



# US 250 Operations Study

## Needs & Conditions Report Final

August 3, 2016



OHIO DEPARTMENT OF  
TRANSPORTATION



**US 250 Operations Study**  
DRAFT Needs & Conditions Report

VAR-STW-STIS 2-Lane Operational Improvement Study  
PID No. 97881

Prepared for:

Ohio Department of Transportation  
Office of Statewide Planning & Research

Prepared by:

Hatch Mott MacDonald  
July 15, 2016



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# US 250 Operations Study

## Needs & Conditions Report

### EXECUTIVE SUMMARY

#### Overview

This Needs & Conditions Report is designed to conduct a detailed needs assessment on a pilot two lane Strategic Transportation System corridor (US 250), with a focus on identifying issues impeding the flow of freight traffic across the State of Ohio. This report entails (1) an existing corridor assessment identifying and confirming issues restricting the flow of freight along the corridor, and (2) a proposed corridor assessment applying countermeasures to address the issues identified and confirmed.

#### Existing Corridor Assessment

Issues identified as restricting the flow of freight along the corridor (as noted by stakeholders or observed during field work) were supplemented with a review of available data inventory to arrive at a list of locations included in this existing conditions assessment. Issues were identified in four categories as follows:

- *Traffic Operations* - locations exhibiting a LOS D, E or F for at least one movement in 2015 or 2040
- *Safety* - locations exhibiting relative spikes in frequency or higher than anticipated proportions of a particular crash type
- *Geometry* - locations exhibiting geometry not meeting applicable design standards that restrict freight flow
- *Physical Operation* - roadway segments with a Pavement Condition Rating less than 65 (Fair or Worse) or structures with a General Appraisal of Four or less (Poor or Worse) or a Load Rating less than 150% of the Ohio Legal Limit

#### Proposed Corridor Assessment

At each location where existing issues were deemed to impede freight flow, proposed countermeasures were recommended to remove these freight bottlenecks. An emphasis was placed on identifying low-cost, easily implementable countermeasures (i.e. upgrades to signage) whenever possible in lieu of higher-cost, less feasible improvements (i.e. bypasses).

#### Modular Summaries

Modular summaries of each location with an issue(s) identified along the corridor with respect to traffic operation, safety, geometry, and physical condition are presented from west to east across the state. The first page of the modular summaries encompasses the Existing Corridor Assessment including: Location, Existing Conditions, and Problem Statement & Potential Countermeasures. If proposed countermeasures are recommended, the second page encompasses the Proposed Corridor Assessment including: Concepts/Countermeasures & Operation Analysis, and Cost/Preliminary Indications.

#### Existing Corridor Assessment Summary

Overall, safety and geometry issues were most prevalent along the corridor with nearly half of the locations (23 of 51) analyzed exhibiting crash patterns indicating the presence of a safety issue, while over half (29 of 51) of the locations exhibited geometric deficiencies. Nine locations had traffic operation issues, and 10 locations had physical conditions issues with respect to bridge appraisal/load rating (eight bridges) or pavement condition (two segments).

#### Proposed Corridor Assessment Summary

Proposed countermeasures were recommended at 40 of the 51 locations assessed along the corridor. The majority of locations (24 of 40) have proposed countermeasures to enhance traffic control which included upgrades to signage, upgrades to pavement markings, installation of flashing beacons, installation of signal detection, and intersection reconfigurations. For each proposed countermeasure, preliminary benefit-cost (B/C) ratios and return on investment (ROI) were calculated comparing quantified operation and safety benefits against estimated project costs. Geometric improvements and physical condition improvements were not able to be quantified, but their respective benefits to freight flow were described qualitatively within the modular summaries.

#### Next Steps / Actions

The next phase of this study will evaluate identified countermeasures by applying Evaluation Criteria to each proposed improvement. Countermeasures with an associated travel time savings (Group B) will have economic benefits quantified using ODOT's Quick Economic Impact Module (QEIM), otherwise qualitative economic benefits will be derived. The evaluation phase will culminate in the preparation of a Benefit-Cost Analysis Summary Report.



### OVERVIEW

#### Background

As part of ODOT's implementation of an Access Ohio 2040 recommendation, consultants will be performing Operational Studies along each of the two-lane highway corridors identified on the Statewide Transportation System (STS) network. The goal of these studies is to analyze portions of the two-lane STS that are critical to freight movement. Recognizing the important role these highways play in moving freight and as critical truck routes, ODOT wishes to learn more about their operation, identify freight "bottlenecks" and develop and prioritize needed improvements.

#### Purpose of Report

This Needs & Conditions Report is designed to conduct a detailed needs assessment on a pilot STS corridor (US 250), with a focus on identifying operational issues impeding the flow of freight traffic across the State of Ohio. While this report focuses primarily on the issues present along the two-lane segments of the US 250 corridor, issues identified along the four/five-lane segments of the corridor are included for informational purposes, although it is acknowledged they will not be the emphasis of subsequent phases of the study.

Contained in this report is a two-prong assessment. The first prong of the assessment examines the existing (2015) and future (2040) conditions of the corridor as currently constructed to identify and confirm issues restricting the flow of freight along the corridor. The second prong of the assessment examines existing and future conditions along the "proposed corridor" applying countermeasures to address the issues identified and confirmed.





# US 250 Operations Study

## Needs & Conditions Report

### EXISTING CORRIDOR ASSESSMENT

In accordance with the *STS 2-Lane Operational Improvement Study Methodology (dated September 2, 2015)*, issues identified along the corridor with respect to traffic operation, safety, geometry, and physical condition (as noted by stakeholders or observed during field work) were supplemented with a review of available data inventory to arrive at a list of locations included in this existing conditions assessment. Each location is classified as either an Intersection, Segment, or Bridge. Locations are organized by geographic location along the corridor and presented going from west to east across the state beginning in Sandusky near Lake Erie and ending in Steubenville at the Ohio River and West Virginia State Line.

#### Traffic Operation

In order to confirm the presence of traffic operation issues, 20 intersections along the freight corridor were strategically chosen for detailed traffic analysis. At each of these 20 intersections 12-hour turning movement counts were conducted on August 28, 2015, and September 1, 2015, and certified traffic was obtained from ODOT for the existing year (2015) and design year (2040). In general, the 20 intersections chosen were those locations with the highest historical traffic volumes and the primary freight interface along the two-lane segments of the corridor. In addition, efforts were made to spread out the analysis locations geographically along the corridor to obtain reliable data along all the major segments. In some cases a detailed traffic analysis was performed at a minor side street where freight stakeholders specifically noted long delays (i.e. 12th Street in Strasburg), but the majority of locations were major intersections. Capacity analyses were performed using Highway Capacity Software (HCS) for the AM and PM Peak Hours for both the existing year (2015) and design year (2040). Any location with one or more approaches and/or movements operating at an unacceptable (per Highway Capacity Manual) Level of Service (LOS) of D, E, or F was noted. Detailed HCS capacity analysis summaries are included in Appendices C-F. Locations exhibiting spikes in travel time delay from INRIX data were also noted.

#### Safety

A safety assessment was performed for the corridor by conducting a query of available crash data and examining trends in crash patterns in the most recent available three-year period (2012-2014). Locations exhibiting relative spikes in frequency or higher than anticipated proportions of a particular crash type or characteristic (i.e. serious injury or fatal) were noted. In addition to examining crash history, locations with identified geometric deficiencies were examined for correlating crash patterns (i.e. locations with narrow shoulder widths were examined for "run off the road" crashes). Any location exhibiting trends with respect to frequency, type, severity, or linked to an operations, geometric or physical condition issue was noted.

#### Geometry

Geometry was considered to include lane/shoulder widths, horizontal/vertical curvature, horizontal/vertical clearances, intersection angles, turning radii, and sight distances. Given that the study corridor is 162 miles in length, efforts were made to identify the most pertinent geometric issues pertaining to freight movements rather than compiling an exhaustive list of every verifiable deficiency along the corridor. For example, a local road with low freight volumes intersecting the corridor at a substandard intersection skew was not identified as a geometric issue. In order to identify geometric issues available mapping and visual inspection were used to compare actual conditions against applicable design criteria (i.e. ODOT Location & Design Manual, Vol. I). Freight locations exhibiting geometry not meeting design standards were noted.

#### Physical Condition

In order to confirm the presence of physical condition issues, identified TIMS and Bridge Inventory Appraisal data were reviewed for locations not meeting minimum acceptable threshold standards. Roadway locations with a Pavement Condition Rating (PCR) less than 65 (considered Fair or worse) were considered below minimum acceptable threshold standards. Roads with rough pavement impede freight flow by increasing fuel consumption and vehicle operating costs while providing a less safe and comfortable driver experience. Bridges with a General Appraisal of Four or less (Poor or worse) or a Load Rating less than 150% of the Ohio Legal Limit were considered below minimum acceptable threshold standards. Bridges in Poor or worse condition are considered structurally deficient and require traffic and/or load restrictions that impede freight flow. Bridges with a Load Rating less than 150% of the Ohio Legal Limit (40 tons) may restrict some overweight loads that would have otherwise been permitted without modeling their proposed axle configuration. Any roadway location with a PCR less than 65, a bridge with a General Appraisal less than Five or a Load Rating less than 150% of the Ohio Legal Limit was noted.



# US 250 Operations Study

## Needs & Conditions Report

### PROPOSED CORRIDOR ASSESSMENT

At each location where existing issues were deemed to impede freight flow, applicable countermeasures were identified to remove these freight bottlenecks. An emphasis was placed on identifying low-cost, easily implementable countermeasures to address freight issues whenever possible in lieu of higher-cost, less feasible improvements.

#### Traffic Operation

Proposed countermeasures to address traffic operation issues focused on improving LOS to an acceptable level (LOS C or better) wherever possible. In addition to meeting minimum LOS thresholds, travel time savings were quantified for all proposed countermeasures as a means of comparison between proposed countermeasures.

#### Safety

Improvements to address safety issues focused on applying countermeasures with accepted crash modification factors to address crash patterns at locations with potential for safety improvement based on Highway Safety Manual methodology.

#### Geometry

Proposed countermeasures to address geometric issues focused on improving roadway geometry to facilitate freight mobility, particularly lateral/vertical clearances and turn radii, for both a WB-62 truck as well as oversize vehicles.

#### Physical Condition

Proposed countermeasures to address geometric issues focused on improving / restoring pavement and bridge conditions to acceptable levels and improving the Load Rating of bridges to 150% of the Ohio Legal Limit.

#### Cost / Preliminary Indications

Conceptual project costs were ascribed to each proposed improvement using historical unit cost data for primary cost drivers. Design costs (10%) and planning-level contingencies (20%) were applied to project cost estimates for all but very minor improvements, such as adding signs at a single intersection, which could be handled by ODOT highway maintenance crews or incorporated into a standard maintenance project.

A preliminary quantitative B/C ratio and ROI evaluation was performed for each proposed countermeasure where travel time savings and/or expected crash reductions could be quantified. Travel time savings were quantified by applying values from the *U.S. Department of Transportation 2015 Valuation of Travel Time Memorandum* to vehicular and freight traffic volumes traveling through a location. Expected crash reductions were calculated using ODOT's Economic Crash Analysis Tool in conjunction with accepted Crash Modification Factors (if applicable) for correlating proposed improvements. Benefits were annualized and discounted over a 20-year service life at a seven percent discount rate to arrive at a preliminary B/C ratio and ROI. A brief qualitative description of benefits was provided for proposed countermeasures where travel time savings and / or expected crash reductions could not be quantified.

#### Evaluation Categories

Each proposed countermeasure is categorized in one of the following four groups:

- *Group A* – Improvements that add capacity and/or divert traffic (e.g. adding thru lanes; construction of a bypass)
- *Group B* – Improvements where travel time savings can be quantified (e.g. installation of a traffic signal)
- *Group C* – Improvements where travel time savings cannot be quantified, but safety benefits can be quantified (e.g. installing signage; widening shoulder widths)
- *Group D* – Improvements where neither travel time savings or safety benefits can be quantified (e.g. increase turn radii)

A full Benefit-Cost Ratio incorporating quantifiable economic benefits will be provided as part of the subsequent Evaluation phase of this study for Group A and Group B improvements.

#### Prioritization

As the final step of this report, HMM categorized proposed countermeasures, for further discussion in the next steps, as either short term, medium term, or long term based on the cost and scale of the improvement and how imminent a need is.

### SEGMENT: US 250 FROM US 6 TO SR 2 ERI-250-0.00 TO ERI-250-3.94



### Location Overview

The segment of US 250 between US 6 and SR 2 is a four/five-lane urban arterial in highly commercialized area that serves as the gateway to Cedar Point tourist traffic during from April through October, as well as servicing heavy retail traffic during the holiday shopping season in November and December.

### Existing Conditions

This segment has the highest ADT (30,420) along the entire US 250 corridor, but only 1% trucks as non-tourism related freight generally avoids this congested area.

INRIX data shows this segment as the primary location with delay along the entire US 250 corridor.

Crash analysis shows a high frequency of rear end crashes along this segment which is indicative of congestion.

### Problem Statement & Potential Countermeasures

A programmed ODOT TRAC project (PID 88407) will upgrade signals and signing, incorporate access management, and add turn lanes where needed to address noted safety and congestion issues. No further countermeasures are recommended.



*Pictured Above:*

Aerial view of the 5-lane segment of US 250 in a highly commercialized area in Perkins Twp just south of Sandusky and Cedar Point.



### BRIDGE: OHIO TURNPIKE (I-80/I-90) RAMPS OVER US 250 ERI-250-3.94 (SFN 2229382)



#### Location Overview

The steel girder structure (SFN 2229382) carrying the Ohio Turnpike Interchange ramps over US 250 provides a freight connection with I-80/I-90 in rural Erie County. This structure is part of ODOT's bridge inventory, but is owned by the Ohio Turnpike and Infrastructure Commission.

#### Existing Conditions

This three-span structure was constructed in 1954 and rehabilitated in 1987. It carries two lanes of bi-directional traffic for the I-80/I-90 to US 250 eastbound ramp and US 250 eastbound to I-80/I-90 ramp traffic separated by a raised concrete curb.

The structure has a General Appraisal of Six indicating it is in Satisfactory Condition. The Load Rating for this structure is 140% of the Ohio Legal Load. Structures with a Load Rating of less than 150% of the Ohio Legal Limit potentially restrict the freight flow of Permit Loads along the corridor.

