

Critique of the VHB Traffic Study
Prepared by *Neighbors for a Better Newtonville*

Contributors

Ron Mauri, Transportation Economist ABD, Volpe National Transportation Systems Center
Adel Foz, MCP/M.Arch MIT
Peter F. Harrington
Fred Arnstein, Ph.D., Principal: Survey Action Associates

Background

The developer has provided you with a traffic study from the project team prepared by Vanasse Hangan Brustlin (VHB).

The VHB study would have you believe that the Washington Place (Orr Block) project will have minimal impact on nearby traffic and that proposed improvements will mitigate such any such impacts. It also claims that safety will be improved.

We contend that the study is flawed and the conclusions cannot be trusted. It is not possible to know what the true traffic situation is based on the VHB study.

On the face of it, a construction of 171 residential units on the Orr site will add to traffic and delay. Below, we will point out several of the failings of the report. But to be clear on the main point: If the developer's petitions are contingent on the idea that the project does not make traffic worse, then this project fails the test.

We hope the Land Use Committee and the full City Council will acknowledge that the VHB report is inadequate, and that the impact of Washington Place as proposed is likely to be negative. We hope it will consider this in deciding to reject the Washington Street petitions.

The overall picture is that large developments, both commercial and residential, do increase traffic, and this is a current and future problem for Newton. Newton's streets are for the most part already built out. Their capacity cannot be increased and in some places is already being reduced by bike lanes & pedestrian bump outs.

Witness the regular Rt. 9 traffic jam every afternoon at 3 PM from Parker St. to Elliott St. (0.9 miles) or Needham St. every afternoon. A single project may have modest negative impact, but the cumulative result of multiple projects — in terms of wasted energy and air pollution, not to mention daily aggravation — is very substantial. We fear that this could be the fate of the whole Washington Street corridor. But it need not be so.

VHB'S ASSUMPTIONS AND PROCEDURES

Statistically invalid data collection: how VHB measured traffic volume

The measurement of traffic volumes is the foundation of the analysis. Here, VHB has failed absolutely to generate convincing data. It is almost impossible to believe that they took their own method seriously. Quoting their report, they collected data "based on automatic traffic recorder counts conducted on November 19, 2015." In other words, they collected data for one single day.

It does not require statistical expertise to grasp the essence of statistical sampling. Most every type of phenomenon we encounter involves variability from one instance to the next. For any process that exhibits variability, a sample of one makes no sense. Hitting a baseball is a process with variability: some days you hit, other days you don't.

What is David Ortiz' batting average? — observe a single game?!

Traffic flow is variable. It can be different in Newton from one day to another in any particular week, and similarly variable across months and seasons. Furthermore, as we learned from the Austin St. case, the Newtonville village center commercial area is sometimes clogged during non-rush hours and on weekends. So those periods should have been included as well.

The VHB report abandons site-specific data when it comes to seasonal variations (bottom of p.8 of VHB report).¹ The report thus makes an unsubstantiated assumption that Newton patterns are identical to the average of other communities in the state. Do we believe that winter and summer traffic patterns around Fenway Park are the same as those in Newton? Or similar to those in the Berkshires during leaf-peeping season?

For those who say that VHB conducted the study according to industry standards — that one day's observation is enough — we say that such a standard is not credible. It flies in the face of statistical theory and common sense.

¹ References to tables, etc. refer to the VHB report. In some cases, we have reproduced those tables in this presentation, keeping the original table numbers. We do also have several tables that we created, derived from tables in the VHB report. We have made it clear that these are derivative.

Critical street segments were not included

VHB chose to study only two street segments (see Table 1, p. 8 VHB). These are the segments on the Orr Block's exterior faces: (a) Washington west of Walnut and (b) Walnut north of Washington. While these segments are relevant to traffic entering and exiting the project, they are less relevant to overall traffic volume impacts. This is because they have lower volumes than the alternatives indicated by the turning data in the Appendix.

