Alternatives Analysis

March 8, 2019

Peck Road at Bricher Road

Cities of Geneva and St Charles, Illinois

Prepared For:

Kane County Division of Transportation

Prepared By:

Crawford, Murphy & Tilly, Inc.

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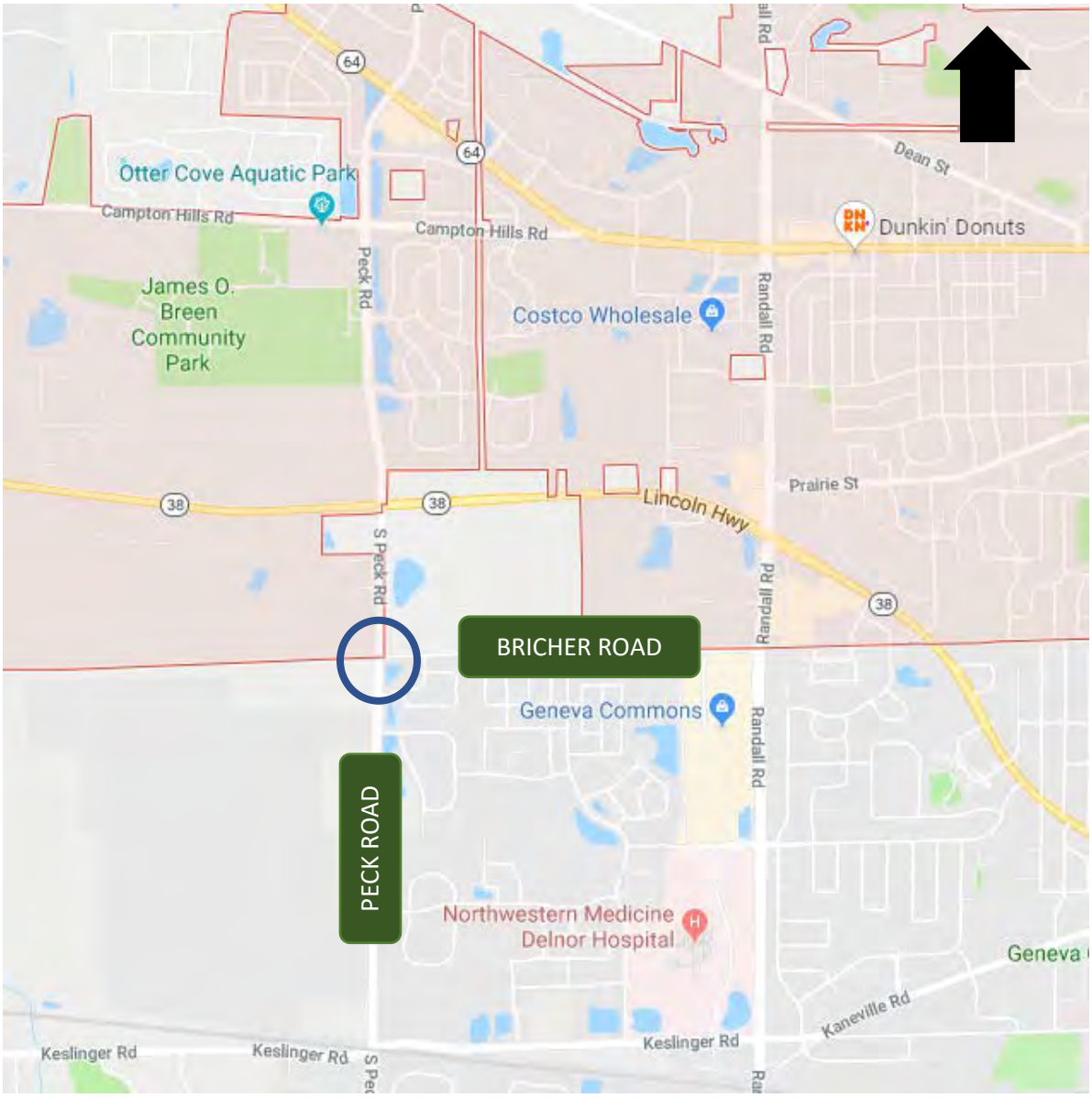
1. Introduction

A. Location

The intersection of Peck Road at Bricher Road is in the eastern central portion of Kane County in St Charles and Geneva Townships. Peck Road runs in the north-south direction and Bricher Road runs in the east-west direction. See Figure 1. The intersection is split between St Charles Township, north of Bricher Road, and Geneva Township, south of Bricher Road.

Figure 1 – Location Map



B. Existing Conditions

The northwest quadrant of the intersection is incorporated City of St Charles and is zoned public land. See Figure 2. The property is James O. Breen Community Park South and is owned by the St Charles Park District. The southeast quadrant of the intersection is incorporated City of Geneva and is zoned residential. The northeast and southwet quadrants are unincorporated. The northeast quadrant is part of the Kane County judicial center complex. The southwest is the Community Gardens as an adjacent component of the overall Prairie Green Preserve, a public owned prairie/wetland restoration and passive recreation site that is a joint project between the Geneva Park District and the Forest Preserve District of Kane County.

The existing intersection of Peck Road at Bricher Road is a three-leg intersection which has a minor park district entrance as the fourth leg driveway of the intersection. Peck Road, a minor arterial, is under the free flow condition. Bricher Road, a major collector, and the entrance are under stop control. Peck Road is under the jurisdiction of Kane County. Bricher Road is under the jurisdiction of the City of Geneva. The park district entrance serves a garden plot. Parking for the soccer fields is located north of the soccer fields at the District 303 Transportation Yard.

Figure 2 - Existing Adjacent Land Use

Peck Road has northbound and southbound left turn lanes as well as a northbound right turn lane. See Figure 3. Bricher Road has an exclusive westbound left turn lane and a shared westbound thru/right lane. The park district entrance, the eastbound approach, has a single lane serving left, thru, and right turning movements.

A bike path runs along the east side of Peck Road. The Mid County Trail crosses the south and east legs of this intersection. There are no other crosswalks at the intersection.

Figure 3 – Existing Intersection Configuration

Figure 4 – Photo at intersection looking east at Bricher Road

Figure 5 – Photo at intersection looking south at Peck Road

Figure 6 – Photo at intersection looking north at Peck Road

2. Alternatives

A. No Build Condition

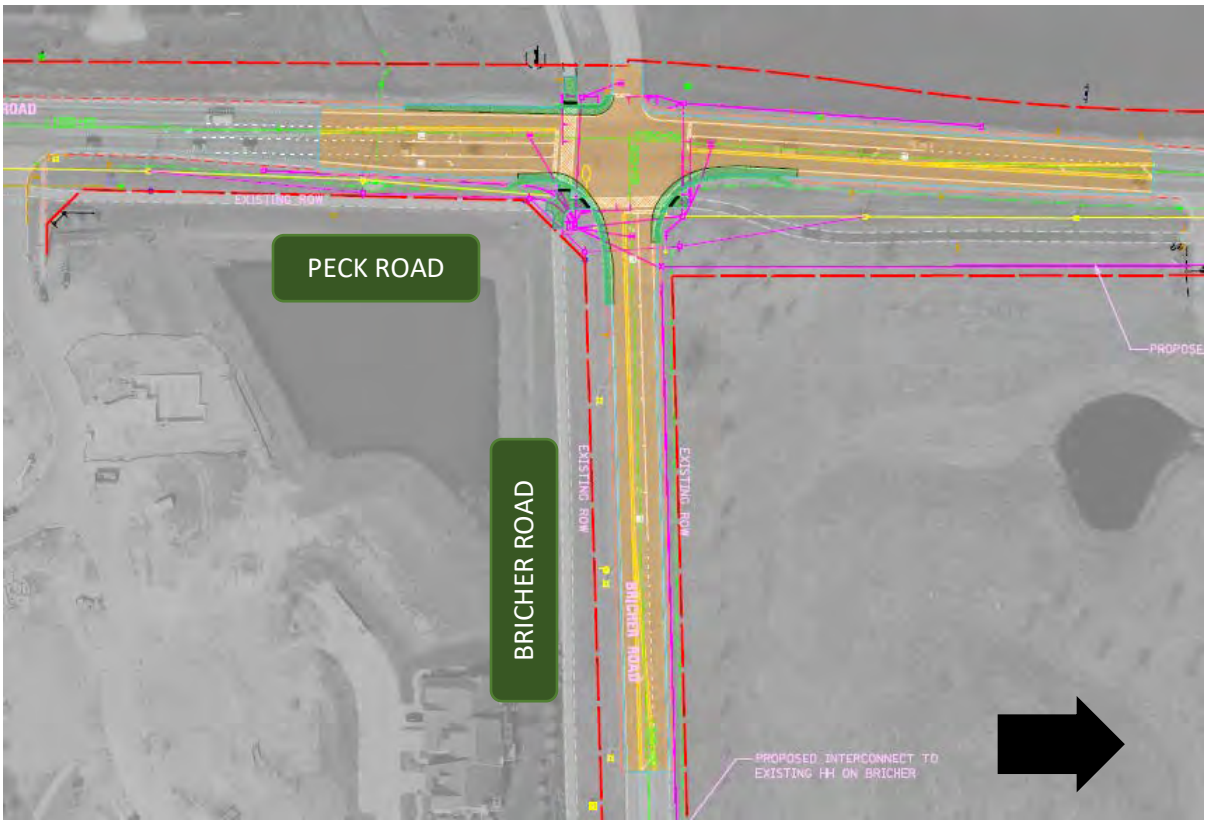
In the no-build condition, the existing geometry would remain the same. Traffic is expected to increase by approximately 20%, or 0.83% per year, on the north leg of Peck Road, from 10,500 ADT in the year 2018 to 12,600 ADT in the year 2040. Traffic is expected to increase by approximately 20%, or 0.83% per year on the south leg of Peck Road, from 12,160 ADT in the year 2018 to 14,600 ADT in the year 2040. Traffic on Bricher Road is expected to increase by approximately 20%, or 0.83% per year, from 5500 ADT in the year 2018 to 6600 ADT in the year 2040. These traffic projections were provided from the Chicago Metropolitan Agency for Planning. No increase in traffic was assumed for the park district entrance.

B. Alternative 1 – Traffic Signals

The first alternative adds traffic signals to the intersection to improve the vehicular capacity of the intersection and improve pedestrian safety. This alternative also improves geometrics at the intersection to fit the design vehicle, avoid maintenance issues, further improve pedestrian safety.

The scope of improvements generally includes extending the southbound left turn lane and westbound left turn lane. The pavement scope is limited to resurfacing within the geometric and pavement marking modifications. The construction limits are generally 265 feet south of Bricher Road to 540 feet north of Bricher Road along Peck Road for a total distance of 805 feet (0.15 miles) and from the intersection of Peck Road to approximately 540 feet east of Peck Road along Bricher Road. The total improvement length is 1345 feet (0.25 miles).

Figure 7 – Alternative 1 Plan View



The drainage system remains open with the use of ditches. B-6.24 curb and gutter outlets to ditches are added where the gutters discharge to the ditch. An interconnect is included along the north side of Bricher Road from approximately 1430 feet (0.27 miles) east of Peck Road to this intersection. Interconnect is also included from along the east side of Peck Road right-of-way to the intersection of Illinois Route 38, approximately 2100 feet (0.40 miles). Total interconnect distance is approximately 0.67 miles. The existing conditions were reviewed for accordance with current design standards.

This alternative includes design exceptions for vertical curves which is further described in section 3.

The curb return on the southeast quadrant would be revised to avoid the blunt curb obstacle for maintenance vehicles. See Figure 8. There is evidence of vehicles hitting this obstacle. The curb return would be revised to transition into the edge of shoulder instead of the edge of pavement.

Figure 8 – Existing Southeast Curb Return Damage

The northeast curb return will have curb added to protect the traffic signal equipment and better define the space between pedestrians/bicyclists and vehicles.

Figure 9 – Existing Northeast Curb Return

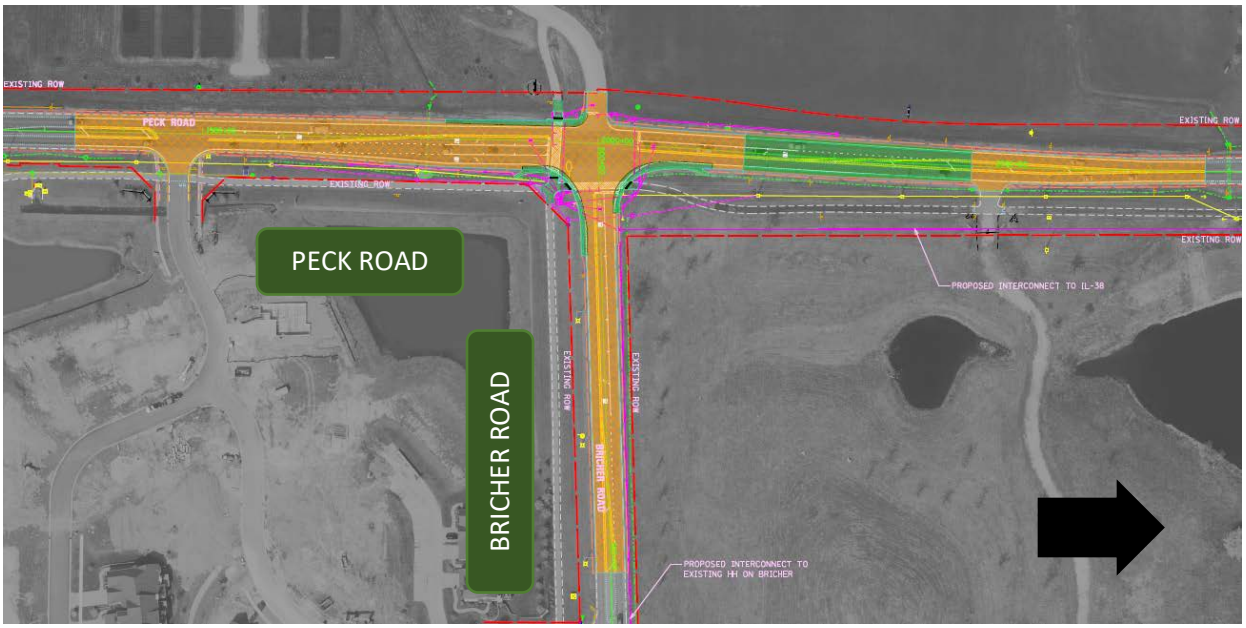
The southbound outside shoulder on Peck Road, south of the intersection, will be reconstructed to full depth pavement to accommodate the design vehicle making a westbound left turn. A curb return will be added at the southwest quadrant to better define the space between pedestrian/bicyclist and vehicles, protect traffic signal equipment, and to avoid off-tracking of eastbound right turning vehicles outside the paved area.

Figure 10 – Existing Southwest Curb Return

C. Alternative 2 – Traffic Signals and Profile Modifications

The scope of this improvement is identical to Alternative 1 except that brings all vertical curves to modern criteria standards and has no design exception for vertical curves. The pavement scope includes adding pavement vertically to the south leg to address vertical curve issues and removing and reconstructing pavement for a portion of the north leg to address vertical curve issues.

Figure 11 – Alternative 2 Plan View



The construction limits are generally 660 feet south of Bricher Road to 770 feet north of Bricher Road along Peck Road for a total distance of 1430 feet (0.27 miles) and from the intersection of Peck Road to approximately 540 feet east of Peck Road along Bricher Road. The total improvement length is 1970 feet (0.37 miles). Reconstruction length (shown in green) is approximately 290 feet.

The drainage system remains open and ditches can be reestablished within the existing ROW, despite roadway profiles being raised and lowered.

D. Alternative 3 – Single Lane Roundabout

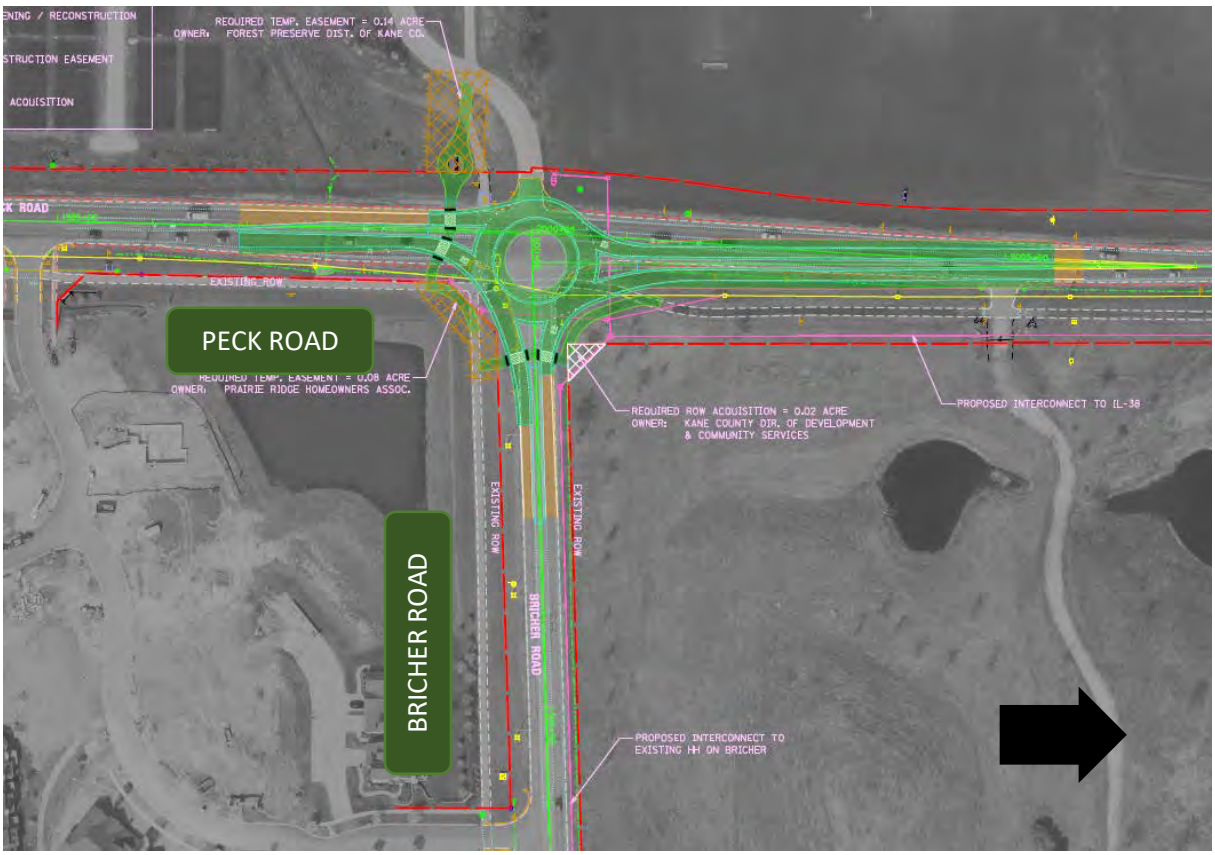
The scope of this improvement replaces the existing traditional channelized intersection with a single lane roundabout. This alternative improves vehicular capacity and improves pedestrian safety.

The construction limits are generally 310 feet south of Bricher Road to 700 feet north of Bricher Road along Peck Road for a total distance of 1010 feet (0.19 miles) and from the intersection of Peck Road to approximately 300 feet east of Peck Road along Bricher Road. The total improvement length is 1310 feet (0.25 miles). Most of the project would include reconstructed pavement (shown in green) with various minor resurfacing improvements at the ends of the project on each approach.

The drainage system will be closed at the intersection with minor storm sewer improvements discharging into the open drainage system on the approaches of the intersection.

Per KDOT direction, Alternative 3 assumes the same interconnect routing to the east and north of the intersection, just like the traffic signal alternatives. A closed-circuit television camera would be implemented on a pole at the roundabout and would connect to the fiber optic interconnect infrastructure for communications with the camera.

Figure 12 – Alternative 3 Plan View



3. Capacity

Capacity analysis was performed for the two-way stop, all-way stop, traffic signal, and single lane roundabout controls. Appendix A includes the Capacity Outputs.

A. Existing

The intersection fails due to the westbound approach experiencing LOS F in the Saturday and weekday PM peak hour. The weekday AM peak hour experiences LOS E on the same approach. The westbound right turn movement experiences an acceptable LOS, but the westbound left turn movement experiences significant delay. The eastbound approach experiences LOS E during the weekday PM peak hour. Peck Road is free flowing and is LOS A. Assuming the worst of the minor street approaches defines the overall intersection LOS, then the intersection performs at LOS F, E, and F in the Saturday, weekday AM and PM peak hours, respectively.

Table 1 – Two-Way Stop Control Existing 2018 Capacity Analysis

Intersection Configuration	Peak Period	Eastbound			Westbound			Northbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Peck & Bricher - TWSC	Sat AM	-	D	-	F	-	B	A	-	-	A	-	-
		D			F			A			A		
	AM	-	D	-	E	-	B	A	-	-	A	-	-
		D			C			A			A		
	PM	-	E	-	F	-	B	A	-	-	A	-	-
		E			F			A			A		

B. No Build

With projected traffic in the year 2040 the eastbound approach worsens from LOS E to LOS F in the PM peak hour.

Table 2 – Two-Way Stop Control 2040 Capacity Analysis

Intersection Configuration	Peak Period	Eastbound			Westbound			Northbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Peck & Bricher - TWSC	Proj AM	-	D	-	E	-	B	A	-	-	A	-	-
		D			C			A			A		
	Proj PM	-	F	-	F	-	C	A	-	-	A	-	-
		F			F			A			A		

C. AWSC

Installing stop signs on Peck Road to interrupt the free flow condition would improve the LOS on Bricher Road but Peck Road traffic would experience LOS F in the existing PM and Saturday peak hours. It would continue to operate at LOS F in the projected PM peak hour. In the AM peak hour it would worsen from LOS C to LOS D from existing to projected traffic. This traffic control configuration was not carried forward for further evaluation because it would not address the existing capacity issues.

