

MEMORANDUM

TO: CHARLIE ARMSTRONG

FROM: BILL WUENSCH, P.E., PTOE;
WEI HE

ORGANIZATION: SOUTHERN DEVELOPMENT

DATE: OCTOBER 29, 2019
JANUARY 13, 2020 REVISED

PHONE NUMBER:

SENDER'S REFERENCE NUMBER:

RE: BREEZY HILL SUPPLEMENTAL STUDY #2
- WITH COORDINATED TRAFFIC SIGNALS ONLY

YOUR REFERENCE NUMBER:

☐ URGENT ☒ FOR YOUR USE ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

Purpose and Methodology

As requested, the purpose of this memorandum is to provide a supplemental study for the Breezy Hill development to examine the traffic operations at the intersection of Route 250 and Route 22 and the intersection of Route 250 and N Milton Road.

The focus of the analysis is to compare the 2023 no build scenario with existing traffic signal timing and control and 2023 build scenario that includes coordinated traffic signals only (i.e. no commuter bus service). The comparison examines if the 2023 build scenario with coordinated traffic signals will have improved traffic operations compared to 2023 no build scenario with existing traffic signal operations.

In this memorandum, EPR analyzed the traffic operations using Synchro and SimTraffic to determine the average vehicle delays, vehicle/capacity ratios, levels of service, and maximum queue lengths at the two study intersections, as well as further examined the average vehicle stops and corridor travel times using SimTraffic.

2023 No Build Scenario with Existing Traffic Signals

The 2023 no build scenario traffic volumes were obtained from the prior study and are illustrated in **Figure 1**. The traffic volumes as illustrated in Figure 1 were analyzed in Synchro and SimTraffic and the results were reported in the attachments and summarized in **Table 1**.

