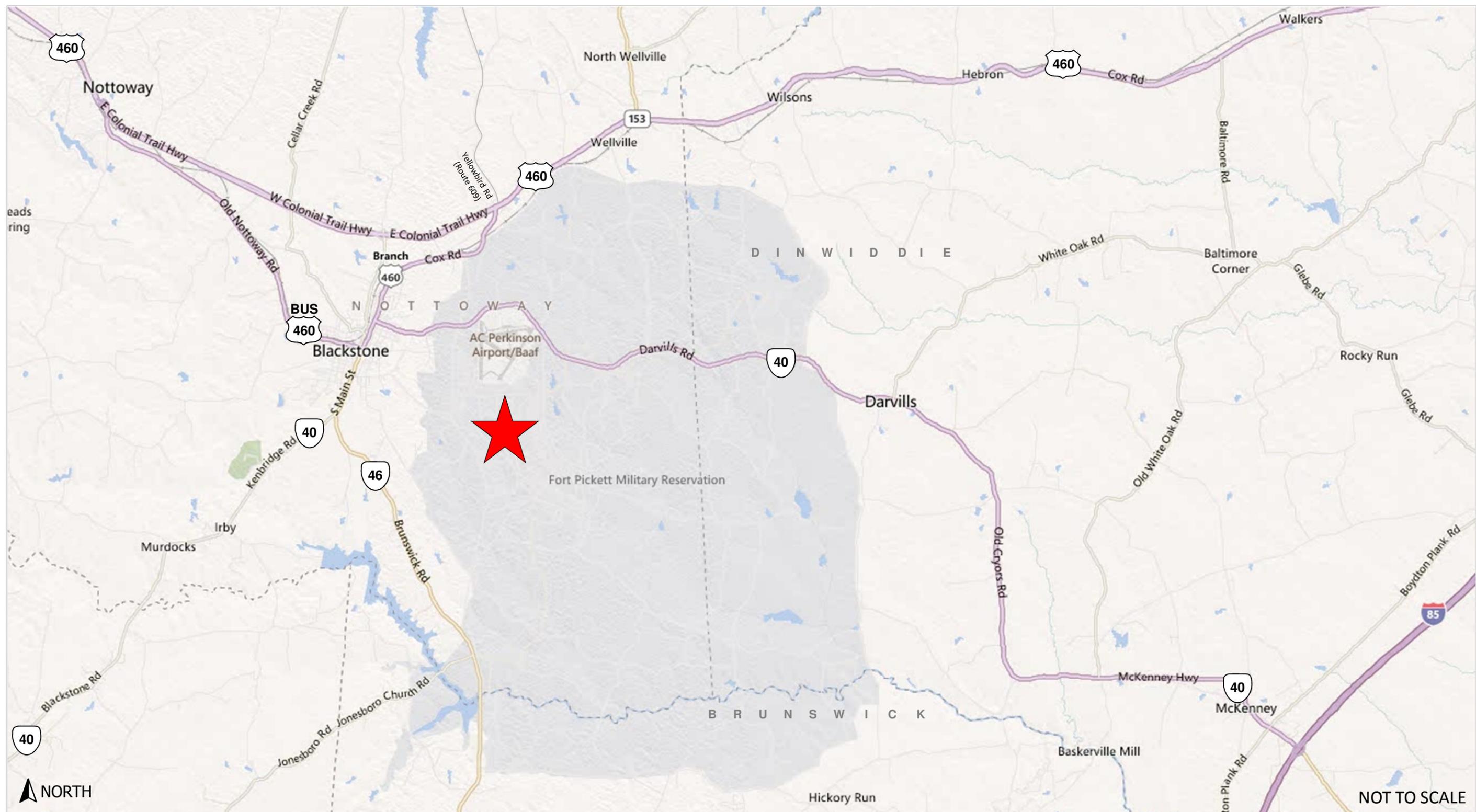
The roadways within the study area are maintained by three different agencies; VDOT, the Town of Blackstone, and VAARNG. In general, VDOT maintains the roadways and traffic control devices (e.g., traffic signals and stop signs) in Nottoway County (excluding Fort Pickett); the Town of Blackstone maintains the roadways and traffic control devices within the Town limits, and VAARNG maintains the roadways and traffic control devices within the boundaries of Fort Pickett.

There is an exception to the maintenance of several roadway segments within Fort Pickett. VDOT currently maintains portions of six roadways within Fort Pickett, as indicated on Figure 2-9. Three of these roadways, SR 754 (Garnett Avenue), SR 755 (West Parade Avenue), and SR 756 (Armistead Avenue) will be eliminated with the construction of the FASTC facilities within LRA Parcel 9 under both Build Alternatives 1 and 2. These roadways will need to be abandoned from the VDOT secondary system of state highway, requiring action by the Nottoway County Board of Supervisors.

2.5 PROGRAMMED ROADWAY IMPROVEMENTS

Within the study area there is one VDOT programmed improvement within the study area. VDOT will replace the existing bridge on Cox Road (US Route 460 Business) over the Norfolk-Southern railroad tracks. Construction is scheduled to begin in June 2014 and the project is anticipated to be complete in 2016, prior to the completion of FASTC Phase 1 in 2017. During construction of the VDOT project, traffic on Cox Road will not be detoured to an alternate route.

The VDOT project details are shown on Figure 2-10.



★ FASTC Location

**FOREIGN AFFAIRS SECURITY TRAINING CENTER
[FASTC]**
An American Recovery and Reinvestment Act of 2009 Project

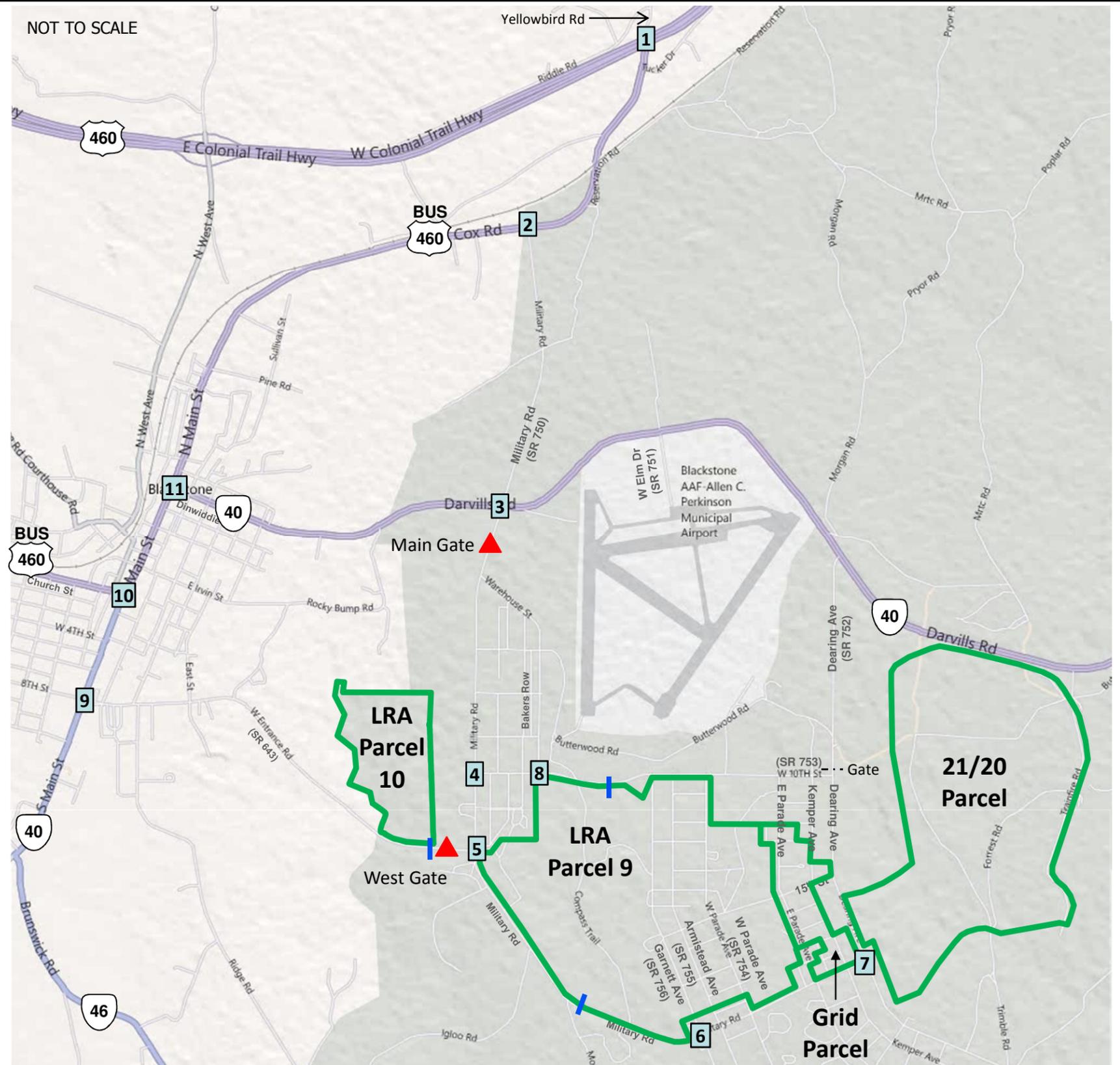


Figure 2-1

FASTC Site Location within Fort Pickett

Directional Turning Movement Count Locations:

1. East Colonial Trail Highway (US Route 460) at Cox Road (US Route 460 Business)/Yellowbird Road (SR 609)
2. Cox Road (US Route 460 Business) at Military Road (SR 750)
3. Military Road (SR 750) at Darvills Road (VA Route 40)
4. Military Road at West 10th Street
5. Military Road at West Entrance Road (SR 643)
6. Military Road at Garnett Avenue (SR 756)
7. Military Road at Dearing Avenue
8. West 10th Street (SR 753) at Warehouse Street
9. West Entrance Road (SR 643)/8th Street at South Main Street (VA Route 40/US Route 460 Business)
10. Church Street (US Route 460 Business) at South Main Street (VA Route 40/US Route 460 Business)
11. Dinwiddie Avenue (VA Route 40) at Main Street (VA Route 40/US Route 460 Business)



LEGEND

NATURAL CONSTRAINTS

- STREAMS / WETLANDS WITH 100' BUFFER
- WATER BODY
- ARCHEOLOGICAL SITE
- BALD EAGLE NEST BUFFER

BOUNDARIES, SETBACKS, SITE CIRCULATION

- PROPOSED TANK TRAIL
- TEST FIT PROPERTY LINE
- HAZMAT AREA BOUNDARY
- FRAGMENT SAFETY DISTANCE
- 140 dB ACOUSTICAL RANGE
- EXISTING ROAD/ TANK TRAIL TO REMAIN
- PROPOSED SECURITY FENCE
- 100' CLEAR ZONE AROUND HIGH-SPEED DRIVING TRACKS

ACTIVITY AREAS

MAIN CAMPUS AREA

- A01 ADMINISTRATIVE BUILDING
- A02 TECHNICAL SECURITY TRAINING
- A03 MOCK EMBASSY
- A04 TRAINING CAC
- A06 DORMITORIES
- A07 DINING FACILITY
- A08 FITNESS CENTER
- I07 DATA CENTER
- R06 SIMULATIONS BUILDING
- S01/S04 MAIN CASVISITOR CENTER

DRIVING TRACK AREA

- D01 DRIVER TRAINING
- D02 HIGH-SPEED DRIVING COURSE
- D02a/c CLASSROOMS (3)
- D03 MOCK URBAN DRIVING COURSE
- D04 UNIMPROVED-ROAD DRIVING COURSE
- D04a CLASSROOM BUILDING
- D05 OFF-ROAD DRIVING COURSE
- D05a CLASSROOM BUILDING
- D06 VEHICLE MAINTENANCE WAREHOUSE
- D09 WAREHOUSE

MOCK URBAN TACTICAL TRAINING AREA

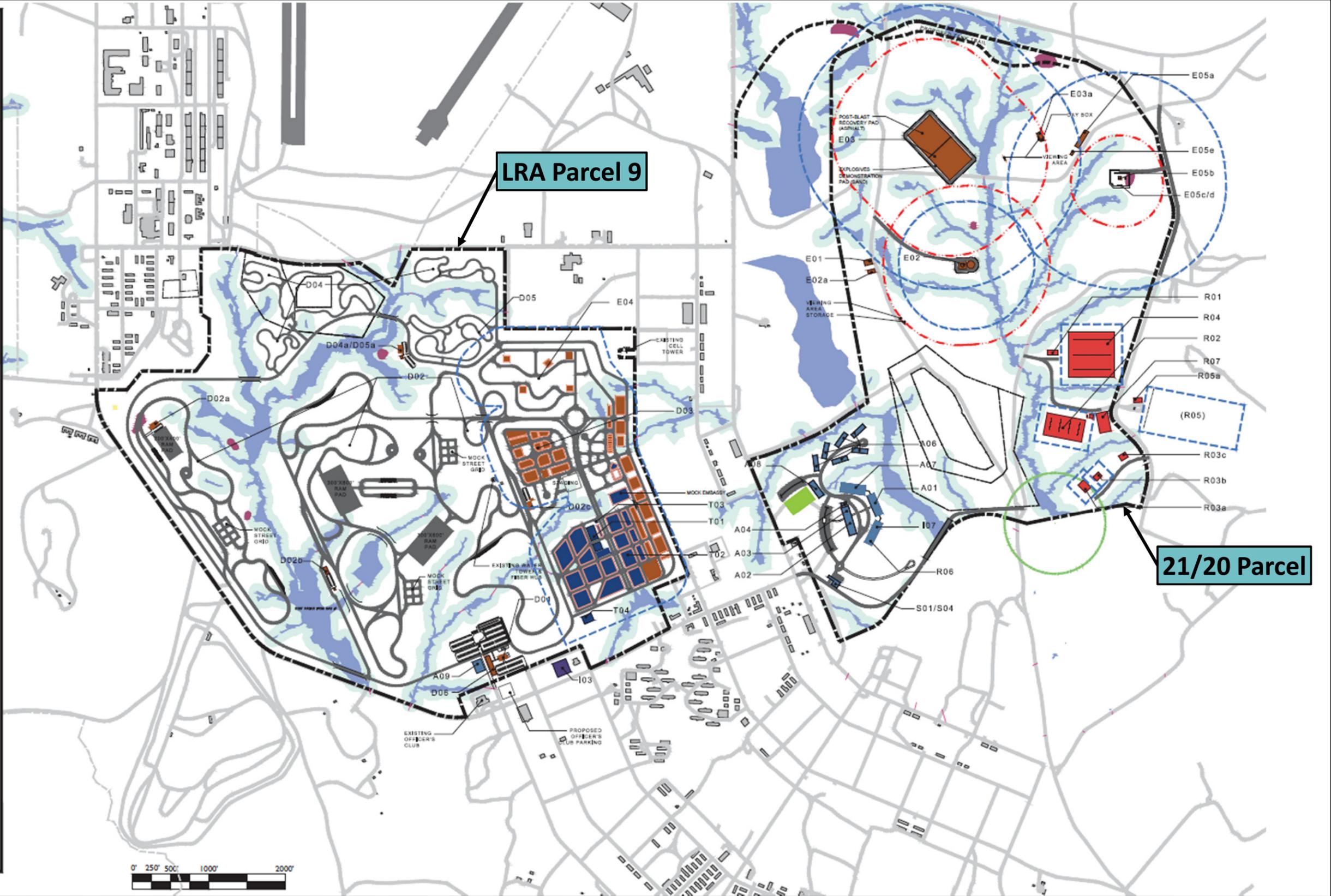
- T01 TACTICAL TRAINING
- T02 MOCK URBAN TACTICAL TRAINING
- T03 RAFFEL TOWER
- T04 TACTICAL MAZE

EXPLOSIVES RANGE AREA

- E01 EXPLOSIVES TRAINING
- E02 EXPLOSIVES DEMO RANGE
- E02a CLASSROOM
- E03 POST-BLAST TRAINING RANGE
- E03a CLASSROOM
- E04 EXPLOSIVES SIMULATIONS ALLEY
- E05a EXPLOSIVES BREACHING CLASSROOM
- E05b BREACHING HOUSE
- E05c/d BREACHING WALLS
- E05e BREACHING STORAGE

FIRING RANGE AREA

- R01 FIREARM TRAINING
- R02 50M INDOOR FIRING RANGE
- R03a LIVE FIRE SHOOT HOUSE (2-STORY)
- R03b LIVE FIRE SHOOT HOUSE (2-STORY)
- R03c LIVE FIRE SHOOT HOUSE CLASSROOM
- R04 150 M INDOOR/OUTDOOR FIRING RANGE
- R05 EXISTING 330m OUTDOOR FIRING RANGE
- R05a CLASSROOM
- R07 ARMORY



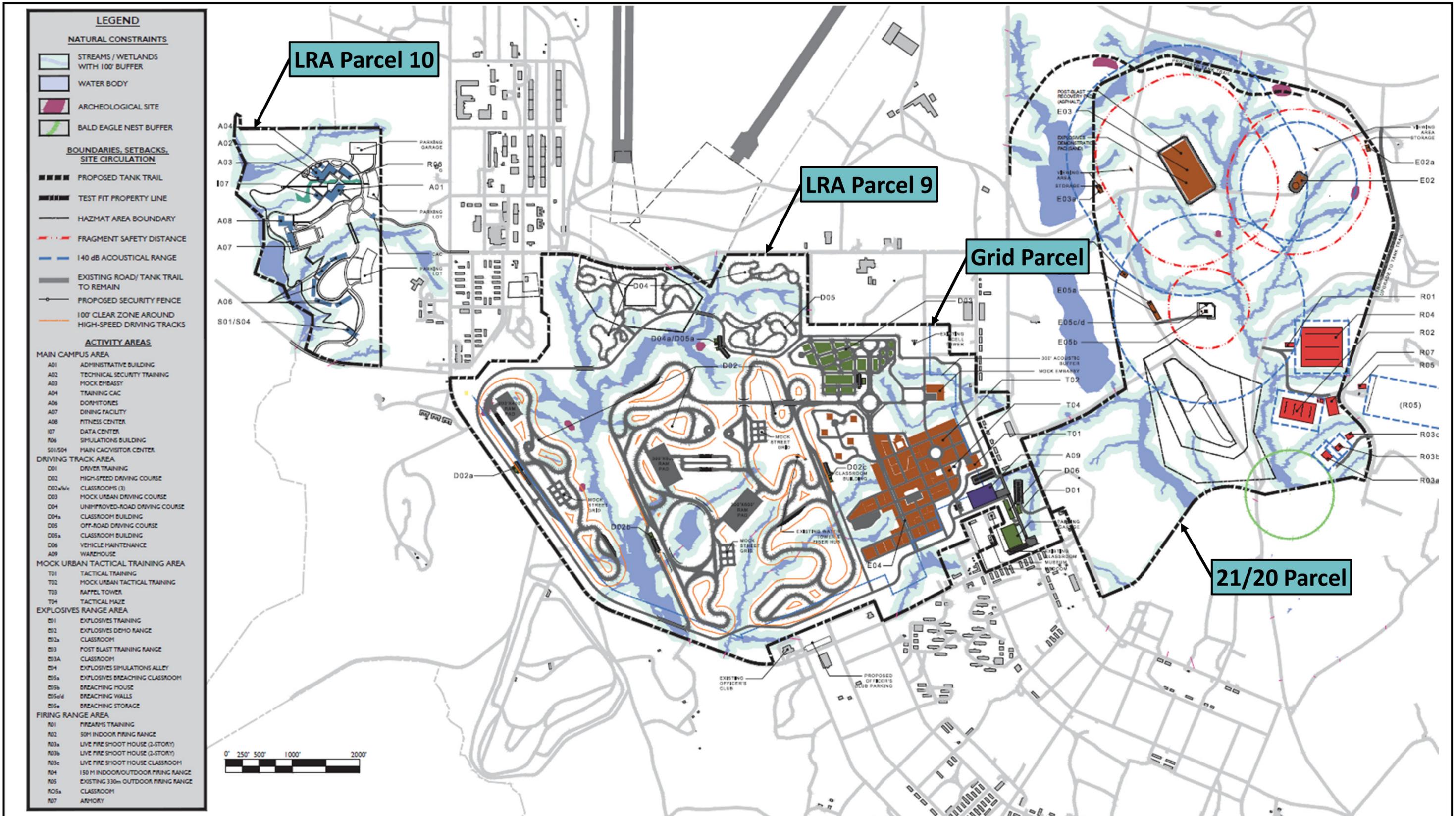


Figure 2-5

FASTC EIS Build Alternative 2

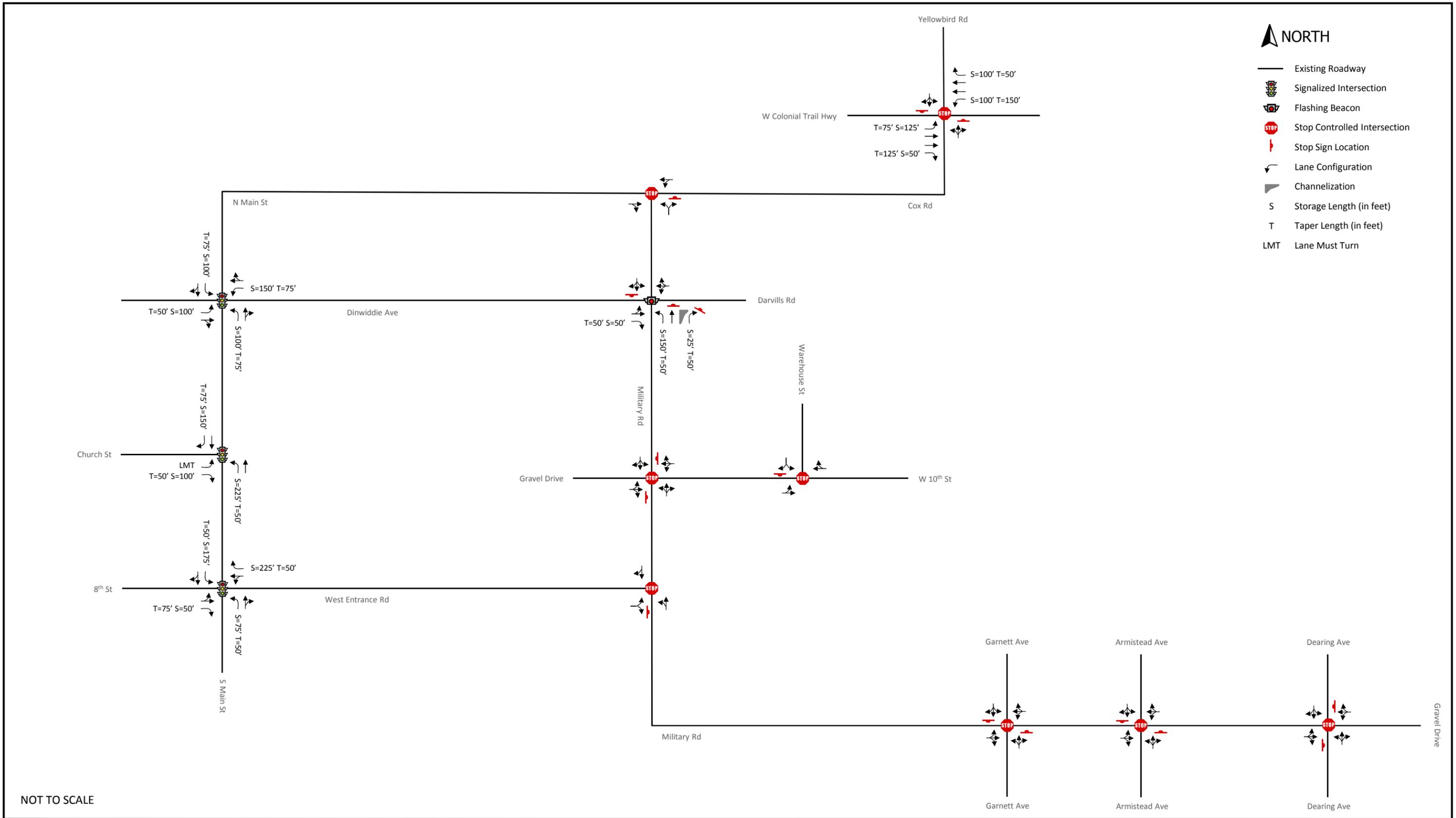


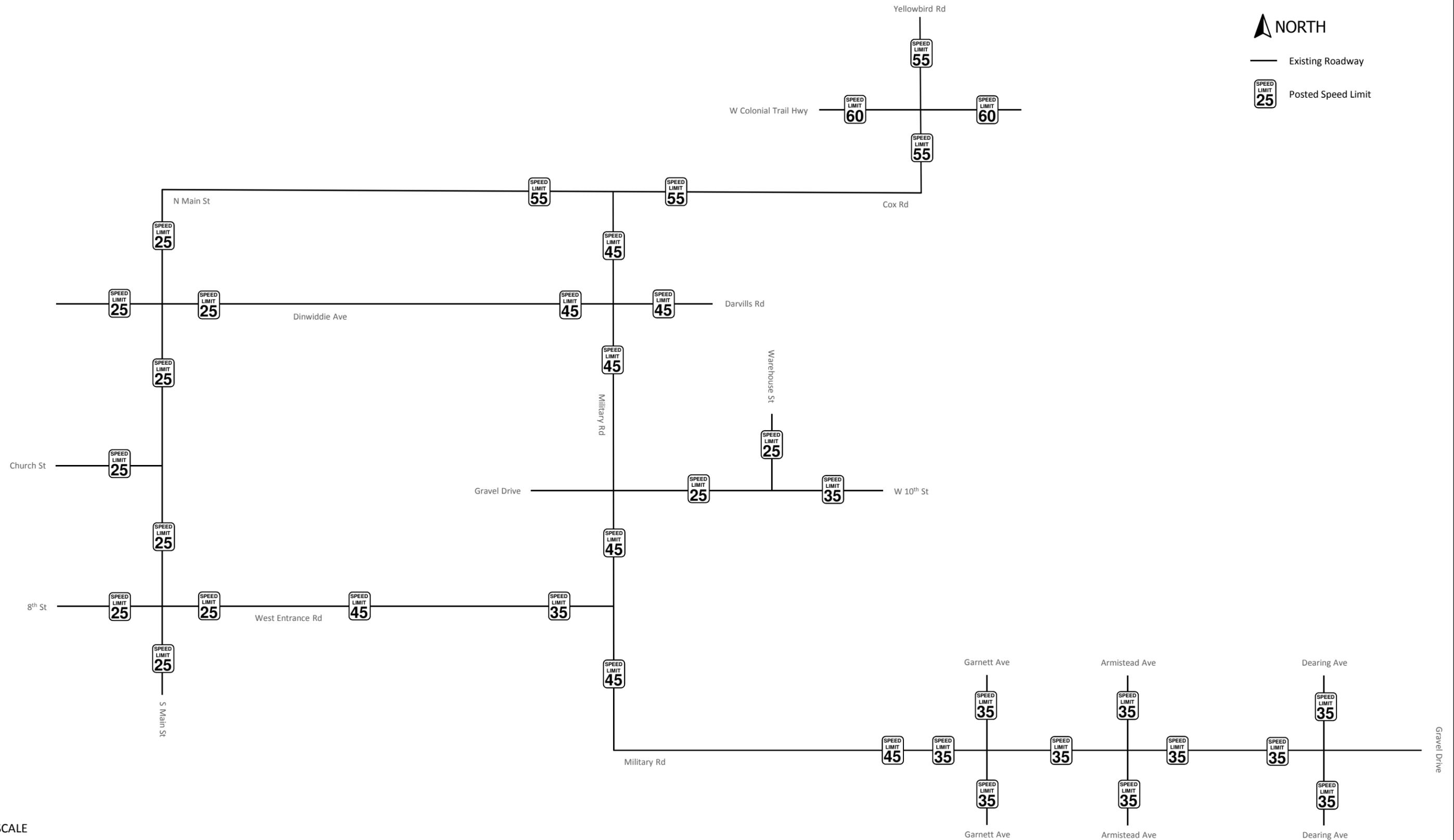
Figure 2-6

2012 Existing Geometry



Existing Roadway

Posted Speed Limit



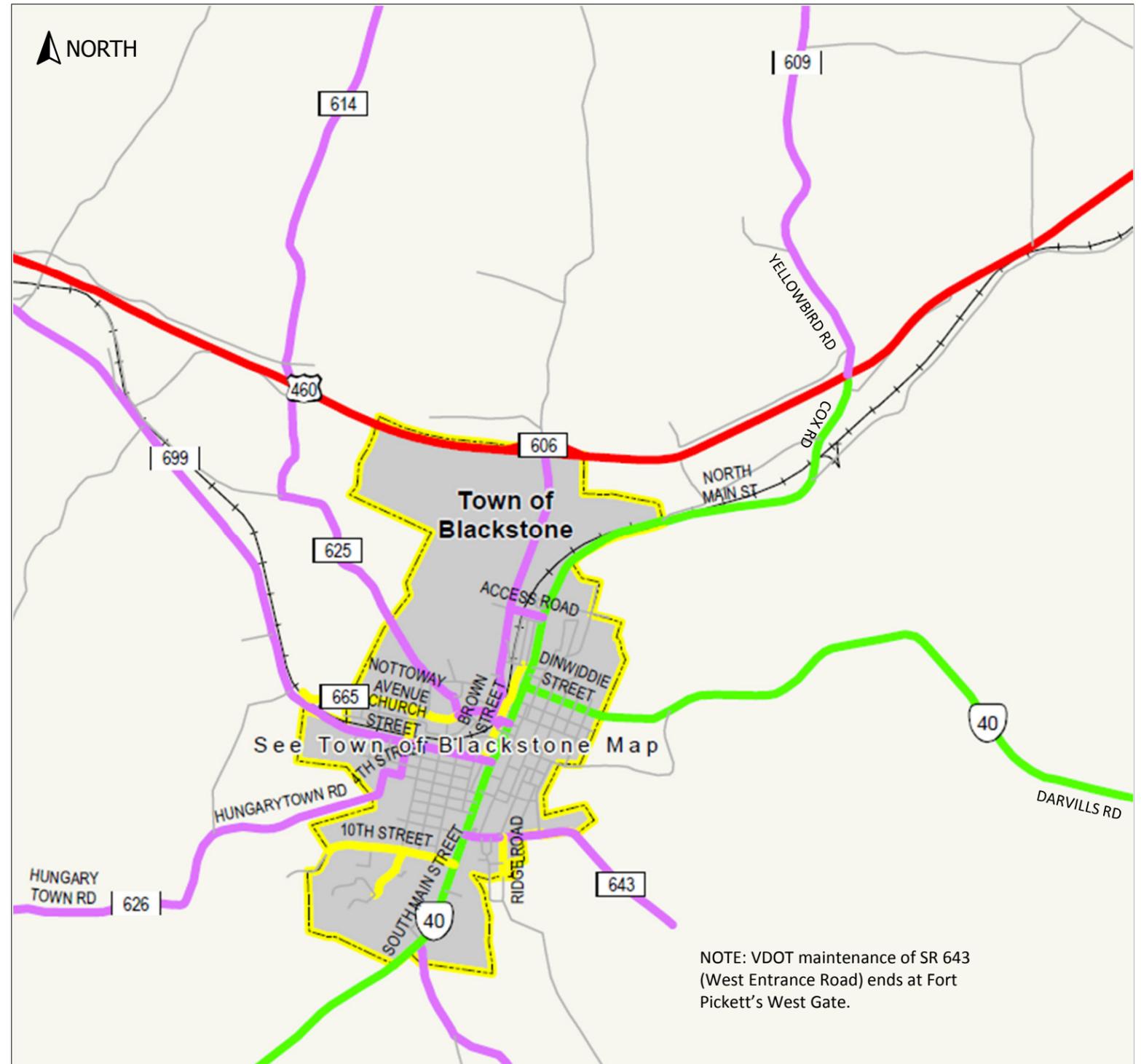
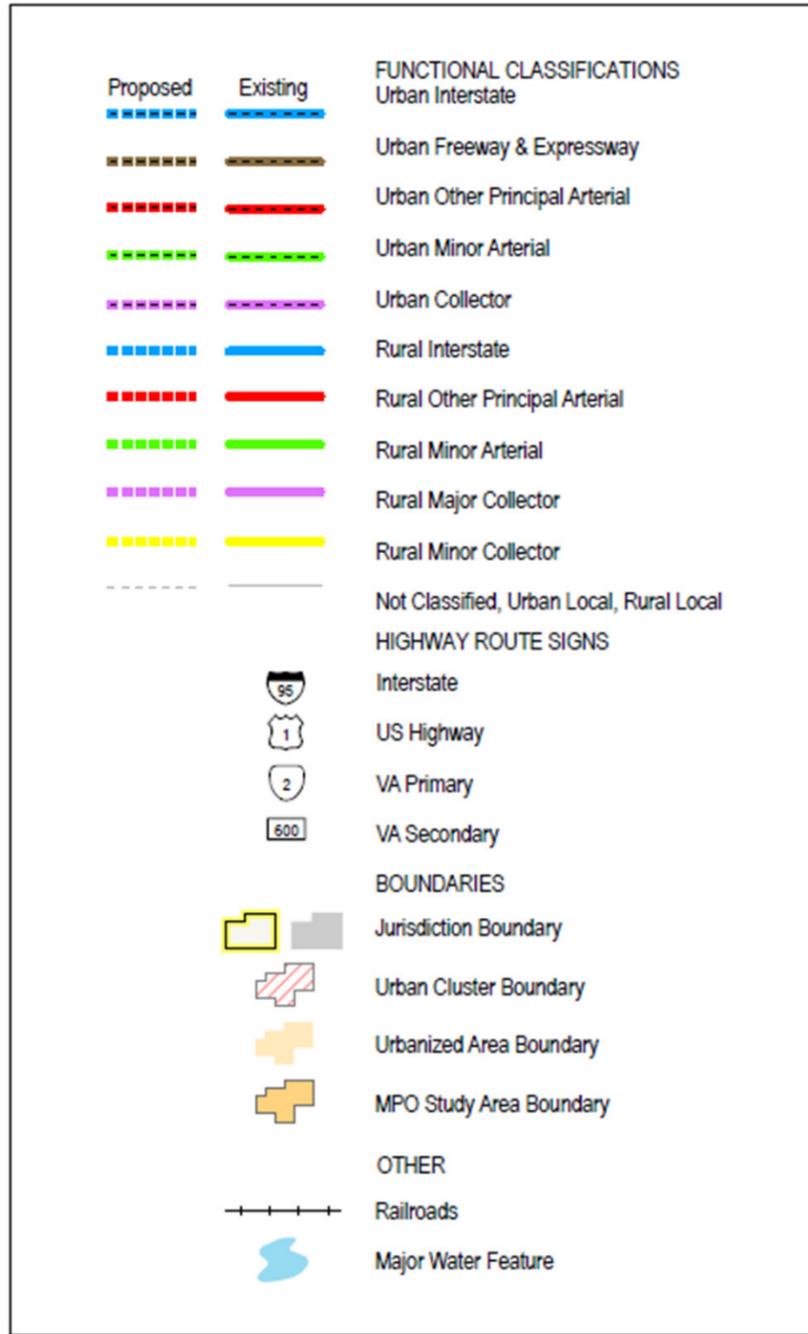
NOT TO SCALE

FOREIGN AFFAIRS SECURITY TRAINING CENTER
[FASTC]
An American Recovery and Reinvestment Act of 2009 Project



Figure 2-7

Posted Speed Limits



Source: VDOT's Nottoway County 2005 Functional Classification Map (http://www.virginiadot.org/projects/resources/fxn_class/Richmond/Nottoway_County.pdf)

NOTE: VDOT maintenance of SR 750 (Military Road) ends at Fort Pickett's Main Gate.



NOTE: Dearing Avenue is gated off just north of W 10th Street to prevent access to Fort Pickett.

-  NORTH
-  VDOT Primary Route
-  VDOT Secondary Road
-  Manned Gate
-  Unmanned Gate
-  LRA Parcel 9

Source: VDOT Online Transportation Map (<http://www.virginiadot.org/travel/prOTIM.asp>)



Line Item Details

Project Summary

UPC	18964
Project	RTE 460 BUS - BRIDGE REPLACEMENT & ACCELERATION LANE
Scope of Work	Bridge Replacement w/o Added Capacity
Description	FROM: BR - FR 0.421 MI S RT 641 TO 0.123 MI N RT 641 TO: ACCEL LN-FR 0.041 MI S 460 BYP TO 0.357 MI E INT RT 460B/460
Report Note	State Funds - AC for future federal conversion. Revised schedule required
Fund Source	BR/STP

Project Location

District	Richmond	Jurisdiction	Nottoway County
Road System	Primary	Length	0.9370 MI
Route	7460	Street	COX ROAD (RTE 460 BUS)/RTE 460 BYPASS
Structure No.	28704	Sufficiency Rating	-2
MPO Area	NonMPO		

Estimates & Schedule

Estimated Cost (Thousands)	Schedule
Prelim. Eng. (PE) \$758	Underway
Right of Way (RW) \$744	FY2013
Construction (CN) \$10,095	FY2015
Total Estimate \$11,598	

Required Allocations

Fund Sources	Previous Allocations	Values in Thousands of Dollars						Required After FY2018
		FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	
Primary Formula: Federal	\$1,540	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Primary Formula: Federal	\$221	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Primary Formula: Federal	\$152	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Primary Formula: State	\$1,098	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Primary Formula: State Match	\$478	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Funding	\$3,489	\$0	\$0	\$0	\$0	\$0	\$0	\$8,109

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VDOT Six-Year Improvement Program v1.0

Sources: VDOT's Six-Year Improvement Program (http://syip.virginiadot.org/Pages/lineitemDetails.aspx?syp_scenario_id=193&line_item_id=182471) and VDOT's Dashboard (http://dashboard.virginiadot.org/Pages/Projects/EngineeringDetailDesign.aspx?prj_nbr=18964)

Engineering Dashboard Project Details

UPC	18964	State Project #	7460067107
Summary			
Description	RTE 460 BUS - BRIDGE REPLACEMENT & ACCELERATION LANE (PETERSBURG, NOTTOWAY)		
District	Richmond	Residency	PETERSBURG
County	NOTTOWAY	Town	
Road System	Primary	Route	7460
Next Scheduled Activity	NOTICE TO PROCEED/RW ACQUIS	Accomplishment	Contract (1)
Project Status	ACTIVITY DATES SET (15)		
Comments			

Contact Information

VDOT Project Manager	Michael Tatom	Phone	804-524-6407
VDOT Contact	Michael Tatom	Phone	804-524-6407

Schedule

Baseline Ad Date	January 13, 2009
Current Ad Date	August 12, 2014
Actual Ad Date	

R THE ORIGINAL TARGET DATE HAS PASSED

Cost Estimates

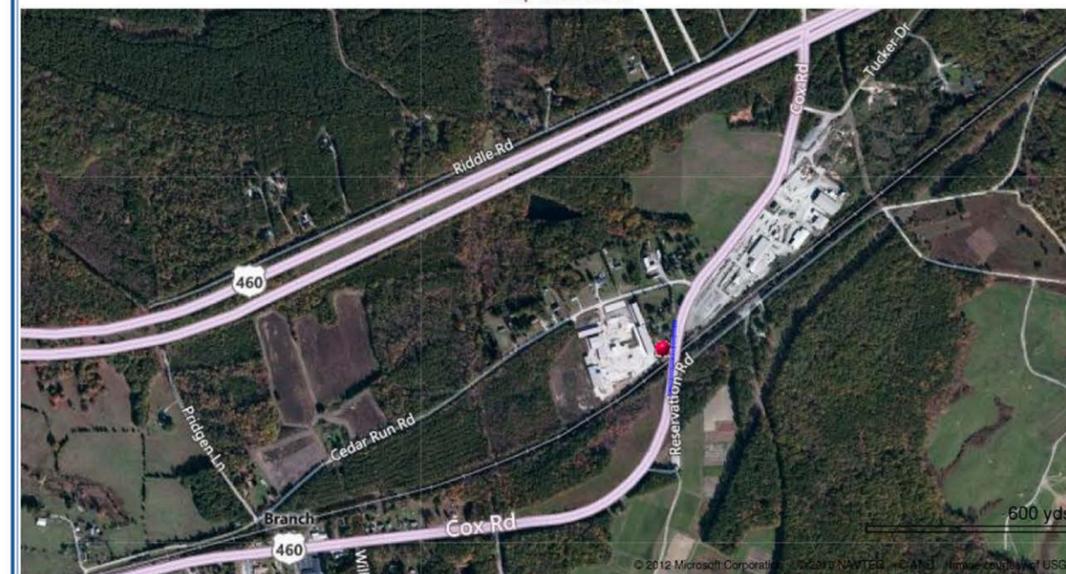
Scoping Estimate	\$9,514,490
Current Estimate	\$11,597,868
Estimate Date	May 15, 2012
Variance	22%

G COST ESTIMATE VARIANCE IS 21.89%

Activities

Activity	Code	Scheduled Begin Date	Actual Begin Date	Scheduled End Date	Actual End Date
AUTHORIZE PE	12	3/1/2007	3/1/2007	3/30/2007	3/5/2007
SERP-NOTICE TO STATE AGENCIES	18	8/1/2002	9/8/2000	11/27/2002	11/16/2000
SCOPE PROJECT	22	12/5/2007	12/5/2007	2/27/2009	2/11/2009
DRAFT ENV. DOCUMENT OR CATEGORICAL EXCLUSION (CE)	25	1/31/2011	11/4/2008	5/27/2011	5/1/2009
CONDUCT LOCATION SURVEY	31S	9/16/2010	9/16/2010	12/1/2010	11/16/2010
R/W&UT DATA-HEARING/PUBLIC INV	44	5/9/2011	5/11/2011	6/17/2011	7/8/2011
ADOPT LOCATION/DESIGN	49	8/22/2011	8/22/2011	11/22/2011	11/17/2011
FURNISH R/W&UT PLANS	51	4/16/2012	5/2/2012	10/19/2012	
NOTICE TO PROCEED/RW ACQUIS	60P	10/22/2012		11/2/2012	
UTILITY RELOCATION BY UTILITY	67U	11/4/2013		7/4/2014	
ACQUIRE RIGHT OF WAY	69	11/5/2012		11/1/2013	
APPROVED CONSTRUCTION PLANS	71	4/11/2014		7/3/2014	
ADVERTISE PROJECT/BEGIN CN	80	7/11/2014		8/12/2014	

Map Information



3 EXISTING CONDITIONS ANALYSIS

To complete the analysis of the existing conditions, directional turning movement counts were conducted at the study intersections, a field review was completed to document existing intersection geometry, and existing traffic signal timings were obtained from the consultant for the Town of Blackstone. This data was used to complete the capacity analyses for the study intersections.

3.1 EXISTING TRAFFIC VOLUMES

Existing AM (6:00 a.m. – 9:00 a.m.) and PM (3:00 p.m. – 6:00 p.m.) peak hour directional turning movement counts were obtained for the following intersections:

1. East Colonial Trail Highway (US Route 460) at Cox Road (US Route 460 Business)/Yellowbird Road (Route 609);
2. Cox Road (US Route 460 Business) at Military Road (Route 750);
3. Military Road (Route 750) at Darvills Road (VA Route 40);
4. Military Road at West 10th Street;
5. Military Road at West Entrance Road;
6. Military Road at Garnett Avenue;
7. Military Road at Dearing Avenue;
8. West 10th Street at Warehouse Street;
9. West Entrance Road (Route 643)/8th Street at South Main Street (VA Route 40/US Route 460 Business);
10. Church Street (US Route 460 Business) at South Main Street (VA Route 40/US Route 460 Business); and
11. Dinwiddie Avenue (VA Route 40) at Main Street (VA Route 40/US Route 460 Business).

The data was collected on April 24, 2012 while Nottoway County public schools were in session and during typical conditions for Fort Pickett. The turning movement counts included the number of heavy vehicles by movement.

In addition to the turning movement counts, VAARNG requested 48-hour directional volume counts at three locations:

1. West 10th Street between Warehouse Street and Garnett Avenue;
2. Military Road between Mosby Road and Garnett Avenue; and
3. West Entrance Road at the old Fort Pickett Gate (west of the current West Gate location).

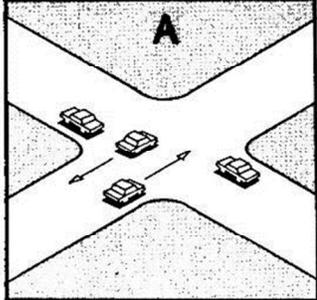
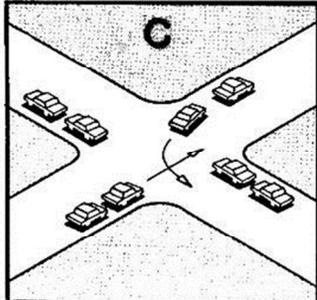
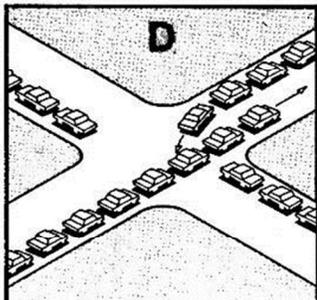
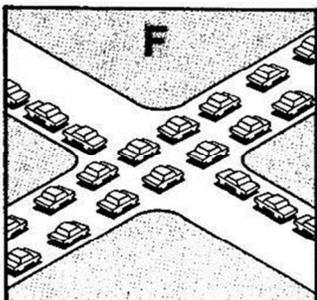
The data was collected on April 24 – 25, 2012.

The balanced 2012 AM (6:30 – 7:30) and PM (4:00 – 5:00) peak hour volumes are shown on Figures 3-1 and 3-2 (all figures are located at the end of the chapter after page 3-6). The complete turning movement count data can be found in Appendix B.

3.2 CAPACITY ANALYSES

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. Level of service (LOS) is a concept defined in the Highway Capacity Manual (HCM) as the qualitative measure of the operational conditions within a traffic stream and the resulting perception by motorists and/or passengers. The HCM methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of LOS from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. Table 3-1 shows in detail how each of these levels of service are interpreted.

Table 3-1: Level of Service Definitions

Level of Service	Roadway Segments or Controlled Access Highways	Intersections	
A	Free flow, low traffic density.	No vehicle waits longer than one signal indication.	
B	Delay is not unreasonable, stable traffic flow.	On a rare occasion motorists wait through more than one signal indication.	
C	Stable condition, movements somewhat restricted due to higher volumes, but not objectionable for motorists.	Intermittently drivers wait through more than one signal indication, and occasionally backups may develop behind left turning vehicles, traffic flow still stable and acceptable.	
D	Movements more restricted, queues and delays may occur during short peaks, but lower demands occur often enough to permit clearing, thus preventing excessive backups.	Delays at intersections may become extensive with some, especially left-turning vehicles waiting two or more signal indications, but enough cycles with lower demand occur to permit periodic clearance, thus preventing excessive backups.	
E	Actual capacity of the roadway involves delay to all motorists due to congestion.	Very long queues may create lengthy delays, especially for left-turning vehicles.	
F	Forced flow with demand volumes greater than capacity resulting in complete congestion. Volumes drop to zero in extreme cases.	Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a storage area during part or all of an hour.	

SOURCE: "A Policy on Design of Design of Urban Highways and Arterial Streets" - AASHTO, 1973 based upon material published in "Highway Capacity Manual", National Academy of Sciences, 1965.

For both unsignalized and signalized intersections, level of service is defined in terms of **delay**, a measure of driver discomfort, frustration, fuel consumption and lost travel time. Table 3-2 summarizes the delay associated with each LOS category:

Table 3-2: Level of Service Criteria

Signalized Intersections		Unsignalized Intersections	
Level of Service	Control Delay per Vehicle (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤ 10	A	0 to 10
B	> 10 to ≤ 20	B	> 10 to ≤ 15
C	> 20 to ≤ 35	C	> 15 to ≤ 25
D	> 35 to ≤ 55	D	> 25 to ≤ 35
E	> 55 to ≤ 80	E	> 35 to ≤ 50
F	> 80	F	> 50

Source: Exhibit 16-2 and Exhibit 17-2 from TRB's "Highway Capacity Manual 2000"

Level of service calculations for the intersections within the study area were performed using Synchro[®], a software package that calculates LOS, delay, and 95th percentile queue lengths based on techniques outlined in the 2000 HCM.

Twelve intersections, three signalized and nine unsignalized, were analyzed for the 2012 existing volumes. These intersections were analyzed using Synchro[®] Version 7 (Build 773 Rev 8) based on 2000 HCM methodologies. Capacity analyses were performed with the following assumptions:

- Level terrain;
- 12-foot lane widths;
- No parking activity or bus stops;
- No pedestrians;
- Traffic signal timing data provided by the Town of Blackstone's consultant (see Appendix C);
- Peak hour factor (PHF) by approach as determined from directional turning movement counts with a minimum PHF of 0.85 per VDOT's TIA regulations (see Appendix B); and
- Heavy vehicle percentages by movement as determined from directional turning movement counts (see Appendix B).

Table 3-3 summarizes the 2012 existing intersection delay and LOS based on the 2012 existing traffic volumes shown on Figures 3-1 and 3-2, the existing geometry shown on Figure 2-6 and the posted speed limits shown on Figure 2-7. The 2012 AM and PM existing intersection level of service is shown on Figure 3-3 and the corresponding Synchro[®] worksheets are included in Appendix D. The intersection numbers shown on Table 3-3 correspond to the intersection numbers in the Synchro[®] models.

As indicated in Table 3-3, under 2012 existing conditions the three signalized intersections operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements operate at LOS D:

- The eastbound through-left movement during the PM peak hour;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the AM peak hour.

All of the unsignalized movements operate at LOS B or better during the AM and PM peak hours.

Table 3-3: Intersection Delay and Level of Service Summary 2012 Existing Traffic Volumes

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	8.4	A	7.9	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	11.2	B	12.4	B
	SB Left-Through-Right	14.9	B	12.4	B
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	5.4	A	1.3	A
	NB Left-Right	9.3	A	10.1	B
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	EB Left-Through	1.4	A	1.4	A
	EB Right	†	†	†	†
	WB Left-Through-Right	2.9	A	0.9	A
	NB Left	11.5	B	10.1	B
	NB Through	9.9	A	10.8	B
	NB Right	0.0	A	0.0	A
4. W. 10th St at Military Rd Two-Way Stop	EB Left-Through-Right	0.0	A	10.0	B
	WB Left-Through-Right	10.8	B	10.1	B
	NB Left-Through-Right	0.0	A	0.0	A
	SB Left-Through-Right	3.2	A	2.2	A
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	10.2	B	9.4	A
	NB Left-Through	1.4	A	2.7	A
	SB Through-Right	†	†	†	†
6. Military Rd at Garnett Ave Two-Way Stop	EB Left-Through-Right	0.1	A	0.2	A
	WB Left-Through-Right	0.8	A	0.1	A
	NB Left-Through-Right	9.7	A	9.5	A
	SB Left-Through-Right	8.8	A	9.1	A
7. Military Rd at Armistead Ave Two-Way Stop	EB Left-Through-Right	0.1	A	0.3	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	9.4	A	9.2	A
	SB Left-Through-Right	8.3	A	8.7	A
8. Military Rd at Dearing Ave Two-Way Stop	EB Left-Through-Right	8.3	A	8.3	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	5.4	A	7.2	A
	SB Left-Through-Right	0.0	A	0.0	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Through	0.4	A	0.4	A
	WB Through-Right	†	†	†	†
	SB Left-Right	8.7	A	8.8	A
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	30.1	C	38.9	D
	EB Right	27.2	C	36.6	D
	WB Left-Through	44.7	D	32.0	C
	WB Right	22.4	C	21.1	C
	NB Left	8.8	A	14.7	B
	NB Through-Right	11.2	B	23.8	C
	SB Left	4.3	A	11.4	B
	SB Through-Right	4.0	A	11.2	B
Overall	10.3	B	20.4	C	
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	22.3	C	25.6	C
	EB Right	13.1	B	11.4	B
	NB Left	2.9	A	3.4	A
	NB Through	2.4	A	2.7	A
	SB Through	8.8	A	13.8	B
	SB Right	8.1	A	11.3	B
	Overall	7.1	A	9.2	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	23.6	C	26.8	C
	EB Through-Right	23.6	C	26.2	C
	WB Left	23.6	C	26.4	C
	WB Through-Right	23.2	C	25.1	C
	NB Left	0.0	A	12.3	B
	NB Through-Right	18.6	B	14.6	B
	SB Left	10.0	B	8.1	A
	SB Through-Right	9.9	A	9.3	A
Overall	14.9	B	15.5	B	

NOTES:

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

3.3 PEDESTRIAN AND BICYCLE FACILITIES AND BUS ROUTE ANALYSES

Within the study area, sidewalks are provided in the Town of Blackstone along Main Street, Dinwiddie Avenue, Church Street, and West Entrance Road. There are no sidewalks provided along VDOT maintained roadways or along the roadways within Fort Pickett.