Table 3 – All-Way Stop Control 2018 Capacity Analysis

Intersection Configuration	Peak Period	Eastbound			Westbound			Northbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Peck & Bricher - AWSC	Sat AM	B	-	-	B	B	-	B	F	B	B	F	-
		B			B			F			F		
		F											
	AM	B	-	-	B	A	-	A	D	A	B	C	-
		B			B			D			C		
		C											
	Proj AM	B	-	-	B	B	-	A	E	A	B	D	-
		B			B			D			C		
		D											
	PM	B	-	-	C	C	-	B	F	B	B	F	-
		B			C			F			F		
		F											
	Proj PM	B	-	-	C	C	-	B	F	B	C	F	-
		B			C			F			F		
		F											

D. Alternatives 1 and 2

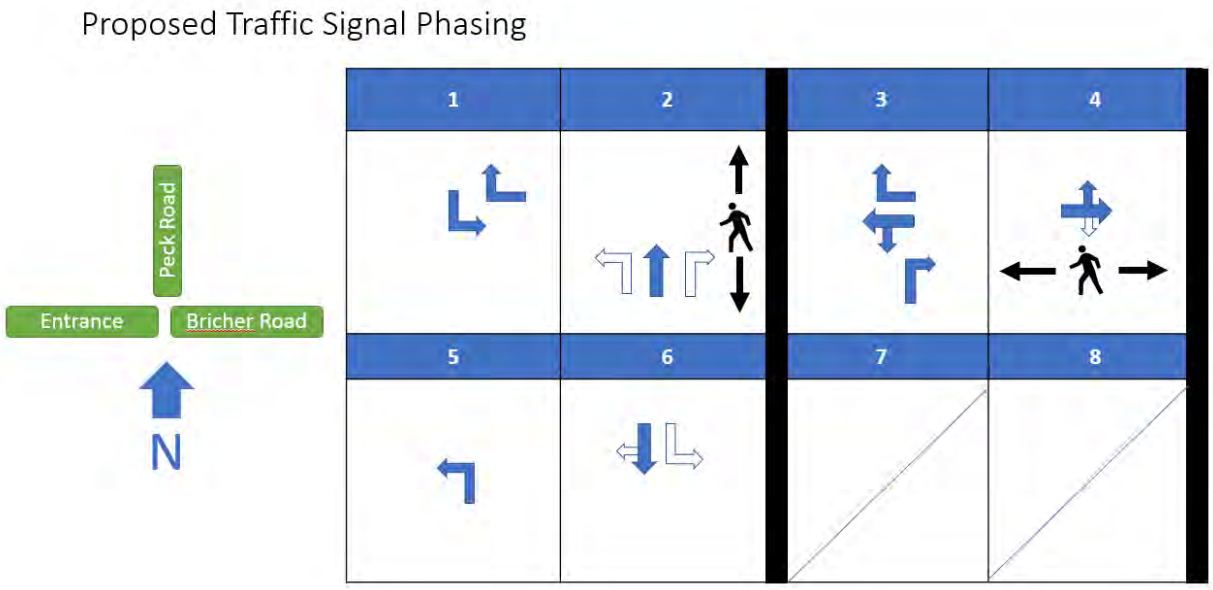
Alternatives 1 and 2 have the same traffic signal control device. Implementing a traffic signal with split phasing eastbound and westbound results in an acceptable intersection LOS for existing and projected traffic. A split phase means that instead of eastbound and westbound phases running concurrently with permissive left turns, the eastbound phase would go with protected movements, then the eastbound phase would end and the westbound phase would go with protected movements. A split phase is preferable due to the low volume of traffic eastbound and the high volume of traffic westbound. In addition, the eastbound traffic volume peaks do not occur at the same time as the traditional peak hours. In most cases the eastbound phase will be skipped due to no traffic on that approach. This will decrease the delay for all other approaches when the eastbound approach phase is skipped. The eastbound approach operates at LOS E in the AM peak hour; however, a shorter cycle length could be implemented in that time period to reduce the delay to that approach.

Table 4 – Traffic Signal 2040 Capacity Analysis

Intersection Configuration	Peak Period	Eastbound			Westbound			Northbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Peck & Bricher - Signalized	Sat AM	-	D	-	-	D	D	A	B	A	A	A	-
		D			D			B			A		
		B											
	AM	-	D	-	-	D	D	A	A	A	A	A	-
		D			D			A			A		
		A											
	Proj AM	-	D	-	-	D	D	A	A	A	A	A	-
		D			D			A			A		
		A											
	PM	-	D	-	-	D	C	A	B	B	A	A	-
		D			C			B			A		
		B											
	Proj PM	-	D	-	-	D	C	B	B	B	B	A	-
		D			C			B			A		
		B											

It should be noted that due to HCS7 program limitations, a westbound right turn overlap and a northbound right turn overlap are not reflected in the calculations; therefore, the estimate of delay is conservative as shown in the summary table of HCS7 outputs. Also, the HCS7 program output files shows the proposed signal phasing diagrammatically incorrect for split phasing despite the calculations being correct. To clarify the proposed traffic signal phasing, a diagram has been prepared. See Figure 13.

Figure 13 – Proposed Traffic Signal Phasing with Split Phasing Eastbound/Westbound



E. Alternative 3

All approaches operate at an acceptable level of service as a single lane roundabout.

Table 5 – Roundabout 2040 Capacity Analysis

Intersection Configuration	Peak Period	Eastbound			Westbound			Northbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Peck & Bricher - Roundabout	**Sat AM**	-	A	-	-	A	-	-	A	-	-	A	-
	AM	-	A	-	-	A	-	-	A	-	-	A	-
	Proj AM	-	A	-	-	A	-	-	B	-	-	A	-
	PM	-	A	-	-	A	-	-	A	-	-	A	-
	Proj PM	-	A	-	-	B	-	-	B	-	-	B	-

4. Safety

A. Crash Analysis

The most recent five full years of crash data was collected and reviewed between the years 2012-2016. See Appendix B – Crash Memorandum. There were a total of 13 crashes, or approximately 2.6 crashes per year. The year 2012 alone produced 6 of the 13 crashes. Most of the crashes, 10 out of 13, were rear end collisions. There were two major areas where rear ends collisions were occurring, the first was westbound on Bricher Road, east of the intersection. The second area was northbound on Peck Road, north of the intersection. The remaining crashes were left turn, animal, and other collision types. Most of the crashes were property damage only, 11 of 13. For injury crashes, there was one crash identified as a Type B (Non-incapacitating injury) and one crash identified as a Type C

(Reported, not evident). There were no Type A injury (incapacitating injury) or fatal crashes. Most of the crashes, 8 of 13, occurred between the hours of 3 and 6 P.M. Only 2 of the crashes occurred at night. Most of the crashes occurred during dry roadway conditions, 10 of 13, with 2 crashes occurring on wet roadways, and 1 crash occurring on snow/ice.

Using predictive tools and comparing the existing crash rate, the existing crash rate (2.6) is slightly higher than expected (2.3). A signal control would be expected to lower the crash rate to 1.9 crashes per year. A single lane roundabout control would be expected to lower the crash rate to 1.3 crashes per year.

B. Sight Distance Analysis

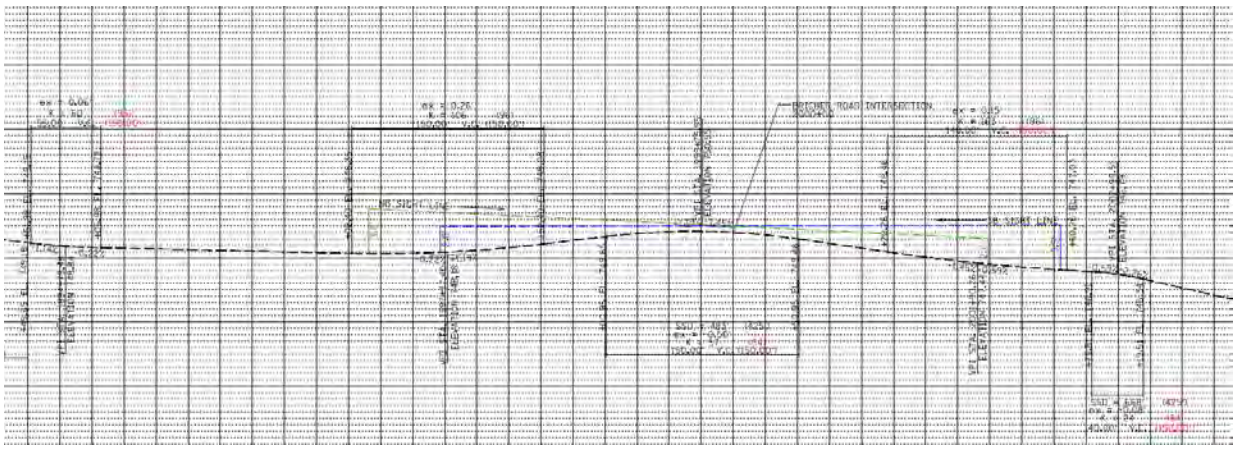
A potential existing deficiency was identified during the scoping of this project. Specifically, there were vertical sight distance concerns along Peck Road based upon a field investigation. A review of the vertical alignments was performed. Four vertical curves along Peck Road were found to be substandard. See Appendix C – Sight Distance Exhibits. One sag vertical curve south of the intersection at STA 1994+79.48 was found to have a substandard K value (60) and curve length (55 feet). At minimum the K value should be 96 and the curve length should be 150 feet. The crest vertical curve at the intersection at STA 1999+75.95 has a substandard K value (57); the K value should be 84 at minimum. A sag curve north of the intersection at STA 2001+90.26 has a substandard curve length (140 feet) which should be a minimum of 150 feet. A crest vertical curve further north at STA 2002+99.51 has a substandard K value (24) and length (40 feet). At minimum the K value should be 84 and the curve length should be 150 feet.

Figure 14 – Photo of Vertical Curves north of intersection looking south

Figure 15– Photo of Vertical Curves south of intersection looking north

A northbound and southbound stopping sight distance analysis was performed and found that the worst case scenario in each direction was found to have adequate stopping sight distance.

Figure 16 – Vertical Alignment Analysis (see Appendix C)



Alternative 1 would maintain the existing substandard curve lengths and K values. Alternative 2 improve the roadway profile to eliminate the substandard vertical curves. Alternative 3 would change the roadway layout all together and vertical curves would be designed to current standards for a roundabout.

5. Bicycle and Pedestrian

The existing conditions include one bicycle/pedestrian crossing of Peck Road on the south leg of the intersection. Peck Road is free flowing; therefore, drivers must yield to users of the crosswalk. The existing conditions include one bicycle/pedestrian crossing of Bricher Road on the east leg of the intersection. There is robust signage on Peck Road for the crosswalk in accordance with the MUTCD. Since Bricher Road is under stop control and the stop sign and stop bar marking are in advance of the crosswalk, it is a safer crossing than the Peck Road crossing. There are small bike stop signs on the east leg crosswalk but none on the south leg crosswalk.

Alternatives 1 and 2 will introduce protected crosswalks with pedestrian signal heads and push buttons as part of the traffic signal. Alternative 3 will provide a splitter island refuge to allow for users of the crosswalk to only manage one direction of travel per crossing, instead of two directions of travel in the existing condition. All alternatives will improve the safety of the existing crossings.

Figure 17 – Photo of Robust Signage for Existing Mid-County Trail Crossing of Peck Road

6. Construction Staging and Maintenance of Traffic

Alternative 1 would result in the least amount of impact to existing traffic flow. Work could be performed with daily lane closures as needed. Existing lane widths could be temporarily restricted to allow for the widening work at the intersection of Peck and Bricher. Work would be restricted to one side of the road at a time. Pedestrian traffic could be accommodated during most of the construction.

Alternative 2, while like Alternative 1 at the intersection, will require reconstruction work on Peck Road north of Bricher to lower the profile, and build up of the existing profile south of Bricher. The reconstruction work will require the construction of temporary pavement to maintain traffic configuration, or a short duration closure of Peck Road north of Bricher Road in order to complete the reconstruction work. The limits of the improvement on Peck Road will also be increased in order to match in with the new profile. Pedestrian traffic could be accommodated during most of the construction.

Alternative 3 would result in the most impact to existing traffic flow. It is likely that the construction of a roundabout would require a complete closure of the intersection.

7. Environmental Impacts

No wetlands or surface water are readily apparent within the project limits; therefore, none of the alternatives anticipate wetland impacts. A wetland report will be completed in the following weeks. A full biological review has not been completed, but none of the alternatives are anticipated to have tree impacts. None of the alternatives are expected to have cultural impacts. Only the roundabout alternative is expected to be impacting a property identified as a potentially impacted property (PIP). The PIP is the judicial center property in the northeast quadrant. Alternatives 1 and 2 would likely require LPC 662 and Alternative 3 would likely require Form LPC 663 as part of the Clean Construction Demolition Debris (CCDD) scope. None of the alternatives should require a detailed noise analysis given the scope of the improvements. The improvement will likely improve air quality with the improvement in capacity. The

receptors are far away from the intersection; therefore, it is assumed it would likely pass a COSIM prescreen. A comprehensive environmental review will be performed for the selected alternative.

8. Property Impacts

Alternative 1 and Alternative 2 should not require the acquisition of any Right-of-Way, or the need for any Temporary Easements. Alternative 3 will require the need for acquired Right-of-Way on the NE quadrant of the intersection in order to construct new pedestrian accommodations. In addition, in the SE and SW quadrants, a Temporary Easement will be needed to construct new pedestrian accommodations.

9. Utility Impacts

Alternative 1 would require the relocation of 3 joint poles on the east side of Peck Road at the intersection. These poles contain ComEd, Comcast, Geneva F.O. and MetroNet F.O., in addition to a beacon light in the SE quadrant. In addition, a City of Geneva light pole in the SE quadrant would need to be removed. Additional impacts to facilities (handholes) in the SE quadrant would need to be further investigated for depth information as the design advanced.

Figure 18 – Utilities on the East Side of Peck Road

Alternative 2 would require the relocation of a minimum of 3 joint poles on the east side of Peck Road at the intersection (an additional pole north of Bricher may need to be relocated due to lowering of the existing profile). These poles contain ComEd, Comcast, Geneva F.O. and MetroNet F.O., in addition to a beacon light in the SE quadrant. In addition, a City of Geneva light pole in the SE quadrant would need to be removed. Additional impacts to facilities (handholes) in the SE quadrant would need to be further investigated for depth information as the design advanced.

Alternative 3 would require the relocation of 6 joint poles on the east side of Peck Road at the intersection. These poles contain ComEd, Comcast, Geneva F.O. and MetroNet F.O., in addition to a beacon light in the SE quadrant. In addition, a City of Geneva light pole in the SE quadrant would need to be removed. Additional impacts to facilities

(handholes) in the SE quadrant would need to be relocated, and buried facilities along the east side of Peck Road would need to be evaluated for conflicts as design progresses.

10. Schedule

All alternatives can be completed in one construction season; however, the land acquisition associated with Alternative 3 would delay construction by a year. It is assumed Alternatives 1 and 2 can be completed in 2019 if utilities are preemptively given enough lead time to begin relocation. Alternative 3 construction would likely have to be deferred to 2020 due to land acquisition occurring in 2019.

11. Project Cost

A comprehensive cost estimate was performed for each alternative including Phase I and II engineering costs currently under contract, future Phase III engineering costs based on a percentage of construction, land acquisition costs, construction costs, and contingencies. All utility relocation costs are assumed to be at the cost of others. See Appendix E - Alternative Cost Exhibits. The costs are summarized below with no planning level rounding.

Table 6 – Alternative Cost Summary

Alternative	Alternative 1	Alternative 2	Alternative 3
Improvement Scope	Traffic Signals	Traffic Signals and Profile Modifications	Single Lane Roundabout
Construction	$741,600	$1,111,800	$1,344,600
Engineering	$377,428	$414,428	$437,728
Land Acquisition	$0	$0	$2,000
Total	**$1,119,028**	**$1,526,228**	**$1,784,328**

12. Summary

Table 7 is a summary matrix of the performance of the scenarios. Appendix D includes exhibits of all the alternatives.

Table 7 – Alternative Summary Matrix

Evaluation Criteria	*Measure of Effectiveness (MOE)*	**Existing Year 2018**	**No Build Year 2040**	**Alternative 1** **Traffic Signal Year 2040**	**Alternative 2** **Traffic Signal and Profile Modifications Year 2040**	**Alternative 3** **Single Lane Roundabout Year 2040**
Capacity	*LOS AM (PM)*	D (F)	D (F)	A (B)	A (B)	B (B)
Safety	*Crash Rate*	2.6	2.6+	1.9	1.9	1.3
	Vertical Curve Requirements and Stopping Sight Distance	Curves do not meet modern standards, Meets Sight Distance Requirements	Curves do not meet modern standards, Meets Sight Distance Requirements	Curves do not meet modern standards, Meets Sight Distance Requirements	Improved Stopping Sight Distance and meets modern standards	Reconstruct to meet current standards
Bicycle/Pedestrian	*Bicycle/Pedestrian Roadway Crossing Types*	One high speed and one low speed crossing with no protection	One high speed and one low speed crossing with no protection	Protected Crossings with pedestrian signal equipment	Protected Crossings with pedestrian signal equipment	Splitter island refuge and one-way direction of traffic per crossing
Construction Staging and MOT	*Description*	NA	NA	Off-Road operations with some daytime lane closures	Temporary Pavement or Detour North Leg	Intersection Closure and Detour
Environmental Impacts	*Description*	NA	NA	No impacts anticipated	No impacts anticipated	Impacts PIP
Property Impacts	*Acres of Permanent and Temporary Land Acquisition*	NA	NA	0 (0) acres	0 (0) acres	0.02 (0.22) acres
Utility Impacts	*Facilities and amount of impacts*	NA	NA	3 joint power poles	4 joint power poles	6 joint power poles
Schedule		NA	NA	2019 Construction	2019 Construction	2020 Construction
Construction Cost	*$*	NA	NA	$750,000	$1,100,000	$1,400,000

13. Conclusions

A. Purpose and Need

The purpose of this project is to improve capacity at the intersection. The poor capacity at the intersection is a contributor to crashes; however, the crash rate is not above average for a similar intersection with similar traffic. There is no bicycle or pedestrian crash history. The safety of pedestrians and bicyclists crossing Peck Road and Bricher Road is an ancillary benefit of the proposed improvements.

B. Selection of Preferred Alternative

Table 8 summarizes compares alternatives to one another. A "+" (Pro) indicates that the evaluation criteria for that alternative is good in comparison to either the existing and no build conditions (purpose and need for the project) or relative to the other build alternatives. A "+/-" indicates a the criteria is neither good nor bad for that alternative. A "-" (Con) indicates the criteria underperforms for that alternative relative to other alternatives. The scoring assumes equal weighting of each criteria.

Table 8 – Alternative Selection Matrix

	Existing	No Build	Build Alternative 1 Traffic Signal	Build Alternative 2 Traffic Signal and Profile Modifications	Build Alternative 3 Single Lane Roundabout
Capacity	-	-	+	+	+
Safety – Crash Rate	-	-	+	+	+
Safety – Sight Distance	+/-	+/-	+/-	+	+
Bicycle/Pedestrian	+/-	+/-	+	+	+
Construction Staging and MOT	**NA**	**NA**	+	+/-	-
Environmental Impacts	**NA**	**NA**	+	+	+
Property Impacts	**NA**	**NA**	+	+	-
Utility Impacts	**NA**	**NA**	+	+/-	-
Schedule	**NA**	**NA**	+	+	-
Cost	**NA**	**NA**	+	+/-	-
TOTAL PROS	**NA**	**NA**	**9.5 / 10**	**8.5 / 10**	**5 / 10**

Between Alternatives 1 and 2 there is a $350,000 cost increase with Alternative 2. There are no quantifiable benefits, such as improved crash rate, air quality, or level of service, to show the incremental benefit to the project of the more expensive alternative (Alternative 2). Even though Alternative 1 doesn't meet the modern standard for vertical curves, it still meets the stopping sight distance requirements.

C. Value Considerations

The resurfacing on Peck Road was recent. The County could consider pavement marking removal and remarking the new layout without milling and resurfacing. Bricher Road is under the jurisdiction of the City of Geneva. The County could consider pavement marking removal and remarking the new layout without milling and resurfacing on the local street. This could save approximately $60,000 from Alternative 1.