The existing vertical clearance (14.7 ft.) along US 250 under this structure is substandard. The minimum vertical clearance for an arterial is 16.5 ft. per L&D Vol. 1, 302-1E. Lateral clearance along US 250 under this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure has a Load Rating of 140% of the Ohio Legal Load and a substandard vertical clearance of 14.7 ft., both of which pose potential freight bottlenecks for oversize/overweight loads. Potential countermeasures should explore reconstructing the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase vertical clearance to a standard 16.5 ft.



#### Inspection Summary

Deck	7
Superstructure	7
Substructure	6
Culverts	n/a
Channel	n/a
<b>Approaches</b>	<b>4</b>
General Appraisal	6

#### Load Rating

<b>% of Ohio Legal Load</b>	<b>140</b>
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#### Clearances

Lateral	10'
<b>Vertical</b>	<b>14.7'</b>





## US 250 Operations Study

### Needs & Conditions Report

#### BRIDGE: OHIO TURNPIKE (I-80/I-90) RAMPS OVER US 250 ERI-250-3.94 (SFN 2229382)

##### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase the vertical clearance below along US 250 to a standard 16.5 ft. This improvement would address the substandard load rating and vertical clearance that restrict the movement of some overweight/oversize freight loads.

##### Cost / Preliminary Indications

The reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase the vertical clearance below along US 250 to a standard 16.5 ft. is estimated to cost \$1,630,000.

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by improving the load rating to accommodate overweight loads and increasing the vertical clearance to accommodate oversize loads.

#### Benefit-Cost Summary

Proposed Project Cost	\$1,630,000
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##### *Operational*

Travel Time Savings (annual)	n/a
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PV Benefits	n/a
-------------	-----

##### *Safety*

Expected Annual Crash Adjustment	n/a
-------------------------------------	-----

PV Benefits	n/a
-------------	-----

##### *Combined*

PV Operational & Safety Benefits	n/a
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Preliminary B/C Ratio	n/a
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### INTERSECTION: US 250 AND SR 113 (EAST) ERI-250-11.75



#### Location Overview

The signalized intersection of US 250 and SR 113 at the edge of the Village of Milan in Erie County is the bottleneck where US 250 moving east transitions from five lanes to two lanes.

#### Existing Conditions

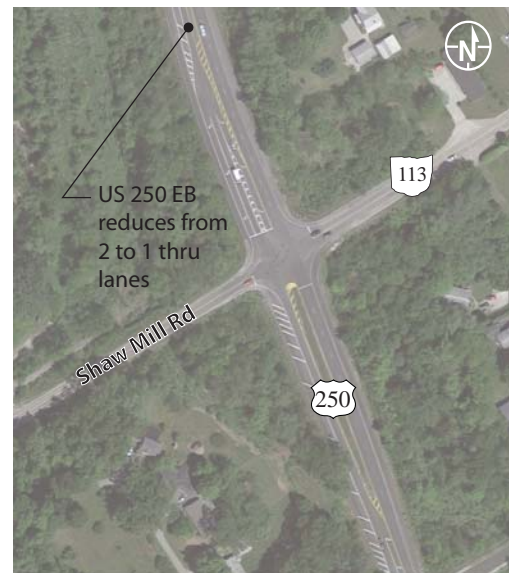
US 250 eastbound transitions from two lanes to one lane before opening up to a left turn lane, through lane, right turn lane configuration at this intersection. US 250 westbound transitions from one lane to two lanes 375 ft. south of this intersection.

A resurfacing project (PID 83417) completed in 2011 restriped the eastbound US 250 approach from two through lanes to its current configuration.

Turning movement counts were not conducted here, but a safety review was performed. The signalized intersection experienced 14 crashes between 2012-2014 including five rear end crashes and four angle crashes.

#### Problem Statement & Potential Countermeasures

The frequency of crashes at this location indicate a safety issue may be present. Potential countermeasures include reviewing yellow/all-red signal timings.



#### *Pictured Above:*

Looking south along US 250 (EB) approaching SR 113 (east) where US 250 drops from 2 to 1 thru lanes outside the Village of Milan.

### INTERSECTION: US 250 AND SR 113 (EAST) ERI-250-11.75

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included modifying the yellow / all red signal timings.

Based on the safety analysis, the predicted number of crashes based on similar site types is about 18 crashes per year. The expected number of crashes based on this intersections crash history from 2012 – 2014 is 13.3 crashes per year. Therefore, the potential for safety improvement at this location is a net negative 4.7 crashes. This means the intersection is experiencing less crashes than other similar intersections in the state. Although based on the safety analysis there is little room for improvement at this location, a review of the yellow / all red signal timings should be performed and adjusted if necessary to address the rear end and angle crashes. If current clearance intervals don't meet ITE standards, modifying them could result in a reduction of about 1 crash per year based on the ECAT analysis.

#### Cost / Preliminary Indications

If current clearance intervals don't meet ITE standards, a modification of the yellow / all red signal timings at this location results in a Preliminary B/C Ratio of 45.64 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

#### Benefit-Cost Summary

Proposed Project Cost	\$3,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-1.063
PV Benefits	\$136,934
<i>Combined</i>	
PV Operational & Safety Benefits	\$136,934
Preliminary B/C Ratio	45.64

APPROACH SPEED (MPH)	YELLOW INTERVAL (SECONDS)
25	3.0
30	3.2
35	3.6
40	4.0
45	4.3
50	4.7
55	5.0
60	5.4
65	5.8

\* For approach grades other than 0%, Use ITE Formula.

INTERSECTION GEOMETRY									
Intersection Type	UD	UD	UD	UD	D	D	D	D	D
# Through Lanes	2	2	4	4	4	4	6	6	6
# Turn Lanes		1		1		2	2	3	4
Median Width (ft.)					15	3	3	3	3
X-Walk Width (ft.)		6	6	6	6	6	6	6	6
Stop Bar Setback (ft.)	6	4	4	4	4	4	4	4	4
Total Traversed Width W (ft.)	30	46	58	70	73	85	109	121	133
APPROACH SPEED (MPH)	ALL-RED CLEARANCE INTERVAL (Seconds)								
25	1.4	1.8	2.1						
30	1.1	1.5	1.8	2.0					
35	1.0	1.3	1.5	1.7	1.8				
40	0.9	1.1	1.3	1.5	1.6	1.8	2.2	2.4	2.6
45	0.8	1.0	1.2	1.4	1.4	1.6	2.0	2.1	2.3
50	0.7	0.9	1.1	1.2	1.3	1.4	1.8	1.9	2.1
55	0.6	0.8	1.0	1.1	1.2	1.3	1.6	1.7	1.9
60	0.6	0.7	0.9	1.0					
65	0.5	0.7	0.8						

Uncommon Parameters

#### INTERSECTION: US 250 & WHITTLESEY AVENUE/LEAGUE STREET HUR-250-2.93



#### Location Overview

The signalized intersection of US 250 at Whittlesey Avenue/League Street is located in the City of Norwalk in northern Huron County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to all US 250 through traffic having to turn (EB US 250 must turn left and WB US 250 must turn right) at this location.

#### Existing Conditions

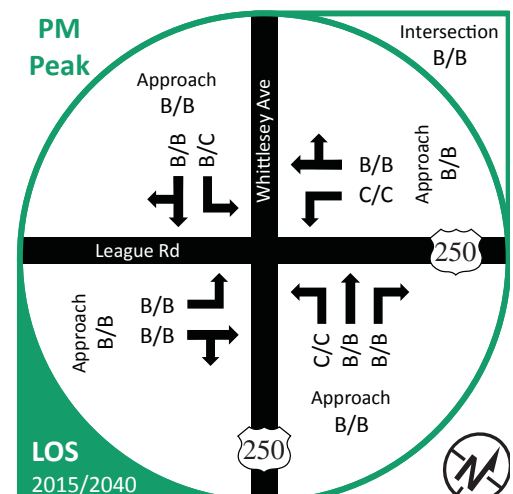
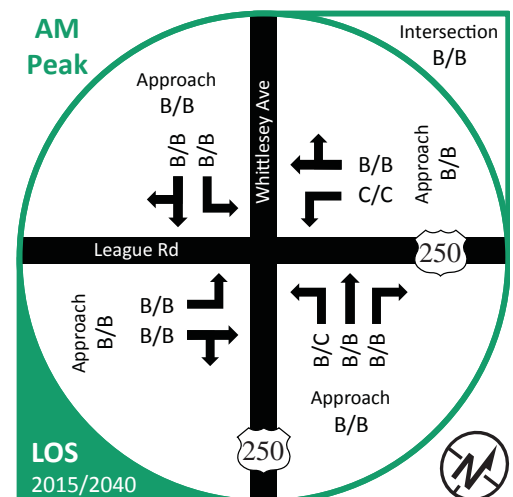
This four-leg intersection is in an urbanized area with commercial drive access near the southwest and southeast corners. Eastbound US 250 traffic must turn left from League Street to Whittlesey Avenue, while westbound US 250 traffic must turn right from Whittlesey Avenue to League Street.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows 30 crashes observed at this intersection during a three-year period (2012 to 2014) with the majority being either rear end (11 crashes) or angle (nine crashes). Normally rear end crashes may be attributed to congestion at an intersection, while angle crashes lack of gaps in opposing traffic for turning vehicles, but traffic analysis does not show any movements operating at unacceptable levels. Four crashes involved trucks, with three of those crashes involving trucks making a westbound left turn movement. AutoTurn analysis shows adequate truck turn radii for all movements.

#### Problem Statement & Potential Countermeasures

The frequency of crashes at this location indicate a safety issue may be present. Potential countermeasures include reviewing yellow / all-red signal timings.





# US 250 Operations Study

## Needs & Conditions Report

### INTERSECTION: US 250 & WHITTLESEY AVENUE/LEAGUE STREET HUR-250-2.93

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included modifying the yellow / all red signal timings, and upgrading the existing signal to add backplates.

Based on safety analysis, the predicted number of crashes based on similar site types is 7.1 crashes per year. The expected number of crashes based on crash history from 2012 – 2014 is 7.4 crashes. Therefore, the expected excess crashes or potential for safety improvement at this location is 0.3 crashes per year. Although based on the safety analysis the amount of excess crashes at this location is minimal, a review of the yellow / all red signal timings should be performed and adjusted if necessary to address the rear end and angle crashes. If current clearance intervals don't meet ITE standards, modifying them could result in a reduction of about 0.6 crashes per year based on the ECAT analysis.

In addition to this improvement, signal backplates could provide a qualitative benefit to the safety of this intersection. Existing span wire should be checked to determine feasibility of adding backplates.

#### Cost / Preliminary Indications

If current clearance intervals don't meet ITE standards, a modification of the yellow / all red signal timings at this location results in a Preliminary B/C Ratio of 21.04 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

#### Benefit-Cost Summary

Proposed Project Cost	\$3,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-0.593
PV Benefits	\$63,128
<i>Combined</i>	
PV Operational & Safety Benefits	\$63,128
Preliminary B/C Ratio	21.04

APPROACH SPEED (MPH)	YELLOW INTERVAL (SECONDS)
25	3.0
30	3.2
35	3.6
40	4.0
45	4.3
50	4.7
55	5.0
60	5.4
65	5.8

\* For approach grades other than 0%, Use ITE Formula.

INTERSECTION GEOMETRY										
Intersection Type	UD	UD	UD	UD	D	D	D	D	D	D
# Through Lanes	2	2	4	4	4	4	6	6	6	6
# Turn Lanes		1		1		2	2	3	4	
Median Width (ft.)					15	3	3	3	3	
X-Walk Width (ft.)		6	6	6	6	6	6	6	6	
Stop Bar Setback (ft.)	6	4	4	4	4	4	4	4	4	
Total Traversed Width W (ft.)	30	46	58	70	73	85	109	121	133	
APPROACH SPEED (MPH)	ALL-RED CLEARANCE INTERVAL (Seconds)									
25	1.4	1.8	2.1							
30	1.1	1.5	1.8	2.0						
35	1.0	1.3	1.5	1.7	1.8					
40	0.9	1.1	1.3	1.5	1.6	1.8	2.2	2.4	2.6	
45	0.8	1.0	1.2	1.4	1.4	1.6	2.0	2.1	2.3	
50	0.7	0.9	1.1	1.2	1.3	1.4	1.8	1.9	2.1	
55	0.6	0.8	1.0	1.1	1.2	1.3	1.6	1.7	1.9	
60	0.6	0.7	0.9	1.0						
65	0.5	0.7	0.8							

Uncommon Parameters



### INTERSECTION: US 250 & SR 61 (MAIN STREET)

HUR-250-3.34



### Location Overview

The signalized intersection of US 250 and SR 61 is located in the City of Norwalk in northern Huron County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being Norwalk's central downtown intersection.

### Existing Conditions

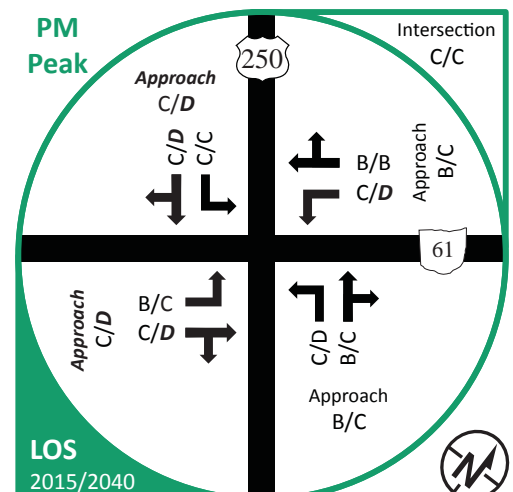
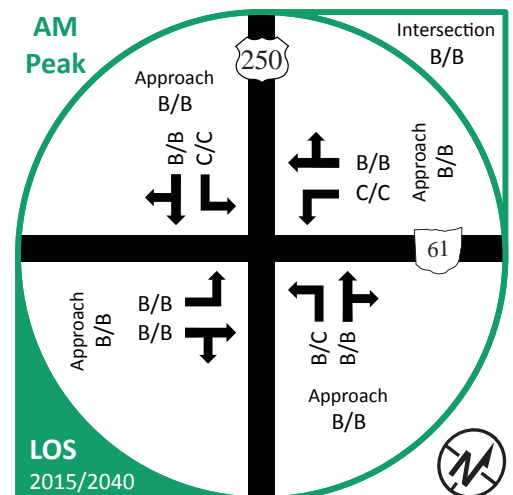
This intersection has left turn lanes on all four approaches. Right turns on red are prohibited on all four approaches. On-street parallel parking is permitted on the eastbound US 250 south of the intersection and on westbound US 250 north of intersection.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during the AM peak hour. The westbound US 250 and northbound SR 61 approaches operate at an unacceptable LOS D during the 2040 PM Peak Hour.

