

Appendix I

Road Safety Audits

Missouri Department of Transportation

Road Safety Audit: Mo 68/CRD 1050

Road Safety Audit (RSA) Details

Date: June 29, 2017

RSA Team:

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Ray Brown, Intercounty Electric

Doug Lane, Intercounty Electric

On June 29, 2017, the RSA team met at the Meramec Regional Planning Commission to review the intersection of Mo 68 and County Road 1050, in Phelps County. The group discussed the intersection's crash history and traffic data (see appendix A), before heading out to the intersection for field observations. Team members Larry Stratman and John Doe were unable to attend the field check. During the observation, the team noted improvements such as striping, speed limit adjustment, and tree trimming that could be done to enhance the intersection safety.

Roadway Description

The RSA was completed at the intersection of Mo 68 and CRD 1050, in Phelps County (see figure 1). The intersection is located about 1000' north of the St. James City Limits. Mo 68 is a two lane roadway with 11 foot lanes and 6' earthen shoulders. Mo 68 is considered a minor arterial with a speed limit of 55 mph and a total AADT of 7,800. See figure 2 for intersection turning volumes.

CRD 1050 intersects Mo 68 at a slight skew across from the Intercounty Electric Cooperative facility. CRD 1050 is a chip seal route that connects Route EE to Mo 68. The entrance to Intercounty Electric is gravel. The stopping sight distance at the intersection for the EB MO 68 is 1,133' and WB Mo 68 is 1,021'. Both directions have more than double the minimum 495' required for a 55 mph roadway. The intersection sight distance for the EB direction is 1,153' and the WB direction is 1,080'; both exceed the minimum 610' (see figure 3).

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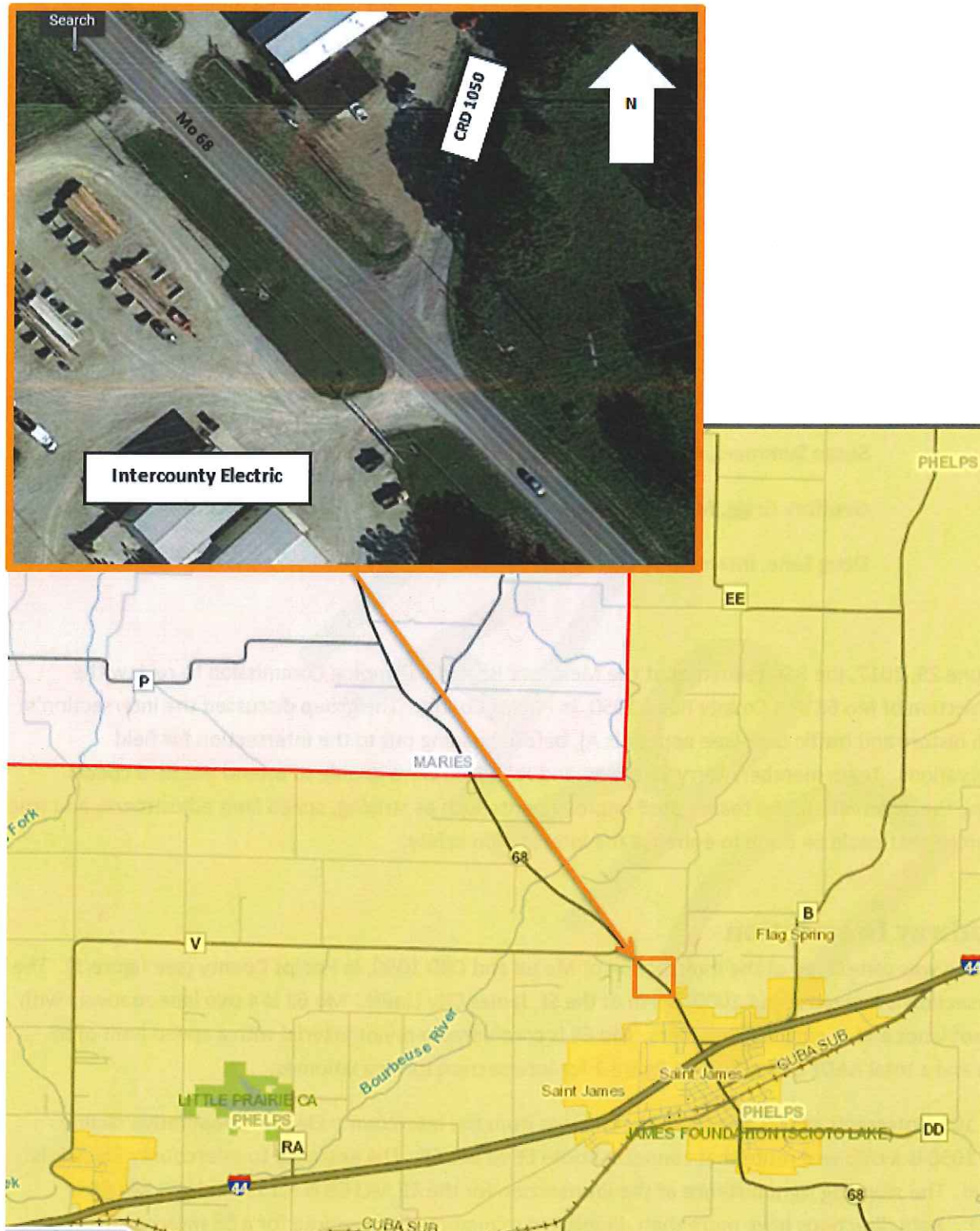


