

APPENDIX B

B.6 TRAVEL TIME ANALYSIS

Eastern Corridor Segments II & III (PID 86462)**Travel Time Analysis**

File: 173620095

Date: March 29, 2019

The purpose of this memorandum is to summarize the cumulative benefits that the individual projects within the Eastern Corridor Segment II & III project area have during the morning and afternoon peak periods. Segment II & III stretch from I-275 to the east to Red Bank Road to the west. Approximately 70 total roadway capacity, bicycle, and pedestrian projects within the study area were identified. While each of the individual roadway capacity projects stand alone on their own merit, when combined, they provide a regional benefit for vehicles traversing between I-275 and Red Bank Road on SR 32, Round Bottom Road, Valley Avenue, Church Street, SR 125, US 50, and Wooster Road.

To quantify the cumulative benefit that the individual roadway capacity projects have for travel within the study area, baseline no build travel times were established for two route alternatives to get from I-275 to Red Bank Road (and vice versa). Route 1 utilized SR 32, the 'Newtown Zig-Zag' (consisting of Round Bottom Road, Valley Avenue and Church Street), and US 50. Route 2 utilized SR 32, SR 125, and Wooster Road. The two routes are shown in **Figure 1**.

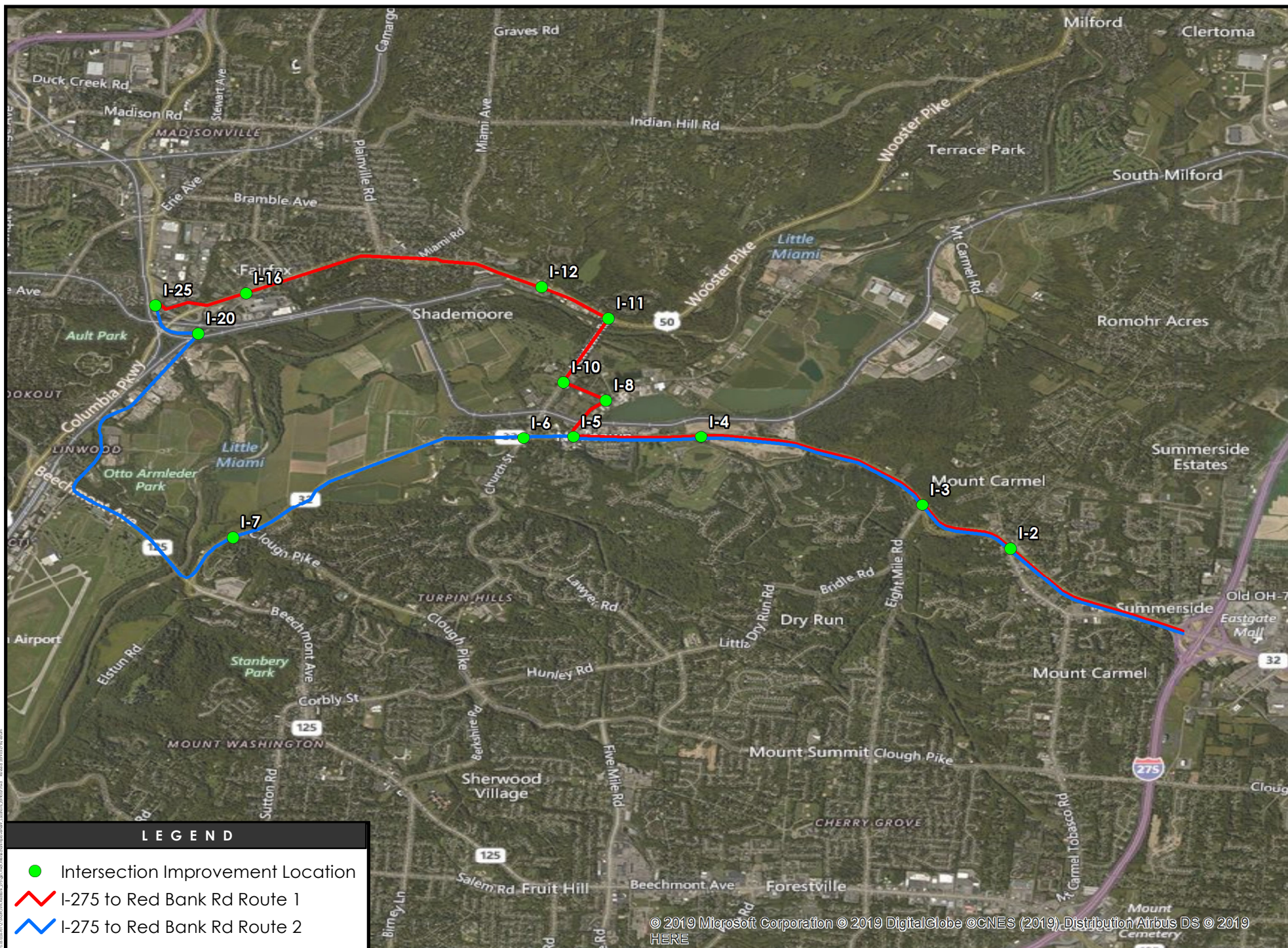


Figure 1: Travel Time Routes and Intersection Improvement Locations



Eastern Corridor Segments II & III (PID 86462)

