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Ref: 1214

May 2, 2013

Kien Ho, P.E., PTOE
Vice President
BETA Group, Inc.
315 Norwood Park South, 2nd Floor
Norwood, Massachusetts 02062

Subject: Traffic Impact and Access Study
Proposed Babson College (College) Residence Hall (Project)

Dear Kien:

I am writing this letter in response to your letter of April 22, 2012 to Mr. Hans Larsen, the Executive Director of the Town of Wellesley, with respect to February 6, 2013 Traffic Impact and Access Study (TIAS) prepared for the project by TEPP LLC.

I have included the text of your letter that called for a response to facilitate your review. My responses to your questions and comments are in bold text.

TRAFFIC VOLUMES

COMMENT

It should be noted that Wellesley Public Schools release students early on Wednesdays. Because some students were released early, these trips may not have been captured on the roadway network during the peak periods. Historical volume data for Wellesley Avenue has shown little change in morning peak-hour volumes on early release days versus normal release days. However, evening peak-hour volumes were found to be 5% higher on normal release days than on early release days. Based on this data, it is recommended that the evening peak-hour volumes be increased by 5% to account for school related traffic. We recommend that the evening peak analysis for the three intersections be revised.

RESPONSE

In accordance with your recommendation, the PM peak-hour volumes were increased by five percent to account for school related traffic. Figures 1 and 2 show PM peak-hour volumes. Table 1 summarizes the analysis, and worksheets are enclosed. The results are generally similar to those in the TIAS, without the five-percent increase. The Wellesley Ave-

Due to the 5% increase in traffic volume at the Babson Main/Forest Street intersection shows greater delays and queuing, but this is due to the 5-percent increase, not due to impacts of the Project.