Figure 1: Location Map

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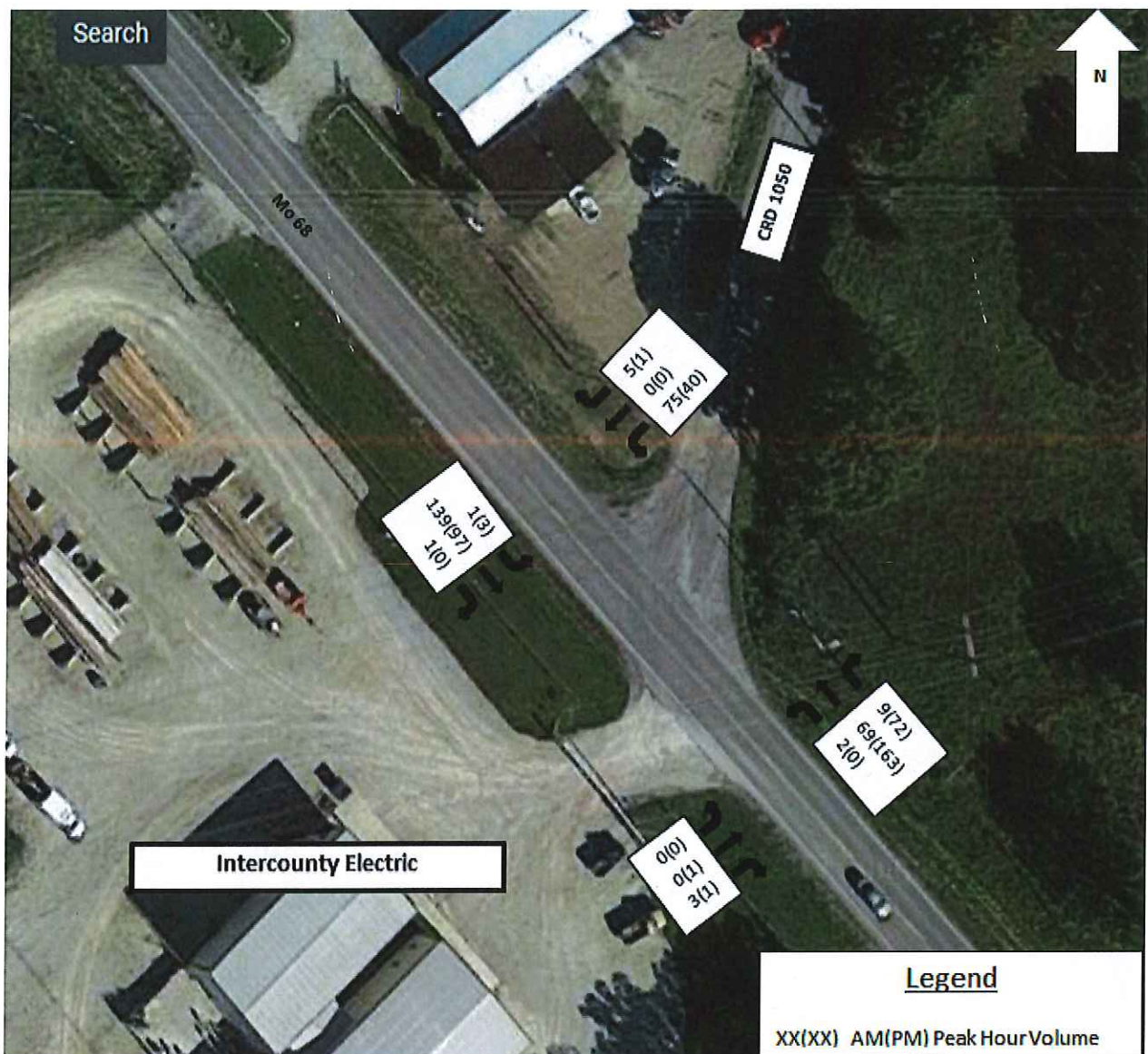


