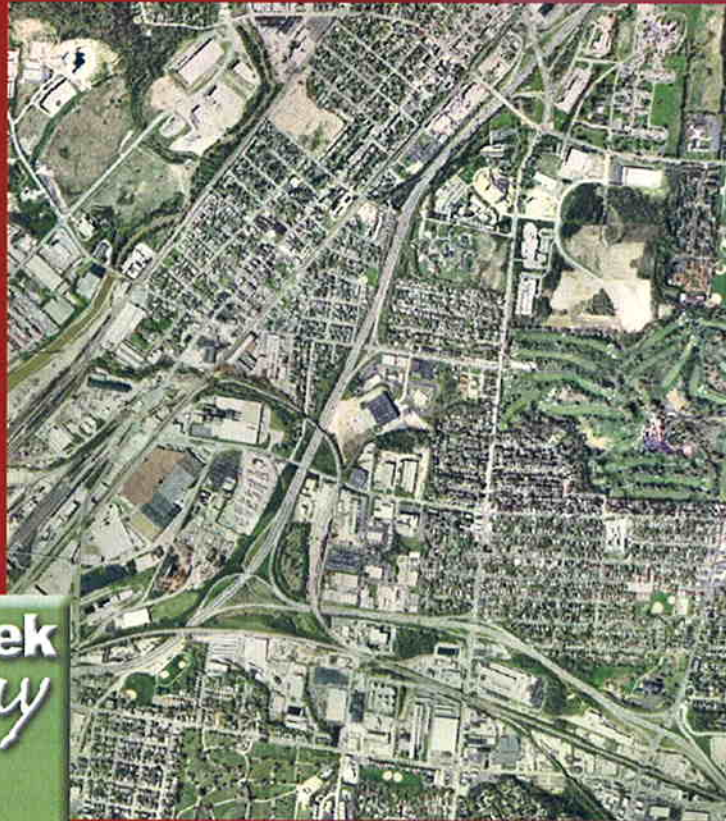


Paddock Area Study HAM-75-2.30



Ohio Department of
Transportation, District 8
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Tran Systems

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1.0 Introduction

The partial interchange of Towne Street at IR 75 is proposed to be closed as part of the I-75 Mill Creek Expressway project (HAM-75-2.30, PID 76257). As a result, the City of Cincinnati and the Ohio Department of Transportation (ODOT) District 8 commissioned a study to consider the effects of this change on motorists and on the routes that would serve the redirected traffic, including any recommended improvements. Specifically, the City requested that the project team do additional studies in the Paddock area to determine whether the Paddock Road corridor and connecting roads will accommodate the additional traffic as a result of the proposed closure. A focus of this investigation is ease of truck movements through existing intersections on redirected routes.

At the beginning of this study, the nearby Thru The Valley project (HAM-75-10.10) was proposing to close the Galbraith Road ramps north of the Paddock Road interchange area as well. Therefore, traffic information was collected for routes affected by that potential closure. Since then, ODOT has decided to allow the Galbraith Road interchange to remain open, and no analyses or recommendations were prepared regarding that issue.

This report provides the results of traffic capacity analyses and geometric investigations for the routes affected by the Towne Street interchange closure.

2.0 Traffic

Due to the proposed ramp closures, traffic will be forced to seek out new paths to access and exit I-75. As a result, Transystems analyzed 22 intersections, listed in **Table 1**, within the study sub-area near the Paddock Road interchange. A map in **Appendix A** shows the locations of these intersections.

Table 1: Intersection Number and Location	
• (1) Reading Road & SR 562 Westbound Ramps	• (12) North Bend Road & Paddock Road
• (2) Reading Road & SR 562 Eastbound Ramps	• (13) Paddock Road & Seymour Avenue
• (3) Paddock Road & SR 562 Westbound Ramps	• (14) Seymour Avenue & Reading Road
• (4) Paddock Road & SR 562 Eastbound Ramps	• (15) Section Road & Reading Road
• (5) Township Avenue & Vine Street	• (16) Summit Road & Reading Road
• (6) Township Avenue & Chestnut Street	• (17) Galbraith Road & SR 126 Westbound Ramps
• (7) Towne Street & Paddock Road	• (18) Galbraith Road & SR 126 Eastbound Ramps
• (8) Fairpark Avenue & Vine Street	• (19) Springfield Pike & Galbraith Road
• (9) Vine Street & Paddock Road	• (20) Woodbine Avenue & Galbraith Road
• (10) North Bend Road & Vine Street	• (21) Ridge/Columbia & SR 126 Westbound Ramps
• (11) Seymour Avenue & Vine Street	• (22) Ridge/Columbia & SR 126 Eastbound Ramps

