Attachment E

Northborough Wegman's Trip Generation

COPY

MEMORANDUM

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DATE: July 11, 2011

RE: 5989

SUBJECT: Proposed Retail Expansion
Northborough Crossing (fka The Loop – Northborough)
Northbrough, Massachusetts

Vanasse & Associates, Inc. (VAI) has conducted a traffic analysis relative to a planned expansion of the Northborough Crossing development formerly known as The Loop – Northborough development adjacent to Route 20. An increase in proposed retail area of approximately 53,000 square feet (sf) is currently proposed which results from the decrease in certain planned restaurant space and substitution of retail tenants. This proposed change to the project exceeds MEPA thresholds applicable to changes in approved projects under 301 CMR 11.10, and therefore requires the submittal of a Notice of Project Change (NPC). Due to passage of time since the original traffic data for the development were collected, new traffic counts and a revised five-year projection were utilized to update the traffic operations for this expansion. Based on the updated analysis, it is our conclusion that the previously approved roadway improvements provide adequate mitigation for this expansion, and the proposed change in the project therefore should be deemed insignificant in terms of its environmental consequences. The following sections document and support the foregoing analysis and conclusion.

PROJECT EXPANSION

The original development included 575,000 sf of retail space along with a 350-unit residential apartment complex developed by AvalonBay. Following initial approval, AvalonBay submitted a Notice of Project Change requesting an additional 32 apartment units, and this was approved by MEPA in June 2009. The current proposal is for the modification of the retail area from 575,000 sf to 628,400 sf. Table 1 provides the status of the Project with regard to MEPA thresholds.

Table 1
MEPA THRESHOLDS

Impact Area	Avalon NPC[a]	Current Proposal	Volume Change	Percent Change
Physical Dimensions:				
Parking Spaces	3,810	3,652	-158	-4.1
Retail GLA (sf)	575,000	628,400	53,400	9.3
Residential Units	382	382	0	0
Project Impacts:				
Average Daily Traffic	23,382	26,214	2,832	12.1

[a]Based on Avalon NPC approved June 2009.

As shown, in Table 1, the change in physical dimensions is expected to be below the 10 percent level of change identified in the MEPA regulations. However, the increase in Daily Trips associated with the proposed project change exceed the applicable threshold, and therefore a Notice of Project Change will be submitted for review and approval by the MEPA office.

Project Status

The residential component of the project developed by AvalonBay has been completely constructed and the 382-unit development is currently at full occupancy. The retail component of the project has been delayed during the recent area-wide economic slowdown, but is currently under construction and the first segments of retail buildings are expected to be completed within the next six months.

Access to the entire development is through two driveways intersecting with Southwest Cutoff (Route 20) from the west. These driveways have been constructed and are operational, although the North site driveway is currently open to construction vehicles only. The South Site Driveway is operating under traffic signal control, and AvalonBay traffic uses this driveway exclusively.

Off-Site Roadway Improvements Status

As mitigation for the development, the project proponent committed to extensive roadway widening and reconstruction of Route 20 and improvements to the Route 9/Route 20 interchange intersections. Specifically, roadway and traffic control improvements were identified at the following intersections:

1. Route 20 at the Route 9 eastbound ramps;
2. Route 20 at the Route 9 westbound ramps;
3. Route 20 at the proposed South Driveway;
4. Route 20 at the proposed North Driveway and Hitching Post Lane;
5. Route 20 at Tomblin Hill Road.

A Transportation Improvement Project (TIP) for Route 20 and the interchange ramps to and from Route 9 was designed and approved by MassDOT in April 2008. Major elements of the TIP included: the widening of Route 20 in the vicinity of the Route 9 interchange to provide a three-lane cross section with exclusive turn lanes at the Route 9 ramp intersections and signalization at both locations; signalization with additional widening of Route 20 at the vicinity of the proposed South Driveway to provide a five-lane cross section consisting of two westbound lanes, two northbound left-turn lanes and one northbound through/right-turn lane; and widening of Route 20 in the vicinity of the proposed North Driveway/Hitching Post Lane and Tomblin Hill Road to provide exclusive left-turn lanes on Route 20 and median separation. During the design process, the driveway for the existing East Coast Golf Center was relocated and incorporated into the proposed intersection of the South driveway and Route 20, so that traffic to and from this site could enter and exit via traffic signal control.

