



TETRA TECH



MEMORANDUM

To: Ms. Nora Loughnane,
Town Planner, Town of Westwood

Fr: Nancy B. Doherty, PE
Jeffery S. Dirk, PE, PTOE, FITE

Re: **University Station - Response to Initial Beta Traffic Comments**

Dt: January 11, 2013

Tetra Tech and Vanasse & Associates, Inc. (Tt/VAI) have prepared supplemental information and analyses in response to the initial comments that were received from Beta Group, Inc. (BETA) in response to their review of November 2012 *University Station Traffic Impact Study* (the “November 2012 TIS”) prepared by Tt/VAI in support of the University Station mixed-use, transit oriented development (hereafter referred to as the “Project”). Initial comments on the study and requests for additional information were made by town staff and BETA at our meeting with the Town and BETA on December 11, 2012. This memorandum includes a brief summary of BETA’s initial comments, provides additional information where requested, and includes supporting technical analyses and plans as required.

Some of the responses required modification of the figures provided in the November 2012 TIS. Where updates or additional information are provided on the figures, they are shown in red ink to highlight the change. For completeness and ease of review, all figures from the November 2012 TIS are attached.

By way of correction: it was noted that in the November 2012 TIS, Figure 39 - 2022 Build PM Peak Hour, and Figure 40 - Build SAT Peak Hour, were incorrectly labeled. The traffic volumes depicted on Figure 39 are the 2022 Build Saturday peak hour volumes and the traffic volumes depicted on Figure 40 are the 2022 Build PM peak hour volumes. Both figures are correctly labeled in this document. These corrections are editorial and did not impact the analyses or findings that were presented in the November 2012 TIS.

The following summarizes the initial comments received from BETA followed by the Tt/VAI response.

Comment: Determine the project’s impact on traffic operations at the intersections of Smith Drive at East Street and Downey Street.

Following the methodology of the November 2012 TIS, a traffic impact analysis was conducted for the intersections of Smith Drive with East Street and Downey Street. Both the Smith Drive/East Street and Smith Drive/Downey Street intersections are unsignalized T-intersections with single lane approaches. Smith Drive is under Stop sign control at both locations. The Downey Elementary School is located on the east side of Downey Street, just south of Smith Drive.

A review of MassDOT crash data for 2008, 2009 and 2010 indicates that the East Street/ Smith Drive intersection experienced three crashes in 2008, with no crashes reported in 2009 or 2010; no collisions were reported for the Downey Street/Smith Drive intersection. The calculated crash rate for the East Street/Smith Drive intersection is 0.19, lower than the MassDOT average statewide and District crash rates for unsignalized intersections. The crash data is provided in Attachment A.

Weekday morning, weekday afternoon and Saturday mid-day peak hour traffic counts were performed at the Smith Drive/East Street and Smith Drive/Downey Street intersections on Saturday, December 15, 2012 (11:00 p.m. to 1:00 p.m.), Thursday, January 3, 2013 (4:00 p.m. to 6:00 p.m.) and Friday, January 4, 2013 (7:00 a.m. to 9:00 p.m.). The count data is provided in Attachment A. The existing peak hour volumes are depicted on Figures 4, 5 and 6.

Using an annual background traffic growth rate of 0.5 percent per year and incorporating the background projects listed in Table 12 of the November 2012 TIS, the 2017 and 2022 No-Build peak hour volumes were estimated for both locations and are shown on Figures 11 through 16.

Based on a conversation with town staff, the Project trip distribution patterns shown in the November 2012 TIS for the residential and Wegman's components of the Project were adjusted slightly. It is expected that a small (one to two percent) amount of the trips generated by these components will arrive/depart via the south leg of East Street. The original distribution patterns shown in the November 2012 TIS indicated that traffic associated with these uses would use the rotary to travel between East Street and Canton Street. Based on input from town staff, the distributions now show that Project traffic associated with these uses arriving or departing to/from East Street would use Downey Street and Smith Drive as shown on Figures 21, 22, 25 and 26.

These adjustments to the trip distribution patterns affect the 2017 and 2022 Build condition traffic volumes at the East Street Rotary and at the Canton Street/Downey Street intersection. Approximately 20 or fewer Project trips would travel through East Street Rotary during peak hours. At the Canton Street/Downey Street intersection, the total volume of Project trips does not change; however Project trips are re-assigned to different approaches to the intersection.

Using the University Station trip generation shown in Table 13 of the November 2012 TIS and the trip distribution patterns depicted on Figures 17 through 28, Project trips were assigned to the Smith Drive intersections as shown on Figure 29 through Figure 34 and were added to the No-Build networks to develop the Build condition peak hour traffic volumes depicted on Figures 35 through Figure 40.

Intersection capacity analyses were performed for the East Street/Smith Drive and Downey Street/Smith Drive intersections for the 2012 Existing, 2017 No-Build and Build and 2022 No-Build and Build peak hour conditions. The 2017 Build and 2022 Build conditions were reanalyzed for the Canton Street/Downey Street intersection to reflect the adjustments to the Wegman's and residential traffic distributions noted above. As Build condition volumes were shown to correspondingly decrease at the East Street Rotary, the Rotary was not reanalyzed. The analysis results are provided in Attachment A and summarized in Table 1.