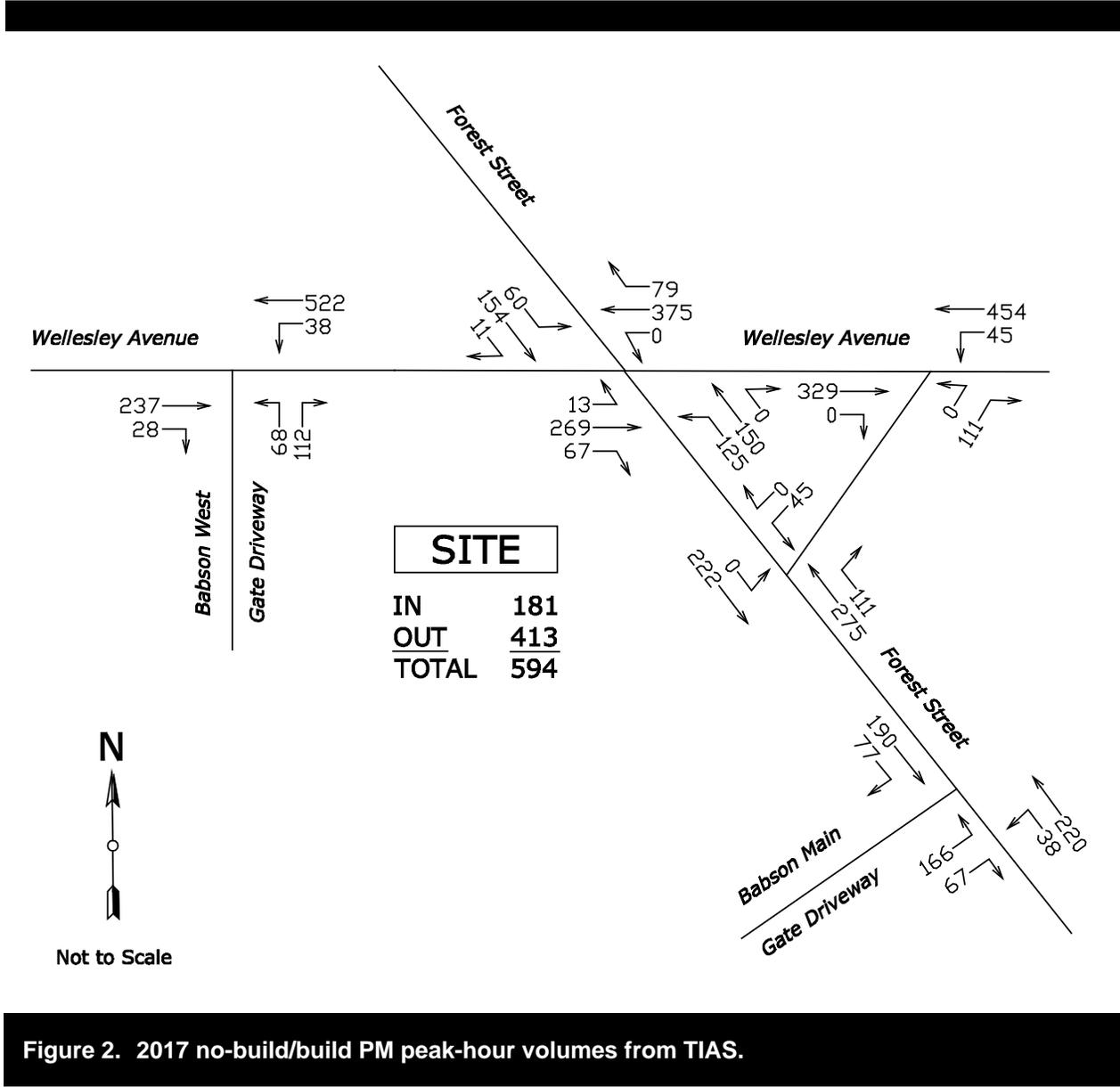


Figure 2. 2017 no-build/build PM peak-hour volumes from TIAS.