All of the TIP improvements described above have been constructed, and traffic signal control is operational at the Route 20/Route 9 eastbound ramps; the Route 20/Route 9 westbound ramps; and the Route 20/South Site Driveway/relocated East Coast Golf Center driveway. Final paving is expected to be completed within the next 4 to 10 months.

CONTEXT FOR ANALYSIS

Given that the residential component of the project is constructed and fully occupied, and the off-site improvements are nearly complete and only awaiting finish paving, it was determined that any traffic analysis be based on the current roadway conditions. Therefore, traffic volumes were collected in April

and May 2011 to identify volume conditions and also provide a legitimate basis for projection of the retail component of the project. New traffic volume data was collected, then projected to future conditions using a five-year horizon and project traffic was incorporated. The methodologies contained in the initial Traffic Impact Assessment were used in this analysis.

Existing Traffic Volumes

To determine existing traffic-volume demands and flow patterns within the study area, Manual Turning Movement and Vehicle Classification (TMC) counts were completed in April and May 2011. The TMC data was collected at each of the intersections identified above during the weekday afternoon-evening peak periods (4:00 to 6:00 PM), and Saturday midday (11:00 AM to 1:00 PM) peak periods. These periods are consistent with the previous analyses conducted for the project and contain the critical hours of adjacent street traffic and the peak hours of traffic generation for retail facilities. The counts collected traffic flows of passenger vehicles and trucks to determine existing traffic characteristics on Route 20 and at the study area intersections.

Seasonal Adjustments

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, a review of existing seasonal traffic data collected by MassDOT was conducted. The traffic data gathered as part of this study were collected during the months of April and May. Traffic-volume data compiled by the MassDOT from the nearest continuous count location (Station 307 located in Westborough on Route 9, east of the Northborough Town Line) indicate that April traffic volumes are approximately 2.6 percent higher than average-month volumes and May volumes are approximately 3.7 percent higher than average-month volumes. MassDOT requires an average-month condition should be analyzed; however, to provide a conservative (higher) traffic-volume scenario, the observed volumes were used without adjustment. A summary of the collected data is provided in Table 1. The raw count data along with the seasonal count data is provided in the Appendix.

Table 1
EXISTING ROADWAY TRAFFIC-VOLUME SUMMARY[a]

	Weekday	Weekday Peak Hours			Saturday	Saturday Midday Peak Hour		
Location	Daily Volume (vpd)[a]	Volume (vph)[b]	Percent of Daily Traffic[c]	Predominant Flow[d]	Daily Volume (vpd)[a]	Volume (vph)	Percent of Daily Traffic	Predominant Flow
Route 20, in the vicinity of project site	12,000	935 (AM) 1,043 (PM)	7.8 8.7	53% EB 58% WB	8,920	759	8.5	54% EB

Source: ATR counts conducted in April and May, 2011, rounded.
[a]Two-way daily traffic expressed in vehicles per day.
[b]Two-way peak-hour volume expressed in vehicles per hour.
[c]The percent of daily traffic that occurs during the peak hour.
[d]EB = eastbound; WB = westbound.

A review of the traffic data indicates the volumes on Route 20 have decreased since 2005 when the original traffic counts for the project were conducted. A comparison of the volumes is shown below in Table 2.

Table 2
TRAFFIC VOLUME COMPARISON[a]

Time Period	2011 Volume	2005 Volume	Percent Change
Weekday			
Daily	12,000	12,990	-7.6
Morning	935	1,090	-14.2
Evening	1,043	1,200	-13.1
Saturday			
Daily	8,920	8,970	-0.6
Midday	759	780	-2.7

[a]Source: Counts conducted by VAI, April, May 2011 and June 2005

As shown in the count data above, the traffic volumes adjacent to the site have generally decreased since the initial planning efforts for the project were commenced in 2005. The AvalonBay development is likely sending 2,500 daily trips into the area (based on ITE trip generation statistics), which, if removed from the 2011 daily traffic volume in Table 2, would indicate lower daily traffic volumes of between 9,000 and 10,000 vehicles per day. The 2011 Existing weekday evening and Saturday midday peak hour traffic volumes are graphically depicted on Figure 1 and Figure 2, respectively.

Future Traffic Volumes

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to the year 2016. Traffic volumes on the roadway network at that time, in the absence of the project (that is, the No Build condition), would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific development by others expected to be completed by 2016. Inclusion of these factors resulted in the development of future 2016 No Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No Build traffic-flow networks to develop the 2016 Build volume conditions.