Table 1 Capacity Analyses Summary

Location	2012 Existing			2017 No-Build			2017 Build			2022 No-Build			2022 Build		
	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³
AM Peak Hour															
East St./Smith Dr.															
East St. EB LR	0.02	1	A	0.02	1	A	0.02	1	A	0.02	1	A	0.02	1	A
Smith Dr. NB L	0.54	47	E	0.65	63	F	0.68	68	F	0.69	72	F	0.74	79	F
Downey St./Smith Dr.															
Downey St. EB L	0.09	5	A	0.09	5	A	0.09	5	A	0.09	5	A	0.09	5	A
Smith Dr. SB LR	0.20	12	B	0.21	12	B	0.22	12	B	0.21	12	B	0.23	12	B
Downey St./Canton St.															
Downey St. EB LTR	-	-	-	-	-	-	0.24	18	C	-	-	-	0.28	21	C
Metcalf Rd. WB LTR	-	-	-	-	-	-	0.01	12	B	-	-	-	0.01	13	B
Canton St. NB L	-	-	-	-	-	-	0.03	1	A	-	-	-	0.03	1	A
Canton St. NB R	-	-	-	-	-	-	0.00	0	A	-	-	-	0.00	0	A
PM Peak Hour															
East St./Smith Dr.															
East St. EB LR	0.01	0	A	0.01	0	A	0.01	0	A	0.01	0	A	0.01	0	A
Smith Dr. NB L	0.35	33	D	0.39	37	E	0.43	40	E	0.42	40	E	0.46	43	E
Downey St./Smith Dr.															
Downey St. EB L	0.01	4	A	0.01	4	A	0.01	4	A	0.01	4	A	0.01	4	A
Smith Dr. SB LR	0.08	9	A	0.08	9	A	0.09	9	A	0.09	9	A	0.10	9	A
Downey St./Canton St.															
Downey St. EB LTR	-	-	-	-	-	-	0.56	55	F	-	-	-	0.63	66	F
Metcalf Rd. WB LTR	-	-	-	-	-	-	0.02	25	C	-	-	-	0.02	26	D
Canton St. NB L	-	-	-	-	-	-	0.06	2	A	-	-	-	0.06	2	A
Canton St. NB R	-	-	-	-	-	-	0.00	0	A	-	-	-	0.00	0	A
SAT Peak Hour															
East St./Smith Dr.															
East St. EB LR	0.01	0	A	0.01	0	A	0.01	0	A	0.01	0	A	0.01	0	A
Smith Dr. NB L	0.36	24	C	0.39	26	D	0.43	28	D	0.41	28	D	0.45	30	D
Downey St./Smith Dr.															
Downey St. EB L	0.03	5	A	0.03	5	A	0.03	5	A	0.03	5	A	0.03	5	A
Smith Dr. SB LR	0.11	10	A	0.11	10	A	0.13	10	A	0.11	10	A	0.13	10	A
Downey St./Canton St.															
Downey St. EB LTR	-	-	-	-	-	-	0.18	16	C	-	-	-	0.19	16	C
Metcalf Rd. WB LTR	-	-	-	-	-	-	0.01	10	A	-	-	-	0.01	10	B
Canton St. NB L	-	-	-	-	-	-	0.03	1	A	-	-	-	0.03	1	A
Canton St. NB R	-	-	-	-	-	-	0.00	0	A	-	-	-	0.00	0	A

¹v/c = volume-to-capacity ratio ² Delay = Average delay expressed in seconds per vehicle ³ LOS= Level of Service

Project-related traffic is not expected to result in degradation from LOS D or better to a LOS E/F condition at either Smith Drive intersection or at the Canton Street/Downey Street intersection.

Comment: Provide a comparison of count data obtained on Canton Street in 2006 and 2012

Traffic count data was obtained from the *Westwood Station FEIR* and compared to the data presented in the November 2012 TIS. To provide a comprehensive comparison, traffic count data from the southerly intersection of Canton Street at University Avenue and the northerly intersection of Canton Street at Downey Street were compared for the weekday morning, weekday afternoon and Saturday midday peak hours. Specific dates of each count, along with the volume by intersection approach are provided in Table 2. A comparison of various count data indicates that traffic has decreased along Canton Street at a rate of approximately one (1) to three (3) percent during the weekday peak hours and has remained approximately level for the Saturday peak hour

Comment: There is a concern that traffic counts obtained in June and August may not reflect typical conditions when local schools are in session. Recount intersections during the peak hours at locations closest to schools including Canton Street/Downey Street and Nahatan Street/Clapboardtree Street and provide a comparison of the counts obtained in December to those previously obtained in June.

As requested, the peak hour traffic volumes at the intersections of Nahatan Street/Clapboardtree Street and Canton Street/Downey Street were recounted on Saturday, December 15, 2012 (11:00 p.m. to 1:00 p.m.), Thursday, January 3, 2013 (4:00 p.m. to 6:00 p.m.) and Friday, January 4, 2013 (7:00 a.m. to 9:00 p.m.). The count data, along with the data obtained in June 2012 is provided in Attachment B. A summary and comparison of the peak hour traffic volumes for each intersection is provided in Table 3.

At the Nahatan Street/Clapboardtree Street intersection, the morning peak hour traffic volume data collected in January 2013 was 25 percent higher than the data collected in June 2012. This increase is attributed to Westwood High School, located approximately one half mile to the west of the intersection on Nahatan Street. Westwood High School was closed when the June counts were performed. The most notable changes occurred for the southbound right turn and eastbound left turn volumes. The afternoon peak hour traffic volumes obtained in January 2013 were not meaningfully different than the volumes obtained in June 2012; afternoon traffic associated with the High School occurs earlier in the afternoon. For the Saturday peak hour, 86 additional vehicles were counted in December as compared to June. However, as no significant change occurred for a particular movement, the increase can be attributed to traffic volume fluctuations associated with the December holidays.

The data collected at the Canton Street/Downey Street/Metcalf Street intersection indicates that weekday peak hour traffic volumes were higher in June 2012 than in January 2013 (9 percent higher for the morning peak hour and 16 percent higher for the afternoon peak hour). An additional 38 vehicles were observed during the Saturday peak hour in December as compared to data collected in June. The 38 additional vehicles, representing a 7 percent increase, are also

attributed to traffic volume fluctuations associated with the December holidays and are not considered significant.

