Appendix 3

Traffic Analysis
Technical Memorandum

Metro Transit Police Department District II Substation & Training Facility

Franconia-Springfield

Traffic Impact Technical Memorandum

Prepared for:

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Appendix A Traffic Analysis Printouts

Acronyms and Abbreviations

MTPD	Metro Transit Police Department
ADT	Average Daily Traffic
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
LOS	Level of Service
sec/veh	Seconds per Vehicle
SF	Square Feet
SOV	Single Occupant Vehicle
VDOT	Virginia Department of Transportation

1 Introduction

1.1 Introduction

The new Metro Transit Police Department (MTPD) District II Substation and Training Facility is proposed to be located on vacant WMATA property adjacent to the Franconia-Springfield Metrorail Station in Springfield, Virginia. This report presents existing transportation conditions, projected future service levels with and without the Franconia – Springfield MTPD redevelopment, and recommendations to improve the flow of traffic within the study area.

1.2 Purpose of Report and Study Objectives

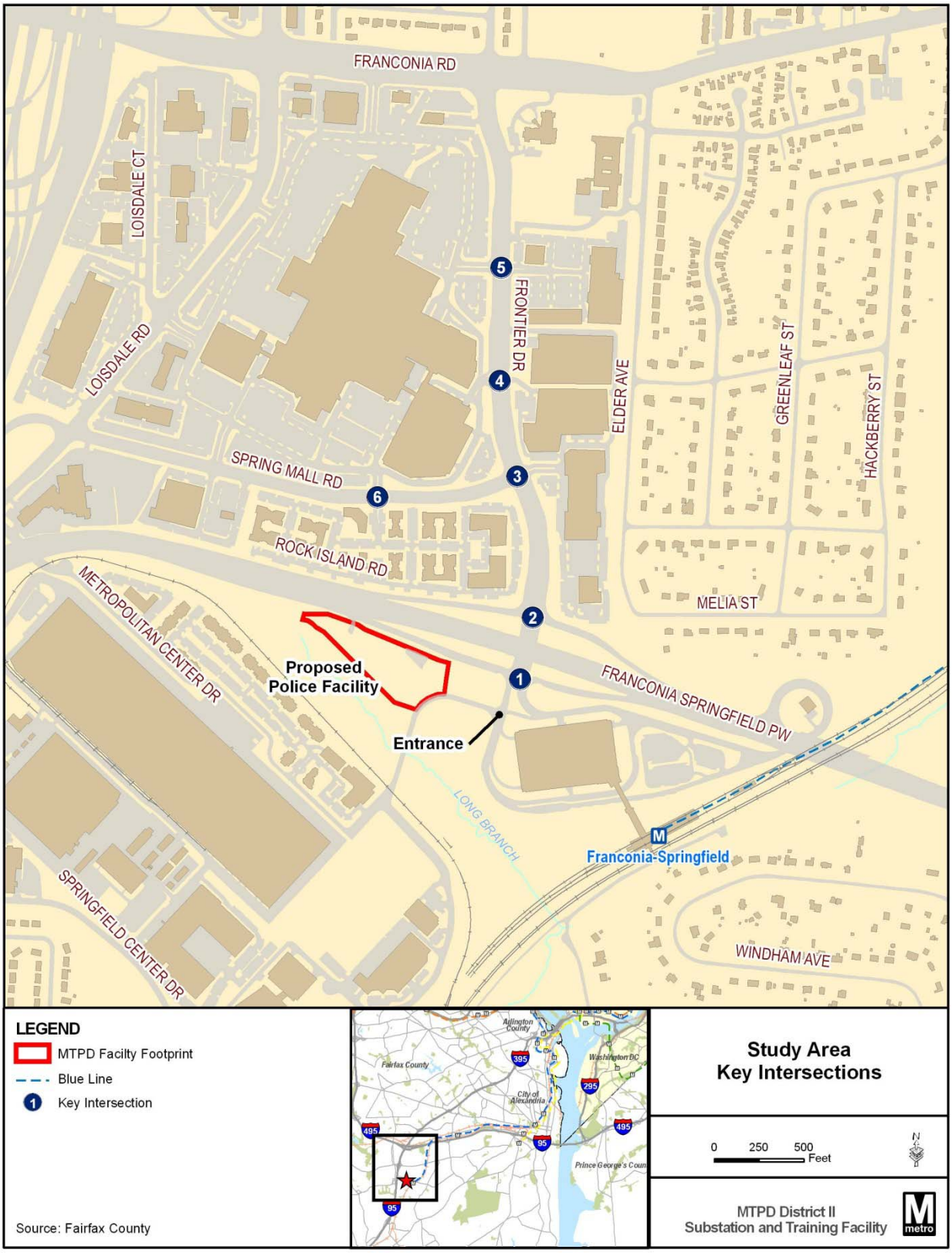
The purpose of this study is to determine the traffic impacts of the preferred Franconia – Springfield development concept. To this effect, the report examines and presents existing and proposed physical conditions, as well as future build and no-build scenarios and their respective impact on local traffic.