The study focused on using design year traffic at each of the 22 intersections to determine the level of service (LOS) and volume to capacity ratios (v/c) for each movement on each approach based on (1) existing conditions with all ramps and partial interchanges in place which exist today, compared to (2) the proposed conditions where the Towne Street partial interchange will be closed. The design year is 20 years after opening day of the proposed constructed project. For this study, the design year selected is 2030.

Level of service is a measure used to describe operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined for roadways, including intersections. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of those conditions. For intersections, LOS is based solely on control delay. Control delay is that portion of total delay attributed to traffic signal operation for signalized intersections. Control delay includes initial deceleration delay at the beginning of the red interval, queue (backups) move up time during the beginning of the green interval, stopped delay during the red interval, and final acceleration



delay to the desired speed at the beginning of the green interval. **Table 2** shows the relationship between average delay and LOS.

Table 2: Level of Service Delay Ranges for Signalized and Unsignalized Intersections

Level of Service (LOS)	Average Delay Range (sec/veh)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

As noted above, the study focused on performing capacity analyses at each of the 22 intersections using design year traffic for the AM and PM design hours under two conditions: one with the affected existing ramps in place and the other with them removed. Both conditions assume the future I-75 lane addition. Traffic volumes for each condition were determined using the Ohio-Kentucky-Indiana (OKI) regional traffic model, which has the ability to simulate the distribution of traffic to all roadways under either condition.

Based on the results of the capacity analyses, intersections were grouped into three categories by comparing the LOS with the Towne Street ramps in place compared to them closed. The three categories are: (1) No change in LOS or LOS improves; (2) Worse LOS, but LOS D or better is achieved; and (3) Worse LOS and LOS E or F is achieved. Where there is no change in the LOS, where the LOS improves, or where it is LOS D or better, no corrective action is anticipated as a result of this study, since the proposed project will have little or no negative effect on those intersections. Where a worse LOS resulting in LOS E or F is found, corrective action is evaluated for that intersection.

Baseline 2030 Condition

The “Baseline” condition denotes the scenario where the affected existing ramps remain in place in the 2030 design year. This condition assumes improvements to I-75. Additionally, existing geometry was assumed at all analyzed intersections. **Table 3** details the LOS and average delays for each of the intersections. Highway Capacity Software (HCS+ v. 5.21), which is based on the 2000 Highway Capacity Manual, was used to complete the capacity analyses. The results show that, for both the AM and PM design hours, 20 of the intersections show a LOS D or better. However, the unsignalized intersection of North Bend Road and Paddock Road shows LOS F for both approaches in the AM design hour and LOS E for the eastbound leg in the PM design hour. The intersection of Springfield Pike and Galbraith Road shows LOS E in the PM design hour. The HCS reports for the “Baseline” condition are found in **Appendix B**.

Towne Street Interchange Closed 2030 Condition

The “Towne Interchange Closed” condition denotes the scenario where the affected Towne Street Interchange ramps are closed. In this scenario, improvements to I-75 were again assumed. Additionally, existing geometry was assumed at all analyzed intersections except intersections modified with the proposed improvements. Improvements to the Paddock interchange include in the I-75 northbound direction constructing a collector-distributor type exit terminal with ramp to Seymour Avenue and Paddock Road. The southbound exit ramp is proposed to have increased storage length. The southbound and northbound entrance ramps are proposed to include two lanes with ramp meters.