There are no designated bicycle facilities provided within the study area.

Bus service within the Town of Blackstone is provided by the Blackstone Area Bus System (BABS). The current route and schedule information for the BABS Line is provided in Figure 3-4. BABS also provides on-call shuttle service between Fort Pickett and the Main Street business district in the Town of Blackstone. Additionally, BABS also provides scheduled bus service between Fort Pickett and the Town of Blackstone on Friday and Saturday evenings from 6:00 PM to 11:00 PM. The bus travels through the Main Gate on Military Road and stops at the gym, Post Exchange (PX), and billeting office.

3.4 SPEED STUDY

A speed study was not required by VDOT for this project.

3.5 CRASH HISTORY NEAR SITE

An analysis of the crash history near the site was not required by VDOT for this project.

3.6 SIGHT DISTANCE EVALUATION

A sight distance evaluation was not required by VDOT for this project.

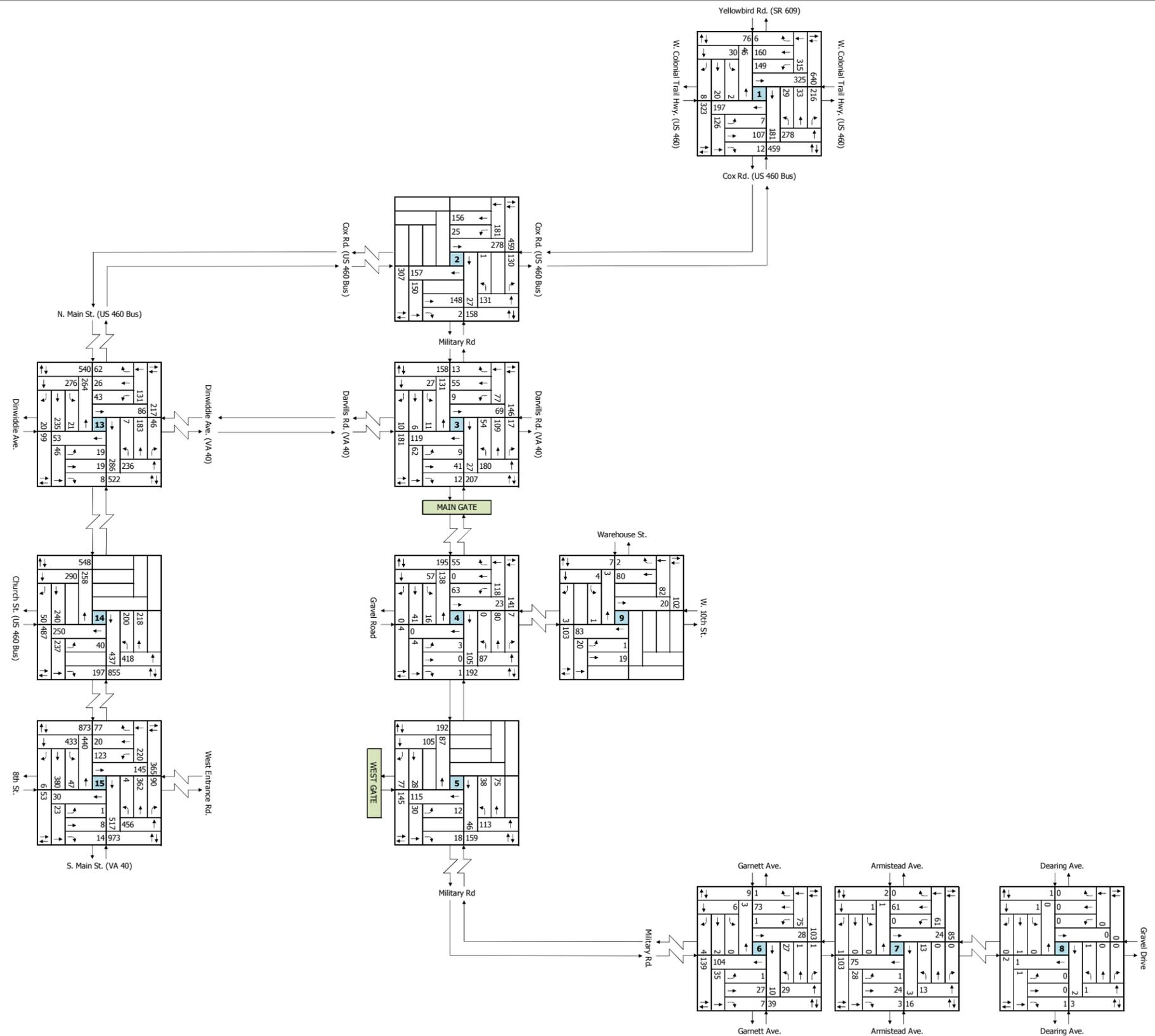
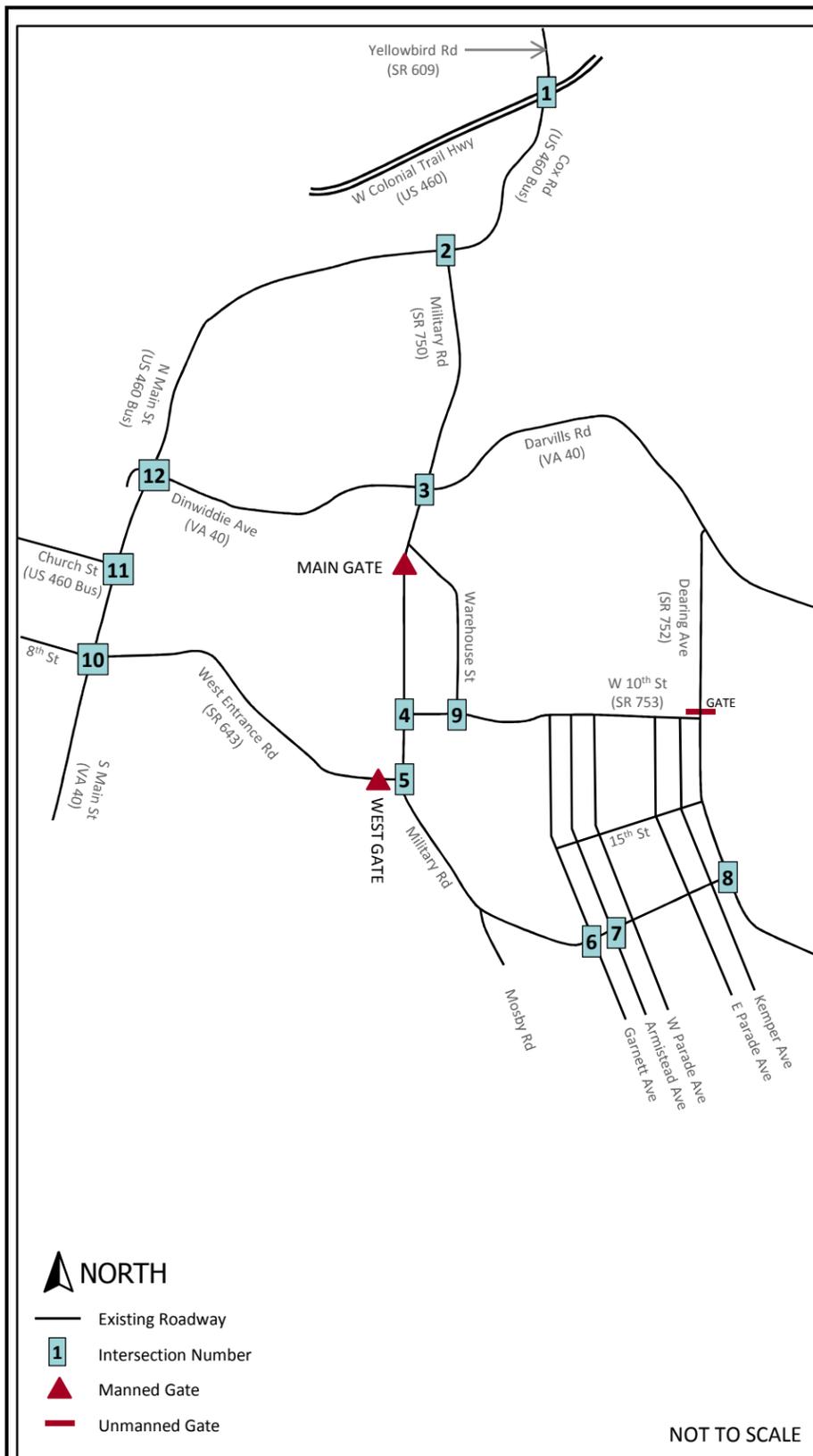
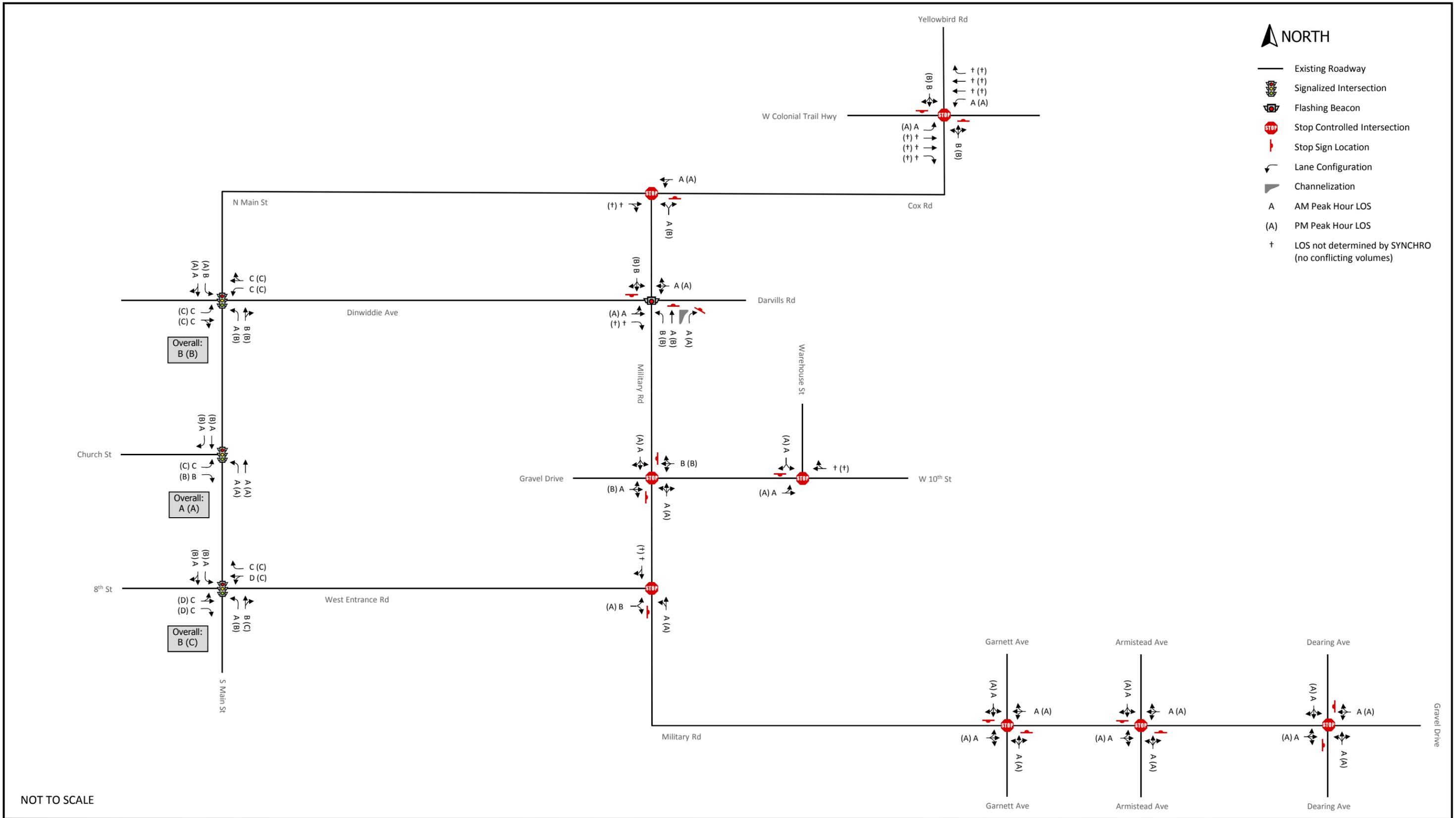


Figure 3-2

2012 Existing PM Peak Hour Volumes



NOT TO SCALE



Figure 3-3

2012 Existing Volumes Levels of Service

4 FUTURE NO BUILD CONDITIONS ANALYSIS (WITHOUT DEVELOPMENT)

To complete the analysis of the future No Build conditions (without FASTC), the existing volumes were projected to 2017 and 2020 using an annual growth rate. The projected volumes along with the existing intersection geometry and existing traffic signal timings were used to complete the capacity analyses for the study intersections.

4.1 FUTURE NO BUILD TRAFFIC VOLUMES

Future No Build volumes were calculated for 2017 and 2020. A 1% per year compounded growth rate was applied to the AM and PM peak hour existing traffic volumes (see Figures 3-1 and 3-2) to produce the 2017 and 2020 No Build traffic volumes shown on Figures 4-1 through 4-4 (all figures are located at the end of the chapter after page 4-10). The growth rate was determined from a review of historical count data available on VDOT's website. A summary of the historic count data and growth trends is included in Appendix B.

4.2 CAPACITY ANALYSES

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. LOS is a concept defined in the HCM as the qualitative measure of the operational conditions within a traffic stream and the resulting perception by motorists and/or passengers. The HCM methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of LOS from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. For detailed information about level of service definitions and criteria for unsignalized and signalized intersections, see Chapter 3.2 - Capacity Analyses.

Twelve intersections, three signalized and nine unsignalized, were analyzed for the 2017 and 2020 No Build volumes. These intersections were analyzed using Synchro[®] Version 7 (Build 773 Rev 8) based on 2000 HCM methodologies. Capacity analyses were performed with the following assumptions:

- Level terrain;
- 12-foot lane widths;
- No parking activity or bus stops;
- No pedestrians;
- Traffic signal timing data provided by the Town of Blackstone's consultant (see Appendix C);
- PHF by approach as determined from directional turning movement counts with a minimum PHF of 0.92 per VDOT's TIA regulations (see Appendix B); and
- Heavy vehicle percentages by movement as determined from directional turning movement counts (see Appendix B).

4.2.1 2017 No Build Traffic Volumes

Table 4-1 summarizes the 2017 No Build intersection delay and LOS based on the 2017 No Build traffic volumes shown on Figures 4-1 and 4-2, the existing geometry shown on Figure 2-6 and the posted speed limits shown on Figure 2-7. The 2017 AM and PM No Build volumes intersection LOS is shown on Figure 4-5 and the corresponding Synchro[®] worksheets are included in Appendix E.

As indicated in Table 4-1, under 2017 No Build conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D:

- The eastbound through-left movement during the PM peak hour;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the AM peak hour.

All of the unsignalized movements would operate at LOS B or better during the AM and PM peak hours.

Table 4-1: Intersection Delay and Level of Service Summary 2017 No Build Traffic Volumes

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	8.3	A	7.9	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	11.1	B	12.7	B
	SB Left-Through-Right	14.4	B	12.6	B
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	5.4	A	1.3	A
	NB Left-Right	9.3	A	10.0	B
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	EB Left-Through	1.4	A	1.3	A
	EB Right	†	†	†	†
	WB Left-Through-Right	3.0	A	0.9	A
	NB Left	11.5	B	9.9	A
	NB Through	10.0	A	10.7	B
	NB Right	0.0	A	0.0	A
4. W. 10th St at Military Rd Two-Way Stop	EB Left-Through-Right	0.0	A	10.0	A
	WB Left-Through-Right	10.7	B	10.0	B
	NB Left-Through-Right	0.0	A	0.0	A
	SB Left-Through-Right	2.8	A	2.2	A
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	10.2	B	9.4	A
	NB Left-Through	1.3	A	2.7	A
	SB Through-Right	†	†	†	†
6. Military Rd at Garnett Ave Two-Way Stop	EB Left-Through-Right	0.1	A	0.2	A
	WB Left-Through-Right	0.8	A	0.1	A
	NB Left-Through-Right	9.7	A	9.5	A
	SB Left-Through-Right	8.8	A	9.0	A
7. Military Rd at Armistead Ave Two-Way Stop	EB Left-Through-Right	0.1	A	0.3	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	9.4	A	9.2	A
	SB Left-Through-Right	8.3	A	8.6	A
8. Military Rd at Dearing Ave Two-Way Stop	EB Left-Through-Right	8.3	A	8.3	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	5.4	A	7.2	A
	SB Left-Through-Right	0.0	A	0.0	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Through	0.4	A	0.4	A
	WB Through-Right	†	†	†	†
	SB Left-Right	8.7	A	8.8	A
	Overall	10.1	B	20.3	C
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	30.0	C	39.6	D
	EB Right	27.0	C	37.1	D
	WB Left-Through	44.5	D	32.3	C
	WB Right	22.2	C	21.6	C
	NB Left	8.9	A	14.5	B
	NB Through-Right	11.2	B	23.9	C
	SB Left	4.3	A	11.4	B
	SB Through-Right	4.0	A	11.2	B
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	21.8	C	25.3	C
	EB Right	13.1	B	11.2	B
	NB Left	2.9	A	3.4	A
	NB Through	2.4	A	2.7	A
	SB Through	8.8	A	13.8	B
	SB Right	8.1	A	11.5	B
	Overall	6.9	A	8.9	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	23.6	C	26.9	C
	EB Through-Right	23.5	C	26.3	C
	WB Left	23.6	C	26.5	C
	WB Through-Right	23.2	C	25.2	C
	NB Left	0.0	A	12.3	B
	NB Through-Right	18.6	B	14.7	B
	SB Left	10.0	B	8.2	A
	SB Through-Right	9.9	A	9.4	A
Overall	14.9	B	15.4	B	

NOTES:

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

4.2.2 2020 No Build Traffic Volumes

Table 4-2 summarizes the 2020 No Build intersection delay and LOS based on the 2020 No Build traffic volumes shown on Figures 4-3 and 4-4, the existing geometry shown on Figure 2-6 and the posted speed limits shown on Figure 2-7. The 2020 AM and PM No Build volumes intersection LOS is shown on Figure 4-6 and the corresponding Synchro[®] worksheets are included in Appendix F.

As indicated in Table 4-2, under 2020 No Build conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D:

- The eastbound through-left movement during the PM peak hour;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the AM peak hour.

All of the unsignalized movements would operate at LOS B or better during the AM and PM peak hours.

Table 4-2: Intersection Delay and Level of Service Summary 2020 No Build Traffic Volumes

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	8.4	A	7.9	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	11.3	B	13.0	B
	SB Left-Through-Right	14.8	B	12.8	B
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	5.4	A	1.3	A
	NB Left-Right	9.3	A	10.1	B
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	EB Left-Through	1.5	A	1.4	A
	EB Right	†	†	†	†
	WB Left-Through-Right	2.9	A	1.0	A
	NB Left	11.7	B	10.1	B
	NB Through	10.0	B	10.8	B
	NB Right	0.0	A	0.0	A
4. W. 10th St at Military Rd Two-Way Stop	EB Left-Through-Right	0.0	A	10.0	B
	WB Left-Through-Right	10.8	B	10.1	B
	NB Left-Through-Right	0.0	A	0.0	A
	SB Left-Through-Right	3.2	A	2.2	A
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	10.2	B	9.4	A
	NB Left-Through	1.3	A	2.7	A
	SB Through-Right	†	†	†	†
6. Military Rd at Garnett Ave Two-Way Stop	EB Left-Through-Right	0.1	A	0.2	A
	WB Left-Through-Right	0.8	A	0.1	A
	NB Left-Through-Right	9.7	A	9.5	A
	SB Left-Through-Right	8.8	A	9.1	A
7. Military Rd at Armistead Ave Two-Way Stop	EB Left-Through-Right	0.1	A	0.2	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	9.4	A	9.2	A
	SB Left-Through-Right	8.3	A	8.6	A
8. Military Rd at Dearing Ave Two-Way Stop	EB Left-Through-Right	8.3	A	8.3	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	5.4	A	7.2	A
	SB Left-Through-Right	0.0	A	0.0	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Through	0.4	A	0.3	A
	WB Through-Right	†	†	†	†
	SB Left-Right	8.7	A	8.9	A
	Overall	10.2	B	21.0	C
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	30.4	C	40.4	D
	EB Right	27.0	C	37.5	D
	WB Left-Through	44.5	D	32.8	C
	WB Right	22.1	C	21.7	C
	NB Left	8.9	A	14.7	B
	NB Through-Right	11.3	B	25.0	C
	SB Left	4.4	A	11.9	B
	SB Through-Right	4.0	A	11.5	B
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	22.2	C	26.0	C
	EB Right	13.0	B	11.3	B
	NB Left	2.9	A	3.4	A
	NB Through	2.4	A	2.7	A
	SB Through	8.9	A	14.1	B
	SB Right	8.2	A	11.5	B
	Overall	7.0	A	9.0	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	23.6	C	27.2	C
	EB Through-Right	23.5	C	26.5	C
	WB Left	23.7	C	26.8	C
	WB Through-Right	23.3	C	25.5	C
	NB Left	0.0	A	12.3	B
	NB Through-Right	18.8	B	14.8	B
	SB Left	10.1	B	8.2	A
	SB Through-Right	10.0	B	9.5	A
Overall	15.0	B	15.5	B	

NOTES:

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

4.3 TURN LANE ANALYSES

Left and right-turn lane analyses were performed for movements at unsignalized intersections of VDOT maintained roadways outside of Fort Pickett using the 2017 and 2020 No Build traffic volumes. The guidelines for left and right turn lane treatments are found in Appendix F of VDOT’s *Road Design Manual* and are reproduced in Table 4-3. These guidelines provide criteria for the installation of left and right turn lanes on two-lane and four-lane highways at unsignalized intersections.

Table 4-3: VDOT Left and Right Turn Lane Criteria

LENGTH OF STORAGE		TAPER - Rural and Urban	
Rural - For Design Speeds 50 MPH or Higher	*L - 200' min. (For 240 or fewer vehicles during peak hour, <u>making turn</u>)	- For Design Speeds 35 MPH or Higher	**T - 200' Min.
Rural - For Design Speeds 45 MPH or Less	*L - 100' min. (For 60 or fewer vehicles during peak hour, <u>making turn</u>)	- For Design Speeds 30 MPH or Less	**T - 100' Min. (single) **T - 200' Min. (dual)
*Distance L to be adjusted upward as determined by capacity analysis for Left and Right Turn Storage.		**Tapers are to be straight-line unless local policy requires reverse curves. In congested areas the taper length may be reduced to increase storage length. However, a design waiver shall be required.	
Urban - Length determined by capacity analysis for Left and Right Turn Storage		- For Design Speeds 50 MPH or Higher	**T - 200' Min.
		- For Design Speeds 45 MPH or Less	**T - 100' Min. (single) **T - 150' Min. (dual)

Taper rates: Rural - 8:1 for design speeds up to 30 mph and less, 15:1 for design speeds 35 mph and greater. Urban - 8:1 for design speeds up to 45 mph and less, 15:1 for design speeds 50 mph and greater. For urban dual lane taper (150' min.), See 2011 AASHTO Green Book, Chapter 9.

Note: Taper lengths shown above were compiled using these formulas and were rounded up.

SOURCE: Figure 3-1 VDOT’s *Road Design Manual* Appendix F (Rev 7/12)

VDOT’s *Road Design Manual* defines Storage Length and Taper as follows:

- **Storage Length:** Lane footage added to a deceleration lane to store the maximum number of vehicles likely to accumulate during a peak period, so as not to interfere with the through-travel lanes.
- **Taper:** The widening of pavement to allow the redirection and transition of vehicles around or into a turn lane; of two types: (a) redirect tapers necessary for the redirection of vehicles along the traveled way; and (b) transition tapers for turn lanes that allow the turning vehicle to transition from or to the traveled way, to or from a turn lane.

Turn lane analyses were completed using the 2017 and 2020 No Build traffic volumes for the movements listed below:

- Eastbound left turn from US Route 460 onto Yellowbird Road;
- Eastbound right turn from US Route 460 onto Cox Road;
- Westbound left turn from US Route 460 onto Cox Road;
- Westbound right turn from US Route 460 onto Yellowbird Road;
- Eastbound right turn from Cox Road onto Military Road;
- Westbound left turn from Cox Road onto Military Road;
- Eastbound left turn from Darvills Road onto Military Road;
- Eastbound right turn from Darvills Road onto Military Road;
- Westbound left turn from Darvills Road onto Military Road;
- Westbound right turn from Darvills Road onto Military Road;
- Northbound left turn from Military Road onto Darvills Road;
- Northbound right turn from Military Road onto Darvills Road
- Southbound left turn from Military Road onto Darvills Road; and
- Southbound right turn from Military Road onto Darvills Road.

The 2017 No Build traffic volumes from Figures 4-1 and 4-2 and the 2020 No Build traffic volumes from Figures 4-3 and 4-4 were used to complete the turn lane analyses.

The VDOT turn lane nomographs for the 2017 No Build traffic volumes are included Appendix G and VDOT turn lane nomographs for the 2020 No Build traffic volumes are included Appendix H. The results of the turn lane analyses are summarized in Table 4-4. The minimum left turn lane storage lengths shown in Table 4-4 are the larger of the 200-foot minimum specified in Table 4-3 and the length specified on the nomographs. The minimum taper lengths are as specified in Table 4-3.

The turn lane analyses indicate that the existing turn lane treatments are sufficient with one exception. The eastbound right turn lane from Darvills Road onto Military Road should be brought up to the current VDOT minimum standard of a 200-foot storage lane with a 200-foot taper.

**Table 4-4: Turn Lane Analyses Summary
2017 and 2020 No Build Traffic Volumes**

Intersection and Movement	Existing Turn Lane Treatment	Turn Lane Treatment Required per VDOT Policy		Additional Treatment Required?	
		2017 No Build Volumes	2020 No Build Volumes	2017	2020
US Route 460 at Cox Road					
Eastbound Left	125-foot Left Turn Lane with 75-foot Taper	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Eastbound Right	50-foot Right Turn Lane with 125-foot Taper	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Westbound Left	150-foot Left Turn Lane with 150-foot Taper	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	No	No
Westbound Right	100-foot Right Turn Lane with 50-foot Taper	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Cox Road at Military Road					
Eastbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Westbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Darvills Road at Military Road					
Eastbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Eastbound Right	50-foot Right Turn Lane with 50-foot Taper	Minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Yes	Yes
Westbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Westbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Northbound Left	150-foot Left Turn Lane with 50-foot Taper	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Northbound Right	25-foot Right Turn Lane with 50-foot Taper	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Southbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Southbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No

Shaded cells indicate additional turn lane treatments required to accommodate future No Build Volumes.

4.4 TRAFFIC SIGNAL WARRANT ANALYSES

Traffic signal warrant analyses were not performed for 2017 and 2020 No Build traffic volumes.

4.5 PEDESTRIAN AND BICYCLE FACILITIES AND BUS ROUTE ANALYSES

Within the study area, sidewalks are provided in the Town of Blackstone along Main Street, Dinwiddie Avenue, Church Street, and West Entrance Road. There are no sidewalks provided along VDOT maintained roadways or along the roadways within Fort Pickett. No additional pedestrian accommodations are planned.

There are no designated bicycle facilities provided within the study area and none are planned.

Bus service within the Town of Blackstone is provided by BABS. BABS also provides on-call shuttle service between Fort Pickett and the Main Street business district in the Town of Blackstone. Additionally, BABS also provides scheduled bus service between Fort Pickett and the Town of Blackstone on Friday and Saturday evenings from 6:00 PM to 11:00 PM. The bus travels through the Main Gate on Military Road and stops at the gym, PX, and billeting office. No additional bus service is planned.

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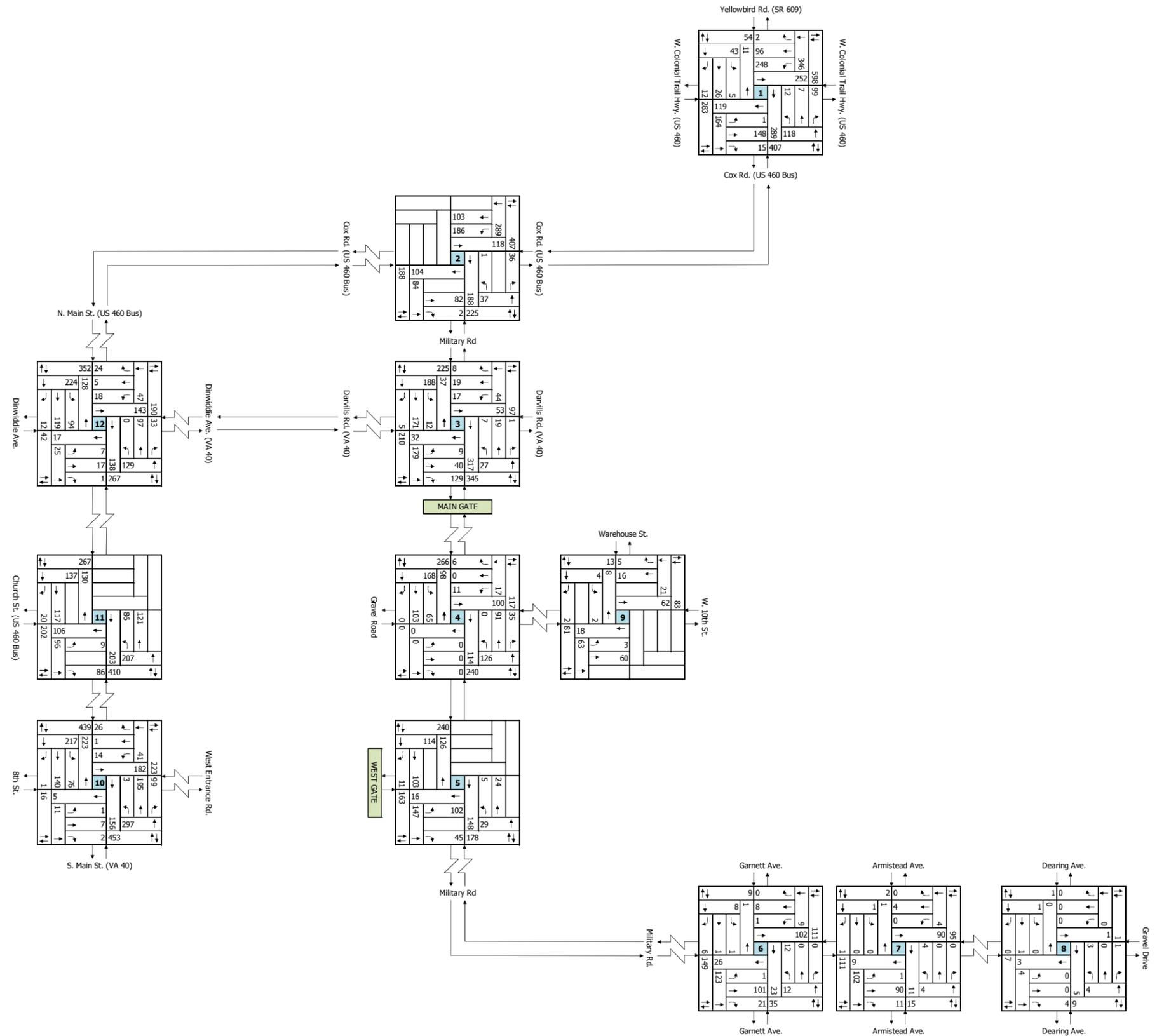
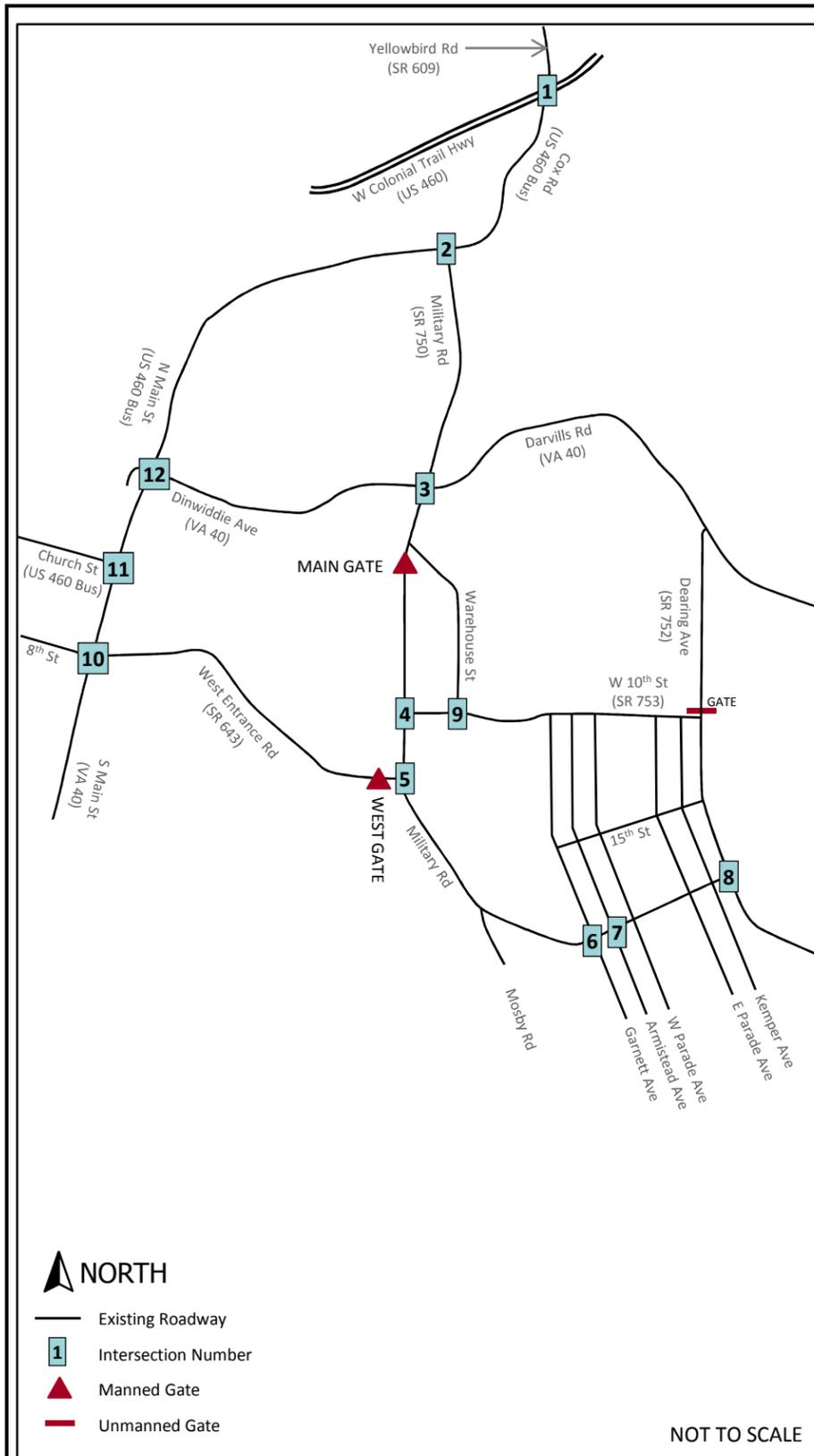


Figure 4-1

2017 No Build AM Peak Hour Volumes

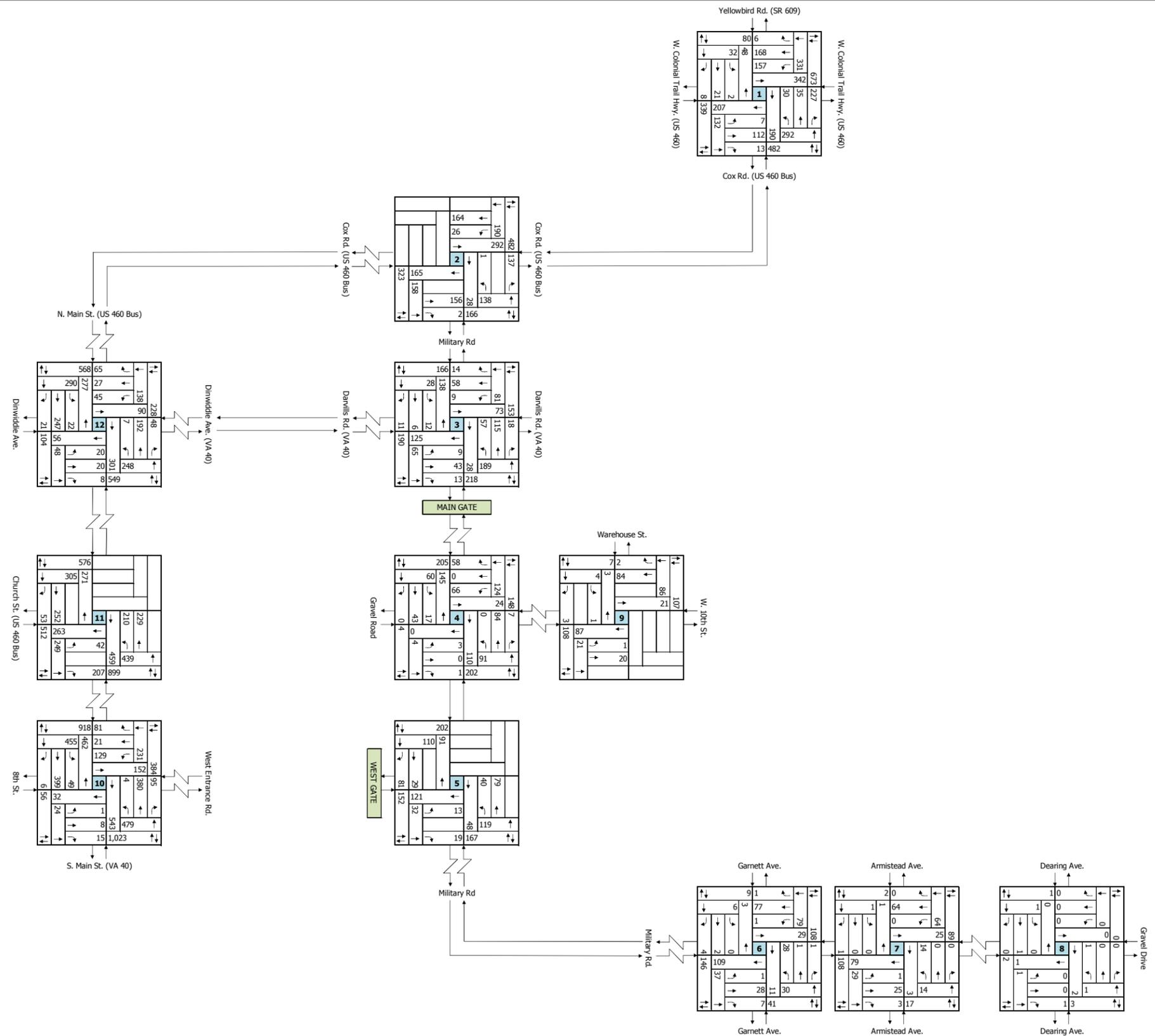
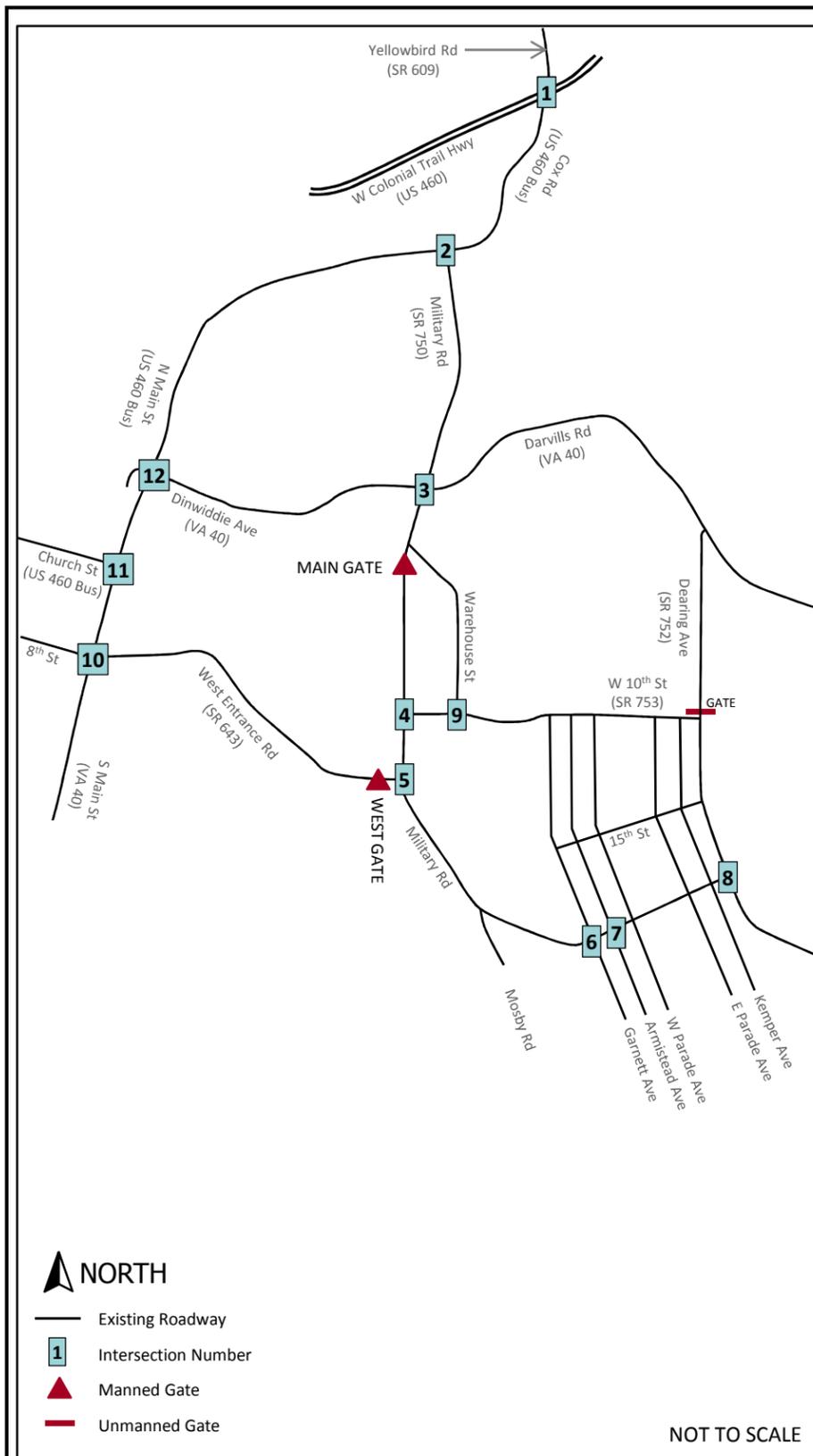


Figure 4-2

2017 No Build PM Peak Hour Volumes

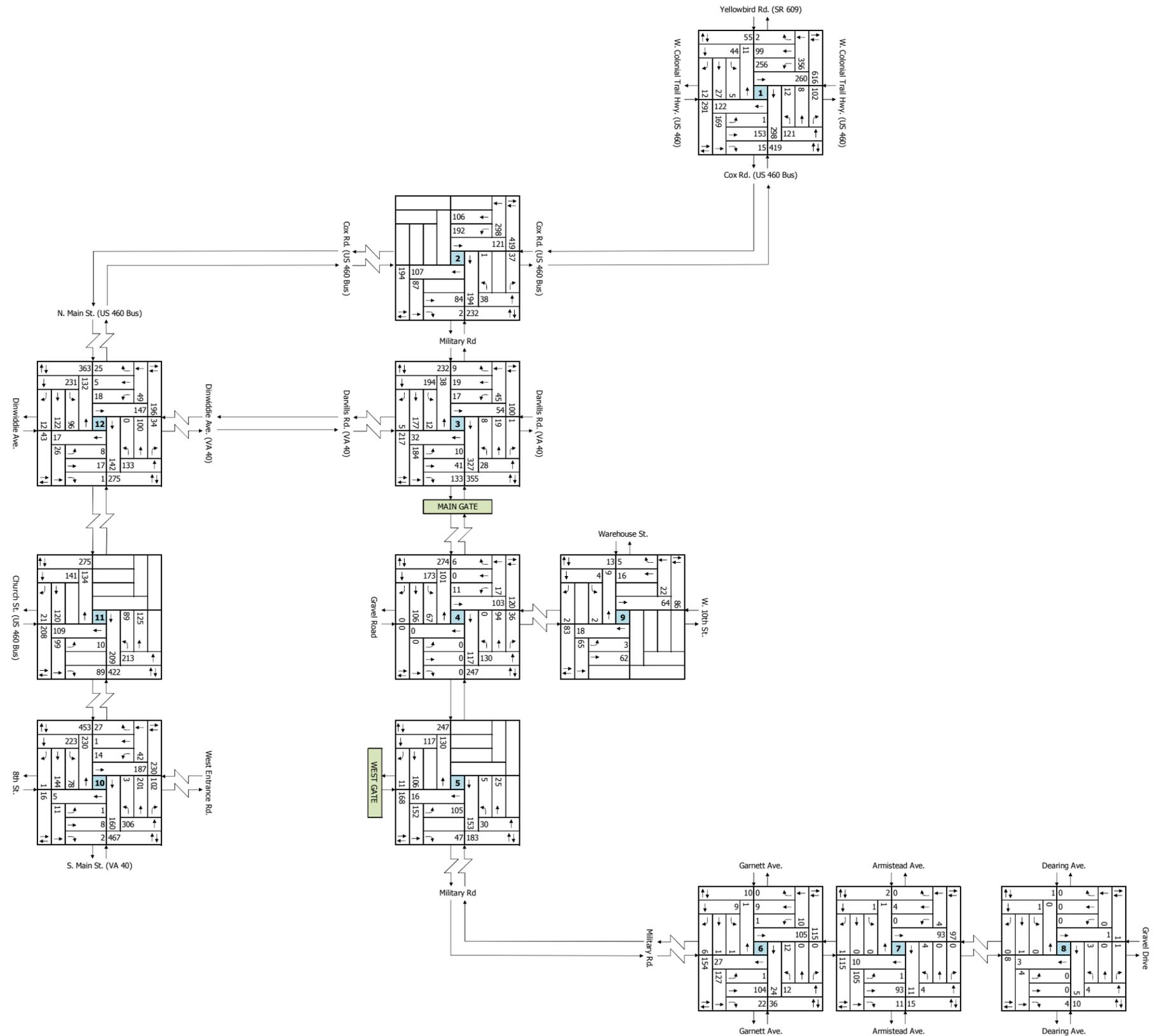
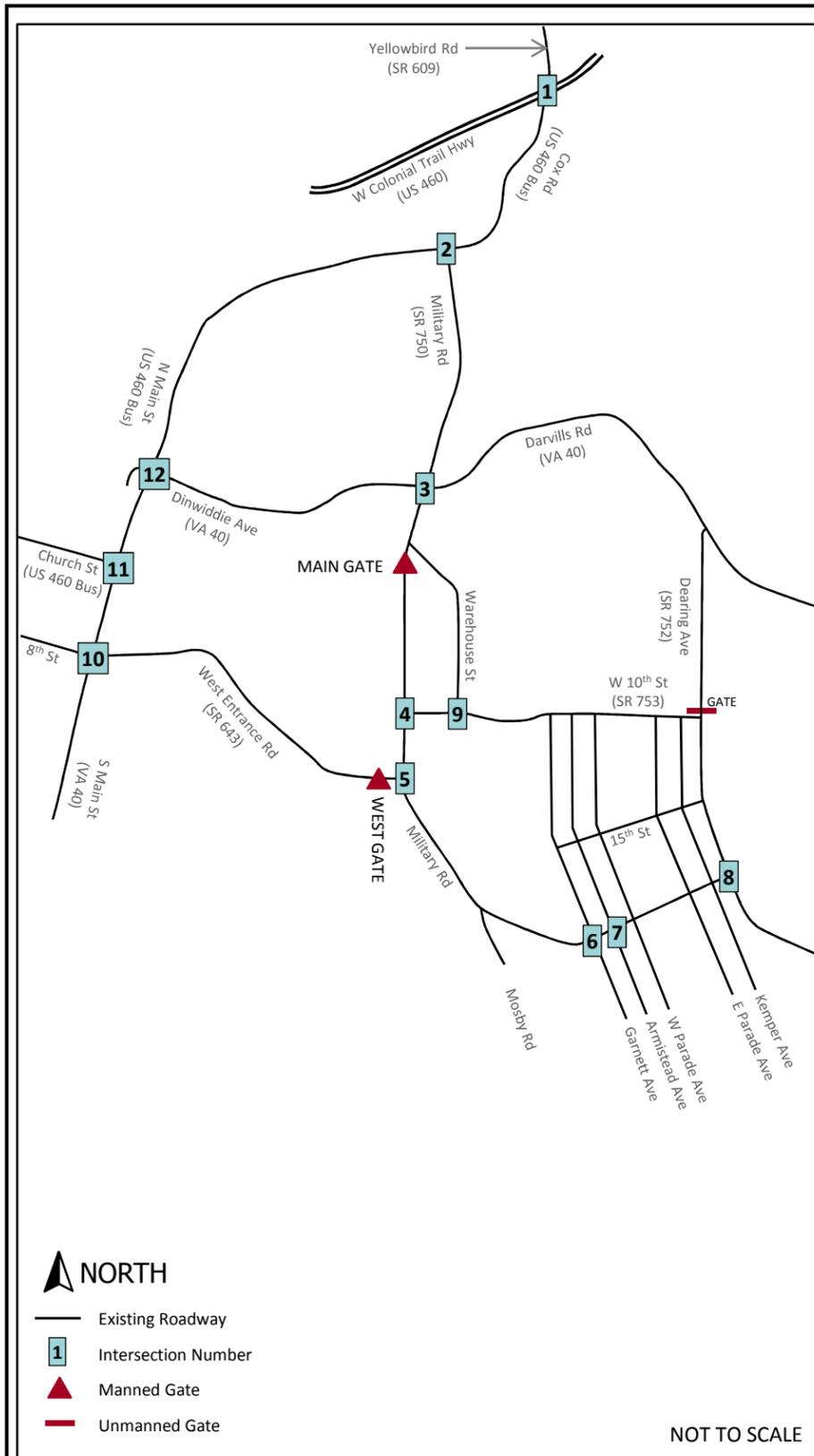


