



TECHNICAL MEMORANDUM

TO: District Department of Transportation

CC: Office of Planning
Fairfield at Capitol Commerce Center Team

FROM: Gorove/Slade Associates

DATE: August 9, 2006

SUBJECT: Fairfield at Capitol Commerce Center
Transportation Impact Analysis Addendum

INTRODUCTION

This memorandum contains a summary of additional transportation analyses performed for the proposed Fairfield at Capitol Commerce Center. This memorandum serves as an addendum to the Fairfield at Capitol Commerce Center Traffic Impact Analysis, dated March 31, 2006 by Gorove/Slade Associates, Inc. The purpose of this addendum is to respond to the questions and concerns of DDOT and the Zoning Commission raised during: (1) a July 7, 2006 meeting of the Fairfield team with DDOT, (2) the July 11, 2006 letter from DDOT to the Zoning Commission regarding the development, and (3) The Zoning Commission hearing for the project on July 13, 2006.

The July 11th DDOT letter contained a request for additional analysis, the basis of which was set during the July 7th meeting. The four topics are listed below:

- 1) Provide a diagram showing trip assignments (rush hour and average daily traffic) from the site through the intersections surrounding the confluence of Florida and New York Avenues, most notably the intersection of Florida Avenue with Eckington Place. These diagrams are needed to provide input for further analysis of this system, either by DDOT or other development-related study nearby.
- 2) Analyze traffic flows at the intersection of Eckington Place and Q Street, NE with the addition of the extension of Q Street across Eckington Place and through the proposed development. Although this intersection was included in the TIA scope, DDOT requested additional analysis and thoughts given to possible use of a four-way stop or traffic signal at this location, possibly for non-volume related reasons (such as a tool to control speeding).
- 3) Determine the need for a traffic signal at the intersection of Rhode Island Avenue and 3rd Street.

The TIA noted that the poor levels of service at this intersection calculated in the analysis were not observed in the field, and were due to the lack of upstream and downstream traffic signals outside of the study scope. DDOT requested additional analysis, including more detail on the impact of nearby traffic signals and a determination if the intersection warrants a traffic signal.

- 4) Analyze in more detail the traffic impacts at the intersections of R Street with Lincoln Road and North Capitol Street. This intersection was observed and discussed in the TIA; DDOT requested a more detailed analysis, with emphasis on mitigation of morning rush hour queuing on R Street.

In addition, DDOT requested that the TIA addendum address not only the impact of the Fairfield proposal, but consider future development in the Eckington neighborhood. During the meeting DDOT said they had no objection to the project (given the completion of these additional analyses), but were concerned about future development in Eckington. An additional purpose of this addendum was to set the stage for further DDOT or development-related studies.

During the Zoning Commission hearing on July 13th, the Commission requested that this addendum also expand on item (1) by providing Level of Service (LOS) analyses of the New York Avenue and Florida Avenue intersection area with and without the proposed interim improvement suggested by DDOT, taking into consideration the proposed development. In addition, the Commission also expressed concern that future development, which would otherwise be welcome in this area of the District, may be stalled due to traffic concerns. Thus, in similar fashion to DDOT, they also requested that this addendum examine and discuss future traffic.

This addendum addresses these issues in three ways:

- 1) The results of the four additional analyses are presented in the following sections of this memorandum.
- 2) After each section, a discussion is included regarding the impact of additional development. For example, if a traffic signal was found to be unnecessary, an analysis is performed to determine what approximate percentage increase of traffic would trigger the need for a signal.
- 3) A CD-ROM was assembled including this addendum, the TIA, and all analysis files used (including final Synchro files). In addition, copies of the Eckington Traffic Calming Study, the Eckington Rhode Island Avenue Study, and the draft New York Avenue Corridor Study were included. This CD was assembled to provide a starting point for future studies of Eckington neighborhood traffic.

