HAM I-75 & I-275 Vissim Analysis

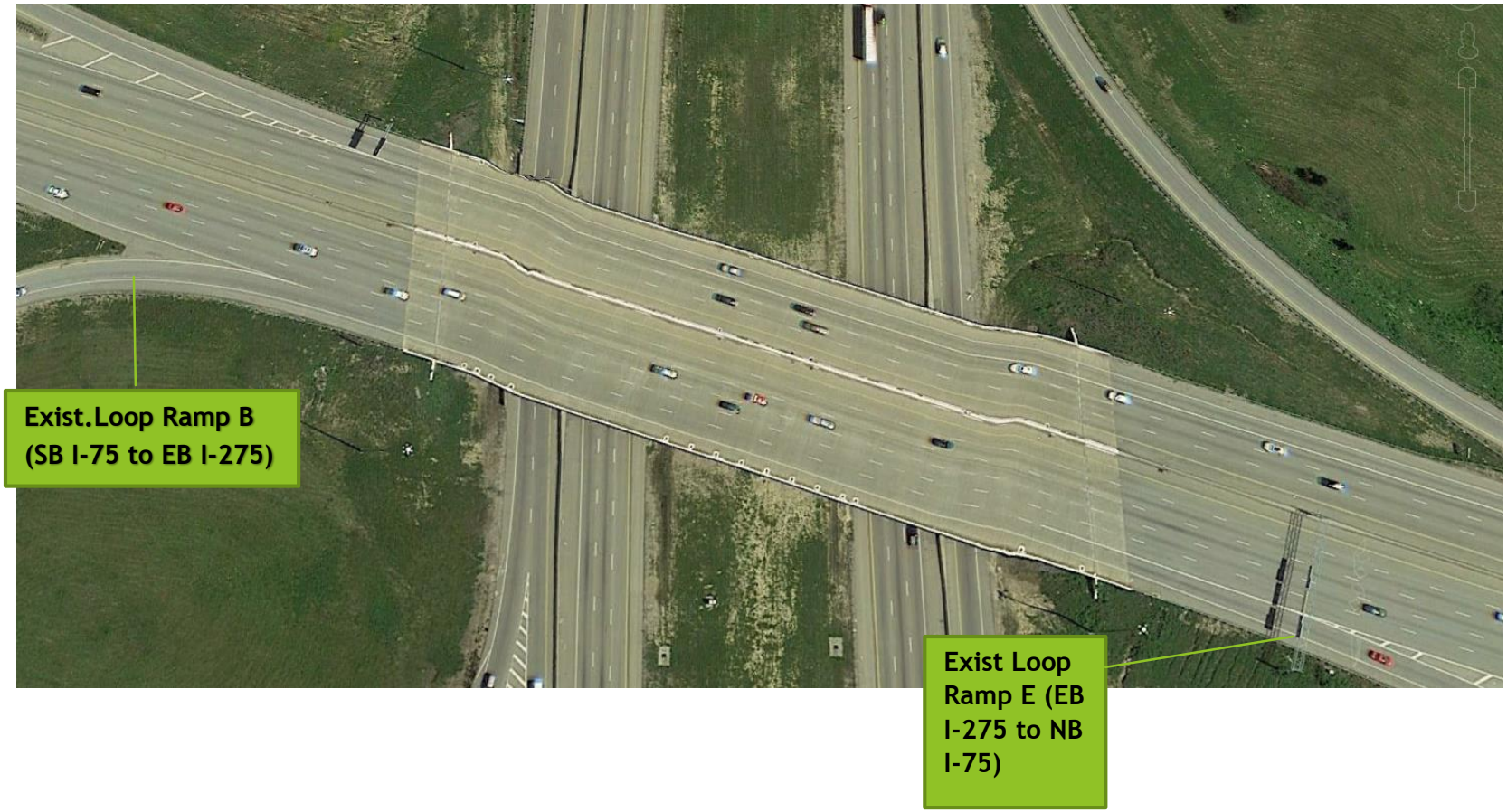
Introduction

The purpose of this study to evaluate operations along the segment of EB I-275, between the I-75 & I-275 System Interchange and the nearby Mosteller Interchange (to the east) in Hamilton County. The type of weaves (existing and proposed) and their interaction cannot be sufficiently analyzed with HCS software. The weaving segments are not conventional weaves as defined by the software. Therefore, Vissim simulation, was chosen to more effectively evaluate the weaving segments.

