ATTACHMENT C

Baltimore/Washington International Thurgood Marshall Airport

Hotel Environmental Review: Traffic Study

PREPARED FOR:

Maryland Aviation Administration

PREPARED BY:

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IN ASSOCIATION WITH:

Landrum & Brown, Inc.

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DRAFT

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1. Introduction

This study was prepared to provide traffic analyses and associated information needed to support the environmental review of a potential future terminal area hotel facility for Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall or the Airport). The analysis was conducted by Ricondo & Associates, Inc., (R&A), a subconsultant to Landrum & Brown, Inc. (L&B), as a task (Task Order No. 8) prepared under the Comprehensive Airport Facilities Planning Services Contract between the Maryland Aviation Administration (MAA) and L&B (Contract No: MAA-AE-11-002) for work at BWI Marshall and Martin State Airport.

Based on initial planning conducted to date, the hotel is anticipated to be a "first-class" facility providing approximately 250 guest rooms, food and beverage facilities, and approximately 12,500 square feet of state-of-the art conference and banquet facilities[1]. The general site configuration, access routes, and trip generation characteristics of the hotel site are based on analysis contained in the document "Terminal Area Hotel Planning Considerations," April 5, 2012, prepared by L&B and R&A. The hotel is planned to be located directly adjacent to the existing Hourly Garage on the site of the existing Main Terminal Employee Parking Lot.

The purpose of the study is to assess the potential traffic operational impacts associated with the hotel project which could result from (a) new trips associated with the hotel operation and (b) reallocation of existing employee parking trips resulting from modifications to the employee exit flow path to accommodate the implementation of the hotel. The analysis provides an assessment of existing (2012) traffic conditions and two future year conditions representing the first year of operation (assumed to be 2015) and opening-day plus five years (2020). Potential impacts were assessed by comparing the future "No-Action" traffic condition to anticipated future "With Project" traffic conditions for both of the future planning horizons.

The report is organized as follows:

- Section 2. Existing Conditions—Summarizes the existing conditions within the study area that would be affected by the hotel project.
- Section 3. Future Conditions—Summarizes the anticipated future conditions along the roadways and intersections that would accommodate traffic associated by the hotel.
- Section 4. Project Impact Analysis—Summarizes the estimated project-related impacts, if any.

[1] Source: Page 58 of *Market Analysis – Demand for Lodging Baltimore/Washington International Airport*, Ernst $ Associates, Inc., January 17, 2012.

2. Existing Conditions

2.1 Study Area

The study area depicted in **Exhibit 2-1** was defined to provide for an assessment of the anticipated traffic operations along the key roadways and intersections that would accommodate future hotel-related traffic. The boundaries of the study area are generally formed by (a) I-195 from Aviation Boulevard to the Hourly Garage, (b) the north side of the Hourly Garage, (c) Elm Road, to Terminal Road to Aviation Boulevard, and (d) Aviation Boulevard (MD 170) from Terminal Road to I-195. The terminal area arrivals and departures level curbside roadways are not included in the study area because hotel-related traffic entering and exiting the study area would have direct access to the hotel site and would, therefore, not access the departures or arrivals level curbside roadways.

Detailed traffic analysis has been conducted for the following roadways and intersection within the study area:

- I-195 Inbound/Outbound and Circulation Roadways
- Intersection of Aviation Boulevard and I-195 southbound on-ramp (to Airport)
- Intersection of Aviation Boulevard and I-195 northbound off-ramp (from Airport)
- Intersection of Terminal Road and Aviation Boulevard

2.2 Public and Employee Parking

The hotel facilities would be developed adjacent to the Hourly Garage on the site of the existing Main Terminal Employee Parking Lot. Because the hotel development would displace some of the employee parking capacity that is currently available, it is necessary to evaluate the existing capacity and demands for public and employee parking in the Terminal core area to identify any potential effects that the hotel project would have on future parking demands.

[Preliminary Draft for Discussion Purposes Only]

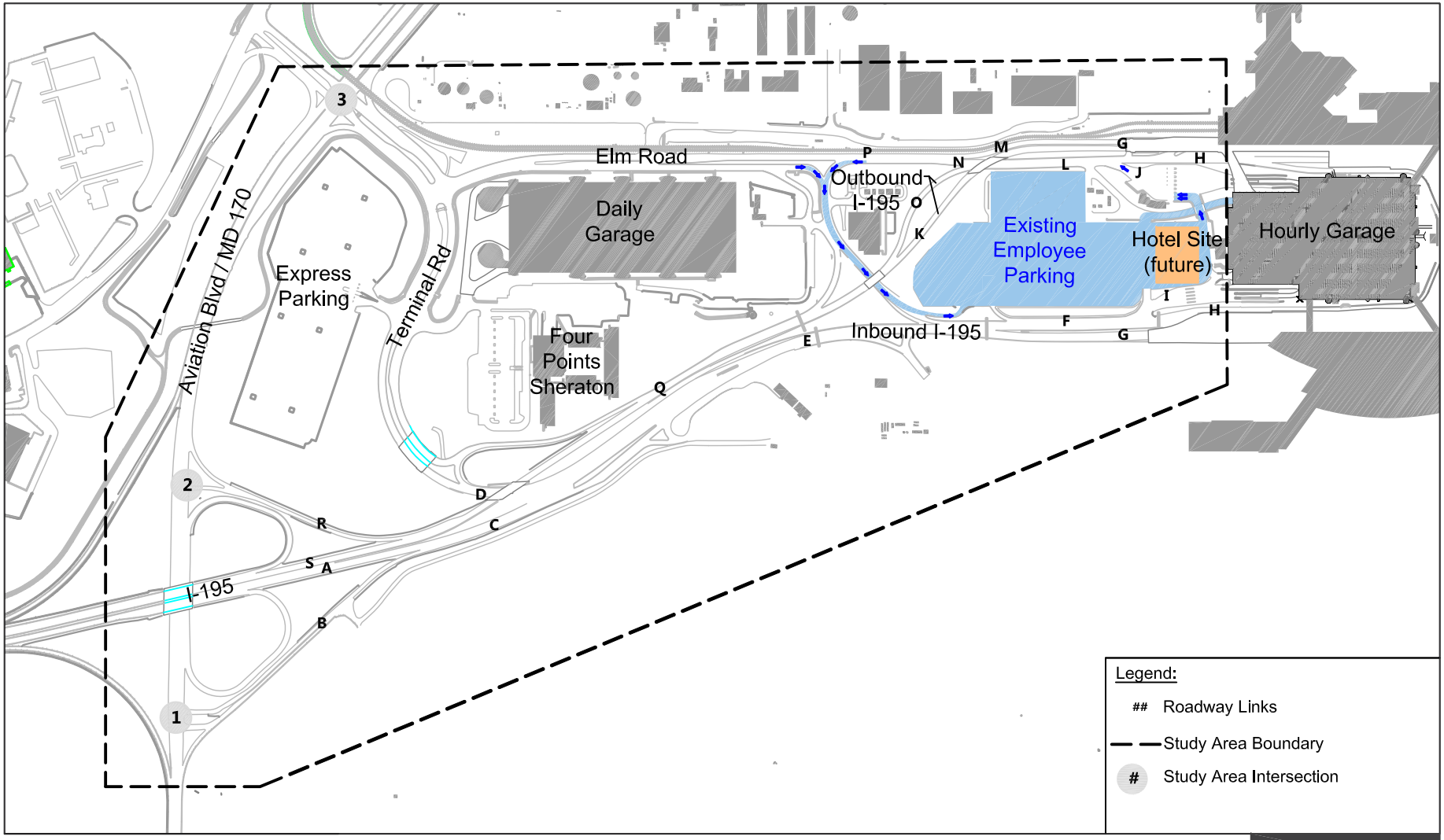


Exhibit 2-1

Source: Ricondo & Associates, Inc., January 2013.
Prepared by: Ricondo & Associates, Inc., January 2013.

NORTH 0 600 ft.

Traffic Analysis Study Area and Link Diagram

Drawing: N:\BWI\BWI - OnCall (11-08-0706)\08 - Hotel Analysis (MAA 17)\01 Initial Planning Phase\04 CADD\BWI-HOTEL Concepts_6_copy.dwg_Layout: Link Diagram_Jan 10, 2013, 5:16pm

The Hourly Garage is premium priced product offered within a six-level facility located adjacent to the main passenger terminal. The Hourly Garage is equipped with "smart parking" technology that guides patrons to available spaces. The Hourly Garage provides 5,400 parking spaces, with 5,000 spaces allocated for public parking and 400 spaces currently allocated for assigned employee parking. The Main Terminal Employee Parking Lot adjacent to the Hourly Garage accommodates approximately 1,200 spaces. **Table 2-1** provides a summary of total parking spaces provided and the existing demands for public and employee parking.

