

Memorandum

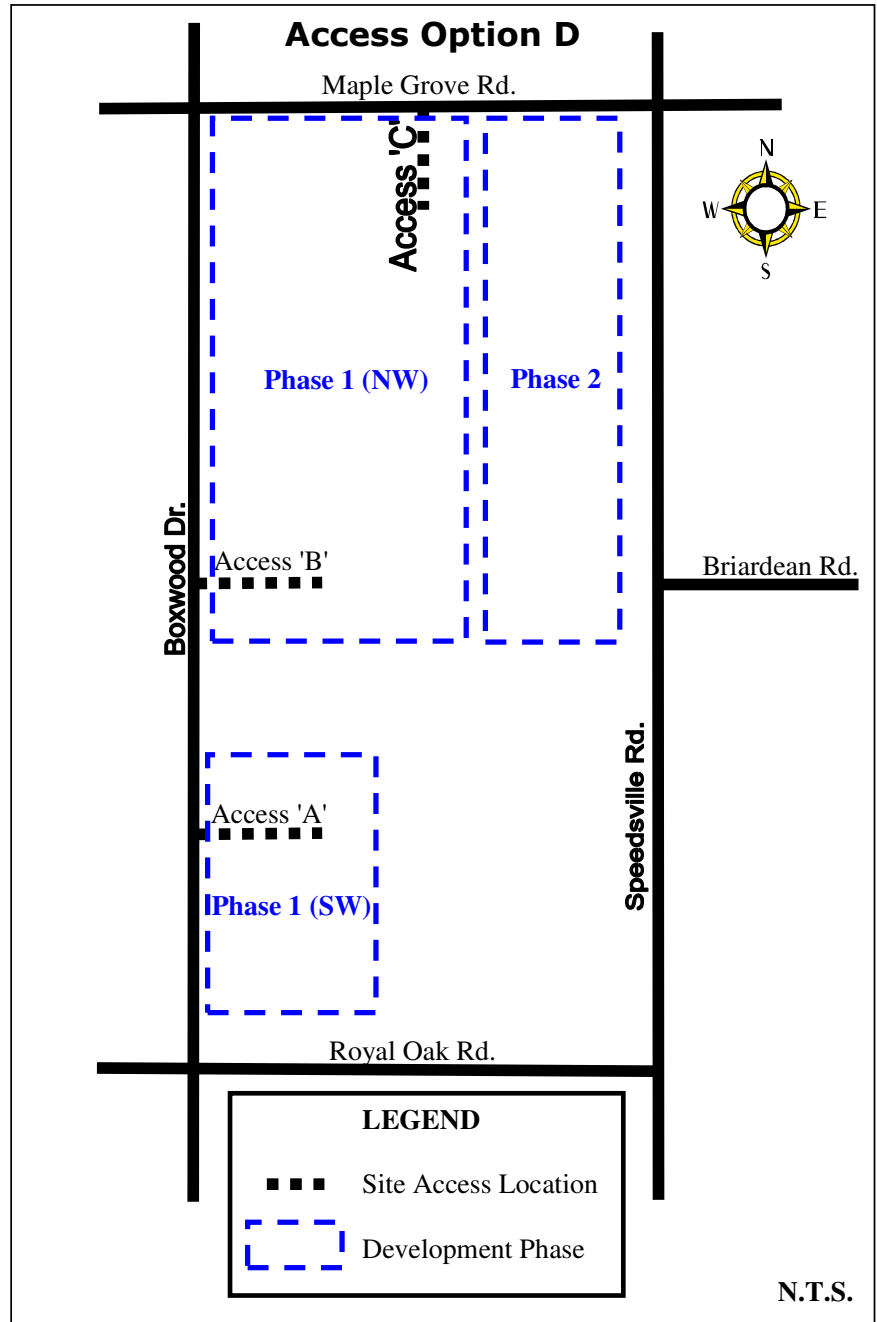
To: Shannon Noonan
Copy: Ken Hodges
From: Nick Palomba

Date: October 21, 2008
Project: EM3528 TWD01

Re: Boxwood Industrial Park: Briardean Access

In response to a request from City of Cambridge Staff, further traffic operational analysis was conducted examining an alternative access option into the Boxwood Industrial Park (named Access Option D). Access Option D is illustrated in the figure; it includes both accesses onto Boxwood Drive, one access onto Maple Grove Road and no access onto Speedsville Road.