Figure 1 2023 No Build Scenario Traffic Volumes

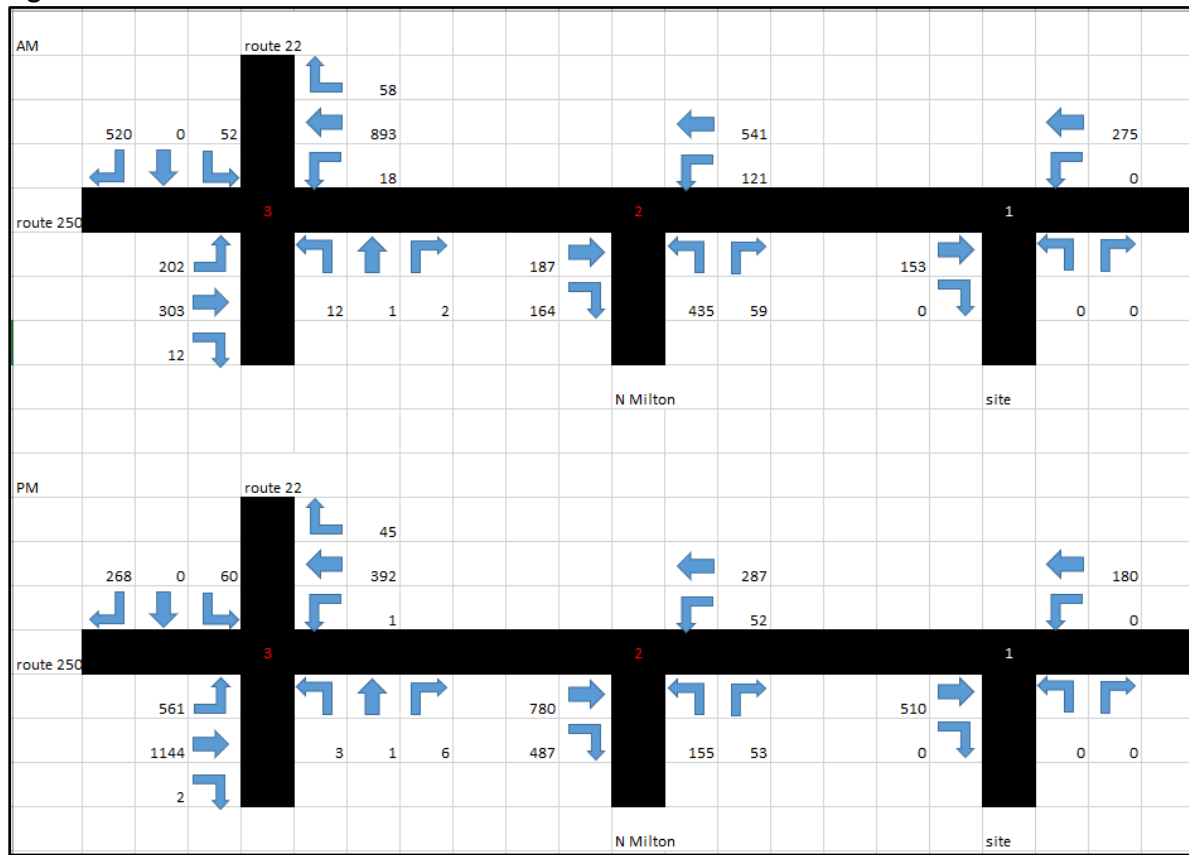


Table 1 2023 No Build Scenario Traffic Results

Intersection	Approach	Movement	2023 No Build AM				2023 No Build PM			
			LOS	V/C	Delay	Queue	LOS	V/C	Delay	Queue
3. Route 250/ Route 22	Route 250 EB	EBL	D	0.49	39.2	278	D	0.95	44.2	401
	Route 250 EB	EBT	B	0.28	10.2	161	F	1.20	117.8	513
	Route 250 EB	EBR	A	0.00	0.0	54	A	0.00	0.0	185
	Route 250 WB	WBL	C	0.09	25.4	329	C	0.01	26.5	8
	Route 250 WB	WBT	F	1.20	141.6	927	D	0.85	37.1	316
	Route 250 WB	WBR	A	0.00	0.0	300	A	0.00	0.0	174
	Quarry NB	NBL/NBT/NBR	F	0.85	136.2	119	F	0.50	83.4	60
	Rotue 22 SB	SBL/SBT	E	0.56	65.1	102	D	0.49	44.6	70
	Rotue 22 SB	SBR	A	0.00	0.0	6	A	0.00	0.0	0
	Intersection Overall		F		96.6	2276	F		81.9	1727
2. Route 250/ N Milton	Route 250 EB	EBT	D	0.51	50.6	289	C	0.87	23.5	927
	Route 250 EB	EBR	D	0.13	44.7	130	B	0.49	12.5	130
	Route 250 WB	WBL	C	0.43	32.2	180	B	0.23	14.1	81
	Route 250 WB	WBT	D	0.90	48.9	573	A	0.24	5.0	142
	N Milton NB	NBL	C	0.52	21.9	743	D	0.73	37.5	167
	N Milton NB	NBR	B	0.04	15.1	296	C	0.10	29.2	59
	Intersection Overall		D		38.2	2211	B		18.9	1506

2023 Build Scenario with Existing Traffic Signals

In the 2023 build scenario, the Breezy Hill development was assumed to consist of 160 single family homes with one entrance to the site from Route 250. The generated site trips are summarized in **Table 2**. The site trips were assigned to the intersections based on the methodology as provided in the prior traffic study. The resulting 2023 build scenario traffic volumes are illustrated in **Figure 2**.

Table 2 Trip Generation

Use Description	ITE Code	Qty	Daily	AM		PM	
				in	out	in	out
Single Family Detached	210	160	1602	29	89	100	60
Peak Hour Trips				118		160	

Figure 2 2023 Build Scenario Traffic Volumes



The traffic volumes as illustrated Figure 2 were analyzed in Synchro and SimTraffic and the results were reported in the attachments and summarized in **Table 3**.

Table 3 2023 Build Scenario Traffic Results

Intersection	Approach	Movement	2023 Build AM				2023 Build PM			
			LOS	V/C	Delay	Queue	LOS	V/C	Delay	Queue
3. Route 250/ Route 22	Route 250 EB	EBL	D	0.49	39.2	294	D	0.98	54.0	430
	Route 250 EB	EBT	B	0.30	10.5	184	F	1.25	139.1	539
	Route 250 EB	EBR	A	0.00	0.0	37	A	0.00	0.0	347
	Route 250 WB	WBL	C	0.09	25.5	329	C	0.01	26.7	16
	Route 250 WB	WBT	F	1.29	179.6	927	D	0.87	40.4	338
	Route 250 WB	WBR	A	0.00	0.0	300	A	0.00	0.0	180
	Quarry NB	NBL/NBT/NBR	F	0.85	136.2	125	F	0.50	85.4	60
	Rotue 22 SB	SBL/SBT	E	0.57	65.3	82	D	0.51	46.9	84
	Rotue 22 SB	SBR	A	0.00	0.0	0	A	0.00	0.0	0
	Intersection Overall		F		120.6	2278	F		96.9	1994
2. Route 250/ N Milton	Route 250 EB	EBT	D	0.50	48.5	361	C	0.93	31.8	938
	Route 250 EB	EBR	D	0.11	42.2	130	B	0.48	12.4	130
	Route 250 WB	WBL	C	0.44	29.5	180	B	0.28	17.4	107
	Route 250 WB	WBT	D	0.93	51.0	640	A	0.28	5.1	200
	N Milton NB	NBL	C	0.56	25.4	835	D	0.73	39.6	159
	N Milton NB	NBR	B	0.04	17.3	325	C	0.10	30.9	49
	Intersection Overall		D		40.2	2471	C		22.9	1583