Appendix A

Capacity Outputs

HCS7 Two-Way Stop-Control Report

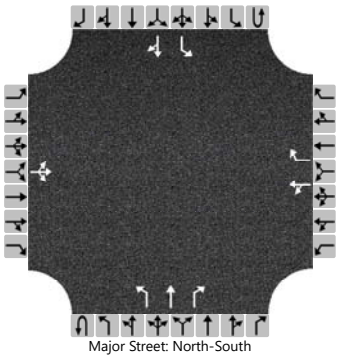
General Information

Analyst	MPM
Agency/Co.	CMT
Date Performed	12/7/2018
Analysis Year	2040
Time Analyzed	2040 Projection
Intersection Orientation	North-South
Project Description	Year 2040 Weekday AM Peak Analysis

Site Information

Intersection	Peck and Bricher
Jurisdiction	KDOT
East/West Street	Bricher Road
North/South Street	Peck Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1	0	1	1	1	0	1	1	0
Configuration			LTR			LT		R		L	T	R		L		TR
Volume (veh/h)		1	1	1		30	1	79		1	487	118		139	438	1
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		1				-1										
Right Turn Channelized						Yes				Yes						
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.31	6.71	6.31		6.91	6.31	6.11		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			3			34		86		1				151		
Capacity, c (veh/h)			141			130		560		1090				1043		
v/c Ratio			0.02			0.26		0.15		0.00				0.14		
95% Queue Length, Q_{95} (veh)			0.1			1.0		0.5		0.0				0.5		
Control Delay (s/veh)			31.2			42.2		12.6		8.3				9.0		
Level of Service (LOS)			D			E		B		A				A		
Approach Delay (s/veh)		31.2				20.9				0.0				2.2		
Approach LOS		D				C										

HCS7 Two-Way Stop-Control Report

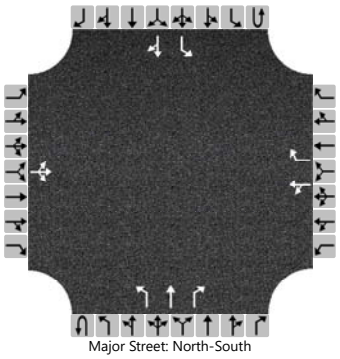
General Information

Analyst	MPM
Agency/Co.	CMT
Date Performed	12/7/2018
Analysis Year	2040
Time Analyzed	2040 Projection
Intersection Orientation	North-South
Project Description	Year 2040 Weekday PM Peak Analysis

Site Information

Intersection	Peck and Bricher
Jurisdiction	KDOT
East/West Street	Bricher Road
North/South Street	Peck Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1	0	1	1	1	0	1	1	0
Configuration			LTR			LT		R		L	T	R		L		TR
Volume (veh/h)		7	2	2		130	5	214		1	539	131		156	563	5
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)			1				-1									
Right Turn Channelized							Yes				Yes					
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.31	6.71	6.31		6.91	6.31	6.11		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			12			147		233		1				170		
Capacity, c (veh/h)			49			87		521		968				994		
v/c Ratio			0.24			1.68		0.45		0.00				0.17		
95% Queue Length, Q_{95} (veh)			0.8			12.0		2.3		0.0				0.6		
Control Delay (s/veh)			100.9			431.6		17.4		8.7				9.4		
Level of Service (LOS)			F			F		C		A				A		
Approach Delay (s/veh)		100.9				177.6				0.0				2.0		
Approach LOS		F				F										

HCS7 Two-Way Stop-Control Report

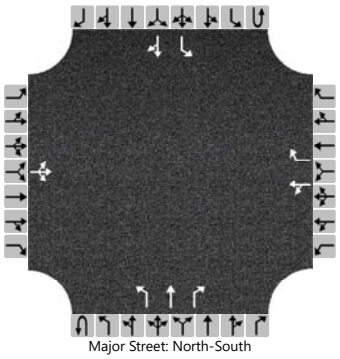
General Information

Analyst	MPM
Agency/Co.	CMT
Date Performed	10/27/2018
Analysis Year	2018
Time Analyzed	Sat AM Peak 9:30-10:30
Intersection Orientation	North-South
Project Description	Saturday AM Capacity Analysis

Site Information

Intersection	Peck and Bricher
Jurisdiction	KDOT
East/West Street	Bricher Road
North/South Street	Peck Road
Peak Hour Factor	0.79
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1	0	1	1	1	0	1	1	0
Configuration			LTR			LT		R		L	T	R		L		TR
Volume (veh/h)		1	1	3		70	2	90		1	420	71		144	399	2
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)			1				-1									
Right Turn Channelized							Yes				Yes					
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.31	6.71	6.31		6.91	6.31	6.11		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			6			91		114		1				182		
Capacity, c (veh/h)			167			108		553		1055				1041		
v/c Ratio			0.04			0.84		0.21		0.00				0.18		
95% Queue Length, Q_{95} (veh)			0.1			4.9		0.8		0.0				0.6		
Control Delay (s/veh)			27.4			120.9		13.2		8.4				9.2		
Level of Service (LOS)			D			F		B		A				A		
Approach Delay (s/veh)		27.4				61.1				0.0				2.4		
Approach LOS		D				F										

HCS7 Two-Way Stop-Control Report

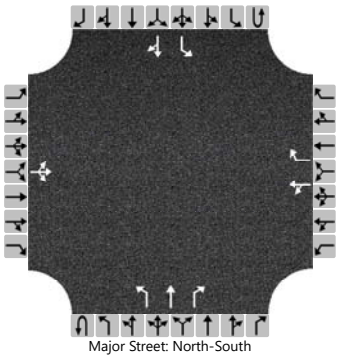
General Information

Analyst	MPM
Agency/Co.	CMT
Date Performed	10/30/2018
Analysis Year	2018
Time Analyzed	Weekday AM Peak 7:30-8:30
Intersection Orientation	North-South
Project Description	Weekday AM Peak Analysis

Site Information

Intersection	Peck and Bricher
Jurisdiction	KDOT
East/West Street	Bricher Road
North/South Street	Peck Road
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1	0	1	1	1	0	1	1	0
Configuration			LTR			LT		R		L	T	R		L		TR
Volume (veh/h)		1	1	1		25	1	66		1	406	98		116	365	1
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		1				-1										
Right Turn Channelized						Yes				Yes						
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.31	6.71	6.31		6.91	6.31	6.11		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			4			32		80		1				141		
Capacity, c (veh/h)			163			149		584		1119				1074		
v/c Ratio			0.02			0.21		0.14		0.00				0.13		
95% Queue Length, Q_{95} (veh)			0.1			0.8		0.5		0.0				0.5		
Control Delay (s/veh)			27.5			35.5		12.1		8.2				8.9		
Level of Service (LOS)			D			E		B		A				A		
Approach Delay (s/veh)		27.5				18.8				0.0				2.1		
Approach LOS		D				C										

HCS7 Two-Way Stop-Control Report

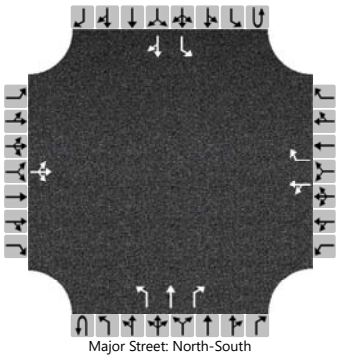
General Information

Analyst	MPM
Agency/Co.	CMT
Date Performed	10/30/2018
Analysis Year	2018
Time Analyzed	Weekday PM Peak 5:00-6:00
Intersection Orientation	North-South
Project Description	Weekday PM Peak Analysis

Site Information

Intersection	Peck and Bricher
Jurisdiction	KDOT
East/West Street	Bricher Road
North/South Street	Peck Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1	0	1	1	1	0	1	1	0
Configuration			LTR			LT		R		L	T	R		L		TR
Volume (veh/h)		6	2	2		108	4	178		1	449	109		130	469	5
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)			1				-1									
Right Turn Channelized							Yes				Yes					
Median Type | Storage			Undivided													

Critical and Follow-up Headways

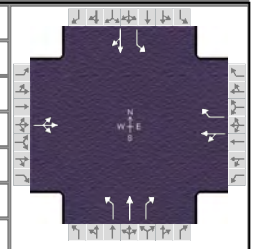
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.31	6.71	6.31		6.91	6.31	6.11		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11			122		193		1				141		
Capacity, c (veh/h)			97			135		590		1056				1080		
v/c Ratio			0.11			0.90		0.33		0.00				0.13		
95% Queue Length, Q_{95} (veh)			0.4			6.0		1.4		0.0				0.4		
Control Delay (s/veh)			46.9			115.5		14.1		8.4				8.8		
Level of Service (LOS)			E			F		B		A				A		
Approach Delay (s/veh)		46.9				53.2				0.0				1.9		
Approach LOS		E				F										

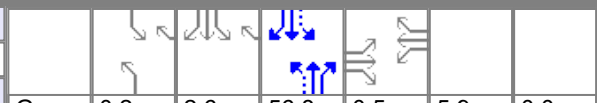
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.25
Analyst	MPM	Analysis Date	12/10/2018	Area Type	Other
Jurisdiction	KDOT	Time Period	AM Peak	PHF	0.82
Urban Street	Peck Road	Analysis Year	2018	Analysis Period	1> 7:00
Intersection	Bricher Road	File Name	Signalized_Weekday AM Peak_Capacity Analysis…		
Project Description	Existing AM Peak				

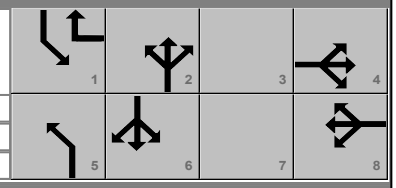


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1	1	1	25	1	66	1	406	98	116	365	1

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	0.2	2.6	56.8	0.5	5.9	0.0
Yellow	3.0	3.0	4.5	4.5	4.5	0.0
Red	0.0	0.0	1.5	1.5	1.5	0.0



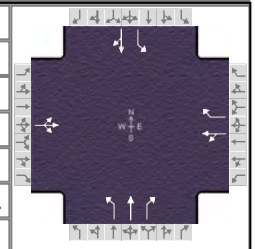
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		12.0		11.0	1.1	3.0	1.1	4.0
Phase Duration, s		6.5		11.9	3.2	62.8	8.8	68.4
Change Period, (*Y+R c*), s		6.0		6.0	3.0	6.0	3.0	6.0
Max Allow Headway (*MAH*), s		3.0		3.0	2.9	0.0	2.9	0.0
Queue Clearance Time (*g s*), s		2.2		6.1	2.0		4.2	
Green Extension Time (*g e*), s		0.0		0.2	0.0	0.0	0.2	0.0
Phase Call Probability		0.09		0.94	0.03		0.97	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		4			32	80	1	495	120	141	446	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1644			1836	1631	1790	1963	1515	1790	1864	
Queue Service Time (*g s*), s		0.2			1.5	4.1	0.0	11.2	2.8	2.2	2.4	
Cycle Queue Clearance Time (*g c*), s		0.2			1.5	4.1	0.0	11.2	2.8	2.2	2.4	
Green Ratio (*g/C*)		0.01			0.07	0.13	0.63	0.63	0.63	0.72	0.69	
Capacity (*c*), veh/h		10			120	212	682	1238	956	655	1293	
Volume-to-Capacity Ratio (*X*)		0.381			0.265	0.380	0.002	0.400	0.125	0.216	0.345	
Back of Queue (*Q*), ft/ln (95 th percentile)		4.6			29.7	71	0.3	186.8	37.1	24.6	33.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.2			1.2	2.8	0.0	7.4	1.4	1.0	1.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.30	0.71	0.00	0.00	0.26	0.25	0.00	
Uniform Delay (*d 1*), s/veh		44.6			40.0	35.8	6.1	8.2	6.7	5.0	1.1	
Incremental Delay (*d 2*), s/veh		9.0			0.4	0.4	0.0	1.0	0.3	0.1	0.7	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		53.6			40.5	36.3	6.1	9.2	6.9	5.1	1.9	
Level of Service (LOS)		D			D	D	A	A	A	A	A	
Approach Delay, s/veh / LOS	53.6	D		37.4	D		8.7	A		2.6	A	
Intersection Delay, s/veh / LOS	8.6						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.0	B
Bicycle LOS Score / LOS	0.5	A	0.7	A	1.5	B	1.5	A

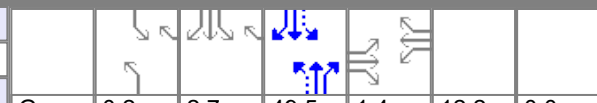
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMT			Duration, h	0.25
Analyst	MPM	Analysis Date	12/10/2018	Area Type	Other
Jurisdiction	KDOT	Time Period	PM Peak	PHF	0.92
Urban Street	Peck Road	Analysis Year	2018	Analysis Period	1> 7:00
Intersection	Bricher Road	File Name	Signalized_Weekday PM Peak_Capacity Analysis…		
Project Description	Existing PM Peak				

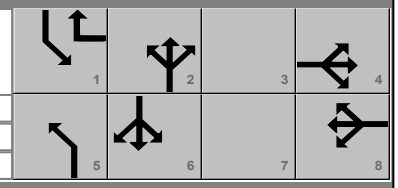


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	6	2	2	108	4	178	1	449	109	130	469	5

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	0.2	2.7	49.5	1.4	12.2	0.0						
Yellow	3.0	3.0	4.5	4.5	4.5	0.0						
Red	0.0	0.0	1.5	1.5	1.5	0.0						



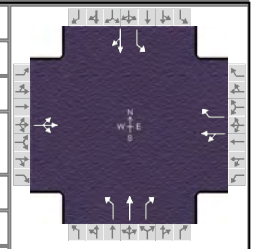
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		12.0		11.0	1.1	3.0	1.1	4.0
Phase Duration, s		7.4		18.2	3.2	55.5	8.8	61.2
Change Period, (*Y+R c*), s		6.0		6.0	3.0	6.0	3.0	6.0
Max Allow Headway (*MAH*), s		3.0		3.0	2.9	0.0	2.9	0.0
Queue Clearance Time (*g s*), s		2.6		11.7	2.0		4.8	
Green Extension Time (*g e*), s		0.0		0.5	0.0	0.0	0.2	0.0
Phase Call Probability		0.24		1.00	0.03		0.97	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		11			122	193	1	488	118	141	515	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1699			1836	1631	1790	1978	1536	1790	1876	
Queue Service Time (*g s*), s		0.6			5.5	9.7	0.0	13.2	3.4	2.8	7.2	
Cycle Queue Clearance Time (*g c*), s		0.6			5.5	9.7	0.0	13.2	3.4	2.8	7.2	
Green Ratio (*g/C*)		0.02			0.14	0.20	0.55	0.55	0.55	0.64	0.61	
Capacity (*c*), veh/h		27			249	327	538	1089	846	564	1151	
Volume-to-Capacity Ratio (*X*)		0.403			0.489	0.592	0.002	0.448	0.140	0.251	0.448	
Back of Queue (*Q*), ft/ln (95 th percentile)		11.6			108.7	166.2	0.4	230.9	48.5	38.5	96.3	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.5			4.3	6.6	0.0	9.2	1.9	1.5	3.8	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			1.09	1.66	0.00	0.00	0.33	0.39	0.00	
Uniform Delay (*d 1*), s/veh		43.9			36.0	32.7	9.1	12.1	9.9	8.0	3.9	
Incremental Delay (*d 2*), s/veh		3.6			0.6	0.6	0.0	1.3	0.3	0.1	1.3	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		47.4			36.6	33.3	9.1	13.4	10.2	8.0	5.1	
Level of Service (LOS)		D			D	C	A	B	B	A	A	
Approach Delay, s/veh / LOS	47.4	D		34.6	C		12.8	B		5.8	A	
Intersection Delay, s/veh / LOS	14.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	1.0	A	1.5	A	1.6	B

HCS7 Signalized Intersection Results Summary

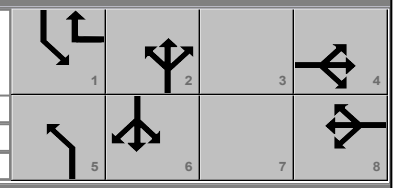
General Information				Intersection Information	
Agency	CMT			Duration, h	0.25
Analyst	MPM	Analysis Date	12/10/2018	Area Type	Other
Jurisdiction	KDOT	Time Period	Saturday AM Peak	PHF	0.79
Urban Street	Peck Road	Analysis Year	2018	Analysis Period	1> 7:00
Intersection	Bricher Road	File Name	Signalized_Saturday AM Peak_Capacity Analysis…		
Project Description	Existing Saturday AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1	1	3	70	2	90	1	420	71	144	399	2

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.2	2.8	54.2	0.9	8.0	0.0						
Yellow	3.0	3.0	4.5	4.5	4.5	0.0						
Red	0.0	0.0	1.5	1.5	1.5	0.0						



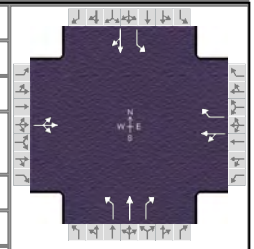
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		12.0		11.0	1.1	3.0	1.1	4.0
Phase Duration, s		6.9		14.0	3.2	60.2	8.9	65.9
Change Period, ($Y+R_c$), s		6.0		6.0	3.0	6.0	3.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.0	2.9	0.0	2.9	0.0
Queue Clearance Time (g_s), s		2.4		7.7	2.0		5.2	
Green Extension Time (g_e), s		0.0		0.3	0.0	0.0	0.3	0.0
Phase Call Probability		0.15		0.99	0.03		0.99	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		6			91	114	1	532	90	182	508	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1518			1835	1631	1790	1978	1538	1790	1878	
Queue Service Time (g_s), s		0.4			4.3	5.7	0.0	13.2	2.2	3.2	4.3	
Cycle Queue Clearance Time (g_c), s		0.4			4.3	5.7	0.0	13.2	2.2	3.2	4.3	
Green Ratio (*g/C*)		0.01			0.09	0.15	0.60	0.60	0.60	0.69	0.67	
Capacity (*c*), veh/h		15			163	252	618	1191	926	597	1251	
Volume-to-Capacity Ratio (*X*)		0.427			0.560	0.451	0.002	0.446	0.097	0.305	0.406	
Back of Queue (*Q*), ft/ln (95 th percentile)		7.4			86	99	0.4	220.2	30.1	39.2	56.4	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.3			3.4	3.9	0.0	8.7	1.2	1.6	2.2	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.86	0.99	0.00	0.00	0.21	0.39	0.00	
Uniform Delay (d_1), s/veh		44.3			39.3	34.6	7.1	9.7	7.6	6.4	1.9	
Incremental Delay (d_2), s/veh		7.1			1.1	0.5	0.0	1.2	0.2	0.1	1.0	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		51.4			40.4	35.0	7.1	11.0	7.8	6.5	2.9	
Level of Service (LOS)		D			D	D	A	B	A	A	A	
Approach Delay, s/veh / LOS	51.4	D		37.4	D		10.5	B		3.9	A	
Intersection Delay, s/veh / LOS	11.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.8	A	1.5	B	1.6	B

HCS7 Signalized Intersection Results Summary

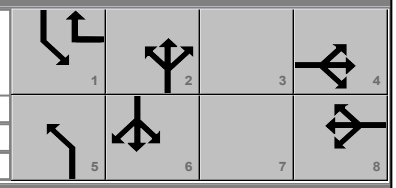
General Information				Intersection Information	
Agency	CMT			Duration, h	0.25
Analyst	MPM	Analysis Date	12/10/2018	Area Type	Other
Jurisdiction	KDOT	Time Period	Weekday PM Peak	PHF	0.92
Urban Street	Peck Road	Analysis Year	2040	Analysis Period	1> 7:00
Intersection	Bricher Road	File Name	Signalized_Projected AM Peak_Capacity Analysis…		
Project Description	Exising PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1	1	1	30	1	79	1	487	118	139	438	1

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.2	2.7	56.5	0.5	6.2	0.0						
Yellow	3.0	3.0	4.5	4.5	4.5	0.0						
Red	0.0	0.0	1.5	1.5	1.5	0.0						



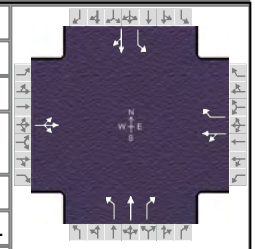
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		12.0		11.0	1.1	3.0	1.1	4.0
Phase Duration, s		6.5		12.2	3.2	62.5	8.9	68.2
Change Period, ($Y+R_c$), s		6.0		6.0	3.0	6.0	3.0	6.0
Max Allow Headway (*MAH*), s		3.0		3.0	2.9	0.0	2.9	0.0
Queue Clearance Time (g_s), s		2.2		6.3	2.0		4.4	
Green Extension Time (g_e), s		0.0		0.2	0.0	0.0	0.2	0.0
Phase Call Probability		0.08		0.95	0.03		0.98	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		3			34	86	1	529	128	151	477	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1644			1836	1631	1790	1963	1515	1790	1677	
Queue Service Time (g_s), s		0.2			1.6	4.3	0.0	12.4	3.1	2.4	3.3	
Cycle Queue Clearance Time (g_c), s		0.2			1.6	4.3	0.0	12.4	3.1	2.4	3.3	
Green Ratio (*g/C*)		0.01			0.07	0.13	0.63	0.63	0.63	0.71	0.69	
Capacity (*c*), veh/h		9			126	218	661	1232	951	627	1159	
Volume-to-Capacity Ratio (*X*)		0.379			0.267	0.393	0.002	0.430	0.135	0.241	0.412	
Back of Queue (*Q*), ft/ln (95 th percentile)		4.2			31.4	75.5	0.3	204.5	40.9	27	41	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.2			1.2	3.0	0.0	8.1	1.6	1.1	1.6	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.31	0.76	0.00	0.00	0.28	0.27	0.00	
Uniform Delay (d_1), s/veh		44.6			39.8	35.6	6.2	8.5	6.8	5.4	1.2	
Incremental Delay (d_2), s/veh		9.9			0.4	0.4	0.0	1.1	0.3	0.1	1.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		54.5			40.2	36.1	6.2	9.6	7.1	5.5	2.3	
Level of Service (LOS)		D			D	D	A	A	A	A	A	
Approach Delay, s/veh / LOS	54.5	D		37.2	D		9.1	A		3.1	A	
Intersection Delay, s/veh / LOS	8.9						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.0	B
Bicycle LOS Score / LOS	0.5	A	0.7	A	1.6	B	1.5	B

HCS7 Signalized Intersection Results Summary

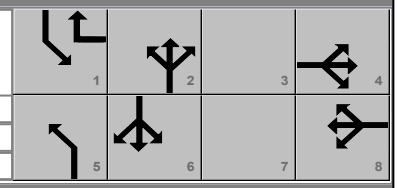
General Information				Intersection Information	
Agency	CMT			Duration, h	0.25
Analyst	MPM	Analysis Date	12/10/2018	Area Type	Other
Jurisdiction	KDOT	Time Period	Projected PM Peak	PHF	0.92
Urban Street	Peck Road	Analysis Year	2040	Analysis Period	1> 7:00
Intersection	Bricher Road	File Name	Signalized_Projected PM Peak_Capacity Analysis…		
Project Description	Projected PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	7	2	2	130	5	214	1	539	131	156	563	5

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.2	2.8	47.3	1.6	14.2	0.0						
Yellow	3.0	3.0	4.5	4.5	4.5	0.0						
Red	0.0	0.0	1.5	1.5	1.5	0.0						



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		12.0		11.0	1.1	3.0	1.1	4.0
Phase Duration, s		7.6		20.2	3.2	53.3	8.9	59.0
Change Period, (*Y+R c*), s		6.0		6.0	3.0	6.0	3.0	6.0
Max Allow Headway (*MAH*), s		3.0		3.0	2.9	0.0	2.9	0.0
Queue Clearance Time (*g s*), s		2.6		13.6	2.0		5.6	
Green Extension Time (*g e*), s		0.0		0.6	0.0	0.0	0.2	0.0
Phase Call Probability		0.26		1.00	0.03		0.99	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		12			147	233	1	586	142	170	617	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1707			1836	1631	1790	1978	1535	1790	1876	
Queue Service Time (*g s*), s		0.6			6.6	11.6	0.0	18.0	4.4	3.6	11.4	
Cycle Queue Clearance Time (*g c*), s		0.6			6.6	11.6	0.0	18.0	4.4	3.6	11.4	
Green Ratio (*g/C*)		0.02			0.16	0.22	0.53	0.53	0.53	0.61	0.59	
Capacity (*c*), veh/h		29			291	365	440	1039	806	469	1106	
Volume-to-Capacity Ratio (*X*)		0.406			0.505	0.637	0.002	0.564	0.177	0.362	0.558	
Back of Queue (*Q*), ft/ln (95 th percentile)		12.7			128.3	196.3	0.4	304	63.9	52.5	147.4	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.5			5.1	7.8	0.0	12.1	2.5	2.1	5.8	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			1.28	1.96	0.00	0.00	0.44	0.53	0.00	
Uniform Delay (*d 1*), s/veh		43.8			34.7	31.6	10.4	14.4	11.2	10.2	5.2	
Incremental Delay (*d 2*), s/veh		3.3			0.5	0.7	0.0	2.2	0.5	0.2	2.0	
Initial Queue Delay (*d 3*), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		47.1			35.2	32.3	10.4	16.6	11.6	10.4	7.3	
Level of Service (LOS)		D			D	C	B	B	B	B	A	
Approach Delay, s/veh / LOS	47.1	D		33.4	C		15.6	B		7.9	A	
Intersection Delay, s/veh / LOS	16.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	2.3	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	1.1	A	1.7	B	1.8	B