Figure 2: Peak Hour Turning Movements

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Figure 3: Sight distance from CRD 1050

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Crash History

From 2012 to 2016 there were 7 crashes at this intersection; they were 1 fatal, 1 disabling injury, 1 minor injury and 4 property damage only crashes. All of the crashes occurred during the day on dry pavement. The fatal crash involved a westbound left vehicle failing to yield to an eastbound motorcycle. The disabling injury involved two eastbound vehicles, vehicle one was attempting to turn left onto CRD 1050 and was struck by vehicle 2 trying to pass. The crashes were equally spread among 3 crash types: Left Turn, Left Turn Right Angle, and Out of Control. See figure 4 for the intersection crash diagram. See Appendix A for detailed crash information.

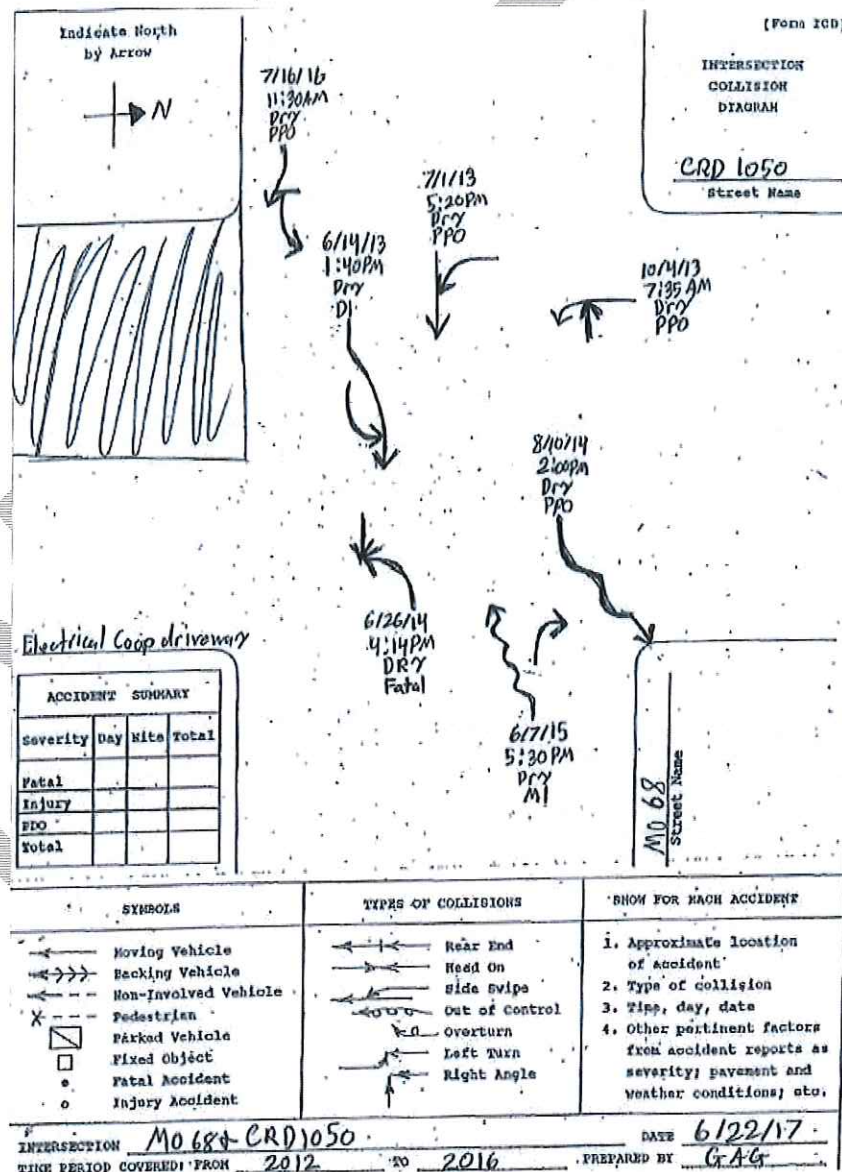
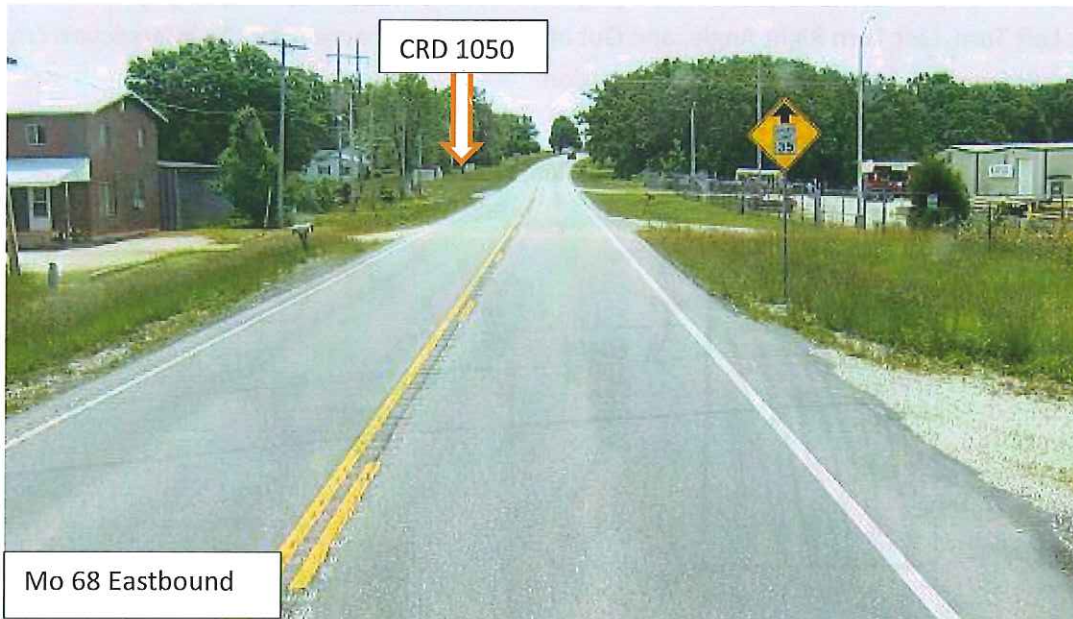