NEW YORK AVENUE AND FLORIDA AVENUE, NE

As part of the on-going New York Avenue Corridor (NYAC) study, long term plans are being developed to reconfigure and reconstruct the intersection of New York Avenue with Florida Avenue, as well as other nearby intersections including Florida Avenue and Eckington Place. Approximately 95,000 vehicle trips pass through the New York Avenue and Florida Avenue intersection on a daily basis and these modifications would better accommodate the high volume of traffic.

In addition, DDOT has developed interim short-term improvements to ease congestion surrounding this intersection. The portion of Florida Avenue between Eckington Place and New York Avenue would be made one-way westbound, and First Street, between Florida Avenue and New York Avenue, would be made one-way southbound.

Under existing conditions, it is difficult for drivers to make the left-turn from Eckington Place to eastbound Florida Avenue because of the proximity of the New York Avenue and Florida Avenue signal. The distance between the signals allows a queue of six vehicles in each lane (two eastbound lanes) before the Eckington Place and Florida Avenue intersection is blocked, restricting the southbound left-turn movement of Eckington Place. Also, because the signal timing between both intersections does not allow enough clearance of the vehicles between the two signals prior to southbound movement from Eckington Place getting a green light, there is, for the most part, no space to accommodate the vehicles heading eastbound from Eckington Place. The new configuration would alleviate this congestion by converting all turns into right turns, thus allowing smoother flow of traffic from Eckington Place. Figure 1 shows the expected distribution of the Fairfield trips through the proposed New York Avenue/Florida Avenue reconfiguration.

DDOT provided their electronic Synchro files of the analyses of the proposed New York/Florida Avenue reconfiguration. Since DDOT's volumes represent 2002 traffic, a growth rate of 1.9 % per year was applied to all movements throughout the reconfigured study intersections. This rate is consistent with the recent New York Avenue Corridor Study. The growth was applied over 8 years to represent conditions at the 2010 build out of Fairfield development. Table 1 shows the results of the analysis under Future Background conditions.

The site trips shown in Figure 1 were then added to the new Synchro network representing background conditions to determine the Total Future traffic forecast. The network was then re-analyzed for the Total Future Traffic scenario. Table 2 shows the results of the Total Future analysis with the proposed reconfiguration and Fairfield trips included.

