Highway Safety Program
District 8 Approval Form

Logical Termini:	IR 275, between IR-75/Mosteller Rd.
County-Route-Section:	HAM IR-275-25.98-26.28
Jurisdiction:	City of Sharonville

Priorities:

Location Type:	Urban Freeway	Rank*:	72	SA Year:	2015

* If Location Type is "Multiple," enter "Multiple" for Rank

Programming:

Proposed Cost: $1,723,970 **B/C Ratio:**

Proposed Award Date (FY and Quarter):

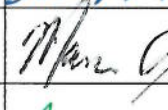
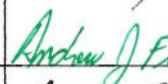
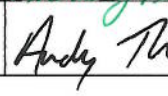
Problem Statement:

Crashes were pulled from 2013-2016, with only data from 2013-2015 being entered into ECAT. There were 139 crashes for the whole period, with 28 in 2013, 29 in 2014, 54 in 2015 and 28 in 2016. Of all crashes, 31% resulted in injury, and there were 6 incapacitating injuries. Most of the crashes occurred on weekdays, with 14% occurring on weekends.

Recommended Countermeasures:

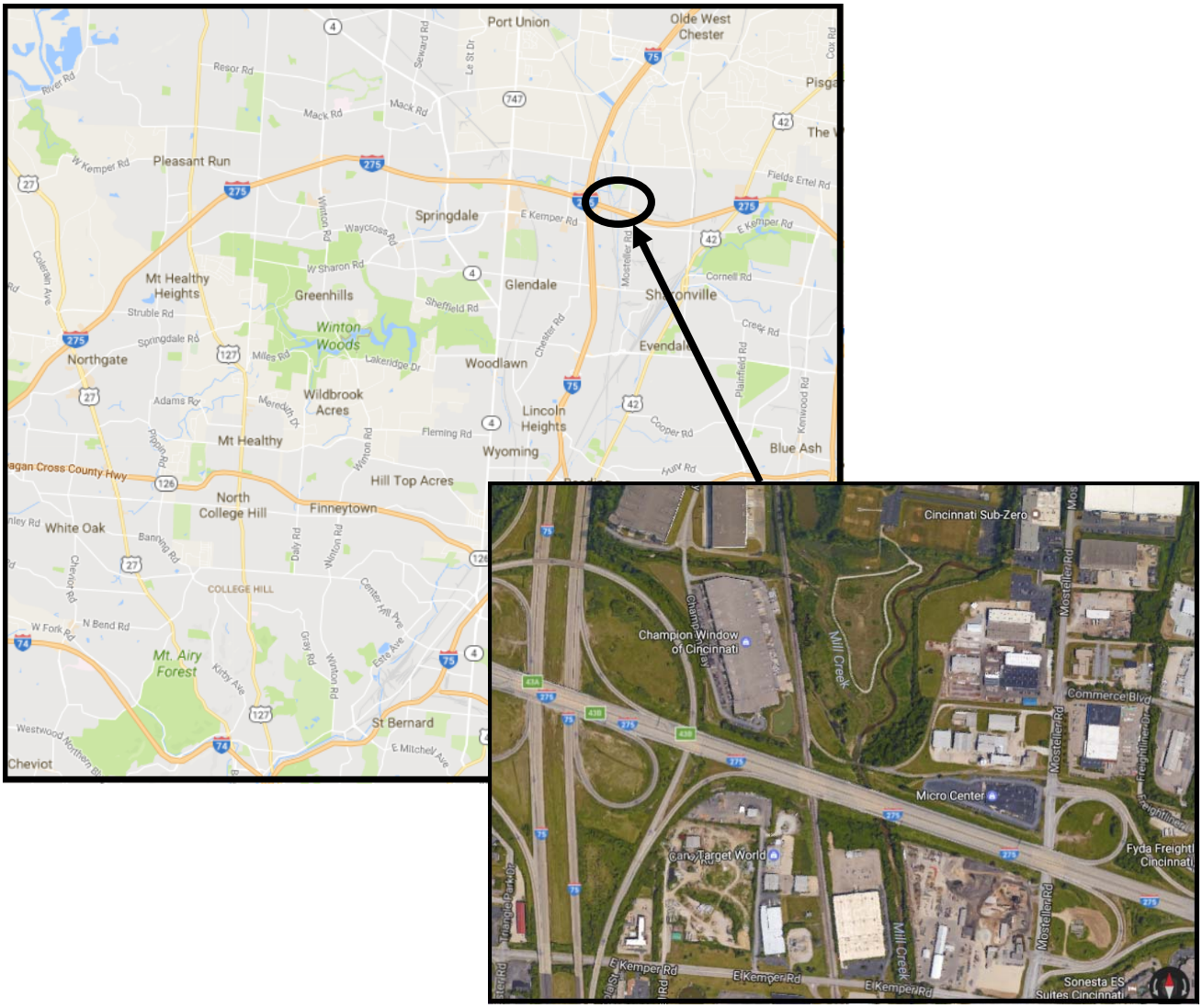
- Add 4th lane to IR-75 NB for on-ramp from IR-275 EB to IR-75 NB
- Add 5th lane to IR-75 NB for on-ramp from IR-275 WB to IR-75 NB

District 8 Safety Review Team

Team Member*	Signature	Date	Vote		Comments
			Yes	No	
DSRT Chairperson		6/29/17	✓		
Planning & Engineering Administrator		6/29/17	✓		
Highway Administrator		6/29/17	✓		
Traffic Engineer		6/29/17	✓		
Planning Engineer		6/29/17	✓		
FHWA Representative		6/29/17	✓		

*Or qualified representative
Additional non-voting members of the DSRT include but are not limited to the Real Estate Administrator and the District Environmental Engineer.

District 8 Safety Study
HAM-275-25.98 to 26.28
Rank #72 Urban Freeway-2015



Report prepared by

Mead & Hunt

Ohio Department of Transportation
PID 104689
HAM-275-25.98 to 26.28 Safety Study

Date: May 12, 2017

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Appendices

1. Purpose and Background

As a requirement of the Federal Highway Administration (FHWA), states are required to have a highway safety improvement program (HSIP). As part of the HSIP, the FHWA encourages each state to use more than one network screening approach to find locations that have the highest potential for safety improvement. FHWA developed Safety Analyst (SA), a network screening program designed to improve the programming of site-specific highway safety improvements by incorporating safety management approaches with computerized analytical tools.

The Ohio Department of Transportation's (ODOT's) Highway Safety Program uses six main categories that were developed using the SA program: Rural and Urban - Freeway Segments, Non-Freeway Segments and Intersections. The program typically studies the top 50 locations statewide in each category and recommends countermeasures to reduce crashes. Based on funding availability, the HSIP locations are then improved based on the recommendation.

The urban freeway segment of IR275 appears on the ODOT 2015 HSIP priority list and is ranked 72nd. This segment is also near the interchange of IR75/IR275. The area in and around this interchange has consistently appeared on the ODOT HSIP.

This study will examine the probable causes for the crashes and recommend suitable countermeasures to mitigate the safety issue on this segment of IR275.

2. Existing Conditions

This segment of IR275 is located in the City of Sharonville. The west end of the section is at the east end of the bridge over the ramp from northbound IR75 to westbound IR275. The east end of the section is at the east end of the bridge over the Mill Creek.

There are four thru lanes in the eastbound direction at the beginning of this section. An auxiliary lane from the ramp for northbound I-75 to the exit ramp for Mosteller Road begins around the middle of this segment.

There are five lanes in the westbound direction. The three inside lanes are for thru IR275 traffic. The fourth lane, from the median, becomes a drop lane to southbound IR75 and the outside lane is an auxiliary lane from Mosteller Road to northbound IR75.

In the eastbound direction, there are two overhead cantilever signs; a 0.5 mile to Mosteller Road ½ Mile sign and a Mosteller Road exit only sign. There are ground mounted signs on the mainline and a ramp sign, indicating that the ramp lane is an add lane.

In the westbound direction, there is an overhead truss sign that includes signage for IR275 pull through, IR75 south exit only and IR75 north exit only.

Westbound direction signage

The speed limit for the segment of IR275 is posted as 65 mph.

For westbound IR275, the channelizing line runs the entire length of the segment. The channel line is between the three thru lanes on IR275 and the two drop lanes to IR75.

The pavement markings, raised pavement markers and signs are all in good condition.

IR275 is elevated above the surrounding terrain for this entire segment.

There are two structures in the segment; one over the railroad and one over the Mill Creek.

3. Crash Information

The crash location was identified as the urban freeway of IR275 in the City of Sharonville. The location ranked 72nd for urban freeways on the ODOT 2015 HSIP.

A crash analysis was completed for the years 2013-2016. Only data spanning 2013-2015 was used for the crash diagram, since the 2016 data may not have been completed at the time crashes were retrieved for analysis. During the 2013-2015 time period, there were 121 crashes reported. Ten of the crashes were excluded; seven were debris in roadway, one was a medical emergency and two were not within the study area. This left 111 crashes for further analysis. The year 2016 crashes, for the specified log points, had 28 crashes.

Some trends for the 2013-2015 crashes are as follows:

- 54 (48.6%) crashes occurred in 2015
- 2013, 2014 and 2016 had 28, 29 and 28 crashes respectively
- 21 crashes occurred in 2013-2014 and 23 crashes occurred in 2015 from July 31st to December 4th (time of 2015 construction for extending northbound on ramp)
- 67 (60.3%) crashes occurred between 3:00 pm and 7:00 pm
- 62 (55.9%) crashes were rear end

- 27 (24.3%) crashes were sideswipe passing
- 41 (36.9%) crashes, the road condition was reported as wet, snow or ice
- 81 (73%) crashes were reported coming from the east

4. Probable Causes

After reviewing the crash data and conducting field observations, the most prominent crash trends are rear ends and sideswipe passing in the westbound direction. Another trend involved fixed object crashes on the northbound IR75 to eastbound IR275 ramp, mainly during wet conditions.

- For the eastbound direction, there were nine crashes involving vehicles from the northbound IR75 ramp. Seven of these occurred during wet pavement conditions.
- The westbound direction accounted for almost 75 percent of the crashes. Of these, two-thirds occurred from 3:00 pm to 7:00 pm. A congestion issue exists due to backup from the exit ramp to northbound IR75. This ramp merges with the eastbound IR275 to northbound IR75 and becomes an added lane onto northbound IR75. Essentially, these ramps act as one lane that is well over capacity, carrying more than 3,000 vehicles during the PM peak hour. The backups from this ramp regularly extend east of the Mosteller interchange.
- In 2015 ODOT extended the merge for the eastbound and westbound IR275 ramps to northbound IR75. During the construction time period, there were 12 more crashes than in the previous two years. 2015 had twice as many crashes, as did the previous two years. The number of crashes in 2016 were the same as 2013 and 2014 so the extended merge does not appear to have had a positive impact on the crashes for this segment. The construction accounts for a portion of the increase in crashed during 2015. There were twice as many crashes in 2015 (19) related to wet/snow/ice pavement conditions as in the previous two years and 2016 (9-11 each year).

These are the factors contributing to the crashes on this segment of IR275.

5. Potential Countermeasures

For westbound IR275, the crash problem is wet crashes involving the ramp from IR275. History has shown success in alleviating these types of crashes by treating the pavement with a friction surface. This portion of the ramp was treated in 2016 with a friction course treatment project, PID100244.