Crash analysis shows only nine crashes observed at this intersection during a three-year period (2012 to 2014) so no further safety analysis is required.

### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but degrades to a LOS D on two approaches in the 2040 PM peak hour. Potential countermeasures should explore retiming and/or rephasing the signal to achieve more efficient operation. Physical reconfiguration of the intersection (i.e. adding turn lanes) is not feasible due to the adjacent high density development.



### INTERSECTION: US 250 & SR 61 (MAIN STREET) HUR-250-3.34

#### Concepts / Countermeasures & Operational Analysis

The existing intersection configuration currently operates at an acceptable level of service so immediate countermeasures are not recommended at this location.

The eastbound and southbound approaches operate at LOS D in the 2040 PM peak hour with an overall intersection LOS C. It is not feasible to increase capacity by widening due to physical constraints at this urbanized location, and there is not much room for operational improvement at this isolated location due to simplicity of phasing. Future improvements should consider looking at coordination efficiencies with adjacent signals and detection for low volume side streets to improve traffic flow through the Norwalk corridor. However, the signal is currently operating acceptably and few crashes were recorded at this location. Therefore this improvement is not viewed as an immediate need, but rather a potential need to be reevaluated in the future.

#### Cost / Preliminary Indications

No countermeasures are currently recommended at this location.

#### Benefit-Cost Summary

Proposed Project Cost	n/a
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a

*Operational*

Travel Time Savings (annual) n/a

PV Benefits n/a

*Safety*

Expected Annual Crash Adjustment n/a

PV Benefits n/a

*Combined*

PV Operational & Safety Benefits n/a

Preliminary B/C Ratio n/a

### INTERSECTION: US 250 AND US 20/SR 18 WB RAMPS HUR-250-4.92



#### Location Overview

The unsignalized intersection of US 250 and the US 20/SR 18 (Norwalk bypass) westbound ramps at the south edge of the City of Norwalk in Huron County provides connectivity to an east-west STS route in US 20.

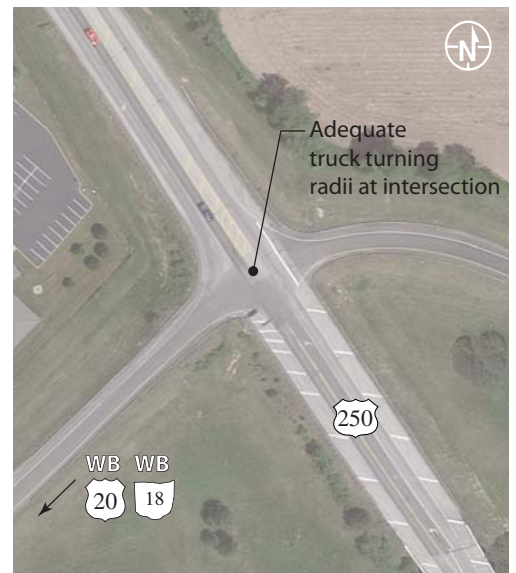
#### Existing Conditions

This intersection has a right turn lane along the US 250 eastbound approach and a left turn lane along the US 250 westbound approach.

Crash analysis shows only one crash observed at this intersection during a three-year period (2012 to 2014) so no further safety analysis is required. AutoTurn analysis shows an adequate turn radius for westbound trucks turning left.

#### Problem Statement & Potential Countermeasures

The low crash frequency at this location indicates there are no safety issues and adequate turn radii exist for truck movements. No further countermeasures are recommended at this location.



*Pictured Above:*

US 250 looking northwest at intersection with US 20/SR 18 (Norwalk bypass) WB Ramps.

### SEGMENT: US 250 FROM NORWALK TO ASHLAND COUNTY HUR-250-4.92 TO HUR-250-19.84



#### Location Overview

The two-lane segment of US 250 between US 20/SR 18 and Ashland County is a mostly straight, flat roadway traversing farmland in rural Huron County.

#### Existing Conditions

This segment of US 250 has an ADT of 6,980 with 23% trucks. Shoulder and median rumble strips are present.

Six locations along this segment were listed in ODOT's 2013 HSIP Top 500 rural non-freeway segments, but only one segment made the list in 2014.

Crash analysis shows 134 crashes observed along this segment during a three-year period (2012 to 2014). There were only two left of center - sideswipe meeting crashes indicating centerline rumble strips are working well. Run off the road right fixed object crash frequency was fairly high with 36 crashes, which may correlate with substandard three ft. shoulders present along this segment as the L&D standard is eight ft. for an arterial. This segment also exhibited a high frequency of animal crashes.

#### Problem Statement & Potential Countermeasures

The high frequency of run off the road right fixed object crashes despite the presence of shoulder rumble strips indicates that the substandard three ft. shoulders along this segment are a safety issue. Potential countermeasures include shoulder widening to meet L&D standards (eight ft.).



*Pictured Above:*

Looking SW along the straight, flat stretch of US 250 traversing farmland in rural Huron County.

#### ODOT HSIP Rural Non-Freeway List

County	SLM	2013 Rank	2014 Rank
HUR	0.35-0.45	295	-
HUR	11.01-11.11	283	-
HUR	11.11-11.21	-	357
HUR	11.21-11.31	282	-
HUR	11.41-11.51	46	-
HUR	11.51-11.61	32	-
HUR	11.61-11.71	47	-
HUR	14.71-14.81	279	-

### SEGMENT: US 250 FROM NORWALK TO ASHLAND COUNTY HUR-250-4.92 TO HUR-250-19.84

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included widening the existing shoulders from 3 ft. to a standard 8 ft. Widening the shoulders was examined as a potential countermeasure due to substandard shoulder widths and a relatively high frequency of run off the road crashes throughout this segment.

Based on safety analysis, the predicted number of crashes based on similar site types is 18.9 crashes per year. The expected number of crashes based on crash history from 2012 – 2014 is 19.4 crashes. Therefore, the expected excess crashes or potential for safety improvement at this location is 0.5 crashes per year. The proposed shoulder widening results in an expected reduction of about 5.6 crashes per year.

#### Cost / Preliminary Indications

The widening of the existing shoulders for the entire 15 mile segment is estimated to cost approximately \$5.9 million. This improvement would likely be combined with a typical resurfacing of the existing pavement (\$6 million).

The widening of the existing shoulder from three ft. to eight ft. results in a Preliminary B/C Ratio of 0.53 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

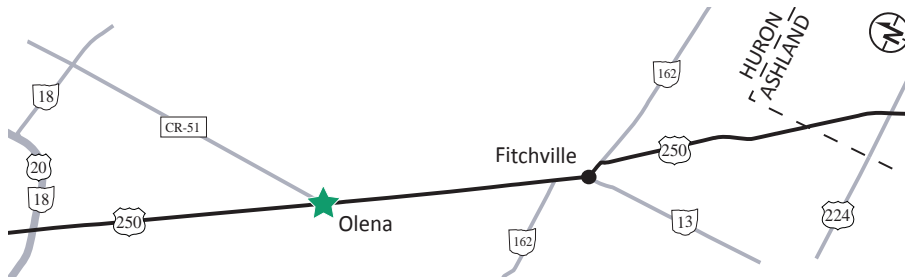
#### Benefit-Cost Summary

Proposed Project Cost	\$5,857,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-5.261
PV Benefits	\$3,108,023
<i>Combined</i>	
PV Operational & Safety Benefits	\$3,108,023
Preliminary B/C Ratio	0.53





### INTERSECTION: US 250 & GREENWICH TOWN LINE ROAD (CR 51) HUR-250-10.75



#### Location Overview

The unsignalized intersection of US 250 and CR 51 is located in rural Huron County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to CR 51 providing a potential freight bypass around Norwalk in conjunction with SR 601.

#### Existing Conditions

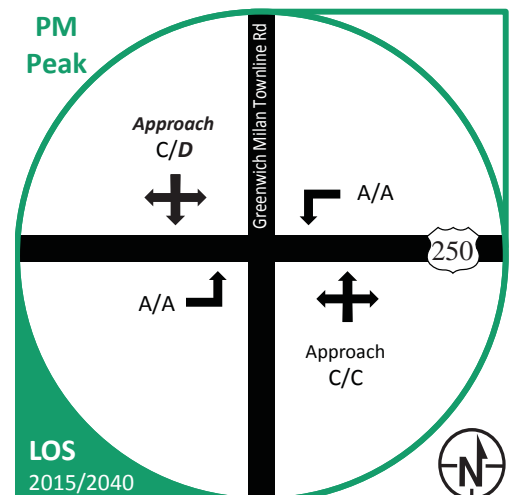
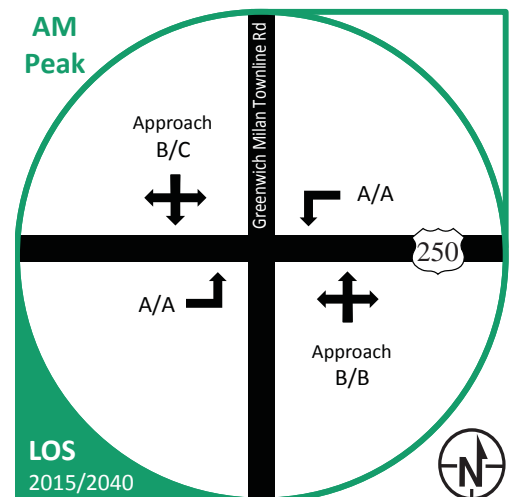
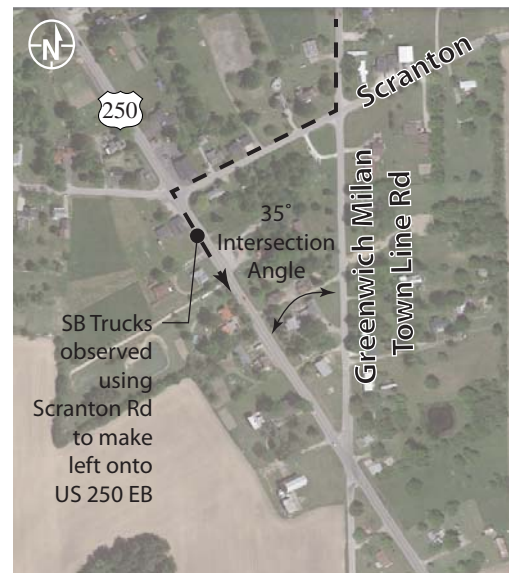
This two-way stop-control intersection has a single lane on all four approaches with CR 51 operating under stop control. The existing ADT along CR 51 north of intersection (870) is almost double that of the ADT along CR 51 south of the intersection (440).

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. Both stop control approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during the AM peak hour. The southbound stop control approach operates at an unacceptable LOS D during the 2040 PM Peak Hour.

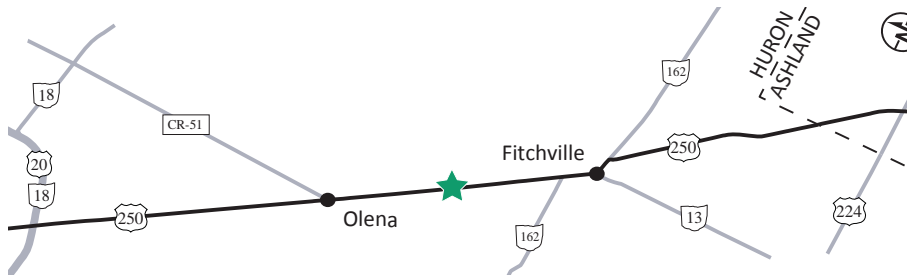
Crash analysis shows zero crashes observed at this intersection during a three-year period (2012 to 2014) so no further safety analysis is required. A severe intersection skew angle (35 degrees) impairs sight distance at the stop control approaches, but that intersection skew does not appear to be contributing to crashes.

#### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but degrades to a LOS D on the southbound CR 51 approach in the 2040 PM peak hour. The existing intersection angle (35 degrees) does not meet the L&D standard of 70 degrees, but this geometric deficiency does not appear to be causing crashes. Potential countermeasures to improve operation on the southbound approach are limited as improvements would increase overall delays on the much higher freight volume US 250 approaches.



### BRIDGE: US 250 OVER INDIAN CREEK HUR-250-13.00 (SFN 3903818)



#### Location Overview

The concrete slab structure (SFN 3903818) carrying US 250 over Indian Creek is located in rural Huron County 1.9 miles north of SR 162.

#### Existing Conditions

This single-span structure was constructed in 1947 and carries a two-lane segment of US 250.

The structure has a General Appraisal of Six indicating it is in Satisfactory Condition. The Load Rating for this structure is 145% of the Ohio Legal Load. Structures with a Load Rating of less than 150% of the Ohio Legal Limit potentially restrict the freight flow of Permit Loads along the corridor.

The existing lateral clearance (seven ft.) along US 250 on this structure is substandard. The minimum lateral clearance for an arterial is eight ft. per L&D Vol. 1, 302-1E.

#### Problem Statement & Potential Countermeasures

The existing structure has a Load Rating of 145% of the Ohio Legal Load and a substandard lateral clearance of seven ft., both of which pose potential freight bottlenecks for oversize/overweight loads. Potential countermeasures should explore reconstructing the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase its lateral clearance to a standard eight ft.



#### Inspection Summary

Deck	6
Superstructure	6
Substructure	7
Culverts	n/a
Channel	6
Approaches	7
<b>General Appraisal</b>	<b>6</b>

#### Load Rating

<b>% of Ohio Legal Load</b>	<b>145</b>
-----------------------------	------------

#### Clearances

<b>Lateral</b>	<b>7'</b>
<b>Vertical</b>	<b>n/a</b>

### BRIDGE: US 250 OVER INDIAN CREEK HUR-250-13.00 (SFN 3903818)

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase its lateral clearance to a standard eight ft. This improvement would address the substandard load rating and lateral clearance that restrict the movement of some overweight/oversize freight loads.