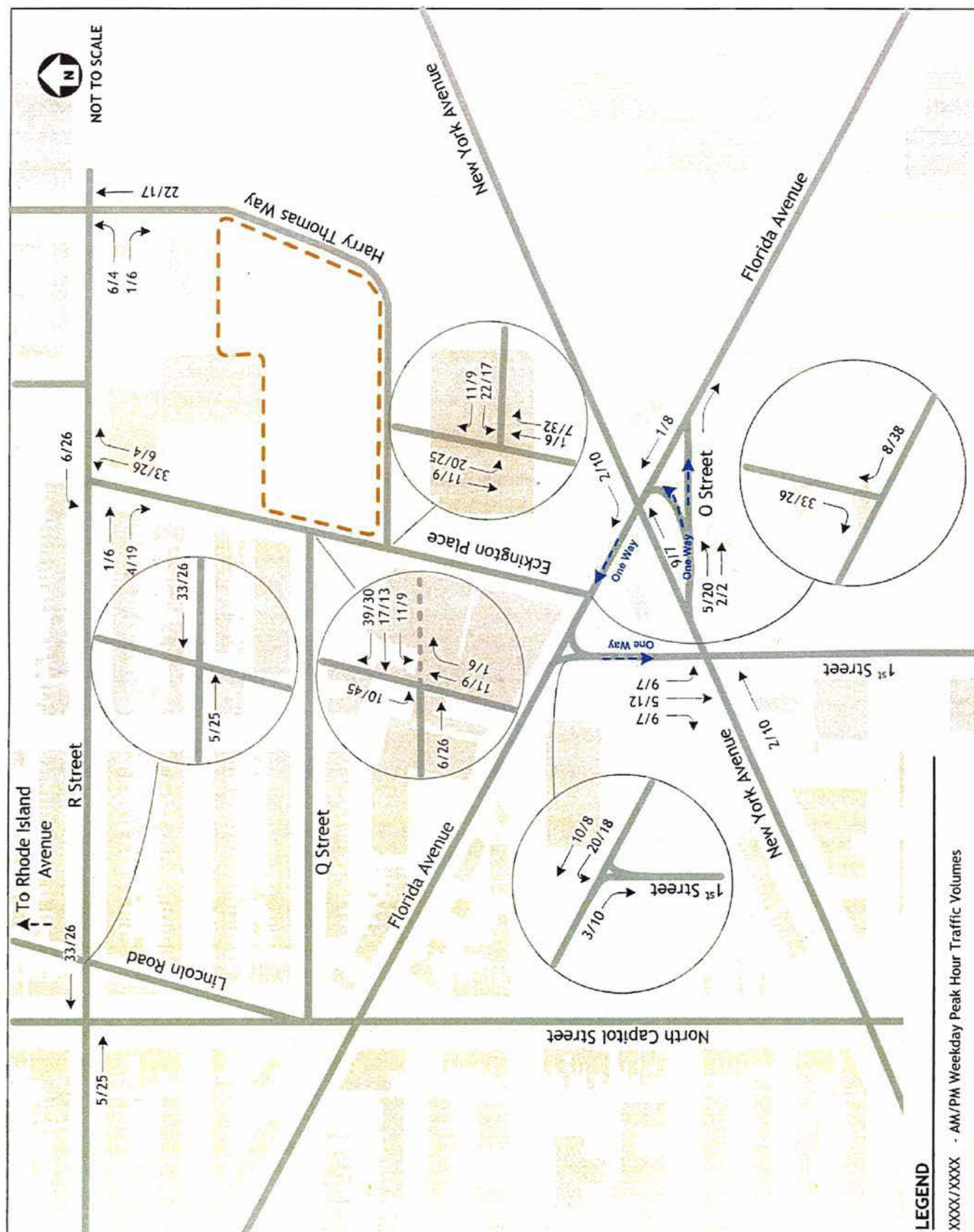


Table 1 – 2010 Levels of Service (w/Interim Improvement & Percentage Growth)

Intersection (Approach)	Background (2010)			
	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
New York Avenue/Florida Avenue				
Overall	100.0	F	35.9	D
North-eastbound thru (NY Avenue NB)	17.3	B	28.3	C
South-westbound (NY Avenue SB)	154.0	F	34.4	C
Northbound-left (Ramp)	43.2	D	51.8	D
Westbound (FI Avenue)	118.1	F	33.3	C
WB Florida Avenue/Eckington PI				
Overall	11.5	B	14.3	B
Westbound	7.4	A	12.3	B
Northbound	26.0	C	17.0	B
Southbound	33.3	C	21.7	C
New York Avenue/1 st Street				
Overall	22.9	C	23.2	C
Eastbound	24.5	C	31.4	C
Westbound	2.0	A	2.4	A
Northbound	55.4	E	40.6	D
Southbound	39.6	D	25.3	C
Ramp to 1 st Street/ 1 st Street				
Overall	14.1	B	26.5	C
Westbound-left	10.4	B	33.1	C
Southbound-thru	17.6	B	19.5	B

Table 2 – 2010 Levels of Service (w/Improvement, Growth and Site Traffic)