Figure 4-3

2020 No Build AM Peak Hour Volumes

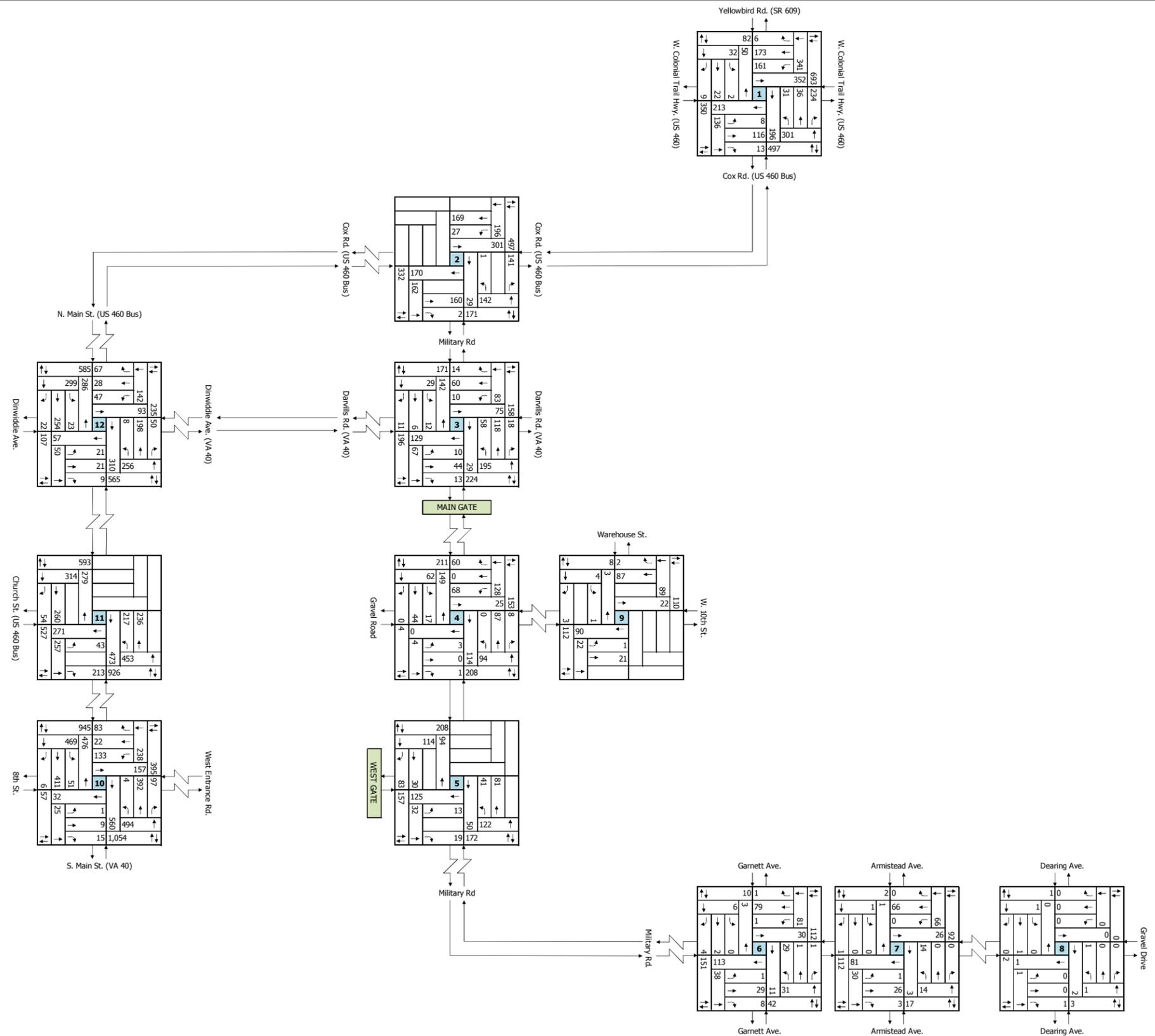
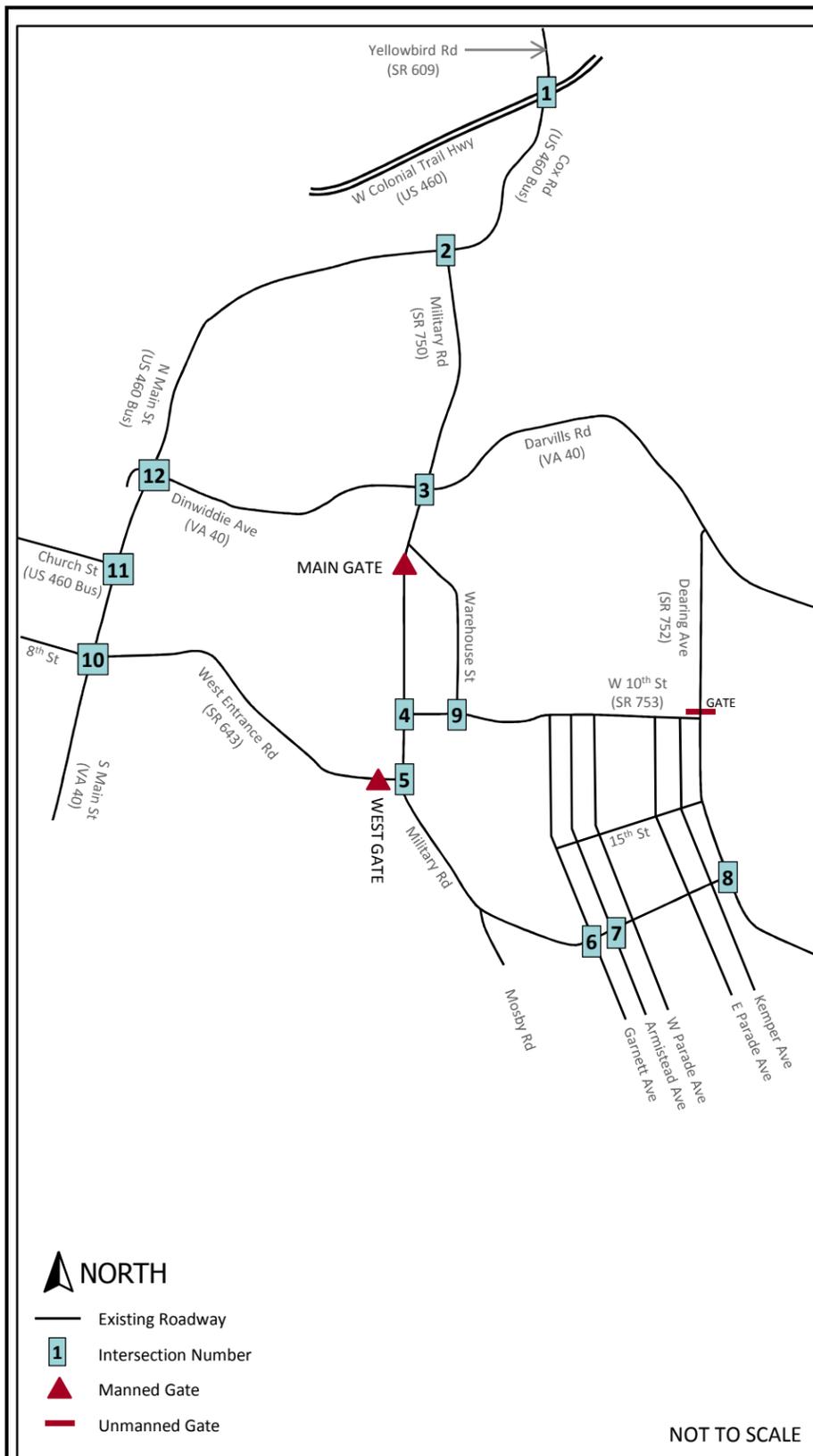
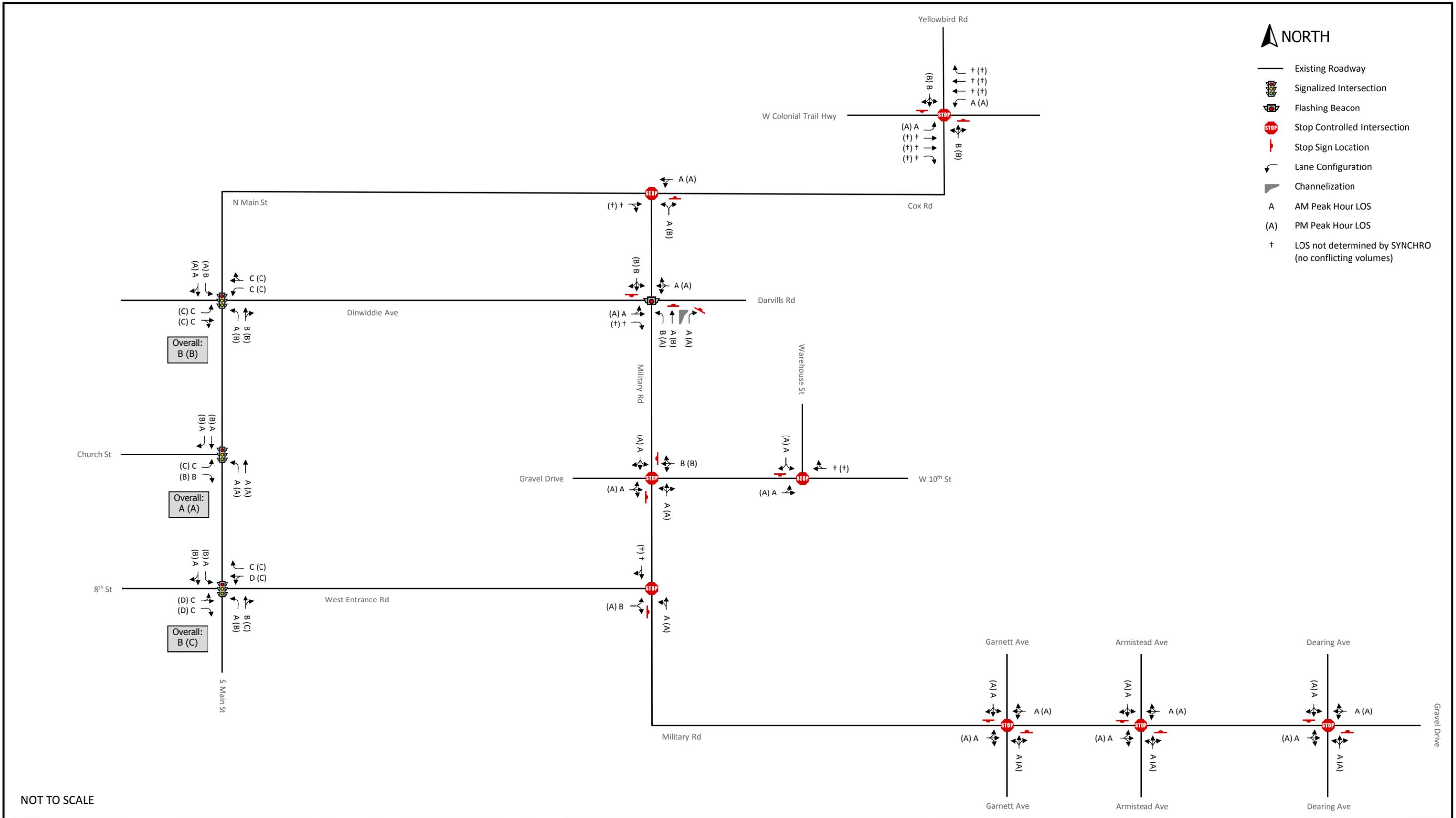


Figure 4-4

2020 No Build PM Peak Hour Volumes

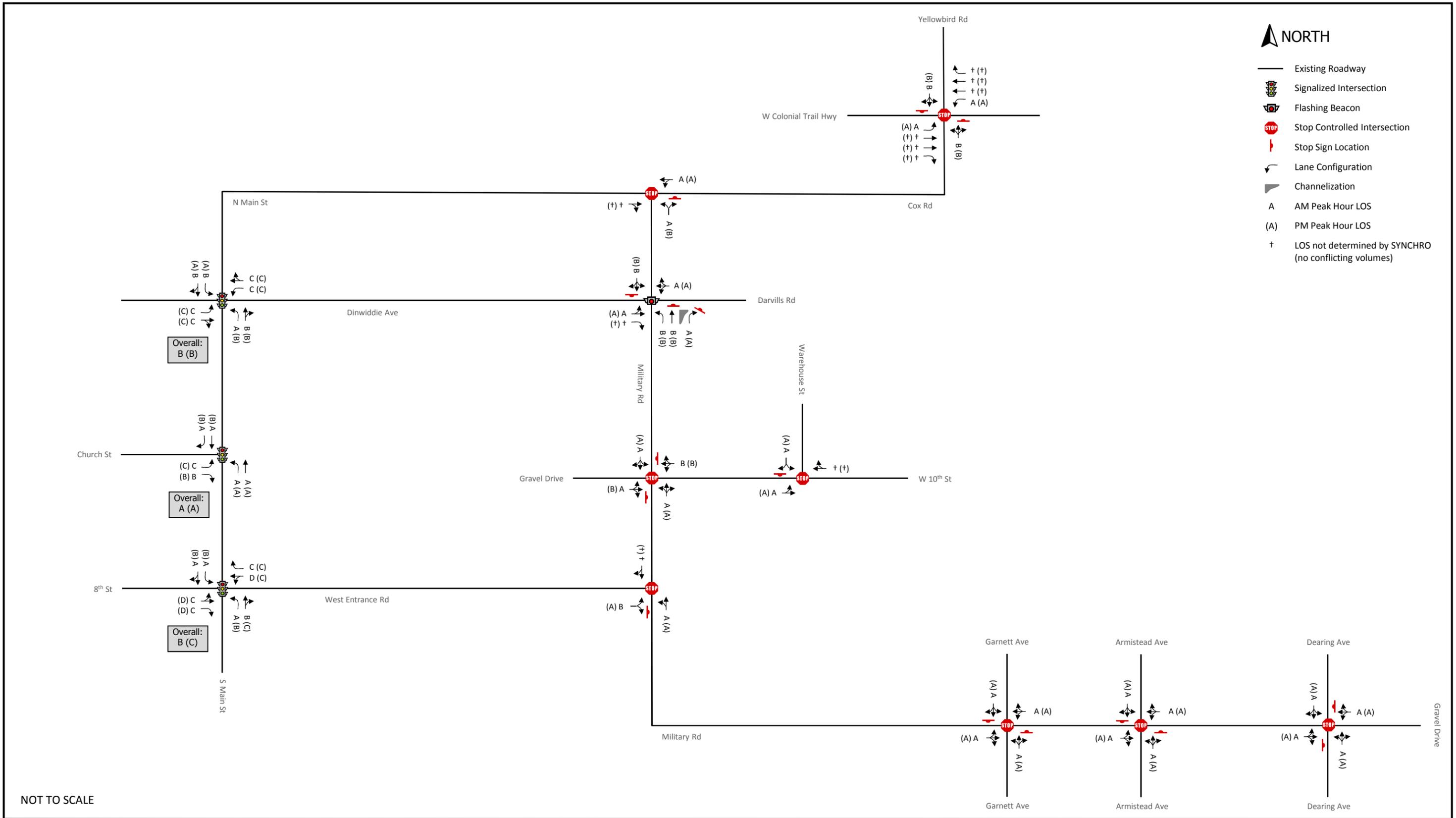


NOT TO SCALE



Figure 4-5

2017 No Build Volumes Levels of Service



NOT TO SCALE



Figure 4-6

2020 No Build Volumes Levels of Service

5 TRIP GENERATION

The estimated site-generated traffic was determined based on the anticipated number of instructors, staff, and students provided by DOS and GSA.

At the completion of Phase 1 in 2017, the FASTC facilities are anticipated to employ 533 persons and train approximately 400 students per day during peak periods (typically occurring during the summer months). In 2020 when the FASTC site is fully developed it is anticipated to employ 1,070 persons and train approximately 700 students per day during peak periods.

The site-generated traffic volumes for FASTC shown in Table 5-1 are based on trip generation information provided in the 8th edition of the Institute of Transportation Engineer's (ITE's) *Trip Generation Report*. Trip generation was calculated using the number of employees as the independent variable for the general office use. Additional trips for students were determined from data provided by DOS and GSA. Some students will be housed on site in dormitories and others will be housed in local area hotels and bused to the site daily.

Table 5-1: Trip Generation Summary

LAND USE	ITE CODE	AMOUNT	UNITS	ADT	WEEKDAY						
					AM PEAK HOUR			PM PEAK HOUR			
					IN	OUT	TOTAL	IN	OUT	TOTAL	
PHASE 1 (2017)											
Instructors & Staff (General Office)	710	533	Employees	1,815	248	34	281	44	214	257	
Students in Area Hotels ¹	N/A	250	Students	48	12	12	24	12	12	24	
Students in Dormitories (Bused) ²	N/A	90	Students	8	0	0	0	4	4	8	
Students in Dormitories (POV) ²	N/A	60	Students	60	0	0	0	0	60	60	
				<i>Subtotal Phase 1:</i>	<i>1,931</i>	<i>260</i>	<i>46</i>	<i>305</i>	<i>60</i>	<i>290</i>	<i>349</i>
FULL BUILDOUT (2020)											
Instructors & Staff (General Office)	710	1,070	Employees	3,260	451	61	512	78	378	456	
Students in Area Hotels ³	N/A	250	Students	48	12	12	24	12	12	24	
Students in Dormitories (Bused) ⁴	N/A	270	Students	24	0	0	0	12	12	24	
Students in Dormitories (POV) ⁴	N/A	180	Students	180	0	0	0	0	180	180	
				Total at Buildout:	3,512	463	73	536	102	582	684

SOURCES: DOS, GSA, and Institute of Transportation Engineers' "Trip Generation Report" 8th edition (2008)

¹ In Phase 1, 250 students will be housed at local hotels and transported daily to site using 25 passenger shuttle buses.

² In Phase 1, 150 students will be housed on site in dormitories and will arrive on site on Sunday and depart on Friday; 60% will be bused and 40% will use their personal vehicles (POV). Trips shown for students in dormitories are applicable to Friday only.

³ At full buildout, 250 students will be housed at local hotels and transported daily to site using 25 passenger shuttle buses.

⁴ At full buildout, 450 students will be housed on site in dormitories and will arrive on site on Sunday and depart on Friday; 60% will be bused and 40% will use their personal vehicles (POV). Trips shown for students in dormitories are applicable to Friday only.

The estimated site trips shown in Table 5-1 are applicable to both Build Alternatives 1 and 2. The number of employees and students is the same for both alternatives.

The DOS and GSA anticipate that a majority of the students will be transported to the site by bus. Student from outside of the local area will be flown to either Ronald Reagan Washington National Airport or Dulles International Airport and then bused to the FASTC site. Local students will be bused directly from the Washington DC area. Students housed in local area hotels will be transported to the site daily by shuttle bus. Students housed in the FASTC dormitories may drive their personal vehicle to the site; however, during training they will not be permitted to use their personal vehicle within the FASTC site; all students will be transported between FASTC training venues using shuttle buses.

Students will arrive at the FASTC dormitories or local hotels on Sunday with training starting on Monday. The only weekday AM peak hour trips associated with students will be those generated by the shuttle buses transporting students from the local hotels. Students will typically complete their training and depart the FASTC site on Friday. In order to provide the worst case analysis for the weekday PM peak hour, the departing student trips via personal vehicle were included in the total FASTC site traffic volume projections.

6 SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT

Site traffic for FASTC was distributed onto the surrounding roadway network.

6.1 TRIP DISTRIBUTION METHODOLOGY

The trip distributions were determined using employee surveys of VAARNG staff at Fort Pickett and FASTC staff anticipated to relocate to the Fort Pickett facility. Within Fort Pickett, FASTC site trips were distributed based on the number of parking spaces provided at each training venue. Supporting data for the trip distribution methodology is contained in Appendix I.

The overall trip distributions from the surrounding areas are as follows:

- 75% to/from the northeast via US Route 460 (Richmond and Washington DC);
- 2% to/from the east via VA Route 40;
- 2% to/from the south via VA Route 46;
- 2% to/from the southwest VA Route 40;
- 14% to/from the west and northwest via US Route 460 (Farmville, Burkeville, and Crewe); and
- 5% to/from within the Town of Blackstone.

Since the site trips were allocated within Fort Pickett based on the number of parking spaces, separate distribution percentages were determined for Phase 1 (2017) and Buildout (2020).

The site trip distribution percentages for Build Alternative 1 for 2017 and 2020 are shown on Figures 6-1 and 6-2 (all figures are located at the end of the chapter after page 6-2).

The site trip distribution percentages for Build Alternative 2 for 2017 and 2020 are shown on Figures 6-3 and 6-4.

6.2 TRAFFIC ASSIGNMENT

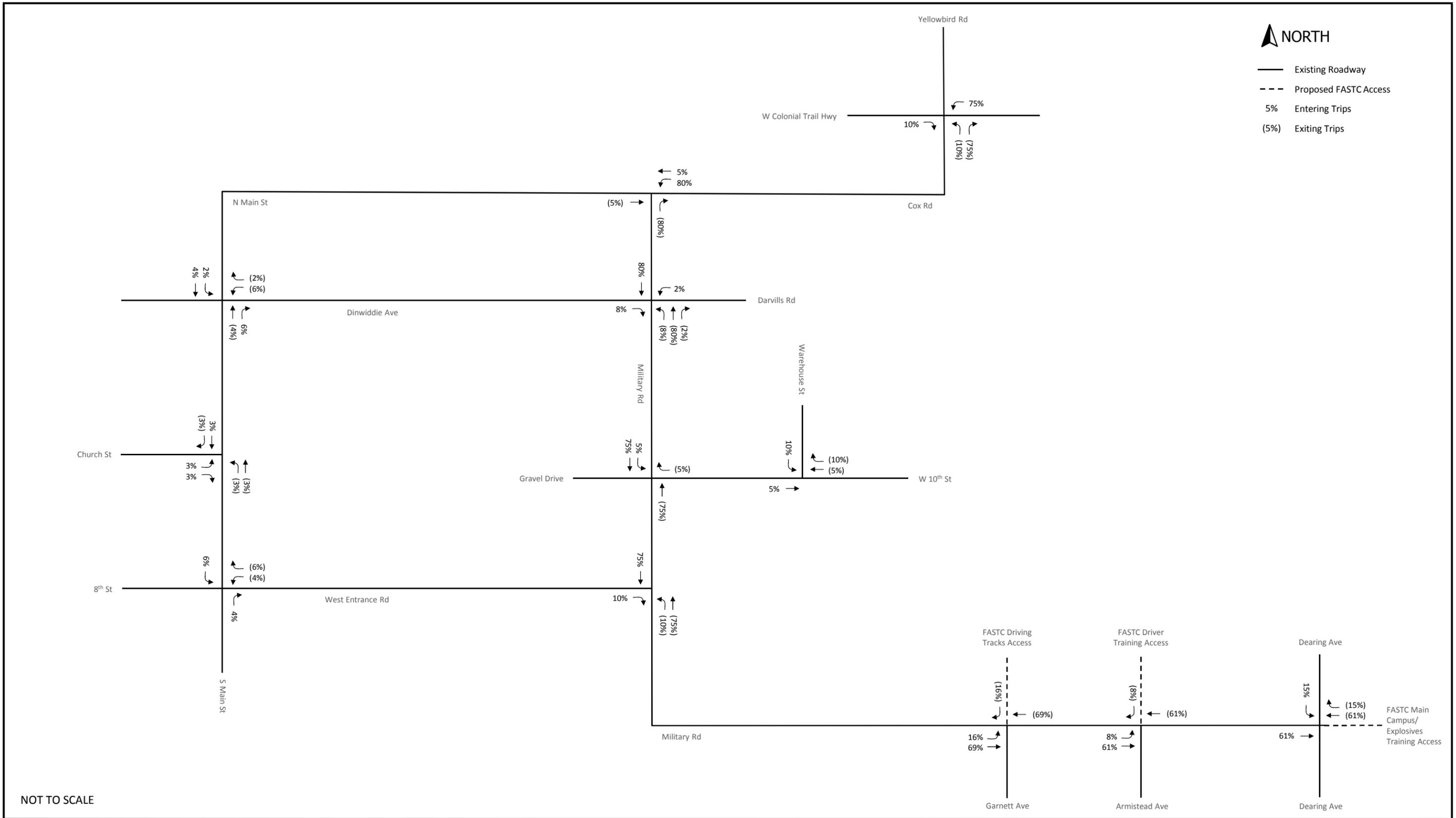
To generate the 2017 Build Alternative 1 site trips, the percentages from Figure 6-1 were applied to the Phase 1 trip generation estimates from Table 5-1. The AM and PM peak hour trips are shown on Figures 6-5 and 6-6.

To generate the 2020 Build Alternative 1 site trips, the percentages from Figure 6-2 were applied to the Buildout trip generation estimates from Table 5-1. The AM and PM peak hour trips are shown on Figures 6-7 and 6-8.

To generate the 2017 Build Alternative 2 site trips, the percentages from Figure 6-3 were applied to the Phase 1 trip generation estimates from Table 5-1. The AM and PM peak hour trips are shown on Figures 6-9 and 6-10.

To generate the 2020 Build Alternative 2 site trips, the percentages from Figure 6-4 were applied to the Buildout trip generation estimates from Table 5-1. The AM and PM peak hour trips are shown on Figures 6-11 and 6-12.

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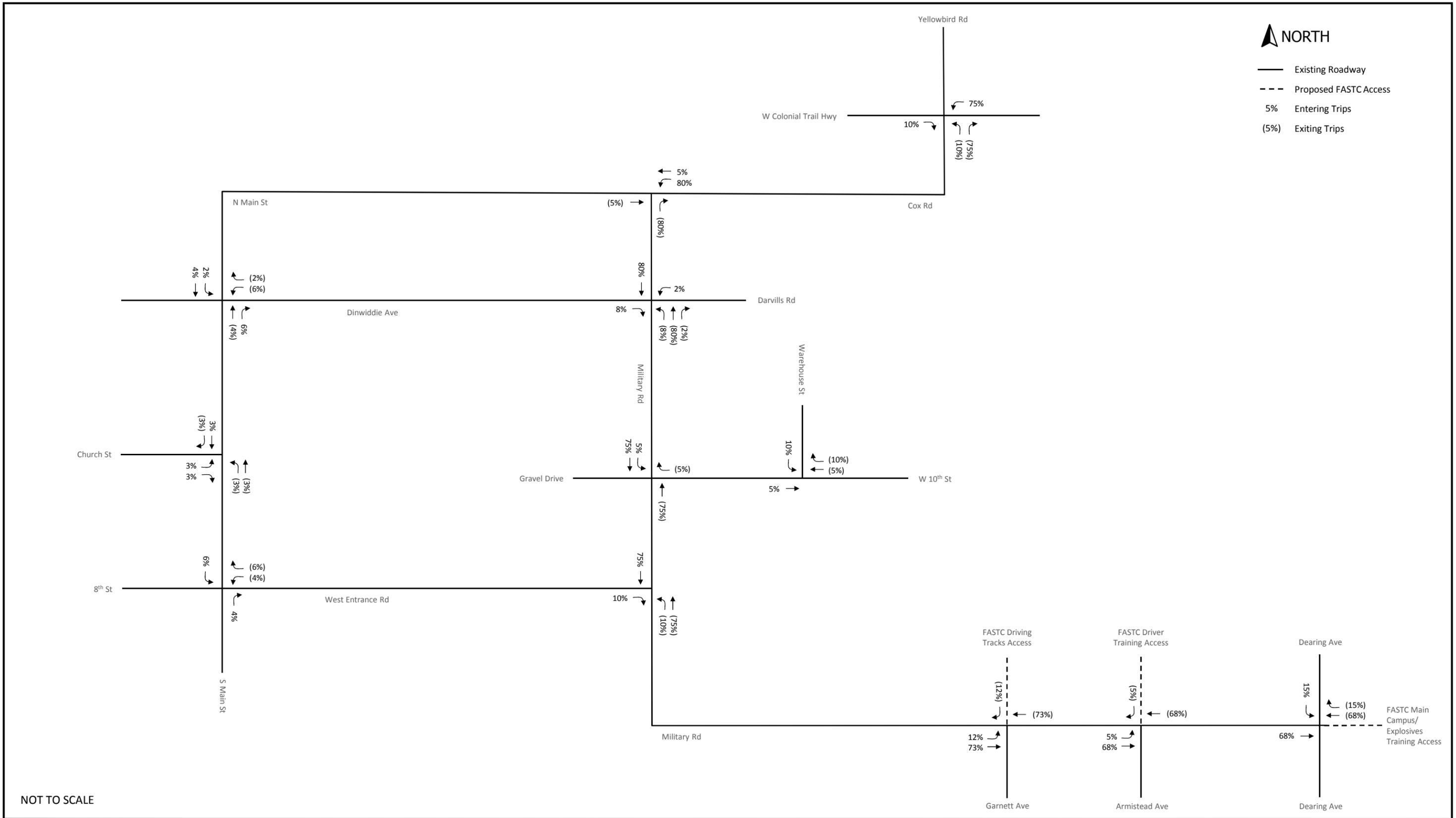


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Figure 6-1

2017 Build Alternative 1 Trip Distribution Percentages

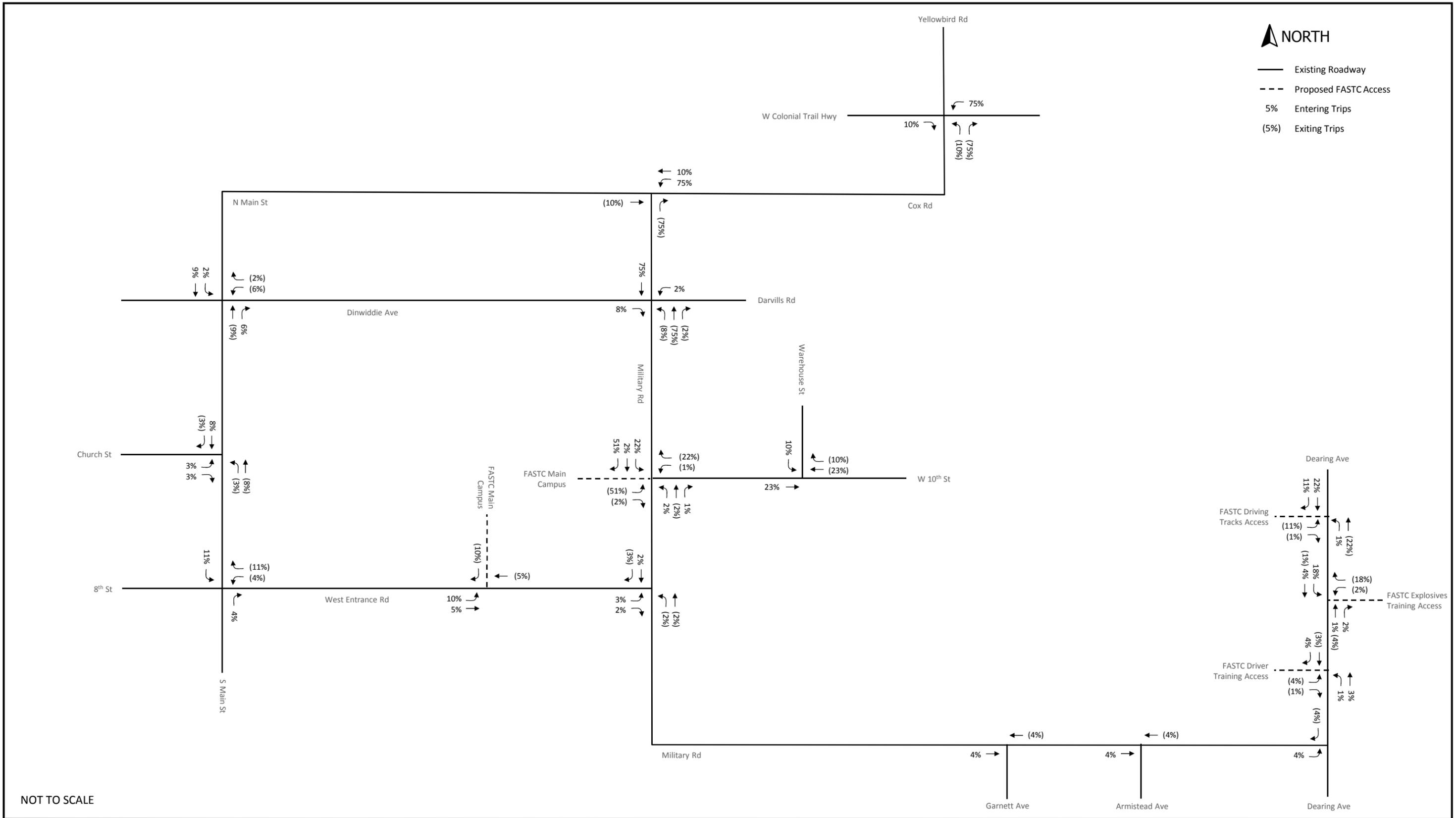


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Figure 6-2

2020 Build Alternative 1 Trip Distribution Percentages



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Figure 6-4

2020 Build Alternative 2 Trip Distribution Percentages

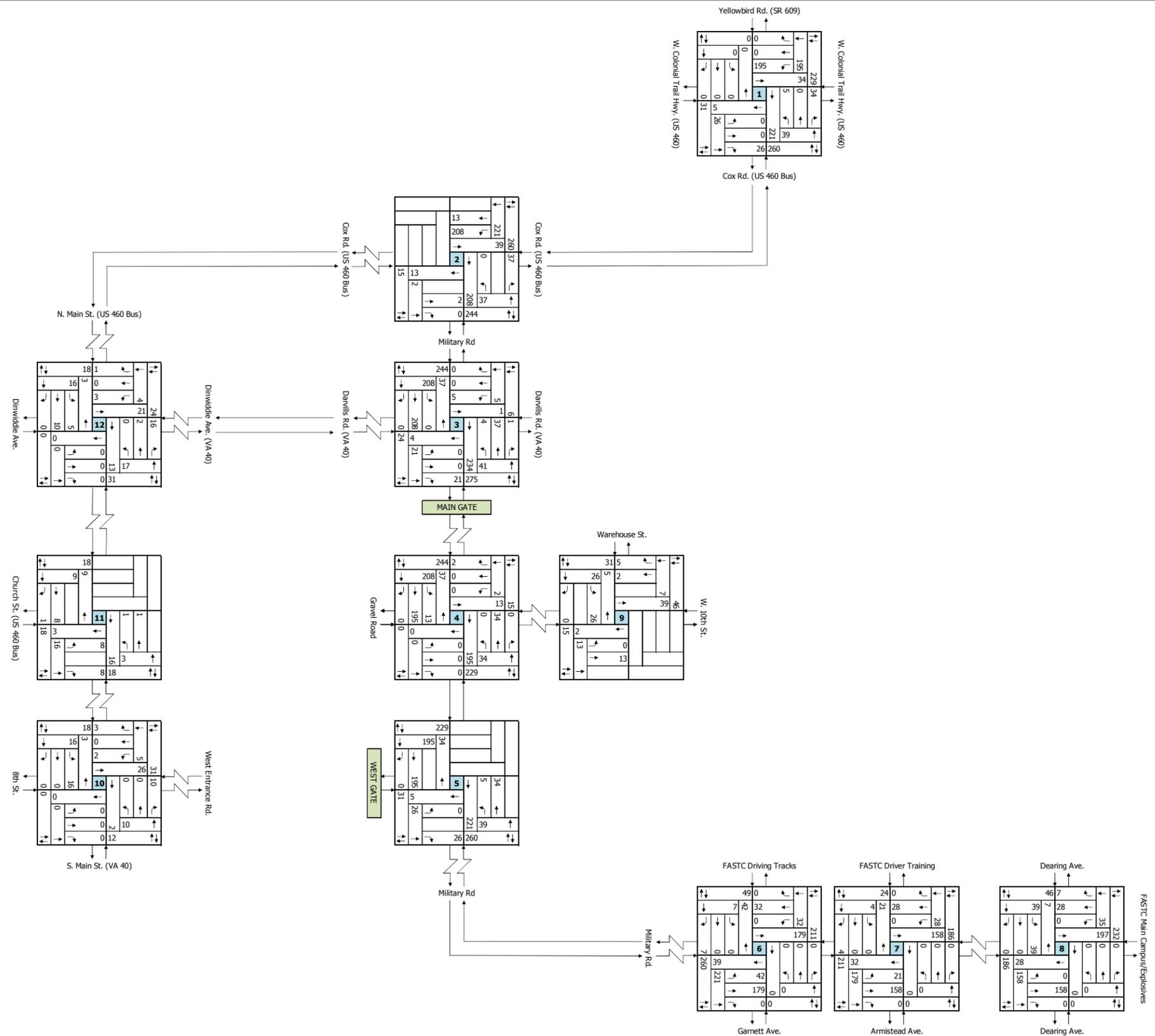
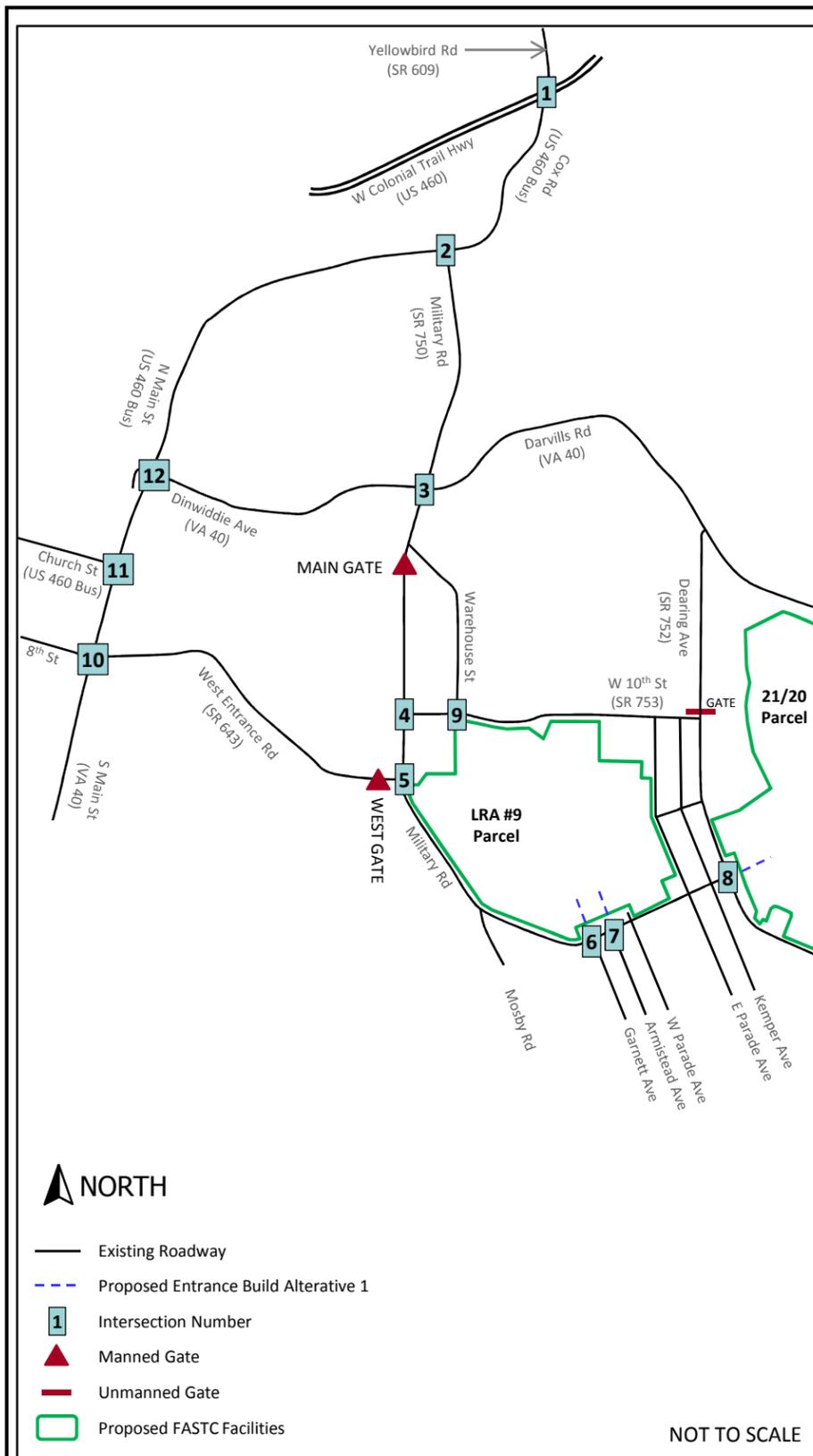


Figure 6-5

2017 Build Alternative 1 FASTC Site Trips AM Peak Hour Volumes

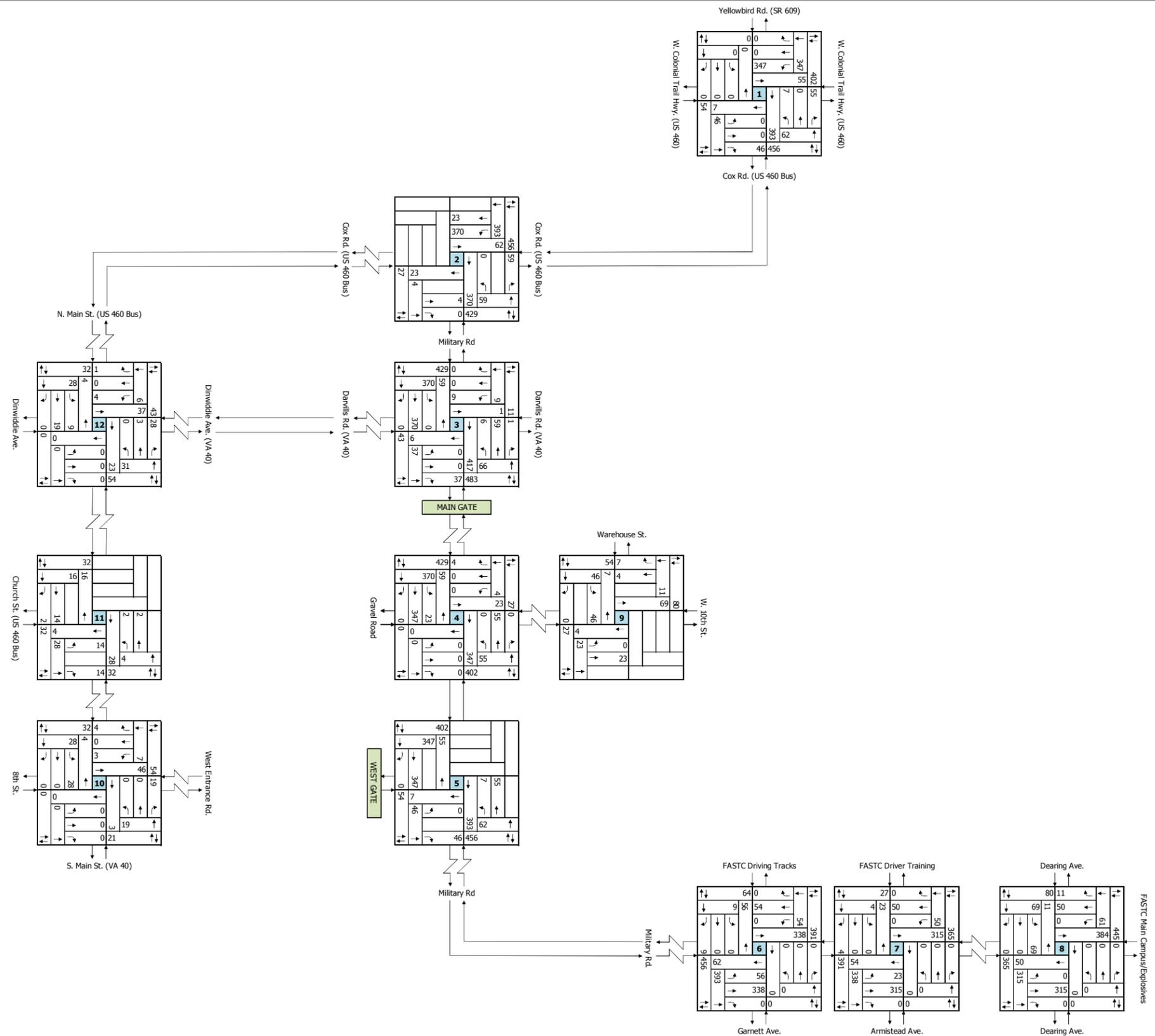
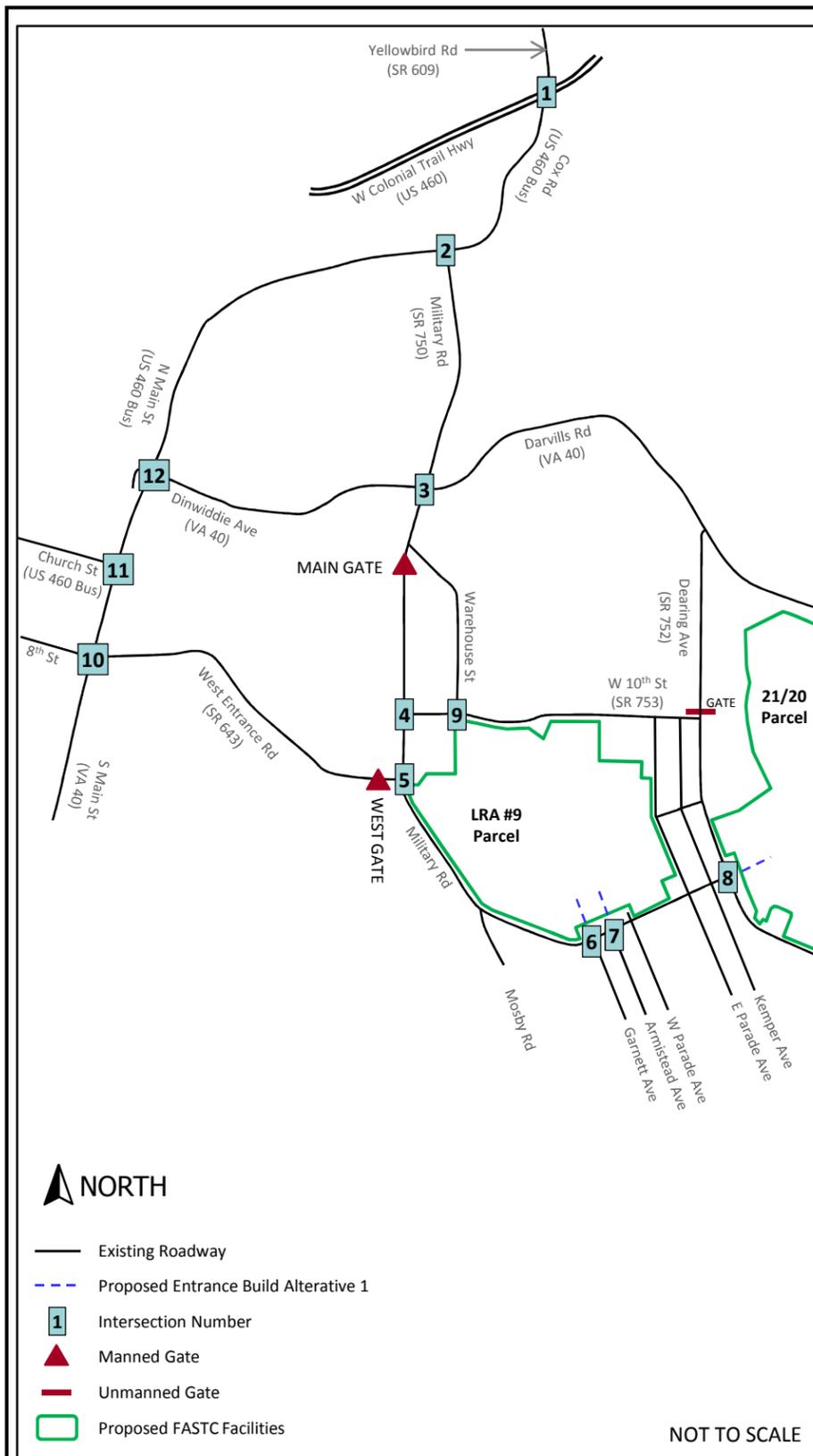


