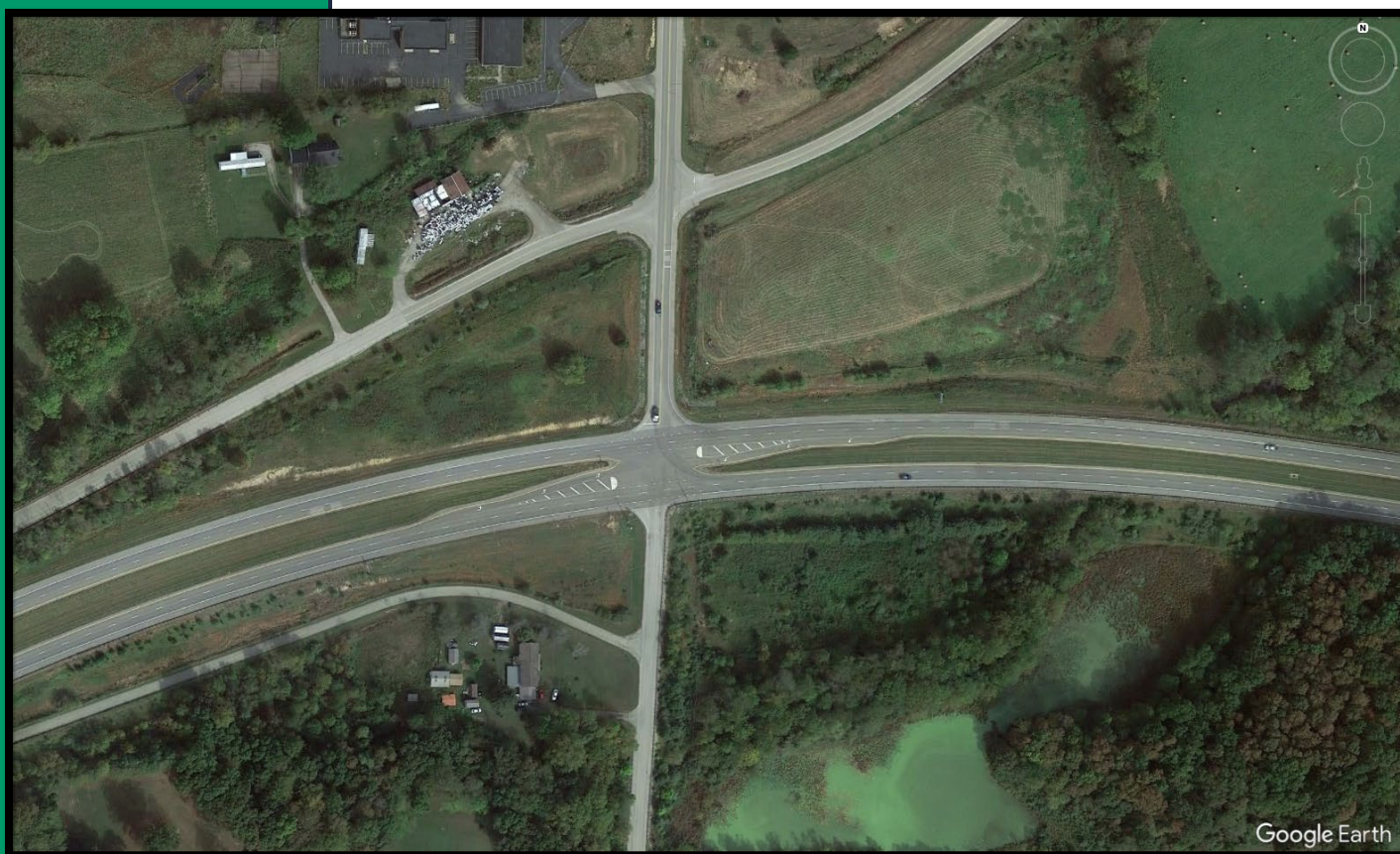




PIK-32-18.56

PIK-32 & SR 220 Safety Study

August 31, 2023



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I. Executive Summary

A. Purpose and Need

The purpose of this study is to analyze existing conditions and identify potential countermeasures to reduce crash frequency and severity at the intersection of SR 32, SR 220, and Schuster Rd. The study limits include the intersection of SR 32, SR 220, Schuster Rd and approximately 1000 feet on each intersection approach.