Table 2-1: Existing Public and Employee Parking Demand Estimates

	EXISTING CAPACITY	SPACE DEMAND
Public Parking—Hourly Garage [1/]	5,000	2,830
Surplus /(Deficit)	-	2,170
Employee Parking—Main Terminal Employee Parking Lot and Hourly Garage [2/]	1,600	1,000
Surplus /(Deficit)	-	600

NOTES:

1/ Hourly Garage total capacity of 5,400 spaces; however, 400 spaces on Level 3 are currently dedicated for employee parking use resulting in 5,000 spaces available for public parking. Source for Hourly Garage public parking demand is Table 9 from Final Report for *Task 10: BWI Marshall Taxicab/Shuttle Staging and Parking Lot Analysis; Subtask 2: Potential Public Parking Reuse of the Former West Tenant Lot*; June 2012, Ricondo & Associates, Inc.

2/ Existing capacity (400 spaces on Level 3 of the Hourly Garage + 1,200 surface spaces); Existing employee parking demand based on 400 occupied spaces in the Hourly Garage and 50% occupancy of the surface lot based on occupancy estimates provided by MAA staff on November 30, 2012.

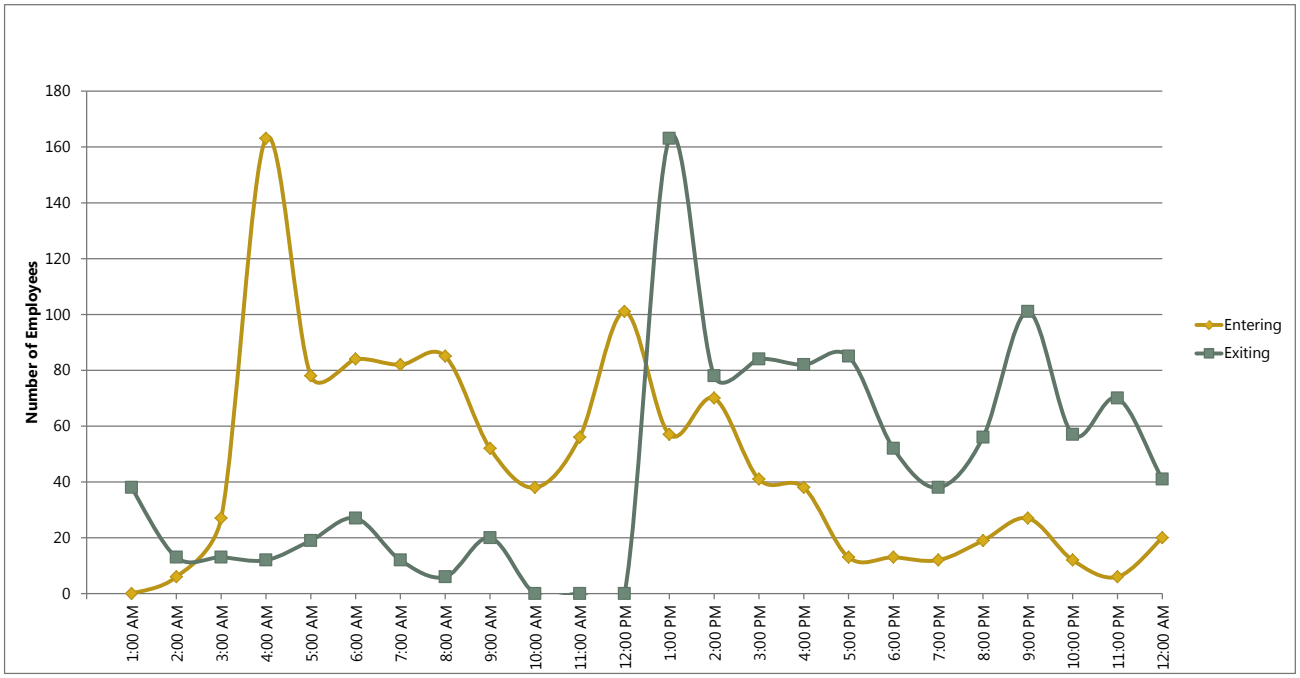
SOURCE: See footnotes above.
PREPARED BY: Ricondo & Associates, Inc., January 2013.

Employee parkers currently enter the Main Terminal Employee Parking Lot via a dedicated entrance provided at the north side of the lot that is accessed via Elm Road. Employees are provided a permit that determines whether they park in the surface lot or if they are eligible to drive through the lot to enter the parking structure and park within the dedicated spaces provided on Level 3 of the Hourly Garage. All employees parking in either the surface spaces or Hourly Garage are required to exit through the existing Main Parking Exit Plaza where one exit lane has been configured with an automated gate to allow free access from the employee parking area.

The MAA provided employee access data used to estimate traffic volumes entering the employee parking facilities during the week of November 4 through November 10, 2012. The access activity information was derived from proximity card data for employees accessing the Main Terminal Employee Parking Lot and dedicated spaces within the Hourly Garage. Based on a review of these data, the week day volumes ranged from 1,094 to 1,193 entries. **Exhibit 2-2** provides a chart of existing hourly volumes entering and exiting the employee parking facility on the Friday (November 9) when a total of 1,100 vehicles entered the employee parking lot. Data from Friday was selected because it correlates with the peak day of the week for on-airport roadway traffic. Because exiting volumes are not counted, the volumes exiting the lot were estimated based on the assumption that employees would depart on average nine hours after their arrival. As shown in the chart, it is estimated that approximately 170 employee vehicles enter the lot during the peak entry period

between 3:00 a.m. and 4:00 a.m. The peak exit period is estimated to occur nine hours later between 12:00 p.m. and 1:00 p.m.

Exhibit 2-2: Employee Hourly Entry and Exit Volumes - Friday November 9, 2012



NOTE: Entry volumes are based on MAA proximity card data for Friday November 9, 2012; exit volumes were estimated based on an assumed vehicle exit 9 hours after entering.

SOURCE: Maryland Aviation Administration, Ricondo & Associates, Inc.

PREPARED BY: Ricondo & Associates, Inc., December 2012.

2.3 Existing (2012) Roadway Volumes and Levels of Service

This section summarizes existing volumes, roadway capacity assumptions and estimated levels of service for the I-195 inbound/outbound roadways and terminal area roadways that would accommodate hotel-related traffic.

2.3.1 KEY ASSUMPTIONS

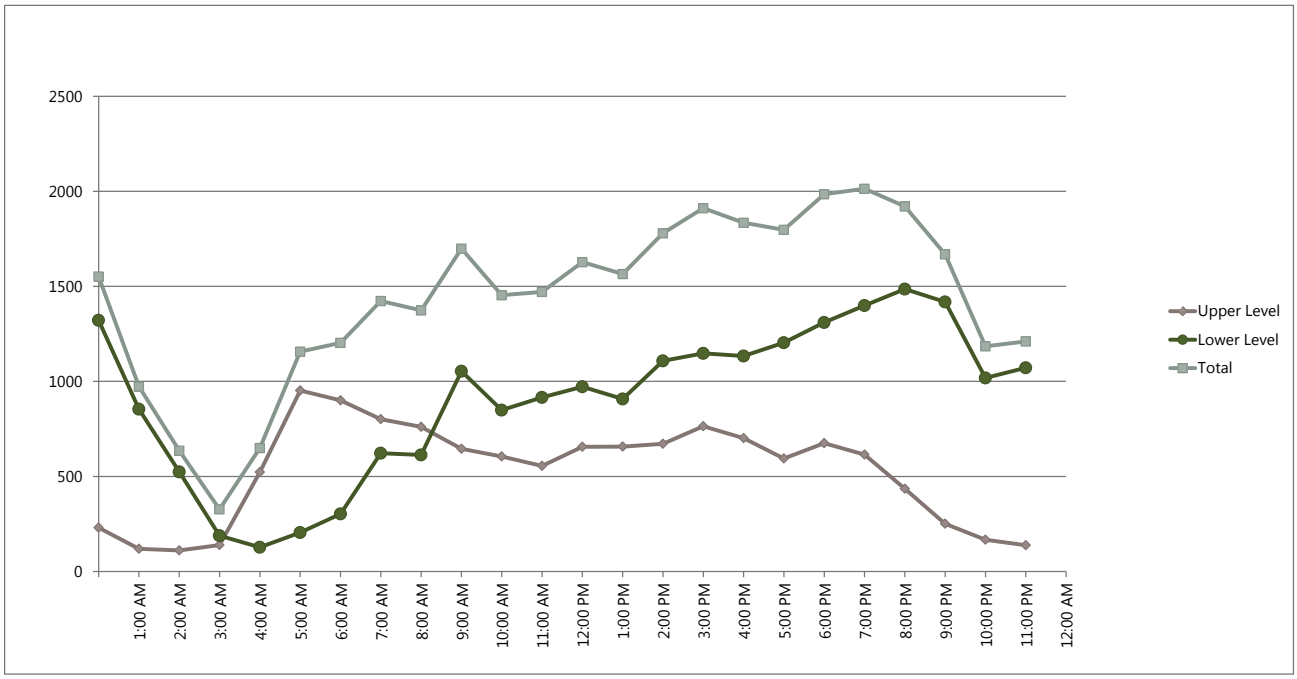
The general approach for estimating existing roadway traffic volumes and the key assumptions associated with the analysis of existing conditions are documented in this section.

