The following HOL-62-24.75 Safety Study was completed in 2021.

As Part 1 of the HOL-62-24.75, PID 120127 project, the District would like the consultant to complete a new feasibility study. The new feasibility study is expected to evaluate multiple alternatives that reduce congestion and mitigate crashes at the intersections of US 62/SR 39 and SR 557, and US 62/SR39 and CR 201, in Holmes County. Upon completion of the feasibility study, a preferred alternative for this project will be selected.

Part 2 of this project will be to complete construction plans for this preferred alternative.

The Ohio Department of Transportation

HOL-62-24.75, US 62 at SR 557

Safety Study

July 2021

HOL-62-24.75, US 62 at SR 557

Safety Study

July 2021

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Executive Summary

The Ohio Department of Transportation (ODOT) retained Arcadis U.S., Inc. (Arcadis) to study safety and traffic operations at the intersections of US Route 62 (US 62) with State Route (SR) 557 and US 62 with County Route (CR) 201 in Holmes County, Ohio. These intersections are located 5.2 miles east of the Village of Millersburg. US 62 is a major east-west corridor crossing Holmes County from the southwest to the northeast connecting the City of Columbus to the City of Canton. SR 557 is a north-south corridor connecting the Village of Charm to US 62. CR 201 is a north-south corridor connecting the Village Fredericksburg to US 62. The purpose of this safety study is to analyze existing safety conditions, predict safety conditions in the future, and develop safety improvements that will promote safe and efficient traffic operation now and in the future.

ODOT District 11 has been monitoring the crash history and traffic operation at the intersection of US 62 and SR 557 for several years. The segment of SR 557 from its terminus at US 62 to Township Route 354 appears on Holmes County's high crash segment list. In general, traffic volumes are steady throughout the day with no significant spike during the a.m. and p.m. peak hours. On US 62 it is common to see a three to four vehicle queue develop when a westbound vehicle is stopped to turn left. On SR 557 it is common to see a three to four vehicle queue at the stop sign however, queues extend south to the Keim Lumber billboard located approximately 700 feet south of the intersection at various times during the day. Given that the segment of SR 557 from US 62 south to Township Route 354 appears on Holmes County's high crash segment list and given that queueing is routinely observed at this intersection ODOT District 11 proactively performed a traffic signal warrant analysis to address congestion in 2017. However, a traffic signal was not constructed because a predictive crash analysis indicated it may increase the crash frequency on US 62. At that time District 11 made signage improvements in an effort to reduce crash frequency by increasing the visibility of the intersection to unfamiliar drivers.

The Holmes County Engineer has been monitoring the crash history and traffic operation at the intersection of US 62 and CR 201 for several years. The intersection appears on Holmes County's high crash intersection list. In general, traffic volumes are steady throughout the day with no significant spike during the a.m. and p.m. peak hours. On US 62 it is common to see a three to four vehicle queue develop when an eastbound vehicle is stopped to turn left. On CR 201 it is common to see a three to four vehicle queue at the stop sign however, queues extend north 500 feet to the top of the hill at various times during the day.

These three roads provide residents of Holmes County and a growing Amish community with regional access to nearby villages, the City of Columbus, and the City of Canton. These three roads also provide industries in Holmes County with access to Interstate 77 and promote tourism by providing access to the Villages of Berlin and Charm. Each road must accommodate familiar and unfamiliar drivers and a mix of local and tourist passenger vehicles, local trucks, semi-trucks, bicycles, motorcycles, Amish buggies, and tractors. Traffic congestion within the study area is a daily, ongoing issue at both intersections. It is anticipated that if the population of Holmes County rises, local industry expands, and tourism grows the volume of unfamiliar drivers, semi-trucks, bicycles and pedestrians passing through these two intersections may increase exacerbating an existing congestion and safety problem.

ODOT's Crash Analysis Module (CAM) Tool and Economic Crash Analysis Tool (ECAT) were used to analyze existing and future safety conditions and examine the feasibility of implementing safety improvements that will promote safe and efficient traffic operation now and in the future. Between 2017 and 2019 twenty-one crashes and eight injuries occurred at these two intersections. Rear-end crashes were the most common crash type with 14 of the 21 crashes and five of the eight injuries being rear end crashes. Six occurred on US 62 when a westbound vehicle was stopped and waiting to turn left onto SR 557 and five occurred on US 62 when an

eastbound vehicle was stopped and waiting to turn left onto CR 201. ECAT shows that these two intersections perform slightly better than their peers by approximately 0.7 crashes per year. It also shows that there is potential for safety improvement in non-incapacitating (B category) crashes. Given that most of the crashes were rear-end crashes three sets of proposed countermeasures that focus on mitigating this type of crash were analyzed:

- Short Term – The goal of the short-term countermeasures is to improve the visibility of these two intersections through the following:
    - Replace 4 existing intersection-ahead advanced warning signs and the two existing stop-ahead advanced warning signs on the right side of each approach, at both intersections, with flashing LED advanced warning signs. This countermeasure will erect 4 new LED intersection ahead advanced warning signs on US 62, 1 new stop-ahead advanced warning sign on SR 557, and 1 new stop-ahead advanced warning sign on CR 201.
    - Place 2 new intersection-ahead advanced warning signs on the left side of US 62 at CR 201 on both approaches to provide dual advanced warning signs.
    - Replace the stop sign on the right side of each approach at both intersections with a flashing LED stop sign.
    - Add a second stop sign on the left side of CR 201.
- Medium Term – There are three goals of the medium-term countermeasures. The first is to provide storage on US 62 for vehicles turning left to allow through movements to continue under free-flow conditions. The second is to provide a northbound right turn lane on SR 557 so northbound right turning vehicles can bypass the queue of northbound left turning vehicles. The third is to improve the visibility of the intersection.
    - Construct a westbound left-turn lane on US 62 at SR 557
    - Construct an eastbound left-turn lane on US 62 at CR 201
    - Construct a northbound right turn lane on SR 557 so northbound right turning vehicles can bypass the queue of northbound left turning vehicles. Currently, if a northbound passenger vehicle is stopped while waiting to turn left, northbound vehicles wishing to turn right will use the shoulder to go around the stopped vehicle and turn right.
    - This countermeasure will also include the signing upgrades described above where the Short-Term countermeasures were discussed.
- Long Term – The goal of the long-term countermeasure is to reduce delay on SR 557, reduce the number of angle crashes, and slow traffic speeds on US 62 as it passes through the CR 201 intersection. This countermeasure will convert the intersection at SR 557 to a modern single lane roundabout.

The benefit-cost ratios for the short-, medium-, and long-term countermeasures are favorable (i.e., above 1). Therefore, if these countermeasures are implemented, they are predicted to provide a sufficient safety benefit to justify the cost of construction. It is recommended that the short-term countermeasures be constructed. Crashes at both intersections should then be monitored to determine if the crash frequency is reduced before determining whether to construct the medium-term countermeasures.

According to ODOT's ECAT, the short-term countermeasures will reduce crashes by 0.6 per year and the benefit-cost ratio is 3.16. The medium-term countermeasures will reduce crashes by 4 per year and the benefit-cost ratio is 1.29. The long-term countermeasure will also reduce crashes by almost 3 per year and the benefit-cost ratio is 1.23.

1 Introduction

The Ohio Department of Transportation (ODOT) retained Arcadis U.S., Inc. (Arcadis) to study the overall safety and traffic operations of two intersections on US Route 62 (US 62) in Holmes County, Ohio. The study area is located 5.2 miles east of the Village of Millersburg and includes the intersections of US 62 with State Route (SR) 557 and with County Route (CR) 201. Arcadis analyzed the existing safety performance of the two intersections, identified potential improvements to reduce crash frequency and improve overall safety, and performed a traffic analysis to predict how the intersections operate now, if no improvements are made, and how they will operate if the proposed improvements are implemented. This report presents the results of the safety study.

2 Purpose and Need

The purpose of this safety study is to analyze existing safety conditions, predict safety conditions in the future, and develop safety improvements that will promote safe and efficient traffic operation now and in the future.

ODOT District 11 and the Holmes County Engineer have been monitoring the crash history and traffic operation at these two intersections for several years. The segment of SR 557 from its terminus at US 62 to Township Route 354 appears on Holmes County's high crash segment list and the intersection of US 62 and CR 201 appears on Holmes County's high crash intersection list. Between 2017 and 2019 twenty-one crashes and eight injuries occurred at these two intersections with rear-end crashes being the most common crash type. Fourteen of the 21 crashes and five of the eight injuries were rear end crashes. Six occurred on US 62 when a westbound vehicle was stopped and waiting to turn left onto SR 557 and five occurred on US 62 when an eastbound vehicle was stopped and waiting to turn left onto CR 201.

Traffic congestion within the study area is a daily, ongoing issue at both intersections. In general, traffic volumes are steady throughout the day with no significant spike during the a.m. and p.m. peak hours. On US 62 it is common to see a three to four vehicle queue develop when either a westbound or eastbound vehicle is stopped to turn left on either SR 557 or CR 201, respectively. On SR 557 it is common to see a three to four vehicle queue at the stop sign however, queues extend south to the Keim Lumber billboard located approximately 700 feet south of the intersection at various times during the day. On CR 201 it is common to see a three to four vehicle queue at the stop sign however, queues extend north 500 feet to the top of the hill at various times during the day.

These three roads provide residents of Holmes County and a growing Amish community with regional access to nearby villages, the City of Columbus and the City of Canton. These three roads also provide industries in Holmes County with access to Interstate 77 and promote tourism by providing access to the Villages of Berlin and Charm. Each road must accommodate familiar and unfamiliar drivers and a mix of local and tourist passenger vehicles, local trucks, semi-trucks, bicycles, motorcycles, Amish buggies, and tractors. It is anticipated that if the population of Holmes County rises, local industry expands, and tourism grows the volume of unfamiliar drivers, semi-trucks, bicycles and pedestrians passing through these two intersections may increase exacerbating an existing congestion and safety problem.

3 Existing Conditions

US 62 is a national truck route. It is an east-west minor arterial with a posted speed limit of 55 miles per hour (mph) and an average daily traffic (ADT) volume of approximately 11,000 vehicles per day (vpd), of which 8 percent is truck traffic. There is one 12-foot-wide lane in each direction, with 4-foot-wide paved shoulders adjacent to the travel lanes. The road is striped with a centerline and edge lines. The intersections with SR 557 and CR 201 are both stop controlled on the minor street. The pavement condition rating (PCR) for US 62 is 80, according to the ODOT Transportation Information Mapping System (TIMS). There is no roadway lighting present along the corridor. Utility poles are present along the south side of the road.

SR 557 is a north-south major collector with a posted speed limit of 55 mph and an ADT volume of 4,000 vpd, of which 9 percent is truck traffic. There is one 12-foot-wide lane in each direction, with a 1-foot-wide paved shoulder adjacent to the travel lanes. The road is striped with a centerline and edge lines. The PCR for SR 557 is 59, according to the ODOT TIMS. Utility poles are present along both sides of the road.

CR 201 is a north-south major collector with a posted speed limit of 45 mph and an ADT volume of 3,500 vpd, of which 8 percent is truck traffic. There is one 12-foot-wide lane in each direction with no shoulder. The road is striped with a centerline but no edge lines. The pavement condition rating for CR 201 is 67, according to the ODOT TIMS. Utility poles are present along the eastern side of the road.

There are no pedestrian facilities (sidewalk, curb ramps, and crosswalks) within the study area.

The study area is illustrated on Figure 1.

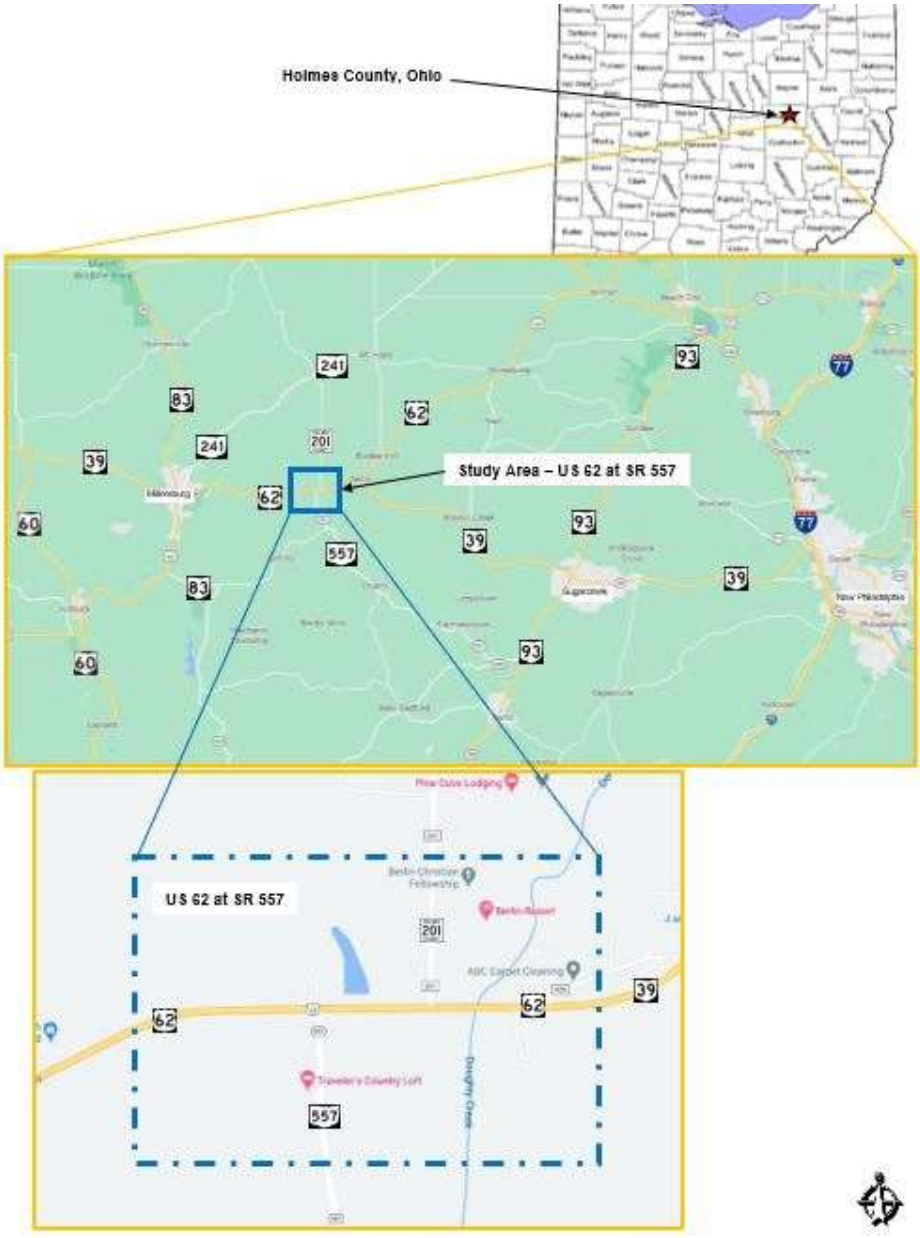

Figure 1. Study Area Map

Arcadis conducted a field review of the study area on February 4, 2021 during the a.m. and p.m. peak periods. The a.m. peak hour is estimated to be from 10:45 a.m. to 11:45 a.m. and the p.m. peak hour is estimated to be from 3:30 p.m. to 4:30 p.m. Observations of the study area during the field review are summarized as follows:

Overall

- In general, traffic volumes at both intersections are steady throughout the day:
  - No significant spike in traffic volumes was observed during the a.m. and p.m. peak hours. From noon to 3:30 p.m., long queues were observed on SR 557 and on CR 201.

  - The makeup of vehicular traffic is diverse. Passenger vehicles, trucks, semi-trucks, bicycles, motorcycles, Amish buggies, and tractors were observed during the field review. Where possible, Amish buggies, bicycles, and tractors used the shoulder but still impacted vehicular traffic when making turns.
- There are several constraints within the study area that may impact potential countermeasures:
  - There is a stream crossing US 62 east of CR 201.
  - There are two culverts crossing US 62. One is west of SR 557 and one is between SR 557 and CR 201.
  - There is a gas line on the south side of US 62 running parallel to the edge of pavement.
  - There is a fiber optic line west of SR 557.
  - There is a pond on the north side of US 62 between SR 557 and CR 201.

SR 557 Intersection

- Queuing was observed on US 62 westbound and on SR 557:
  - A typical queue was three to four vehicles on US 62 westbound when a vehicle was stopped to turn left. The queued vehicles did not use the shoulder to bypass the left-turning vehicle.
  - A typical queue was three to four cars on SR 557. In the p.m. peak hour, vehicles were observed queueing south to the Keim Lumber billboard located approximately 700 feet south of the intersection. The maximum queue was 12 cars.
  - If a northbound passenger vehicle is stopped while waiting to turn left, a northbound vehicle can use the shoulder to go around the stopped vehicle and turn right. However, if two northbound vehicles are queued or one large northbound vehicle is stopped, a right-turning vehicle does not have sufficient space to go around the stopped vehicles to turn right.
- Sight distance on the eastbound approach is substandard but is close to adequate.
- US 62 west of SR 557 has a 5 percent upgrade slope that impacts the acceleration of heavy vehicles making a left turn from SR 557.
- Large semi-trucks were observed turning left and right from SR 557.

CR 201 Intersection

- Queueing was observed on US 62 eastbound and on CR 201:
  - A typical queue was three to four vehicles on US 62 eastbound when a vehicle was stopped to turn left. The queued vehicles occasionally used the shoulder to bypass the left-turning vehicle.
  - A typical queue was three to four cars on CR 201. Once during the p.m. peak hour, vehicles were observed queueing to the top of the hill approximately 500 feet north of the intersection.
- Sight distance is an issue at all three approaches:
  - Southbound drivers are not able to see the stop sign until they are 500 feet from the intersection.
  - Eastbound and westbound sight distance is limited by the permanent sign structure in the northeast quadrant and the hill in the northwest quadrant. Eastbound and westbound drivers on US 62 are only able to see the first vehicle queued at the stop sign.

- CR 201 north of US 62 has a 10 percent upgrade slope that impacts heavy vehicles turning onto CR 201 and southbound vehicles that must stop on a downhill grade as they approach the intersection.
- Large semi-trucks were observed turning left onto CR 201.

4 Crash Data

Crash data from 2017 to 2019 were obtained from ODOT's TIMS. A total of 21 crashes occurred within the study area during the three-year period. The OH-1 report for each crash was reviewed to identify the location of each crash. Ten of the crashes occurred at the SR 557 intersection and 11 occurred at the CR 201 intersection.

Crash data for the study area were compared to statewide averages obtained from ODOT's Crash Analysis Module (CAM) Tool. Crash data were also analyzed using ODOT's CAM Tool.

The frequency of crash types in the study area compared to statewide averages for rural roads on the state system are shown on Figure 2. As indicated on the figure, rear-end, angle, bicycle, and other non-collision crashes occur more frequently in the study area compared to statewide averages. Injury crashes also occur more frequently in the study area than statewide averages.

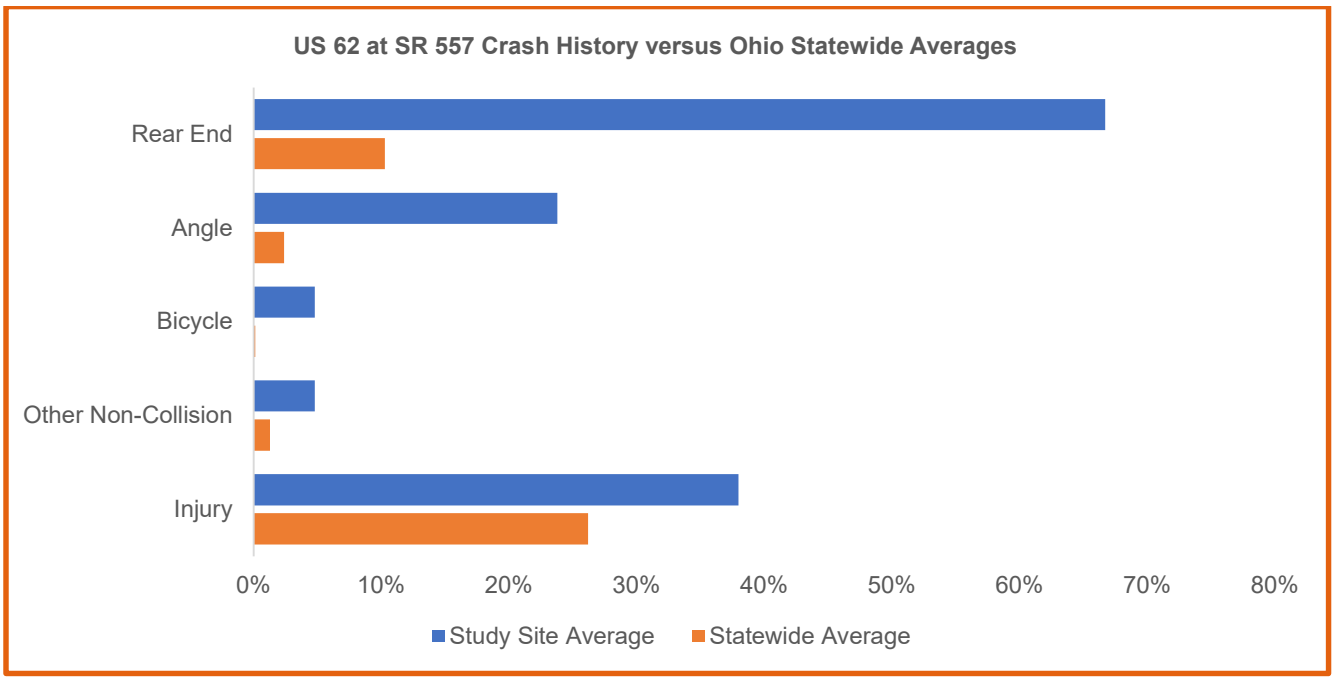

Figure 2. Crash History Compared to Statewide Averages

Additional statistics based on the crash data are summarized in Table 1. The table shows that the two most common crash types that occurred between 2017 and 2019 within the study area are rear-end crashes and angle crashes. None of the crashes resulted in a fatality, and eight crashes resulted in injuries. Five of the injuries occurred as a result of rear-end crashes. Two occurred on SR 557 and three occurred on CR 201. The remaining three injuries occurred on CR 201 in two angle crashes and a bicycle crash. Seventeen crashes occurred on dry pavement, indicating that weather is not typically a contributing factor. Sixteen crashes occurred in the daylight, indicating lighting is not typically a contributing factor. Of the five crashes that occurred in the dark, three were

rear-end, one was angle, and one was the bicycle crash. Thirteen crashes occurred between May and September. More detailed explanations of the crashes are provided below:

- *Rear-End Crashes* – Rear-end crashes accounted for approximately 67 percent of all crashes and 39 percent of all injuries. Of the 14 rear-end crashes, all but three occurred on US 62. Six occurred when a westbound vehicle was stopped while waiting to turn left onto SR 557 and five occurred when an eastbound vehicle was stopped while waiting to turn left onto CR 201. Of these 11 rear-end crashes, five resulted in an injury. Two of the remaining three rear-end crashes occurred on SR 557 and one occurred on CR 201. Of these, none resulted in an injury. Assured clear distance or following too closely was the contributing factor in most of these crashes.
- *Angle Crashes* – Angle crashes accounted for approximately 23 percent of all crashes and 33 percent of all injuries. Two angle crashes occurred on SR 557. The first occurred when an eastbound vehicle turning right slid on snow-covered pavement into a northbound vehicle stopped at the stop sign. The second occurred when a westbound vehicle turning left, in the dark, struck a northbound vehicle stopped at the stop sign. Three angle crashes were identified as occurring on CR 201. However, one that occurred west of the intersection was actually a rear-end crash in which an eastbound vehicle lost control trying to stop behind an eastbound vehicle waiting to turn left onto CR 201 and slid into a westbound vehicle stopped in a queue. The second occurred when a southbound vehicle attempting to turn left onto US 62 stalled and was struck by a westbound vehicle. The third occurred when an eastbound vehicle turned left in front of a westbound vehicle.
- *Sideswipe-Passing Crash* – A crash identified as a sideswipe-passing crash was actually a rear-end crash at the intersection of US 62 and SR 557. A vehicle traveling westbound on US 62 stopped behind a vehicle that was stopped while waiting to turn left onto SR 557 and was rear-ended by another westbound vehicle. The at-fault vehicle attempted to steer around the stopped vehicle; therefore, the collision was similar to a sideswipe-passing crash. The crash was recorded in the CAM Tool as a rear-end crash.
- *Not a Collision Between Two Motor Vehicles* – The single vehicle crash that occurred at the intersection of US 62 and CR 201 involved a pickup truck with a trailer that exited the roadway, causing the trailer to overturn. The OH-1 report did not indicate whether the vehicle left the roadway in an attempt to avoid a rear-end crash.
- *Bicycle Crashes* – The bicycle crash was actually an angle crash that occurred when a bicyclist traveling eastbound on US 62 attempted to turn left onto CR 201 and was struck by a southbound vehicle turning left onto US 62. The bicyclist sustained minor injuries.

Table 1. Study Area Crash Statistics (2017 to 2019)

Crash Severity	Number	Percentage
Fatal Crash	0	0%
Injury Crash	8	38%
Property Damage Only (PDO) Crash	13	62%

Light Condition	Number	Percentage
Daylight	16	76%
Dark – Not Lighted	3	14%
Dawn/Dusk	2	10%

Table 1. Study Area Crash Statistics (2017 to 2019) (Continued)

Type of Crash	Number	Percentage
Rear-End	14	67%
Angle	5	23%
Other/Non-Collision	1	5%
Pedalcycles	1	5%

Road Condition	Number	Percentage
Dry	17	80%
Wet	2	10%
Snow	2	10%

Month	Number	Percentage
January	1	5%
February	3	13%
March	1	5%
April	0	0%
May	2	10%
June	1	5%
July	3	13%
August	5	24%
September	2	10%
October	2	10%
November	0	0%
December	1	5%

Contributing Factor	Number	Percentage
Followed too Closely/ACDA	14	67%
Failure to Yield	3	14%
Improper Lane Change/Passing/ Off Road	3	14%
Unsafe Speed	1	5%

A full printout from the ODOT CAM Tool is included in Appendix A. Crash diagrams for the study area are included in Appendix B.

5 Existing Conditions Capacity Analysis

A capacity analysis is the primary method for evaluating the efficiency of a roadway or intersection as it relates to vehicular traffic. The Highway Capacity Manual, published by the Transportation Research Board, outlines capacity analysis procedures and criteria for evaluating the operations of unsignalized and signalized intersections.[1] The criteria for evaluating the operation of an intersection are measured in terms of level of service (LOS), a qualitive measure, and control delay per vehicle. There are six levels of service, designated by the letters A through F. LOS A represents the best operating conditions, and LOS F represents the worst operating conditions. An overall intersection LOS of A through D is generally considered acceptable for ODOT projects. LOS criteria are listed in Table 2.

[1] Transportation Research Board. 2016. Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis.

Table 2. Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service	Signalized Intersection Delay (seconds)	Unsignalized Intersection and Roundabout Delay (seconds)
A	≤ 10	≤ 10
B	> 10–20	> 10–15
C	> 20–35	> 15–25
D	> 35–55	> 25–35
E	> 55–80	> 35–60
F	> 80 or Volume-Capacity Ratio > 1.0	> 60 or Volume-Capacity Ratio > 1.0

The existing conditions, no-build conditions, medium-term, and long-term capacity analysis was conducted using Highway Capacity Software (HCS).

5.1 Data Collection and Design Hourly Traffic Volumes

ODOT collected peak hour turning movement counts (TMC) for both intersections in December 2020. ODOT forecasted design hourly traffic volumes (DHVs) using its SHIFT tool. To account for seasonal fluctuations in traffic volumes ODOT developed DHVs for the intersection of US 62 and SR 557 using a historic TMC collected in August 2017. No historic TMC was available for the intersection of US 62 and CR 201 so ODOT developed DHVs using the December 2020 TMC. The DHVs provided by ODOT included a.m. and p.m. peak period traffic volumes for 2024 and 2044. The DHVs used for the capacity analysis are included in Appendix C.

5.2 Existing Conditions Capacity Analysis Results

Arcadis conducted a traffic analysis to evaluate existing operations at both intersections. The results of the existing capacity analysis are presented in Table 3.

As shown in the table, at the intersection of US 62 and SR 557, the westbound movement operates at LOS A in the a.m. and p.m. peak hours. The average queue on US 62 westbound is one car when vehicles are stopped while waiting to make a left-turn maneuver, although the longest queue is five cars. The northbound movement operates at LOS A in the a.m. peak hour and LOS C in the p.m. peak hour. The average queue on SR 557 during the p.m. peak hour is 2.3 cars, although the longest queue is six cars.

At the intersection of US 62 and CR 201, the eastbound movement operates at LOS A in the a.m. and p.m. peak hours. The average queue on US 62 eastbound is one car when vehicles are stopped while waiting to make a left-turn maneuver, although the longest queue is seven cars. The southbound movement operates at LOS C during the a.m. peak hour and LOS D during the p.m. peak hours. The average queue on CR 201 during the p.m. peak hour is 2.5 cars, although the longest queue is three cars.

Outputs from HCS are included in Appendix D.

Table 3. Existing Conditions (2020) Capacity Analysis Results

Intersection	Movement	AM			PM		
		LOS	Delay (seconds)	Average Queue Length (veh)	LOS	Delay (seconds)	Average Queue Length (veh)
SR 557	Eastbound	N/A*			N/A*		
	Westbound	A	8.6	1.0	A	8.7	1.0
	Northbound	A	10.0	1.0	C	21.3	2.3
CR 201	Eastbound	A	8.3	1.0	A	8.8	1.0
	Westbound	N/A*			N/A*		
	Southbound	C	22.8	1.6	D	30.2	2.5

*This approach has no restricted movements.

5.3 No-Build Conditions Capacity Analysis Results

Arcadis analyzed future traffic operations assuming no improvements are made using traffic volumes forecasted to 2024 and 2044. This is referred to as a no-build condition capacity analysis and was conducted to evaluate intersection operations if no improvements are constructed at either intersection. The results of the no-build capacity analysis are presented in Tables 4 and 5.

As shown in Table 4, in 2024, at the intersection of US 62 and SR 557, the westbound movement operates at LOS A in the a.m. and p.m. peak hours. The average queue on US 62 westbound is one car when vehicles are stopped while waiting to make a left-turn maneuver, although the longest queue is ten cars. The northbound movement operates at LOS C in the a.m. peak hour and LOS E in the p.m. peak hour. The average queue on SR 557 during the p.m. peak hour is 4.4 cars, although the longest queue is six cars.

As shown in Table 4, in 2024, at the intersection of US 62 and CR 201, the eastbound movement operates at LOS A in the a.m. and p.m. peak hours. The average queue on US 62 eastbound is one car when vehicles are stopped while waiting to make a left-turn maneuver, although the maximum longest is ten cars. The southbound movement operates at LOS F during the a.m. and p.m. peak hours. The queue on CR 201 during the a.m. peak hour is 10.5 cars.

As shown in Table 4, overall, traffic operations will deteriorate slightly as traffic volumes in the study area increase.

Table 4. No-Build Conditions (2024) Capacity Analysis Results

Intersection	Movement	AM			PM		
		LOS	Delay (seconds)	Average Queue Length (veh)	LOS	Delay (seconds)	Average Queue Length (veh)
SR 557	Eastbound	N/A*			N/A*		
	Westbound	A	9.2	1.0	A	9.0	1.0
	Northbound	C	19.6	2.0	E	39.2	4.4
CR 201	Eastbound	A	8.8	1.0	A	9.6	1.0
	Westbound	N/A*			N/A*		
	Southbound	F	161.5	10.5	F	140.2	8.6

*This approach has no restricted movements.

As shown in Table 5, in 2044, at the intersection of US 62 and SR 557, the westbound movement operates at LOS A in the a.m. and p.m. peak hour. The average queue on US 62 westbound is one car when vehicles are stopped while waiting to make a left-turn maneuver, although the longest queue is sixteen cars. The northbound movement operates at LOS D in the a.m. peak hour and LOS F in the p.m. peak hour. The queue on SR 557 during the p.m. peak hour is 11.7 cars.

As shown in Table 5, in 2044, at the intersection of US 62 and CR 201, the eastbound movement operates at LOS A in the a.m. and p.m. peak hours. The average queue on US 62 eastbound is one car when vehicles are stopped while waiting to make a left-turn maneuver, although the longest queue is sixteen cars. The southbound movement operates at LOS F during the a.m. and p.m. peak hours. The queue on CR 201 during the a.m. peak hour is 17.8 cars.

Table 5. No-Build Conditions (2044) Capacity Analysis Results

Intersection	Movement	AM			PM		
		LOS	Delay (seconds)	Average Queue Length (veh)	LOS	Delay (seconds)	Average Queue Length (veh)
SR 557	Eastbound	N/A*			N/A*		
	Westbound	A	9.4	1.0	A	9.4	1.0
	Northbound	D	28.9	3.2	F	172.6	11.7
CR 201	Eastbound	A	9.0	1.0	A	10.0	1.0
	Westbound	N/A*			N/A*		
	Southbound	F	381.5	17.8	F	392.3	15.3

*This approach has no restricted movements.

Note: Table 4 and Table 5 show that delay on CR 201 may indicate adding a southbound right turn lane may be an appropriate countermeasure. However, a southbound right turn lane on CR 201 was not included as a potential countermeasure because only one crash occurred on CR 201. A southbound right turn lane may be an appropriate capacity improvement to reduce delay and it may also provide a safety benefit. However, the presence of only one crash on CR 201 does not provide an evidenced safety need to include this countermeasure.

The HCS analysis results for 2024 and 2044 are included in Appendix D.

5.4 Turn Lane Warrants

Turn lane warrants on free-flow approaches were checked according to Figures 401-5b and 401-6b in ODOT's Location and Design Manual. Table 6 identifies locations that warrant left or right turn lanes on US 62.

Table 6. Turn Lane Warrants

Intersection	Turn Lane	Turn Lane Warranted
SR 557	Eastbound Right Turn	Yes
	Westbound Left Turn	Yes
CR 201	Eastbound Left Turn	Yes
	Westbound Right Turn	Yes

The table shows that left and right turn lanes are warranted on US 62 at the intersection of SR 557 and CR 201. The turn lane warrant analysis results are included in Appendix E.

Note: Adding an eastbound right turn lane at SR 557 or a westbound right turn lane at CR 201 may be an appropriate capacity improvement that may also provide a safety benefit. However, the crash analysis discussed in Section 4 indicates no crashes occurred on the west approach at SR 557 or on the east approach at CR 201. Therefore, even though these two right turn lanes are warranted they are not included in the proposed countermeasures discussed in Section 7 because there is no evidenced safety need.

5.5 Traffic Signal Warrant Analysis

A traffic signal warrant analysis was conducted for both intersections using ODOT's Office of Traffic Operations (OTO) Signal Warrant spreadsheet following ODOT's Traffic Engineering Manual (TEM) Section 402-3. The signal warrant spreadsheet requires 24 hours of raw turning movement counts. However, the peak-hour turning movement counts collected by ODOT in December 2020 included data for the peak 12 hours of the day. Therefore, 12 hours of TMC data were input into the spreadsheet. Neither intersection met the requirements for a traffic signal. Traffic signal warrants were also evaluated using Highway Capacity Software (HCS). Traffic signal warrants 1a, 1b, 1c, 2, 3a, and 3b, which compare peak-hour volumes to certain thresholds, were analyzed. The traffic signal warrant analysis results from HCS are summarized in Table 7 and indicate that both intersections met the requirements for a traffic signal.

Table 7. Level of Service Criteria for Signalized and Unsignalized Intersections

Intersection	Warrant 1 Eight-Hour Vehicular Volumes			Warrant 2 Four-Hour Volumes	Warrant 3 Peak-Hour Volumes	
	1A	1B	1C		3A	3B
SR 557	N	Y	Y	Y	N	Y
CR 201	N	Y	Y	Y	N	Y

Installation of a traffic signal at either intersection may help to reduce peak-hour side road delay and make it easier for side street traffic to find gaps to enter US 62. However, given that traffic signals statistically increase the frequency and severity of rear-end crashes, installation of a traffic signal may negatively impact overall intersection safety. Other intersection control options may be considered to improve the performance of the side street without negatively impacting the safety of the major road. ODOT's Economic Crash Analysis Tool (ECAT) predicts that installing traffic signals at SR 557 and at CR 201 may lead to seven additional crashes per year within the study area.

The traffic signal warrant analysis results using ODOT's OTO Signal Warrant spreadsheet and using HCS are included in Appendix F.

6 Crash Probable Causes

As indicated in Section 4, rear-end crashes and angle crashes accounted for a majority of the crashes that occurred in the study area between 2017 and 2019. Probable causes and additional details regarding these crash types are summarized below:

- *Rear-End Crashes* – This is the predominant crash type at both intersections. Six westbound rear-end crashes occurred at the intersection of SR 557 and five eastbound rear-end crashes occurred at the intersection of CR 201. Two occurred on SR 557 and one occurred on CR 201. Assured clear distance or following too closely was the contributing factor in most of these crashes according to the OH-1 reports, indicating that inattentive driving may be a common contributing factor. In addition, the study area experiences a spike in seasonal tourist traffic during the summer months. Although not specifically stated in the OH-1 reports, some of the crashes may occur because drivers are not local to the area, may be unfamiliar with these two intersections, and may be surprised when vehicles are stopped on US 62 waiting to turn left.
- *Angle Crashes* – Angle crashes are the second most predominant crash type within the study area. Two angle crashes occurred at the intersection of US 62 at SR 557 and three angle crashes occurred at the intersection of US 62 at CR 201. Failure to yield was the contributing factor cited in the OH-1 reports. Although not specifically stated in the OH-1 reports, some of the crashes may occur because sight distance is limited at both intersections. As stated in Section 3, sight distance on the eastbound approach at SR 557 is slightly substandard, and eastbound and westbound sight distance at CR 201 is limited by the permanent sign structure in the northeast quadrant and the hill in the northwest quadrant, making it difficult for eastbound and westbound drivers on US 62 to see vehicles queued on CR 201.
- *Sideswipe-Passing Crashes* – The crash identified as a sideswipe-passing crash was actually a rear-end crash at the SR 557 intersection caused by a vehicle attempting to avoid a rear-end crash.

- *Not a Collision Between Two Motor Vehicles* – The single vehicle crash that occurred at CR 201 involved a pickup truck with a trailer that overturned while the truck was exiting the roadway. The OH-1 report did not indicate whether the vehicle was attempting to avoid a rear-end crash.

Two crashes, one of the angle crashes and the sideswipe-passing crash summarized above, were recoded as rear-end crashes after reviewing the OH-1 reports.

7 Proposed Countermeasures

Given that the majority of crashes in the study area were rear-end crashes, the proposed countermeasures focus on mitigating this type of crash:

- Short Term – The goal of the short-term countermeasures is to improve the visibility of the two intersections:
    - The intersection of US 62 at SR 557 has dual intersection-ahead advanced warning signs on both US 62 approaches, a stop-ahead advanced warning sign on the right side of SR 557, and dual stop signs at the intersection. The existing intersection-ahead advanced warning signs on the right side of each approach will be replaced with flashing LED intersection ahead advanced warning signs. The existing stop sign on the right side of SR 557 will be replaced with a flashing LED stop sign and the existing stop-ahead advanced warning sign on the right side of SR 557 will be replaced with a flashing LED stop-ahead advanced warning sign.
    - The intersection of US 62 at CR 201 has intersection-ahead advanced intersection ahead warning signs on the right side of US 62 on both approaches, a single stop-ahead advanced warning sign on the right side of CR 201, and a single stop sign at the intersection. The existing intersection-ahead advanced warning signs on the right side of each approach on US 62 will be replaced with flashing LED intersection ahead advanced warning signs. Two new intersection-ahead advanced warning signs will be placed on the left side of US 62 at CR 201 on both approaches to provide dual advanced warning signs. The existing stop sign on the right side of CR 201 will be replaced with a flashing LED stop sign and the existing stop-ahead advanced warning sign on the right side of CR 201 will be replaced with a flashing LED stop ahead advanced warning sign. A second stop sign on the left side of CR 201.
- Medium Term – There are three goals of the medium-term countermeasures. The first is to provide storage on US 62 for vehicles turning left to allow through movements to continue under free-flow conditions. The second is to provide a northbound right turn lane on SR 557 so northbound right turning vehicles can bypass the queue of northbound left turning vehicles. The third is to improve the visibility of the intersection.
    - Construct a westbound left-turn lane on US 62 at SR 557
    - Construct an eastbound left-turn lane on US 62 at CR 201
    - Construct a northbound right turn lane on SR 557 so northbound right turning vehicles can bypass the queue of northbound left turning vehicles. Currently, if a northbound passenger vehicle is stopped while waiting to turn left, northbound vehicles wishing to turn right will use the shoulder to go around the stopped vehicle and turn right.
    - This countermeasure will also include the signing upgrades described above where the Short-Term countermeasures were discussed.
- Long Term – The goal of the long-term countermeasure is to convert the intersection at SR 557 to a modern roundabout:

- This countermeasure will reduce delay on SR 557, reduce the number of angle crashes, and slow traffic speeds on US 62 as it passes through the CR 201 intersection.

Note: A southbound right turn lane on CR 201 was not included in the medium-term countermeasures because only one crash occurred on CR 201. A southbound right turn lane may be an appropriate capacity improvement to reduce delay and it may also provide a safety benefit. However, the presence of only one crash on CR 201 does not provide an evidenced safety need. Additionally, adding an eastbound right turn lane at SR 557 or a westbound right turn lane at CR 201 was also not included in the medium-term countermeasures because no crashes occurred on the west approach at SR 557 or on the east approach at CR 201. Therefore, even though these two right turn lanes are warranted they are not included in the proposed countermeasures because there is no evidenced safety need.

Conceptual schematics of the short-, medium-, and long-term improvements are included in Appendix G.

7.1 Short Term

The short-term countermeasures do not include any capacity improvements. Therefore, an HCS capacity analysis was not conducted.

7.2 Medium Term

A HCS capacity analysis was conducted to evaluate traffic operations with construction of a westbound left-turn lane at SR 557, an eastbound left-turn lane at CR 201, and a northbound right turn lane on SR 557. The capacity analysis was conducting using 2044 DHVs, and the results are presented in Table 8.

The addition of a westbound left-turn lane at the US 62 and SR 557 intersection will maintain the LOS of the left turn movement but will remove all delay from the westbound through movement. When compared to Table 5, the LOS on SR 557 will improve in both the a.m. and p.m. peak hours (significantly in the p.m. peak hour) but the LOS in the p.m. peak hour is still LOS F.

The addition of an eastbound left-turn lane at the US 62 and CR 201 intersection will maintain the LOS of the left turn movement but will remove all delay from the eastbound through movement. When compared to Table 5, the LOS on CR 201 improves slightly in the a.m. and p.m. peak hours but remains a LOS F because the lack of evidence of a safety issue on CR 201 did not yield any recommended improvements to the northern leg of the intersection.

Table 8. Medium-Term Proposed Improvements (2044) Capacity Analysis Results

Intersection	Movement	AM			PM		
		LOS	Delay (seconds)	Average Queue Length (veh)	LOS	Delay (seconds)	Average Queue Length (veh)
SR 557	Eastbound	N/A*			N/A*		
	Westbound	A	9.4	1.0	A	9.4	1.0
	Northbound	D	25.7	2.0	F	62.1	5.3
CR 201	Eastbound	A	9.0	1.0	A	10.0	1.0
	Westbound	N/A*			N/A*		
	Southbound	F	349.0	17.2	F	353.7	14.7

*This approach has no restricted movements.

Table 8 indicates that a southbound right turn lane on CR 201 may be an appropriate capacity improvement to reduce southbound delay. However, as discussed in Section 7 this countermeasure was not included because only one crash occurred on CR 201. A southbound right turn lane may be an appropriate capacity improvement to reduce delay and it may also provide a safety benefit. However, the presence of only one crash on CR 201 does not provide an evidenced safety need to include this countermeasure.

The HCS analysis results for 2044 are included in Appendix D.

7.3 Long Term

Table 9 presents the results of an HCS analysis conducted to assess operations if the US 62 and SR 557 intersection is reconfigured into a modern single-lane roundabout. The capacity analysis was conducting using 2044 DHVs.

The table shows that in 2044, a roundabout at the SR 557 intersection operates at an overall LOS A in the a.m. peak hour and LOS B in the p.m. peak hour. The long-term countermeasure does not include any capacity improvements at CR 201. The table shows that the long-term countermeasure is expected to have a positive impact on capacity compared to the no-build conditions. The reconfiguration of the intersection into a modern single-lane roundabout is expected to reduce delay on US 62.

Table 9. Long-Term Proposed Improvements (2044) Capacity Analysis Results

Intersection	Movement	AM			PM		
		LOS	Delay (seconds)	Average Queue Length (veh)	LOS	Delay (seconds)	Average Queue Length (veh)
SR 557	Eastbound	A	9.9	3.4	A	9.6	3.1
	Westbound	A	8.4	2.8	B	13.4	6.0
	Northbound	A	8.2	1.0	A	8.7	8.7

The HCS analysis results for 2044 are included in Appendix D.

8 Conceptual Estimate of Probable Cost

A conceptual estimate of probable cost to implement the short-, medium-, and long-term countermeasures was prepared using ODOT historical bid prices. The estimates include the cost for design, right-of-way, and construction. Estimated construction costs were developed using estimated quantities for items that would be needed for or impacted by implementation of the recommended improvements.

The following assumptions were utilized in developing the conceptual estimate of probable cost:

- Unit prices for all items were estimated based on ODOT's Summary of Contracts Awarded for 2020, Procedures for Budget Estimating, and prior bid tabs.
- A 25 percent contingency was selected based on the Procedures for Budget Estimating.
- A 25 percent design engineering fee was applied to each countermeasure.
- The rate of inflation was calculated using the ODOT Office of Estimating Fiscal Year 2021–2025 Business Plan Inflation Calculator. Based on a construction midpoint of June 2023, a 12.4 percent rate of inflation (to the assumed midpoint of construction) was assumed.

The total 2025 conceptual estimate of probable cost (with inflation) is $57,217 for the short-term countermeasures, $2,047,410 for the medium-term countermeasure, and $2,053,030 for the long-term countermeasure. A detailed cost estimate is included in Appendix H.

9 Safety Benefits

The safety benefit associated with each of the three improvements discussed in Section 8 was analyzed.