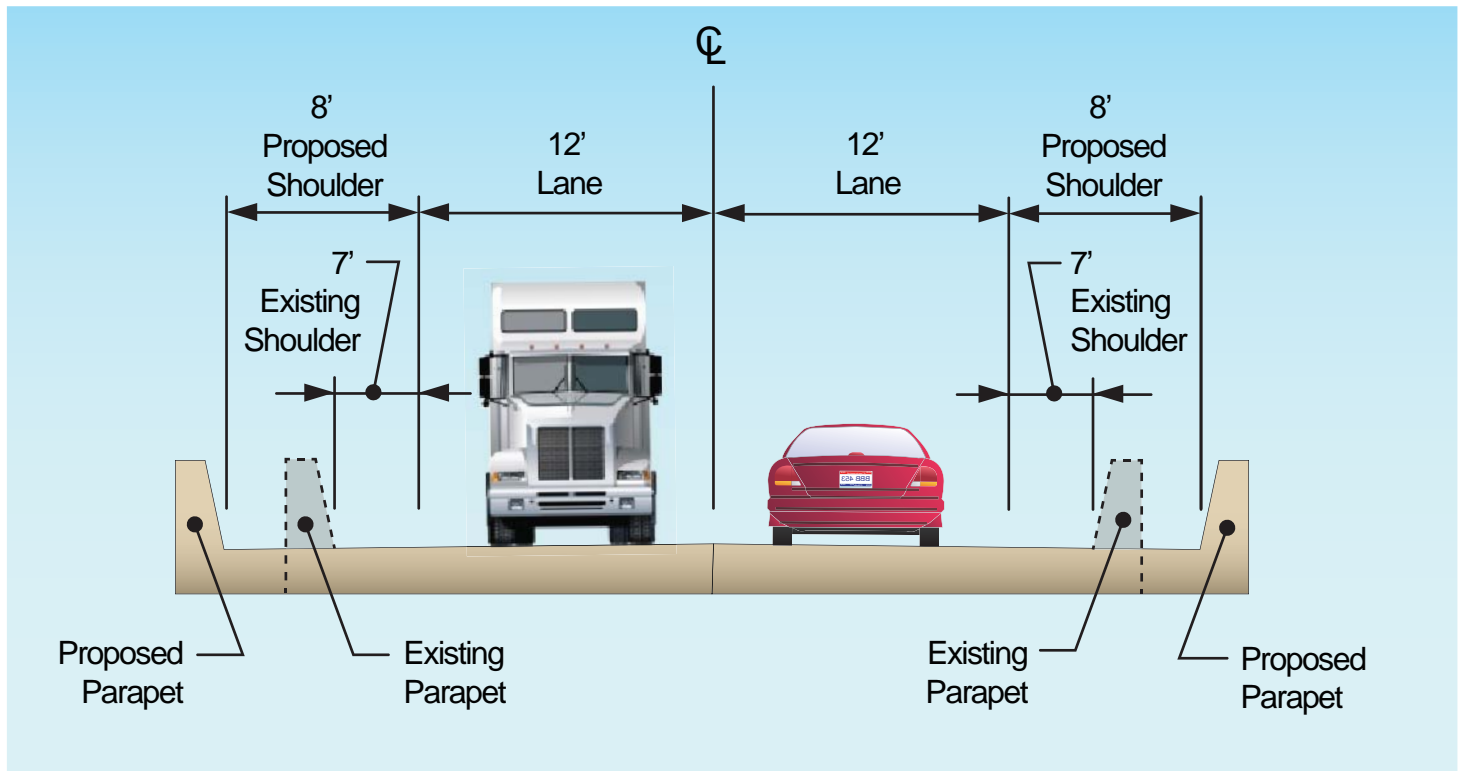
#### Cost / Preliminary Indications

The reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase its lateral clearance to a standard eight ft. is estimated to cost \$151,000.

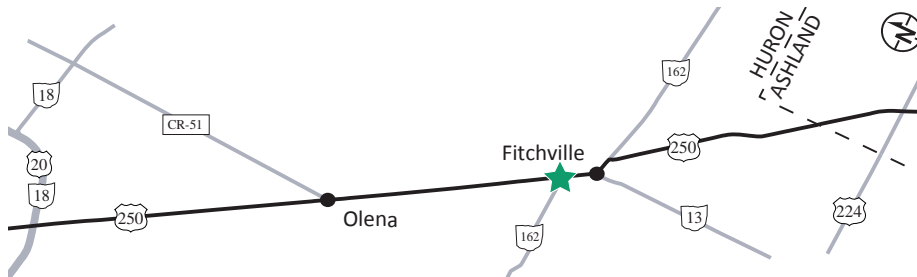
The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by improving the load rating to accommodate overweight loads and increasing the lateral clearance to accommodate oversize loads.

#### Benefit-Cost Summary

Proposed Project Cost	\$151,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



### INTERSECTION: US 250 AND SR 162 (WEST) HUR-250-14.87



#### Location Overview

The unsignalized intersection of US 250 and SR 162 (west) is located in rural Huron County just north of Fitchville.

#### Existing Conditions

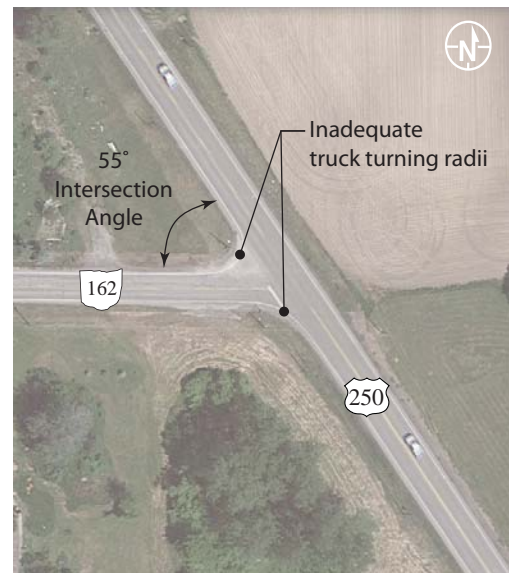
This three-leg intersection operates with SR 162 westbound under stop control and US 250 in free flow.

Crash analysis shows only one crash observed at this intersection during a three-year period (2012 to 2014).

The intersection angle (55°) is less than the L&D minimum 70° for an unsignalized intersection, but that intersection skew does not appear to be contributing to crashes. AutoTurn analysis shows insufficient turn radii for trucks turning right from eastbound US 250 to westbound SR 162 and eastbound SR 162 to eastbound US 250.

#### Problem Statement & Potential Countermeasures

Geometric deficiencies at this location include insufficient truck turn radii and substandard intersection skew. Intersection skew does not appear to be causing crashes, but inadequate turn radii are an impediment to freight movements. Potential countermeasures should consider pavement widening to facilitate truck turning movements.



*Pictured Above:*

US 250 looking northwest at the intersection with SR 162 (west) just north of Fitchville.



### INTERSECTION: US 250 AND SR 162 (WEST) HUR-250-14.87

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the widening of the existing intersection to improve the deficient turn radii.

Widening the existing intersection to improve the existing deficient turn radii, especially the eastbound US 250 to westbound SR 162 movement, would facilitate all movements for a WB-62 vehicle without oversteering.

The deficient intersection skew currently does not appear to be contributing to a crash problem so realigning SR 162 to improve the intersection angle was not considered. Although the proposed improvement does not include a realignment of SR 162, the widened intersection footprint by improving the turn radii will allow eastbound SR 162 left turning vehicles to square up better with US 250 improving sight distance.

#### Cost / Preliminary Indications

The widening of the existing intersection to improve the deficient turn radii at this location is expected to cost approximately \$65,000.

The proposed improvement is a qualitative improvement as a safety or operational benefit is unable to be quantified. The proposed improvement will result in qualitative benefits to freight flow by improving the deficient turn radii to accommodate WB-62 trucks.

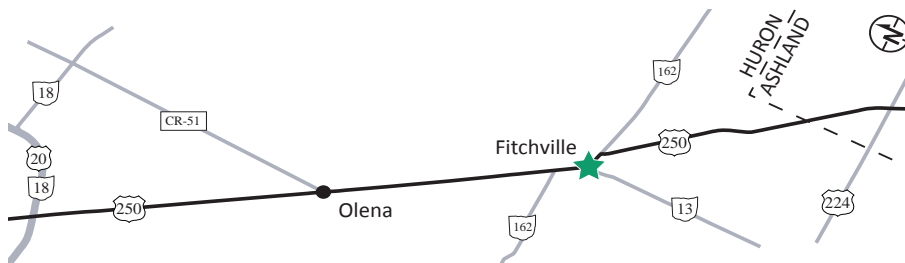
#### Benefit-Cost Summary

Proposed Project Cost	\$65,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a





### INTERSECTION: US 250 & SR 13 (FITCHVILLE RIVER ROAD) HUR-250-15.51



#### Location Overview

The unsignalized intersection of US 250 and SR 13 is located in rural Huron County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a major freight diversion point along US 250 as almost one-fourth of eastbound trucks depart for SR 13 southbound towards Mansfield.

#### Existing Conditions

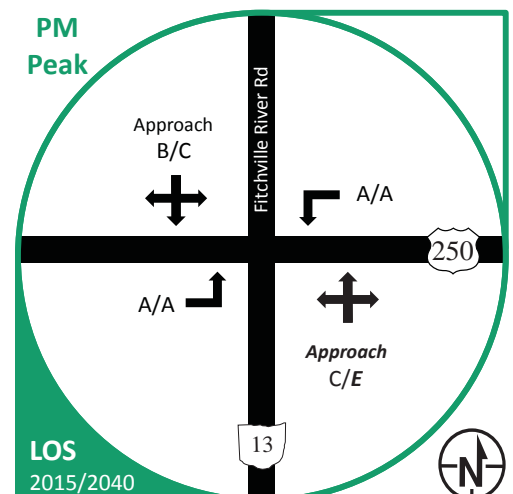
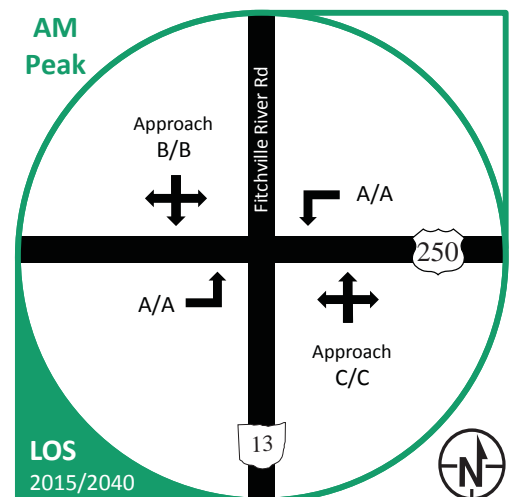
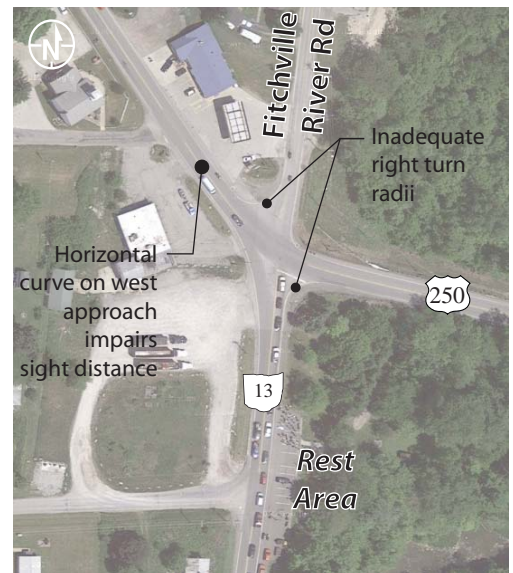
This two-way stop-control intersection has a single lane on all four approaches with SR 13/Fitchville River Road operating under stop control. The northbound (SR 13) approach volume is about four times greater than the southbound (Fitchville River Road) approach volume. The intersection is located on an abrupt horizontal curve with commercial development present on the two western corners and a Rest Area located just southeast of the intersection along SR 13.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. Both stop control approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during the AM peak hour. The northbound stop control approach operates at an unacceptable LOS E during the 2040 PM Peak Hour.

Crash analysis shows only six crashes observed at this intersection during a three-year period (2012 to 2014). Field inspection shows that the northwest and southeast corners are traveled off road to complete tight southbound/northbound right turn movements. The intersection skew west of the intersection impairs sight distance southbound looking east.

#### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but degrades to a LOS E on the northbound SR 13 approach in the 2040 PM peak hour. The existing intersection angle west of the intersection does not meet the L&D standard of 70 degrees, but this geometric deficiency does not appear to be causing crashes. Potential countermeasures to improve operation on the northbound approach include installation of traffic signal which is likely warranted.



### INTERSECTION: US 250 & SR 13 (FITCHVILLE RIVER ROAD) HUR-250-15.51

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included installing a traffic signal, installing a roundabout, installing a northbound left turn lane on SR 13, installing an eastbound right turn lane on US 250, and installing both a northbound left turn lane and eastbound right turn lane.

Installing a traffic signal at this location provides an annual travel time savings of 63 hours, but results in an expected crash increase of 4.3 crashes per year.

A signal warrant analysis was performed at the intersection and indicated that a signal was not warranted. Hourly volumes and trends in volumes indicated that the intersection may have met the eight-hour warrant if the count was continued past 6:00 pm.

The HCS capacity analysis for a signalized intersection improved to a LOS B in 2040. No measureable improvement was seen by installing turn lanes in conjunction with the signal.

Installing a roundabout was considered at this location and would provide travel time savings and safety benefits, but the physical constraints of the site preclude the geometric feasibility of installing a roundabout. This is due to adjacent commercial buildings on the northwest and southwest corners, the Vermillion River bridge on US 250, and the heavy skew of the eastbound US 250 approach.