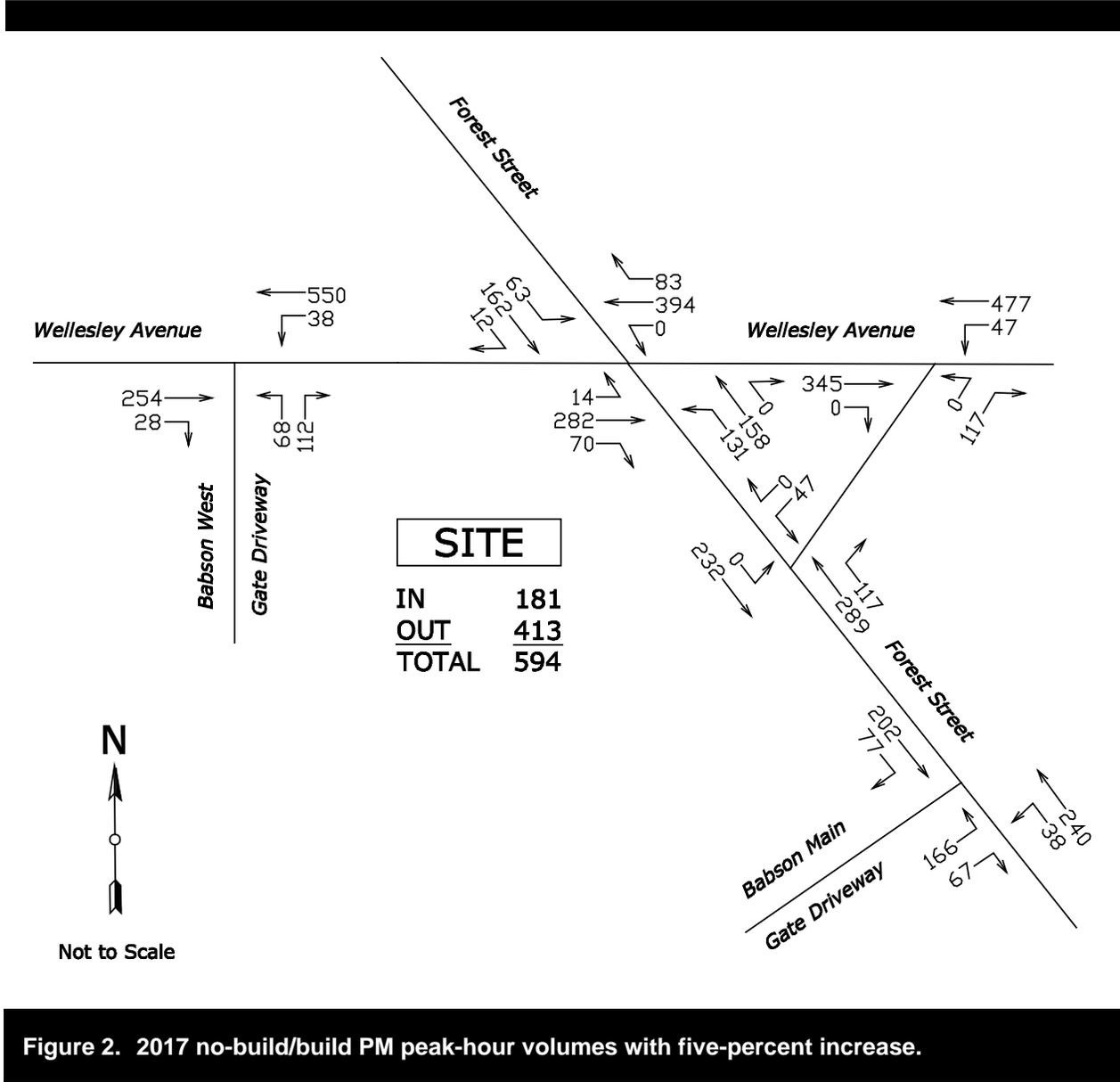


Table 1. 2017 no-build/build weekday PM peak-hour capacity analysis summary.

Intersection and Movements ^a	From TIAS				With Five-Percent Increase			
	V/C ^b	LOS ^c	D ^d	Q ^e	V/C	LOS	D	Q
Wellesley Avenue/Forest Street Unsignalized Intersection								
Forest Street NB LTR	0.70	D	29.4	5.4	0.76	E	35.5	6.4
Wellesley Avenue EB LTR	0.89	E	46.6	9.6	0.96	F	62.8	11.8
Wellesley Avenue WB LTR	1.04	F	69.5	13.3	1.15	F	71.6	12.9
Forest Street SB LTR	0.61	C	24.1	3.9	0.66	D	27.9	4.6
Wellesley Avenue/Channelized Turns Unsignalized Intersection near Forest Street								
Channelized NB LR	0.18	B	11.4	0.7	0.19	B	11.7	0.7
Wellesley Avenue WB L	0.04	A	8.1	0.1	0.04	A	8.2	0.1
Forest Street/Channelized Turns Unsignalized Intersection near Wellesley Avenue								
Forest Street EB L	0.00	A	0.0	0.0	0.00	A	0.0	0.0
Channelized SB LR	0.11	B	13.8	0.4	0.12	B	14.3	0.4
Wellesley Avenue/West Gate Driveway Unsignalized Intersection								
Driveway NB LR	0.42	C	18.3	2.1	0.45	C	19.6	2.2
Wellesley Avenue WB L	0.03	A	7.9	0.1	0.03	A	7.9	0.1
Forest Street/Main Gate Driveway Unsignalized Intersection								
Driveway NB L	0.49	C	20.2	2.6	0.51	C	21.8	2.9
Driveway NB R	0.12	B	10.2	0.4	0.12	B	10.3	0.4
Forest Street WB L	0.03	A	7.8	0.1	0.03	A	7.9	0.1

^a EB = eastbound, WB = westbound, SB = southbound, NB = northbound, L = left, T = through, R = right.

^b V/C = volume-to-capacity ratio.

^c LOS = level of service.

^d D = Average delay in seconds per vehicle.