The American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual (HSM) is used to determine how a corridor, or intersection, is performing compared to similar locations.[2] It is also used to assess the safety benefits of proposed countermeasures. The HSM Part C discusses use of a predictive model for this type of analysis. The predictive method estimates the predicted crash frequency ($N_{predicted}$) together

[2] AASHTO. 2010. Highway Safety Manual. First Edition.

with observed crash frequency to estimate the expected crash frequency ($N_{expected}$). The difference between predicted and expected crash frequency is explained below.

$N_{predicted}$ is the anticipated (predicted) crash frequency, which describes how a location is expected to perform relative to similar sites. The calculation of $N_{predicted}$ uses Safety Performance Functions to determine a base condition and applies crash modification factors (CMFs) to account for site-specific features that are different from the base condition. The final value is multiplied by a calibration factor specific to Ohio to normalize the base condition.

$N_{expected}$ is the estimated expected average crash frequency at a site for a given time period. The calculation of $N_{expected}$ uses the Empirical Bayes method to combine actual crash frequency with $N_{predicted}$.

The difference between $N_{predicted}$ and $N_{expected}$ is the "expected excess crashes." If $N_{expected}$ is greater than $N_{predicted}$, the location may benefit from a safety improvement. If $N_{expected}$ is less than $N_{predicted}$, the site is experiencing fewer crashes than similar sites.

ODOT's ECAT was used to calculate $N_{predicted}$ and $N_{expected}$. The existing conditions (traffic control, presence of a median, number of lanes, intersection control, lighting, presence of driveways) of the study area were input into ECAT. CMFs were used in ECAT to calculate the reduction in crashes that can be expected if a particular improvement is implemented. ODOT's ECAT was also used to perform a benefit-cost analysis for the recommended improvements. The CMF values used to predict the safety benefit of the short-, medium-, and long-term countermeasures are listed below:

- Short-Term
  - Installation of flashing LED stop signs at stop-controlled intersections – CMF = 0.59, and flashing stop-ahead warning signs before stop signs at stop-controlled intersections/intersection ahead warning signs – CMF = 0.919.
- Medium-Term
  - Installation of flashing LED stop signs at stop-controlled intersections – CMF = 0.59, and flashing stop-ahead warning signs before stop signs at stop-controlled intersections/intersection ahead warning signs – CMF = 0.919. Addition of left-turn lanes at the SR 557 and CR 201 intersections along with a northbound right turn lane on SR 557.
- Long-Term
  - Conversion of a stop-controlled intersection into a single-lane roundabout at US 62 and SR 557 – CMF = 0.13 (for KA, B, and C) and CMF = 0.29 (for O).

Complete ECAT results are included in Appendix I.

9.1 Short Term

Table 10 presents a comparison of existing intersections ($N_{expected\ existing}$) to similar intersections ($N_{predicted\ existing}$) and the proposed conditions if the short-term countermeasures are implemented ($N_{predicted\ proposed}$). The table shows that overall, the two intersections are functioning slightly better than their peers by 0.7 crashes per year. However, the third column in table 10 shows that there is potential for safety improvement in non-incapacitating (B category) crashes. The table also shows that if the short-term countermeasures are implemented, the frequency of injury and PDO crashes is predicted to decrease, these two intersections are predicted to operate better than their peers, and the overall crash frequency may decrease by 0.63 per year.

Table 10. Short-Term Countermeasure ECAT Analysis Results Summary

Crashes	KA	B	C	O	Total
$N_{predicted}$ (Existing Conditions)	0.46	0.46	1.83	5.71	8.46
$N_{expected}$ (Existing Conditions)	0.38	1.09	0.79	5.49	7.75
$N_{Potential\ for\ Improvement}$ (Existing Conditions)	-0.08	0.63	-1.04	-0.23	-0.71
$N_{predicted}$ (Proposed Conditions)	0.35	1.01	0.72	5.04	7.12

ODOT's ECAT was also used to compare the cost to construct the short-term countermeasures to the anticipated safety benefit. The results of the benefit-cost analysis are shown in Table 11.

Table 11. Short-Term Countermeasure Benefit-Cost Summary

Value	Result
Expected Annual Crash Adjustment	0.63
Net Present Value of the Build Alternative	$57,217
Net Present Value of Safety Benefit	$180,724
Benefit-Cost Ratio	**3.16**

The short-term countermeasures show a benefit-cost ratio greater than 1, which indicates a positive return on investment.

9.2 Medium Term

Table 12 presents the same comparison of the existing intersections ($N_{expected\ existing}$) to similar intersections ($N_{predicted\ existing}$) and the proposed conditions if the medium-term countermeasure is implemented ($N_{predicted\ proposed}$). The table shows that the two intersections are functioning slightly better than their peers by 0.7 crashes per year. However, the third column in table 10 shows that there is potential for safety improvement in non-incapacitating (B category) crashes. The table also shows that if the medium-term countermeasure is implemented, the intersections are predicted to operate better than their peers and crashes may decrease by four per year.

Table 12. Medium-Term Countermeasure ECAT Analysis Results Summary

Crashes	KA	B	C	O	Total
$N_{predicted}$ (Existing Conditions)	0.46	0.46	1.83	5.71	8.46
$N_{expected}$ (Existing Conditions)	0.38	1.09	0.79	5.49	7.75
$N_{Potential\ for\ Improvement}$ (Existing Conditions)	-0.08	0.63	-1.04	-0.23	-0.71
$N_{predicted}$ (Proposed Conditions)	0.23	0.24	0.97	2.91	4.34

ODOT's ECAT was also used to compare the cost to construct the medium-term countermeasure to the anticipated safety benefit. The results of the benefit-cost analysis are shown in Table 13.

Table 13. Medium-Term Countermeasure Benefit-Cost Summary

Value	Result
Expected Annual Crash Adjustment	4.11
Net Present Value of the Build Alternative	$2,047,410
Net Present Value of Safety Benefit	$2,632,103
Benefit-Cost Ratio	**1.29**

The medium-term countermeasure shows a benefit-cost ratio greater than 1, which indicates a positive return on investment.

9.3 Long Term

Table 14 presents the same comparison of the existing intersections ($N_{expected\ existing}$) to similar intersections ($N_{predicted\ existing}$) and the proposed conditions if the long-term countermeasure is implemented ($N_{predicted\ proposed}$). The table shows that the two intersections are functioning slightly better than their peers by 0.7 crashes per year. However, the third column in table 10 shows that there is potential for safety improvement in non-incapacitating (B category) crashes. The table also shows that if the long-term countermeasure is implemented, the intersection is predicted to operate better than its peers and crashes may decrease by almost three per year.

Table 14. Long-Term Countermeasure ECAT Analysis Results Summary

Crashes	KA	B	C	O	Total
$N_{predicted}$ (Existing Conditions)	0.46	0.46	1.83	5.71	8.46
$N_{expected}$ (Existing Conditions)	0.38	1.09	0.79	5.49	7.75
$N_{Potential\ for\ Improvement}$ (Existing Conditions)	-0.08	0.63	-1.04	-0.23	-0.71
$N_{predicted}$ (Proposed Conditions)	0.24	0.24	0.96	3.51	4.95

ODOT's ECAT was also used to compare the cost to construct the long-term countermeasure to the anticipated safety benefit. The results of the benefit-cost analysis are shown in Table 15.

Table 15. Long-Term Countermeasure Benefit-Cost Summary

Value	Result
Expected Annual Crash Adjustment	3.50
Net Present Value of the Build Alternative	$2,053,030
Net Present Value of Safety Benefit	$2,524,020
Benefit-Cost Ratio	**1.23**

The long-term countermeasure shows a benefit-cost ratio greater than 1, which indicates a positive return on investment.

When deciding whether to implement the medium-term countermeasure versus the long-term countermeasure it is important to compare the predicted safety benefit to the predicted construction cost. Comparing Table 12 to Table 14 shows that the predicted safety benefit associated with the long-term countermeasure is very similar to the predicted safety benefit associated with the medium-term countermeasure. Comparing Table 13 to Table 15 shows that implementing the long-term countermeasure will cost more than implementing the medium-term countermeasure. Given the similar safety benefit the cost to implement the long-term countermeasure may not be justified from a safety perspective.

10 Conclusions and Recommendations

ODOT's ECAT was used to calculate the reduction in crashes that can be expected if the short-, medium-, and long-term countermeasures are implemented and to perform a benefit-cost analysis for each set of countermeasures based on the safety benefit. A benefit-cost ratio greater than 1 indicates a positive return on investment.

Table 16 presents the results of the benefit-cost analysis for each set of improvements.

Table 16. Short-, Medium-, and Long-Term Countermeasure Benefit-Cost Summary

Value	Short-Term Countermeasures	Medium-Term Countermeasure	Long-Term Countermeasure
Expected Annual Crash Adjustment	0.63	4.11	3.50
Net Present Value of the Build Alternative	$57,217	$2,047,410	$2,053,030
Net Present Value of Safety Benefit	$180,724	$2,632,103	$2,524,020
Benefit-Cost Ratio	**3.16**	**1.29**	**1.23**

The benefit-cost ratios for the short-, medium-, and long-term countermeasures are favorable (i.e., above 1). Therefore, if these countermeasures are implemented, they are predicted to provide a sufficient safety benefit to justify the cost of construction.

It is recommended that the short-term countermeasures be constructed. Crashes at both intersections should then be monitored to determine if the crash frequency is reduced before determining whether to construct the additional countermeasures.

If additional countermeasures are implemented, it is recommended that the medium-term countermeasures be constructed. The predicted safety benefit associated with the long-term countermeasure is very similar to the predicted safety benefit associated with the medium-term countermeasure while the estimated cost to construct the long-term countermeasure is higher than the estimated cost to construct the medium-term countermeasure. Therefore, given the similar safety benefit the cost to implement the long-term countermeasure may not be justified from a safety perspective.

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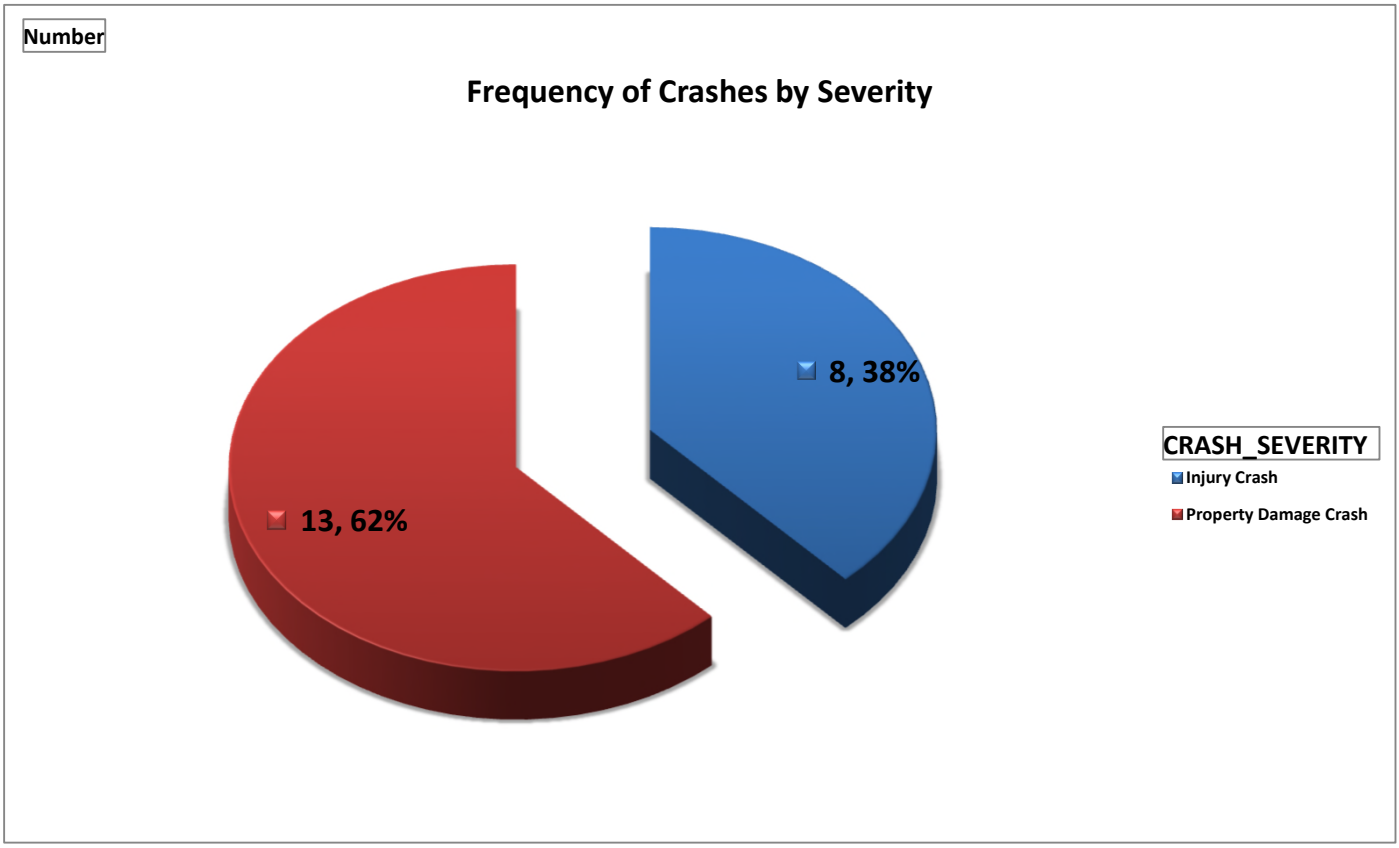
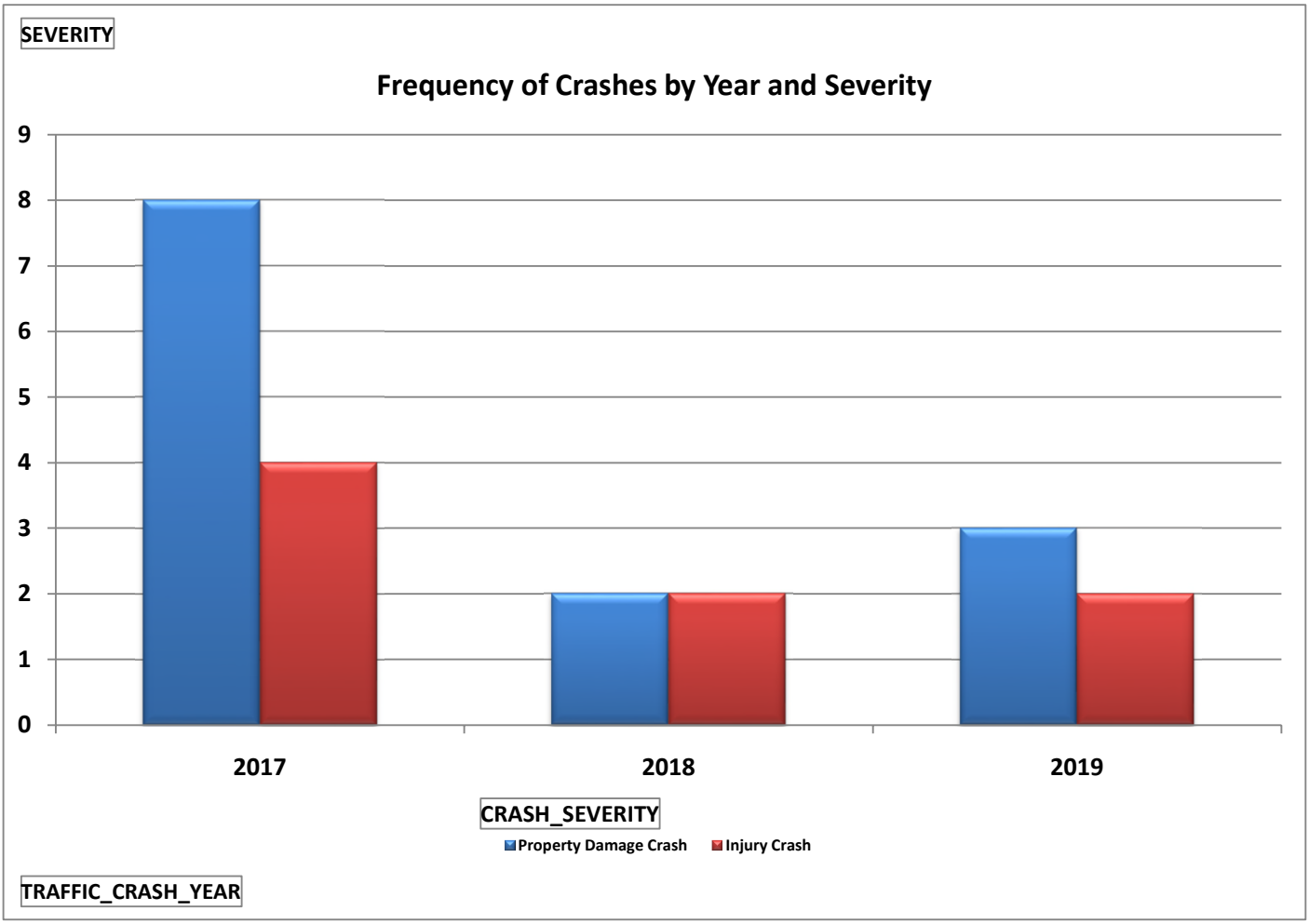
APPENDIX A

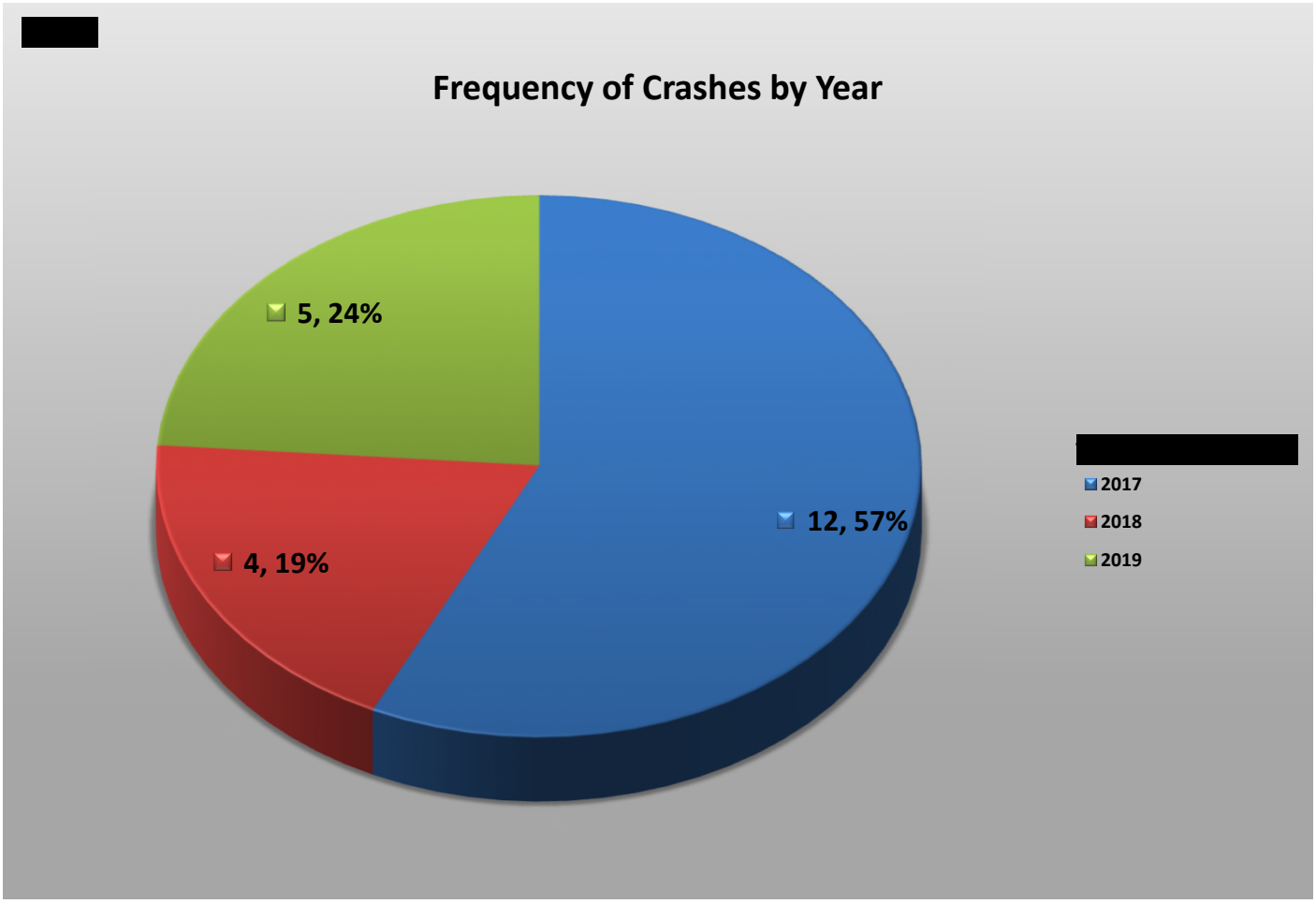
Crash Analysis Module Tool Results

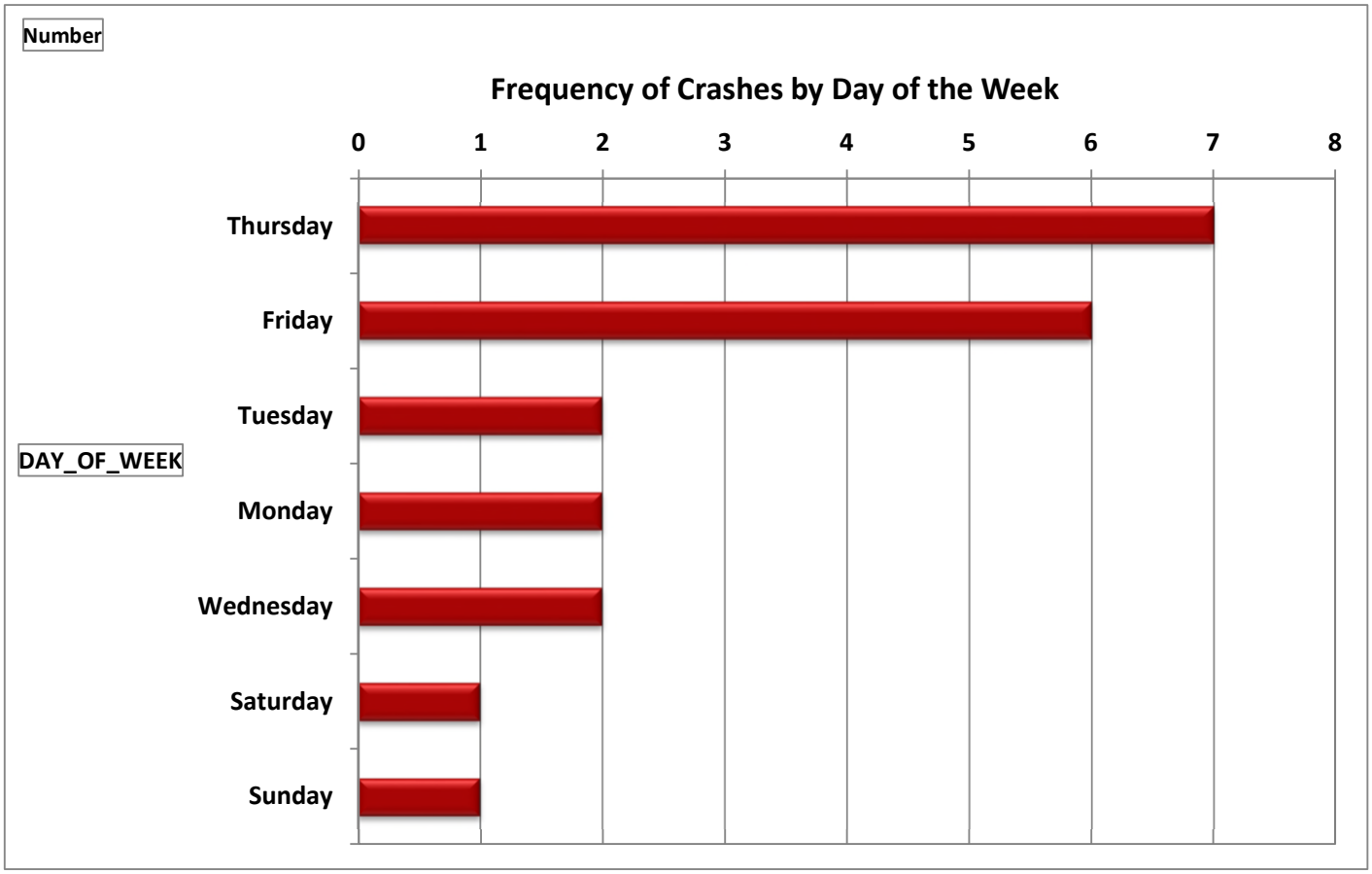
US 62 at SR 557





US 62 at SR 557





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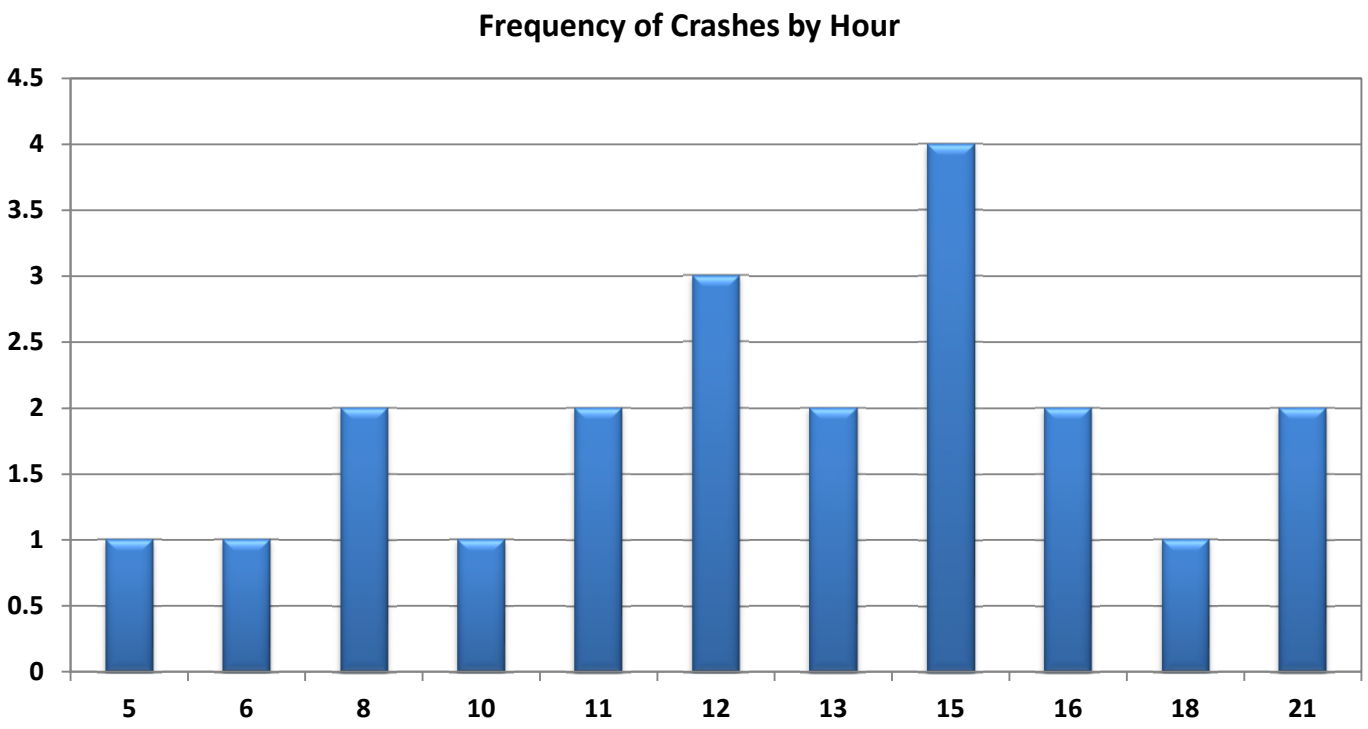

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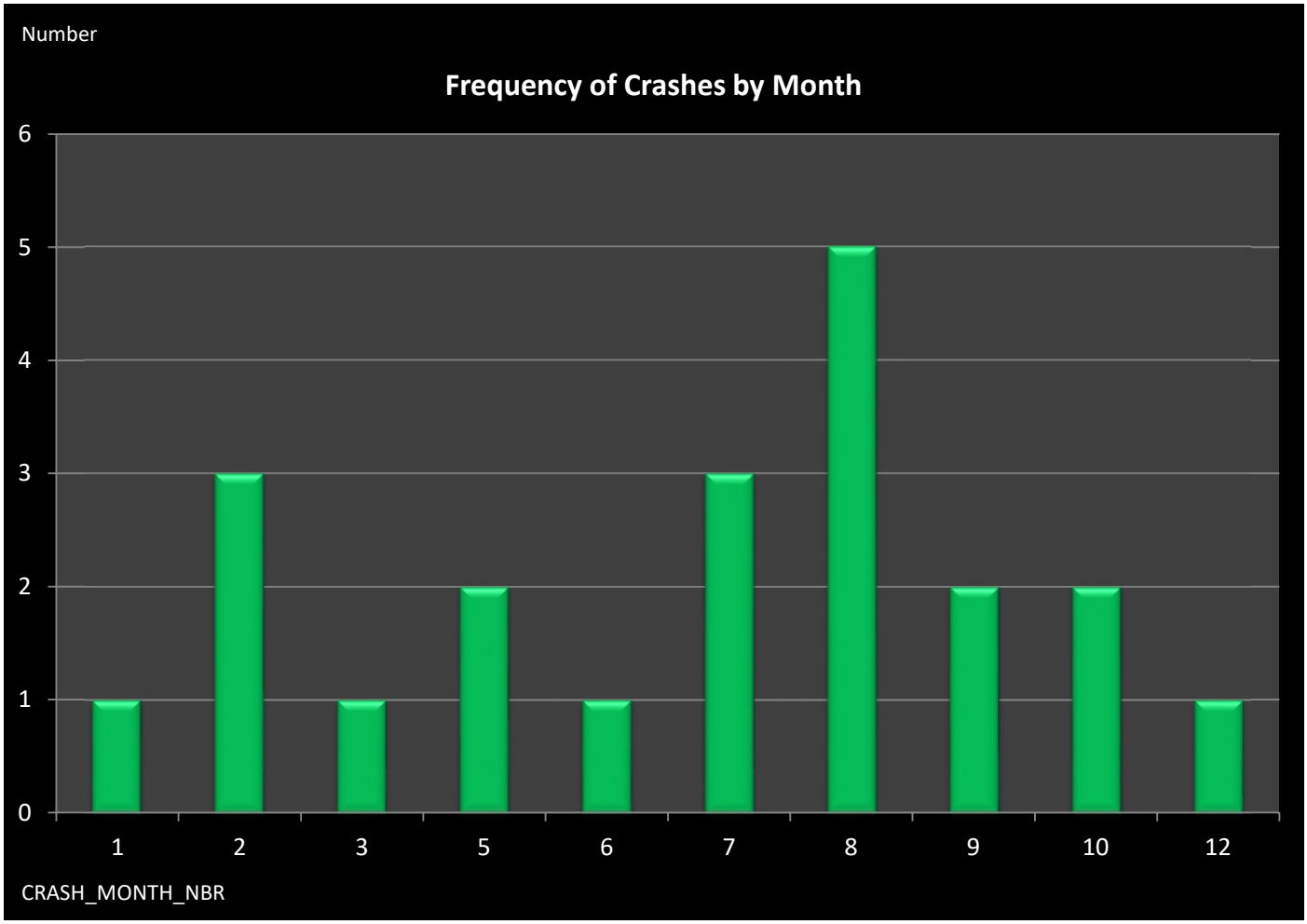

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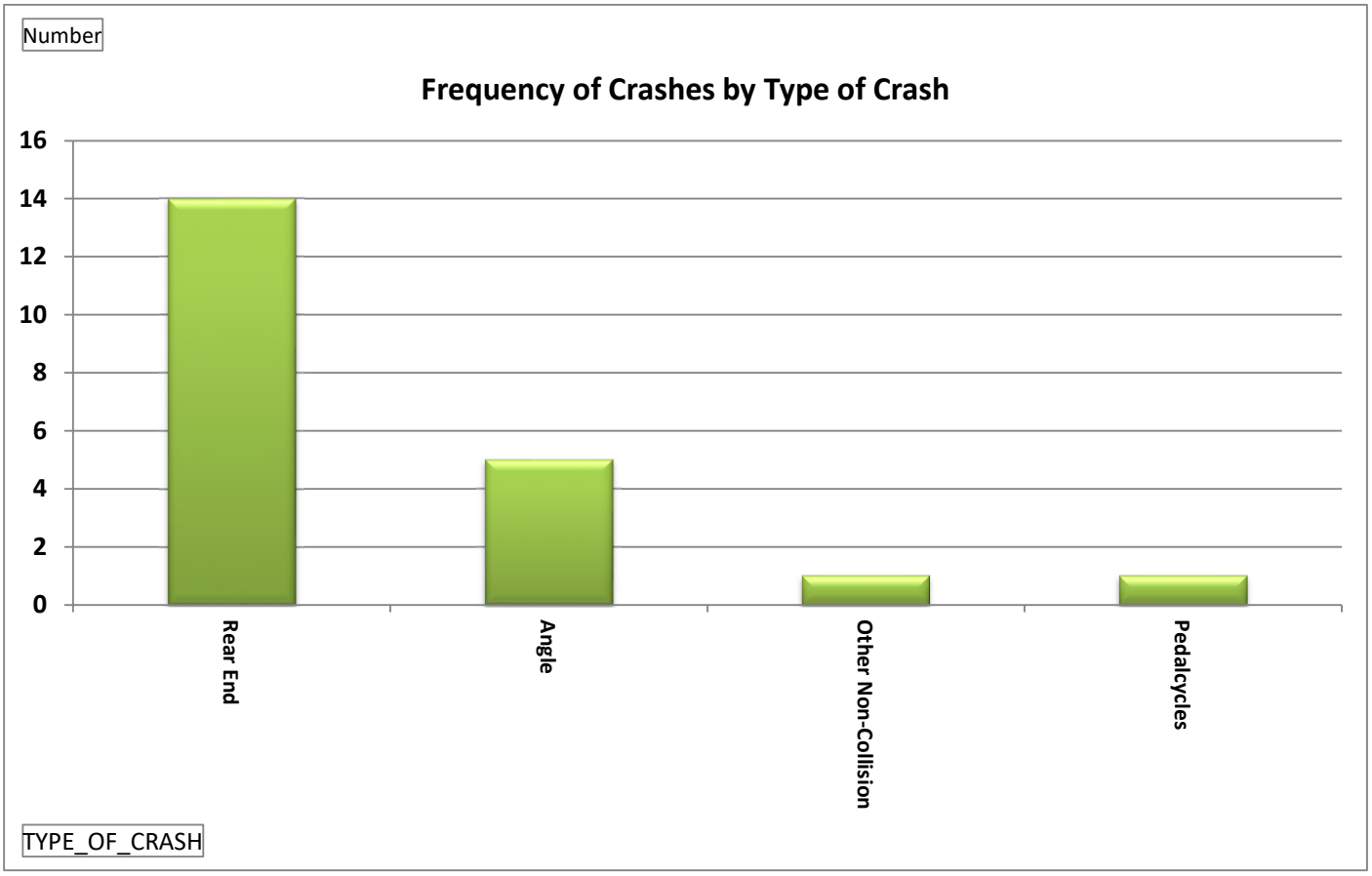

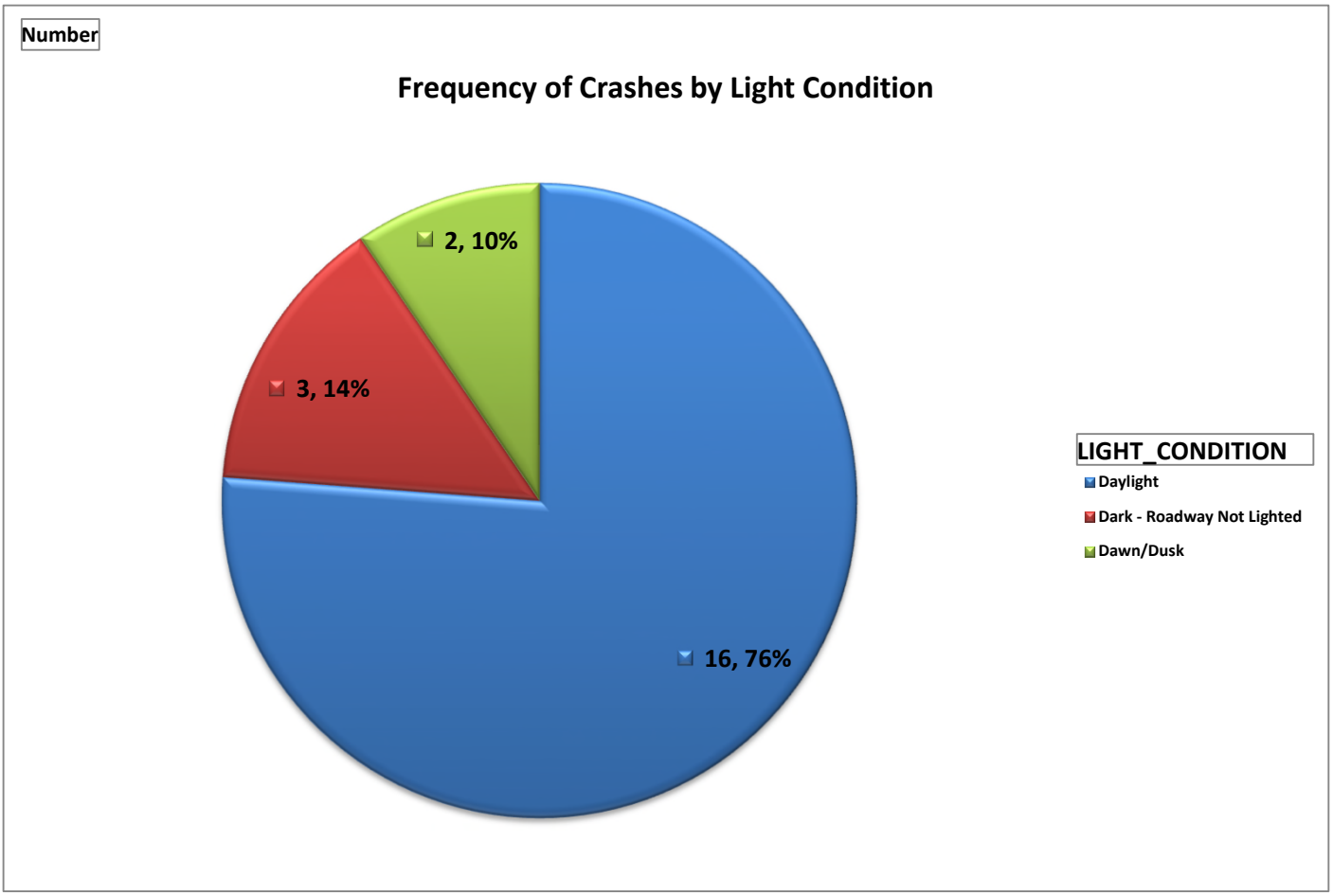

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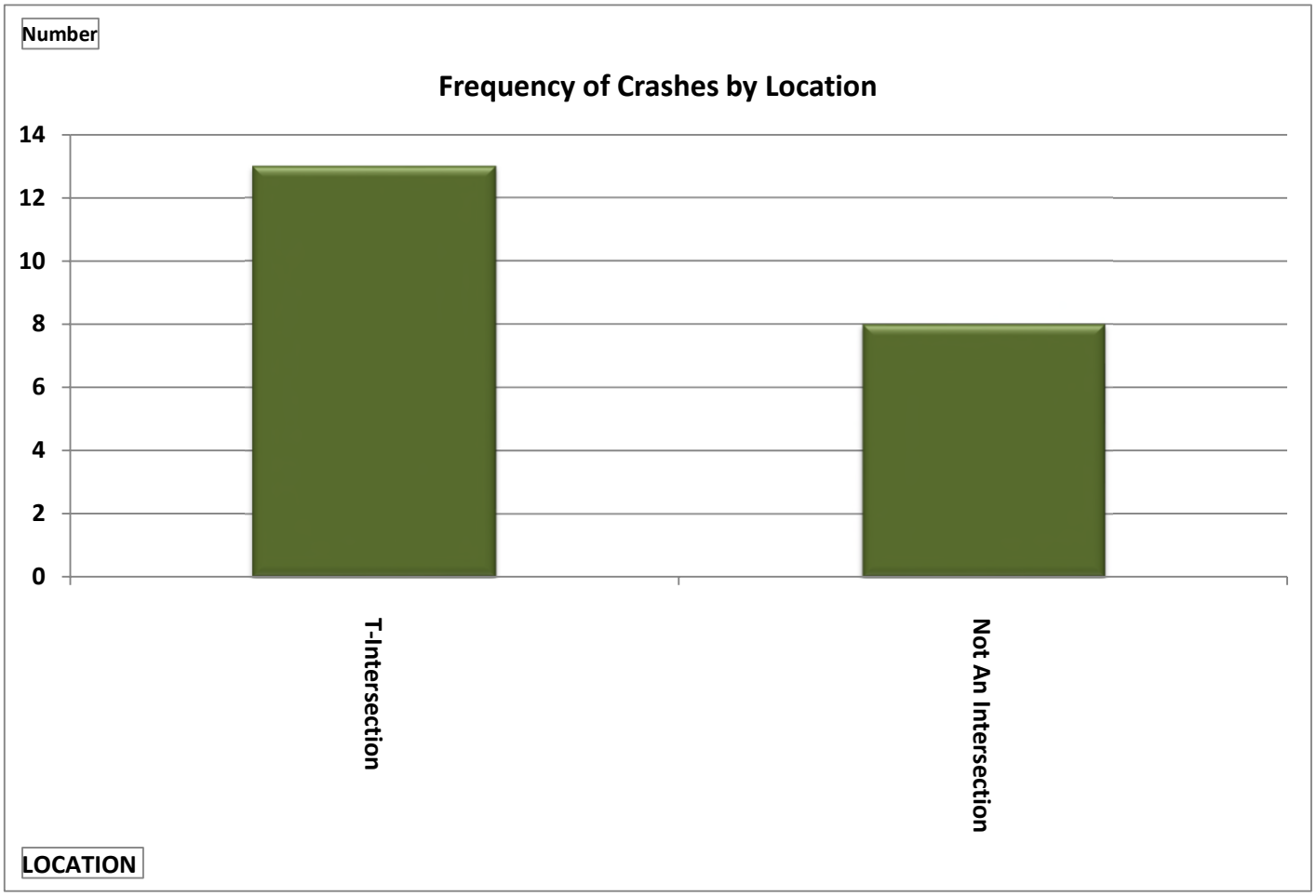

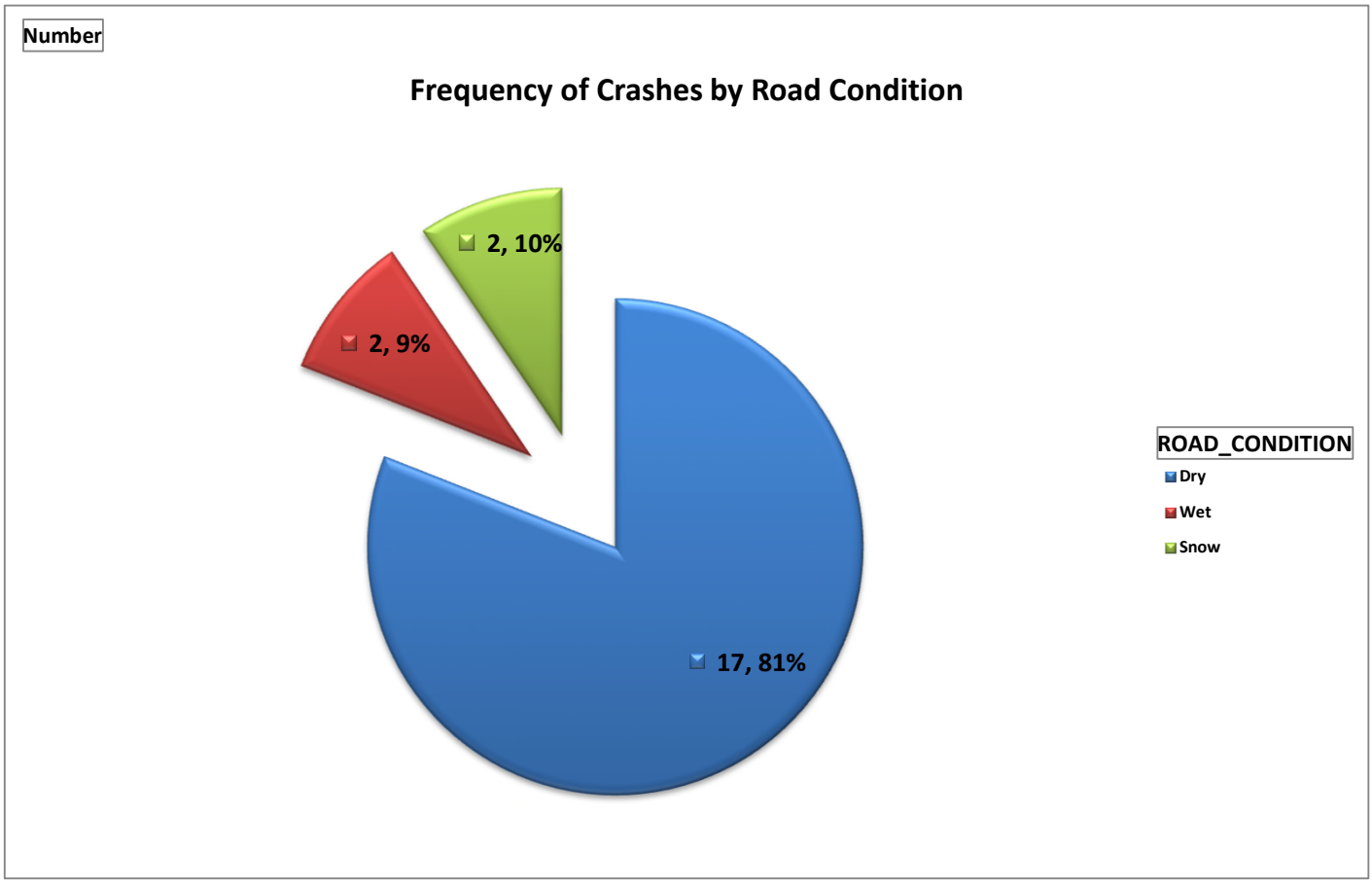

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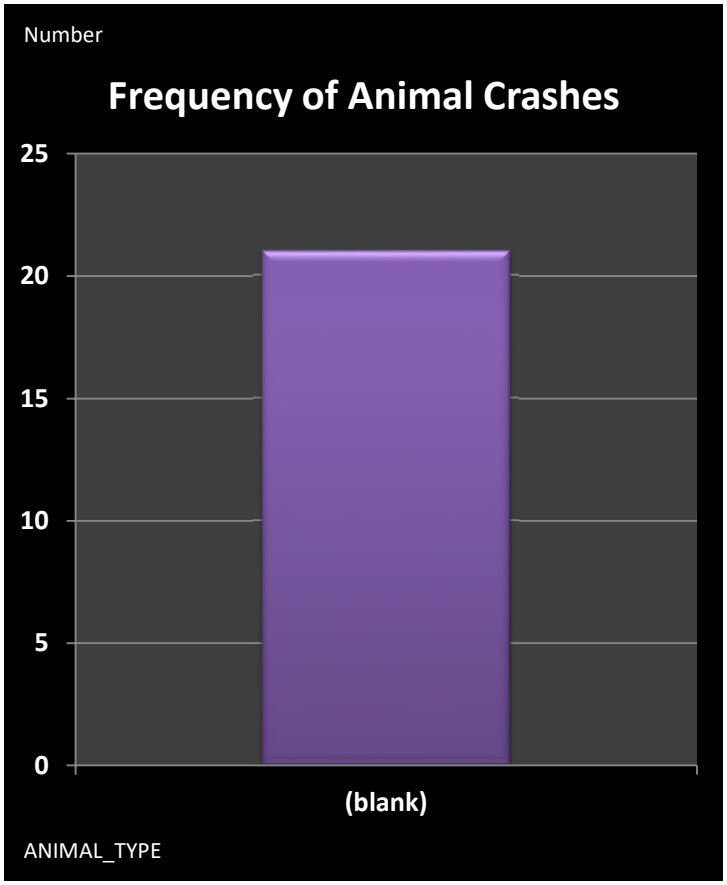