Specifically, (a) Washington St. EAST of Walnut gets the cumulative effects of funneling three flows (from Washington St. west of Walnut, plus the north-bound and south-bound Walnut St. flows) heading to and from Boston via the Mass Pike entrance at Newton Corner. (b) NNHS is located south of Washington St. and is a major traffic generator twice a day, including the morning peak rush hour. (c) The Walnut St./Watertown St. intersection can become very clogged and so influence congestion on Walnut Street heading toward Washington Street. Thus areas with high impacts are not included in the analysis, e.g., the estimated LOS ["Level of Service," explained below] and delay measures.

Impact of Austin Street simultaneous construction not considered

A 68-unit building has been approved by the city for 28 Austin Street. This location is a mere 0.2 mile from the Washington Place site, a 3-minute walk using Walnut Street (we have timed it). The VHB report mentions the possibility that Austin Street, and several other projects, might adversely affect traffic. But VHB concludes (p. 15) that the impact will be negligible: "their site-related trips are not expected to affect our study area."

There are two problems here. First, given the problems we see in the Washington Place traffic study, one has to wonder whether the Austin Street study was similarly flawed. Independent research by Peter Bruce contends that that Austin Street, when completed, will have more impact on parking than the official study shows. It's reasonable to suspect that traffic congestion will also be worse.

Second, and not at all speculative, is the problem of overlapping construction periods. These two projects, so near each other, are very likely going to be built at the same time, or partially so. There is no doubt that traffic will be adversely affected during each of the construction periods. When the construction periods overlap, traffic disruptions are likely to be quite severe. Leaving out this issue is a serious flaw in the VHB report.

Some of the existing trips will remain post-construction

A primary factor in assessing the project's traffic impacts are the estimated changes in the number of vehicle trips. (See Table 3 for the peak A.M. and P.M hours).

The methodology offsets new trips by assuming that all existing trips disappear. While this may be true for the Washington Place site itself, it is wrong to assume that the trips will simply disappear from Newtonville or the rest of Newton. Existing trips to and from the site are made for specific purposes. These purposes do not end when the existing buildings are demolished and their users relocate. Rather, they simply shift to other locations. Simply stated, a meal at Karoun's, or the need for camera repair at NV camera, or studio dance lessons are not obliterated by a wrecking ball. So those trips still exist, and some will probably be on the same Newton streets as before.

So while the study method might be valid in its estimate of vehicles entering and exiting the specific site, it is not valid to subtract all the existing trips from the number of vehicles passing by the site and contributing to congestion on Washington, Walnut and other area streets. Thus the project traffic impacts are understated.

"Transit-oriented Development" concept is irrelevant

The VHB report says (p. 9) that "It should be understood that the proposed redevelopment is a Transit-Oriented Development (TOD)." Similarly the report says (p. 1), "VHB, Inc. has completed a detailed traffic assessment to evaluate the potential impacts associated with the mixed use transit oriented redevelopment know as Washington Place..."

We have explained rather extensively in a different presentation (*Transit-Oriented Development: Why It Does Not Apply to the Washington Place Proposal*) why Washington Place does not qualify as a Transit-oriented development. The most fundamental reason is that public transit capabilities in the Newtonville Village Center do not meet the minimum requirements for a 'Transit Neighborhood' which is the most modest type of transit-oriented place.

Unnecessary rounding of results casts doubt on accuracy

There are two statistical charts, Figure 4 and Figure 5, located between page 9 and 10 Existing Conditions, inserted in the paragraph titled "Crash History," that call for review. The charts display the number of vehicles entering the intersections of Walnut & Washington and the intersection of Lowell and Washington. They show the number of vehicles that turn right, turn

left, or pass straight through. There are 12 entries for each intersection, A.M. and P.M.; a total of 48 entries in all.

What's odd is that each of the 48 entries ends in a 0 or a 5. The chance of getting all zeros and fives is approximately zero, a statistical impossibility. Apparently, the figures have been rounded up or down. In itself, rounding makes no difference to any conclusions. But why bother to round at all?