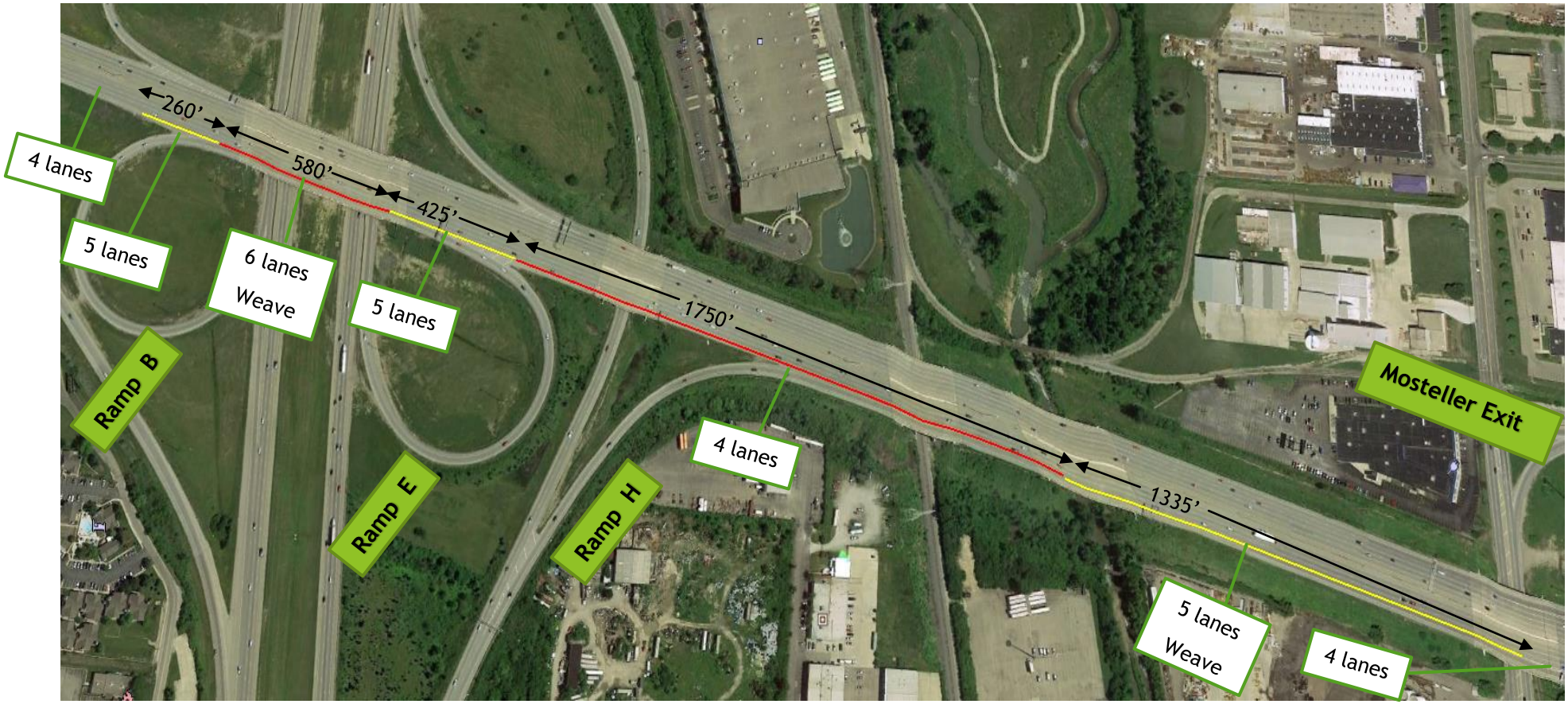
Alternatives

1. No-Build

Close-up of EB I-275 weaving area.



The drawing below represents the Vissim segments (links) used in the No-Build simulation. A change in cross section and no. of lanes requires a separate link in the Vissim software.



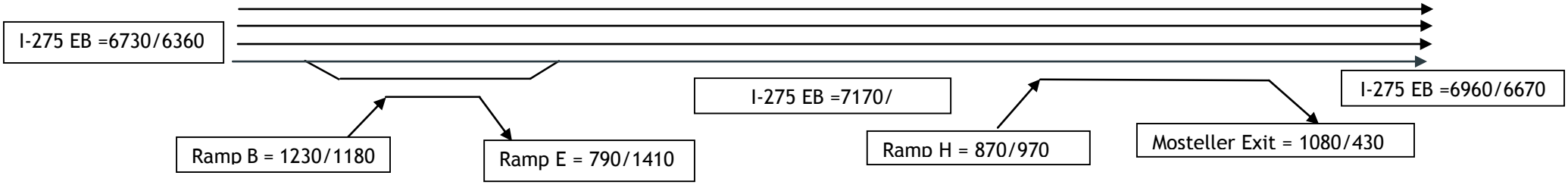
District 8 has provided Certified Traffic Plates for the proposed No-Build & Build 2034 AM/PM Data. ORE ran simulations of the 2034 AM/PM No-Build & Build Conditions between I-75 and Mosteller Rd. along EB I-275.

