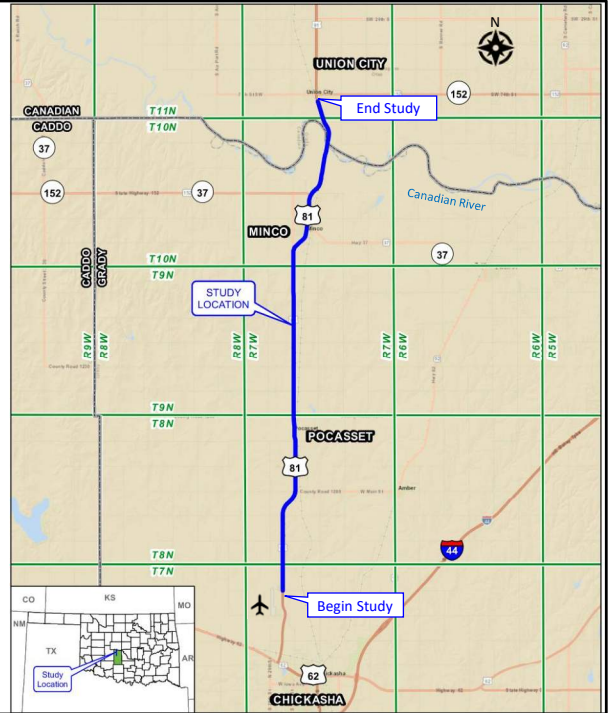




Hello and thank you for viewing the Stakeholder Presentation for the US-81 Corridor Study in Grady County.

## Purpose of the Presentation

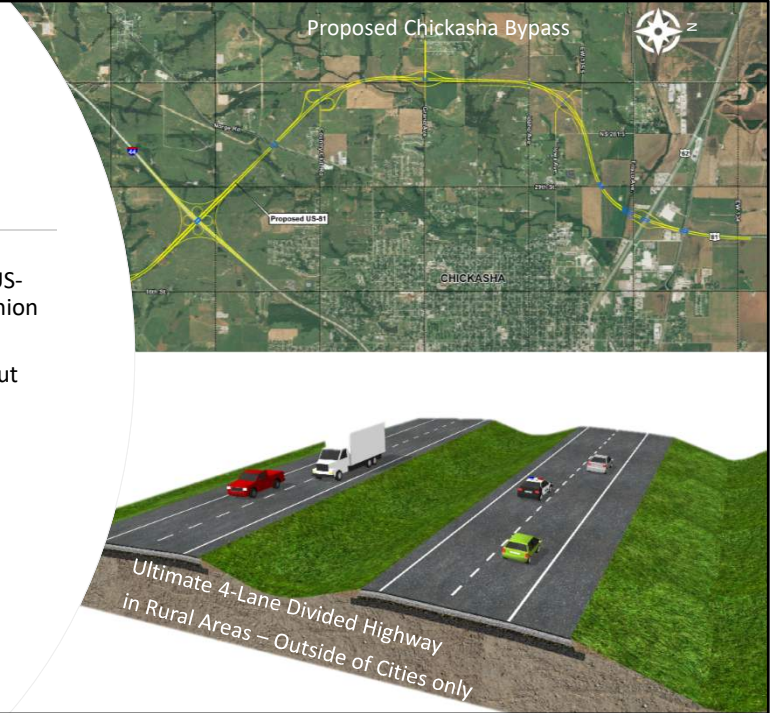
- To present the findings of the US-81 Corridor Study and obtain Stakeholder input



The purpose of this presentation is to present the findings of the US-81 corridor study, and obtain Stakeholder input. This map shows the extents of the study, from north of Chickasha to just south of Union City in Grady County.

## Corridor History

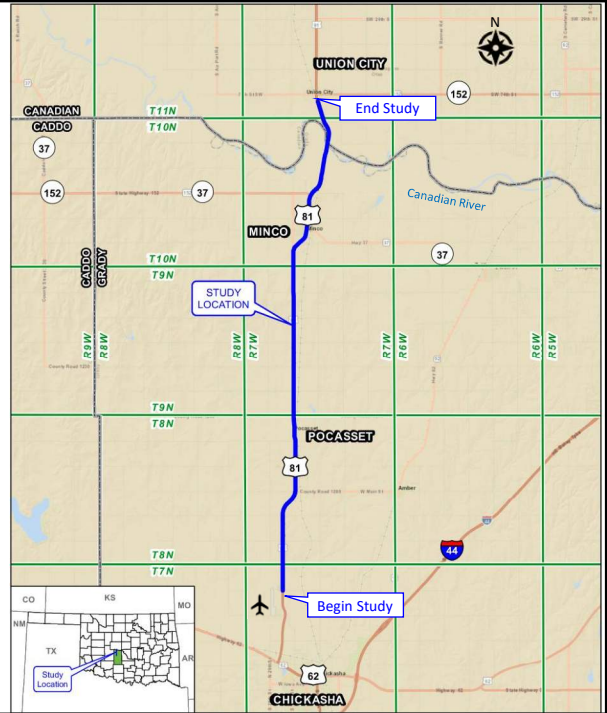
- In 2007 ODOT completed a study of the US-81 corridor from south of Chickasha to Union City
- Stakeholders and the public provided input
- A bypass at Chickasha was recommended
- 2007 Study recommended widening the highway to a 4-lane divided roadway (outside of cities)



To begin, we will outline a brief history of the corridor. In 2007 ODOT completed a study of the US-81 corridor covering an area from south of Chickasha extending north to Union City. At that time, ODOT sought input from stakeholders and the general public to help understand local concerns. The 2007 study had two primary recommendations: first a realignment of US-81 around Chickasha (also called a bypass), as shown in the top picture on the slide. That project is currently in design and is anticipated to begin construction in 2023. Second, the 2007 study recommended that the remainder of US-81 (outside of towns and cities) be widened to a 4-lane divided highway. This ultimate widening would be similar to what is shown in bottom picture on the slide.