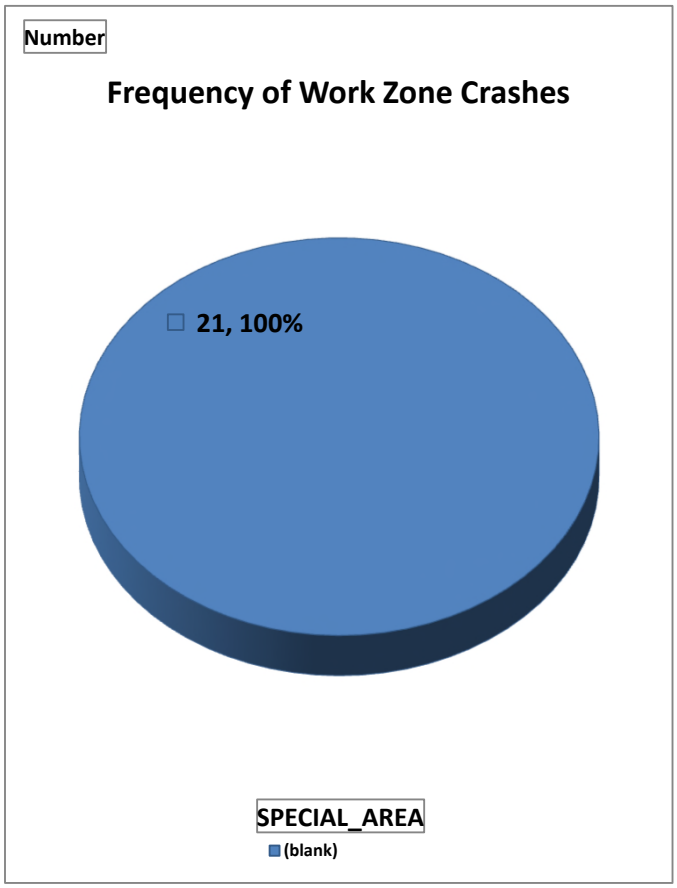

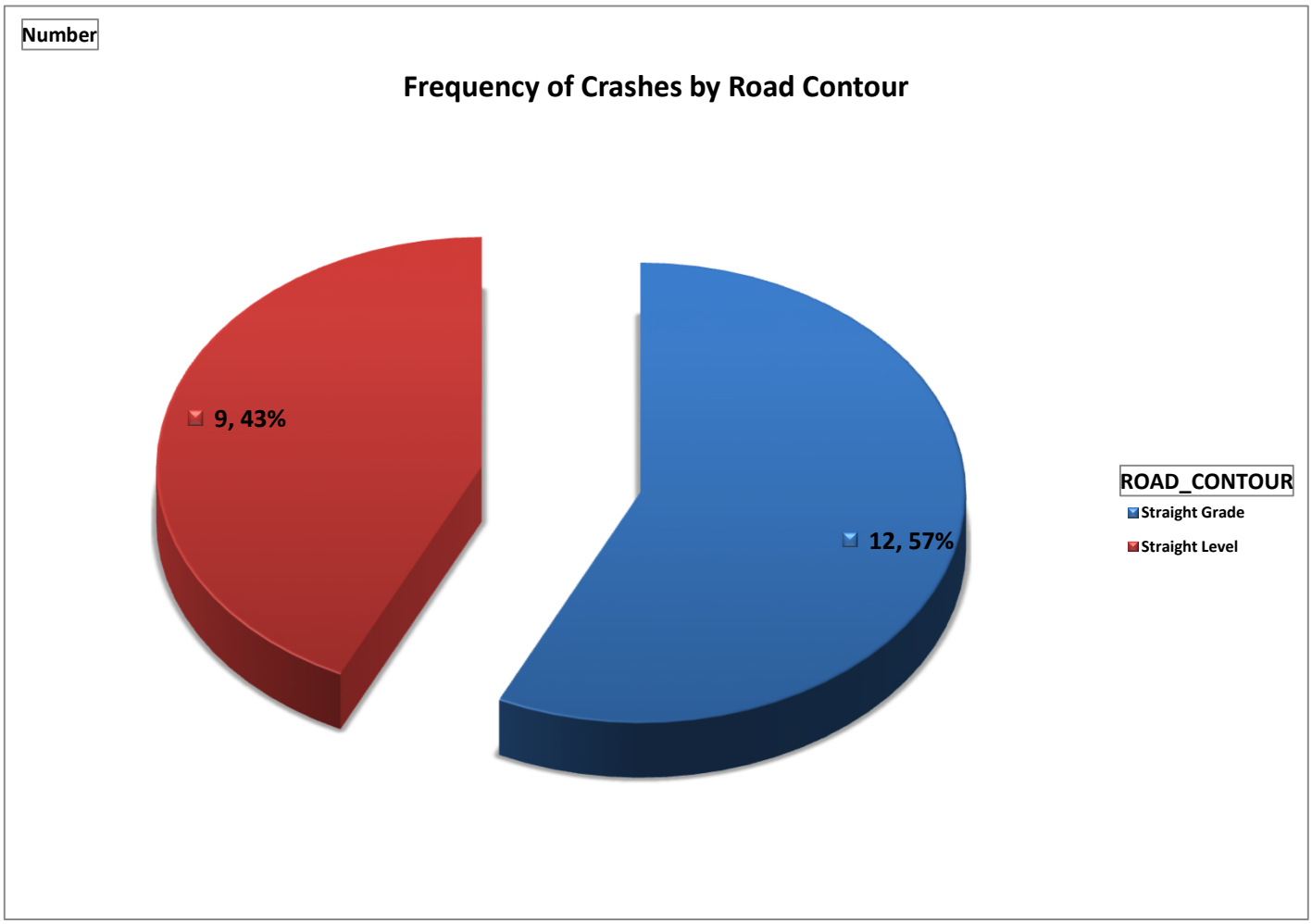

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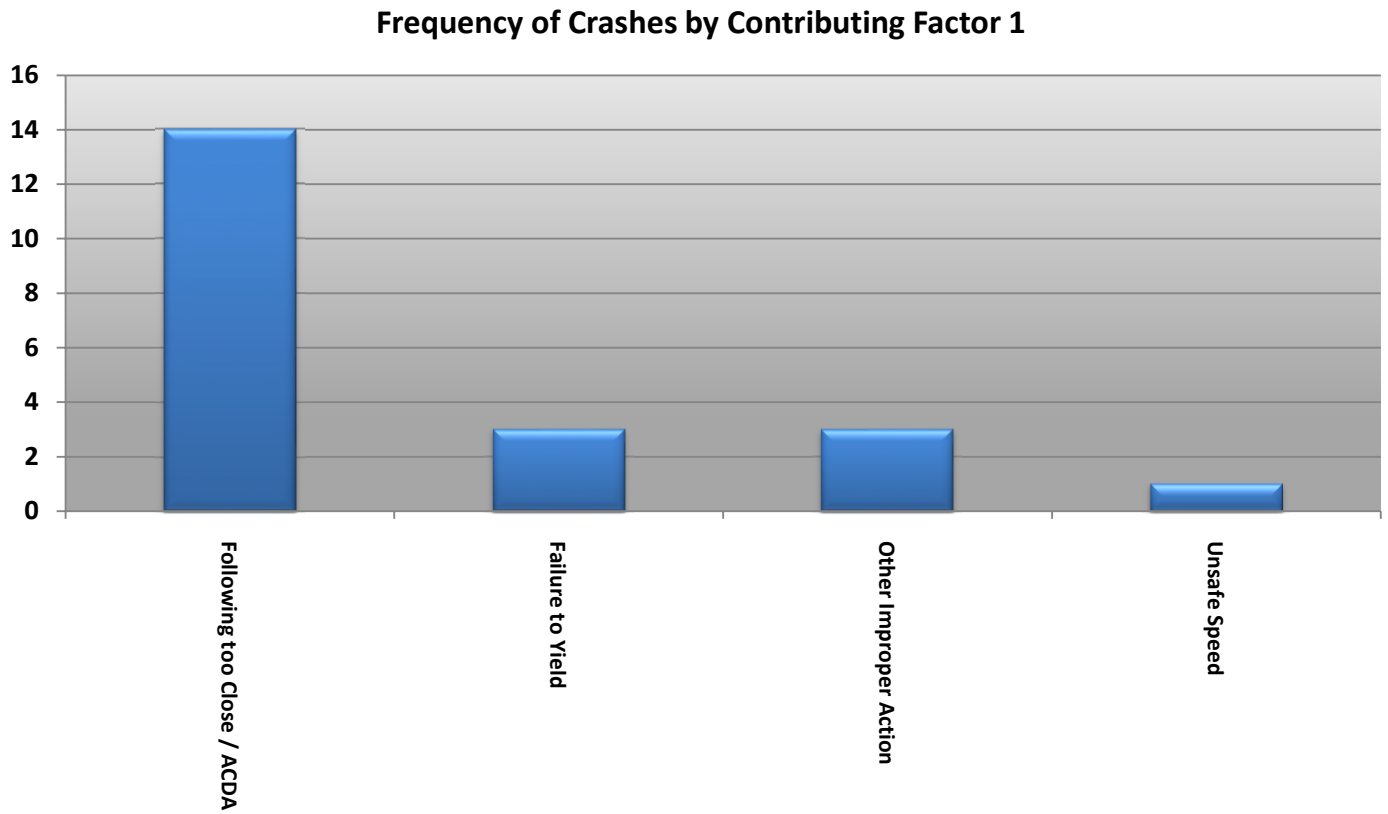

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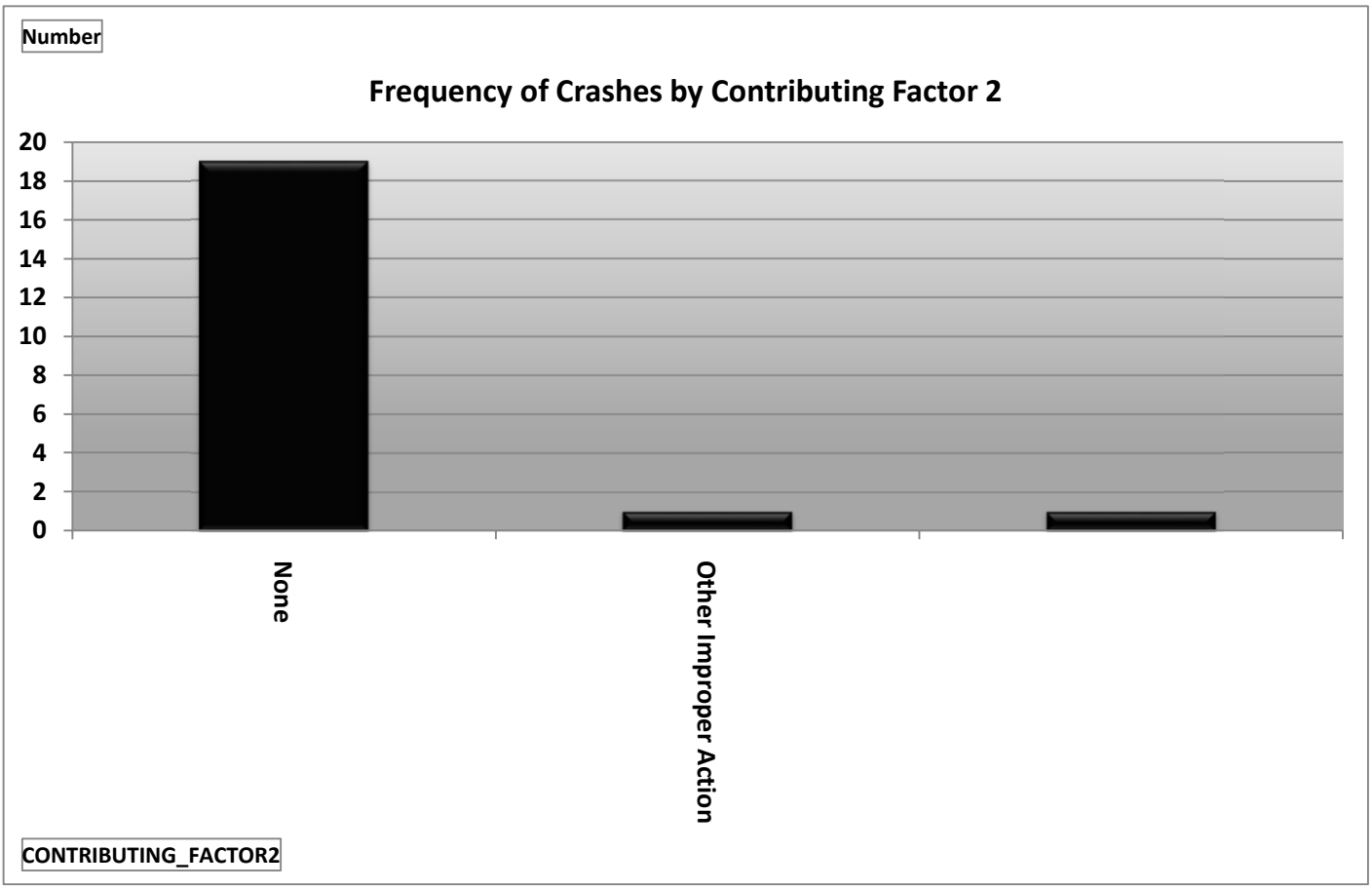
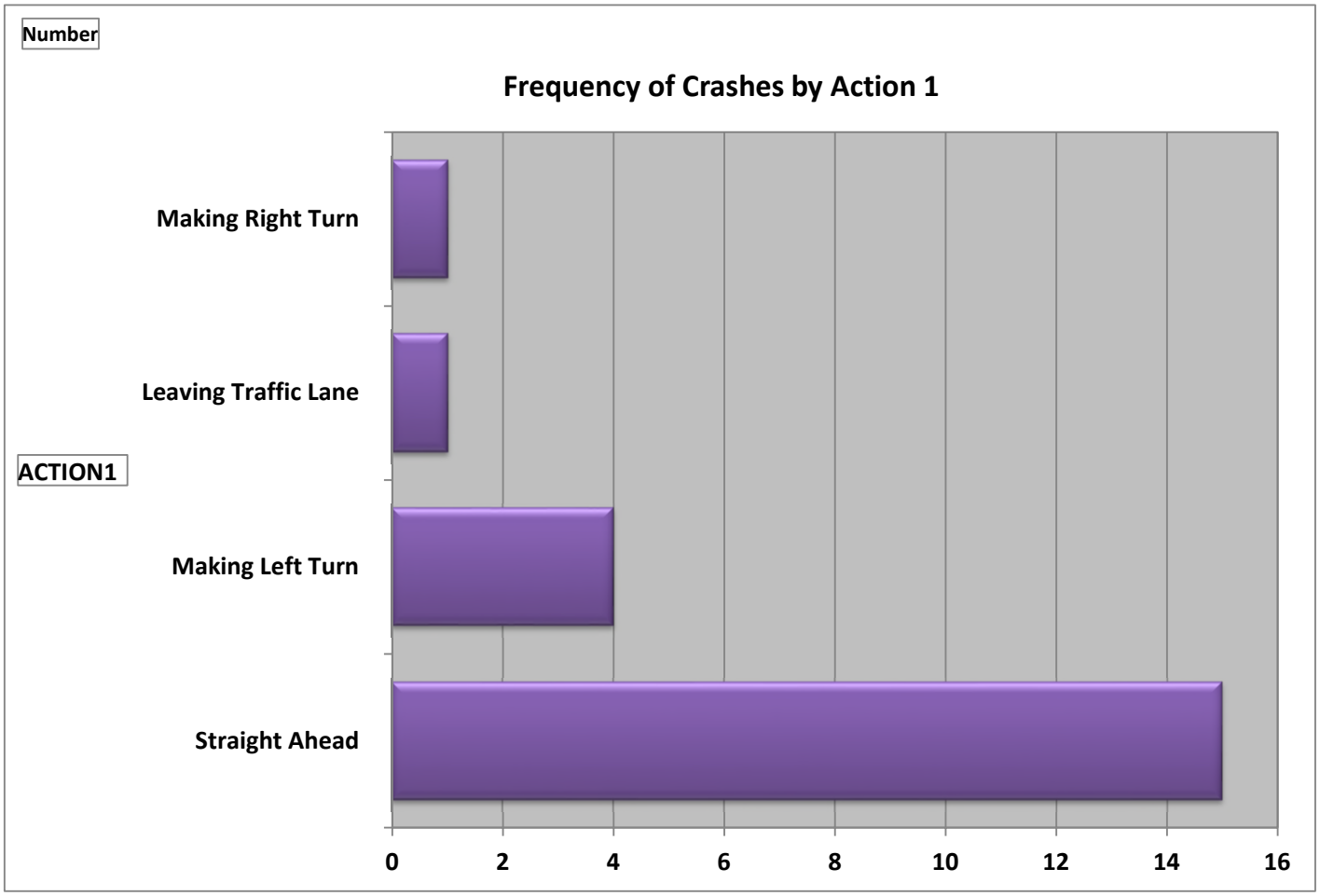
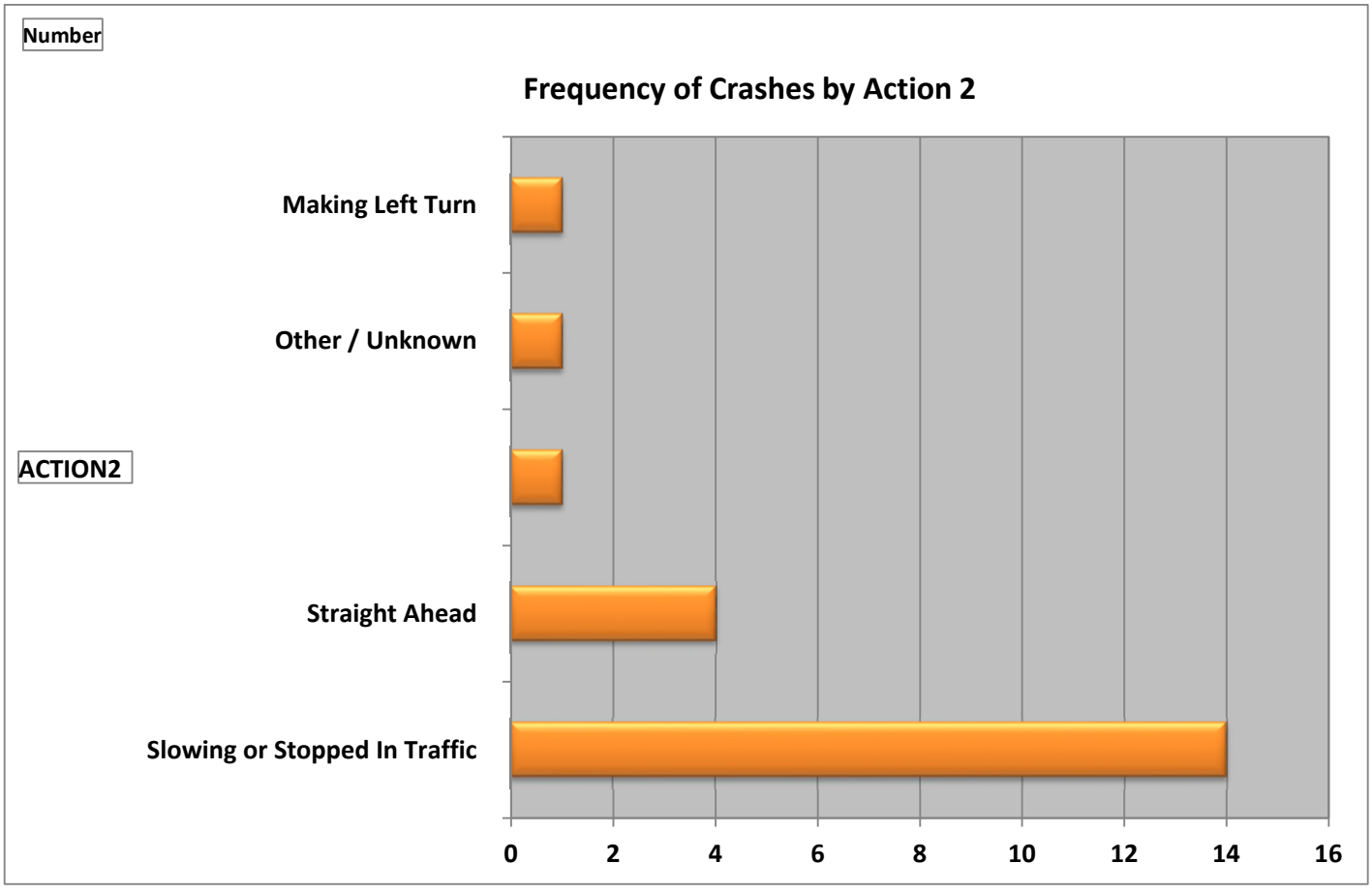
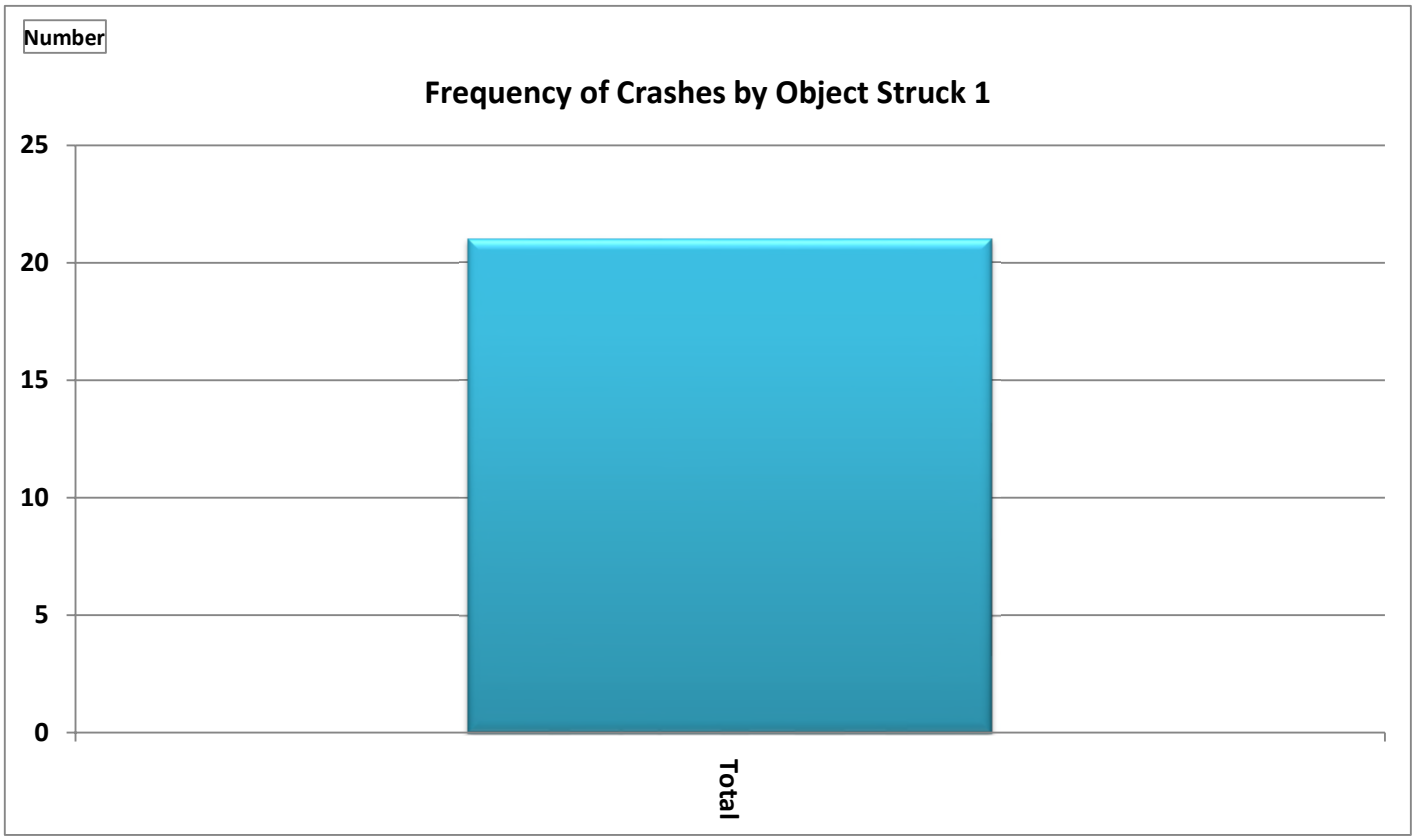


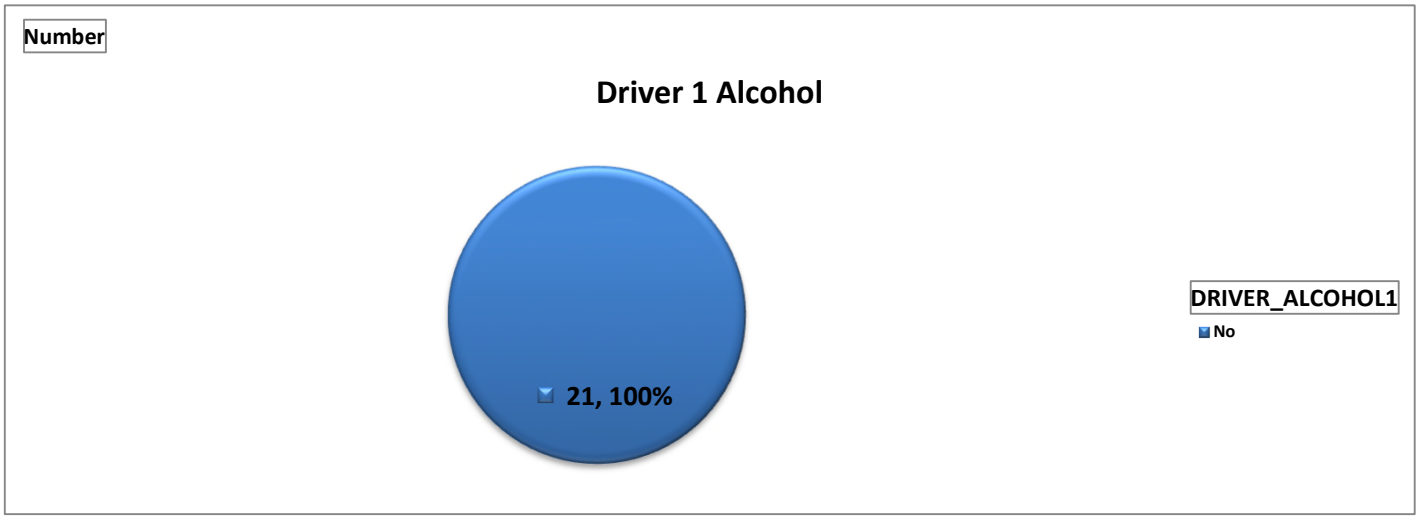
US 62 at SR 557

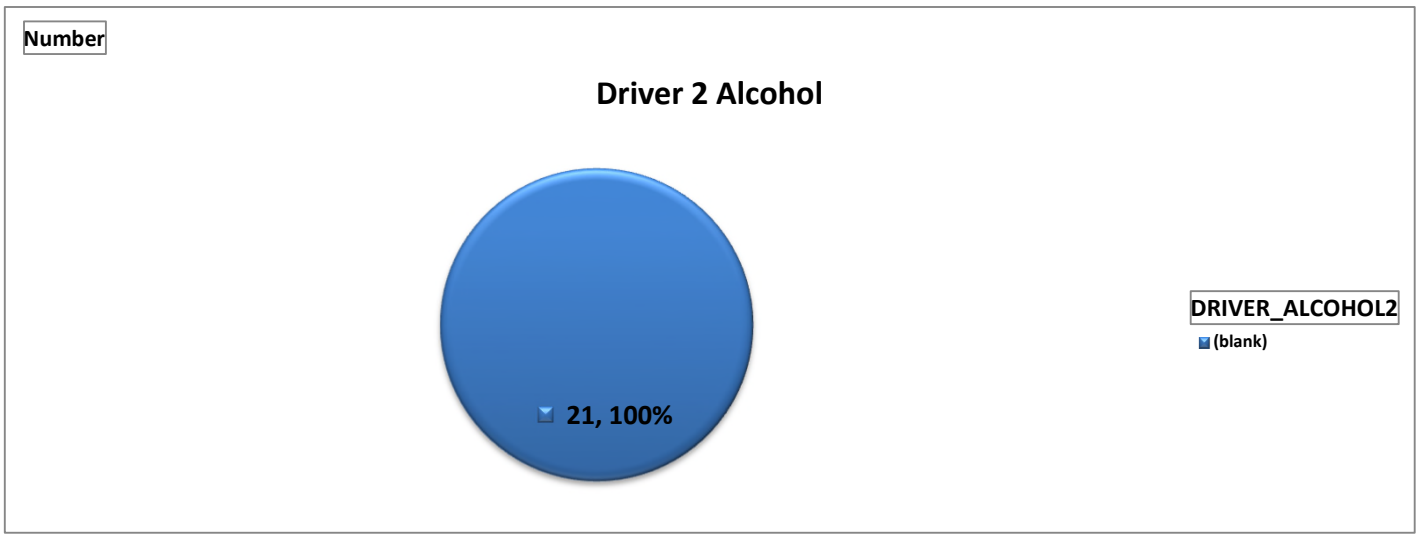




US 62 at SR 557







Select Site Type	Seg/Rur; 2-lane

Crash Severity	Site Average		Statewide Average
	Total (2017-2019)	Total (%)	Total (%)
Fatal Crash	0	0.00%	0.93%
Serious Injury Suspected Crash	1	4.76%	4.50%
Minor Injury Suspected Crash	4	19.05%	14.06%
Injury Possible Crash	3	14.29%	7.65%
Property-Damage-Only	13	61.90%	72.86%
Total	**21**		

Crashes by Crash Type				
	Total (%)		Fatal & All Injury (%)	
Crash Type	Site Average	Statewide Average	Site Average	Statewide Average
Unknown	0.00%	0.19%	0.00%	0.12%
Head On	0.00%	2.86%	0.00%	5.74%
Rear End	66.67%	10.26%	62.50%	15.40%
Backing	0.00%	1.12%	0.00%	0.56%
Sideswipe - Meeting	0.00%	2.30%	0.00%	3.00%
Sideswipe - Passing	0.00%	3.66%	0.00%	3.92%
Angle	23.81%	2.36%	25.00%	4.64%
Parked Vehicle	0.00%	0.81%	0.00%	0.79%
Pedestrian	0.00%	0.26%	0.00%	0.88%
Animal	0.00%	33.28%	0.00%	5.60%
Train	0.00%	0.02%	0.00%	0.03%
Pedalcycles	4.76%	0.14%	12.50%	0.48%
Other Non-Vehicle	0.00%	0.01%	0.00%	0.04%
Fixed Object	0.00%	34.58%	0.00%	47.05%
Other Object	0.00%	0.92%	0.00%	0.21%
Falling From Or In Vehicle	0.00%	0.00%	0.00%	0.00%
Overturning	0.00%	2.75%	0.00%	6.35%
Other Non-Collision	4.76%	1.30%	0.00%	0.54%
Left Turn	0.00%	2.66%	0.00%	4.09%
Right Turn	0.00%	0.52%	0.00%	0.56%

Crashes by Light Conditions				
	Total (%)		Fatal & All Injury (%)	
Light Conditions	Site Average	Statewide Average	Site Average	Statewide Average
Daylight	76.19%	48.48%	75.00%	63.03%
Dawn/Dusk	9.52%	6.46%	0.00%	4.79%
Dark - Lighted Roadway	0.00%	1.78%	0.00%	1.47%
Dark - Roadway Not Lighted	14.29%	42.57%	25.00%	30.27%
Dark - Unknown Roadway Lighting	0.00%	0.28%	0.00%	0.16%
Other / Unknown	0.00%	0.43%	0.00%	0.28%

Crashes by Road Conditions				
	Total (%)		Fatal & All Injury (%)	
Road Conditions	Site Average	Statewide Average	Site Average	Statewide Average
Dry	80.95%	69.75%	87.50%	69.58%
Wet	9.52%	18.12%	12.50%	19.13%
Snow	9.52%	8.08%	0.00%	7.31%
Ice	0.00%	3.11%	0.00%	3.16%
Sand, Mud, Dirt, Oil, Gravel	0.00%	0.04%	0.00%	0.06%
Water (Standing, Moving)	0.00%	0.10%	0.00%	0.08%
Slush	0.00%	0.54%	0.00%	0.55%
Other / Unknown	0.01%	0.26%	0.00%	0.13%

APPENDIX B

Crash Diagrams

LEGEND

TYPES OF COLLISIONS

REAR END

SIDE-SWIPE PASSING

ANGLE

NON COLLISION
WITH MOTOR VEHICLES

BICYCLE

YEAR	LIGHT
2017	DL = DAYLIGHT
2018	LT = NIGHT LIGHTED
2019	NL = NIGHT NOT-LIGHTED
	DW = DAWN
	DK = DUSK

CONTRIBUTING FACTOR

ACD = ASSURED CLEAR DISTANCE
OVN = OPERATING IN NEGLIGENT MANNER
FTY = FAILURE TO YIELD
USS = UNSAFE SPEED
OTH = OTHER

SEVERITY	ROAD
P = PROPERTY DAMAGE ONLY	D = DRY
	W = WET
I = INJURY	S = SNOW
F = FATALITY	I = ICE

DATE/HOUR/LIGHT/ROAD/
SEVERITY/CONTR FACTOR

NNOT DRAWN TO SCALE

CALCULATED QA
CHECKED JM

STW SAFETY STUDIES - US 62 AT SR 557
CRASH DIAGRAMS (2017-2019)

PID #112364

2 | 1

C:\Users\qai\OneDrive - ARCADIS\Desktop\My Work\PID • 112364 - Task 4 - HOL - 62 24.75 US 62 at SR 557 Safety Study\Crash Analysis\Crash Diagrams\US 62 and SR 557 Crash Diagram - 1.dgn 3/25

LEGEND

TYPES OF COLLISIONS

REAR END

SIDE-SWIPE PASSING

ANGLE

NON COLLISION
WITH MOTOR VEHICLES

BICYCLE

YEAR	LIGHT
2017	DL = DAYLIGHT
2018	LT = NIGHT LIGHTED
2019	NL = NIGHT NOT-LIGHTED
	DW = DAWN
	DK = DUSK

CONTRIBUTING FACTOR

ACD = ASSURED CLEAR DISTANCE
OVN = OPERATING IN NEGLIGENT MANNER
FTY = FAILURE TO YIELD
USS = UNSAFE SPEED
OTH = OTHER

SEVERITY	ROAD
P = PROPERTY DAMAGE ONLY	D = DRY
I = INJURY	W = WET
F = FATALITY	S = SNOW
	I = ICE

DATE/HOUR/LIGHT/ROAD/
SEVERITY/CONTR FACTOR

N

NNOT DRAWN TO SCALE

CALCULATED QA
CHECKED JM

STW SAFETY STUDIES - US 62 AT CR 201
CRASH DIAGRAMS (2017-2019)

PID #112364

2
2

C:\Users\qa\OneDrive - ARCADIS\Desktop\My Work\PID • 112364 - Task 4 - HOL - 62 24.75 US 62 at SR 557 Safety Study\Crash Analysis\Crash Diagrams\US 62 and SR 557 Crash Diagram - 2.dgn 3/2

APPENDIX C

Design Hourly Volumes

PID Location HOL 62 24.75

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

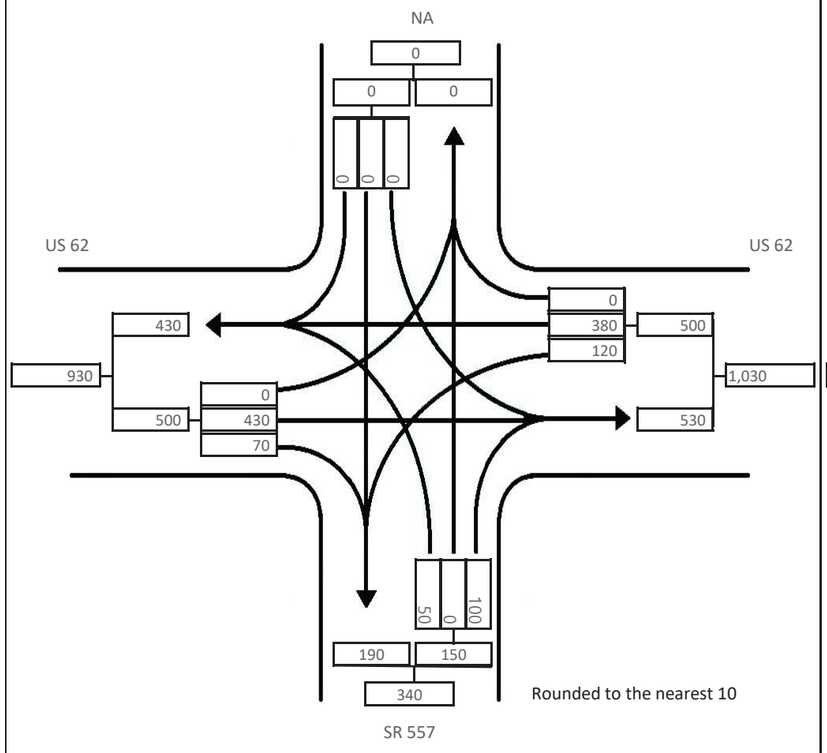
Method: IPF

Location	US 62 West Leg SHOL00062R 24.75		US 62 East Leg SHOL00062R 24.75		NA North Leg		SR 557 South Leg SHOL00557R 8.69	
2024 ADT	11,100	*	12,300	*	0	*	4,150	*
2044 ADT	11,800	*	12,800	*	0	*	4,350	*
K	0.10		0.10		0.00		0.10	
DHV	1,180		1,280		0		440	
D	0.56		0.56		-1.00		0.51	
T24	0.14		0.14		0.00		0.14	
TD	0.08		0.09		0.00		0.11	

