Appendix C-6: Congestion and Mobility at Major Intersections

The BRAC FEIS identified the need for intersection improvements at four locations external to the BRAC campus, each at the junction of a State highway and a County arterial road:

- Old Georgetown Road (MD 187) and Cedar Lane
- Rockville Pike (MD 355) and Cedar Lane
- Rockville Pike (MD 355) and Jones Bridge Road
- Connecticut Avenue (MD 185) and Jones Bridge Road / Kensington Boulevard

The Montgomery County Adequate Public Facilities (APF) ordinance uses the Critical Lane Volume (CLV) technique to assess the adequacy of intersection performance. All four of these intersections are located in the Bethesda/Chevy Chase Policy Area, where adequacy is defined as a CLV during the morning and evening peak hours of less than 1600. As indicated in Table 1, three of these intersections are currently operating at CLVs above 1600 during the morning and/or the evening peak hour.   The CLV of 1600 is equivalent to the threshold between level of service (LOS) letter grades E and F.   The SHA analysis of existing conditions applied Highway Capacity Manual operational analysis to estimate the average delay per vehicle during the AM and PM peak hours. The Highway Capacity Manual defines a LOS F as an intersection with more than 80 seconds of delay per vehicle. At all four locations, conditions during the evening peak period are worse than they are during the AM peak period.

An estimate of total vehicle hours of delay for these two busiest hours of the day can be calculated by multiplying the number of entering vehicles (larger than the CLV by definition) by the average delay. As indicated in Table 1, vehicles are delayed by approximately 1267 hours during the AM and PM peak hour at these four intersections. The MD 355/Cedar Lane and MD 185/Jones Bridge intersections are the two most congested intersections and account for roughly three-quarters of the total delay.

Table 1: Intersection Peak Hour Performance – Current Conditions

Location	CLV AM/(PM)	Delay per Vehicle AM/(PM) in seconds	Weekday Peak Hour Delay (hours)
187/Cedar	1189 / (1496)	21 / (42)	76
355/Cedar	1809 / (1969)	104 / (148)	475
355/Jones Bridge	1360 / (1658)	56 / (82)	214
185/Jones Bridge	1710 / (1831)	121 / (150)	503
TOTAL			1268

As a federal action, the BRAC consolidation activities at the National Naval Medical Center are not subject to the County's APF rules. The federal government's Environmental Impact Statement (EIS) process has similar requirements for ensuring that impacts are appropriately addressed and mitigated.

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The NNMC and SHA worked cooperatively with the Planning Board and staff during the development of the EIS documentation. The transportation analysis conducted for the EIS process utilized the County's process of including background traffic from approved but unbuilt developments in the study area to arrive at a Total Build Condition. The BRAC EIS defines this as year 2011 conditions, based on the opening date of the NNMC BRAC action. The County's APF process does not define a specific horizon year, but the County's pipeline of approved but unbuilt development is expected to take between seven and 13 years to be absorbed at current growth rates.

The need for improvements at these four locations was based in part on the fact that the Total Build Conditions (impacts of NNMC traffic added to background traffic from approved but unbuilt developments) at these four locations would exceed the 1600 CLV standard. The need for improvements is also based on the desire to provide efficient, multimodal transportation service to the NNMC, an objective shared by the federal government and the BRAC Implementation Committee.

At the two less-congested intersections (MD 187/Cedar and MD 355/Jones Bridge), the capacity problems are limited to the evening peak period. At these two locations, the directional distribution of traffic flow facilitates implementation of a "dynamic lane control" for southbound left turns to cross northbound traffic. Both of these intersections have a high volume (more than 400) PM peak hour southbound left turn vehicles. During the evening peak period southbound traffic toward the Bethesda CBD is substantially lighter than northbound traffic leaving the CBD. Through changeable message signs controlling lane uses, the leftmost of three through lanes can be converted to a left turn only lane during the evening peak period. During this time of day, the remaining two through lanes can accommodate the southbound traffic volume and the development of a second left turn lane allows green time to be more efficiently allocated to all intersection approaches, reducing the CLV and delay per vehicle.

The primary drawback to dynamic lane control is a safety concern. Changing the lane use by time of day requires greater user attention, as in the reversible lane systems on Georgia Avenue and Colesville Road serving the Silver Spring CBD. The benefits of dynamic lane control are therefore greatest where the greatest mobility improvements can be achieved. SHA therefore proposes to implement dynamic lane control at the MD 355/Jones Bridge intersection; based on this experience SHA will evaluate its future implementation at the MD 187/Cedar intersection as well.

At the two most congested intersections (MD 355/Cedar and MD 185/Jones Bridge), delays are extensive enough that the proposed mitigation projects include construction of a northbound auxiliary lane through the intersection to accommodate the northbound flow of traffic during the evening peak period.

Table 2 provides a comparison of the intersection performance for Total Build Conditions both without, and with, the proposed improvements.

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Table 2: Intersection Peak Hour Performance – Total Build Conditions

Location	Without Improvements			With Improvements		
	CLV AM/(PM)	Delay per vehicle AM/(PM) in seconds	Weekday Peak Hour Delay (hours)	CLV AM/(PM)	Delay per vehicle AM/(PM) in seconds	Weekday Peak Hour Delay (hours)
187/Cedar	1323 / (1735)	31 / (83)	158	1183 / (1461)	27 / (60)	119
355/Cedar	1947 / (2084)	136 / (168)	617	1620 / (1645)	55 / (52)	217
355/Jones Bridge	1377 / (1769)	57 / (105)	266	1366 / (1414)	41 / (49)	146
185/Jones Bridge[1]	1860 / (1955)	146 / (194)	677	1503 / (1755)	85 / (148)	467
TOTAL			1718			949

As indicated in Table 2, the proposed improvements will result in CLV volumes lower than the 1600 congestion standard for the Bethesda/Chevy Chase policy area at all intersections except for at the MD 355/Cedar intersection. At this location, however, the operational analysis indicates that the delay per vehicle will be reduced to less than 80 seconds per vehicle (and therefore in the LOS E, rather than LOS F, range). This intersection is also recommended for an ultimate grade separated interchange in the Bethesda/Chevy Chase Master Plan. Because the interchange would likely require several years of planning, design, and engineering, the County Council and federal/state agencies determined during the EIS process that the interchange was not a suitable mitigation effort to meet the BRAC timeline.

The effect of the improvements will be to reduce total vehicular delay under the Total Build Conditions by about 45%. (Dynamic lane control, if implemented at MD 187/Cedar Lane, could reduce the total peak hour delay by another 29 hours.) Total vehicular delay under the Total Build Conditions will also be substantially lower than the current delay values shown in Table 1. The improvements provide sufficient additional mobility at the study area's most congested locations to mitigate the effects of BRAC and provide some additional infrastructure capacity for planned and contemplated growth at Metrorail and Purple Line stations.

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[1] For Phases 1, 2, and 3 combined, the "With Improvements" CLV during the AM peak hour would be 1452 and during the PM peak hour would be 1508. The PM peak period delay per vehicle would be reduced to 89 seconds and the weekday peak hour delay would be reduced to 327 hours.