For eastbound IR275, most crashes are rear end and sideswipe passing due to the PM peak congestion. The congestion is primarily due to the backups from the northbound IR75 exit ramp that can extend passed the Mosteller interchange. The eastbound and westbound IR275 ramps to northbound IR75 merge together and form an add lane on IR75. In 2015, ODOT extended the merge to the Crescentville Road overpass. The merge extension has not had a positive impact on crashes, the amount of crashes in

2016 are the same as those in 2013 and 2014. Two alternatives were investigated to alleviate the backups on the northbound exit ramp. Certified traffic was used from a previous project for the years 2014/2034. The two alternatives are as follows:

- Alternative 1 would merge the eastbound IR275 to northbound IR75 ramp into the three lanes of IR75 between the bridges of mainline IR275 and the northbound IR75 to westbound IR275 ramp. This requires a design exception for both shoulders under the ramp bridge. See Appendix E for the diagram and cost estimate.
    - Another alternative analyzed but not diagrammed was to make the eastbound IR275 ramp the add lane and merge the westbound IR275 ramp into four lanes on IR75. This is referred to as Alternative 1b.
- Alternative 2 is similar to the merge above, except the eastbound IR275 to northbound IR75 ramp becomes an add lane (fourth lane) for IR75 between the bridges of mainline IR275 and the northbound IR75 to westbound IR275 ramp. This requires a design exception for both shoulders under the ramp bridge. The westbound IR275 ramp to northbound IR75 would become an add/auxiliary lane on IR75 (fifth lane). The fifth lane would end at the Union Centre Blvd. exit ramp. Widening would be to the median side. Additional design exceptions would be needed for lane width (11.5 feet) and median shoulder (4.1 feet) for the two structures on IR75, one over the railroad and one over the Millcreek. See Appendix F for the diagram and cost estimate.

The analysis for both alternatives compared to the existing can be seen in the table below, further details can be found in Appendix D.

Table 1 – Alternatives Analysis

	No Build	Alternative 1	Alternative 1b	Alternative 2
Westbound I-275 Ramp to Northbound I-75	D(33.4)	D(33.4)	D(33.4)	D(33.4)
Eastbound I-275 Ramp to Northbound I-75	D(27.8)	D(27.8)	D(27.8)	D(27.8)
Mainline I-75 South of I-275 On Ramps	E(40.0)	E(40.0)	E(40.0)	E(40.0)
Eastbound I-275 Ramp Merge into 3 Lanes	NA	F	NA	NA
Eastbound I-275 Ramp Add Lane (4 lanes on I-75)	NA	NA	E(40.0)/D(27.8)	E(40.0)/D(27.8)
Mainline North of Eastbound I-275 Ramp Merge	NA	F	NA	NA
Mainline North of Eastbound I-275 Ramp Add Lane	NA	NA	E(35.8)	E(35.8)
Eastbound/Westbound I-275 Ramp Merge	F	NA	NA	NA
Westbound I-275 Ramp Add Lane - Mainline 3 Lanes	NA	F/D(33.4)	NA	NA
Westbound I-275 Ramp Merge - Mainline 4 Lanes	NA	NA	F	NA
Westbound I-75 Ramp Add Lane - Mainline 4 Lanes	NA	NA	NA	E(35.8)/D(33.4)
Mainline I-75 North of On Ramps (4 Lanes)	F	F	F	NA
Mainline I-75 North of On Ramps (5 Lanes)	NA	NA	NA	E(52.4)

Mainline/Ramp

LOS(Density) - no density is calculated for LOS of F

6. Recommended Countermeasures

Based on the current analysis and review of alternatives analysis, Alternative 2 should be pursued. The alternative has no segments or merge conditions with a LOS of F. The No Build, Alternative 1 and 1b have at least two segments or merge conditions with a LOS of F. The cost for the construction is estimated to be less than $2.0 million, but would require shoulder width design exceptions for both shoulders under the IR75 Northbound to IR275 Westbound ramp and for the median shoulders on the two mainline structures. Another design exception for lane width, 11.5 feet, for the section encompassing the two structures would be required.

Separating the two ramps eliminates the poor merge condition that queues traffic up the ramp and past the Mosteller interchange in the pm peak hours. Providing the fifth lane between the interchanges of IR275 and Union Centre Blvd. provides for LOS E or better.

Providing a fifth lane allows the westbound ramp to be an add lane which further eliminates the queuing up the ramp that would impact mainline Westbound IR-275.

APPENDIX A
Crash Data 2013 - 2015

HAM-275-25.98 to 26.28; 01/01/2013 to 12/31/2015

	Number
Total	**111**

CRASH_SEVERITY	Number	%
Injury Crash	**35**	31.5%
Property Damage Crash	**76**	68.5%
Grand Total	**111**	**100.0%**

TRAFFIC_CRASH_YEAR	Number	%
2013	**28**	25.2%
2014	**29**	26.1%
2015	**54**	48.6%
Grand Total	**111**	**100.0%**

DAY_OF_WEEK	Number	%
Friday	**27**	24.3%
Thursday	**24**	21.6%
Tuesday	**21**	18.9%
Wednesday	**14**	12.6%
Monday	**12**	10.8%
Saturday	**11**	9.9%
Sunday	**2**	1.8%
Grand Total	**111**	**100.0%**

HOUR_OF_DAY	Number	%
1	**1**	0.9%
3	**1**	0.9%
5	**3**	2.7%
6	**1**	0.9%
7	**3**	2.7%
8	**4**	3.6%
9	**6**	5.4%
10	**1**	0.9%
11	**3**	2.7%
12	**5**	4.5%
13	**6**	5.4%
14	**7**	6.3%
15	**14**	12.6%
16	**21**	18.9%
17	**15**	13.5%
18	**17**	15.3%
19	**2**	1.8%
20	**1**	0.9%
Grand Total	**111**	**100.0%**

TYPE_OF_CRASH	Number	%
Rear End	**62**	55.9%
Sideswipe - Passing	**27**	24.3%
Fixed Object	**16**	14.4%
Parked Vehicle	**2**	1.8%
Overturning	**1**	0.9%
Angle	**1**	0.9%
Head On	**1**	0.9%
Other Non-Collision	**1**	0.9%
Grand Total	**111**	**100.0%**

HAM-275-25.98 to 26.28; 01/01/2013 to 12/31/2015

WEATHER_CONDITION	Number	%
Clear	**49**	44.1%
Rain	**29**	26.1%
Cloudy	**28**	25.2%
Snow	**5**	4.5%
Grand Total	**111**	**100.0%**

ROAD_CONDITION	Number	%
Road - Dry	**70**	63.1%
Road - Wet	**35**	31.5%
Road - Snow	**4**	3.6%
Road - Ice	**2**	1.8%
Grand Total	**111**	**100.0%**

LIGHT_CONDITION	Number	%
Daylight	**94**	84.7%
Dark - Lighted	**9**	8.1%
Dusk	**6**	5.4%
Dawn	**2**	1.8%
Grand Total	**111**	**100.0%**

NUMBER_OF_VEHICLES	Number	%
(blank)	**111**	100.0%
Grand Total	**111**	**100.0%**

LOCATION	Number	%
Not An Intersection	**102**	91.9%
On Ramp	**6**	5.4%
Off Ramp	**2**	1.8%
Four-Way Intersection	**1**	0.9%
Grand Total	**111**	**100.0%**

CRASH_MONTH_NBR	Number	%
1	**11**	9.9%
2	**6**	5.4%
3	**6**	5.4%
4	**11**	9.9%
5	**11**	9.9%
6	**10**	9.0%
7	**10**	9.0%
8	**14**	12.6%
9	**12**	10.8%
10	**7**	6.3%
11	**10**	9.0%
12	**3**	2.7%
Grand Total	**111**	**100.0%**

ROAD_CONTOUR	Number	%
Straight - Level	**101**	91.0%
Curve - Grade	**4**	3.6%
Straight - Grade	**3**	2.7%
Contour Not Stated	**2**	1.8%
Curve - Level	**1**	0.9%
Grand Total	**111**	**100.0%**

SPECIAL_AREA	Number	%
Unknown or Not in Work Zone	**111**	100.0%
Grand Total	**111**	**100.0%**

ANIMAL_TYPE	Number	%
Animal Not Stated	**111**	100.0%
Grand Total	**111**	**100.0%**

HAM-275-25.98 to 26.28; 01/01/2013 to 12/31/2015

ACTION1	Number	%
Straight Ahead	**70**	63.1%
Changing Lanes	**21**	18.9%
Negotiating A Curve	**8**	7.2%
Entering Traffic Lane	**4**	3.6%
Slowing Or Stopped In Traffic	**4**	3.6%
Leaving Traffic Lane	**1**	0.9%
Unknown	**1**	0.9%
Parked	**1**	0.9%
Overtaking/Passing	**1**	0.9%
Grand Total	**111**	**100.0%**

CONTRIBUTING_FACTOR1	Number	%
Followed Too Closely/ACDA	**66**	59.5%
Failure To Control	**22**	19.8%
Improper Lane Change/Passing/Offroad	**12**	10.8%
Unknown	**4**	3.6%
Unsafe Speed	**2**	1.8%
None	**2**	1.8%
Swerving To Avoid	**1**	0.9%
Failure To Yield	**1**	0.9%
Operating Defective Equipment	**1**	0.9%
Grand Total	**111**	**100.0%**

	Number	%
Total	**111**	**100.0%**

TRAFFIC_CONTROL1	Number	%
Pavement Markings	**110**	99.1%
Traffic Signal	**1**	0.9%
Grand Total	**111**	**100.0%**

DRIVER_ALCOHOL1	Number	%
None	**107**	96.4%
0	**3**	2.7%
Yes - Alcohol Suspected	**1**	0.9%
Grand Total	**111**	**100.0%**

DRIVER_DRUGS1	Number	%
(blank)	**111**	100.0%
Grand Total	**111**	**100.0%**

HAM-275-25.98 to 26.28; 01/01/2013 to 12/31/2015

DIRECTION_FROM1	Number	%
East	**81**	73.0%
West	**21**	18.9%
South	**6**	5.4%
North	**2**	1.8%
Southwest	**1**	0.9%
Grand Total	**111**	**100.0%**

DIRECTION_TO1	Number	%
West	**80**	72.1%
East	**27**	24.3%
North	**2**	1.8%
Northeast	**1**	0.9%
Southeast	**1**	0.9%
Grand Total	**111**	**100.0%**

POSTED_SPEED1	Number	%
Posted Speed 61-65	**111**	100.0%
Grand Total	**111**	**100.0%**

ESTIMATED_SPEED1	Number	%
Unit Speed 20 and Under	**24**	21.6%
Unit Speed Not Stated	**14**	12.6%
Unit Speed 31-35	**10**	9.0%
Unit Speed 26-30	**10**	9.0%
Unit Speed 41-45	**9**	8.1%
Unit Speed 56-60	**9**	8.1%
Unit Speed 46-50	**8**	7.2%
Unit Speed 21-25	**8**	7.2%
Unit Speed 51-55	**8**	7.2%
Unit Speed 61-65	**5**	4.5%
Unit Speed 36-40	**4**	3.6%
Unit Speed Over 65	**2**	1.8%
Grand Total	**111**	**100.0%**