ODOT District 9 Safety maintains a list of 4-lane highway at grade intersections and ranks each location based on crash criteria and intersection characteristics. As of August 2023, this intersection is currently ranked second on the list of locations without a project constructed or in design. Increased attention has been given to this intersection due to public complaints due to crashes.

B. Overview of Safety Issues

Crash data was pulled from 2020 through 2022 from ODOT's crash database inside TIMS. There were 11 crashes within that 3-year period.

Of the 11 crashes, 6 crashes (54.5%) resulted in injuries. All 6 injury crashes were minor injury crashes. 14 of the 17 crashes (52.9%) were angle crashes. There is a significant trend of southbound traffic on SR 220 stopping at the stop sign and failing to yield to oncoming westbound traffic on SR 32. It is believed that the curvature, horizontal and vertical, in the roadway is causing issues on speed judgement. Sight distance issues involving eastbound traffic on SR 32 may be causing SR 220 drivers to focus too heavily on that movement.

C. Recommended Countermeasures

Based on the crash report investigation resulting in an angle/left turn crash pattern involving southbound SR 220 traffic being identified, an RCUT is being proposed at this intersection. The RCUT is expected to mitigate the primary crash pattern identified at the intersection. The estimated cost of the roundabout is \$2,234,658. ECAT analysis shows a benefit-cost ratio of 0.22. It is believed that the ECAT Tool is underrepresenting the benefits of the RCUT alternative.

II. Purpose and Need

The purpose of this study is to analyze existing conditions and identify potential countermeasures to reduce crash frequency and severity at the intersection of SR 32, SR 220, and Schuster Rd. The study limits include the intersection of SR 32, SR 220, Schuster Rd and approximately 1000 feet on each intersection approach.

ODOT District 9 Safety maintains a list of 4-lane highway at grade intersections and ranks each location based on crash criteria and intersection characteristics. As of August 2023, this intersection is currently ranked second on the list of locations without a project constructed or in design. Increased attention has been given to this intersection due to public complaints due to crashes. A project location map is provided in **Figure 1**. A study area aerial is provided in **Figure 2**.



Figure 1: Project Location Map (Pike County outlined in red)