## Purpose of the Current Study

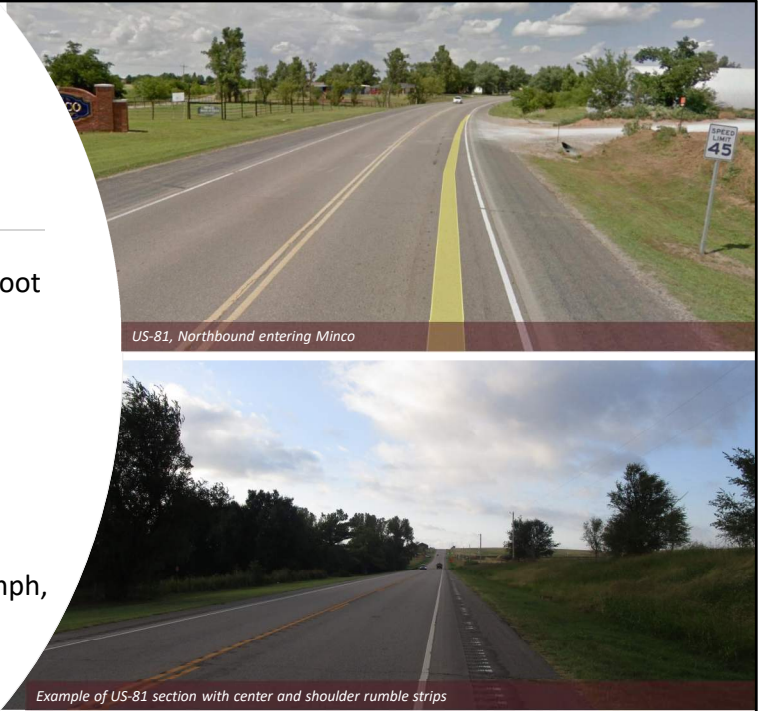
- Identify interim projects to improve operations and safety until the ultimate 4-lane divided highway can be built
- Widening of US-81 is not currently programmed in ODOT's 8-Year Work Plan due to budget constraints
- Current traffic volumes are not yet at a level where a 4-lane highway is needed



The purpose of this current study is to identify smaller, interim projects that would improve operations and safety on US-81 until the ultimate 4-lane divided highway can be built. Widening of US-81 is not currently programmed in ODOT's 8-year work plan due to budgetary constraints. And currently, traffic volumes are not yet at levels which demand a 4-lane roadway.

## Existing Conditions Roadway

- Primarily a 2-Lane roadway with 8-foot shoulders
- Rumble strips in various locations (both shoulder and centerline)
- All curves meet standards for rehabilitation except one:
  - Sag curve south of CR 1290
- Speed limit is 65 mph except in Pocasset and Minco – drops to 35 mph, 25 mph in school zone

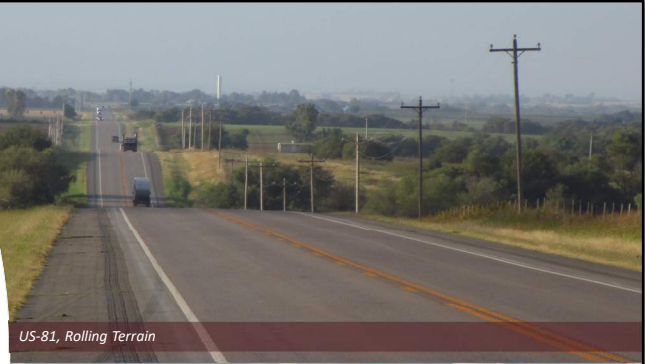


To begin our study we first evaluated the existing conditions. We are going to talk about the existing roadway, traffic, and collision history. Currently, US-81 is primarily a 2-lane roadway with 8-foot shoulders. There are rumble strips in various locations within the corridor, some on the shoulder and some in the center of the highway. The existing horizontal and vertical curves were evaluated against criteria for highways that are being rehabilitated. All curves, except for one, met or exceeded these criteria. The deficient curve is a vertical sag curve (or dip in the roadway) located south of County Road 1290. However, as will be discussed later, based on evaluation of collision histories, this curve does not appear to have an adverse effect on traffic. Within the corridor, the current speed limit on US-81 is generally 65 miles per hour (mph) except in Pocasset and Minco, where it drops to 35 mph, or 25 mph in school zones.



## Existing Conditions Roadway

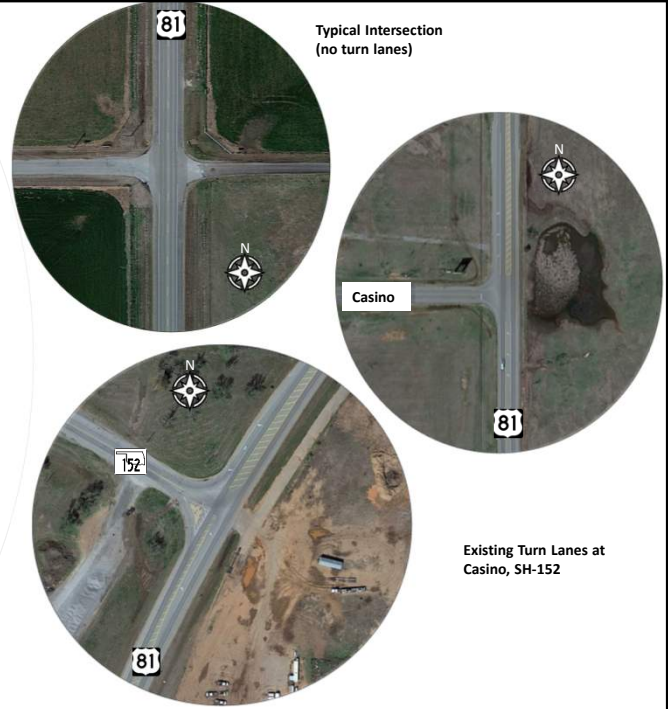
- Existing Roadway
  - Rolling Terrain
  - Existing passing lane near CR 1200 ("Red Hill")
  - Other passing opportunities are intermittent
- Existing Intersections
  - Between towns, generally no turn lanes
  - Existing turn lanes at Casino entrance and SH-152



The existing US-81 roadway has rolling terrain, meaning there are many hills and dips on the alignment. While generally the roadway is 2 lanes, there is one existing passing lane near County Road 1200, also known as Red Hill. Other passing opportunities are intermittent based on the ability to see oncoming traffic.