^e Q = 95th percentile queue in vehicles.

HISTORIC TRAFFIC GENERATION

COMMENT

The proponent provided historic campus trip generation data, collected at the Main Gate driveway and West Gate driveway, for six different years between 1993 and 2012. A table was provided to show a comparison of AM peak hour trips and PM peak hour trips for each year of data. This data shows relatively stable AM peak hour trips, while PM peak hour trips follow a de-

creasing trend. The proponent noted that these volumes have decreased, even with the expansion of Babson College over the past two decades. It is expected that this trend will continue, despite the construction of the new residence hall, as fewer students would need to commute daily. For comparison purposes, is the traffic generation comparable to the college enrollment for these years?

RESPONSE

As **Table 2** shows, overall enrollments have remained relatively stable. Two factors have contributed to reductions in peak-hour vehicle-trips: the holding of classes in the College’s Boston location and an increasing emphasis on online learning.

Year	Vehicle-Trips		Enrollment ^b
	AM Peak Hour	PM Peak Hour	
2003	- ^a	-	3,365
2004	513	612	3,294
2005	-	-	3,244
2006	509	673	3,327
2007	-	-	3,394
2008	-	-	3,431
2009	-	-	3,441
2010	-	-	3,342
2011	-	-	3,321
2012	518	594	3,306

^a Not available.

^b Average of spring and fall semesters. Source: the College.

SIGHT DISTANCES

COMMENT

Stopping sight distance (SSD) was measured/observed for the three unsignalized study area intersections. The intersection of Wellesley Avenue and Forest Street was found to have adequate sight distance. Both site driveways were also found to have adequate sight distance, in excess of

the required 300 feet for all directions. To further improve the sight line, the proponent will trim branches on Forest Street, south of the Main Gate driveway.

RESPONSE

The College trimmed the branches in question in March. The corresponding improved sight distances exceed 300 feet.

ROAD IMPROVEMENTS

COMMENT

It was noted that as part of the Wellesley Country Club project, “All-Way” plaques would be added to all four stop signs at the Wellesley Avenue/Forest Street intersection. The proponent proposes to install these plaques if the Residence Hall is constructed before the Wellesley Country Club projects.

RESPONSE

The College reiterates its commitment to pay for the “All-Way” plaques if the Wellesley Country Club (WCC) does not do so in conjunction with its projects.

SITE TRAFFIC

COMMENT

The residence hall is intended to address the shortage of on-campus housing at the college, not to add additional students. The proponent noted the project will likely reduce the number of commuting trips to the college. The proponent should provide the estimated vehicle trip reduction as a result of this project since off-campus students will now be on-campus. For analysis purposes, it was assumed that the full-build volumes would remain the same as the no-build condition; therefore no trip reduction was used.

We recommend clarifying the trips related to staffing the new residence hall. What effect will this project have on the internal circulation within the site? Which driveways will the students likely use as a result of the new residence hall? How will this new residence hall affect on-site parking? It is unclear where students and parents will park during move-in and move-out days.

RESPONSE

The College states that about 30 students will change residence from off-campus to on-campus as a near-term result of the Project. This does not equate to a reduction of 60 weekday vehicle trips, because:

- **not every commuter is on campus every day**
- **some commuters may make more than round-trip on certain days**
- **not every person-trip results in a vehicle-trip**

Regarding vehicle-trips, a College survey indicated the following types of commuters:

- **single-occupant automobile, 89 percent**
- **carpool, 8 percent**
- **commuter rail or walk, 3 percent**

The College states that Project will add very minimal staff. The residence hall will have a resident director who will live on-site. The Project may involve very small numbers of maintenance and service personnel. The Project will not involve a new staffed food-service facility.

The College anticipates that student living in the residence hall will only make a limited number of trips off campus and that these trips will generally be at off-peak times.