Figure 4: Crash Diagram

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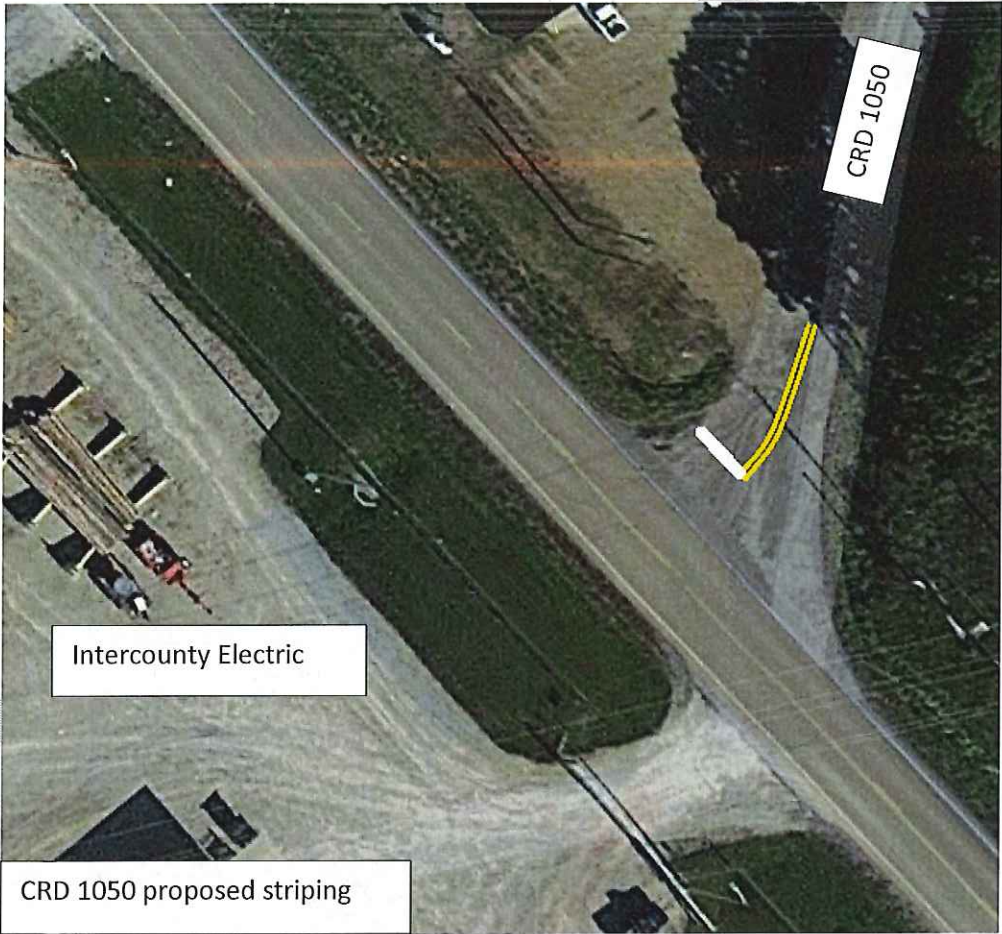
Key RSA Finding and Suggestions

- 1) *Passing Zone* -This section of 68 is striped for passing which can cause a conflict, if a vehicle attempts to pass a vehicle that has slowed to turn left or if a vehicle pulling out of the side road does not look both directions, before turning right. The team suggested striping this section of 68 as a no passing zone.