Reduction in Travel Time

The StreetLight Data segment analysis tool was used to estimate the baseline travel times. Streetlight Data is based on data created by mobile phones, GPS devices, connected cars and commercial trucks, fitness trackers, etc. pinging cell towers and satellites creating location records. Using their proprietary algorithmic processing engine, StreetLight is able to transform these anonymized records into useful transportation data. Personal navigation-gps data was obtained on typical weekdays (Tuesday – Thursday) from the calendar year 2016 and 2017. Data from 7:00 AM to 9:00 AM was used for the morning peak period and data from 4:00 PM to 6:00 PM was used for the afternoon peak period. Data obtained from StreetLight was spot checked for reasonableness using Google travel time data during the morning and afternoon peak periods.

The cumulative travel time benefits of the improvements within the study area were estimated by applying the lowest cost intersection improvement project at each intersection along the two routes. Only those movements that a vehicle is required to make as part of traversing the corridor were considered. For vehicles travelling from I-275 to Red Bank Road, the applicable left-turn/thru/right-turn movements in the northbound/westbound direction were applied. For vehicles travelling from Red Bank Road to I-275, the applicable left-turn/thru/right-turn movements in the southbound/eastbound direction were applied. The reduction in delay at each intersection between the no build and build scenarios was applied to the no build travel time pulled from StreetLight. A list of the intersection improvements applied to each route are shown in **Table 1** and the locations of the improvements are shown in **Figure 1**. The AM and PM peak-hour delay per movement is provided in the Appendix.

Table 1: Intersection Improvements for Travel Time Analysis

Identifier	Intersection	Build Alternative	Route Applied To
I-2	SR 32 & Beechwood Rd	Optimize and Coordinate with Adjacent Intersections	Route 1 & 2
I-3	SR 32 & 8-Mile Rd	Construct a Signalized Green Tee Intersection	Route 1 & 2
I-4	SR 32 & Little Dry Run	Construct a Signalized Green Tee Intersection	Route 1 & 2
I-5	SR 32 & Round Bottom Rd	Construct Dual SBL and 2nd EBT	Route 1 & 2
I-6	SR 32 & Church St	Construct 2nd WBT	Route 2
I-7	SR 32 & Clough Pike	Construct a Signalized Green Tee Intersection	Route 2
I-8	Valley Ave & Round Bottom Rd	Construct a Roundabout	Route 1
I-10	Valley Ave & Church Street	Install a Five Section Head for a WBR Overlap Phase	Route 1
I-11	US 50 & Newtown Rd	Construct a Roundabout	Route 1
I-12	US 50 & Walton Creek Rd	Add SBL pm+pt phase and lengthen SBL turn lane	Route 1
I-16	US 50 & Meadowlark Ln	Construct a Roundabout	Route 1
I-20	Red Bank Road & Wooster Rd	Construct a Roundabout	Route 2
I-25	Red Bank Road & Colbank Rd	Construct 2nd NBT and dual WBR, signalize WB US 50 ramp	Route 1 & 2

As shown in **Table 2**, the cumulative impact of the individual capacity projects results in a two- to six-minute travel time savings in the peak direction which represents an 8% to 25% reduction overall travel time. The peak travel direction is northbound/westbound during the morning peak period and southbound/eastbound during the afternoon peak period. Off-peak travel time reductions were not as significant, primarily due to lesser congestion.