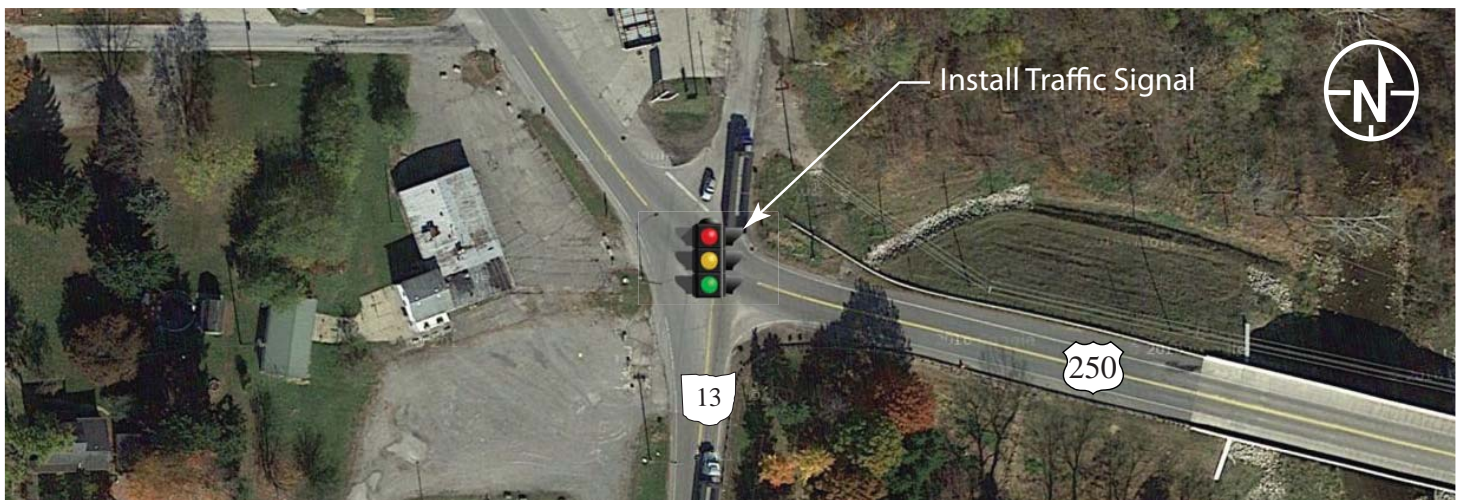
The installation of turn lanes (without signaling the intersection) all failed to achieve a LOS C or better, therefore these countermeasures were not explored further.

#### Cost / Preliminary Indications

The installation of a traffic signal at this intersection is estimated to cost \$152,000. This improvement results in a net negative benefit as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study. Although this proposed countermeasure results in a preliminary net negative benefit, it is being carried forward to the evaluation phase to assess overall economic impacts.

#### Benefit-Cost Summary

Proposed Project Cost	\$152,000
<i>Operational</i>	
Travel Time Savings (annual)	63 hours
PV Benefits	\$10,841
<i>Safety</i>	
Expected Annual Crash Adjustment	4.22
PV Benefits	-\$394,818
<i>Combined</i>	
PV Operational & Safety Benefits	-\$383,977
Preliminary B/C Ratio	0.00



### INTERSECTION: US 250 AND SR 162 (EAST) HUR-250-15.85



#### Location Overview

The unsignalized intersection of US 250 and SR 162 (east) is located in rural Huron County just east of Fitchville.

#### Existing Conditions

This three-leg intersection operates with US 250 westbound under stop control and US 250 eastbound and SR 162 westbound in free flow.

Crash analysis shows only one crash observed at this intersection during a three-year period (2012 to 2014).

The intersection angle (55°) is less than the L&D minimum 70° for an unsignalized intersection, but that intersection skew does not appear to be contributing to crashes. AutoTurn analysis shows insufficient turn radii for trucks turning right from westbound US 250 to eastbound SR 162 and for trucks turning left from westbound SR 162 to eastbound US 250.

Based on nearby ODOT traffic counts, the volumes on US 250 (west of the intersection) are about three times that of the SR 162 volumes.

#### Problem Statement & Potential Countermeasures

Geometric deficiencies at this location include insufficient truck turn radii and substandard intersection skew. Intersection skew does not appear to be causing crashes, but inadequate turn radii are an impediment to freight movements. Potential countermeasures should explore reconfiguring pavement striping and/or the traffic island to facilitate truck turning movements.



#### *Pictured Above:*

US 250 WB at the stop control approach to intersection with SR 162 east of Fitchville. US 250 EB and SR 162 WB approaches are free flow.



### INTERSECTION: US 250 AND SR 162 (EAST) HUR-250-15.85

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the widening/reconfiguration of the existing intersection to improve the deficient turn radii as well as realigning so that US 250 is the through movement and SR 162 intersects under stop control.

Realigning the intersection to make US 250 the through, free-flow movement was not considered further due to physical constraints, intersection and stopping sight distance restrictions, and safety concerns. The existing curve on US 250 meets design criteria for approximately 30 MPH. The property on the east side of US 250 as well as the waterway and steep embankment to the south and west of US 250 restrict the development of a horizontal curve to meet higher design speeds.

Improving the intersection radius without realigning will allow westbound US 250 left turning vehicles to square up better with the intersection improving sight distance.

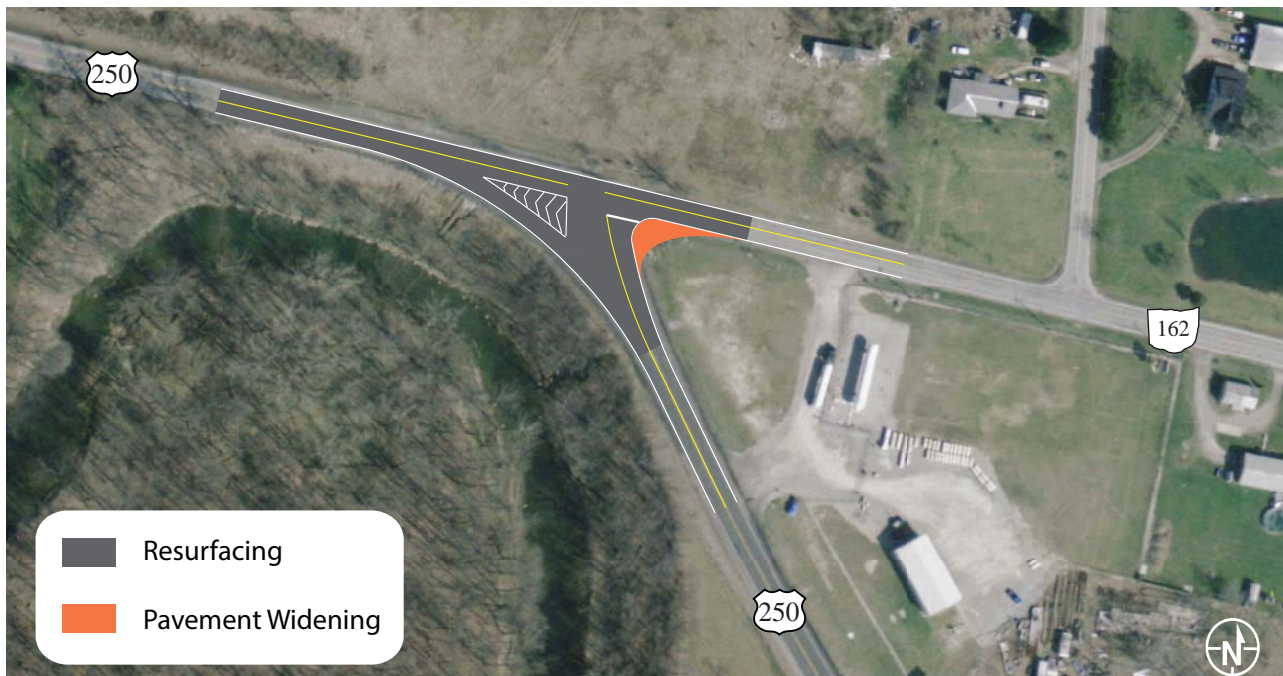
#### Cost / Preliminary Indications

The widening/reconfiguration of the existing intersection to improve the deficient turn radius at this location is estimated to cost approximately \$130,000.

This improvement is a qualitative improvement as a safety or operational benefit is unable to be quantified. The proposed improvement will result in qualitative benefits to freight flow by improving the deficient turn radius to accommodate WB-62 trucks.

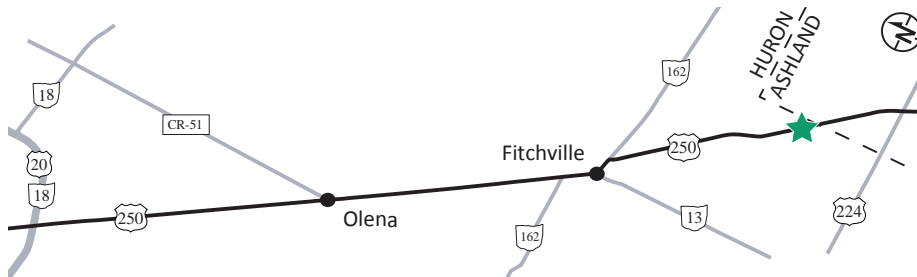
#### Benefit-Cost Summary

Proposed Project Cost	\$130,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a





### BRIDGE: CSX RR OVER US 250 HUR-250-19.60 (SFN 3903931)



#### Location Overview

The steel girder structure carrying CSX RR over US 250 (SFN 3903931) is located in rural southern Huron County 1.85 miles north of US 224.

#### Existing Conditions

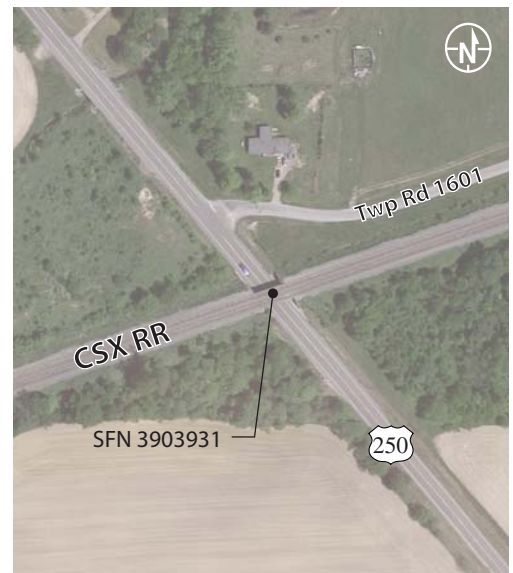
This single-span structure was constructed in 1936 and carries two CSX RR tracks over a two-lane segment of US 250.

The structure has a General Appraisal of Four indicating it is in Poor Condition and Structurally Deficient. The superstructure has a Summary Rating of 4 due to the floor beams and protective coating system being in poor condition.

The existing vertical clearance (14.5 ft.) along US 250 under this structure is substandard. The minimum vertical clearance for an arterial is 16.5 ft. per L&D Vol. 1, 302-1E. Lateral clearance along US 250 under this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure has a General Appraisal of Four (Poor) and if it deteriorates further could lead to a closure of the structure and a freight bottleneck below on US 250 during its reconstruction. The structure has a substandard vertical clearance of 14.5 ft. which poses a potential freight bottlenecks for oversize loads. Potential countermeasures should explore reconstructing the existing structure to improve its condition to a satisfactory or better level and increase vertical clearance below it to a standard 16.5 ft.



#### Inspection Summary

Deck	6
<b>Superstructure</b>	<b>4</b>
Substructure	7
Culverts	n/a
Channel	n/a
Approaches	7

<b>General Appraisal</b>	<b>4</b>
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#### Load Rating

% of Ohio Legal Load	n/a
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#### Clearances

Lateral	8'
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<b>Vertical</b>	<b>14'-4"</b>
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### BRIDGE: CSX RR OVER US 250 HUR-250-19.60 (SFN 3903931)

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location include the reconstruction of the existing structure to increase the vertical clearance below along US 250 to a standard 16.5 ft.

This improvement would address the substandard vertical clearance that restricts the movement of some oversize freight loads.

#### Cost / Preliminary Indications

The reconstruction of the existing structure to increase the vertical clearance below along US 250 to a standard 16.5 ft. is estimated to cost \$8,356,000.

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by increasing the vertical clearance to accommodate oversize loads.

#### Benefit-Cost Summary

Proposed Project Cost	\$8,356,000
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#### Operational

Travel Time Savings (annual)	n/a
------------------------------	-----

PV Benefits	n/a
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#### Safety

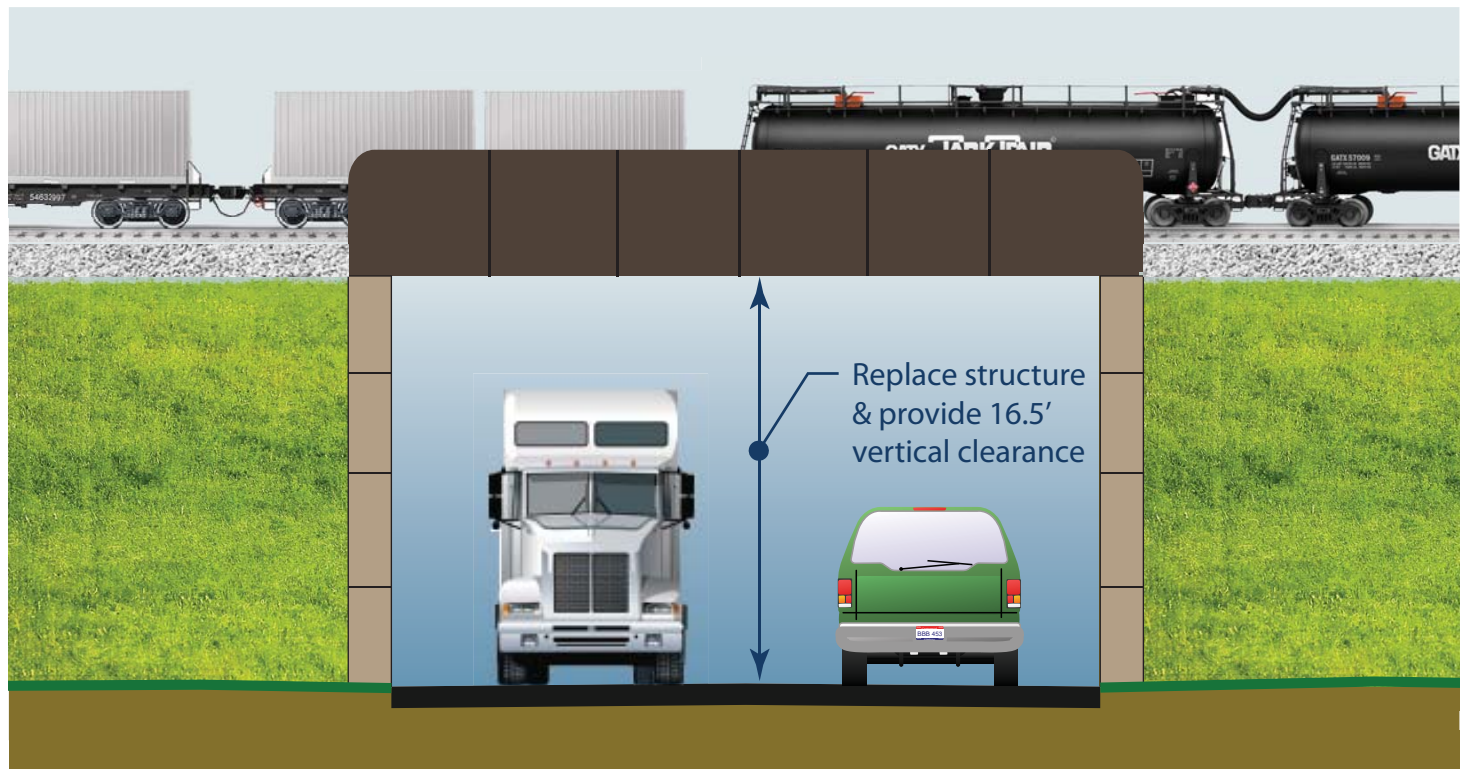
Expected Annual Crash Adjustment	n/a
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PV Benefits	n/a
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#### Combined