## Existing Conditions Intersections

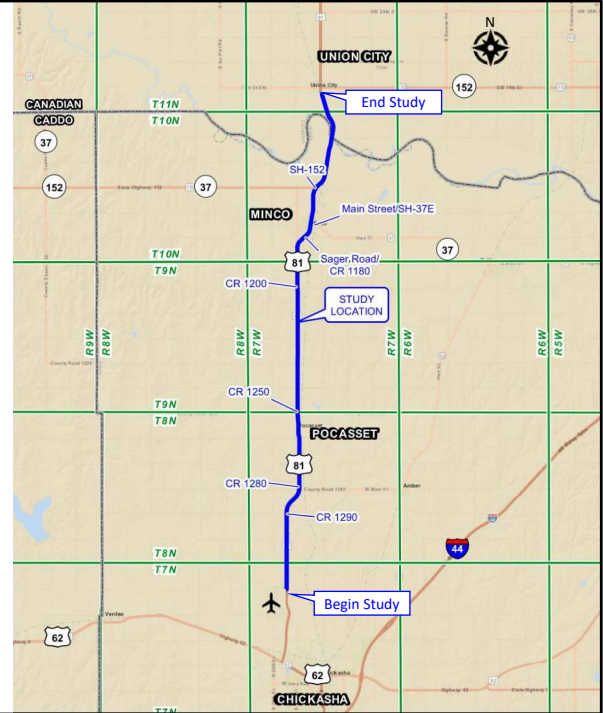
- Existing Roadway
  - Rolling Terrain
  - Existing passing lane near CR 1200 ("Red Hill")
  - Other passing opportunities are intermittent
- Existing Intersections
  - Between towns, generally no turn lanes
  - Existing turn lanes at Casino entrance and SH-152



Moving to intersections, generally, turn lanes do not exist at intersecting roads along the corridor – most intersections look like the top picture, where turning traffic must slow down or stop in the through lane and wait for a gap. Turn lanes are provided at the entrance to the Salt Creek Casino and at the US-81 intersection at State Highway 152 near the north end of the corridor.

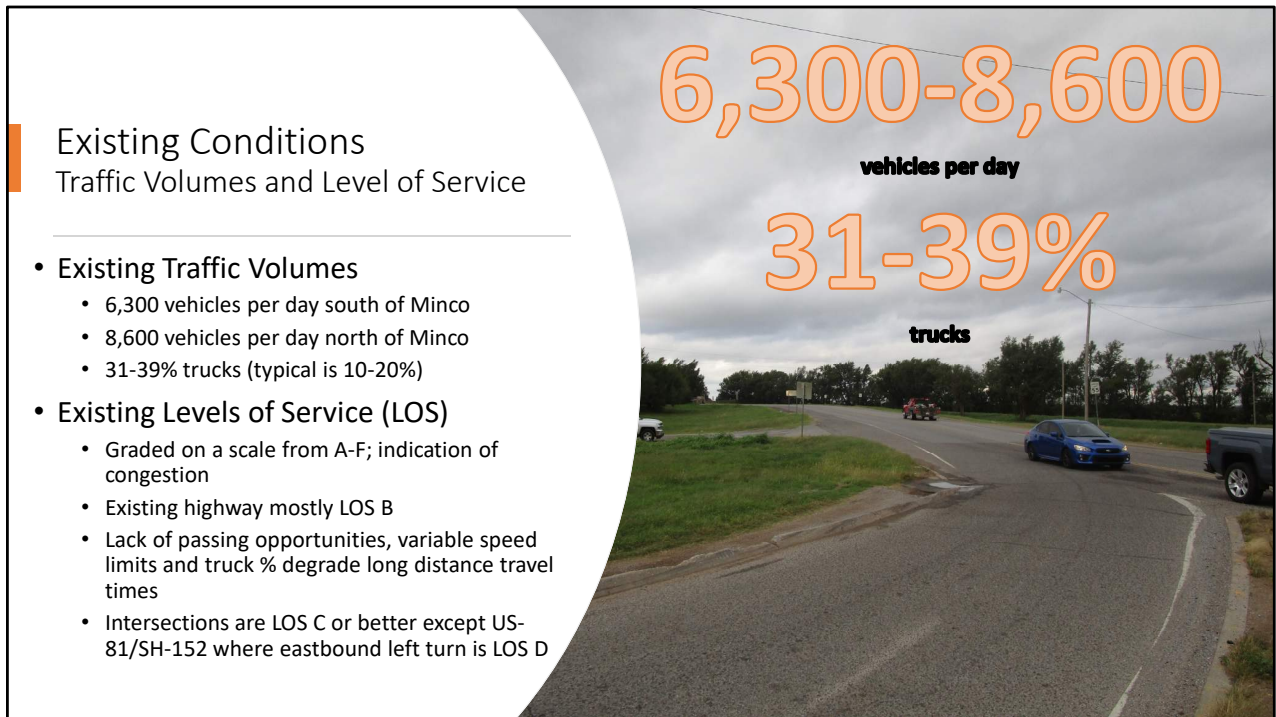
## Existing Conditions Traffic Counts

- Compiled traffic volumes through ODOT count stations and automatic vehicle classification system
- Collected 24-hour turning movement counts at seven existing intersections in Sept. 2019
  - CR 1290
  - CR 1280
  - CR 1250
  - CR 1200
  - Sager Road/CR 1180
  - Main Street/SH-37E
  - SH-152



To obtain an understanding of the existing traffic, ODOT compiled existing traffic volumes using existing data. In addition, ODOT collected turning movement counts at seven intersections in the study area in September of 2019. The locations of these counts are identified on the map.

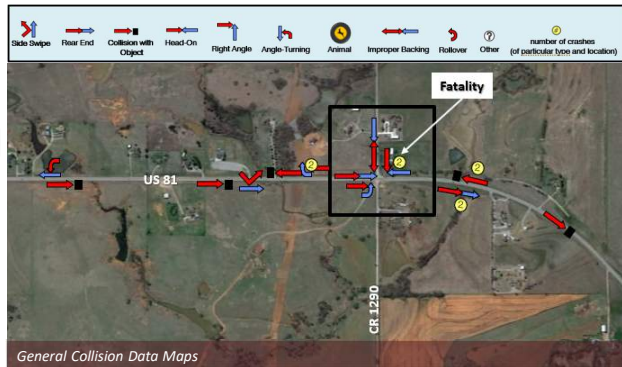




Based on the data collected, existing traffic volumes on US-81 range from approximately 6,300 vehicles per day south of Minco up to 8,600 vehicles per day north of Minco. Trucks comprise 31-39% of the total volume which is considered a high truck composition - typical truck volumes on rural highways are closer to 10-20%. These traffic volumes factor into the operation of the roadway, which can be measured using Level of Service (LOS). Level of Service is rated on a scale from A-F, similar to a report card. A Level of Service D or greater is considered acceptable, with a LOS C or better desired for rural highway segments. Today, the US-81 mainline roadway operates mostly at Level of Service B. However, the lack of passing opportunities, variable speeds, and high truck percentage all reduce travel times over long distances. At the study intersections, all turning movements have Level of Service C or better, except at SH-152, where some vehicles experience more delay resulting in Level of Service D.