Eastern Corridor Segments II & III (PID 86462)
Reduction in Travel Time

Table 2: Eastern Corridor Segment II & III Travel Time Reduction

Northbound/Westbound

I-275 to Red Bank Rd - Route 1 via SR 32, Newtown Zig-Zag, US 50, and Red Bank Rd	AM Peak Period (min)	PM Peak Period (min)
No-Build Total Travel Time ¹	23.0	22.0
Time Saved at Intersections from Improvements ²	4.0	2.0
Build Total Travel Time	19.0	20.0
Percent Reduction in Travel Time	17%	9%

I-275 to Red Bank Rd - Route 2 via SR 32, SR 125, Wooster Rd, and Red Bank Rd	AM Peak Period (min)	PM Peak Period (min)
No-Build Total Travel Time ¹	24.0	20.0
Time Saved at Intersections from Improvements ²	6.0	1.0
Build Total Travel Time	18.0	19.0
Percent Reduction in Travel Time	25%	5%

Southbound/Eastbound

Red Bank Rd to I-275 - Route 1 via Red Bank Rd, US 50, Newtown Zig-Zag, and SR 32	AM Peak Period (min)	PM Peak Period (min)
No-Build Total Travel Time ¹	22.0	24.0
Time Saved at Intersections from Improvements ²	1.0	5.0
Build Total Travel Time	21.0	19.0
Percent Reduction in Travel Time	5%	21%

Red Bank Rd to I-275 - Route 2 via Red Bank Rd, Wooster Rd, SR 125, and SR 32	AM Peak Period (min)	PM Peak Period (min)
No-Build Total Travel Time ¹	22.0	25.0
Time Saved at Intersections from Improvements ²	0.0	2.0
Build Total Travel Time	22.0	23.0
Percent Reduction in Travel Time	0%	8%

1. Data from StreetLight. Represents average weekdays (Tu-Th) from 2016 and 2017. AM travel time period is 7 AM - 9 AM and PM travel time period is 4 PM - 6 PM.

2. Reduction in control delay for intersection movements required to traverse corridor.

Attachment

AM and PM Peak-Hour Delay per Movement

Route 1 - Southbound/Eastbound from Red Bank Road to I-275

Identifier	Intersection	Build Alternative	Movement	HCS Results - No Build		HCS Results - Build	
				AM 2042 Delay (sec)	PM 2042 Delay (sec)	AM 2042 Delay (sec)	PM 2042 Delay (sec)
I-2	SR 32 & Beechwood Rd	Optimize and Coordinate with Adjacent Intersections	EBT	14.6	20.1	13.4	21.0
I-3	SR 32 & 8-Mile Rd	Construct a Signalized Green Tee Intersection	EBT	0.0	0.0	17.2	25.6
I-4	SR 32 & Little Dry Run	Construct a Signalized Green Tee Intersection	EBT	4.3	86.3	11.1	52.1
I-5	SR 32 & Round Bottom Rd	Construct Dual SBL and 2nd EBT	SBL	34.2	128.2	38.1	31.2
I-8	Valley Ave & Round Bottom Rd	Construct a Roundabout	EBR	91.2	46.9	5.6	13.9
I-10	Valley Ave & Church Street	Install a Five Section Head for a WBR Overlap Phase	SBL	72.4	62.3	57.8	63.5
I-11	US 50 & Newtown Rd	Construct a Roundabout	EBR	4.8	30.7	7.3	33.9
I-12	US 50 & Walton Creek Rd	Add SBL pm+pt phase and lengthen SBL turn lane	EBT	21.1	65.0	21.1	51.2
I-16	US 50 & Meadowlark Ln	Construct a Roundabout	EBT	11.3	62.2	13.1	13.9
I-25	Red Bank Road & Colbank Rd	Construct 2nd NBT and dual WBR, signalize WB US 50 ramp	SBL	46.3	121.7	54.6	40.9
TOTAL AVERAGE INTERSECTION DELAY (SEC)				300.2	623.4	239.3	347.2
TOTAL AVERAGE INTERSECTION DELAY SAVED (MIN)						1.0	5.0
PERCENT REDUCTION IN AVERAGE INTERSECTION DELAY						20%	44%