The College has more than adequate parking for all students and staff. Those students who live in the Project will utilize two entrances to enter and exit the campus—the Main Gate and the West Gate. Those students who have cars will be assigned to park in those lots to which undergraduate students have access. This excludes the Knight Parking lot which is adjacent to the West Gate.

Except to a limited extent during construction, the College does not anticipate that the Project will affect internal traffic circulation since the internal roadway (College Drive) will continue to provide access without interruption. Service vehicles may be required to use alternate routes to access certain buildings during construction.

Students and parents will temporarily park on the lawn area in the New Residential Quad and on College Drive during move-in and move-out days. Once they have unloaded their vehicles, they will be required to move to different lots.

SITE CONSTRUCTION

COMMENT

It is unclear when this project will start construction. To minimize construction vehicle impacts to the study area roadways, the construction of this project should be coordinated with the two proposed development projects at the Wellesley Country Club.

RESPONSE

The College understands that:

- **WCC pool construction is slated to start around Labor Day 2013 and finish before Memorial Day 2014**
- **construction for the WCC turf maintenance facility (near the paddle tennis courts off Forest Street) will probably start in March or April 2014 and be finished in the fall of 2014**
- **WCC construction vehicles will use Route 9/Cedar Street and Wellesley Avenue**

Babson College plans to begin Project construction as soon as practicable after all permits have been received. The enclosed April 24, 2013 letter from Cutler Associates addresses construction traffic states:

- **construction traffic will use Route 9, Cedar Street, Hunnewell Street and Wellesley Avenue, entering and exiting the campus via Forest Street**
- **typical construction hours will be 7:00 AM to 5:00 PM on weekdays**
- **construction is expected to start in late summer to early fall of 2013, and have a duration of 13 to 14 months**
- **site and concrete activities are expected through fall 2013 and winter 2014, with 30 to 40 truck visits per day**
- **at other times, materials deliveries are expected to involve 15 to 25 truck visits per day**
- **these materials deliveries are expected to generate 2 to 3 truck visits per hour, scheduled to avoid the afternoon peak hours**

CONCLUSION

- The evening peak analysis for the three intersections should be revised to reflect the higher traffic volume on a normal school release day.

As noted above, the evening peak analysis has been revised to account for the early school release. The results are generally similar to those in the TIAS, without the five-percent increase. The Wellesley Avenue/Forest Street intersection shows greater delays and queuing, but this is due to the five-percent increase, not due to impacts of the Project.

- The proponent should provide information on the potential number of off-campus students that will be using the proposed residence hall and the estimated number of vehicular trips that will be reduced as a result of the shift from off-campus to on-campus.

As noted above, the College has provided information on the number of students anticipated to move on-campus, along with information on automobile use by commuter students. The College anticipates that students living in the residence hall will only make a limited number of trips off campus and that these trips will often be at off-peak times.

- BETA recommends clarifying the trips related to staffing the new residence hall. Likewise, what effect will this project have on the internal traffic circulation within the site, and which driveways will the students likely use as a result of the new residence hall? How will this new residence hall affect on-site parking? It is unclear where students and parents will park during move-in and move-out days.

The College states that Project will add very minimal staff.

The College has more than adequate parking for all students and staff. Those students who live in the Project will utilize two entrances to enter and exit the campus—the Main Gate and the West Gate. Those students who have cars will be assigned to park in those lots to which undergraduate students have access. This excludes the Knight Parking lot which is adjacent to the West Gate.

Except to a limited extent during construction, the College does not anticipate that the Project will affect internal traffic circulation since the internal roadway (College Drive) will continue to provide access without interruption. Service vehicles may be required to use alternative internal routes to access certain campus buildings.

Students and parents will temporarily park on the lawn area in the New Residential Quad and on College Drive during move-in and move-out days. Once they have unloaded their vehicles, they will be required to move to different lots.

- To minimize construction vehicle impacts to the surrounding roadway network, the proposed residence hall construction should be coordinated with the proposed projects at the Wellesley Country Club.