Table 2 Comparison of Count Data along Canton Street (2005, 2006, 2008 and 2012)

Location	Count Data by Approach			Change per Year	
AM Peak Hour					
<u>Canton Street/University Avenue</u>	<u>5/12/2005</u>	<u>6/11/2008</u>	<u>6/21/2012</u>	<u>2005 to 2012</u>	<u>2008 to 2012</u>
University Avenue SB	544	506	511		
Canton Street WB	1119	1112	1028		
University avenue NB	595	437	430		
<u>Canton Street EB</u>	<u>245</u>	<u>253</u>	<u>208</u>		
Intersection Total	2503	2308	2177	-2.0%	-1.5%
<u>Canton Street/Downey Street</u>					
<u>4/14/2006</u>	<u>6/11/2008</u>	<u>6/21/2012</u>	<u>2006 to 2012</u>	<u>2008 to 2012</u>	
Canton Street SB	448	456	360		
Metcalf Street WB	9	0	5		
Canton Street NB	537	527	513		
<u>Downey Street EB</u>	<u>88</u>	<u>114</u>	<u>77</u>		
Intersection Total	1082	1097	955	-2.1%	-3.4%
PM Peak Hour					
<u>Canton Street/University Avenue</u>	<u>5/12/2005</u>	<u>6/11/2008</u>	<u>6/21/2012</u>	<u>2005 to 2012</u>	<u>2008 to 2012</u>
University Avenue SB	585	533	476		
Canton Street WB	438	460	444		
University avenue NB	791	654	738		
<u>Canton Street EB</u>	<u>785</u>	<u>711</u>	<u>744</u>		
Intersection Total	2599	2358	2402	-1.1%	0.5%
<u>Canton Street/Downey Street</u>					
<u>4/12/2006</u>	<u>6/11/2008</u>	<u>6/21/2012</u>	<u>2006 to 2012</u>	<u>2008 to 2012</u>	
Canton Street SB	810	756	714		
Metcalf Street WB	2	0	4		
Canton Street NB	505	537	433		
<u>Downey Street EB</u>	<u>66</u>	<u>79</u>	<u>71</u>		
Intersection Total	1383	1372	1222	-2.0%	-2.9%
SAT Peak Hour					
<u>Canton Street/University Avenue</u>	<u>1/21/2006</u>	<u>6/7/2008</u>	<u>6/23/2012</u>	<u>2006 to 2012</u>	<u>2008 to 2012</u>
University Avenue SB	212	142	137		
Canton Street WB	192	234	245		
University avenue NB	171	151	161		
<u>Canton Street EB</u>	<u>141</u>	<u>132</u>	<u>170</u>		
Intersection Total	716	659	713	-0.1%	2.0%
<u>Canton Street/Downey Street</u>					
<u>4/15/2006</u>	<u>6/7/2008</u>	<u>6/23/2012</u>	<u>2006 to 2012</u>	<u>2008 to 2012</u>	
Canton Street SB	303	295	271		
Metcalf Street WB	4	5	2		
Canton Street NB	285	259	255		
<u>Downey Street EB</u>	<u>43</u>	<u>54</u>	<u>57</u>		
Intersection Total	635	613	585	-1.4%	-1.2%

Table 3 Traffic Count Data Comparison

	Morning Peak Hour		Afternoon Peak Hour		Saturday Peak Hour	
	06/21/12	01/04/13	06/21/12	01/03/13	06/23/12	12/15/12
Nahatan St./Clapboardtree St.						
NBL	12	50	14	22	34	15
NBT	480	495	151	122	120	182
NBR	22	11	34	39	62	32
SBL	20	16	156	133	29	51
SBT	81	106	392	365	151	176
SBR	78	264	154	201	72	102
EBL	172	314	73	98	70	109
EBT	97	88	190	176	155	135
EBR	6	13	9	17	17	13
WBL	13	26	2	17	19	28
WBT	186	142	125	131	178	137
<u>WBR</u>	<u>261</u>	<u>258</u>	<u>44</u>	<u>30</u>	<u>45</u>	<u>58</u>
Total	1,428	1,783	1,344	1,351	952	1,038
Percent Difference	+25%		+1%		+9%	
Canton Street/Downey Street						
NBL	26	51	36	46	28	39
NBT	487	344	397	358	227	233
NBR	0	1	0	1	0	1
SBL	2	0	3	3	2	1
SBT	345	367	680	524	246	260
SBR	13	19	31	24	21	28
EBL	23	25	29	19	34	19
EBT	0	0	0	0	0	1
EBR	54	54	42	46	23	37
WBL	0	0	1	1	0	0
WBT	0	0	1	1	0	0
<u>WBR</u>	<u>5</u>	<u>4</u>	<u>2</u>	<u>0</u>	<u>2</u>	<u>2</u>
Total	955	865	1,222	1,023	583	621
Percent Difference	-9%		-16%		+7%	

As the recent morning peak hour traffic volumes were 25 percent higher at the Nahatan Street/Clapboardtree Street intersection, the morning peak hour was reanalyzed for the Nahatan Street/Clapboardtree Street intersection for the 2012 Existing, 2017 No-Build, 2017 Build, 2022 No-Build and 2022 Build conditions. The results of these analyses are provided in Attachment C and summarized in Table 4. The most significant change from the LOS results reported in the November 2012 TIS occurred at the northeasterly Clapboardtree Street/North Connector Road intersection. As reported in the November 2012 TIS, this movement was shown to operate at a LOS D under 2012 Existing conditions vs. the LOS F condition reported using the current (January) traffic volumes. That said and given the limited impact of the Project at this intersection, the recommendations described in Section 4.0 of the November 2012 TIS for Nahatan Street/Clapboardtree Street intersection are considered to be appropriate to address the impact of the Project at this intersection and include traffic monitoring and safety improvements.