## Existing Conditions Collision History

- 176 collisions between 2008-2017 (most recent ODOT data)
- Overall collision rate for corridor is less than the statewide average
- Fatality rate is higher than the statewide average
  - 9 fatal collisions in the last 10 years
  - Majority involved large trucks
- Collisions tend to be related to
  - Short passing opportunities
  - Descending speeds entering towns
  - Areas with driveways
  - Major intersections



Another important part of this study was an examination of ODOT’s collision data. The data shows there have been 176 collisions within the study portion of US-81 in the last ten years. Overall, the collision rate in the corridor is **less** than the statewide average for similar type roadways. However, the fatality rate on US-81 is **higher** than the statewide average. There have been 9 fatal collisions in the last ten years, most of which involved large trucks. The collision locations and types were mapped and show that collisions tend to occur where there are limited passing opportunities, where speed limits are reduced entering towns, in areas with driveways, and at major intersections. These maps can be viewed in more detail in the “Exhibits” section of the website.

## Needs Assessment

- **Future Traffic Volumes (2030)**
  - Range from 7,300 (north of Pocasset) to 12,000 (at SH-152) vehicles per day
  - Capacity constraints for two-lane road approximately 10,000 to 15,000 vehicles per day
  - Assumes Chickasha Bypass is complete
  - Reflects recent growth trends (3.5% annual)
- **Future Level of Service (2030)**
  - US-81 mainline will decline to LOS C
  - 50-60% of travel time will be spent following slower vehicles
  - Many intersections will decline to LOS C
  - At SH-152, west leg will be LOS F

# 7,300-12,000

vehicles per day (2030)



Next, we are going to discuss how these existing conditions contribute to the need for improvements. To understand how the roadway may operate over time, ODOT developed estimates of future traffic volumes in the year 2030. This forecast yielded a range of traffic volumes on the corridor from 7,300 vehicles per day north of Pocasset to 12,000 vehicles per day near the SH-152 intersection. Even with this growth, the Level of Service on the highway is still expected to be at an acceptable Level of Service C. However, up to 60% of the anticipated travel time will be spent following slower vehicles, delaying long distance trips. At the intersection with SH-152, the stop-sign controlled eastbound to northbound turning movement will witness LOS F (or failing) conditions.

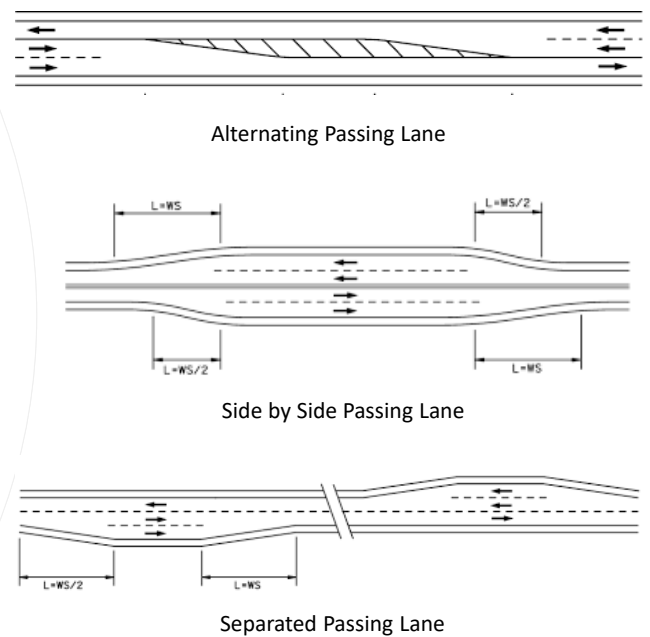
## Needs Assessment

- **Traffic Flow**
  - Limited passing opportunities create driver frustration and lead to unsafe passing attempts
  - Speed limits drop from 65 mph to 35 mph in Minco and Pocasset
- **Intersections**
  - Lack of turn lanes
  - Lack of lighting
  - Some limited sight distance
  - Increased delay and conflicts at SH-152
- **Access Management**
  - Many driveways and intersections in Minco
- **Warning Devices**
  - Incomplete rumble strip application in corridor
  - Curves lack warning signage
  - Limited warning devices

Building from both the analysis of the existing conditions and projected traffic demands, the improvement needs for the US-81 corridor were categorized into four (4) topics as seen here. As mentioned, long distance travel time will be hindered by the growing traffic volumes and lack of passing opportunities on the current two-lane route. In addition, the corridor has a decreased speed limit as it passes through the towns of Minco and Pocasset. Most intersections lack turn lanes, don't have lighting, some have limited sight distance, and the intersection at SH-152 is expected to experience increased delay. Within the town of Minco, there are many driveways and intersections within a short segment, which increases collision potential from turning traffic. Finally, most of the corridor lacks warning devices such as rumble strips, warning signage, and intersection warning devices. Next, we are going to discuss potential improvements in each of these areas.

## Considerations: Traffic Flow

- Passing Lanes
  - Provides an additional lane to allow passing
    - Alternating
    - Side by Side
    - Separated
  - Each passing lane desirably at least one mile long
  - Advanced warning signs added stating "Passing Zone XX Miles Ahead"
  - Beneficial when departing towns where traffic is slower, and where passing opportunities are limited
  - Corridor constraints, from an interim standpoint, prevent continuous passing lanes (bridges, towns, cemeteries, etc.)