All analysis for Access Option D was analyzed using City of Cambridge saturation flow rates for 2014 and 2019 total traffic conditions, with the recommended geometric improvements documented in the Draft Traffic Impact Study (TIS). Only the intersections that were directly affected by the re-



assignment of trips due to the removal of the Briardean access have been summarized in this memo.

Tables 1 and 2 present the signalized operational performance, under 2014 total traffic conditions (with geometric improvements), for the AM and PM peak hours, respectively.

Table 1
Signalized Operational Performance
AM Peak Hour 2014 Total Traffic With Geometric Improvements

Signalized Intersection*	ACCESS OPTION D			
	LOS	Delay (s)	V/C	Critical V/C>=0.85
Maple Grove Rd & Speedsville Rd	A	8.9	0.46	–
Access 'C' & Maple Grove Rd	A	3.6	0.31	–

Table 2
Improved Signalized Operational Performance
PM Peak Hour 2014 Total Traffic With Geometric Improvements

Signalized Intersection*	ACCESS OPTION D			
	LOS	Delay (s)	V/C	Critical V/C>=0.85
Maple Grove Rd & Speedsville Rd	C	23.4	0.71	–
Access 'C' & Maple Grove Rd	A	8.7	0.57	–

As shown above, the affected signalized intersections will operate satisfactorily and will experience a Level of Service (LOS) C or better under 2014 total traffic conditions during both the AM and PM peak hours.

Tables 3 and 4 present the unsignalized operational performance under 2014 total traffic conditions during the AM and PM peak hours, respectively.

Table 3
Unsignalized Operational Performance
AM Peak Hour 2014 Total Traffic

Unsignalized Intersections*	OPTION D	
	Highest Movement LOS*	Corresponding Highest Movement Delay (s)
Speedsville Rd & Royal Oak Rd	EBL = E	39.7
Cherry Blossom Rd & Boxwood Rd	N/SLTR=E	39.7
Access 'A' & Boxwood Rd	WBLR=B	11.1
Access 'B' & Boxwood Rd	WBLR=B	10.7

Table 4
Unsignalized Operational Performance
PM Peak Hour 2014 Total Traffic

Unsignalized Intersections*	OPTION D	
	Highest Movement LOS*	Corresponding Highest Movement Delay (s)
Speedsville Rd & Royal Oak Rd	EBL = F EBR = F	222.5
Cherry Blossom Rd & Boxwood Rd	SBLTR=F	174.6
Access 'A' & Boxwood Rd	WBLR=B	10.9
Access 'B' & Boxwood Rd	WBLR=B	11.6

As shown above in **Tables 4 and 5**, the intersections of Access 'A' and 'B' with Boxwood Drive will operate satisfactorily at a LOS of B during both time periods. However, the intersections of Speedsville Road and Royal Oak Road will experience extensive delay for eastbound traffic on Royal Oak Road under the 2014 total traffic conditions during the PM peak hour. The AM peak hour is also approaching capacity.

The intersection of Cherry Blossom Road/Royal Oak Road and Boxwood Drive will experience increased delay to the southbound traffic as a result of the re-assignment of 'Briardean Access' trips. A sensitivity analysis was conducted to determine if a separate southbound left turn auxiliary lane

would improve the approach delay. The result of this analysis was that the delay did decrease, but remained in excess of 2 minutes. This significant level of delay could be remedied through the use of either a traffic signal or roundabout at this location.

Tables 5 and 6 present the signalized operational performance, under 2019 total traffic conditions (with geometric improvements), for the AM and PM peak hours, respectively.