In absence of certified weave data, the following assumptions were made about both the No-Build & Build traffic exiting to Mosteller Rd.:

- 25% of traffic originated from Ramp B (SB I-75)....270 (in 2034 AM) & 108 (in 2034 PM)
- 25% of traffic originated from Ramp H (NB I-75)....270 (in 2034 AM) & 107 (in 2034 PM)
- 50 % of traffic from EB I-275....540 (in 2034 AM) & 215 (in 2034 PM)

For the No-Build conditions, it is assumed that 100% of the traffic entering from ramp B (SB I-75 to EB I-275) continues EB on I-275 and does not exit at Ramp E.

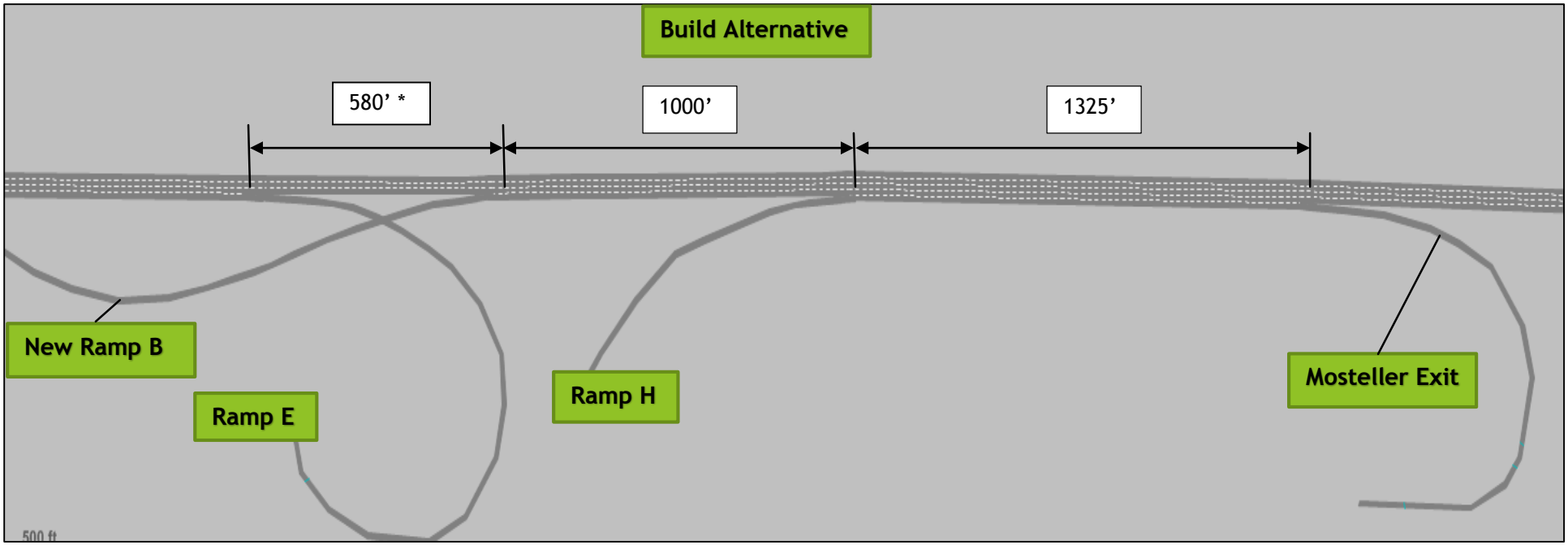
2034 AM/2034 PM Traffic Volumes used for the Vissim Models



2. Build – This alternative consists of removing the existing SB I-75 to EB I-275 Loop Ramp B and replacing it with a proposed flyover Ramp B (50 mph design) which would touch down to the east of Exit ramp E (I-275 EB to I-75 NB). Initially, the 4th lane will drop to Exit Ramp E and reintroduced as an add lane from Ramp B. This 4th lane will continue until the US42 exit (similar to how it terminates in the existing condition). The weave between Ramp B & Ramp has been eliminated.

The lengths below represents the configuration and dimensions used in the Vissim Build Analysis Simulation.