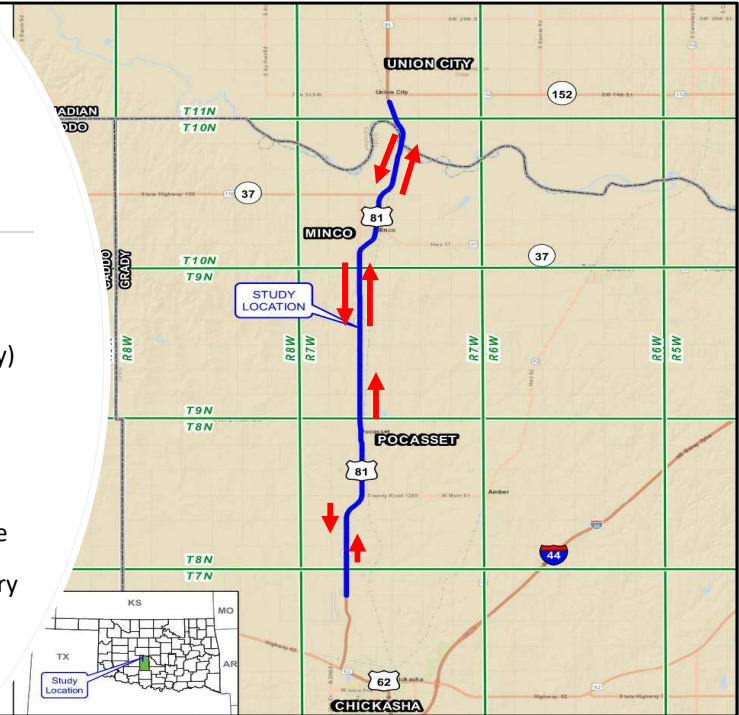
From the previously described needs, various improvements were considered. The first was the construction of passing lanes. Several different passing lane configurations were considered, including alternating, side by side, and separated (as illustrated on the right). Ideally, passing lanes are at least one mile long, with advanced signage to alert drivers to the next passing opportunity. Passing lanes are beneficial where traffic is exiting towns and where terrain or the amount of traffic make passing difficult. Existing constraints in the US-81 corridor, including bridges, towns, and sensitive areas, like cemeteries – determined which kind of passing lane configurations were possible.



## Considerations: Traffic Flow

- **Add Passing Lanes**

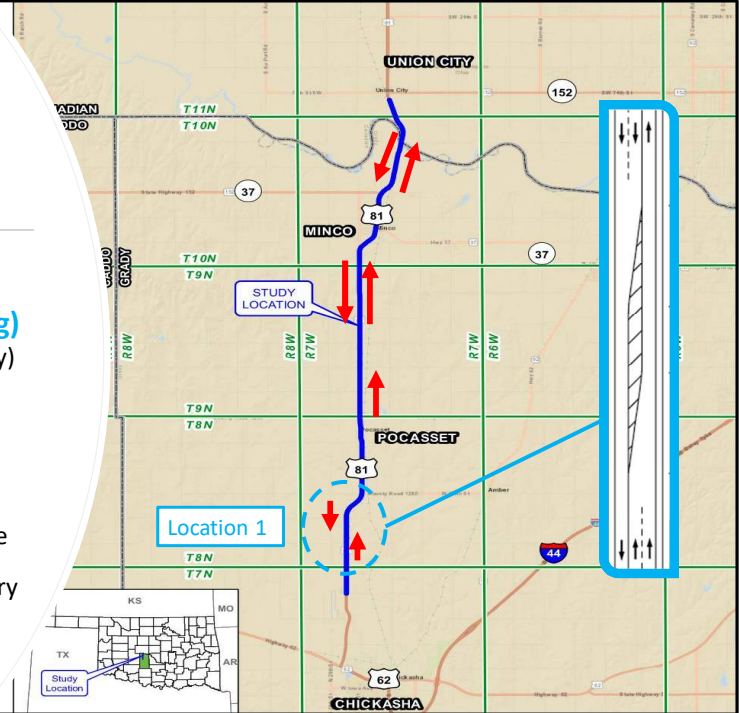
- Recommended locations:
  - CR 1306 to 1280 (alternating)
  - CR 1240 to 1220 (northbound only)
  - CR 1220 to 1190 (side by side)
  - SH-152 to Canadian River (side by side)
- Anticipated to reduce collisions, especially injury and fatal collisions
- In Texas, adding passing lanes to 2-lane roadways have reduced non-intersection collisions by 35% and injury and fatal collisions by 42%



For this study corridor four (4) passing lane locations were specifically considered.

## Considerations: Traffic Flow

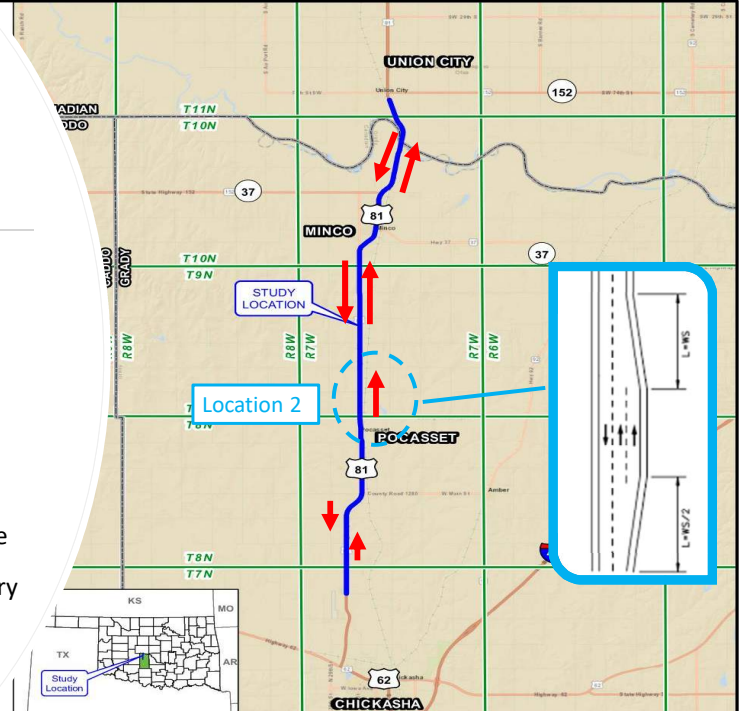
- Add Passing Lanes
  - Recommend locations:
    - **CR 1306 to 1280 (alternating)**
    - CR 1240 to 1220 (northbound only)
    - CR 1220 to 1190 (side by side)
    - SH-152 to Canadian River (side by side)
  - Anticipated to reduce collisions, especially injury and fatal collisions
  - In Texas, adding passing lanes to 2-lane roadways have reduced non-intersection collisions by 35% and injury and fatal collisions by 42%



The first passing lane location would be an “Alternating” configuration between CR 1306 and CR 1280, where each direction of traffic would have an opportunity to pass.