INTERSECTION SUMMARY

Site: 101 [Peck & Bricher - Projected AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Travel Speed (Average)	32.5	mph	32.5	mph
Travel Distance (Total)	887.5	veh-mi/h	1065.0	pers-mi/h
Travel Time (Total)	27.3	veh-h/h	32.7	pers-h/h
Demand Flows (Total)	1410	veh/h	1692	pers/h
Percent Heavy Vehicles (Demand)	3.0	%		
Degree of Saturation	0.578			
Practical Spare Capacity	47.2	%		
Effective Intersection Capacity	2441	veh/h		
Control Delay (Total)	3.46	veh-h/h	4.15	pers-h/h
Control Delay (Average)	8.8	sec	8.8	sec
Control Delay (Worst Lane)	10.3	sec		
Control Delay (Worst Movement)	10.3	sec	10.3	sec
Geometric Delay (Average)	0.0	sec		
Stop-Line Delay (Average)	8.8	sec		
Idling Time (Average)	6.7	sec		
Intersection Level of Service (LOS)	LOS A			
95% Back of Queue - Vehicles (Worst Lane)	4.4	veh		
95% Back of Queue - Distance (Worst Lane)	112.6	ft		
Queue Storage Ratio (Worst Lane)	0.03			
Total Effective Stops	353	veh/h	424	pers/h
Effective Stop Rate	0.25		0.25	
Proportion Queued	0.40		0.40	
Performance Index	48.6		48.6	
Cost (Total)	394.79	$/h	394.79	$/h
Fuel Consumption (Total)	36.1	gal/h		
Carbon Dioxide (Total)	323.7	kg/h		
Hydrocarbons (Total)	0.028	kg/h		
Carbon Monoxide (Total)	0.399	kg/h		
NOx (Total)	0.498	kg/h		

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Site Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 3 (Maximum: 10)
Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 100.0% 93.3% 0.0%

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	676,696	veh/y	812,035	pers/y
Delay	1,661	veh-h/y	1,993	pers-h/y
Effective Stops	169,616	veh/y	203,539	pers/y
Travel Distance	426,016	veh-mi/y	511,219	pers-mi/y
Travel Time	13,097	veh-h/y	15,717	pers-h/y
Cost	189,501	$/y	189,501	$/y

Fuel Consumption	17,332	gal/y
Carbon Dioxide	155,357	kg/y
Hydrocarbons	14	kg/y
Carbon Monoxide	191	kg/y
NOx	239	kg/y

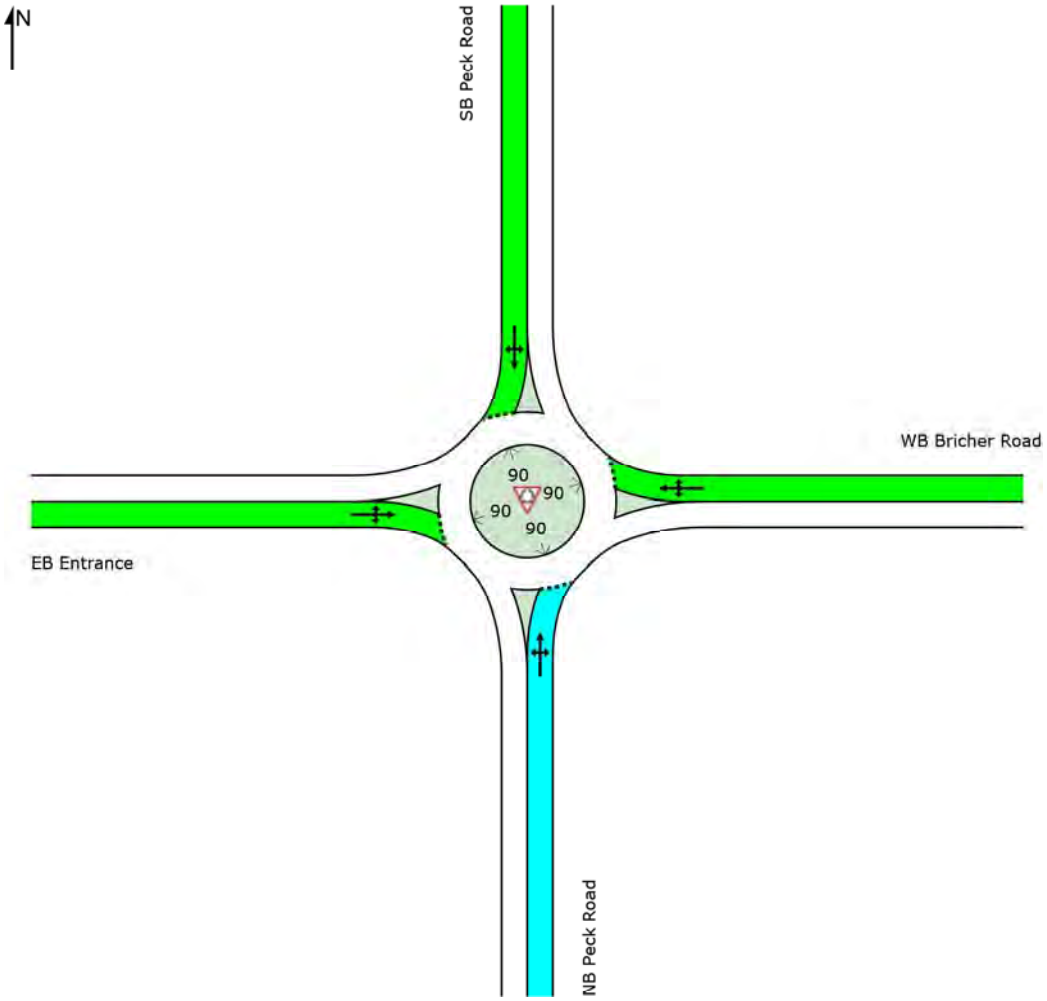
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [Peck & Bricher - Projected AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	B	A	A	A	A



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: Same as Sign Control
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 101 [Peck & Bricher - Projected AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Peck Road												
3	L2	1	3.0	0.578	10.3	LOS B	4.4	112.6	0.54	0.36	0.54	32.3
8	T1	529	3.0	0.578	10.3	LOS B	4.4	112.6	0.54	0.36	0.54	32.3
18	R2	128	3.0	0.578	10.3	LOS B	4.4	112.6	0.54	0.36	0.54	31.5
Approach		659	3.0	0.578	10.3	LOS B	4.4	112.6	0.54	0.36	0.54	32.1
East: WB Bricher Road												
1	L2	33	3.0	0.156	6.3	LOS A	0.6	16.4	0.57	0.52	0.57	33.4
6	T1	1	3.0	0.156	6.3	LOS A	0.6	16.4	0.57	0.52	0.57	33.4
16	R2	86	3.0	0.156	6.3	LOS A	0.6	16.4	0.57	0.52	0.57	32.6
Approach		120	3.0	0.156	6.3	LOS A	0.6	16.4	0.57	0.52	0.57	32.8
North: SB Peck Road												
7	L2	151	3.0	0.486	7.8	LOS A	3.6	92.7	0.22	0.08	0.22	32.9
4	T1	476	3.0	0.486	7.8	LOS A	3.6	92.7	0.22	0.08	0.22	32.9
14	R2	1	3.0	0.486	7.8	LOS A	3.6	92.7	0.22	0.08	0.22	32.0
Approach		628	3.0	0.486	7.8	LOS A	3.6	92.7	0.22	0.08	0.22	32.9
West: EB Entrance												
5	L2	1	3.0	0.005	5.4	LOS A	0.0	0.5	0.57	0.39	0.57	33.8
2	T1	1	3.0	0.005	5.4	LOS A	0.0	0.5	0.57	0.39	0.57	33.8
12	R2	1	3.0	0.005	5.4	LOS A	0.0	0.5	0.57	0.39	0.57	32.9
Approach		3	3.0	0.005	5.4	LOS A	0.0	0.5	0.57	0.39	0.57	33.5
All Vehicles		1410	3.0	0.578	8.8	LOS A	4.4	112.6	0.40	0.25	0.40	32.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

INTERSECTION SUMMARY

Site: 101 [Peck & Bricher - Projected PM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Travel Speed (Average)	30.6	mph	30.6	mph
Travel Distance (Total)	1200.8	veh-mi/h	1440.9	pers-mi/h
Travel Time (Total)	39.2	veh-h/h	47.0	pers-h/h
Demand Flows (Total)	1908	veh/h	2289	pers/h
Percent Heavy Vehicles (Demand)	3.0	%		
Degree of Saturation	0.686			
Practical Spare Capacity	23.9	%		
Effective Intersection Capacity	2781	veh/h		
Control Delay (Total)	6.82	veh-h/h	8.18	pers-h/h
Control Delay (Average)	12.9	sec	12.9	sec
Control Delay (Worst Lane)	13.2	sec		
Control Delay (Worst Movement)	13.2	sec	13.2	sec
Geometric Delay (Average)	0.0	sec		
Stop-Line Delay (Average)	12.9	sec		
Idling Time (Average)	8.7	sec		
Intersection Level of Service (LOS)	LOS B			
95% Back of Queue - Vehicles (Worst Lane)	6.8	veh		
95% Back of Queue - Distance (Worst Lane)	174.6	ft		
Queue Storage Ratio (Worst Lane)	0.04			
Total Effective Stops	1055	veh/h	1266	pers/h
Effective Stop Rate	0.55		0.55	
Proportion Queued	0.67		0.67	
Performance Index	83.7		83.7	
Cost (Total)	583.33	$/h	583.33	$/h
Fuel Consumption (Total)	51.4	gal/h		
Carbon Dioxide (Total)	460.2	kg/h		
Hydrocarbons (Total)	0.041	kg/h		
Carbon Monoxide (Total)	0.561	kg/h		
NOx (Total)	0.712	kg/h		

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Site Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 3 (Maximum: 10)
Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 100.0% 94.9% 0.0%

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	915,652	veh/y	1,098,783	pers/y
Delay	3,271	veh-h/y	3,925	pers-h/y
Effective Stops	506,261	veh/y	607,513	pers/y
Travel Distance	576,364	veh-mi/y	691,636	pers-mi/y
Travel Time	18,816	veh-h/y	22,579	pers-h/y
Cost	279,998	$/y	279,998	$/y

Fuel Consumption	24,648	gal/y
Carbon Dioxide	220,897	kg/y
Hydrocarbons	20	kg/y
Carbon Monoxide	269	kg/y
NOx	342	kg/y

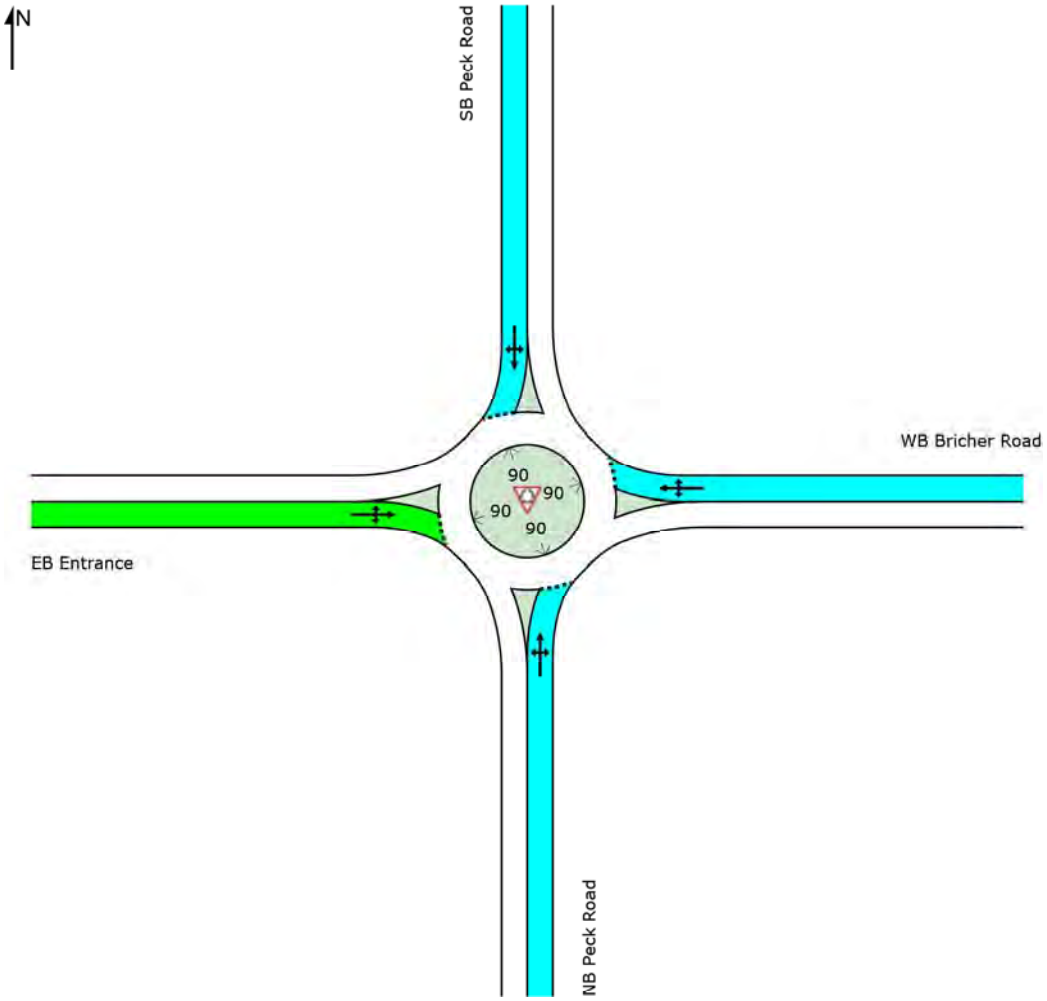
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [Peck & Bricher - Projected PM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	B	B	B	A	B



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: Same as Sign Control
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 101 [Peck & Bricher - Projected PM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Peck Road												
3	L2	1	3.0	0.657	12.5	LOS B	6.8	174.6	0.65	0.51	0.73	31.3
8	T1	586	3.0	0.657	12.5	LOS B	6.8	174.6	0.65	0.51	0.73	31.3
18	R2	142	3.0	0.657	12.5	LOS B	6.8	174.6	0.65	0.51	0.73	30.5
Approach		729	3.0	0.657	12.5	LOS B	6.8	174.6	0.65	0.51	0.73	31.1
East: WB Bricher Road												
1	L2	141	3.0	0.529	13.2	LOS B	3.7	95.3	0.75	0.88	1.13	30.2
6	T1	5	3.0	0.529	13.2	LOS B	3.7	95.3	0.75	0.88	1.13	30.2
16	R2	233	3.0	0.529	13.2	LOS B	3.7	95.3	0.75	0.88	1.13	29.4
Approach		379	3.0	0.529	13.2	LOS B	3.7	95.3	0.75	0.88	1.13	29.7
North: SB Peck Road												
7	L2	170	3.0	0.686	13.1	LOS B	6.4	162.8	0.64	0.43	0.64	30.6
4	T1	612	3.0	0.686	13.1	LOS B	6.4	162.8	0.64	0.43	0.64	30.6
14	R2	5	3.0	0.686	13.1	LOS B	6.4	162.8	0.64	0.43	0.64	29.9
Approach		787	3.0	0.686	13.1	LOS B	6.4	162.8	0.64	0.43	0.64	30.6
West: EB Entrance												
5	L2	8	3.0	0.024	7.4	LOS A	0.1	2.1	0.64	0.58	0.64	32.1
2	T1	2	3.0	0.024	7.4	LOS A	0.1	2.1	0.64	0.58	0.64	32.1
12	R2	2	3.0	0.024	7.4	LOS A	0.1	2.1	0.64	0.58	0.64	31.3
Approach		12	3.0	0.024	7.4	LOS A	0.1	2.1	0.64	0.58	0.64	32.0
All Vehicles		1908	3.0	0.686	12.9	LOS B	6.8	174.6	0.67	0.55	0.77	30.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

INTERSECTION SUMMARY

Site: 101 [Peck & Bricher - Saturday AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Travel Speed (Average)	32.8	mph	32.8	mph
Travel Distance (Total)	825.2	veh-mi/h	990.2	pers-mi/h
Travel Time (Total)	25.1	veh-h/h	30.1	pers-h/h
Demand Flows (Total)	1309	veh/h	1570	pers/h
Percent Heavy Vehicles (Demand)	3.0	%		
Degree of Saturation	0.481			
Practical Spare Capacity	76.9	%		
Effective Intersection Capacity	2723	veh/h		
Control Delay (Total)	2.88	veh-h/h	3.46	pers-h/h
Control Delay (Average)	7.9	sec	7.9	sec
Control Delay (Worst Lane)	8.3	sec		
Control Delay (Worst Movement)	8.3	sec	8.3	sec
Geometric Delay (Average)	0.0	sec		
Stop-Line Delay (Average)	7.9	sec		
Idling Time (Average)	5.7	sec		
Intersection Level of Service (LOS)	LOS A			
95% Back of Queue - Vehicles (Worst Lane)	3.4	veh		
95% Back of Queue - Distance (Worst Lane)	86.8	ft		
Queue Storage Ratio (Worst Lane)	0.02			
Total Effective Stops	361	veh/h	434	pers/h
Effective Stop Rate	0.28		0.28	
Proportion Queued	0.42		0.42	
Performance Index	43.4		43.4	
Cost (Total)	366.83	$/h	366.83	$/h
Fuel Consumption (Total)	33.7	gal/h		
Carbon Dioxide (Total)	302.4	kg/h		
Hydrocarbons (Total)	0.026	kg/h		
Carbon Monoxide (Total)	0.372	kg/h		
NOx (Total)	0.466	kg/h		

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Site Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 3 (Maximum: 10)
Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 100.0% 93.3% 0.0%

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	628,174	veh/y	753,809	pers/y
Delay	1,384	veh-h/y	1,661	pers-h/y
Effective Stops	173,451	veh/y	208,141	pers/y
Travel Distance	396,080	veh-mi/y	475,296	pers-mi/y
Travel Time	12,058	veh-h/y	14,469	pers-h/y
Cost	176,078	$/y	176,078	$/y

Fuel Consumption	16,196	gal/y
Carbon Dioxide	145,171	kg/y
Hydrocarbons	13	kg/y
Carbon Monoxide	179	kg/y
NOx	224	kg/y

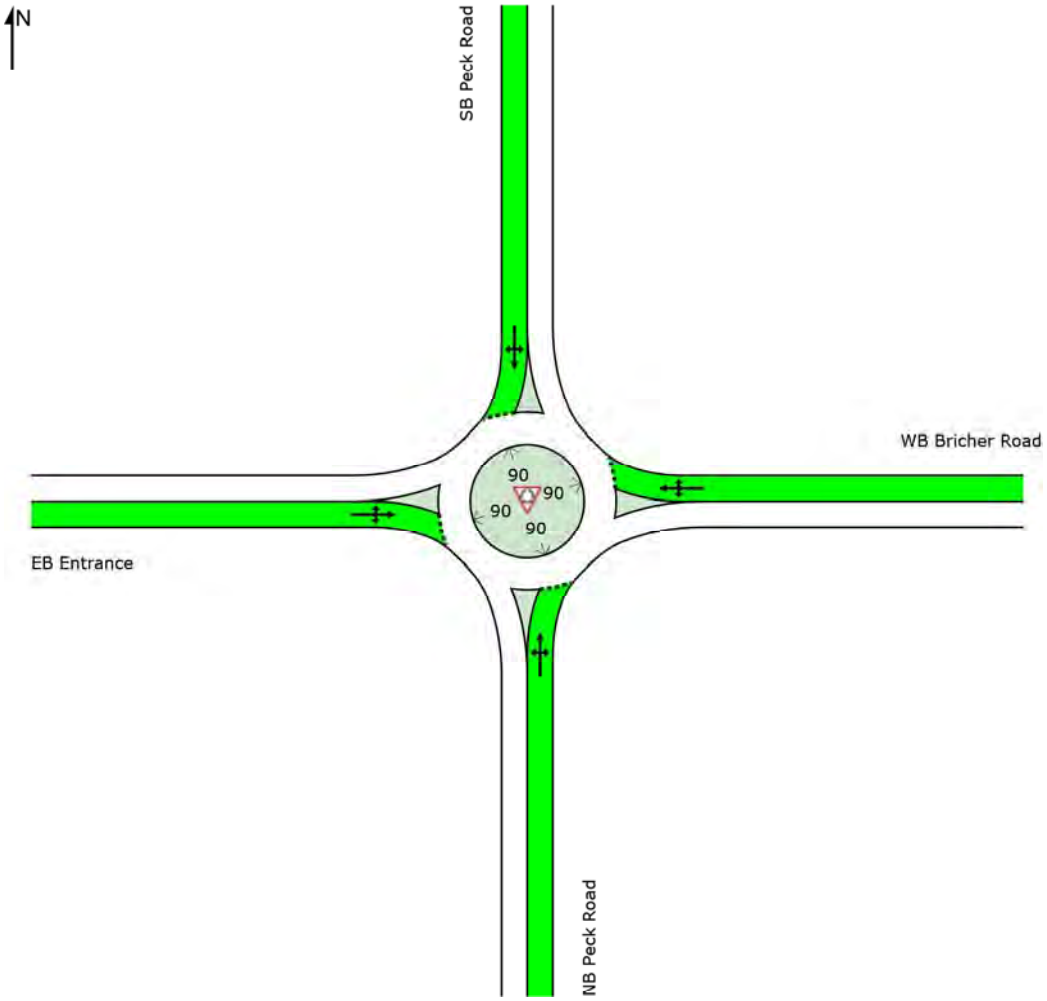
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [Peck & Bricher - Saturday AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: Same as Sign Control
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 101 [Peck & Bricher - Saturday AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Peck Road												
3	L2	1	3.0	0.472	8.3	LOS A	3.1	78.4	0.47	0.31	0.47	33.2
8	T1	457	3.0	0.472	8.3	LOS A	3.1	78.4	0.47	0.31	0.47	33.2
18	R2	77	3.0	0.472	8.3	LOS A	3.1	78.4	0.47	0.31	0.47	32.4
Approach		535	3.0	0.472	8.3	LOS A	3.1	78.4	0.47	0.31	0.47	33.1
East: WB Bricher Road												
1	L2	76	3.0	0.213	6.6	LOS A	0.9	23.7	0.56	0.50	0.56	32.9
6	T1	2	3.0	0.213	6.6	LOS A	0.9	23.7	0.56	0.50	0.56	32.9
16	R2	98	3.0	0.213	6.6	LOS A	0.9	23.7	0.56	0.50	0.56	32.1
Approach		176	3.0	0.213	6.6	LOS A	0.9	23.7	0.56	0.50	0.56	32.4
North: SB Peck Road												
7	L2	157	3.0	0.481	8.0	LOS A	3.4	86.8	0.34	0.17	0.34	32.7
4	T1	434	3.0	0.481	8.0	LOS A	3.4	86.8	0.34	0.17	0.34	32.7
14	R2	2	3.0	0.481	8.0	LOS A	3.4	86.8	0.34	0.17	0.34	31.9
Approach		592	3.0	0.481	8.0	LOS A	3.4	86.8	0.34	0.17	0.34	32.7
West: EB Entrance												
5	L2	1	3.0	0.008	5.5	LOS A	0.0	0.8	0.57	0.42	0.57	34.1
2	T1	1	3.0	0.008	5.5	LOS A	0.0	0.8	0.57	0.42	0.57	34.1
12	R2	3	3.0	0.008	5.5	LOS A	0.0	0.8	0.57	0.42	0.57	33.2
Approach		5	3.0	0.008	5.5	LOS A	0.0	0.8	0.57	0.42	0.57	33.5
All Vehicles		1309	3.0	0.481	7.9	LOS A	3.4	86.8	0.42	0.28	0.42	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