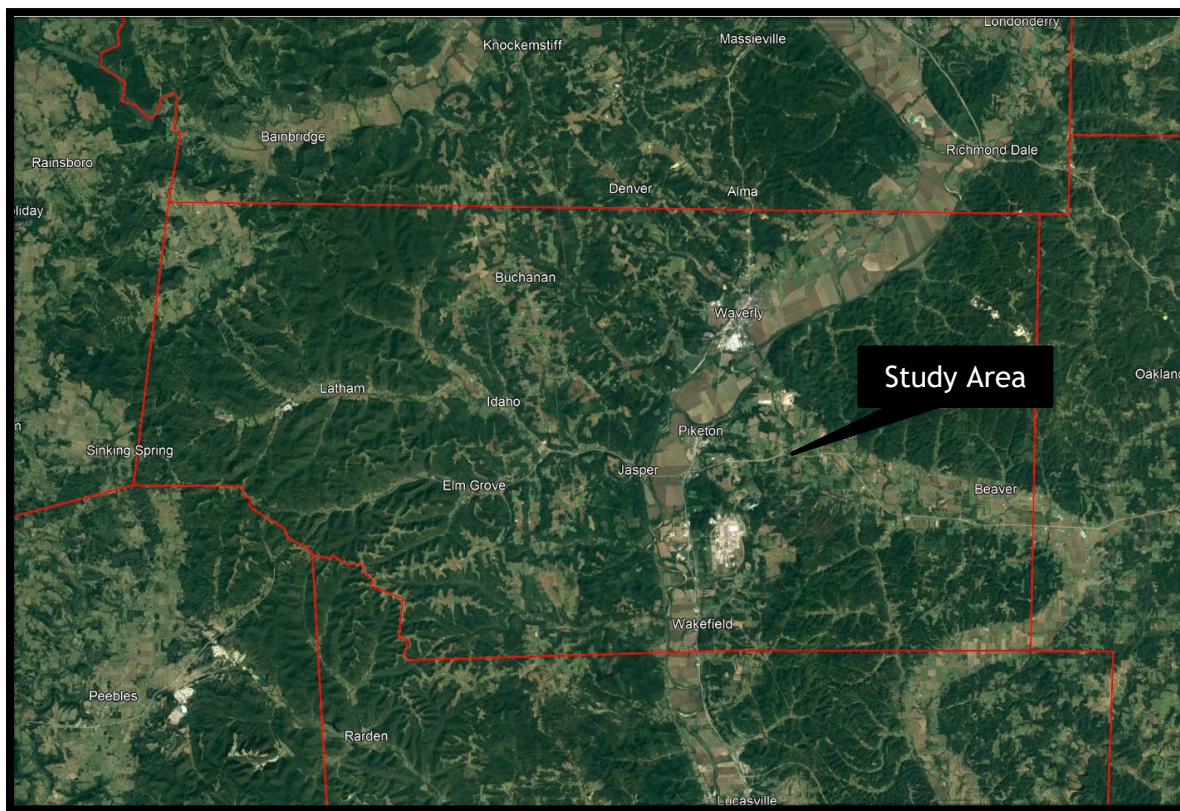


Figure 2: Study Area Aerial





III. Existing Conditions

A. Land Use

The study area is approximately 3 miles east of the village of Piketon on SR 32. The surrounding area of the study area includes undeveloped wooded and grassy space and residential housing. Two culverts exist in the study area. Culvert ID 91651197 is a 284' long, 36" span culvert with a current appraisal rating of 8. The second culvert, Culvert ID 91731639 is a 90', 18" span culvert with a current appraisal rating of 7.

B. Roadway Conditions

SR 32 acts as an east-west connector throughout Ohio with an AADT of as high as 10,324 in locations along this corridor. SR 32 is classified as a Principle Arterial Other and has a posted speed limit of 60 MPH. This segment of SR 32 is a four-lane, divided, rural highway with 12-foot shoulders. Rumble strips are present at the outside edge lines in both directions.

SR 220 is classified as a Major Collector. The roadway is a two-lane rural roadway with an 8-foot paved shoulder. Centerline and edge lines exist on the roadway. SR 220 is stop controlled. SR 220 serves a connector between Waverly and SR 32.

Schuster Rd is designated as CR-81 and is classified as a Minor Collector. The roadway is a two-lane rural roadway with a 1-foot paved shoulder. Centerline and edge lines do not exist on the roadway. Schuster Rd is stop controlled.

C. Intersection Conditions

The intersection of SR 32, SR 220, and Schuster Rd is a 4-leg, divided highway, rural intersection. SR 220's approach is a single lane, stop-controlled approach. Schuster Rd exhibits the same stop control as SR 220. SR 32 has no stop control. Dedicated left turn lanes exist on SR 32 in both directions. The intersection connects at the crest of both a vertical and horizontal curve on SR 32.