"Internal Capture Trips" are irrelevant to street traffic volumes

Table 3 ("Project Trip Generation Summary") on page 19 of the report is central to the report's overall conclusion that traffic would not be seriously affected by the new development. We are reproducing the table here so that you can follow the argument.

Table 3 Project Trip Generation Summary

Time Period	Existing Observed Trips ^a	Proposed Residential Trips ^b	Proposed Retail Trips ^c	Internal Capture Trips ^d	Pass-By Trips ^e	Net New Trips
Weekday Morning Peak Hour						
Enter	40	18	59	1	12	24
Exit	<u>27</u>	<u>69</u>	<u>36</u>	<u>1</u>	<u>12</u>	<u>65</u>
Total	67	87	95	2	24	89
Weekday Evening Peak Hour						
Enter	121	73	166	50	50	18
Exit	<u>139</u>	<u>39</u>	<u>180</u>	<u>50</u>	<u>50</u>	<u>-20</u>
Total	260	112	346	100	100	-2

- a. Based on existing driveway counts.
- b. Trip Generation estimate based ITE LUC 220 (Apartment) for 171 units.
- c. Trip Generation estimate based ITE LUC 820 (Shopping Center) for 43,985 sf (includes community center space and commercial loading areas).
- d. Internal capture based on NCHRP rates.
- e. Pass-by based on ITE rates for LUC 820 (Shopping Center).

The table concludes that 89 net new trips would be created in the AM peak hour, yet 2 new net trips would be lost in the PM peak hour. This result is difficult to believe. If it is true, we do not understand it. However, we will venture a possibility.

Notice in Figure 3 the column labeled "Internal Capture Trips (ICTs)." ICTs are trips made within a mixed use development, such as from your residence to a restaurant within the complex. In Washington Place, it would be highly unlikely for a person to drive from one internal location to another. The distances are too small. So internal trips (ITCs) would amount

to foot traffic. The point is that foot traffic is irrelevant to the main topic of the report, which is the volume of auto traffic on Washington and Walnut Streets.

ICTs have no impact at all on auto trips outside the development. Yet in Table 3, the estimated ICTs are subtracted from the total traffic volume in order to arrive at the Net New Trips. You can see that the report estimates only 2 ICTs in the morning while they estimate 100 in the afternoon.

Here — excluding the subtraction of ICTs — are the calculations for the afternoon trips:

- New trips (combine Residential and Commercial): 458
- Subtract 260 existing trips that will disappear when existing buildings are torn down: 198 (note that as we said above, some of these trips would actually remain)
- Subtract 100 Pass-by trips: we are down to 98 trips — which pretty well matches the 89 morning trips.

VHB'S CONCLUSIONS

How traffic flow is graded

Before addressing the specifics, let us explain how the professional transportation community evaluates and characterizes traffic flow. Highways and signalized intersections are rated for traffic congestion using Level of Service (LOS) grades from "A" to "F." The computations are complex, taking account of a variety of factors, but the general idea of the ratings is easy to understand.

- "A" indicates free traffic flow at the speed limit
- "F" is the worst rating, characterized by a breakdown in traffic flow, more demand than capacity, and a constant traffic jam.

Let's look specifically at the three lowest grades, as they apply to signalized intersections.

Level of Service	Description
D	Significant congestion on critical approaches, but intersection functional. Cars required to wait through more than one cycle during short peaks. No long-standing queues formed. This is a reasonable goal for urban streets during peak hours.

E	Sluggish and frustrating. Severe congestion with some long-standing queues on critical approaches. Intersection can be blocked if traffic signal does not provide for protected turning movements. Any disruption may create shockwaves in upstream traffic.
F	Total breakdown in flow, jammed-up stop-and-go traffic. The wait at the intersection is at least 80 seconds; it's more likely to be two minutes or more.

With these Level Of Service (LOS) definitions in mind, let's consider VHB's conclusions.

Traffic congestion is already bad

Let's focus on the main intersection – Washington @ Walnut. Table 9 in VHB's report tells us the overall condition is "E" in the morning and "F" in the afternoon. When you look at the various flows – east, west, north, south, and thru, right and left — you find almost half (21 of 48) are already at a grade of LOS "F." One-third of the specific flows are considerably worse than the 80-second "F" minimum delay time.