Figure 6-7

2020 Build Alternative 1 FASTC Site Trips AM Peak Hour Volumes

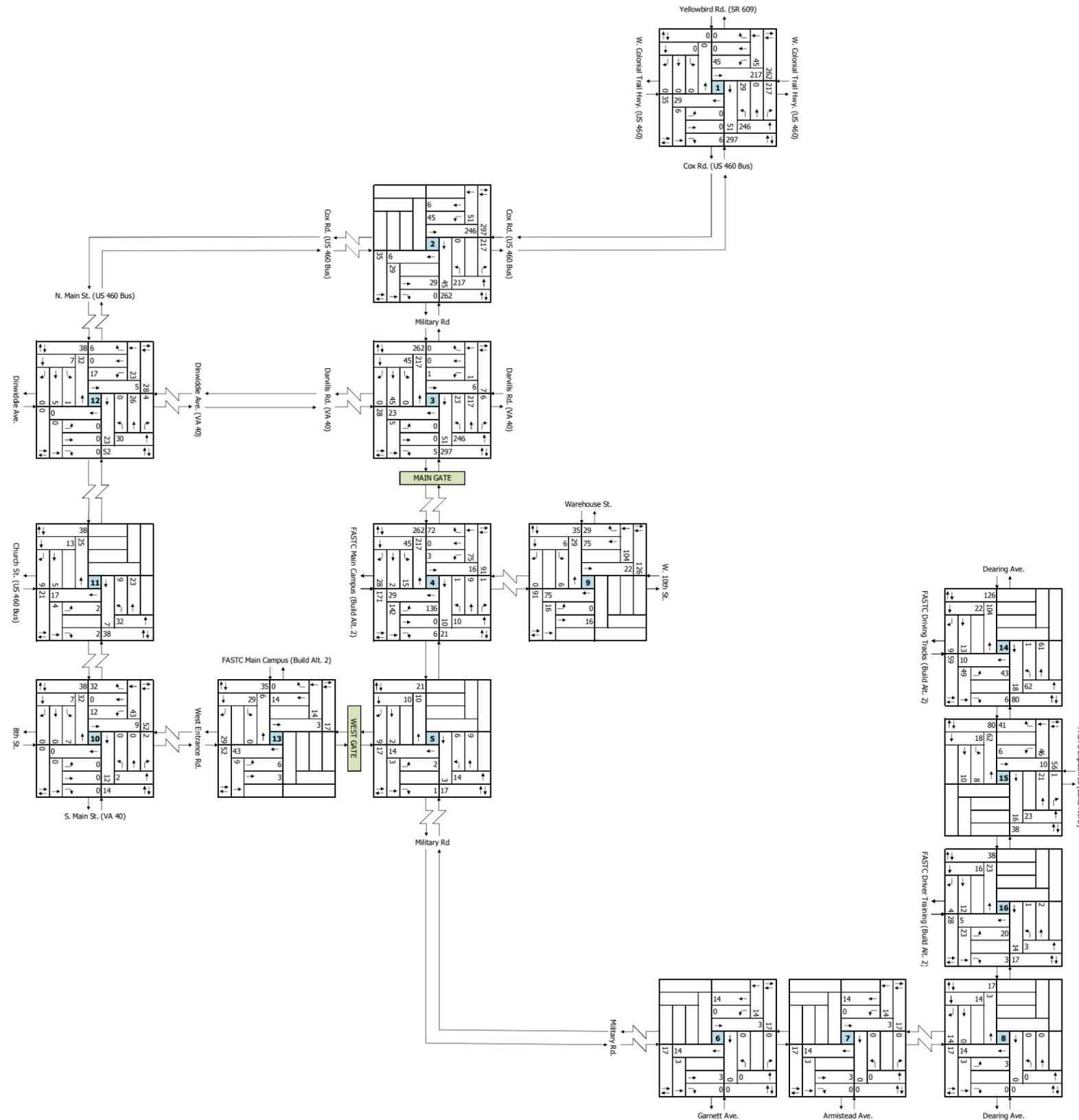
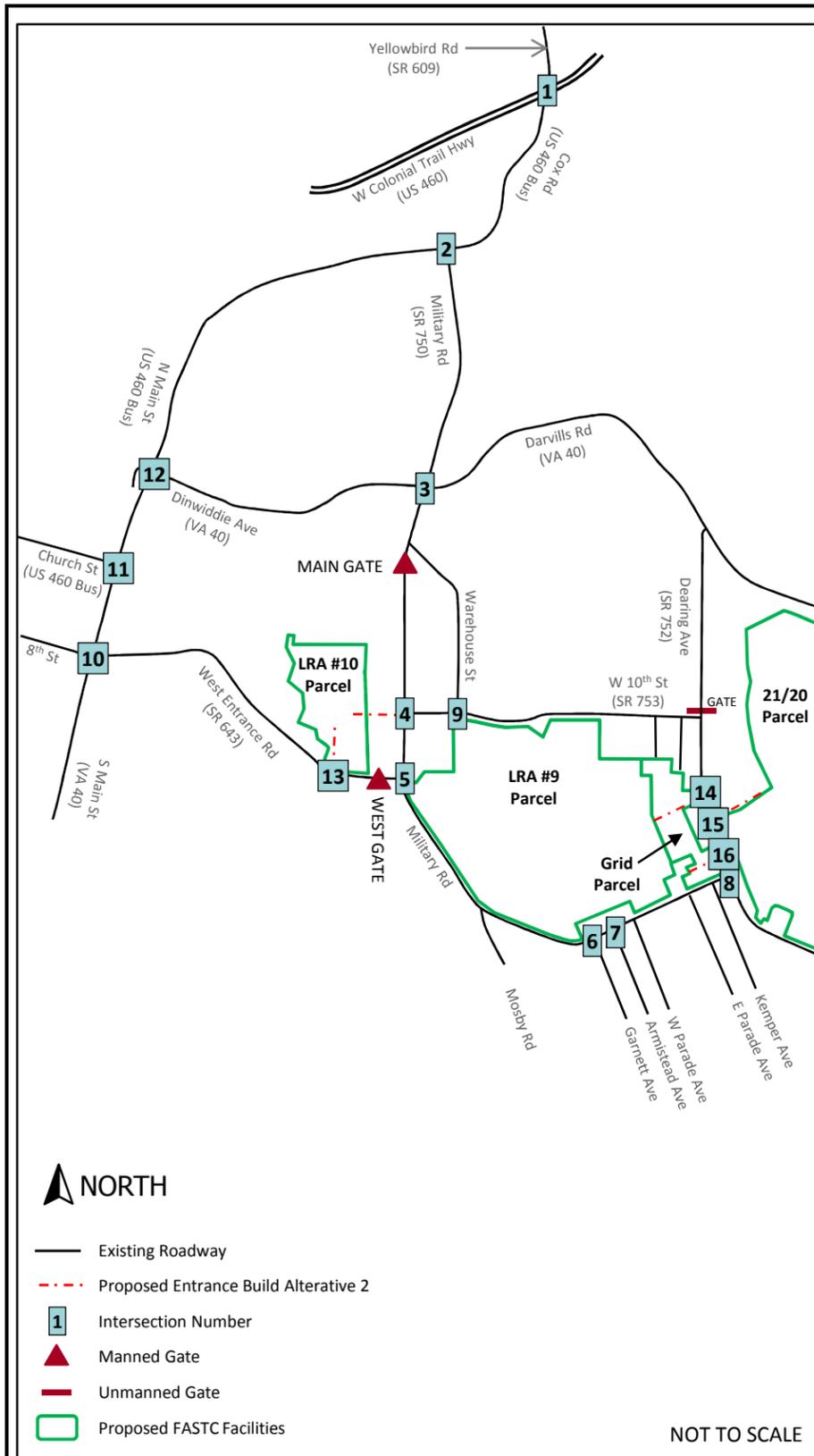
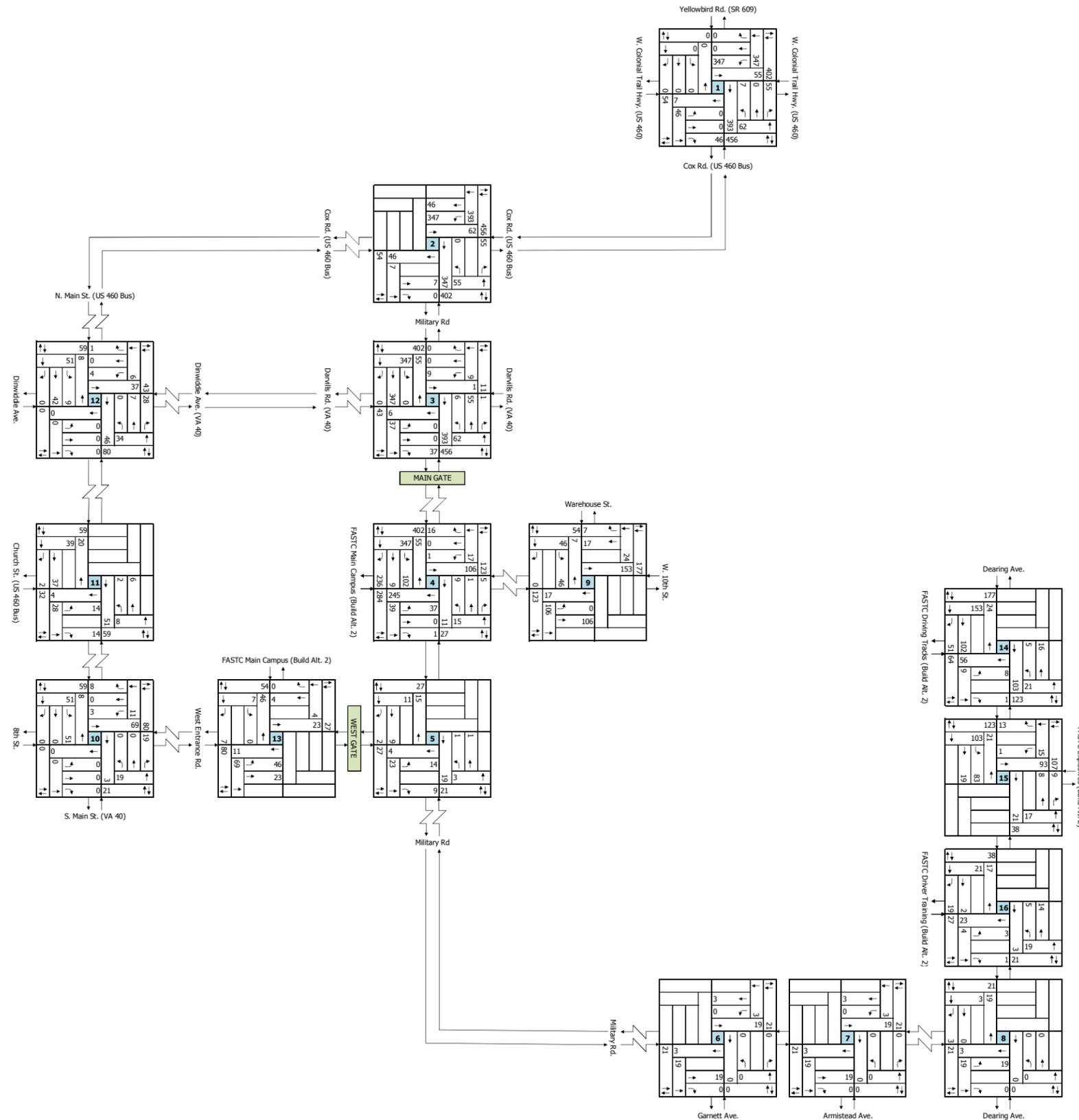
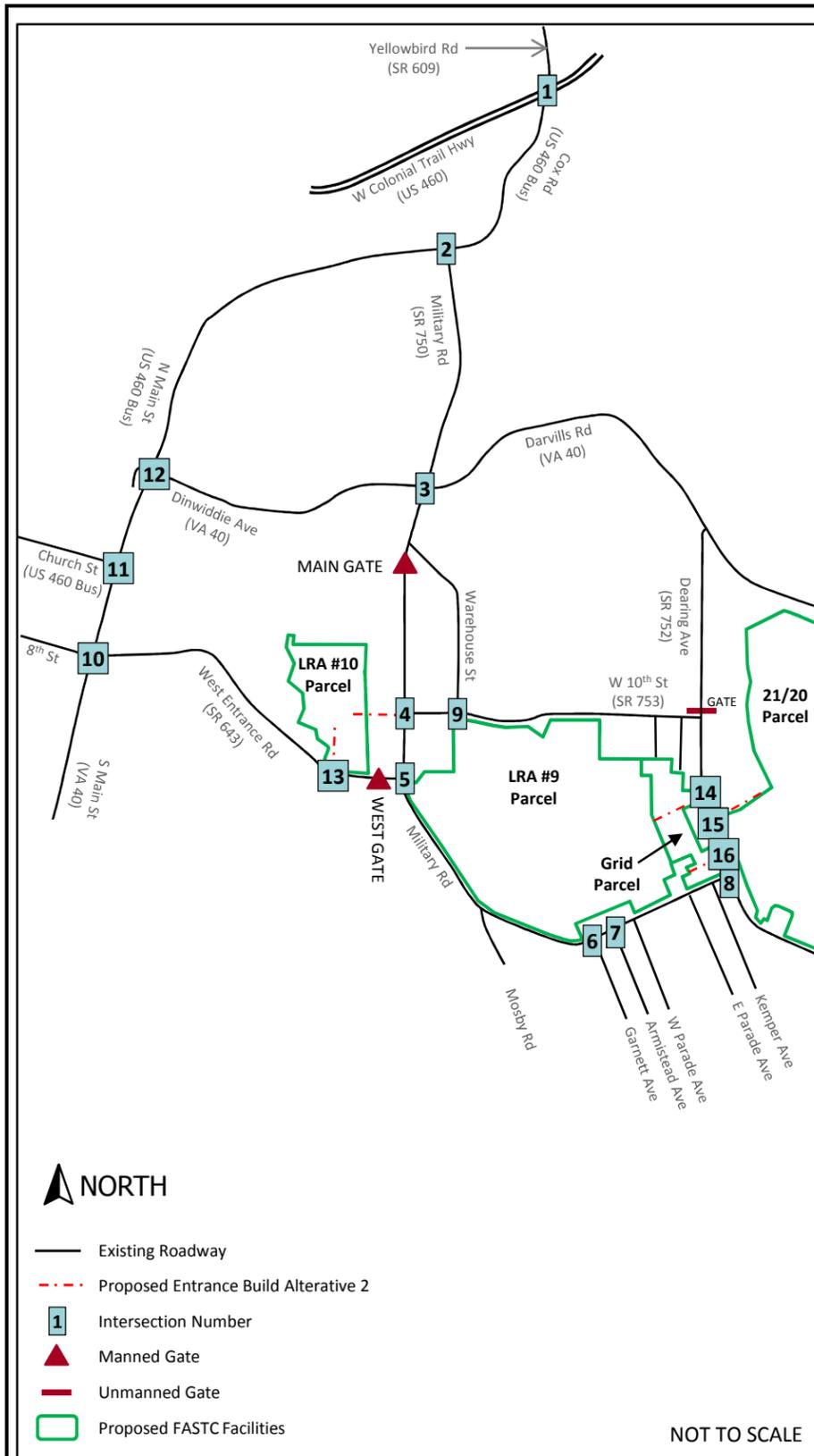


Figure 6-10

2017 Build Alternative 2 FASTC Site Trips PM Peak Hour Volumes



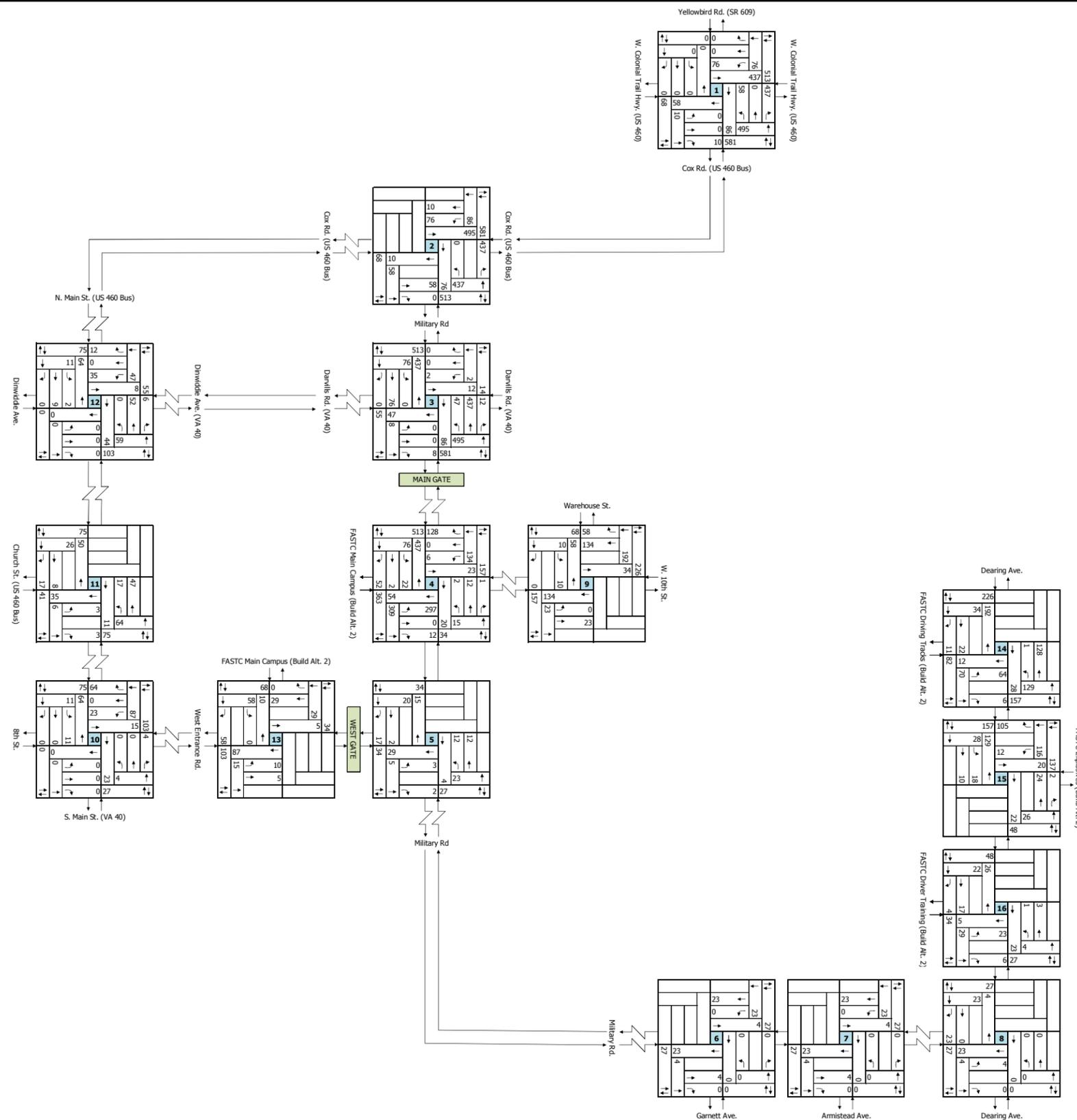
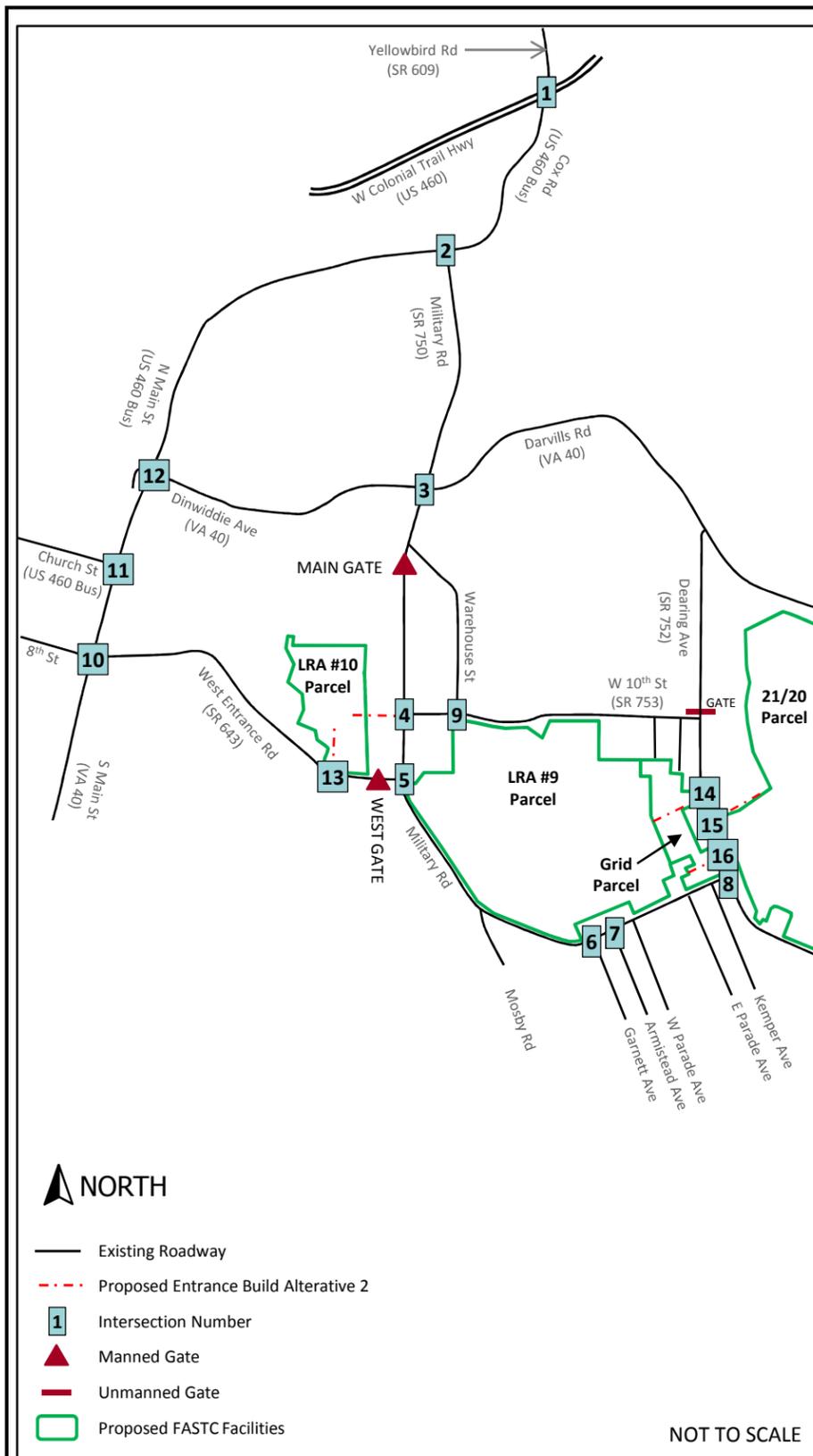


Figure 6-12

2020 Build Alternative 2 FASTC Site Trips PM Peak Hour Volumes

7 FUTURE BUILD CONDITIONS ANALYSIS (WITH DEVELOPMENT)

To complete the analysis of the future Build conditions (with FASTC), the estimated FASTC site trips were added to the 2017 and 2020 No Build volumes. The projected volumes along with the proposed intersection geometry and existing traffic signal timings were used to complete the capacity analyses for the study intersections. Based on the results of the capacity analyses, mitigation measures were determined to address intersections and movements with poor levels of service.

7.1 FUTURE BUILD CONDITIONS TRAFFIC VOLUMES

With the construction of the FASTC facilities within LRA Parcel 9 a majority of the existing roadways will be eliminated, including three VDOT maintained routes. To account for the road closures, the 2017 and 2020 No Build traffic volumes were rerouted on the remaining roadways within Fort Pickett. The rerouted AM and PM peak hour 2017 No Build traffic volumes are shown on Figures 7-1 and 7-2 (all figures are located at the end of the chapter after page 7-32). The rerouted AM and PM peak hour 2020 No Build traffic volumes are shown on Figures 7-3 and 7-4.

To generate the future build condition traffic volumes used in the analyses, the rerouted No Build traffic volumes were added to the FASTC site traffic volumes.

The rerouted AM and PM peak hour 2017 No Build traffic volumes from Figures 7-1 and 7-2 were added to the Build Alternative 1 site trips from Figures 6-5 and 6-6 to generate the 2017 Build Alternative 1 traffic volumes shown on Figures 7-5 and 7-6.

The rerouted AM and PM peak hour 2020 No Build traffic volumes from Figures 7-3 and 7-4 were added to the Build Alternative 1 site trips from Figures 6-7 and 6-8 to generate the 2020 Build Alternative 1 traffic volumes shown on Figures 7-7 and 7-8.

The rerouted AM and PM peak hour 2017 No Build traffic volumes from Figures 7-1 and 7-2 were added to the Build Alternative 2 site trips from Figures 6-9 and 6-10 to generate the 2017 Build Alternative 2 traffic volumes shown on Figures 7-9 and 7-10.

The rerouted AM and PM peak hour 2020 No Build traffic volumes Figures 7-3 and 7-4 were added to the Build Alternative 2 site trips from Figures 6-11 and 6-12 to generate the 2020 Build Alternative 1 traffic volumes shown on Figures 7-11 and 7-12.

7.2 CAPACITY ANALYSES

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. LOS is a concept defined in the HCM as the qualitative measure of the operational conditions within a traffic stream and the resulting perception by motorists and/or passengers. The HCM methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of LOS from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. For detailed information about level of service definitions and criteria for unsignalized and signalized intersections along with diverge, merge, and weave areas, see Chapter 3.2 - Capacity Analyses.

Twelve intersections, three signalized and nine unsignalized, were analyzed for the 2017 and 2020 Build Alternative 1 volumes. Sixteen intersections, three signalized and thirteen unsignalized, were analyzed for the 2017 and 2020 Build Alternative 2 volumes. All of the intersections were analyzed using Synchro[®] Version 7 (Build 773 Rev 8) based on 2000 HCM methodologies. Capacity analyses were performed with the following assumptions:

- Level terrain;
- 12-foot lane widths;
- No parking activity or bus stops;
- No pedestrians;
- Traffic signal timing data provided by the Town of Blackstone's consultant (see Appendix C);
- PHF by approach as determined from directional turning movement counts with a minimum PHF of 0.92 per VDOT's TIA regulations (see Appendix B); and
- Heavy vehicle percentages by movement as determined from directional turning movement counts and anticipated FASTC bus trips (see Appendix J).

7.2.1 2017 Build Alternative 1 Traffic Volumes

Table 7-1 summarizes the 2017 Build Alternative 1 intersection delay and LOS based on the 2017 Build Alternative 1 traffic volumes shown on Figures 7-5 and 7-6 and the geometry shown on Figure 7-13. The 2017 AM and PM Build Alternative 1 volumes intersection LOS is shown on Figure 7-14 and the corresponding Synchro[®] worksheets are included in Appendix K.

As indicated in Table 7-1, under 2017 Build Alternative 1 conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D:

- The eastbound through-left movement during the PM peak hour;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the AM peak hour.

All of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with one exception. At the intersection of US Route 460 and Cox Road/Yellowbird Road the southbound left-through-right movement would operate at LOS D during the AM peak hour.

**Table 7-1: Intersection Delay and Level of Service Summary
2017 Build Alternative 1 Traffic Volumes**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	9.2	A	8.1	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	16.4	C	22.2	C
SB Left-Through-Right	26.0	D	17.0	C	
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	7.1	A	2.9	A
	NB Left-Right	9.6	A	13.0	B
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	EB Left-Through	1.4	A	1.3	A
	EB Right	†	†	†	†
	WB Left-Through-Right	3.5	A	1.1	A
	NB Left	19.5	C	11.0	B
	NB Through	10.5	B	15.7	C
	NB Right	0.0	A	0.0	A
SB Left-Through-Right	24.2	C	12.4	B	
4. W. 10th St at Military Rd Two-Way Stop	EB Left-Through-Right	0.0	A	12.7	B
	WB Left-Through-Right	12.6	B	13.1	B
	NB Left-Through-Right	0.0	A	0.0	A
	SB Left-Through-Right	1.8	A	1.0	A
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	13.2	B	10.8	B
	NB Left-Through	1.3	A	1.9	A
	SB Through-Right	†	†	†	†
6. Military Rd at FASTC Driving Tracks Access Two-Way Stop	EB Left-Through-Right	1.1	A	1.0	A
	WB Left-Through-Right	0.2	A	0.0	A
	NB Left-Through-Right	12.9	B	13.0	B
	SB Left-Through-Right	8.8	A	10.3	B
7. Military Rd at FASTC Driver Training Access Two-Way Stop	EB Left-Through-Right	0.7	A	0.6	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	11.2	B	11.5	B
	SB Left-Through-Right	8.7	A	9.9	A
8. Military Rd at FASTC Main Campus and Explosives Training Access Two-Way Stop	EB Left-Through-Right	11.0	B	9.6	A
	WB Left-Through-Right	9.9	A	10.5	B
	NB Left-Through-Right	7.2	A	7.2	A
	SB Left-Through-Right	7.1	A	6.7	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Through	0.4	A	0.4	A
	WB Through-Right	†	†	†	†
	SB Left-Right	9.1	A	9.1	A
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	30.0	C	39.6	D
	EB Right	26.7	C	37.1	D
	WB Left-Through	49.4	D	31.8	C
	WB Right	21.6	C	20.9	C
	NB Left	9.1	A	15.2	B
	NB Through-Right	11.5	B	26.0	C
	SB Left	4.5	A	12.2	B
	SB Through-Right	4.0	A	11.8	B
	Overall	10.5	B	21.4	C
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	25.5	C	25.6	C
	EB Right	12.9	B	11.2	B
	NB Left	3.0	A	3.5	A
	NB Through	2.4	A	2.7	A
	SB Through	9.0	A	14.1	B
	SB Right	8.2	A	11.6	B
	Overall	7.4	A	9.0	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	23.7	C	27.9	C
	EB Through-Right	23.7	C	27.3	C
	WB Left	23.9	C	27.6	C
	WB Through-Right	23.4	C	25.4	C
	NB Left	0.0	A	12.4	B
	NB Through-Right	19.0	B	15.0	B
	SB Left	10.1	B	8.4	A
	SB Through-Right	10.0	B	9.6	A
Overall	15.1	B	16.1	B	

NOTES:

Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

7.2.2 2020 Build Alternative 1 Traffic Volumes

Table 7-2 summarizes the 2020 Build Alternative 1 intersection delay and LOS based on the 2020 Build Alternative 1 traffic volumes shown on Figures 7-7 and 7-8 and the geometry shown on Figure 7-13. The 2020 AM and PM Build Alternative 1 volumes intersection LOS is shown on Figure 7-15 and the corresponding Synchro[®] worksheets are included in Appendix L.

As indicated in Table 7-2, under 2020 Build Alternative 1 conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D or E:

- The eastbound through-left movement would operate at LOS D during the PM peak hour;
- The eastbound right turn movement would operate at LOS D during the PM peak hour; and
- The westbound through-left movement would operate at LOS E during the AM peak hour and LOS D during the PM peak hour.

A majority of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours. The exceptions are noted below:

- At the intersection of US Route 460 and Cox Road/Yellowbird Road:
 - The northbound left-through-right movement would operate at LOS E during the AM peak hour and LOS F during the PM peak hour; and
 - The southbound left-through-right movement would operate at LOS F during the AM peak hour and LOS D during the PM peak hour.
- At the intersection of Darvills Road and Military Road:
 - The northbound left turn would operate at LOS F during the AM peak hour;
 - The northbound through movement would operate at LOS E during the PM peak hour; and
 - The southbound left-through-right movement would operate at LOS F during the AM peak hour.

**Table 7-2: Intersection Delay and Level of Service Summary
2020 Build Alternative 1 Traffic Volumes**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	10.5	B	8.2	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	48.6	E	101.6	F
	SB Left-Through-Right	178.6	F	29.8	D
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	8.1	A	3.7	A
	NB Left-Right	9.9	A	24.2	C
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	EB Left-Through	1.5	A	1.4	A
	EB Right	†	†	†	†
	WB Left-Through-Right	3.9	A	1.1	A
	NB Left	**	F	12.0	B
	NB Through	10.8	B	43.1	E
	NB Right	0.0	A	0.0	A
4. W. 10th St at Military Rd Two-Way Stop	SB Left-Through-Right	83.1	F	18.7	C
	EB Left-Through-Right	0.0	A	17.9	C
	WB Left-Through-Right	14.9	B	19.9	C
	NB Left-Through-Right	0.0	A	0.0	A
	SB Left-Through-Right	1.8	A	1.1	A
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	17.9	C	12.7	B
	NB Left-Through	1.3	A	2.0	A
	SB Through-Right	†	†	†	†
6. Military Rd at FASTC Driving Tracks Access Two-Way Stop	EB Left-Through-Right	1.2	A	1.0	A
	WB Left-Through-Right	0.1	A	0.0	A
	NB Left-Through-Right	16.7	C	20.0	C
	SB Left-Through-Right	8.9	A	12.9	B
7. Military Rd at FASTC Driver Training Access Two-Way Stop	EB Left-Through-Right	0.5	A	0.5	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	13.5	B	15.5	C
	SB Left-Through-Right	8.8	A	11.8	B
8. Military Rd at FASTC Main Campus and Explosives Training Access Two-Way Stop	EB Left-Through-Right	15.1	C	9.9	A
	WB Left-Through-Right	10.5	B	15.0	B
	NB Left-Through-Right	7.2	A	7.2	A
	SB Left-Through-Right	7.2	A	7.0	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Through	0.3	A	0.4	A
	WB Through-Right	†	†	†	†
	SB Left-Right	9.3	A	9.6	A
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	30.6	C	42.4	D
	EB Right	26.8	C	39.1	D
	WB Left-Through	63.6	E	36.2	D
	WB Right	21.5	C	20.9	C
	NB Left	9.2	A	16.3	B
	NB Through-Right	11.8	B	29.6	C
	SB Left	4.6	A	12.7	B
	SB Through-Right	4.0	A	12.0	B
	Overall	11.0	B	23.6	C
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	30.2	C	27.2	C
	EB Right	12.6	B	11.3	B
	NB Left	3.0	A	3.5	A
	NB Through	2.5	A	2.7	A
	SB Through	9.3	A	14.4	B
	SB Right	8.5	A	11.7	B
	Overall	8.1	A	9.1	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	24.0	C	29.6	C
	EB Through-Right	23.9	C	28.8	C
	WB Left	24.2	C	26.4	C
	WB Through-Right	23.5	C	24.3	C
	NB Left	0.0	A	14.3	B
	NB Through-Right	19.3	B	17.6	B
	SB Left	10.2	B	10.1	B
	SB Through-Right	10.2	B	11.6	B
	Overall	15.3	B	17.7	B

NOTES:

Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

**Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO; queue length cannot be calculated.

7.2.3 2017 Build Alternative 1 Traffic Volumes with Mitigation

Based on the results of the 2017 Build Alternative 1 volumes capacity analyses, the turn lane analyses (see Chapter 7-4) and the traffic signal warrant analyses (see Chapter 7.5) mitigation measures were developed. To accommodate the 2017 Build Alternative 1 traffic volumes the following mitigation measures are recommended:

- At the unsignalized intersection of US Route 460 and Cox Road/Yellowbird Road, extend the westbound left turn lane to provide a 350-foot storage lane with a 200-foot taper;
- At the unsignalized intersection of Cox Road and Military Road, install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper; and
- At the unsignalized intersection of Darvills Road and Military Road, extend the eastbound right turn lane to provide a 200-foot storage lane with a 200-foot taper.

These turn lane improvements will bring the two existing turn lanes up to current VDOT standards based on the turn lane analyses. FASTC adds site trips to each of these movements. The mitigation measures recommended for the 2017 Build Alternative 1 traffic volumes are identified on Figure 7-16.

Table 7-3 summarizes the 2017 Build Alternative 1 intersection delay and LOS based on the 2017 Build Alternative 1 traffic volumes with the mitigation measures shown on Figure 7-16. The 2017 AM and PM Build Alternative 1 volumes intersection LOS is shown on Figure 7-17 and the corresponding Synchro[®] worksheets are included in Appendix K.

As indicated in Table 7-3, under mitigated 2017 Build Alternative 1 conditions the three signalized intersections operate at overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements operate at LOS D:

- The eastbound through-left movement during the PM peak hour;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the AM peak hour.

All of the unsignalized movements operate at LOS C or better during the AM and PM peak hours with one exception. At the intersection of US Route 460 and Cox Road/Yellowbird Road the southbound left-through-right movement operates at LOS D during the AM peak hour.

**Table 7-3: Intersection Delay and Level of Service Summary
2017 Build Alternative 1 Traffic Volumes with Mitigation**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left <i>Extend Storage</i>	9.2	A	8.1	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	16.4	C	22.2	C
	SB Left-Through-Right	26.0	D	17.0	C
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	<i>WB Left</i>	8.4	A	2.9	A
	WB Through	†	†	†	†
	NB Left-Right	9.6	A	13.0	B
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	EB Left-Through	1.4	A	1.3	A
	EB Right <i>Extend Storage</i>	†	†	†	†
	WB Left-Through-Right	3.5	A	1.1	A
	NB Left	19.5	C	11.0	B
	NB Through	10.5	B	15.7	C
	NB Right	0.0	A	0.0	A
4. W. 10th St at Military Rd Two-Way Stop	EB Left-Through-Right	0.0	A	12.7	B
	WB Left-Through-Right	12.6	B	13.1	B
	NB Left-Through-Right	0.0	A	0.0	A
	SB Left-Through-Right	1.8	A	1.0	A
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	13.2	B	10.8	B
	NB Left-Through	1.3	A	1.9	A
	SB Through-Right	†	†	†	†
6. Military Rd at FASTC Driving Tracks Access Two-Way Stop	EB Left-Through-Right	1.1	A	1.0	A
	WB Left-Through-Right	0.2	A	0.0	A
	NB Left-Through-Right	12.9	B	13.0	B
	SB Left-Through-Right	8.8	A	10.3	B
7. Military Rd at FASTC Driver Training Access Two-Way Stop	EB Left-Through-Right	0.7	A	0.6	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	11.2	B	11.5	B
	SB Left-Through-Right	8.7	A	9.9	A
8. Military Rd at FASTC Main Campus and Explosives Training Access Two-Way Stop	EB Left-Through-Right	11.0	B	9.6	A
	WB Left-Through-Right	9.9	A	10.5	B
	NB Left-Through-Right	7.2	A	7.2	A
	SB Left-Through-Right	7.1	A	6.7	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Through	0.4	A	0.4	A
	WB Through-Right	†	†	†	†
	SB Left-Right	9.1	A	9.1	A
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	30.0	C	39.6	D
	EB Right	26.7	C	37.1	D
	WB Left-Through	49.4	D	31.8	C
	WB Right	21.6	C	20.9	C
	NB Left	9.1	A	15.2	B
	NB Through-Right	11.5	B	26.0	C
	SB Left	4.5	A	12.2	B
	SB Through-Right	4.0	A	11.8	B
	Overall	10.5	B	21.4	C
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	25.5	C	25.6	C
	EB Right	12.9	B	11.2	B
	NB Left	3.0	A	3.5	A
	NB Through	2.4	A	2.7	A
	SB Through	9.0	A	14.1	B
	SB Right	8.2	A	11.6	B
	Overall	7.4	A	9.0	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	23.7	C	27.9	C
	EB Through-Right	23.7	C	27.3	C
	WB Left	23.9	C	27.6	C
	WB Through-Right	23.4	C	25.4	C
	NB Left	0.0	A	12.4	B
	NB Through-Right	19.0	B	15.0	B
	SB Left	10.1	B	8.4	A
	SB Through-Right	10.0	B	9.6	A
Overall	15.1	B	16.1	B	

NOTES: *Mitigation Measures noted in bold italics.*
 Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.
 Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.
 † SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

7.2.4 2020 Build Alternative 1 Traffic Volumes with Mitigation

Based on the results of the 2020 Build Alternative 1 volumes capacity analyses, the turn lane analyses (see Chapter 7-4) and the traffic signal warrant analyses (see Chapter 7.5) mitigation measures were developed. To accommodate the 2020 Build Alternative 1 traffic volumes the following mitigation measures are recommended:

- At the unsignalized intersection of US Route 460 and Cox Road/Yellowbird Road:
 - Extend the westbound left turn lane to provide a 500-foot storage lane with a 200-foot taper; and
 - Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper (to serve left turns and through movements).
- At the unsignalized intersection of Cox Road and Military Road, install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper.
- At the unsignalized intersection of Darvills Road and Military Road:
 - Extend the eastbound right turn lane to provide a 200-foot storage lane and a 200-foot taper
 - Extend the northbound left turn lane to provide a 200-foot storage lane and a 200-foot taper;
 - Extend the northbound right turn lane to provide a 200-foot taper;
 - Switch the stop control from Military Road approached to the Darvills Road approaches; and
 - Remove the existing red flashing beacon and replace with a yellow and red flashing beacon (yellow for Military Road and red for Darvills Road) and install "STOP AHEAD" signs on both approaches of Darvills Road.
- At the unsignalized intersection of Military Road and West Entrance Road:
 - Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper; and
 - Install an eastbound right turn lane with a 200-foot storage lane and a 200-foot taper.
- Provide two egress lanes exiting the FASTC Main Campus at Dearing Avenue.

The turn lane extensions at the intersections of US Route 460 at Cox Road and Darvills Road at Military Road will bring the four existing turn lane treatments up to current VDOT standards based on the turn lane analyses. FASTC adds site trips to each of these movements. The mitigation measures recommended for the 2020 Build Alternative 1 traffic volumes are identified on Figure 7-18.

Table 7-4 summarizes the 2020 Build Alternative 1 intersection delay and LOS based on the 2020 Build Alternative 1 traffic volumes with the mitigation measures shown on Figure 7-18. The 2020 AM and PM Build Alternative 1 volumes intersection LOS is shown on Figure 7-19 and the corresponding Synchro[®] worksheets are included in Appendix L.

As indicated in Table 7-4, under mitigated 2020 Build Alternative 1 conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D:

- The eastbound through-left movement during the AM and PM peak hours;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the PM peak hour.

A majority of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours. The exceptions are noted below:

- At the intersection of US Route 460 and Cox Road/Yellowbird Road:
 - The northbound left-through movement would operate at LOS F during the AM peak hour; and
 - The southbound left-through-right movement would operate at LOS F during the AM peak hour and LOS D during the PM peak hour.
- At the intersection of Darvills Road and Military Road:
 - The eastbound left-through movement would operate at LOS D during the PM peak hour; and
 - The westbound left-through-right movement would operate at LOS D during the AM and PM peak hours.

Although the northbound left-through movement and southbound left-through-right movement at the intersection of US Route 460 and Cox Road would operate at LOS F during the AM peak hour; a traffic signal is not warranted (see Chapter 7.4).

**Table 7-4: Intersection Delay and Level of Service Summary
2020 Build Alternative 1 Traffic Volumes with Mitigation**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	10.5	B	8.2	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through	138.6	F	23.2	C
	NB Right	9.7	A	18.1	C
SB Left-Through-Right	178.6	F	29.8	D	
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left	9.1	A	8.2	A
	WB Through	†	†	†	†
3. Darvils Rd (VA 40) at Military Rd Two-Way Stop <i>(VA 40 is now the stop street)</i>	NB Left-Right	9.9	A	24.2	C
	EB Left-Through	18.8	C	31.4	D
	EB Right	16.2	C	9.1	A
	WB Left-Through-Right	29.4	D	34.2	D
	NB Left	8.8	A	7.6	A
	NB Through	†	†	†	†
	NB Right	†	†	†	†
4. W. 10th St at Military Rd Two-Way Stop	SB Left-Through-Right	0.3	A	1.3	A
	EB Left-Through-Right	0.0	A	17.9	C
	WB Left-Through-Right	14.9	B	19.9	C
	NB Left-Through-Right	0.0	A	0.0	A
5. West Entrance Rd at Military Rd One-Way Stop	SB Left-Through-Right	1.8	A	1.1	A
	EB Left-Right	15.9	C	19.2	C
	EB Right	12.8	B	9.4	A
	NB Left	8.6	A	7.9	A
	NB Through	†	†	†	†
6. Military Rd at FASTC Driving Tracks Access Two-Way Stop	SB Through-Right	†	†	†	†
	EB Left-Through-Right	1.2	A	1.0	A
	WB Left-Through-Right	0.1	A	0.0	A
	NB Left-Through-Right	16.7	C	20.0	C
7. Military Rd at FASTC Driver Training Access Two-Way Stop	SB Left-Through-Right	8.9	A	12.9	B
	EB Left-Through-Right	0.5	A	0.5	A
	WB Left-Through-Right	0.0	A	0.0	A
	NB Left-Through-Right	13.5	B	15.5	C
8. Military Rd at FASTC Main Campus and Two-Way Stop	SB Left-Through-Right	8.8	A	11.8	B
	EB Left-Through-Right	15.1	C	9.9	A
	WB Left-Through	10.8	B	13.6	B
	NB Left-Through-Right	7.2	A	7.2	A
9. W. 10th St at Warehouse St One-Way Stop	SB Left-Through-Right	7.2	A	7.0	A
	EB Left-Through	0.3	A	0.4	A
	WB Through-Right	†	†	†	†
	SB Left-Right	9.3	A	9.6	A
	EB Left-Through	35.7	D	42.4	D
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Right	27.2	C	39.1	D
	WB Left-Through	32.8	C	36.2	D
	WB Right	21.2	C	20.9	C
	NB Left	9.3	A	16.3	B
	NB Through-Right	12.0	B	29.6	C
	SB Left	4.7	A	12.7	B
	SB Through-Right	4.1	A	12.0	B
	Overall	10.4	B	23.6	C
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	30.2	C	27.2	C
	EB Right	12.6	B	11.3	B
	NB Left	3.0	A	3.5	A
	NB Through	2.5	A	2.7	A
	SB Through	9.3	A	14.4	B
	SB Right	8.5	A	11.7	B
	Overall	8.1	A	9.1	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	24.0	C	29.6	C
	EB Through-Right	23.9	C	28.8	C
	WB Left	24.2	C	26.4	C
	WB Through-Right	23.5	C	24.3	C
	NB Left	0.0	A	14.3	B
	NB Through-Right	19.3	B	17.6	B
	SB Left	10.2	B	10.1	B
	SB Through-Right	10.2	B	11.6	B
Overall	15.3	B	17.7	B	

NOTES:

Mitigation Measures noted in bold italics.

Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

7.2.5 2017 Build Alternative 2 Traffic Volumes

Table 7-5 summarizes the 2017 Build Alternative 2 intersection delay and LOS based on the 2017 Build Alternative 2 traffic volumes shown on Figures 7-9 and 7-10 and the geometry shown on Figure 7-20. The 2017 AM and PM Build Alternative 2 volumes intersection LOS is shown on Figure 7-21 and the corresponding Synchro[®] worksheets are included in Appendix M.

As indicated in Table 7-5, under 2017 Build Alternative 2 conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D:

- The eastbound through-left movement during the PM peak hour;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the AM peak hour.

All of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with one exception. At the intersection of US Route 460 and Cox Road/Yellowbird Road the southbound left-through-right movement would operate at LOS D during the AM peak hour.

**Table 7-5: Intersection Delay and Level of Service Summary
2017 Build Alternative 2 Traffic Volumes**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	9.2	A	8.1	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	16.4	C	22.2	C
	SB Left-Through-Right	26.0	D	17.0	C
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	6.9	A	2.8	A
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	NB Left-Right	9.6	A	13.1	B
	EB Left-Through	1.4	A	1.3	A
4. W. 10th St at Military Rd/ FASTC Main Campus Two-Way Stop	EB Right	†	†	†	†
	WB Left-Through-Right	3.5	A	1.1	A
	NB Left	18.7	C	10.9	B
	NB Through	10.5	B	15.2	C
	NB Right	0.0	A	0.0	A
	SB Left-Through-Right	23.0	C	12.3	B
	EB Left-Through-Right	16.2	C	15.6	C
	WB Left-Through-Right	11.5	B	10.8	B
5. West Entrance Rd at Military Rd One-Way Stop	NB Left-Through-Right	0.3	A	0.1	A
	SB Left-Through-Right	3.1	A	1.9	A
6. Military Rd at Garnett Ave One-Way Stop	EB Left-Right	10.4	B	9.6	A
	NB Left-Through	1.4	A	2.7	A
	SB Through-Right	†	†	†	†
7. Military Rd at Armistead Ave One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	0.6	A	0.1	A
	NB Left-Right	9.6	A	9.4	A
8. Military Rd at Dearing Ave One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	0.0	A	0.0	A
	NB Left-Right	9.2	A	9.2	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Right	8.6	A	8.7	A
	NB Left-Through	7.2	A	7.2	A
	SB Through-Right	†	†	†	†
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	0.2	A	0.3	A
	WB Through-Right	†	†	†	†
	SB Left-Right	9.5	A	9.8	A
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left-Through	29.7	C	39.6	D
	EB Right	26.4	C	37.2	D
	WB Left-Through	49.1	D	31.8	C
	WB Right	21.1	C	20.9	C
	NB Left	9.3	A	15.3	B
	NB Through-Right	11.8	B	26.2	C
	SB Left	4.6	A	12.3	B
	SB Through-Right	4.1	A	11.9	B
	Overall	10.5	B	21.4	C
	EB Left	25.5	C	25.8	C
	EB Right	12.9	B	11.2	B
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	NB Left	2.9	A	3.4	A
	NB Through	2.4	A	2.8	A
	SB Through	9.0	A	14.1	B
	SB Right	8.2	A	11.6	B
	Overall	7.5	A	8.9	A
	EB Left	23.7	C	28.2	C
	EB Through-Right	23.7	C	27.6	C
	WB Left	23.9	C	27.9	C
	WB Through-Right	23.4	C	25.6	C
	NB Left	0.0	A	12.4	B
	NB Through-Right	19.0	B	15.1	B
SB Left	10.1	B	8.4	A	
SB Through-Right	10.1	B	9.6	A	
Overall	15.0	B	16.1	B	
13. West Entrance Rd at FASTC Main Campus One-Way Stop	EB Left-Through	1.1	A	1.2	A
	WB Through-Right	†	†	†	†
	SB Left-Right	8.6	A	9.2	A
14. Dearing Ave at FASTC Driving Track Access One-Way Stop	EB Left-Right	9.3	A	9.2	A
	NB Left-Through	2.5	A	0.1	A
	SB Through-Right	†	†	†	†
15. Dearing Ave at FASTC Explosives Training One-Way Stop	WB Left-Right	8.7	A	8.7	A
	NB Through-Right	†	†	†	†
	SB Left-Through	4.8	A	3.2	A
16. Dearing Ave at FASTC Driver Training Access One-Way Stop	EB Left-Right	8.9	A	8.7	A
	NB Left-Through	1.7	A	2.5	A
	SB Through-Right	†	†	†	†

NOTES:

Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

7.2.6 2020 Build Alternative 2 Traffic Volumes

Table 7-6 summarizes the 2020 Build Alternative 2 intersection delay and LOS based on the 2020 Build Alternative 2 traffic volumes shown on Figures 7-11 and 7-12 and the geometry shown on Figure 7-20. The 2020 AM and PM Build Alternative 1 volumes intersection LOS is shown on Figure 7-22 and the corresponding Synchro[®] worksheets are included in Appendix N.

As indicated in Table 7-6, under 2020 Build Alternative 2 conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D or E:

- The eastbound through-left movement would operate at LOS D during the PM peak hour;
- The eastbound right turn movement would operate at LOS D during the PM peak hour; and
- The westbound through-left movement would operate at LOS E during the AM peak hour and LOS D during the PM peak hour.

A majority of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours. The exceptions are noted below:

- At the intersection of US Route 460 and Cox Road/Yellowbird Road:
 - The northbound left-through-right movement would operate at LOS E during the AM peak hour and LOS F during the PM peak hour; and
 - The southbound left-through-right movement would operate at LOS F during the AM peak hour and LOS D during the PM peak hour.
- At the intersection of Darvills Road and Military Road:
 - The northbound left turn would operate at LOS F during the AM peak hour;
 - The northbound through movement would operate at LOS E during the PM peak hour; and
 - The southbound left-through-right movement would operate at LOS F during the AM peak hour.

**Table 7-6: Intersection Delay and Level of Service Summary
2020 Build Alternative 2 Traffic Volumes**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	10.5	B	8.2	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	48.6	E	101.6	F
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	SB Left-Through-Right	178.6	F	29.8	D
	EB Through-Right	†	†	†	†
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	WB Left-Through	7.9	A	3.6	A
	NB Left-Right	9.9	A	24.5	C
4. W. 10th St at Military Rd/ FASTC Main Campus Two-Way Stop	EB Left-Through	1.5	A	1.4	A
	EB Right	†	†	†	†
	WB Left-Through-Right	3.9	A	1.1	A
	NB Left	557.4	F	11.9	B
	NB Through	10.8	B	36.0	E
	NB Right	0.0	A	0.0	A
	SB Left-Through-Right	70.3	F	16.7	C
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Through-Right	21.1	C	52.1	F
	WB Left-Through-Right	12.5	B	11.6	B
	NB Left-Through-Right	0.6	A	0.2	A
6. Military Rd at Garnett Ave One-Way Stop	SB Left-Through-Right	3.3	A	2.0	A
	EB Left-Right	10.6	B	9.8	A
7. Military Rd at Armistead Ave One-Way Stop	NB Left-Through	1.6	A	2.9	A
	SB Through-Right	†	†	†	†
8. Military Rd at Dearing Ave One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	0.6	A	0.1	A
9. W. 10th St at Warehouse St One-Way Stop	NB Left-Right	9.6	A	9.5	A
	EB Through-Right	†	†	†	†
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	WB Left-Through	0.0	A	0.0	A
	NB Left-Right	9.2	A	9.2	A
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left-Right	8.6	A	8.7	A
	NB Left-Through	7.2	A	7.2	A
	SB Through-Right	†	†	†	†
	EB Left-Through	0.2	A	0.2	A
	WB Through-Right	†	†	†	†
	SB Left-Right	10.0	B	10.5	B
	EB Left-Through	30.3	C	42.5	D
	EB Right	26.5	C	39.2	D
	WB Left-Through	63.3	E	36.3	D
	WB Right	21.1	C	21.0	C
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	NB Left	9.4	A	16.4	B
	NB Through-Right	12.1	B	29.8	C
	SB Left	4.8	A	12.8	B
	SB Through-Right	4.1	A	11.9	B
	Overall	11.0	B	23.6	C
	EB Left	31.7	C	27.4	C
	EB Right	12.7	B	11.3	B
	NB Left	3.0	A	3.5	A
	NB Through	2.4	A	2.8	A
	SB Through	9.4	A	14.5	B
13. West Entrance Rd at FASTC Main Campus One-Way Stop	SB Right	8.5	A	11.7	B
	Overall	8.2	A	9.0	A
	EB Left	24.0	C	30.3	C
	EB Through-Right	23.9	C	29.5	C
	WB Left	24.2	C	27.0	C
	WB Through-Right	23.6	C	24.8	C
	NB Left	0.0	A	14.0	B
	NB Through-Right	19.4	B	17.8	B
14. Dearing Ave at FASTC Driving Track Access One-Way Stop	SB Left	10.2	B	10.2	B
	SB Through-Right	10.4	B	11.5	B
	Overall	15.2	B	17.9	B
15. Dearing Ave at FASTC Explosives Training One-Way Stop	EB Left-Through	1.7	A	1.7	A
	WB Through-Right	†	†	†	†
16. Dearing Ave at FASTC Driver Training Access One-Way Stop	SB Left-Right	8.6	A	9.5	A
	EB Left-Right	9.6	A	9.8	A
17. Dearing Ave at FASTC Explosives Training One-Way Stop	NB Left-Through	1.8	A	0.1	A
	SB Through-Right	†	†	†	†
18. Dearing Ave at FASTC Driver Training Access One-Way Stop	WB Left-Right	8.7	A	9.0	A
	NB Through-Right	†	†	†	†
19. Dearing Ave at FASTC Driver Training Access One-Way Stop	SB Left-Through	6.0	A	4.7	A
	EB Left-Right	8.8	A	8.7	A
20. Dearing Ave at FASTC Driver Training Access One-Way Stop	NB Left-Through	1.9	A	1.9	A
	SB Through-Right	†	†	†	†

NOTES:

Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.

Overall intersection LOS and delay reported for signalized intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

7.2.7 2017 Build Alternative 2 Traffic Volumes with Mitigation

Based on the results of the 2017 Build Alternative 2 volumes capacity analyses, the turn lane analyses (see Chapter 7-4) and the traffic signal warrant analyses (see Chapter 7.5) mitigation measures were developed. To accommodate the 2017 Build Alternative 2 traffic volumes the following mitigation measures are recommended:

- At the unsignalized intersection of US Route 460 and Cox Road/Yellowbird Road, extend the westbound left turn lane to provide a 350-foot storage lane with a 200-foot taper;
- At the unsignalized intersection of Cox Road and Military Road, install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper; and
- At the unsignalized intersection of Darvills Road and Military Road, extend the eastbound right turn lane to provide a 200-foot storage lane with a 200-foot taper.

These turn lane improvements will bring the two existing turn lanes up to current VDOT standards based on the turn lane analyses. FASTC adds site trips to each of these movements. The mitigation measures recommended for the 2017 Build Alternative 2 traffic volumes are identified on Figure 7-23.

Table 7-7 summarizes the 2017 Build Alternative 2 intersection delay and LOS based on the 2017 Build Alternative 1 traffic volumes with the mitigation measures shown on Figure 7-23. The 2017 AM and PM Build Alternative 2 volumes intersection LOS is shown on Figure 7-24 and the corresponding Synchro[®] worksheets are included in Appendix M.

As indicated in Table 7-7, under mitigated 2017 Build Alternative 2 conditions the three signalized intersections operate at overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements operate at LOS D:

- The eastbound through-left movement during the PM peak hour;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the AM peak hour.

All of the unsignalized movements operate at LOS C or better during the AM and PM peak hours with one exception. At the intersection of US Route 460 and Cox Road/Yellowbird Road the southbound left-through-right movement operates at LOS D during the AM peak hour.