2023 Build Scenario with Coordinated Traffic Signals

In the 2023 build scenario with coordinated traffic signals, the traffic signals at the study intersections were assumed to be coordinated. The traffic volumes as illustrated in Figure 2 were analyzed in Synchro and SimTraffic and the results were reported in the attachments and summarized in **Table 4**.

Table 4 2023 Build Scenario with Coordinated Traffic Signals Traffic Results

Intersection	Approach	Movement	2023 Build with Improvement AM				2023 Build with Improvement PM			
			LOS	V/C	Delay	Queue	LOS	V/C	Delay	Queue
3. Route 250/ Route 22	Route 250 EB	EBL	D	0.61	46.8	303	B	0.85	19.9	441
	Route 250 EB	EBT	C	0.39	20.4	167	D	0.99	42.1	503
	Route 250 EB	EBR	A	0.00	0.0	48	A	0.00	0.0	100
	Route 250 WB	WBL	B	0.04	12.9	329	C	0.02	33.5	10
	Route 250 WB	WBT	F	1.16	99.7	926	C	0.47	21.1	393
	Route 250 WB	WBR	B	0.00	11.0	300	A	0.00	0.0	108
	Quarry NB	NBL/NBT/NBR	F	0.85	136.2	117	F	0.50	117.2	63
	Rotue 22 SB	SBL/SBT	E	0.57	65.3	78	F	0.69	86.6	109
	Rotue 22 SB	SBR	A	0.00	0.0	0	A	0.00	0.0	0
	Intersection Overall		E		74.6	2268	C		34.0	1727
2. Route 250/ N Milton	Route 250 EB	EBT	C	0.45	21.1	342	A	0.77	7.8	928
	Route 250 EB	EBR	B	0.14	19.1	130	A	0.41	4.9	130
	Route 250 WB	WBL	C	0.38	27.6	180	C	0.16	20.8	116
	Route 250 WB	WBT	D	0.90	44.6	571	A	0.24	4.4	153
	N Milton NB	NBL	C	0.57	26.6	710	E	0.85	79.3	217
	N Milton NB	NBR	B	0.04	18.0	312	E	0.06	56.7	60
	Intersection Overall		C		33.0	2245	B		13.2	1604

Findings and Conclusions

This study effort compared the traffic operations results as shown in Table 1 and Table 4. All of these data points are comparing the "No Build" scenario (i.e. if Breezy Hill is not developed) to the "Build with Coordinated Traffic Signals Scenario" (i.e. if Breezy Hill is developed and the signals are improved to operate as coordinated with optimized timings). The findings are as followings –

"No Build" vs. "Build with Coordinated Traffic Signals Scenario" Overall Intersection Performance:

- 250 @ Rte 22 AM: Delay decreases from 97 to 75 and LOS improves from F to E
- 250 @ Rte 22 PM: Delay decreases from 82 to 34 and LOS improves from F to C
- 250 @ Milton AM: Delay decreases from 38 to 33 and LOS improves from D to C
- 250 @ Milton PM: Delay decreases from 19 to 13 and LOS is B in either scenario

"No Build" vs. "Build with Coordinated Traffic Signals Scenario" AM/PM Peak Direction 250 Through Traffic Performance:

- 250 @ Rte 22 AM WB: Delay decreases from 142 to 100 and LOS is F in either scenario
- 250 @ Rte 22 PM EB: Delay decreases from 118 to 42 and LOS improves from F to D
- 250 @ Milton AM WB: Delay decreases from 49 to 45 and LOS is D in either scenario
- 250 @ Milton PM EB: Delay decreases from 24 to 8 and LOS improves from C to A

As indicated in the comparison above, **developing Breezy Hill and implementing the proposed coordinated traffic signals will make traffic performance on the Route 250 east corridor better than it is today.**

Further Analysis

As requested, EPR further analyzed the average vehicle stops and corridor travel times using SimTraffic at the two study intersections.