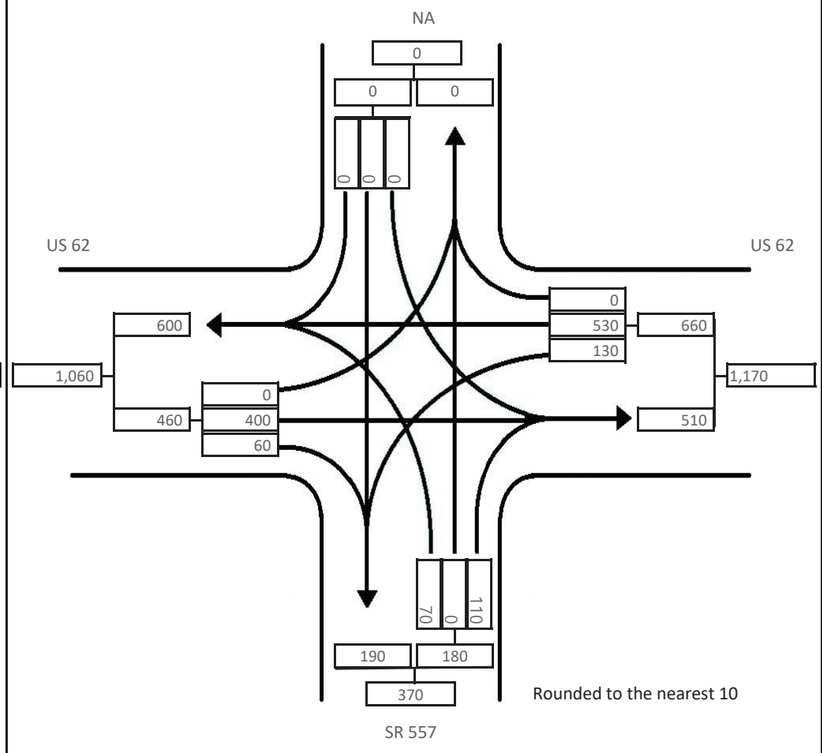
* pivot from turn movmement count ADT

US 62 & SR 557 in Holmes County

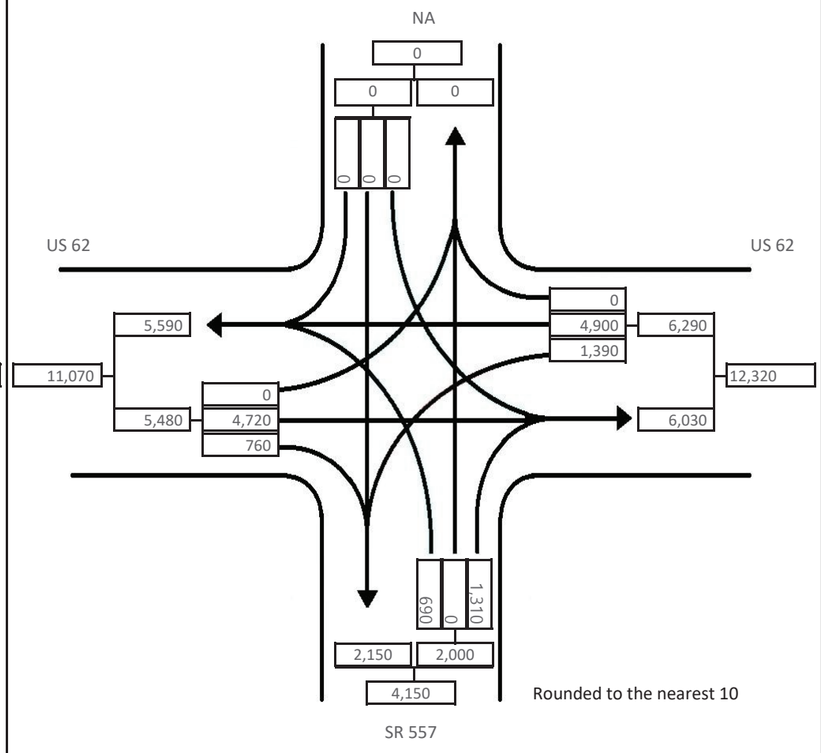
Forecast Year 2024 AM Total Veh



Forecast Year 2024 PM Total Veh

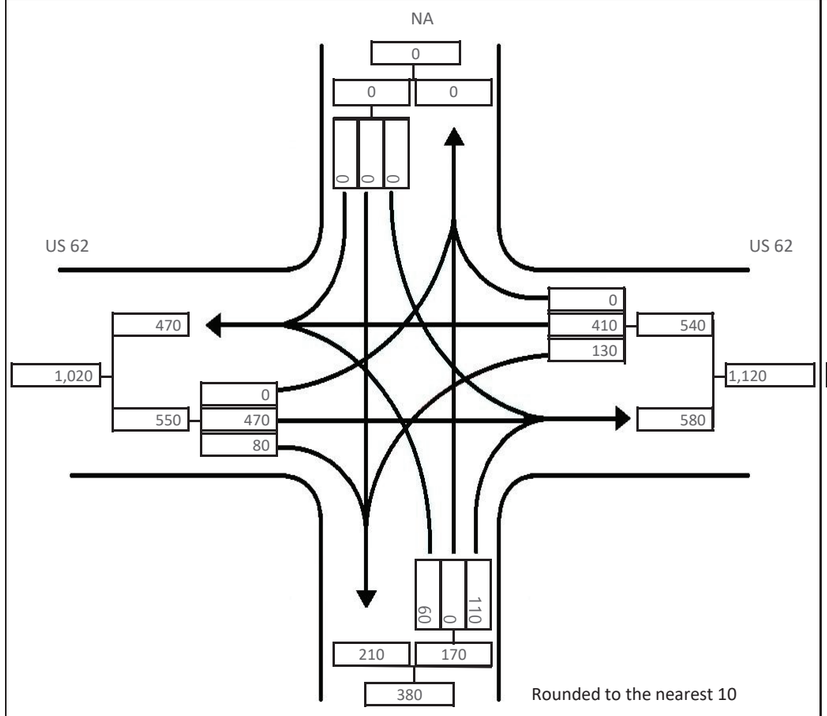


Forecast Year 2024 ADT Total Veh



Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

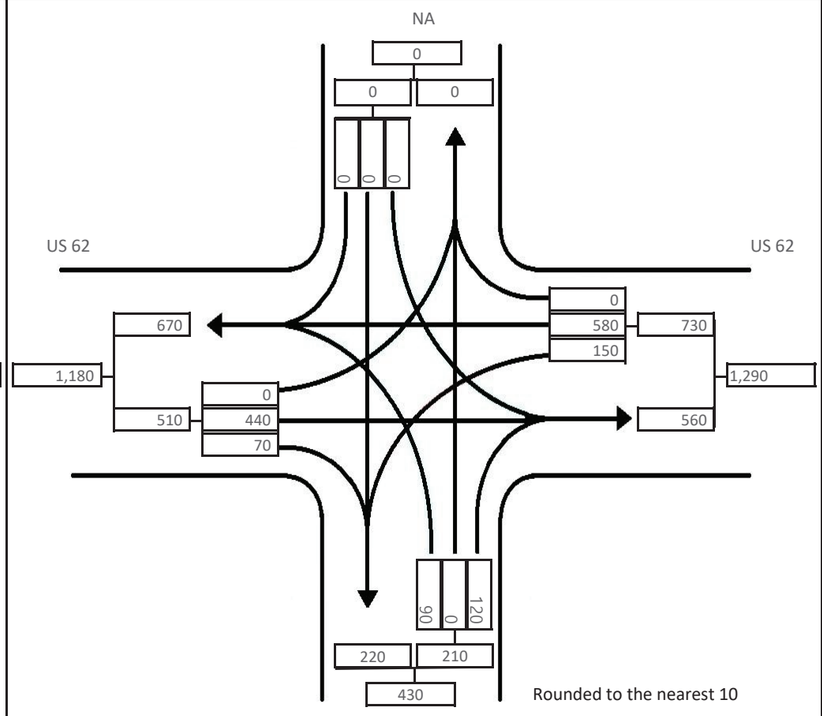
Forecast Year 2044 AM Total Veh



Rounded to the nearest 10

SR 557

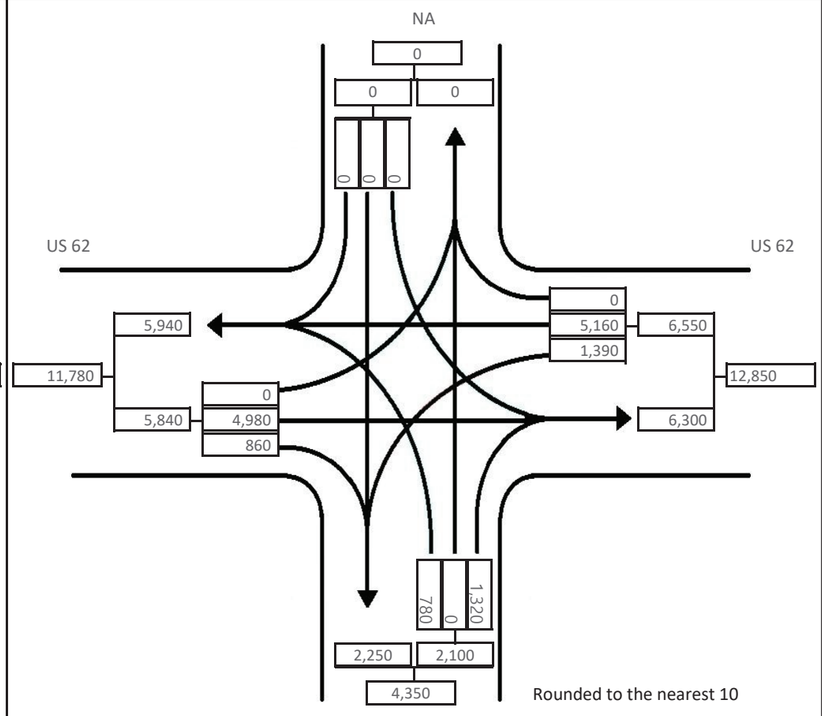
Forecast Year 2044 PM Total Veh



Rounded to the nearest 10

SR 557

Forecast Year 2044 ADT Total Veh

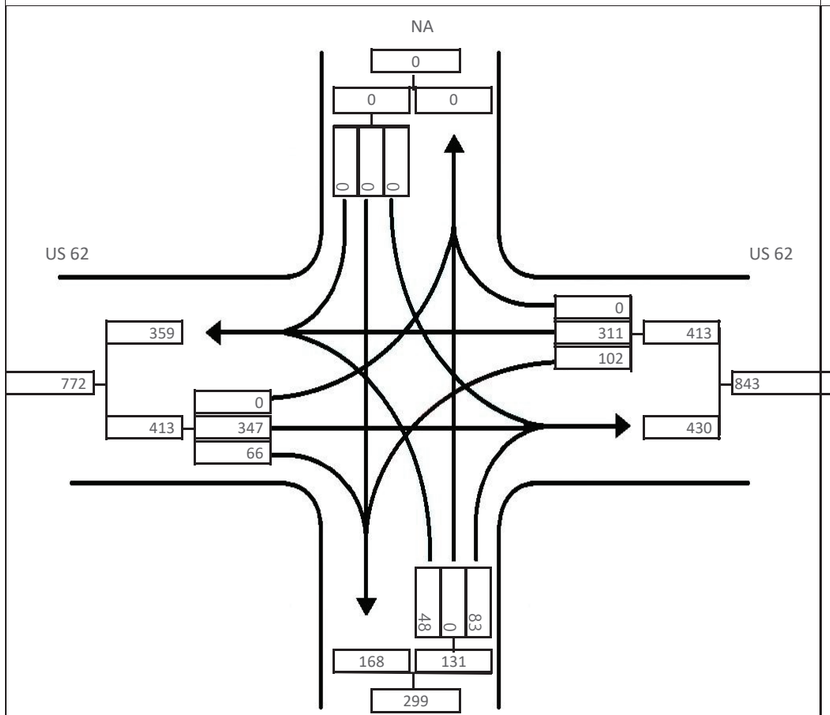


Rounded to the nearest 10

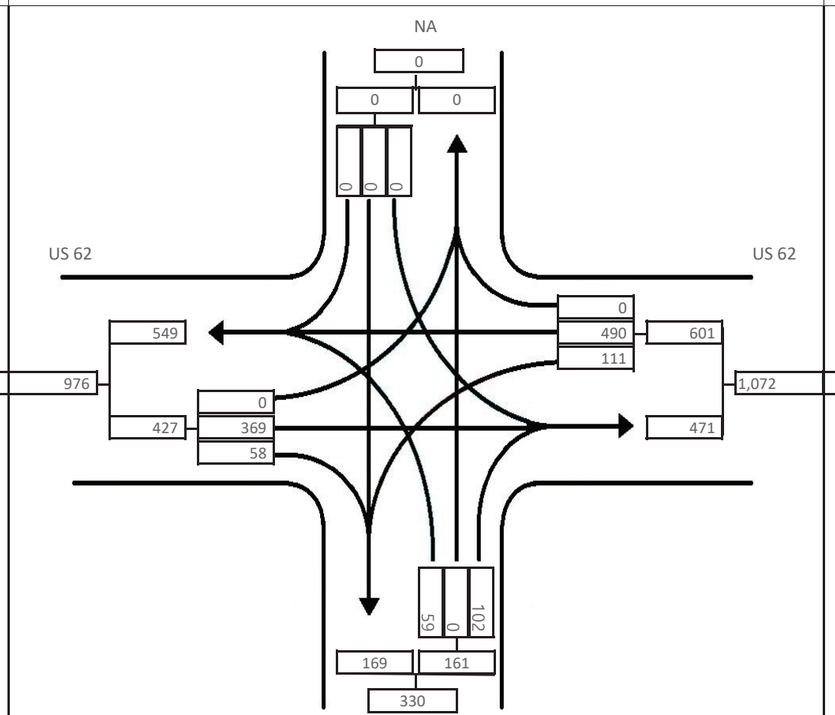
SR 557

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

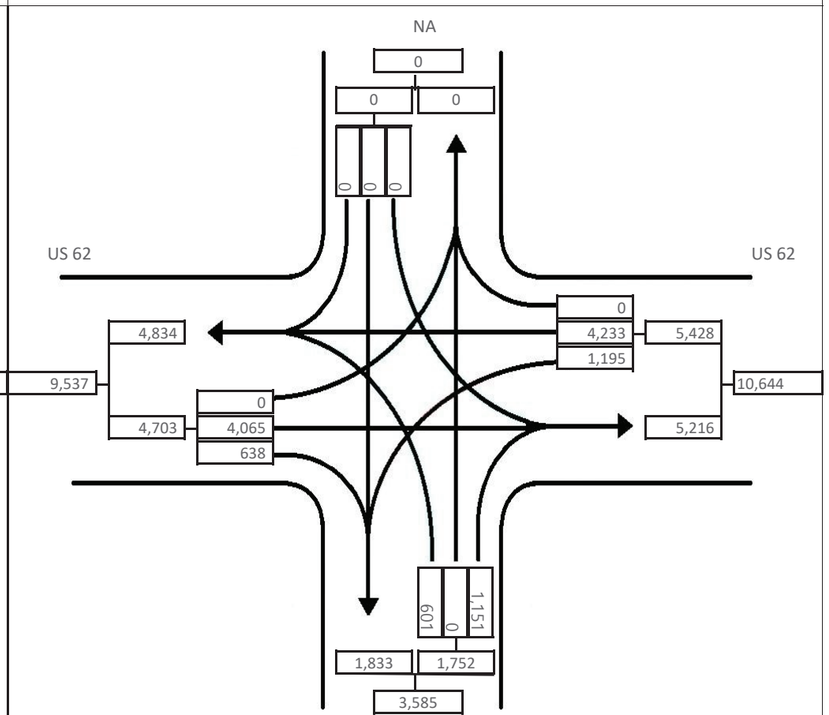
Forecast Year 2024 AM CARS



Forecast Year 2024 PM CARS

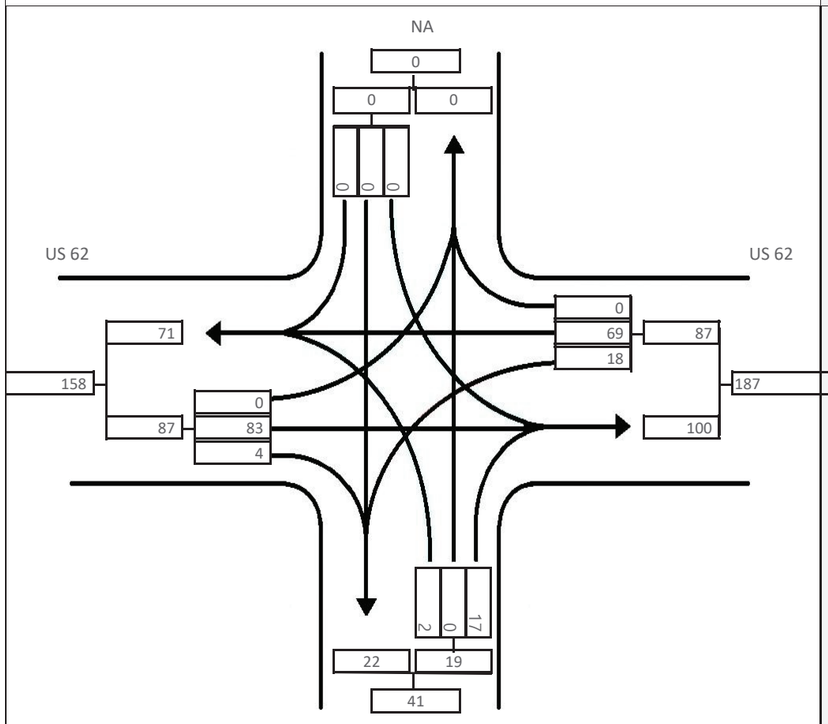


Forecast Year 2024 ADT CARS

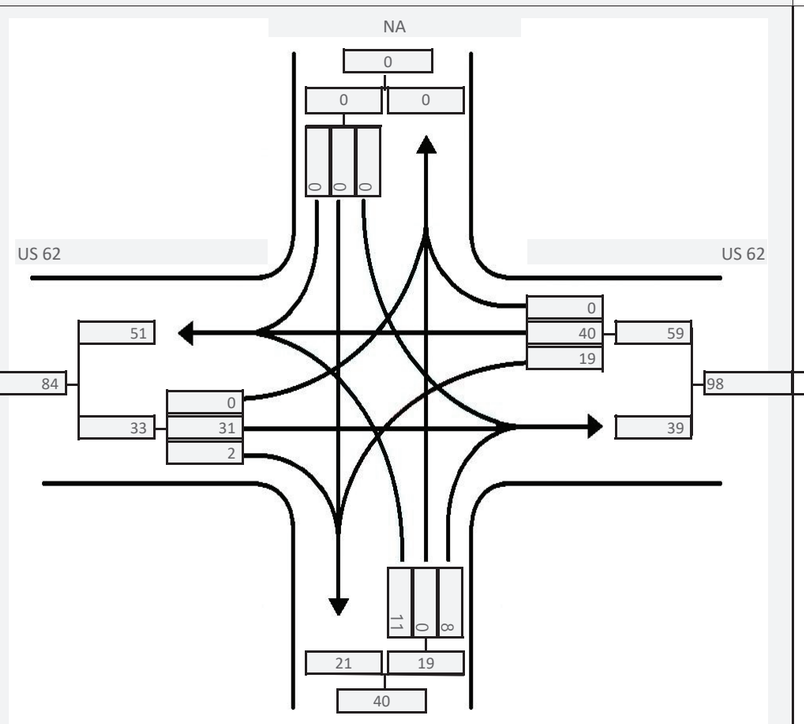


Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

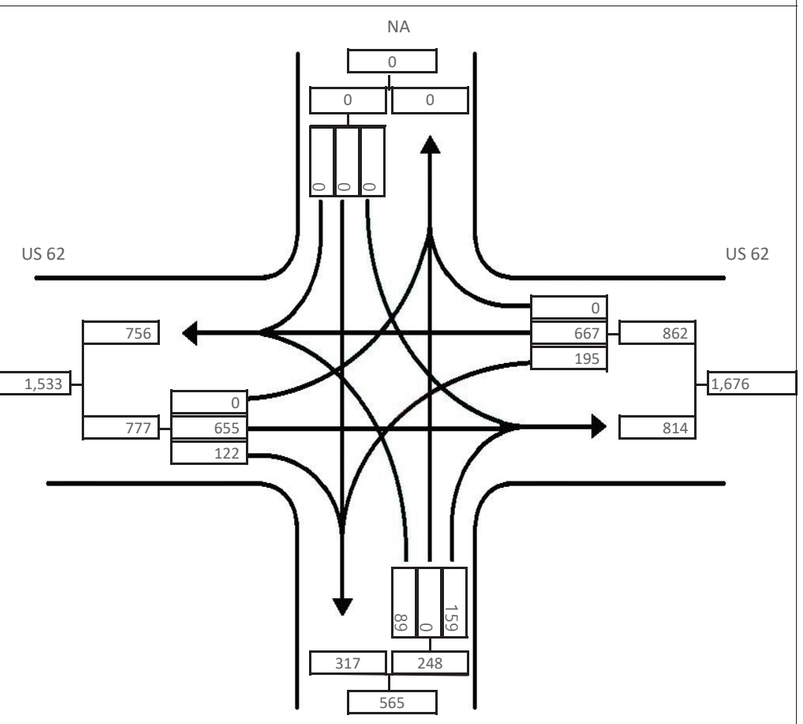
Forecast Year 2024 AM TRUCKS



Forecast Year 2024 PM TRUCKS

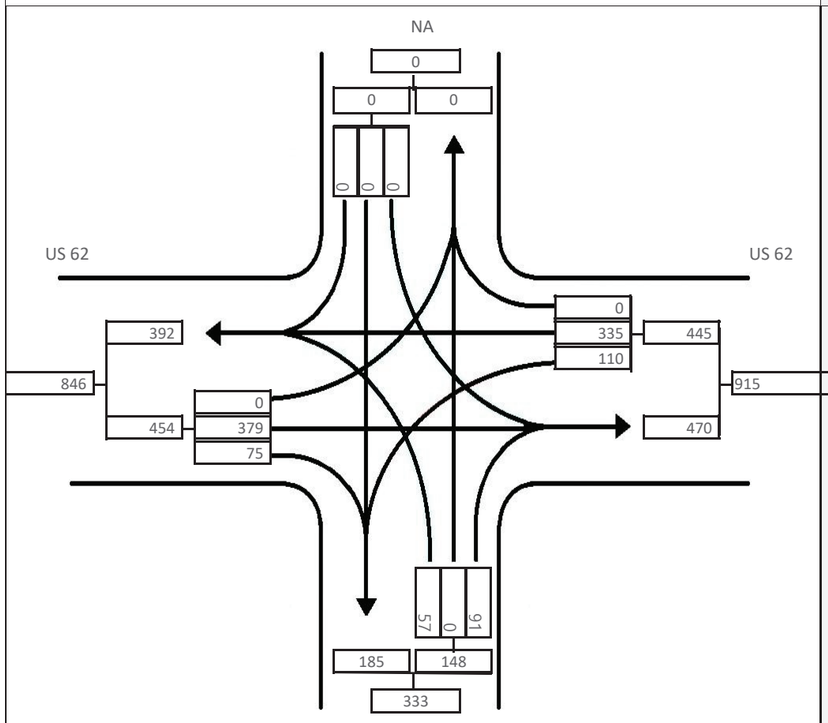


Forecast Year 2024 ADT TRUCKS

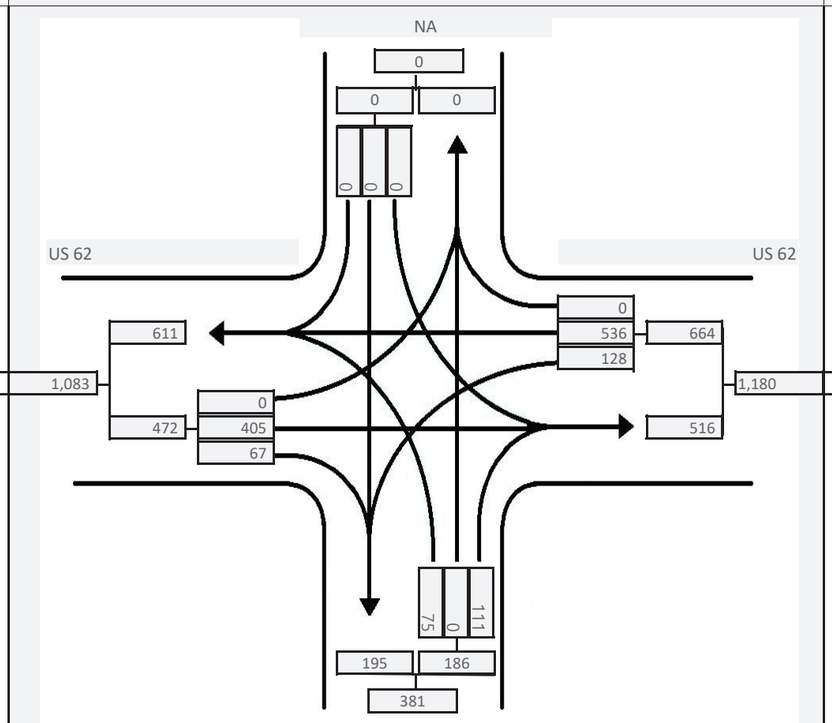


Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

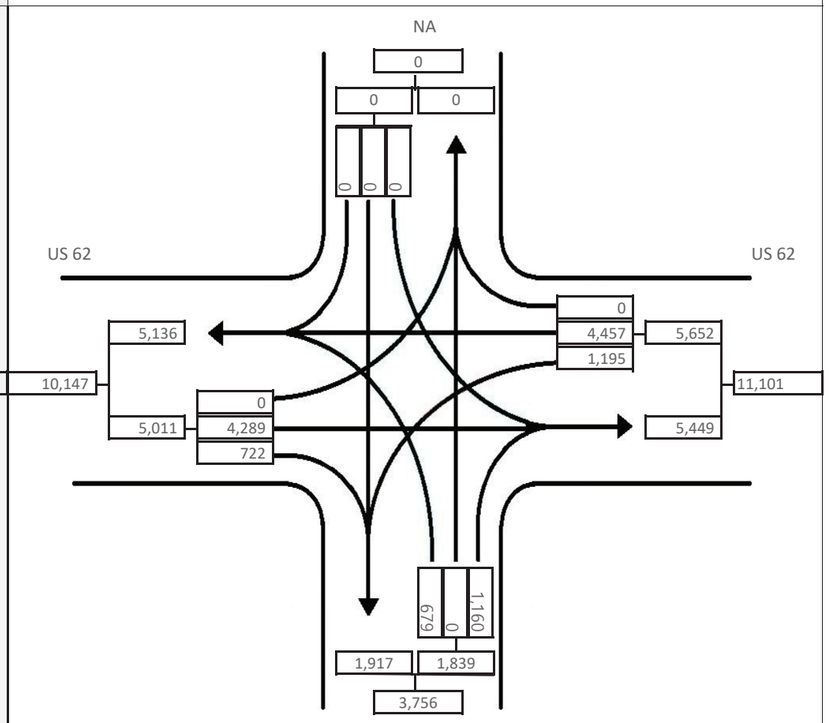
Forecast Year 2044 AM CARS



Forecast Year 2044 PM CARS

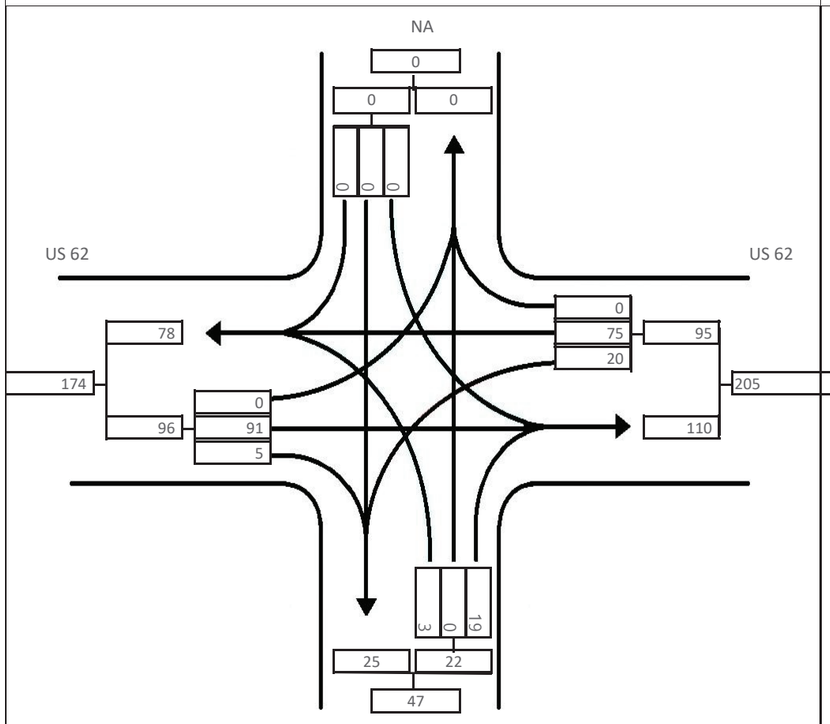


Forecast Year 2044 ADT CARS

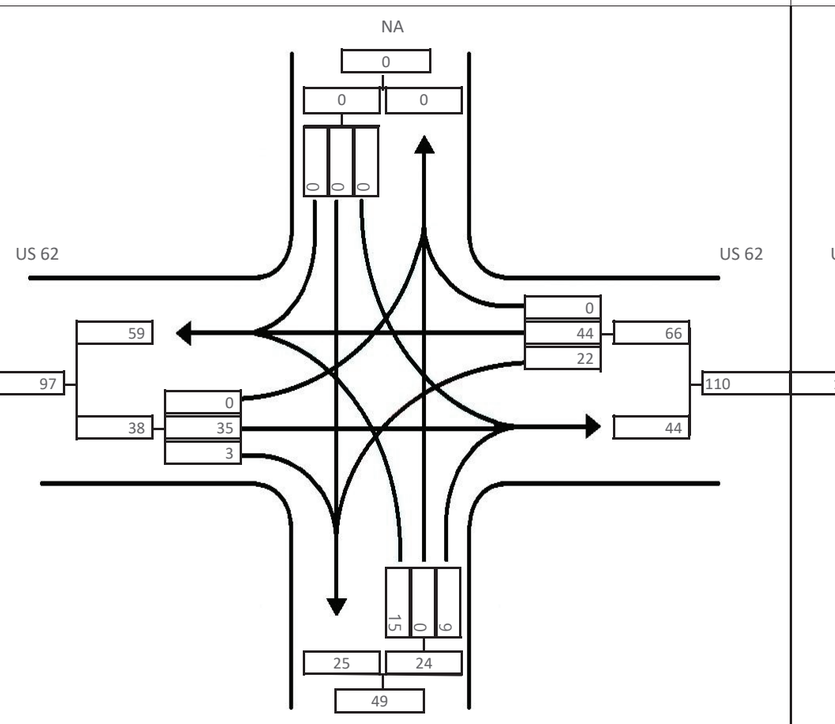


Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

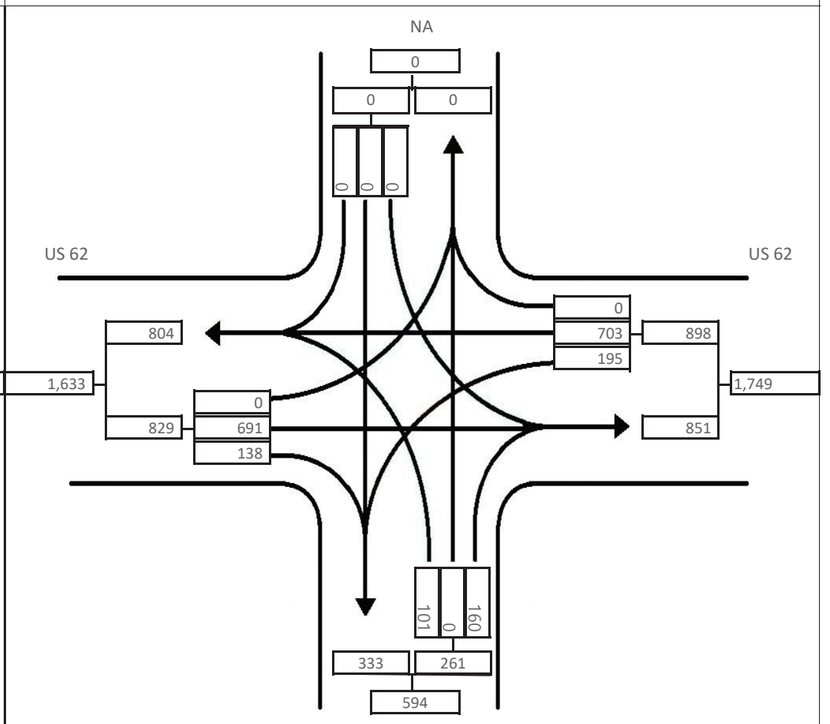
Forecast Year 2044 AM TRUCKS

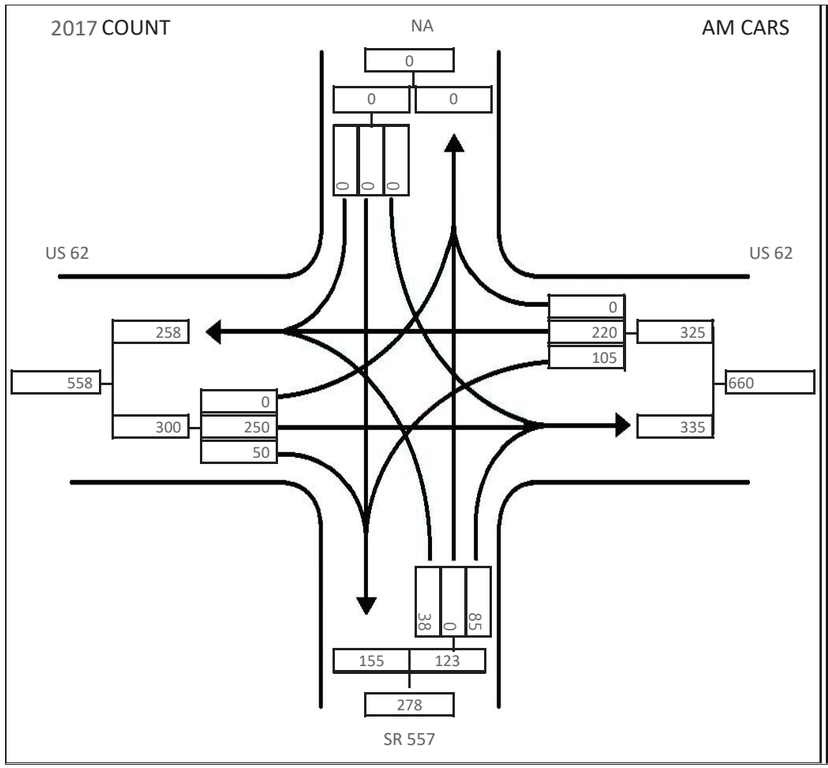


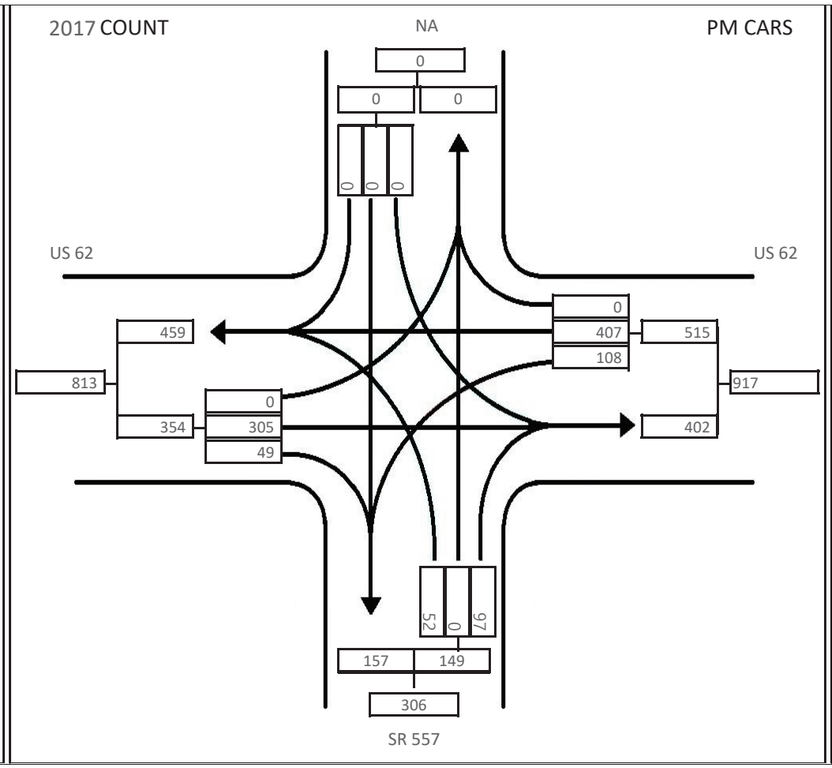
Forecast Year 2044 PM TRUCKS

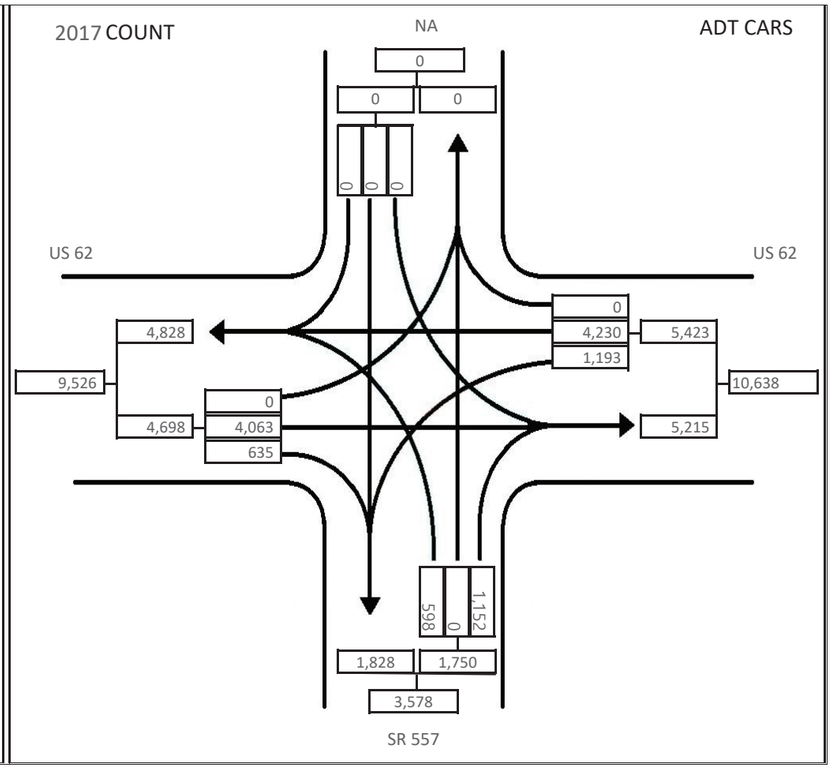


Forecast Year 2044 ADT TRUCKS

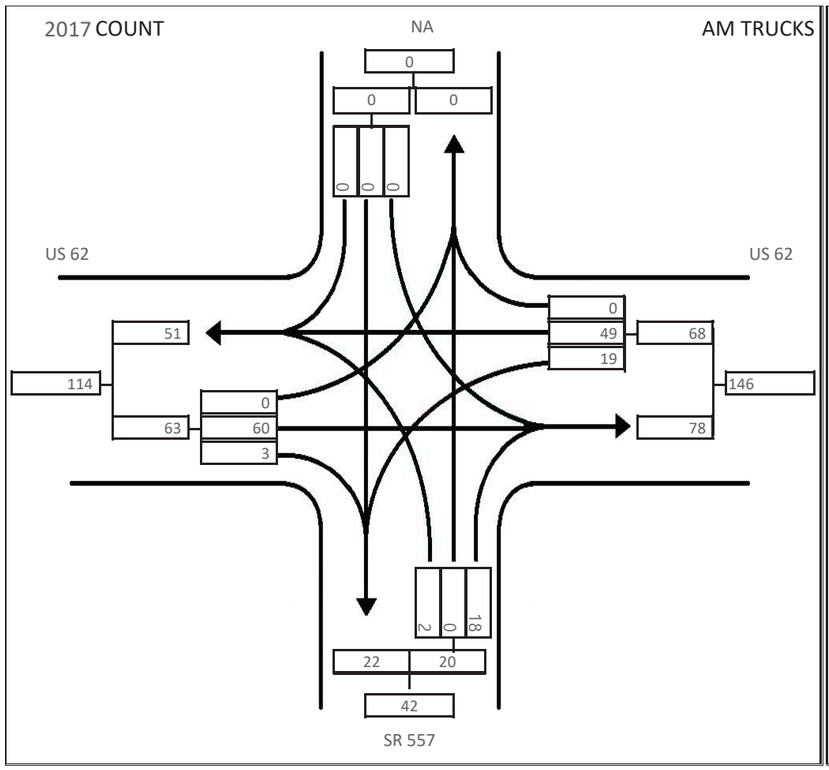


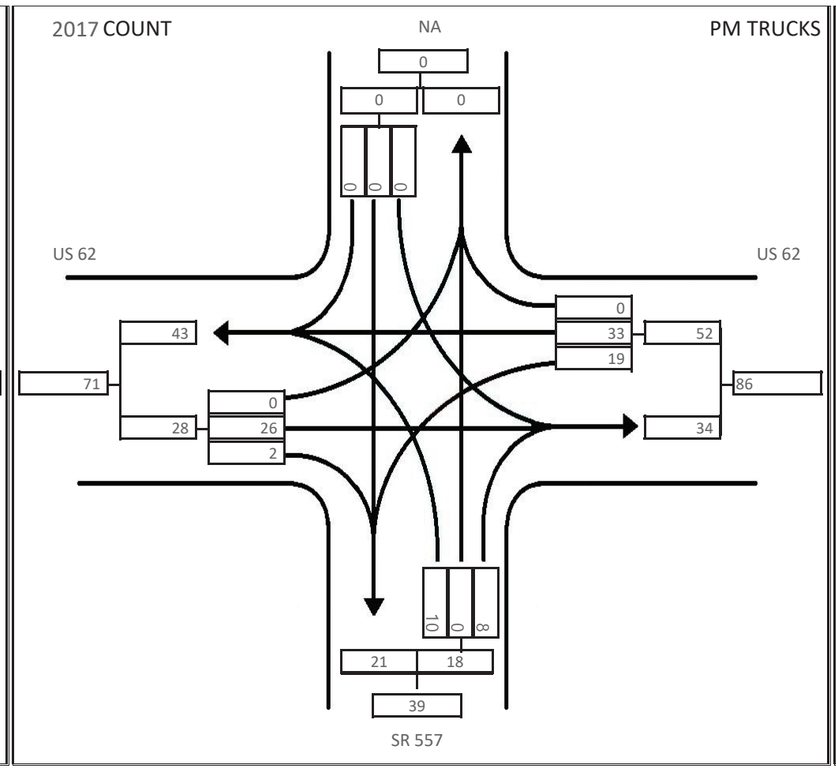

2017 COUNT
NA
AM CARS
US 62
US 62
0
0 0
0 0 0
258
558
300
0
250
50
0
220
105
325
660
335
38 0 85
155 123
278
SR 557

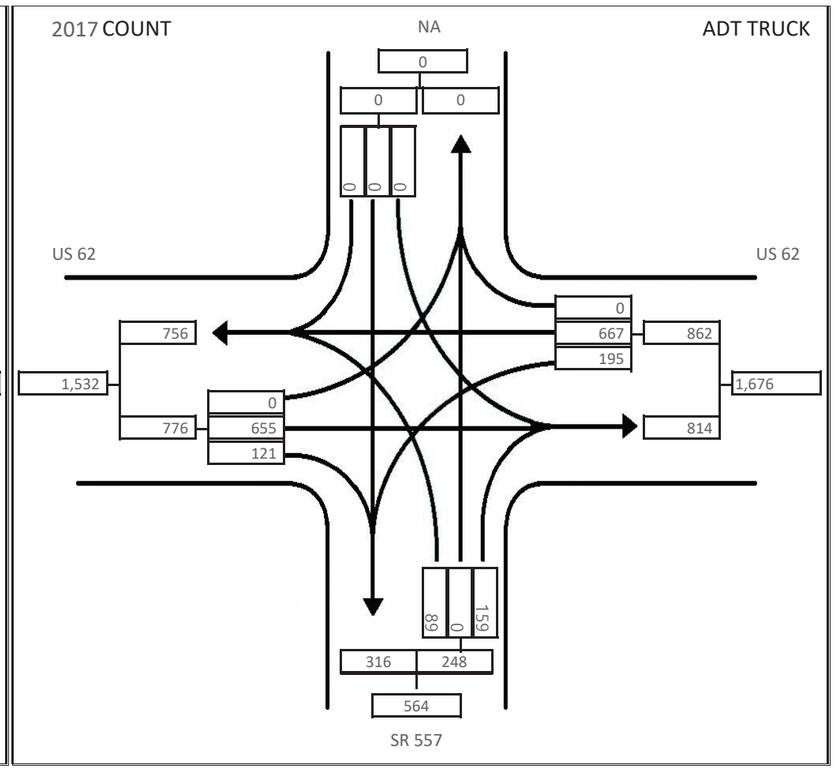

2017 COUNT
NA
PM CARS
US 62
US 62
0
0 0
0 0 0
459
813
354
0
305
49
0
407
108
515
917
402
52 0 97
157 149
306
SR 557


2017 COUNT
NA
ADT CARS
US 62
US 62
0
0 0
0 0 0
4,828
9,526
4,698
0
4,063
635
0
4,230
1,193
5,423
10,638
5,215
598 0 1,152
1,828 1,750
3,578
SR 557

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

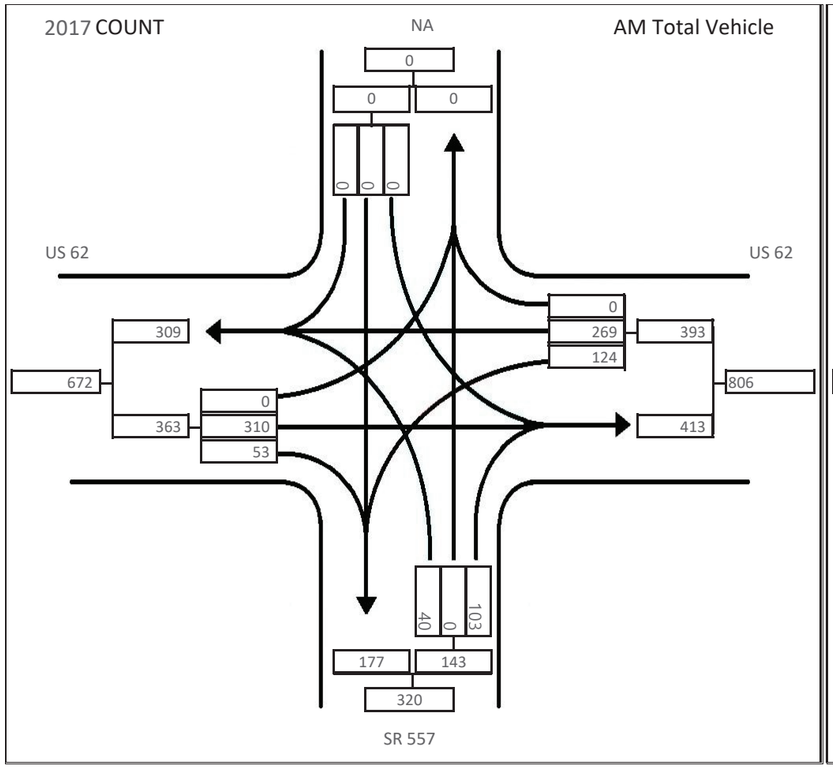


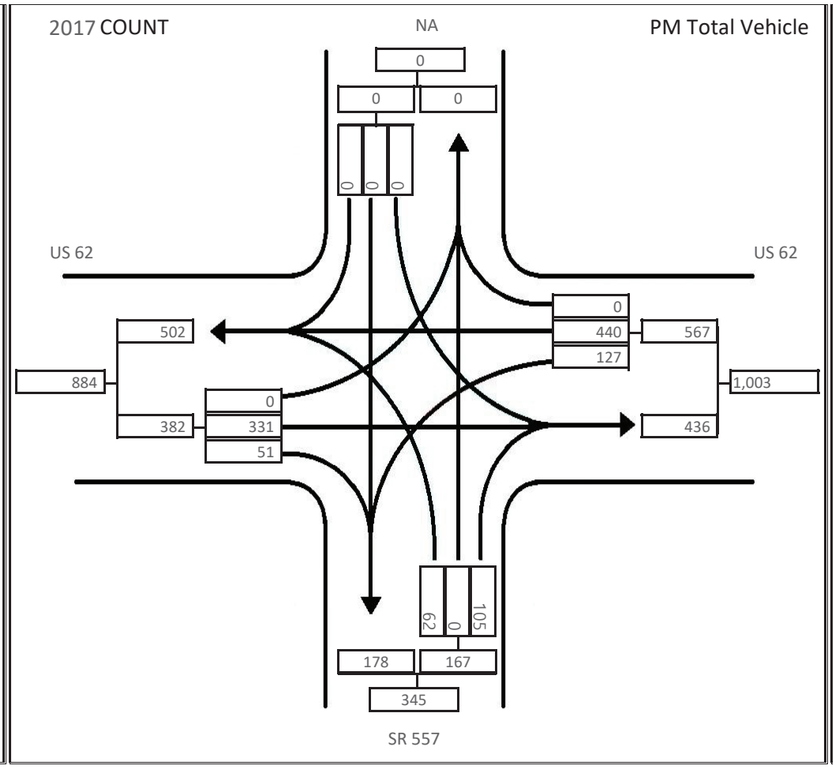


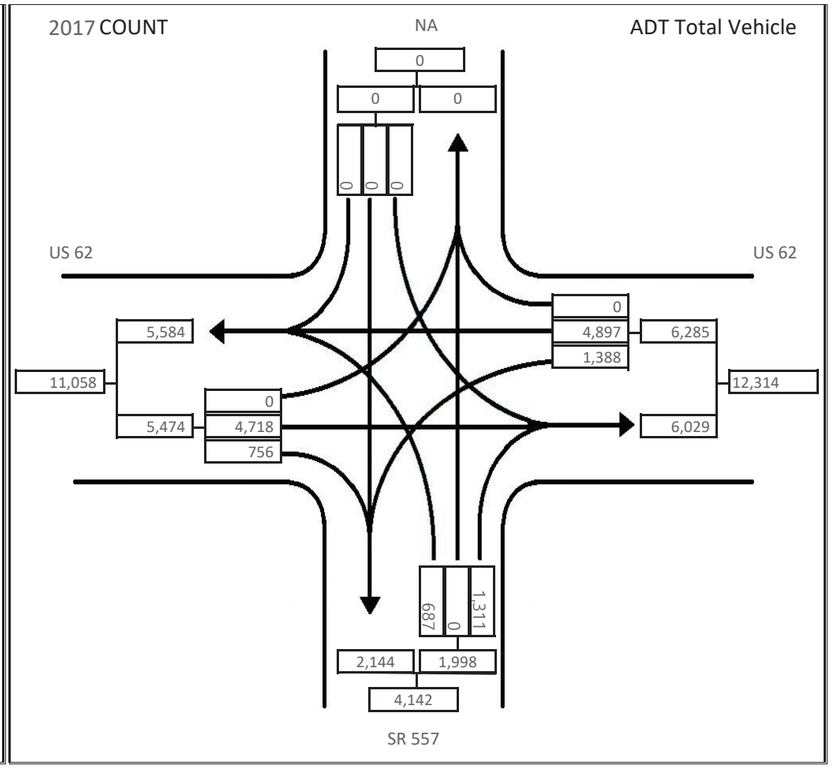


Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

Pivot Forecast From TurnsCount: Yes







Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

RptIntersectionTbl

ID 1 (1-Design Yr, 2-Opening Year)

INTERSECTION TABLE VALUES

Forecast Year 2044

Target Forecast Volumes

Counted ADT

ADT Annual Growth Rate

Leg #	Street Name	AM	AM Keved	PM	PM Keyed	ADT	ADT Keyed	Leg DHV	K 30	K Keyed	Year	Yr Keyed	Vol.	CNT Keyed	Car+TK	G Keyed	%	PCT Keved	2040 ADT Vol	Route	Car	TRK
1	US 62	1113	☐	1284	☐	12835	☐	12835	0.10	☐	2020	☑	11,492	☑	55.9	☐	0.61%	☐	10,400		24.7	31.3
2	SR 557	377	☐	435	☐	4347	☐	4347	0.10	☐	2020	☑	3,679	☑	27.8	☐	0.86%	☐	3,850		20.2	7.7
3	US 62	1022	☐	1179	☐	11792	☐	11792	0.10	☐	2020	☑	10,449	☑	55.9	☐	0.61%	☐	10,400		25.0	31.0
4	NA	0	☐	0	☑	0	☐	0	0.00	☐	0	☐	0	☐	0.0	☐	0.00%	☐	0		0.0	0.0