## Considerations: Traffic Flow

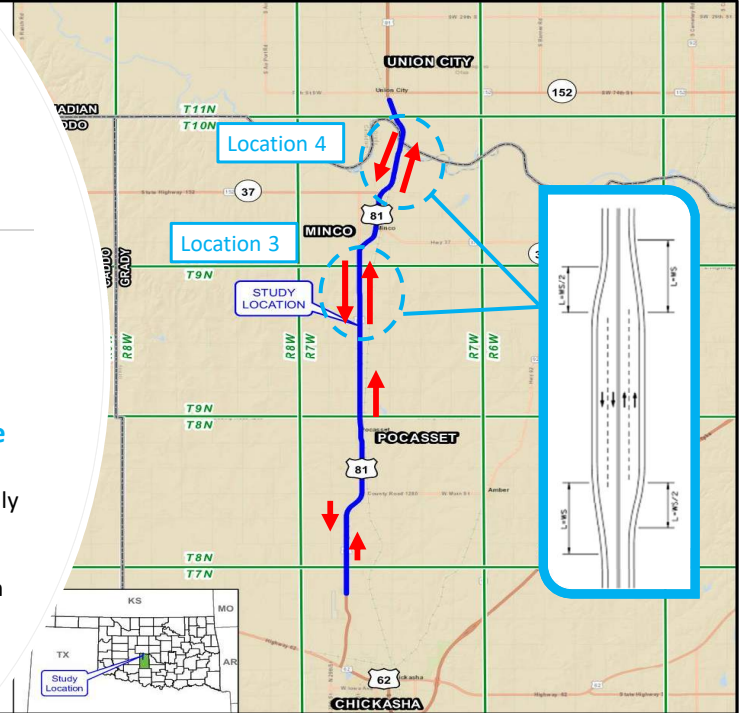
- Add Passing Lanes
  - Recommended locations:
    - CR 1306 to 1280 (alternating)
    - **CR 1240 to 1220 (NB only)**
    - CR 1220 to 1190 (side by side)
    - SH-152 to Canadian River (side by side)
  - Anticipated to reduce collisions, especially injury and fatal collisions
  - In Texas, adding passing lanes to 2-lane roadways have reduced non-intersection collisions by 35% and injury and fatal collisions by 42%



Moving north along the corridor, the second passing lane opportunity would be for northbound traffic only, between CR 1240 and CR 1220, as vehicles leave the town of Pocasset.

## Considerations: Traffic Flow

- Add Passing Lanes
  - Recommended locations:
    - CR 1306 to 1280 (alternating)
    - CR 1240 to 1220 (northbound only)
    - **CR 1220 to 1190 (side by side)**
    - **SH-152 to Canadian River (side by side)**
  - Anticipated to reduce collisions, especially injury and fatal collisions
  - In Texas, adding passing lanes to 2-lane roadways have reduced non-intersection collisions by 35% and injury and fatal collisions by 42%



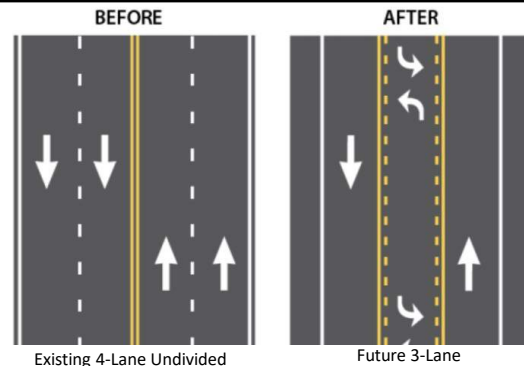
At the north end of the corridor, two side by side passing lane opportunities were considered from CR 1220 to CR 1190 and between the SH 152 intersection and the bridge at the Canadian River.

In general all of the passing lane locations considered would be expected to improve safety and travel time. A recent Texas study found that adding passing lanes to a 2-lane roadway reduced all non-intersection collisions by 35% and serious injury/fatal crashes by 42%. More detail on the types and locations of passing lanes are provided in the “Exhibits” section of this website.

## Considerations: Access Management

- Minco

- Restripe US-81 through Minco to one driving lane in each direction and a center turn lane
- Anticipated to reduce collisions caused by stopped vehicles and blocked sight distance
  - 19-47% total crash reduction
- Center turn lane would serve nearly 100 driveways and crossing streets
- Reduces speed and discourages passing through town



Existing 4-Lane Undivided

Future 3-Lane



Future 3-Lane Section in Minco

From an Access Management standpoint, the roadway section within Minco was evaluated. Today, the route has two lanes in each direction and serves nearly 100 driveways and crossing streets, which create the need for left turns. Turning vehicles must stop in the through lane while waiting for gaps, and cause restricted sight distance when opposing vehicles wait to turn at the same time. As a potential solution, the roadway could be restriped to include a single lane in each direction and a center turn lane, as shown in the graphic at top right. This configuration would encourage vehicles to stay within the speed limit of 25 or 35 mph, and provide dedicated left turn access to driveways and side roads. This safety treatment has been proven to reduce crashes by 19 to 47%.



## Considerations: Intersections

- Most intersections did not warrant turn lanes, but could benefit from
  - Updated signing and striping
  - Stop bars
  - Advanced warning signs
- These improvements have been shown to reduce injury and fatal crashes by 10%



At the study intersections, an analysis of turn lane needs was performed. This analysis showed that most of the intersections did not have traffic volumes which warranted turn lanes. However, other improvements were considered including updated signing and striping, and advance warning devices. Prior studies have shown systematic application of signing and striping measures such as those shown here can reduce injury and fatal crashes by 10%.