VEHICLE_TYPE1	Number	%
Mid Size	**29**	26.1%
Sport Utility Vehicle	**21**	18.9%
Compact	**16**	14.4%
Full Size	**15**	13.5%
Pickup	**14**	12.6%
Tractor/Semi-Trailer	**5**	4.5%
Minivan	**4**	3.6%
Single Unit Truck/Trailer	**1**	0.9%
Van	**1**	0.9%
Motorcycle	**1**	0.9%
Sub-Compact	**1**	0.9%
Single Unit Truck; 3+ Axles	**1**	0.9%
Single Unit Truck Or Van 2 Axle, 6 Tires	**1**	0.9%
Bus/Van (9-15 Seats Inc Driver)	**1**	0.9%
Grand Total	**111**	**100.0%**

VEHICLE_TYPE2	Number	%
Mid Size	**21**	18.9%
Sport Utility Vehicle	**20**	18.0%
	16	14.4%
Compact	**16**	14.4%
Minivan	**11**	9.9%
Full Size	**9**	8.1%
Pickup	**8**	7.2%
Tractor/Semi-Trailer	**4**	3.6%
Single Unit Truck; 3+ Axles	**4**	3.6%
Sub-Compact	**1**	0.9%
Single Unit Truck Or Van 2 Axle, 6 Tires	**1**	0.9%
Grand Total	**111**	**100.0%**

HAM-275-25.98 to 26.28; 01/01/2013 to 12/31/2015

ACTION2	Number	%
Slowing Or Stopped In Traffic	**62**	55.9%
Straight Ahead	**28**	25.2%
	16	14.4%
Changing Lanes	**3**	2.7%
Entering Traffic Lane	**1**	0.9%
Parked	**1**	0.9%
Grand Total	**111**	**100.0%**

CONTRIBUTING_FACTOR2	Number	%
None	**86**	77.5%
	16	14.4%
Unknown	**4**	3.6%
Improper Lane Change/Passing/Offroad	**2**	1.8%
Swerving To Avoid	**1**	0.9%
Failure To Yield	**1**	0.9%
Followed To Closely/ACDA	**1**	0.9%
Grand Total	**111**	**100.0%**

DIRECTION_FROM2	Number	%
East	**76**	68.5%
West	**19**	17.1%
	16	14.4%
Grand Total	**111**	**100.0%**

DIRECTION_TO2	Number	%
West	**76**	68.5%
East	**19**	17.1%
	16	14.4%
Grand Total	**111**	**100.0%**

DRIVER_ALCOHOL2	Number	%
None	**94**	84.7%
	16	14.4%
0	**1**	0.9%
Grand Total	**111**	**100.0%**

DRIVER_DRUGS2	Number	%
(blank)	**111**	100.0%
Grand Total	**111**	**100.0%**

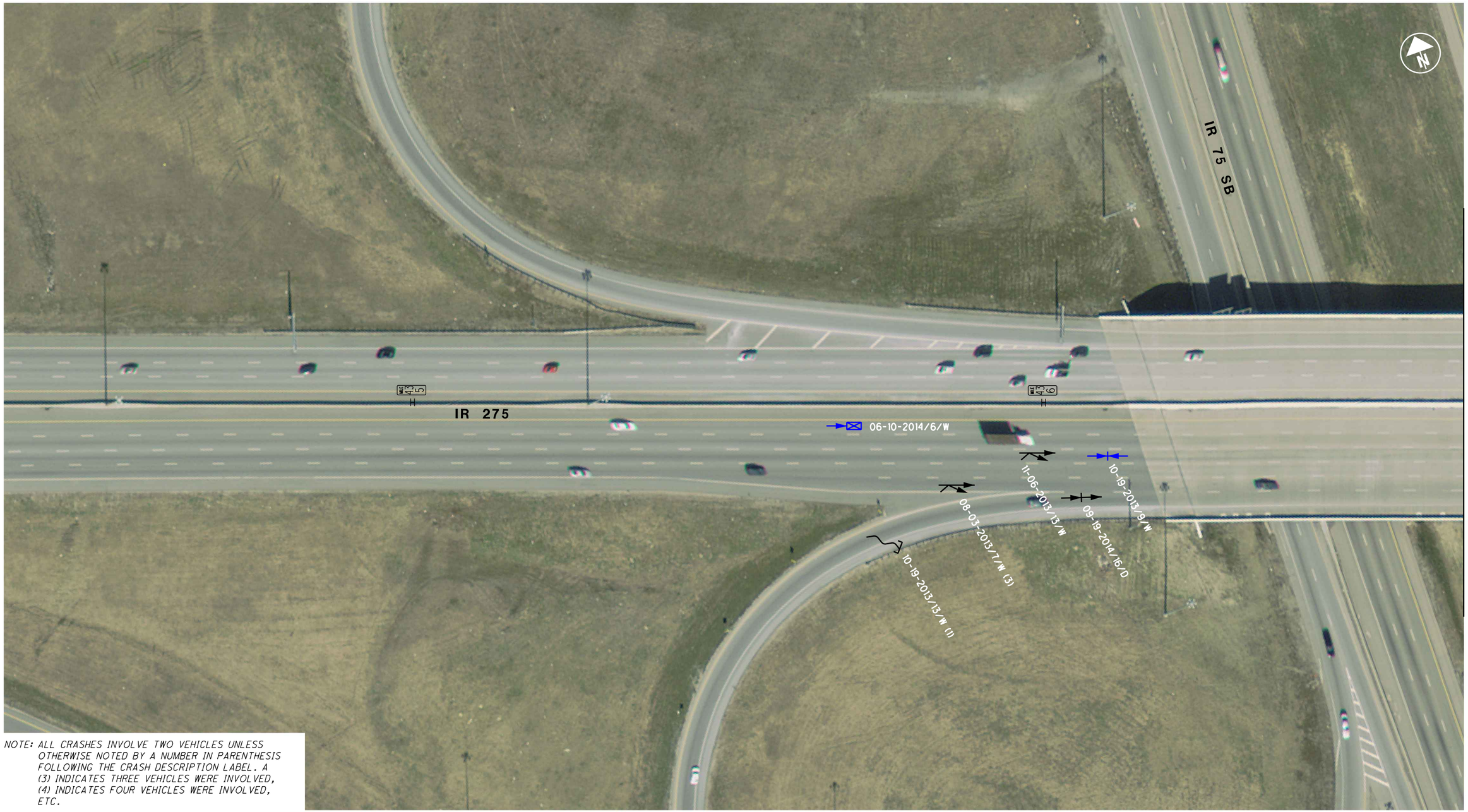
HAM-275-25.98 to 26.28; 01/01/2013 to 12/31/2015

SEVERITY	CRASH_SEVERITY	
TRAFFIC_CRASH_YEAR	Property Damage Crash	Injury Crash
2013	20	8
2014	18	11
2015	38	16
Grand Total	**76**	**35**

TRAFFIC_CRASH_YEAR	Fatalities	Incapacitating Injuries
2013	0	1
2014	0	0
2015	0	2
Grand Total	**0**	**3**

TRAFFIC_CRASH_YEAR	INJ_TYPE2_SERIOUS_VISIBLE	INJ_TYPE3_MINOR_VISIBLE	INJ_TYPE4_NO_VISIBLE
2013	1	3	12
2014	0	4	8
2015	2	10	8
Grand Total	**3**	**17**	**28**

APPENDIX B
Crash Diagram



NOTE: ALL CRASHES INVOLVE TWO VEHICLES UNLESS OTHERWISE NOTED BY A NUMBER IN PARENTHESIS FOLLOWING THE CRASH DESCRIPTION LABEL. A (3) INDICATES THREE VEHICLES WERE INVOLVED, (4) INDICATES FOUR VEHICLES WERE INVOLVED, ETC.

CRASH TYPES			
REAR END		ANGLE	
SIDE-SWIPE PASSING		FIXED OBJECT	
SIDE-SWIPE MEETING		PARKED CAR	
HEAD ON		OTHER	
LEFT TURN		AT FAULT DRIVER	

ROAD CONDITION	
X	NOT STATED
D	DRY
W	WET
S	SNOW
I	ICE
SEVERITY	
BLACK	PROPERTY DAMAGE ONLY
BLUE	INJURY
RED	FATAL

CRASH DESCRIPTION		
1	2	3
07-20-2015/23/D		

1 DATE MM-DD-YYYY
2 TIME OF DAY (HR 0-24)
3 ROAD CONDITION

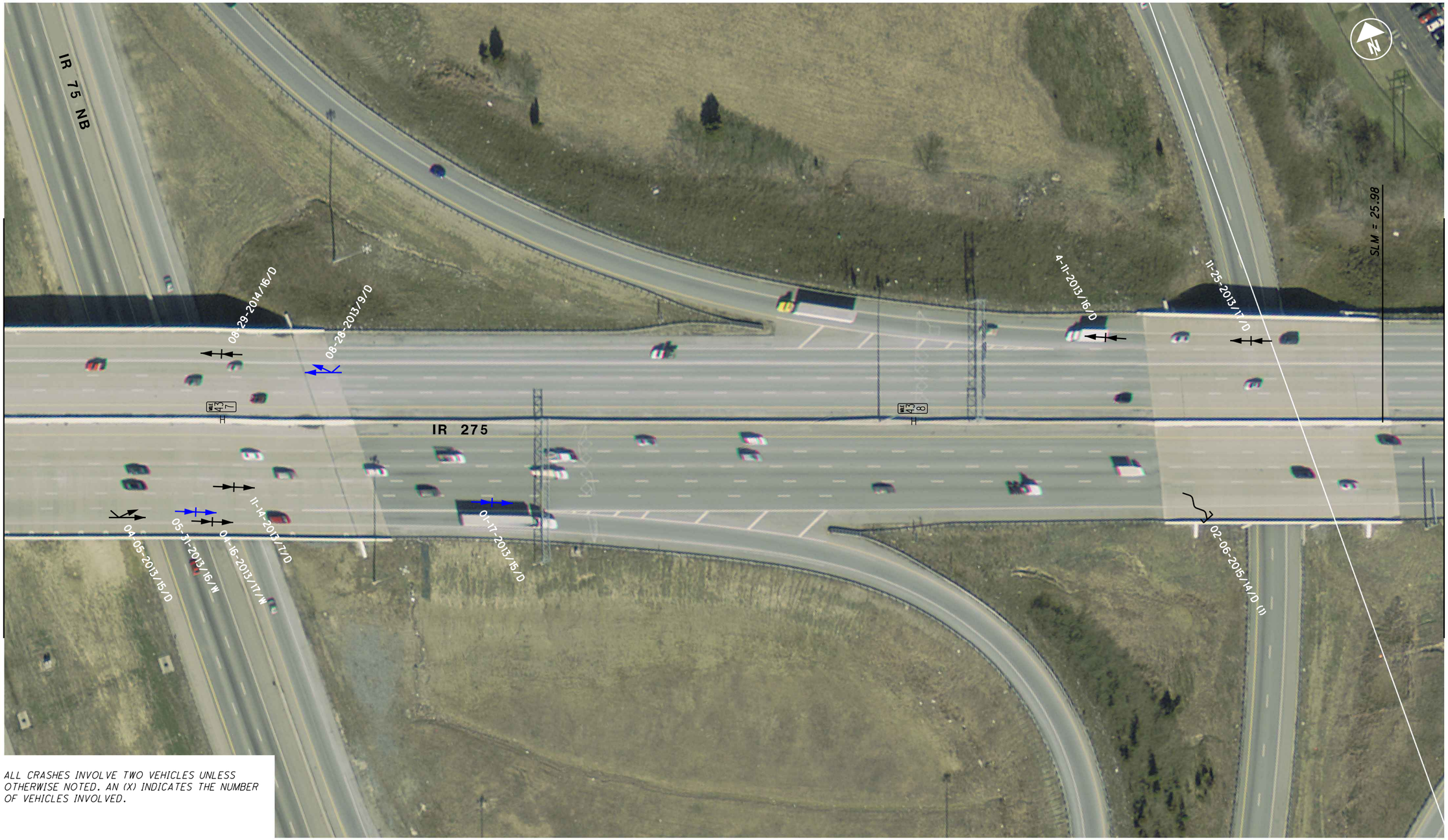
COLLISION DIAGRAM

INTERSECTION: IR 275 AT: IR 75

CITY: SHARONVILLE, OH (ODOT DISTRICT 8) ROUTE NUMBER: HAM-275-25.98 TO 26.28

Mead & Hunt
4700 LAKEHURST CT, STE 110
DUBLIN, OH 43016
(614) 792-5900 PHONE

DATE: 03/14/17



NOTE: ALL CRASHES INVOLVE TWO VEHICLES UNLESS OTHERWISE NOTED. AN (X) INDICATES THE NUMBER OF VEHICLES INVOLVED.