Turning Mvmt Count Year 2017 ☑ Pivot from turnscounts to target volume ☐ 1 Rate for all

OTHER 0 OTH Keyed ☐

CMS SHIFT Data

Leg1
2044 ADT=10580.725 DHV=1058.0725, 2024 ADT=9461.745 DHV=946.1745SHOLUS00062**C, 24.75 |11178,11178,SHOL00062R,24748,
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3,5,5,0,0,6278,517,6592,967,467,23,6338,500,6871,1008,517,24,9694,1884,50,53,8,5,A ,0.71,9605,-3688,9775,1.05,9612,9694, RAF ,0.94,1858,-77,1898,1.51,1871,1884, RAF ,9294,1971,9129,1766,9252,2726,9105,2780,8644,2670,0,0,0,1,0,0,0,0,0,0, AVG ,
MODEL,6358,10986,778,3746,8644,9408,1648,2791,7741,7877,1858,1898,6358,10986,778,3746,0.0087,0.0072,0.0084,0.007,0.0045,-9999,0.008,0.007,0.0078,0.0069,0.0041,-9999,-0.0009,-0.0012,-0.0005,-0.0013,-0.0009,-0.0096,0.0181,0.0031,0.0242,0.0163,0.0574,0.0607,
9999,0.0289,0.021,0.0582,0.0603,0.056,-9999,0.0255,0.0245,0.026,0.025,0.0255,-0.0174,0.0978,0.0255,2,9129,1766,8500,1900,10400,0.1,0.52,0.18,0.1,0.53,S,HOL,62,R,24.748,0.169

Leg2
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,1493,0,0,0,0,2008,1960,200,2160,2011,2973,275,3248,2014,2949,362,3311,2016,3070,377,3447,2019,3056,192,3248,5,0,2040,3269,299,3264,390,3064,263,3073,220,3076,213,0,0,5089,371,5503,947,3345,68,3311,-47,3482,-
546,0,0,1059,308,806,74,210,421,158,426,423,449,0,0,3,6,4,5,0,0,1005,42,1254,114,71,2,998,43,1376,102,91,2,3775,298,50,56,8,5,A ,1.48,3899,1057,3687,1.2,3863,3775, RAF ,1.54,334,68,284,1.74,312,298, RAF ,4876,264,5294,748,3336,-3,3293,-75,3462,-
566,0,0,0,1,0,0,0,1,0,1, MODEL, AVG ,2616,7207,-1464,1095,3293,5503,-566,947,3403,3565,284,334,2616,7207,-1464,1095,0.0317,0.0381,0.0045,0.004,0.0066,-9999,0.0284,0.0349,0.0044,0.0037,0.0063,-9999,0.0066,0.0079,0.0054,0.0077,0.0066,-
0.0069,0.0647,0.0066,0.0444,0.1873,-0.0308,-0.0593,-0.183,-9999,0.0179,0.1381,-0.0484,-0.0662,-0.1882,-9999,0.0263,0.0352,0.0228,0.0298,0.0263,-0.4107,0.224,0.04,2,5294,748,3500,350,3850,0.1,0.55,0.09,0.05,0.53,S,HOL,557,R,8.694,1.493

Leg3
2044 ADT=10580.725 DHV=1058.0725, 2024 ADT=9461.745 DHV=946.1745SHOLUS00062**C, 24.75 |11178,11178,SHOL00062R,24748,
,169,0,0,0,0,2008,7360,890,8250,2011,7502,628,8130,2014,7763,896,8659,2016,8051,929,8980,2019,7955,1227,9182,5,0,2040,8069,1106,7979,1108,8064,1206,7976,1237,8010,1201,0,0,9408,1850,9154,1648,9361,2706,9127,2791,8700,2645,0,0,388,536,176,432,656,248,329,1
3,5,5,0,0,6278,517,6592,967,467,23,6338,500,6871,1008,517,24,9694,1884,50,53,8,5,A ,0.71,9605,-3688,9775,1.05,9612,9694, RAF ,0.94,1858,-77,1898,1.51,1871,1884, RAF ,9294,1971,9129,1766,9252,2726,9105,2780,8644,2670,0,0,0,1,0,0,0,0,0,0, AVG ,
MODEL,6358,10986,778,3746,8644,9408,1648,2791,7741,7877,1858,1898,6358,10986,778,3746,0.0087,0.0072,0.0084,0.007,0.0045,-9999,0.008,0.007,0.0078,0.0069,0.0041,-9999,-0.0009,-0.0012,-0.0005,-0.0013,-0.0009,-0.0096,0.0181,0.0031,0.0242,0.0163,0.0574,0.0607,
9999,0.0289,0.021,0.0582,0.0603,0.056,-9999,0.0255,0.0245,0.026,0.025,0.0255,-0.0174,0.0978,0.0255,2,9129,1766,8500,1900,10400,0.1,0.52,0.18,0.1,0.53,S,HOL,62,R,24.748,0.169

Leg4 0 ☐

URL1
http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.555394,-81.82416&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555418,-81.820947&sensor=false&path=color:0xff0000ff|weight:5|40.555394,-81.82416|40.555
81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947

URL2
http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.535718,-81.816445&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555394,-81.82416&sensor=false&path=color:0xff0000ff|weight:5|40.535718,-81.816445|40.54
81.818798|40.544621,-81.823586|40.549937,-81.823573|40.555394,-81.82416

URL3
http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.555394,-81.82416&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555418,-81.820947&sensor=false&path=color:0xff0000ff|weight:5|40.555394,-81.82416|40.555
81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947

URL4

URLIX
http://maps.googleapis.com/maps/api/staticmap?size=260x257&maptype=roadmap\&markers=size:mid%7Ccolor:blue%7Clabel:X%7C40.555394,-81.82416&sensor=false&path=color:0xff0000ff|weight:5|40.555418,-81.820947|40.555414,-81.821931|40.555408,-81.82269|40.555401,-81.82345|40.5553
81.82416|40.555394,-81.82416|40.555401,-81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947

PID Location HOL 62 24.75

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

N

ID 2 (1-Design Yr, 2-Opening Year)

INTERSECTION TABLE VALUES

Forecast Year 2024

Target Forecast Volumes

Counted ADT

ADT Annual Growth Rate

Leg #	Street Name	AM	AM Keyed	PM	PM Keyed	ADT	ADT Keyed	Leg DHV	K 30	K Keyed	Year	Yr Keyed	Vol.	CNT Keyed	Car+TK	G Keyed	%	PCT Keyed	2040 ADT Vol	Route	Car	TRK
1	US 62	1016	☐	1172	☐	11716	☐	1172	0.10	☐	2020	☑	11,492	☑	55.9	☐	0.61%	☐	10,400		24.7	31.3
2	SR 557	328	☐	379	☐	3790	☐	379	0.10	☐	2020	☑	3,679	☑	27.8	☐	0.86%	☐	3,850		20.2	7.7
3	US 62	925	☐	1067	☐	10673	☐	1067	0.10	☐	2020	☑	10,449	☑	55.9	☐	0.61%	☐	10,400		25.0	31.0
4	NA	0	☐	0	☑	0	☐	0	0.00	☐	0	☐	0	☐	0.0	☐	0.00%	☐	0		0.0	0.0

Turning Mvmt Count Year 2017 ☑ Pivot from turnscounts to target volume ☐ 1 Rate for all

OTHER OTH Keyed CMS SHIFT Data

Leg1 0 ☐
2044 ADT=10580.725 DHV=1058.0725, 2024 ADT=9461.745 DHV=946.1745SHOLUS00062**C, 24.75 |11178,11178,SHOL00062R,24748,
,169,0,0,0,0,0,2008,7360,890,8250,2011,7502,628,8130,2014,7763,896,8659,2016,8051,929,8980,2019,7955,1227,9182,5,0,2040,8069,1106,7979,1108,8064,1206,7976,1237,8010,1201,0,0,9408,1850,9154,1648,9361,2706,9127,2791,8700,2645,0,0,388,536,176,432,656,248,329,1
3,5,5,0,0,6278,517,6592,967,467,23,6338,500,6871,1008,517,24,9694,1884,50,53,8,5,A ,0.71,9605,-3688,9775,1.05,9612,9694, RAF ,0.94,1858,-77,1898,1.51,1871,1884, RAF ,9294,1971,9129,1766,9252,2726,9105,2780,8644,2670,0,0,0,1,0,0,0,0,0,0, AVG ,
MODEL,6358,10986,778,3746,8644,9408,1648,2791,7741,7877,1858,1898,6358,10986,778,3746,0.0087,0.0072,0.0084,0.007,0.0045,-9999,0.008,0.007,0.0078,0.0069,0.0041,-9999,-0.0009,-0.0012,-0.0005,-0.0013,-0.0009,-0.0096,0.0181,0.0031,0.0242,0.0163,0.0574,0.0607,
9999,0.0289,0.021,0.0582,0.0603,0.056,-9999,0.0255,0.0245,0.026,0.025,0.0255,-0.0174,0.0978,0.0255,2,9129,1766,8500,1900,10400,0.1,0.52,0.18,0.1,0.53,S,HOL,62,R,24.748,0.169

Leg2 0 ☐
2044 ADT=3944.24 DHV=394.424, 2024 ADT=3387.248 DHV=338.7248SHOLSR00557**C, 10.19 |11144,11144,SHOL00557R,8694,
,1493,0,0,0,0,2008,1960,200,2160,2011,2973,275,3248,2014,2949,362,3311,2016,3070,377,3447,2019,3056,192,3248,5,0,2040,3269,299,3264,390,3064,263,3073,220,3076,213,0,0,5089,371,5503,947,3345,68,3311,-47,3482,-
546,0,0,1059,308,806,74,210,421,158,426,423,449,0,0,3,6,4,5,0,0,1005,42,1254,114,71,2,998,43,1376,102,91,2,3775,298,50,56,8,5,A ,1.48,3899,1057,3687,1.2,3863,3775, RAF ,1.54,334,68,284,1.74,312,298, RAF ,4876,264,5294,748,3336,-3,3293,-75,3462,-
566,0,0,1,0,0,0,1,0,1, MODEL, AVG ,2616,7207,-1464,1095,3293,5503,-566,947,3403,3565,284,334,2616,7207,-1464,1095,0.0317,0.0381,0.0045,0.004,0.0066,-9999,0.0284,0.0349,0.0044,0.0037,0.0063,-9999,0.0066,0.0079,0.0054,0.0077,0.0066,-
0.0069,0.0647,0.0066,0.0444,0.1873,-0.0308,-0.0593,-0.183,-9999,0.0179,0.1381,-0.0484,-0.0662,-0.1882,-9999,0.0263,0.0352,0.0228,0.0298,0.0263,-0.4107,0.224,0.04,2,5294,748,3500,350,3850,0.1,0.55,0.09,0.05,0.53,S,HOL,557,R,8.694,1.493

Leg3 0 ☐
2044 ADT=10580.725 DHV=1058.0725, 2024 ADT=9461.745 DHV=946.1745SHOLUS00062**C, 24.75 |11178,11178,SHOL00062R,24748,
,169,0,0,0,0,2008,7360,890,8250,2011,7502,628,8130,2014,7763,896,8659,2016,8051,929,8980,2019,7955,1227,9182,5,0,2040,8069,1106,7979,1108,8064,1206,7976,1237,8010,1201,0,0,9408,1850,9154,1648,9361,2706,9127,2791,8700,2645,0,0,388,536,176,432,656,248,329,1
3,5,5,0,0,6278,517,6592,967,467,23,6338,500,6871,1008,517,24,9694,1884,50,53,8,5,A ,0.71,9605,-3688,9775,1.05,9612,9694, RAF ,0.94,1858,-77,1898,1.51,1871,1884, RAF ,9294,1971,9129,1766,9252,2726,9105,2780,8644,2670,0,0,0,1,0,0,0,0,0,0, AVG ,
MODEL,6358,10986,778,3746,8644,9408,1648,2791,7741,7877,1858,1898,6358,10986,778,3746,0.0087,0.0072,0.0084,0.007,0.0045,-9999,0.008,0.007,0.0078,0.0069,0.0041,-9999,-0.0009,-0.0012,-0.0005,-0.0013,-0.0009,-0.0096,0.0181,0.0031,0.0242,0.0163,0.0574,0.0607,
9999,0.0289,0.021,0.0582,0.0603,0.056,-9999,0.0255,0.0245,0.026,0.025,0.0255,-0.0174,0.0978,0.0255,2,9129,1766,8500,1900,10400,0.1,0.52,0.18,0.1,0.53,S,HOL,62,R,24.748,0.169

Leg4 0 ☐

URL1 http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.555394,-81.82416&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555418,-81.820947&sensor=false&path=color:0xff0000ff|weight:5|40.555394,-81.82416|40.555
81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947

URL2 http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.535718,-81.816445&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555394,-81.82416&sensor=false&path=color:0xff0000ff|weight:5|40.535718,-81.816445|40.54
81.818798|40.544621,-81.823586|40.549937,-81.823573|40.555394,-81.82416

URL3 http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.555394,-81.82416&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555418,-81.820947&sensor=false&path=color:0xff0000ff|weight:5|40.555394,-81.82416|40.555
81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947

URL4

URLIX http://maps.googleapis.com/maps/api/staticmap?size=260x257&maptype=roadmap\&markers=size:mid%7Ccolor:blue%7Clabel:X%7C40.555394,-81.82416&sensor=false&path=color:0xff0000ff|weight:5|40.555418,-81.820947|40.555414,-81.821931|40.555408,-81.82269|40.555401,-81.82345|40.5553
81.82416|40.555394,-81.82416|40.555401,-81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947

TurnsCount

TurnsCount

Tuesday, February 9, 2021
2:13:53 PM

ID	LEG NUM	Tm Period	Time	PA LEFT	PAT HRU	PA RIGHT	PA TOTAL	BC LEFT	BC THRU	BC RIGHT	BC TOTAL	TOTAL VEH
93	1	AM	10:45 AM	23	48	0	71	4	15	0	19	90
110	1	AM	11:00 AM	23	61	0	84	6	13	0	19	103
111	1	AM	11:15 AM	27	54	0	81	4	12	0	16	97
112	1	AM	11:30 AM	32	57	0	89	5	9	0	14	103
113	2	AM	10:45 AM	10	0	22	32	1	0	4	5	37
114	2	AM	11:00 AM	9	0	23	32	0	0	7	7	39
115	2	AM	11:15 AM	12	0	20	32	0	0	4	4	36
116	2	AM	11:30 AM	7	0	20	27	1	0	3	4	31
117	3	AM	10:45 AM	0	65	16	81	0	17	1	18	99
118	3	AM	11:00 AM	0	48	18	66	0	15	1	16	82
119	3	AM	11:15 AM	0	57	7	64	0	13	1	14	78
120	3	AM	11:30 AM	0	80	9	89	0	15	0	15	104
121	4	AM	10:45 AM	0	0	0	0	0	0	0	0	0
122	4	AM	11:00 AM	0	0	0	0	0	0	0	0	0
123	4	AM	11:15 AM	0	0	0	0	0	0	0	0	0
124	4	AM	11:30 AM	0	0	0	0	0	0	0	0	0
125	0			0	0	0	0	0	0	0	0	0
126	1	PM	4:15 PM	30	115	0	145	10	7	0	17	162
127	1	PM	4:30 PM	37	93	0	130	7	10	0	17	147
128	1	PM	4:45 PM	22	95	0	117	1	8	0	9	126
129	1	PM	5:00 PM	19	104	0	123	1	8	0	9	132
130	2	PM	4:15 PM	13	0	24	37	2	0	0	2	39
131	2	PM	4:30 PM	15	0	21	36	2	0	2	4	40
132	2	PM	4:45 PM	10	0	22	32	3	0	3	6	38
133	2	PM	5:00 PM	14	0	30	44	3	0	3	6	50
134	3	PM	4:15 PM	0	62	18	80	0	7	0	7	87
135	3	PM	4:30 PM	0	75	11	86	0	7	1	8	94
136	3	PM	4:45 PM	0	85	7	92	0	4	1	5	97
137	3	PM	5:00 PM	0	83	13	96	0	8	0	8	104
138	4	PM	4:15 PM	0	0	0	0	0	0	0	0	0
139	4	PM	4:30 PM	0	0	0	0	0	0	0	0	0
140	4	PM	4:45 PM	0	0	0	0	0	0	0	0	0
141	4	PM	5:00 PM	0	0	0	0	0	0	0	0	0
142	1	ADT	12:00 AM	1193	4230	0	5,423	195	667	0	862	6,285
143	2	ADT	12:00 AM	598	0	1152	1,750	89	0	159	248	1,998
144	3	ADT	12:00 AM	0	4063	635	4,698	0	655	121	776	5,474
145	4	ADT	12:00 AM	0	0	0	0	0	0	0	0	0

37

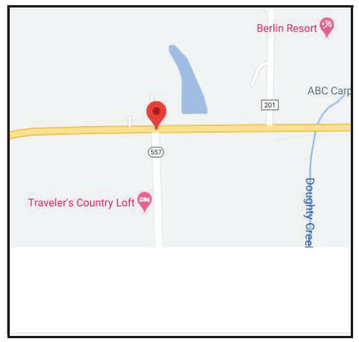
Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

N

IXRptWarnings

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

Safety Study - Intersection of US 62 and CR 201 in Holmes County

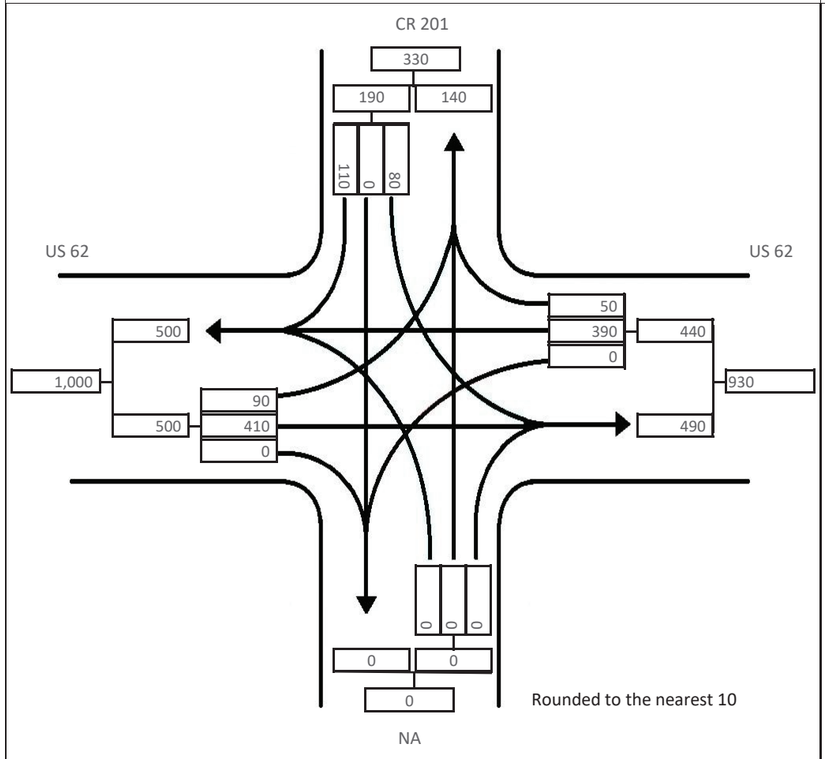


Method: IPF

Location	US 62 West Leg SHOL00062R 24.75		US 62 East Leg SHOL00062R 24.92		CR 201 North Leg SHOL00557R 8.69	NA South Leg
2024 ADT	11,800	*	11,100	*	3,400	0
2044 ADT	12,900	*	11,900	*	3,950	0
K	0.10		0.10		0.10	0.00
DHV	1,290		1,190		400	0
D	0.56		0.57		0.52	-1.00
T24	0.10		0.10		0.10	0.00
TD	0.08		0.08		0.08	0.00

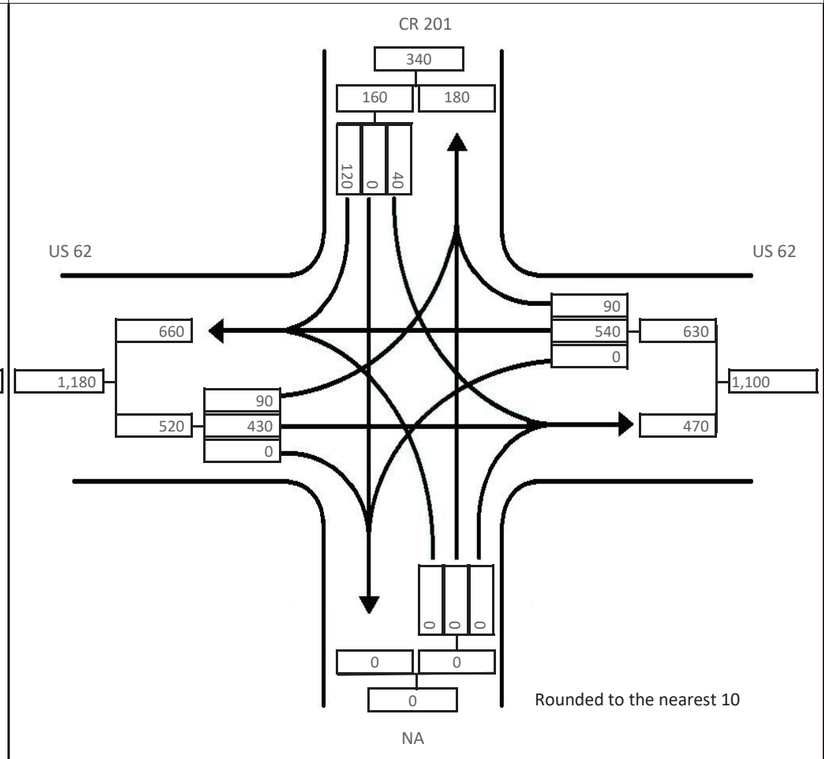
* pivot from turn movmement count ADT

Forecast Year 2024 AM Total Veh



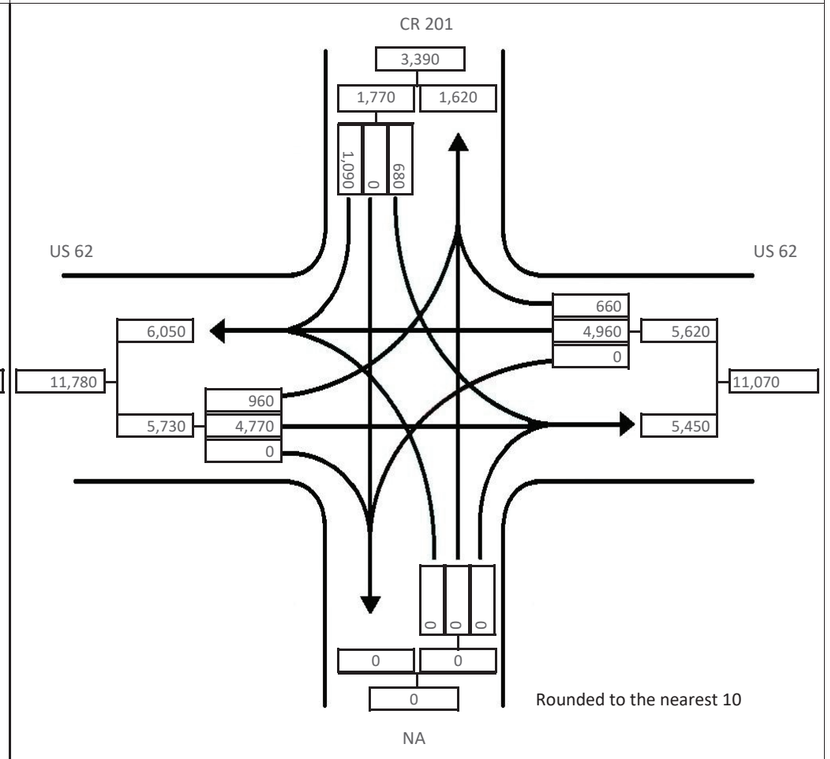
Rounded to the nearest 10

Forecast Year 2024 PM Total Veh



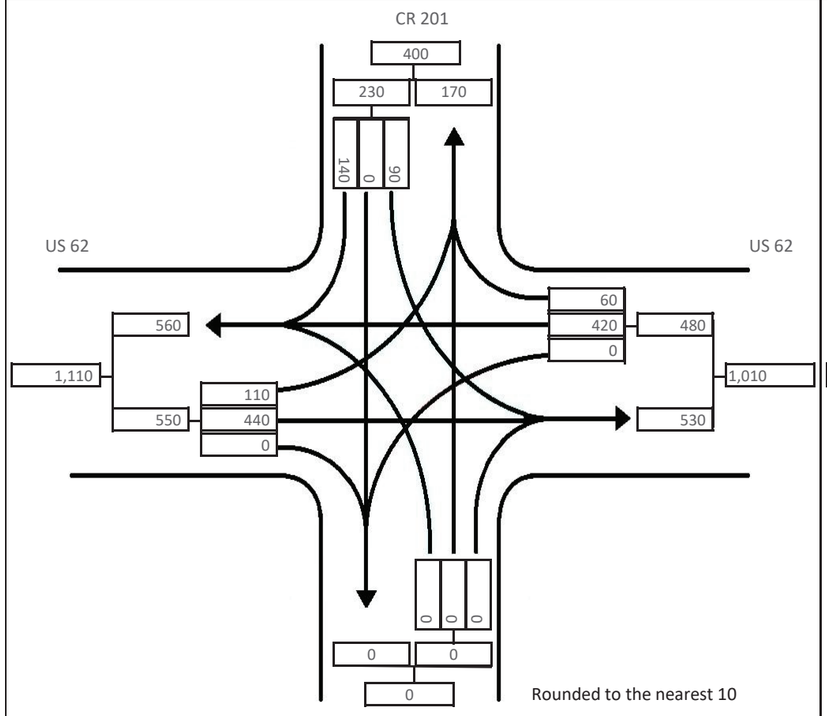
Rounded to the nearest 10

Forecast Year 2024 ADT Total Veh



Rounded to the nearest 10

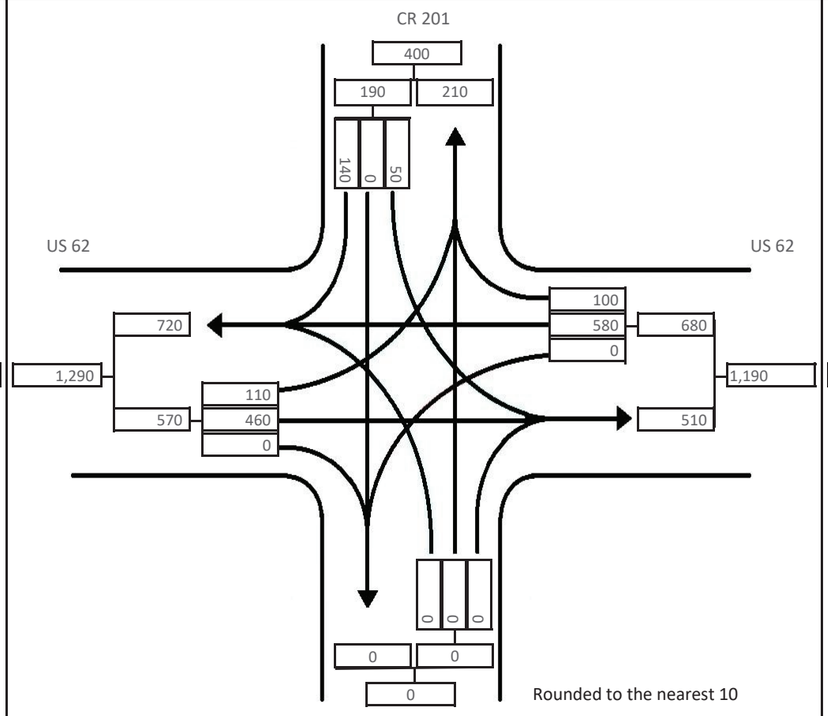
Forecast Year 2044 AM Total Veh



Rounded to the nearest 10

NA

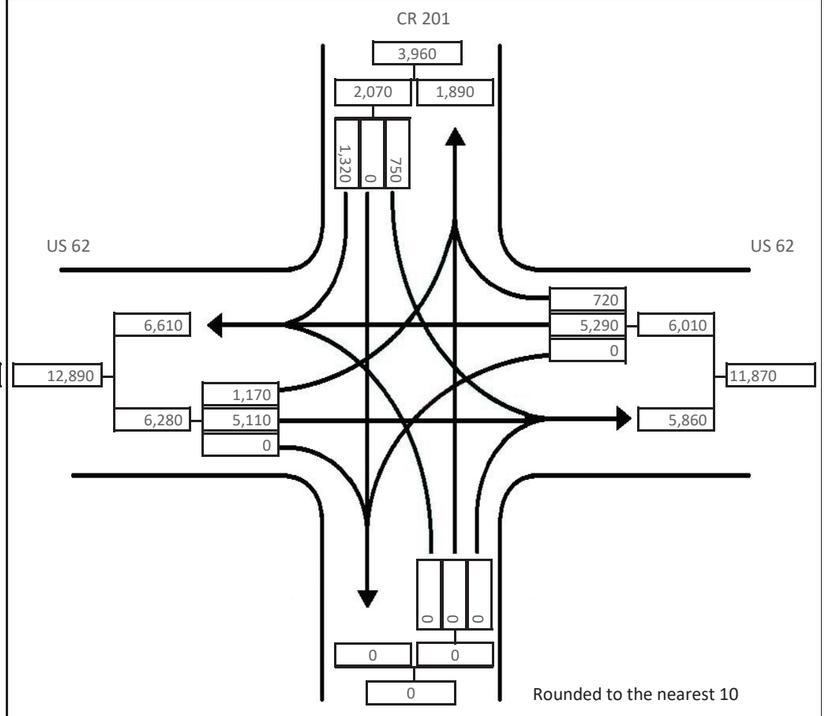
Forecast Year 2044 PM Total Veh



Rounded to the nearest 10

NA

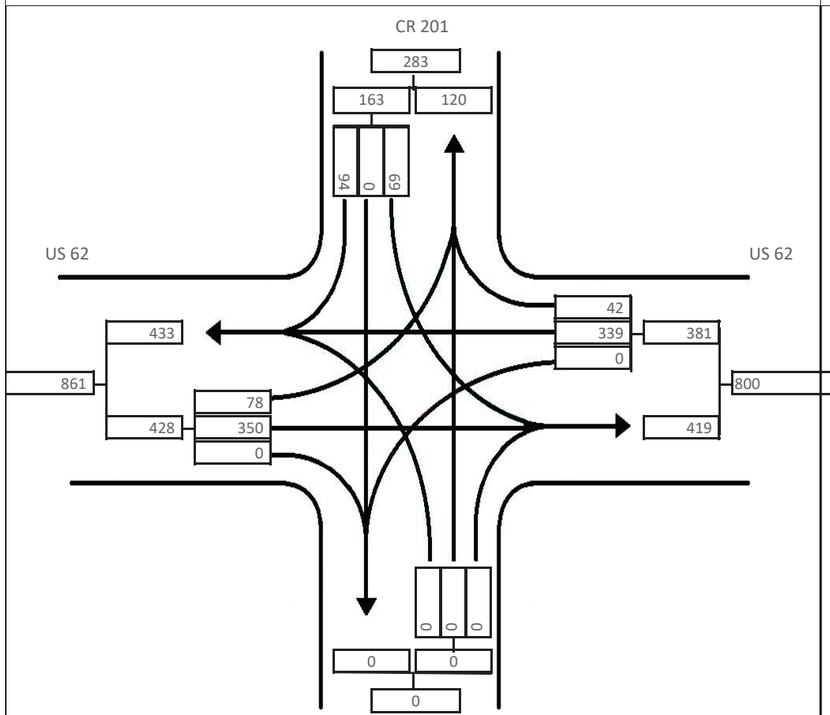
Forecast Year 2044 ADT Total Veh



Rounded to the nearest 10

NA

Forecast Year 2024 AM CARS



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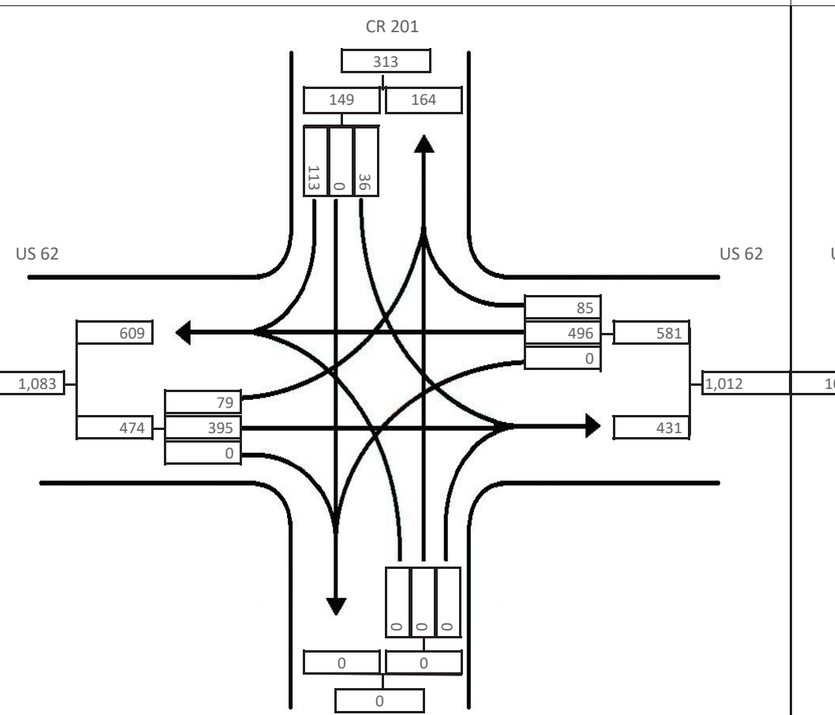
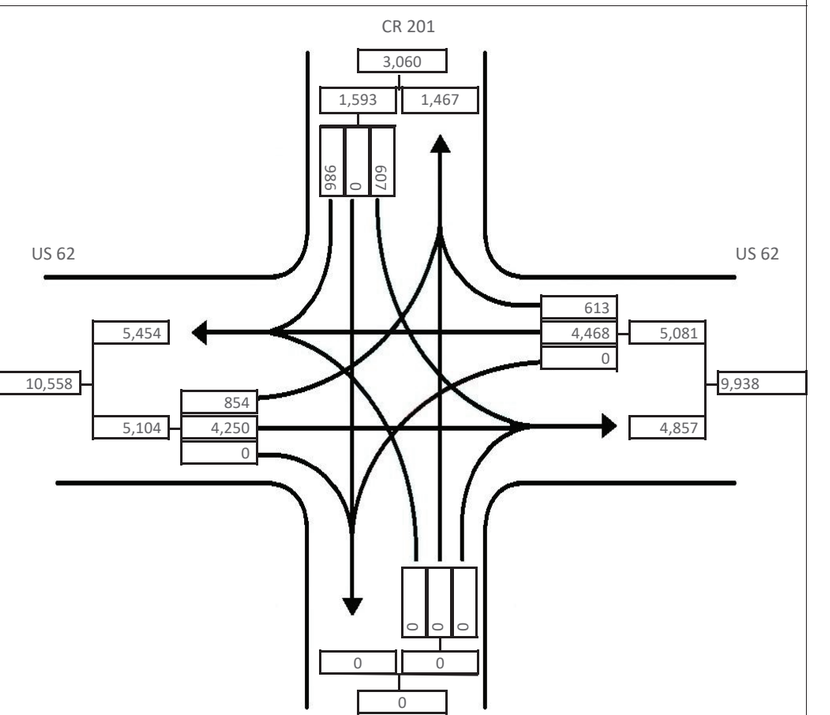
Forecast Year 2024 PM CARS



NA

Forecast Year 2024 ADT CARS

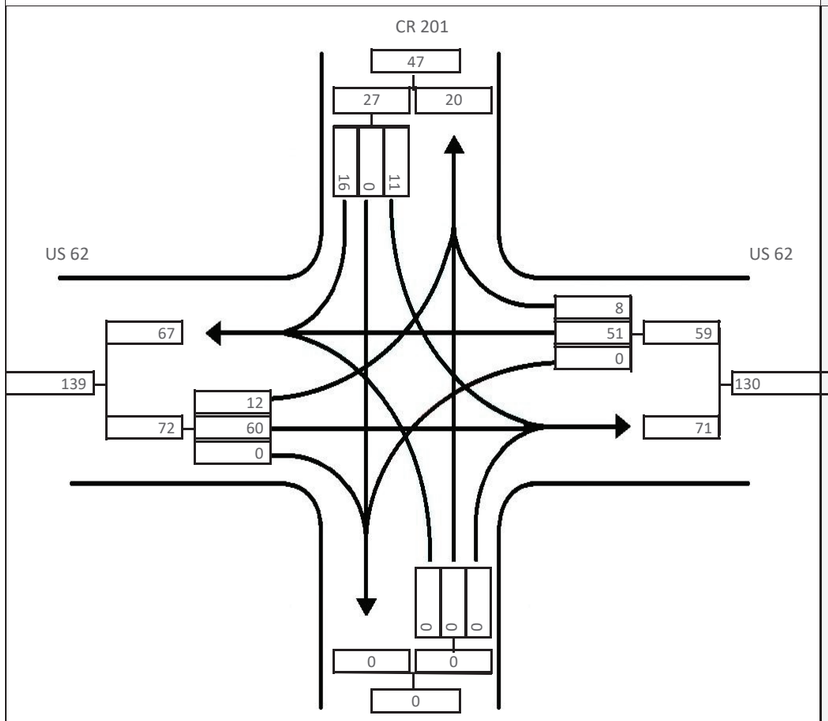


NA

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

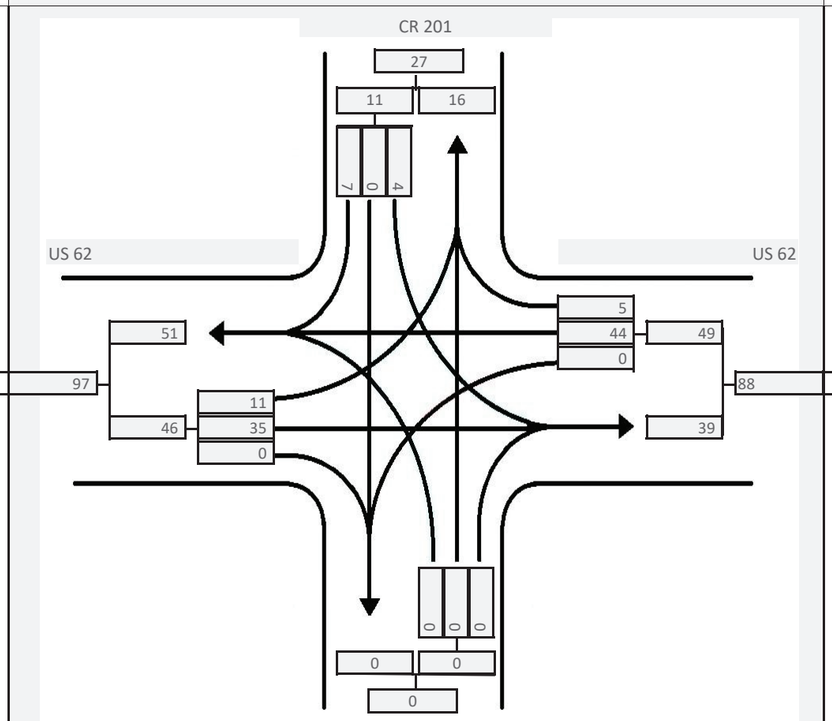
N

Forecast Year 2024 AM TRUCKS



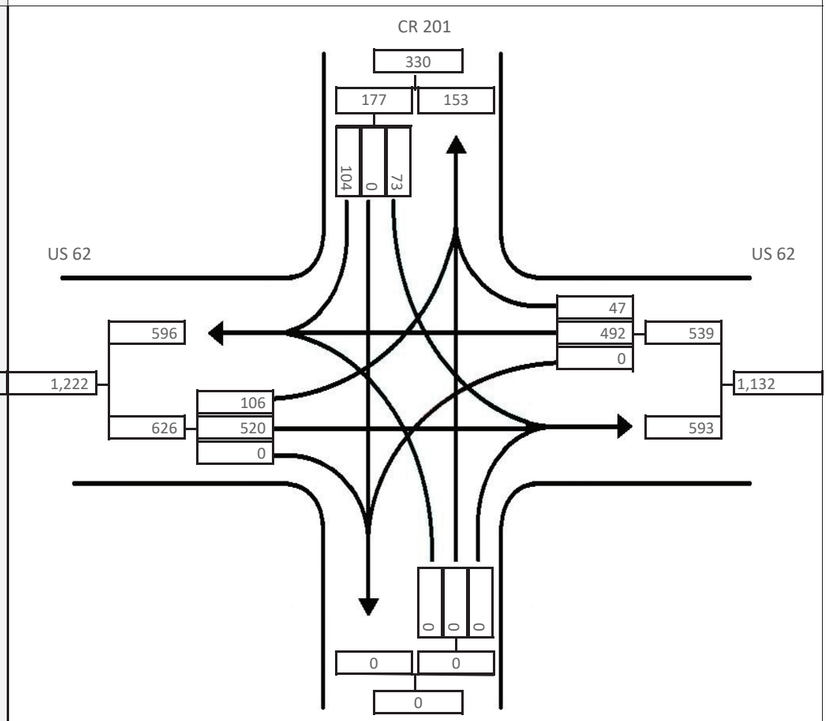
NA

Forecast Year 2024 PM TRUCKS



NA

Forecast Year 2024 ADT TRUCKS

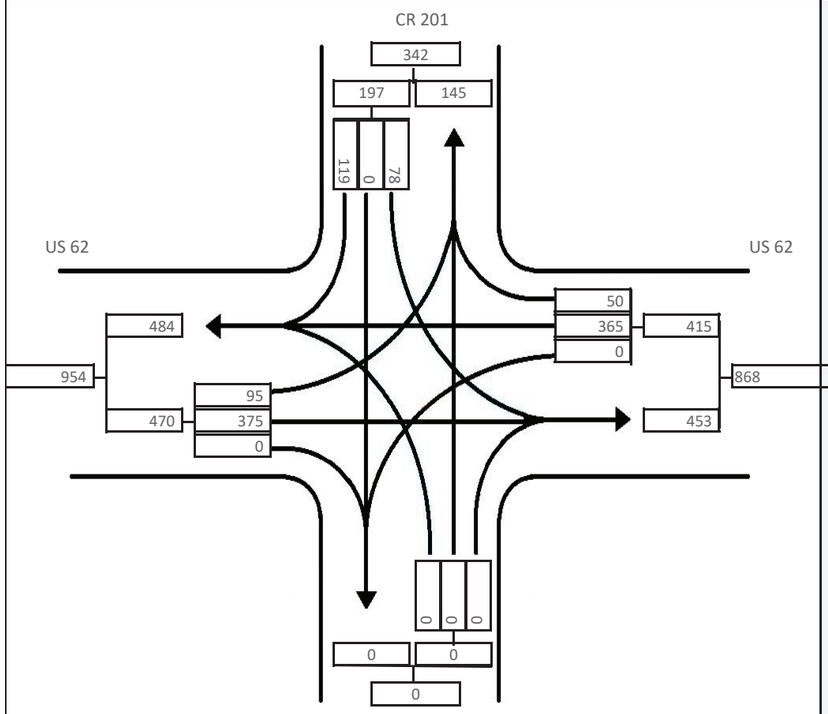


NA

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

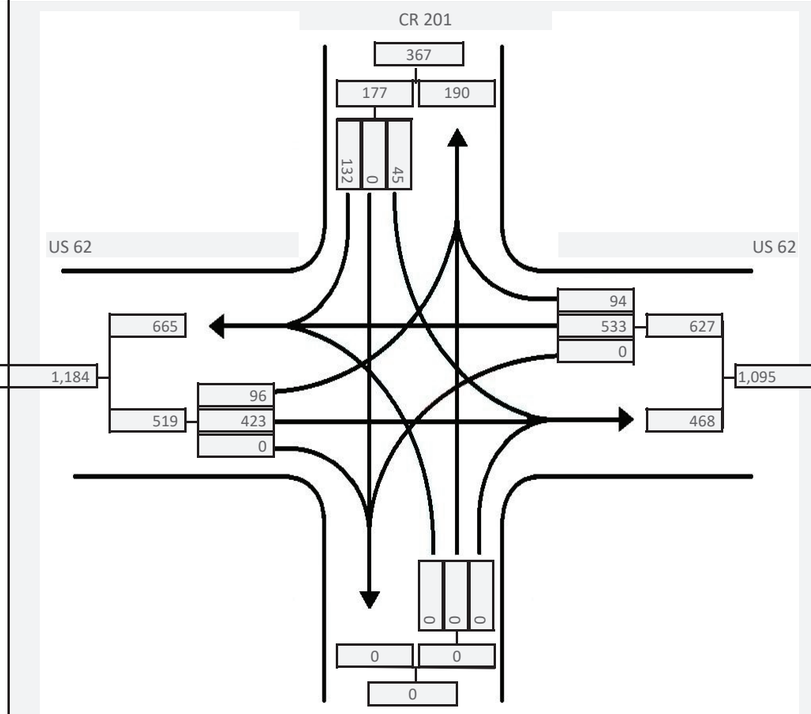
N

Forecast Year 2044 AM CARS



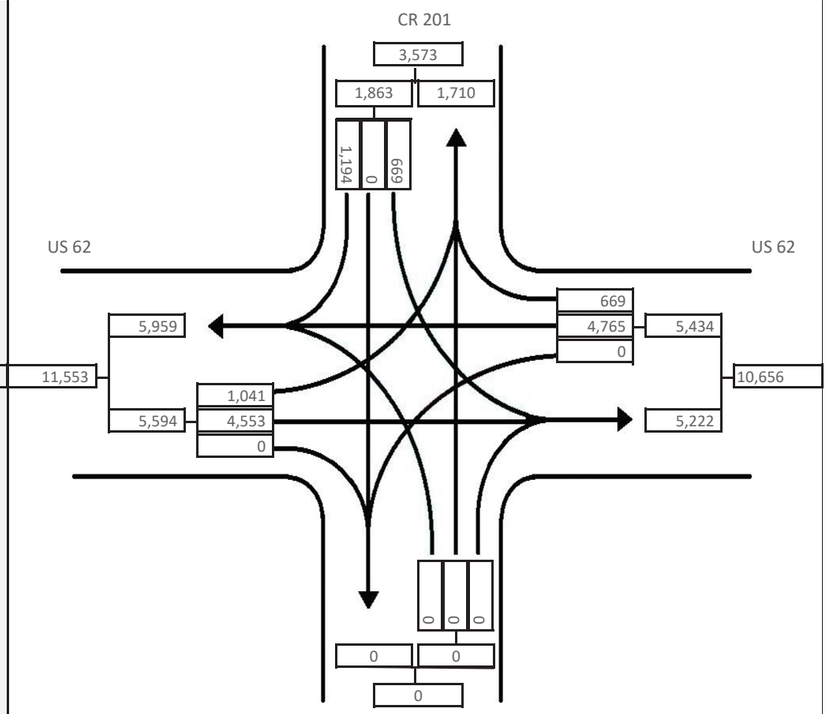
NA

Forecast Year 2044 PM CARS



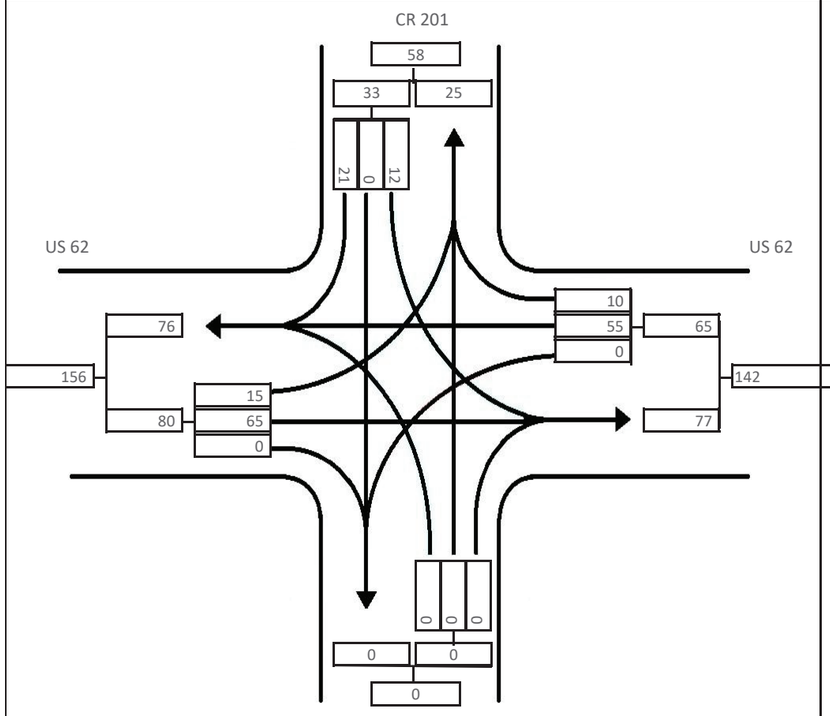
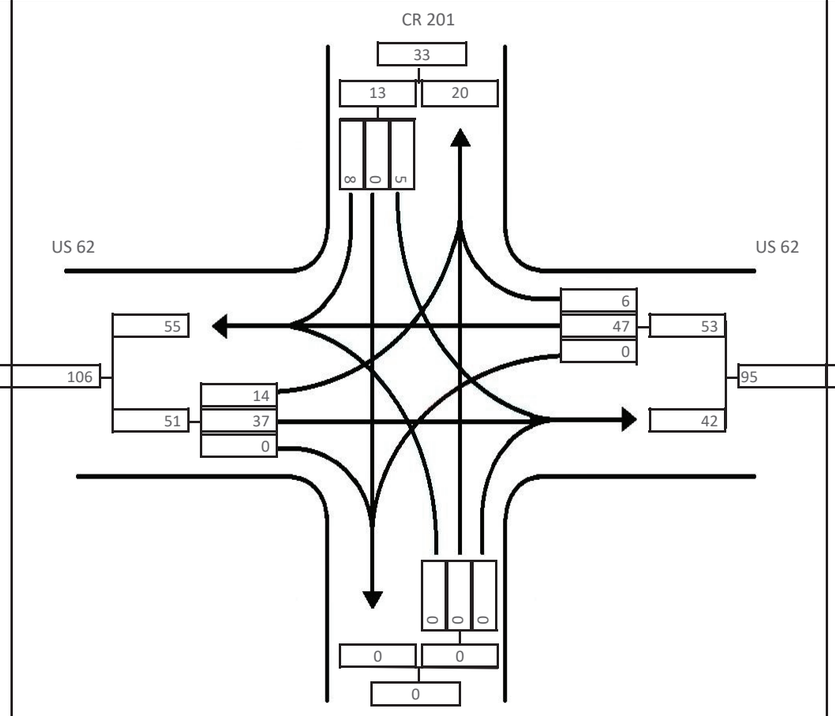
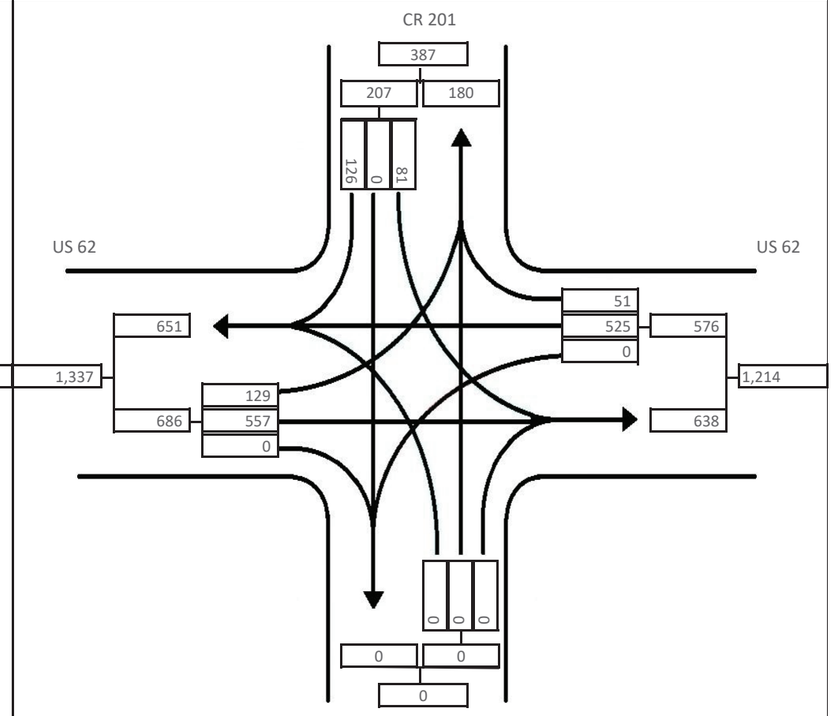
NA