**Table 7-7: Intersection Delay and Level of Service Summary
2017 Build Alternative 2 Traffic Volumes with Mitigation**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left Extend Storage	9.2	A	8.1	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through-Right	16.4	C	22.2	C
	SB Left-Through-Right	26.0	D	17.0	C
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left	8.3	A	8.1	A
	WB Through	†	†	†	†
	NB Left-Right	9.6	A	13.1	B
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop	EB Left-Through	1.4	A	1.3	A
	EB Right Extend Storage	†	†	†	†
	WB Left-Through-Right	3.5	A	1.1	A
	NB Left	18.7	C	10.9	B
	NB Through	10.5	B	15.2	C
	NB Right	0.0	A	0.0	A
	SB Left-Through-Right	23.0	C	12.3	B
4. W. 10th St at Military Rd/ FASTC Main Campus Two-Way Stop	EB Left-Through-Right	16.2	C	15.6	C
	WB Left-Through-Right	11.5	B	10.8	B
	NB Left-Through-Right	0.3	A	0.1	A
	SB Left-Through-Right	3.1	A	1.9	A
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	10.4	B	9.6	A
	NB Left-Through	1.4	A	2.7	A
	SB Through-Right	†	†	†	†
6. Military Rd at Garnett Ave One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	0.6	A	0.1	A
7. Military Rd at Armistead Ave One-Way Stop	NB Left-Right	9.6	A	9.4	A
	EB Through-Right	†	†	†	†
8. Military Rd at Dearing Ave One-Way Stop	WB Left-Through	0.0	A	0.0	A
	NB Left-Right	9.2	A	9.2	A
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Right	8.6	A	8.7	A
	NB Left-Through	7.2	A	7.2	A
	SB Through-Right	†	†	†	†
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	0.2	A	0.3	A
	WB Through-Right	†	†	†	†
	SB Left-Right	9.5	A	9.8	A
	EB Left-Through	29.7	C	39.6	D
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Right	26.4	C	37.2	D
	WB Left-Through	49.1	D	31.8	C
	WB Right	21.1	C	20.9	C
	NB Left	9.3	A	15.3	B
	NB Through-Right	11.8	B	26.2	C
	SB Left	4.6	A	12.3	B
	SB Through-Right	4.1	A	11.9	B
	Overall	10.5	B	21.4	C
	EB Left	25.5	C	25.8	C
	EB Right	12.9	B	11.2	B
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	NB Left	2.9	A	3.4	A
	NB Through	2.4	A	2.8	A
	SB Through	9.0	A	14.1	B
	SB Right	8.2	A	11.6	B
	Overall	7.5	A	8.9	A
	EB Left	23.7	C	28.2	C
	EB Through-Right	23.7	C	27.6	C
WB Left	23.9	C	27.9	C	
13. West Entrance Rd at FASTC Main Campus One-Way Stop	WB Through-Right	23.4	C	25.6	C
	SB Left-Right	8.6	A	9.2	A
14. Dearing Ave at FASTC Driving Track Access One-Way Stop	NB Left	0.0	A	12.4	B
	NB Through-Right	19.0	B	15.1	B
15. Dearing Ave at FASTC Explosives Training One-Way Stop	SB Left	10.1	B	8.4	A
	SB Through-Right	10.1	B	9.6	A
16. Dearing Ave at FASTC Driver Training Access One-Way Stop	Overall	15.0	B	16.1	B
	EB Left-Through	1.1	A	1.2	A
13. West Entrance Rd at FASTC Main Campus One-Way Stop	WB Through-Right	†	†	†	†
	SB Left-Right	8.6	A	9.2	A
14. Dearing Ave at FASTC Driving Track Access One-Way Stop	EB Left-Right	9.3	A	9.2	A
	NB Left-Through	2.5	A	0.1	A
15. Dearing Ave at FASTC Explosives Training One-Way Stop	SB Through-Right	†	†	†	†
	WB Left-Right	8.7	A	8.7	A
16. Dearing Ave at FASTC Driver Training Access One-Way Stop	NB Through-Right	†	†	†	†
	SB Left-Through	4.8	A	3.2	A
16. Dearing Ave at FASTC Driver Training Access One-Way Stop	EB Left-Right	8.9	A	8.7	A
	NB Left-Through	1.7	A	2.5	A
16. Dearing Ave at FASTC Driver Training Access One-Way Stop	SB Through-Right	†	†	†	†

NOTES:

Mitigation Measures noted in bold italics.
 Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.
 Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.
 † SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

7.2.8 2020 Build Alternative 2 Traffic Volumes with Mitigation

Based on the results of the 2020 Build Alternative 2 volumes capacity analyses, the turn lane analyses (see Chapter 7-4) and the traffic signal warrant analyses (see Chapter 7.5) mitigation measures were developed. To accommodate the 2020 Build Alternative 2 traffic volumes the following mitigation measures are recommended:

- At the unsignalized intersection of US Route 460 and Cox Road/Yellowbird Road:
 - Extend the westbound left turn lane to provide a 500-foot storage lane with a 200-foot taper; and
 - Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper (to serve left turns and through movements).
- At the unsignalized intersection of Cox Road and Military Road, install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper.
- At the unsignalized intersection of Darvills Road and Military Road:
 - Extend the eastbound right turn lane to provide a 200-foot storage lane and a 200-foot taper
 - Extend the northbound left turn lane to provide a 200-foot storage lane and a 200-foot taper;
 - Extend the northbound right turn lane to provide a 200-foot taper;
 - Switch the stop control from Military Road approached to the Darvills Road approaches; and
 - Remove the existing red flashing beacon and replace with a yellow and red flashing beacon (yellow for Military Road and red for Darvills Road) and install "STOP AHEAD" signs on both approaches of Darvills Road.
- At the unsignalized intersection of Military Road and West 10th Street:
 - Install a southbound right turn lane with a 200-foot storage lane and a 200-foot taper; and
 - Convert the existing two-way stop to a four-way stop and install "STOP AHEAD" signs on both approaches of Military Road.
- Provide two egress lanes exiting the FASTC Main Campus at Military Road.
- At the signalized intersection of South Main Street and 8th Street/West Entrance Road, modify the traffic signal timings.

The turn lane extensions at the intersections of US Route 460 at Cox Road and Darvills Road at Military Road will bring the four existing turn lane treatments up to current VDOT standards based on the turn lane analyses. FASTC adds site trips to each of these movements. The mitigation measures recommended for the 2020 Build Alternative 2 traffic volumes are identified on Figure 7-25.

Table 7-8 summarizes the 2020 Build Alternative 2 intersection delay and LOS based on the 2020 Build Alternative 2 traffic volumes with the mitigation measures shown on Figure 7-25. The 2020 AM and PM Build Alternative 1 volumes intersection LOS is shown on Figure 7-26 and the corresponding Synchro[®] worksheets are included in Appendix N.

As indicated in Table 7-8, under mitigated 2020 Build Alternative 1 conditions the three signalized intersections would operate at an overall LOS C or better during the AM and PM peak hours. At the signalized intersection of South Main Street and 8th Street/West Entrance Road three movements would operate at LOS D:

- The eastbound through-left movement during the AM and PM peak hours;
- The eastbound right turn movement during the PM peak hour; and
- The westbound through-left movement during the PM peak hour.

A majority of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours. The exceptions are noted below:

- At the intersection of US Route 460 and Cox Road/Yellowbird Road:
 - The northbound left-through movement would operate at LOS F during the AM peak hour; and
 - The southbound left-through-right movement would operate at LOS F during the AM peak hour and LOS D during the PM peak hour.
- At the intersection of Darvills Road and Military Road:
 - The eastbound left-through movement would operate at LOS D during the PM peak hour; and
 - The westbound left-through-right movement would operate at LOS D during the AM and PM peak hours.

Although the northbound left-through movement and southbound left-through-right movement at the intersection of US Route 460 and Cox Road would operate at LOS F during the AM peak hour; a traffic signal is not warranted (see Chapter 7.4).

**Table 7-8: Intersection Delay and Level of Service Summary
2020 Build Alternative 2 Traffic Volumes with Mitigation**

Intersection and Type of Control	Movement	AM PEAK HOUR		PM PEAK HOUR	
		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS
1. US 460 (W Colonial Trail Hwy) at Cox Rd (US 460 Bus)/ Yellowbird Rd Two-Way Stop	EB Left	8.7	A	7.6	A
	EB Through	†	†	†	†
	EB Right	†	†	†	†
	WB Left	10.5	B	8.2	A
	WB Through	†	†	†	†
	WB Right	†	†	†	†
	NB Left-Through	138.6	F	23.2	C
	NB Right	9.7	A	18.1	C
	SB Left-Through-Right	178.6	F	29.8	D
2. Cox Rd (US 460 Bus) at Military Rd One-Way Stop	EB Through-Right	†	†	†	†
	WB Left	9.0	A	8.3	A
	WB Through	†	†	†	†
3. Darvills Rd (VA 40) at Military Rd Two-Way Stop <i>(VA 40 is now the stop street)</i>	NB Left-Right	9.9	A	24.5	C
	EB Left-Through	18.2	C	29.4	D
	EB Right	15.6	C	9.0	A
	WB Left-Through-Right	27.5	D	31.6	D
	NB Left	8.8	A	7.6	A
	NB Through	†	†	†	†
4. W. 10th St at Military Rd/ FASTC Main Campus <i>Converted to Four-Way Stop</i>	NB Right	†	†	†	†
	SB Left-Through-Right	0.3	A	1.3	A
	EB Left-Through-Right	9.3	A	13.8	B
	WB Left-Through-Right	8.7	A	11.0	B
	NB Left-Through-Right	8.8	A	10.4	B
	SB Left-Through-Right	11.0	B	9.9	A
	SB Right	7.8	A	8.5	A
Overall	9.4	A	11.7	B	
5. West Entrance Rd at Military Rd One-Way Stop	EB Left-Right	10.6	B	9.8	A
	NB Left-Through	1.6	A	2.9	A
	SB Through-Right	†	†	†	†
6. Military Rd at Gamett Ave One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	0.6	A	0.1	A
	NB Left-Right	9.6	A	9.5	A
7. Military Rd at Armistead Ave One-Way Stop	EB Through-Right	†	†	†	†
	WB Left-Through	0.0	A	0.0	A
	NB Left-Right	9.2	A	9.2	A
8. Military Rd at Dearing Ave One-Way Stop	EB Left-Right	8.6	A	8.7	A
	NB Left-Through	7.2	A	7.2	A
	SB Through-Right	†	†	†	†
	Overall	†	†	†	†
9. W. 10th St at Warehouse St One-Way Stop	EB Left-Through	0.2	A	0.2	A
	WB Through-Right	†	†	†	†
	SB Left-Right	10.0	B	10.5	B
	Overall	†	†	†	†
	Overall	10.0	B	10.5	B
10. 8th St/West Entrance Rd at S. Main St (VA 40) Signalized	EB Left-Through	35.6	D	42.5	D
	EB Right	27.1	C	39.2	D
	WB Left-Through	32.7	C	36.3	D
	WB Right	21.0	C	21.0	C
	NB Left	9.4	A	16.4	B
	NB Through-Right	12.1	B	29.8	C
	SB Left	4.8	A	12.8	B
	SB Through-Right	4.1	A	11.9	B
	Overall	10.3	B	23.6	C
11. Church St (US 460 Bus) at S. Main St (US 460 Bus/VA 40) Signalized	EB Left	31.7	C	27.4	C
	EB Right	12.7	B	11.3	B
	NB Left	3.0	A	3.5	A
	NB Through	2.4	A	2.8	A
	SB Through	9.4	A	14.5	B
	SB Right	8.5	A	11.7	B
	Overall	8.2	A	9.0	A
12. Dinwiddie Ave (VA 40) at N. Main St (US 460 Bus) Signalized	EB Left	24.0	C	30.3	C
	EB Through-Right	23.9	C	29.5	C
	WB Left	24.2	C	27.0	C
	WB Through-Right	23.6	C	24.8	C
	NB Left	0.0	A	14.0	B
	NB Through-Right	19.4	B	17.8	B
	SB Left	10.2	B	10.2	B
	SB Through-Right	10.4	B	11.5	B
	Overall	15.2	B	17.9	B
13. West Entrance Rd at FASTC Main Campus One-Way Stop	EB Left-Through	1.7	A	1.7	A
	WB Through-Right	†	†	†	†
	SB Left-Right	8.6	A	9.5	A
14. Dearing Ave at FASTC Driving Track Access One-Way Stop	EB Left-Right	9.6	A	9.8	A
	NB Left-Through	1.8	A	0.1	A
	SB Through-Right	†	†	†	†
15. Dearing Ave at FASTC Explosives Training One-Way Stop	WB Left-Right	8.7	A	9.0	A
	NB Through-Right	†	†	†	†
	SB Left-Through	6.0	A	4.7	A
16. Dearing Ave at FASTC Driver Training Access One-Way Stop	EB Left-Right	8.8	A	8.7	A
	NB Left-Through	1.9	A	1.9	A
	SB Through-Right	†	†	†	†

NOTES: **Mitigation Measures noted in bold italics.**
 Shaded cells denote an increase in delay and drop in LOS to D, E, or F with the addition of FASTC traffic.
 Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.
 † SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

7.3 TURN LANE ANALYSES

Left and right-turn lane analyses were performed for movements at unsignalized intersections of VDOT maintained roadways outside of Fort Pickett using the 2017 and 2020 traffic volumes for Build Alternatives 1 and 2. The guidelines for left and right turn lane treatments are found in Appendix F of VDOT's *Road Design Manual* and are reproduced in Table 4-3 (on page 4-6). These guidelines provide criteria for the installation of left and right turn lanes on two-lane and four-lane highways at unsignalized intersections.

Turn lane analyses were completed using the 2017 and 2020 Build Alternative 1 and 2 traffic volumes for the movements listed below:

- Eastbound left turn from US Route 460 onto Yellowbird Road;
- Eastbound right turn from US Route 460 onto Cox Road;
- Westbound left turn from US Route 460 onto Cox Road;
- Westbound right turn from US Route 460 onto Yellowbird Road;
- Eastbound right turn from Cox Road onto Military Road;
- Westbound left turn from Cox Road onto Military Road;
- Eastbound left turn from Darvills Road onto Military Road;
- Eastbound right turn from Darvills Road onto Military Road;
- Westbound left turn from Darvills Road onto Military Road;
- Westbound right turn from Darvills Road onto Military Road;
- Northbound left turn from Military Road onto Darvills Road;
- Northbound right turn from Military Road onto Darvills Road
- Southbound left turn from Military Road onto Darvills Road; and
- Southbound right turn from Military Road onto Darvills Road.

For the 2017 and 2020 Build Alternative 2 traffic volumes the eastbound left turn from West Entrance Road into the FASTC Main Campus was also analyzed.

7.3.1 Build Alternative 1

The 2017 Build Alternative 1 traffic volumes from Figures 7-5 and 7-6 and the 2020 Build Alternative 1 traffic volumes from Figures 7-7 and 7-8 were used to complete the turn lane analyses.

The VDOT turn lane nomographs for the 2017 Build Alternative 1 traffic volumes are included Appendix O and VDOT turn lane nomographs for the 2020 Build Alternative 1 traffic volumes are included Appendix P. The results of the turn lane analyses are summarized in Table 7-9. The minimum left turn lane storage lengths shown in Table 7-7 are the larger of the 200-foot minimum specified in Table 4-3 and the length specified on the nomographs. The minimum taper lengths are as specified in Table 4-3.

The turn lane analyses for the 2017 Build Alternative 1 conditions indicate the following turn lane treatments are needed to accommodate the Phase 1 FASTC site traffic:

- A 350-foot left turn lane with a 200-foot taper on westbound US Route 460 at Cox Road;
- A 200-foot left turn lane with a 200-foot taper on westbound Cox Road at Military Road; and
- A 200-foot right turn lane with a 200-foot taper on eastbound Darvills Road at Military Road (also needed to accommodate the 2017 No Build traffic volumes).

The turn lane analyses for the 2020 Build Alternative 1 conditions indicate the following turn lane treatments are needed to accommodate the FASTC site traffic at buildout:

- A 500-foot left turn lane with a 200-foot taper on westbound US Route 460 at Cox Road;
- A 200-foot left turn lane with a 200-foot taper on westbound Cox Road at Military Road;
- A 200-foot right turn lane with a 200-foot taper on eastbound Darvills Road at Military Road (also needed to accommodate the 2020 No Build traffic volumes);
- A 200-foot left turn lane with a 200-foot taper on northbound Military Road at Darvills Road; and
- A 200-foot right turn lane taper on northbound Military Road at Darvills Road.

**Table 7-9: Turn Lane Analyses Summary
2017 and 2020 Build Alternative 1 Traffic Volumes**

Intersection and Movement	Existing Turn Lane Treatment	Turn Lane Treatment Required per VDOT Policy		Additional Treatment Required?	
		2017 Build Alternative 1 Volumes	2020 Build Alternative 1 Volumes	2017	2020
US Route 460 at Cox Road					
Eastbound Left	125-foot Left Turn Lane with 75-foot Taper	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Eastbound Right	50-foot Right Turn Lane with 125-foot Taper	Minimum 200-foot Right Turn Taper	Minimum 200-foot Right Turn Taper	No	No
Westbound Left	150-foot Left Turn Lane with 150-foot Taper	Minimum 350-foot Left Turn Lane with minimum 200-foot Taper	Minimum 500-foot Left Turn Lane with minimum 200-foot Taper	Yes	Yes
Westbound Right	100-foot Right Turn Lane with 50-foot Taper	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Cox Road at Military Road					
Eastbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Westbound Left	None	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	Yes
Darvills Road at Military Road					
Eastbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Eastbound Right	50-foot Right Turn Lane with 50-foot Taper	Minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Yes*	Yes*
Westbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Westbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Northbound Left	150-foot Left Turn Lane with 50-foot Taper	No Left Turn Lane Required	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	No	Yes
Northbound Right	25-foot Right Turn Lane with 50-foot Taper	No Right Turn Lane or Taper Required	Minimum 200-foot Right Turn Taper	No	Yes
Southbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Southbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No

Shaded cells indicate additional turn lane treatments required to accommodate future Build Alternative 1 Volumes.

* Required to accommodate 2017 and 2020 No Build Traffic Volumes.

7.3.2 Build Alternative 2

The 2017 Build Alternative 2 traffic volumes from Figures 7-9 and 7-10 and the 2020 Build Alternative 2 traffic volumes from Figures 7-11 and 7-12 were used to complete the turn lane analyses.

The VDOT turn lane nomographs for the 2017 Build Alternative 2 traffic volumes are included Appendix Q and VDOT turn lane nomographs for the 2020 Build Alternative 2 traffic volumes are included Appendix R. The results of the turn lane analyses are summarized in Table 7-10. The minimum left turn lane storage lengths shown in Table 7-8 are the larger of the 200-foot minimum specified in Table 4-3 and the length specified on the nomographs. The minimum taper lengths are as specified in Table 4-3.

The turn lane analyses for the 2017 Build Alternative 2 conditions indicate the following turn lane treatments are needed to accommodate the Phase 1 FASTC site traffic:

- A 350-foot left turn lane with a 200-foot taper on westbound US Route 460 at Cox Road;
- A 200-foot left turn lane with a 200-foot taper on westbound Cox Road at Military Road; and
- A 200-foot right turn lane with a 200-foot taper on eastbound Darvills Road at Military Road (also needed to accommodate the 2017 No Build traffic volumes).

The turn lane analyses for the 2020 Build Alternative 2 conditions indicate the following turn lane treatments are needed to accommodate the FASTC site traffic at buildout:

- A 500-foot left turn lane with a 200-foot taper on westbound US Route 460 at Cox Road;
- A 200-foot left turn lane with a 200-foot taper on westbound Cox Road at Military Road;
- A 200-foot right turn lane with a 200-foot taper on eastbound Darvills Road at Military Road (also needed to accommodate the 2020 No Build traffic volumes);
- A 200-foot left turn lane with a 200-foot taper on northbound Military Road at Darvills Road; and
- A 200-foot right turn lane taper on northbound Military Road at Darvills Road.

**Table 7-10: Turn Lane Analyses Summary
2017 and 2020 Build Alternative 2 Traffic Volumes**

Intersection and Movement	Existing Turn Lane Treatment	Turn Lane Treatment Required per VDOT Policy		Additional Treatment Required?	
		2017 Build Alternative 2 Volumes	2020 Build Alternative 2 Volumes	2017	2020
US Route 460 at Cox Road					
Eastbound Left	125-foot Left Turn Lane with 75-foot Taper	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Eastbound Right	50-foot Right Turn Lane with 125-foot Taper	Minimum 200-foot Right Turn Taper	Minimum 200-foot Right Turn Taper	No	No
Westbound Left	150-foot Left Turn Lane with 150-foot Taper	Minimum 350-foot Left Turn Lane with minimum 200-foot Taper	Minimum 500-foot Left Turn Lane with minimum 200-foot Taper	Yes	Yes
Westbound Right	100-foot Right Turn Lane with 50-foot Taper	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Cox Road at Military Road					
Eastbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Westbound Left	None	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	Yes
Darvills Road at Military Road					
Eastbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Eastbound Right	50-foot Right Turn Lane with 50-foot Taper	Minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Yes*	Yes*
Westbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Westbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
Northbound Left	150-foot Left Turn Lane with 50-foot Taper	No Left Turn Lane Required	Minimum 200-foot Left Turn Lane with minimum 200-foot Taper	No	Yes
Northbound Right	25-foot Right Turn Lane with 50-foot Taper	No Right Turn Lane or Taper Required	Minimum 200-foot Right Turn Taper	No	Yes
Southbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No
Southbound Right	None	No Right Turn Lane or Taper Required	No Right Turn Lane or Taper Required	No	No
West Entrance Road at FASTC					
Eastbound Left	None	No Left Turn Lane Required	No Left Turn Lane Required	No	No

Shaded cells indicate additional turn lane treatments required to accommodate future Build Alternative 2 Volumes.

* Required to accommodate 2017 and 2020 No Build Traffic Volumes.

7.4 TRAFFIC SIGNAL WARRANT ANALYSES

Traffic signal warrant analyses were performed for unsignalized intersections with movements operating at LOS E or F. For the 2017 and 2020 traffic volumes for Build Alternatives 1 and 2 at traffic signal warrant analyses were performed for the following intersections:

1. US Route 460 at Cox Road/Yellowbird Road; and
2. Darvills Road (VA Route 40) at Military Road.

The warrant analyses were completed using Warrants 1 (Eight-Hour), 2 (Four-Hour), and 3 (Peak Hour) from the 2009 *Manual on Uniform Traffic Control Devices* (MUTCD). The warrant analyses were conducted using HCS 2010 MUTCD Signal Warrants Release 6.3.

At the intersection of US Route 460 and Cox Road the warrant analyses were conducted using the 100% and 70% volume thresholds since the posted speed limit on US Route 460 is 60 mph. The right turn volumes from the northbound approach of Cox Road were excluded since an exclusive right turn lane is anticipated to be provided at buildout of the FASTC site in 2020.

At the intersection of Darvills Road and Military Road the warrant analyses were conducted using the 100% volume thresholds since the posted speed limit 45 mph on all approaches. The right turn volumes from the eastbound approach of Darvills Road were excluded since an exclusive right turn lane is provided. For the analyses, Military Road was assumed to be the major street since it carries a majority of the volume.

7.4.1 Build Alternative 1

The 2017 Build Alternative 1 traffic volumes from Figures 7-5 and 7-6 and the 2020 Build Alternative 1 traffic volumes from Figures 7-7 and 7-8 were used to project the 12-hour volumes used in the analyses. The 12-hour projections were made using 24-hour count data from the Main Gate at Fort Pickett (provided by VAARNG). The projected 2017 and 2020 12-hour volumes for Build Alternative 1 are included in Appendices R and S, respectively.

All of the warrant analyses worksheets for the 2017 and 2020 Build Alternative 1 traffic volumes are included in Appendix S and T, respectively. The results of the traffic signal warrant analyses are summarized in Table 7-11.

As indicated in Table 7-11, the Warrants 1, 2, and 3 are not met for either location under 2017 Build Alternative 1 conditions.

At buildout of FASTC in 2020, the Build Alternative 1 conditions at the intersection of US Route 460 and Cox Road will satisfy Warrant 3 but not Warrants 1 or 2. Warrant 3 is met during the PM peak hour when the approaches of Cox Road and Yellowbird Road are anticipated to operate at LOS D. A traffic signal is not recommended at this time. The location should be monitored and if future conditions indicate a traffic signal may be needed, a traffic signal warrant analysis should be conducted using actual 12-hour count data collected after the FASTC facilities have opened.

At the intersection of Darvills Road and Military Road, Warrants 1, 2, and 3 are not met under 2020 Build Alternative 1 conditions. A traffic signal is not warranted at this intersection.

**Table 7-11: Traffic Signal Warrant Analyses Summary
2017 and 2020 Build Alternative 1 Traffic Volumes**

Intersection	2017 Build Alternative 1 Volumes			2020 Build Alternative 1 Volumes		
	Eight Hour Warrant	Four Hour Warrant	Peak Hour Warrant	Eight Hour Warrant	Four Hour Warrant	Peak Hour Warrant
US Route 460 at Cox Road ¹ (using 100% volume thresholds)	Not Met	Not Met	Not Met	Not Met	Not Met	Met
US Route 460 at Cox Road ¹ (using 70% volume thresholds)	Not Met	Not Met	Not Met	Not Met	Not Met	Met
VA Route 40 (Darvills Road) at Military Road ²	Not Met	Not Met	Not Met	Not Met	Not Met	Not Met

¹ Assumptions:

- US Route 460 is the Major Street
- Evaluated with 100% and 70% Volume Thresholds (posted speed is 60 mph)
- Minor Street Right Turn Volumes Excluded on Northbound Approach of Cox Road
- Two or more lanes on Major approach and one lane on Minor approach

² Assumptions:

- Military Road is the Major Street
- 100% Volume Thresholds
- Minor Street Right Turn Volumes Excluded on Eastbound Approach of Darvills Road
- One lane on Major approach and one lane on Minor approach

7.4.2 Build Alternative 2

The 2017 Build Alternative 2 traffic volumes from Figures 7-9 and 7-10 and the 2020 Build Alternative 1 traffic volumes from Figures 7-11 and 7-12 were used to project the 12-hour volumes used in the analyses. The 12-hour projections were made using 24-hour count data from the Main Gate at Fort Pickett (provided by VAARNG). The projected 2017 and 2020 12-hour volumes for Build Alternative 2 are included in Appendices T and U, respectively.

All of the warrant analyses worksheets for the 2017 and 2020 Build Alternative 2 traffic volumes are included in Appendix U and V, respectively. The results of the traffic signal warrant analyses are summarized in Table 7-12.

As indicated in Table 7-12, the Warrants 1, 2, and 3 are not met for either location under 2017 Build Alternative 2 conditions.

At buildout of FASTC in 2020, the Build Alternative 2 conditions at the intersection of US Route 460 and Cox Road will satisfy Warrant 3 but not Warrants 1 or 2. Warrant 3 is met during the PM peak hour when the approaches of Cox Road and Yellowbird Road are anticipated to operate at LOS D. A traffic signal is not recommended at this time. The location should be monitored and if future conditions indicate a traffic signal may be needed, a traffic signal warrant analysis should be conducted using actual 12-hour count data collected after the FASTC facilities have opened.

At the intersection of Darvills Road and Military Road, Warrants 1, 2, and 3 are not met under 2020 Build Alternative 2 conditions. A traffic signal is not warranted at this intersection.

**Table 7-12: Traffic Signal Warrant Analyses Summary
2017 and 2020 Build Alternative 2 Traffic Volumes**

Intersection	2017 Build Alternative 2 Volumes			2020 Build Alternative 2 Volumes		
	Eight Hour Warrant	Four Hour Warrant	Peak Hour Warrant	Eight Hour Warrant	Four Hour Warrant	Peak Hour Warrant
US Route 460 at Cox Road ¹ (using 100% volume thresholds)	Not Met	Not Met	Not Met	Not Met	Not Met	Met
US Route 460 at Cox Road ¹ (using 70% volume thresholds)	Not Met	Not Met	Not Met	Not Met	Not Met	Met
VA Route 40 (Darvills Road) at Military Road ²	Not Met	Not Met	Not Met	Not Met	Not Met	Not Met

¹ Assumptions:

- US Route 460 is the Major Street
- Evaluated with 100% and 70% Volume Thresholds (posted speed is 60 mph)
- Minor Street Right Turn Volumes Excluded on Northbound Approach of Cox Road
- Two or more lanes on Major approach and one lane on Minor approach

² Assumptions:

- Military Road is the Major Street
- 100% Volume Thresholds
- Minor Street Right Turn Volumes Excluded on Eastbound Approach of Darvills Road
- One lane on Major approach and one lane on Minor approach

7.5 FORT PICKETT MAIN GATE AND WEST GATE ANALYSES

Access to Fort Pickett is controlled by two gates. The Main Gate is located on Military Road south of the intersection of Darvills Road. The West Gate is located on West Entrance Road west of the intersection of Military Road.

Under Build Alternative 1, all FASTC traffic would use the two existing Fort Pickett gates with 90% using the Main Gate and 10% using the West Gate. Under Build Alternative 2, 10% of the FASTC traffic would use the secure FASTC access from West Entrance Road to enter the FASTC Main Campus and the remaining traffic would use the Fort Pickett gates (85% at the Main Gate and 5% at the West Gate).

VAARNG provided two weeks of daily vehicle counts by lane for both the Main Gate and the West Gate. This data is included in Appendix W. Per the data provided by VAARNG, there are prescribed thresholds for the number of vehicles per hour per lane (vphpl) that dictate the staffing levels required (< 375 vphpl – one guard, ≥ 375 and < 675 vphpl – 2 guards, and ≥ 675 vphpl – 3 guards).

To determine the existing and future No Build volumes by lane at the two gates, the 2012 volumes from Figures 3-1 and 3-2 were allocated between the two lanes at each gate based on the distribution between lanes from the VAARNG gate counts. The 2012 gate traffic volumes were then projected to 2017 and 2020 No Build volumes using a 1% annual growth rate. The Existing and future No Build gate volumes are summarized in Table 7-13.

**Table 7-13: Gate Vehicles per Hour per Lane
2012 Existing and 2017 and 2020 No Build Traffic Volumes**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
2012 Existing	181	121	302	14	14	27	63	77	140	14	17	30
2017 No Build	190	127	317	14	14	28	66	81	147	14	17	32
2020 No Build	196	131	327	15	15	29	68	83	152	15	18	32

Based on the current prescribed vphpl thresholds, the Existing and future No Build gate staffing levels are summarized in Table 7-14.

**Table 7-14: Gate Staffing Levels by Lane
2012 Existing and 2017 and 2020 No Build**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards
2012 Existing	1	1	2	1	1	2	1	1	2	1	1	2
2017 No Build	1	1	2	1	1	2	1	1	2	1	1	2
2020 No Build	1	1	2	1	1	2	1	1	2	1	1	2

7.5.1 Build Alternative 1

To estimate the impacts of the FASTC traffic on the gate operations, the 2017 and 2020 Build Alternative 1 volumes from Figures 6-5 through 6-8 were allocated between the two lanes at each gate based on the distribution between lanes from the VAARNG gate counts. The Build Alternative 1 FASTC site trips at the gates are summarized in Table 7-15.

**Table 7-15: Gate Vehicles per Hour per Lane
2017 and 2020 Build Alternative 1 FASTC Site Trips**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
2017 Build Alt 1 Site Trips	140	94	234	27	27	54	12	14	26	3	3	6
2020 Build Alt 1 Site Trips	250	167	417	46	46	91	21	25	46	5	6	10

To generate the 2017 and 2020 Build Alternative 1 total traffic volumes at the gates, the No Build volumes from Table 7-13 were added to the Build Alternative 1 site trips from Table 7-15. The 2017 and 2020 Build Alternative 1 total gate volumes are summarized in Table 7-16.

**Table 7-16: Gate Vehicles per Hour per Lane
2017 and 2020 Build Alternative 1 Total Traffic Volumes**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
2017 Build Alt 1 Total	331	221	551	41	41	82	78	95	173	17	21	38
2020 Build Alt 1 Total	446	298	744	60	60	120	89	109	198	19	23	42

Based on the current prescribed vphpl thresholds, the 2017 and 2020 Build Alternative 1 total volume gate staffing levels are summarized in Table 7-17.

**Table 7-17: Gate Staffing Levels by Lane
2017 and 2020 Build Alternative 1 Total Traffic Volumes**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards
2017 Build Alt 1 Total	1	1	2	1	1	2	1	1	2	1	1	2
2017 Additional Guards?	No	No	No	No	No	No	No	No	No	No	No	No
2020 Build Alt 1 Total	2	1	3	1	1	2	1	1	2	1	1	2
2020 Additional Guards?	Yes	No	Yes	No	No	No	No	No	No	No	No	No

Shaded cells indicate additional staffing required to accommodate future Build Alternative 1 Volumes.

Based on Table 7-17, in 2017 the addition of the Build Alternative 1 FASTC trips would not exceed the 375 vphpl threshold at the Main Gate, so the existing VAARNG staffing levels (one guard per lane) would be sufficient.

At full buildout in 2020, the addition of the Build Alternative 1 FASTC trips would result in volumes exceeding 375 vphpl in Lane 1. Based on the current VAARNG staffing requirements and the 375 vphpl threshold, a second guard would be needed for Lane 1 at the Main Gate to accommodate the additional FASTC traffic during the AM peak hour (06:30 to 07:30).

The existing VAARNG staffing levels at the West Gate (one guard per lane) would be sufficient to accommodate the 2017 and 2020 Build Alternative 1 FASTC trips.

The analysis assumes worst-case conditions with peak FASTC traffic and peak Fort Pickett traffic arriving during the same one-hour period in the morning. Staggering the FASTC arrival times so they do not overlap with the peak arrivals of Fort Pickett traffic may keep Lane 1 under the 375 vphpl threshold and eliminate the need for an additional guard based on current VAARNG staffing guidelines.

7.5.2 Build Alternative 2

To estimate the impacts of the FASTC traffic on the gate operations, the 2017 and 2020 Build Alternative 2 volumes from Figures 6-9 through 6-12 were allocated between the two lanes at each gate based on the distribution between lanes from the VAARNG gate counts. The Build Alternative 2 FASTC site trips at the gates are summarized in Table 7-18.

**Table 7-18: Gate Vehicles per Hour per Lane
2017 and 2020 Build Alternative 2 FASTC Site Trips**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
2017 Build Alt 2 Site Trips	133	88	221	26	26	51	6	7	13	1	2	3
2020 Build Alt 2 Site Trips	208	139	347	43	43	86	10	13	23	2	3	5

To generate the 2017 and 2020 Build Alternative 2 total traffic volumes at the gates, the No Build volumes from Table 7-13 were added to the Build Alternative 2 site trips from Table 7-18. The 2017 and 2020 Build Alternative 2 total gate volumes are summarized in Table 7-19.

**Table 7-19: Gate Vehicles per Hour per Lane
2017 and 2020 Build Alternative 2 Total Traffic Volumes**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
2017 Build Alt 2 Total	323	215	538	40	40	79	72	88	160	16	19	35
2020 Build Alt 2 Total	404	270	674	58	58	115	79	96	175	17	21	37

Based on the current prescribed vphpl thresholds, the 2017 and 2020 Build Alternative 2 total volume gate staffing levels are summarized in Table 7-20.

**Table 7-20: Gate Staffing Levels by Lane
2017 and 2020 Build Alternative 2 Total Traffic Volumes**

Scenario	Main Gate (Military Road)						West Gate (West Entrance Road)					
	AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)			AM Peak Hour (06:30 - 07:30)			PM Peak Hour (16:00 - 17:00)		
	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total	Lane 1	Lane 2	Total
	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards	Guards
2017 Build Alt 2 Total	1	1	2	1	1	2	1	1	2	1	1	2
2017 Additional Guards?	No	No	No	No	No	No	No	No	No	No	No	No
2020 Build Alt 2 Total	2	1	3	1	1	2	1	1	2	1	1	2
2020 Additional Guards?	Yes	No	Yes	No	No	No	No	No	No	No	No	No

Shaded cells indicate additional staffing required to accommodate future Build Alternative 2 Volumes.

Based on Table 7-20, in 2017 the Build Alternative 2 FASTC trips would not exceed the 375 vphpl thresholds at the Main Gate, so the existing VAARNG staffing levels (one guard per lane) would be sufficient.

At full buildout in 2020, the addition of the Build Alternative 2 FASTC trips would result in volumes exceeding 375 vphpl in Lane 1. Based on the current VAARNG staffing requirements and the 375 vphpl threshold, a second guard would be needed for Lane 1 at the Main Gate to accommodate the additional FASTC traffic during the AM peak hour (06:30 to 07:30).

The existing VAARNG staffing levels at the West Gate (one guard per lane) would be sufficient to accommodate the 2017 and 2020 Build Alternative 2 FASTC trips.

Again, the analysis assumes worst-case conditions with peak FASTC traffic and peak Fort Pickett traffic arriving during the same one-hour period in the morning. Staggering the FASTC arrival times so they do not overlap with the peak arrivals of Fort Pickett traffic may keep Lane 1 under the 375 vphpl threshold and eliminate the need for an additional guard based on current VAARNG staffing guidelines.

7.6 PEDESTRIAN AND BICYCLE FACILITIES AND BUS ROUTE ANALYSES

Within the study area, sidewalks are provided in the Town of Blackstone along Main Street, Dinwiddie Avenue, Church Street, and West Entrance Road. There are no sidewalks provided along VDOT maintained roadways or along the roadways within Fort Pickett. There are no designated bicycle facilities provided within the study area.

FASTC will provide pedestrian and bicycle accommodations along the internal site roadways within the individual FASTC sites at Fort Pickett; however, these accommodations will not extend to the roadways within Fort Pickett. No additional pedestrian or bicycle accommodations are planned along the roadways within the study area.

Bus service within the Town of Blackstone is provided by BABS. BABS also provides on-call shuttle service between Fort Pickett and the Main Street business district in the Town of Blackstone. Additionally, BABS also provides scheduled bus service between Fort Pickett and the Town of Blackstone on Friday and Saturday evenings from 6:00 PM to 11:00 PM. The bus travels through the Main Gate on Military Road and stops at the gym, PX, and billeting office. No additional bus service is planned.

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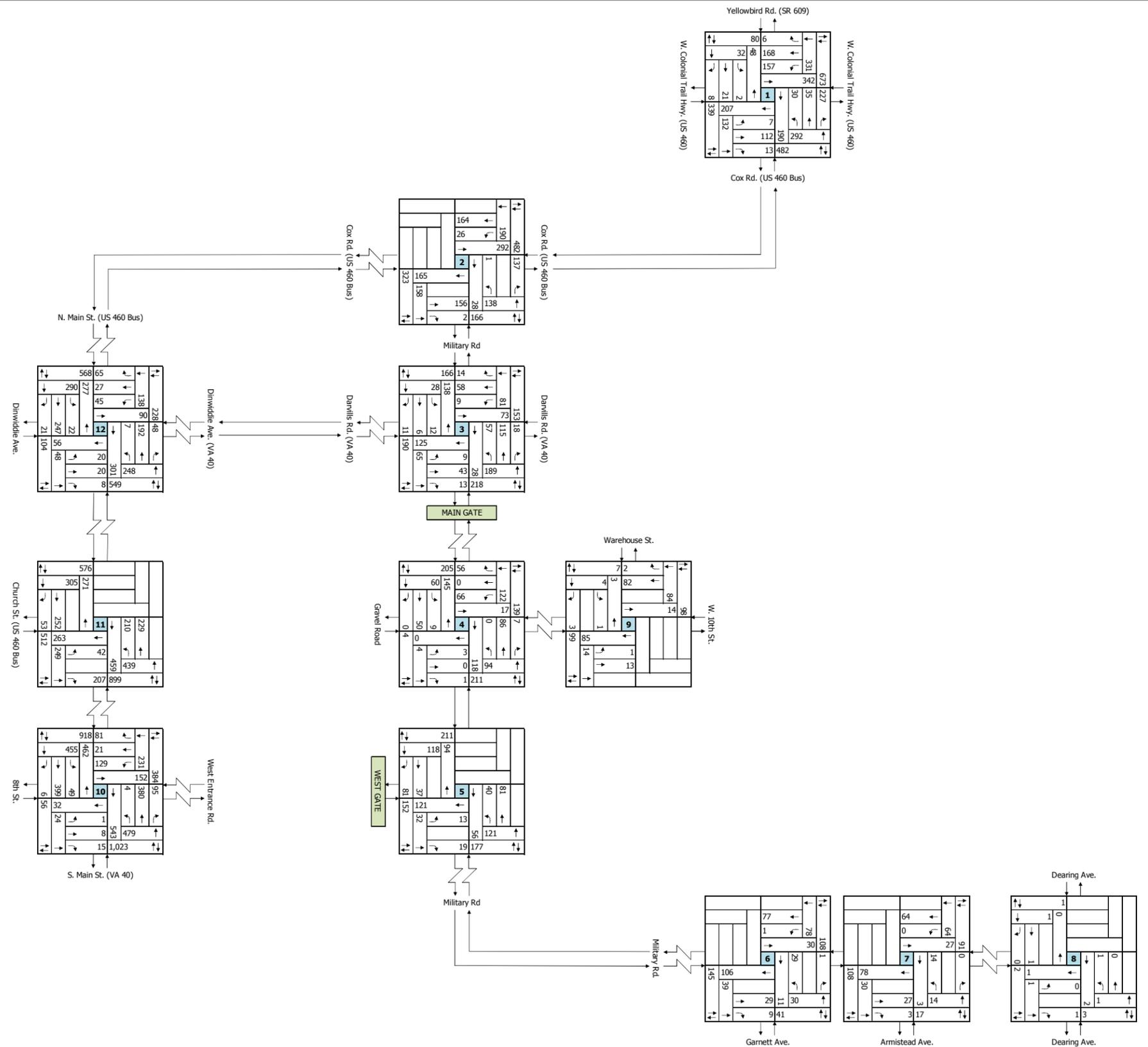
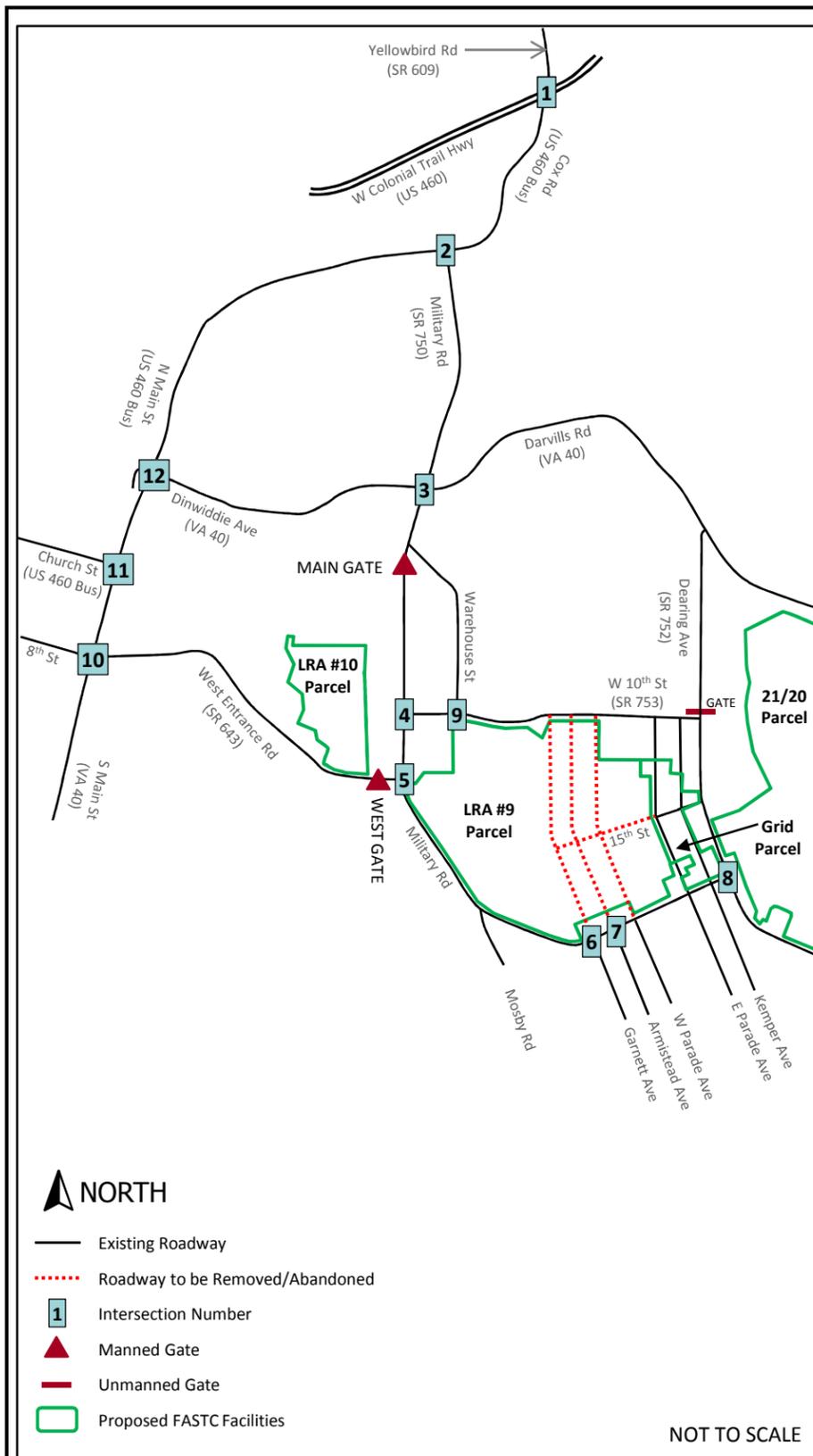


Figure 7-2

2017 No Build PM Peak Hour Traffic Volumes Rerouted

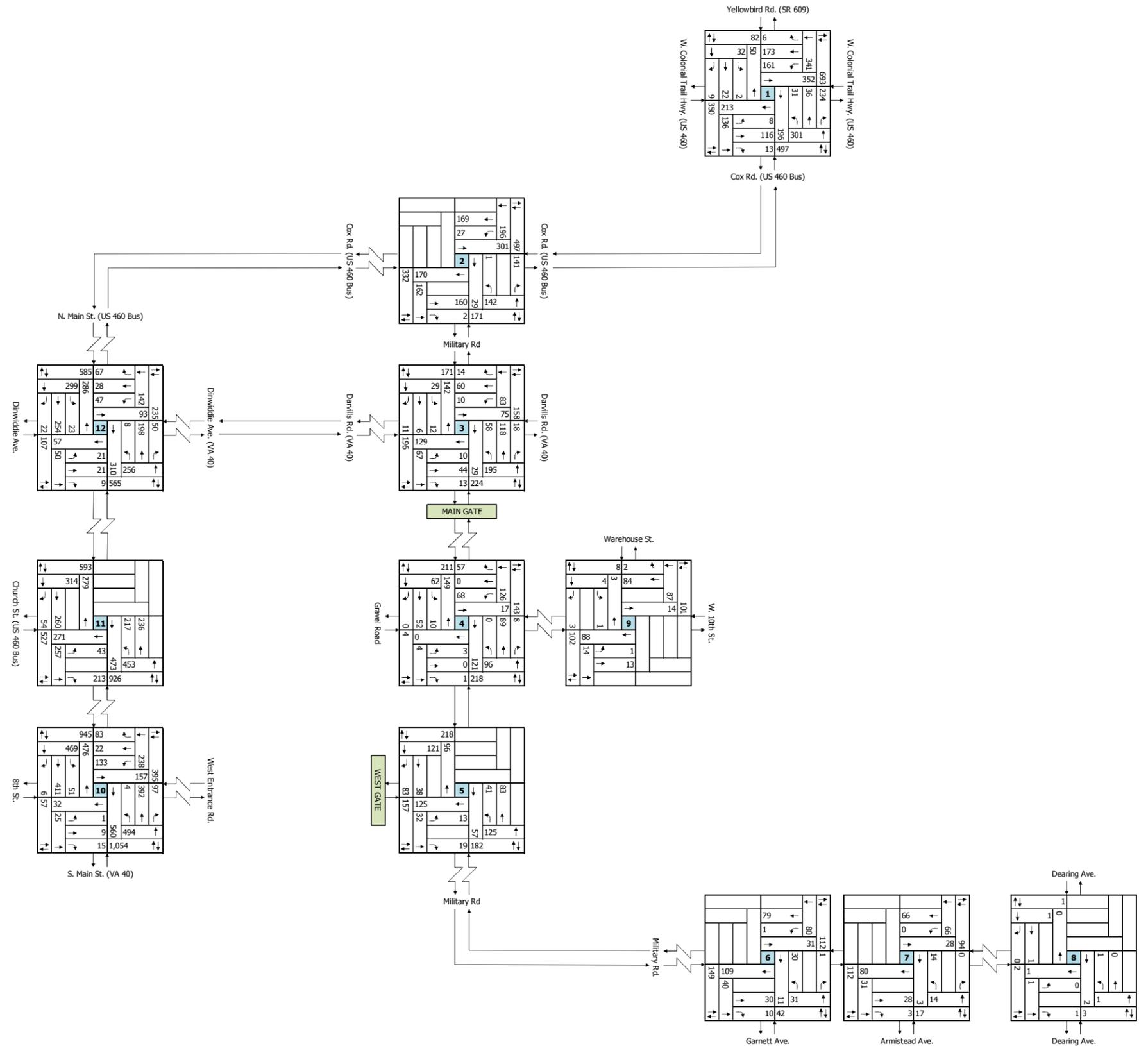
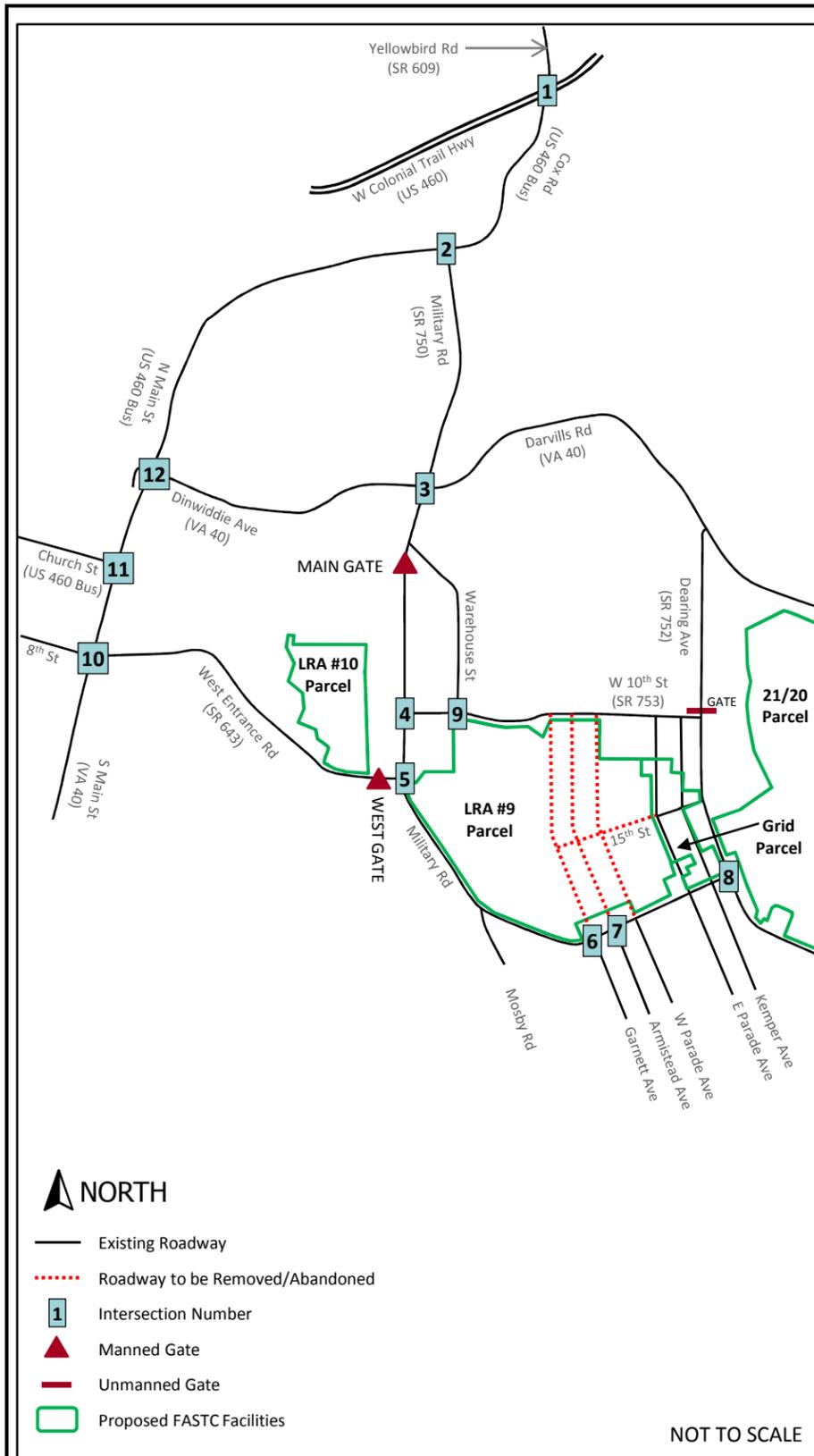