CRASH TYPES			
REAR END		ANGLE	
SIDE-SWIPE PASSING		FIXED OBJECT	
SIDE-SWIPE MEETING		PARKED CAR	
HEAD ON		OTHER	
LEFT TURN		AT FAULT DRIVER	

ROAD CONDITION	
X	NOT STATED
D	DRY
W	WET
S	SNOW
I	ICE
SEVERITY	
BLACK	PROPERTY DAMAGE ONLY
BLUE	INJURY
RED	FATAL

CRASH DESCRIPTION		
1	2	3
07-20-2015/23/D		

1 DATE MM-DD-YYYY
2 TIME OF DAY (HR 0-24)
3 ROAD CONDITION

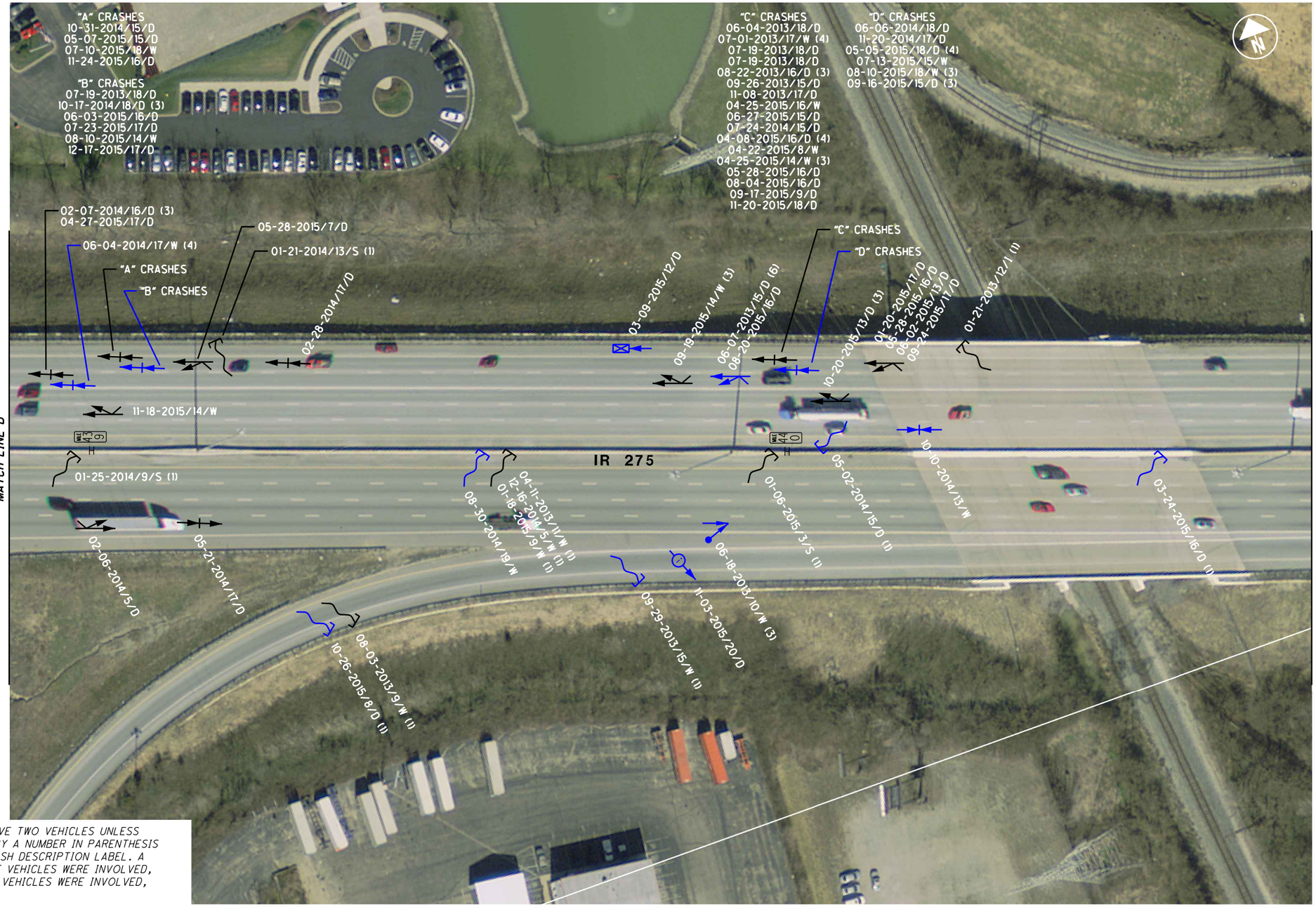
COLLISION DIAGRAM

INTERSECTION: IR 275 AT: IR 75

CITY: SHARONVILLE, OH (ODOT DISTRICT 8) ROUTE NUMBER: HAM-275-25.98 TO 26.28

Mead & Hunt
4700 LAKEHURST CT, STE 110
DUBLIN, OH 43016
(614) 792-5900 PHONE

DATE: 03/14/17



NOTE: ALL CRASHES INVOLVE TWO VEHICLES UNLESS OTHERWISE NOTED BY A NUMBER IN PARENTHESIS FOLLOWING THE CRASH DESCRIPTION LABEL. A (3) INDICATES THREE VEHICLES WERE INVOLVED, (4) INDICATES FOUR VEHICLES WERE INVOLVED, ETC.

CRASH TYPES			
REAR END		ANGLE	
SIDE-SWIPE PASSING		FIXED OBJECT	
SIDE-SWIPE MEETING		PARKED CAR	
HEAD ON		OTHER	
LEFT TURN		AT FAULT DRIVER	

ROAD CONDITION	
X	NOT STATED
D	DRY
W	WET
S	SNOW
I	ICE
SEVERITY	
BLACK	PROPERTY DAMAGE ONLY
BLUE	INJURY
RED	FATAL

CRASH DESCRIPTION

1	2	3
07-20-2015/23/D		

1 DATE MM-DD-YYYY
2 TIME OF DAY (HR 0-24)
3 ROAD CONDITION

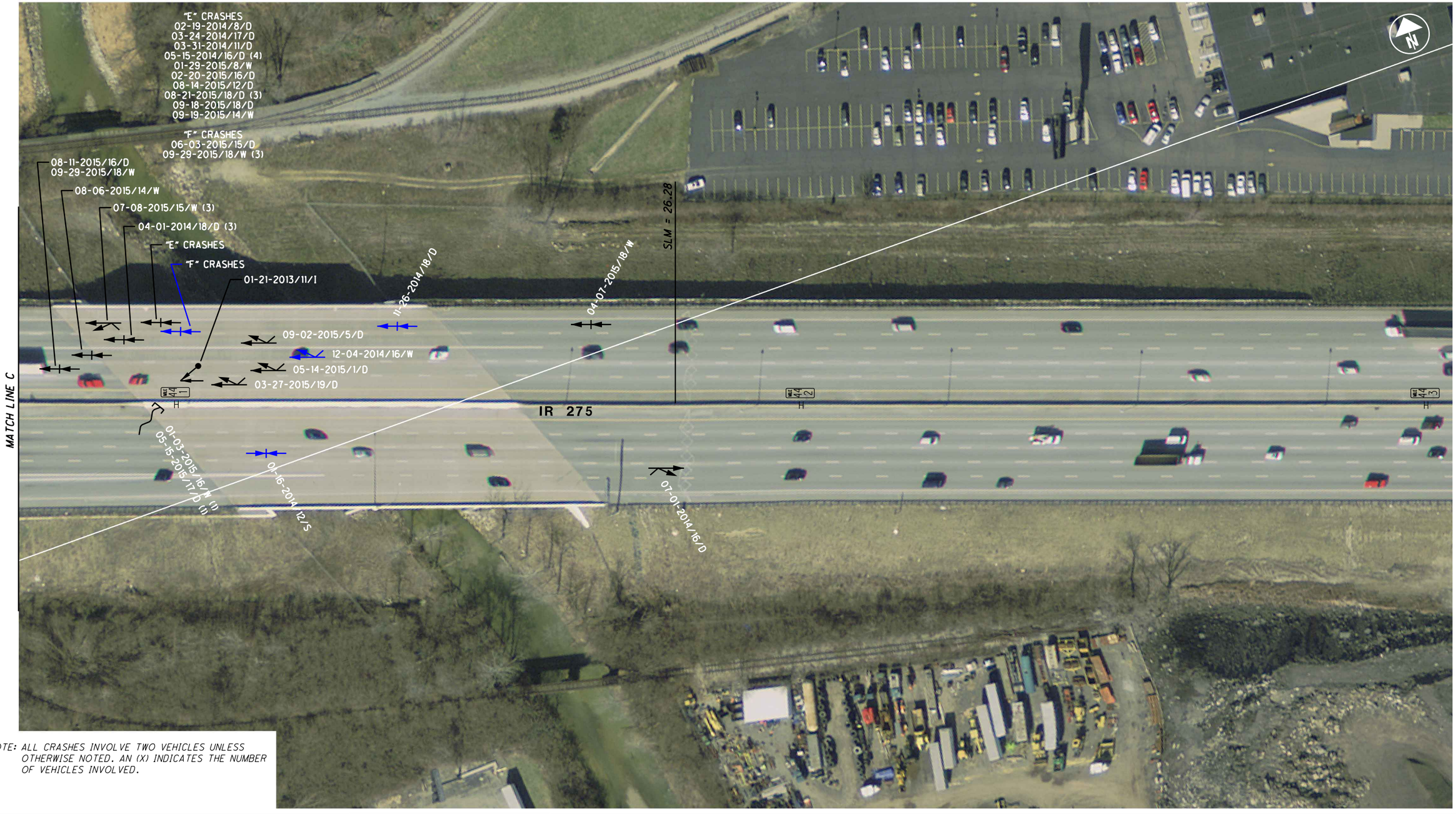
COLLISION DIAGRAM

INTERSECTION: IR 275 AT: IR 75

CITY: SHARONVILLE, OH (ODOT DISTRICT 8) ROUTE NUMBER: HAM-275-25.98 TO 26.28

Mead & Hunt
4700 LAKEHURST CT, STE 110
DUBLIN, OH 43016
(614) 792-5900 PHONE

DATE: 03/14/17



NOTE: ALL CRASHES INVOLVE TWO VEHICLES UNLESS OTHERWISE NOTED. AN (X) INDICATES THE NUMBER OF VEHICLES INVOLVED.