Forecast Year 2044 ADT CARS



NA

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

Forecast Year 2044 AM TRUCKS	Forecast Year 2044 PM TRUCKS	Forecast Year 2044 ADT TRUCKS
		
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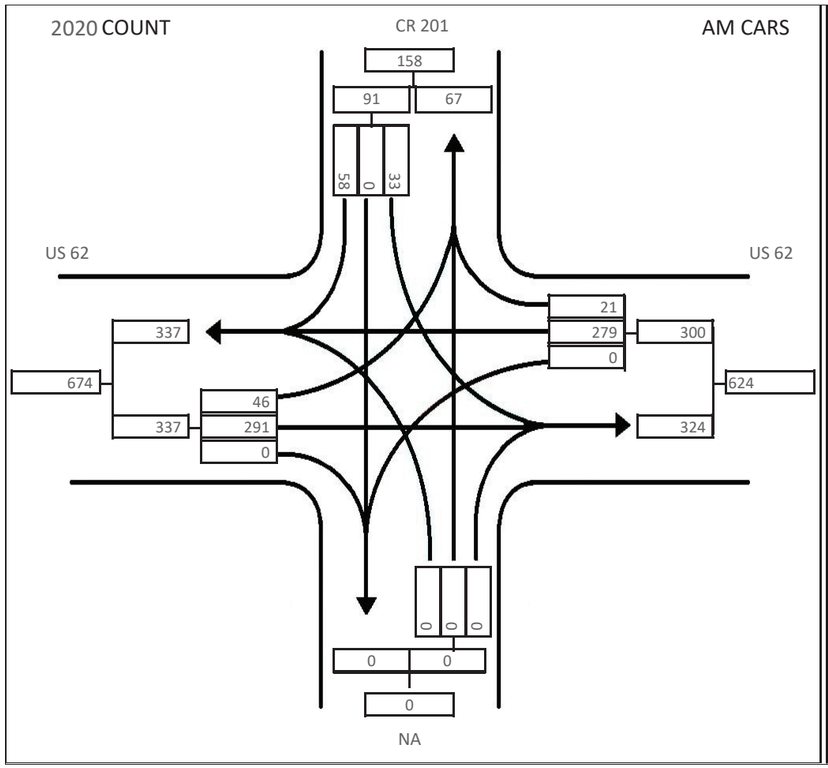
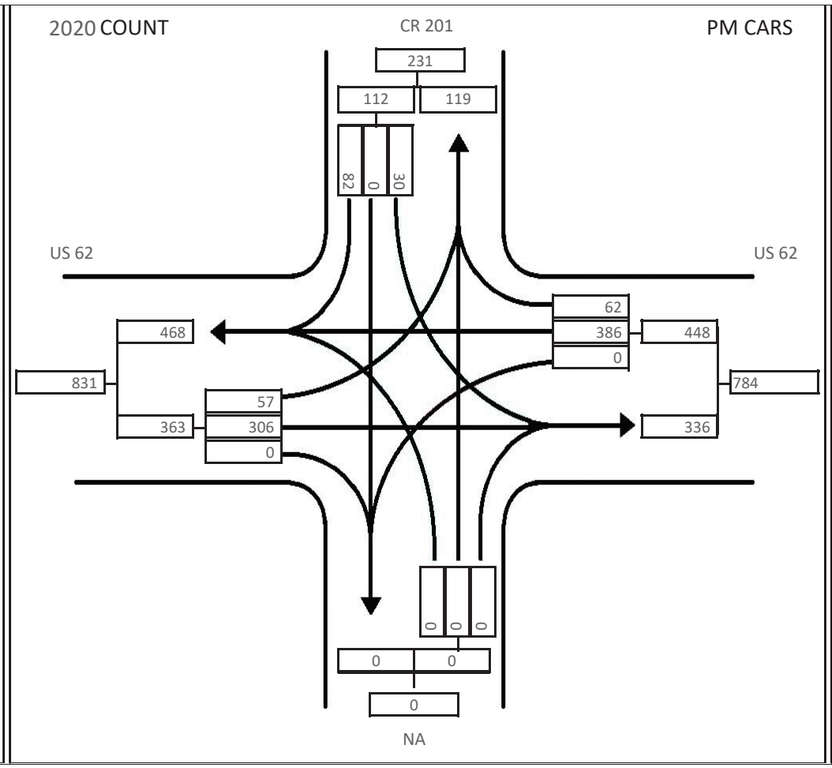
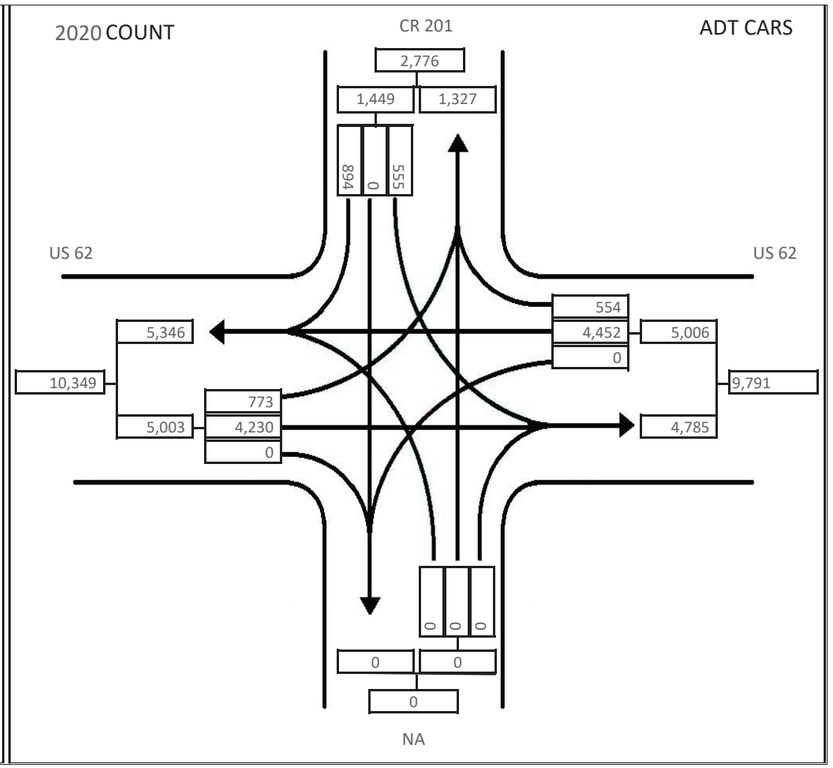
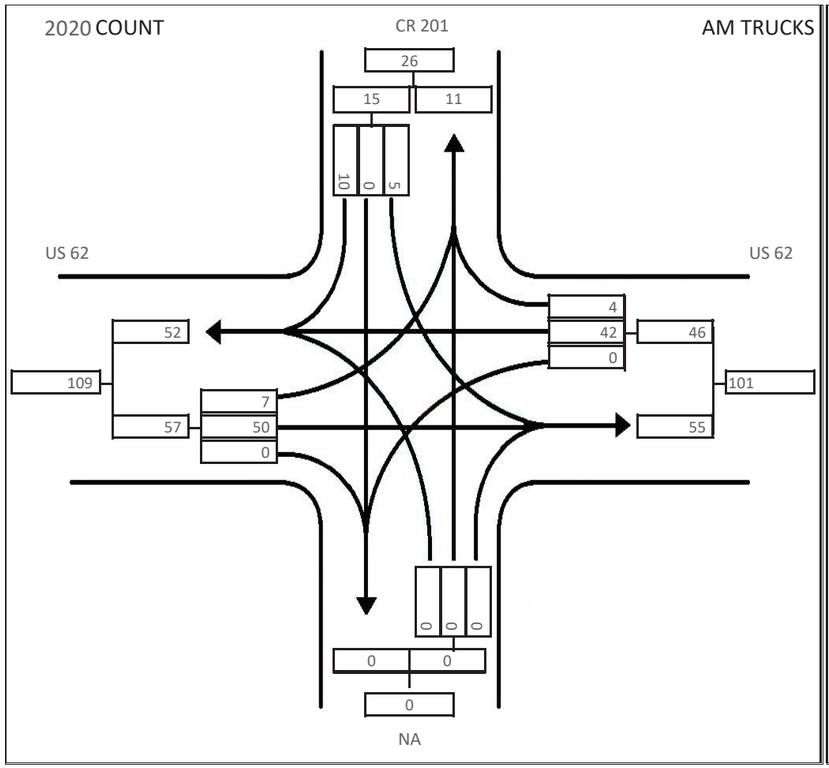
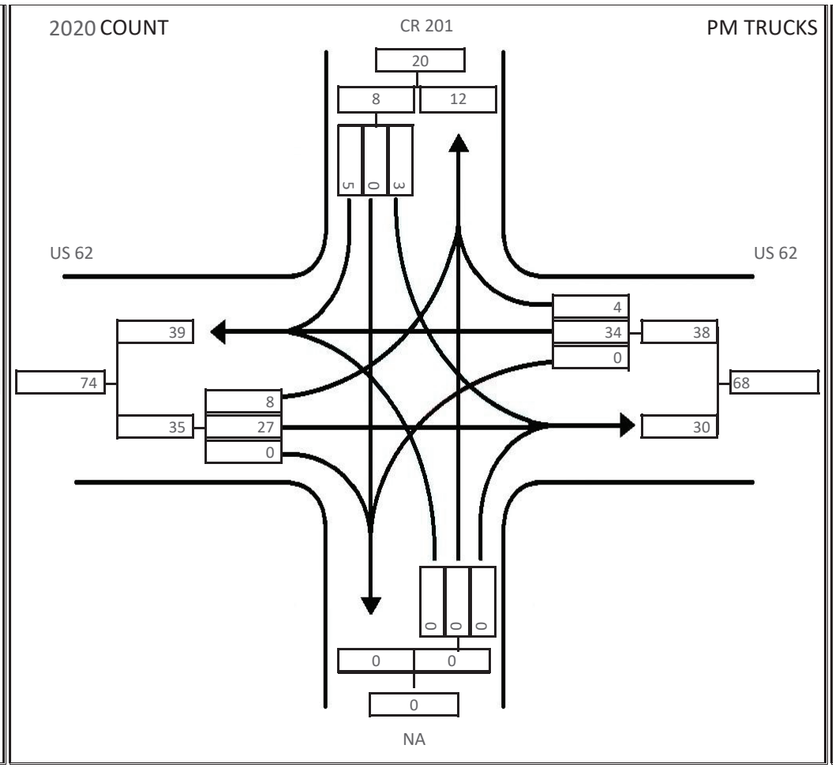
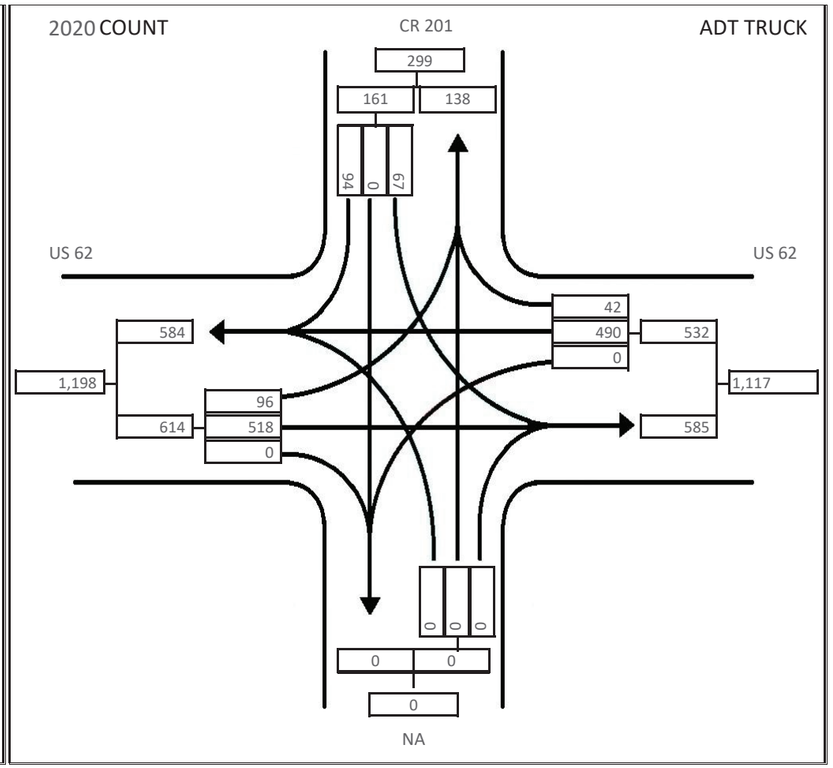

2020 COUNT
CR 201
AM CARS
158
91
67
58
0
33
US 62
US 62
21
279
0
300
337
674
624
46
337
291
324
0
0
0
0
0
0
NA


2020 COUNT
CR 201
PM CARS
231
112
119
82
0
30
US 62
US 62
62
386
0
448
468
831
784
57
363
306
336
0
0
0
0
0
0
NA


2020 COUNT
CR 201
ADT CARS
2,776
1,449
1,327
894
0
555
US 62
US 62
554
4,452
0
5,006
5,346
10,349
9,791
773
5,003
4,230
4,785
0
0
0
0
0
0
NA

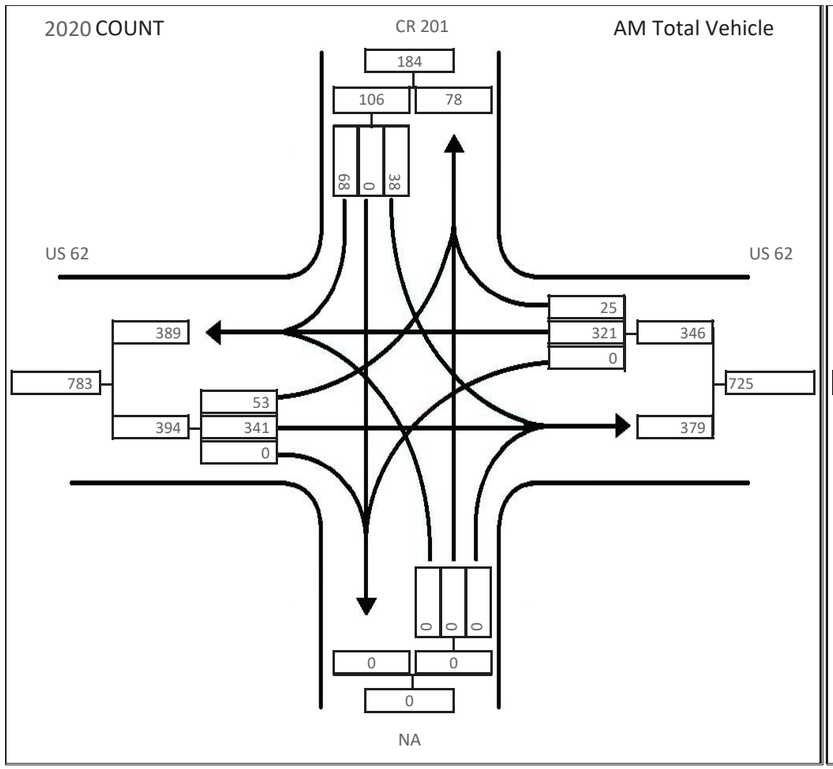

2020 COUNT
CR 201
AM TRUCKS
26
15
11
10
0
5
US 62
US 62
52
109
57
7
50
0
4
42
0
46
101
55
0
0
0
0
0
0
NA

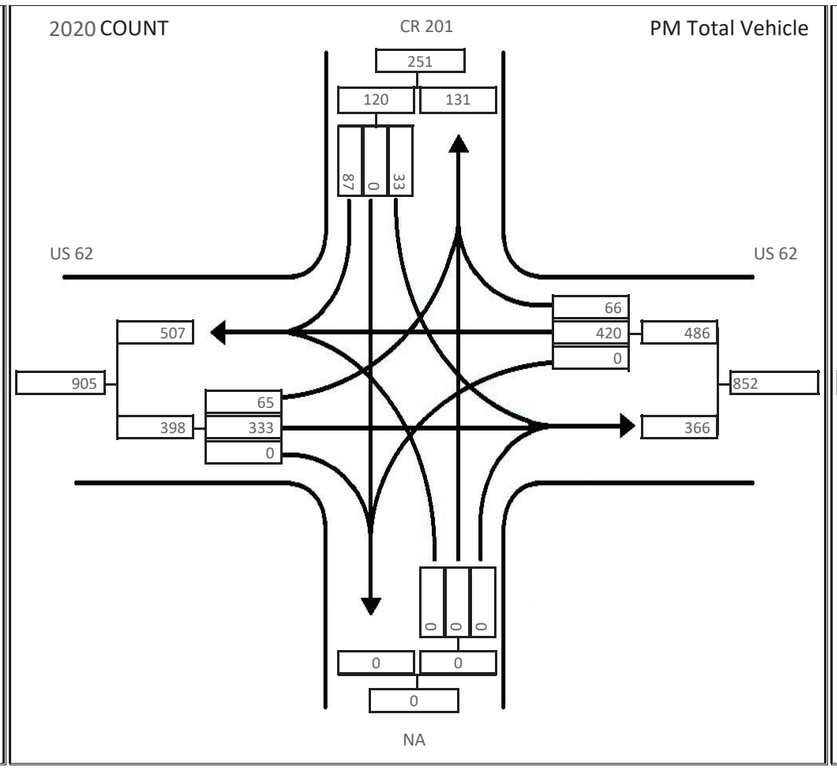

2020 COUNT
CR 201
PM TRUCKS
20
8
12
5
0
3
US 62
US 62
39
74
35
8
27
0
4
34
0
38
68
30
0
0
0
0
0
0
NA

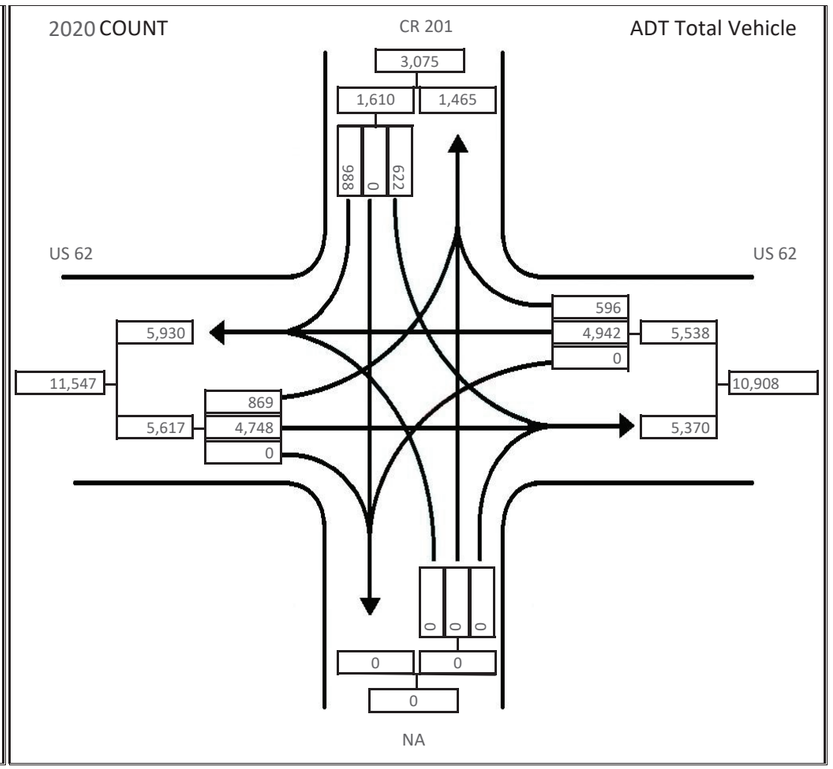

2020 COUNT
CR 201
ADT TRUCK
299
161
138
94
0
67
US 62
US 62
584
1,198
614
96
518
0
42
490
0
532
1,117
585
0
0
0
0
0
0
NA

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

Pivot Forecast From TurnsCount: Yes







RptIntersectionTbl

ID 1 (1-Design Yr, 2-Opening Year)

INTERSECTION TABLE VALUES

Forecast Year 2044

Target Forecast Volumes

Counted ADT

ADT Annual Growth Rate

Leg #	Street Name	AM	AM Keyed	PM	PM Keyed	ADT	ADT Keyed	Leg DHV	K 30	K Keyed	Year	Yr Keyed	Vol.	CNT Keyed	Car+TK	G Keyed	%	PCT Keyed	2040 ADT Vol	Route	Car	TRK
1	US 62	1008	☐	1184	☐	11842	☐	1184	0.10	☐	2020	☑	10,908	☑	38.9	☐	0.39%	☐	10,800		10.9	28.0
2	NA	0	☐	0	☐	0	☐	0	0.00	☐	0	☐	0	☐	0.0	☐	0.00%	☐	0		0.0	0.0
3	US 62	1097	☐	1289	☐	12890	☐	1289	0.10	☐	2020	☑	11,547	☑	55.9	☐	0.61%	☐	10,400		25.0	31.0
4	CR 201	394	☐	394	☐	3944	☐	394	0.10	☐	2019	☐	3,248	☐	27.8	☐	0.86%	☐	3,850	557 R 8.694	20.0	8.0

Turning Mvmt Count Year 2020 ☑ Pivot from turnscounts to target volume ☐ 1 Rate for all

	OTHER	OTH Keyed	CMS SHIFT Data
Leg1	0	☐	2044 ADT=10993.4925 DHV=1099.34925, 2024 ADT=10215.4985 DHV=1021.54985SHOLUS00062**C, 24.92 |11179,11179,SHOL00062R,24917, ,796,2005,8075,1031,9106,2007,8052,994,9046,2010,7993,1000,8993,2013,8352,1404,9756,2016,8284,1348,9632,2019,9110,911,10021,6,0,2040,8777,1176,8303,1096,8840,1167,9020,1099,8927,1116,9107,1085,10111,1354,8936,1209,10524,1295,11019,1227,11225,891,11720,108 777,748,620,676,1020,1141,43,1273,6,4,5,4,5,4,7125,507,7358,936,541,22,7267,502,7764,1004,592,24,10454,1499,50,52,8,5,A ,0.69,10371,-4590,10532,1.03,10377,10454, RAF ,0.71,1372,-377,1563,1.51,1436,1499, RAF ,10444,1088,9742,1024,10793,1038,11108,1038,11408,685,11723,907,1,2,0,1,0,0,0,0,0, AVG , MODEL,8118,13448,-1639,3627,8936,11723,685,1354,8941,8999,1372,1563,8118,13448,-1639,3627,0.0052,-0.0009,0.0074,0.01,0.0111,0.0136,0.007,0.0033,0.0088,0.0104,0.012 0.0006,-0.0007,-0.0009,-0.0008,-0.0052,0.0227,0.0012,0.0232,0.0156,0.0201,0.0165,-0.001,0.0089,0.0093,0.0059,0.0067,0.0067,-0.0118,-0.0002,0.0307,0.0241,0.0341,0.0274,0.0307,-0.1333,0.142,0.0307,2,9742,1024,9300,1500,10800,0.1,0.52,0.14,0.07,0.53,S,HOL,62
Leg2	0	☐	
Leg3	0	☐	2044 ADT=10580.725 DHV=1058.0725, 2024 ADT=9461.745 DHV=946.1745SHOLUS00062**C, 24.75 |11178,11178,SHOL00062R,24748, ,169,0,0,0,0,0,2008,7360,890,8250,2011,7502,628,8130,2014,7763,896,8659,2016,8051,929,8980,2019,7955,1227,9182,5,0,2040,8069,1106,7979,1108,8064,1206,7976,1237,8010,1201,0,0,9408,1850,9154,1648,9361,2706,9127,2791,8700,2645,0,0,388,536,176,432,656,248,329,1 3,5,5,0,0,6278,517,6592,967,467,23,6338,500,6871,1008,517,24,9694,1884,50,53,8,5,A ,0.71,9605,-3688,9775,1.05,9612,9694, RAF ,0.94,1858,-77,1898,1.51,1871,1884, RAF ,9294,1971,9129,1766,9252,2726,9105,2780,8644,2670,0,0,0,0,1,0,0,0,0,0,0, AVG , MODEL,6358,10986,778,3746,8644,9408,1648,2791,7741,7877,1858,1898,6358,10986,778,3746,0.0087,0.0072,0.0084,0.007,0.0045,-9999,0.008,0.007,0.0078,0.0069,0.0041,-9999,-0.0009,-0.0012,-0.0005,-0.0013,-0.0009,-0.0096,0.0181,0.0031,0.0242,0.0163,0.0574,0.0607, 9999,0.0289,0.021,0.0582,0.0603,0.056,-9999,0.0255,0.0245,0.026,0.025,0.0255,-0.0174,0.0978,0.0255,2,9129,1766,8500,1900,10400,0.1,0.52,0.18,0.1,0.53,S,HOL,62,R,24.748,0.169
Leg4	0	☐	2044 ADT=3944.24 DHV=394.424, 2024 ADT=3387.248 DHV=338.7248SHOLSR00557**C, 10.09 |11144,11144,SHOL00557R,8694, ,1493,0,0,0,0,2008,1960,200,2160,2011,2973,275,3248,2014,2949,362,3311,2016,3070,377,3447,2019,3056,192,3248,5,0,2040,3269,299,3264,390,3064,263,3073,220,3076,213,0,0,5089,371,5503,947,3345,68,3311,-47,3482,- 546,0,0,1059,308,806,74,210,421,158,426,423,449,0,0,3,6,4,5,0,0,1005,42,1254,114,71,2,998,43,1376,102,91,2,3775,298,50,56,8,5,A ,1.48,3899,1057,3687,1.2,3863,3775, RAF ,1.54,334,68,284,1.74,312,298, RAF ,4876,264,5294,748,3336,-3,3293,-75,3462,- 566,0,0,0,1,0,0,0,1,0,1, MODEL, AVG ,2616,7207,-1464,1095,3293,5503,-566,947,3403,3565,284,334,2616,7207,-1464,1095,0.0317,0.0381,0.0045,0.004,0.0066,-9999,0.0284,0.0349,0.0044,0.0037,0.0063,-9999,0.0066,0.0079,0.0054,0.0077,0.0066,- 0.0069,0.0647,0.0066,0.0444,0.1873,-0.0308,-0.0593,-0.183,-9999,0.0179,0.1381,-0.0484,-0.0662,-0.1882,-9999,0.0263,0.0352,0.0228,0.0298,0.0263,-0.4107,0.224,0.04,2,5294,748,3500,350,3850,0.1,0.55,0.09,0.05,0.53,S,HOL,557,R,8.694,1.493

URL1	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.555418,-81.820947&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.559498,-81.807331&sensor=false&path=color:0xff0000ff|weight:5|40.555418,-81.820947|40.5 81.817166|40.556352,-81.81359|40.557973,-81.810617|40.559498,-81.807331
URL2	
URL3	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.555394,-81.82416&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555418,-81.820947&sensor=false&path=color:0xff0000ff|weight:5|40.555394,-81.82416|40.555 81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947
URL4	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.535718,-81.816445&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555394,-81.82416&sensor=false&path=color:0xff0000ff|weight:5|40.535718,-81.816445|40.54 81.818798|40.544621,-81.823586|40.549937,-81.823573|40.555394,-81.82416
URLIX	http://maps.googleapis.com/maps/api/staticmap?size=260x257&maptype=roadmap\&markers=size:mid%7Ccolor:blue%7Clabel:X%7C40.555418,-81.820947&sensor=false&path=color:0xff0000ff|weight:5|40.559498,-81.807331|40.557973,-81.810617|40.556352,-81.81359|40.555435,-81.817166|40.55 81.820947|40.555418,-81.820947|40.555414,-81.821931|40.555408,-81.82269|40.555401,-81.82345|40.555394,-81.82416

Simplified HIghway Forecasting Tool (SHIFT)
Design Designation

N

ID 2 (1-Design Yr, 2-Opening Year)

INTERSECTION TABLE VALUES

Forecast Year 2024

Target Forecast Volumes

Counted ADT

ADT Annual Growth Rate

Leg #	Street Name	AM	AM Keyed	PM	PM Keyed	ADT	ADT Keyed	Leg DHV	K 30	K Keyed	Year	Yr Keyed	Vol.	CNT Keyed	Car+TK	G Keyed	%	PCT Keyed	2040 ADT Vol	Route	Car	TRK
1	US 62	941	☐	1106	☐	11064	☐	1106	0.10	☐	2020	☑	10,908	☑	38.9	☐	0.39%	☐	10,800		10.9	28.0
2	NA	0	☐	0	☐	0	☐	0	0.00	☐	0	☐	0	☐	0.0	☐	0.00%	☐	0		0.0	0.0
3	US 62	1002	☐	1177	☐	11771	☐	1177	0.10	☐	2020	☑	11,547	☑	55.9	☐	0.61%	☐	10,400		25.0	31.0
4	CR 201	339	☐	339	☐	3387	☐	339	0.10	☐	2019	☐	3,248	☐	27.8	☐	0.86%	☐	3,850	557 R 8.694	20.0	8.0

Turning Mvmt Count Year 2020 ☑ Pivot from turnscounts to target volume ☐ 1 Rate for all

	OTHER	OTH Keyed	CMS SHIFT Data
Leg1	0	☐	2044 ADT=10993.4925 DHV=1099.34925, 2024 ADT=10215.4985 DHV=1021.54985SHOLUS00062**C, 24.92 |11179,11179,SHOL00062R,24917, ,796,2005,8075,1031,9106,2007,8052,994,9046,2010,7993,1000,8993,2013,8352,1404,9756,2016,8284,1348,9632,2019,9110,911,10021,6,0,2040,8777,1176,8303,1096,8840,1167,9020,1099,8927,1116,9107,1085,10111,1354,8936,1209,10524,1295,11019,1227,11225,891,11720,108 777,748,620,676,1020,1141,43,1273,6,4,5,4,5,4,5,4,7125,507,7358,936,541,22,7267,502,7764,1004,592,24,10454,1499,50,52,8,5,A ,0.69,10371,-4590,10532,1.03,10377,10454, RAF ,0.71,1372,-377,1563,1.51,1436,1499, RAF ,10444,1088,9742,1024,10793,1038,11108,1038,11408,685,11723,907,1,2,0,1,0,0,0,0, AVG , MODEL,8118,13448,-1639,3627,8936,11723,685,1354,8941,8999,1372,1563,8118,13448,-1639,3627,0.0052,-0.0009,0.0074,0.01,0.0111,0.0136,0.007,0.0033,0.0088,0.0104,0.012 0.0006,-0.0007,-0.0009,-0.0008,-0.0052,0.0227,0.0012,0.0232,0.0156,0.0201,0.0165,-0.001,0.0089,0.0093,0.0059,0.0067,0.0067,-0.0118,-0.0002,0.0307,0.0241,0.0341,0.0274,0.0307,-0.1333,0.142,0.0307,2,9742,1024,9300,1500,10800,0.1,0.52,0.14,0.07,0.53,S,HOL,62
Leg2	0	☐	
Leg3	0	☐	2044 ADT=10580.725 DHV=1058.0725, 2024 ADT=9461.745 DHV=946.1745SHOLUS00062**C, 24.75 |11178,11178,SHOL00062R,24748, ,169,0,0,0,0,2008,7360,890,8250,2011,7502,628,8130,2014,7763,896,8659,2016,8051,929,8980,2019,7955,1227,9182,5,0,2040,8069,1106,7979,1108,8064,1206,7976,1237,8010,1201,0,0,9408,1850,9154,1648,9361,2706,9127,2791,8700,2645,0,0,388,536,176,432,656,248,329,1 3,5,5,0,0,6278,517,6592,967,467,23,6338,500,6871,1008,517,24,9694,1884,50,53,8,5,A ,0.71,9605,-3688,9775,1.05,9612,9694, RAF ,0.94,1858,-77,1898,1.51,1871,1884, RAF ,9294,1971,9129,1766,9252,2726,9105,2780,8644,2670,0,0,0,1,0,0,0,0,0, AVG , MODEL,6358,10986,778,3746,8644,9408,1648,2791,7741,7877,1858,1898,6358,10986,778,3746,0.0087,0.0072,0.0084,0.007,0.0045,-9999,0.008,0.007,0.0078,0.0069,0.0041,-9999,-0.0009,-0.0012,-0.0005,-0.0013,-0.0009,-0.0096,0.0181,0.0031,0.0242,0.0163,0.0574,0.0607, 9999,0.0289,0.021,0.0582,0.0603,0.056,-9999,0.0255,0.0245,0.026,0.025,0.0255,-0.0174,0.0978,0.0255,2,9129,1766,8500,1900,10400,0.1,0.52,0.18,0.1,0.53,S,HOL,62,R,24.748,0.169
Leg4	0	☐	2044 ADT=3944.24 DHV=394.424, 2024 ADT=3387.248 DHV=338.7248SHOLSR00557**C, 10.09 |11144,11144,SHOL00557R,8694, ,1493,0,0,0,0,2008,1960,200,2160,2011,2973,275,3248,2014,2949,362,3311,2016,3070,377,3447,2019,3056,192,3248,5,0,2040,3269,299,3264,390,3064,263,3073,220,3076,213,0,0,5089,371,5503,947,3345,68,3311,-47,3482,- 546,0,0,1059,308,806,74,210,421,158,426,423,449,0,0,3,6,4,5,0,0,1005,42,1254,114,71,2,998,43,1376,102,91,2,3775,298,50,56,8,5,A ,1.48,3899,1057,3687,1.2,3863,3775, RAF ,1.54,334,68,284,1.74,312,298, RAF ,4876,264,5294,748,3336,-3,3293,-75,3462,- 566,0,0,0,1,0,0,0,1,0,1, MODEL, AVG ,2616,7207,-1464,1095,3293,5503,-566,947,3403,3565,284,334,2616,7207,-1464,1095,0.0317,0.0381,0.0045,0.004,0.0066,-9999,0.0284,0.0349,0.0044,0.0037,0.0063,-9999,0.0066,0.0079,0.0054,0.0077,0.0066,- 0.0069,0.0647,0.0066,0.0444,0.1873,-0.0308,-0.0593,-0.183,-9999,0.0179,0.1381,-0.0484,-0.0662,-0.1882,-9999,0.0263,0.0352,0.0228,0.0298,0.0263,-0.4107,0.224,0.04,2,5294,748,3500,350,3850,0.1,0.55,0.09,0.05,0.53,S,HOL,557,R,8.694,1.493

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URL2	
URL3	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.555394,-81.82416&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555418,-81.820947&sensor=false&path=color:0xff0000ff|weight:5|40.555394,-81.82416|40.555 81.82345|40.555408,-81.82269|40.555414,-81.821931|40.555418,-81.820947
URL4	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C40.535718,-81.816445&markers=size:mid%7Ccolor:green%7Clabel:E%7C40.555394,-81.82416&sensor=false&path=color:0xff0000ff|weight:5|40.535718,-81.816445|40.54 81.818798|40.544621,-81.823586|40.549937,-81.823573|40.555394,-81.82416
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TurnsCount

TurnsCount

Tuesday, January 26, 2021
7:47:03 AM

ID	LEG NUM	Tm Period	Time	PA LEFT	PAT HRU	PA RIGHT	PA TOTAL	BC LEFT	BC THRU	BC RIGHT	BC TOTAL	TOTAL VEH
93	1	AM	10:45 AM	0	58	7	65	0	10	1	11	76
110	1	AM	11:00 AM	0	70	3	73	0	7	1	8	81
111	1	AM	11:15 AM	0	76	8	84	0	11	1	12	96
112	1	AM	11:30 AM	0	75	3	78	0	14	1	15	93
113	2	AM	10:45 AM	0	0	0	0	0	0	0	0	0
114	2	AM	11:00 AM	0	0	0	0	0	0	0	0	0
115	2	AM	11:15 AM	0	0	0	0	0	0	0	0	0
116	2	AM	11:30 AM	0	0	0	0	0	0	0	0	0
117	3	AM	10:45 AM	7	84	0	91	1	14	0	15	106
118	3	AM	11:00 AM	18	67	0	85	3	12	0	15	100
119	3	AM	11:15 AM	15	76	0	91	3	12	0	15	106
120	3	AM	11:30 AM	6	64	0	70	0	12	0	12	82
121	4	AM	10:45 AM	9	0	11	20	2	0	3	5	25
122	4	AM	11:00 AM	10	0	13	23	1	0	2	3	26
123	4	AM	11:15 AM	6	0	20	26	2	0	2	4	30
124	4	AM	11:30 AM	8	0	14	22	0	0	3	3	25
125	0			0	0	0	0	0	0	0	0	0
126	1	PM	3:45 PM	0	78	10	88	0	14	2	16	104
127	1	PM	4:00 PM	0	103	23	126	0	9	1	10	136
128	1	PM	4:15 PM	0	93	15	108	0	5	1	6	114
129	1	PM	4:30 PM	0	112	14	126	0	6	0	6	132
130	2	PM	3:45 PM	0	0	0	0	0	0	0	0	0
131	2	PM	4:00 PM	0	0	0	0	0	0	0	0	0
132	2	PM	4:15 PM	0	0	0	0	0	0	0	0	0
133	2	PM	4:30 PM	0	0	0	0	0	0	0	0	0
134	3	PM	3:45 PM	12	82	0	94	3	4	0	7	101
135	3	PM	4:00 PM	15	83	0	98	2	11	0	13	111
136	3	PM	4:15 PM	17	72	0	89	2	6	0	8	97
137	3	PM	4:30 PM	13	69	0	82	1	6	0	7	89
138	4	PM	3:45 PM	5	0	21	26	1	0	1	2	28
139	4	PM	4:00 PM	7	0	16	23	0	0	1	1	24
140	4	PM	4:15 PM	7	0	19	26	2	0	2	4	30
141	4	PM	4:30 PM	11	0	26	37	0	0	1	1	38
142	1	ADT	12:00 AM	0	4452	554	5,006	0	490	42	532	5,538
143	2	ADT	12:00 AM	0	0	0	0	0	0	0	0	0
144	3	ADT	12:00 AM	773	4230	0	5,003	96	518	0	614	5,617
145	4	ADT	12:00 AM	555	0	894	1,449	67	0	94	161	1,610

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IXRptWarnings

APPENDIX D

HCS Capacity Software Output

APPENDIX D

HCS Capacity Analysis - Existing Conditions (2020, 2024 & 2044)

HCS7 Two-Way Stop-Control Report

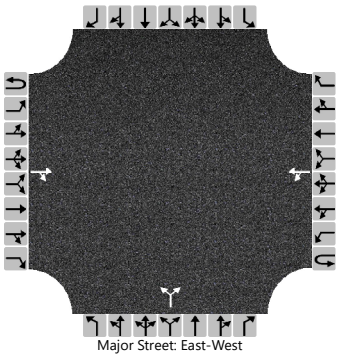
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2020
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 Existing Conditions

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			310	53		124	269			40		103				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						135					155					
Capacity, c (veh/h)						1133					879					
v/c Ratio						0.12					0.18					
95% Queue Length, Q_{95} (veh)						0.4					0.6					
Control Delay (s/veh)						8.6					10.0					
Level of Service (LOS)						A					A					
Approach Delay (s/veh)					3.6				10.0							
Approach LOS					A											

HCS7 Two-Way Stop-Control Report

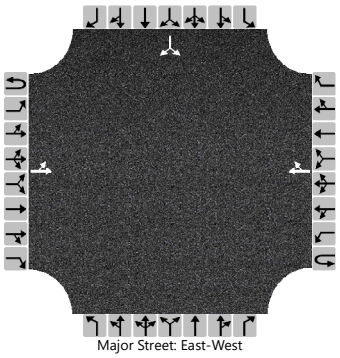
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2020
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 Existing Conditions