Specific Development By Others

Research was conducted in order to determine if there were any projects that would have an impact on future traffic volumes at the merge point. Discussion with the Towns of Shrewsbury and Northborough indicated that there are no significant projects that are currently approved and pending construction or constructed and not yet occupied in the area. In Shrewsbury, a new luxury car dealership is proposed approximately 1.5 miles west of the site on Route 9, but this is adjacent to two other luxury car dealerships and is not likely to be a large traffic generator. Traffic volumes from this project were assumed to be reflected in the background traffic growth rate. There are no projects proposed in Northborough.

The Boston Hill Corporate Center development that was a background project in the 2006 MEPA filings for the project was not included in this analysis. In the six years since permitting efforts began on Northborough Crossing/The Loop – Northborough, the status of the Boston Hill development has not changed, with construction having been halted in 2002 after the construction of a YMCA and sewer pumping station without state or local permits. Based on these circumstances, the Boston Hill project was removed from future consideration.

General Background Traffic Growth

To determine traffic growth in the study area, the traffic count data collected for the project along with the historic traffic count data collected by MassDOT were reviewed. These data collected on Route 20 indicates or a decrease in traffic volumes over the last six years, while the MassDOT data indicates that traffic volumes on Route 9 have decreased by an average of 6.2 percent over the period 2005 to 2009. However, to provide a conservative estimate of traffic conditions, a 1.0 percent per year compounded annual growth rate was used to account for general background traffic growth.

No Build Traffic Volumes

The 2016 background peak-month peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the existing 2011 peak-month peak-hour traffic. The 2016 No Build peak hour traffic volumes are shown in Figure 3 for the weekday evening time period and Figure 4 for the Saturday midday time period.

PROJECT TRIP GENERATION

The Project now incorporates retail tenants, based on actual leasing activity, including a wholesale membership club with associated gas-fueling facility. As such, the expected trip generation has been updated to reflect actual tenant activity. As with the initial MEPA documents, the Institute of Transportation Engineers report *Trip Generation*[1] was used to calculate vehicle trips for the retail component of the project. Table 3 documents the trip generation expected due to the additional retail space.

Table 3
PROJECT VEHICLE TRIP INCREASE

Time Period/ Direction of Travel	Expanded Retail Trips[a]	Fueling Facility[b]	Total Retail Trips	Previously Reviewed Retail Trips[c]	Projected Trip Increase
Weekday Daily	22,428	1,348	23,776	20,944	2,832
Weekday Evening:					
Entering	1,068	56	1,124	943	181
Exiting	1,112	55	1,167	1,022	145
Total	2,180	111	2,291	1,965	326
Saturday	29,414	1,964	31,378	27,526	3,852
Saturday Midday:					
Entering	1,472	82	1,554	1,388	166
Exiting	1,358	79	1,437	1,281	156
Total	2,830	161	2,991	2,669	322

[a]Based on ITE LUC 820, Shopping Center and 628,400 sf, regression mode.
[b]Based on ITE LUC 944, Gasoline/Service Station and 16 vehicle fueling positions (vfps) with 50 percent internal capture rate between on-site retail and membership fueling facility.
[c]From DEIR for Borgatti Property, EOEA No.13708, Table 5-6 *Trip Generation Summary.*

[1] *Trip Generation, 8th Edition;* Institute of Transportation Engineers; Washington, D.C., 2008.

Table 3 documents the change in total retail trips due to the proposed development change. Table 4 details the distinction between the new trips and pass-by trips associated with the expanded development.

Table 4
INCREMENTAL TRIP-GENERATION INCREASE

Time Period/ Direction of Travel	Total Retail Trips	Pass-By Trips[a]	New Retail Trips
Weekday Daily	2,832	708	2,124
Weekday Evening:			
Entering	181	41	140
Exiting	145	41	104
Total	326	82	244
Saturday	3,852	964	2,888
Saturday Midday:			
Entering	166	40	126
Exiting	156	40	116
Total	322	80	242

[a]Based on 25 percent pass-by rate.

The trips shown in Table 4 represent the incremental increases in the retail component trips based on the expanded retail size of 628,400 sf. The trips associated with the entire retail component of 628,400 sf have been assigned to the intersections improved by the Project using the distributions from the DEIR traffic analysis for The Loop development. These trips are depicted in the site-generated networks shown on Figures 5 and 6, representing the weekday evening and Saturday midday peak hour traffic volume conditions, respectively.