Table 4 details the LOS and average delays for each of the intersections. The results show that, for the 2030 AM and PM design hours, 21 of the intersections show LOS D or better. As with the “Baseline” condition, the intersection of North Bend Road and Paddock Road is LOS F in the AM design hour, with one of the legs of the intersection at LOS E in the PM peak. However, the overall intersection LOS at Springfield Pike and Galbraith Road improves to



LOS D in the PM peak hour. The HCS reports for the "Towne Interchange Closed" condition are found in Appendix B.

Comparison of Alternatives

Based upon the results of the capacity analyses, only one intersection is anticipated to have a poor level of service in 2030. The North Bend Road and Paddock Road intersection, which is currently unsignalized, will experience LOS F for both approaches in the AM design hour. In the PM design hour, the eastbound approach is LOS E, with the northbound approach at LOS B. These conditions exist in the "Baseline" condition and are unchanged in the "Towne Interchange Closed" condition. Therefore, no improvements related to capacity issues are recommended.



Table 3: 2030 Baseline HCS Results

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Fairpark Avenue & Vine Street	AM	23.8	C	23.4	C	14.3	B	23.1	C	20.7	C
	PM	22.7	C	22.2	C	22.9	C	18.3	B	21.1	C
Seymour Avenue & Vine Street	AM	12.2	B	11.9	B	11.4	B	12.8	B	12.2	B
	PM	14.9	B	12.3	B	13.8	B	12.7	B	13.4	B
Vine Street & Paddock Road	AM	38.2	D	38.4	D	12.6	B	43.1	D	36.6	D
	PM	26.2	C	27.7	C	20.8	C	27.9	C	25.1	C
Paddock Road & Seymour Avenue	AM	24.6	C	14.2	B	13.9	B	22.1	C	19.3	B
	PM	22.9	C	14.9	B	20.7	C	21.5	C	19.6	B
North Bend Road & Paddock Road	AM	Error*	F	-	-	150.3	F	-	-	-	-
	PM	41.2	E	-	-	13.2	B	-	-	-	-
North Bend Road & Vine Street	AM	12.4	B	14.2	B	13.1	B	13.6	B	13.5	B
	PM	14.5	B	14.2	B	15.1	B	12.3	B	14.2	B
Springfield Pike & Galbraith Road	AM	17.7	B	25.1	C	14.7	B	27.1	C	23.2	C
	PM	18.1	B	85.8	F	73.8	F	46.1	D	63.3	E
Woodbine Avenue & Galbraith Road	AM	13.1	B	11.8	B	12.0	B	12.5	B	12.4	B
	PM	12.3	B	13.9	B	12.4	B	12.4	B	13.2	B
Reading Road & SR 562 Westbound Ramps	AM	-	-	18.4	B	12.0	B	19.0	B	16.1	B
	PM	-	-	18.6	B	14.5	B	18.9	B	16.4	B
Reading Road & SR 562 Eastbound Ramps	AM	19.8	B	-	-	19.7	B	9.6	A	15.6	B
	PM	23.2	C	-	-	22.9	C	7.4	A	18.1	B
Paddock Road & SR 562 Westbound Ramps	AM	-	-	20.9	C	16.8	B	20.5	C	19.5	B
	PM	-	-	30.2	C	14.7	B	30.4	C	25.3	C
Paddock Road & SR 562 Eastbound Ramps	AM	18.0	B	-	-	18.2	B	18.1	B	18.1	B
	PM	40.7	D	-	-	41.1	D	28.3	C	34.6	C
Township Avenue & Vine Street	AM	16.8	B	16.4	B	10.8	B	16.6	B	15.2	B
	PM	15.0	B	13.4	B	15.0	B	13.3	B	14.4	B
Township Avenue & Chestnut Street	AM	20.5	C	19.5	B	20.5	C	20.8	C	20.2	C
	PM	24.8	C	13.3	B	23.8	C	24.4	C	21.5	C
Towne Street & Paddock Road	AM	14.5	B	-	-	14.6	B	11.1	B	13.5	B
	PM	19.8	B	-	-	20.7	C	8.0	A	16.4	B
Galbraith Road & SR 126 Westbound Ramps	AM	-	-	13.1	B	12.8	B	10.5	B	12.2	B
	PM	-	-	14.3	B	11.7	B	14.8	B	14.1	B
Galbraith Road & SR 126 Eastbound Ramps	AM	11.8	B	-	-	12.0	B	12.4	B	12.2	B
	PM	12.8	B	-	-	9.9	A	13.4	B	12.8	B
Ridge/Columbia & SR 126 Westbound Ramps	AM	-	-	13.9	B	14.4	B	13.4	B	13.9	B
	PM	-	-	19.7	B	19.5	B	11.2	B	16.1	B
Ridge/Columbia & SR 126 Eastbound Ramps	AM	19.6	B	-	-	19.8	B	9.9	A	16.1	B
	PM	20.2	C	-	-	19.3	B	19.3	B	19.5	B
Seymour Avenue & Reading Road	AM	23.3	C	23.6	C	23.5	C	22.6	C	23.1	C
	PM	29.2	C	29.1	C	33.0	C	23.1	C	28.8	C
Section Road & Reading Road	AM	21.6	C	13.4	B	21.4	C	14.8	B	17.0	B
	PM	26.2	C	17.1	B	25.8	C	23.3	C	23.6	C
Summit Road & Reading Road	AM	31.1	C	30.1	C	16.2	B	46.3	D	35.3	D
	PM	32.1	C	35.8	D	17.3	B	51.0	D	35.0	C