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		53	341				321	25						38		68
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		58													115	
Capacity, c (veh/h)		1151													316	
v/c Ratio		0.05													0.36	
95% Queue Length, Q_{95} (veh)		0.2													1.6	
Control Delay (s/veh)		8.3													22.8	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)		1.6												22.8		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

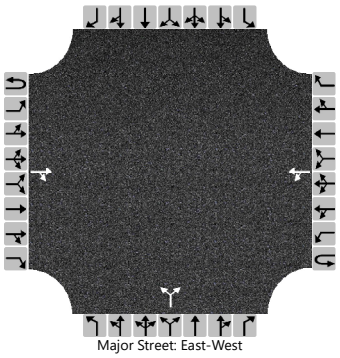
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2020
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 Existing Conditions

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			331	51		127	440			62		105				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						138					182					
Capacity, c (veh/h)						1113					400					
v/c Ratio						0.12					0.45					
95% Queue Length, Q_{95} (veh)						0.4					2.3					
Control Delay (s/veh)						8.7					21.3					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)					3.1				21.3							
Approach LOS									C							

HCS7 Two-Way Stop-Control Report

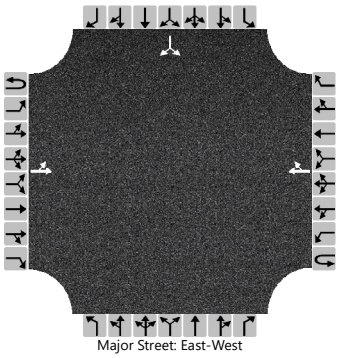
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2020
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 Existing Conditions

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		65	333				420	66						33		87
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		71													130	
Capacity, c (veh/h)		1010													270	
v/c Ratio		0.07													0.48	
95% Queue Length, Q_{95} (veh)		0.2													2.5	
Control Delay (s/veh)		8.8													30.2	
Level of Service (LOS)		A													D	
Approach Delay (s/veh)	2.1												30.2			
Approach LOS													D			

HCS7 Two-Way Stop-Control Report

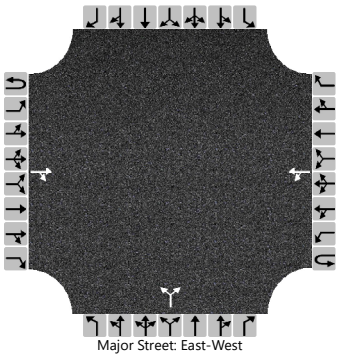
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2024
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 No-Build Conditions

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			430	70		120	380			50		100				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						130					163					
Capacity, c (veh/h)						997					407					
v/c Ratio						0.13					0.40					
95% Queue Length, Q_{95} (veh)						0.4					1.9					
Control Delay (s/veh)						9.2					19.6					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)						3.4				19.6						
Approach LOS										C						

HCS7 Two-Way Stop-Control Report

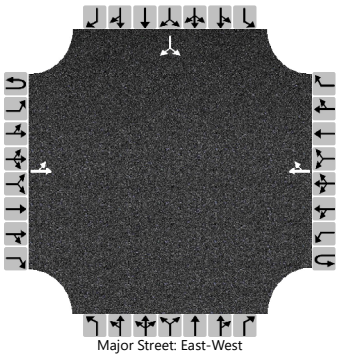
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2024
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 No-Build Conditions

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		90	410				390	50						80		110
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		98													207	
Capacity, c (veh/h)		1054													181	
v/c Ratio		0.09													1.14	
95% Queue Length, Q_{95} (veh)		0.3													10.5	
Control Delay (s/veh)		8.8													161.5	
Level of Service (LOS)		A													F	
Approach Delay (s/veh)		2.5												161.5		
Approach LOS														F		

HCS7 Two-Way Stop-Control Report

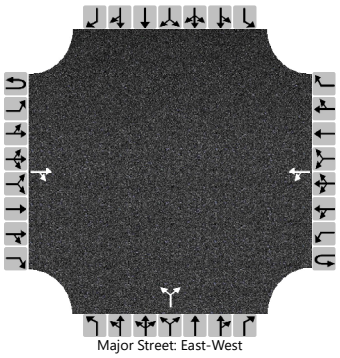
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2024
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 No-Build Conditions

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			400	60		130	530			70		110				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						141					196					
Capacity, c (veh/h)						1035					292					
v/c Ratio						0.14					0.67					
95% Queue Length, Q_{95} (veh)						0.5					4.4					
Control Delay (s/veh)						9.0					39.2					
Level of Service (LOS)						A					E					
Approach Delay (s/veh)						3.3				39.2						
Approach LOS										E						

HCS7 Two-Way Stop-Control Report

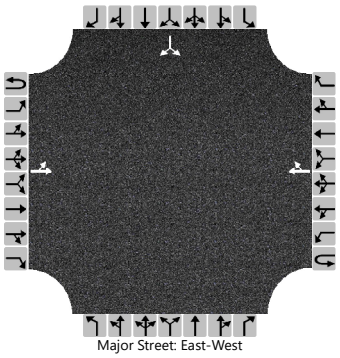
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2024
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 No-Build Conditions

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		90	430				540	90						40		120
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		98													174	
Capacity, c (veh/h)		882													166	
v/c Ratio		0.11													1.05	
95% Queue Length, Q_{95} (veh)		0.4													8.6	
Control Delay (s/veh)		9.6													140.2	
Level of Service (LOS)		A													F	
Approach Delay (s/veh)		2.9												140.2		
Approach LOS														F		

HCS7 Two-Way Stop-Control Report

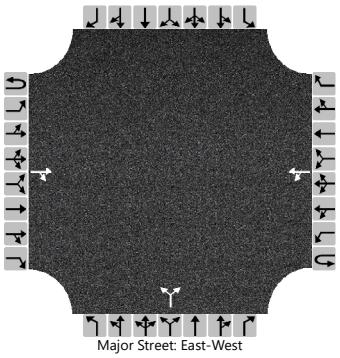
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 No Build Conditions

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			470	80		130	410			60		110				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						141					185					
Capacity, c (veh/h)						951					330					
v/c Ratio						0.15					0.56					
95% Queue Length, Q_{95} (veh)						0.5					3.2					
Control Delay (s/veh)						9.4					28.9					
Level of Service (LOS)						A					D					
Approach Delay (s/veh)						3.7				28.9						
Approach LOS										D						

HCS7 Two-Way Stop-Control Report

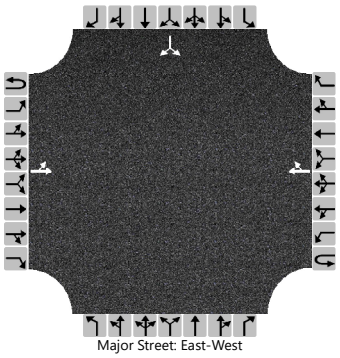
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 No-Build Conditions

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		110	440				420	61						90		140
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		120													250	
Capacity, c (veh/h)		1015													150	
v/c Ratio		0.12													1.67	
95% Queue Length, Q_{95} (veh)		0.4													17.8	
Control Delay (s/veh)		9.0													381.5	
Level of Service (LOS)		A													F	
Approach Delay (s/veh)		3.0												381.5		
Approach LOS														F		

HCS7 Two-Way Stop-Control Report

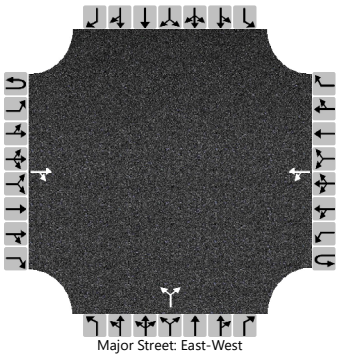
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 No Build Conditions

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			440	70		150	580			90		120				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						163					228					
Capacity, c (veh/h)						987					193					
v/c Ratio						0.17					1.18					
95% Queue Length, Q_{95} (veh)						0.6					11.7					
Control Delay (s/veh)						9.4					172.6					
Level of Service (LOS)						A					F					
Approach Delay (s/veh)					3.8				172.6							
Approach LOS									F							

HCS7 Two-Way Stop-Control Report

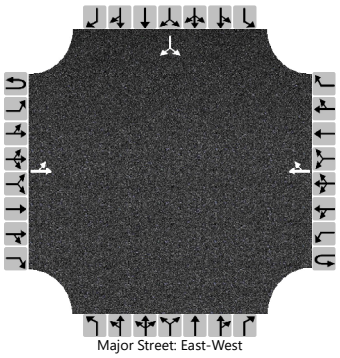
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 No-Build Conditions

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		110	460				580	100						50		140
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		120													207	
Capacity, c (veh/h)		841													124	
v/c Ratio		0.14													1.66	
95% Queue Length, Q_{95} (veh)		0.5													15.3	
Control Delay (s/veh)		10.0													392.3	
Level of Service (LOS)		A													F	
Approach Delay (s/veh)		3.5												392.3		
Approach LOS														F		

APPENDIX D

HCS Capacity Analysis - Medium Term Countermeasures (2044)

HCS7 Two-Way Stop-Control Report

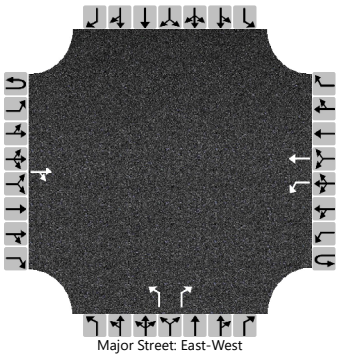
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 Medium-Term Improvements

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			470	80		130	410			60		110				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										Yes						
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						141				65		120				
Capacity, c (veh/h)						951				149		515				
v/c Ratio						0.15				0.44		0.23				
95% Queue Length, Q_{95} (veh)						0.5				2.0		0.9				
Control Delay (s/veh)						9.4				46.9		14.1				
Level of Service (LOS)						A				E		B				
Approach Delay (s/veh)						2.3				25.7						
Approach LOS										D						

HCS7 Two-Way Stop-Control Report

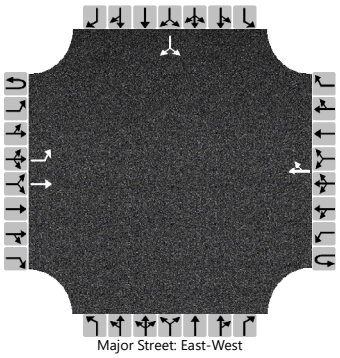
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 Medium-Term Improvements

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		L	T					TR							LR	
Volume (veh/h)		110	440				420	60						90		140
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		120													250	
Capacity, c (veh/h)		1015													156	
v/c Ratio		0.12													1.60	
95% Queue Length, Q_{95} (veh)		0.4													17.2	
Control Delay (s/veh)		9.0													349.0	
Level of Service (LOS)		A													F	
Approach Delay (s/veh)		1.8												349.0		
Approach LOS														F		

HCS7 Two-Way Stop-Control Report

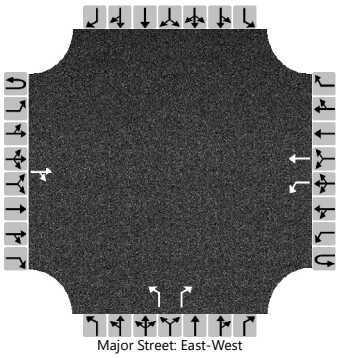
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at SR 557 Medium-Term Improvements

Site Information

Intersection	US 62 at SR 557
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	SR 557
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			440	70		150	580			90		120				
Percent Heavy Vehicles (%)						8				11		11				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										Yes						
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.18				6.51		6.31				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.27				3.60		3.40				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						163				98		130				
Capacity, c (veh/h)						987				111		541				
v/c Ratio						0.17				0.88		0.24				
95% Queue Length, Q_{95} (veh)						0.6				5.3		0.9				
Control Delay (s/veh)						9.4				126.7		13.8				
Level of Service (LOS)						A				F		B				
Approach Delay (s/veh)						1.9				62.1						
Approach LOS										F						

HCS7 Two-Way Stop-Control Report

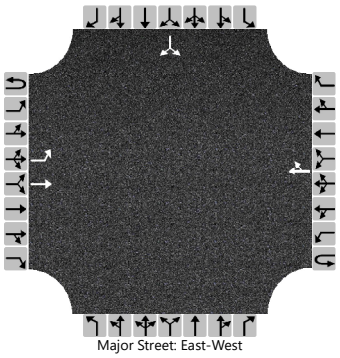
General Information

Analyst	JMM
Agency/Co.	Arcadis
Date Performed	5/6/2021
Analysis Year	2044
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	US 62 at CR 201 Medium-Term Improvements

Site Information

Intersection	US 62 at CR 201
Jurisdiction	ODOT
East/West Street	US 62
North/South Street	CR 201
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		L	T					TR							LR	
Volume (veh/h)		110	460				580	100						50		140
Percent Heavy Vehicles (%)		8												8		3
Proportion Time Blocked																
Percent Grade (%)														9		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.18												8.98		7.13
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.27												3.57		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		120													207	
Capacity, c (veh/h)		841													131	
v/c Ratio		0.14													1.58	
95% Queue Length, Q_{95} (veh)		0.5													14.7	
Control Delay (s/veh)		10.0													353.7	
Level of Service (LOS)		A													F	
Approach Delay (s/veh)		1.9												353.7		
Approach LOS														F		

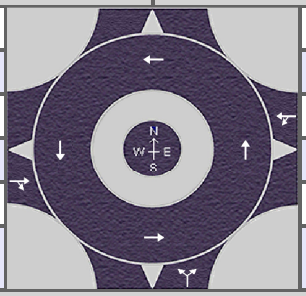
APPENDIX D

HCS Capacity Analysis - Long-Term Countermeasure (2044)

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	4/6/2021
Analysis Year	2044
Time Analyzed	AM
Project Description	HOL-62-24.75, US 62 at SR 5...



Site Information

Intersection	US 62 and SR 557
E/W Street Name	US 62
N/S Street Name	SR 557
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	ODOT

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
Lane Assignment			TR				LT				LR					
Volume (V), veh/h	0		470	80	0	130	410		0	60		110				
Percent Heavy Vehicles, %	3		8	8	3	8	8		3	11		11				
Flow Rate (v_{PCE}), pc/h	0		552	94	0	153	481		0	72		133				
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1							
Pedestrians Crossing, p/h	0				0				0							

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763				
Follow-Up Headway (s)		2.6087			2.6087			2.6087				

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		646			634			205				
Entry Volume, veh/h		598			587			185				
Circulating Flow (v_c), pc/h	153			72			552			706		
Exiting Flow (v_{ex}), pc/h	685			553			0			247		
Capacity (c_{pce}), pc/h		1181			1282			786				
Capacity (c), veh/h		1093			1187			708				
v/c Ratio (x)		0.55			0.49			0.26				

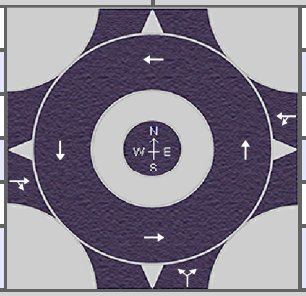
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.9			8.4			8.2				
Lane LOS		A			A			A				
95% Queue, veh		3.4			2.8			1.0				
Approach Delay, s/veh	9.9			8.4			8.2					
Approach LOS	A			A			A					
Intersection Delay, s/veh | LOS	9.1						A					

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	4/6/2021
Analysis Year	2044
Time Analyzed	PM
Project Description	HOL-62-24.75, US 62 at SR 5...



Site Information

Intersection	US 62 and SR 557
E/W Street Name	US 62
N/S Street Name	SR 557
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	ODOT

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
Lane Assignment			TR				LT				LR					
Volume (V), veh/h	0		440	70	0	150	580		0	90		120				
Percent Heavy Vehicles, %	3		8	8	3	8	8		3	11		11				
Flow Rate (v_{PCE}), pc/h	0		517	82	0	176	681		0	109		145				
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1							
Pedestrians Crossing, p/h	0				0				0							

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763				
Follow-Up Headway (s)		2.6087			2.6087			2.6087				

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		599			857			254				
Entry Volume, veh/h		555			794			229				
Circulating Flow (v_c), pc/h	176			109			517			966		
Exiting Flow (v_{ex}), pc/h	662			790			0			258		
Capacity (c_{pce}), pc/h		1153			1235			814				
Capacity (c), veh/h		1068			1143			734				
v/c Ratio (x)		0.52			0.69			0.31				

Delay and Level of Service

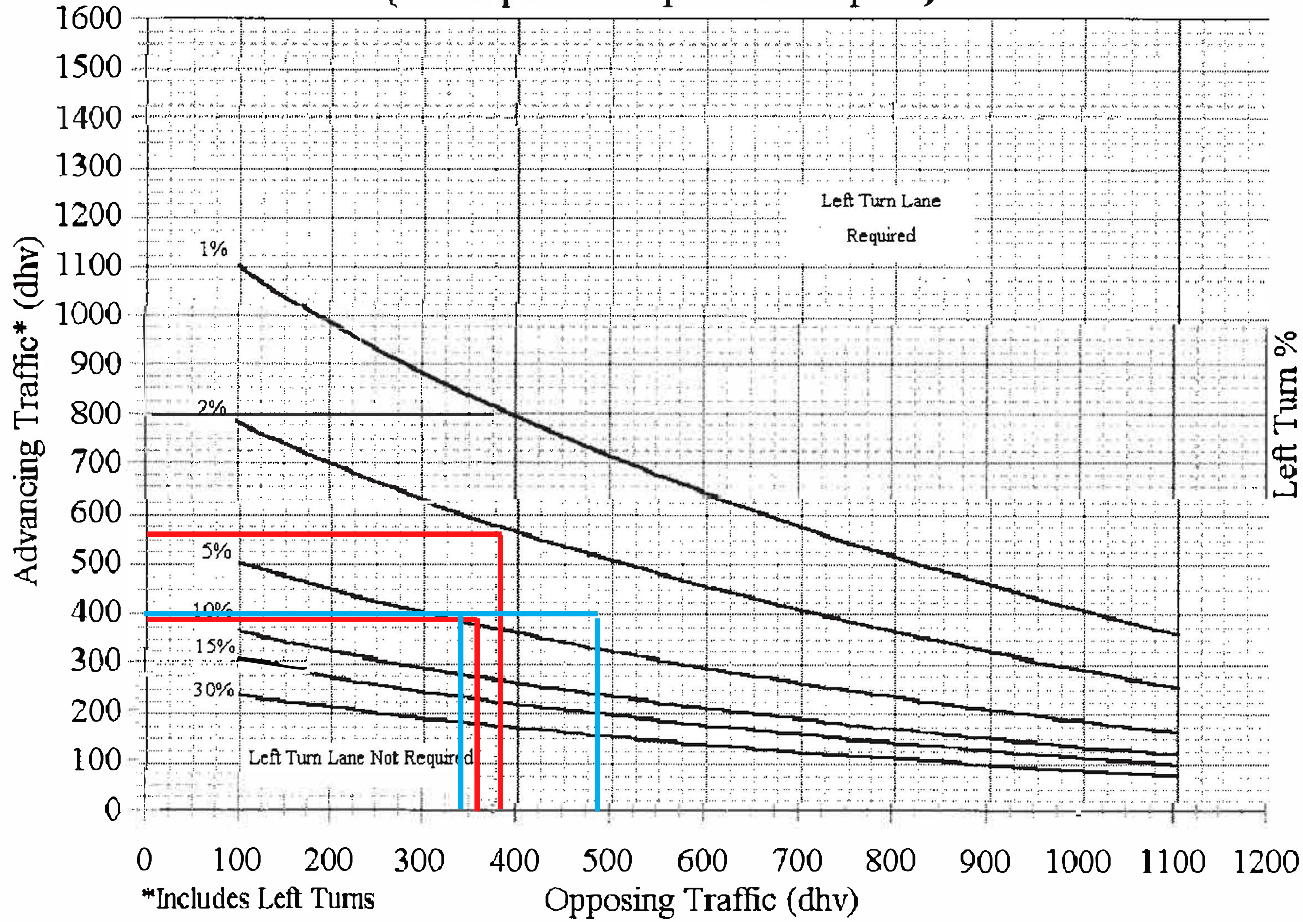
Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.6			13.4			8.7				
Lane LOS		A			B			A				
95% Queue, veh		3.1			6.0			1.3				
Approach Delay, s/veh	9.6			13.4			8.7					
Approach LOS	A			B			A					
Intersection Delay, s/veh | LOS	11.4						B					

APPENDIX E

Traffic Signal Warrant Analysis Results

2-Lane Highway Left Turn Lane Warrant

(>40 mph or 70 kph Posted Speed)

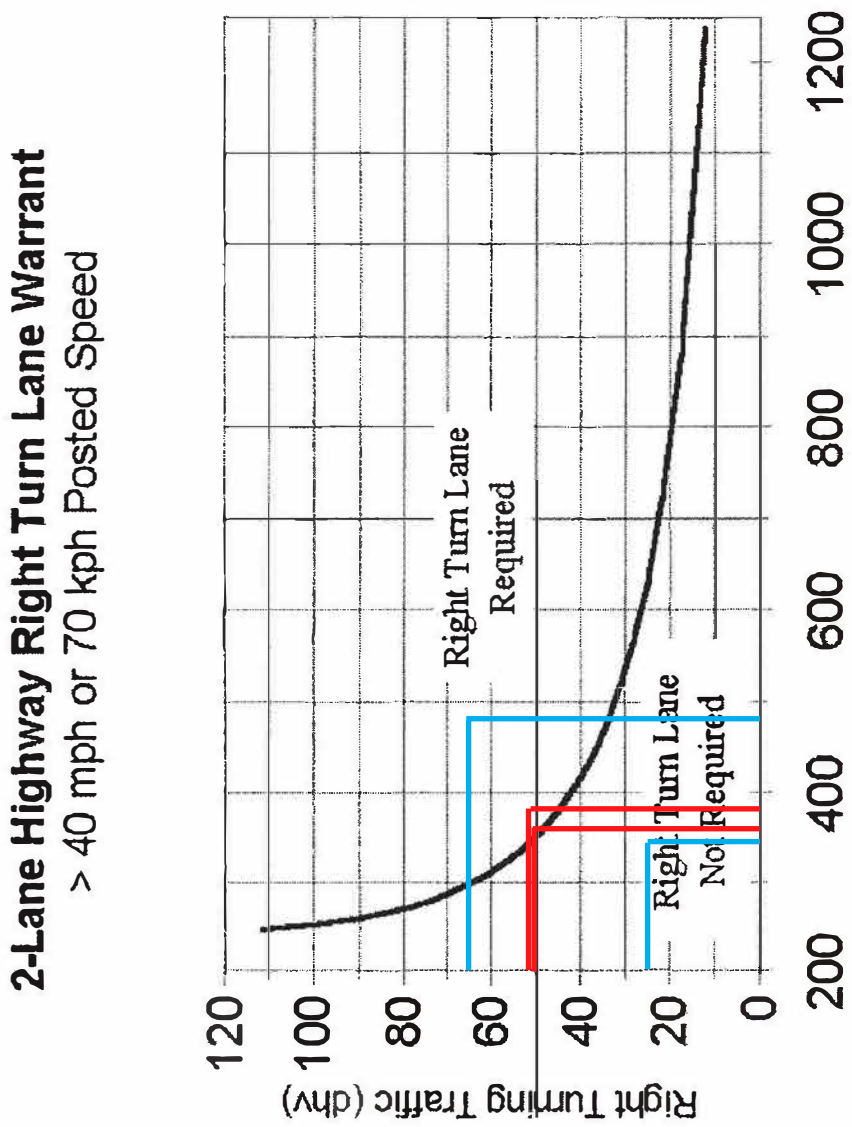


Scenario		Advancing Traffic	Opposing Traffic	Left Turn %	Warrant Met
WBLT at SR 557	Existing Year AM	393	363	32%	Yes
	Existing Year PM	567	382	22%	Yes
EBLT at CR 201	Existing Year AM	394	346	13%	Yes
	Existing Year PM	398	486	16%	Yes

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6b

REFERENCE SECTION
401.6.3



Scenario		Advancing Traffic	Right Turning	Warrant Met
EBRT at SR 557	Existing Year AM	363	53	Yes
	Existing Year PM	382	51	Yes
WBRT at CR 201	Existing Year AM	346	25	No
	Existing Year PM	486	66	Yes

APPENDIX F

Traffic Signal Warrant Analysis Results

STUDY AND ANALYSIS INFORMATION

Municipality:	Anywheretown	**Traffic Volumes Obtained By:**	Arcadis US Inc
County:	Holmes	**Analysis Date:**	2/1/2021
ODOT Engineering District:		**Agency/ Company Name Performing Warrant Analysis:**	Arcadis US Inc

Analysis Information

Data Collection Date: 8/29/2017

Day of the Week: Tuesday

Is the intersection in a built-up area of an isolated community of <10,000 population? Yes

Existing Traffic Signal at intersection: No

Total Number of Approaches at Intersection: 3

Major Street Information

Major Street Name and Route Number: US 62

Major Street Approach Direction: E-Bound, W-Bound

Number of Thru Lanes on Each Major Street Approach: 1 **LANE(S)**

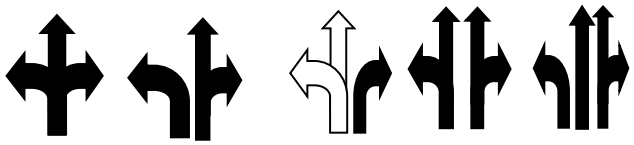
Speed Limit or 85th Percentile Speed on the Major Street*: 55 **MPH**

*Unknown assumes below 45 mph

Minor Street Information

Minor Street Name and Route Number: SR 557

Minor Street Approach Configuration: 1 N-Bound; S-Bound



1 2 3 4 5

Number of Thru Lanes on Each Minor Street Approach: 1 **LANE(S)**

Apply Right Turn Lane Reduction*: Yes

*Right Turn Lane Reduction Shall be used for Warrants 1, 2, & 3 for New ODOT Signals. Please refer to TEM 402-3.2 for clarification and criteria under which Right Turn Reduction is not required.

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Satisfied?	Notes and Comments:	
Warrant 1, Eight-Hour Vehicular Volume	Yes	**No**	Condition B (70%) was met.	
Warrant 2, Four-Hour Vehicular Volume	Yes	**No**	Figure 4C-2 (70% Factor)	
Warrant 3, Peak Hour	Yes	**No**	Signals installed under Warrant 3 should be traffic actuated.	**Peak Hour** 4:15 PM 5:15 PM
For Warrants 1-3, new ODOT signals must be based off of 100% volume thresholds (TEM 402-3.2)				
Warrant 4, Pedestrian Volume	No		If this warrant is met, and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E of the OMUTCD.	**Peak Hour** 4:00 PM 5:00 PM
Warrant 5, School Crossing	No		N/A	
Warrant 6, Coordinated Signal System	No		(Shall not be used as the sole warrant in the analysis)	
Warrant 7, Crash Experience	No		If this is the sole warrant, signal must be semi-actuated with control devices which provide proper coordination if installed at an intersection within a coordinated system and normally should be fully traffic actuated if installed at an isolated intersection.	
Warrant 8, Roadway Network	No		(Shall not be used as the sole warrant in the analysis)	
Warrant 9, Intersection Near a Grade Crossing	No		Figure 4C-9	
Multi-Way Stop Warrant	No		May be used as an interim measure if traffic signal warrants are satisfied.	

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

If no warrants are satisfied, additional options may be considered:

1. An engineering study, performed by a firm prequalified by ODOT for signal design, if approved by the ODOT district, may be used to justify a new signal installation or retention of an existing signal that otherwise does not meet the published warrants. An example of such an instance is a traffic signal in proximity to a railroad crossing that serves to reduce queuing across the tracks.
2. According to TEM 402-2, If the actual turning movement counts fail to satisfy a signal warrant, it may be acceptable to use traffic volumes projected to the second year after project completion. The **Modeling and Forecasting Section** should provide the projected traffic volumes.
3. A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C of TEM) or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal. **Please fill inputs on PHB Score Sheet and submit to ODOT.**

Considerations such as geometrics and lack of sight distance generally have not been accepted in lieu of satisfying signal warrants. These considerations may allow an otherwise unwarranted traffic signal to be retained at **100 percent** local cost. Please review TEM 402-4 for details.

Conclusion:

Notes:

STUDY AND ANALYSIS INFORMATION

Municipality:	Anywheretown	**Traffic Volumes Obtained By:**	Arcadis US Inc
County:	Holmes	**Analysis Date:**	2/1/2021
ODOT Engineering District:		**Agency/ Company Name Performing Warrant Analysis:**	Arcadis US Inc

Analysis Information

Data Collection Date: 12/8/2020

Day of the Week: Tuesday

Is the intersection in a built-up area of an isolated community of <10,000 population? Yes

Existing Traffic Signal at intersection: No

Total Number of Approaches at Intersection: 3

Major Street Information

Major Street Name and Route Number: US 62

Major Street Approach Direction: E-Bound / W-Bound

Number of Thru Lanes on Each Major Street Approach: 1 **LANE(S)**

Speed Limit or 85th Percentile Speed on the Major Street*: 55 **MPH**

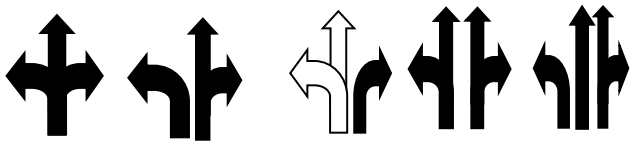
*Unknown assumes below 45 mph

Minor Street Information

Minor Street Name and Route Number: CR 201

Minor Street Approach Configuration:

	N-Bound
1	S-Bound



1 2 3 4 5

Number of Thru Lanes on Each Minor Street Approach: 1 **LANE(S)**

Apply Right Turn Lane Reduction*: Yes

*Right Turn Lane Reduction Shall be used for Warrants 1, 2, & 3 for New ODOT Signals. Please refer to TEM 402-3.2 for clarification and criteria under which Right Turn Reduction is not required.

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Satisfied?	Notes and Comments:	
Warrant 1, Eight-Hour Vehicular Volume	Yes	**No**	Condition B (70%) was met.	
Warrant 2, Four-Hour Vehicular Volume	Yes	**No**	Figure 4C-2 (70% Factor)	
Warrant 3, Peak Hour	Yes	**No**	Signals installed under Warrant 3 should be traffic actuated.	**Peak Hour** 4:30 PM 5:30 PM
For Warrants 1-3, new ODOT signals must be based off of 100% volume thresholds (TEM 402-3.2)				
Warrant 4, Pedestrian Volume	No		If this warrant is met, and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E of the OMUTCD.	**Peak Hour** 3:45 PM 4:45 PM
Warrant 5, School Crossing	No		N/A	
Warrant 6, Coordinated Signal System	No		(Shall not be used as the sole warrant in the analysis)	
Warrant 7, Crash Experience	No		If this is the sole warrant, signal must be semi-actuated with control devices which provide proper coordination if installed at an intersection within a coordinated system and normally should be fully traffic actuated if installed at an isolated intersection.	
Warrant 8, Roadway Network	No		(Shall not be used as the sole warrant in the analysis)	
Warrant 9, Intersection Near a Grade Crossing	No		Figure 4C-9	
Multi-Way Stop Warrant	No		May be used as an interim measure if traffic signal warrants are satisfied.	

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

If no warrants are satisfied, additional options may be considered:

1. An engineering study, performed by a firm prequalified by ODOT for signal design, if approved by the ODOT district, may be used to justify a new signal installation or retention of an existing signal that otherwise does not meet the published warrants. An example of such an instance is a traffic signal in proximity to a railroad crossing that serves to reduce queuing across the tracks.
2. According to TEM 402-2, If the actual turning movement counts fail to satisfy a signal warrant, it may be acceptable to use traffic volumes projected to the second year after project completion. The **Modeling and Forecasting Section** should provide the projected traffic volumes.
3. A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C of TEM) or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal. **Please fill inputs on PHB Score Sheet and submit to ODOT.**

Considerations such as geometrics and lack of sight distance generally have not been accepted in lieu of satisfying signal warrants. These considerations may allow an otherwise unwarranted traffic signal to be retained at **100 percent** local cost. Please review TEM 402-4 for details.

Conclusion:

Notes:

Warrants Summary

Information			
Analyst	QAi	Intersection	US 62 at CR 201
Agency/Co	Arcadis US Inc	Jurisdiction	Holmes County
Date Performed	1/27/2021	Units	U.S. Customary
Project ID	PID # 112364	Time Period Analyzed	12-Hour
East/West Street	US 62	North/South Street	CR 201
File Name	2020 12-Hour Warrants - US 62 at CR 201.xhy	Major Street	East-West

Project Description *PID # 112364*

General				Roadway Network	
Major Street Speed (mph)	55	☑	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	8000	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	4	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	1	0	0	1	0	0	0	0	0	0	0
Lane usage		LT			TR						LR	
Vehicle Volume Averages (vph)	56	280	7	17	288	35	7	0	14	40	0	61
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☑
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☑
1 (56%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 2: Four-Hour Vehicular Volume	☑
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 3: Peak Hour	☑
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (56%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☑
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

Warrants Summary

Information			
Analyst	QAi	Intersection	US 62 at SR 557
Agency/Co	Arcadis US Inc	Jurisdiction	Holmes County
Date Performed	1/27/2021	Units	U.S. Customary
Project ID	PID # 112364	Time Period Analyzed	12 Hour
East/West Street	US 62	North/South Street	SR 557
File Name	2020 12-Hour Warrants - US 62 at SR 557.xhy	Major Street	East-West

Project Description *PID # 112364*

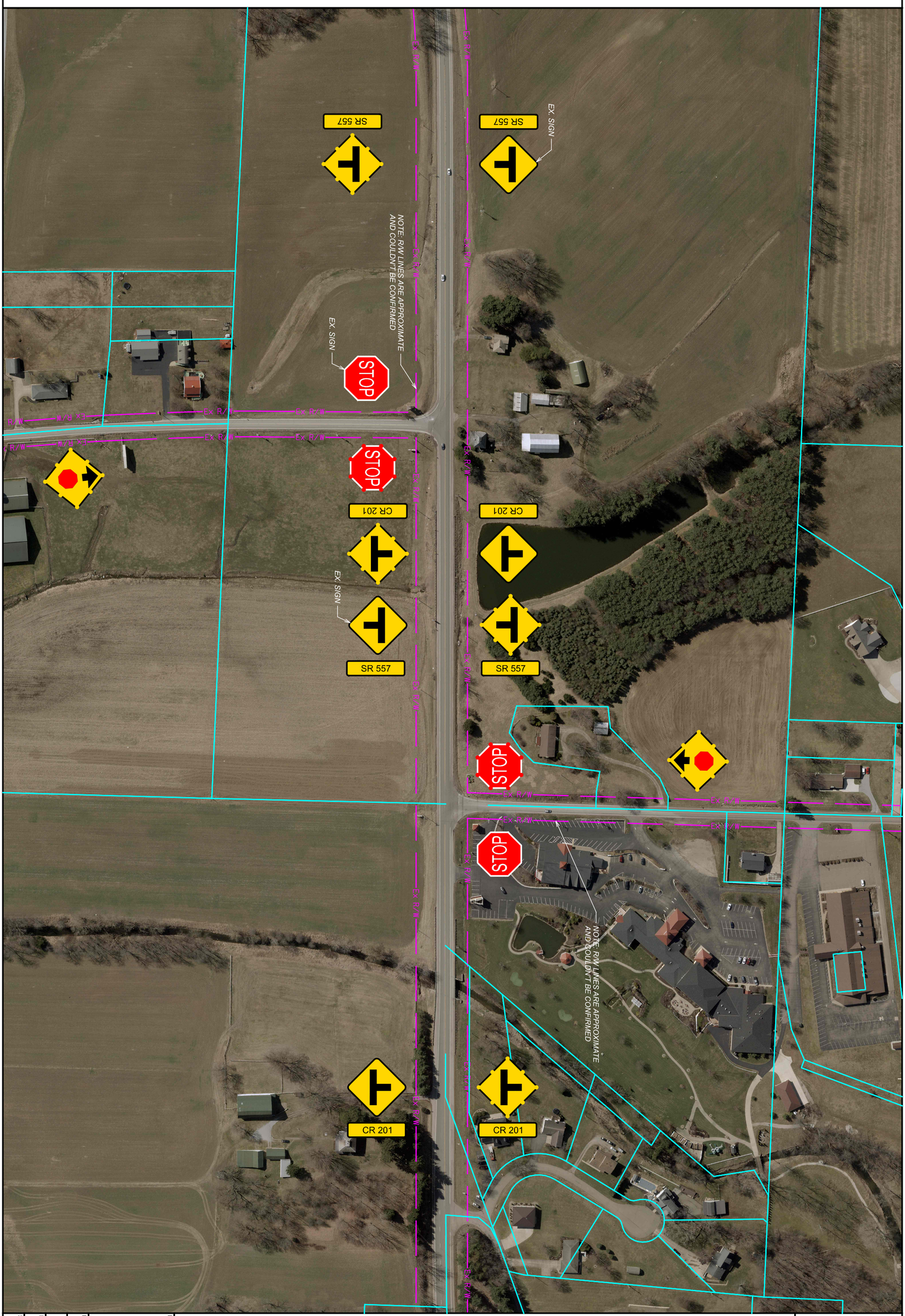
General				Roadway Network	
Major Street Speed (mph)	55	☑	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	8000	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	3	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	1	0	0	1	0	0	0	0	0	0	0
Lane usage		TR			LT			LR				
Vehicle Volume Averages (vph)	0	271	40	68	279	0	37	0	64	0	0	0
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☑
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☑
1 (56%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 2: Four-Hour Vehicular Volume	☑
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 3: Peak Hour	☑
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (56%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☑
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

CTY-RTE-SECTION



SHEET	TOTAL
P.1	4

PROJECT ID: 0

REVIEWER: DRJ MM-DD-YY

DESIGNER: BRO

ARCADIS
1111 SUPERIOR AVENUE SUITE 1300
CLEVELAND, OHIO 44114
(216)781-6177
www.arcadis.com

DESIGN AGENCY

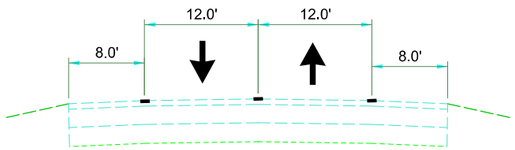
SHORT TERM COUNTERMEASURE
US-62 AT SR-557 AND CR-201

HORIZONTAL SCALE IN FEET

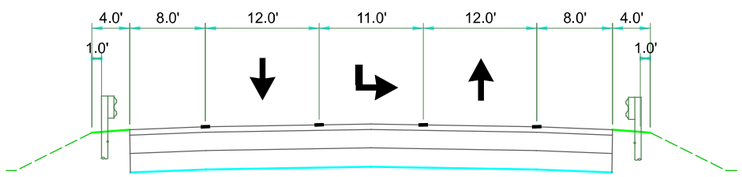
0 100
50 200

CTY-RTE-SECTION

EXISTING
US 62 TO 557
&
US 62 TO 201



PROPOSED
US 62 TO 557



Ex R/W

EXTEND EX. 24" CULVERT 2.5'

EXTEND EX. 24" CULVERT 7.5'

MATCH LINE STA. 140+00.00

ONLY ONLY

STOP

NOTE: R/W LINES ARE APPROXIMATE AND COULDN'T BE CONFIRMED

POTENTIAL UTILITY POLE CONFLICT, RELOCATION BY OTHERS

UTILITY POLE RELOCATION BY OTHERS

ONLY ONLY

NOTES:

1.) PROPERTY LINES ARE TAKEN FROM THE HOLMES COUNTY GIS

2.) SIGNING IMPROVEMENTS ILLUSTRATED ON THE SHORT-TERM COUNTERMEASURE SCHEMATIC WILL BE IMPLEMENTED WITH THE MEDIUM-TERM COUNTERMEASURES

HORIZONTAL SCALE IN FEET
0 20 40 80

MEDIUM TERM COUNTERMEASURE
US-62 AT SR-557 AND CR-201

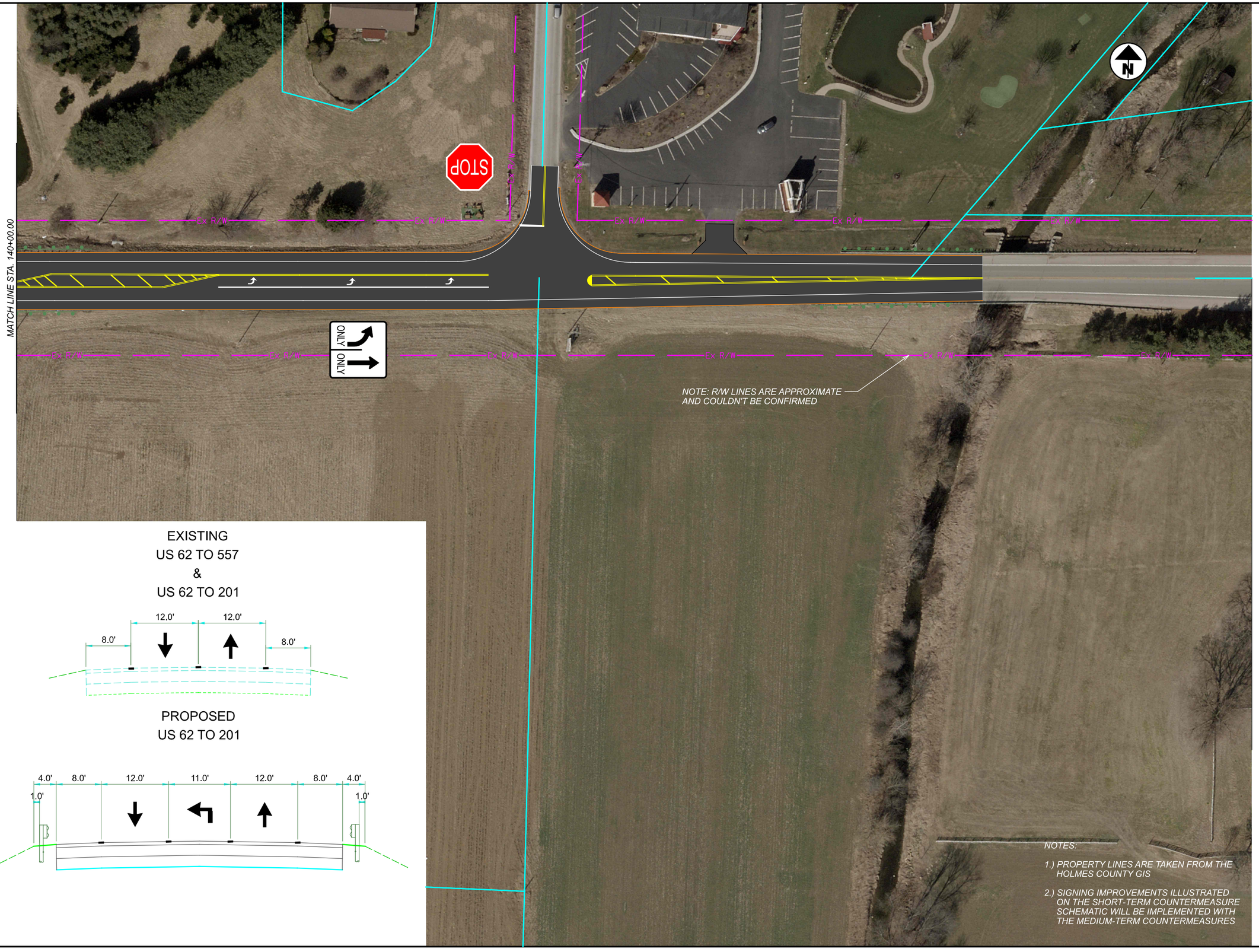
DESIGN AGENCY
ARCADIS
1111 SUPERIOR AVENUE SUITE 1300
CLEVELAND, OHIO 44114
(216) 781-4177
www.arcadis.com

DESIGNER
BRO

REVIEWER
DRJ MM-DD-YY

PROJECT ID
0

SHEET P.2 | TOTAL 4



EXISTING
US 62 TO 557
&
US 62 TO 201

PROPOSED
US 62 TO 201

NOTES:

1.) PROPERTY LINES ARE TAKEN FROM THE HOLMES COUNTY GIS

2.) SIGNING IMPROVEMENTS ILLUSTRATED ON THE SHORT-TERM COUNTERMEASURE SCHEMATIC WILL BE IMPLEMENTED WITH THE MEDIUM-TERM COUNTERMEASURES

HORIZONTAL
SCALE IN FEET
0 20 40 80

MEDIUM TERM COUNTERMEASURE
US-62 AT SR-557 AND CR-201

CTY-RTE-SECTION

DESIGN AGENCY
ARCADIS
1111 SUPERIOR AVENUE SUITE 1300
CLEVELAND, OHIO 44114
(216) 781-7477
www.arcadis.com