The trips shown in Figures 5 and 6 were then superimposed onto the 2016 No Build networks shown in Figures 4 and 5 to develop the 2016 Build traffic volume conditions shown in Figures 7 and 8 for the respective weekday evening and Saturday midday peak hours. These 2016 Build traffic volumes were used as the basis for a review of adequacy of the original project-sponsored off-site improvements.

TRAFFIC ANALYSIS

Analysis of the additional trips onto the 2011 Build road network assumes the following:

- Incorporation of trips due to the AvalonBay project expansion;
- Relocation of the East Coast Golf Center driveway to a location opposite the South Site Driveway for the Shops @9/20, which was a change incorporated during the design phase of the off-site roadway mitigation.

Table 5 provides the results of the analysis for signalized intersections and Table 6 presents the results for unsignalized intersections.

Table 5
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE SUMMARY

Signalized Intersection/Peak Hour/Movement	2011 Existing			2016 No Build			2016 Build		
	V/C[a]	Delay[b]	LOS[c]	V/C	Delay	LOS	V/C	Delay	LOS
Route 20 at Route 9 Eastbound Ramps									
Weekday Evening									
Route 20 EB TH	0.22	2.0	A	0.23	2.0	A	0.35	4.4	A
Route 20 EB RT	0.26	0.4	A	0.27	0.4	A	0.27	0.4	A
Route 20 WB LT	0.11	0.2	A	0.12	0.2	A	0.38	0.7	A
Route 20 WB TH	0.32	0.2	A	0.34	0.2	A	0.38	0.3	A
Route 9 EB to Route 20 WB RT	0.02	0.0	A	0.03	0.0	A	0.03	0.0	A
Route 9 EB to Route 20 EB RT	0.10	40.4	D	0.11	40.4	D	0.51	38.2	D
Overall	**0.32**	**3.6**	**A**	**0.34**	**3.6**	**A**	**0.38**	**6.7**	**A**
Saturday Midday									
Route 20 EB TH	0.19	1.8	A	0.20	1.9	A	0.42	9.8	A
Route 20 EB RT	0.30	0.5	A	0.32	0.5	A	0.32	0.5	A
Route 20 WB LT	0.10	0.2	A	0.11	0.2	A	0.39	27.6	C
Route 20 WB TH	0.20	0.1	A	0.21	0.1	A	0.25	0.2	A
Route 9 EB to Route 20 WBRT	0.03	0.0	A	0.03	0.0	A	0.03	0.0	A
Route 9 EB to Route 20 EB RT	0.09	40.3	D	0.09	40.3	D	0.79	40.4	D
Overall	**0.30**	**3.7**	**A**	**0.32**	**3.8**	**A**	**0.53**	**13.3**	**B**
Route 20 at Route 9 Westbound Ramps									
Weekday Evening									
Route 9 WB to Route 20 WB RT	0.41	0.8	A	0.44	0.9	A	0.44	0.9	A
Route 20 EB LT	0.19	21.0	C	0.20	21.7	C	0.27	28.1	C
Route 20 EB TH	0.25	1.4	A	0.27	1.4	A	0.61	6.7	A
Route 20 WB TH/RT	0.33	22.0	B	0.34	21.8	C	0.59	13.9	B
Route 9 WB to Route 20 EB RT	0.05	39.1	D	0.05	39.2	D	0.55	36.9	D
Overall	**0.41**	**11.2**	**B**	**0.44**	**11.2**	**B**	**0.62**	**11.9**	**B**
Saturday Midday									
Route 9 WB to Route 20 WB RT	0.26	0.4	A	0.27	0.4	A	0.27	0.4	A
Route 20 EB LT	0.15	17.7	B	0.15	17.9	B	0.21	26.7	C
Route 20 EB TH	0.21	0.8	A	0.23	0.8	A	0.75	14.0	B
Route 20 WB TH/RT	0.24	25.3	C	0.25	25.4	C	0.57	16.7	B
Route 9 WB to Route 20 EB RT	0.05	39.1	D	0.05	39.2	D	0.74	39.3	D
Overall	**0.26**	**12.5**	**B**	**0.27**	**12.6**	**B**	**0.75**	**16.8**	**B**

See notes at end of table.