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2) *County Road Approach* – CRD 1050 intersects Mo 68 at a slight skew with an uphill grade. The skew is slight enough that the team observed most drivers still pulling up to the intersection at a right angle. A few drivers did follow the skew which made it difficult for them to look to their right before pulling out to go left. The team recommended striping the county road approach to encourage drivers to pull in at a right angle to avoid having to look over their shoulder to look right. A long term solution may be to realign the county road to the west. This would allow the road to come in perpendicular to Mo 68 and the approach could be made level.



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CRD 1050 approach at Mo 68



CRD 1050 proposed realignment

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3) *Speed Limit* – Currently, the speed limit on Mo 68 is set at 55 mph. A speed study was completed at this location. The study found that 85 percent of the traffic was traveling 57mph or less. The most commonly occurring speed was 50 mph. Speeds as high as 63 mph were recorded. As the RSA team drove the corridor, they felt that changing the speed limit on Mo 68 from Route V to Matlock drive to 45 mph was more appropriate, since the road becomes more urbanized east of Route V. Lowering to speed limit will take the cooperation of law enforcement to encourage compliance. Studies have shown that lowering the speed limit has little effect on driver speed without enforcement; without enforcement a lower speed limit can have a negative effect on safety due to the increased speed differential between those who follow the speed limit and those that don't.



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- 4) *Trim Limbs*- As the team observed traffic from the Intercounty Electric entrance; they noticed that low hanging limbs could potential be blocking the sight distance for larger vehicles. The team suggested trimming the trees.



Looking East/South



Looking West/North

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- 5) *Replace Stop Sign* – The STOP sign on CRD 1050 was a bit out of plumb and had limited retro-reflectivity. The team recommended plumbing up the post and placing a new STOP sign.



CRD 1050 STOP sign

Conclusions

Several of the suggestions noted by the RSA team were low cost improvements that can be addressed by MoDOT maintenance forces. MoDOT plans to take immediate action on the striping, trimming and STOP sign recommendations. These improvements should be completed by the end of 2017.

Local official and MoDOT will need to further investigate lowering the speed limit before making any changes. Lowering to speed limit will take the cooperation of law enforcement to encourage compliance. Studies have shown that lowering the speed limit has little effect on driver speed without enforcement; without enforcement a lower speed limit can have a negative effect on safety due to the increased speed differential between those who follow the speed limit and those that don't.

The higher cost solution of relocating the county road can be re-evaluated after the low cost solutions have been in place for a few years. Relocating the county road would require additional right of way and would impact the Phelps County maintenance facility. Since the need for relocating the approach may be eliminated by implemented the other suggestions, it is recommended that this be re-evaluated in a few years.

APPENDIX A

MO 68 @ CRD 1050 Traffic Data

Crashes:

- From 2012 to 2016 there were 1 Fatal, 1 Disabling, 1 Minor and 4 Property Damage Only crashes at the intersection
- The fatal crash in the area was not at the intersection of 68 and 1050. It involved a WB veh turning left in front of an EB veh.
- All during the day.
- All had dry pavement.
- Six clear weather conditions and one cloudy weather condition.
- Detailed crash data and crash diagram are attached.

Speed:

- 85th percentile; EB 58 mph, WB 55 mph, combined 57 mph.
- Speed limit is 55 mph.
- The most occurring speed was 50 mph.
- Highest speed taken EB 63 mph, WB 62 mph.

Stopping Sight distance:

- EB 1133 ft. on MO 68
- WB 1021 ft. on MO 68.
- For speeds of 55mph the minimum required stopping sight distance is 495 ft.
- For speeds of 65 mph the minimum required stopping sight distance is 645 ft.