CRASH TYPES			
REAR END		ANGLE	
SIDE-SWIPE PASSING		FIXED OBJECT	
SIDE-SWIPE MEETING		PARKED CAR	
HEAD ON		OTHER	
LEFT TURN		AT FAULT DRIVER	

ROAD CONDITION	
X	NOT STATED
D	DRY
W	WET
S	SNOW
I	ICE

SEVERITY	
BLACK	PROPERTY DAMAGE ONLY
BLUE	INJURY
RED	FATAL

CRASH DESCRIPTION

1	2	3
07-20-2015/23/D		

1 DATE MM-DD-YYYY
2 TIME OF DAY (HR 0-24)
3 ROAD CONDITION

COLLISION DIAGRAM

INTERSECTION: IR 275 AT: IR 75

CITY: SHARONVILLE, OH (ODOT DISTRICT 8) ROUTE NUMBER: HAM-275-25.98 TO 26.28

Mead & Hunt
4700 LAKEHURST CT, STE 110
DUBLIN, OH 43016
(614) 792-5900 PHONE

DATE: 03/14/17

APPENDIX C
Crash Exclusion Log

HAM-275-25.98 TO 26.28
PID No. 104689
Safety Study Crash Exclusion/Correction Log

ACCIDENTS_POINTS_NBR	LOCAL_REPORT_NBR	DATE	REASON FOR EXCLUSION/CORRECTION
Questionable Exclusions			
Definate Exclusions			
20137066468	13-3476	12/02/13	WB vehicle struck debris (matress) in the roadway. Single vehicle involved.
20144029026	14-2463	08/06/14	WB vehicle struck by debris from a vehicle ahead of it.
20146015743	31-0074-31	02/06/14	EB vehicle struck debris (metal) in the roadway. Single vehicle involved.
20146065199	31-0207-31	06/17/14	WB vehicle struck by debris (metal panel) from a vehicle ahead of it.
20146122471	09-0651-31	11/10/14	WB vehicle struck by debris from a vehicle ahead of it.
20137008748	13-1158	05/03/13	WB vehicle hit by debris (boat seat cushion) from a vehicle ahead of it. Three vehicles involved. Injury crash.
20136667168	31-0215-31	09/04/13	Crash occurred on the exit ramp from Mosteller Rd to EB IR 275. Outside the study area.
20137006110	13-0783	03/26/13	Driver had an a medical emergency while traveling EB on IR 275. Driver was deceased when police arrived.
20156058317	31-0158-31	05/11/15	EB vehicle struck debris (wheelbarrow) in the roadway. Single vehicle involved.
20157064139	2015013474	09/22/15	Crash occurred in the WB IR 275 entrance ramp to Mosteller Rd. Outside the study area.
Correction Required			
20154021749	2015011135	08/10/15	Report states rear end crash, not sideswipe-passing.
20144004023	14-147	01/16/14	Report states head on crash, not sideswipe-passing.
20157066461	2015013832	09/29/15	Report states rear end crash, not sideswipe-passing.
20147060608	14-3556	10/10/14	Report states head on crash, not sideswipe-passing.
20147039748	14-2291	07/24/14	Report states rear end crash, not sideswipe-passing.
20147046021	14-1705	06/10/14	Report states rear end crash, not sideswipe-passing.
20134003191	13-165	01/21/13	Report states angle crash, not rear end.
20137001100	13-0138	01/17/13	Report states rear end crash, not sideswipe-passing.
20137064782	13-3301	11/14/13	Report states rear end crash, not sideswipe-passing.

APPENDIX D
Alternatives Analysis

HCS7 Basic Freeway Report

Project Information

Analyst	Mead & Hunt	Date	4/18/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Peak No Build
Project Description	Westbound Ramp I-275 to Northbound I-75 2034 PM Peak		

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	65.0	Total Ramp Density (TRD), ramps/mi	3.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	56.9
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3340	Heavy Vehicle Adjustment Factor (f_{HV})	0.999
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1778
Total Trucks, %	0.09	Capacity (c), pc/h/ln	2241
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2104
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	33.4
Total Ramp Density Adjustment	8.1	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.1		

HCS7 Basic Freeway Report

Project Information

Analyst	Mead & Hunt	Date	4/18/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Peak No Build
Project Description	Eastbound Ramp I-275 to Northbound I-75 2034 PM Peak		

Geometric Data

Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	65.0	Total Ramp Density (TRD), ramps/mi	3.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	56.9
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	2820	Heavy Vehicle Adjustment Factor (f_{HV})	0.999
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1502
Total Trucks, %	0.09	Capacity (c), pc/h/ln	2241
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2104
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.71
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	54.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.8
Total Ramp Density Adjustment	8.1	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.1		

HCS7 Basic Freeway Report

Project Information

Analyst	Mead & Hunt	Date	4/18/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Peak No Build
Project Description	04 Alt 1 - 2034 PM Peak No Build I-75 NB before merge		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	65.0	Total Ramp Density (TRD), ramps/mi	3.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	56.9
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	5610	Heavy Vehicle Adjustment Factor (f_{HV})	0.999
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1991
Total Trucks, %	0.09	Capacity (c), pc/h/ln	2241
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2104
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.95
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	49.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	40.0
Total Ramp Density Adjustment	8.1	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.1		

HCS7 Freeway Merge Report

Project Information

Analyst	Mead & Hunt	Date	4/17/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Build
Project Description	03 Alt 1 - 2034 PM Peak Build I 275 EB to I 75 NB merge		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	3	1
Free-Flow Speed (FFS), mi/h	65.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Volume (V_i), veh/h	5610	1410
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	0.09	0.10
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.999	0.999
Flow Rate (v_i), pc/h	5974	1502
Capacity (c), pc/h	6479	1878
Volume-to-Capacity Ratio (v/c)	1.15	0.80

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	-
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2413
Distance to Downstream Ramp (L_{DOWN}), ft	2800	On-Ramp Influence Area Speed (S_R), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.596	Outer Lanes Freeway Speed (S_O), mi/h	54.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3561	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	5063	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F		

HCS7 Basic Freeway Report

Project Information

Analyst	Mead & Hunt	Date	4/18/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Peak Build
Project Description	Alt 1 Mainline north of Eastbound I-275 ramp merge 2034 PM Peak		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	65.0	Total Ramp Density (TRD), ramps/mi	3.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	56.9
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7020	Heavy Vehicle Adjustment Factor (f_{HV})	0.999
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2492
Total Trucks, %	0.09	Capacity (c), pc/h/ln	2241
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2104
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.18
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	8.1	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.1		

HCS7 Basic Freeway Report

Project Information

Analyst	Mead & Hunt	Date	4/18/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Peak Build
Project Description	Alt 1a + 2 Mainline North of Eastbound I-275 Ramp and add lane 2034 PM Peak		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	65.0	Total Ramp Density (TRD), ramps/mi	3.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	56.9
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7020	Heavy Vehicle Adjustment Factor (f_{HV})	0.999
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1869
Total Trucks, %	0.09	Capacity (c), pc/h/ln	2241
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2104
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.89
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	52.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	35.8
Total Ramp Density Adjustment	8.1	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.1		

HCS7 Freeway Merge Report

Project Information

Analyst	Mead & Hunt	Date	4/17/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM No Build
Project Description	No Build Eastbound/Westbound I-275 ramp merge 2034 PM Peak		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	2	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Volume (V_i), veh/h	2820	1670
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	0.10	0.07
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.999	0.999
Flow Rate (v_i), pc/h	3003	1778
Capacity (c), pc/h	4226	1878
Volume-to-Capacity Ratio (v/c)	1.13	0.95

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	-
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	3003	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4781	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F		

HCS7 Freeway Merge Report

Project Information

Analyst	Mead & Hunt	Date	4/17/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Build
Project Description	Alt 1a Westbound I-275 ramp merge- mainline 4 lanes 2034 PM Peak		

Geometric Data

	Freeway	Ramp
Number of Lanes (N)	4	1
Free-Flow Speed (FFS), mi/h	55.0	35.0
Segment Length (L) / Acceleration Length (L_A), ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Volume (V_i), veh/h	7020	1670
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	0.09	0.07
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.999	0.999
Flow Rate (v_i), pc/h	7476	1778
Capacity (c), pc/h	8451	1878
Volume-to-Capacity Ratio (v/c)	1.10	0.95

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Density in Ramp Influence Area (D_R), pc/mi/ln	-
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	2243
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.000	Outer Lanes Freeway Speed (S_O), mi/h	45.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	2990	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4768	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F		

HCS7 Basic Freeway Report

Project Information

Analyst	Mead & Hunt	Date	4/18/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Peak No Build
Project Description	No Build, Alt 1 + 1a- Mainline I-75 North of on Ramps (4 lanes)		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	65.0	Total Ramp Density (TRD), ramps/mi	3.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	56.9
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8690	Heavy Vehicle Adjustment Factor (f_{HV})	0.999
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2314
Total Trucks, %	0.09	Capacity (c), pc/h/ln	2241
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2104
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.10
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	8.1	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.1		

HCS7 Basic Freeway Report

Project Information

Analyst	Mead & Hunt	Date	4/18/2017
Agency	District 8	Analysis Year	2034
Jurisdiction	ODOT	Time Period Analyzed	PM Peak Build
Project Description	Alt 2 Mainline I-75 north of on ramps (5 lanes)		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	65.0	Total Ramp Density (TRD), ramps/mi	3.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	56.9
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