2.3.1.1 Existing (2012) Terminal Area Volumes

The MAA conducts annual traffic counts of traffic volumes using the airport terminal area roadways during the peak summer months to assess changes in traffic volumes over time. The most recent data were obtained using automatic traffic recorder (ATR) counters placed on the terminal area outbound roadways during the

week of July 27 through August 2, 2012. Based on a review of these data, it was determined that the peak day occurred on Friday, July 27. **Exhibit 2-3** provides a summary of the hourly roadway volumes exiting the terminal area via the upper level roadways and the lower level roadways. The upper level roadways generally peak during the morning between 5:00 a.m. and 6:00 a.m. during the peak airline departures period; the lower level roadways (which include the volume from the Main parking exit plaza) peak during the evenings between 8:00 p.m. and 9:00 p.m. The overall peak hour volume occurred adjacent to the arrivals peak hour from 7:00 p.m. to 8:00 p.m. Based on a review of these data, the volumes obtained during the overall peak hour were used as a basis for estimating background traffic volumes using the study area roadways and for assessing potential operational impacts associated with the project.

Exhibit 2-3: Exiting Traffic Summary - July 27, 2012



SOURCE: *BWI Marshall, Summer 2012 Traffic Count*, AECOM, August 17, 2012.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

2.3.1.2 Roadway Capacity and Level of Service Assumptions

In order to analyze the operating conditions along the Airport roadway system, the calculated volume for each roadway link is compared to the capacity of the roadway at that particular location. The capacities of the roadway segments are determined based on the characteristics of the roadway segment and the number of travel lanes provided. Based on the Highway Capacity Manual, Special Report 209, the theoretical capacity of a roadway is the maximum hourly flow rate per lane under "ideal" conditions comprised of (a) uninterrupted flow, (b) all passenger cars comprised of drivers that are frequent users of the roadway, (c) 12-foot minimum lane width, (d) relatively flat grades with minor curvature, and (e) optimal lateral clearance between the edge

of lane and from nearby obstacles and walls. Theoretical capacity under these conditions is 2,200 passenger cars per hour per lane (pcphpl).

For airport roadways, however, capacities are significantly lower as many of the "ideal" conditions listed above cannot be attained. For example, drivers are often unfamiliar with the roadway system. Also, increased interaction and impedances between vehicles usually results in drivers slowing to change lanes or maneuver in response to signage describing multiple on-airport destinations occurring over relatively short distances. Because airports accommodate relatively intense activity occurring over a relatively compact area, airport roadway geometry (e.g., grades, horizontal curvature) is often more constrained than would be desired resulting in reduced capacities as compared with non-airport roadways.

The assumed capacities for the airport roadways are depicted in **Table 2-2**. As shown in the table, the roadway capacities are higher for roadways providing primary access to an airport where speeds are higher and decision points are more widely spaced. Capacities are reduced for roadway facilities with lower speeds experiencing increased turbulence, as described previously, characterized as roadways providing access to the terminal areas and circulation around the terminals.

Table 2-2: Level of Service Ranges

		MAXIMUM FLOW RATES (VEHICLES/HOUR/LANE) [1/]				
TYPICAL ROADWAY CLASSIFICATION [2/]	MAXIMUM FREE FLOW SPEED (MPH) [2/]	A	B	C	D	E
Airport access highway	60	630	1,030	1,460	1,880	2,090
	55	520	850	1,220	1,580	1,800
Entry/Exit roadway	50	450	730	1,050	1,390	1,620
	45	400	660	950	1,260	1,530
Terminal Loop roadway	40	370	600	860	1,130	1,410
	35	340	540	790	1,030	1,290
Terminal access roadway	30	310	480	700	930	1,170
	25	250	400	600	800	1,010
Ramps (25 mph or less)	15	250	400	600	800	1,010

NOTES:

1/ Flow rates adjusted for heavy vehicles and the effect of unfamiliar drivers.

2/ The roadway classification and associated speeds represent a typical range that will vary by airport.

SOURCE: (a) Exhibit 21-2, Transportation Research Board, National Research Council, Highway Capacity Manual, December 2000, and (b) Airport Cooperative Research Program, Report 40, Airport Curbside and Terminal Area Roadway Operations, Airport Cooperative Research Program, 2010.

PREPARED BY: Ricondo & Associates, Inc., December 2012.

To assess the ability of the Airport roadway system to accommodate future traffic volumes, the Level of Service (LOS) of each roadway section was determined. The LOS describes the operating performance of a roadway, measured quantitatively and reported on a scale of "A" to "F." LOS A represents the optimal operating condition, characterized by uninterrupted free flow operations. At the other end of the scale, LOS F represents the worst operating condition, characterized by severe roadway congestion and delay. For purposes of this study in analyzing existing and future traffic activity levels using the terminal area roadways, LOS D conditions or better are considered to be acceptable.

2.3.2 EXISTING ROADWAY VOLUMES AND LEVEL OF SERVICE ANALYSIS

The existing volumes, roadway capacity assumptions and resulting levels of service for existing (2012) peak hour conditions are summarized in **Table 2-3**. As shown in the table, all of the study area roadway links are anticipated to operate at an acceptable level of service (LOS D or better) during the 2012 peak hour.

Table 2-3: Existing Roadway Volumes and Levels of Service

LINK	SPEED LIMIT	# LANES	CAPACITY 1/	HOURLY VOLUME	DAILY TRAFFIC VOLUMES 2/ 3/	V/C	LOS
A	30	2	2,340	922	15,863	0.394	B
B	30	1	1,170	851	14,643	0.728	D
C	30	2	2,340	1,774	30,506	0.758	D
D	30	2	2,340	530	9,112	0.226	A
E	30	3	3,510	2,304	39,618	0.656	D
F	15	3	3,030	1,689	29,042	0.557	C
G	15	2	2,020	615	12,665	0.304	B
H	15	2	2,020	1,486	21,754	0.736	D
I	15	1	1,010	203	3,486	0.201	A
J	30	1	1,170	346	6,062	0.296	B
K	30	1	1,170	699	9,443	0.597	C
L	30	2	2,340	1,832	31,505	0.783	D
M	30	1	1,170	137	3,222	0.117	A
N	30	1	1,170	301	5,610	0.257	A
O	50	1	1,620	1,098	16,144	0.678	D
P	30	2	2,340	438	8,832	0.187	A
Q	45	2	3,060	1,576	25,587	0.515	C
R	30	1	1,170	484	8,321	0.414	C
S	45	2	3,060	1,092	18,782	0.357	B

NOTES:

1/ Capacity is defined as the maximum volume that can be accommodated to provide LOS E based on the maximum free-flow speeds defined previously in Table 2-2 multiplied by the number of lanes within the roadway section.

2/ Estimated daily traffic volumes are not required for the traffic analysis but are provided for informational purposes.

3/ Daily volume estimates were calculated using a peak hour factor of 0.058 derived from analysis of hourly volumes from the Summer 2012 traffic counts.

SOURCE: *BWI Marshall, Summer 2012 Traffic Count*, AECOM, August 17, 2012; Ricondo & Associates, Inc.
PREPARED BY: Ricondo & Associates, Inc., January 2013.

2.4 Existing (2012) Intersection Volumes and Levels of Service

This section summarizes existing intersection volumes and estimated levels of service the three terminal area intersections that would accommodate traffic related to the development of the hotel project.

2.4.1 KEY ASSUMPTIONS

The general approach for estimating existing roadway intersection volumes and the key assumptions associated with the analysis of existing conditions are documented in this section.

2.4.1.1 Intersection Turning Movement Volumes

Existing (2012) turning movement counts for the three study area intersections were estimated using the most recent available turning movement counts that were collected for the Long Range Needs Assessment[2]. These turning movement counts, which were collected in 2005, were adjusted to represent 2012 traffic volumes. Specifically, the volumes were increased based on the assumption that the intersection turning movements would increase in proportion to the growth in annual airline passenger activity between 2005 and 2012 (i.e., an adjustment factor of 1.11 was applied, calculated as the ratio of 10.8 million annual passengers in 2012 divided by 9.71 million annual passengers in 2005).

The intersection traffic volume counts were further adjusted to reflect the increase in traffic associated with employee vehicle parking in the terminal area in 2012 as compared to 2005, when approximately 125 vehicles parked in the Tenant Manager's Lot during terminal area during a typical busy day[3]. Existing (2012) employee related peak hour volumes are depicted in **Table 2-4**. Based on the assumption that parking entry and exit volumes are correlated with parking space demands, it is estimated that the intersection counts from 2005 included approximately 14 percent of the employee traffic volumes depicted in the table (i.e., 125 occupied spaces in 2005 divided by 900 occupied spaces in 2012); therefore, the net difference in "growth" from 2005 to 2012, represented by 86 percent of the existing 2012 employee volumes, was added to the adjusted 2012 volumes.