Table 5 (Continued)
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE SUMMARY

Signalized Intersection/Peak Hour/Movement	2011 Existing			2016 No Build			2016 Build		
	V/C[a]	Delay[b]	LOS[c]	V/C	Delay	LOS	V/C	Delay	LOS
Route 20 at South Site Driveway and East Coast Golf Center Driveway									
Weekday Evening									
South Site Driveway EB LT	0.22	40.0	D	0.23	39.9	D	0.97	69.3	E
South Site Driveway EB RT	0.01	31.3	C	0.01	31.1	C	0.31	13.2	B
East Coast Golf Ctr Driveway WB LT/TH/RT	0.20	43.3	D	0.21	43.5	D	0.22	43.7	D
Route 20 EB LT	0.24	40.7	D	0.25	40.5	D	0.84	35.8	D
Route 20 EB TH	0.28	2.9	A	0.30	3.0	A	0.34	6.9	A
Route 20 WB LT	0.00	0.0	-[d]	0.00	0.0	-[d]	0.00	0.0	-[d]
Route 20 WB TH/RT	0.31	8.1	A	0.33	8.4	A	0.81	36.5	D
Overall	**0.30**	**10.2**	**B**	**0.32**	**10.3**	**B**	**0.84**	**32.4**	**C**
Saturday Midday									
South Site Driveway EB LT	0.30	40.4	D	0.31	40.4	D	1.02	75.8	E
South Site Driveway EB RT	0.02	31.3	C	0.02	31.1	C	0.36	9.7	A
East Coast Golf Ctr Driveway WB LT/TH/RT	0.16	41.1	D	0.17	41.2	D	0.18	41.6	D
Route 20 EB LT	0.15	45.0	D	0.16	44.7	D	0.95	47.0	D
Route 20 EB TH	0.30	6.4	A	0.32	6.5	A	0.40	16.1	B
Route 20 WB LT	0.05	42.1	D	0.05	42.1	D	0.05	42.1	D
Route 20 WB TH/RT	0.21	8.1	A	0.22	8.3	A	0.86	49.3	D
Overall	**0.29**	**12.4**	**B**	**0.30**	**12.6**	**B**	**0.90**	**39.6**	**D**

[a]Vehicle/Capacity ratio.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]No volume observed during count period.
EB = eastbound; WB = westbound; NB = northbound; SB = southbound.
LT = Left Turn movement; TH = Through movement; RT = Right Turn movement.

Table 6
UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE SUMMARY

	2011 Existing			2016 No Build			2016 Build		
Unsignalized Intersection/Peak Hour/Movement	Demand[a]	Delay[b]	LOS[c]	Demand	Delay	LOS	Demand	Delay	LOS
Route 20 at Hitching Post Lane and NorthernSite Drive									
Weekday Evening									
Northern Site Drive EB LT/TH	--	--	--	--	--	--	93	>100	F
Northern Site Drive EB RT	--	--	--	--	--	--	142	19.6	C
Hitching Post Lane WB LT/TH/RT	1	22.9	C	1	24.5	C	1	>100	F
Saturday Midday									
Northern Site Drive EB LT/TH	--	--	--	--	--	--	114	>100	F
Northern Site Drive EB RT	--	--	--	--	--	--	173	16.1	C
Hitching Post Lane WB LT/TH/RT	7	10.5	B	7	10.6	B	7	12.4	B
Route 20 at Tomblin Hill Road									
Weekday Evening									
Tomblin Hill Road WB LT/RT	66	21.5	C	69	32.1	D	111	>100	F
Saturday Midday									
Tomblin Hill Road WB LT/RT	29	15.1	C	30	15.8	C	89	63.3	F

[a] Demand in vehicles per hour.
[b] Delay in seconds per vehicle.
[c] Level of service.
EB = eastbound; WB = westbound; NB = northbound; SB = southbound.
LT = Left Turn movement; TH = Through movement; RT = Right Turn movement.

Summary of Results

As shown in Tables 5 and 6, capacity will still exist at the improved intersections following the proposed modification to the Project. It should be noted that the original Build scenario did not contemplate the connection of the East Coast Golf Center into the traffic signal operation proposed for the South site driveway, which was added during the Transportation Improvement Project (TIP) design process for the off-site improvements. This addition reserves an exclusive portion of the green time for the Golf Center driveway operations at the signal. Minor adjustments to the design signal timings were included in the Build condition, but do not require changes to phasing or cycle length. These can be accomplished through fine tuning of signal timing in the field following occupancy of the retail component, which is typically the final part of the design process.