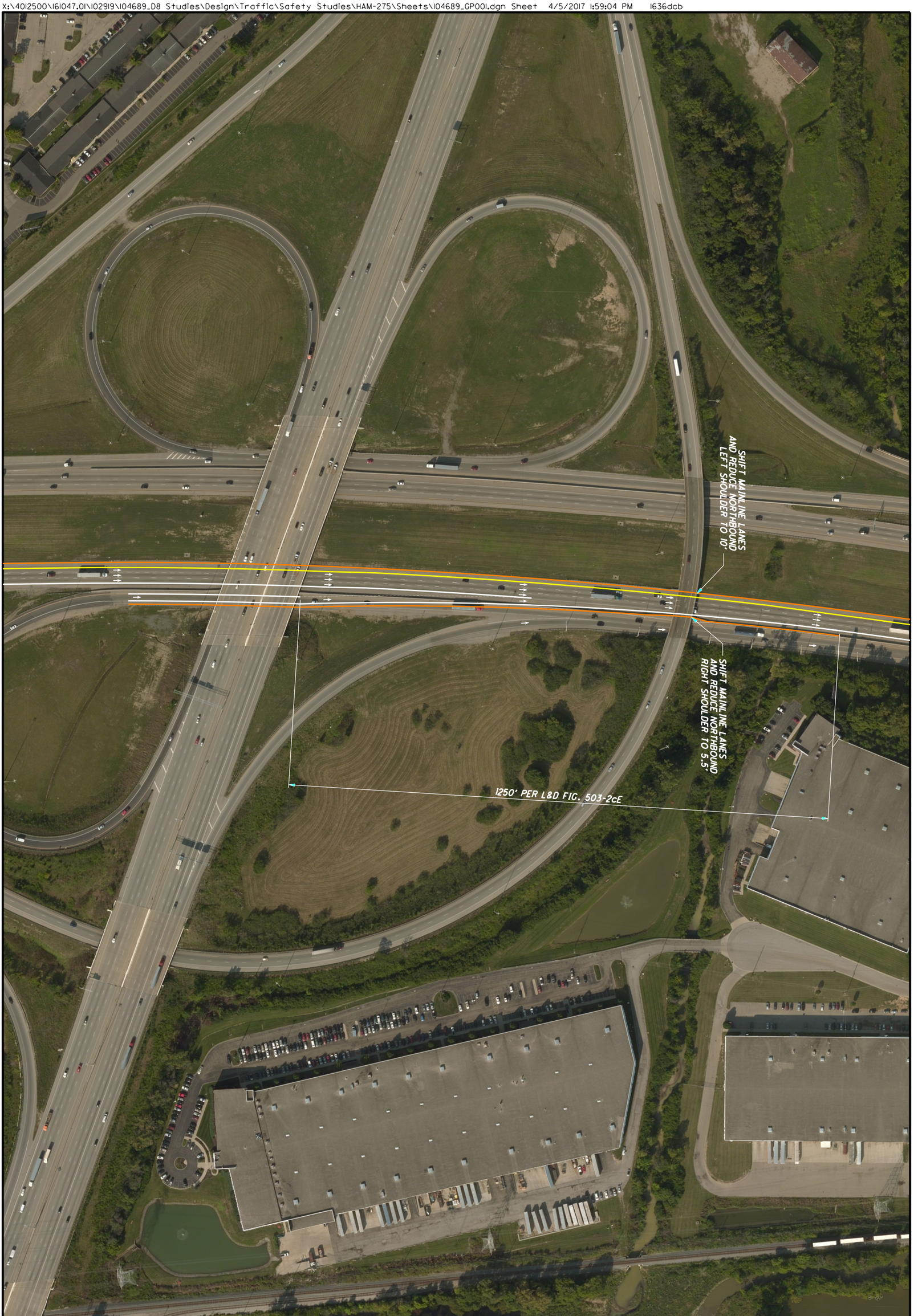
Volume (V), veh/h	8690	Heavy Vehicle Adjustment Factor (f_{HV})	0.999
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1851
Total Trucks, %	0.09	Capacity (c), pc/h/ln	2241
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2104
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	52.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	35.3
Total Ramp Density Adjustment	8.1	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.1		

APPENDIX E
Merge Alternative Diagram and Estimate

X:\40125001161047.01\102919\104689_D8 Studies\Design\Traffic\Safety Studies\HAM-275\Sheets\104689_GP001.dgn Sheet 4/5/2017 1:59:04 PM l636dcb



	HAM-275/75	PLAN MERGED LOOP INTO THREE LANES	CALCULATED DCB CHECKED MJH	0 50 25 100 HORIZONTAL SCALE IN FEET

Estimate HAM-275-25.98

Estimated Cost:$243,293.59

Contingency: 0.00%

Estimated Total: $243,293.59

Preliminary Estimate - Merged Loop Into Three Lanes Option

Base Date: 04/26/17

Spec Year: 16

Unit System: E

Work Type:

Highway Type:

Urban/Rural Type:

Season:

County:

Latitude of Midpoint: 0

Longitude of Midpoint: 0

District:

Federal/State Project Number: PID No. 104689

Prepared by Mead & Hunt/egd on 04/26/17

Line #	Item Number / Description / *Supplemental Description*	Quantity	Units	Unit Price	Extension
Group 0001: Initial Group					
0005	202E23000 PAVEMENT REMOVED	1,945.000	SY	$9.64279	$18,755.23
0006	202E30700 CONCRETE BARRIER REMOVED	875.000	FT	$12.58101	$11,008.38
0007	204E10000 SUBGRADE COMPACTION	1,945.000	SY	$1.67434	$3,256.59
0008	302E46000 ASPHALT CONCRETE BASE, PG64-22	675.000	CY	$121.01117	$81,682.54
0009	304E20000 AGGREGATE BASE	325.000	CY	$54.73412	$17,788.59
0010	407E10000 TACK COAT	110.000	GAL	$1.97426	$217.17
0011	408E10000 PRIME COAT	80.000	GAL	$4.11866	$329.49
0012	441E10000 ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (446), PG64-22	85.000	CY	$220.00000	$18,700.00
0013	441E10200 ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (446)	135.000	CY	$129.85421	$17,530.32
0014	605E05100 4" SHALLOW PIPE UNDERDRAINS	900.000	FT	$10.38824	$9,349.42
0015	644E00104 EDGE LINE, 6"	1.950	MILE	$3,241.26987	$6,320.48
0016	644E00204 LANE LINE, 6"	1.600	MILE	$1,378.35956	$2,205.38

Total for Group 0001:$187,143.59

Group 0002:

0020	990E30000 AGREED LUMP SUM 30% Contingency	1.000	LS	$56,150.00000	$56,150.00

Total for Group 0002:$56,150.00

APPENDIX F
Add Lane Alternative Diagram and Estimate

SHIFT MAINLINE LANES
AND REDUCE NORTHBOUND
LEFT SHOULDER TO 6'

SHIFT MAINLINE LANES
AND REDUCE NORTHBOUND
RIGHT SHOULDER TO 4'

650' PER L&D FIG. 503-2cE

HORIZONTAL
SCALE IN FEET
0 25 50 100

CALCULATED DCB
CHECKED MJH

PLAN
MERGED LOOP ADDED / 4 THRU LANES

HAM-275 / 75

4 — 1

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WIDEN MAINLINE LANES TOWARD THE MEDIAN

WB I-275 TO NB I-75 ENTRANCE RAMP BECOMES AUXILIARY LANE TO UNION CENTER BLVD

REDUCE INSIDE SHOULDER AND MAINLINE LANES (11.5' MIN.) TO FIT WITHIN EXISTING STRUCTURE

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED DCB
CHECKED MJH

PLAN
MERGED LOOP ADDED/4 THRU LANES

HAM-275/75

2 of 4

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3 / 4	HAM-275/75	PLAN MERGED LOOP ADDED/4 THRU LANES	CALCULATED DCB CHECKED MJH	0 50 25 100 HORIZONTAL SCALE IN FEET

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4 / 4	HAM-275/75	PLAN MERGED LOOP ADDED/4 THRU LANES	CALCULATED DCB CHECKED MJH	0 50 25 100 HORIZONTAL SCALE IN FEET

Estimate HAM-275-25.98

Estimated Cost:$1,723,969.89

Contingency: 0.00%

Estimated Total: $1,723,969.89

Preliminary Estimate - Merged Loop Added/ Four Thru Lanes Option

Base Date: 04/26/17

Spec Year: 16

Unit System: E

Work Type:

Highway Type:

Urban/Rural Type:

Season:

County:

Latitude of Midpoint: 0

Longitude of Midpoint: 0

District:

Federal/State Project Number: PID No. 104689

Prepared by Mead & Hunt/egd on 04/26/17

Line #	Item Number	Description / *Supplemental Description*	Quantity	Units	Unit Price	Extension
Group 0001: Initial Group						
0005	202E23000	PAVEMENT REMOVED	4,105.000	SY	$8.09873	$33,245.29
0006	202E30700	CONCRETE BARRIER REMOVED	875.000	FT	$12.58101	$11,008.38
0007	202E58100	CATCH BASIN REMOVED	10.000	EACH	$312.00547	$3,120.05
0008	204E10000	SUBGRADE COMPACTION	17,035.000	SY	$0.89921	$15,318.04
0009	302E46000	ASPHALT CONCRETE BASE, PG64-22	5,920.000	CY	$98.64250	$583,963.60
0010	304E20000	AGGREGATE BASE	2,840.000	CY	$47.16108	$133,937.47
0011	407E10000	TACK COAT	225.000	GAL	$1.97368	$444.08
0012	408E10000	PRIME COAT	165.000	GAL	$3.93694	$649.60
0013	441E10000	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (446), PG64-22	715.000	CY	$160.00000	$114,400.00
0014	441E10200	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (446)	1,185.000	CY	$129.85421	$153,877.24
0015	605E05100	4" SHALLOW PIPE UNDERDRAINS	20,300.000	FT	$10.00000	$203,000.00
0016	611E98230	CATCH BASIN, NO. 4	10.000	EACH	$3,713.22684	$37,132.27
0017	644E00104	EDGE LINE, 6"	7.340	MILE	$2,992.60185	$21,965.70
0018	644E00204	LANE LINE, 6"	10.170	MILE	$1,230.55678	$12,514.76
0019	644E01510	DOTTED LINE, 6"	1,210.000	FT	$1.28381	$1,553.41
					Total for Group 0001:	$1,326,129.89
Group 0002:						
0020	990E30000	AGREED LUMP SUM 30% Contingency	1.000	LS	$397,840.00000	$397,840.00
					Total for Group 0002:	$397,840.00

APPENDIX G
Certified Traffic 2014/2034

INTER-OFFICE COMMUNICATION

TO: **Jennifer F. Elston, Pavement Engineer, District 8**

FROM: Becky Salak, Transportation Planner, Office of Statewide Planning and Research