D. Data Collection

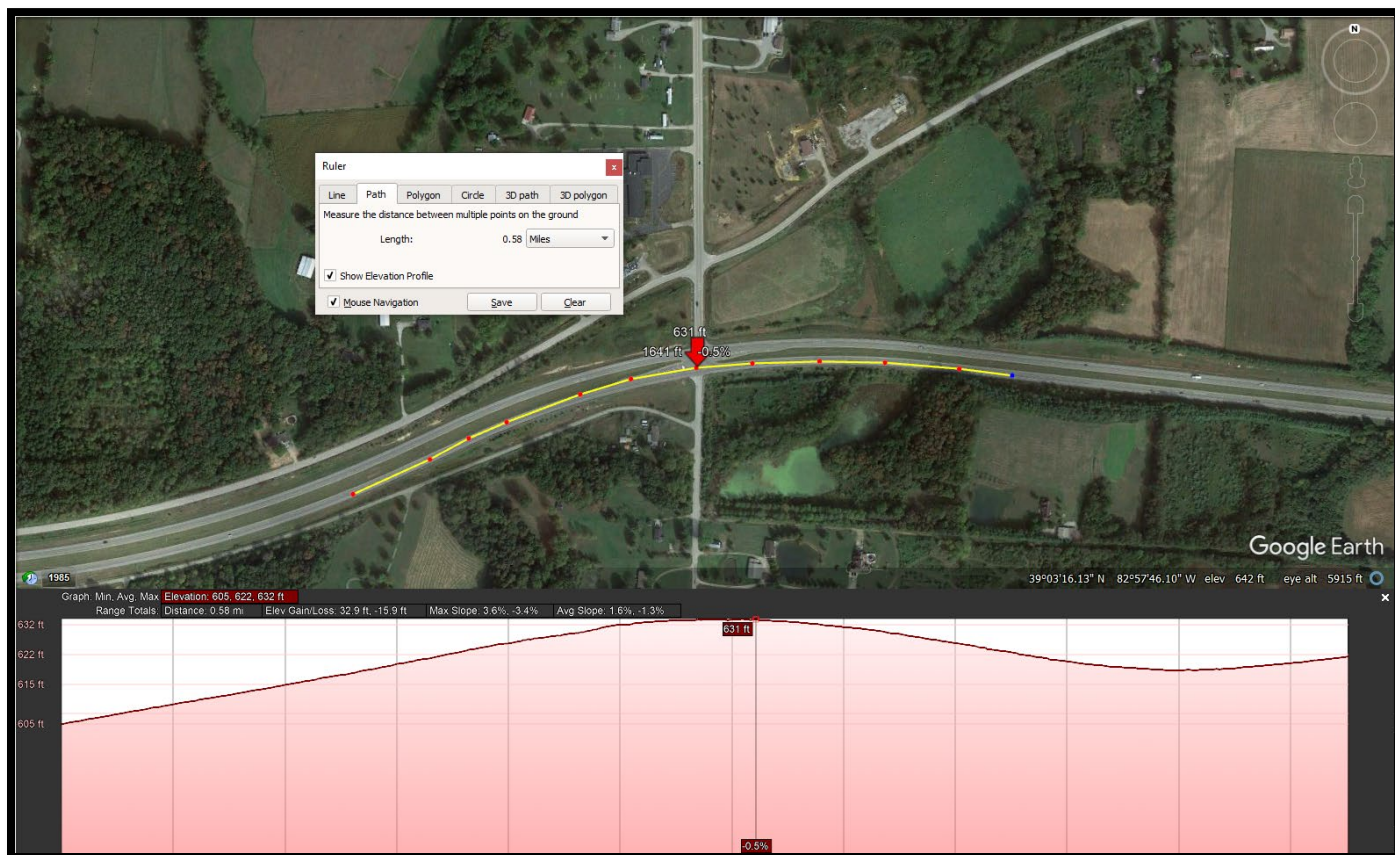
Existing data for the routes and the intersection was obtained through TIMS.

IV. Existing Conditions Analysis

Brief studies have been conducted at the intersection for nearly 20 years. This study was conducted as a result of a new public complaint regarding the intersection. Crash data shows a trend of left turn/angle crashes involving traffic on SR 220 and SR 32 westbound traffic. It is believed that the curvature, horizontal and vertical, in the roadway is causing issues on speed judgement. Sight distance issues involving eastbound traffic on SR 32 may be causing SR 220 divers to focus too heavily on that movement. **Figure 3** the elevation profile of the SR 32 along the study area.



Figure 3: SR 32 Elevation Profile



V. Crash Data

Crash data was pulled from 2020 through 2022 from ODOT's crash database inside TIMS. There were 11 crashes within that 3-year period.

Of the 11 crashes, 6 crashes (54.5%) resulted in injuries. All 6 injury crashes were minor injury crashes. 14 of the 17 crashes (52.9%) were angle crashes. There is a significant trend of southbound traffic on SR 220 stopping at the stop sign and failing to yield to oncoming westbound traffic on SR 32. Table 1 shows a breakdown of crash statistics over the 5-year period.