INTERSECTION SUMMARY

Site: 101 [Peck & Bricher - Weekday AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Travel Speed (Average)	33.3	mph	33.3	mph
Travel Distance (Total)	740.4	veh-mi/h	888.5	pers-mi/h
Travel Time (Total)	22.2	veh-h/h	26.7	pers-h/h
Demand Flows (Total)	1176	veh/h	1411	pers/h
Percent Heavy Vehicles (Demand)	3.0	%		
Degree of Saturation	0.469			
Practical Spare Capacity	81.3	%		
Effective Intersection Capacity	2509	veh/h		
Control Delay (Total)	2.36	veh-h/h	2.83	pers-h/h
Control Delay (Average)	7.2	sec	7.2	sec
Control Delay (Worst Lane)	8.1	sec		
Control Delay (Worst Movement)	8.1	sec	8.1	sec
Geometric Delay (Average)	0.0	sec		
Stop-Line Delay (Average)	7.2	sec		
Idling Time (Average)	5.5	sec		
Intersection Level of Service (LOS)	LOS A			
95% Back of Queue - Vehicles (Worst Lane)	3.1	veh		
95% Back of Queue - Distance (Worst Lane)	79.6	ft		
Queue Storage Ratio (Worst Lane)	0.02			
Total Effective Stops	219	veh/h	263	pers/h
Effective Stop Rate	0.19		0.19	
Proportion Queued	0.32		0.32	
Performance Index	37.2		37.2	
Cost (Total)	320.00	$/h	320.00	$/h
Fuel Consumption (Total)	29.7	gal/h		
Carbon Dioxide (Total)	266.5	kg/h		
Hydrocarbons (Total)	0.023	kg/h		
Carbon Monoxide (Total)	0.329	kg/h		
NOx (Total)	0.410	kg/h		

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Site Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 3 (Maximum: 10)
Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 100.0% 92.5% 0.0%

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	564,522	veh/y	677,426	pers/y
Delay	1,132	veh-h/y	1,359	pers-h/y
Effective Stops	105,110	veh/y	126,132	pers/y
Travel Distance	355,400	veh-mi/y	426,479	pers-mi/y
Travel Time	10,673	veh-h/y	12,808	pers-h/y
Cost	153,602	$/y	153,602	$/y

Fuel Consumption	14,270	gal/y
Carbon Dioxide	127,916	kg/y
Hydrocarbons	11	kg/y
Carbon Monoxide	158	kg/y
NOx	197	kg/y

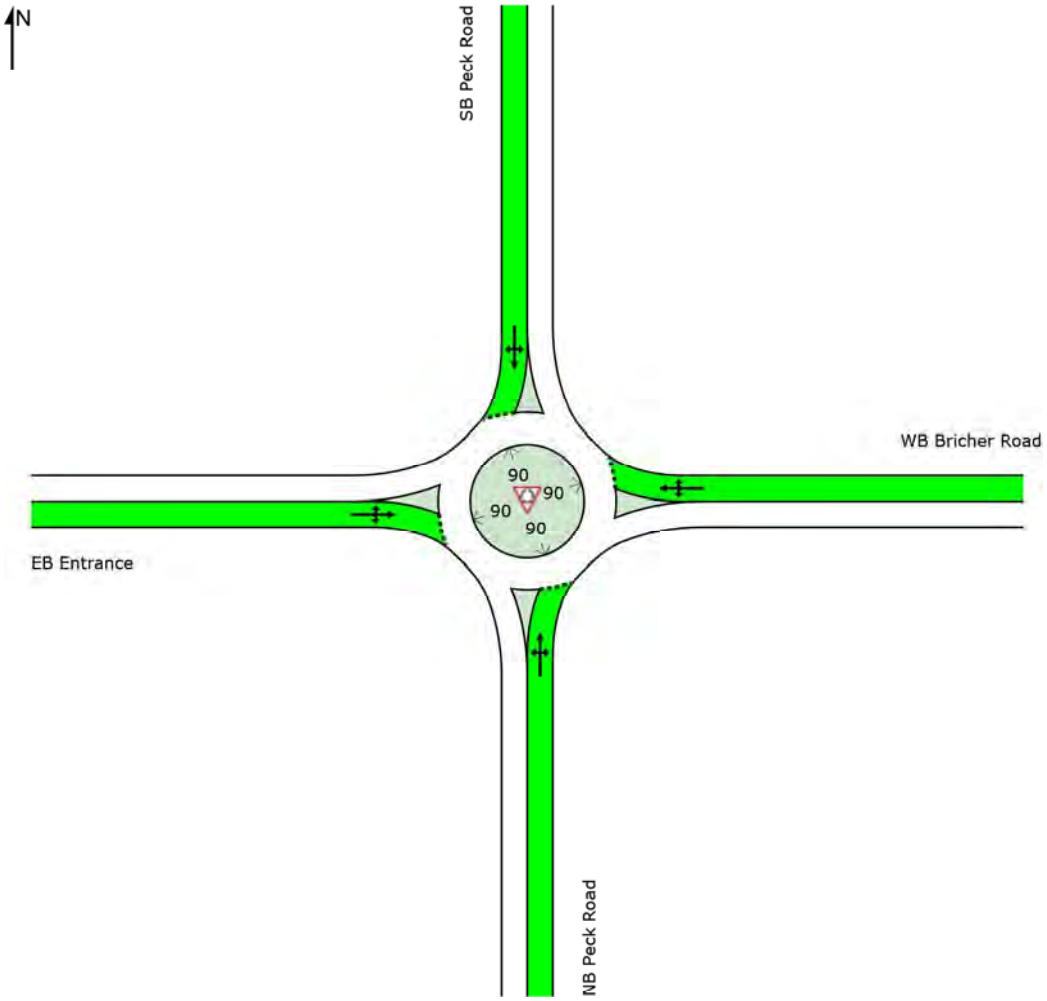
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [Peck & Bricher - Weekday AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: Same as Sign Control
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 101 [Peck & Bricher - Weekday AM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Peck Road												
3	L2	1	3.0	0.469	8.1	LOS A	3.1	79.6	0.43	0.26	0.43	33.3
8	T1	441	3.0	0.469	8.1	LOS A	3.1	79.6	0.43	0.26	0.43	33.3
18	R2	107	3.0	0.469	8.1	LOS A	3.1	79.6	0.43	0.26	0.43	32.5
Approach		549	3.0	0.469	8.1	LOS A	3.1	79.6	0.43	0.26	0.43	33.2
East: WB Bricher Road												
1	L2	27	3.0	0.119	5.5	LOS A	0.5	12.5	0.52	0.44	0.52	33.9
6	T1	1	3.0	0.119	5.5	LOS A	0.5	12.5	0.52	0.44	0.52	33.9
16	R2	72	3.0	0.119	5.5	LOS A	0.5	12.5	0.52	0.44	0.52	33.0
Approach		100	3.0	0.119	5.5	LOS A	0.5	12.5	0.52	0.44	0.52	33.2
North: SB Peck Road												
7	L2	126	3.0	0.403	6.6	LOS A	2.6	67.5	0.18	0.06	0.18	33.5
4	T1	397	3.0	0.403	6.6	LOS A	2.6	67.5	0.18	0.06	0.18	33.4
14	R2	1	3.0	0.403	6.6	LOS A	2.6	67.5	0.18	0.06	0.18	32.6
Approach		524	3.0	0.403	6.6	LOS A	2.6	67.5	0.18	0.06	0.18	33.4
West: EB Entrance												
5	L2	1	3.0	0.004	4.8	LOS A	0.0	0.4	0.53	0.34	0.53	34.1
2	T1	1	3.0	0.004	4.8	LOS A	0.0	0.4	0.53	0.34	0.53	34.1
12	R2	1	3.0	0.004	4.8	LOS A	0.0	0.4	0.53	0.34	0.53	33.2
Approach		3	3.0	0.004	4.8	LOS A	0.0	0.4	0.53	0.34	0.53	33.8
All Vehicles		1176	3.0	0.469	7.2	LOS A	3.1	79.6	0.32	0.19	0.32	33.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

INTERSECTION SUMMARY

Site: 101 [Peck & Bricher - Weekday PM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Travel Speed (Average)	32.1	mph	32.1	mph
Travel Distance (Total)	1001.0	veh-mi/h	1201.2	pers-mi/h
Travel Time (Total)	31.2	veh-h/h	37.4	pers-h/h
Demand Flows (Total)	1590	veh/h	1908	pers/h
Percent Heavy Vehicles (Demand)	3.0	%		
Degree of Saturation	0.558			
Practical Spare Capacity	52.5	%		
Effective Intersection Capacity	2852	veh/h		
Control Delay (Total)	4.17	veh-h/h	5.00	pers-h/h
Control Delay (Average)	9.4	sec	9.4	sec
Control Delay (Worst Lane)	9.6	sec		
Control Delay (Worst Movement)	9.6	sec	9.6	sec
Geometric Delay (Average)	0.0	sec		
Stop-Line Delay (Average)	9.4	sec		
Idling Time (Average)	6.7	sec		
Intersection Level of Service (LOS)	LOS A			
95% Back of Queue - Vehicles (Worst Lane)	4.3	veh		
95% Back of Queue - Distance (Worst Lane)	108.9	ft		
Queue Storage Ratio (Worst Lane)	0.03			
Total Effective Stops	608	veh/h	729	pers/h
Effective Stop Rate	0.38		0.38	
Proportion Queued	0.52		0.52	
Performance Index	57.2		57.2	
Cost (Total)	458.45	$/h	458.45	$/h
Fuel Consumption (Total)	41.6	gal/h		
Carbon Dioxide (Total)	372.9	kg/h		
Hydrocarbons (Total)	0.033	kg/h		
Carbon Monoxide (Total)	0.458	kg/h		
NOx (Total)	0.576	kg/h		

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Site Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 3 (Maximum: 10)
Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 100.0% 94.0% 0.0%

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	763,304	veh/y	915,965	pers/y
Delay	2,002	veh-h/y	2,402	pers-h/y
Effective Stops	291,662	veh/y	349,995	pers/y
Travel Distance	480,462	veh-mi/y	576,555	pers-mi/y
Travel Time	14,960	veh-h/y	17,952	pers-h/y
Cost	220,057	$/y	220,057	$/y

Fuel Consumption	19,969	gal/y
Carbon Dioxide	178,984	kg/y
Hydrocarbons	16	kg/y
Carbon Monoxide	220	kg/y
NOx	276	kg/y

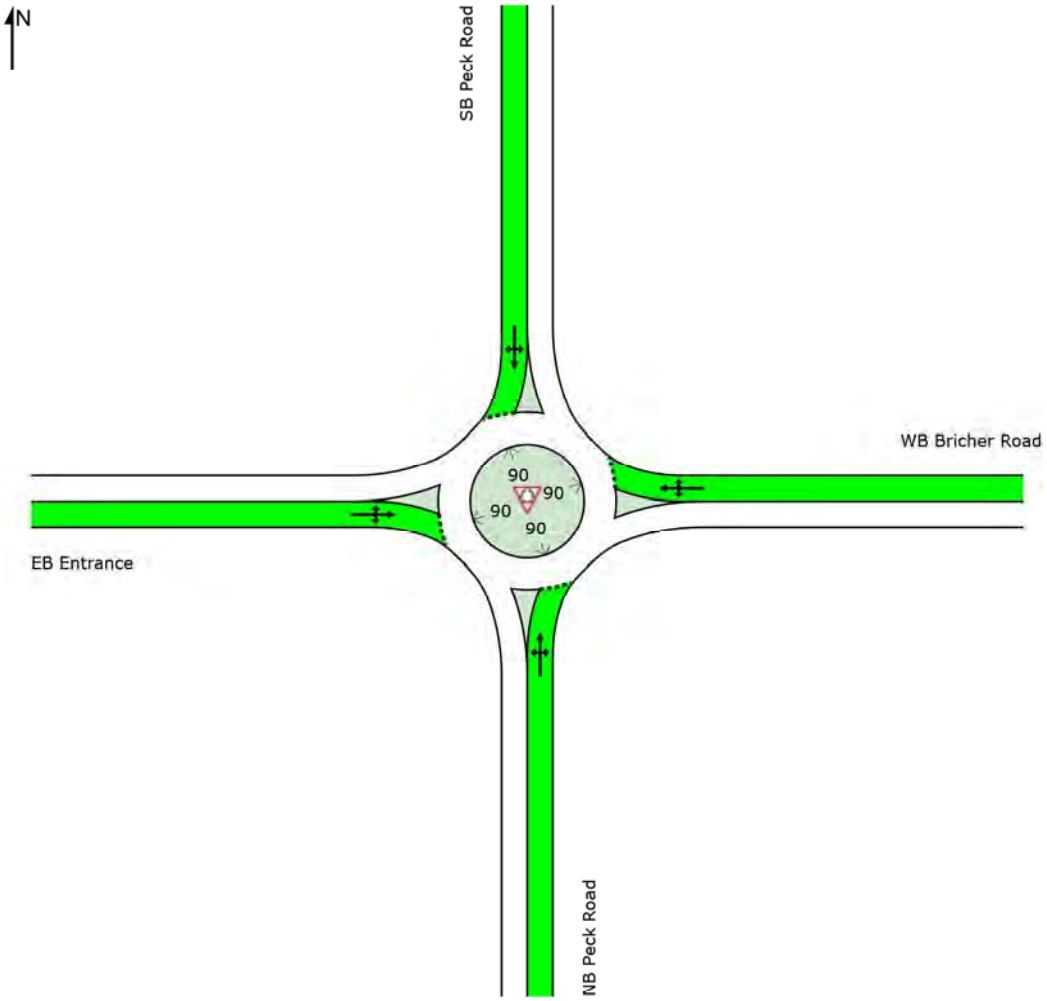
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [Peck & Bricher - Weekday PM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	A	A



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: Same as Sign Control
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 101 [Peck & Bricher - Weekday PM Peak]

Peck Road & Bricher Road
Site Category: -
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: NB Peck Road												
3	L2	1	3.0	0.531	9.3	LOS A	3.8	96.7	0.50	0.33	0.50	32.8
8	T1	488	3.0	0.531	9.3	LOS A	3.8	96.7	0.50	0.33	0.50	32.8
18	R2	118	3.0	0.531	9.3	LOS A	3.8	96.7	0.50	0.33	0.50	31.9
Approach		608	3.0	0.531	9.3	LOS A	3.8	96.7	0.50	0.33	0.50	32.6
East: WB Bricher Road												
1	L2	117	3.0	0.396	9.4	LOS A	2.1	53.5	0.65	0.67	0.72	31.8
6	T1	4	3.0	0.396	9.4	LOS A	2.1	53.5	0.65	0.67	0.72	31.8
16	R2	193	3.0	0.396	9.4	LOS A	2.1	53.5	0.65	0.67	0.72	30.9
Approach		315	3.0	0.396	9.4	LOS A	2.1	53.5	0.65	0.67	0.72	31.3
North: SB Peck Road												
7	L2	141	3.0	0.558	9.6	LOS A	4.3	108.9	0.48	0.29	0.48	32.1
4	T1	510	3.0	0.558	9.6	LOS A	4.3	108.9	0.48	0.29	0.48	32.1
14	R2	5	3.0	0.558	9.6	LOS A	4.3	108.9	0.48	0.29	0.48	31.3
Approach		657	3.0	0.558	9.6	LOS A	4.3	108.9	0.48	0.29	0.48	32.1
West: EB Entrance												
5	L2	7	3.0	0.018	6.2	LOS A	0.1	1.7	0.60	0.50	0.60	32.7
2	T1	2	3.0	0.018	6.2	LOS A	0.1	1.7	0.60	0.50	0.60	32.7
12	R2	2	3.0	0.018	6.2	LOS A	0.1	1.7	0.60	0.50	0.60	31.9
Approach		11	3.0	0.018	6.2	LOS A	0.1	1.7	0.60	0.50	0.60	32.5
All Vehicles		1590	3.0	0.558	9.4	LOS A	4.3	108.9	0.52	0.38	0.53	32.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix B

Crash Memorandum

Memorandum

To:	Candance Thomas, P.E.	**Date:**	03/08/2018
From:	Michael Moes	**Re:**	Crash Data for Peck Road and Bricher Road
Cc:	Tice Cole, P.E., PTOE		

CMT has reviewed the historical crash data provided by the Kane County Division of Transportation, for the years including and between 2012 to 2016, and compared this information to the projected crash volume as obtained from utilizing IHSDM-HSM Predictive Method (v14.0.0).

Historical Data is provided in appendix A of this memorandum, and in summary, showed a total of **13** crashes at this intersection between 2012 and 2016. This results in a crash rate of *2.6 crashes per year*. The year 2012 alone produced 6 of the 13 total crashes, or 46.2% of the total crashes. Of the 13 total crashes, 10, or 77%, were rear-end collisions.

Data generated from the application of the IHSDM-HSM model resulted in a predictive value of **11.64** crashes between 2012 and 2016 for the existing TWSC intersection. This results in a crash rate of *2.3 crashes per year*. This data is included in this memorandum as Appendix B. The model was also run to simulate a signalized intersection, as well as a roundabout. The signalized model predicted 9.5 crashes, and the roundabout predicted 6.5 crashes.

A collision diagram showing the nature and location of the crashes has been included as Appendix C.

Intersection Type	**Crash Total**	**Crash Rate**
Existing (Actual) – TWSC	13	2.6
Existing (Predictive) – TWSC	11.64	2.3
Proposed – Signalized (Predictive)	9.5	1.9
Proposed – Roundabout (Predictive)	6.5	1.3

END OF MEMO ■

APPENDIX A

CRASH HISTORY

Location: Peck Road at Bricher Road **From** 2012 **To** 2016

CRASH TYPE	2012 Num.	2012 %	2013 Num.	2013 %	2014 Num.	2014 %	2015 Num.	2015 %	2016 Num.	2016 %	Year 1 - Year 5 Num.	Year 1 - Year 5 %
Left Turn (10L)	1	17%		0%		0%		0%		0%	1	8%
Right Turn (10R)		0%		0%		0%		0%		0%	0	0%
Rear End (11)	4	67%	2	100%	1	100%	2	100%	1	50%	10	77%
Angle (15)		0%		0%		0%		0%		0%	0	0%
Sideswipe - Same Dir. (12)		0%		0%		0%		0%		0%	0	0%
Sideswipe Opp Dir. (13)		0%		0%		0%		0%		0%	0	0%
Head-On (14)		0%		0%		0%		0%		0%	0	0%
Overturned (5)		0%		0%		0%		0%		0%	0	0%
Fixed Object (6)		0%		0%		0%		0%		0%	0	0%
Animal (4)		0%		0%		0%		0%	1	50%	1	8%
Other (8)	1	17%		0%		0%		0%		0%	1	8%

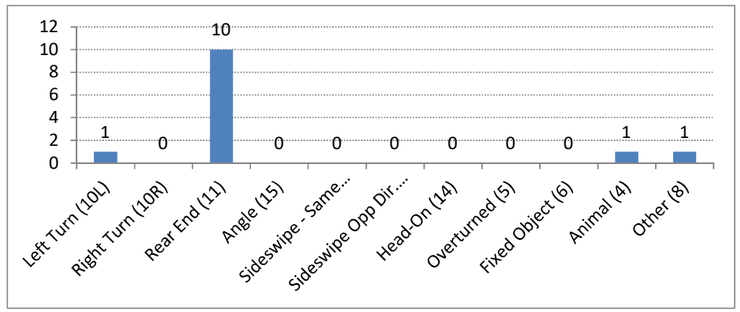
SEVERITY [1]	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Fatal		0%		0%		0%		0%		0%	0	0%
Type A		0%		0%		0%		0%		0%	0	0%
Type B	1	17%		0%		0%		0%		0%	1	8%
Type C	1	17%		0%		0%		0%		0%	1	8%
Propery Damage Only	4	67%	2	100%	1	100%	2	100%	2	100%	11	85%

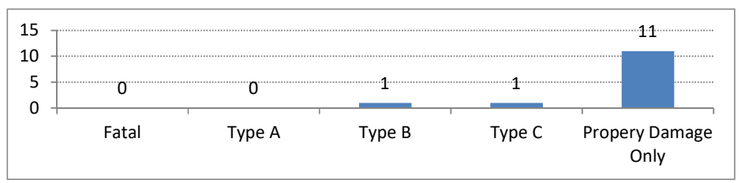
TIME OF DAY	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
12:00 - 3:00 AM		0%		0%		0%		0%		0%	0	0%
3:01 -6:00 AM		0%		0%		0%		0%		0%	0	0%
6:01 - 9:00 AM [2]		0%		0%		0%		0%		0%	0	0%
9:01 - 12:00 PM		0%		0%	1	100%		0%		0%	1	8%
12:01 - 3:00 PM	2	33%		0%		0%		0%		0%	2	15%
3:01 - 6:00 PM [2]	3	50%	2	100%		0%	2	100%	1	50%	8	62%
6:01 - 9:00 PM	1	17%		0%		0%		0%	1	50%	2	15%
9:01-11:59 PM		0%		0%		0%		0%		0%	0	0%