Intersection (Approach)	Future (2010)			
	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
New York Avenue/Florida Avenue				
Overall	100.1	F	36.5	D
North-eastbound thru (NY Avenue NB)	17.4	B	28.6	C
South-westbound (NY Avenue SB)	154.3	F	34.7	C
Northbound-left (Ramp)	43.7	D	53.3	D
Westbound (FI Avenue)	118.1	F	32.7	C
WB Florida Avenue/ Eckington PI				
Overall	12.0	B	14.2	B
Westbound	7.4	A	12.1	B
Northbound	26.0	C	17.0	B
Southbound	34.2	C	22.1	C
New York Avenue/1 st Street				
Overall	23.0	C	23.3	C
Eastbound	24.5	C	31.6	C
Westbound	2.0	A	2.4	A
Northbound	55.4	E	40.6	D
Southbound	39.6	D	25.3	C
Ramp to 1 st Street/ 1 st Street				
Overall	14.1	B	26.2	C
Westbound-left	10.4	B	32.4	C
Southbound-thru	17.6	B	19.5	B

This analysis shows that in the future, the New York Avenue/Florida Avenue intersection is expected to operate under LOS F for the morning peak and LOS D for the afternoon peak. The other signalized intersections surrounding the intersection of New York and Florida Avenue will operate under LOS B and C.

The addition of the site trips is not expected to cause a decline in LOS and would only marginally increase delay at a few intersections. The intersection of Florida Avenue and Eckington Place would operate at LOS B in both AM and PM peak hours.

Sensitivity Analysis

Looking towards future development within the Eckington neighborhood, a sensitivity analysis was performed to determine how much more traffic can be added to the southbound approach of Eckington Place during rush hour without the need for additional roadway capacity. To determine this, traffic was increased on the southbound Eckington Place approach until a LOS E was reached at the traffic signal at Florida Avenue and Eckington Place. This analysis shows that LOS E would be reached when the forecasted 2010 traffic increases threefold. Note that this analysis did not also increase traffic on Florida Avenue, as it was intended only to show how much more traffic Eckington Place (and thus additional development in the Eckington neighborhood) can handle prior to requiring mitigation.

ECKINGTON PLACE AND Q STREET, NE

As stated in the Traffic Impact Analysis, the peak hour levels of service for the intersection of Eckington Place and Q Street, NE were found to operate at acceptable conditions during all time periods. The following table shows the LOS findings for existing, future background, and total future condition (under two-way STOP control).

Table 3 – TIA Results: Q St and Eckington Pl, NE

Intersection (Approach)	Levels of Service			
	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
Q St, NE & Eckington Pl, NE (Existing) Eastbound	5.1	A	4.0	A
Q St, NE & Eckington Pl NE (Background) Eastbound	12.0	B	9.6	A
Q St, NE & Eckington Pl, NE (Total Future) Eastbound	14.8	B	12.5	B
Westbound	15.2	C	13.1	B

No traffic flow interruptions or problems were noted during observations in the field of this intersection. Vehicles making the left or right from Q Street to Eckington Place did not experience undue delays since traffic flows along Eckington Place allowed many gaps for these motorists. There were no sight distance

problems, and no excessive speeding was observed along Eckington Place. This was also the conclusion of the 2004 Eckington Place, Q Street and Quincy Place Area, N.E. Traffic Calming Study, when speed lasers were used to collect speed data. The results of this study showed that the 85th percentile speed on Eckington Place was about 33 mph, or approximately 8 mph above the posted speed limit of 25 mph. This is less than the 10 mph (above the posted speed limit) threshold the District uses as a warrant for traffic calming measures.

As a requirement of this addendum, DDOT requested further analysis of the Eckington Place/Q Street intersection. In addition to the two-way stop control recommended and tested by Gorove/Slade, DDOT required analyses of the intersection under 4-way stop control and a traffic signal. Table 4 shows the results of these analyses.

As shown in Table 4, the intersection would operate favorably under any of the three conditions presented. Under 4-way stop control, the intersection operates at an overall LOS B in the morning and LOS A in the afternoon. All approaches would operate at LOS B or better. If the intersection was signalized, it would operate at overall LOS A in both morning and afternoon hours, however, the eastbound and westbound approaches would operate at LOS C for both scenarios (although these results could change based on signal timing).