Table 4 Nahatan St./Clapboardtree St. Capacity Analyses Summary - Morning Peak Hour

Location	2012 Existing			2017 No-Build			2017 Build			2022 No-Build			2022 Build		
	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³	v/c ¹	Delay ²	LOS ³
N. Connector Rd./ Clapboardtree St.															
N. Connector Rd. EB L	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F	2.18	>120	F
Nahatan Bypass/ Clapboardtree St.															
Nahatan Bypass WB L	0.08	16	C	0.09	17	C	0.10	18	C	0.10	18	C	0.11	19	C
Nahatan St./ Clapboardtree St.⁴															
Nahatan St. EB LTR	0.44	17	C	0.46	17	C	0.47	18	C	0.48	18	C	0.49	18	C
Nahatan St. WB LTR	0.84	36	E	0.89	41	E	0.90	44	E	0.91	46	E	0.93	49	E
Clapboardtree St. NB LT	1.18	>120	F	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F
Clapboardtree St. SB LT	0.31	14	B	0.33	15	B	0.37	16	C	0.35	16	C	0.39	16	C
Nahatan Bypass/ Nahatan St.															
Nahatan Bypass EB R	0.01	9	A	0.01	9	A	0.01	9	A	0.02	9	A	0.02	9	A
Nahatan St. NB L	0.02	1	A	0.02	1	A	0.02	1	A	0.02	1	A	0.02	1	A
North Connector Rd./ Nahatan St.															
N. Connector Rd. WB LR	0.38	12	B	0.39	12	B	0.41	13	B	0.40	13	B	0.42	13	B
Nahatan St. SB L	0.20	6	A	0.21	6	A	0.23	6	A	0.22	6	A	0.24	6	A

v/c = volume-to-capacity ratio ² Delay = Average delay expressed in seconds per vehicle ³ LOS= Level of Service

⁴ Four-way Stop Control: Degree of Utilization reported rather than v/c.

Comment: High travel speeds are perceived as a problem on Canton Street. Conduct speed studies on Canton Street to determine if speeding is a problem between East Street and University Avenue. Provide average daily traffic volumes on Canton Street.

Daily traffic volumes and speed studies were conducted at two locations on Canton Street including one just south of Forbes Street and the other just south of Everett Street. These locations were selected as they are segments of Canton Street with generally straight alignments where higher travel speeds are likely to occur. Both locations are posted for 35 mph. The counts were conducted from Tuesday, January 2, 2013 through Saturday, January 5, 2013. The data is provided in Attachment D.

The 50th percentile and 85th percentile measured speeds by travel direction are summarized in Table 5 for both measurement locations. The data indicates that 50 percent of all measured vehicles traveled 36 mph or less and 85 percent of all measured vehicles traveled at a speed of 41 mph or less.

Table 5 Canton Street Speed Study Summary

	Wednesday January 2		Thursday January 3		Friday January 4		Saturday January 5	
	50 th	85 th	50 th	85 th	50 th	85 th	50 th	85 th
South of Forbes St.								
Northbound	35	40	35	40	36	41	36	41
Southbound	34	39	34	39	35	39	35	40
South of Everett St.								
Northbound	35	40	35	40	35	40	36	40
Southbound	35	39	35	39	35	39	36	40

Note – Speeds reported in miles per hour

The daily and peak hour traffic volumes obtained on Canton Street are summarized in Table 6. The weekday daily traffic on Canton Street are approximately 7,400 vehicles south of Forbes street and 6,500 vehicles south of Everett Street. At both locations the daily volumes are approximately 46 percent northbound and 54 percent southbound.

Table 6 Canton Street Daily Traffic Volumes

	Wednesday January 2, 2013			Thursday January 3, 2013			Friday January 4, 2013			Saturday January 5, 2013		
	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak
South of Forbes St.												
Northbound	3,304	385	289	3,512	387	310	3,450	345	302	2,361	183	190
Southbound	<u>3,952</u>	<u>248</u>	<u>418</u>	<u>3,924</u>	<u>228</u>	<u>483</u>	<u>4,154</u>	<u>258</u>	<u>505</u>	<u>2,871</u>	<u>208</u>	<u>306</u>
Total	7,256	633	707	7,436	615	793	7,604	603	807	5,232	391	496
South of Everett St.												
Northbound	2,931	337	293	3,103	365	317	2,890	252	287	1,852	163	143
<u>Southbound</u>	<u>3,527</u>	<u>265</u>	<u>355</u>	<u>3,546</u>	<u>253</u>	<u>413</u>	<u>3,574</u>	<u>320</u>	<u>431</u>	<u>2,359</u>	<u>161</u>	<u>230</u>
Total	6,458	602	648	6,649	618	730	6,464	572	718	4,211	324	373

Comment: Provide the trip generation analysis for the Northborough Wegman's Development

The trip generation analysis prepared and approved by MEPA for the Wegman's project in Northborough (Northborough Crossing) is provided in Attachment E. As presented therein, the Wegman's was considered as a part of the overall shopping center for trip-generation purposes. This contrasts with the approach that has been used for the Project, where trips associated with the Wegman's component have been generated separately using the higher trip estimates for a supermarket.

Comment: Provide additional information to support the mode share assumptions for residential trips.

The assumed transit share of 36 percent for the morning peak hour and 22 percent for the afternoon peak were approved for use by MassDOT and are considered reasonable for future residents of the Project as they are significantly less than the transit shares suggested by the CTPS for the Project (46 percent for the morning peak hour and 40 percent for the afternoon peak hour) and are also consistent with 2000 US Census data for the easterly area of Westwood, which includes the Project site.

The 2000 US Census indicates that the mode share for Westwood workers who live in Block Group 412300, which encompasses the area of Westwood east of Milk Street and includes the Project site, is provided in Table 7. As seen in Table 7, 80 percent of all work related trips made by workers who live in this area of Westwood are automobile trips $((1,763 + 61/2 + 34/3)/2,267)$. Also, shown in Table 7 is the mode split for the 28 percent of these workers who live in the block group and work specifically in Boston. For those that work in Boston, the automobile trip share is approximately 60 percent $((379+22/2)/643)$.

It is expected that many of the residents of the Project will choose to live at University Station given the accessibility to the Route 128 Commuter Rail station and will work in Boston, using public transportation for their commute. Thus, the mode share for workers that live in Westwood and currently work in Boston (60 percent automobile) is a good indicator of the mode share for future residents of the Project. However, the automobile share for residential trips was held at a conservative 64 percent for the morning peak hour and 78 percent for the afternoon peak hour.

Table 7 2000 Census Mode Share Summary (Block Group 412300)

	Drive- Alone	Carpool (2 person)	Carpool (3 person)	Bus	Other Transit	Other Mode	Work At Home	Total
Total Trips to all Work Locations	1,763	61	34	0	233	61	115	2,267
Percentage	78%	3%	1%	0%	10%	3%	5%	100%
Total Trips to Boston	379	22	0	0	233	9	0	643
Percentage	59%	4%	0%	0%	36%	1%	0%	100%

Comment: Provide the MassDOT plans/schematics for the most recent I-95/I-93 interchange improvements

The current I-95/I-93 interchange schematic, obtained from MassDOT, is provided in Attachment F.