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2 Table 14-15, *Facility Needs Assessment, BWI Long Range Needs Assessment.* March 2007.

3 Table 3-44, *Facility Needs Assessment, BWI Long Range Needs Assessment*. March 2007.

Table 2-4: Employee 2012 Peak Hour Vehicle Trips

	PEAK EMPLOYEE HOURS		COMMUTER PEAK HOURS		
	INBOUND 3-4 AM	OUTBOUND 12-1 PM	MORNING 7-8 AM	AFTERNOON 5-6 PM	AIRPORT PEAK HOURS 7-8 PM
Enter Parking	170	60	90	20	20
Exit Parking 1/	20	170	10	60	60

NOTE:

1/ Exit volumes estimated based on an assumed departure 9 hours after entering.

SOURCE: MAA proximity card data for Friday November 9, 2012.

PREPARED BY: Ricondo & Associates, Inc., December 2012.

The incremental increase in employee vehicle volumes were then assigned to the intersections in proportion to the regional approach distributions for traffic accessing the Airport. The assumed regional approach/departure distribution patterns for inbound and outbound traffic during the a.m. and p.m. peak hours are depicted in **Table 2-5**.

Table 2-5: Regional Approach / Departure Distribution

	DISTRIBUTION 1/			
	IN		OUT	
	AM	PM	AM	PM
I-195 West	50%	49%	77%	65%
Aviation Boulevard (MD-170) South	37%	30%	10%	11%
Aviation Boulevard (MD-170) South	13%	21%	13%	24%
Total	**100%**	**100%**	**100%**	**100%**

NOTE:

1/ Based on historical turning movement volumes and 2012 link volumes.

SOURCE: *BWI Marshall, Summer 2012 Traffic Count*, AECOM, August 17, 2012; *Facility Needs Assessment, BWI Long-Range Needs Assessment*. March 2007.

PREPARED BY: Ricondo & Associates, Inc., December 2012.

Table 2-6 summarizes the resulting existing 2012 peak hour intersection volumes. Consistent with the analysis prepared for the *BWI Long Range Needs Assessment*, the volumes represent peak intersection activity periods during the a.m. commuter peak hour (7:00 a.m. to 8:00 a.m.) and during the evening commuter peak hour (5:00 p.m. to 6:00 p.m.) when the combined effects of Airport-related traffic and background traffic unrelated to the Airport are greatest. The table also depicts the current lane geometry at each of the intersections. All three of the intersections are signalized.

Table 2-6 (1 of 2): Existing (2012) Intersection Lane Geometry and Peak Hour Volumes

				LANE GEOMETRY						AM		PM	
	INTERSECTION		DIRECTION	L	LT	T	RT	R		PEAK HOUR VOLUME [1/]	DAILY VOLUME [2/]	PEAK HOUR VOLUME [1/]	DAILY VOLUME [2/]
1	I-195/MD-170 Interchange (South Intersection)	MD 170	NB	-	-	2	-	-	Left	-		-	
									Through	1,137	19,548	1,524	28,238
									Right	-		-	
			SB	1	-	2	-	-	Left	202		353	
									Through	258	7,905	526	16,281
									Right	-		-	
			EB	-	-	-	-	-	Left	-		-	
									Through	-	-	-	-
		Aviation Blvd							Right	-		-	
									Left	-		-	
			WB	-	-	-	-	-	Through	-	-	-	-
									Right	-		-	
2	I-195/MD-170 Interchange (North Intersection)	MD 170	NB	-	-	2	-	-	Left	-		-	
									Through	1,446	24,866	1,029	19,070
									Right	-		-	
			SB	-	-	2	-	-	Left	-		-	
									Through	291	4,998	650	12,049
									Right	-		-	
			EB	-	-	-	-	-	Left	-		-	
									Through	-	-	-	-
		I-195 Ramp							Right	-		-	
									Left	169		228	
			WB	1	-	-	-	-	Through	-	2,907	-	4,232
									Right	-		-	

Table 2-6 (2 of 2): Existing Intersection Lane Geometry and Peak Hour Volumes

			LANE GEOMETRY						AM		PM	
	INTERSECTION	DIRECTION	L	LT	T	RT	R		PEAK HOUR VOLUME 1/	DAILY VOLUME 2/	PEAK HOUR VOLUME 1/	DAILY VOLUME 2/
3	Aviation Blvd and Elm Road	NB	2	-	1	-	1	Left	16		73	
								Through	66	5,286	87	12,114
								Right	226		493	
		Elm Road						Left	-		-	
		SB	-	-	-	-	-	Through	62	4,405	204	7,593
								Right	194		206	
								Left	395		418	
		EB	2	-	2	-	1	Through	852	25,824	702	23,217
								Right	254		134	
		Aviation Blvd						Left	302		463	
		WB	2	-	2	-	-	Through	508	13,927	1,138	29,674
								Right	-		-	

NOTES:

1/ Based on intersection counts from the Long Range Needs Assessment increased by 11% based on the assumption will increase in proportion to the change in airline passenger activity from 2005 to 2012; includes adjustment for addition of employee volumes

2/ Daily volume calculated using a peak hour factor of 0.058 derived from analysis of hourly volumes from the Summer 2012 traffic counts.

SOURCE: *Facility Needs Assessment, BWI Long-Range Needs Assessment*. March 2007; *BWI Marshall, Summer 2012 Traffic Count*, AECOM, August 17, 2012; Ricondo & Associates, Inc.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

2.4.2 INTERSECTION CAPACITY AND LEVEL OF SERVICE THRESHOLDS

Level of service for the signalized intersections was calculated using Circular 212 Critical Movement Analysis (CMA) methodology for all study area intersections. Level of service is a qualitative measure that describes traffic operating conditions at a signalized intersection (e.g., delay, queue lengths, congestion). Intersection levels of service range from LOS A (i.e., excellent conditions with little or no vehicle delay) to LOS F (i.e., excessive vehicle delays and queue lengths). Level of service definitions for the CMA methodology, which is based on the estimated intersections critical volume divided by the intersection capacity (v/c ratio), are presented in **Table 2-7**. For purposes of this study in analyzing existing and future traffic activity levels in the study area intersections, LOS D conditions or better are considered to be acceptable.

Table 2-7: Level of Service Threshold and Definitions for Signalized Intersections

LEVEL OF SERVICE	VOLUME/CAPACITY RATIO	DEFINITION
A	0.000 - 0.600	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.601 - 0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.701 - 0.800	GOOD. Occasionally, drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.801 - 0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.901 - 1.000	POOR. Represents the most vehicles that intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	Greater than 1.000	FAILURE. Backups from nearby intersections or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

SOURCE: Transportation Research Board, Interim Materials on Highway Capacity, Transportation Research Circular No. 212, January 1980.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

2.4.3 EXISTING INTERSECTION VOLUMES AND LEVELS OF SERVICE

The estimated levels of service (LOS) for existing (2012) peak hour traffic conditions are provided in **Table 2-8**. As shown in the table, all of the intersections are currently operating at an acceptable level of service (LOS D or better) during the a.m. and p.m. peak hours.

Table 2-8: Existing Conditions Intersection Volumes and Levels of Service

		2012		
NUMBER	INTERSECTION	PEAK HOUR	V/C	LOS
1	I-195/MD-170 Interchange (South Intersection)	AM Peak	0.560	A
		PM Peak	0.811	D
2	I-195/MD-170 Interchange (North Intersection)	AM Peak	0.649	B
		PM Peak	0.540	A
3	Aviation Blvd and Elm Road	AM Peak	0.501	A
		PM Peak	0.718	C

SOURCE: *Facility Needs Assessment, BWI Long-Range Needs Assessment*. March 2007.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

3. Future Conditions

Traffic analyses were prepare for two future year conditions representing the first year of operation for the hotel project (assumed to be 2015) and opening-day plus five years (2020). This section documents the analysis of two operational conditions for both future horizon years. The future "No-Action" alternative provides a representation of traffic operations based on the assumption that the project site would continue to operate as it is currently configured. The future "With Project" alternative provides a representation of traffic operations based on the assumption that the hotel project is implemented and the exit route from the employee parking facilities is modified such that employees would exit the site via Elm Road, rather than through the existing parking exit plaza as currently provided.

3.1 Public and Employee Parking Space Demands

Public and employee parking demand estimates were prepared to ensure that the Hourly Garage would provide adequate capacity through the 2020 planning horizon such that the employee parking currently provided in the Hourly Garage could remain in place. In addition, the analysis is required to ensure that the demand for employee parking could continue to grow even with the reduction of parking capacity as required to accommodate the hotel and associated parking.