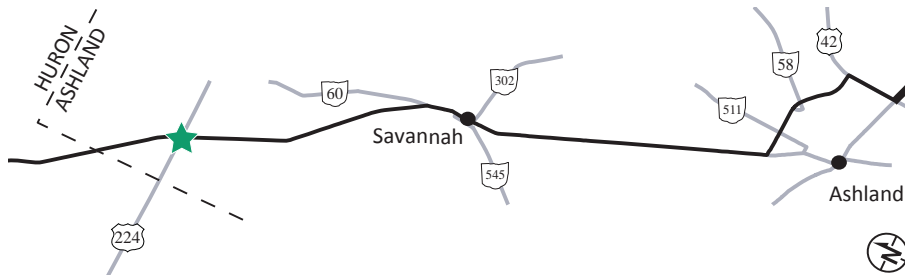
PV Operational & Safety Benefits	n/a
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Preliminary B/C Ratio	n/a
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### INTERSECTION: US 250 & US 224

ASD-250-1.61



### Location Overview

The signalized intersection of US 250 and US 224 is located in rural northern Ashland County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a major freight diversion point as over one-third of southbound trucks depart for US 224 eastbound which eventually connects to I-76 to Akron and points east.

### Existing Conditions

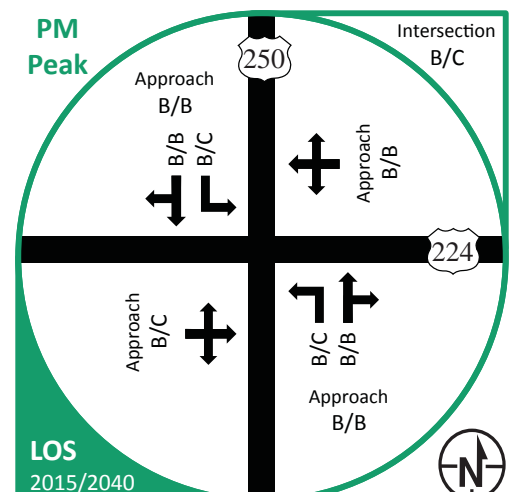
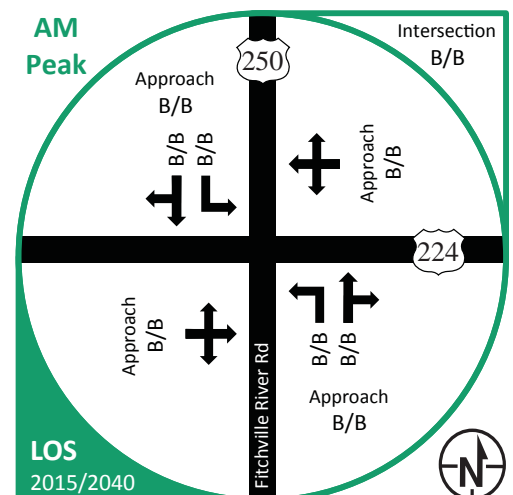
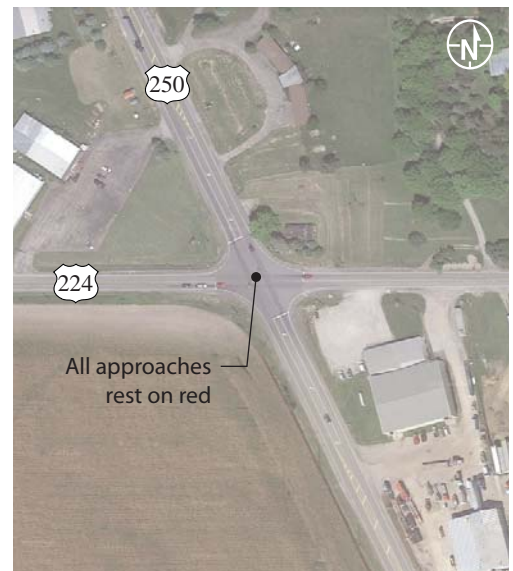
This four-leg intersection is in a rural area with commercial development on the northwest and southeast corners. Both US 250 approaches have well-developed left turn lanes. The signal operation is unique in that it rests in all red until actuated as a previously implemented countermeasure to trucks running this signal.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

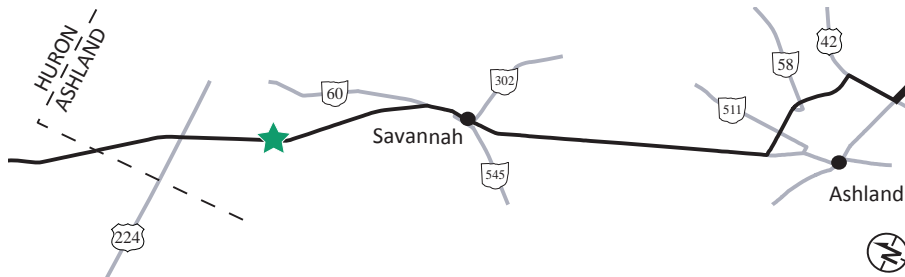
Crash analysis shows only two crashes observed at this intersection during a three-year period (2012 to 2014) with neither involving a truck so no further safety analysis is required.

### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS and exhibits no crash patterns. No countermeasures are recommended at this location.



### BRIDGE: US 250 OVER MYERS BRANCH OF VERMILION RIVER ASD-250-3.54 (SFN 0304654)



#### Location Overview

The concrete slab structure (SFN 0304654) carrying US 250 over the Myers Branch of Vermilion River is located in rural northern Ashland County 1.9 miles south of US 224.

#### Existing Conditions

This three-span structure was constructed in 1931 and carries a two-lane segment of US 250.

The structure has a General Appraisal of Five indicating it is in Fair Condition. The Load Rating for this structure is 140% of the Ohio Legal Load. Structures with a Load Rating of less than 150% of the Ohio Legal Limit potentially restrict the freight flow of Permit Loads along the corridor.

The existing lateral clearance (7.2 ft.) along US 250 on this structure is substandard. The minimum lateral clearance for an arterial is eight ft. per L&D Vol. 1, 302-1E.

#### Problem Statement & Potential Countermeasures

The existing structure has Load Rating of 145% of the Ohio Legal Load and a substandard lateral clearance of 7.2 ft., both of which pose a potential freight bottleneck for oversize/overweight loads. Potential countermeasures should explore rehabilitating/reconstructing the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increasing its lateral clearance to a standard eight ft.

#### Inspection Summary

Deck	6
Superstructure	6
Substructure	5
Culverts	n/a
Channel	5
Approaches	6
General Appraisal	5

#### Load Rating

% of Ohio Legal Load	140
----------------------	-----

#### Clearances

Lateral	7.2'
Vertical	n/a



### BRIDGE: US 250 OVER MYERS BRANCH OF VERMILION RIVER ASD-250-3.54 (SFN 0304654)

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase its lateral clearance to a standard eight ft. This improvement would address the substandard load rating and lateral clearance that restrict the movement of some overweight/oversize freight loads.

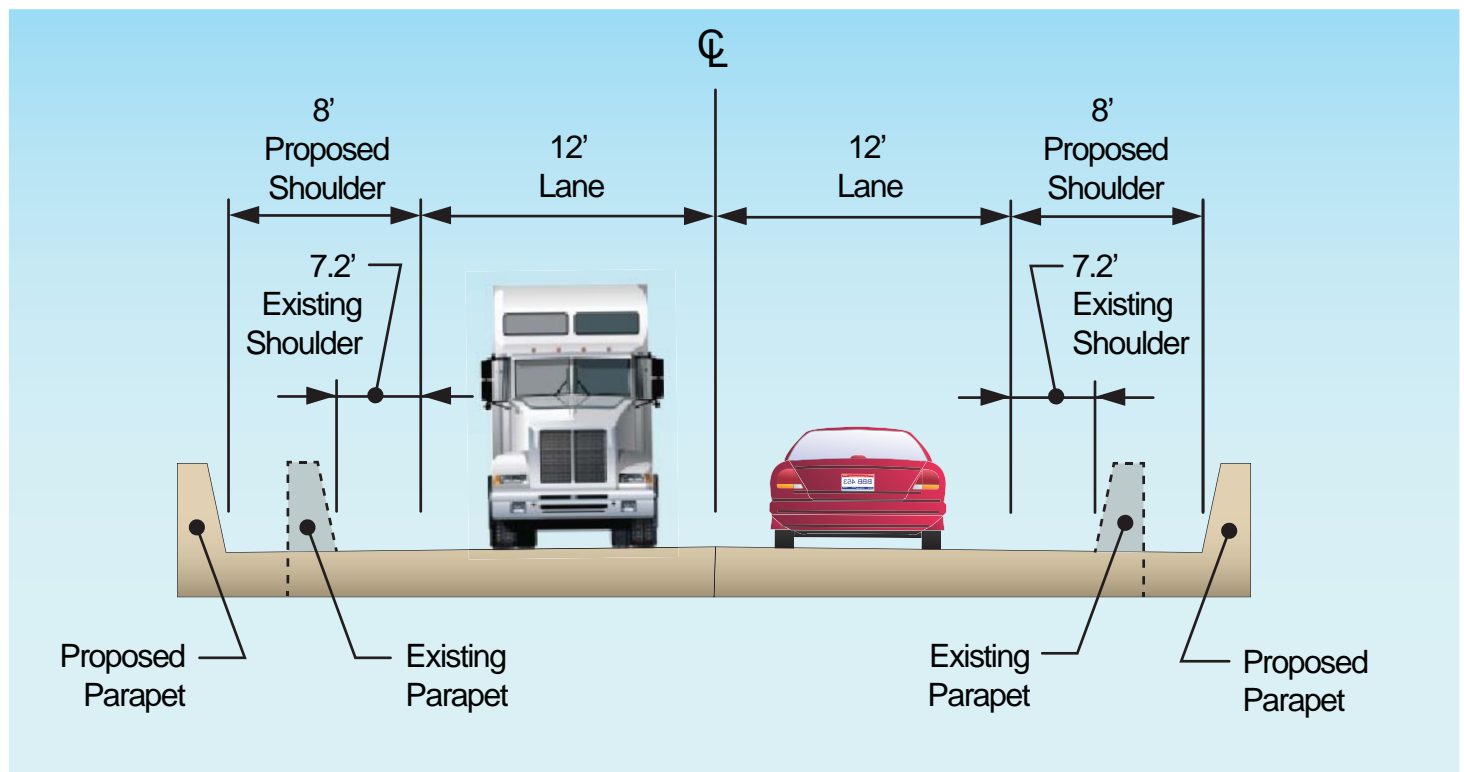
#### Cost / Preliminary Indications

The reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase its lateral clearance to a standard eight ft. is estimated to cost \$191,000.

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by improving the load rating to accommodate overweight loads and increasing the lateral clearance to accommodate oversize loads.

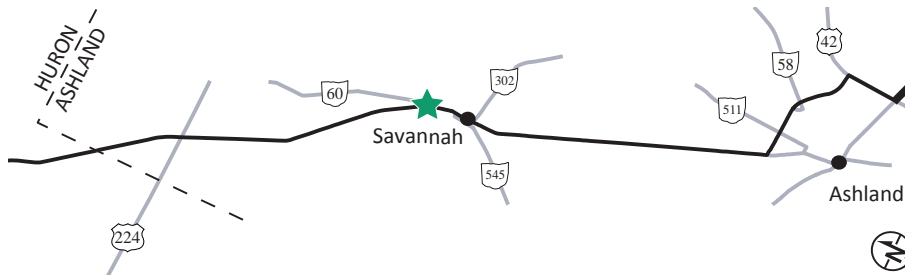
#### Benefit-Cost Summary

Proposed Project Cost	\$191,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



### INTERSECTION: US 250 & SR 60 (NORTH)

ASD-250-6.28



### Location Overview

The unsignalized intersection of US 250 and SR 60 is located in rural Ashland County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted in order to obtain traffic data at a location between US 224 and the City of Ashland.