SUBJECT: **HAM-75-17.22, No PID**

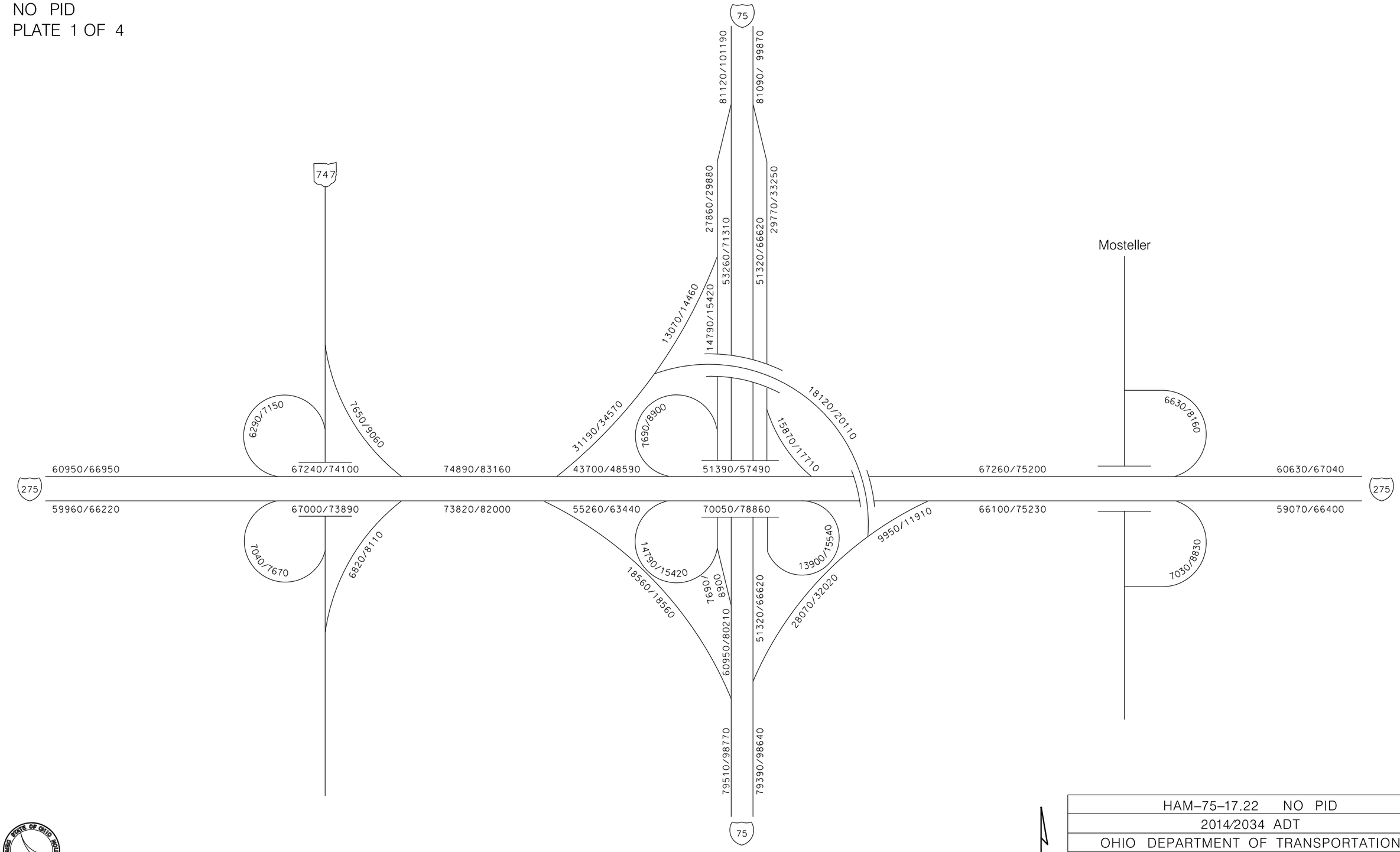
DATE: January 25, 2013

In reply to a request dated January 2, 2013, plates are attached showing 2014/2034 ADT, A.M. DHV, P.M. DHV and truck factors. K & D factors can be calculated from the plates as needed. The requested weaves for the loop ramps are not provided. Please refer to Leigh's response regarding these weaves from the original 2008 request (attached to this IOC).

If you have any questions, please contact me at (614) 644-8195.

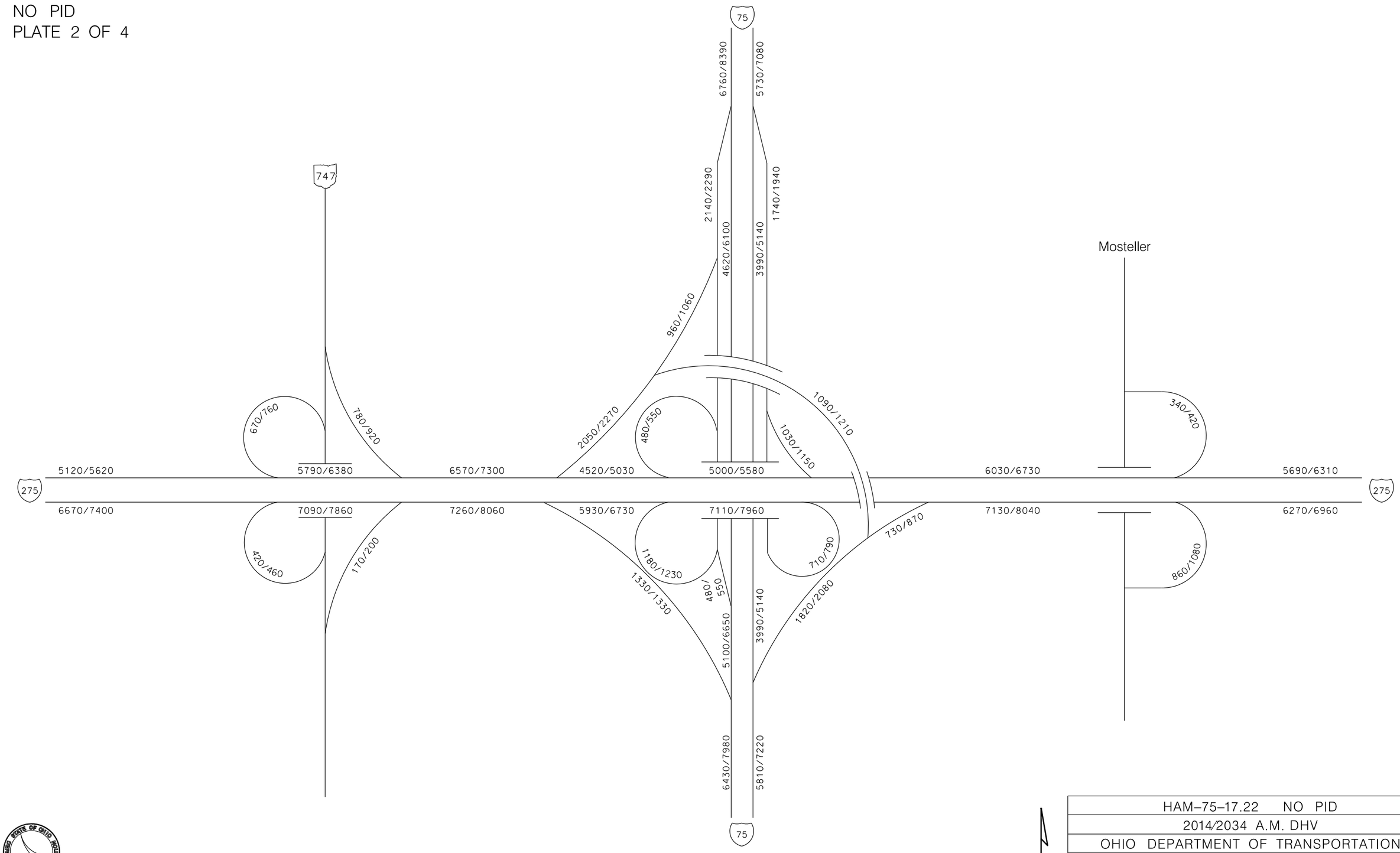
c: M. Byram, OSPR – G. Giaimo, OSPR – File

HAM–75–17.22
NO PID
PLATE 1 OF 4



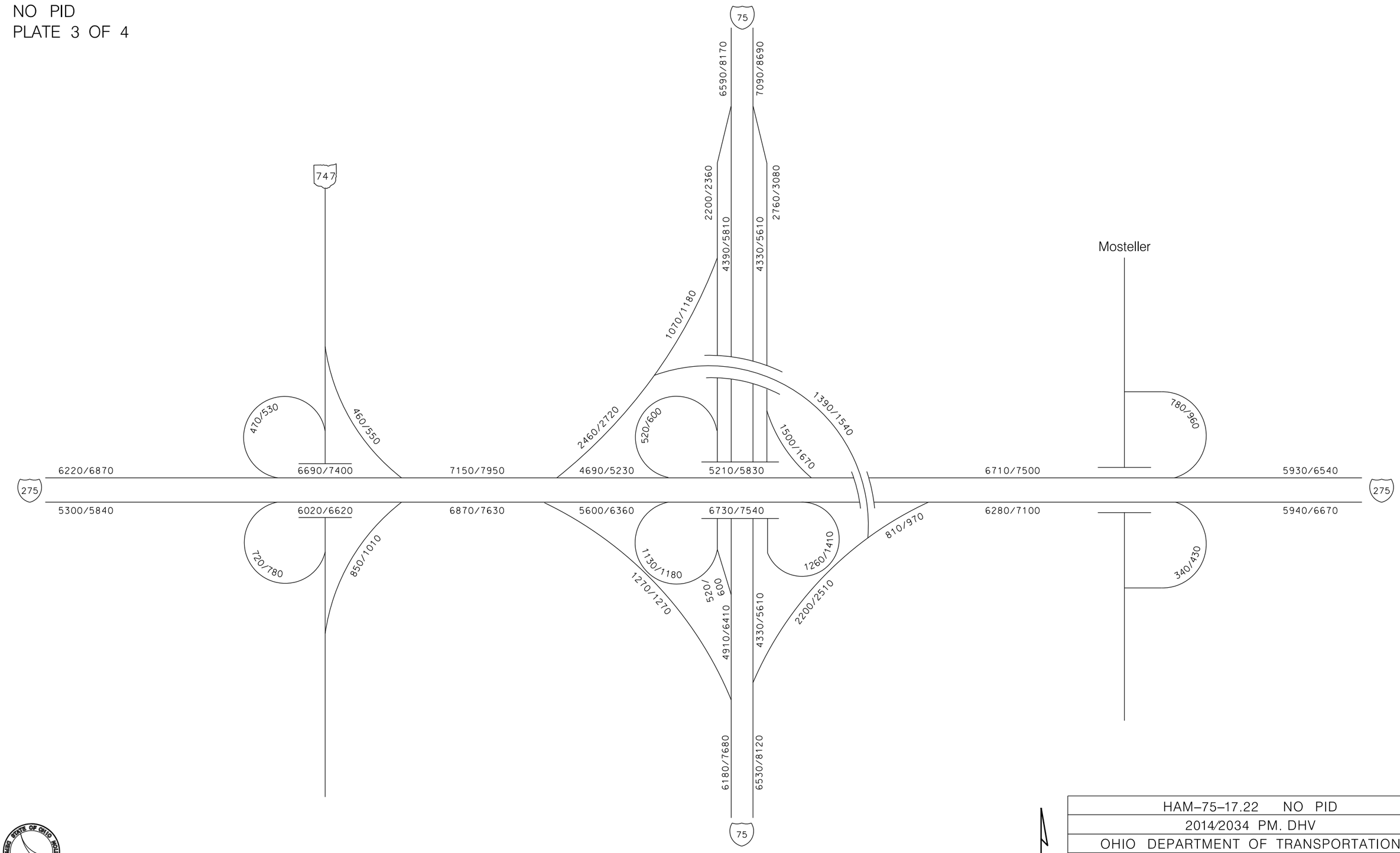
HAM–75–17.22 NO PID	
2014/2034 ADT	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
JANUARY 25, 2013	NOT TO SCALE

HAM–75–17.22
NO PID
PLATE 2 OF 4



HAM–75–17.22 NO PID	
2014/2034 A.M. DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
JANUARY 25, 2013	NOT TO SCALE