This study examines traffic impacts at key streets and intersections pertinent to accessing the MTPD. To capture transportation movements and concerns that affect the Franconia – Springfield area, the traffic impact study will cover wider area than just the MTPD entrance. The MTPD development area is adjacent to the Franconia – Springfield Metro Station, and lies within the traffic study area as shown in **Figure 1**.

Within this study area, AECOM identified six key intersections for analysis:

1. Frontier Drive at eastbound Franconia-Springfield Parkway ramps
2. Frontier Drive at westbound Franconia-Springfield Parkway ramps
3. Frontier Drive at Spring Mall Road
4. Frontier Drive at South Springfield Mall Entrance (Macy's & Home Depot)
5. Frontier Drive at North Springfield Mall Entrance (Target & Best Buy)
6. Spring Mall Road at Mall Entrance

Figure 1: Study Area Intersections



The analysis examined five (5) scenarios:

1. Existing 2010 conditions.
2. No-build option for year 2013.
3. MTPD Development build out option for year 2013.
4. No-build option for year 2030.
5. MTPD Development build out option for year 2030.

1.3 Study Methodology and Assumptions

Assumptions for the traffic analysis are described below:

1. The 2010 year traffic counts that were provided by VDOT for weekday peak periods between 7:00-9:00AM and 4:00-6:00PM are used to analyze the following six signalized intersections:

    - Frontier Drive at eastbound Franconia-Springfield Parkway ramps
    - Frontier Drive at westbound Franconia-Springfield Parkway ramps
    - Frontier Drive at Spring Mall Road
    - Frontier Drive at South Springfield Mall Entrance (Macy's & Home Depot)
    - Frontier Drive at North Springfield Mall Entrance (Target & Best Buy)
    - Spring Mall Road at Mall Entrance

2. The proposed option years to develop the police facility are 2013 and planning year is 2030.
3. The study includes six intersections to determine the capacity (LOS) of these intersections. LOS was evaluated for existing conditions (2010), future (2013) no-build conditions, and future build out conditions (2013), future (2030) no-build conditions, and future build out conditions (2030). The future no-build condition serves as a base for comparison, which assumes the traffic patterns continue, as they currently exist, increased by the expected annual growth rate.
4. The Highway Capacity Manual module of Synchro modeling software is used to determine the LOS for AM and PM peak periods.
5. Annual traffic growth rate of 1.13% is used to determine the projected volume for 2013 and 2030. The growth rate is determined based on historical local data compounded per year to the years 2013 and 2030.
6. The trip assignment follows the existing turning movements and ADT percentages that considers factors such as logical routing, roadway classification, available capacities and projected travel times.

2 Existing Conditions

The MTPD site has a robust transportation network that includes: Franconia-Springfield Parkway; Frontier Drive; Spring Mall Road; Metropolitan Center Drive; Joseph Alexander Road; Loisdale Road and I-95. Figure 1 shows the traffic study area within a regional map as well as the proposed MTPD development area. In addition to the roadway network, other modes of transportation options such as mass transit (WMATA Metro Blue Line, CSX rail, bus), walking and bicycling are available in the area.