Figure 7-4

2020 No Build PM Peak Hour Traffic Volumes Rerouted

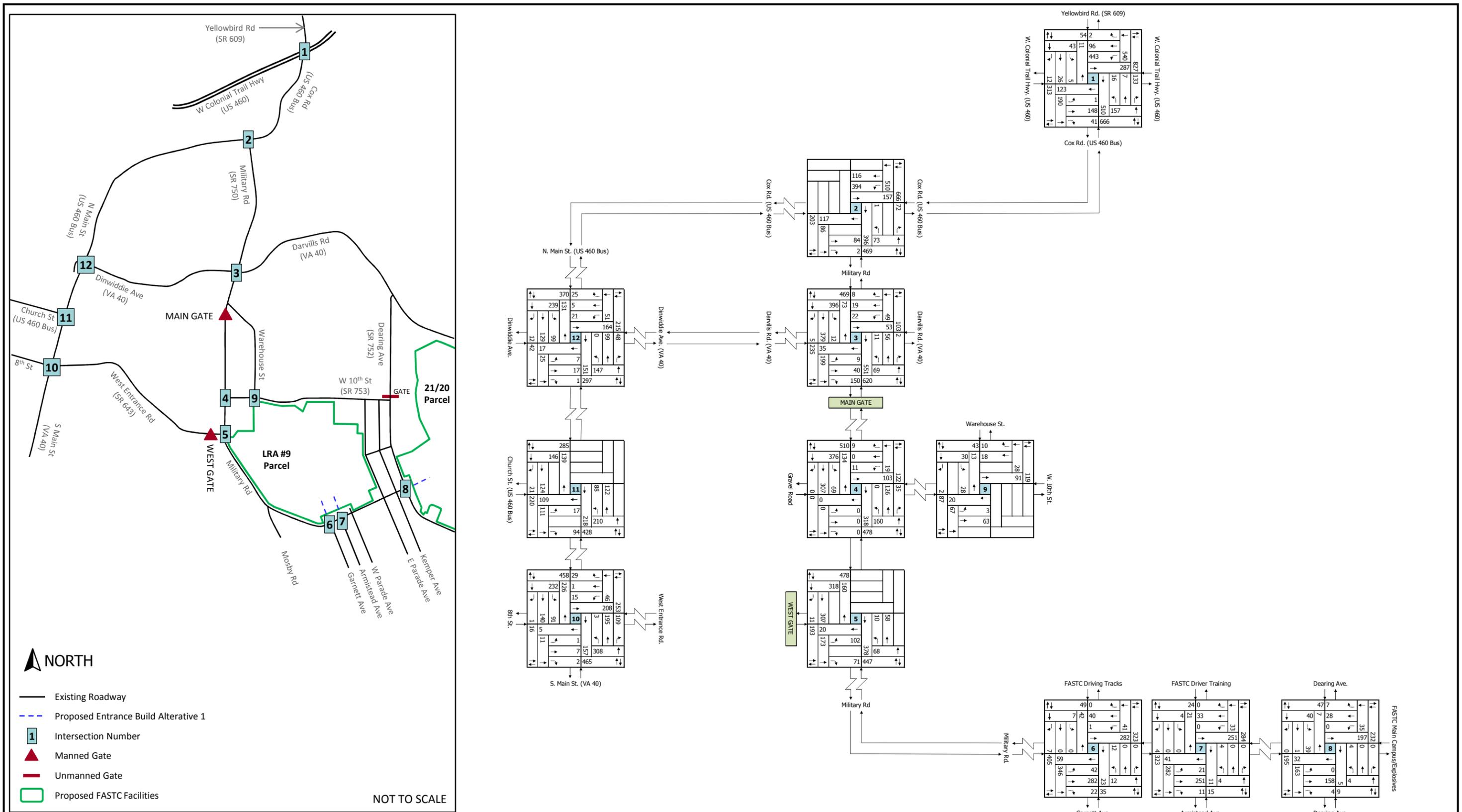


Figure 7-5
 2017 Build Alternative 1 Total AM Peak Hour Volumes

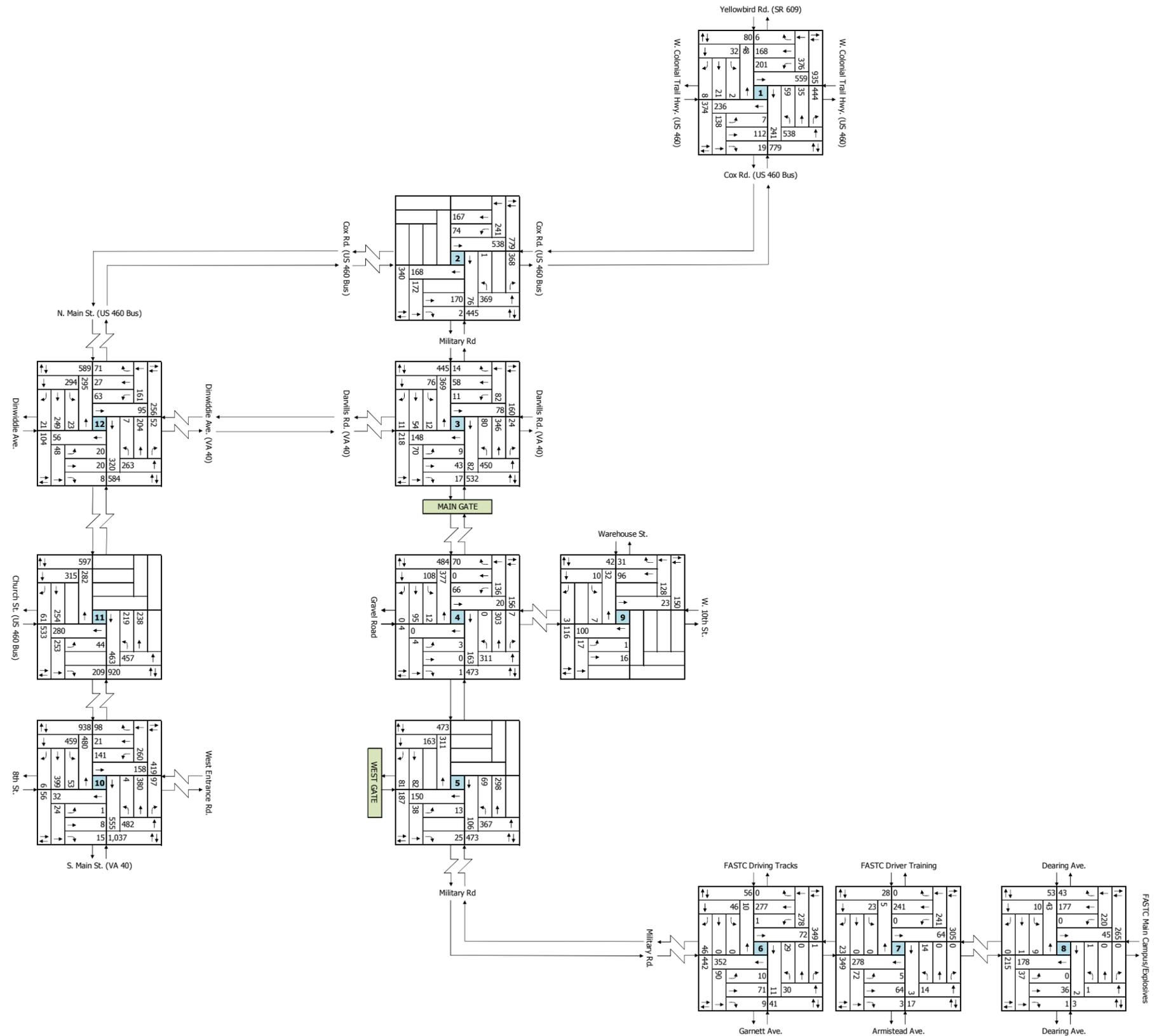
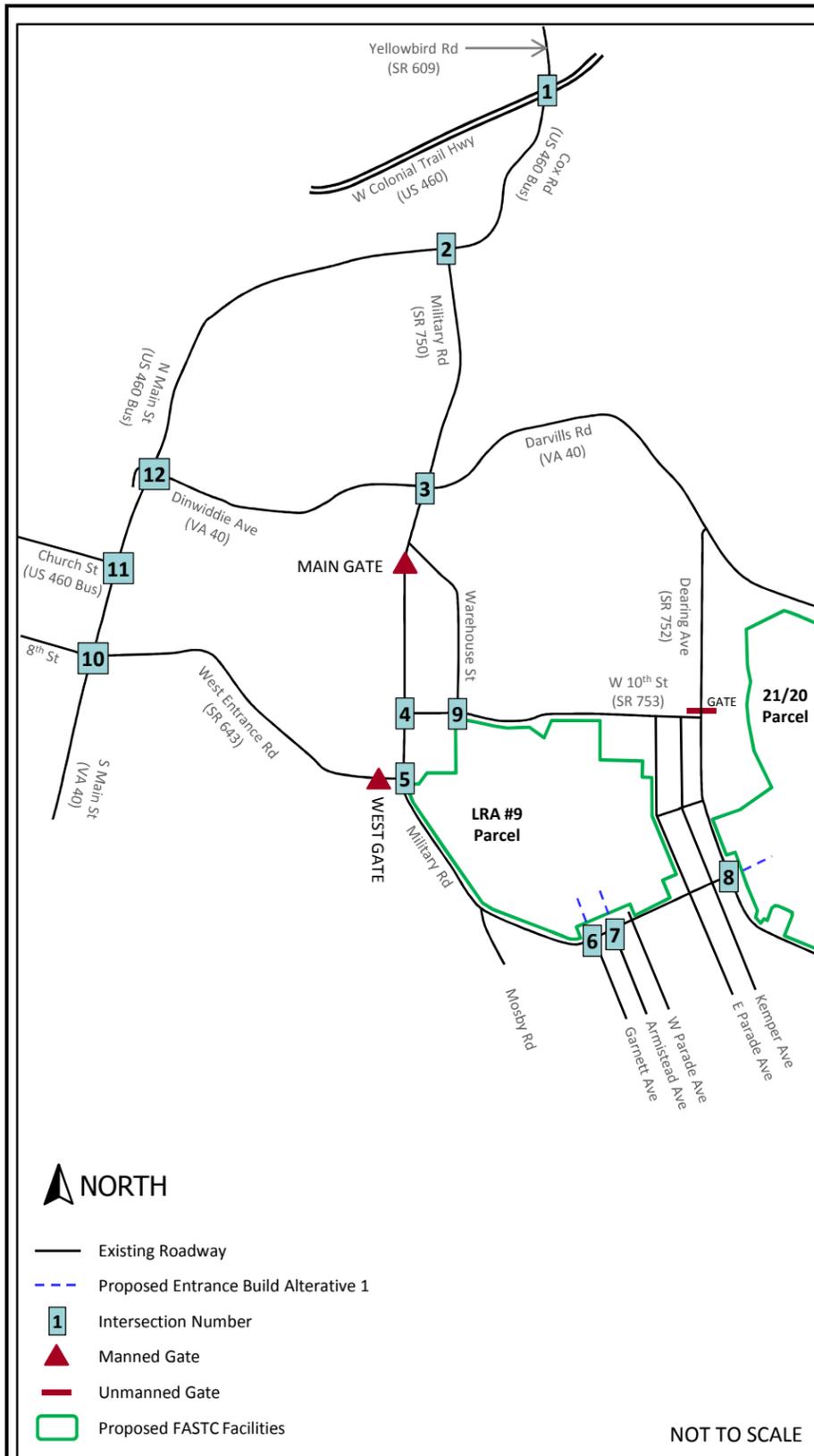


Figure 7-6

2017 Build Alternative 1 Total PM Peak Hour Volumes

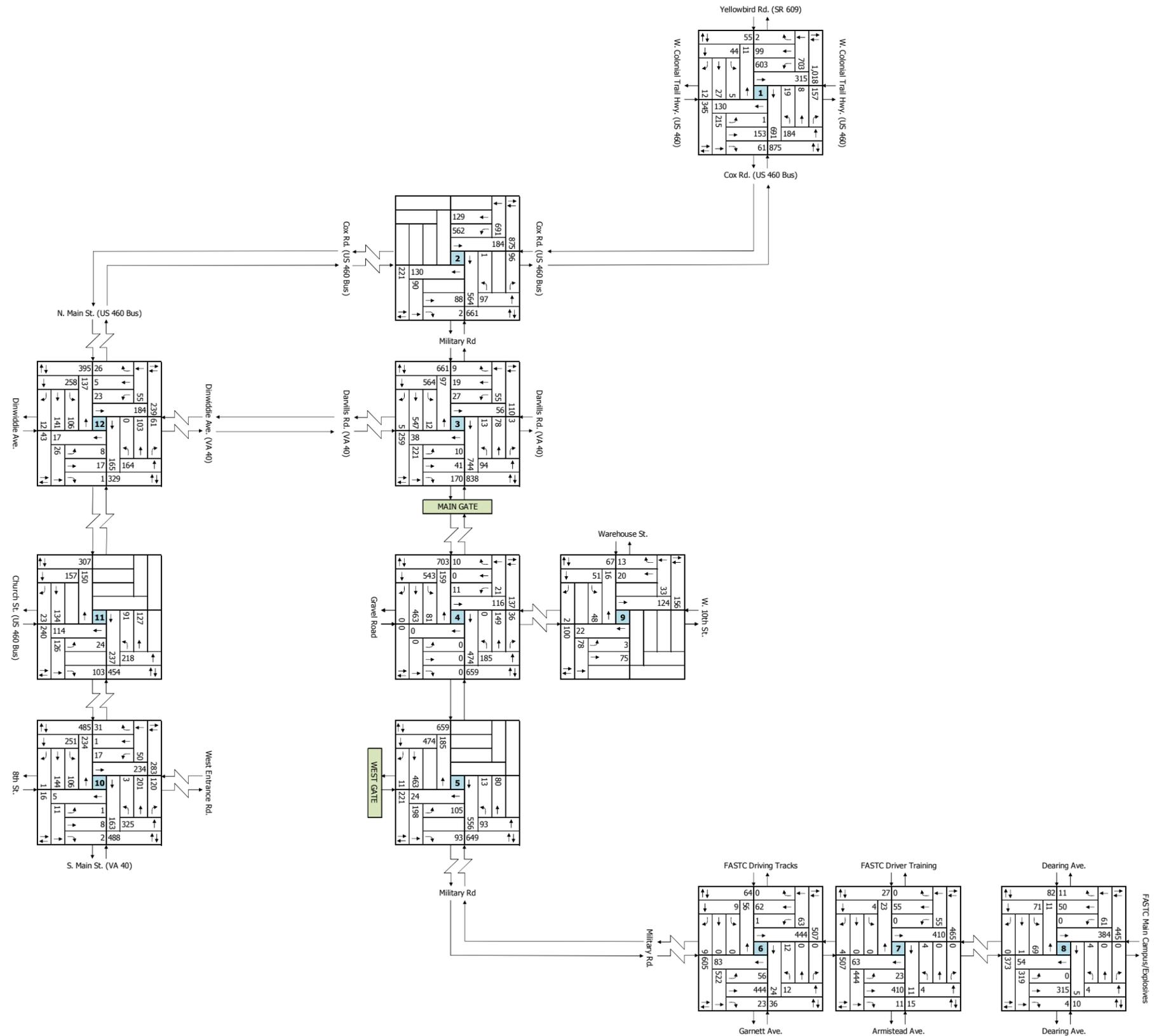
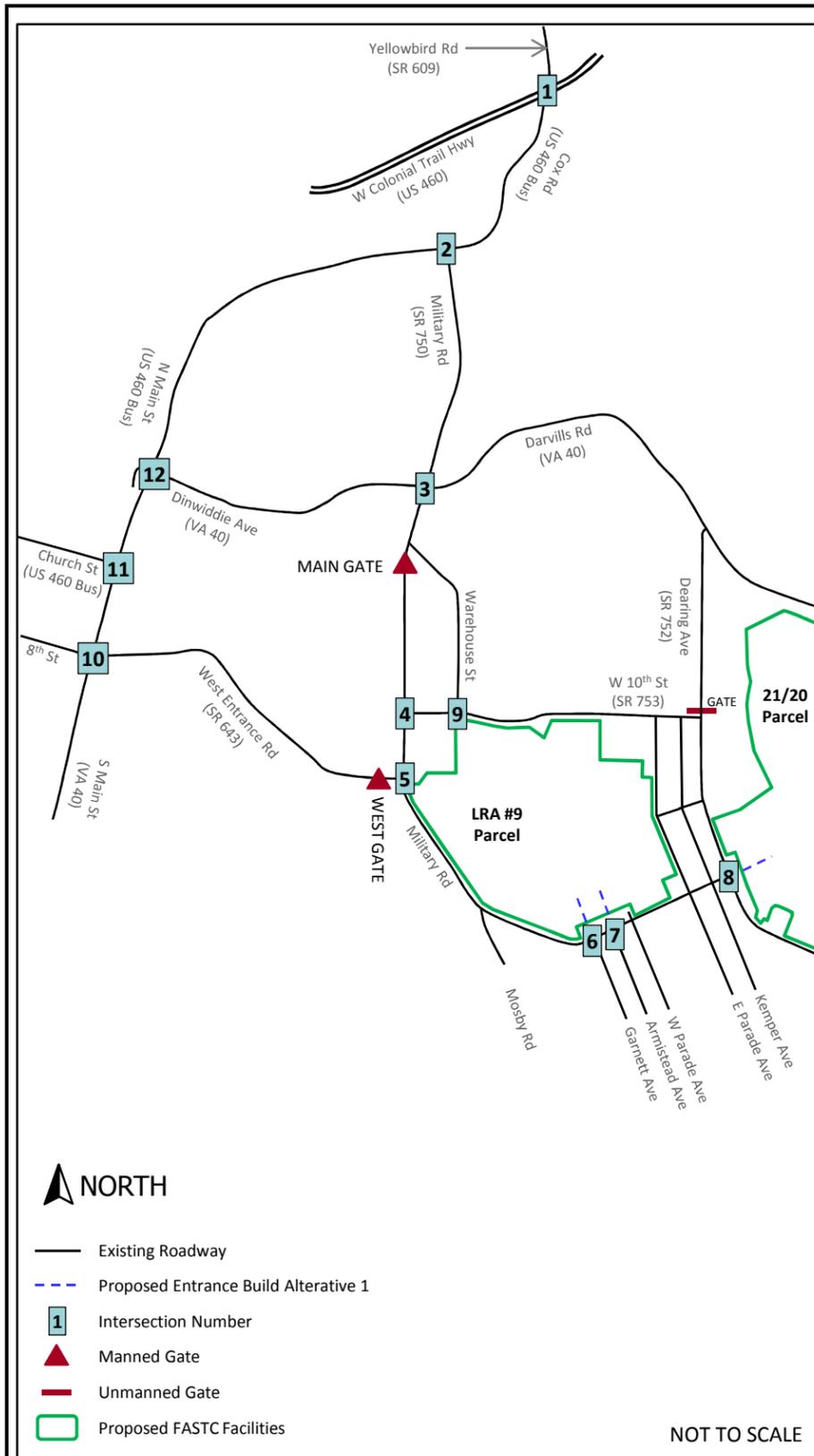


Figure 7-7

2020 Build Alternative 1 Total AM Peak Hour Volumes

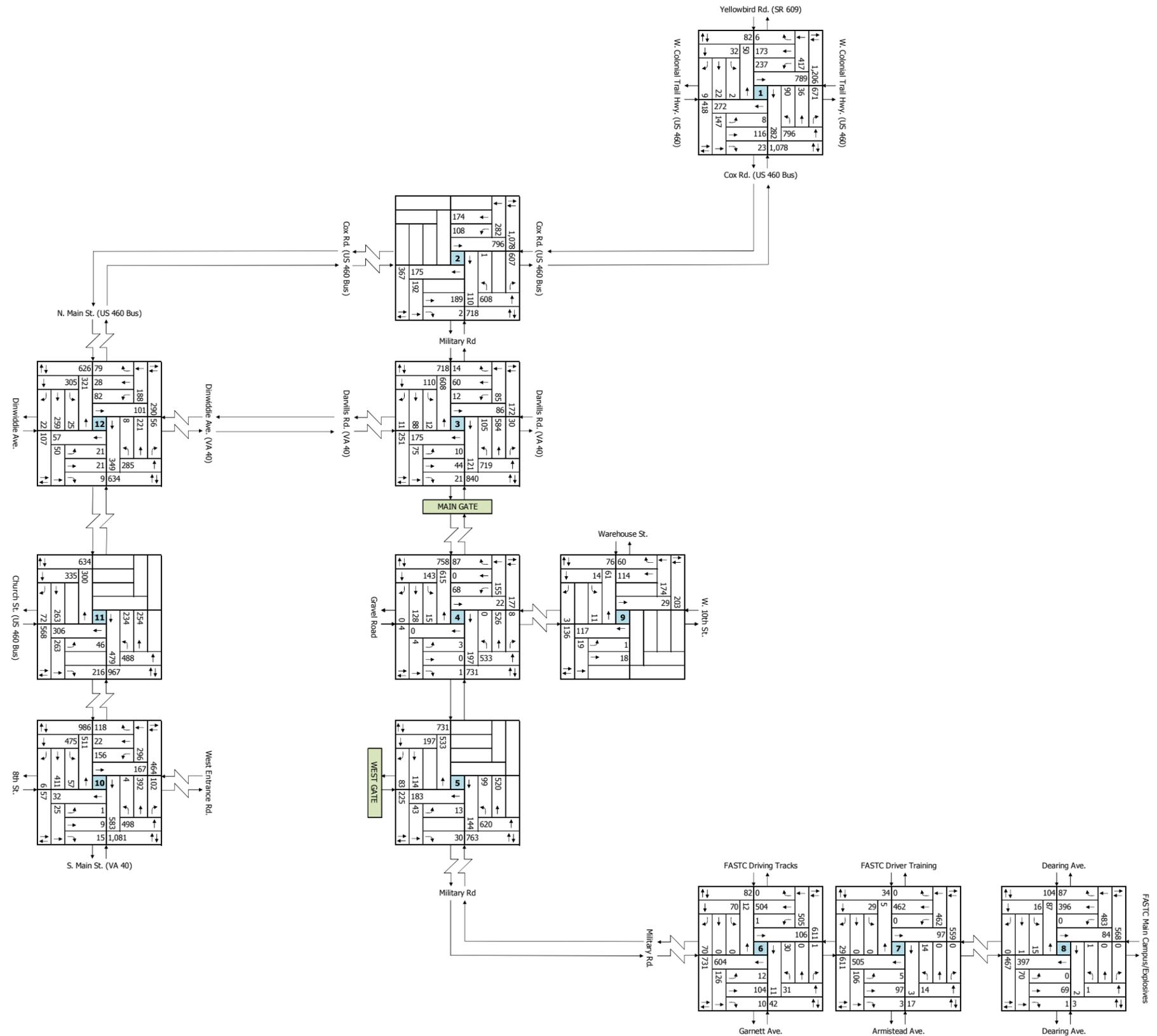
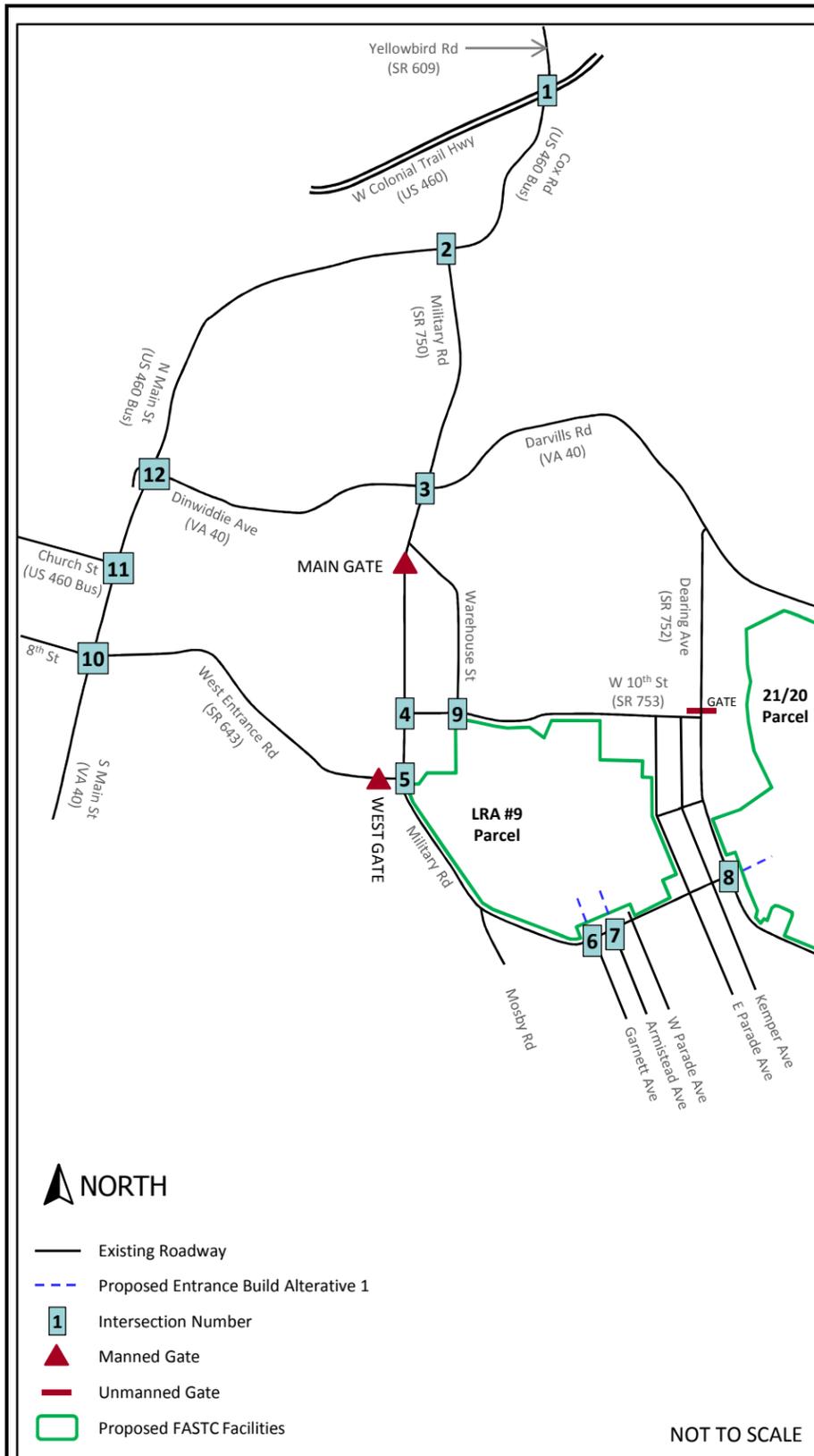


Figure 7-8

2020 Build Alternative 1 Total PM Peak Hour Volumes

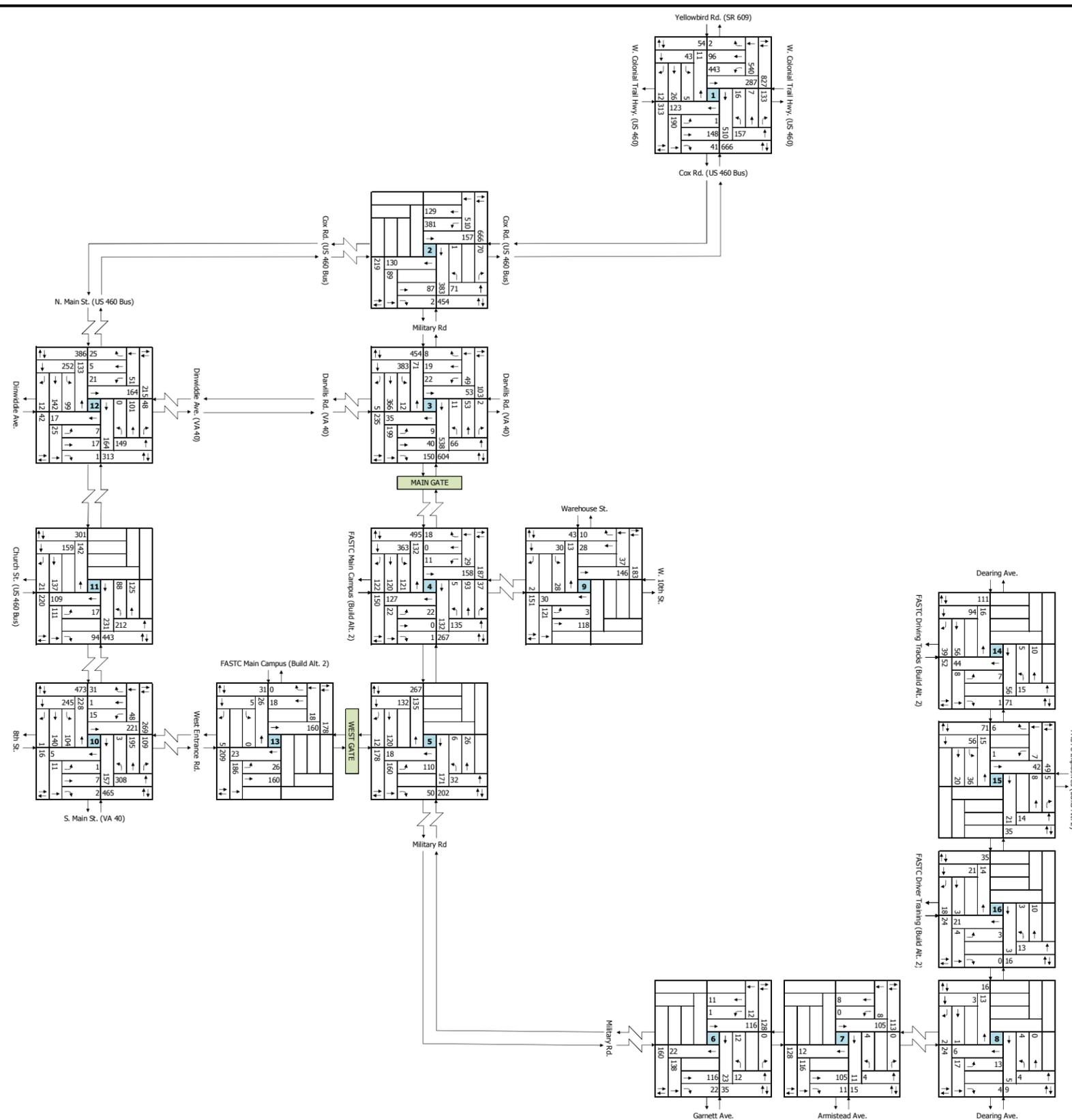
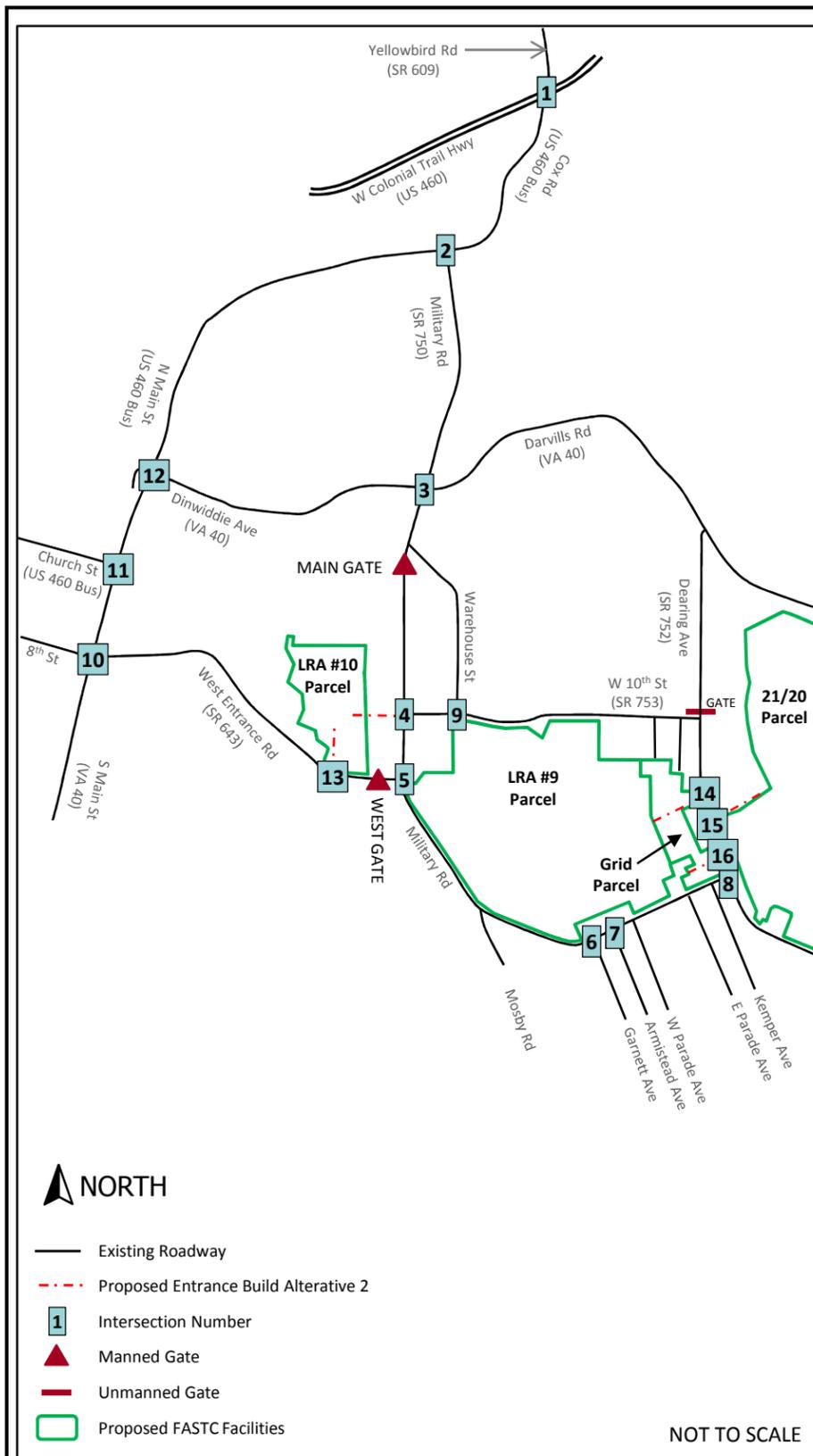


Figure 7-9

2017 Build Alternative 2 Total AM Peak Hour Volumes

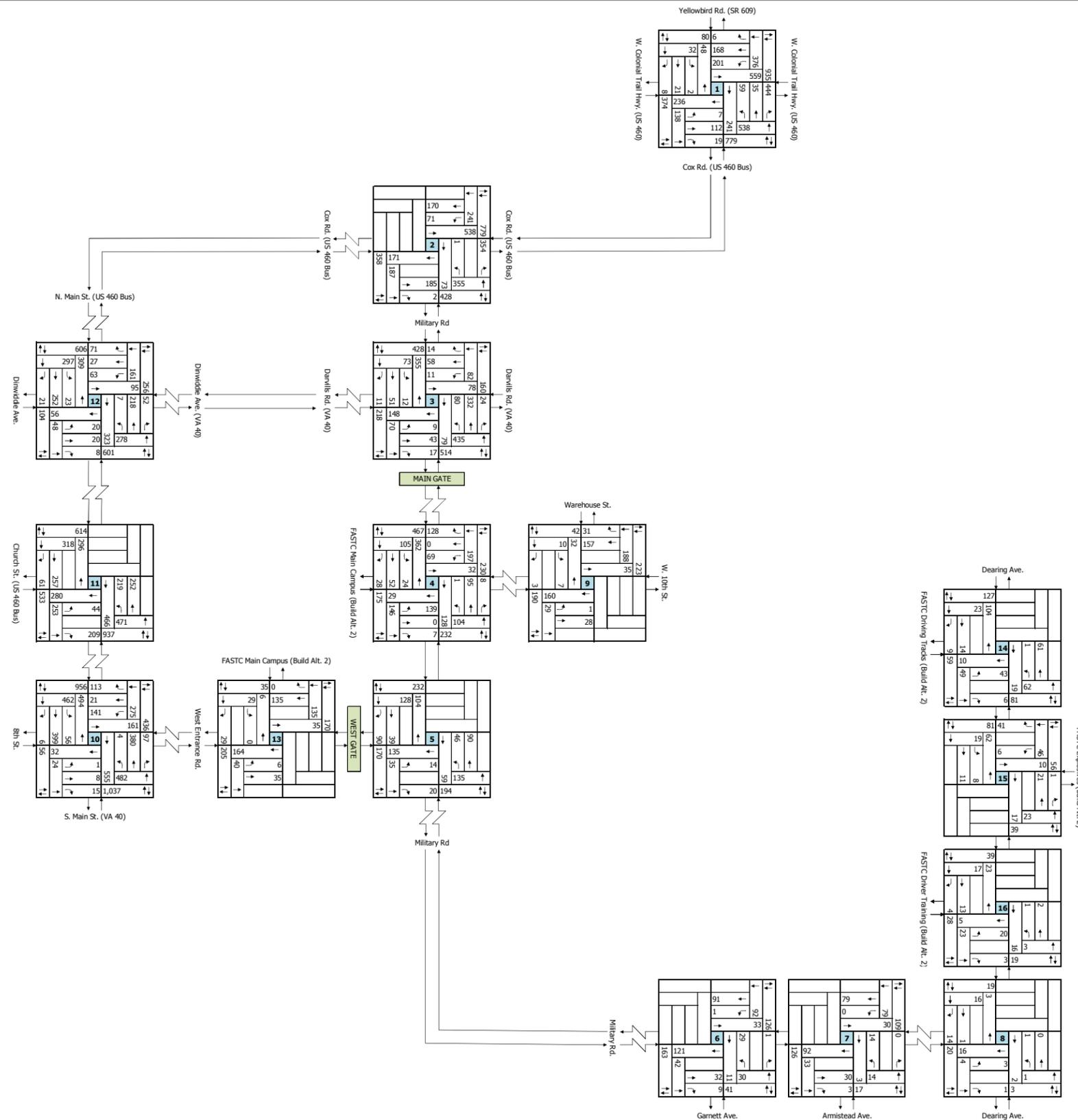
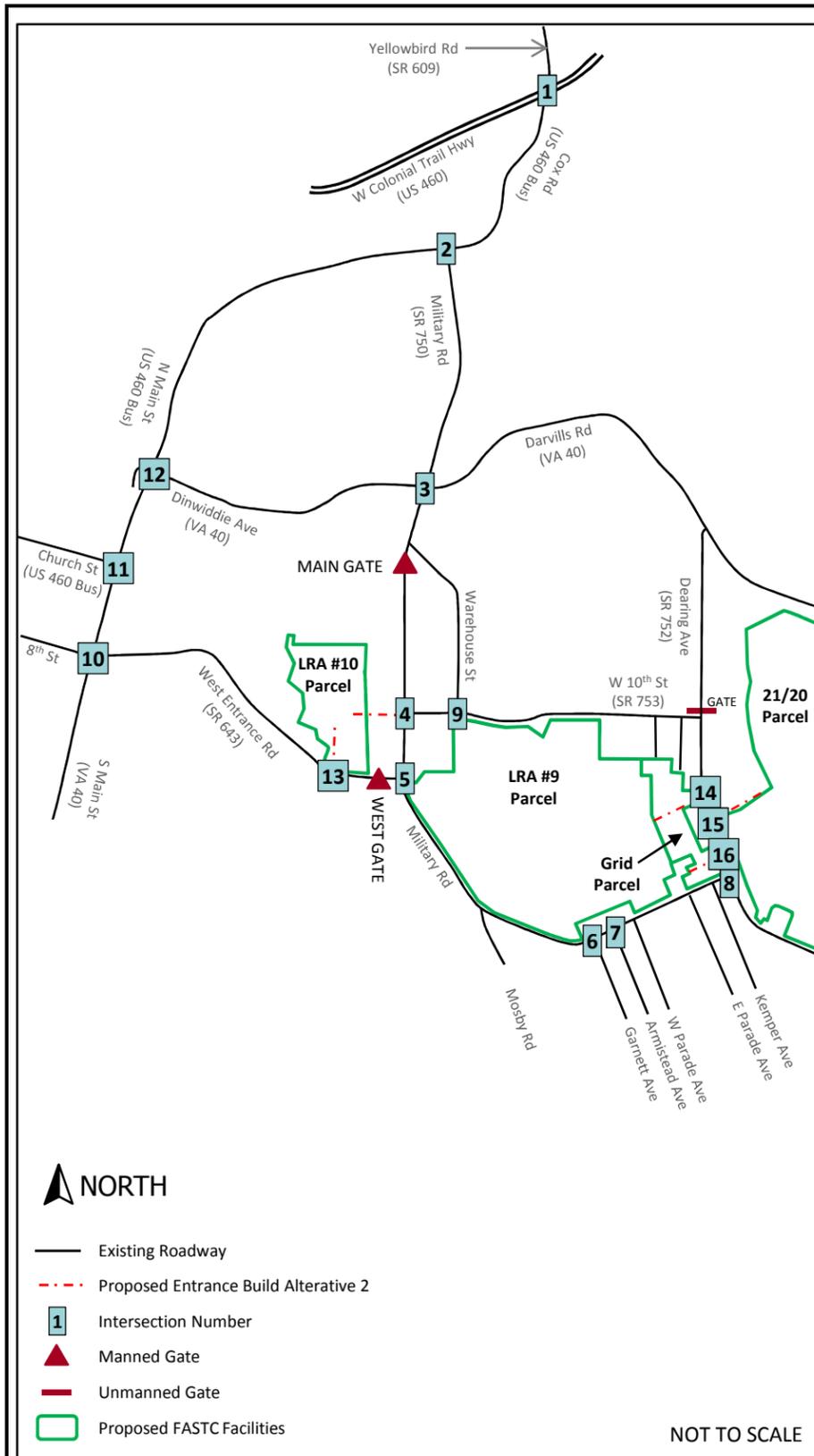


Figure 7-10

2017 Build Alternative 2 Total PM Peak Hour Volumes

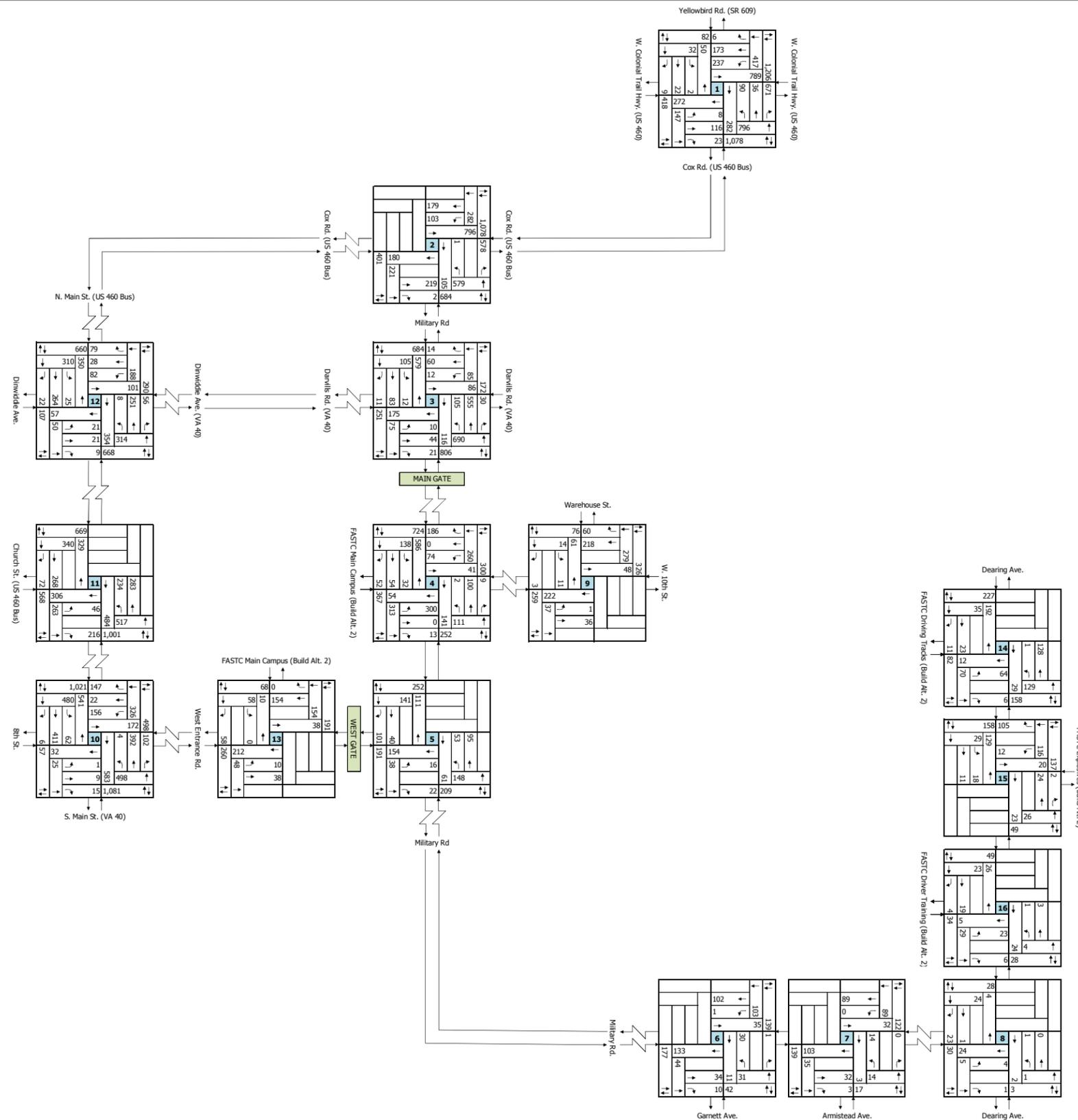
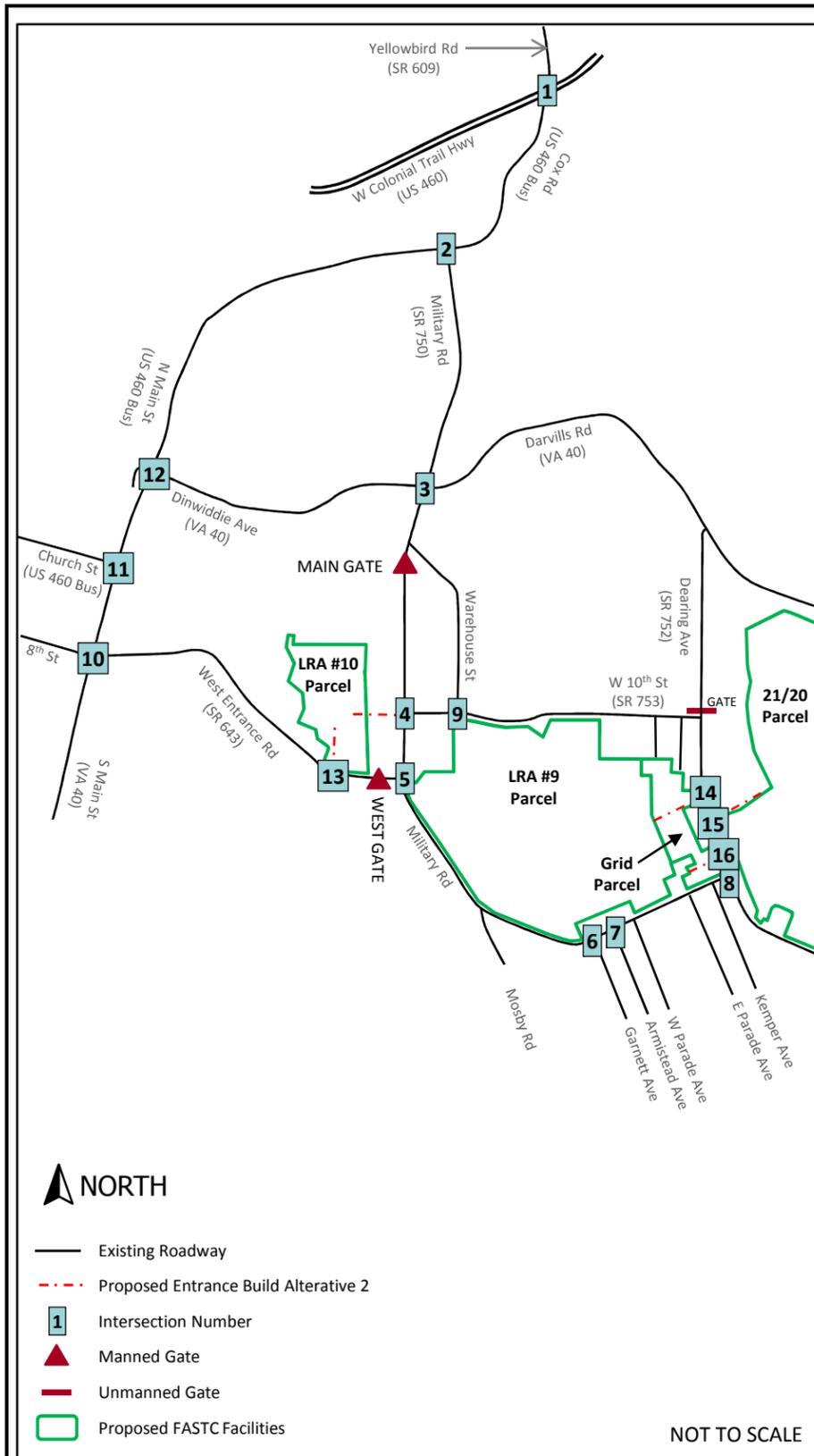
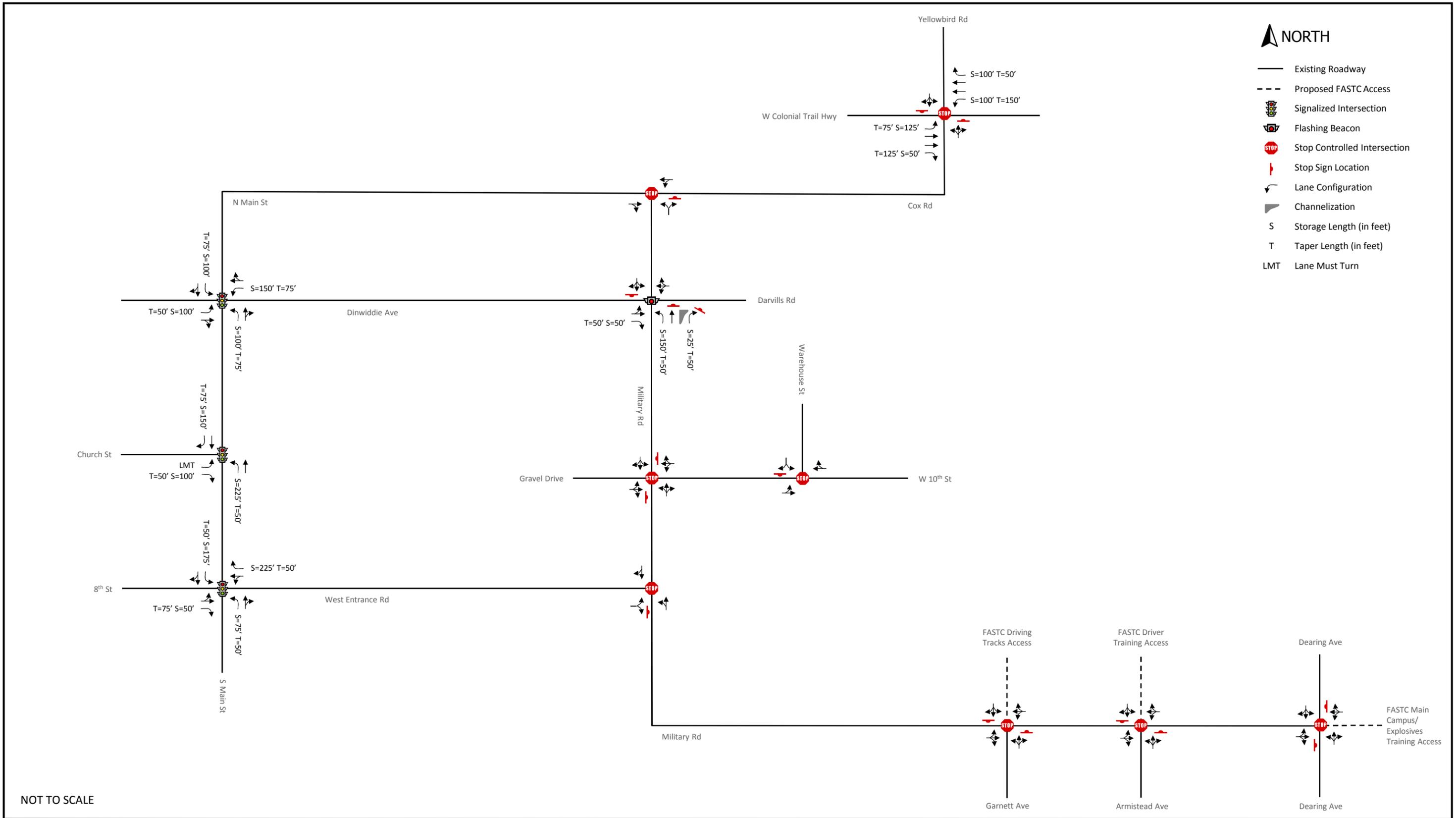