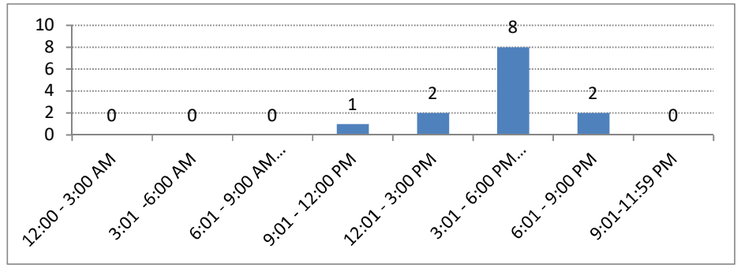
ROADWAY CONDITIONS	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Dry	4	67%	1	50%	1	100%	2	100%	2	100%	10	77%
Wet	1	17%	1	50%		0%		0%		0%	2	15%
Snow/Ice	1	17%		0%		0%		0%		0%	1	8%

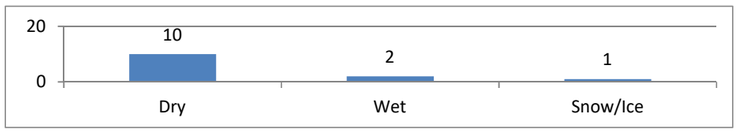
TOTAL CRASHES	6	46%	2	15%	1	8%	2	15%	2	15%	13	

5 Year Statistics









Notes:

Data Source: Illinois Department of Transportation

Table Prepared by: Kane County Division of Transportation

[1] Type A - Incapacitating Injury; Type B - Nonincapacitating Injury; Type C - Reported, not evident

[2] AM/PM peak traffic periods

APPENDIX B

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

December 14, 2018

Disclaimer

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List of Tables

List of Figures

Report Overview

Report Generated: Dec 14, 2018 11:05 AM
Report Template: System: Multi-Page [System] (mlcpm2, Dec 6, 2018 10:06 AM)

Evaluation Date: Fri Dec 14 09:48:50 CST 2018
IHSDM Version: v14.0.0 (Sep 26, 2018)
Crash Prediction Module: v9.0.0 (Sep 26, 2018)

User Name: mmoes
Organization Name: CMT
Phone: 630-820-1022
E-Mail: mmoes@cmtengr.com

Project Title: Peck and Bricher
Project Comment: Created using wizard
Project Unit System: U.S. Customary

Highway Title: Peck Road
Highway Comment: Created Fri Dec 14 08:59:41 CST 2018
Highway Version: 2

Evaluation Title: Evaluation 2
Evaluation Comment: Created Fri Dec 14 09:48:04 CST 2018

Minimum Location: 1992+00.000
Maximum Location: 2010+00.000
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
Empirical-Bayes Analysis: None
First Year of Analysis: 2012
Last Year of Analysis: 2016

Section Types

Section 1 Evaluation

Section: Section 1
Evaluation Start Location: 1992+00.000
Evaluation End Location: 2010+00.000
Area Type: Suburban
Functional Class: Arterial
Type of Alignment: Undivided, Two Lane
Model Category: Urban/Suburban Arterial
Calibration Factor: 2U=1.0; 3ST=1.0;

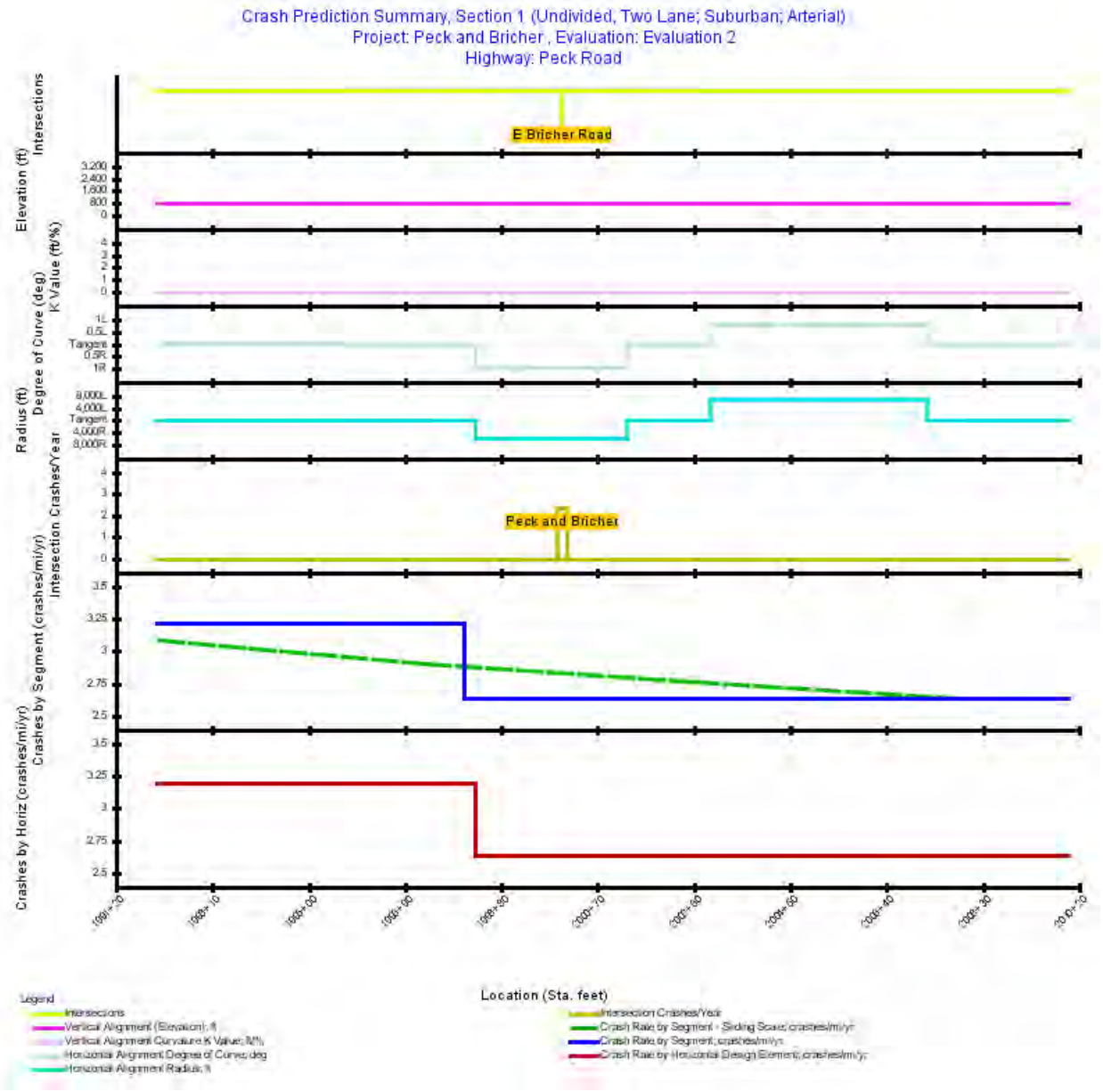

Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length(mi)	AADT	Number Major Commericial Driveways	Number Minor Commericial Driveways	Number Major Industial/Institutional	Number Minor Industial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	2U	1992+00.000	1998+08.000	608.00	0.1152	2012-2016: 12,160	0	0	0	0	1	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
2	2U	1998+08.000	1998+30.070	22.07	0.0042	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
3	2U	1998+30.070	1999+42.000	111.93	0.0212	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
4	2U	1999+42.000	2000+41.000	99.00	0.0187	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
5	2U	2000+41.000	2001+27.930	86.93	0.0165	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
6	2U	2001+27.930	2001+92.000	64.07	0.0121	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
7	2U	2001+92.000	2002+93.300	101.30	0.0192	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
8	2U	2002+93.300	2007+20.780	427.48	0.0810	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
9	2U	2007+20.780	2010+00.000	279.22	0.0529	2012-2016: 12,160	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00

Table 2. Evaluation Intersection (Section 1)

Inter. No.	Title	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Nearby	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed	Replaced with Roundabout
1	Peck and Bricher	2000+00.000	2012-2016: 12,160	2012-2016: 5,500	3	Stop-Controlled	Three-Legged w/STOP control	0	0			false	false	false				false

Table 3. Predicted Highway Crash Rates and Frequencies (Section 1)

First Year of Analysis	**2012**
Last Year of Analysis	**2016**
Evaluated Length (mi)	**0.3409**
Average Future Road AADT (vpd)	**12,160**
Predicted Crashes	
Total Crashes	**16.46**
Fatal and Injury Crashes	**5.20**
Property-Damage-Only Crashes	**11.26**
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	**32**
Percent Property-Damage-Only Crashes (%)	**68**
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	**9.6575**
FI Crash Rate (crashes/mi/yr)	**3.0520**
PDO Crash Rate (crashes/mi/yr)	**6.6056**
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	**7.57**
Travel Crash Rate (crashes/million veh-mi)	**2.18**
Travel FI Crash Rate (crashes/million veh-mi)	**0.69**
Travel PDO Crash Rate (crashes/million veh-mi)	**1.49**

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
1	1992+00.000	1998+08.000	0.1152	1.853	0.3707	0.1054	0.2653	3.2190	0.72	
2	1998+08.000	1998+30.070	0.0042	0.055	0.0110	0.0030	0.0080	2.6295	0.59	
3	1998+30.070	1999+42.000	0.0212	0.279	0.0557	0.0153	0.0404	2.6295	0.59	
4	1999+42.000	2000+41.000	0.0187	0.246	0.0493	0.0135	0.0358	2.6295	0.59	
Peck and Bricher	2000+00.000			11.640	2.3280	0.7722	1.5559			0.43
5	2000+41.000	2001+27.930	0.0165	0.216	0.0433	0.0119	0.0314	2.6295	0.59	
6	2001+27.930	2001+92.000	0.0121	0.160	0.0319	0.0088	0.0232	2.6295	0.59	
7	2001+92.000	2002+93.300	0.0192	0.252	0.0504	0.0138	0.0366	2.6295	0.59	
8	2002+93.300	2007+20.780	0.0810	1.064	0.2129	0.0584	0.1545	2.6295	0.59	
9	2007+20.780	2010+00.000	0.0529	0.695	0.1391	0.0381	0.1009	2.6295	0.59	
All Segments			0.3409	4.822	0.9643	0.2683	0.6960	2.8286		
All Intersections				11.640	2.3280	0.7722	1.5559			
Total			0.3409	16.462	3.2923	1.0404	2.2519			

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Tangent	1992+00.000	1998+30.070	0.1193	1.908	0.3817	0.1084	0.2732	3.1984	0.72
Simple Curve 1	1998+30.070	2001+27.930	0.0564	0.742	0.1483	0.0407	0.1076	2.6295	0.59
Tangent	2001+27.930	2002+93.300	0.0313	0.412	0.0824	0.0226	0.0598	2.6295	0.59
Simple Curve 2	2002+93.300	2007+20.780	0.0810	1.064	0.2129	0.0584	0.1545	2.6295	0.59
Tangent	2007+20.780	2010+00.000	0.0529	0.695	0.1391	0.0381	0.1009	2.6295	0.59

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2012	3.29	1.04	0.316	2.25	0.684
2013	3.29	1.04	0.316	2.25	0.684
2014	3.29	1.04	0.316	2.25	0.684
2015	3.29	1.04	0.316	2.25	0.684
2016	3.29	1.04	0.316	2.25	0.684
Total	16.46	5.20	0.316	11.26	0.684
Average	3.29	1.04	0.316	2.25	0.684

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Five Lane or Fewer Segment Crash Type Distribution (Section 1)

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.01	0.0	0.07	0.4	0.08	0.5
Highway Segment	Collision with Bicycle	0.02	0.1	0.00	0.0	0.02	0.1
Highway Segment	Collision with Fixed Object	0.21	1.3	0.83	5.0	1.05	6.4
Highway Segment	Collision with Other Object	0.00	0.0	0.01	0.1	0.02	0.1
Highway Segment	Other Single-vehicle Collision	0.07	0.4	0.18	1.1	0.25	1.5
Highway Segment	Collision with Pedestrian	0.02	0.1	0.00	0.0	0.02	0.1
Highway Segment	Total Segment Single Vehicle Crashes	0.34	2.1	1.09	6.7	1.44	8.7
Highway Segment	Angle Collision	0.08	0.5	0.17	1.0	0.25	1.5
Highway Segment	Driveway-related Collision	0.11	0.7	0.23	1.4	0.34	2.0
Highway Segment	Head-on Collision	0.06	0.4	0.01	0.1	0.07	0.4
Highway Segment	Other Multi-vehicle Collision	0.03	0.2	0.11	0.7	0.14	0.9
Highway Segment	Rear-end Collision	0.65	4.0	1.68	10.2	2.33	14.2
Highway Segment	Sideswipe, Opposite Direction Collision	0.07	0.4	0.12	0.7	0.18	1.1
Highway Segment	Sideswipe, Same Direction Collision	0.01	0.1	0.07	0.4	0.08	0.5
Highway Segment	Total Segment Multiple Vehicle Crashes	1.00	6.1	2.38	14.5	3.39	20.6
Highway Segment	Total Highway Segment Crashes	1.34	8.1	3.48	21.1	4.82	29.3
Intersection	Collision with Animal	0.00	0.0	0.03	0.2	0.03	0.2
Intersection	Collision with Bicycle	0.18	1.1	0.00	0.0	0.18	1.1
Intersection	Collision with Fixed Object	0.47	2.9	1.16	7.0	1.63	9.9
Intersection	Non-Collision	0.07	0.4	0.04	0.3	0.11	0.6
Intersection	Collision with Other Object	0.06	0.3	0.13	0.8	0.18	1.1
Intersection	Other Single-vehicle Collision	0.02	0.1	0.03	0.2	0.06	0.3
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.01	0.0
Intersection	Collision with Pedestrian	0.24	1.4	0.00	0.0	0.24	1.4
Intersection	Total Intersection Single Vehicle Crashes	1.03	6.3	1.39	8.4	2.42	14.7
Intersection	Angle Collision	0.97	5.9	1.67	10.2	2.64	16.1
Intersection	Head-on Collision	0.13	0.8	0.15	0.9	0.27	1.7
Intersection	Other Multi-vehicle Collision	0.18	1.1	1.50	9.1	1.69	10.2
Intersection	Rear-end Collision	1.19	7.2	2.81	17.1	4.00	24.3
Intersection	Sideswipe	0.36	2.2	0.26	1.6	0.61	3.7
Intersection	Total Intersection Multiple Vehicle Crashes	2.83	17.2	6.39	38.8	9.22	56.0
Intersection	Total Intersection Crashes	3.86	23.5	7.78	47.3	11.64	70.7
	Total Crashes	5.20	31.6	11.26	68.4	16.46	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

December 14, 2018

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Report Overview

Report Generated: Dec 14, 2018 10:58 AM
Report Template: System: Multi-Page [System] (mlcpm2, Dec 6, 2018 10:06 AM)

Evaluation Date: Fri Dec 14 09:44:47 CST 2018
IHSDM Version: v14.0.0 (Sep 26, 2018)
Crash Prediction Module: v9.0.0 (Sep 26, 2018)

User Name: mmoes
Organization Name: CMT
Phone: 630-820-1022
E-Mail: mmoes@cmtengr.com

Project Title: Peck and Bricher
Project Comment: Created using wizard
Project Unit System: U.S. Customary

Highway Title: Bricher Road
Highway Comment: Created using wizard
Highway Version: 1

Evaluation Title: Evaluation 1
Evaluation Comment: Created Fri Dec 14 09:43:16 CST 2018

Minimum Location: 500+00.000
Maximum Location: 511+00.000
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
Empirical-Bayes Analysis: None
First Year of Analysis: 2012
Last Year of Analysis: 2016

Section Types

Section 1 Evaluation

Section: Section 1
Evaluation Start Location: 500+00.000
Evaluation End Location: 511+00.000
Area Type: Suburban
Functional Class: Arterial
Type of Alignment: Undivided, Two Lane
Model Category: Urban/Suburban Arterial
Calibration Factor: 2U=1.0; 3ST=1.0;

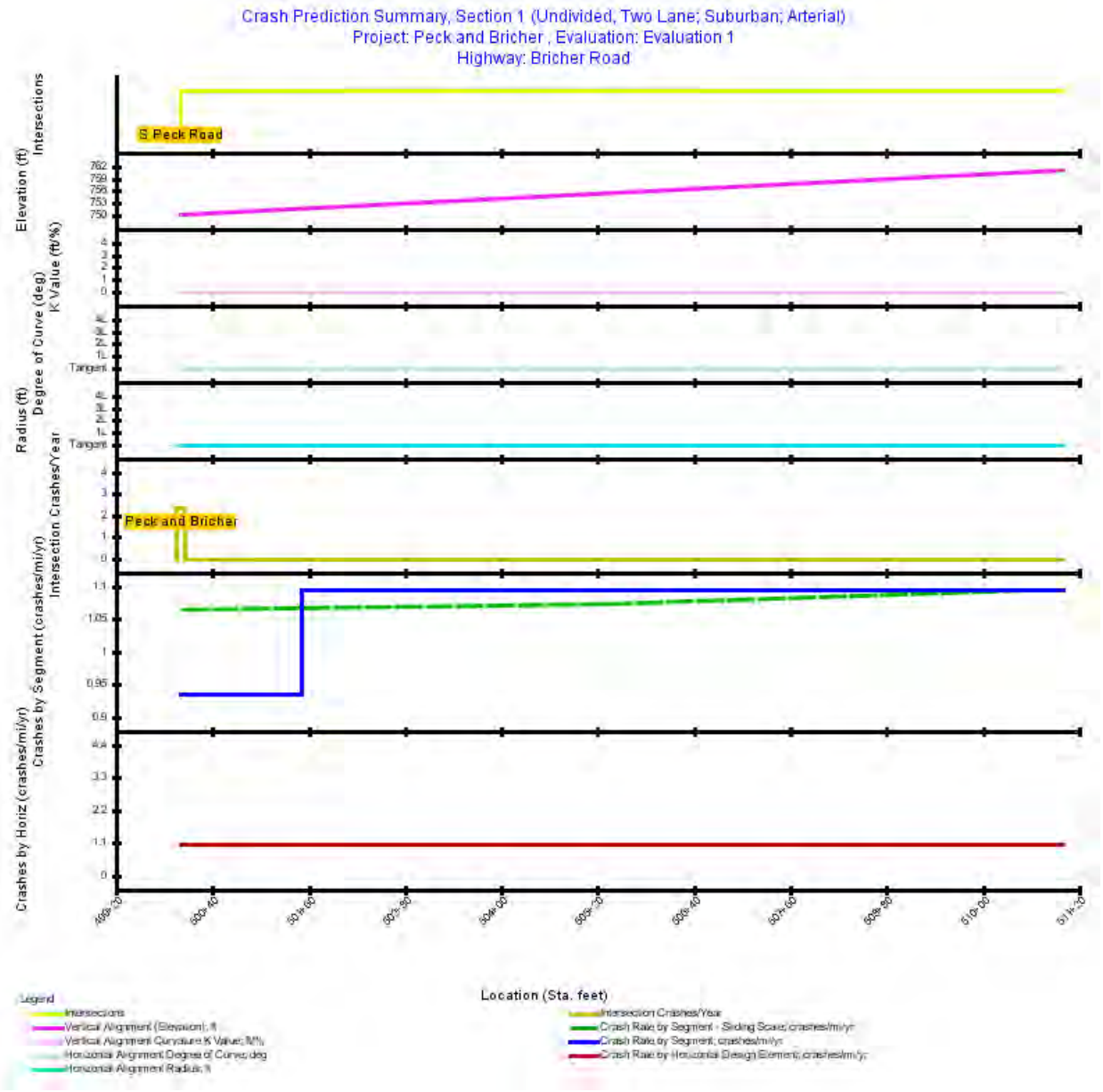


Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length(mi)	AADT	Number Major Commericial Driveways	Number Minor Commericial Driveways	Number Major Industial/Institutional	Number Minor Industial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	2U	500+00.000	500+67.000	67.00	0.0127	2012-2016: 5,500	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
2	2U	500+67.000	501+51.000	84.00	0.0159	2012-2016: 5,500	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00
3	2U	501+51.000	511+00.000	949.00	0.1797	2012-2016: 5,500	0	0	0	0	1	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	0.00	12.00

Table 2. Evaluation Intersection (Section 1)

Inter. No.	Title	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Nearby	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed	Replaced with Roundabout
1	Peck and Bricher	500+00.000	2012-2016: 12,160	2012-2016: 5,500	3	Stop-Controlled	Three-Legged w/STOP control	0	0			false	false	false				false

Table 3. Predicted Highway Crash Rates and Frequencies (Section 1)

First Year of Analysis	**2012**
Last Year of Analysis	**2016**
Evaluated Length (mi)	**0.2083**
Average Future Road AADT (vpd)	**5,500**
Predicted Crashes	
Total Crashes	**12.76**
Fatal and Injury Crashes	**4.19**
Property-Damage-Only Crashes	**8.57**
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	**33**
Percent Property-Damage-Only Crashes (%)	**67**
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	**12.2476**
FI Crash Rate (crashes/mi/yr)	**4.0239**
PDO Crash Rate (crashes/mi/yr)	**8.2237**
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	**2.09**
Travel Crash Rate (crashes/million veh-mi)	**6.10**
Travel FI Crash Rate (crashes/million veh-mi)	**2.00**
Travel PDO Crash Rate (crashes/million veh-mi)	**4.10**

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
Peck and Bricher	500+00.000			11.640	2.3280	0.7722	1.5559			0.43
1	500+00.000	500+67.000	0.0127	0.059	0.0119	0.0035	0.0084	0.9357	0.47	
2	500+67.000	501+51.000	0.0159	0.074	0.0149	0.0043	0.0106	0.9357	0.47	
3	501+51.000	511+00.000	0.1797	0.984	0.1968	0.0584	0.1384	1.0949	0.55	
All Segments			0.2083	1.118	0.2235	0.0661	0.1574	1.0730		
All Intersections				11.640	2.3280	0.7722	1.5559			
Total			0.2083	12.758	2.5516	0.8383	1.7133			