Estimated future public and employee parking demands are depicted in **Table 3-1**. As shown in the table, it is estimated that the demand for public parking in the Hourly Garage on an average busy day during the peak month of July 2020 would equate to 3,520 spaces, which represents an occupancy level of approximately 70 percent. It is also estimated that the site would provide adequate parking capacity to accommodate the demand for employee parking through 2020. As shown, it is estimated that a surplus of 110 employee parking spaces would be available in 2020.

Table 3-1: Future Public and Employee Parking Demand Estimates

			SPACE DEMAND		
	EXISTING CAPACITY	FUTURE CAPACITY	2012	2015	2020
Public Parking—Hourly Garage [1/]	5,000	5,000	2,830	3,080	3,520
Surplus /(Deficit)	-		2,170	1,920	1,480
Employee Parking—Main Terminal Employee Parking Lot and Hourly Garage [2/]	1,600	1,360	1,000	1,080	1,250
Surplus /(Deficit)	-		600	280	110
Million Annual Enplaned Passengers (MAEP) 3/			**10.8**	**11.7**	**13.5**

NOTES:

1/ Hourly Garage total capacity of 5,400 spaces; however, 400 spaces on Level 3 are currently dedicated for employee parking use resulting in 5,000 spaces available for public parking. Source for Hourly Garage public parking unconstrained demand is Table 9 from Final Report for *Task 10: BWI Marshall Taxicab/Shuttle Staging and Parking Lot Analysis; Subtask 2: Potential Public Parking Reuse of the Former West Tenant Lot*; June 2012, Ricondo & Associates, Inc. Demands represent an unconstrained condition based on the assumption that the differential in parking rates between parking products and between on- and off-airport parking facilities will not change such that future parking demands would shift between parking products (i.e., the demands within all parking products would increase at the same growth rate).

2/ Existing employee parking capacity (400 spaces on Level 3 of the Hourly Garage + 1,200 surface spaces) assumed to be reduced by 240 spaces to accommodate the hotel; Existing employee parking demand based on 400 occupied spaces in the Hourly Garage and 50% occupancy at the surface lot based on information provided by MAA staff on November 30, 2012.

3/ Source: Federal Aviation Administration Terminal Area Forecast (TAF)

SOURCE: See footnotes above.

PREPARED BY: Ricondo & Associates, Inc., January 2013.

3.2 Future "No-Action" Traffic Conditions

Future "No-Action" conditions represent the traffic volumes and resulting operational conditions that would be expected within the study area if the site continued to function as currently configured and the hotel were not implemented.

3.2.1 KEY ASSUMPTIONS

It is assumed that growth in roadway traffic activity is directly correlated to the growth in origination-destination (O&D) passengers at the Airport. The connecting ratio at the airport is assumed to remain fixed at

its current rate through the 2020 planning horizon, thus the growth rate for enplanements would be equal to the growth rate for O&D activity. Therefore, future year "No-Action" roadway and intersection volumes were prepared based on the assumption that the existing (2012) roadway traffic volumes defined in the previous section would increase in proportion with the growth rate consistent with the most recent Terminal Area Forecast (TAF) for the Airport.

3.2.2 FUTURE "NO-ACTION" ROADWAY VOLUMES AND LEVELS OF SERVICE

The estimated levels of service (LOS) for future "No-Action" peak hour traffic conditions for the study area roadways are provided in **Table 3-2**. As shown in the table, the following roadway segments are anticipated to operate at an unacceptable level of service (LOS E or worse):

- Link B—Anticipated to operate at LOS E in 2020.
- Link C—Anticipated to operate at LOS E in 2015 and 2020.
- Link H—Anticipated to operate at LOS E in 2015 and 2020.
- Link L—Anticipated to operate at LOS E in 2015 and 2020
- Link O—Anticipated to operate at LOS F in 2015 and 2020

3.2.3 FUTURE "NO-ACTION" INTERSECTION VOLUMES AND LEVELS OF SERVICE

The estimated levels of service (LOS) for future "No-Action" peak hour traffic conditions for the study area intersections are provided in **Table 3-3**. As shown in the table, the following intersection is anticipated to operate at an unacceptable level of service (LOS E or worse):

- I-195 / MD-170 Interchange (South Intersection)—Anticipated to operate at LOS E during the 2020 p.m. peak hour.

3.3 Future "With-Project" Traffic Conditions

Future "With Project" conditions represent the traffic volumes and resulting operational conditions that would be expected within the study area if the hotel project is implemented and the exit route from the employee parking facilities is modified such that employees would exit the site via Elm Road, rather than through the existing Main Parking Exit Plaza as currently provided.

3.3.1 KEY ASSUMPTIONS

3.3.1.1 Project Site Layout and Access

Exhibit 3-1 depicts the existing site layout and the proposed site improvements. As shown on the left side of the exhibit, the site is currently used for employee parking. Employee vehicles enter the site via Elm Road. Upon entering the site, employees have the ability to park in the surface lot or drive into a portion of the Hourly Garage that has been segmented from the public parking supply for use as employee parking. Upon exiting the site, employees drive through the existing exit plaza where they then have the option to exit the Airport via I-195, or drive to Elm Road.

Table 3-2: Future "No Action" Roadway Volumes and Levels of Service

				HOURLY TRAFFIC VOLUME		DAILY TRAFFIC VOLUMES [2/ 3/]		V/C		LOS	
LINK ID	SPEED LIMIT (MPH)	# LANES	CAPACITY [1/]	2015	2020	2015	2020	2015	2020	2015	2020
A	30	2	2,340	994	1,105	17,090	18,996	0.425	0.472	C	C
B	30	1	1,170	917	1,020	15,775	17,535	0.784	0.871	D	**E**
C	30	2	2,340	1,911	2,124	32,865	36,530	0.817	0.908	**E**	**E**
D	30	2	2,340	571	635	9,817	10,912	0.244	0.271	A	B
E	30	3	3,510	2,482	2,759	42,682	47,442	0.707	0.786	D	D
F	15	3	3,030	1,819	2,022	31,288	34,777	0.600	0.667	D	D
G	15	2	2,020	663	736	11,394	12,665	0.328	0.365	B	B
H	15	2	2,020	1,601	1,779	27,532	30,602	0.793	0.881	**E**	**E**
I	15	1	1,010	218	243	3,756	4,175	0.216	0.240	A	A
J	30	1	1,170	373	414	6,410	7,125	0.319	0.354	B	B
K	30	1	1,170	753	837	12,951	14,395	0.644	0.715	D	D
L	30	2	2,340	1,974	2,194	33,942	37,727	0.843	0.938	**E**	**E**
M	30	1	1,170	148	164	2,538	2,821	0.126	0.140	A	A
N	30	1	1,170	324	360	5,577	6,199	0.277	0.308	B	B
O	30	1	1,620	1,183	1,315	20,343	22,612	1.011	1.124	**F**	**F**
P	30	2	2,340	472	525	8,115	9,020	0.202	0.224	A	A
Q	45	2	3,060	1,698	1,887	29,199	32,455	0.555	0.617	C	C
R	30	1	1,170	521	579	8,964	9,964	0.446	0.495	C	C
S	45	2	3,060	1,177	1,308	20,235	22,492	0.385	0.427	B	B

NOTES:

1/ Capacity is defined as the maximum volume to provide LOS E based on speed limit and number of lanes as defined in table 2-2

2/ Daily traffic volumes are not required for the traffic analysis but are provided for informational purposes

3/ Daily volume calculated using a peak hour factor of 0.058 derived from analysis of hourly volumes from the Summer 2012 traffic counts.

SOURCE: Ricondo & Associates, Inc.

PREPARED BY: Ricondo & Associates, Inc., December 2012.