Figure 7-12

2020 Build Alternative 2 Total PM Peak Hour Volumes

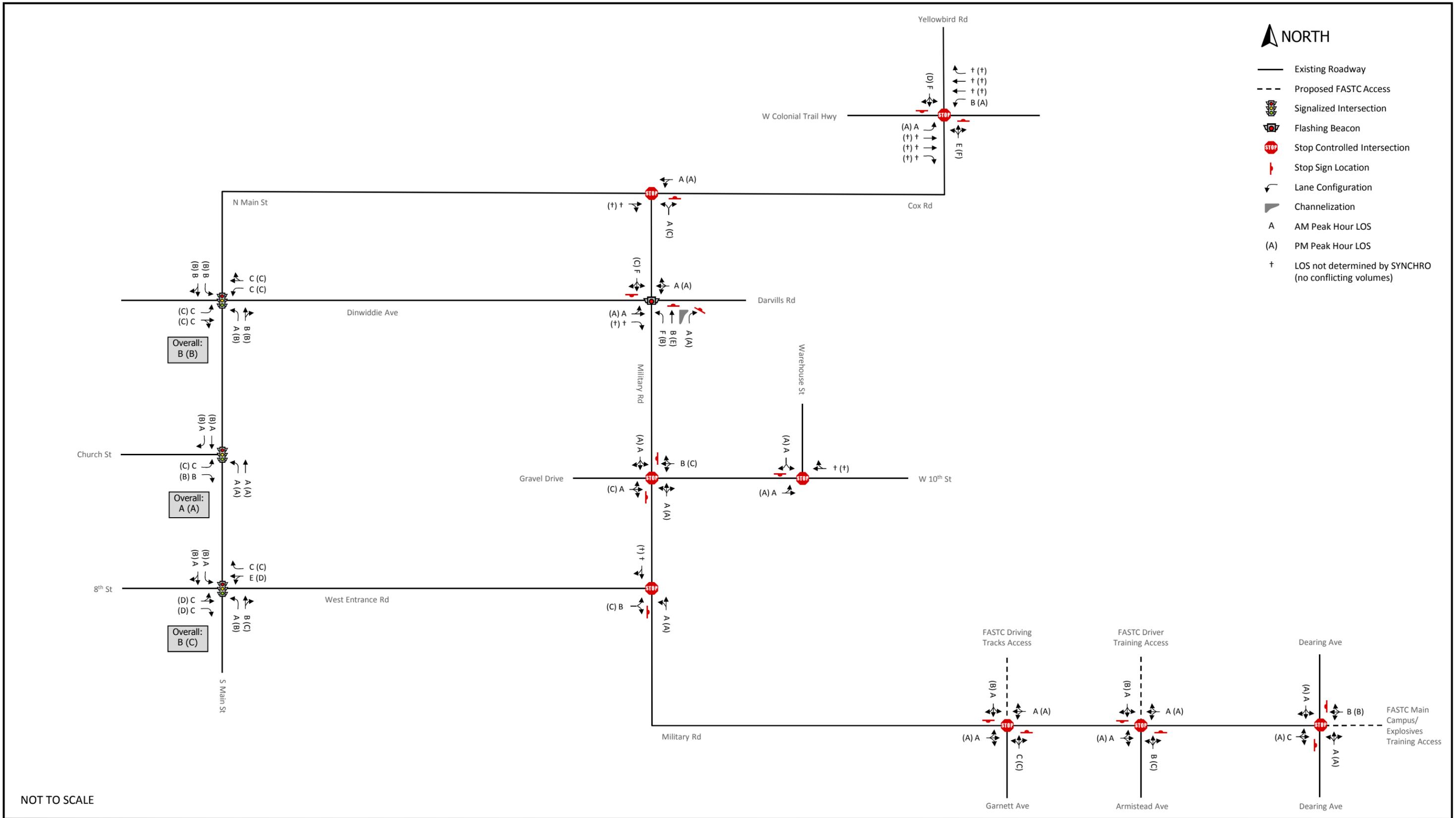


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Figure 7-13

Build Alternative 1 Geometry



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Figure 7-15

2020 Build Alternative 1 Volumes Levels of Service

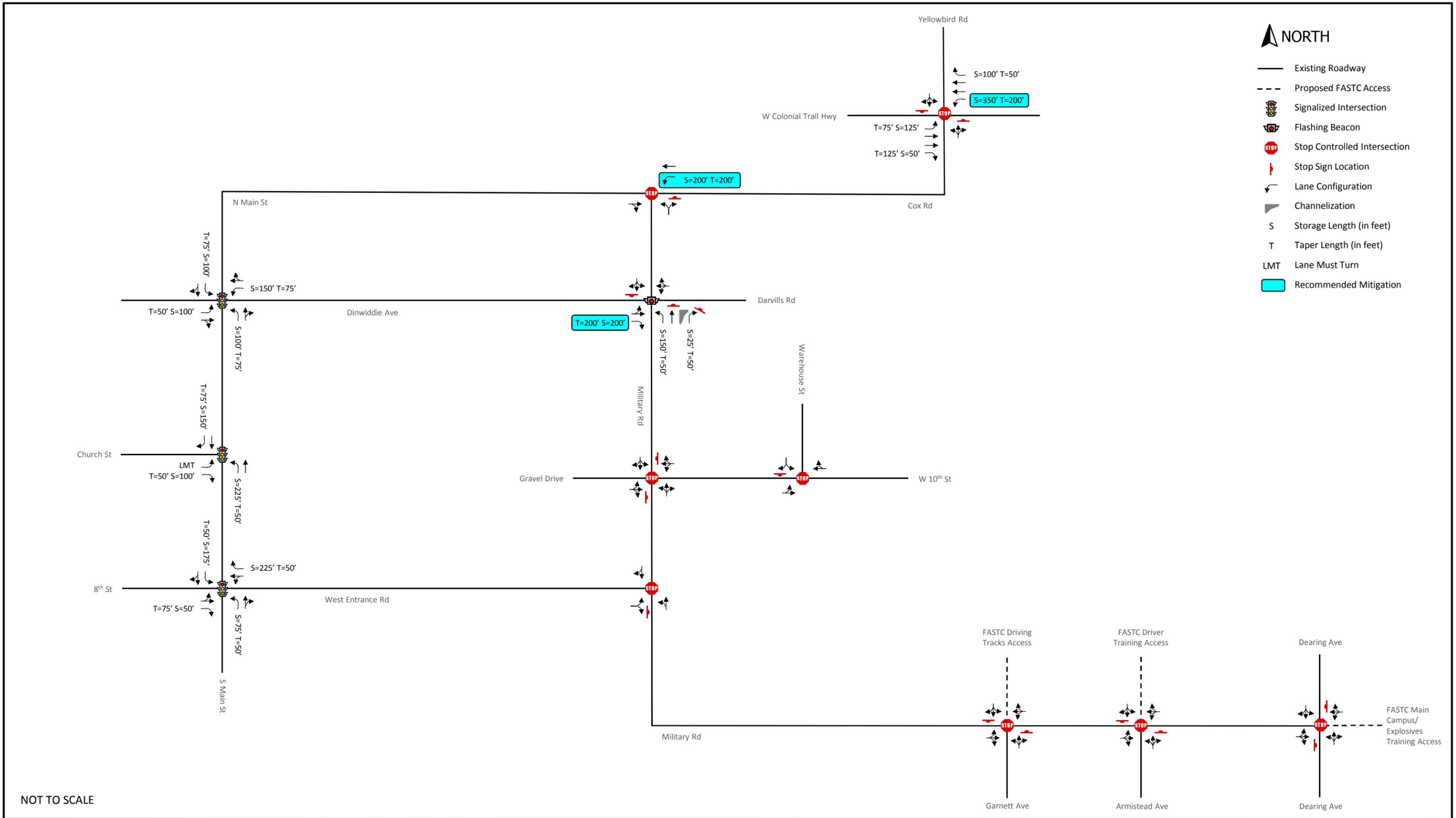


Figure 7-16

Build Alternative 1 2017 Geometry with Mitigation

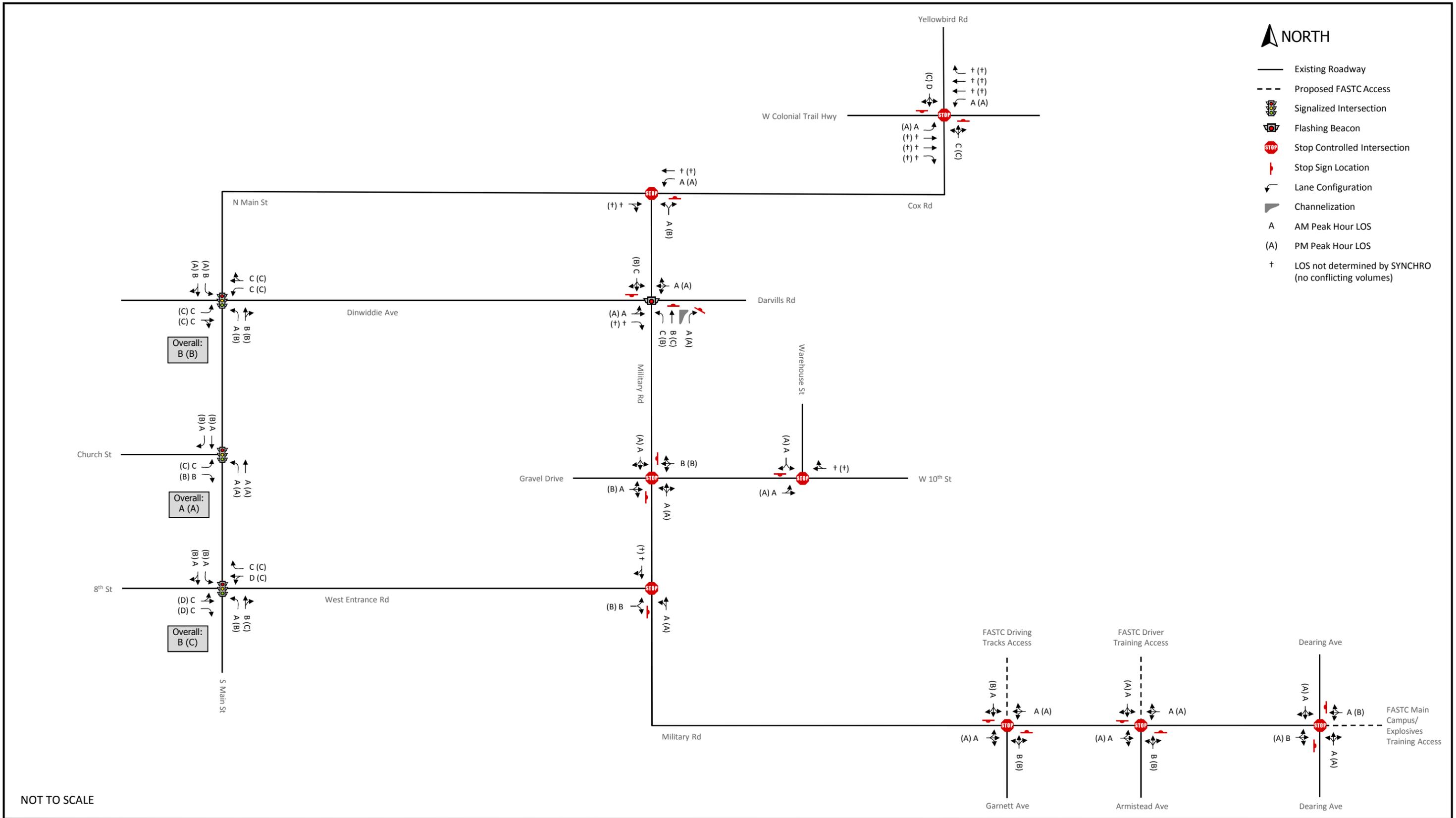
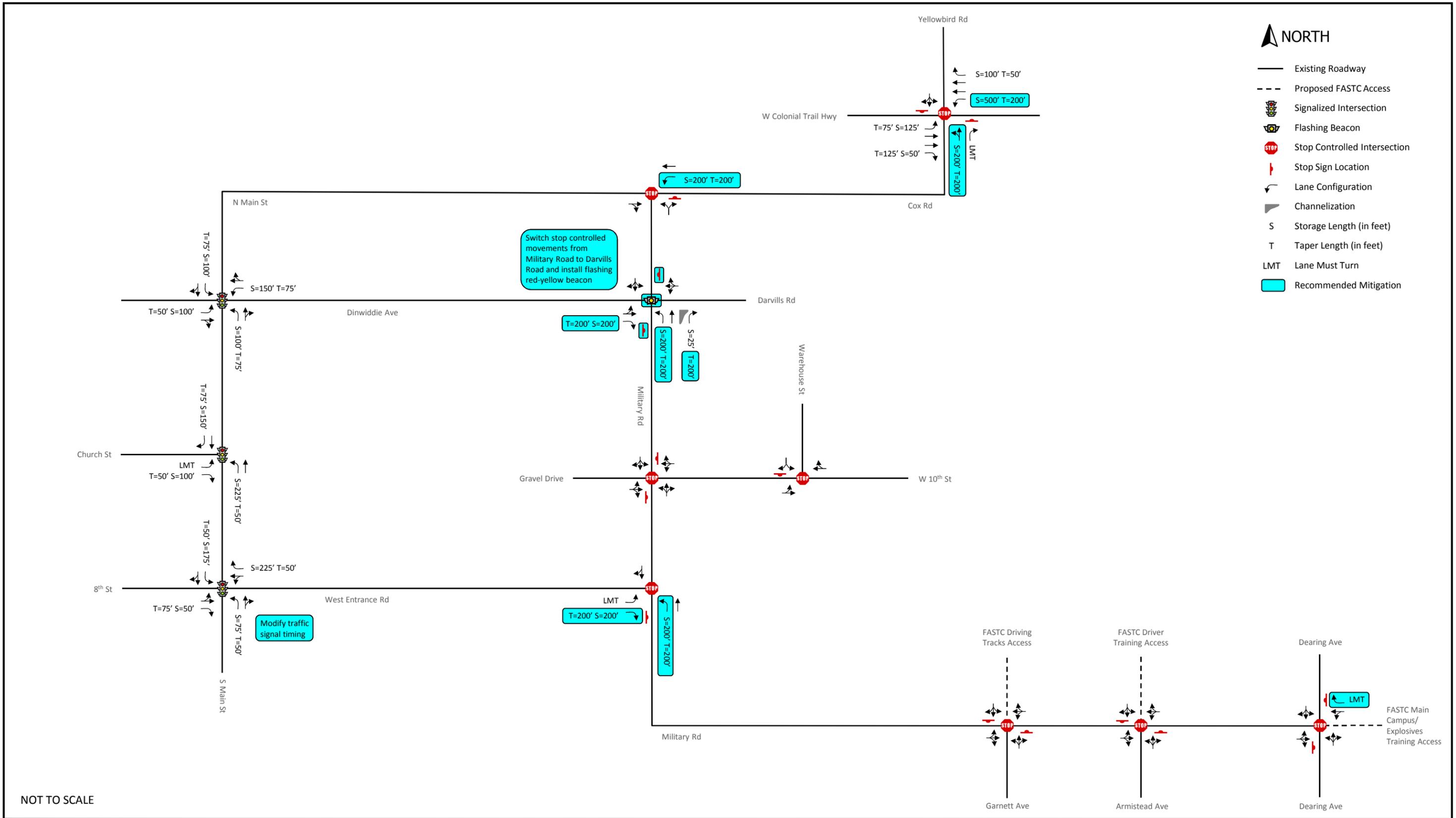
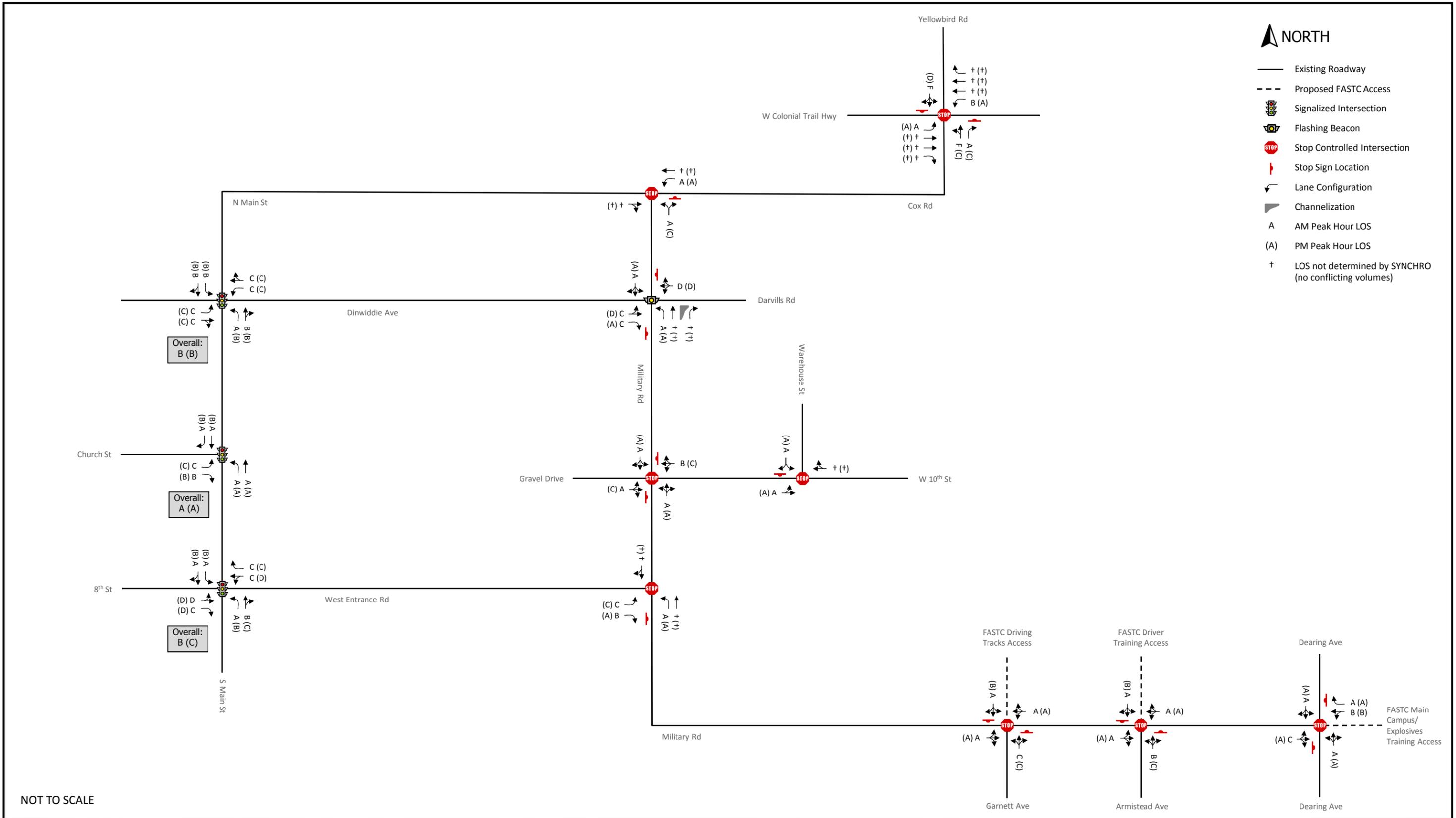


Figure 7-17

2017 Build Alternative 1 Volumes Levels of Service with Mitigation



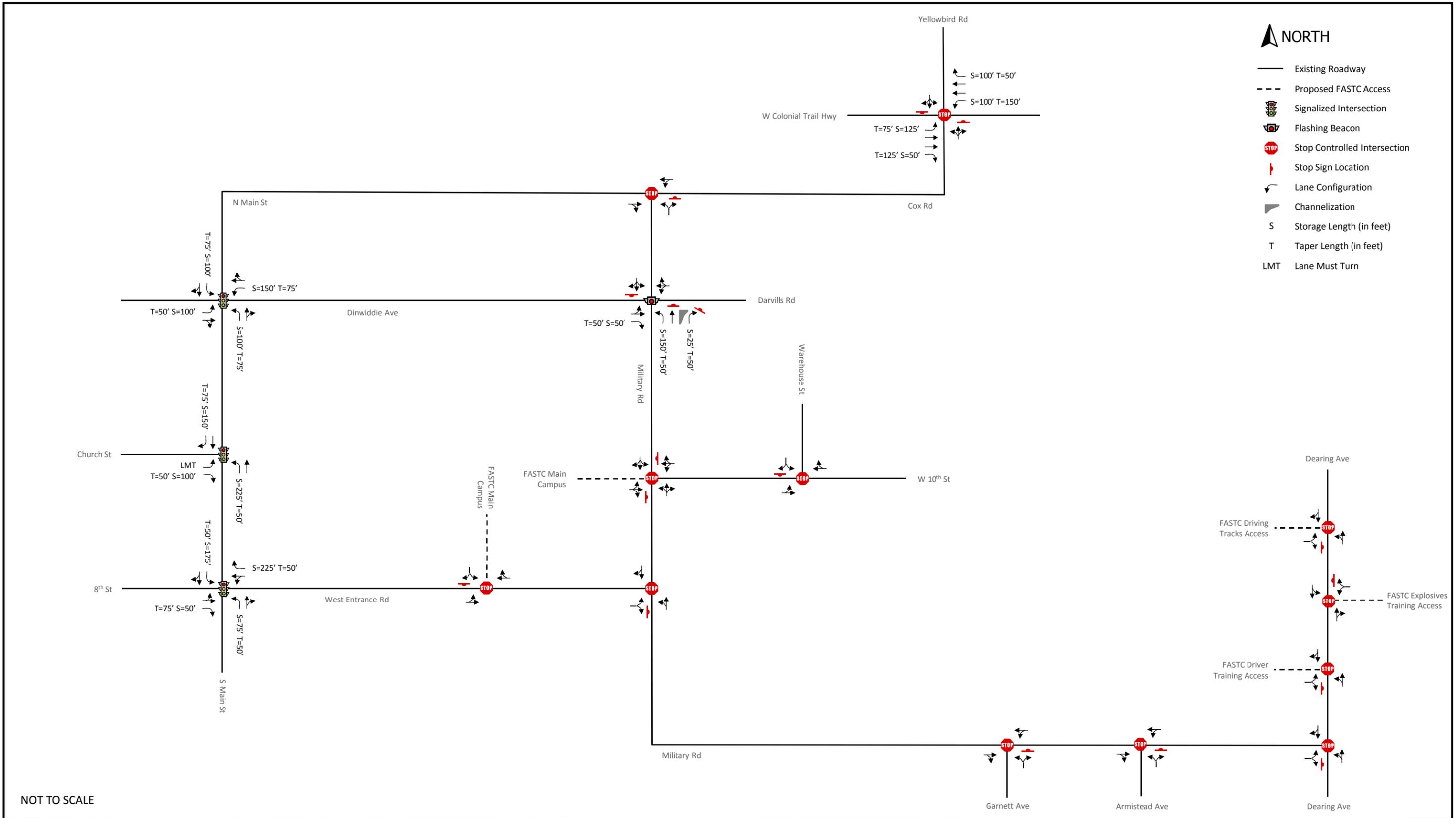


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Figure 7-19

2020 Build Alternative 1 Volumes Levels of Service with Mitigation

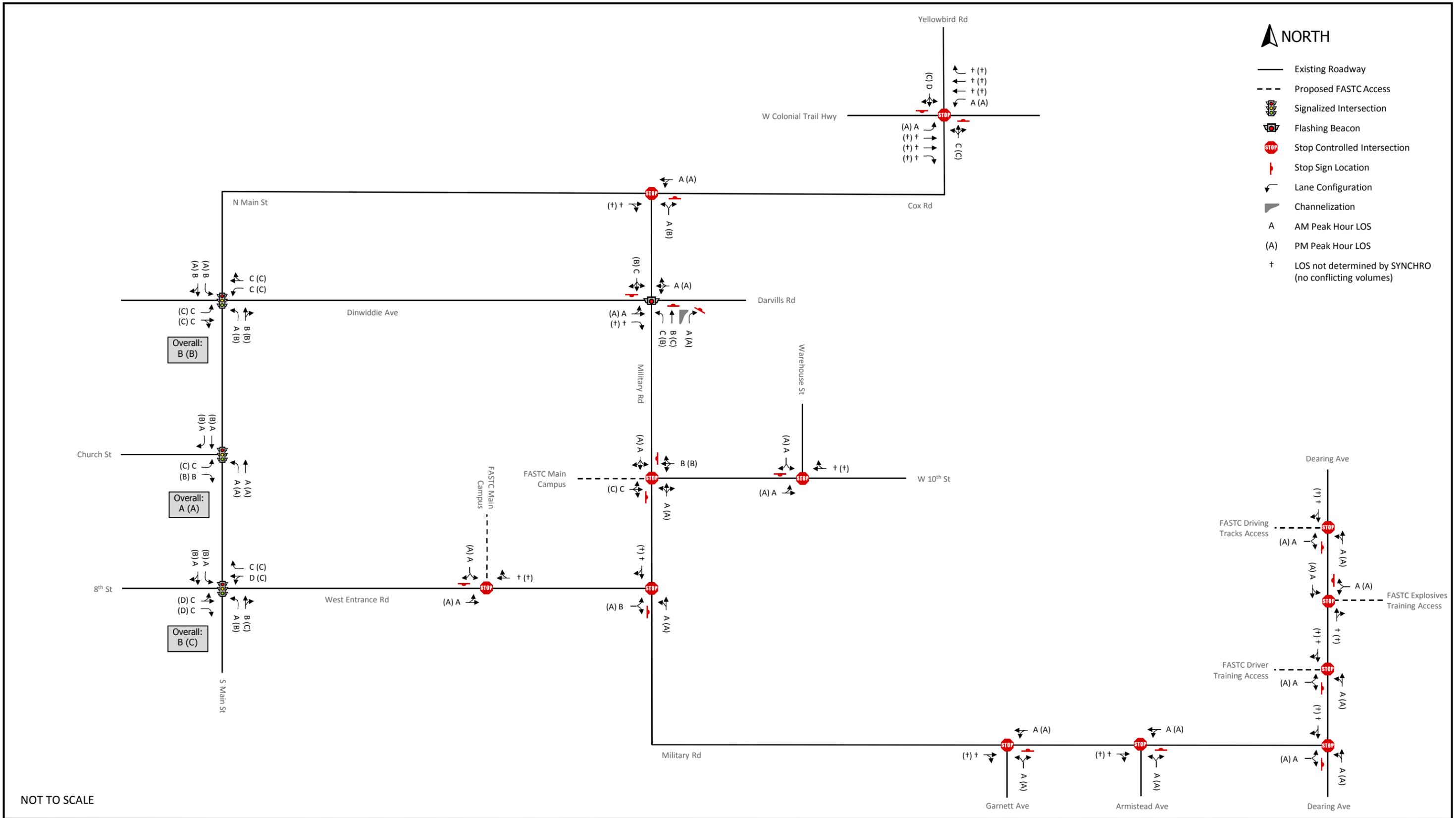


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Figure 7-20

Build Alternative 2 Geometry



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Figure 7-21

2017 Build Alternative 2 Volumes Levels of Service

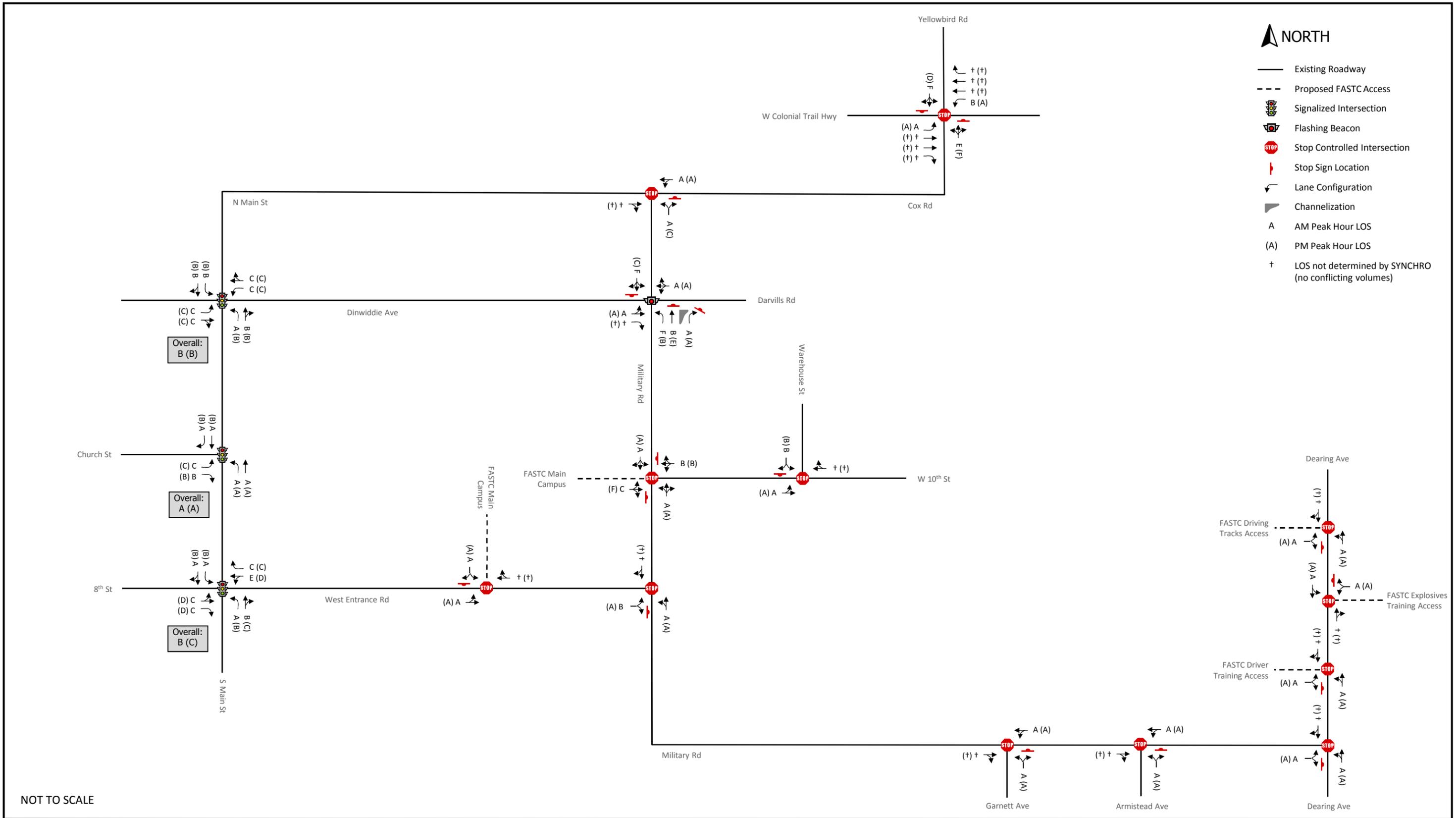


Figure 7-22

2020 Build Alternative 2 Volumes Levels of Service

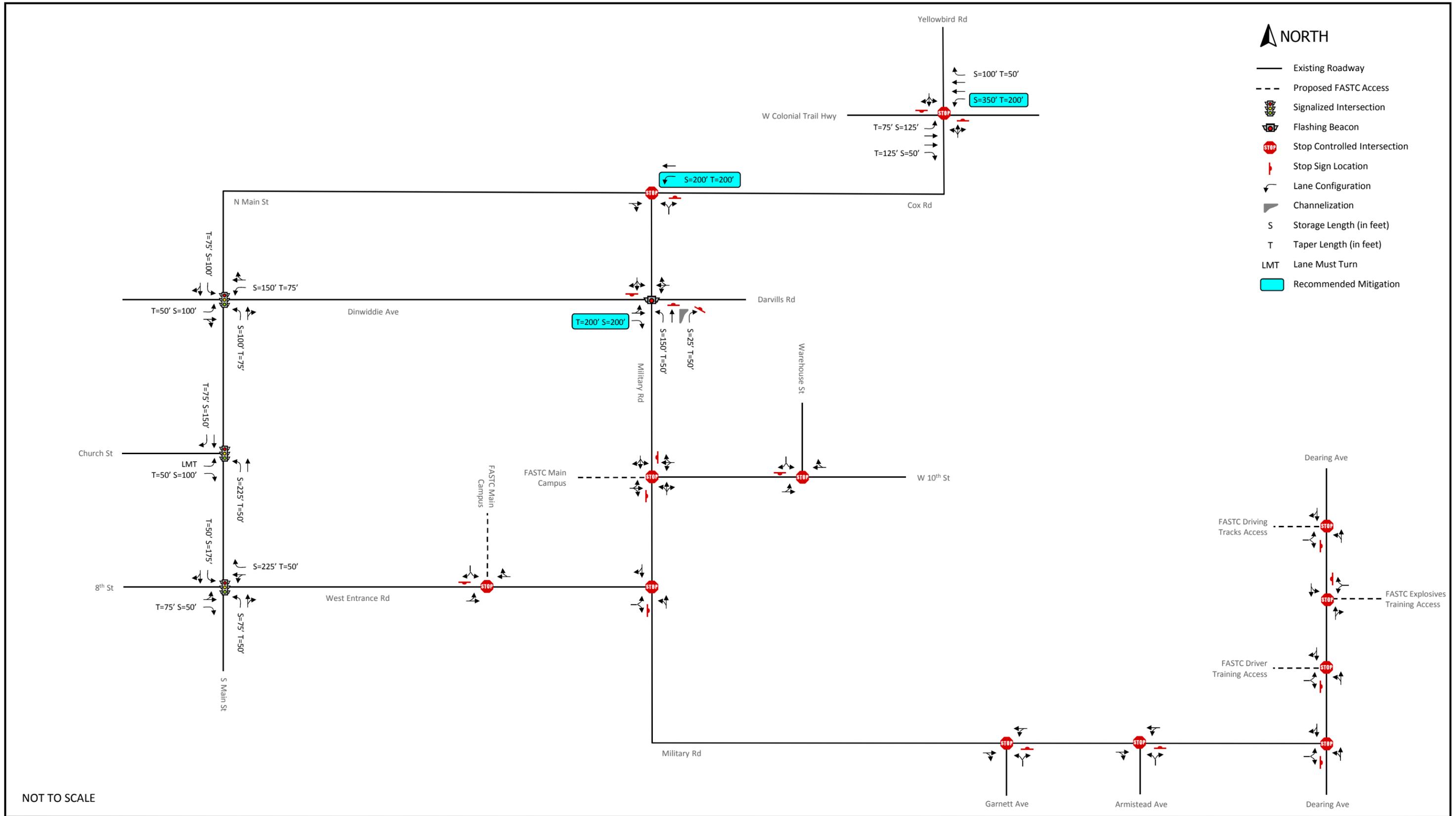
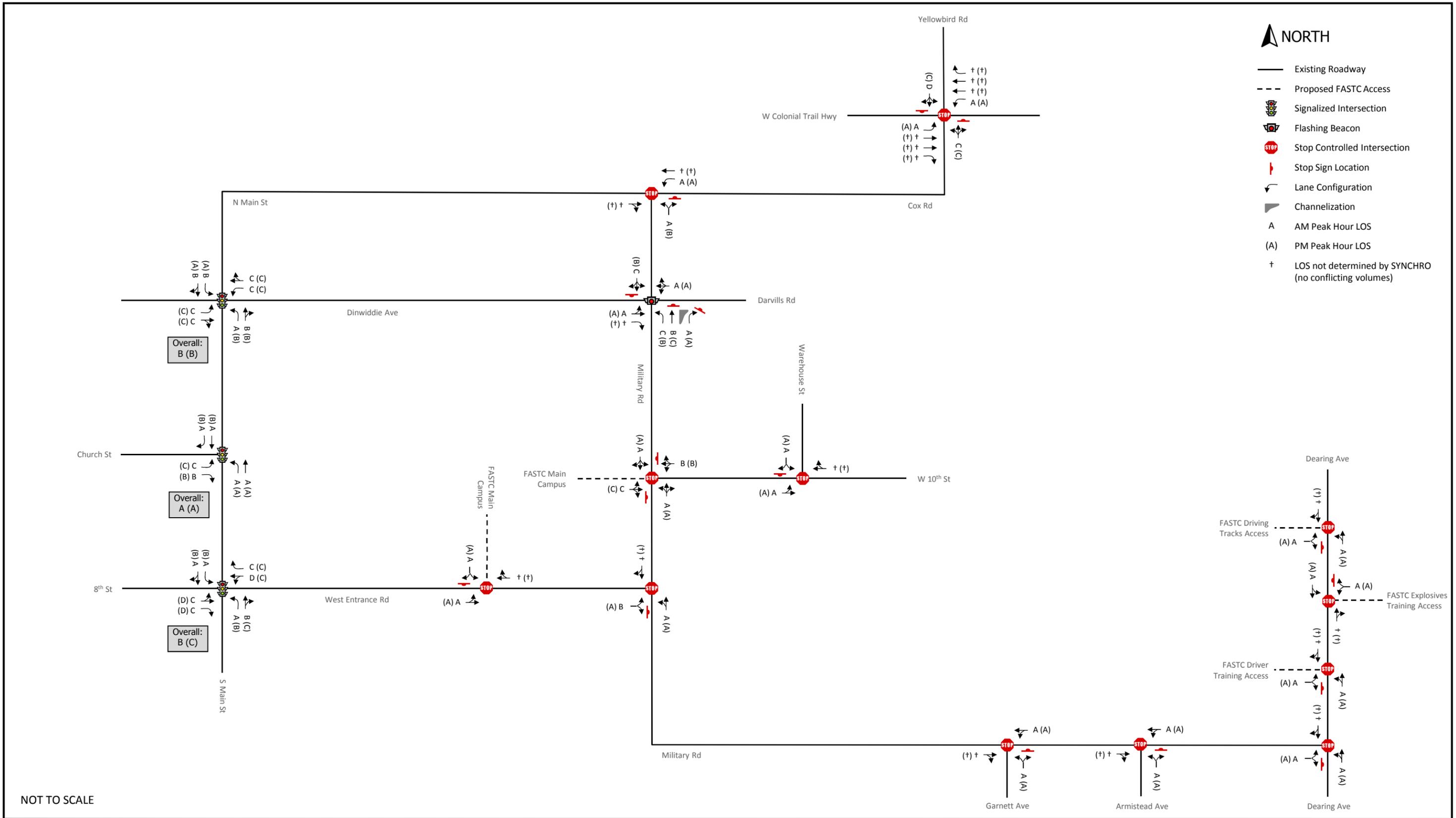


Figure 7-23

Build Alternative 2 2017 Geometry with Mitigation

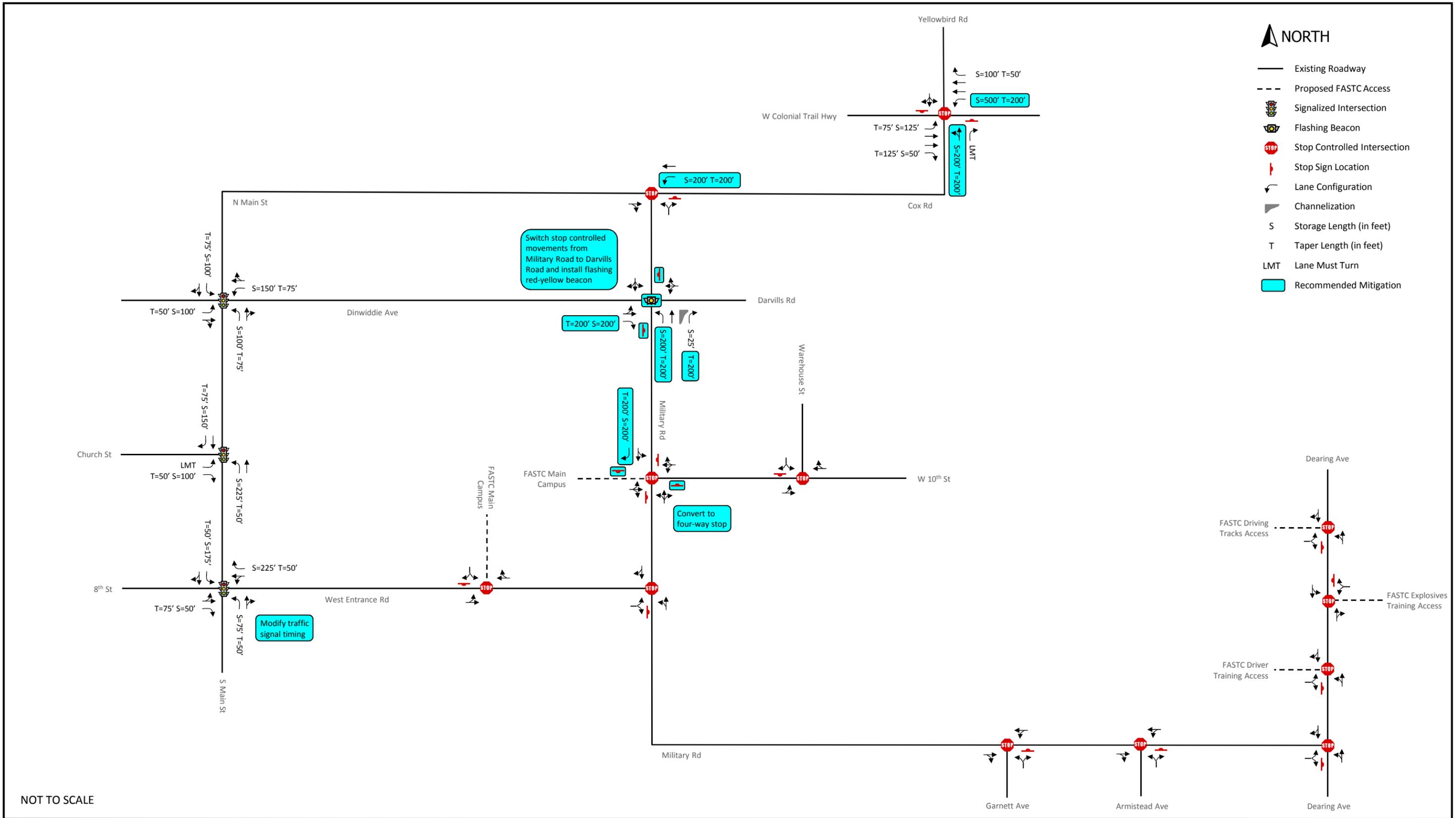


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Figure 7-24

2017 Build Alternative 2 Volumes Levels of Service with Mitigation



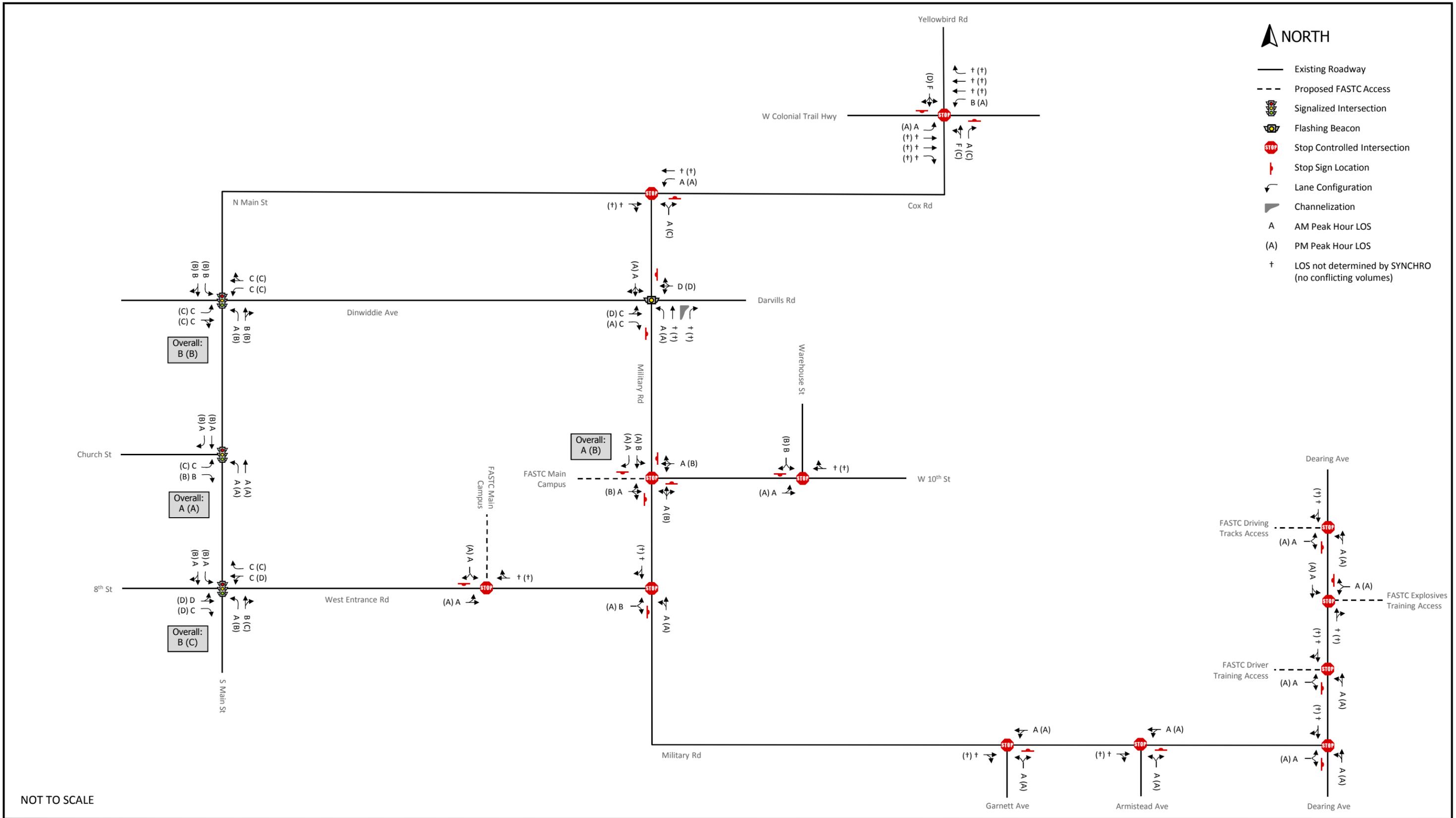


Figure 7-26

2020 Build Alternative 2 Volumes Levels of Service with Mitigation

8 RECOMMENDED IMPROVEMENTS

The improvements considered in the analyses of future volumes for Build Alternatives 1 and 2 include the recommended mitigation measure for the FASTC site. No other improvements were considered.

8.1 PLANNED IMPROVEMENTS BY OTHERS

Within the study area there is one VDOT planned improvement; however, this improvement (to replace the existing bridge on Cox Road over the Norfolk-Southern railroad tracks) will not impact operations at the intersections within the study area.

8.2 PROPOSED FASTC MITIGATION MEASURES

To accommodate the 2020 Build Alternative 1 traffic volumes the following mitigation measures, identified on Figure 7-16, are recommended:

- At the unsignalized intersection of US Route 460 and Cox Road/Yellowbird Road:
 - Extend the westbound left turn lane to provide a 500-foot storage lane with a 200-foot taper; and
 - Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper (to serve left turns and through movements).
- At the unsignalized intersection of Cox Road and Military Road, install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper.
- At the unsignalized intersection of Darvills Road and Military Road:
 - Extend the eastbound right turn lane to provide a 200-foot storage lane and a 200-foot taper;
 - Extend the northbound left turn lane to provide a 200-foot storage lane and a 200-foot taper;
 - Extend the northbound right turn lane to provide a 200-foot taper;
 - Switch the stop control from Military Road approached to the Darvills Road approaches; and
 - Remove the existing red flashing beacon and replace with a yellow and red flashing beacon (yellow for Military Road and red for Darvills Road) and install "STOP AHEAD" signs on both approaches of Darvills Road.
- At the unsignalized intersection of Military Road and West Entrance Road:
 - Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper; and
 - Install an eastbound right turn lane with a 200-foot storage lane and a 200-foot taper.
- Provide two egress lanes exiting the FASTC Main Campus at Dearing Avenue.

The turn lane extensions at the intersections of US Route 460 at Cox Road and Darvills Road at Military Road will bring the four existing turn lane treatments up to current VDOT standards based on the turn lane analyses. FASTC adds site trips to each of these movements.

To accommodate the 2020 Build Alternative 2 traffic volumes the following mitigation measures, identified on Figure 7-21, are recommended:

- At the unsignalized intersection of US Route 460 and Cox Road/Yellowbird Road:
 - Extend the westbound left turn lane to provide a 500-foot storage lane with a 200-foot taper; and
 - Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper (to serve left turns and through movements).
- At the unsignalized intersection of Cox Road and Military Road, install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper.
- At the unsignalized intersection of Darvills Road and Military Road:
 - Extend the eastbound right turn lane to provide a 200-foot storage lane and a 200-foot taper
 - Extend the northbound left turn lane to provide a 200-foot storage lane and a 200-foot taper;
 - Extend the northbound right turn lane to provide a 200-foot taper;
 - Switch the stop control from Military Road approached to the Darvills Road approaches; and
 - Remove the existing red flashing beacon and replace with a yellow and red flashing beacon (yellow for Military Road and red for Darvills Road) and install "STOP AHEAD" signs on both approaches of Darvills Road.
- At the unsignalized intersection of Military Road and West 10th Street:
 - Install a southbound right turn lane with a 200-foot storage lane and a 200-foot taper; and
 - Convert the existing two-way stop to a four-way stop and install "STOP AHEAD" signs on both approaches of Military Road
- At the signalized intersection of South Main Street and 8th Street/West Entrance Road, modify the traffic signal timings.

The turn lane extensions at the intersections of US Route 460 at Cox Road and Darvills Road at Military Road will bring the four existing turn lane treatments up to current VDOT standards based on the turn lane analyses. FASTC adds site trips to each of these movements.

8.3 TRAVEL DEMAND MANAGEMENT MEASURES

Although specific travel demand management (TDM) measures are not proposed for this project, offsetting the FASTC arrival times relative to the peak VAARNG arrival times should be considered to avoid overloading the Fort Pickett gates, particularly the Main Gate during AM peak periods.

Additionally, scheduling the FASTC arrival and departure times to avoid the VAARNG peak arrival and departure times would improve traffic operations at two key locations; the intersections of US Route 460 at Cox Road/Yellowbird Road and Darvills Road at Military Road. By spreading the peak arrival and departure volumes over a longer period, peak hour demand and the average delay would be reduced.

8.4 CAPACITY ANALYSES OF FUTURE TRAFFIC VOLUMES

Capacity analyses were completed for future 2017 and 2020 volumes without and with the proposed FASTC development.

Analysis summaries addressing the change in level of service in 2020 with the addition of the FASTC site trips and with the proposed mitigation measures are provided for the following key locations:

1. US Route 460 at Cox Road/Yellowbird Road for Build Alternatives 1 and 2;
2. Cox Road at Military Road for Build Alternatives 1 and 2;
3. Darvills Road (VA Route 40) at Military Road for Build Alternatives 1 and 2;
4. Military Road at FASTC Main Campus/West 10th Street for Build Alternative 2; and
5. Military Road at West Entrance Road for Build Alternative 1.

8.4.1 US Route 460 at Cox Road/Yellowbird Road for Build Alternatives 1 and 2

Overall delay was not calculated for the unsignalized intersection of US Route 460 and Cox Road/Yellowbird Road but delay was calculated for each movement with opposing volumes. There are two mitigation measures proposed at this intersection:

1. Extend the westbound left turn lane to provide a 500-foot storage lane with a 200-foot taper; and
2. Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper (to serve left turns and through movements).