OFFSET	TRAVEL WAY ID	DESIGNATION	TRAVEL WAY NAME	DIRECTION	BEGIN LOG	END LOG	BEGIN DISTRICT	END DISTRICT	BEGIN COUNTY	END COUNTY	COUNTY BEGIN LOG	COUNTY END LOG
	7834	MO	68	E.	11.327	11.327	4	4	PHELPS	PHELPS	2.937	2.937

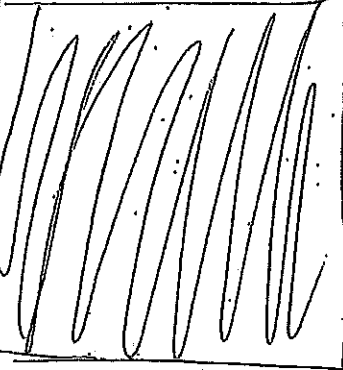
TYPE	2012	2013	2014	2015	2016	TOTAL
FATAL	0	0	1	0	0	1
DISABLING INJURY	0	1	0	0	0	1
MINOR INJURY	0	0	0	1	0	1
PROPERTY DAMAGE ONLY	0	2	1	0	1	4
TOTAL	0	3	2	1	1	7
AADT	7798	7782	7938	8033	8290	

TYPE	2012	2013	2014	2015	2016	Rate Level
CRASH RATE	0	1.06	0.69	0.34	0.33	
STATE RATE	0	0	0	0	0	

TYPE	2012	2013	2014	2015	2016	TOTAL
ANIMAL DRAWN VEH OR RIDDEN ANIMAL	0	0	0	0	0	0
ANIMAL NOT DEER/DOG/FARM ANIMAL	0	0	0	0	0	0
ANIMAL OTHER THAN DEER	0	0	0	0	0	0
AVOIDING	0	0	0	0	0	0
BACKING	0	0	0	0	0	0
CHANGING LANE	0	0	0	0	0	0
CROSS MEDIAN	0	0	0	0	0	0
DEER	0	0	0	0	0	0
DOG	0	0	0	0	0	0
DUAL LEFTS COLLIDE	0	0	0	0	0	0
DUAL RIGHTS COLLIDE	0	0	0	0	0	0
FARM ANIMAL	0	0	0	0	0	0
FIXED OBJECT	0	0	0	0	0	0
HEAD ON	0	0	0	0	0	0
JACKKNIFE	0	0	0	0	0	0
LEFT TURN	0	0	1	0	1	2
LEFT TURN RIGHT ANGLE COLLISION	0	2	0	0	0	2
OTHER	0	0	0	0	0	0
OUT OF CONTROL	0	0	1	1	0	2
PARKING OR PARKED CAR	0	0	0	0	0	0
PASSING	0	0	0	0	0	0
PEDALCYCLE	0	0	0	0	0	0
PEDESTRIAN	0	0	0	0	0	0
REAR END	0	1	0	0	0	1
RIGHT ANGLE	0	0	0	0	0	0
RIGHT TURN	0	0	0	0	0	0
RIGHT TURN RIGHT ANGLE COLLISION	0	0	0	0	0	0
SIDESWIPE	0	0	0	0	0	0
TOWED UNIT DISCONNECTS	0	0	0	0	0	0
U - TURN	0	0	0	0	0	0
WRONG WAY ON DIVIDED HIGHWAY	0	0	0	0	0	0
TOTAL	0	3	2	1	1	0