Comment: Provide the Canton Street license plate survey study conducted by VAI.

A license plate tracking study was conducted of the Canton Street corridor between the I-95/Route 128/East Street/Canton Street/Allied Drive Rotary (East Street Rotary) and the Canton

Street/University Avenue intersection in September 2012. The purpose of the study was to determine the potential use of Canton Street to access the University Station Project from I-95/Route 128 (and in the reverse). The data, provided in Attachment G, is summarized in the tables below. Table 8 depicts the inbound direction to the Project site. Based on the data shown in Table 8, approximately one (1) percent of all vehicles tracked turned right from the East Street Rotary onto Canton Street and then turned left onto University Avenue. Similarly, as indicated by the data in Table 9, less than one (1) percent of vehicles tracked turned right from University Avenue onto Canton Street, proceeded north, and entered the East Street Rotary. It is worth noting that vehicles exiting the Rotary onto Canton Street may have first entered the Rotary on approaches other than the I-95 southbound off-ramp to the East Street Rotary. This is also true for vehicles entering the East Street Rotary from Canton Street; they may have exited the East Street Rotary onto other roads other than the I-95 northbound on-ramp.

Table 8 Canton Street SB (from East Street Rotary to University Avenue)

Observation Period	Total No. of Observations	Number of vehicles which turn onto Canton Street from the East Street Rotary and then turn left onto University Avenue
Weekday 7:00 to 9:00 AM	613	7
Weekday 4:00 to 6:00 PM	1,311	10
Saturday 11:00 AM to 2:00 PM	790	9

Table 9 Canton Street NB (from University Avenue to East Street Rotary)

Observation Period	Total No. of Observations	Number of vehicles which right from University Avenue onto Canton Street and then enter the East Street Rotary
Weekday 7:00 to 9:00 AM	1,039	1
Weekday 4:00 to 6:00 PM	805	6
Saturday 11:00 AM to 2:00 PM	735	9

Comment: Provide back-up data for the redistribution of existing traffic resulting from the new I-95 northbound off-ramp on Dedham Street.

The back-up data for the redistribution of existing peak hour traffic volumes expected to occur once the new I-95 northbound off-ramp to Dedham Street is constructed is provided in Attachment H. Traffic volumes for each pathway were estimated based on a proportional analysis of existing entering and exiting traffic volumes at the various intersections along the pathway affected by the new ramp.

Comment: Provide a comparison of the regional trip distributions assumed for the Westwood Station project to the regional distributions assumed for the current University Station project.

The traffic analysis contained in the Westwood Station FEIR assumed that the office and residential distributions would be the same, and that the retail and grocery store distributions would also be the same. Table 10 provides a comparison of the revised regional distributions used in the November 2012 TIS and the regional distributions presented in the Westwood Station FEIR. The most significant change is the portion of traffic expected to arrive/depart the site from the south via I-95. For the residential distribution, the US Census data indicated that only a small portion of Westwood residents work in communities to the south. This is confirmed by the low volume of traffic on southbound I-95 in the morning within the study area. A number of large competing stores located to the south of Westwood also results in a smaller portion of Project-generated retail trips arriving/departing to the south on I-95 from the values that were used in the Westwood Station FEIR.

Table 10 Distribution Comparison

Direction	Office		Residential		Retail		Grocery	
	FEIR	Current	FEIR	Current	FEIR	Current	FEIR	Current
I-95 to/from the south	27%	26%	27%	7%	26%	15%	26%	18%
I-93 to/from the east	34%	29%	34%	16%	20%	23%	20%	23%
I-95/ to/from the north	15%	11%	15%	20%	30%	13%	30%	8%
Route 1 to/from the south	8%	4%	8%	6%	10%	3%	10%	6%
Route 1 to/from the north	6%	4%	6%	10%	3%	9%	3%	3%
Route 1A to/from the south	3%	2%	3%	4%	2%	3%	2%	4%
Route 1A to/from the north	0%	1%	0%	1%	0%	2%	0%	2%
Route 109 to/from the south	1%	4%	1%	2%	1%	4%	1%	4%
Route 109 to/from the north	0%	1%	0%	3%	0%	2%	0%	2%
East Street to/from the north	2%	2%	2%	7%	3%	5%	3%	6%
Washington Street to/from the south	2%	2%	2%	2%	0%	4%	0%	6%
Route 138 from the south	0%	3%	0%	1%	0%	2%	0%	3%
Route 138 to/from the north	0%	5%	0%	9%	0%	8%	0%	3%
Randolph Street to/from the east	0%	3%	0%	1%	0%	4%	0%	6%
From within the study area	2%	3%	2%	11%	5%	3%	5%	6%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Comment: Did the trip distribution analysis consider the expansion of the Walpole Walmart.

The population for the town of Walpole was reduced by 30 percent to account for competing stores in that community.

Comment: Revise the office distribution/trip assignments and analysis to reflect the current proposal to locate office space on the east side of University Avenue

The office distributions for 2017 and 2022 were updated to reflect approximately 42 percent of office development on the east side of University Avenue. The updated distributions are shown on Figure 17 for the 2017 roadway system and on Figure 18 for the 2022 roadway system. The

updated 2017 and 2022 peak hour Project trip and Build condition volumes are provided on Figures 29 through 40. The volumes which changed as a result of the new distribution are shown in red.

Updated intersection capacity analyses were conducted for the 2017 and 2022 Build condition for the intersections of University Avenue with Harvard Street, South Site Drive, North Site Drive, Relocated Rosemont Drive, Blue Hill Drive and the MBTA Driveway. Although the volumes at the Blue Hill Drive and MBTA intersections with University Avenue were not affected by the updated office distribution, these locations were reanalyzed as they are part of a coordinated traffic signal system with Relocated Rosemont Drive, North Site Drive and South Site Drive. The results of the updated intersection capacity analyses are summarized in Table 11 (2017) and Table 12 (2022), and depicted on Figures 41 through 46. The analyses are provided in Attachment I.