### Existing Conditions

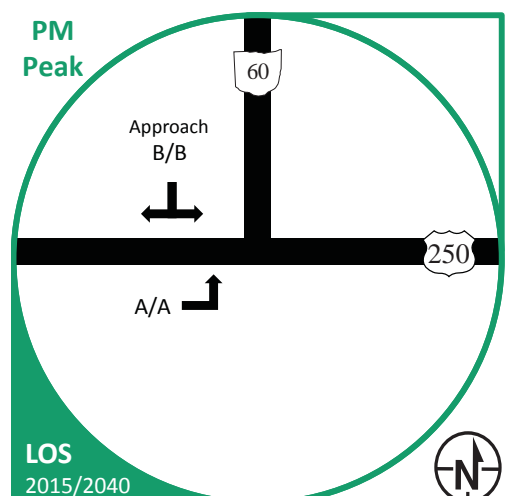
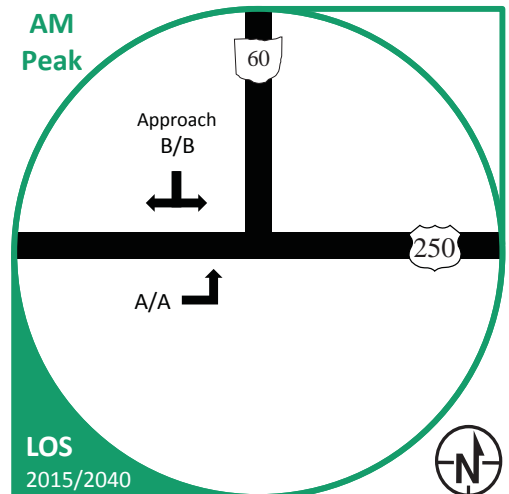
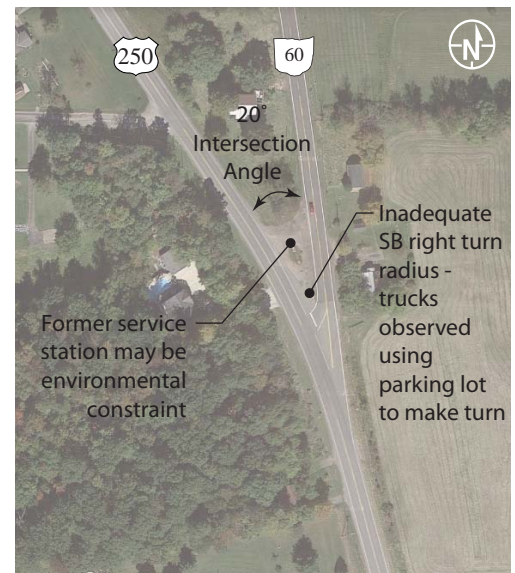
This three-leg stop control intersection operates with SR 60 under stop control and US 250 in free flow.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

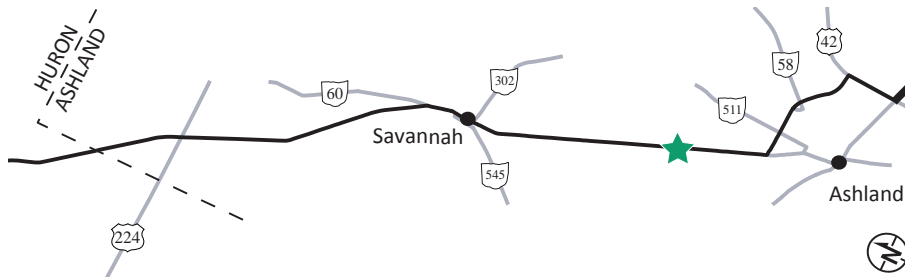
Crash analysis shows only two crashes observed at this intersection during a three-year period (2012 to 2014). A severe intersection skew angle (20°) impairs sight distance at the southbound SR 60 stop control approach, but that intersection skew does not appear to be contributing to crashes.

### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS and exhibits no crash patterns. While the intersection skew does not meet L&D standards, it has negligible impacts on freight movements with only 70 trucks per day traveling on the SR 60 approach. No countermeasures are recommended at this location.



### BRIDGE: US 250 OVER BRANCH OF LONG CREEK ASD-250-11.62 (SFN 0304808)



#### Location Overview

The concrete slab structure (SFN 0304808) carrying US 250 over the Branch of Long Creek is located in rural Ashland County 1.1 miles north of Faultless Drive.

#### Existing Conditions

This two-span structure was constructed in 1961 and carries a two-lane segment of US 250.

The structure has a General Appraisal of Five indicating it is in Fair Condition. The Load Rating for this structure is 150% of the Ohio Legal Load.

The existing lateral clearance (4.1 ft.) along US 250 on this structure is substandard. The minimum lateral clearance for an arterial is eight ft. per L&D Vol. 1, 302-1E.

#### Problem Statement & Potential Countermeasures

The existing structure has a substandard lateral clearance of 4.1 ft. which poses a potential freight bottleneck for oversize loads. Potential countermeasures should explore reconstructing the existing structure to increase its lateral clearance to a standard eight ft.



#### Inspection Summary

Deck	6
Superstructure	6
Substructure	5
Culverts	n/a
Channel	6
Approaches	6
General Appraisal	5

#### Load Rating

% of Ohio Legal Load	150
----------------------	-----

#### Clearances

Lateral	4.1'
Vertical	n/a

### BRIDGE: US 250 OVER BRANCH OF LONG CREEK ASD-250-11.62 (SFN 0304808)

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to increase its lateral clearance to a standard eight ft. This improvement would address the substandard lateral clearance that restricts the movement of some oversize freight loads.

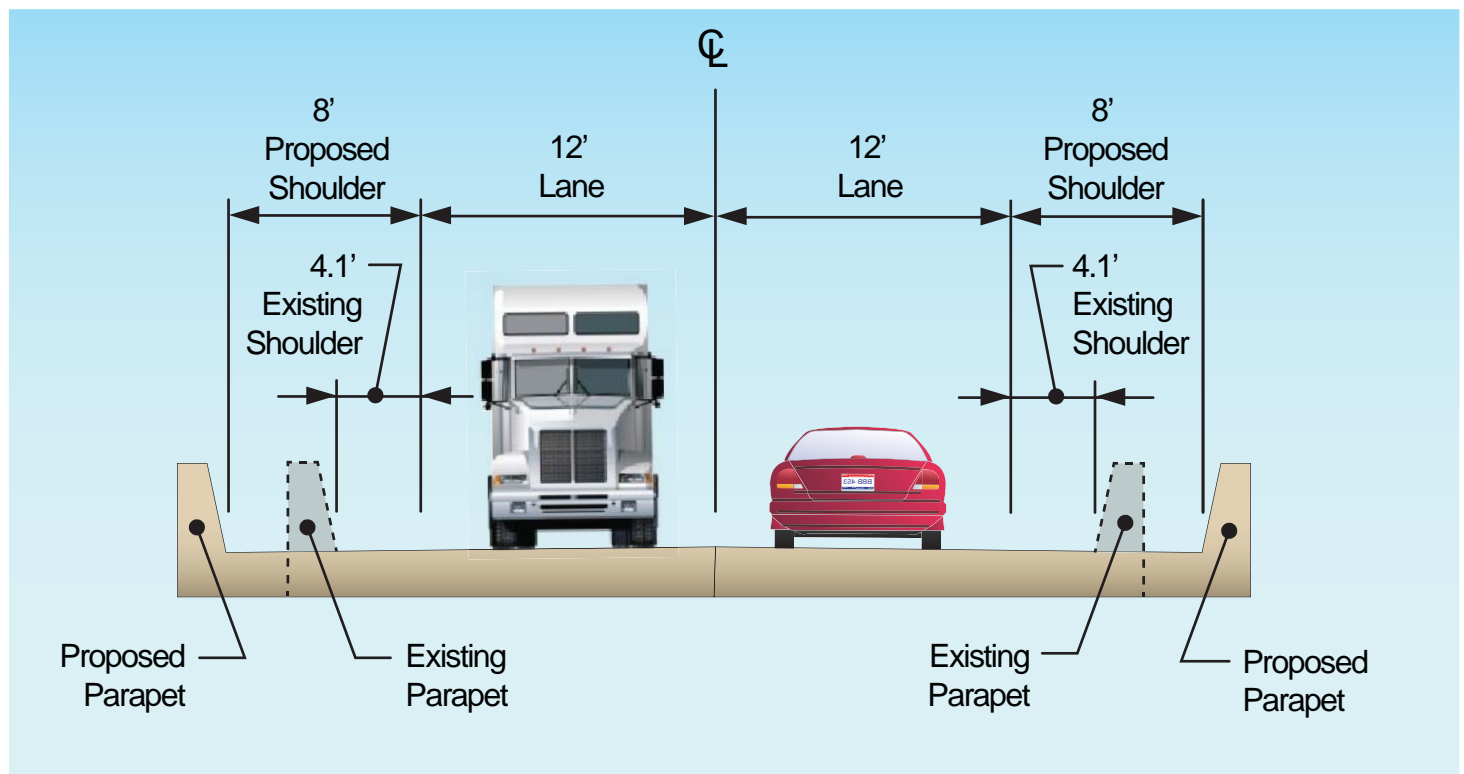
#### Cost / Preliminary Indications

The reconstruction of the existing structure to increase its lateral clearance to a standard eight ft. is estimated to cost \$391,000.

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by increasing the lateral clearance to accommodate oversize loads.

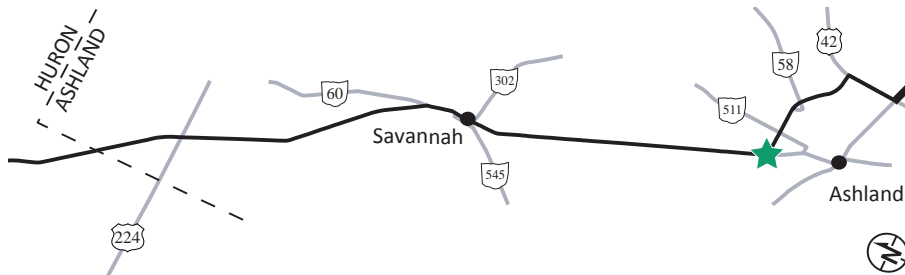
#### Benefit-Cost Summary

Proposed Project Cost	\$391,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a





### INTERSECTION: US 250 & SR 60 (SOUTH)/FAULTLESS DRIVE ASD-250-12.72



#### Location Overview

The unsignalized intersection of US 250 and SR 60/Faultless Drive is located at the northern edge of the City of Ashland in Ashland County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted as Faultless Drive is a major freight destination as the entrance to the Ashland Business Park.

#### Existing Conditions

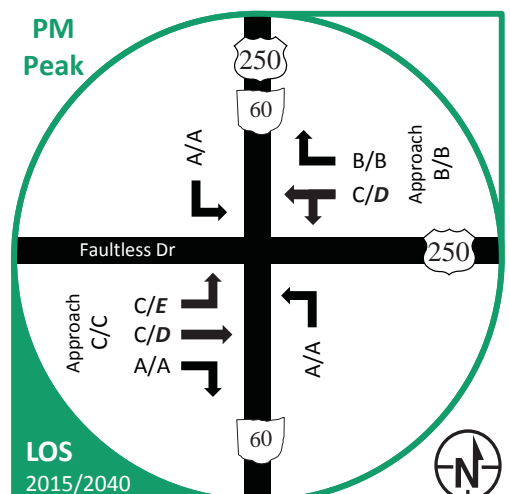
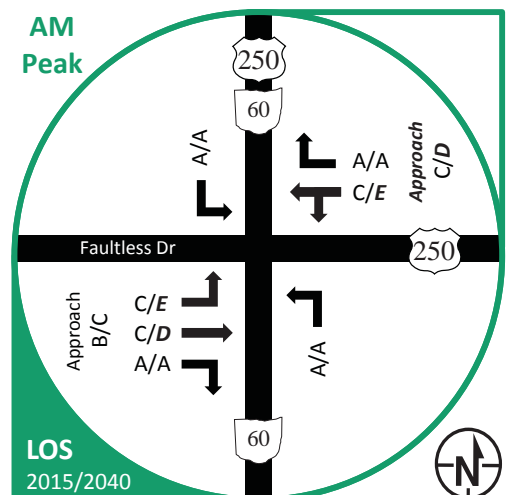
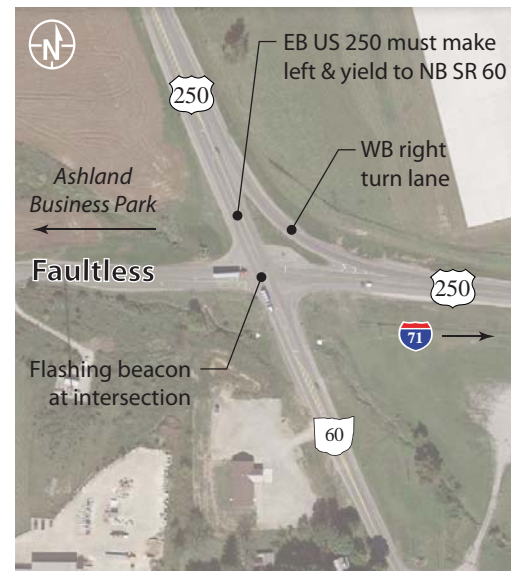
This two-way stop-control intersection operates with Faultless Drive and westbound US 250 under stop control, but with a continuous right turn on the westbound US 250 approach. Eastbound US 250 traffic must turn left and yield to northbound SR 60 traffic. A flashing beacon is present at this location.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. Both stop control approaches operate at an acceptable LOS (C or better) in 2015 in both the AM and PM peak hours. The westbound stop control approach operates at an unacceptable LOS D and LOS E during the 2040 AM Peak Hour and PM Peak Hour, respectively. The eastbound stop control left turn movement (LOS E) and through movement (LOS D) both operate at unacceptable levels in both the 2040 AM and PM Peak Hours.

Crash analysis shows seven crashes observed at this intersection during a three-year period (2012 to 2014) with four angle crashes. One crash involved a truck load shift and overturning while making a left turn along US 250 eastbound. Sight distance is poor looking north due to a crest vertical curve.

#### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but degrades to LOS D/E at two approaches in both 2040 peak hours. Potential countermeasures should explore reconfiguring the intersection (i.e. installation of a roundabout) in a manner that operates at an acceptable LOS and provides potential for safety improvement by addressing geometric deficiencies while maintaining preferential treatment to the dominant US 250 through movements.



### INTERSECTION: US 250 & SR 60 / FAULTLESS DRIVE ASD-250-12.72

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included installing four-way stop control, installing a roundabout, and installing a traffic signal.

Installing four-way stop control provides an annual increase in travel time (521 hours), but results in an expected crash reduction of 2.1 crashes per year. The resulting HCS capacity analysis showed an overall intersection improvement to LOS B though average vehicle delay increased slightly due to the fact that currently the heaviest US 250 movements are operating at LOS A while the lighter movements are failing (LOS D/E). When balanced to achieve an overall intersection LOS B, delay for the heavier movements suffers slightly resulting in a negative weighted delay savings.

Installing a roundabout provides an annual decrease in travel time (1,667 hours), and results in an expected crash reduction of 2.2 crashes per year.