While all options have acceptable levels of service, given the relatively low traffic volumes going through the intersection, it would not meet the warrants recommending signalization. No safety issues were observed for existing conditions, and it is not expected that the increase in traffic as a result of the new development would cause any such issues in the future.

Gorove/Slade does not recommend the use of a 4-way stop control, since sometimes the addition of stop signs to through routes can create an increase in the accident rate, notably rear-end collisions. In addition, even if speed were an issue on Eckington Place, traffic calming measures would be recommended prior to the addition of stop signs. In addition, Gorove/Slade does not recommend the placement of a traffic signal at this location for because it is not warranted and its building and maintaining costs.

Sensitivity Analysis

A sensitivity analysis was performed to determine what level of Eckington Place through traffic would generate LOS E on the Q Street stop sign controlled approaches. This analysis revealed that traffic along Eckington Place could accommodate three times the total future traffic before the eastbound and westbound approaches would approach LOS E.

Table 4 – Q Street/Eckington Place (3 Scenarios)

Intersection (Approach)	Total Future Conditions			
	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
Q Street NE/Eckington Place NE (2-Way Stop Control)				
Eastbound	14.8	B	12.5	B
Westbound	15.2	C	13.1	B
Q Street NE/Eckington Place NE (4-Way Stop Control)				
Overall	10.7	B	9.4	A
Eastbound	9.0	A	8.7	A
Westbound	9.2	A	8.6	A
Northbound	12.9	B	10.7	B
Southbound	9.3	A	8.5	A
Q Street NE/Eckington Place NE (Signal)				
Overall	5.9	A	6.8	A
Eastbound	25.5	C	25.0	C
Westbound	25.8	C	24.7	C
Northbound	3.1	A	2.7	A
Southbound	2.3	A	2.3	A

RHODE ISLAND AVENUE AND 3RD STREET, NE

Analysis of the Rhode Island Avenue/3rd Street NE intersection showed results of LOS E on the northbound approach, however this was not observed in the field. It was initially thought that the upstream signalized intersection of Rhode Island Avenue with Lincoln Avenue, NE would provide a break or gap in traffic flow, allowing vehicles from 3rd Street NE to merge unto Rhode Island Avenue. This upstream signalized intersection was included in a further analysis to see if the observation of the field could be replicated. This attempt was still unsuccessful for a combination of reasons which include:

1. All analyses and estimates were conservatively high. In addition to using higher volumes than is normally experienced on the roadways, the Synchro software (and Highway Capacity Manual, HCM) uses default critical gaps which are conservatively high. The effects of this conservative estimate are increased further with the fact that the left-turn movement requires a two stage gap acceptance (vehicles can make a left turn or cross Rhode Island Avenue in two movements, by first moving into the median).
2. Modeling of Nearby Signal. The HCM methodology software does not model the effect a nearby signal very well.
3. SimTraffic does not model two-stage gap acceptance. The SimTraffic software cannot effectively model the two-stage gap acceptance which is required for the analysis of the intersection.

Using the Synchro software and HCM methodology, the results observed in the field can be replicated if the assumption is made that the average gap accepted by drivers at this intersection is two-thirds the default

length. A lower gap acceptance is often found in urban areas with drivers accustomed to making the same movements everyday, which occurs at this intersection, so this explanation is feasible.

At the request of DDOT, Gorove/Slade conducted a preliminary signal warrant analysis to determine if the signal is need for the Rhode Island Avenue/ 3rd Street intersection. The eight warrants were examined with the data collected for the traffic study. Table 5 below shows the results of the warrant analysis.