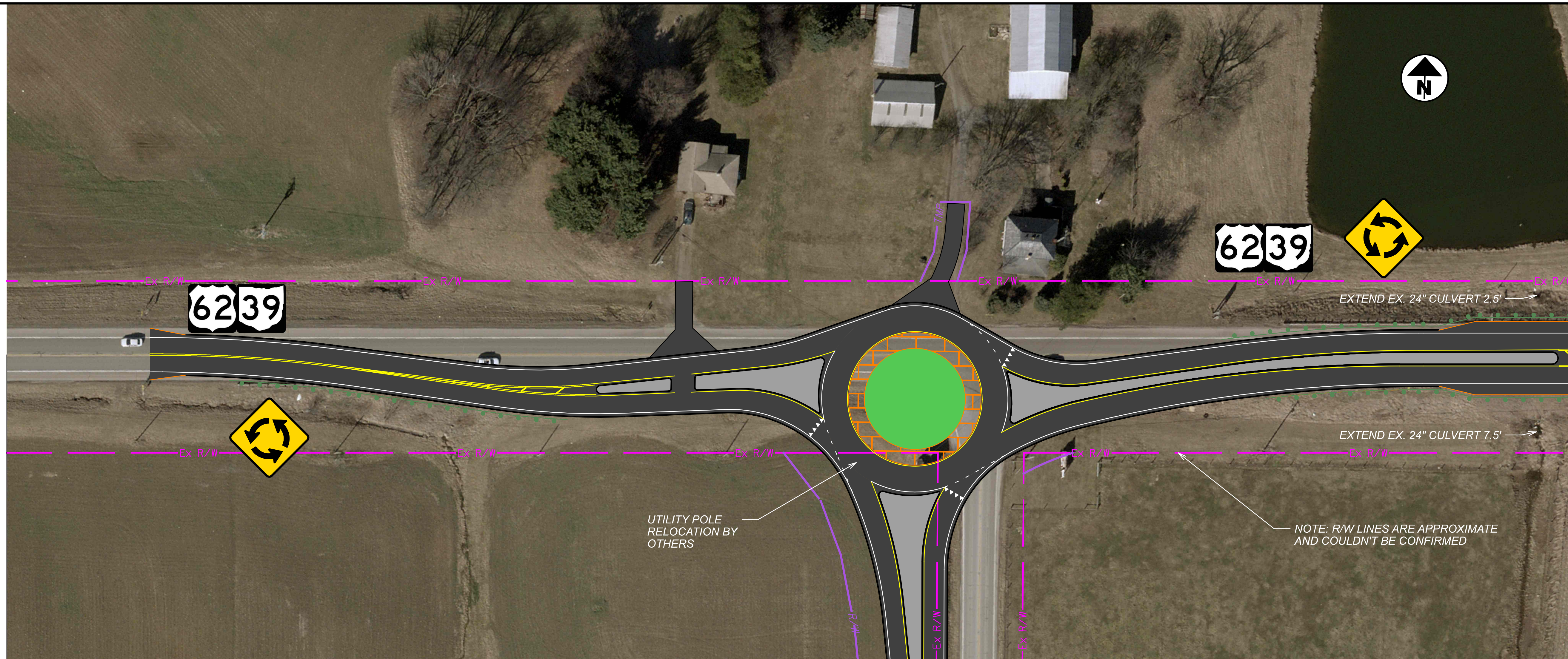
DESIGNER
BRO

REVIEWER
DRJ MM-DD-YY

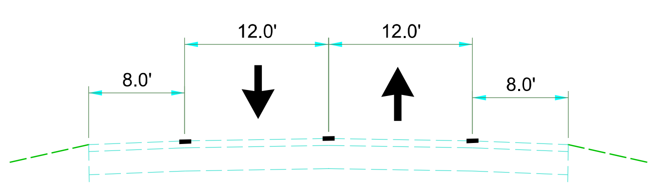
PROJECT ID
0

SHEET P.3 | TOTAL 4

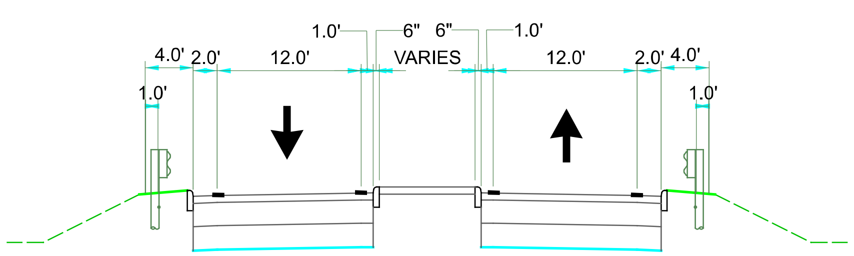
CTY-RTE-SECTION



EXISTING
US 62 TO 557
&
US 62 TO 201



PROPOSED
US 62 TO 557



HORIZONTAL SCALE IN FEET
0 20 40 80

LONG TERM COUNTERMEASURE
US-62 AT SR-557 AND CR-201

DESIGN AGENCY
ARCADIS
1111 SUPERIOR AVENUE SUITE 1300
CLEVELAND, OHIO 44114
(216) 781-6177
www.arcadis.com

DESIGNER	BRO
REVIEWER	DRJ MM-DD-YY
PROJECT ID	0
SHEET	TOTAL
P.4	4

APPENDIX H

Cost Estimate

Short Term Countemeasure (LED Signs)				
Item	Unit Cost	Assumed Qty.	Unit	Total
MOT	$15,000.00	1	LS	$7,500.00
Sign	$15.00	61	SF	$915.00
LED Solar Sign	$3,000.00	8	EACH	$24,000.00
Post	$9.00	169	FT	$1,521.00
Total				**$33,936.00**
25% Contingency				**$8,484.00**
25% Engineering				**$8,484.00**
ROW Cost				**$0.00**
Grand Total				**$50,904.00**
Grand Total with Inflation 2025				**$57,217.00**

Medium Term Countemeasure (Lane Widening)				
Item	Unit Cost	Assumed Qty.	Unit	Total
Pavement Removed	$12.00	3852	SY	$46,222.67
Pavement Planning, Asphalt Concrete, 3 1/4"	$2.00	4774	SY	$9,548.00
1 1/2 " Asphalt Concrete Surface Course, 12.5mm, Type A	$215.00	426	CY	$91,590.00
1 3/4 " Asphalt Concrete Intermediate Course, 19mm, Type A	$190.00	497	CY	$94,430.00
9" Asphalt Concrete Base, PG64-22	$160.00	1360	CY	$217,600.00
6" Aggregate Base	$55.00	907	CY	$49,885.00
8" Non-Reinforced Concrete	$90.00	39	SY	$3,530.00
Excavation of Subgrade	$20.00	2720	CY	$54,400.00
Granular Material, Type C	$45.00	2720	CY	$122,400.00
Geotextile Fabric	$2.00	5440	SY	$10,880.00
MOT	$75,000.00	1	LS	$75,000.00
Excavation	$15.00	3174	CY	$47,610.00
Embankment	$12.00	1360	CY	$16,320.00
24" Conduit, Type A with Headwall	$1,000.00	10	FT	$10,000.00
6" Shallow Pipe Underdrain with Fabric Wrap	$12.00	3000	FT	$36,000.00
Sign	$15.00	170	SF	$2,542.50
Post	$10.00	338	FT	$3,380.00
Pavement Marking (Prop. And Removals)	$5.00	2000	FT	$10,000.00
Lane Arrow	$200.00	6	EA	$1,200.00
Guardrail, MGS (Prop. And Removals)	$20.00	1025	FT	$20,500.00
Anchor Assembly (Prop. And Removals)	$1,800.00	10	EACH	$18,000.00
Total				**$941,039.00**
25% Contingency				**$235,260.00**
25% Engineering				**$235,260.00**
ROW Cost				**$0.00**
Grand Total				**$1,411,559.00**
Grand Total with Inflation 2025				**$1,586,593.00**

Long Term Countemeasure (Roundabout)				
Item	Unit Cost	Assumed Qty.	Unit	Total
Pavement Removed	$12.00	6524	SY	$78,286.67
Pavement Planning, Asphalt Concrete, 3 1/4"	$2.00	942	SY	$1,884.00
1 1/2 " Asphalt Concrete Surface Course, 12.5mm, Type A	$215.00	447	CY	$96,105.00
1 3/4 " Asphalt Concrete Intermediate Course, 19mm, Type A	$190.00	521	CY	$98,990.00
9" Asphalt Concrete Base, PG64-22	$160.00	1446	CY	$231,360.00
6" Aggregate Base	$55.00	1159	CY	$63,745.00
8" Non-Reinforced Concrete	$90.00	1496	SY	$134,670.00
Excavation of Subgrade	$20.00	579	CY	$11,580.00
Granular Material, Type C	$45.00	579	CY	$26,055.00
Geotextile Fabric	$2.00	5784	SY	$11,568.00
MOT	$75,000.00	1	LS	$75,000.00
Excavation	$15.00	4338	CY	$65,070.00
Embankment	$12.00	2410	CY	$28,920.00
Curb and Gutter	$35.00	4573	FT	$160,055.00
24" Conduit, Type A with Headwall	$1,000.00	10	FT	$10,000.00
6" Shallow Pipe Underdrain with Fabric Wrap	$12.00	3000	FT	$36,000.00
Sign	$15.00	172	SF	$2,580.00
LED Sign	$3,000.00	0	EACH	$0.00
Post	$10.00	364	FT	$3,640.00
Pavement Marking (Prop. And Removals)	$5.00	2700	FT	$13,500.00
Lane Arrow	$200.00	3	EA	$600.00
Guardrail, MGS (Prop. And Removals)	$20.00	1138	FT	$22,750.00
Anchor Assembly (Prop. And Removals)	$1,800.00	10	EACH	$18,000.00
Total				**$1,190,359.00**
25% Contingency				**$297,590.00**
25% Engineering				**$297,590.00**
ROW Cost				**$41,000.00**
Grand Total				**$1,826,539.00**
Grand Total with Inflation 2025				**$2,053,030.00**

APPENDIX I

Economic Crash Analysis Tool Results

APPENDIX I

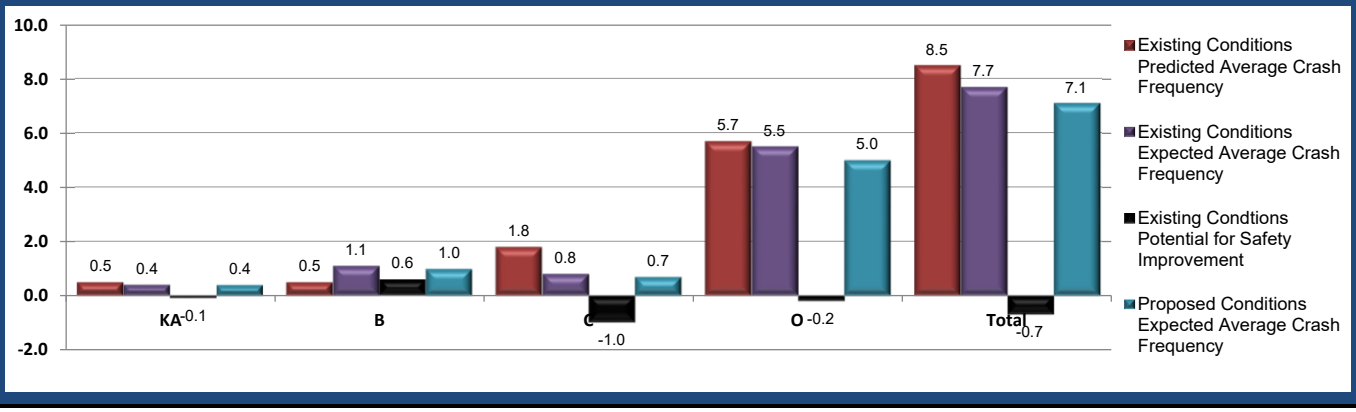
Economic Crash Analysis Tool Results - Short Term Countermeasures

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{predicted}$ - Existing Conditions	0.4558	0.4558	1.8299	5.7146	8.4561
$N_{expected}$ - Existing Conditions	0.3760	1.0898	0.7929	5.4870	7.7457
$N_{potential\ for\ improvement}$ - Existing Conditions	-0.0798	**0.6340**	-1.0370	-0.2276	-0.7104
$N_{expected}$ - Proposed Conditions	0.3516	1.0095	0.7151	5.0409	7.1171

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.248	0.248	0.9955	3.109	4.6005
US62: 24.915	CR 201	0.2078	0.2078	0.8344	2.6056	3.8556

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.1622	0.4703	0.3422	3.0406	4.0153
US62: 24.915	CR 201	0.2138	0.6195	0.4507	2.4464	3.7304

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	-0.0858	0.2223	-0.6533	-0.0684	-0.5852
US62: 24.915	CR 201	0.006	0.4117	-0.3837	-0.1592	-0.1252

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Proposed Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.1517	0.4356	0.3086	2.7934	3.6893
US62: 24.915	CR 201	0.1999	0.5739	0.4065	2.2475	3.4278

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	1.4057	0.0320	-1.3737	0.0320
Head On	0.1004	0.0794	-0.0210	0.0794
Rear End	1.9138	2.3323	**0.4185**	2.3323
Backing	0.2678	0.2671	-0.0007	0.2671
Sideswipe - Meeting	0.3544	0.3617	**0.0073**	0.3617
Sideswipe - Passing	0.3326	0.3401	**0.0075**	0.3401
Angle	0.9711	1.0725	**0.1014**	1.0725
Parked Vehicle	0.2831	0.2944	**0.0113**	0.2944
Pedestrian	0.0493	0.0442	-0.0051	0.0442
Animal	0.0000	0.0000	0.0000	0.0000
Train	0.0006	0.0009	**0.0003**	0.0009
Pedalcycles	0.0311	0.0397	**0.0086**	0.0397
Other Non-Vehicle	0.0017	0.0013	-0.0004	0.0013
Fixed Object	2.1793	2.3221	**0.1428**	2.3221
Other Object	0.0838	0.0862	**0.0024**	0.0862
Overturning	0.1724	0.1451	-0.0273	0.1451
Other Non-Collision	0.1411	0.1417	**0.0006**	0.1417
Left Turn	0.1679	0.1850	**0.0171**	0.1850
Right Turn	0.0000	0.0000	0.0000	0.0000

Safety Benefit - Cost Analysis

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557 Safety Study	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)					$0.00	$0.00	0.000	$0
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)					$0.00	$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)					$0.00	$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)					$0.00	$0.00		
CMF 1 - Replace standard stop sign with flashing LED stop sign	10	$57,217.00	$0.00	$0.00	$57,217.00	$57,217.00	-0.440	$136,186
CMF 2 - Implement systemic signing and marking improvements at stop-controlled intersections	10				$0.00	$0.00	-0.189	$44,538
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
Totals		**$57,217.00**	**$0.00**	**$0.00**	**$57,217.00**	**$57,217.00**	**-0.629**	**$180,724**

Safety Benefit - Cost Analysis

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557 Safety Study	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Benefit - Cost Calculator

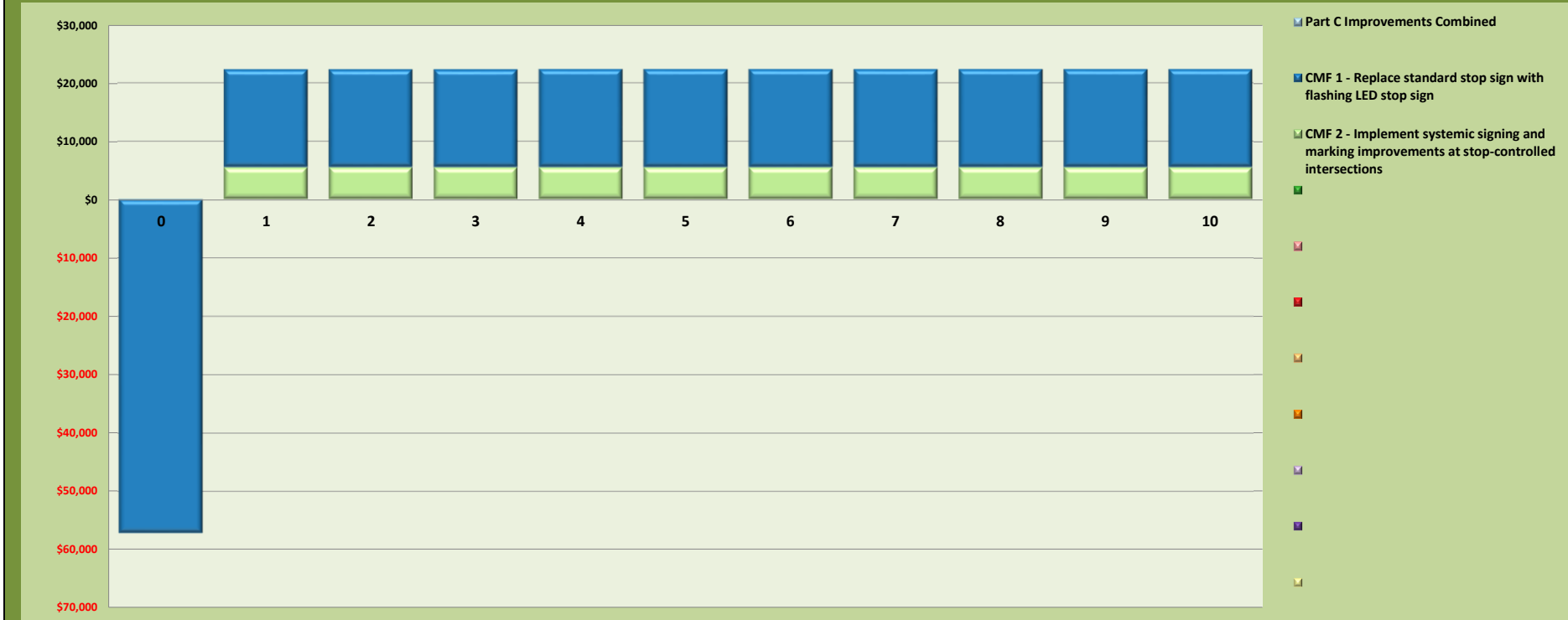
Net Present Value of Project	$57,217.00
Net Present Value of Safety Benefits	$180,724.09
Net Benefit	$123,507.09
Benefit / Cost Ratio	3.16

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.024
Number of Injury Crashes	-0.183
Number of Total Crashes	-0.629

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year

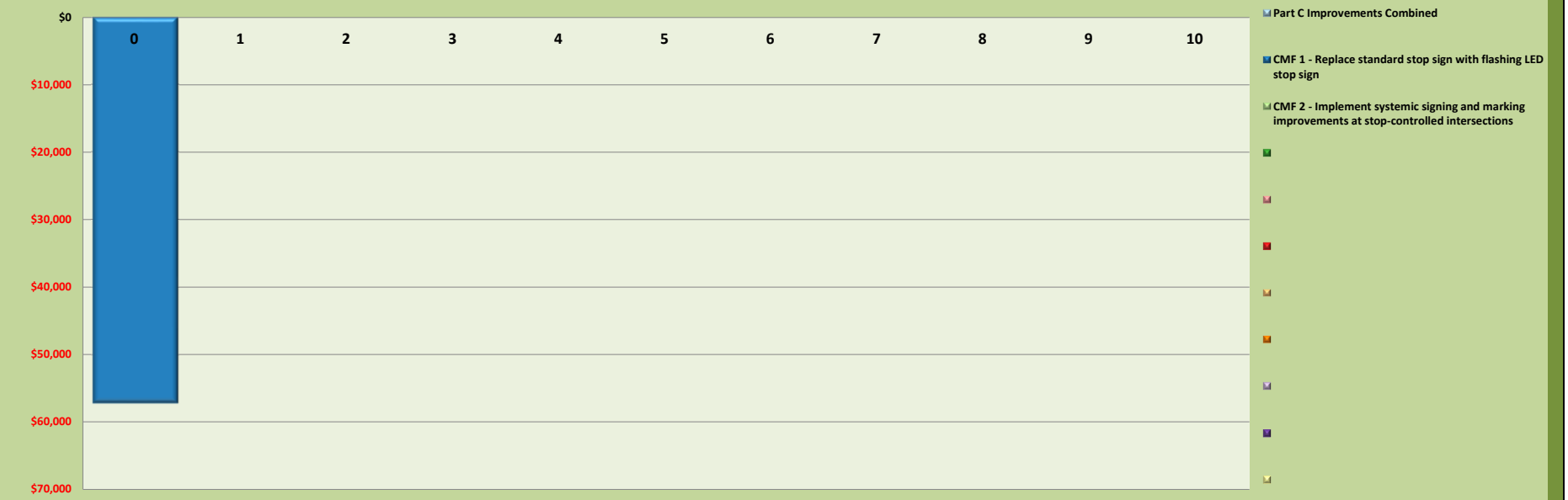


Safety Benefit - Cost Analysis

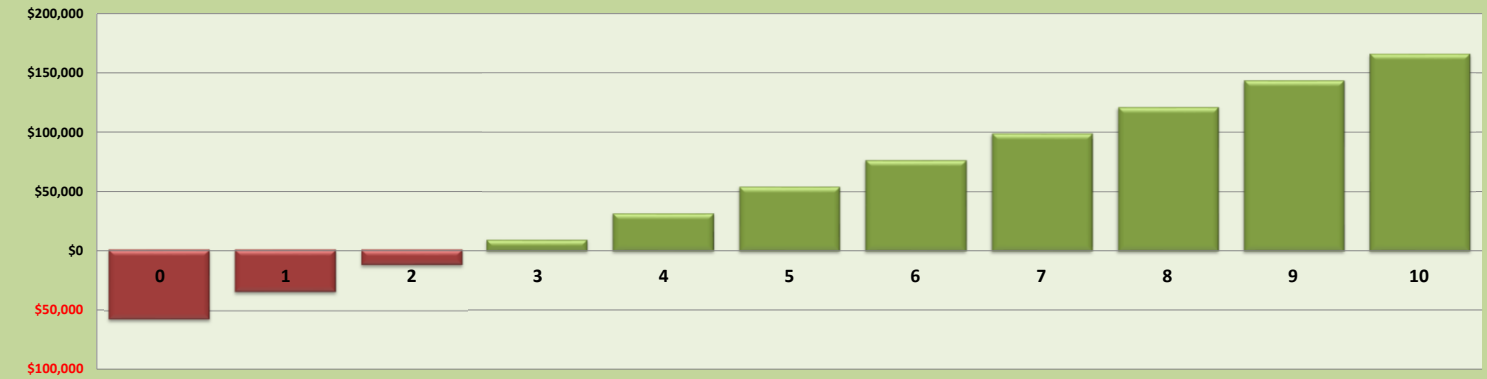
General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557 Safety Study	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investiment: 2027 (3 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 80.00%

APPENDIX I

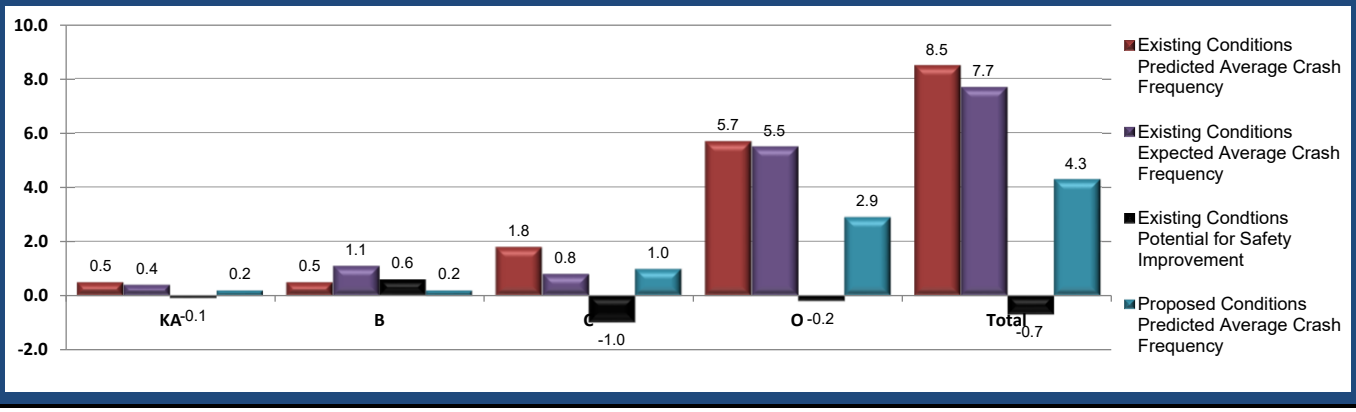
Economic Crash Analysis Tool Results - Medium Term Countermeasures

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{predicted}$ - Existing Conditions	0.4558	0.4558	1.8299	5.7146	8.4561
$N_{expected}$ - Existing Conditions	0.3760	1.0898	0.7929	5.4870	7.7457
$N_{potential\ for\ improvement}$ - Existing Conditions	-0.0798	**0.6340**	-1.0370	-0.2276	-0.7104
$N_{predicted}$ - Proposed Conditions	0.2279	0.2384	0.9707	2.9067	4.3437

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.248	0.248	0.9955	3.109	4.6005
US62: 24.915	CR 201	0.2078	0.2078	0.8344	2.6056	3.8556

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.1622	0.4703	0.3422	3.0406	4.0153
US62: 24.915	CR 201	0.2138	0.6195	0.4507	2.4464	3.7304

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	-0.0858	0.2223	-0.6533	-0.0684	-0.5852
US62: 24.915	CR 201	0.006	0.4117	-0.3837	-0.1592	-0.1252

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.112	0.1172	0.4772	1.4287	2.1351
US62: 24.915	CR 201	0.1159	0.1212	0.4935	1.478	2.2086

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown			0.0000	
Head On			0.0000	
Rear End			0.0000	
Backing			0.0000	
Sideswipe - Meeting			0.0000	
Sideswipe - Passing			0.0000	
Angle			0.0000	
Parked Vehicle			0.0000	
Pedestrian			0.0000	
Animal			0.0000	
Train			0.0000	
Pedalcycles			0.0000	
Other Non-Vehicle			0.0000	
Fixed Object			0.0000	
Other Object			0.0000	
Overturning			0.0000	
Other Non-Collision			0.0000	
Left Turn			0.0000	
Right Turn			0.0000	

Safety Benefit - Cost Analysis

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557 Safety Study	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Eastbound and Westbound Left Turn Lane on US 62; Northbound Right Turn Lane on SR 557	25	$2,047,410.00	$0.00	$0.00	$2,047,410.00	$2,047,410.00	-3.943	$2,502,540
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)					$0.00	$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)					$0.00	$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)					$0.00	$0.00		
CMF 1 - Implement systemic signing and marking improvements at stop-controlled intersections	10				$0.00	$0.00	-0.083	$32,494
CMF 2 - Replace standard stop sign with flashing LED stop sign	10				$0.00	$0.00	-0.087	$97,069
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
Totals		**$2,047,410.00**	**$0.00**	**$0.00**	**$2,047,410.00**	**$2,047,410.00**	**-4.112**	**$2,632,103**

Safety Benefit - Cost Analysis

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557 Safety Study	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Benefit - Cost Calculator

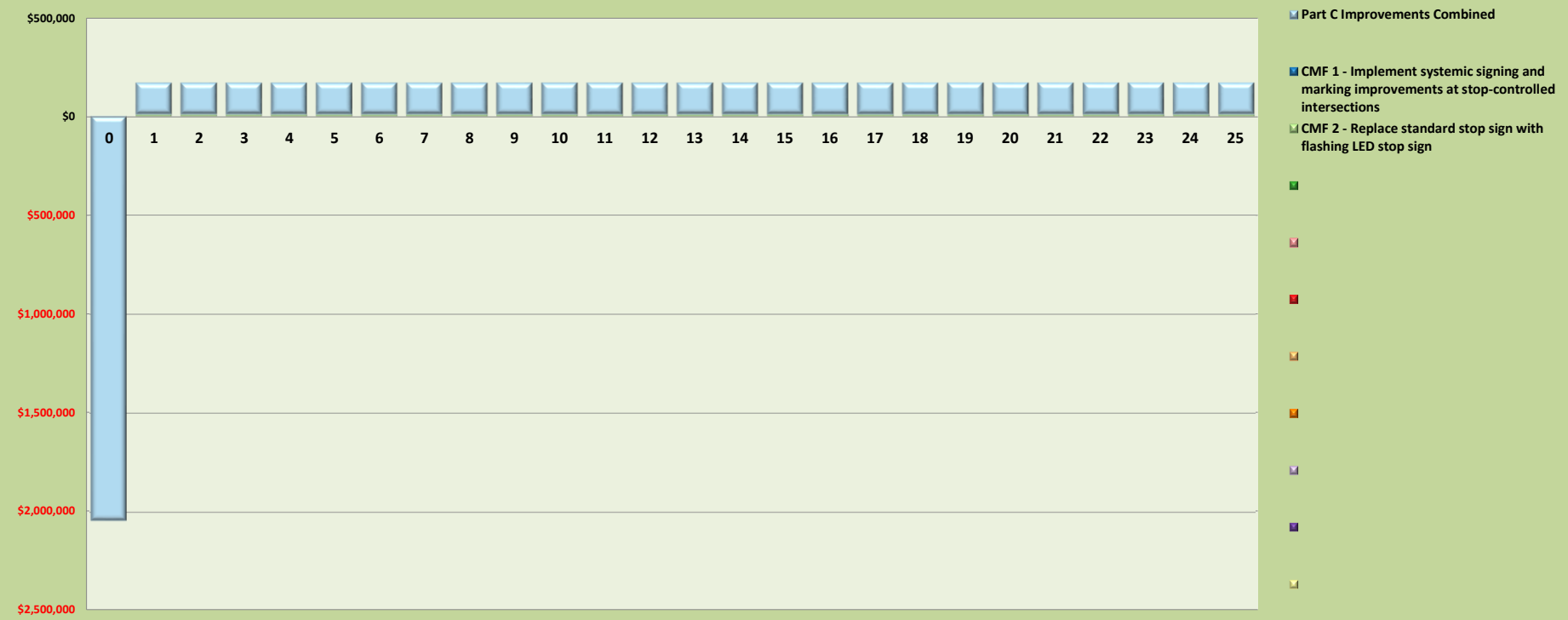
Net Present Value of Project	$2,047,410.00
Net Present Value of Safety Benefits	$2,632,102.62
Net Benefit	$584,692.62
Benefit / Cost Ratio	1.29

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.228
Number of Injury Crashes	-1.305
Number of Total Crashes	-4.112

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year

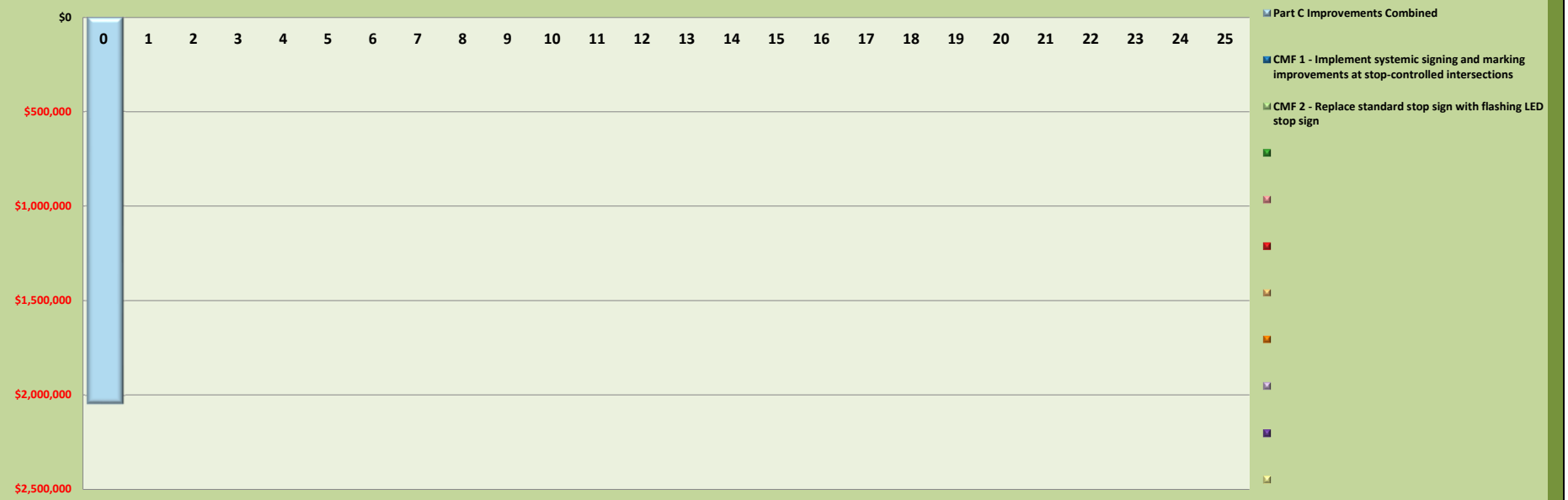


Safety Benefit - Cost Analysis

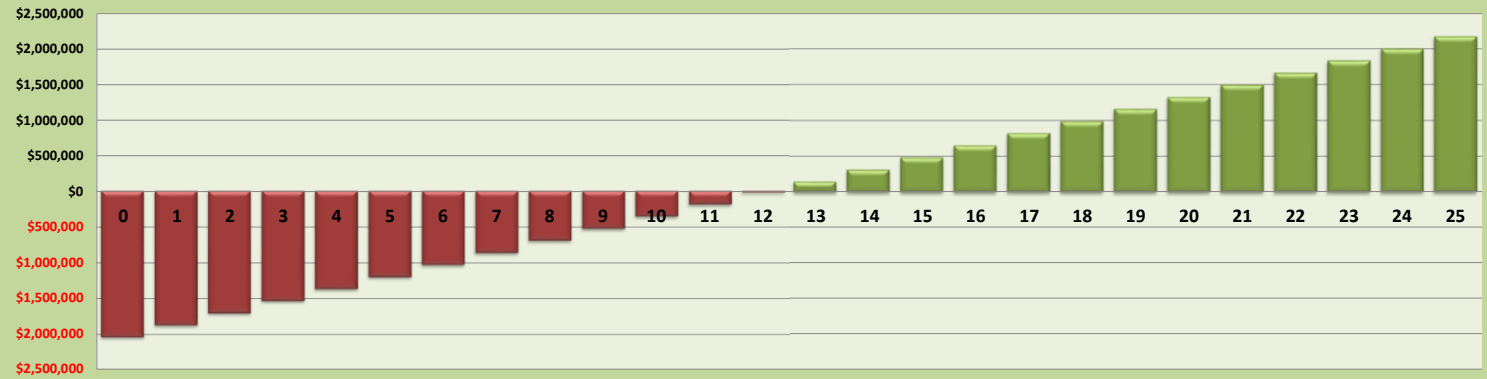
General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557 Safety Study	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2024
Agency/Company	Arcadis		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investiment: 2037 (13 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 52.00%

APPENDIX I

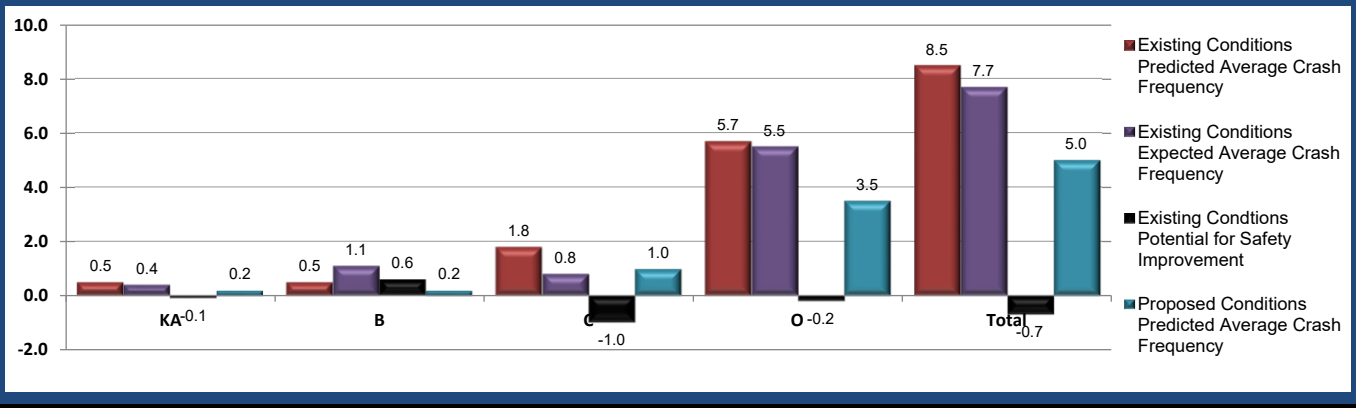
Economic Crash Analysis Tool Results - Long Term Countermeasure

Project Safety Performance Report

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2044
Agency/Company	Arcadis		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{predicted}$ - Existing Conditions	0.4558	0.4558	1.8299	5.7146	8.4561
$N_{expected}$ - Existing Conditions	0.3760	1.0898	0.7929	5.4870	7.7457
$N_{potential\ for\ improvement}$ - Existing Conditions	-0.0798	**0.6340**	-1.0370	-0.2276	-0.7104
$N_{predicted}$ - Proposed Conditions	0.2401	0.2401	0.9640	3.5083	4.9525

Project Safety Performance Report

General Information

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Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2044
Agency/Company	Arcadis		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.248	0.248	0.9955	3.109	4.6005
US62: 24.915	CR 201	0.2078	0.2078	0.8344	2.6056	3.8556

Project Safety Performance Report

General Information

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Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2044
Agency/Company	Arcadis		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.1622	0.4703	0.3422	3.0406	4.0153
US62: 24.915	CR 201	0.2138	0.6195	0.4507	2.4464	3.7304

Project Safety Performance Report

General Information

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Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2044
Agency/Company	Arcadis		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	-0.0858	0.2223	-0.6533	-0.0684	-0.5852
US62: 24.915	CR 201	0.006	0.4117	-0.3837	-0.1592	-0.1252

Project Safety Performance Report

General Information

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Analyst	Justin Maderia	Analysis Year	2044
Agency/Company	Arcadis		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 24.745	SR 557	0.0323	0.0323	0.1296	0.9027	1.0969
US62: 24.915	CR 201	0.2078	0.2078	0.8344	2.6056	3.8556

Project Safety Performance Report

General Information

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Agency/Company	Arcadis		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	1.4057	0.0320	-1.3737	
Head On	0.1004	0.0794	-0.0210	
Rear End	1.9138	2.3323	**0.4185**	
Backing	0.2678	0.2671	-0.0007	
Sideswipe - Meeting	0.3544	0.3617	**0.0073**	
Sideswipe - Passing	0.3326	0.3401	**0.0075**	
Angle	0.9711	1.0725	**0.1014**	
Parked Vehicle	0.2831	0.2944	**0.0113**	
Pedestrian	0.0493	0.0442	-0.0051	
Animal	0.0000	0.0000	0.0000	
Train	0.0006	0.0009	**0.0003**	
Pedalcycles	0.0311	0.0397	**0.0086**	
Other Non-Vehicle	0.0017	0.0013	-0.0004	
Fixed Object	2.1793	2.3221	**0.1428**	
Other Object	0.0838	0.0862	**0.0024**	
Overturning	0.1724	0.1451	-0.0273	
Other Non-Collision	0.1411	0.1417	**0.0006**	
Left Turn	0.1679	0.1850	**0.0171**	
Right Turn	0.0000	0.0000	0.0000	

Safety Benefit - Cost Analysis

General Information

Project Name	Task 4 - HOL-62-24.75, US 62 at SR 557 Safety Study	Contact Email	justin.maderia@arcadis.com
Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2044
Agency/Company	Arcadis		

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)					$0.00	$0.00	0.005	($3,536)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)					$0.00	$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)					$0.00	$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)					$0.00	$0.00		
CMF 1 - Convert intersection with minor-road stop control to modern roundabout (Rural)	25	$2,053,030.00	$0.00	$0.00	$2,053,030.00	$2,053,030.00	-3.509	$2,527,556
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
					$0.00	$0.00	0.000	$0
Totals		**$2,053,030.00**	**$0.00**	**$0.00**	**$2,053,030.00**	**$2,053,030.00**	**-3.504**	**$2,524,020**

Safety Benefit - Cost Analysis

General Information

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Project Description	Safety Study	Contact Phone	216-298-5239
Reference Number	PID #112364	Date Performed	4/14/2021
Analyst	Justin Maderia	Analysis Year	2044
Agency/Company	Arcadis		

Benefit - Cost Calculator

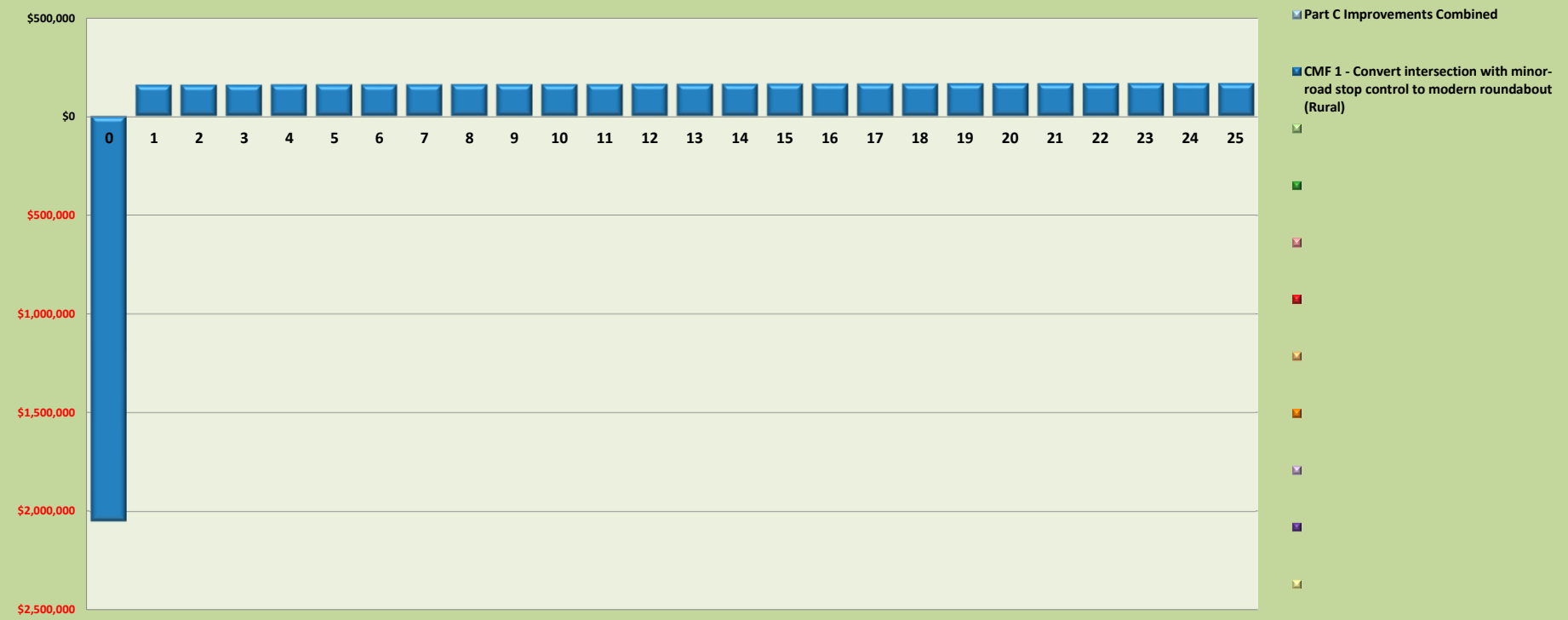
Net Present Value of Project	$2,053,030.00
Net Present Value of Safety Benefits	$2,524,020.19
Net Benefit	$470,990.19
Benefit / Cost Ratio	1.23

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.216
Number of Injury Crashes	-1.297
Number of Total Crashes	-3.504

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



Safety Benefit - Cost Analysis

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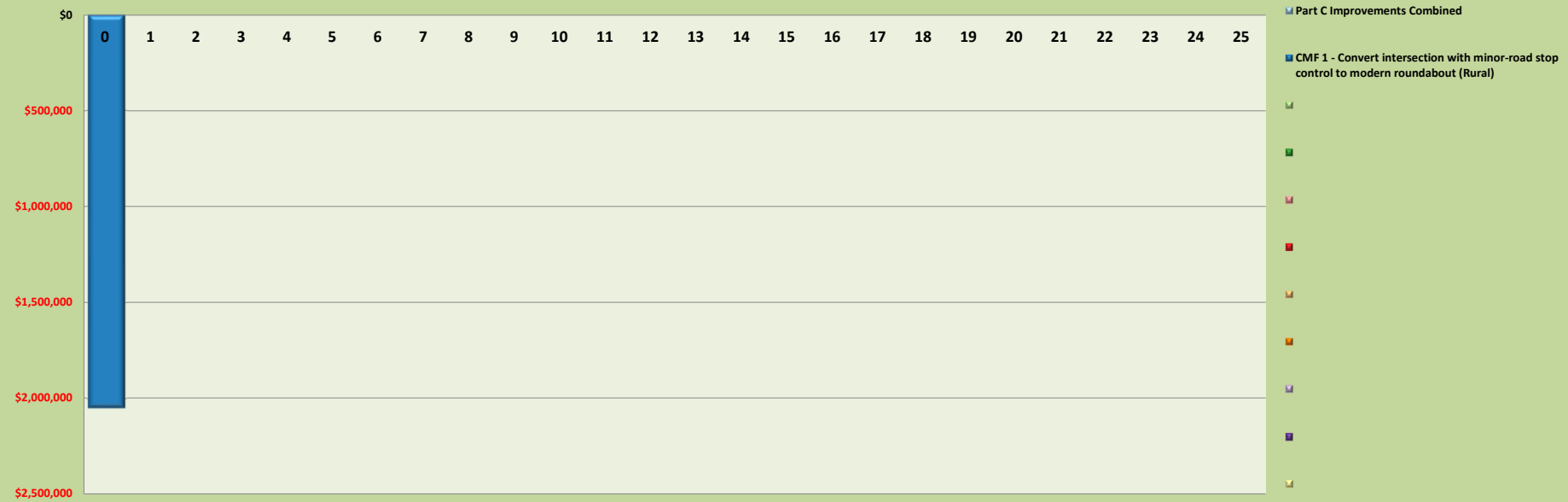
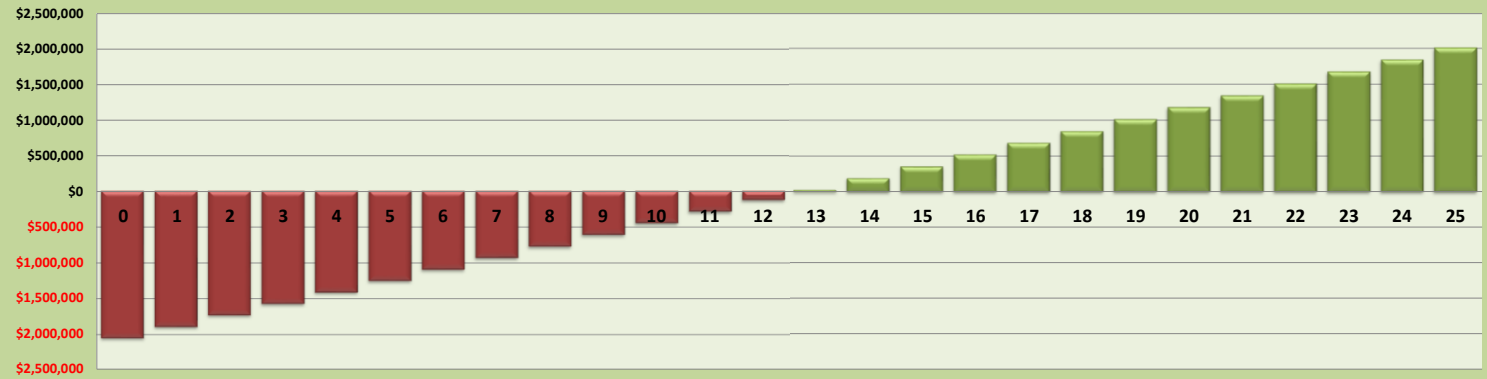
Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investiment: 2057 (13 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 52.00%