## Considerations: Intersections

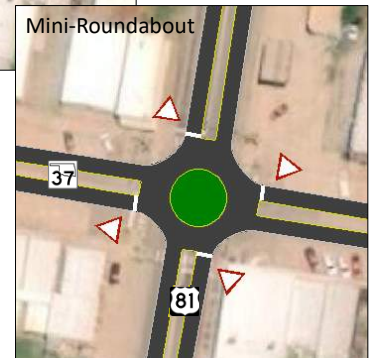
- US-81/CR 1280
  - Add a Left turn lane at CR 1280 for southbound traffic
  - Turn lane will Facilitate traffic between Pocasset and Amber
  - Tree clearing to improve sight distance
  - Improving the sight distance at 4-Way intersections along a rural road has been shown to decrease crashes by 37%



At the intersection of US-81 and CR 1280, analysis showed that a southbound left turn lane was warranted to facilitate traffic between Pocasset and Amber. Further improvements at this intersection include clearing vegetation at the southwest corner which restricts sight distance for traffic on both roadways. Similar applications of improving sight distance at 4-way rural intersections have reduced crashes by 37%.

## Considerations: Intersections

- US-81/SH-37 (Main Street)
  - All-Way Stop (LOS C)
    - Maintain Current Configuration
    - Sustains 10-15% beyond 2030
    - Intersection control type would not work with 3-lane section
  - Traffic Signal (LOS B)
    - Provides adequate levels of service for future traffic growth
  - Mini-Roundabout (LOS D)
    - Less able to handle future traffic growth
    - Would only be possible with 3-lane
    - 30% crash reductions compared to a signalized intersection

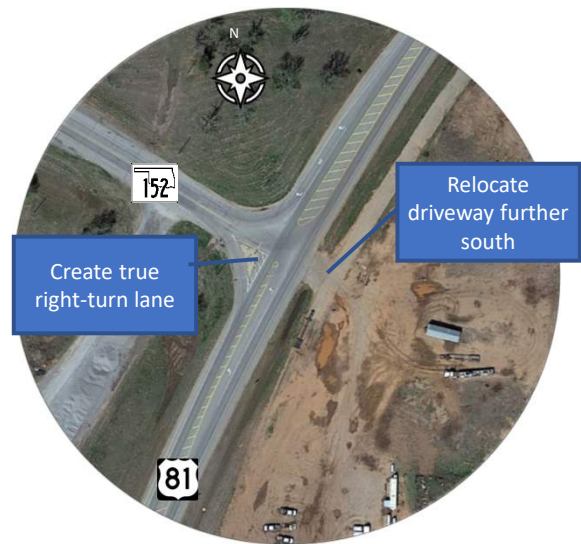


At the intersection of SH-37 (Main Street) in Minco, several options were studied to improve operations and safety. The current all-way stop intersection is expected to operate at Level of Service C in 2030 in its present 4-lane configuration. However, if the road was restriped to a 3-lane configuration to improve safety, then the all-way stop sign configuration would no longer function acceptably by 2030. The installation of a traffic signal at this location would improve conditions with a 3-lane roadway. A “mini-roundabout” was also considered under the 3-lane restriping option. Mini-roundabouts operate similarly to traditional roundabouts, but have a smaller footprint and accommodate less traffic. The mini-roundabout configuration would provide safety benefits over the signalized option, but would be less able to handle traffic growth and would operate at LOS D by 2030.

## Considerations Intersections

- US-81/SH-152

- Recommend moving driveway access on the east side to the south
- Traffic Signal (LOS C)
  - Existing channelized right turn island would be replaced with right turn lane to improve safety (44% crash reduction)
  - Reduced delay over stop-control
  - Signal Warning Devices can be used to notify drivers of upcoming intersection control for 19% crash reduction over signal alone



Existing US-81/SH-152 Intersection

At the intersection of US-81 and SH-152 at the north end of the corridor, several options were considered to address the expected LOS F condition in 2030. As a general application, the existing driveway located on the east leg of the intersection is recommended to be relocated further to the south to reduce conflict points. In addition, the existing right turn island on SH-152 could be modified to a formal right turn lane to improve line of sight and reduce the skew angle.

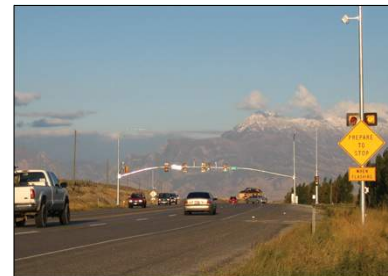
## Considerations Intersections

- US-81/SH-152
  - Recommend moving driveway access on the east side to the south
  - Traffic Signal (LOS C)
    - Existing channelized right turn island would be replaced with right turn lane to improve safety (44% crash reduction)
    - Reduced delay over stop-control
    - Signal Warning Devices can be used to notify drivers of upcoming intersection control for 19% crash reduction over signal alone

Traffic Signal



Warning Device



Several means of intersection control were studied at this location. If a traffic signal were installed at this location, Level of Service C conditions would be maintained for all movements. However, a traffic signal on a high-speed highway like US-81 can cause an increase in rear-end collisions. Signal warning devices, like the one shown in the bottom picture, can be used to lower this risk.



## Considerations Intersections

- US-81/SH-152

- Recommend moving driveway access on the east side to the south
- Roundabout (LOS C)
  - Decrease delay and back-ups
  - Improved safety over signal with lower speeds and fewer conflict points
  - For high speed rural routes, overall reductions of 67% and serious/fatal collision reductions of 87%

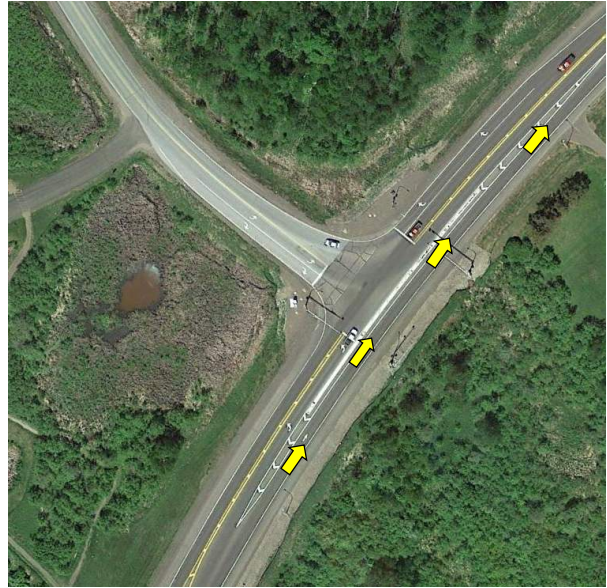


A roundabout option was also considered at the intersection. Like a signal, a roundabout would reduce delay to LOS C or better for all intersection movements. The roundabout offers additional safety benefits over the signal option – studies have shown that roundabout applications on higher speed rural routes result in overall collision reductions of 67% and even higher reductions of serious and fatal collision rates. A roundabout could be configured to support the eventual 4-lane US-81 facility.