Table 5
Signalized Operational Performance
AM Peak Hour 2019 Total Traffic With Geometric Improvements

Signalized Intersection*	ACCESS OPTION D			
	LOS	Delay (s)	V/C	Critical V/C>=0.85
Maple Grove Rd & Speedsville Rd	B	17.1	0.74	–
Access 'C' & Maple Grove Rd	A	4.1	0.41	–
Royal Oak Rd & Speedsville Rd	A	8.0	0.64	–

Table 6
Signalized Operational Performance
PM Peak Hour 2019 Total Traffic With Geometric Improvements

Signalized Intersection*	ACCESS OPTION D			
	LOS	Delay (s)	V/C	Critical V/C>=0.85
Maple Grove Rd & Speedsville Rd	C	31.9	0.82	–
Access 'C' & Maple Grove Rd	A	9.8	0.63	–
Royal Oak Rd & Speedsville Rd	C	25.7	0.69	SBT=0.85

As shown above, the affected signalized intersections are anticipated to operate satisfactorily at a Level of Service (LOS) C or better under 2019 total traffic conditions for the both the AM and PM peak hours. Since the intersection of Speedsville Road and Eagle Street will become a network constraint in the system and since Synchro software analyzes intersections

in isolation, a further analysis of the intersection of Speedsville Road and Royal Oak Road was conducted with the SimTraffic micro simulation model software. The analysis will highlight the impact of the downstream intersection operation on Royal Oak Road intersection. Although **Table 6** indicates that the intersection of Speedsville Road and Royal Oak Drive will operate satisfactorily in 2019, SimTraffic analysis indicates that downstream delays will result in extensive queuing and delay for the eastbound right-turn movement, resulting in blockage of the eastbound left turn lane for the majority of the PM peak hour.

A similar review of the other access options confirmed that queuing will also exist under these configurations as well, however, due to the re-distribution of 'Briardean access' traffic to/from Royal Oak Drive there will be increased demand on the eastbound approach. This increase in demand will result in longer queues under the 'Access Option D' option extending as far back as the Boxwood Drive intersection during the PM peak hour. This eastbound queuing on Royal Oak Road at Speedsville Road is a direct result of the downstream "bottleneck" occurring for southbound traffic on Speedsville Road at Eagle Street. Without this constraint at Eagle Street, the intersection of Speedsville Road and Royal Oak Road would operate satisfactorily.

Tables 7 and 8 present the unsignalized operational performance under 2019 total traffic conditions during the AM and PM peak hours, respectively.

**Table 7 – Unsignalized Operational Performance
AM Peak Hour 2019 Total Traffic**

Unsignalized Intersections*	OPTION D	
	Highest Movement LOS*	Corresponding Highest Movement Delay (s)
Cherry Blossom Rd & Boxwood Rd	N/SBLTR=C	21.0
Access 'A' & Boxwood Rd	WBLR=B	12.0
Access 'B' & Boxwood Rd	WBLR=B	11.6

**Table 8 – Unsignalized Operational Performance
PM Peak Hour 2019 Total Traffic**

Unsignalized Intersections*	OPTION D	
	Highest Movement LOS*	Corresponding Highest Movement Delay (s)
Cherry Blossom Rd & Boxwood Rd	SBLTR=F	315.3
Access 'A' & Boxwood Rd	WBLR=B	11.4
Access 'B' & Boxwood Rd	WBLR=B	13.9

As shown above in **Table 8**, and as was the case under 2014 total traffic conditions, the re-assignment of 'Briardean Access' trips will increase delay significantly for the southbound leg of the intersection of Cherry Blossom Road/Royal Oak Road and Boxwood Drive. As was noted previously, this poor level of service could be remedied with a change in intersection traffic control (i.e. traffic signal or roundabout), however if downstream queues along Royal Oak Road spillback to this intersection the delay to Boxwood Drive traffic would remain even with a traffic signal.

SUMMARY

The lack of access onto Speedsville Road from the Boxwood Industrial Park will result in a longer, more circuitous route for motorists wishing to access the site, especially for those traveling to/from the south along Speedsville Road.

The lack of access will increase traffic demands along Royal Oak Road from Boxwood Drive east and will require the need for signalization at the Boxwood Drive and Royal Oak intersection. Overall delay and congestion on Royal will increase to unacceptable levels.

It is not recommended that the Boxwood Subdivision be constructed without an access to Speedsville Road.