Table 5 – Rhode Island Avenue/3rd Street NE Preliminary Signal Warrant Analysis

Warrant	Name	Evaluation
Warrant 1	Eight-Hour Vehicular Volume	Condition A is not met for the peak hour studied; while Condition B is just marginally met for the highest peak hours. More data required for other hours, but based on the peak hour volumes, it appears that Warrant 1 will not be met since volumes would be less outside of the peak hours.
Warrant 2	Four-Hour Vehicular Volume	Warrant 2 is not met.
Warrant 3	Peak hour	Warrant 3: Condition does not exist.
Warrant 4	Pedestrian Volume	Warrant 4 is not met.
Warrant 5	School Crossing	Warrant 5: Condition does not exist.
Warrant 6	Coordinated Signal system	Warrant 6: Condition appears not to exist - DDOT's discretion.
Warrant 7	Crash Experience	Crash data not available. Warrant 7 not examined.
Warrant 8	Roadway Network	Warrants 6 needs further evaluation (with warrant 1) but appears not to be met based on peak hour volumes, since volumes should be less for other hours.

Based on this review, it does not appear that the intersection of Rhode Island Avenue and 3rd Street NE would warrant a signal.

Additionally, placing a signal at this intersection may cause an unnecessary disruption in the traffic flow along Rhode Island Avenue, a principal arterial. It would also place added maintenance burden on the District and set precedence for unwarranted signals. Furthermore, the Rhode Island Avenue/4th Street NE signalized intersection provides sufficient capacity for neighborhood vehicles if it was the actual case that lengthy queues exist on the northbound approach of the Rhode Island Avenue/3rd Street NE intersection. Sensitivity analyses show that Eckington traffic could grow as much as two-times before any movement at the intersection of Rhode Island Avenue and 4th Street reaches LOS E.

Sensitivity Analysis

As stated above sensitivity analyses show that Eckington traffic could grow as much as two-times before any movement at the intersection of Rhode Island Avenue and 4th Street reaches LOS E. As more development occurs in the Eckington neighborhood, Gorove/Slade recommends no mitigation occur at Rhode Island and 3rd St, or Rhode Island and 2nd St (the second half of the one-way pair) until the LOS at the signalized intersection of Rhode Island Avenue and 4th Street reaches unacceptable conditions.

NORTH CAPITOL STREET/R STREET, NE & LINCOLN AVENUE, NE

Earlier observations of the North Capitol Street/R Street intersection revealed that, under existing conditions during the morning rush hour peak R Street, NE can experience westbound queues extending from North Capitol Street to Eckington Place. The vehicles in these queues are predominantly commercial vehicles leaving the Eckington neighborhood.

To accommodate a request by DDOT, existing AM and PM peak hour traffic counts were conducted at the R Street/North Capitol Street and R Street Lincoln Avenue intersections on Tuesday, August 1, 2006, between the hours of 6:00 AM to 9:00 AM and 4:00 PM to 7:00 PM. Counts were actually done for one-half hour segments for the AM and PM peak. These were then doubled to represent peak hour traffic and further increased by 15% to account for the effects of school closures. Signal timings and geometric data were also collected. The Synchro software was used to analyze the intersections with the results shown in Table 6.

Table 6 shows that, although motorists may experience lengthy queues and longer delays on the westbound approaches of these intersections, the intersections operate at acceptable levels of service in both the AM and PM scenarios. The North Capitol Street/R Street intersection operates at LOS B and LOS C during the morning and afternoon hours respectively, while the R Street/Lincoln Avenue intersection operates at LOS B for the morning and afternoon peaks. The high commercial vehicle volumes contribute significantly to the queues on the westbound approach in the AM peak.

With background growth in traffic of 1.5% per year up to the year 2010, the North Capitol Street/R Street intersection will experience an operational decline to LOS C and LOS D during the morning and afternoon hours respectively, while the R Street/Lincoln Avenue intersection will operate at LOS C and LOS B for the same. The addition of the Fairfield site trips would result in slight changes in delay, however levels of service remain consistent to background conditions.

Some of the traffic calming or traffic routing measures of the Eckington Place, Q Street and Quincy Place Area, N.E. Traffic Calming Study could be implemented to ease the heavy use and lengthy queues of R Street in the morning peak. However, this would require coordination and dialogue between DDOT Staff,

the Eckington residential community, and the Eckington industrial community. Also, it may be that the reconfiguration of the New York Avenue/Florida Avenue intersection would result in more commercial vehicles using the new intersection, since there will be reductions in delays at the intersection of Eckington Place and Florida Avenue.