Table 4: 2030 Towne Interchange Closed HCS Results

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Fairpark Avenue & Vine Street	AM	23.2	C	23.0	C	15.0	B	24.0	C	21.5	C
	PM	22.7	C	22.2	C	22.8	C	17.9	B	21.0	C
Seymour Avenue & Vine Street	AM	12.9	B	11.9	B	11.7	B	12.6	B	12.3	B
	PM	15.3	B	14.4	B	15.6	B	10.4	B	14.2	B
Vine Street & Paddock Road	AM	33.4	C	34.2	C	13.4	B	34.0	C	31.0	C
	PM	25.0	C	25.4	C	20.2	C	25.8	C	23.7	C
Paddock Road & Seymour Avenue	AM	23.5	C	12.4	B	15.5	B	23.3	C	19.8	B
	PM	50.8	D	12.2	B	53.5	D	39.6	D	40.0	D
North Bend Road & Paddock Road	AM	Error*	F	-	-	113.0	F	-	-	-	-
	PM	12.4	B	-	-	37.4	E	-	-	-	-
North Bend Road & Vine Street	AM	12.9	B	14.4	B	13.0	B	13.4	B	13.6	B
	PM	14.5	B	15.2	B	14.9	B	12.2	B	14.4	B
Springfield Pike & Galbraith Road	AM	16.2	B	21.2	C	14.9	B	21.9	C	19.7	B
	PM	18.1	B	73.5	E	59.9	E	38.9	D	53.7	D
Woodbine Avenue & Galbraith Road	AM	12.9	B	11.8	B	12.1	B	12.5	B	12.3	B
	PM	11.6	B	13.0	B	12.8	B	12.8	B	12.5	B
Reading Road & SR 562 Westbound Ramps	AM	-	-	18.3	B	12.3	B	18.6	B	15.9	B
	PM	-	-	18.5	B	15.5	B	18.9	B	16.9	B
Reading Road & SR 562 Eastbound Ramps	AM	18.6	B	-	-	18.7	B	10.5	B	15.7	B
	PM	21.3	C	-	-	21.7	C	8.5	A	17.8	B
Paddock Road & SR 562 Westbound Ramps	AM	-	-	23.9	C	19.1	B	24.2	C	22.7	C
	PM	-	-	33.2	C	14.9	B	31.7	C	27.2	C
Paddock Road & SR 562 Eastbound Ramps	AM	18.8	B	-	-	18.6	B	12.3	B	15.7	B
	PM	34.2	C	-	-	34.4	C	32.1	C	33.2	C
Township Avenue & Vine Street	AM	15.1	B	15.6	B	11.0	B	16.3	B	14.7	B
	PM	13.8	B	13.2	B	13.9	B	13.0	B	13.5	B
Township Avenue & Chestnut Street	AM	18.3	B	20.5	C	20.1	C	20.4	C	19.8	B
	PM	21.6	C	17.3	B	21.5	C	21.3	C	20.1	C
Towne Street & Paddock Road	AM	14.5	B	-	-	15.8	B	10.6	B	14.0	B
	PM	17.2	B	-	-	16.9	B	9.4	A	14.9	B
Galbraith Road & SR 126 Westbound Ramps	AM	-	-	13.2	B	12.8	B	10.4	B	12.3	B
	PM	-	-	14.6	B	11.7	B	14.5	B	14.1	B
Galbraith Road & SR 126 Eastbound Ramps	AM	12.1	B	-	-	11.6	B	12.1	B	12.0	B
	PM	13.2	C	-	-	9.6	A	13.1	B	12.6	B
Ridge/Columbia & SR 126 Westbound Ramps	AM	-	-	14.0	B	14.4	B	13.4	B	13.9	B
	PM	-	-	19.4	B	20.1	C	11.5	B	16.4	B
Ridge/Columbia & SR 126 Eastbound Ramps	AM	19.6	B	-	-	19.6	B	10.1	B	16.1	B
	PM	20.2	C	-	-	19.7	B	19.7	B	19.8	B
Seymour Avenue & Reading Road	AM	23.9	C	23.8	C	24.1	C	21.7	C	23.2	C
	PM	26.7	C	31.8	C	33.0	C	23.1	C	29.0	C
Section Road & Reading Road	AM	21.6	C	13.4	B	21.0	C	14.1	B	16.7	B
	PM	24.8	C	16.0	B	25.2	C	18.7	B	21.3	C
Summit Road & Reading Road	AM	29.0	C	29.0	C	17.0	B	28.2	C	25.2	C
	PM	30.5	C	31.9	C	17.9	B	38.3	D	29.4	C