Table 3-3: Future "No Action" Intersection Volumes and Levels of Service

					2015								2020							
					AM				PM				AM				PM			
	INTERSECTION		DIRECTION		PEAK HOUR VOLUME 1/	V/C	LOS	DAILY VOLUME 2/	PEAK HOUR VOLUME 1/	V/C	LOS	DAILY VOLUME 2/	PEAK HOUR VOLUME 1/	V/C	LOS	DAILY VOLUME 2/	PEAK HOUR VOLUME 1/	V/C	LOS	DAILY VOLUME 2/
1	I-195/MD-170 Interchange (South Intersection)	MD 170	NB	Left	-	0.603	B		-	0.873	D		-	0.670	B		-	0.969	**E**	
				Through	1,225			21,060	1,642			28,238	1,361			23,408	1,819			31,281
				Right	-				-				-				-			
			SB	Left	217				380				241				423			
				Through	278			8,517	566			16,281	309			9,466	623			17,980
				Right	-				-				-				-			
		Aviation Blvd	EB	Left	-				-				-				-			
				Through	-			-	-			-	-			-	-			-
				Right	-				-				-				-			
			WB	Left	-				-				-				-			
				Through	-			-	-			-	-			-	-			-
				Right	-				-				-				-			
2	I-195/MD-170 Interchange (North Intersection)	MD 170	NB	Left	-	0.699	B		-	0.582	A		-	0.776	C		-	0.636	B	
				Through	1,558			26,789	1,109			19,070	1,731			29,777	1,216			20,915
				Right	-				-				-				-			
		I-195 Ramp	SB	Left	-				-				-				-			
				Through	313			5,385	701			12,049	348			5,986	779			13,393
				Right	-				-				-				-			
			EB	Left	-				-				-				-			
				Through	-			-	-			-	-			-	-			-
				Right	-				-				-				-			
			WB	Left	182				246				202				267			
				Through	-			3,131	-			4,232	-			3,481	-			4,587
				Right	-				-				-				-			
3	Aviation Blvd and Elm Road	Elm Road	NB	Left	17	0.540	A		79	0.774	C		19	0.600	B		88	0.860	D	
				Through	71			5,695	94			12,114	79			6,330	104			13,210
				Right	244				532				271				576			
		Aviation Blvd	SB	Left	-				-				-				-			
				Through	67			4,746	220			7,593	75			5,275	244			8,440
				Right	209				222				232				247			
			EB	Left	426				450				473				500			
				Through	918			27,821	756			23,217	1,020			30,924	840			25,525
				Right	274				144				305				144			
			WB	Left	325				499				362				551			
				Through	547			15,004	1,226			29,674	608			16,677	1,363			32,910
				Right	-				-				-				-			

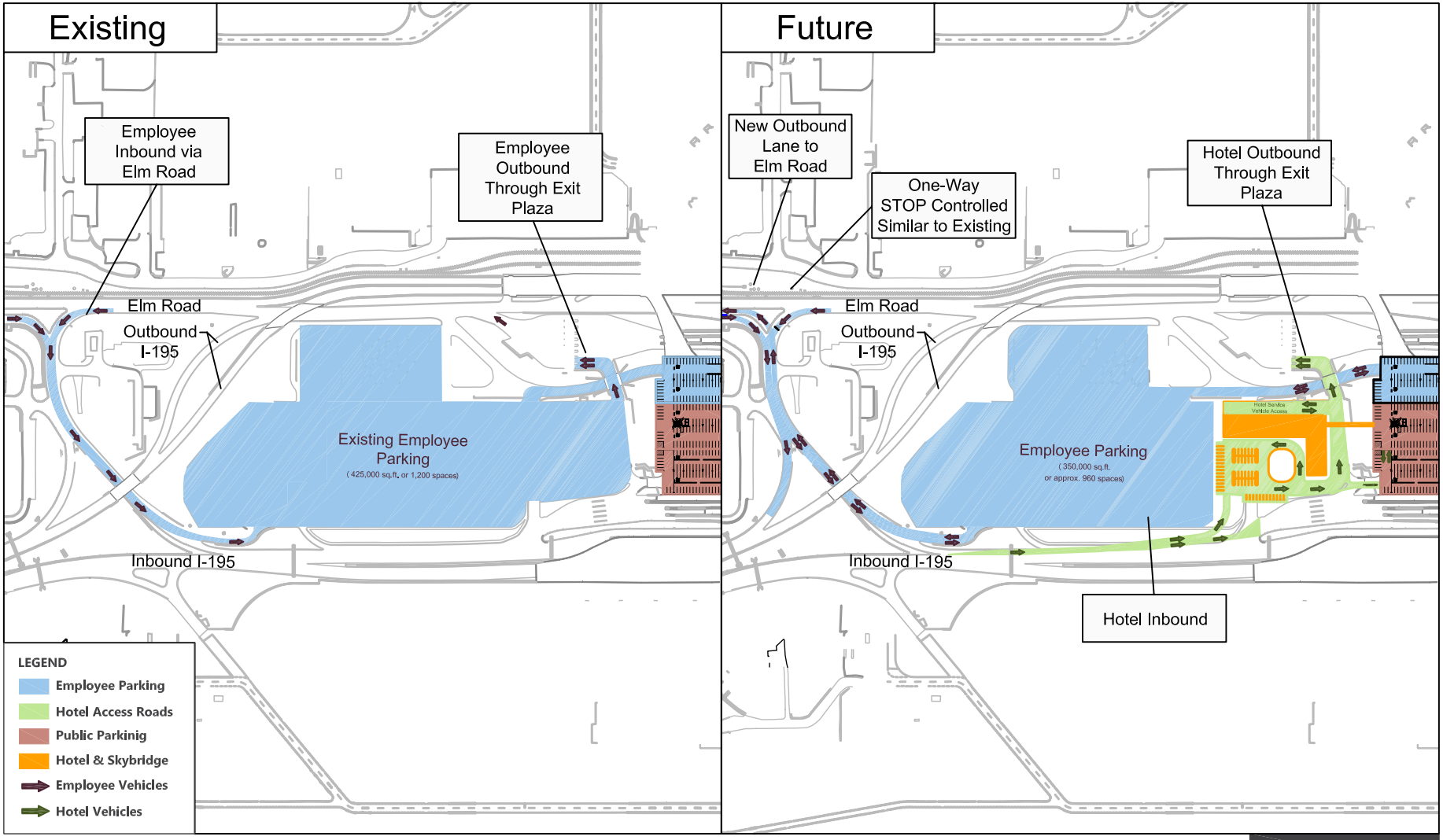
NOTES:

1/ Based on intersection counts from the Long Range Needs Assessment increased by 11% based on the assumption will increase in proportion to the change in airline passenger activity from 2005 to 2012; includes adjustment for addition of employee volumes

2/ Daily volume calculated using a peak hour factor of 0.058 derived from analysis of hourly volumes from the Summer 2012 traffic counts.

SOURCE: *Facility Needs Assessment, BWI Long-Range Needs Assessment*. March 2007; Ricondo & Associates, Inc.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

[Preliminary Draft for Discussion Purposes Only]



SOURCE: Maryland Aviation Administration, Ricondo & Associates, Inc., December 2012.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

EXHIBIT 3-1

NORTH 0 400 ft.

Project Site Layout and Access

Drawing: N:\BWI\BWI - OnCall (11-08-0706)\08 - Hotel Analysis (MAA 17)\01 Initial Planning Phase\04 CADD\BWI-HOTEL Concepts_6.DWG_Layout: Exhibit 1 + Existing_Jan 11, 2013, 2:13pm

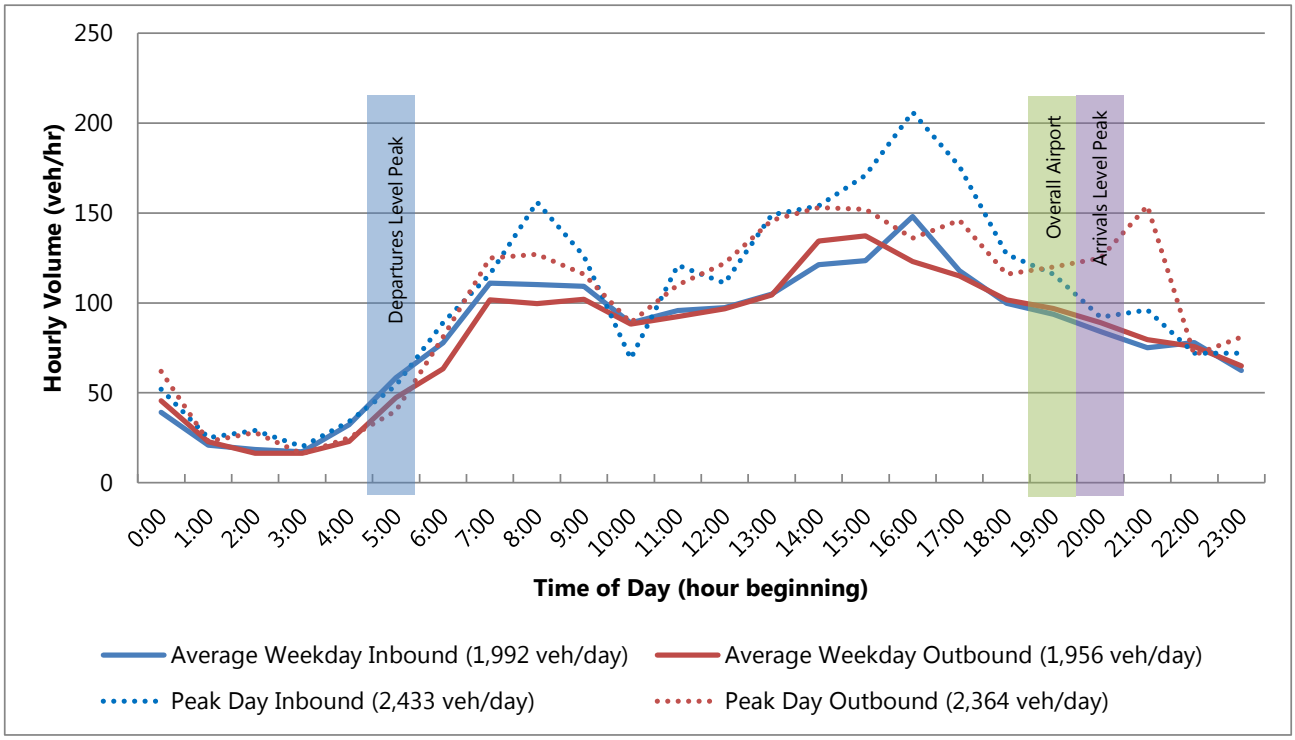
The future hotel site and associated changes to the employee parking lot are depicted on the right side of the exhibit. Hotel traffic would access the study area via I-195 and enter the site through a slip ramp that is shared with the public parking entrance. Hotel traffic would circulate within the site and then exit via the parking exit plaza which may require modification to accommodate hotel traffic and hotel service vehicles that would exit the site. All employee traffic would enter the site and exit the site via a dedicated driveway that provides a direct connection with Elm Road.