So, according to VHB's own data, this area is not appropriate for further development and added vehicle traffic.

The project would increase traffic, make Level of Service worse

How will the added trips affect LOS? Again looking at Table 9, you will find that the morning peak changes from LOS "E" to "F" (the worst). The afternoon peak, already at "F," will probably become even worse. (As we just remarked, VHB was almost certainly wrong in contending that traffic would decrease in the afternoon peak.) The impact of the project would be negative in the morning and probably negative in the evening.

Bump outs disrupt traffic flow

VHB proposes curb extensions ("bump outs") to make the intersection safer. What the reports fail to mention is that bump outs also slow traffic, so the LOS estimates will be worse, not better. We are not saying that bump outs are a bad idea. But if bump outs and other such changes are good ideas, they should be built into the base case (no build). Newton should consider doing them regardless of whether and when a project is built. And if they are done, then the downside (impeding traffic flow) has to be taken into consideration.

New signals and signal timing won't help at congested times

New signals and timing will probably help in off-peak non-congested periods, but not at peak periods when most trips and traffic congestion occurs. Why not? Because signaling improvements cannot repeal the laws of physics. A minute will always be 60 seconds and the typical flow rate is about 30 vehicles per lane. When demand exceeds capacity, the queues just get longer until demand drops.

We would also bring to your attention two other very relevant considerations. First, the Metropolitan Planning Organization (MPO) study of the corridor actually recommends that the exclusive pedestrian signal phases at both intersections be increased – again making the already congested intersections worse.

Second, the MPO study also notes that the introduction of new turnpike tolling in Newton will considerably increase the baseline traffic flows on Washington Street from those assumed by the consultants. This is due to happen on October 28. It could have a significant impact on traffic and needs to be taken into account.

Fewer access points do not mean greater safety

The proposed development will have two access points, less than the current six access points on the Orr Block. But fewer access points is not evidence of a safer pedestrian environment. The more important point is that there will be more vehicles exiting and entering and hence more conflicts with other street and sidewalk traffic. The net effect of the project due to fewer access points but increased trips would be better characterized as a negative, not the claimed “substantial enhancement.”

Intersection Capacity Analysis (p. 29) may be flawed

The VHB report provides the project’s basic traffic congestion impacts based on the Synchro commercial simulation software. If the input data are valid and the results seem consistent and plausible, then the model is acceptable.

But is the input valid? Are the model results consistent and plausible? Table 9 (p. 30) provides a small sample of model results that can be used to begin to answer these questions and assess the traffic impacts of the project.

The following Table A is derived from Table 9. It shows travel time changes (in seconds) based on traffic changes for various cases. It was assumed, as expected, that background traffic increases from 2016 to the 2023 No-Build Case, and increases again from the 2023 No-Build to the 2023 Build case. As a result, all values are expected to be positive – more delay as a result

of higher traffic levels. In most cases there is the expected increase in delay, but the few zero and negative values are puzzling and unexpected. More troubling are the two large negative values (-26 and -63) that are in bold text. How could delays not increase from no-build 2016 to no-build 2023, given normal increases in traffic volume from year to year? The traffic study should note and explain why these negative estimates are valid.

Note the entries that say “Large: No Usable Data.” Those words mean that the model results are over 120 seconds in all cases so the change cannot be calculated. That is also why South Bound results are not shown for the Washington & Walnut Intersection. The over-120 seconds are either because the model could not make estimates or the estimated delays are considered so large as to be unacceptable to drivers who would then use other street options. In other words, drivers would re-route, using smaller residential streets. If that's the case, the report should specify what those other street options would be and consider the implications for residents and normal traffic on those streets.

