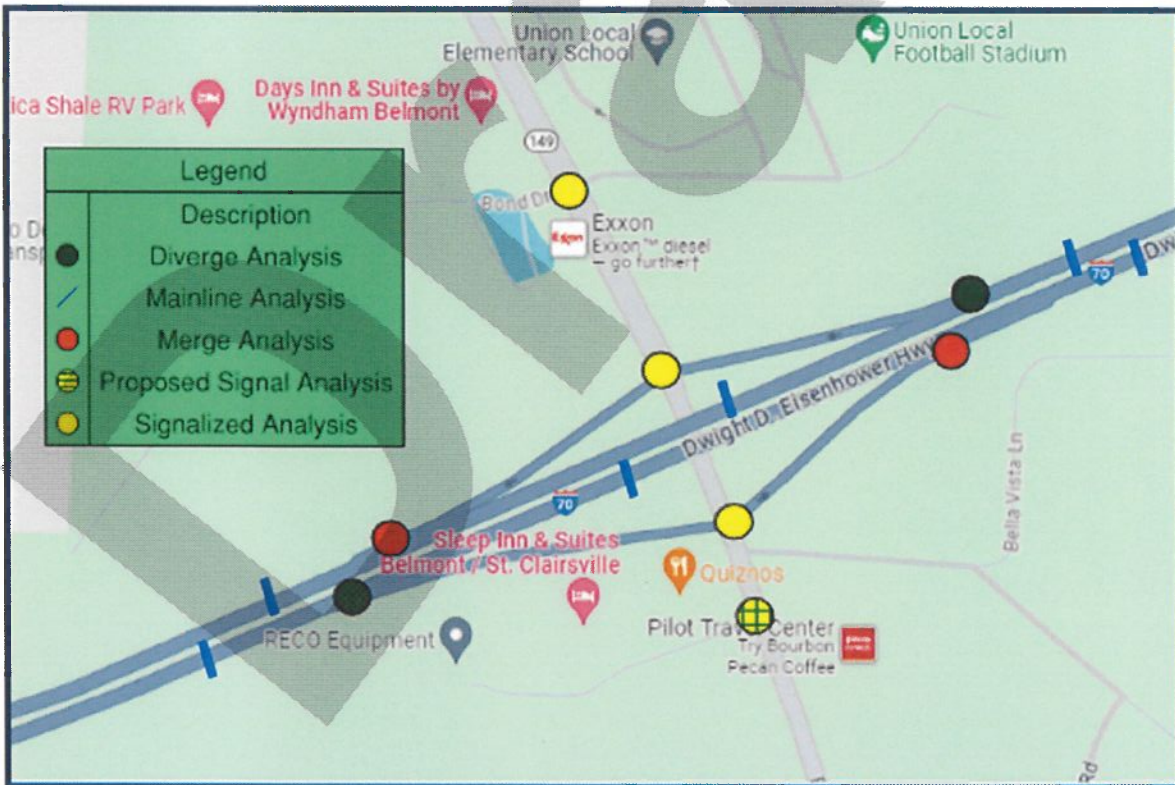


BEL-70 & SR149 INTERCHANGE OPERATIONS STUDY

Project Summary

Location	IR70 & SR149 Interchange, near Belmont, Ohio
	Belmont County
PID	120547
Study Sponsor	ODOT, District 11
Proposed Work	Add left turn lane to westbound exit ramp; between the ramps add a northbound left turn lane, southbound through lane and southbound left turn lane; relocate Reco Dr south to the Pilot car access; between Reco and the eastbound ramps add a second through lane southbound with a left turn lane and right turn lane at new Reco Dr, add second through lane northbound and add continuous right turn lane northbound onto the eastbound entrance ramp; relocate Pilot truck entrance to line up with new Love's truck entrance; between relocated Reco Dr and truck entrance add a right turn and left turn lane southbound, add through lane and left turn lane northbound; south of truck entrance add a left turn lane northbound.

Study Area



HCM Analysis Points

Freeway Analysis

- EB & WB IR70, upstream of the SR149 Diverge
- EB & WB IR70, between Diverge and Merge of SR149
- EB & WB IR70, downstream of the SR149 Diverge

Ramp Analysis

- EB & WB Diverge to SR149
- EB & WB Merge from SR149

Intersection Analysis

- SR149 at Bond Drive
- SR149 at WB Ramps
- SR149 at EB Ramps
- SR149 at Reco Drive
- SR149 at Pilot/Love's Truck Drive

Problem Description

A new Love's Travel Stop is being constructed on property on the west side of SR149 just south of the IR70/SR149 interchange. This development will increase the traffic, both cars and trucks at the interchange and along SR149 to Reco Drive and the new Love's truck access. An analysis of the increased traffic using Transmodeler revealed that backups are expected onto mainline IR70 westbound and ramp intersections with resulting levels of service F.