3.3.1.2 Project Site Trips and Parking Requirements

Airport hotels are unique as compared to off-airport hotels given that a large proportion of the hotel guests and visitors attending conferences and meetings arrive by airline rather than drive to the airport. Therefore, trip generation characteristics from non-airport hotels depicted in sources such as the ITE Trip Generation Manual must be adjusted to represent the unique characteristics of an airport hotel.

For purposes of estimating trip generation characteristics for an airport hotel of similar characteristics to the hotel envisioned for BWI, hourly inbound and outbound trip volumes were obtained for the Hilton Boston Logan Airport which is located within the terminal area at Boston-Logan International Airport (BOS). The hourly inbound and outbound trips are depicted on **Exhibit 3-2**. The exhibit depicts both average hourly weekday volumes (solid lines) and the maximum hourly volume occurring each hour of the day for all days of data collected May 28 through June 6, 2008 (dashed lines). As shown, the peak hourly inbound volume on an average weekday was 148 vehicles per hour at 4:00 p.m. The peak hourly outbound volume on an average weekday was 137 vehicles per hour at 3:00 p.m. The maximum hourly volume that occurred within each hour over the data collection period is also depicted on the chart for informational purposes and to illustrate that the peak conditions do not generally overlap with the airport peak hours highlighted on this chart, based on the assumption that the peaking characteristics of the BOS example are applicable to other airports and BWI in particular.

Exhibit 3-2: Vehicle Traffic at Hilton Boston Logan



SOURCE: Massachusetts Port Authority
PREPARED BY: Ricondo & Associates, Inc., December 2012.

Table 3-4 summarizes the hotel characteristics and vehicle trip rates from the BOS hotel example. As shown the BOS hotel has 599 guest rooms and 30,000 square feet of conference space. While the BWI hotel is anticipated to be smaller with 250 guest rooms and approximately 12,500 square feet of conference space, interestingly the relationship of guest rooms to conference space is equivalent for both hotels. Assuming that the trip generation characteristics of the BOS hotel (i.e., vehicle trips per guest room) are applicable to BWI, then it can be estimated that the BWI hotel would generate 70 peak hour inbound trips and 60 peak hour outbound trips[4]. Assuming the hourly profile of trips would be comparable to BOS, these trips would not occur during the Airport peak hours; however, as a conservative assumption we have assumed that these peak hour trips would overlap with the roadway and intersection peak hours analyzed for this study.

[4] For comparison purposes, the peak hour trips estimated for BWI using the BOS peak hour trip generation characteristics are equivalent to 80% of the peak hour volumes that would be expected from a non-airport hotel with the same number of guest rooms as defined in the ITE Trip Generation Manual. It is expected that trip generation for an airport hotel will be lower than a traditional non-airport hotel given the high proportion of guests and associated traffic that would arrive by aircraft and walk to the hotel.

Table 3-4: Project Site Trips - Hotel Related Vehicles

	BOS [1/]		BWI
	CHARACTERISTICS	RATE	
Hotel Name	Hilton Boston Logan Airport		New Hotel
Hotel Site Area	7.6 acres		2.5 acres
Annual Enplanements [5/]	14,180,730		11,067,319
Number of Guest Rooms	599		250 [2/]
Conference Area (sq. ft.)	30,000		12,500 [2/]
Free/Short-Term Parking	51		52
Pay Parking	185	0.31 spaces/room	100 [3/]
Service Vehicle Access	35'x40'		36'x275'
Peak Daily Trips In [4/]	1,992	3.33 trips/room	830
Peak Daily Trips Out [4/]	1,956	3.27 trips/room	820
Peak Hour Trips In [4/]	148	0.25 trips/room	70
Peak Hour Trips Out [4/]	137	0.23 trips/room	60

NOTES:

1/ Data Obtained from Page 58 of *Market Analysis – Demand for Lodging Baltimore/Washington International Airport*, Ernst & Associates, Inc., January 6, 2012 unless otherwise specified.

2/ Source: Page 58 of *Market Analysis – Demand for Lodging Baltimore/Washington International Airport*, Ernst & Associates, Inc., January 6, 2012

3/ Nominal space requirement exceeds benchmark rate of 0.31 spaces per room from BOS

4/ Vehicle trip rates for new BWI hotel are assumed to be proportional to the trip rates for BOS hotel which has the same proportional relationship of convention center space to rooms as anticipated for BWI.

5/ Source: CY 2011 Air Carrier Activity Information System (ACAIS)

SOURCE: See footnotes above.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

3.3.2 FUTURE "WITH PROJECT" ROADWAY VOLUMES AND LEVELS OF SERVICE

The estimated levels of service (LOS) for future "With Project" peak hour traffic conditions for the study area roadways are provided in **Table 3-5**. As shown in the table, the following intersections are anticipated to operate at an unacceptable level of service (LOS E or worse):

- Link B—Anticipated to operate at LOS E in 2015 and 2020
- Link C—Anticipated to operate at LOS E in 2015 and 2020
- Link E—Anticipated to operate at LOS E in 2020
- Link H—Anticipated to operate at LOS E in 2015 and 2020
- Link L—Anticipated to operate at LOS E in 2015 and 2020
- Link O—Anticipated to operate at LOS F in 2015 and 2020

3.3.3 FUTURE "WITH PROJECT" INTERSECTION VOLUMES AND LEVELS OF SERVICE

The estimated levels of service (LOS) for future "With Project" peak hour traffic conditions for the study area intersections are provided in **Table 3-6**. As shown in the table, the following intersection is anticipated to operate at an unacceptable level of service (LOS E or worse):

- I-195 / MD-170 Interchange (South Intersection)—Anticipated to operate at LOS E during the 2020 p.m. peak hour.

Table 3-5: Future "With Project" Roadway Volumes and Levels of Service

				HOURLY TRAFFIC VOLUME		DAILY TRAFFIC VOLUMES [2/ 3/]		V/C		LOS	
LINK ID	SPEED LIMIT (MPH)	# OF LANES	CAPACITY [1/]	2015	2020	2015	2020	2015	2020	2015	2020
A	30	2	2,340	1,023	1,134	17,601	19,506	0.437	0.485	C	C
B	30	1	1,170	935	1,038	16,083	17,842	0.799	0.887	**E**	**E**
C	30	2	2,340	1,959	2,172	33,684	37,349	0.837	0.928	**E**	**E**
D	30	2	2,340	583	647	10,030	11,125	0.249	0.276	A	B
E	30	3	3,510	2,542	2,819	43,714	48,474	0.724	0.803	D	**E**
F	15	3	3,030	1,879	2,082	32,320	35,809	0.620	0.687	D	D
G	15	2	2,020	663	736	11,394	12,665	0.328	0.365	B	B
H	15	2	2,020	1,601	1,779	27,532	30,602	0.793	0.881	**E**	**E**
I	15	1	1,010	278	303	4,788	5,207	0.276	0.300	B	B
J	30	1	1,170	354	388	6,081	6,672	0.302	0.332	B	B
K	30	1	1,170	753	837	12,951	14,395	0.644	0.715	D	D
L	30	2	2,340	1,955	2,167	33,613	37,274	0.835	0.926	**E**	**E**
M	30	1	1,170	148	164	2,538	2,821	0.126	0.140	A	A
N	30	1	1,170	309	343	5,310	5,902	0.264	0.293	A	B
O	30	1	1,620	1,179	1,306	20,281	22,455	1.008	1.116	**F**	**F**
P	30	2	2,340	456	507	7,848	8,723	0.195	0.217	A	A
Q	45	2	3,060	1,694	1,878	29,137	32,299	0.554	0.614	C	C
R	30	1	1,170	514	571	8,842	9,828	0.439	0.488	C	C
S	45	2	3,060	1,180	1,307	20,295	22,471	0.386	0.427	B	B

NOTES:

1/ Capacity is defined as the maximum volume to provide LOS E based on speed limit and number of lanes as defined in Table 2-2

2/ Daily traffic volumes are not required for the traffic analysis but are provided for informational purposes

3/ Daily volume calculated using a peak hour factor of 0.058 derived from analysis of hourly volumes from the Summer 2012 traffic counts.