Note: * The L&D Manual requires a minimum length of 500’ for freeway sections.



Summary of Results

Videos were recorded of both the 2034 AM No-Build & Build conditions. The models were run for a total simulation time of 1 hour and a minimum of 5 simulations each. The multiple simulations were then averaged to determine various criteria, in particular, delay and speed. The average speed for the No-Build corridor increased from 46 mph to 58 mph. The average delay improved from 28 sec. to 8 sec.

Videos were also recorded for both of 2034 PM No-Build & Build conditions. The models were run for a total simulation time of 1 hour and a minimum of 5 simulations each. The multiple simulations were, again, averaged to determine delay & speed. The average speed for the No-Build 2034 PM corridor increased from 24 mph to 59 mph with the Build condition. The average delay significantly improved from 105 sec. to 6 sec. The amount of traffic exiting at Ramp B in the PM condition is nearly double that of the AM condition and led to heavy weaving turbulence occurring between the existing Ramp B & E loop ramps. When this weave was removed with the Build condition, the average speed & delay for the corridor greatly improve.

Density outputs were also obtained for the No-Build & Build Vissim simulations. Please note that the Vissim methodology of calculating density does not completely match the HCM definition. In general, the resulting densities and corresponding LOS showed overall improvements with respect to the proposed Build condition. The Build simulation predicts that all the I-275 EB freeway segments will operate at at a LOS "D" or better in both 2034 AM & PM conditions.

All Vissim supporting files & simulation videos can be found at O:\Roadway\Studies\HAM 275 & 75 Vissim .

No-Build 2034 AM Sim Run	Time Int	DELAYAVG(ALL)	SPEEDAVG(ALL)	DELAYSTOPTOT(ALL)	VEHARR(ALL)	DELAYLATENT
1	0-3600	29.04	45.54	5533	8775	1618
2	0-3600	26.84	46.80	6647	8600	921
3	0-3600	28.54	45.75	6816	8764	1289
4	0-3600	25.73	47.14	4713	8690	1210
5	0-3600	26.75	46.71	5427	8525	900
6	0-3600	29.04	45.54	5533	8775	1618
Average	0-3600	27.65	46.25	5778	8688	1259
Standard deviation	0-3600	1.40	0.72	801	105	317
Minimum	0-3600	25.73	45.54	4713	8525	900
Maximum	0-3600	29.04	47.14	6816	8775	1618

Build 2034AM Sim Run	Time Int	DELAYAVG(ALL)	SPEEDAVG(ALL)	DELAYSTOPTOT(ALL)	VEHARR(ALL)	DELAYLATENT
1	0-3600	7.98	58.17	4296	8567	584
2	0-3600	6.96	58.88	1820	8633	699
3	0-3600	7.75	58.23	3647	8664	689
4	0-3600	6.99	58.79	2049	8514	617
5	0-3600	8.74	57.56	4377	8657	744
Average	0-3600	7.68	58.33	3238	8607	667
Standard deviation	0-3600	0.74	0.53	1226	65	65
Minimum	0-3600	6.96	57.56	1820	8514	584
Maximum	0-3600	8.74	58.88	4377	8664	744

No-Build 2034 PM Sim Run	Time Int	DELAYAVG(ALL)	SPEEDAVG(ALL)	DELAYSTOPTOT(ALL)	VEHARR(ALL)	DELAYLATENT
1	0-3600	109	23	145229	7228	138571
2	0-3600	130	20	202240	6621	3110275
3	0-3600	87	26	114467	7455	1140618
4	0-3600	89	26	1249974	7354	964638
5	0-3600	109	23	132323	7200	2077575
Average	0-3600	105	24	143847	7172	1735765
Standard deviation	0-3600	17	2	34510	324	877138
Minimum	0-3600	87	20	114467	6621	964638
Maximum	0-3600	130	26	202240	7455	3110275

Build 2034PM Sim Run	Time Int	DELAYAVG(ALL)	SPEEDAVG(ALL)	DELAYSTOPTOT(ALL)	VEHARR(ALL)	DELAYLATENT
1	0-3600	4.89	60	1425	8270	563
2	0-3600	7.45	58	5941	8367	658
3	0-3600	4.93	60	1201	8364	666
4	0-3600	5.98	59	2633	8238	591
5	0-3600	6.74	58	2159	8346	697
Average	0-3600	6.00	59	2672	8317	635
Standard deviation	0-3600	1.12	1	1915	59	56
Minimum	0-3600	4.89	58	1201	8238	563
Maximum	0-3600	7.45	60	5941	8367	697