Route 1 - Northbound/Westbound from I-275 to Red Bank Road

Identifier	Intersection	Build Alternative	Movement	HCS Results - No Build		HCS Results - Build	
				AM 2042 Delay (sec)	PM 2042 Delay (sec)	AM 2042 Delay (sec)	PM 2042 Delay (sec)
I-2	SR 32 & Beechwood Rd	Optimize and Coordinate with Adjacent Intersections	WBT	23.9	28.0	16.8	23.2
I-3	SR 32 & 8-Mile Rd	Construct a Signalized Green Tee Intersection	WBT	0.0	0.0	0.0	0.0
I-4	SR 32 & Little Dry Run	Construct a Signalized Green Tee Intersection	WBT	63.0	2.7	0.0	0.0
I-5	SR 32 & Round Bottom Rd	Construct Dual SBL and 2nd EBT	WBR	25.5	16.3	5.1	8.0
I-8	Valley Ave & Round Bottom Rd	Construct a Roundabout	NBL	61.8	60.2	21.5	14.5
I-10	Valley Ave & Church Street	Install a Five Section Head for a WBR Overlap Phase	WBR	53.3	55.6	38.9	15.0
I-11	US 50 & Newtown Rd	Construct a Roundabout	NBL	118.2	41.9	12.0	13.8
I-12	US 50 & Walton Creek Rd	Add SBL pm+pt phase and lengthen SBL turn lane	WBT	34.0	26.0	34.0	26.9
I-16	US 50 & Meadowlark Ln	Construct a Roundabout	WBT	13.0	13.6	15.4	15.2
I-25	Red Bank Road & Colbank Rd	Construct 2nd NBT and dual WBR, signalize WB US 50 ramp	WBR	18.7	9.6	14.0	9.2
TOTAL AVERAGE INTERSECTION DELAY (SEC)				411.4	253.9	157.7	125.8
TOTAL AVERAGE INTERSECTION DELAY SAVED (MIN)						4.2	2.0
PERCENT REDUCTION IN AVERAGE INTERSECTION DELAY						62%	50%

Route 2 - Southbound/Eastbound from Red Bank Road to I-275

Identifier	Intersection	Build Alternative	Movement	HCS Results - No Build		HCS Results - Build	
				AM 2042 Delay (sec)	PM 2042 Delay (sec)	AM 2042 Delay (sec)	PM 2042 Delay (sec)
I-2	SR 32 & Beechwood Rd	Optimize and Coordinate with Adjacent Intersections	EBT	14.6	20.1	13.4	21.0
I-3	SR 32 & 8-Mile Rd	Construct a Signalized Green Tee Intersection	EBT	0.0	0.0	17.2	25.6
I-4	SR 32 & Little Dry Run	Construct a Signalized Green Tee Intersection	EBT	4.3	86.3	11.1	52.1
I-5	SR 32 & Round Bottom Rd	Construct Dual SBL and 2nd EBT	EBT	17.1	140.9	13.5	32.8
I-6	SR 32 & Church St	Construct 2nd WBT	EBT	21.0	76.2	31.4	67.5
I-7	SR 32 & Clough Pike	Construct a Signalized Green Tee Intersection	NBT	27.9	31.9	26.4	28
I-20	Red Bank Road & Wooster Rd	Construct a Roundabout	EBR	3.2	6.7	6.7	26.2
I-25	Red Bank Road & Colbank Rd	Construct 2nd NBT and dual WBR, signalize WB US 50 ramp	SBT	11.5	7.9	7.5	6.0
TOTAL AVERAGE INTERSECTION DELAY (SEC)				99.6	370.0	127.2	259.2
TOTAL AVERAGE INTERSECTION DELAY SAVED (MIN)						-0.4	2.0
PERCENT REDUCTION IN AVERAGE INTERSECTION DELAY						-28%	30%

Route 2 - Northbound/Westbound from I-275 to Red Bank Road

Identifier	Intersection	Build Alternative	Movement	HCS Results - No Build		HCS Results - Build	
				AM 2042 Delay (sec)	PM 2042 Delay (sec)	AM 2042 Delay (sec)	PM 2042 Delay (sec)
I-2	SR 32 & Beechwood Rd	Optimize and Coordinate with Adjacent Intersections	WBT	23.9	28.0	16.8	23.2
I-3	SR 32 & 8-Mile Rd	Construct a Signalized Green Tee Intersection	WBT	0.0	0.0	0.0	0.0
I-4	SR 32 & Little Dry Run	Construct a Signalized Green Tee Intersection	WBT	63.0	2.7	0.0	0.0
I-5	SR 32 & Round Bottom Rd	Construct Dual SBL and 2nd EBT	WBT	34.6	27.5	36.5	32.7
I-6	SR 32 & Church St	Construct 2nd WBT	WBT	134.4	27.9	39.7	20.8
I-7	SR 32 & Clough Pike	Construct a Signalized Green Tee Intersection	SBT	69.0	17.4	0.0	0.0
I-20	Red Bank Road & Wooster Rd	Construct a Roundabout	NBL	30.8	24.5	31.4	10.3
I-25	Red Bank Road & Colbank Rd	Construct 2nd NBT and dual WBR, signalize WB US 50 ramp	NBT	125.9	26.6	18.6	29.8
TOTAL AVERAGE INTERSECTION DELAY (SEC)				481.6	154.6	143.0	116.8
TOTAL AVERAGE INTERSECTION DELAY SAVED (MIN)						5.6	1.0
PERCENT REDUCTION IN AVERAGE INTERSECTION DELAY						70%	24%