Comment: Provide AM/PM/SAT queue diagrams along with capacity analysis data and phasing diagrams for each signalized location along University Avenue inclusive of Blue Hill Drive and Canton Street intersections. Provide the same information for the Everett Street and Forbes Street intersection.

This information is provided on Figures 41 through 46.

Summary

Tt/VAI have prepared supplemental information and analyses in response to the initial comments received from BETA concerning their review of the November 2012 TIS prepared by Tt/VAI in support of the University Station mixed-use, transit oriented development. This information has updated and refined the information that was presented in the November 2012 TIS and supports the planned elements of the comprehensive transportation improvement program defined therein. Additional information is being developed that is focused on the traffic calming program which will be provided in a subsequent memorandum.

Attachments:

Figure 1 through Figure 46

Attachment A - New Intersection Impact Analyses

Attachment B - Turning Movement Counts

Attachment C - Capacity Analyses (Nahatan St./Clapboardtree St. and Canton St./Downey St.)

Attachment D - Canton Street ATRs and Speed Studies

Attachment E - Northborough Wegman's Trip Generation

Attachment F - I-95/I-93 Interchange Concept Plans

Attachment G - Canton Street License Plate Survey

Attachment H - Dedham Street/I-95 Ramp Traffic Redistribution

Attachment I - University Avenue Corridor Intersection Capacity Analyses

Table 11 2017 Build Condition – University Avenue Corridor Capacity Analyses Summary

Location	AM					PM					SAT				
	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵
University Avenue/MBTA Drive/Office Drive															
Office Drive EB LTR	0.04	26	C	1	9	0.04	19	B	2	20	0.03	28	C	1	9
MBTA Dr. WB L	0.09	26	C	2	11	0.61	26	C	56	110	0.05	28	C	1	9
MBTA Dr. WB TR	0.00	25	C	0	0	0.08	20	B	0	14	0.00	28	C	0	0
University Ave. NB L	0.15	3	A	0	m12	0.04	3	A	1	m3	0.01	1	A	0	m1
University Ave. NB TR	0.47	4	A	0	164	0.67	9	A	119	620	0.45	2	A	0	79
University Ave. SB LTR	0.60	3	A	0	158	0.55	6	A	112	162	0.51	2	A	0	122
Intersection	0.57	3	A			0.65	10	A			0.49	2	A		
University Avenue/Blue Hill Drive															
Blue Hill Dr. Ramp EB L	0.74	49	D	144	210	0.21	45	D	24	48	0.18	46	D	21	42
Blue Hill Dr. Ramp EB T	0.21	35	C	54	90	0.23	45	D	47	75	0.21	46	D	43	70
Blue Hill Dr. Ramp EB R	0.31	1	A	0	0	0.35	1	A	0	0	0.41	1	A	0	0
Greenlodge St. WB L	0.11	34	C	18	41	0.32	46	D	48	78	0.09	45	D	12	29
Green Lodge St. WB TR	0.11	34	C	17	52	0.32	46	D	58	99	0.24	46	D	35	77
University Ave. NB L	0.60	30	C	127	41	1.08	73	E	~662	#785	0.90	37	D	414	#517
University Ave. NB TR	0.45	10	A	47	258	0.55	3	A	9	135	0.42	2	A	8	87
University Ave. SB L	0.10	16	B	13	m35	0.22	26	C	15	m34	0.13	20	C	15	m45
University Ave. SB TR	0.59	22	C	258	336	0.77	33	C	287	#531	0.64	27	C	272	440
Intersection	0.63	20	B			0.81	37	D			0.69	22	C		
University Avenue/Relocated Rosemont Road															
Relocated Rosemont Rd. EB L	0.27	46	D	34	70	0.79	61	E	180	#290	0.39	55	E	37	77
Relocated Rosemont Rd. EB LTR	0.18	45	D	21	56	0.78	60	E	173	#273	0.25	54	D	22	61
Site Drive WB LT	0.30	49	D	27	63	0.71	71	E	74	#170	0.58	58	E	70	#142
Site Drive WB R	0.06	47	D	0	52	0.13	52	D	0	#82	0.13	51	D	0	75
University Ave. NB L	0.03	12	B	2	m11	0.23	30	C	7	m19	0.31	25	C	11	m41
University Ave. NB TR	0.30	13	B	75	135	0.76	27	C	256	#634	0.56	19	B	202	m#478
University Ave. SB L	0.42	6	A	16	66	0.68	60	E	103	m#251	0.74	58	E	108	#285
University Ave. SB T	0.45	5	A	43	115	0.76	17	B	99	#848	0.70	9	A	107	#835
University Ave. SB R	0.40	15	B	45	105	0.07	0	A	0	m1	0.05	0	A	0	m0
Intersection	0.42	13	B			0.76	30	C			0.68	21	C		
University Avenue/North Site Drive															
North Site Drive EB L	0.55	50	D	68	125	0.90	71	E	254	#428	0.95	80	E	294	#493
North Site Drive EB LTR	0.39	48	D	43	98	0.84	62	E	223	#382	0.89	68	E	261	#446
Site Drive WB LTR	0.33	52	D	22	65	0.64	65	E	62	#141	0.33	55	D	28	72
University Ave. NB L	0.09	8	A	5	30	0.42	23	C	14	m116	0.43	19	B	11	m111
University Ave. NB TR	0.27	8	A	54	172	0.61	18	B	89	#480	0.46	12	B	48	376
University Ave. SB L	0.09	2	A	6	7	0.16	7	A	5	m11	0.12	9	A	5	m20
University Ave. SB T	0.40	3	A	64	108	0.70	10	B	131	#673	0.67	13	B	121	#683
University Ave. SB R	0.13	2	A	0	4	0.34	26	C	18	484	0.45	31	C	2	548
Intersection	0.41	10	B			0.75	26	C			0.71	29	C		