2.1 Existing Traffic Network

The roadways are functionally classified based on their urban or rural setting and hierarchal level of service that includes factors as connectivity, mobility, accessibility, vehicle miles traveled, average annual daily traffic, and abutting land use. The purpose of the roadway functional classification is to describe how traffic is channeled through the roadway network and to determine project eligibility for inclusion in the Long Range Plan and short-range Transportation Improvement Program (TIP).

Roadway classification within the project is based on the VDOT/FHWA Functional Classification. The functional classification of roadways along with the Average Daily Traffic (ADT) in the study area is shown below:

- I-95 – Urban Interstate (119,000 veh/day)
- Franconia-Springfield Parkway - Urban Minor Arterial (47,000 veh/day)
- Frontier Drive - Urban Collector (37,000 veh/day)
- Loisdale Road - Urban Collector (9,200 veh/day)
- Spring Mall Road – Local (16,000 veh/day)
- Metropolitan Center Drive - Local
- Joseph Alexander Road - Local

2.2 Existing Traffic Operations

VDOT's turning movements (year 2010) along with current signal timing and Synchro files for weekday AM and PM peak periods were used to determine the capacity of existing traffic operations. VDOT supplied current signal timing and modeling files with basic timings, cycle lengths, offsets and splits for the intersections studied. Using Synchro software, a macroscopic analysis and optimization software program for modeling, analyzing and simulating traffic networks, AECOM analyzed the traffic capacity for the existing conditions. This analysis establishes the base condition to determine the existing traffic performance in the study area.

2.3 Capacity and Level of Service

The Highway Capacity Manual (HCM), published by the Transportation Research Board, contains the standard methodology used to analyze the various elements of existing and proposed roadways. The Synchro traffic analysis software, using the Highway Capacity Software module, was used for the traffic analysis of this study.

Level of Service (LOS) is a quality measurement of traffic flow in terms of speed and travel time, freedom to maneuver, comfort and convenience. There are six LOS designations, represented by the letters A through F, with LOS A representing the best operating conditions and LOS F the worst. Signalized

intersection LOS is determined by seconds delay per vehicle. A level of service D or better is considered acceptable in major urban areas such as the Metropolitan Washington Area. However, it is recognized that the Northern Virginia area typically experiences considerably worse LOS at peak periods at many intersections, and residents of the area are accustomed to a level of service below that considered acceptable by traffic engineers.

Table 1 displays the criteria used to determine LOS and the results of the capacity analysis performed for Existing Conditions. Traffic analysis results are shown in **Table 2**. The results indicate that all signalized intersections operate at LOS D or better during AM peak hour with the year 2010 traffic volumes. During the PM peak hour, one intersection operates at capacity level with LOS E and another intersection at LOS F, over capacity level.

Table 1: Level of Service (LOS) Criteria

Level of Service	Signalized Intersections Average Control Delay (sec/veh)[1]
A	Less than10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	More than 80

[1]sec/veh – seconds per vehicle

Table 2: Traffic Analysis Results: Existing Conditions (Year 2010)

Intersection Description	Level of Service AM	Delay (sec) AM	Level of Service PM	Delay (sec) PM
Frontier Dr/SFL Mall Entrance(N) (Target & Best Buy)	B	15.6	D	45.8
Frontier Dr/SFL Mall Entrance(S) (Macy's & Home Depot)	B	11.4	C	28.5
Frontier Dr/Spring Mall Rd	C	28.5	D	45.2
Spring Mall Rd/Mall Entrance	B	10.0	C	20.8
Frontier Dr/VA 7900 WB Ramp	D	35.8	F	102.7
Frontier Dr/VA 7900 EB Ramp	D	48.8	E	55.5

3 Future No-Build Conditions (Years 2013 and 2030)

Capacity analyses for the studied intersections were performed for the no-build (background) traffic conditions for Years 2013 and 2030 to determine the actual traffic impacts of the proposed MTPD development.

The background traffic is through traffic, consisting of all movements in the study area referred to as "background growth". Existing year 2010 traffic data was projected to year 2013 and 2030 for AM and PM peak hours using a +1.13% annual compound growth rate.