Table A: Delay Changes Derived from Table 9 of VHB Traffic Study

Washington & Lowell Intersection			
Time & Direction Cases		2016 to 2023 No-Build	2023 No-Build to Build
Morning Peak	East Bound	0	+1
	West Bound	-1	+1
	South Bound	-26	+15
Evening Peak	East Bound	0	+1
	West Bound	+1	-2
	South Bound	+8	+3
Washington & Walnut Intersection			
Morning Peak	East Bound	+7	+2
	West Bound	GT -63 ²	+2
	South Bound	Large: No Usable Data	Large: No Usable Data
Evening Peak	East Bound	+1	0
	West Bound	Large: No Usable Data	Large: No Usable Data
	South Bound	Large: No Usable Data	Large: No Usable Data

²“GT” means “Greater Than” and indicates the actual value cannot be computed but is larger in absolute value than the value shown.

Table B (derived from VHB's Table 11) likewise gives the travel time changes in seconds based on traffic changes for various cases. The first column in Table B is the same case (and results) as the second column Table A. The new information in Table B is in the second column where estimates are given for "improvements" hypothesized for the build case.

Table B: Delay Changes Derived from Table 11 of VHB Traffic Study

Washington & Lowell Intersection			
Time & Direction Cases		2023 No-Build to Build	2023 Build to Build w/ Improvements
Morning Peak	East Bound	+1	-8
	West Bound	+1	-8
	South Bound	+15	-76
Evening Peak	East Bound	+1	-7
	West Bound	-2	-10
	South Bound	+3	-17
Washington & Walnut Intersection			
Morning Peak	East Bound	+2	-43
	West Bound	+2	-39
	South Bound	+15	(GT) -92
Evening Peak	East Bound	0	-27
	West Bound	Large: No Usable Data	(GT) -93
	South Bound	Large: No Usable Data	(GT) -91

The projected improvements result in smaller delays, in most cases by substantial amounts. The sum of the two columns equals the net effect of the project. The overall conclusion is that the improvements swamp all the delays in the first column. We are given to believe that even though the project adds to the number of vehicle trips, it will improve Newton traffic flows.³ What exactly are the improvements that have such felicitous results?

The report lists them but does not indicate what model values are attributed to them. It should indicate those values if we are to believe the conclusions.

- Fewer access points. Since there are more total vehicles using the remaining access points, it's hard to believe this has any traffic delay benefit.

³ VHB told Ron Mauri that they reduced 2023 build (and maybe no build too) traffic by a percentage because MAPC or some other organization said they could do so. The percent reduction is not in the report. Regardless, just because some guidance says "you can" does not mean "you should" and that it makes sense. LUC should tell Planning dept what to assume and make it explicit.

- Improvements to the two signalized intersections. However, as we noted, some of those (bump outs and ADA adaptations) are aimed at slowing traffic.
- Transportation Demand Management (TDM). This simply provides transit information on-site that will have minimal if any impact on behavior (or did VHB assume a sizable reduction in the number of vehicle trips?).
- Modernizing the signal system. This item could have a positive effect, but if it's the source of these sizable delay reductions, it is something Newton should do regardless of this project and long before 2023. In other words it should not count as a project benefit.

A dense project will jeopardize the City's Comprehensive Plan for the Washington Street Corridor

The roadway between Walnut and Lowell Streets is the shortest signalized stretch of Washington Street between Newton Corner and West Newton. On a daily basis, it already shows limited capacity to store vehicles waiting for signals and often operates at Level of Service E/F. Causing these two intersections and their approaches to operate longer at these Levels of Service and worse will discourage investment in the future development of the corridor, as proposed by the City.

In addition, Walnut Street is the only major North-South roadway between Newton Corner and West Newton. Significant delays to traffic between Walnut and Lowell on Washington will cause diversions onto other City streets which are not designed to provide relief capacity nor to provide comparable East-West and North-South connections.

In conclusion

We are skeptical of the rosy picture portrayed by the VHB consultants. The Washington Place petition for rezoning and waivers is likely to create traffic problems that will affect the immediate area and may add to congestion in other parts of the city. The VHB report, in its current state, does not prove the contrary. A smaller development (within current zoning) will be a safer development.