3.0 Geometrics

As a result of the closure of the Towne Street interchange, vehicles which currently use the ramps to enter or exit I-75 northbound will be forced to take alternate routes. The geometric evaluation focused on the probable alternative routes to determine if modifications would be necessary to accommodate rerouted trucks. For this analysis, the project team utilized a WB-62 design vehicle (interstate semi-trailer as described in the AASHTO *A Policy on Geometric Design of Highways and Street, 2004*) on these routes.

Auto TURN v. 4.2 software, along with aerial photography and visual observation of the roadway network, was used to examine existing conditions. Proposed future routes as a result of the Towne Street closure were determined. Exhibits of the proposed routes are found in **Appendix C**.

Closure of I-75 Northbound to Towne Street Exit Ramp

Three routes were identified as possible alternatives for vehicles traveling on I-75 northbound to Towne Street. These routes are described in detail below.

Exit Route A: Mitchell Avenue, (See Exhibit A)

The first alternative route exits I-75 at Mitchell Avenue, turns left onto Mitchell Avenue, turns right onto Spring Grove Avenue, continues onto Vine Street, and turns right onto Township Avenue. (2.58 miles)

The Mitchell Avenue intersections will be improved to accommodate a WB-62 as a part of the proposed HAM-75-2.30 project. The right turn onto Spring Grove Avenue currently has adequate pavement to allow for this turn. The remaining turn, a right turn from Vine Street onto Township Avenue, does not currently provide enough space for trucks to turn.

To improve this turning radius requires a slight modification at the intersection of Vine Street and Township Avenue. It appears the truck turning path encroaches on a convenience store/gas station property in the southeast quadrant of the intersection. The wider curb return requires impacts to the sidewalk and potentially the store's sign structure.

Exit Route B: SR 562 (Norwood Lateral), (See Exhibit B)

The second alternative route exits I-75 at SR 562 (Norwood Lateral), exits SR 562 at Paddock Road, turns left onto Paddock Road, and turns left onto Towne Street. (1.52 miles)

As a part of the HAM-75-2.30 project the ramp from I-75 northbound to SR 562 eastbound, SR 562 and the exit terminal from SR 562 to Paddock Road will be modified and meet design standards to accommodate a WB-62, so no additional improvements are needed in this area.