SOURCE: Ricondo & Associates, Inc.

PREPARED BY: Ricondo & Associates, Inc., December 2012.

Table 3-6: Future "With Project" Intersection Volumes and Levels of Service

					2015								2020							
					AM				PM				AM				PM			
	INTERSECTION		DIRECTION		VOLUME	V/C	LOS	DAILY 2/	VOLUME	V/C	LOS	DAILY 2/	VOLUME	V/C	LOS	DAILY 2/	VOLUME	V/C	LOS	DAILY 2/
1	I-195/MD-170 Interchange (South Intersection)	MD 170	NB	Left	-	0.603	B		-	0.873	D		-	0.670	B		-	0.969	E	
				Through	1,225			21,060	1,642			28,238	1,361			23,408	1,819			31,281
				Right	-				-				-				-			
			SB	Left	217				380				241				423			
				Through	285			8,637	574			16,414	316			9,587	630			18,112
				Right	-				-				-				-			
				Left	-				-				-				-			
		Aviation Blvd	EB	Through	-			-	-			-	-			-	-			-
				Right	-				-				-				-			
				Left	-				-				-				-			
			WB	Through	-			-	-			-	-			-	-			-
				Right	-				-				-				-			
2	I-195/MD-170 Interchange (North Intersection)	MD 170	NB	Left	-	0.704	C		-	0.584	A		-	0.781	C		-	0.637	B	
				Through	1,558			26,789	1,109			19,070	1,731			29,777	1,216			20,915
				Right	-				-				-				-			
			SB	Left	-				-				-				-			
				Through	314			5,401	707			12,155	349			6,003	786			13,510
		I-195 Ramp	EB	Through	-			-	-			-	-			-	-			-
				Right	-				-				-				-			
				Left	188				248				208				268			
			WB	Through	-			3,236	-			4,259	-			3,583	-			4,602
				Right	-				-				-				-			
3	Aviation Blvd and Elm Road	Elm Road	NB	Left	25	0.543	A		121	0.774	C		28	0.604	B		135	0.860	D	
				Through	71			5,990	94			13,131	79			6,641	104			14,307
				Right	253				548				280				593			
			SB	Left	-				-				0				-			
				Through	67			4,746	220			7,593	75			5,275	244			8,440
				Right	209				222				232				247			
				Left	426				450				473				500			
		Aviation Blvd	EB	Through	918			27,821	756			23,217	1,020			30,924	840			25,525
				Right	274				144				305				144			
				Left	333				512				370				563			
			WB	Through	547			15,140	1,226			29,887	608			16,813	1,363			33,123
				Right	-				-				-				-			

NOTES:

1/ Based on intersection counts from the Long Range Needs Assessment increased by 11% based on the assumption will increase in proportion to the change in airline passenger activity from 2005 to 2012; includes adjustment for addition of employee volumes

2/ Daily volume calculated using a peak hour factor of 0.058 derived from analysis of hourly volumes from the Summer 2012 traffic counts.

SOURCE: Ricondo & Associates, Inc.

PREPARED BY: Ricondo & Associates, Inc., December 2012.

4. Project Impact Analysis

A future project impact would be considered significant if the roadway segment or intersection operating under the future "With Project" condition is (a) anticipated to operate at an unacceptable level of service (LOS E or F) AND (b) the project contribution to the roadway or intersection V/C ratio as measured by the difference in V/C between the "With Project" and "No-Action" condition is 5 percent or greater than the V/C ratio for the "No-Action" condition.

Table 4-1 provides a comparison of the "No-Action" and "With Project" levels of service for the study area roadway segments, including the percentage change in V/C ratio resulting from the "With Project" condition. As shown in the table, several roadway links would experience an improvement in traffic operations (decrease in V/C ratio) resulting from the diversion of employee-related traffic to the Elm Road intersections. As shown, there are no anticipated significant impacts to roadway operations resulting from the hotel project.

Table 4-2 provides a comparison of the "No-Action" and "With Project" levels of service for the study area intersections. As shown, there are no anticipated significant impacts to intersection operations resulting from the hotel project.

Table 4-1: Comparison of "No Action" and "With Project" Roadway Volumes and LOS

	2015							2020						
	NO ACTION		WITH PROJECT		PROJECT EFFECT			NO ACTION		WITH PROJECT		PROJECT EFFECT		
LINK	V/C	LOS	V/C	LOS	V/C	%	IMPACT?	V/C	LOS	V/C	LOS	V/C	%	IMPACT?
	[A]		[B]		[B - A]	[(B - A) / A]		[A]		[B]		[B] - [A]	[(B - A) / A]	
A	0.425	C	0.437	C	0.013	3.0%	No	0.472	C	0.485	C	0.013	2.7%	No
B	0.784	D	0.799	**E**	0.015	2.0%	No	0.871	**E**	0.887	**E**	0.015	1.8%	No
C	0.817	**E**	0.837	**E**	0.020	2.5%	No	0.908	**E**	0.928	**E**	0.020	2.2%	No
D	0.244	A	0.249	A	0.005	2.2%	No	0.271	B	0.276	B	0.005	2.0%	No
E	0.707	D	0.724	D	0.017	2.4%	No	0.786	D	0.803	**E**	0.017	2.2%	No
F	0.600	D	0.620	D	0.020	3.4%	No	0.667	D	0.687	D	0.020	3.0%	No
G	0.328	B	0.328	B	0.000	0.0%	No	0.365	B	0.365	B	0.000	0.0%	No
H	0.793	**E**	0.793	**E**	0.000	0.0%	No	0.881	**E**	0.881	**E**	0.000	0.0%	No
I	0.216	A	0.276	B	0.060	27.8%	No	0.240	A	0.300	B	0.060	24.9%	No
J	0.319	B	0.302	B	(0.016)	-5.1%	No	0.354	B	0.332	B	-0.023	-6.4%	No
K	0.644	D	0.644	D	0.000	0.0%	No	0.715	D	0.715	D	0.000	0.0%	No
L	0.843	**E**	0.835	**E**	(0.008)	-1.0%	No	0.938	**E**	0.926	**E**	-0.011	-1.2%	No
M	0.126	A	0.126	A	0.000	0.0%	No	0.140	A	0.140	A	0.000	0.0%	No
N	0.277	B	0.264	A	(0.013)	-4.8%	No	0.308	B	0.293	B	-0.015	-4.8%	No
O	1.011	**F**	1.008	**F**	(0.003)	-0.3%	No	1.124	**F**	1.116	**F**	-0.008	-0.7%	No
P	0.202	A	0.195	A	(0.007)	-3.3%	No	0.224	A	0.217	A	-0.007	-3.3%	No
Q	0.555	C	0.554	C	(0.001)	-0.2%	No	0.617	C	0.614	C	-0.003	-0.5%	No
R	0.446	C	0.439	C	(0.006)	-1.4%	No	0.495	C	0.488	C	-0.007	-1.4%	No
S	0.385	B	0.386	B	0.001	0.3%	No	0.427	B	0.427	B	0.000	-0.1%	No

SOURCE: Ricondo & Associates, Inc.
PREPARED BY: Ricondo & Associates, Inc., December 2012.

Table 4-2: Future "With Project" Intersection Volumes and Levels of Service

			2015							2020						
			NO ACTION		WITH PROJECT		PROJECT EFFECT			NO ACTION		WITH PROJECT		PROJECT EFFECT		
NUMBER	INTERSECTION	PEAK HOUR	V/C	LOS	V/C	LOS	V/C	%	IMPACT?	V/C	LOS	V/C	LOS	V/C	%	IMPACT?
1	I-195/MD-170 Interchange (South Intersection)	AM Peak	0.603	B	0.603	B	0.000	0.0%	No	0.670	B	0.670	B	0.000	0.0%	No
		PM Peak	0.873	D	0.873	D	0.000	0.0%	No	0.969	E	0.969	E	0.000	0.0%	No
2	I-195/MD-170 Interchange (North Intersection)	AM Peak	0.699	B	0.704	C	0.005	0.7%	No	0.776	C	0.781	C	0.005	0.6%	No
		PM Peak	0.582	A	0.584	A	0.002	0.3%	No	0.636	B	0.637	B	0.001	0.2%	No
3	Aviation Blvd and Elm Road	AM Peak	0.540	A	0.543	A	0.003	0.6%	No	0.600	B	0.604	B	0.004	0.7%	No
		PM Peak	0.774	C	0.774	C	0.000	0.0%	No	0.860	D	0.860	D	0.000	0.0%	No

SOURCE: Ricondo & Associates, Inc.

PREPARED BY: Ricondo & Associates, Inc., December 2012.