Traffic Analysis

Posted Speed Limits

- Interstate, IR 70 – 70 mph.
- Mainline, SR 149 – 45 mph.
- Sideroad, Reco Drive – 25 mph.
- Sideroad, Bond Drive (west leg)- 25 mph.
- Sideroad, Bond Drive, (east leg) – 35 mph.

Freeway and Ramp Analysis Results:

Segment	Type	2047 AM (MID) [PM] No Build		2047 AM (MID) [PM] Build	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
<i>Eastbound</i>					
US40 to SR 149	Basic	B (B) [D]	13.6 (15.7) [30.3]	B (B) [C]	13.6 (15.7) [18.1]
I-70 EB Off-Ramp to SR 149	Diverge	B (B) [E]	12.2 (14.0) [43.1]	B (B) [B]	12.3 (14.2) [16.3]
I-70 EB Off-Ramp to I-70 EB On-Ramp	Basic	B (B) [B]	11.5 (13.6) [15.7]	B (B) [B]	11.7 (13.4) [15.0]
I-70 EB On-Ramp from SR 149	Merge	B (B) [B]	15.2 (16.6) [18.2]	B (B) [B]	16.3 (16.8) [18.6]
SR 149 to Rest Area	Basic	B (B) [B]	16.5 (17.3) [17.4]	B (B) [C]	17.3 (17.4) [20.3]
<i>Westbound</i>					
Rest Area to SR 149	Basic	F (C) [F]	70.6 (19.2) [107.9]	B (C) [C]	13.2 (18.7) [19.6]
I-70 WB Off-Ramp to SR 149	Diverge	F (D) [F]	76.3 (34.0) [94.6]	B (B) [B]	11.8 (17.2) [18.2]
I-70 WB Off-Ramp to I-70 WB On-Ramp	Basic	A (B) [A]	8.4 (14.8) [10.3]	A (B) [B]	9.3 (13.9) [13.5]
I-70 WB On-Ramp from SR 149	Merge	A (B) [A]	8.4 (14.3) [9.2]	B (B) [B]	10.4 (13.6) [14.0]
SR 149 to US40	Basic	A (B) [A]	9.0 (15.8) [10.5]	B (B) [B]	11.6 (16.2) [16.6]

Intersection Analysis Results:

Intersection	Approach	2047 AM (MID) [PM] No Build	2047 AM (MID) [PM] Build
		LOS	LOS
SR 149 & Bond Dr	NB	A (A) [A]	A (A) [A]
	SB	B (A) [F]	A (A) [A]
	EB	C (C) [F]	C (C) [C]
	WB	D (C) [F]	C (C) [D]
SR 149 & I-70 WB Ramp	NB	D (C) [F]	A (B) [C]
	SB	E (E) [F]	B (B) [C]
	WB	F (F) [F]	C (C) [C]
SR 149 & I-70 EB Ramp	NB	C (D) [D]	A (A) [A]
	SB	D (C) [D]	B (A) [A]
	EB	D (D) [F]	B (B) [C]
SR 149 & Reco Drive (new Signalized Intersection)	NB	F (C) [F]	B (B) [B]
	SB	B (B) [B]	B (B) [B]
	EB	D (D) [F]	B (C) [C]
	WB	-	C (C) [C]
SR 149 & Loves Truck Access (new Signalized Intersection)	NB	-	B (B) [C]
	SB	-	A (A) [A]
	EB	-	E (D) [E]
	WB	-	B (B) [B]

Note: Bond and the Ramp intersections listed above are all currently signalized.

Intersection Queue Length:

Intersection	Approach/ Movement		2047 AM (MID [PM]) - Build	
			95 th ile Queue (ft)	Queue/Storage Ratio
SR 149 & Bond Drive	NB	L	0 (0) [1]	0 (0) [0]
		T	6 (3) [10]	0 (0) [0]
		R	0 (0) [0]	0 (0) [0]
	SB	L	11 (0) [0]	0.1 (0) [0]
		T	5 (1) [10]	-
		R	0 (0) [0]	0 (0) [0]
	EB	L	29 (55) [16]	0.1 (0.2) [0.1]
		TR	21 (30) [42]	-
	WB	L	31 (16) [45]	0.2 (0.1) [0.2]
TR		12 (11) [10]	-	
SR 149 & I70 WB RAMP	NB	T	0 (17) [148]	0 (0) [0.3]
		L	172 (143) [235]	0.4 (0.3) [0.5]
	WB	TR	139 (125) [270]	0.2 (0.2) [0.5]
		L	126 (187) [234]	0.2 (0.3) [0.4]
		TL	109 (158) [207]	0.1 (0.1) [0.2]
R	44 (24) [21]	0.1 (0.1) [0.1]		
SR 149 & I70 EB RAMP	NB	T	58 (54) [115]	0.1 (0.1) [0.3]
		R	0 (0) [0]	0 (0) [0]
	SB	T	60 (20) [15]	0.1 (0) [0]
		L	63 (23) [39]	0.1 (0.1) [0.1]
	EB	TL	39 (73) [59]	0 (0.1) [0]
R		76 (65) [172]	0.2 (0.1) [0.4]	
SR 149 & Reco Drive	NB	L	16 (8) [18]	0.1 (0.1) [0.2]
		TR	184 (131) [177]	0.5 (0.4) [0.5]
	SB	L	28 (10) [10]	0.2 (0.1) [0.1]
		T	168 (218) [292]	0.4 (0.5) [0.7]
	R	2 (3) [2]	0 (0) [0]	
	EB	L	80 (107) [83]	0.2 (0.3) [0.2]
		RT	23 (18) [18]	-
WB	LTR	47 (50) [61]	-	
SR 149 & Loves Truck Access	NB	L	63 (0) [0]	0.1 (0) [0]
		TR	212 (145) [246]	-
	SB	L	70 (109) [87]	0.3 (0.5) [0.4]
		T	103 (63) [17]	0.3 (0.2) [0]
	R	0 (0) [0]	0 (0) [0]	
	EB	LTR	253 (112) [421]	-
WB	LTR	84 (108) [150]	-	

Storage Lengths:

Intersection /Turn Lane	2047 DHV for Turn Lane			Required Turn Lane Storage#	Potential Thru Lane Backup	Available Storage Length	Proposed Turn Lane Length
	AM veh/hr	MID veh/hr	PM veh/hr				
SR 149 & Bond Drive	90 sec cycle	110 sec. cycle	120 sec. cycle				
EBL	10	10	10	125'	100'	270'	175'
NBL	10	20	10	125'	475'	250'	525'
NBR	20	20	170	125'	475'	150'	525'
WBL	10	10	10	125'	100'	190'	175'
SBL	10	10	10	125'	450'	220'	500'
SBR	10	10	60	125'	450'	220'	500'
SR 149 & I70 WB Ramp	90 sec cycle	110 sec. cycle	120 sec. cycle				
NBL	190	180	170	325'	475'	440'	525'
WBL	520	400	280	550'	50'	600'	600'
WBR	180	160	180	275'	50'	350'	325'
SR 149 & I70 EB Ramp	90 sec cycle	110 sec. cycle	120 sec. cycle				
EBR	220	170	170	325'	150'	425'	375'
SBL	160	110	170	250'	625'	440'	300'
SR 149 & Reco Drive	90 sec cycle	110 sec. cycle	120 sec. cycle				
EBL	10	10	10	125'	100'	350'	175'
NBL	60	60	55	175'	425'	345'	475'
SBL	50	40	60	175'	375'	160'	425'
SBR	95	170	230	325'	375'	160'	425'
SR 149 & Loves Truck Access	90 sec cycle	110 sec. cycle	120 sec. cycle				
NBL	0	0	55	125'	825'	475'	875'
SBL	70	90	50	225'	675'	220'	725'
SBR	95	30	10	225'	675'	360'	725'

#-Does not include 50' taper

Required Storage Length- length needed based upon turning volume.

Available Storage Length – distance between intersections based upon the design.

Proposed Turn Lane Length – longest length between needed and thru-lane backup.