Average Vehicle Stops

The average vehicle stops (stops per car traveling through the system) were analyzed in SimTraffic and the results were reported in the attachments and summarized in **Table 5**.

Table 5 Average Vehicle Stop Results

Intersection	Approach	Movement	2023 No Build		2023 Build		2023 Build with Improvement	
			AM	PM	AM	PM	AM	PM
3. Route 250/ Route 22	Route 250 EB	EBL	0.91	0.72	0.93	0.76	0.90	0.71
	Route 250 EB	EBT	0.18	0.42	0.18	0.57	0.18	0.40
	Route 250 EB	EBR	0.25	0.33	0.19	0.33	0.19	0.25
	Route 250 WB	WBL	0.68	0.00	0.64	1.00	0.60	0.00
	Route 250 WB	WBT	1.43	0.68	1.52	0.69	1.42	0.48
	Route 250 WB	WBR	0.29	0.63	0.29	0.64	0.28	0.43
	Quarry NB	NBL/NBT/NBR	0.94	1.00	1.00	0.91	1.00	1.00
	Rotue 22 SB	SBL/SBT	0.92	0.89	0.92	0.89	0.94	0.97
	Rotue 22 SB	SBR	0.00	0.00	0.00	0.00	0.00	0.00
	Intersection Overall		0.77	0.50	0.80	0.58	0.76	0.47
2. Route 250/ N Milton	Route 250 EB	EBT	0.85	1.54	0.83	1.96	0.67	0.99
	Route 250 EB	EBR	0.64	0.33	0.62	0.33	0.54	0.20
	Route 250 WB	WBL	0.70	0.93	0.70	0.93	0.75	0.94
	Route 250 WB	WBT	0.96	0.27	1.13	0.29	0.94	0.23
	N Milton NB	NBL	0.89	0.82	0.91	0.82	1.11	0.90
	N Milton NB	NBR	0.49	0.77	0.49	0.79	0.40	0.85
	Intersection Overall		0.85	0.92	0.91	1.11	0.84	0.69

As shown in the table above, **the overall intersection and AM/PM peak direction 250 through traffic average vehicle stop results are all lower in "Build with Coordinated Traffic Signals Scenario" compared to in "No Build Scenario"**. The findings are as followings

"No Build" vs. "Build with Coordinated Traffic Signals Scenario" Overall Intersection Performance:

- 250 @ Rte 22 AM: Average Vehicle Stop decreases from 0.77 to 0.76
- 250 @ Rte 22 PM: Average Vehicle Stop decreases from 0.50 to 0.47
- 250 @ Milton AM: Average Vehicle Stop decreases from 0.85 to 0.84
- 250 @ Milton PM: Average Vehicle Stop decreases from 0.92 to 0.69

"No Build" vs. "Build with Coordinated Traffic Signals Scenario" AM/PM Peak Direction 250 Through Traffic Performance:

- 250 @ Rte 22 AM WB: Average Vehicle Stop decreases from 1.43 to 1.42
- 250 @ Rte 22 PM EB: Average Vehicle Stop decreases from 0.42 to 0.40

- 250 @ Milton AM WB: Average Vehicle Stop decreases from 0.96 to 0.94
- 250 @ Milton PM EB: Average Vehicle Stop decreases from 1.54 to 0.99

Travel Time

The corridor travel times traveling eastbound and westbound between points A and B as shown in the below figure were analyzed in SimTraffic and the results were reported in the attachments and summarized in **Table 6**.



Table 6 Travel Time Results

	EB (A to B)	WB (B to A)
2023 No Build AM	80 s	270 s
2023 No Build PM	124.5 s	75.3 s
2023 Build AM	80.5 s	428.9 s
2023 Build PM	184.4 s	79.7 s
2023 Build with Improvement AM	70.5 s	259.7 s
2023 Build with Improvement PM	114.7 s	67.2 s

As indicated in the table above, the travel times between points A and B in “Build with Coordinated Traffic Signals Scenario” will be shorter compared to in “No Build Scenario”.

End of Memorandum