A comparison of the original project Build conditions from the DEIR analysis and the expanded project Build conditions is shown below in Table 7.

Table 7
INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

	2011 Original Build Scenario with Designed Improvements				2016 Modified Build Scenario with Designed Improvements			
Signalized Intersection/Peak Hour/Movement	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Route 20 at Route 9 Eastbound Ramps								
Weekday Evening								
Route 20 EB TH	0.73	16.5	B	14/21	0.35	4.4	A	3/8
Route 20 EB RT	0.36	0.7	A	0/0	0.27	0.4	A	0/0
Route 20 WB LT	0.61	19.8	B	5/7	0.38	0.7	A	0/0
Route 20 WB TH	0.51	0.4	A	0/0	0.38	0.3	A	0/0
Route 9 EB to Route 20 WB RT	0.09	0.1	A	0/0	0.03	0.0	A	0/0
Route 9 EB to Route 20 EB RT	0.89	50.8	D	8/16	0.51	38.2	D	2/5
Overall	**0.78**	**11.4**	**B**		**0.38**	**6.7**	**A**	
Saturday Midday								
Route 20 EB TH	0.78	20.3	C	16/24	0.42	9.8	A	5/11
Route 20 EB RT	0.41	0.8	A	0/0	0.32	0.5	A	0/0
Route 20 WB LT	0.69	24.7	C	9/13	0.39	27.6	C	1/2
Route 20 WB TH	0.37	0.3	A	0/0	0.25	0.2	A	0/0
Route 9 EB to Route 20 WBRT	0.11	0.1	A	0/0	0.03	0.0	A	0/0
Route 9 EB to Route 20 EB RT	0.92	56.2	E	10/18	0.79	40.4	D	6/10
Overall	**0.83**	**15.2**	**B**		**0.53**	**13.3**	**B**	
Route 20 at Route 9 Westbound Ramps								
Weekday Evening								
Route 9 WB to Route 20 WB RT	0.54	1.3	A	0/0	0.44	0.9	A	0/0
Route 20 EB LT	0.49	25.4	C	5/8	0.27	28.1	C	2/4
Route 20 EB TH	0.68	4.6	A	4/14	0.61	6.7	A	5/19
Route 20 WB TH/RT	0.86	10.9	B	4/4	0.59	13.9	B	13/19
Route 9 WB to Route 20 EB RT	0.12	37.2	D	1/2	0.55	36.9	D	3/5
Overall	**0.80**	**10.3**	**B**		**0.62**	**11.9**	**B**	
Saturday Midday								
Route 9 WB to Route 20 WB RT	0.43	0.9	A	0/0	0.27	0.4	A	0/0
Route 20 EB LT	0.54	30.9	C	7/9	0.21	26.7	C	2/4
Route 20 EB TH	0.73	7.1	A	16/22	0.75	14.0	B	18/27
Route 20 WB TH/RT	0.69	18.0	B	17/19	0.57	16.7	B	13/14
Route 9 WB to Route 20 EB RT	0.44	42.0	D	2/4	0.74	39.3	D	6/9
Overall	**0.74**	**15.5**	**B**		**0.75**	**16.8**	**B**	

See notes at end of table.

Table 7 (Continued)
INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/Peak Hour/Movement	2011 Original Build Scenario with Designed Improvements V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg./95th	2016 Modified Build Scenario with Designed Improvements V/C	Delay	LOS	Queue Avg./95th
Route 20 at South Site Driveway and East Coast Golf Center Driveway								
Weekday Evening								
South Site Driveway EB LT	0.83	40.7	D	9/13	0.97	69.3	E	10/18
South Site Driveway EB RT	0.35	12.8	B	4/6	0.31	13.2	B	2/3
East Coast Golf Ctr Driveway WB LT/TH/RT	0.04	42.8	D	1/1	0.22	43.7	D	1/1
Route 20 EB LT	0.80	42.2	D	8/15	0.84	35.8	D	6/17
Route 20 EB TH	0.59	12.6	B	8/10	0.34	6.9	A	2/4
Route 20 WB LT	0.02	19.5	B	1/1	0.00	0.0	-[d]	--
Route 20 WB TH/RT	0.99	53.1	D	13/16	0.81	36.5	D	9/11
Overall	**0.88**	**35.1**	**D**		**0.84**	**32.4**	**C**	
Saturday Midday								
South Site Driveway EB LT	0.85	41.7	D	11/18	1.02	75.8	E	13/21
South Site Driveway EB RT	0.37	8.9	A	4/6	0.36	9.7	A	1/2
East Coast Golf Ctr Driveway WB LT/TH/RT	0.32	49.6	D	1/2	0.18	41.6	D	1/2
Route 20 EB LT	0.88	36.4	D	12/17	0.95	47.0	D	11/20
Route 20 EB TH	0.57	11.9	B	9/12	0.40	16.1	B	2/8
Route 20 WB LT	0.04	29.2	C	1/1	0.05	42.1	D	1/1
Route 20 WB TH/RT	0.94	55.8	E	10/14	0.86	49.3	D	7/9
Overall	**0.88**	**31.8**	**C**		**0.90**	**39.6**	**D**	