As noted above, the College understands that WWC construction is likely from Labor Day 2013 to fall 2014. WCC construction vehicles will use Route 9/Cedar Street and Wellesley Avenue.

The College plans to begin Project construction as soon as practicable after all permits have been received, anticipated late summer to early fall of 2013 and lasting 13 to 14 months. Material deliveries will be scheduled to avoid afternoon peak hours.

Thank you for your thoughtful comments. I trust that the above is responsive to each of the issues raised in your letter. Should you have any additional comments or questions, please feel free to contact me.

Sincerely,



Kim Eric Hazarvartian, Ph.D., P.E., PTOE
Principal
Email keh@teppllc.com

enclosures: capacity analysis worksheets, April 24, 2013 letter from Cutler Associates

copy: file

HCM 2010 AWSC
2: Forest Street & Wellesley Avenue

5/1/2013

Intersection

Intersection Delay, s/veh	54
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	14	282	70	0	394	83	63	162	12	131	158	0
Peak Hour Factor	0.84	0.84	0.84	0.92	0.92	0.92	0.88	0.88	0.88	0.91	0.91	0.91
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	2	0	0
Mvmt Flow	17	336	83	0	428	90	72	184	14	144	174	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	SE	NW
Opposing Approach	WB	EB	NW	SE
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SE	NW	WB	EB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NW	SE	EB	WB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	62.8	71.6	27.9	35.5
HCM LOS	F	F	D	E

Lane	NWLn1	EBLn1	WBLn1	SELn1
Vol Left, %	45%	4%	0%	27%
Vol Thru, %	55%	77%	83%	68%
Vol Right, %	0%	19%	17%	5%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	289	366	477	237
LT Vol	158	282	394	162
Through Vol	0	70	83	12
RT Vol	131	14	0	63
Lane Flow Rate	318	436	518	269
Geometry Grp	1	1	1	1
Degree of Util (X)	0.768	0.965	1	0.663
Departure Headway (Hd)	8.701	7.973	8.121	8.86
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	416	453	451	407
Service Time	6.777	6.049	6.121	6.944
HCM Lane V/C Ratio	0.764	0.962	1.149	0.661
HCM Control Delay	35.5	62.8	71.6	27.9
HCM Lane LOS	E	F	F	D
HCM 95th-tile Q	6.4	11.8	12.9	4.6

Notes

- : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Two Way Analysis cannot be performed on an All Way Stop Intersection.

Intersection

Intersection Delay, s/veh 6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	202	77	38	240	166	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	50	-	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	72	72	90	90	75	75
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	281	107	42	267	221	89

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	281
Stage 1	-	-	-
Stage 2	-	-	-
Follow-up Headway	-	-	2
Pot Capacity-1 Maneuver	-	-	1293
Stage 1	-	-	-
Stage 2	-	-	-
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	-	-	1293
Mov Capacity-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	18

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	431	763	-	-	1293	-
HCM Lane V/C Ratio	0.514	0.117	-	-	0.033	-
HCM Control Delay (s)	21.8	10.3	-	-	7.878	0
HCM Lane LOS	C	B			A	A
HCM 95th %tile Q(veh)	2.856	0.396	-	-	0.101	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	254	28	38	550	68	112
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	87	87	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	265	29	44	632	74	122

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	294
Stage 1	-	-	-
Stage 2	-	-	-
Follow-up Headway	-	-	2
Pot Capacity-1 Maneuver	-	-	1279
Stage 1	-	-	-
Stage 2	-	-	-
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	-	-	1279
Mov Capacity-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	439	-	-	1279	-
HCM Lane V/C Ratio	0.446	-	-	0.034	-
HCM Control Delay (s)	19.6	-	-	7.914	0
HCM Lane LOS	C			A	A
HCM 95th %tile Q(veh)	2.246	-	-	0.106	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

HCM 2010 TWSC
 11: Channelized Turns & Wellesley Avenue

5/1/2013

Intersection

Intersection Delay, s/veh 1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	345	0	47	477	0	117
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	383	0	52	530	0	130