Table 11 2017 Build Condition – University Avenue Corridor Capacity Analyses Summary (continued)

Location	AM					PM					SAT				
	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵
University Avenue/South Site Drive															
South Site Dr. EB L	0.40	49	D	43	88	0.74	53	D	190	291	0.79	54	D	228	#390
South Site Dr. EB LT	0.40	49	D	43	88	0.74	53	D	190	291	0.79	55	D	229	#390
South Site Dr. EB R	0.05	39	D	0	26	0.24	29	C	12	41	0.31	28	C	35	54
Site Dr. WB LTR	0.06	54	D	1	14	0.12	56	E	6	33	0.13	56	E	7	37
University Ave. NB L	0.21	6	A	10	81	0.57	15	B	89	#236	0.54	15	B	104	261
University Ave. NB TR	0.21	6	A	26	158	0.37	13	B	146	318	0.19	13	B	65	152
University Ave. SB L	0.01	2	A	0	m1	0.06	13	B	3	m7	0.06	12	B	3	m9
University Ave. SB T	0.31	3	A	20	34	0.45	15	B	61	m#370	0.31	13	B	30	m101
University Ave. SB R	0.14	0	A	0	0	0.37	38	D	3	m547	0.47	93	F	359	m714
Intersection	0.31	9	A			0.58	27	C			0.58	45	D		
University Avenue/Harvard Street															
Harvard St. EB LT	0.17	20	B	4	20	0.45	21	C	32	68	0.53	32	C	43	87
Harvard St. EB R	0.14	13	B	8	22	0.72	20	B	86	148	0.34	22	C	30	76
Drive WB LTR	0.01	19	B	0	4	0.05	18	B	2	17	0.01	27	C	0	6
University Ave. NB L	0.42	3	A	0	80	0.31	5	A	12	39	0.31	4	A	16	41
University Ave. NB TR	0.41	4	A	0	208	0.71	9	A	145	#469	0.43	4	A	85	180
University Ave. SB LTR	0.51	9	A	33	#233	0.69	13	B	124	#278	0.40	8	A	96	173
Intersection	0.46	7	A			0.69	13	B			0.45	10	A		
University Avenue/Canton Street															
Canton St. EB L	0.59	39	D	39	#131	0.70	33	C	111	#298	0.42	22	C	65	178
Canton St. EB TR	0.41	41	D	52	110	0.92	55	D	221	#457	0.24	31	C	36	89
Canton St. WB L	0.83	30	C	233	#566	0.75	44	D	72	#213	0.39	29	C	44	128
Canton St. WB T	0.85	41	D	298	#676	0.53	39	D	96	207	0.50	38	D	50	134
Canton St. WB R	0.21	0	A	0	0	0.19	0	A	0	0	0.15	0	A	0	0
University Ave. NB L	0.55	38	D	26	#106	0.18	29	C	14	48	0.05	24	C	4	22
University Ave. NB T	0.77	41	D	207	#475	0.92	57	E	265	#612	0.72	34	C	160	#419
University Ave. NB R	0.16	10	B	0	20	0.68	31	C	107	#319	0.08	18	B	0	27
University Ave. SB L	0.92	79	E	78	#200	0.91	54	D	206	#429	0.66	34	C	107	236
University Ave. SB TR	0.89	42	D	316	#740	0.75	23	C	275	#710	0.58	15	B	142	426
Intersection	0.81	36	D			0.86	39	D			0.55	24	C		

¹ v/c = volume-to-capacity ratio ² Delay = Average delay expressed in seconds per vehicle ³ LOS= Level of Service ⁴ 50 Percentile Queue in feet ⁵ 95th Percentile Queue in feet
m = Queue metered by upstream signal, # = 95th percentile volume exceeds capacity, queue may be longer, ~ = Volume exceeds capacity, queue is theoretically infinite"

Table 12 2022 Build Condition – University Avenue Corridor Capacity Analyses Summary

Location	AM					PM					SAT				
	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵
University Avenue/MBTA Drive/Office Drive															
Office Drive EB LTR	0.04	26	C	1	9	0.04	20	B	2	21	0.03	25	C	1	9
MBTA Dr. WB L	0.09	26	C	2	11	0.65	27	C	58	#120	0.05	26	C	1	8
MBTA Dr. WB TR	0.00	25	C	0	0	0.08	20	B	0	16	0.00	25	C	0	0
University Ave. NB L	0.11	1	A	0	m6	0.03	3	A	2	m1	0.01	1	A	0	m1
University Ave. NB TR	0.53	2	A	0	116	0.68	9	A	321	302	0.47	2	A	0	62
University Ave. SB LTR	0.48	2	A	0	108	0.43	5	A	75	107	0.40	2	A	0	81
Intersection	0.51	2	A			0.67	10	A			0.45	2	A		
University Avenue/Blue Hill Drive															
Blue Hill Dr. Ramp EB L	0.74	49	D	148	212	0.21	45	D	24	48	0.25	45	D	19	39
Blue Hill Dr. Ramp EB T	0.22	34	C	55	89	0.23	45	D	48	77	0.26	44	D	41	65
Blue Hill Dr. Ramp EB R	0.32	1	A	0	0	0.35	1	A	0	0	0.41	1	A	0	0
Greenlodge St. WB L	0.11	33	C	18	40	0.33	46	D	49	80	0.12	43	D	12	28
Green Lodge St. WB TR	0.11	33	C	17	52	0.33	46	D	61	102	0.26	44	D	30	70
University Ave. NB L	0.59	32	C	125	132	1.03	53	D	~630	#775	0.85	26	C	384	68
University Ave. NB TR	0.52	10	A	54	323	0.57	7	A	115	258	0.42	3	A	27	120
University Ave. SB L	0.13	16	B	14	33	0.27	31	C	16	m50	0.13	19	B	15	47
University Ave. SB TR	0.49	19	B	201	257	0.68	33	C	235	#432	0.50	23	C	187	315
Intersection	0.60	19	B			0.77	32	C			0.61	18	B		
University Avenue/Relocated Rosemont Road															
Relocated Rosemont Rd. EB L	0.44	52	D	35	77	0.83	67	E	185	#317	0.47	53	D	34	75
Relocated Rosemont Rd. EB LTR	0.29	50	D	22	62	0.82	65	E	180	#308	0.31	51	D	21	61
Site Drive WB LT	0.29	49	D	27	62	0.61	60	E	72	#131	0.65	59	E	65	#138
Site Drive WB R	0.06	47	D	0	51	0.13	51	D	0	75	0.13	48	D	0	73
University Ave. NB L	0.03	11	B	1	m10	0.16	16	B	6	m16	0.19	17	B	11	m30
University Ave. NB TR	0.31	11	B	81	160	0.76	20	C	283	m#679	0.55	17	B	183	m341
University Ave. SB L	0.36	5	A	13	51	0.68	62	E	74	m#228	0.69	49	D	68	#237
University Ave. SB T	0.40	3	A	40	99	0.67	9	A	83	#745	0.57	5	A	53	145
University Ave. SB R	0.33	4	A	6	30	0.05	0	A	0	m1	0.04	0	A	0	0
Intersection	0.40	10	A			0.76	25	C			0.66	18	B		
University Avenue/North Site Drive															
North Site Drive EB L	0.55	50	D	68	125	0.93	77	E	256	#440	0.94	73	E	267	#461
North Site Drive EB LTR	0.39	48	D	43	98	0.86	66	E	225	#393	0.88	61	E	235	#412
Site Drive WB LTR	0.33	52	D	22	65	0.70	72	E	63	#153	0.37	52	D	25	69
University Ave. NB L	0.12	7	A	8	38	0.40	12	B	18	m51	0.50	17	B	16	m#141
University Ave. NB TR	0.32	7	A	70	177	0.57	11	B	197	383	0.48	12	B	51	352
University Ave. SB L	0.08	3	A	5	17	0.14	7	A	10	m2	0.12	13	B	6	m22
University Ave. SB T	0.41	5	A	68	262	0.57	14	B	399	35	0.62	15	B	108	#521
University Ave. SB R	0.10	4	A	0	18	0.27	32	C	111	0	0.35	17	B	0	346
Intersection	0.42	11	B			0.66	27	C			0.69	26	C		