Table 6 – Levels of Service of North Capitol Street/ R Street & R Street/Lincoln Avenue Intersection

Intersection (Scenario)	Levels Of Service			
	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
EXISTING CONDITIONS				
North Capitol Street/R Street NE (Existing)				
Overall	18.5	B	25.9	C
Eastbound	24.2	C	29.5	C
Westbound	13.5	B	20.5	C
Northbound	17.2	B	35.6	D
Southbound	15.2	B	12.1	B
R Street NE/ Lincoln Avenue NE				
Overall	19.6	B	15.3	B
Eastbound	9.7	A	11.2	B
Westbound	41.0	D	19.7	B
Northbound	7.2	A	14.4	B
Southbound	8.8	A	15.3	B
2010 BACKGROUND CONDITIONS				
North Capitol Street/R Street NE				
Overall	20.5	C	36.3	D
Eastbound	24.4	C	29.8	C
Westbound	14.7	B	21.0	C
Northbound	18.5	B	53.9	D
Southbound	22.3	C	13.2	B
R Street NE/ Lincoln Avenue NE				
Overall	20.5	C	15.5	B
Eastbound	10.0	A	11.0	B
Westbound	43.4	D	20.0	B
Northbound	7.2	A	14.5	B
Southbound	9.0	A	15.6	B
2010 TOTAL FUTURE CONDITIONS				
North Capitol Street/R Street NE				
Overall	20.6	C	36.2	D
Eastbound	24.3	C	30.6	C
Westbound	15.4	B	20.5	C
Northbound	18.6	B	53.9	D
Southbound	22.3	C	13.2	B
R Street NE/ Lincoln Avenue NE				
Overall	23.3	C	6.8	A
Eastbound	11.9	B	25.0	C
Westbound	48.6	D	24.7	C
Northbound	7.2	A	2.7	A
Southbound	9.0	A	2.3	A

SUMMARY

Based on the analysis presented in this memorandum, the following summarizes the conclusions of this TIA addendum for the four requests made by District agencies.

- 1) *Detail assignments and provide capacity analysis results for the New York Avenue and Florida Avenue intersection and surrounding traffic signals.*

Gorove/Slade has provided a graphic detailing assignments and tables of capacity analysis results for future conditions of the New York Avenue and Florida Avenue intersection and surrounding signalized intersections. The analysis concluded that intersection of Eckington Place with Florida Avenue will operate under acceptable conditions in the future, including traffic generated by Fairfield at Capitol Commerce Center.

- 2) *Further analysis of the intersection of Eckington Place and Q Street, considering differing traffic control measures.*

Based on the analyses performed, Gorove/Slade recommends a 2-way stop control for this intersection, with the stop signs on the Q Street approach. Capacity analyses show this will create acceptable traffic conditions in the future and both 4-way stop sign and traffic signal controls are not warranted.

- 3) *Determine the need for a traffic signal at the intersection of Rhode Island Avenue and 3rd Street.*

Based on the analysis performed, a traffic signal is not warranted for this location. A traffic signal should be considered at a point in the future when the intersection of Rhode Island Avenue and 4th Street operates at unacceptable conditions.

- 4) *Analyze in more detail the traffic impacts at the intersections of R Street with Lincoln Road and North Capitol Street.*

Detailed capacity analyses of these intersections showed that they are expected to operate at acceptable conditions in the future. The long queues observed on R Street are generated by the large percentage of commercial vehicle traffic and are not due to overall heavy volumes on R Street. Gorove/Slade recommends that DDOT and the Eckington community, both residential and industrial, work towards a solution starting with the recommendations contained in the *Eckington Place, Q Street and Quincy Place Area, N.E. Traffic Calming Study*.