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	383
Stage 1	-	-	-
Stage 2	-	-	-
Follow-up Headway	-	-	2
Pot Capacity-1 Maneuver	-	-	1187
Stage 1	-	-	-
Stage 2	-	-	-
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	-	-	1187
Mov Capacity-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	12

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	669	-	-	1187	-
HCM Lane V/C Ratio	0.194	-	-	0.044	-
HCM Control Delay (s)	11.7	-	-	8.172	0
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	0.716	-	-	0.138	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

HCM 2010 TWSC
 12: Forest Street & Channelized Turns

5/1/2013

Intersection

Intersection Delay, s/veh 1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	232	289	117	47	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	1	1	0	0	0
Mvmt Flow	0	258	321	130	52	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	451	0	386
Stage 1	-	-	-
Stage 2	-	-	-
Follow-up Headway	2	-	3
Pot Capacity-1 Maneuver	1120	-	666
Stage 1	-	-	-
Stage 2	-	-	-
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	1120	-	666
Mov Capacity-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1120	-	-	-	440
HCM Lane V/C Ratio	-	-	-	-	0.119
HCM Control Delay (s)	0	-	-	-	14.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.401

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined



April 24, 2013

Dr. Sam Dunn, P.E.
VP of Facilities & Construction
Babson College
231 Forest Street
Babson Park, MA 02457-0310

RE: Babson College New Residence Hall – Construction Traffic

Dear Sam,

This letter addresses the questions surrounding the truck and vehicular traffic associated with the construction of the new residence hall.

Vehicular Site Access – Vehicular traffic for the construction trades will enter the main gate to the campus off of Forest Street onto Babson College Drive, and will be directed to park in a designated area of Trim Parking Lot. Signage will be provided to designate the walkway route to the construction site.

Construction Traffic – Traffic will enter the site through the delivery driveway adjacent to Tomasso Hall off of Forest Street. Immediately inside the gates to the site, there will be a stone truck wash area that will minimize the dirt and debris leaving the site. The driveway to Forest Street will be swept on a regular basis to further prevent dirt from leaving the site. In order to minimize construction traffic through the town, construction vehicles will be directed to approach the site using the Cedar Street exit from Route 9, and traveling along Hunnewell Street and Wellesley Avenue to enter the site on Forest Street.

Hours of Construction Traffic – Typical construction hours will be 7:00 am to 5:00 pm weekdays. The majority of vehicular traffic will occur just prior to 7:00 am and between 3:30-5:00 in the afternoon.

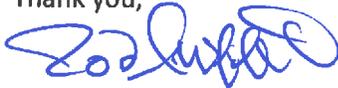
Amount of Construction Traffic – We expect a construction duration of 13-14 months with an expected start in the late summer/early fall. Based on preliminary schedule we would anticipate that the peak of construction activities from mid-April to mid-October 2014, when we would expect to have in the range of 80-120 trades people on site. Ride sharing will be encouraged.

Truck Traffic – The majority of the truck traffic will occur during the site and concrete activities. In the fall of 2013, earthwork activities will be ongoing with concrete work extending through the winter months. We would expect that during peak time periods there would be 30 - 40 truck visits per day accessing the site. During other times of construction, material deliveries could be expected to generate 15 - 25 truck visits per day. We would expect these deliveries would generate 2 – 3 truck trips per hour. Some of these deliveries would impact the morning peak hours. Deliveries will be scheduled to avoid afternoon peak times.

Subcontractors will be required by contract to comply with the above requirements. We will monitor truck traffic and compliance with these requirements during the course of the project. The College has established a website with call-in numbers for any concerns related to the project. Once the project begins, our contact information will be added so that we may be contacted directly.

Based on our current logistics plan, we would not expect that there would be changes in parking and traffic of students and staff during construction. Please do not hesitate to contact me if you have further questions.

Thank you,



Rod Shaffert, P.E., LEED AP
Vice President