County	Travelway	Log	Crash Class	Date	Severity Rating	Image #	Intersection #	Light Cond	Road Surf Cond	Weather Cond	Travelway Id	Day of Week	Time	OBJECT_ID	Notes
PHELPS	MO 68 E	11.327	LEFT TURN	6/26/2014	FATAL	3140016526	399070	DAYLIGHT	DRY	CLEAR	7834	THU	1614	157602366	V1 WB 68 (utility truck), V2 EB 68 (motorcycle). V1 put on his blinker and did not observe V2 and turned in front of V2. V2 hit the side of V1. Passenger of V2 was pronounced dead at scene, driver of V2 taken to PCRMC with Disabling injury.
PHELPS	MO 68 E	11.327	LEFT TURN	7/16/2016	PROPERTY DAMAGE ONLY	3160018861	399070	DAYLIGHT	DRY	CLEAR	7834	SAT	1130	157936873	V1 and V2 EB 68. V1 stopped at CRD 1050 waiting for traffic to clear so they could turn left onto 1050. V2 struck V1 in rear and swerved to the right and came to rest.
PHELPS	MO 68 E	11.327	LEFT TURN RIGHT ANGLE COLLISION	7/1/2013	PROPERTY DAMAGE ONLY	3130014677	399070	DAYLIGHT	DRY	CLEAR	7834	MON	1720	157455500	V1 on 1050, V2 EB 68. V1 made a left turn onto 68 failing to yield to V2 and struck the towed unit.
PHELPS	MO 68 E	11.327	LEFT TURN RIGHT ANGLE COLLISION	10/4/2013	PROPERTY DAMAGE ONLY	3130023377	399070	DAYLIGHT	DRY	CLOUDY	7834	FRI	735	157449899	V1 on 1050, V2 WB 68. V1 failed to yield and proceeded directly into the path of V2. V2 struck the V1 EB 68. V1 tried to make a left turn onto CRD 1050 and was going to fast and started to skid and went off the right side of 1050.
PHELPS	CRD 1050 S	4.617	OUT OF CONTROL	8/10/2014	PROPERTY DAMAGE ONLY	3140019559	399070	DAYLIGHT	DRY	CLEAR	972977	SUN	1400	157622144	V1 WB 68. D1 failed to pay attention to veh in front of him that was making a right turn onto 1050. They swerved to avoid collision, crossed the centerline and traveled off the left side of the road. Both driver and passenger taken to PCRMC for Minor injuries. No seatbelts worn.
PHELPS	MO 68 E	11.327	OUT OF CONTROL	6/7/2015	MINOR INJURY	3150013961	399070	DAYLIGHT	DRY	CLEAR	7834	SUN	1730	157813385	V1 (tractor) and V2 (Dump truck) EB 68. V2 attempted to pass V1, during the pass V1 turned left onto 1050 and was struck by V2. D2 was taken to PCRMC with Disabling injuries.
PHELPS	MO 68 E	11.327	REAR END	6/14/2013	DISABLING INJURY	3150013496	399070	DAYLIGHT	DRY	CLEAR	7834	FRI	1340	157443688	

Indicate North by Arrow



(Form ICD)

INTERSECTION
COLLISION
DIAGRAM

CRD 1050
Street Name

7/16/16
11:30AM
Dry
PPD

7/1/13
5:20PM
Dry
PPD

6/14/13
1:40PM
Dry
DI

10/4/13
7:35 AM
Dry
PPD

8/10/14
2:00PM
Dry
PPD

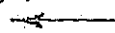
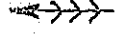






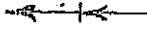

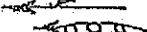




6/26/14
4:14PM
DRY
Fatal

6/7/15
5:30PM
Dry
MI

Electrical Coop driveway

ACCIDENT SUMMARY			
Severity	Day	Nite	Total
Fatal			
Injury			
PDO			
Total			

MO 68
Street Name

SYMBOLS	TYPES OF COLLISIONS	SHOW FOR EACH ACCIDENT
 Moving Vehicle  Backing Vehicle  Non-Involved Vehicle  Pedestrian  Parked Vehicle  Fixed Object  Fatal Accident  Injury Accident	 Rear End  Head On  Side Swipe  Out of Control  Overturn  Left Turn  Right Angle	<ol style="list-style-type: none"> 1. Approximate location of accident 2. Type of collision 3. Time, day, date 4. Other pertinent factors from accident reports as severity; pavement and weather conditions; etc.

INTERSECTION MO 68 & CRD 1050 DATE 6/22/17
 TIME PERIOD COVERED: FROM 2012 TO 2016 PREPARED BY GAG