Unsignalized Intersection/Peak Hour/Movement	Demand[e]	Delay	LOS	Queue 95th	Demand	Delay	LOS	Queue 95th
Route 20 at Hitching Post Lane and Northern Site Drive								
Weekday Evening								
Northern Site Drive EB LT/TH	80	>100	F	N/A[f]	93	>100	F	10
Northern Site Drive EB RT	124	39.9	E	3	142	19.6	C	2
Hitching Post Lane WB LT/TH/RT	4	15.2	C	1	1	>100	F	1
Saturday Midday								
Northern Site Drive EB LT/TH	102	>100	F	N/A	114	>100	F	13
Northern Site Drive EB RT	153	22.0	C	2	173	16.1	C	2
Hitching Post Lane WB LT/TH/RT	3	>100	F	1	7	12.4	B	1
Route 20 at Tomblin Hill Road								
Weekday Evening								
Tomblin Hill Road WB LT/RT	242	>100	F	N/A	111	>100	F	6
Saturday Midday								
Tomblin Hill Road WB LT/RT	168	>100	F	>20	89	63.3	F	4

[a]Vehicle/Capacity ratio.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]Queues in vehicles, average and 95th percentile measurements.
[e]Demand in vehicles per hour.
[f] Not available. No results given by Synchro program.
EB = eastbound; WB = westbound; NB = northbound; SB = southbound.
LT = Left Turn movement; TH = Through movement; RT = Right Turn movement.

As shown in Table 7, the expanded Build traffic operating conditions are similar to those of the original Build scenario in the vicinity of the site driveway, and are generally improved moving away from the site driveways. This is due in part to the lower traffic volumes as compared with the 2005 conditions, but also due to the failure of the Boston Hill development to proceed (and its removal from this analysis).

SUMMARY AND CONCLUSION

Northborough Crossing, the development formerly known as The Loop – Northborough, is proposing an addition of approximately 53,000 sf of retail development to the previously proposed retail component of this mixed-use development. The increase in daily trips as a result of the expansion exceeds thresholds for a Notice of Project Change under MEPA statutes.

The proponent for Northborough Crossing has constructed substantial roadway improvements to the interchange of Route 9 and Route 20 consisting of traffic signal control installation and roadway widening, along with reconfiguration of entrance ramps to Route 9 in order to eliminate substandard weaving conditions that previously existed. The improvements are substantially complete and only final paving is outstanding.

Due to passage of time since the original MEPA filings and MassDOT design permitting efforts, along with occupancy of the AvalonBay development, new traffic count information was collected at the intersections improved by the project and on Route 20. A review of the 2011 traffic count information as well as MassDOT count data indicates that, even with the inclusion of the AvalonBay development, traffic volumes have substantially decreased from levels seen in 2005 prior to the start of permitting efforts.

The 2016 Build traffic analysis shows sufficient capacity exists at the improved intersections to accommodate the proposed expansion. When compared with the (then) Build condition of 2011 identified in the MEPA filings, operations are generally the same or improved moving away from the South site driveway. Minor adjustments to the design signal timings are likely to be required, but these can be accomplished through fine tuning of signal timing in the field following occupancy of the retail component.

In conclusion, this analysis indicates that the proposed expansion to the Northborough Crossing development can be accommodated at the improved intersections without additional mitigation efforts in the area, and the proposed change in the project therefore should be deemed insignificant in terms of its environmental consequences.