The traffic analysis results for AM and PM peak hours are shown in **Table 3**. The analysis indicates that all signalized intersections operate at overall LOS D or better at the AM peak hour during 2013 no-build conditions. During the PM peak hour, one intersection operates at capacity level with LOS E and one intersection at LOS F with over capacity without the MTPD development in 2013. In year 2030 no-build conditions, two intersections operate at LOS F with over capacity for the AM peak hour and one intersection at capacity level with LOS E and two intersections at LOS F with over capacity level at the PM peak hour.

Table 3: Traffic Analysis Results: No-Build Conditions (Year 2013)

Intersection Description	Level of Service AM	Delay (sec) AM	Level of Service PM	Delay (sec) PM
Frontier Dr/SFL Mall Entrance(N) (Target & Best Buy)	B	15.8	D	46.6
Frontier Dr/SFL Mall Entrance(S) (Macy's & Home Depot)	B	11.4	C	28.8
Frontier Dr/Spring Mall Rd	C	29.1	D	46.4
Spring Mall Rd/Mall Entrance	B	11.0	C	21.2
Frontier Dr/VA 7900 WB Ramp	D	39.6	F	118.0
Frontier Dr/VA 7900 EB Ramp	D	53.3	E	60.3

Table 4: Traffic Analysis Results: No-Build Conditions (Year 2030)

Intersection Description	Level of Service AM	Delay (sec) AM	Level of Service PM	Delay (sec) PM
Frontier Dr/SFL Mall Entrance(N) (Target & Best Buy)	B	17.2	D	54.8
Frontier Dr/SFL Mall Entrance(S) (Macy's & Home Depot)	B	12.9	C	32.5
Frontier Dr/Spring Mall Rd	C	31.7	E	63.1
Spring Mall Rd/Mall Entrance	B	12.0	C	24.5
Frontier Dr/VA 7900 WB Ramp	F	81.7	F	218.6
Frontier Dr/VA 7900 EB Ramp	F	121.2	F	95.6

4 Future Build Conditions (Years 2013 and 2030)

4.1 Trip Generation and Distribution

In order to forecast the traffic impacts of land development, proposed land uses (office, residential, etc.) are converted into vehicular trips. The Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 8th Edition* provides trip generation rates, equations, and data plots based on data collected at close to 5,000 developments across the country.

The manual categorizes land uses by type and provides a means to calculate vehicular trips entering and exiting sites, and is the industry standard for transportation professionals analyzing the site impact of proposed new development or infill projects. Study calculations were based on number of dwelling units, square footage, gross floor area, and other variables. The study estimated future vehicular trips generated by the proposed MTPD development, using the *Trip Generation Manual* for the office section of the Police Station and then trips added for the firing range portion of the facility.

Table 5 present the data used and the results of the trip generation analysis.

Table 5: MTPD Trip Generation by Land Use

Development	Land Use	ITE Code	Size	Weekday AM Peak Hour			Weekday PM Peak Hour		
			sq. ft.	In	Out	Total	In	Out	Total
Metro Police Substation and Training Facility	General Office Building	710	22,300	49	7	56	6	27	33
	Firing Range	N/A	26,260	20	20	40	20	20	40
Total				**69**	**27**	**96**	**26**	**47**	**73**

4.2 Traffic Analysis

A LOS analysis was performed with the 2013 and 2030 build conditions traffic volumes. Cycle lengths, offsets, pedestrian crossing times, and other timing inputs were not modified from existing conditions to provide direct comparison. Under build conditions, the results show all signalized intersections operate at overall LOS D or better for the AM peak hour during 2013. During the PM peak hour, one intersection operates at capacity level with LOS E and one intersection at LOS F with over capacity in 2013. In year 2030 build conditions two intersections operate over capacity with LOS F in the AM peak hour and one intersection at capacity level with LOS E and two intersections at LOS F in the PM peak hour. **Tables 6 and 7** show the LOS results for the build condition.