Table 1: Crash Statistics

| TRAFFIC_CRASH_YEAR | Number | % |
|--------------------|-----------|---------------|
| 2020 | 7 | 63.6% |
| 2022 | 4 | 36.4% |
| Grand Total | 11 | 100.0% |

| TYPE_OF_CRASH | Number | % |
|--------------------|-----------|---------------|
| Angle | 7 | 63.6% |
| Rear End | 2 | 18.2% |
| Right Turn | 1 | 9.1% |
| Left Turn | 1 | 9.1% |
| Grand Total | 11 | 100.0% |

| CRASH_SEVERITY | Number | % |
|-----------------------|-----------|---------------|
| Injury Crash | 6 | 54.5% |
| Property Damage Crash | 5 | 45.5% |
| Grand Total | 11 | 100.0% |

| HOUR_OF_DAY | Number | % |
|--------------------|-----------|---------------|
| 6 | 1 | 9.1% |
| 10 | 1 | 9.1% |
| 12 | 1 | 9.1% |
| 14 | 1 | 9.1% |
| 15 | 1 | 9.1% |
| 16 | 3 | 27.3% |
| 17 | 2 | 18.2% |
| 19 | 1 | 9.1% |
| Grand Total | 11 | 100.0% |

| CONTRIBUTING_FACTOR1 | Number | % |
|----------------------------|-----------|---------------|
| Failure to Yield | 7 | 63.6% |
| Following Too Closely/ACDA | 2 | 18.2% |
| None | 1 | 9.1% |
| Unsafe Speed | 1 | 9.1% |
| Grand Total | 11 | 100.0% |

VI. Recommended Countermeasures

A. Recommended Alternative

Based on the crash report investigation resulting in an 73% left turn/angle crash pattern being identified, an RCUT proposed at this intersection. RCUTs have been shown to reduce the serious crash types involving median crossing movements for side street traffic. Given the serious crash types observed at the intersection, it is believed that an RCUT is the best solution to the crash pattern observed.

A traditional 4-lane, divided highway intersection has 42 total conflict points, including 24 crossing points, 10 merge points, and 8 diverge points. The RCUT configuration proposed reduces those conflict points down to 24. Those 24 conflict points include 4 crossing points, 10 merge points, and 10 diverge points. **Figure 4** shows the proposed layout of the RCUT configuration. **Figure 5** shows the conflict points of a traditional 4-lane, divided highway intersection. **Figure 6** shows the conflict points of an RCUT configuration.