However, the left turn movement onto Paddock Road from the ramp is a two-lane movement that may require improvements. For a truck in the furthest left of the two left turn lanes turning into the near lane of Paddock Road, it may be necessary to remove the raised concrete median and replace it with striping. The stop bar on the Paddock Road southbound left turn lane will need to be moved farther north so it is not in the truck path. No modifications to the intersection are required to accommodate a truck in the right of the two left turn lanes turning into the far lane of Paddock Road; however, the trailer of the WB-62 does encroach into the path of the left turn lane next to it. Therefore, two left turns cannot be accomplished side by side for trucks.

To accommodate the left turn onto Towne Street it is necessary to move the stop bar of the Towne Street eastbound lanes farther west to not interfere with the path of a turning truck.

Exit Route C: Seymour Avenue, (See Exhibit C)

The third alternative route exits I-75 at Seymour Avenue, turns right on Seymour Avenue, turns right onto Paddock Road, and turns right onto Towne Street. (1.12 miles)

This alternative begins with a new proposed ramp from I-75 northbound to Seymour Avenue. This ramp, as well as the intersection of this ramp with Seymour Avenue will be designed as part of the HAM-75-2.30 project and meet the



necessary criteria to accommodate a WB-62. The existing intersection of Seymour Avenue with Paddock Road will not require modifications to allow for the right turning movement.

At the intersection of Paddock Road with Towne Street, the turning path of the WB-62 requires a wider curb return. This encroaches on a residential property. No impacts to the structure of the residential property are anticipated; however, some impacts to the sidewalk and the lawn are likely.

Closure of Towne Street to I-75 Northbound Entrance Ramp

Two routes are identified as possible alternatives for vehicles traveling on Towne Street to I-75 northbound. These routes are described in detail below.

Entrance Route A: Enter I-75 at SR 562 (Norwood Lateral), (See Exhibit D)

The first alternative is to take Towne Street eastbound, turn right onto Paddock Road, turn right onto the SR 562 entrance ramp, and enter I-75 via the SR 562 westbound to I-75 northbound ramp. (1.57 miles)

This alternative requires only one modification of the existing route. The right turn truck path onto Paddock Road from Towne Street is too wide to fit within the existing pavement area of the intersection. Widening the southwest corner of the intersection would be required to accommodate a WB-62. These improvements affect the sidewalk and a portion of the grassy area of the property on this corner (a nursing home) but will not affect the structure itself. The entrance ramp from Paddock Road to SR 562 is presently wide enough for a WB-62. SR 562 and the ramp from SR 562 westbound to I-75 northbound will be designed as part of the HAM-75-2.30 project and will accommodate a WB-62.

Entrance Route B: Enter I-75 at Paddock Road, (See Exhibit E)

The second alternative is to take Towne Street eastbound, turn left onto Paddock Road, and enter I-75 northbound via Paddock Road to the I-75 northbound ramp. (1.30 miles)

This alternative requires little modification to allow for turning trucks. The intersection of Towne Street at Paddock Road is currently wide enough for this turning movement. It is necessary to move the stop bar for the Paddock Road southbound lanes farther north to not interfere with the path of a turning truck. Paddock Road will accommodate a WB-62 along the existing road. The ramp from Paddock Road onto I-75 northbound will be modified as part of the HAM-75-2.30 project and will meet design criteria for a WB-62 turning movement.

4.0 Conclusion

There are several alternative routes available for vehicles to use in lieu of the partial interchange at Towne Street and I-75. The intersections along these routes, including other intersections within the vicinity, were analyzed for traffic operations.

Findings of this investigation based upon traffic analyses are that the closure of the Towne Street interchange should minimally impact the studied intersections.

However, three intersections along the available alternative routes require modifications to accommodate truck turning, assuming a WB-62 design vehicle. The recommended improvements include:

Vine Street/Township Avenue Intersection (Village of Elmwood Place)

- Increase radius of curb return from Vine Street northbound to Township Avenue eastbound

SR 562 Eastbound Ramp/Paddock Road Intersection (City of Cincinnati)

- Remove raised concrete median on north approach and replace with striping to improve turning for trucks in left-most left turn lane.
- Move stop bar on the Paddock Road southbound left turn lane farther north to not interfere with the path of a turning truck.