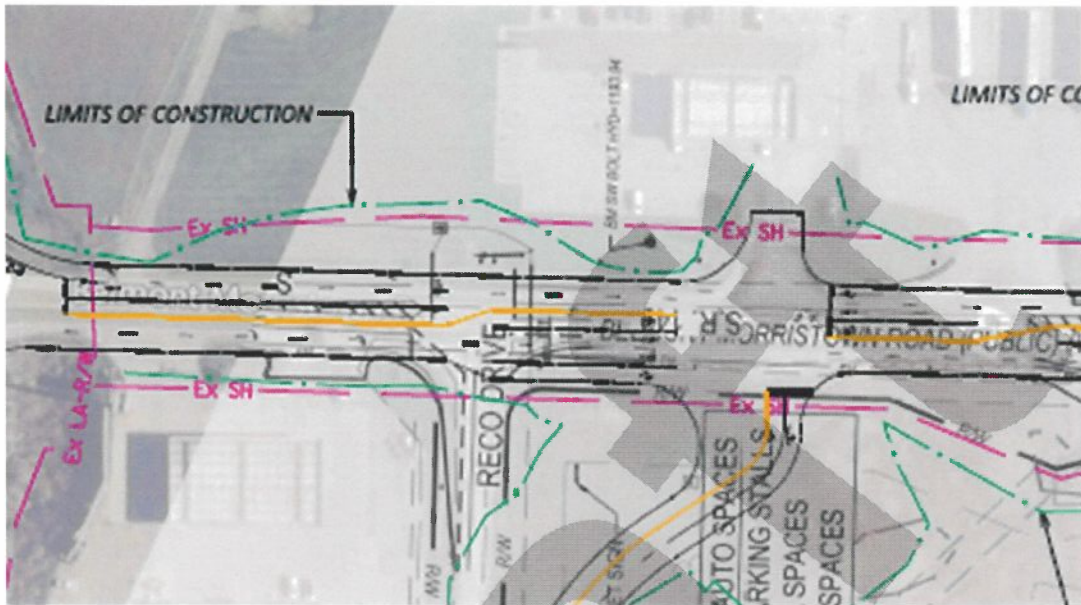
The table above shows the required storage length which is based upon the cycle length and design hourly volume. The proposed storage length is the higher value between the required storage length and the through lane back-up.

The available storage length is based upon the distance between the existing intersections and the proposed lane layouts. As you can see in the table above the available storage length is greater than the required storage lengths, except for the southbound left and right turn lanes at the Reco Drive intersection. The Reco Drive has been moved farther south than originally proposed to allow for longer turn lanes but is still restricted due to spacing requirements.

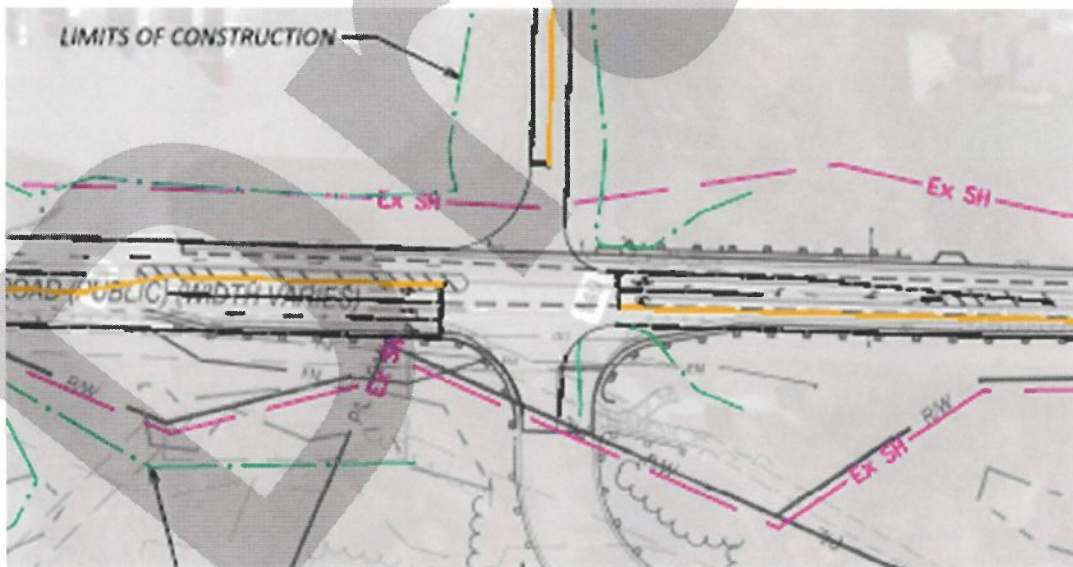
Build at Ramps: Added Left Turn Lane WB Exit Ramp, Added SB & NB Left Turn Lane between Ramps, Added SB Lane and Continuous Right Turn onto EB Entrance Ramp



Build from EB Ramps to South of Relocated Reco Dr.: Added NB & SB Thru Lane, Added SB & NB Left Turn Lane at Reco Dr. and Added SB Rt. Lane at Reco Dr. between Ramps



Build South of Relocated Reco Dr. to South of Proposed Truck Entrance: Added NB & SB and Convert Outside SB Thru Lane to Right Turn Lane



Conclusion

The IOS verifies that under the build condition the level of service is D or better for all design year movements, except an E for EB at the truck drive. The study meets the requirements of the Ohio Department of Transportation.