Table 6: Traffic Analysis Results: Build Conditions (Year 2013)

Intersection Description	Level of Service AM	Delay (sec) AM	Level of Service PM	Delay (sec) PM
Frontier Dr/SFL Mall Entrance(N) (Target & Best Buy)	B	15.7	D	46.6
Frontier Dr/SFL Mall Entrance(S) (Macy's & Home Depot)	B	11.4	C	28.7
Frontier Dr/Spring Mall Rd	C	29.2	D	46.7
Spring Mall Rd/Mall Entrance	B	11.0	C	21.3
Frontier Dr/VA 7900 WB Ramp	D	40.7	F	120.3
Frontier Dr/VA 7900 EB Ramp	E	59.9	E	63.0
Frontier Dr/Metro Police Station Entrance[1]	B	13.0	A	9.5

Table 7: Traffic Analysis Results: Build Conditions (Year 2030)

Intersection Description	Level of Service AM	Delay (sec) AM	Level of Service PM	Delay (sec) PM
Frontier Dr/SFL Mall Entrance(N) (Target & Best Buy)	B	17.2	D	55.0
Frontier Dr/SFL Mall Entrance(S) (Macy's & Home Depot)	B	12.9	C	32.5
Frontier Dr/Spring Mall Rd	C	31.8	E	63.9
Spring Mall Rd/Mall Entrance	B	12.1	C	24.7
Frontier Dr/VA 7900 WB Ramp	F	83.6	F	219.5
Frontier Dr/VA 7900 EB Ramp	F	136.4	F	98.9
Frontier Dr/Metro Police Station Entrance[1]	B	14.6	A	9.6

[1]Un-signalized Intersection

5 Conclusion

The previous chapters examined in detail the current traffic conditions as well as the future build and no-build traffic conditions.

Construction of the proposed Metro Transit Police Department (MTPD) District II substation and training facility will add traffic volume to the study area roadways. However, the increases in traffic volumes and delays are marginal.

The findings of this traffic report will be incorporated into the Documented Categorical Exclusion effort currently underway.

5.1 Comparison of No-Build Actions with Build

The Franconia – Springfield development will increase traffic volumes and vehicle delays at all six studied intersections in the area. However, the LOS and average delay per vehicle change from No-Build to Build is not significant in most cases.

Therefore, no mitigation measures are recommended. **Tables 8 and 9** provide a comparison of the LOS analysis results between the No-Build and Build scenarios.

Table 8: 2013 Traffic Analysis Results: Comparison of No-Build Action with Build

Intersection Description	Scenario	Level of Service AM	Delay (sec) AM	Level of Service PM	Delay (sec) PM
Frontier Dr/SFL Mall Entrance(N) (Target & Best Buy)	No-Build	B	15.8	D	46.6
	Build	B	15.7	D	46.6
Frontier Dr/SFL Mall Entrance(S) (Macy's & Home Depot)	No-Build	B	11.4	C	28.8
	Build	B	11.4	C	28.7
Frontier Dr/Spring Mall Rd	No-Build	C	29.1	D	46.4
	Build	C	29.2	D	46.7
Spring Mall Rd/Mall Entrance	No-Build	B	11.0	C	21.2
	Build	B	11.0	C	21.3
Frontier Dr/VA 7900 WB Ramp	No-Build	D	39.6	F	118.0
	Build	D	40.7	F	120.3
Frontier Dr/VA 7900 EB Ramp	No-Build	D	53.3	E	60.3
	Build	E	59.9	E	63.0

Table 9: 2030 Traffic Analysis Results: Comparison of No-Build Action with Build

Intersection Description	Scenario	Level of Service AM	Delay (sec) AM	Level of Service PM	Delay (sec) PM
Frontier Dr/SFL Mall Entrance(N) (Target & Best Buy)	No-Build	B	17.2	D	54.8
	Build	B	17.2	D	55.0
Frontier Dr/SFL Mall Entrance(S) (Macy's & Home Depot)	No-Build	B	12.9	C	32.5
	Build	B	12.9	C	32.5
Frontier Dr/Spring Mall Rd	No-Build	C	31.7	E	63.1
	Build	C	31.8	E	63.9
Spring Mall Rd/Mall Entrance	No-Build	B	12.0	C	24.5
	Build	B	12.1	C	24.7
Frontier Dr/VA 7900 WB Ramp	No-Build	F	81.7	F	218.6
	Build	F	83.6	F	219.5
Frontier Dr/VA 7900 EB Ramp	No-Build	F	121.2	F	95.6
	Build	F	136.4	F	98.9