Figure 4: Proposed RCUT Layout

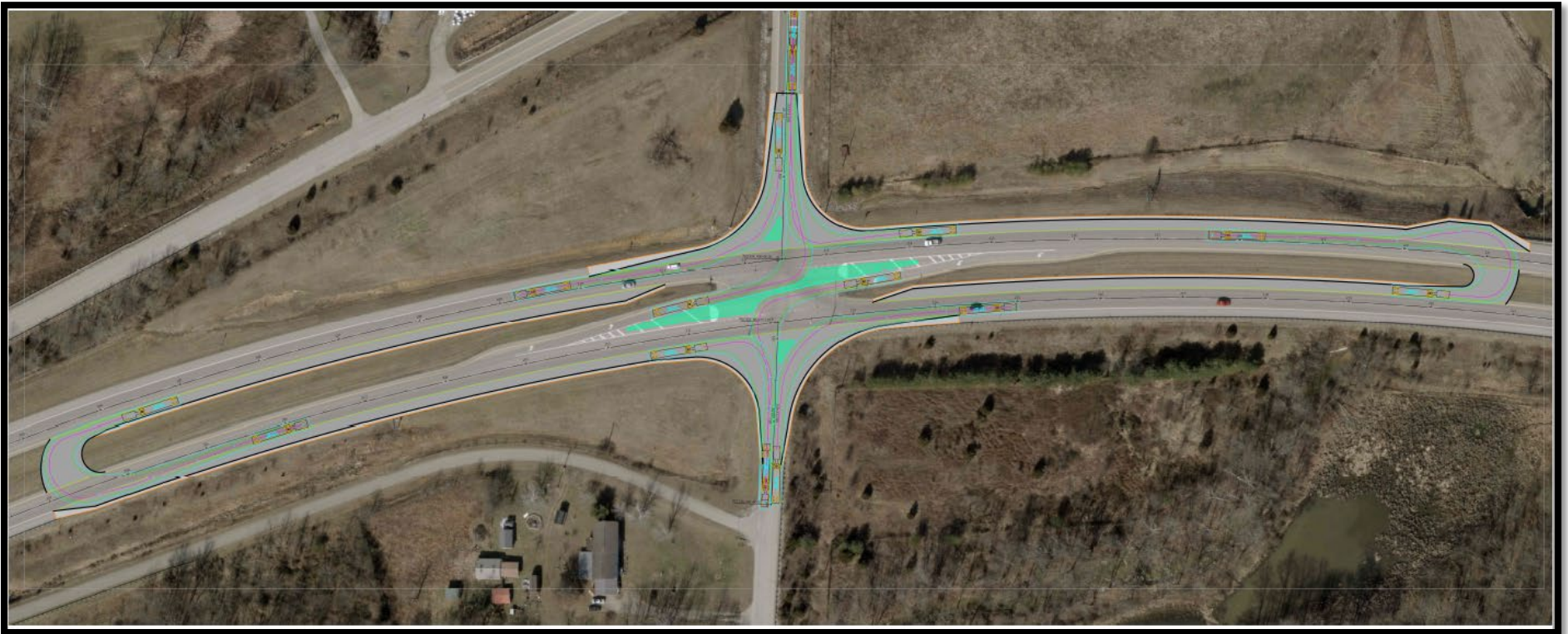




Figure 5: Traditional 4-Lane, Divided Highway Conflict Points

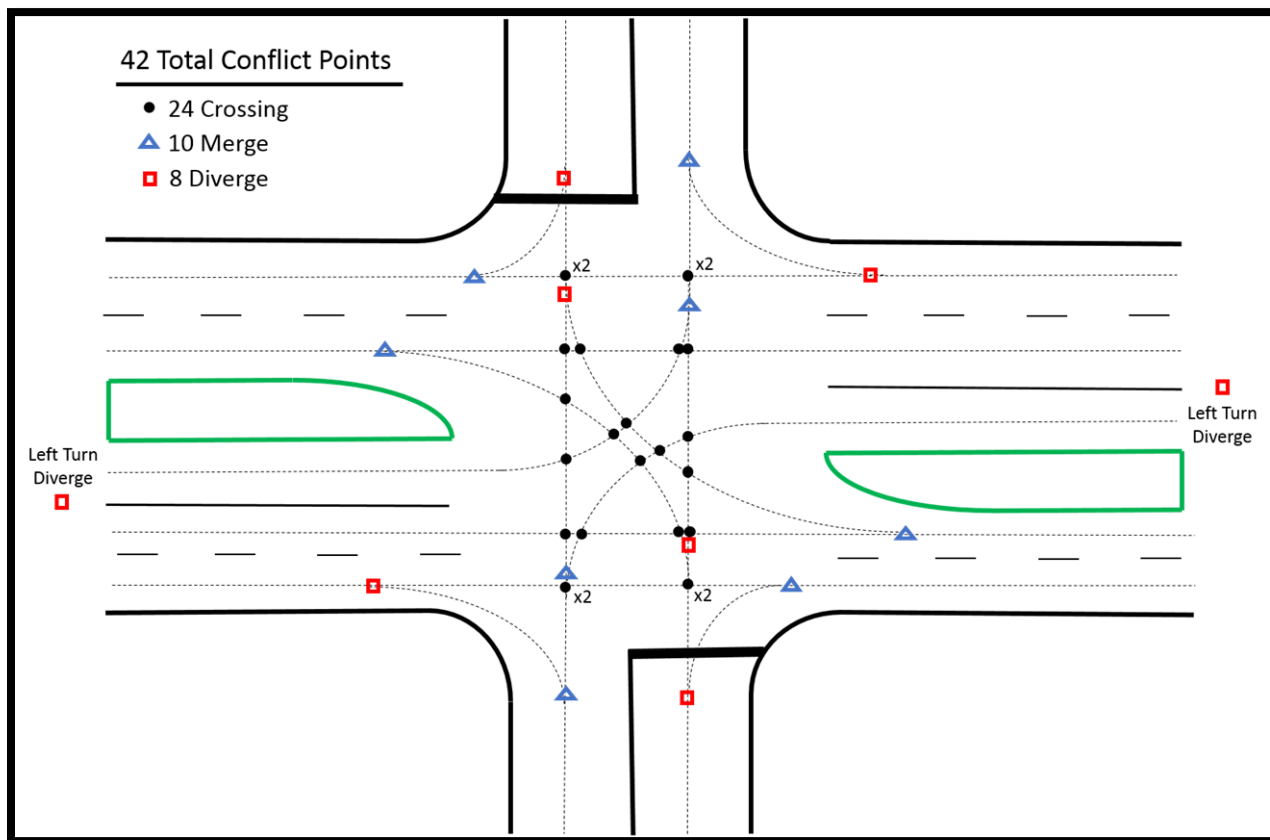
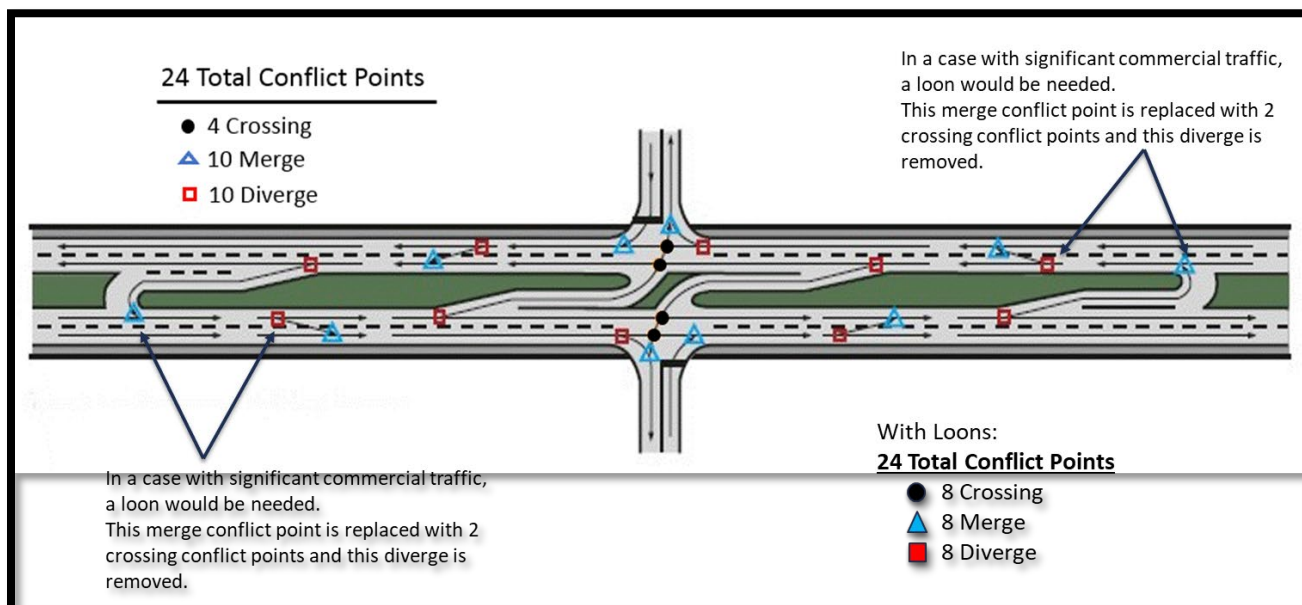


Figure 6: RCUT Conflict Points





The estimated cost of the RCUT is \$2,234,658. ECAT analysis shows a benefit-cost ratio of 0.22. It is believed that ECAT analysis is underrepresenting the safety benefits of the RCUT. Although the benefit-cost ratio from ECAT is 0.22, it is still believed the RCUT is the best alternative to address the crash types observed.

B. Alternatives Considered

Given the crash trends and sight distance issues involving eastbound SR 32 traffic, a Turbo Lane was also considered. It is believed that the RCUT and Turbo Lane configurations would both address the crash trends observed at the intersection. Both RCUT and Turbo Lane configurations exist on this corridor of SR 32 within 2 miles of the intersection, providing two alternatives that drivers in the area would already be familiar with. However, after investigation traffic shifts for the Turbo Lane configuration, it was discovered that traffic on Schuster Rd, that would have their access restricted, would be detoured up to 4.5 miles. For this reason, the Turbo Lane was ruled out. **Figure 7** shows the proposed layout of the Turbo Lane.



Figure 7: Turbo Lane Layout