## Considerations Intersections

- US-81/SH-152
  - Unsignalized Green T
    - Applies only to 3 leg intersections
    - US-81 traffic would not stop
    - EB to NB movement needs gap in only one direction (LOS C or better)
    - Green T intersections have been shown to reduce overall collisions by approximately 4% and injury/fatal collisions by approximately 15%
  - Signalization also possible

Green-T Intersection (Duluth, MN)



As an additional option, a “Green T” intersection was also considered. A “Green T” uses raised medians and striping to allow one direction of mainline traffic to travel freely without having to stop at the intersection. For US-81, the “Green T” would allow northbound US-81 traffic to proceed without stopping at SH-152. Traffic turning left from SH-152 would still need to find gaps in southbound traffic and yield to left turning traffic from northbound US-81. This configuration would cause fewer mainline stops and collisions, and provide LOS C or better conditions in 2030. Signalization could be provided at a future date, as shown in the example on the screen from Minnesota.

## Considerations: Warning Devices

- **Rumble Strips**

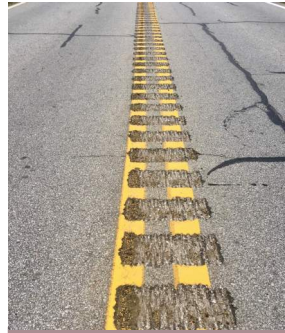
- Add centerline and shoulder rumble strips
- Reduce head-on crossover and off-road collisions

- **Curve Signage**

- Place chevron warning signs at horizontal curves to reduce departures
- Key locations such as CR 1280, CR 1290 and north of SH-152

- **Lighting at Key Intersections**

- Approximately one-third of crashes occurred during “dark” lighting conditions
- Key intersections: CR 1280 and CR 1290
- Rural intersection lighting on two-lane highways reduces nighttime collisions by 71%



Rumble Strips



Chevron Curve Warning Signs

The last identified need was for general corridor-wide warning devices. These include completing the application of rumble strips for the entirety of the corridor and placing chevron curve warning signs at key curve locations near CR 1280, CR 1290 and north of SH-152. As approximately one-third of the corridor crashes occurred during nighttime conditions, additional lighting at key locations could be considered. Applying rural intersection lighting on two-lane highways can reduce nighttime collisions by 71%.

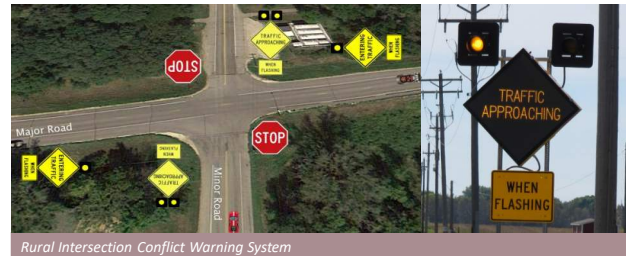
## Considerations: Signage and Warning Devices

- **Rural Intersection Conflict Warning System**

- Reduces collisions by 27%
- Includes signage and detection
- Alerts side street drivers of approaching vehicles
- Cost effective means to assist vehicles at intersections with limited sight distance

- **Signal Warning Devices**

- Apply at intersection of US-81 and SH-152 (with signal improvement)



In addition to signal warning devices already mentioned, the corridor has opportunity for application of Rural Intersection Conflict Warning Systems at locations that have limited sight distance. These systems consist of road detectors and flashing beacons on approach signs to warn side street traffic of vehicles approaching and mainline traffic of vehicles entering the intersection. These low-cost systems have been shown to reduce collisions by 27%.

## Discussion of Improvements and Priorities

- Summary of Considered Improvements
  - Passing Lanes
  - Intersection Options at SH-37E and SH-152
  - Turn lane improvements at SH-152 and CR 1280
  - Restripe of roadway in Minco
  - Signing, striping, rumble strips, safety devices
- Projects would be dependent on future funding
- Please let us know your thoughts on which improvements you would like to see and their priorities

Project/Location	Description	Approx. Cost
<b>Passing Lanes</b>		
CR 1306 to CR 1280	Alternating Northbound to Southbound	\$4,705,000
CR 1240 to CR 1220	Northbound Only	\$2,345,000
CR 1220 to CR 1190	Side-by-Side Passing Lanes	\$4,365,000
CR SH-152 to Canadian River	Side-by-Side Passing Lanes	\$3,131,000
<b>Intersections</b>		
US-81/SH-37E	Add Signal	\$250,000
	Construct Mini-Roundabout	\$300,000*
US-81/SH-152	Add Signal	\$1,328,000
	Construct Roundabout	\$2,601,000
	Remove east leg, modify channelize right	\$500,000*
US-81/CR1280	Add turn-bays	\$1,303,000
<b>Other</b>		
Minco – Pavement Restripe	Restripe from 4 to 3 Lanes	\$996,000
Signage/Striping	Place Chevron/Intersection Signs	< \$100,000
Rumble strips	Add at Centerline/Shoulder (where not)	\$160,000*
Dynamic Speed Feedback Sign	Entrances to Minco, Pocasset	< \$50,000*
Rural Intersection Conflict Warning System at CR 1280, CR 1290	CR 1280, CR 1290	<\$100,000*

\* Costs based on established research and/or past projects.

To summarize, improvements considered for this US-81 corridor study include passing lanes, intersection turn lane and traffic control options, potential re-striping to a 3-lane facility through Minco for better access management, and further application of low-cost signing, striping, and safety devices. These measures range in cost from less than \$500 thousand to almost \$5 million. The table on the slide provides an approximate cost of each of the improvements considered.

Projects are dependent on future funding. We want to know your thoughts on which improvements to prioritize or if other opportunities may be present. Please submit your comments on the Submit a Comment page on the Stakeholder website. More detail on the improvements considered can be found on the “Exhibits” page of the website.

This concludes the presentation. Thank you for your time.