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Tangent	500+00.000	511+00.000	0.2083	1.118	0.2235	0.0661	0.1574	1.0730	0.54

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2012	2.55	0.84	0.329	1.71	0.671
2013	2.55	0.84	0.329	1.71	0.671
2014	2.55	0.84	0.329	1.71	0.671
2015	2.55	0.84	0.329	1.71	0.671
2016	2.55	0.84	0.329	1.71	0.671
Total	12.76	4.19	0.329	8.57	0.671
Average	2.55	0.84	0.329	1.71	0.671

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Five Lane or Fewer Segment Crash Type Distribution (Section 1)

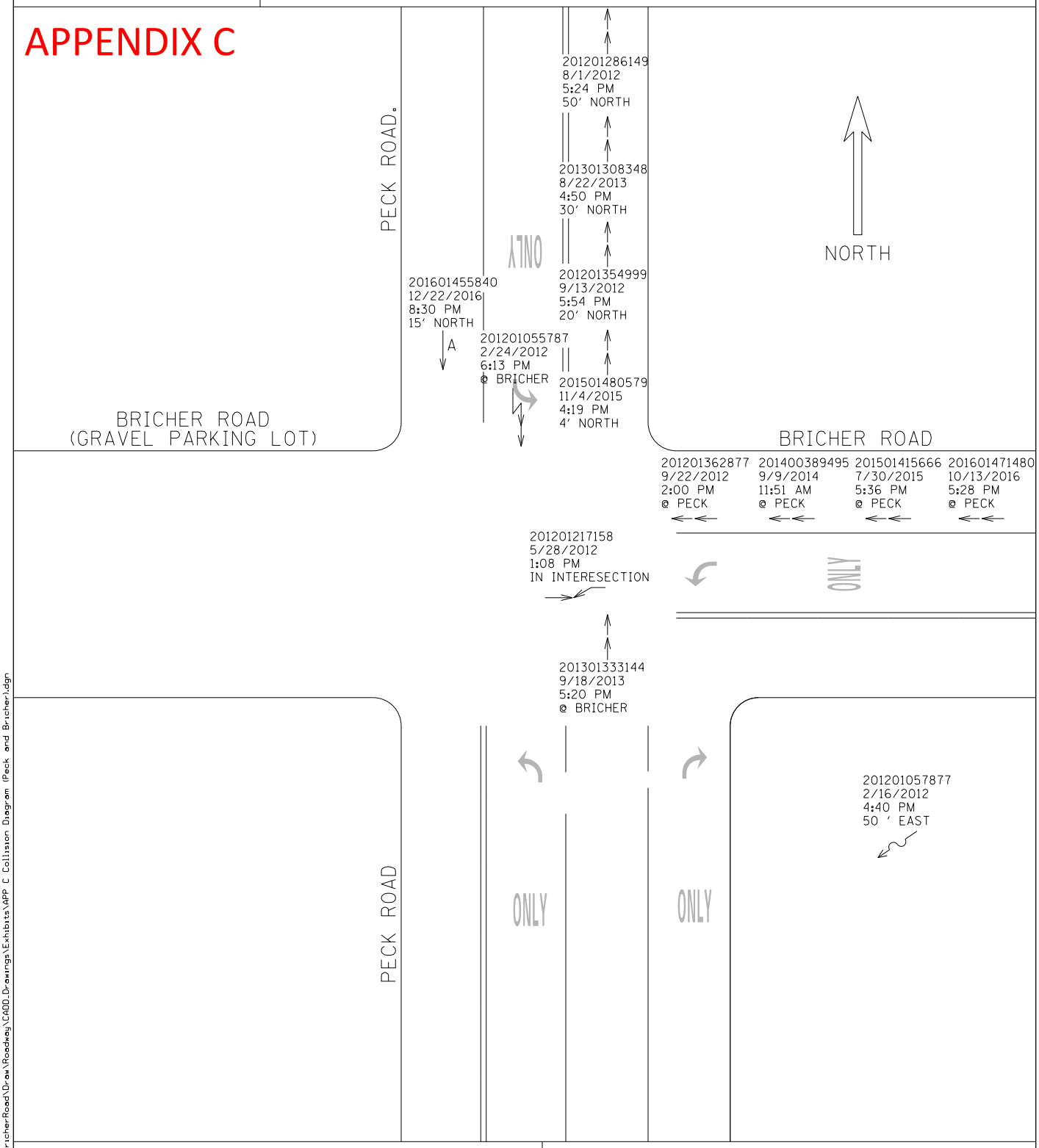
Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.02	0.2	0.03	0.2
Highway Segment	Collision with Bicycle	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Collision with Fixed Object	0.10	0.8	0.28	2.2	0.38	3.0
Highway Segment	Collision with Other Object	0.00	0.0	0.01	0.0	0.01	0.0
Highway Segment	Other Single-vehicle Collision	0.03	0.3	0.06	0.5	0.09	0.7
Highway Segment	Collision with Pedestrian	0.01	0.0	0.00	0.0	0.01	0.0
Highway Segment	Total Segment Single Vehicle Crashes	0.15	1.2	0.37	2.9	0.52	4.1
Highway Segment	Angle Collision	0.01	0.1	0.03	0.2	0.04	0.3
Highway Segment	Driveway-related Collision	0.05	0.4	0.10	0.8	0.14	1.1
Highway Segment	Head-on Collision	0.01	0.1	0.00	0.0	0.01	0.1
Highway Segment	Other Multi-vehicle Collision	0.00	0.0	0.02	0.1	0.02	0.2
Highway Segment	Rear-end Collision	0.10	0.8	0.25	2.0	0.35	2.7
Highway Segment	Sideswipe, Opposite Direction Collision	0.01	0.1	0.02	0.1	0.03	0.2
Highway Segment	Sideswipe, Same Direction Collision	0.00	0.0	0.01	0.1	0.01	0.1
Highway Segment	Total Segment Multiple Vehicle Crashes	0.18	1.4	0.42	3.3	0.60	4.7
Highway Segment	Total Highway Segment Crashes	0.33	2.6	0.79	6.2	1.12	8.8
Intersection	Collision with Animal	0.00	0.0	0.03	0.2	0.03	0.2
Intersection	Collision with Bicycle	0.18	1.4	0.00	0.0	0.18	1.4
Intersection	Collision with Fixed Object	0.47	3.7	1.16	9.1	1.63	12.8
Intersection	Non-Collision	0.07	0.5	0.04	0.3	0.11	0.8
Intersection	Collision with Other Object	0.06	0.4	0.13	1.0	0.18	1.4
Intersection	Other Single-vehicle Collision	0.02	0.2	0.03	0.3	0.06	0.4
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.01	0.0
Intersection	Collision with Pedestrian	0.24	1.8	0.00	0.0	0.24	1.8
Intersection	Total Intersection Single Vehicle Crashes	1.03	8.1	1.39	10.9	2.42	19.0
Intersection	Angle Collision	0.97	7.6	1.67	13.1	2.64	20.7
Intersection	Head-on Collision	0.13	1.0	0.15	1.2	0.27	2.1
Intersection	Other Multi-vehicle Collision	0.18	1.4	1.50	11.8	1.69	13.2
Intersection	Rear-end Collision	1.19	9.3	2.81	22.0	4.00	31.4
Intersection	Sideswipe	0.36	2.8	0.26	2.0	0.61	4.8
Intersection	Total Intersection Multiple Vehicle Crashes	2.83	22.2	6.39	50.1	9.22	72.2
Intersection	Total Intersection Crashes	3.86	30.3	7.78	61.0	11.64	91.2
	Total Crashes	4.19	32.9	8.57	67.1	12.76	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

COLLISION DIAGRAM

JURISDICTION: KDOT CITY: ST. CHARLES / GENEVA
INTERSECTION: PECK ROAD AT BRICHER ROAD
PERIOD: 5 YEARS 0 MONTHS FROM 2012 TO 2016

APPENDIX C



SYMBOLS

→	MOVING VEHICLE	▨	PARKED VEHICLE
M	MOTORCYCLE	P	PEDESTRIAN
⇔	BACKING VEHICLE	A	ANIMAL
→•	STOPPED VEHICLE	B	BICYCLE
⊠	TRAFFIC SIGNAL	□	FIXED OBJECT
■	FATAL	○	OTHER OBJECT

MANNER OF COLLISION

→→	REAR END	→←	HEAD ON
⇉	OVERTAKE	↱	LEFT TURN
⇝	OUT OF CONTROL	↱	RIGHT TURN
⇗	SKIDDING	↳	RIGHT ANGLE
→°	OVERTURNED	⇄	SIDE SWIPE

CMT
License No. 184-000613

DESIGNED	-	M. MOES
DRAWN	-	M .MOES
CHECKED	-	T. COLE
DATE	-	12/27/2018

APPENDIX C
COLLISION DIAGRAM (PECK ROAD AT BRICHER ROAD)

SCALE: NTS SHEET NO. __ OF ___ SHEETS STA. _____ TO STA. _____

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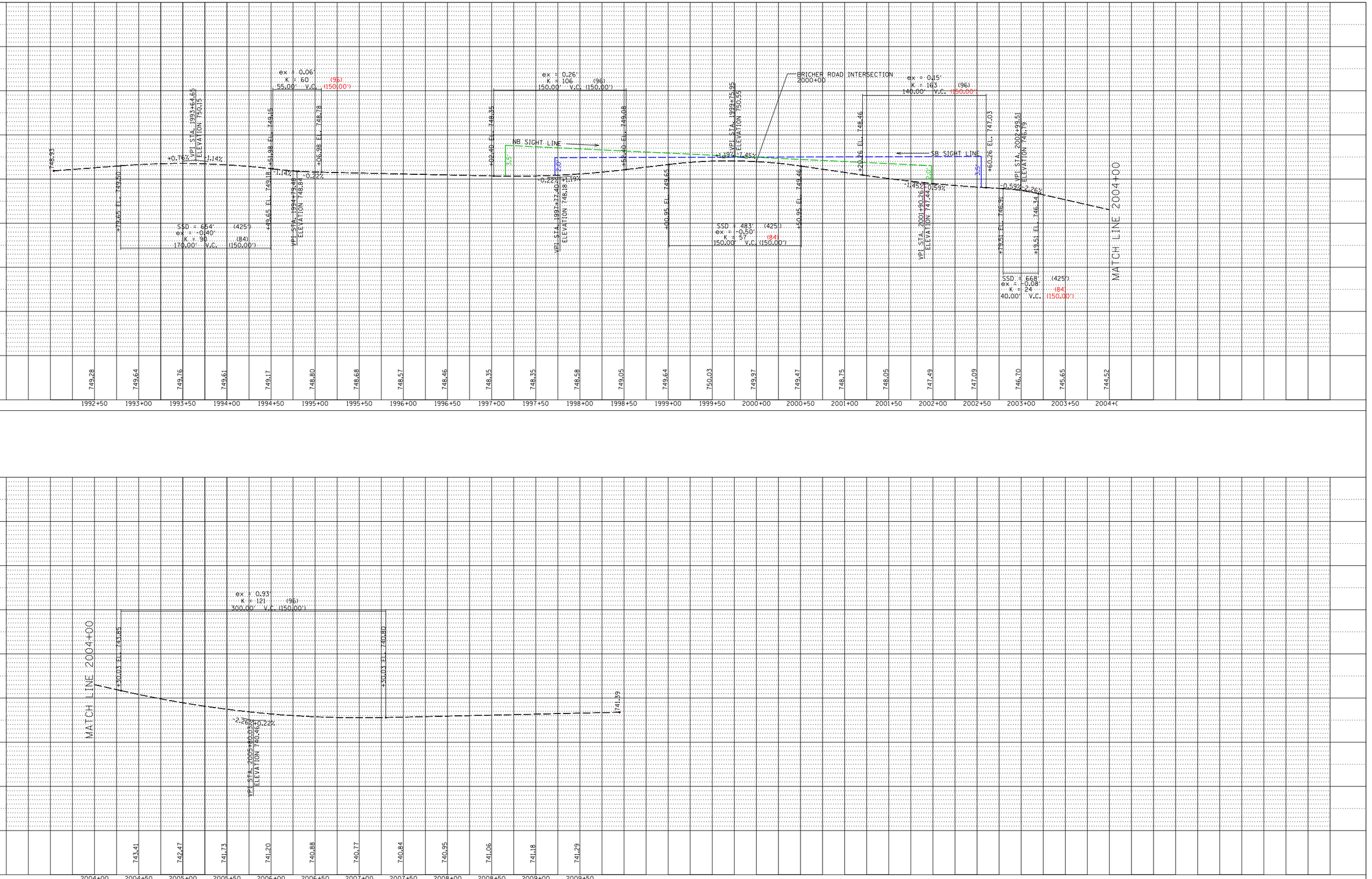
Appendix C

Sight Distance Exhibits



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SURVEYED
PLOTTED
DESIGN CHECKED
R.O.W. CHECKED
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
DESIGN CHECKED
R.O.W. CHECKED
NOTE BOOK
NO.
BY
DATE

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CMT
License No. 184-000613

USER NAME = Mike Moes	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 1/18/2019	DATE - $SUBMITDT$	REVISED -

KANE COUNTY
DIVISION OF TRANSPORTATION

PECK ROAD AND BRICHER ROAD - EXISTING PROFILE ANALYSIS
DESIGN SPEED: 50 MPH
BLRS POLICY VALUE COMPARISON - ALTERNATIVE 1

SCALE: | SHEET NO. OF SHEETS | STA. TO STA.

F.A.-RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	PECK AND BRICHER	KANE	1	
		ILLINOIS	FED. AID PROJECT	

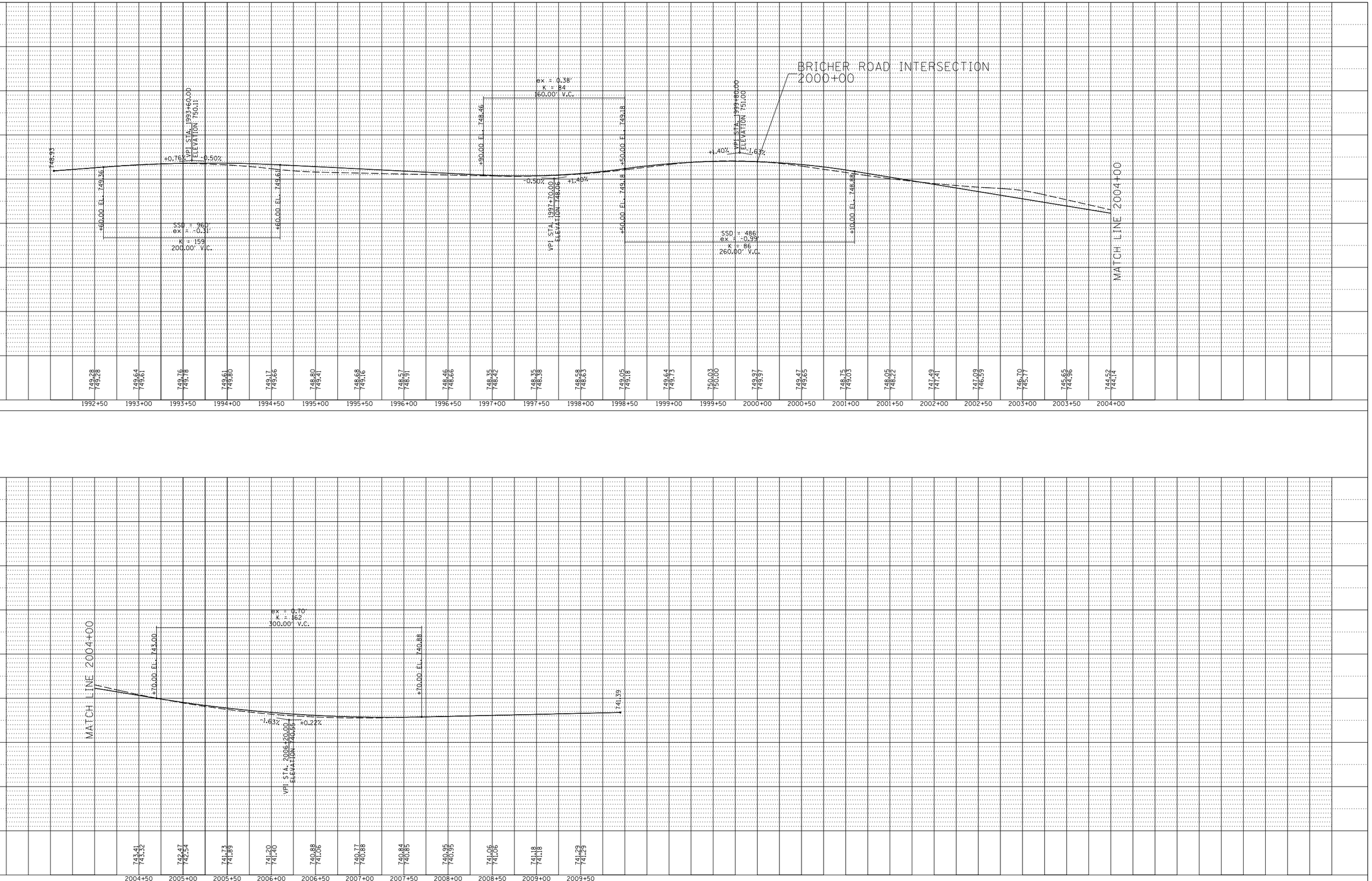
Appendix D

Alternative Exhibits

PLAN

BY	DATE
SURVEYED	
PLOTTED	
ALIGNMENT CHECKED	
RT. OF WAY CHECKED	
CADD FILE NAME	

NOTE BOOK
NO.



PROFILE

BY	DATE
SURVEYED	
PLOTTED	
DESIGN CHECKED	
B.M. NOTED	
STRUCTURE NOTATNS CHKD	

NOTE BOOK
NO.

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CMT
License No. 184-000613

USER NAME = Mike Moes	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 1/18/2019	DATE - $SUBMITDT$	REVISED -

KANE COUNTY
DIVISION OF TRANSPORTATION

PECK ROAD AND BRICHER ROAD - PROPOSED PROFILE ANALYSIS
DESIGN SPEED: 50 MPH
ALTERNATIVE 2

SCALE: | SHEET NO. OF SHEETS | STA. TO STA.

F.A.. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	PECK AND BRICHER	KANE	1	
		ILLINOIS	FED. AID PROJECT	

PAVEMENT MILLING AND RESURFACING

PAVEMENT WIDENING / RECONSTRUCTION

1" = 50'

EXISTING ROW

PECK ROAD

1995+00

2000+00

500+00

2005+00

EXISTING ROW

EXISTING ROW

EXISTING ROW

PROPOSED INTERCONNECT TO IL-38

EXISTING ROW

EXISTING ROW

BRICHER ROAD

1505+00

PROPOSED INTERCONNECT TO
EXISTING HH ON BRICHER

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PEN TABLE = $PENTBLSS

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PLOT SCALE = "
PLOT DATE = "

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DIRECTORY = "
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CMT

License No. 184-000613

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MODEL NAME = Default	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 1/18/2019	DATE -	REVISED -

KANE COUNTY
DIVISION OF TRANSPORTATION

PECK ROAD AND BRICHER ROAD
ALTERNATIVE ANALYSIS 1
MAINTAIN PROFILE / SIGNALIZED INTERSECTION

SCALE: 1" = 50' | SHEET OF SHEETS | STA. TO STA.

SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	KANE		

ILLINOIS | FED. AID PROJECT

PAVEMENT MILLING AND RESURFACING

PAVEMENT WIDENING / RECONSTRUCTION

1" = 50'

EXISTING ROW

PECK ROAD

1995+00

2000+00

2005+00

EXISTING ROW

EXISTING ROW

EXISTING ROW

EXISTING ROW

EXISTING ROW

BRICHER ROAD

PROPOSED INTERCONNECT TO IL-38

PROPOSED INTERCONNECT TO
EXISTING HH ON BRICHER

PLOT DRIVER = $PLTDRVSS
PEN TABLE = $PENTBLSS

USER NAME =
PLOT SCALE =
PLOT DATE =

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DIRECTORY =
FILE NAME =

CMT
License No. 184-000613

FILE NAME = sht_Alternate 2 plan.dgn	DESIGNED -	REVISED -
MODEL NAME = Default	DRAWN -	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 1/18/2019	DATE -	REVISED -

KANE COUNTY
DIVISION OF TRANSPORTATION

PECK ROAD AND BRICHER ROAD
ALTERNATIVE ANALYSIS 2
MODIFY PROFILE / SIGNALIZED INTERSECTION

SCALE: 1" = 50' | SHEET OF SHEETS | STA. | TO STA.

SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	KANE		
ILLINOIS	FED. AID PROJECT		

PAVEMENT MILLING AND RESURFACING

PAVEMENT WIDENING / RECONSTRUCTION

PROPOSED CONSTRUCTION EASEMENT

PROPOSED ROW ACQUISITION

1" = 50'

REQUIRED TEMP. EASEMENT = 0.14 ACRE
OWNER: FOREST PRESERVE DIST. OF KANE CO.

EXISTING ROW

PECK ROAD

1995+00

2000+00

2005+00

EXISTING ROW

EXISTING ROW

EXISTING ROW

REQUIRED TEMP. EASEMENT = 0.08 ACRE
OWNER: PRAIRIE RIDGE HOMEOWNERS ASSOC.

REQUIRED ROW ACQUISITION = 0.02 ACRE
OWNER: KANE COUNTY DIR. OF DEVELOPMENT
& COMMUNITY SERVICES

PROPOSED INTERCONNECT TO IL-38

EXISTING ROW

EXISTING ROW

BRICHER ROAD

PROPOSED INTERCONNECT TO
EXISTING HH ON BRICHER

PLOT DRIVER = $PLTDRVSS
PEN TABLE = $PENTBLSS

USER NAME =
PLOT SCALE =
PLOT DATE =

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CMT
License No. 184-000613

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PLOT DATE = 1/18/2019	DATE -	REVISED -

KANE COUNTY
DIVISION OF TRANSPORTATION

PECK ROAD AND BRICHER ROAD
ALTERNATIVE ANALYSIS 3
ROUNDABOUT INTERSECTION

SCALE: 1" = 50' | SHEET OF SHEETS | STA. | TO STA.

SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	KANE		
	ILLINOIS	FED. AID PROJECT	

Appendix E

Alternative Cost Exhibits

Peck Rd. and Bricher Rd. - Alternate 1

Phase I Engineering

Preliminary Engineer's Opinion of Probable Construction Cost

Date: 1/22/2019
Route: Peck Road
Section: -

Designer: CMT-AURORA
City/County: Geneva/St.Charles
Base Year: 2019

	Work Classification	Estimated Costs	
1	Clearing, Minor Removal Items	$	31,200
2	Earthwork	$	11,400
3	Erosion Control and Landscaping	$	7,100
4	Drainage	$	-
5	Subbase, Base, Surface, Shoulders	$	119,600
6	Marking and Signing	$	12,200
7	Guardrail, Roadside Safety	$	-
8	Traffic Signals and Roadway Lighting	$	361,800
9	Detours, Temporary Traffic Control - Roadway	$	12,200
10	Railroad Crossing Improvements	$	-
11	Field Office and Laboratory	$	-
12	Environmental Mitigation/Incidental Items	$	30,600
13	Miscellaneous Items (10% Roadway Costs)	$	58,700
14	Roadway Subtotal (Categories 1-13)	$	644,800
15	Structure Removal	$	-
16	Major Culverts	$	-
17	Bridges	$	-
18	Structures for Detours and Temporary Traffic Control	$	-
19	Miscellaneous Items (10% Structure Costs)	$	-
20	Structure Subtotal (Categories 15-19)	$	-
21	Roadway and Structure Subtotal (Lines 14 and 20)	$	644,800
22	Contingencies (15% of Line 21)	$	96,800
23	**Total Construction Cost (Lines 21 and 22)**	**$**	**741,600**
24	Utility Adjustments	$	-
25	Land Acquisition and Relocations	$	-
26	Preliminary Engineering (Actual per Agreement)	$	134,173
27	Design Engineering (10% of Line 23)	$	169,055
28	Construction Engineering (10% of Line 23)	$	74,200
29	**Total Project Cost (Lines 23-28)**	**$**	**1,119,028**

Based on IDOT BDE MANUAL FIGURE 65-1.B

All values rounded to nearest $100 |Miscellaenous Items = Unknown Knowns, Contigency = Unknown Unknowns

Peck Rd. and Bricher Rd. - Alternate 2

Phase I Engineering

Preliminary Engineer's Opinion of Probable Construction Cost

Date: 1/22/2019
Route: Peck Road
Section: -

Designer: CMT-AURORA
City/County: Geneva/St.Charles
Base Year: 2019

	Work Classification	Estimated Costs	
1	Clearing, Minor Removal Items	$	58,800
2	Earthwork	$	31,500
3	Erosion Control and Landscaping	$	15,800
4	Drainage	$	-
5	Subbase, Base, Surface, Shoulders	$	306,700
6	Marking and Signing	$	16,300
7	Guardrail, Roadside Safety	$	-
8	Traffic Signals and Roadway Lighting	$	365,900
9	Detours, Temporary Traffic Control - Roadway	$	33,300
10	Railroad Crossing Improvements	$	-
11	Field Office and Laboratory	$	-
12	Environmental Mitigation/Incidental Items	$	50,500
13	Miscellaneous Items (10% Roadway Costs)	$	87,900
14	Roadway Subtotal (Categories 1-13)	$	966,700
15	Structure Removal	$	-
16	Major Culverts	$	-
17	Bridges	$	-
18	Structures for Detours and Temporary Traffic Control	$	-
19	Miscellaneous Items (10% Structure Costs)	$	-
20	Structure Subtotal (Categories 15-19)	$	-
21	Roadway and Structure Subtotal (Lines 14 and 20)	$	966,700
22	Contingencies (15% of Line 21)	$	145,100
23	**Total Construction Cost (Lines 21 and 22)**	**$**	**1,111,800**
24	Utility Adjustments	$	-
25	Land Acquisition and Relocations	$	-
26	Preliminary Engineering (Actual per Agreement)	$	134,173
27	Design Engineering (10% of Line 23)	$	169,055
28	Construction Engineering (10% of Line 23)	$	111,200
29	**Total Project Cost (Lines 23-28)**	**$**	**1,526,228**

Based on IDOT BDE MANUAL FIGURE 65-1.B

All values rounded to nearest $100 |Miscellaenous Items = Unknown Knowns, Contigency = Unknown Unknowns

Peck Rd. and Bricher Rd. - Alternate 3

Phase I Engineering

Preliminary Engineer's Opinion of Probable Construction Cost

Date: 1/22/2019
Route: Peck Road
Section: -

Designer: CMT-AURORA
City/County: Geneva/St.Charles
Base Year: 2019

	Work Classification	Estimated Costs	
1	Clearing, Minor Removal Items	$	93,900
2	Earthwork	$	114,100
3	Erosion Control and Landscaping	$	26,400
4	Drainage	$	84,400
5	Subbase, Base, Surface, Shoulders	$	443,800
6	Marking and Signing	$	16,500
7	Guardrail, Roadside Safety	$	-
8	Traffic Signals and Roadway Lighting	$	212,000
9	Detours, Temporary Traffic Control - Roadway	$	16,900
10	Railroad Crossing Improvements	$	-
11	Field Office and Laboratory	$	-
12	Environmental Mitigation/Incidental Items	$	54,900
13	Miscellaneous Items (10% Roadway Costs)	$	106,300
14	Roadway Subtotal (Categories 1-13)	$	1,169,200
15	Structure Removal	$	-
16	Major Culverts	$	-
17	Bridges	$	-
18	Structures for Detours and Temporary Traffic Control	$	-
19	Miscellaneous Items (10% Structure Costs)	$	-
20	Structure Subtotal (Categories 15-19)	$	-
21	Roadway and Structure Subtotal (Lines 14 and 20)	$	1,169,200
22	Contingencies (15% of Line 21)	$	175,400
23	**Total Construction Cost (Lines 21 and 22)**	**$**	**1,344,600**
24	Utility Adjustments	$	-
25	Land Acquisition and Relocations	$	2,000
26	Preliminary Engineering (Actual per Agreement)	$	134,173
27	Design Engineering (10% of Line 23)	$	169,055
28	Construction Engineering (10% of Line 23)	$	134,500
29	**Total Project Cost (Lines 23-28)**	**$**	**1,784,328**

Based on IDOT BDE MANUAL FIGURE 65-1.B

All values rounded to nearest $100 |Miscellaenous Items = Unknown Knowns, Contigency = Unknown Unknowns

Appendix F

Turn Templates for Traditional Intersection

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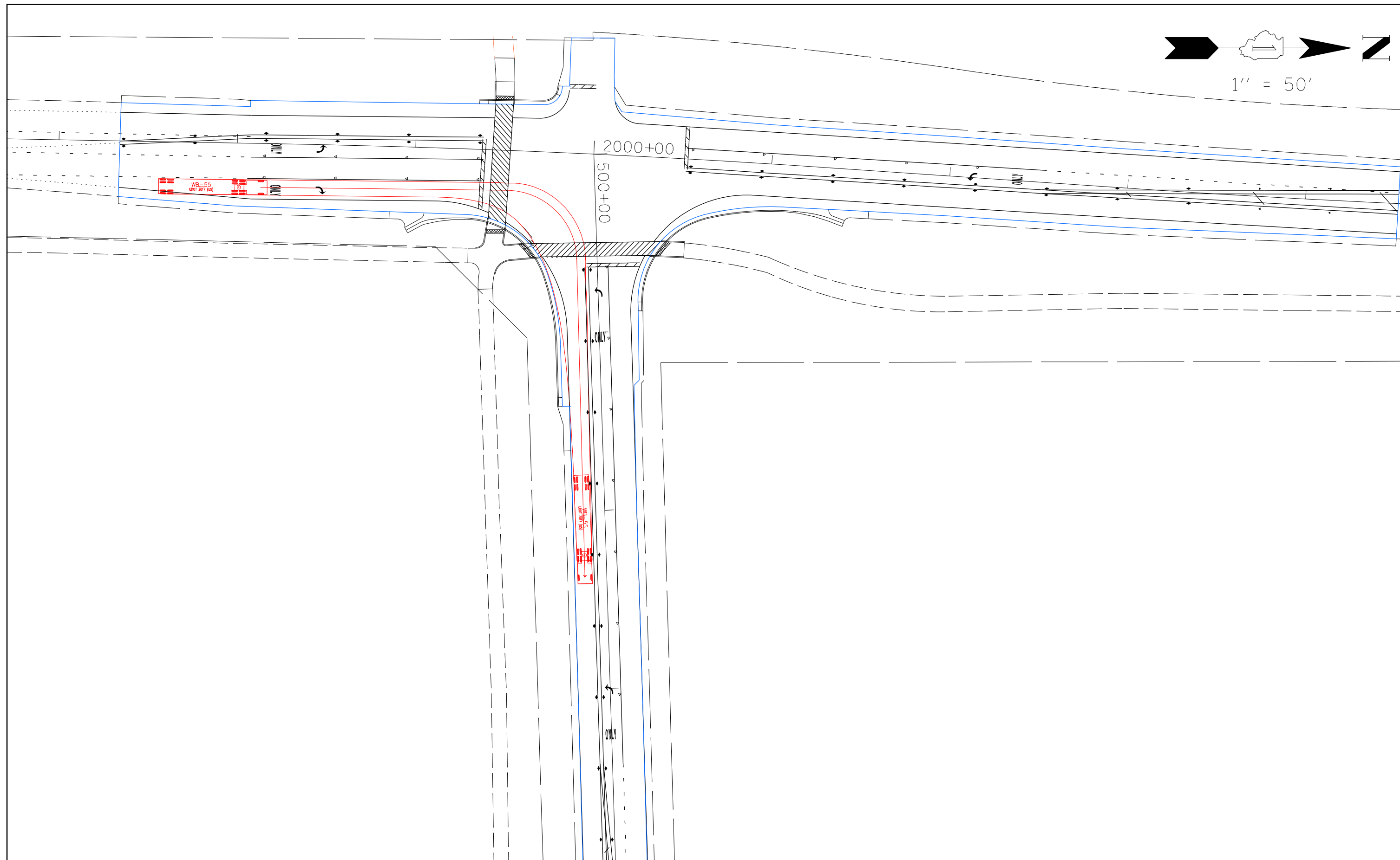
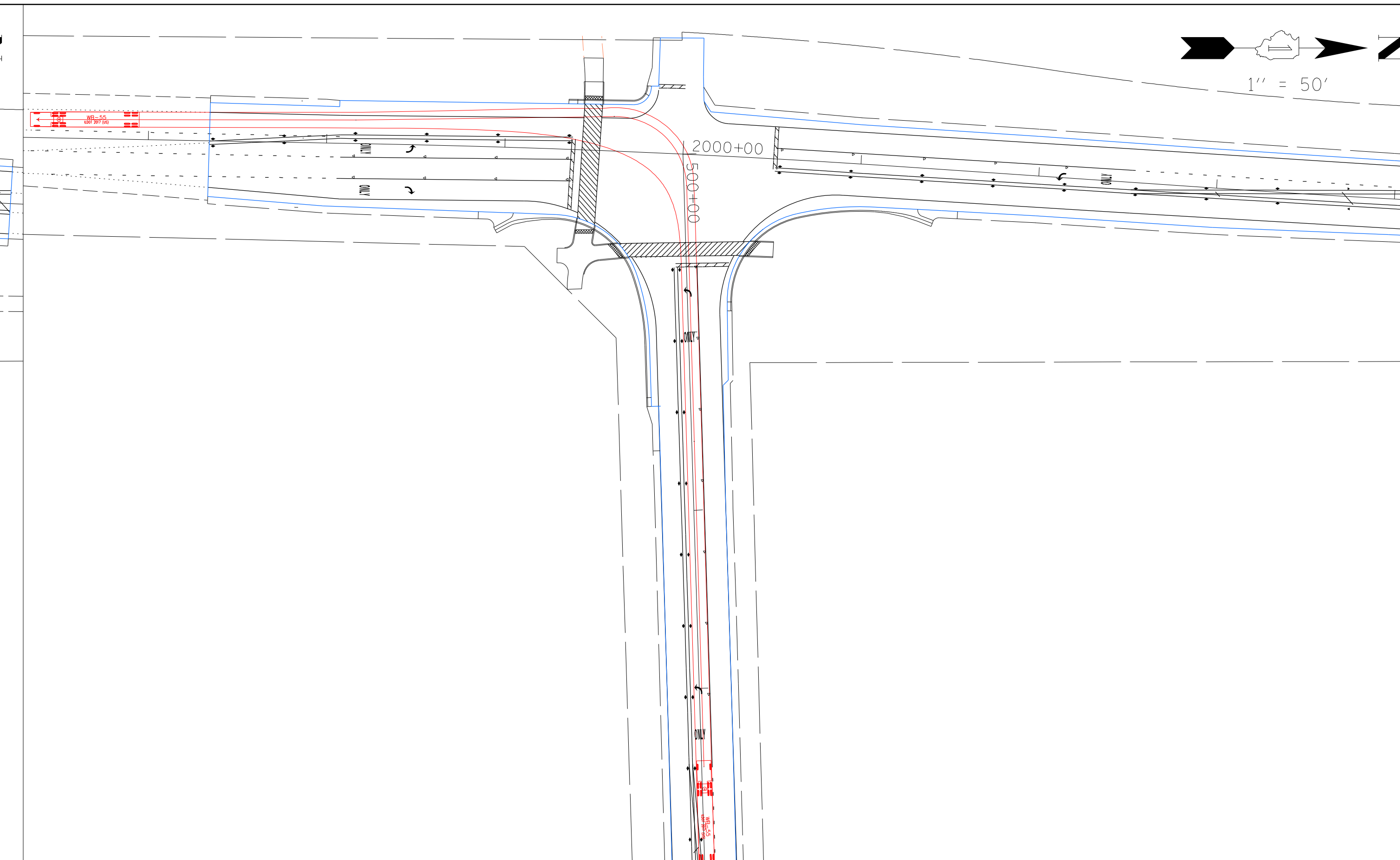
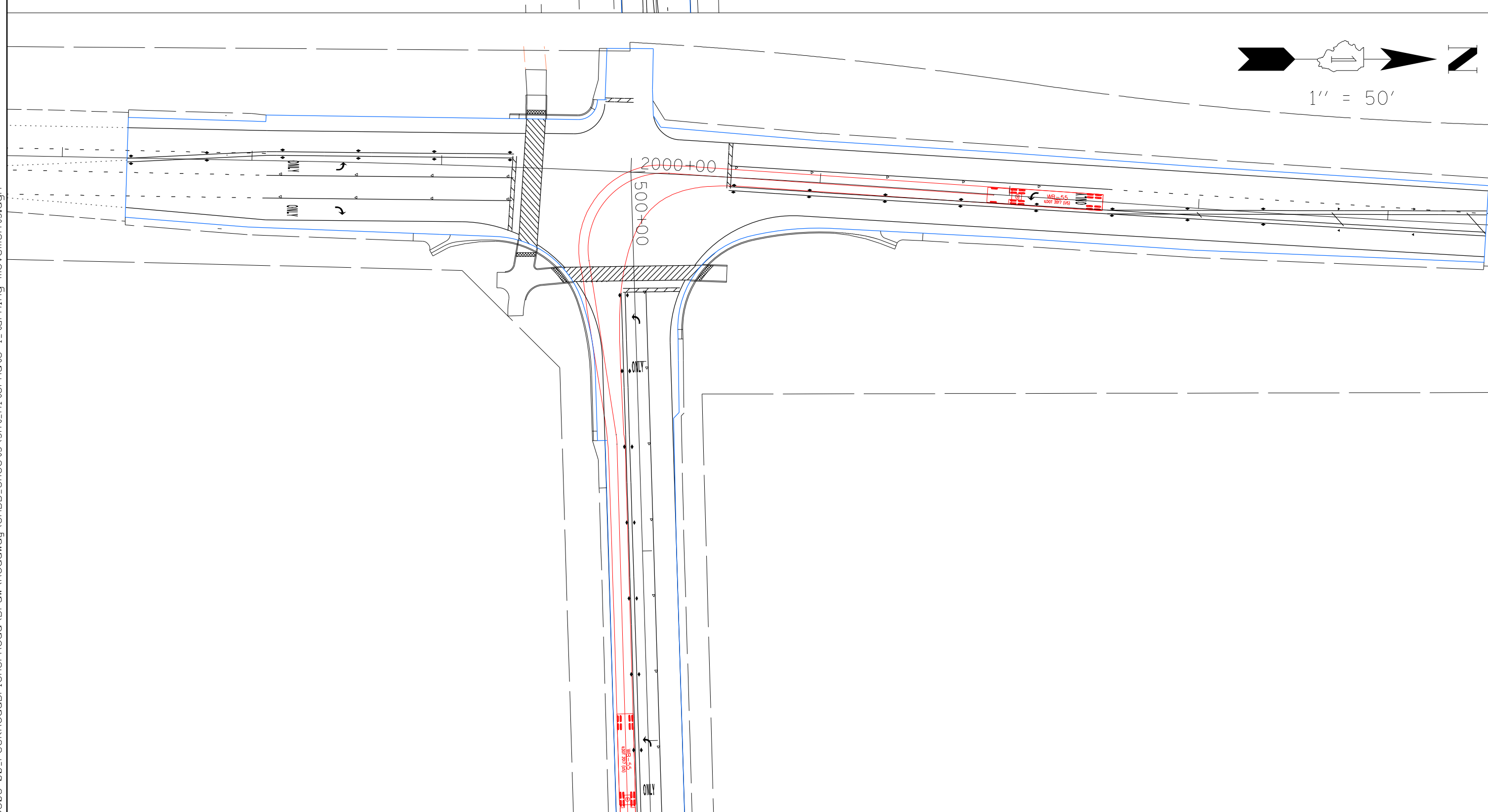


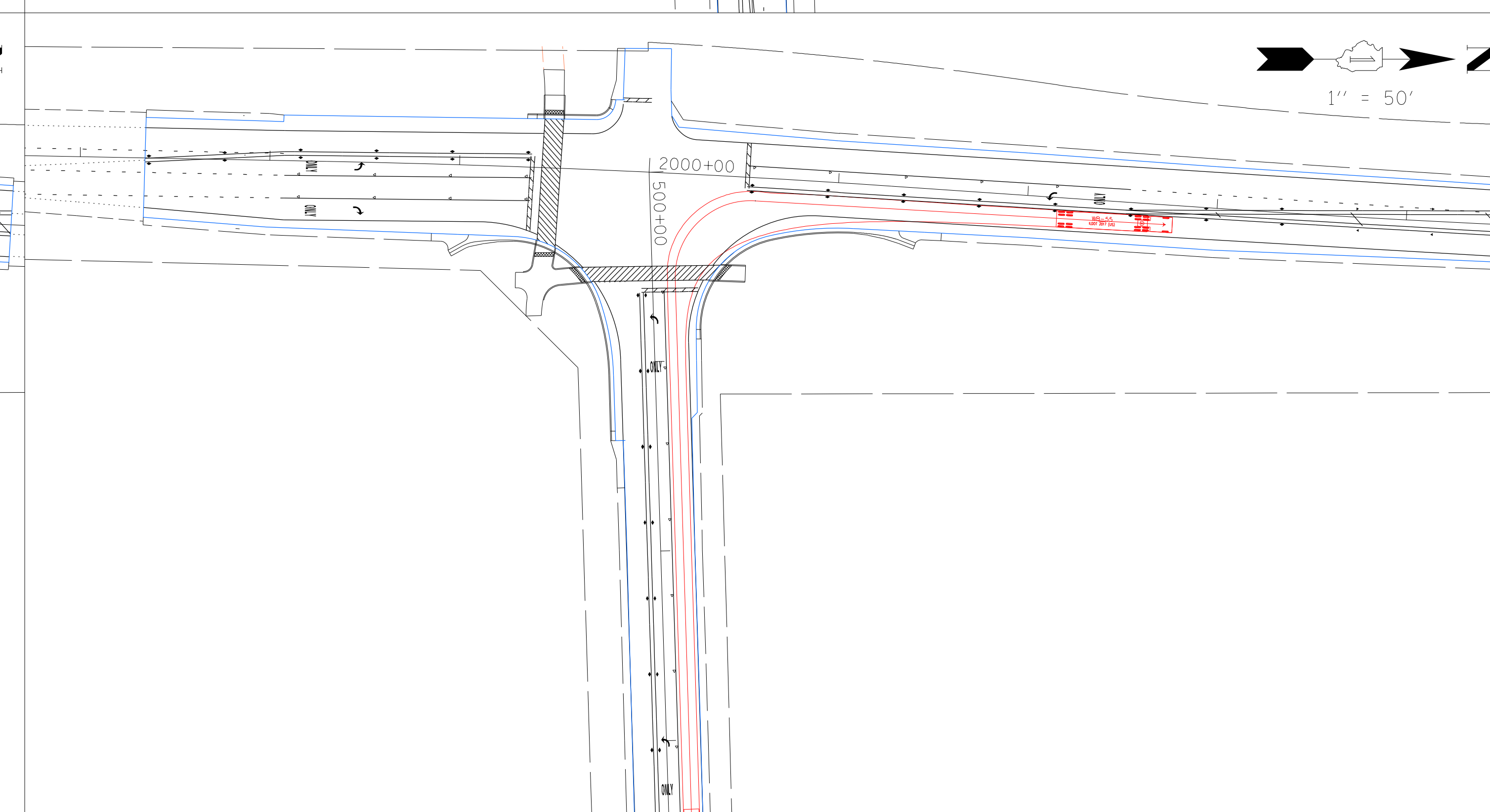
WB 55 DESIGN VEHICLE
NORTHBOUND PECK TO EASTBOUND BRICHER



WB 55 DESIGN VEHICLE
WESTBOUND BRICHER TO SOUTHBOUND PECK



WB 55 DESIGN VEHICLE
SOUTHBOUND PECK TO EASTBOUND BRICHER



WB 55 DESIGN VEHICLE
WESTBOUND BRICHER TO NORTHBOUND PECK

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DIRECTORY =
FILE NAME = L:\KANECO\18029603-00_PeckRoadBricherRoad\Draw\Roadway\CADD_Sheets\sht_Alternate 1_turning movements.dgn

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FILE NAME = sht_Alternate 1_turning movements.dgn	DESIGNED -	REVISED -
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PLOT DATE = 1/21/2019	DATE -	REVISED -

KANE COUNTY
DIVISION OF TRANSPORTATION

PECK ROAD AND BRICHER ROAD
WB 55 TURNING MOVEMENTS

SCALE: 1" = 50' | SHEET OF SHEETS | STA. TO STA.

SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	KANE		

ILLINOIS FED. AID PROJECT