The above mitigation measures are applicable to both Build Alternatives 1 and 2.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 1 for the FASTC site are summarized in Table 8-1.

Under 2012 Existing conditions, the stop controlled minor street approaches (northbound Cox Road and southbound Yellowbird Road) operate at LOS B during the AM and PM peak hours. Under 2020 No Build traffic conditions, it is anticipated that the stop controlled approaches will continue to operate at LOS B during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled northbound approach will operate at LOS E during the AM peak hour and LOS F during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 37 seconds during the AM peak hour and 89 seconds during the PM peak hour over the 2020 No Build conditions. The stop controlled southbound approach is anticipated to operate at LOS F during the AM peak hour and LOS D during the PM peak hour.

If the proposed mitigation measures are installed, under 2020 Build Alternative 1 conditions it is anticipated the stop controlled northbound approach operations will be improved to LOS D during the AM peak hour and LOS C during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 17 seconds during the AM peak hour and 6 seconds during the PM peak hour over the No Build conditions. The stop controlled southbound approach is anticipated to remain at LOS F during the AM peak hour and LOS D during the PM peak hour.

**Table 8-1: Level of Service and Delay Comparison Build Alternative 1
US Route 460 at Cox Road/Yellowbird Road**

AM PEAK HOUR		2020								
US 460 (W Colonial Trail Hwy) at Cox Rd/Yellow Bird Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left	8.7	A	8.7	A	8.7	A	0.0	8.7	A	0.0
Eastbound Through	†	†	†	†	†	†	--	†	†	--
Eastbound Right	†	†	†	†	†	†	--	†	†	--
Westbound Left	8.4	A	8.4	A	10.5	B	2.1	10.5	B	2.1
Westbound Through	†	†	†	†	†	†	--	†	†	--
Westbound Right	†	†	†	†	†	†	--	†	†	--
Northbound Left-Through-Right <i>NB Left-Through</i>	11.2	B	11.3	B	48.6	E	37.3	138.6	F	127.3
<i>Northbound Right</i>							--	9.7	A	--
Northbound Approach	11.2	B	11.3	B	48.6	E	37.3	28.6	D	17.3
Southbound Left-Through-Right	14.9	B	14.8	B	178.6	F	163.8	178.6	F	163.8
Southbound Approach	14.9	B	14.8	B	178.6	F	163.8	178.6	F	163.8
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--
PM PEAK HOUR										
US 460 (W Colonial Trail Hwy) at Cox Rd/Yellow Bird Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left	7.6	A	7.6	A	7.6	A	0.0	7.6	A	0.0
Eastbound Through	†	†	†	†	†	†	--	†	†	--
Eastbound Right	†	†	†	†	†	†	--	†	†	--
Westbound Left	7.9	A	7.9	A	8.2	A	0.3	8.2	A	0.3
Westbound Through	†	†	†	†	†	†	--	†	†	--
Westbound Right	†	†	†	†	†	†	--	†	†	--
Northbound Left-Through-Right <i>NB Left-Through</i>	12.4	B	13.0	B	101.6	F	88.6	23.2	C	10.2
<i>Northbound Right</i>							--	18.1	C	--
Northbound Approach	12.4	B	13.0	B	101.6	F	88.6	18.9	C	5.9
Southbound Left-Through-Right	12.4	B	12.8	B	29.8	D	17.0	29.8	D	17.0
Southbound Approach	12.4	B	12.8	B	29.8	D	17.0	29.8	D	17.0
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--

NOTES:

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.
† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

Mitigation Measures noted in bold italics.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 2 for the FASTC site are summarized in Table 8-2.

Under 2012 Existing conditions, the stop controlled minor street approaches (northbound Cox Road and southbound Yellowbird Road) operate at LOS B during the AM and PM peak hours. Under 2020 No Build traffic conditions, it is anticipated that the stop controlled approaches will continue to operate at LOS B during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled northbound approach will operate at LOS E during the AM peak hour and LOS F during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 37 seconds during the AM peak hour and 89 seconds during the PM peak hour over the 2020 No Build conditions. The stop controlled southbound approach is anticipated to operate at LOS F during the AM peak hour and LOS D during the PM peak hour.

If the proposed mitigation measures are installed, under 2020 Build Alternative 2 conditions it is anticipated the stop controlled northbound approach operations will be improved to LOS D during the AM peak hour and LOS C during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 17 seconds during the AM peak hour and 6 seconds during the PM peak hour over the No Build conditions. The stop controlled southbound approach is anticipated to remain at LOS F during the AM peak hour and LOS D during the PM peak hour.

**Table 8-2: Level of Service and Delay Comparison Build Alternative 2
US Route 460 at Cox Road/Yellowbird Road**

AM PEAK HOUR		2020								
US 460 (W Colonial Trail Hwy) at Cox Rd/Yellow Bird Rd		2012 Existing		No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left	8.7	A	8.7	A	8.7	A	0.0	8.7	A	0.0
Eastbound Through	†	†	†	†	†	†	--	†	†	--
Eastbound Right	†	†	†	†	†	†	--	†	†	--
Westbound Left	8.4	A	8.4	A	10.5	B	2.1	10.5	B	2.1
Westbound Through	†	†	†	†	†	†	--	†	†	--
Westbound Right	†	†	†	†	†	†	--	†	†	--
Northbound Left-Through-Right <i>NB Left-Through</i>	11.2	B	11.3	B	48.6	E	37.3	138.6	F	127.3
<i>Northbound Right</i>							--	9.7	A	--
Northbound Approach	11.2	B	11.3	B	48.6	E	37.3	28.6	D	17.3
Southbound Left-Through-Right	14.9	B	14.8	B	178.6	F	163.8	178.6	F	163.8
Southbound Approach	14.9	B	14.8	B	178.6	F	163.8	178.6	F	163.8
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--
PM PEAK HOUR		2020								
US 460 (W Colonial Trail Hwy) at Cox Rd/Yellow Bird Rd		2012 Existing		No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left	7.6	A	7.6	A	7.6	A	0.0	7.6	A	0.0
Eastbound Through	†	†	†	†	†	†	--	†	†	--
Eastbound Right	†	†	†	†	†	†	--	†	†	--
Westbound Left	7.9	A	7.9	A	8.2	A	0.3	8.2	A	0.3
Westbound Through	†	†	†	†	†	†	--	†	†	--
Westbound Right	†	†	†	†	†	†	--	†	†	--
Northbound Left-Through-Right <i>NB Left-Through</i>	12.4	B	13.0	B	101.6	F	88.6	23.2	C	10.2
<i>Northbound Right</i>							--	18.1	C	--
Northbound Approach	12.4	B	13.0	B	101.6	F	88.6	18.9	C	5.9
Southbound Left-Through-Right	12.4	B	12.8	B	29.8	D	17.0	29.8	D	17.0
Southbound Approach	12.4	B	12.8	B	29.8	D	17.0	29.8	D	17.0
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--

NOTES:

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.
† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

Mitigation Measures noted in bold italics.

8.4.2 Cox Road at Military Road for Build Alternatives 1 and 2

Overall delay was not calculated for the unsignalized intersection of Cox Road and Military Road but delay was calculated for each movement with opposing volumes. There is one mitigation measure proposed at this intersection; install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper. This mitigation measure is applicable to both Build Alternatives 1 and 2.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 1 for the FASTC site are summarized in Table 8-3.

Under 2012 Existing conditions, the stop controlled minor street approach (northbound Military Road) operates at LOS A during the AM peak hour and LOS B during the PM peak hour. The westbound shared left-through lane approach operates at LOS A during the AM and PM peak hours.

Under 2020 No Build traffic conditions, it is anticipated that the stop controlled northbound approach will continue to operate at LOS A during the AM peak hour and LOS B during the PM peak hour. The westbound shared left-through lane approach is anticipated to continue operating at LOS A during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled northbound approach will operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The westbound shared left-through lane approach is anticipated to continue operating at LOS A during the AM and PM peak hours

If the proposed mitigation measures are installed, under 2020 Build Alternative 1 conditions it is anticipated the westbound approach will continue to operate at LOS A during the AM and PM peak hours and the delay (in seconds per vehicle) will increase by approximately 2 seconds during the AM and PM peak hours over the 2020 No Build conditions.

**Table 8-3: Level of Service and Delay Comparison Build Alternative 1
Cox Road at Military Road**

AM PEAK HOUR		2020									
Cox Rd (US 460 Bus) at Military Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation	
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	
Eastbound Through-Right	†	†	†	†	†	†	--	†	†	--	
Westbound Left							--	9.1	A	9.1	
Westbound Left-Through WB Through	5.4	A	5.4	A	8.1	A	2.7	†	†	--	
Westbound Approach	5.4	A	5.4	A	8.1	A	2.7	7.4	A	2.0	
Northbound Left-Right	9.3	A	9.3	A	9.9	A	0.6	9.9	A	0.6	
Northbound Approach	9.3	A	9.3	A	9.9	A	0.6	9.9	A	0.6	
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--	
PM PEAK HOUR		2020									
Cox Rd (US 460 Bus) at Military Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation	
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	
Eastbound Through-Right	†	†	†	†	†	†	--	†	†	--	
Westbound Left							--	8.2	A	8.2	
Westbound Left-Through WB Through	1.3	A	1.3	A	3.7	A	2.4	†	†	--	
Westbound Approach	1.3	A	1.3	A	3.7	A	2.4	3.1	A	1.8	
Northbound Left-Right	10.1	B	10.1	B	24.2	C	14.1	24.2	C	14.1	
Northbound Approach	10.1	B	10.1	B	24.2	C	14.1	24.2	C	14.1	
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--	

NOTES:

Mitigation Measures noted in bold italics.

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 2 for the FASTC site are summarized in Table 8-4.

Under 2012 Existing conditions, the stop controlled minor street approach (northbound Military Road) operates at LOS A during the AM peak hour and LOS B during the PM peak hour. The westbound shared left-through lane approach operates at LOS A during the AM and PM peak hours.

Under 2020 No Build traffic conditions, it is anticipated that the stop controlled northbound approach will continue to operate at LOS A during the AM peak hour and LOS B during the PM peak hour. The westbound shared left-through lane approach is anticipated to continue operating at LOS A during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled northbound approach will operate at LOS A during the AM peak hour and LOS C during the PM peak hour. The westbound shared left-through lane approach is anticipated to continue operating at LOS A during the AM and PM peak hours

If the proposed mitigation measures are installed, under 2020 Build Alternative 2 conditions it is anticipated the westbound approach will continue to operate at LOS A during the AM and PM peak hours and the delay (in seconds per vehicle) will increase by approximately 2 seconds during the AM and PM peak hours over the 2020 No Build conditions.

**Table 8-4: Level of Service and Delay Comparison Build Alternative 2
Cox Road at Military Road**

AM PEAK HOUR		2020									
Cox Rd (US 460 Bus) at Military Rd		2012 Existing		No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation	Net Change in Delay w/Dev. & Mitigation	
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	
Eastbound Through-Right	†	†	†	†	†	†	--	†	†	--	
Westbound Left							--	9.0	A	9.0	
Westbound Left-Through WB Through	5.4	A	5.4	A	7.9	A	2.5	†	†	--	
Westbound Approach	5.4	A	5.4	A	7.9	A	2.5	7.0	A	1.6	
Northbound Left-Right	9.3	A	9.3	A	9.9	A	0.6	9.9	A	0.6	
Northbound Approach	9.3	A	9.3	A	9.9	A	0.6	9.9	A	0.6	
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--	
PM PEAK HOUR		2020									
Cox Rd (US 460 Bus) at Military Rd		2012 Existing		No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation	Net Change in Delay w/Dev. & Mitigation	
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	
Eastbound Through-Right	†	†	†	†	†	†	--	†	†	--	
Westbound Left							--	8.3	A	8.3	
Westbound Left-Through WB Through	1.3	A	1.3	A	3.6	A	2.3	†	†	--	
Westbound Approach	1.3	A	1.3	A	3.6	A	2.3	3.0	A	1.7	
Northbound Left-Right	10.1	B	10.1	B	24.5	C	14.4	24.5	C	14.4	
Northbound Approach	10.1	B	10.1	B	24.5	C	14.4	24.5	C	14.4	
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--	

NOTES:

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.
 † SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

Mitigation Measures noted in bold italics.

8.4.3 Darvills Road (VA Route 40) at Military Road for Build Alternatives 1 and 2

Overall delay was not calculated for the unsignalized intersection of Darvills Road (VA Route 40) and Military Road but delay was calculated for each movement with opposing volumes. There are five mitigation measures proposed at this intersection:

1. Extend the eastbound right turn lane to provide a 200-foot storage lane with a 200-foot taper;
2. Extend the northbound left turn lane to provide a 200-foot storage lane with a 200-foot taper;
3. Extend the northbound right turn lane to provide a 200-foot taper;
4. Switch the stop control from Military Road approached to the Darvills Road approaches; and
5. Remove the existing red flashing beacon and replace with a yellow and red flashing beacon (yellow for Military Road and red for Darvills Road) and install "STOP AHEAD" signs on both approaches of Darvills Road.

The above mitigation measures are applicable to both Build Alternatives 1 and 2.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 1 for the FASTC site are summarized in Table 8-5.

Under 2012 Existing conditions, the stop controlled minor street approaches (northbound and southbound Military Road) operate at LOS B during the AM and PM peak hours. The eastbound and westbound approaches of Darvills Road operate at LOS A during the AM and PM peak hours.

Under 2020 No Build traffic conditions, it is anticipated that the stop controlled approaches will continue to operate at LOS B during the AM and PM peak hours. The eastbound and westbound approaches are anticipated to continue operating at LOS A during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled northbound approach will operate at LOS F during the AM peak hour and LOS E during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 1,381 seconds during the AM peak hour and 28 seconds during the PM peak hour over the 2020 No Build conditions. The stop controlled southbound approach is anticipated to operate at LOS F during the AM peak hour and LOS C during the PM peak hour. The delay will increase by approximately 70 seconds during the AM peak hour and 8 seconds during the PM peak hour over the 2020 No Build conditions. The eastbound and westbound approaches anticipated to continue operating at LOS A during the AM and PM peak hours.

If the proposed mitigation measures are installed, the stop control will switch from Military Road to Darvills Road. Under 2020 Build Alternative 1 conditions it is anticipated the stop controlled eastbound approach will operate at LOS C during the AM peak hour and LOS D during the PM peak hour and the stop controlled westbound approach will operate at LOS D during the AM and PM peak hours. The eastbound approach delay (in seconds per vehicle) will increase by approximately 16 seconds during the AM peak hour and 24 seconds during the PM peak hour over the No Build conditions and westbound approach delay will increase by approximately 27 seconds during the AM peak hour and 33 seconds during the PM peak hour over the No Build conditions.

Northbound operations will be improved to LOS A during the AM and PM peak hours. The delay (in seconds per vehicle) will decrease by approximately 9 seconds during the AM peak hour and 10 seconds during the PM peak hour over the No Build conditions. Southbound operations will be improved to LOS A during the AM and PM peak hours. The delay will decrease by approximately 13 seconds during the AM peak hour and 9 seconds during the PM peak hour over the No Build conditions.

**Table 8-5: Level of Service and Delay Comparison Build Alternative 1
Darvills Road (VA Route 40) at Military Road**

AM PEAK HOUR		2020								
Darvills Rd (VA 40) at Military Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left-Through <i>Stop Controlled*</i>	1.4	A	1.5	A	1.5	A	0.0	18.8	C	17.3
Eastbound Right <i>Stop Controlled*</i>	†	†	†	†	†	†	--	16.2	C	16.2
Eastbound Approach	0.4	A	0.4	A	0.3	A	-0.1	16.8	C	16.4
Westbound Left-Through-Right <i>Stop Controlled*</i>	2.9	A	2.9	A	3.9	A	1.0	29.4	D	26.5
Westbound Approach	2.9	A	2.9	A	3.9	A	1.0	29.4	D	26.5
Northbound Left <i>Free Movement*</i>	11.5	B	11.7	B	9999.0	F	9987.3	8.8	A	-2.9
Northbound Through <i>Free Movement*</i>	9.9	A	10.0	B	10.8	B	0.8	†	†	-10.0
Northbound Right <i>Free Movement*</i>	0.0	A	0.0	A	0.0	A	0.0	†	†	0.0
Northbound Approach	10.4	B	10.5	B	1391.8	F	1381.3	1.2	A	-9.3
Southbound Left-Through-Right <i>Free Movement*</i>	13.1	B	13.4	B	83.1	F	69.7	0.3	A	-13.1
Southbound Approach	13.1	B	13.4	B	83.1	F	69.7	0.3	A	-13.1
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--
PM PEAK HOUR		2020								
Darvills Rd (VA 40) at Military Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left-Through <i>Stop Controlled*</i>	1.4	A	1.4	A	1.4	A	0.0	31.4	D	30.0
Eastbound Right <i>Stop Controlled*</i>	†	†	†	†	†	†	--	9.1	A	9.1
Eastbound Approach	1.1	A	1.1	A	1.0	A	-0.1	25.2	D	24.1
Westbound Left-Through-Right <i>Stop Controlled*</i>	0.9	A	1.0	A	1.1	A	0.1	34.2	D	33.2
Westbound Approach	0.9	A	1.0	A	1.1	A	0.1	34.2	D	33.2
Northbound Left <i>Free Movement*</i>	10.1	B	10.1	B	12.0	B	1.9	7.6	A	-2.5
Northbound Through <i>Free Movement*</i>	10.8	B	10.8	B	43.1	E	32.3	†	†	-10.8
Northbound Right <i>Free Movement*</i>	0.0	A	0.0	A	0.0	A	0.0	†	†	0.0
Northbound Approach	10.5	B	10.6	B	38.5	E	27.9	1.1	A	-9.5
Southbound Left-Through-Right <i>Free Movement*</i>	10.6	B	10.6	B	18.7	C	8.1	1.3	A	-9.3
Southbound Approach	10.6	B	10.6	B	18.7	C	8.1	1.3	A	-9.3
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--

NOTES:

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

* Stop control switched from northbound and southbound approaches to eastbound and westbound approaches.

Mitigation Measures noted in bold italics.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 2 for the FASTC site are summarized in Table 8-6.

Under 2012 Existing conditions, the stop controlled minor street approaches (northbound and southbound Military Road) operate at LOS B during the AM and PM peak hours. The eastbound and westbound approaches of Darvills Road operate at LOS A during the AM and PM peak hours.

Under 2020 No Build traffic conditions, it is anticipated that the stop controlled approaches will continue to operate at LOS B during the AM and PM peak hours. The eastbound and westbound approaches are anticipated to continue operating at LOS A during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled northbound approach will operate at LOS F during the AM peak hour and LOS E during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 78 seconds during the AM peak hour and 22 seconds during the PM peak hour over the 2020 No Build conditions. The stop controlled southbound approach is anticipated to operate at LOS F during the AM peak hour and LOS C during the PM peak hour. The delay will increase by approximately 57 seconds during the AM peak hour and 6 seconds during the PM peak hour over the 2020 No Build conditions. The eastbound and westbound approaches anticipated to continue operating at LOS A during the AM and PM peak hours.

If the proposed mitigation measures are installed, the stop control will switch from Military Road to Darvills Road. Under 2020 Build Alternative 1 conditions it is anticipated the stop controlled eastbound approach will operate at LOS C during the AM and PM peak hours and the stop controlled westbound approach will operate at LOS D during the AM and PM peak hours. The eastbound approach delay (in seconds per vehicle) will increase by approximately 16 seconds during the AM peak hour and 23 seconds during the PM peak hour over the No Build conditions and westbound approach delay will increase by approximately 25 seconds during the AM peak hour and 31 seconds during the PM peak hour over the No Build conditions.

Northbound operations will be improved to LOS A during the AM and PM peak hours. The delay (in seconds per vehicle) will decrease by approximately 9 seconds during the AM peak hour and 9 seconds during the PM peak hour over the No Build conditions. Southbound operations will be improved to LOS A during the AM and PM peak hours. The delay (in seconds per vehicle) will decrease by approximately 13 seconds during the AM peak hour and 9 seconds during the PM peak hour over the No Build conditions.

**Table 8-6: Level of Service and Delay Comparison Build Alternative 2
Darvills Road (VA Route 40) at Military Road**

AM PEAK HOUR	2012 Existing		2020							
			No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation		Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Darvills Rd (VA 40) at Military Rd										
Eastbound Left-Through <i>Stop Controlled*</i>	1.4	A	1.5	A	1.5	A	0.0	18.2	C	16.7
Eastbound Right <i>Stop Controlled*</i>	†	†	†	†	†	†	--	15.6	C	15.6
Eastbound Approach	0.4	A	0.4	A	0.3	A	-0.1	16.2	C	15.8
Westbound Left-Through-Right <i>Stop Controlled*</i>	2.9	A	2.9	A	3.9	A	1.0	27.5	D	24.6
Westbound Approach	2.9	A	2.9	A	3.9	A	1.0	27.5	D	24.6
Northbound Left <i>Free Movement*</i>	11.5	B	11.7	B	557.4	F	545.7	8.8	A	-2.9
Northbound Through <i>Free Movement*</i>	9.9	A	10.0	B	10.8	B	0.8	†	†	-10.0
Northbound Right <i>Free Movement*</i>	0.0	A	0.0	A	0.0	A	0.0	†	†	0.0
Northbound Approach	10.4	B	10.5	B	88.9	F	78.4	1.3	A	-9.2
Southbound Left-Through-Right <i>Free Movement*</i>	13.1	B	13.4	B	70.3	F	56.9	0.3	A	-13.1
Southbound Approach	13.1	B	13.4	B	70.3	F	56.9	0.3	A	-13.1
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--
PM PEAK HOUR										
Darvills Rd (VA 40) at Military Rd	2012 Existing		2020							
			No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation		Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left-Through <i>Stop Controlled*</i>	1.4	A	1.4	A	1.4	A	0.0	29.4	D	28.0
Eastbound Right <i>Stop Controlled*</i>	†	†	†	†	†	†	--	9.0	A	9.0
Eastbound Approach	1.1	A	1.1	A	1.0	A	-0.1	23.7	C	22.6
Westbound Left-Through-Right <i>Stop Controlled*</i>	0.9	A	1.0	A	1.1	A	0.1	31.6	D	30.6
Westbound Approach	0.9	A	1.0	A	1.1	A	0.1	31.6	D	30.6
Northbound Left <i>Free Movement*</i>	10.1	B	10.1	B	11.9	B	1.8	7.6	A	-2.5
Northbound Through <i>Free Movement*</i>	10.8	B	10.8	B	36.0	E	25.2	†	†	-10.8
Northbound Right <i>Free Movement*</i>	0.0	A	0.0	A	0.0	A	0.0	†	†	0.0
Northbound Approach	10.5	B	10.6	B	32.3	E	21.7	1.2	A	-9.4
Southbound Left-Through-Right <i>Free Movement*</i>	10.6	B	10.6	B	16.7	C	6.1	1.3	A	-9.3
Southbound Approach	10.6	B	10.6	B	16.7	C	6.1	1.3	A	-9.3
<i>Overall Intersection</i>	--	--	--	--	--	--	--	--	--	--

NOTES:

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

* Stop control switched from northbound and southbound approaches to eastbound and westbound approaches.

Mitigation Measures noted in bold italics.

8.4.4 Military Road at FASTC Main Campus/West 10th Street for Build Alternative 2

Overall delay was not calculated for the unsignalized intersection of Military Road at FASTC Main Campus/West 10th Street but delay was calculated for each movement with opposing volumes. There are three mitigation measures proposed at this intersection:

1. Install a southbound right turn lane with a 200-foot storage lane and a 200-foot taper;
2. Convert the existing two-way stop to a four-way stop and install "STOP AHEAD" signs on both approaches of Military Road; and
3. Provide two egress lanes exiting the FASTC Main Campus.

The above mitigation measures are applicable to Build Alternative 2 only.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 2 for the FASTC site are summarized in Table 8-7.

Under 2012 Existing conditions, the stop controlled minor street approaches (eastbound FASTC Main Campus and westbound West 10th Street) operate at LOS B or better during the AM and PM peak hours. The northbound and southbound approaches of Military Road operate at LOS A during the AM and PM peak hours.

Under 2020 No Build traffic conditions, it is anticipated that the stop controlled approaches will continue to operate at LOS B or better during the AM and PM peak hours. The northbound and southbound approaches are anticipated to continue operating at LOS A during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled eastbound approach will operate at LOS C during the AM peak hour and LOS F during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 21 seconds during the AM peak hour and 42 seconds during the PM peak hour over the 2020 No Build conditions. The stop controlled westbound approach is anticipated to operate at LOS B during the AM and PM peak hours. The delay (in seconds per vehicle) will increase by approximately 2 seconds during the AM peak hour and 2 seconds during the PM peak hour over the 2020 No Build conditions. The northbound and southbound approaches anticipated to continue operating at LOS A during the AM and PM peak hours.

If the proposed mitigation measures are installed, the traffic control will switch from a two-way stop to a four-way stop. Under 2020 Build Alternative 2 conditions it is anticipated the eastbound approach will operate at LOS A during the AM peak hour and LOS C during the PM peak hour approach delay (in seconds per vehicle) will increase by approximately 9 seconds during the AM peak hour and 6 seconds during the PM peak hour over the No Build conditions. The westbound approach is anticipated to operate at LOS A during the AM peak hour and LOS B during the PM peak hour and the approach delay will increase by approximately 9 seconds during the AM peak hour and 6 seconds during the PM peak hour over the No Build conditions.

The northbound approach is anticipated to operate at LOS A during the AM peak hour and LOS B during the PM peak hour. The delay (in seconds per vehicle) will increase by approximately 10 seconds during the AM peak hour and 12 seconds during the PM peak hour over the No Build conditions. The southbound approach is anticipated to operate at LOS A during the AM and PM peak hours. The delay will increase by approximately 7 seconds during the AM peak hour and 8 seconds during the PM peak hour over the No Build conditions.

Under 2020 Build Alternative 2 conditions with mitigation, the four-way stop-controlled intersection is anticipated to operate at an overall LOS A during the AM peak hour and LOS B during the PM peak hour.

**Table 8-7: Level of Service and Delay Comparison Build Alternative 2
Military Road at FASTC/West 10th Street**

AM PEAK HOUR		2020								
FASTC Main Campus/West 10th St at Military Rd		2012 Existing		No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left-Through-Right	0.0	A	0.0	A	21.1	C	21.1	9.3	A	9.3
Eastbound Approach	0.0	A	0.0	A	21.1	C	21.1	9.3	A	9.3
Westbound Left-Through-Right	10.8	B	10.8	B	12.5	B	1.7	8.7	A	-2.1
Westbound Approach	10.8	B	10.8	B	12.5	B	1.7	8.7	A	-2.1
Northbound Left-Through-Right	0.0	A	0.0	A	0.6	A	0.6	8.8	A	8.8
Northbound Approach Stop Controlled*	0.0	A	0.0	A	0.6	A	0.6	8.8	A	8.8
Southbound Left-Through-Right SB Left-Through	3.2	A	3.2	A	3.3	A	0.1	11.0	B	7.8
Southbound Right							--	7.8	A	7.8
Southbound Approach Stop Controlled*	3.2	A	3.2	A	3.3	A	0.1	9.7	A	6.5
<i>Overall Intersection</i>	--	--	-	--	--	--	--	9.4	A	--
PM PEAK HOUR		2020								
FASTC Main Campus/West 10th St at Military Rd		2012 Existing		No Build		Build Alt 2		Net Change in Delay with Development	Build Alt 2 with Mitigation	Net Change in Delay w/Dev. & Mitigation
Direction and Movement	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left-Through-Right	10.0	B	10.0	B	52.1	F	42.1	13.8	B	3.8
Eastbound Approach	10.0	B	10.0	B	52.1	F	42.1	16.0	C	6.0
Westbound Left-Through-Right	10.1	B	10.1	B	11.6	B	1.5	11.0	B	0.9
Westbound Approach	10.1	B	10.1	B	11.6	B	1.5	11.0	B	0.9
Northbound Left-Through-Right	0.0	A	0.0	A	0.2	A	0.2	10.4	B	10.4
Northbound Approach Stop Controlled*	0.0	A	0.0	A	0.2	A	0.2	10.4	B	10.4
Southbound Left-Through-Right SB Left-Through	2.2	A	2.2	A	2.0	A	-0.2	9.9	A	7.7
Southbound Right							--	8.5	A	8.5
Southbound Approach Stop Controlled*	2.2	A	2.2	A	2.0	A	-0.2	9.7	A	7.5
<i>Overall Intersection</i>	--	--	-	--	--	--	--	11.7	B	--

NOTES:

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.

* Intersection control switched from two-way stop (eastbound and westbound approaches stop controlled) to four-way stop (all approaches stop controlled).

Mitigation Measures noted in bold italics.

8.4.5 Military Road at West Entrance Road for Build Alternative 1

Overall delay was not calculated for the unsignalized intersection of Military Road and West Entrance Road but delay was calculated for each movement with opposing volumes. There are two mitigation measures proposed at this intersection:

1. Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper; and
2. Install an eastbound right turn lane with a 200-foot storage lane and a 200-foot taper.

The above mitigation measures are applicable to Build Alternative 1 only.

The level of service and delay at the intersection based on existing 2012 and 2020 future traffic volumes without and with Build Alternative 1 for the FASTC site are summarized in Table 8-8.

Under 2012 Existing conditions, the stop controlled minor street approach (eastbound West Entrance Road) operates at LOS B during the AM peak hour and LOS A during the PM peak hour. The northbound shared left-through lane approach of Military Road operates at LOS A during the AM and PM peak hours.

Under 2020 No Build traffic conditions, it is anticipated that the stop controlled eastbound approach will continue to operate at LOS B during the AM peak hour and LOS A during the PM peak hour. The northbound shared left-through lane approach is anticipated to continue operating at LOS A during the AM and PM peak hours.

With the addition of FASTC site-generated traffic in 2020, it is anticipated the stop controlled eastbound approach will operate at LOS C during the AM peak hour and LOS B during the PM peak hour and the delay (in seconds per vehicle) will increase by approximately 8 seconds during the AM peak hour and 3 seconds during the PM peak hour over the 2020 No Build conditions. The northbound shared left-through lane approach is anticipated to continue operating at LOS A during the AM and PM peak hours.

If the proposed mitigation measures are installed, under 2020 Build Alternative 1 conditions it is anticipated the stop controlled eastbound approach will operate at LOS B during the AM and PM peak hours and the delay (in seconds per vehicle) will increase by approximately 4 seconds during the AM peak hour and 3 seconds during the PM peak hour over the 2020 No Build conditions. The northbound approach is anticipated to continue operating at LOS A during the AM and PM peak hours and the approach delay will decrease by approximately 1 second during the PM peak hour over the 2020 No Build conditions.

**Table 8-8: Level of Service and Delay Comparison Build Alternative 1
Military Road at West Entrance Road**

AM PEAK HOUR		2020									
West Entrance Road at Military Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation	
Direction and Movement		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left-Right EB Left		10.2	B	10.2	B	17.9	C	--	15.9	C	5.7
Eastbound Right								--	12.8	B	12.8
Eastbound Approach		10.2	B	10.2	B	17.9	C	7.7	14.4	B	4.2
Northbound Left								0.0	8.6	A	8.6
Northbound Left-Through NB Through		1.4	A	1.3	A	1.3	A	0.0	0.0	A	-1.3
Northbound Approach		1.4	A	1.3	A	1.3	A	0.0	1.2	A	-0.1
Southbound Through-Right		†	†	†	†	†	†	--	†	†	--
Southbound Approach		†	†	†	†	†	†	--	†	†	--
<i>Overall Intersection</i>		--	--	--	--	--	--	--	--	--	--
PM PEAK HOUR		2020									
West Entrance Road at Military Rd		2012 Existing		No Build		Build Alt 1		Net Change in Delay with Development	Build Alt 1 with Mitigation	Net Change in Delay w/Dev. & Mitigation	
Direction and Movement		Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Average Delay (sec/veh)	LOS	Net Change (sec/veh)	Average Delay (sec/veh)	LOS	Net Change (sec/veh)
Eastbound Left-Right EB Left		9.4	A	9.4	A	12.7	B	--	19.2	C	9.8
Eastbound Right								--	9.4	A	9.4
Eastbound Approach		9.4	A	9.4	A	12.7	B	3.3	12.3	B	2.9
Northbound Left								0.0	7.9	A	7.9
Northbound Left-Through NB Through		2.7	A	2.7	A	2.0	A	-0.7	0.0	A	-2.7
Northbound Approach		2.7	A	2.7	A	2.0	A	-0.7	1.3	A	-1.4
Southbound Through-Right		†	†	†	†	†	†	--	†	†	--
Southbound Approach		†	†	†	†	†	†	--	†	†	--
<i>Overall Intersection</i>		--	--	--	--	--	--	--	--	--	--

NOTES:

Mitigation Measures noted in bold italics.

Overall intersection LOS and delay reported for signalized and four-way stop controlled intersections only.

† SYNCHRO does not provide level of service, delay, or queue for movements with no conflicting volumes.

8.5 TURN LANE ANALYSES

The turn lane analyses were conducted following procedures from the VDOT *Road Design Manual*. The VDOT turn lane nomographs indicate that the following turn lane treatments are needed to accommodate the 2017 Build Alternative 1 and Build Alternative 2 traffic volumes:

- A 350-foot left turn lane with a 200-foot taper on westbound US Route 460 at Cox Road;
- A 200-foot left turn lane with a 200-foot taper on westbound Cox Road at Military Road; and
- A 200-foot right turn lane with a 200-foot taper on eastbound Darvills Road at Military Road (also needed to accommodate the 2017 No Build traffic volumes).

The turn lane analyses for the 2020 Build Alternative 1 and Build Alternative 2 conditions indicate the following turn lane treatments are needed to accommodate the FASTC site traffic at buildout:

- A 500-foot left turn lane with a 200-foot taper on westbound US Route 460 at Cox Road;
- A 200-foot left turn lane with a 200-foot taper on westbound Cox Road at Military Road;
- A 200-foot right turn lane with a 200-foot taper on eastbound Darvills Road at Military Road (also needed to accommodate the 2020 No Build traffic volumes);
- A 200-foot left turn lane with a 200-foot taper on northbound Military Road at Darvills Road; and
- A 200-foot right turn lane taper on northbound Military Road at Darvills Road.

8.6 TRAFFIC SIGNAL WARRANT ANALYSES

The traffic signal warrant analyses were completed using Warrants 1 (Eight-Hour), 2 (Four-Hour), and 3 (Peak Hour) from the 2009 MUTCD. The warrant analyses were conducted using HCS 2010 MUTCD Signal Warrants Release 6.3.

Traffic signal warrant analyses were performed for the 2017 and 2020 Build Alternative 1 and 2 traffic volumes at the following intersections:

1. US Route 460 at Cox Road/Yellowbird Road; and
2. Darvills Road (VA Route 40) at Military Road.

Warrants 1, 2, and 3 are not met for either location under 2017 Build Alternative 1 conditions. At buildout of FASTC in 2020, the Build Alternative 1 conditions at the intersection of US Route 460 and Cox Road will satisfy Warrant 3 but not Warrants 1 or 2. At the intersection of Darvills Road and Military Road, Warrants 1, 2, and 3 are not met under 2020 Build Alternative 1 conditions. Traffic signals are not recommended at either intersection. All of the warrant analyses worksheets for the 2017 and 2020 Build Alternative 1 traffic volumes are included in Appendices R and S, respectively.

Warrants 1, 2, and 3 are also not met for either location under 2017 Build Alternative 2 conditions. At buildout of FASTC in 2020, the Build Alternative 2 conditions at the intersection of US Route 460 and Cox Road will satisfy Warrant 3 but not Warrants 1 or 2. At the intersection of Darvills Road and Military Road, Warrants 1, 2, and 3 are not met under 2020 Build Alternative 2 conditions. Traffic signals are not recommended at either intersection. All of the warrant analyses worksheets for the 2017 and 2020 Build Alternative 2 traffic volumes are included in Appendices T and U, respectively.

The intersection of US Route 460 and Cox Road/Yellowbird Road should be monitored and if future conditions indicate a traffic signal may be needed, a traffic signal warrant analysis should be conducted using actual 12-hour count data collected after the FASTC facilities have opened.

9 CONCLUSIONS

Analyses were performed for the 2012 existing volumes, the 2017 Phase 1 volumes, and the 2020 volumes, which is the buildout year. The 2017 and 2020 analyses were completed for the No Build condition (without the FASTC site traffic) and for Build Alternatives 1 and 2 (with FASTC site traffic). The key findings from the analyses are summarized below.

9.1 KEY FINDINGS

For the 2012 existing traffic volumes:

- The three signalized intersections within the Town of Blackstone operate at an overall level of service (LOS) C or better during the AM and PM peak hours.
- All of the unsignalized movements operate at LOS B or better during the AM and PM peak hours.

For the 2017 and 2020 No Build traffic volumes:

- The three signalized intersections within the Town of Blackstone would operate at an overall LOS C or better during the AM and PM peak hours.
- All of the unsignalized movements would operate at LOS B or better during the AM and PM peak hours.

For the 2017 Build Alternative 1 and Build Alternative 2 traffic volumes:

- The three signalized intersections within the Town of Blackstone would continue to operate at an overall LOS C or better during the AM and PM peak hours with the addition of the FASTC traffic.
- With the addition of the FASTC traffic all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the southbound left-through-right movement from Yellowbird Road at US Route 460 which would operate at LOS D during the AM peak hour.

For the 2020 Build Alternative 1 traffic volumes:

- The three signalized intersections within the Town of Blackstone would continue to operate at an overall LOS C or better during the AM and PM peak hours with the addition of the FASTC traffic.
- With the addition of the FASTC traffic all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:
 - The northbound left-through-right movement from Cox Road at US Route 460 would operate at LOS E during the AM peak hour and LOS F during the PM peak hour;
 - The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
 - The northbound left turn movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour;
 - The northbound through movement from Military Road at Darvills Road would operate at LOS E during the PM peak hour; and
 - The southbound left-through-right movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour.

With the proposed mitigation measures for the 2020 Build Alternative 1 traffic volumes, all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:

- The northbound left-through movement from Cox Road at US Route 460 would operate at LOS F during the AM peak hour;
- The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
- The eastbound left turn-through movement from Darvills Road at Military Road would operate at LOS D during the AM peak hour; and
- The westbound left-through-right movement from Darvills Road at Military Road would operate at LOS D during the AM and PM peak hours.

The 2020 Build Alternative 1 traffic volumes at the intersection of US Route 460 and Cox Road/ Yellowbird Road would not warrant a traffic signal. Scheduling the FASTC arrival and departure times to avoid the VAARNG peak arrival and departure times would improve traffic operations as peak hour demand and the average delay would be reduced. The LOS results for the analyses of the 2020 Build Alternative 1 traffic volumes without and with the recommended mitigation measures are summarized in Table 9-1.

For the 2020 Build Alternative 2 traffic volumes:

- The three signalized intersections within the Town of Blackstone would continue to operate at an overall LOS C or better during the AM and PM peak hours with the addition of the FASTC traffic.
- With the addition of the FASTC traffic all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:
 - The northbound left-through-right movement from Cox Road at US Route 460 would operate at LOS E during the AM peak hour and LOS F during the PM peak hour;
 - The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
 - The northbound left turn movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour; and
 - The northbound through movement from Military Road at Darvills Road would operate at LOS E during the PM peak hour;
 - The southbound left-through-right movement from Military Road at Darvills Road would operate at LOS F during the AM peak hour; and
 - The eastbound left-through-right movement from the FASTC Main Campus at the intersection of Military Road would operate at LOS F during the PM peak hour.

With the proposed mitigation measures for the 2020 Build Alternative 2 traffic volumes, all of the unsignalized movements would operate at LOS C or better during the AM and PM peak hours with the exception of the following:

- The northbound left-through movement from Cox Road at US Route 460 would operate at LOS F during the AM peak hour;
- The southbound left-through-right movement from Yellowbird Road at US Route 460 would operate at LOS F during the AM peak hour and LOS D during the PM peak hour;
- The eastbound left turn-through movement from Darvills Road at Military Road would operate at LOS D during the AM peak hour; and
- The westbound left-through-right movement from Darvills Road at Military Road would operate at LOS D during the AM and PM peak hours.

The 2020 Build Alternative 2 traffic volumes at the intersection of US Route 460 and Cox Road/ Yellowbird Road would not warrant a traffic signal. Scheduling the FASTC arrival and departure times to avoid the VAARNG peak arrival and departure times would improve traffic operations as peak hour demand and the average delay would be reduced. The LOS results for the analyses of the 2020 Build Alternative 1 traffic volumes without and with the recommended mitigation measures are summarized in Table 9-1.

Table 9-1: LOS for 2020 Volumes Without and With Recommended Mitigation Measures

Intersection and Improvement	Build Alternative 1	Build Alternative 2	2020 Build LOS (by Approach)		2020 Build LOS (by Approach) with Improvement	
			AM	PM	AM	PM
West Entrance Road/8th Street at South Main Street						
Modify traffic signal timings for westbound left/through movement	✓	✓	E	D	C	D
US Route 460 and Cox Road/Yellowbird Road						
Extend the westbound left turn lane to provide a 500-foot storage lane with a 200-foot taper ¹	✓	✓	B	A	B	A
Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper (to serve left turns and through movements)	✓	✓	E	F	D ²	C
Cox Road and Military Road						
Install a westbound left turn lane with a 200-foot storage lane and a 200-foot taper	✓	✓	N/A	N/A	A	A
Darvills Road and Military Road						
Extend the eastbound right turn lane to provide a 200-foot storage lane with a 200-foot taper ³	✓	✓	EB: A WB: A NB: F SB: F	EB: A WB: A NB: E SB: C	EB: C ⁵ WB: D ⁵ NB: A SB: A	EB: D ⁵ WB: D ⁵ NB: A SB: A
Extend the northbound left turn lane to provide a 200-foot storage lane with a 200-foot taper ⁴						
Extend the northbound right turn lane to provide a 200-foot taper ⁴						
Switch the stop control from Military Road approaches to the Darvills Road approaches; remove the existing red flashing beacon and replace with a yellow and red flashing beacon (yellow for Military Road and red for Darvills Road) and install "STOP AHEAD" signs on both approaches of Darvills Road						
West Entrance Road and Military Road						
Install a northbound left turn lane with a 200-foot storage lane and a 200-foot taper	✓	N/A	A	A	A	A
Install an eastbound right turn lane with a 200-foot storage lane and a 200-foot taper	✓	N/A	C	B	B	B
FASTC Main Campus/West 10th Street and Military Road						
Install a southbound right turn lane with a 200-foot storage lane and a 200-foot taper	N/A	✓	EB: C WB: B	EB: F WB: B	EB: A WB: A	EB: C WB: B
Convert the existing two-way stop to a four-way stop and install "STOP AHEAD" signs on both approaches of Military Road	N/A	✓	NB: A SB: A	NB: A SB: A	NB: A SB: A	NB: B ⁶ SB: A

¹ needed to meet VDOT standards; required for future traffic conditions with FASTC

² averaged left turn lane and right turn lane delay times reduce approach delay time so approach would operate at LOS D; left turn movement would operate at LOS F during the a.m. peak hour even with mitigation; low traffic volumes would not warrant a traffic signal

³ needed to correct an existing deficiency; required for future traffic conditions with or without FASTC

⁴ needed to correct an existing deficiency; required for future traffic conditions with FASTC

⁵ decline in LOS on Darvills Road approaches (EB and WB) due to switch from free-flow movement to stop controlled movement; decreases in delay on Military Road approaches (NB and SB) would outweigh increases in delay on Darvills Road approaches (EB and WB) and result in improved traffic operations at the intersection

⁶ decline in LOS due to switch from free-flow movement to stop controlled movement; with conversion to four-way stop, decreases in delay on FASTC Main Campus/West 10th Street approaches (EB and WB) would outweigh increases in delay on Military Road approaches (NB and SB) and result in improved traffic operations at the intersection

Note: EB = eastbound, WB = westbound, NB = northbound, SB = southbound

9.2 RECOMMENDATIONS

Within the study area there is one VDOT planned improvement; however, this improvement (to replace the existing bridge on Cox Road over the Norfolk-Southern railroad tracks) will not impact operations at the intersections within the study area.

The mitigation measures recommended to accommodate the 2017 Build Alternative 1 and Build Alternative 2 volumes are summarized in Table 9-2.

Table 9-2: Summary of Recommended Mitigation Measures for 2017 Volumes

Intersection and Movement	Recommended Mitigation Measure	Reason(s) for Mitigation						
		VDOT Requirement	No Build LOS	No Build Volumes	Build Alt 1 LOS	Build Alt 1 Volumes	Build Alt 2 LOS	Build Alt 2 Volumes
US Route 460 at Cox Road								
Westbound Left	Extend existing lane to provide minimum 350-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Cox Road at Military Road								
Westbound Left	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Darvills Road at Military Road								
Eastbound Right	Extend existing lane to provide minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Yes	No	Yes*	No	Yes	No	Yes

Shaded cells denote mitigation measures recommended due to the addition of FASTC traffic.

* Required to accommodate 2017 No Build Traffic Volumes.

As indicated in Table 9-2, all of the recommended turn lane improvements are required per VDOT's regulations. With the addition of FASTC Phase 1 site trips in 2017, all signalized and unsignalized movements will operate at LOS D or better and no mitigation is required to address unacceptable levels of service.

The mitigation measures recommended for the 2017 Build Alternative 1 traffic volumes are identified on Figure 7-16 and the mitigation measures recommended for the 2017 Build Alternative 2 traffic volumes are identified on Figure 7-23.

The mitigation measures recommended to accommodate the 2020 Build Alternative 1 and Build Alternative 2 volumes are summarized in Table 9-3.

Table 9-3: Summary of Recommended Mitigation Measures for 2020 Volumes

Intersection and Movement	Recommended Mitigation Measure	Reason(s) for Mitigation						
		VDOT Requirement	No Build LOS	No Build Volumes	Build Alt 1 LOS	Build Alt 1 Volumes	Build Alt 2 LOS	Build Alt 2 Volumes
US Route 460 at Cox Road								
Westbound Left	Extend existing lane to provide minimum 500-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Northbound Left-Through	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	No	No	No	Yes	Yes	Yes	Yes
Cox Road at Military Road								
Westbound Left	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Darvills Road at Military Road								
Eastbound Right	Extend existing lane to provide minimum 200-foot Right Turn Lane with minimum 200-foot Taper	Yes	No	Yes*	No	Yes	No	Yes
Northbound Left	Extend existing lane to provide minimum 200-foot Left Turn Lane with minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Northbound Right	Extend existing lane to provide minimum 200-foot Taper	Yes	No	No	No	Yes	No	Yes
Overall Intersection	Switch the stop control from the Military Road approaches to the Darvills Road approaches	No	No	No	Yes	Yes	Yes	Yes
Overall Intersection	Remove the existing red flashing beacon and replace with a yellow and red flashing beacon	No	No	No	Yes	Yes	Yes	Yes
Overall Intersection	Install "STOP AHEAD" signs on both approaches of Darvills Road	No	No	No	Yes	Yes	Yes	Yes
FASTC Main Campus Access/West 10th Street at Military Road (Build Alternative 2 Only)								
Southbound Right	Install a minimum 200-foot Right Turn Lane with minimum 200-foot Taper	N/A	No	No	N/A	N/A	No	Yes
Overall Intersection	Switch the intersection control from two-way stop to four-way stop (all approaches stop controlled)	N/A	No	No	N/A	N/A	Yes	Yes
Overall Intersection	Install "STOP AHEAD" signs on both approaches of Military Road	N/A	No	No	N/A	N/A	Yes	Yes
West Entrance Road at Military Road (Build Alternative 1 Only)								
Northbound Left	Install a minimum 200-foot Left Turn Lane with minimum 200-foot Taper	N/A	No	No	No	Yes	N/A	N/A
Eastbound Right	Install a minimum 200-foot Right Turn Lane with minimum 200-foot Taper	N/A	No	No	Yes	Yes	N/A	N/A
Military Road/FASTC Entrance at Dearing Avenue (Build Alternative 1 Only)								
Westbound Approach	Provide 2 Egress Lanes from FASTC	N/A	No	No	No	Yes	N/A	N/A
South Main Street and 8th Street/West Entrance Road								
Westbound Left-Through	Modify signal timings (intersection split times)	N/A	No	No	Yes	Yes	Yes	Yes

Shaded cells denote mitigation measures recommended due to the addition of FASTC traffic.

* Required to accommodate 2020 No Build Traffic Volumes.

As indicated in Table 9-3, all of the recommended turn lane improvements to VDOT-maintained facilities are required per VDOT policy. With the addition of FASTC Buildout site trips in 2020, additional mitigation measures are needed to address poor levels of service at one signalized intersection and several unsignalized intersections.

The mitigation measures recommended for the 2020 Build Alternative 1 traffic volumes are identified on Figure 7-18 and the mitigation measures recommended for the 2020 Build Alternative 2 traffic volumes are identified on Figure 7-25.

9.3 CONCLUSIONS

The existing intersection geometry within the study area is generally sufficient to accommodate the 2012 existing traffic volumes as well as the 2017 and 2020 No Build traffic volumes.

For Phase 1 of FASTC, the 2017 volumes for Build Alternatives 1 and 2 have negligible impacts on traffic operations within the study area. The only mitigation measures identified for FASTC Phase 1 site volumes are the turn lane improvements required per VDOT's regulations (see Table 9-2); no mitigation is required to address unacceptable levels of service.

The addition of the 2020 FASTC site traffic will have minor impacts on the operations of the three signalized intersections within the Town of Blackstone. A majority of the FASTC traffic (85%) is anticipated to arrive via US Route 460 (10% from the west and 75% from the east) and use Cox Road to Military Road to access the FASTC facilities via the Fort Pickett Main Gate. For Build Alternatives 1 and 2, at buildout of the FASTC facilities in 2020, the overall intersection delay is anticipated to increase by less than 4 seconds during the AM and PM peak hours when the FASTC site traffic is added to the network.

The recommended modifications to the signal timing at the intersection of South Main Street at 8th Street/West Entrance Road (see Table 9-3) address the LOS E for the westbound through-left movement during the AM peak hour at buildout in 2020. With the proposed mitigation, the westbound through-left movement would operate at LOS D at buildout of Build Alternatives 1 and 2.

With the addition of the 2020 FASTC site traffic, a majority of the movements at the unsignalized intersections would operate at LOS C or better. For Build Alternatives 1 and 2, at buildout of the FASTC facilities in 2020, most of the unsignalized movements operating at LOS E or F will be improved to LOS D or better with the implementation of the recommended mitigation measures.

The recommended northbound left turn lane on Cox Road at US Route 460 would allow the northbound right turns to operate at LOS A during the AM peak hour and LOS C during the PM peak hour at buildout of Build Alternatives 1 and 2. The northbound left-through movement from Cox Road and the southbound left-through-right movement from Yellowbird Road would operate at LOS F during the AM peak hour even with mitigation; however, due to low volumes for these movements, a traffic signal is not recommended or warranted (see Chapter 7.4).

At the intersection of Cox Road and Military Road, the recommended westbound left turn lane is required per VDOT's regulations. This mitigation measure will result in a minor increase in delay for the westbound approach for Build Alternatives 1 and 2 at buildout of the FASTC facilities in 2020 since westbound through movements will no longer be impeded by vehicles waiting to turn left onto Military Road.

The recommended mitigation at the intersection of Darvills Road and Military Road (see Table 9-3) would eliminate the failing levels of service on the northbound and southbound approaches resulting from the addition of the 2020 FASTC traffic for Build Alternatives 1 and 2. By providing the VDOT-required turn lane treatments and switching the stop control from Darvills Road (the minor street based on volumes) to Military Road (the major street based on volumes), all movements would operate at LOS D or better.

At the intersection of FASTC Main Campus/West 10th Street and Military Road, the recommended mitigation would eliminate the failing level of service on the eastbound approach due to traffic generated by FASTC Build Alternative 2 at full buildout. By converting the intersection from a two-way stop to a four-way stop and installing a southbound right turn lane, all movements would operate at LOS B or better.

The turn lane improvements at West Entrance Road and Military Road are recommended to mitigate the increased delay due to traffic generated by FASTC Build Alternative 1 at full buildout even though the LOS remains acceptable. The FASTC trips increase the southbound through movement volume by 400% during the AM peak hour and the northbound through movement volume by 625% during the PM peak hour. The additional through volumes on Military Road make the northbound left turn onto West Entrance Road and the eastbound left turn onto Military Road more difficult.