Table 12 2022 Build Condition – University Avenue Corridor Capacity Analyses Summary (continued)

Location	AM					PM					SAT				
	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵	V/C ¹	DELAY ²	LOS ³	50th Q ⁴	95th Q ⁵
University Avenue/South Site Drive															
South Site Dr. EB L	0.42	50	D	43	90	0.84	67	E	205	#378	0.82	55	E	223	#417
South Site Dr. EB LT	0.42	50	D	43	90	0.84	67	E	205	#378	0.82	55	E	224	#418
South Site Dr. EB R	0.05	39	D	0	26	0.24	23	C	14	45	0.26	17	B	16	39
Site Dr. WB LTR	0.06	54	D	1	14	0.12	56	E	6	33	0.13	51	D	6	34
University Ave. NB L	0.31	6	A	15	108	0.69	18	B	119	#401	0.71	19	B	142	#448
University Ave. NB TR	0.26	6	A	35	194	0.41	12	B	145	338	0.24	12	B	66	168
University Ave. SB L	0.01	2	A	0	m1	0.07	8	A	2	m9	0.08	22	C	3	m11
University Ave. SB T	0.33	3	A	24	38	0.55	11	B	41	m#367	0.46	22	C	41	m#225
University Ave. SB R	0.12	0	A	0	0	0.31	40	D	0	m374	0.38	99	F	278	m525
Intersection	0.33	9	A			0.68	26	C			0.70	42	D		
University Avenue/Harvard Street															
Harvard St. EB LT	0.18	21	C	5	23	0.63	55	D	83	147	0.58	39	D	52	100
Harvard St. EB R	0.13	13	B	9	23	0.83	54	D	216	305	0.33	26	C	33	82
Drive WB LTR	0.01	20	C	0	4	0.06	44	D	6	33	0.01	32	C	0	7
University Ave. NB L	0.69	7	A	0	#190	0.42	5	A	27	51	0.46	4	A	28	63
University Ave. NB TR	0.53	4	A	0	260	0.75	9	A	349	599	0.59	6	A	158	325
University Ave. SB LTR	0.55	10	A	43	#242	0.48	10	B	187	310	0.38	8	A	104	190
Intersection	0.61	8	A			0.75	18	B			0.58	10	B		
University Avenue/Canton Street															
Canton St. EB L	0.61	44	D	38	#139	0.77	44	D	114	#297	0.47	21	C	54	#151
Canton St. EB TR	0.81	63	E	71	#180	0.98	**	E	233	#491	0.32	28	C	31	80
Canton St. WB L	0.86	32	C	269	#694	0.84	44	E	85	#260	0.41	24	C	37	111
Canton St. WB T	0.95	54	D	360	#809	0.76	91	D	126	#318	0.58	35	C	42	#129
Canton St. WB R	0.49	1	A	0	0	0.40	1	A	0	0	0.37	1	A	0	0
University Ave. NB L	0.65	51	D	28	#118	0.17	28	C	13	47	0.05	20	C	3	19
University Ave. NB T	0.71	41	D	170	#390	0.82	43	D	232	#528	0.73	30	C	121	#350
University Ave. NB R	0.14	9	A	0	17	0.63	26	C	84	234	0.08	15	B	0	19
University Ave. SB L	0.86	65	E	91	#217	0.96	44	E	214	#453	0.73	31	C	88	#230
University Ave. SB TR	0.91	47	D	320	#747	0.76	19	C	272	#710	0.60	14	B	110	360
Intersection	0.91	36	D			0.80	40	D			0.59	19	B		

¹ v/c = volume-to-capacity ratio ² Delay = Average delay expressed in seconds per vehicle ³ LOS= Level of Service ⁴ 50 Percentile Queue in feet ⁵ 95th Percentile Queue in feet
m = Queue metered by upstream signal, # = 95th percentile volume exceeds capacity, queue may be longer, ~ = Volume exceeds capacity, queue is theoretically infinite"