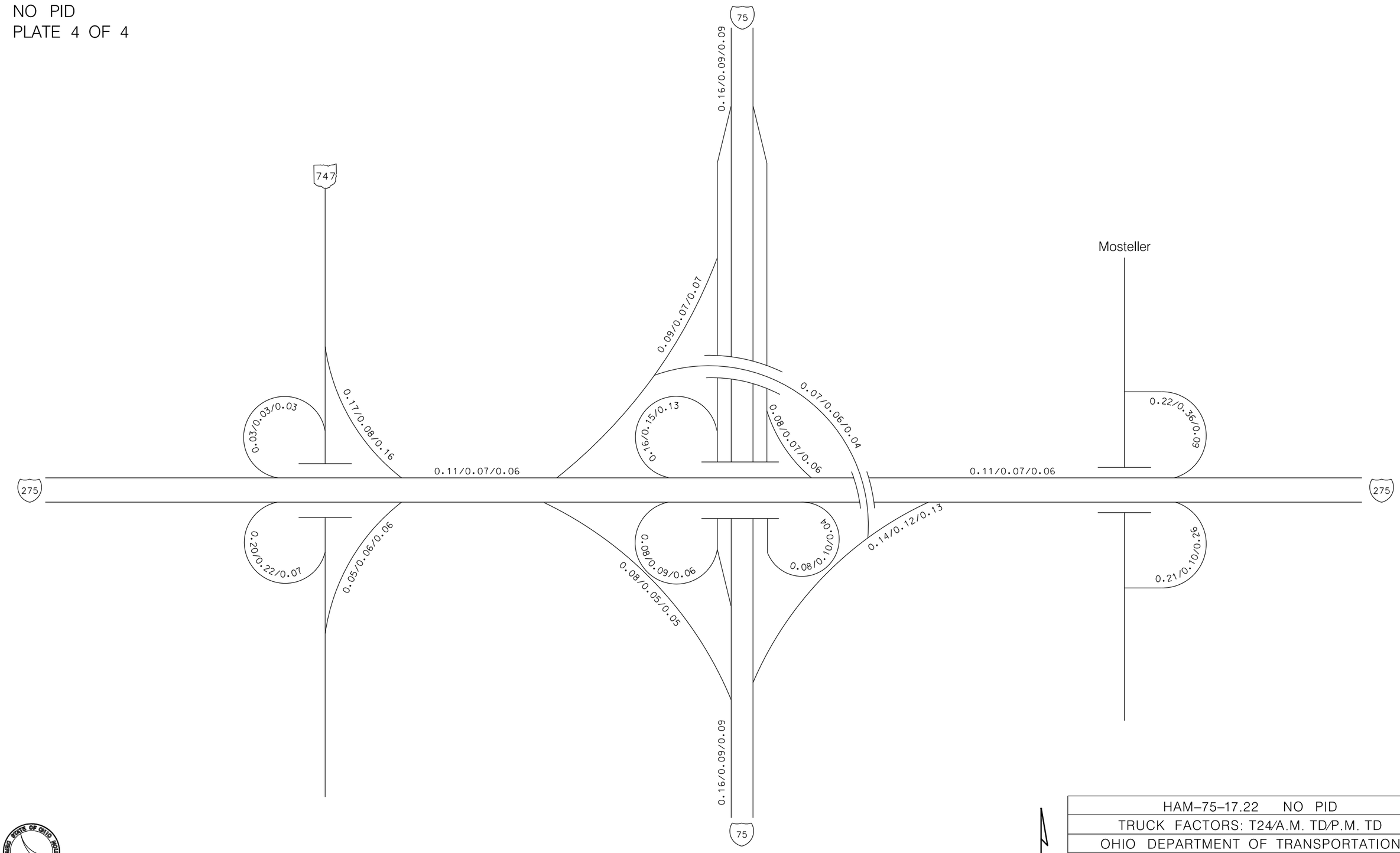
HAM–75–17.22
NO PID
PLATE 3 OF 4



HAM–75–17.22 NO PID	
2014/2034 PM. DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
JANUARY 25, 2013	NOT TO SCALE

N

HAM–75–17.22
NO PID
PLATE 4 OF 4



N

HAM–75–17.22 NO PID	
TRUCK FACTORS: T24/A.M. TD/P.M. TD	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
JANUARY 25, 2013	NOT TO SCALE

APPENDIX H
Crash Data 2016

HAM-275-25.98 to 26.28 for 2016

	Number
Total	**28**

CRASH_SEVERITY	Number	%
Injury Crash	**8**	28.6%
Property Damage Crash	**20**	71.4%
Grand Total	**28**	**100.0%**

TRAFFIC_CRASH_YEAR	Number	%
2016	**28**	100.0%
Grand Total	**28**	**100.0%**

DAY_OF_WEEK	Number	%
Friday	**11**	39.3%
Saturday	**5**	17.9%
Thursday	**4**	14.3%
Wednesday	**3**	10.7%
Sunday	**2**	7.1%
Tuesday	**2**	7.1%
Monday	**1**	3.6%
Grand Total	**28**	**100.0%**

HOUR_OF_DAY	Number	%
7	**2**	7.1%
8	**1**	3.6%
9	**1**	3.6%
12	**2**	7.1%
13	**2**	7.1%
14	**1**	3.6%
15	**7**	25.0%
16	**9**	32.1%
18	**2**	7.1%
20	**1**	3.6%
Grand Total	**28**	**100.0%**

TYPE_OF_CRASH	Number	%
Rear End	**18**	64.3%
Fixed Object	**4**	14.3%
Sideswipe - Passing	**3**	10.7%
Other Object	**2**	7.1%
Other Non-Collision	**1**	3.6%
Grand Total	**28**	**100.0%**

HAM-275-25.98 to 26.28 for 2016

WEATHER_CONDITION	Number	%
Clear	**14**	50.0%
Rain	**7**	25.0%
Cloudy	**7**	25.0%
Grand Total	**28**	**100.0%**

ROAD_CONDITION	Number	%
Road - Dry	**19**	67.9%
Road - Wet	**9**	32.1%
Grand Total	**28**	**100.0%**

LIGHT_CONDITION	Number	%
Daylight	**25**	89.3%
Dark - Lighted	**2**	7.1%
Dawn	**1**	3.6%
Grand Total	**28**	**100.0%**

NUMBER_OF_VEHICLES	Number	%
(blank)	**28**	100.0%
Grand Total	**28**	**100.0%**

LOCATION	Number	%
Not An Intersection	**24**	85.7%
Off Ramp	**3**	10.7%
On Ramp	**1**	3.6%
Grand Total	**28**	**100.0%**

CRASH_MONTH_NBR	Number	%
1	**2**	7.1%
2	**4**	14.3%
3	**1**	3.6%
4	**2**	7.1%
6	**1**	3.6%
7	**3**	10.7%
8	**9**	32.1%
9	**3**	10.7%
10	**1**	3.6%
11	**1**	3.6%
12	**1**	3.6%
Grand Total	**28**	**100.0%**

ROAD_CONTOUR	Number	%
Straight - Level	**26**	92.9%
Curve - Grade	**1**	3.6%
Straight - Grade	**1**	3.6%
Grand Total	**28**	**100.0%**

SPECIAL_AREA	Number	%
Unknown or Not in Work Zone	**28**	100.0%
Grand Total	**28**	**100.0%**

ANIMAL_TYPE	Number	%
Animal Not Stated	**28**	100.0%
Grand Total	**28**	**100.0%**

HAM-275-25.98 to 26.28 for 2016

ACTION1	Number	%
Straight Ahead	**23**	82.1%
Changing Lanes	**3**	10.7%
Negotiating A Curve	**1**	3.6%
Slowing Or Stopped In Traffic	**1**	3.6%
Grand Total	**28**	**100.0%**

CONTRIBUTING_FACTOR1	Number	%
Followed Too Closely/ACDA	**16**	57.1%
Failure To Control	**4**	14.3%
Improper Lane Change/Passing/Offroad	**2**	7.1%
None	**2**	7.1%
Unknown	**1**	3.6%
Load Shifting/Falling/Spilling	**1**	3.6%
Swerving To Avoid	**1**	3.6%
Unsafe Speed	**1**	3.6%
Grand Total	**28**	**100.0%**

	Number	%
Total	**28**	**100.0%**

TRAFFIC_CONTROL1	Number	%
Pavement Markings	**28**	100.0%
Grand Total	**28**	**100.0%**

DRIVER_ALCOHOL1	Number	%
None	**28**	100.0%
Grand Total	**28**	**100.0%**

DRIVER_DRUGS1	Number	%
(blank)	**28**	100.0%
Grand Total	**28**	**100.0%**

HAM-275-25.98 to 26.28 for 2016

DIRECTION_FROM1	Number	%
East	**22**	78.6%
West	**5**	17.9%
South	**1**	3.6%
Grand Total	**28**	**100.0%**

DIRECTION_TO1	Number	%
West	**22**	78.6%
East	**6**	21.4%
Grand Total	**28**	**100.0%**

POSTED_SPEED1	Number	%
Posted Speed 61-65	**27**	96.4%
Posted Speed 31-35	**1**	3.6%
Grand Total	**28**	**100.0%**

ESTIMATED_SPEED1	Number	%
Unit Speed 26-30	**5**	17.9%
Unit Speed 46-50	**3**	10.7%
Unit Speed 51-55	**3**	10.7%
Unit Speed 61-65	**3**	10.7%
Unit Speed 20 and Under	**3**	10.7%
Unit Speed Over 65	**3**	10.7%
Unit Speed 31-35	**3**	10.7%
Unit Speed 36-40	**2**	7.1%
Unit Speed 41-45	**1**	3.6%
Unit Speed Not Stated	**1**	3.6%
Unit Speed 21-25	**1**	3.6%
Grand Total	**28**	**100.0%**

VEHICLE_TYPE1	Number	%
Mid Size	**10**	35.7%
Compact	**6**	21.4%
Pickup	**4**	14.3%
Van	**2**	7.1%
Sport Utility Vehicle	**2**	7.1%
Full Size	**2**	7.1%
Minivan	**1**	3.6%
Tractor/Semi-Trailer	**1**	3.6%
Grand Total	**28**	**100.0%**

VEHICLE_TYPE2	Number	%
Sport Utility Vehicle	**10**	35.7%
	6	21.4%
Van	**3**	10.7%
Pickup	**3**	10.7%
Compact	**2**	7.1%
Mid Size	**2**	7.1%
Full Size	**2**	7.1%
Grand Total	**28**	**100.0%**

HAM-275-25.98 to 26.28 for 2016

ACTION2	Number	%
Slowing Or Stopped In Traffic	**18**	64.3%
	6	21.4%
Straight Ahead	**4**	14.3%
Grand Total	**28**	**100.0%**

CONTRIBUTING_FACTOR2	Number	%
None	**21**	75.0%
	6	21.4%
Unknown	**1**	3.6%
Grand Total	**28**	**100.0%**

DIRECTION_FROM2	Number	%
East	**20**	71.4%
	6	21.4%
West	**2**	7.1%
Grand Total	**28**	**100.0%**

DIRECTION_TO2	Number	%
West	**20**	71.4%
	6	21.4%
East	**2**	7.1%
Grand Total	**28**	**100.0%**

DRIVER_ALCOHOL2	Number	%
None	**22**	78.6%
	6	21.4%
Grand Total	**28**	**100.0%**

DRIVER_DRUGS2	Number	%
(blank)	**28**	100.0%
Grand Total	**28**	**100.0%**

HAM-275-25.98 to 26.28 for 2016

SEVERITY	CRASH_SEVERITY	
TRAFFIC_CRASH_YEAR	Property Damage Crash	Injury Crash
2016	20	8
Grand Total	**20**	**8**

TRAFFIC_CRASH_YEAR	Fatalities	Incapacitating Injuries
2016	0	3
Grand Total	**0**	**3**

TRAFFIC_CRASH_YEAR	INJ_TYPE2_SERIOUS_VISIBLE	INJ_TYPE3_MINOR_VISIBLE	INJ_TYPE4_NO_VISIBLE
2016	3	4	6
Grand Total	**3**	**4**	**6**