Installing a traffic signal provides an annual increase in travel time (721 hours) and results in an expected crash increase of 1.7 crashes per year, therefore this countermeasure was not considered further.

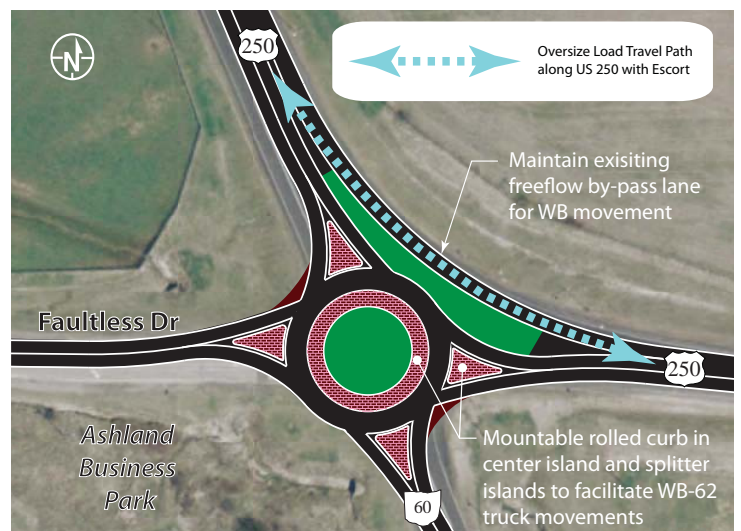
#### Cost / Preliminary Indications

The installation of four-way stop control is estimated to cost \$14,000. This improvement results in a Preliminary B/C Ratio of 57.33 as summarized in the table displayed right. Although the four-way stop increases delay on US 250, it was carried forward to weigh the reduction of crashes and any economic benefits.

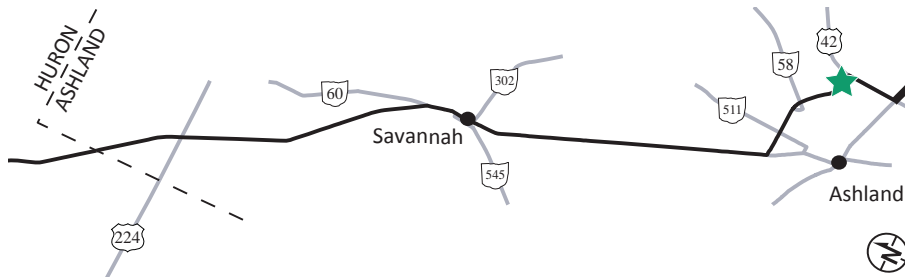
The installation of roundabout is estimated to cost \$1,100,000. This improvement results in a Preliminary B/C Ratio of 1.67 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

#### Benefit-Cost Summary

	4-Way Stop Control	Roundabout
Proposed Project Cost	\$14,000	\$1,100,000
<i>Operational</i>		
Travel Time Savings (annual)	-514 veh-hrs	1,667 veh-hrs
PV Benefits	-\$84,209	\$272,927
<i>Safety</i>		
Expected Annual Crash Adjustment	-2.319	-2.194
PV Benefits	\$886,814	\$1,563,456
<i>Combined</i>		
PV Operational & Safety Benefits	\$802,605	\$1,836,383
Preliminary B/C Ratio	57.33	1.67



### INTERSECTION: US 250 AND CLEVELAND AVENUE (CR 42B) ASD-250-14.79



#### Location Overview

The unsignalized intersection of US 250 and Cleveland Ave (CR 42B) is located in the City of Ashland in Ashland County 0.2 miles west of US 42.

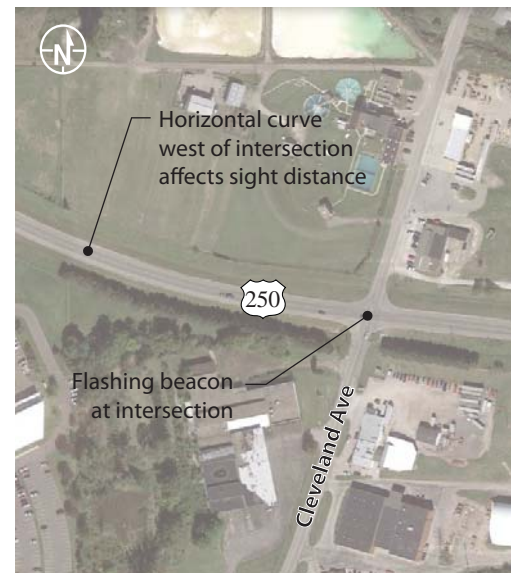
#### Existing Conditions

This two-way stop-control intersection operates with Cleveland Avenue under stop control and US 250 in free flow. A flashing beacon is present at the intersection.

Crash analysis shows nine angle crashes observed at this intersection during a three-year period (2012 to 2014). Crashes occurred largely on weekends during the midday hours. Possible causes include intersection sight distance restrictions, the inability of drivers on Cleveland Avenue to judge gaps in US 250 traffic - likely due to the sweeping curve on US 250 to the west, and driver impatience. While not a consistently heavy movement, eastbound traffic waiting to turn left onto US 42 traffic does limit sight distance for vehicles on northbound Cleveland Avenue.

#### Problem Statement & Potential Countermeasures

Safety analysis shows a high frequency of angle crashes at this intersection. Potential countermeasures include upgrading intersection signage to improve intersection awareness as well as reviewing signal warrants and analyzing alternative intersection control.



*Pictured Above:*

Looking west along US 250 at the intersection with Cleveland Ave near the ODOT District 3 office.



### INTERSECTION: US 250 AND CLEVELAND AVENUE (CR 42B) ASD-250-14.79

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included upgrading warning signage along US 250 in advance of the intersection and revising intersection traffic control (signal or roundabout). A traffic signal or roundabout was not considered further at this time as both of these alternatives would increase delay for freight traffic on US 250.

Although flashing beacons are currently present at the intersection, upgrading the existing intersection warning signs on US 250 to solar powered embedded LED border signs would improve intersection awareness. As part of this countermeasure, the sign location for eastbound US 250 should be relocated closer to the intersection in accordance with OMUTCD guidelines for advanced placement of warning signs. A crash modification factor is not applicable for this countermeasure so an expected crash reduction cannot be calculated.

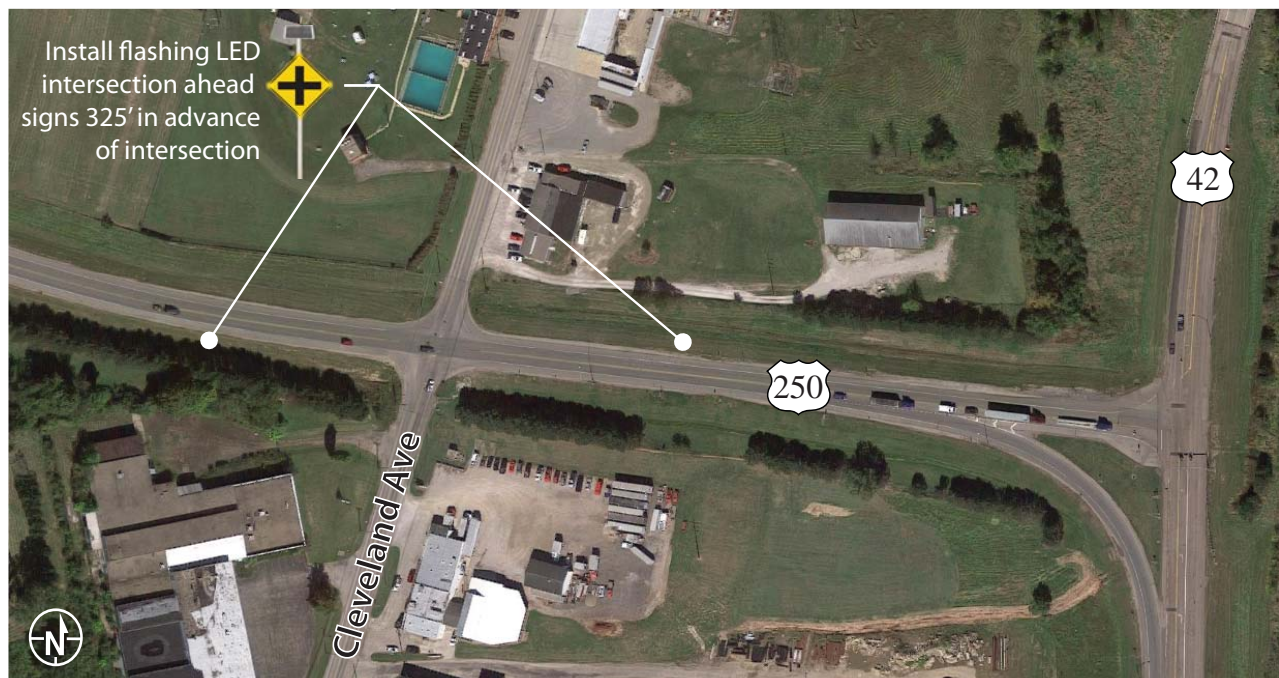
#### Cost / Preliminary Indications

The upgrade of existing intersection warning signs to solar powered embedded LED border signs (including removal and relocation of the existing signs and installation of two solar powered LED sign assemblies) is estimated to cost approximately \$6,000.

This improvement is a qualitative improvement as a safety or operational benefit is unable to be quantified. The proposed improvements will result in qualitative benefits to freight flow by increasing the visibility of this intersection on both approaches.

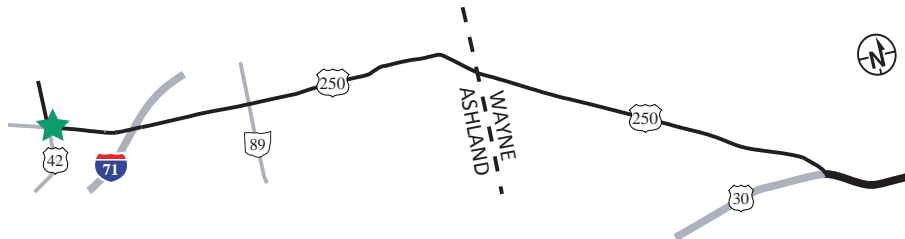
#### Benefit-Cost Summary

Proposed Project Cost	\$6,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a





### SEGMENT: US 250 FROM US 42 TO AMBERWOOD PARKWAY ASD-250-16.30 TO ASD-250-17.00



#### Location Overview

The segment of US 250 between US 42 and Amberwood Parkway is four/five-lane urban arterial in a rapidly commercializing area of the City of Ashland in Ashland County.

#### Existing Conditions

INRIX data shows this segment as one of two primary locations exhibiting travel time delays along the entire US 250 corridor, along with the Sandusky region.

Crash analysis shows a high concentration of crashes (92) observed along this 0.7-mile segment during a three-year period (2012 to 2014) with the majority being rear end (51). There were 30 injury crashes and only three crashes involved trucks.

#### Problem Statement & Potential Countermeasures

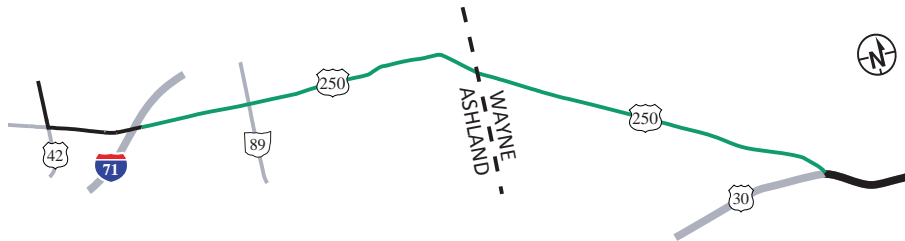
An underway project (PID 88739) will alleviate congestion and enhance safety by removing the US 42 bridge, lowering US 42 and creating a signalized intersection at East Main Street. The area will be widened to provide additional through and turning lanes on the intersection approaches. No further countermeasures are recommended at this location.



*Pictured Above:*

Aerial view of the previous condition at US 250 and US 42 in the City of Ashland.

### SEGMENT: US 250 FROM I-71 TO US 30 ASD-250-18.17 TO WAY-250-7.21



#### Location Overview

The two-lane segment of US 250 between I-71 and Wayne County traverses rolling farmland in rural eastern Ashland County. The existing ADT is 6,300 vehicles with 20% trucks.

#### Existing Conditions

Two locations along this segment were listed in ODOT's 2014 HSIP Top 500 rural non-freeway, one just east of the I-71 interchange and the other in a location where vertical sight distance is likely a contributing factor. Another location in Wayne County just southwest of Firestone Road was ranked on the 2013 list with vertical sight distance likely a factor.

Crash analysis shows 117 crashes observed along this segment during a three-year period (2012 to 2014) with 38 crashes citing a vehicle leaving the roadway and 30 animals crashes. There were zero fatal crashes and 30 injury crashes observed during this period.

Substandard three-ft. shoulders are present along this segment as the L&D standard is eight ft. for an arterial. Vertical sight distance is an issue along this segment. Freight stakeholders opined that truck passing/climbing lanes would be desirable along this segment due to vehicles following too closely as trucks slow down on steep grades.

Two segments along this section of the corridor have a Fair to Poor PCR (56-64): WAY-250-0.00 to 1.29 and WAY-250-5.51 to 6.74.

#### Problem Statement & Potential Countermeasures

Safety analysis shows a high frequency of vehicle leaving lane crashes along this segment, likely correlating to deficient (three ft.) shoulder widths. Potential low-cost countermeasures include installation of edge line rumble stripes.

Two segments along this section of the corridor have a Fair to Poor PCR, but both are already programmed for resurfacing in SFY 2017.



*Pictured Above:*

The rolling terrain along US 250 looking SE just east of Twp Rd 1400 in Perry Twp, Ashland County.

ODOT HSIP Rural Non-Freeway List			
County	SLM	2013 Rank	2014 Rank
ASD	17.47	158	-
ASD	18.3-18.4	-	226
ASD	20.89-20.99	-	277
WAY	3.92-4.02	492	-

**SEGMENT: US 250 FROM I-71 TO US 30**  
**ASD-250-18.17 TO WAY-250-7.21**

### Concepts / Countermeasures & Operational Analysis

Countermeasures considered along this segment included installing edge line rumble stripes and wider six inch pavement markings, comprehensive resigning of the entire segment, and widening the existing shoulder from three ft. to a standard eight ft.

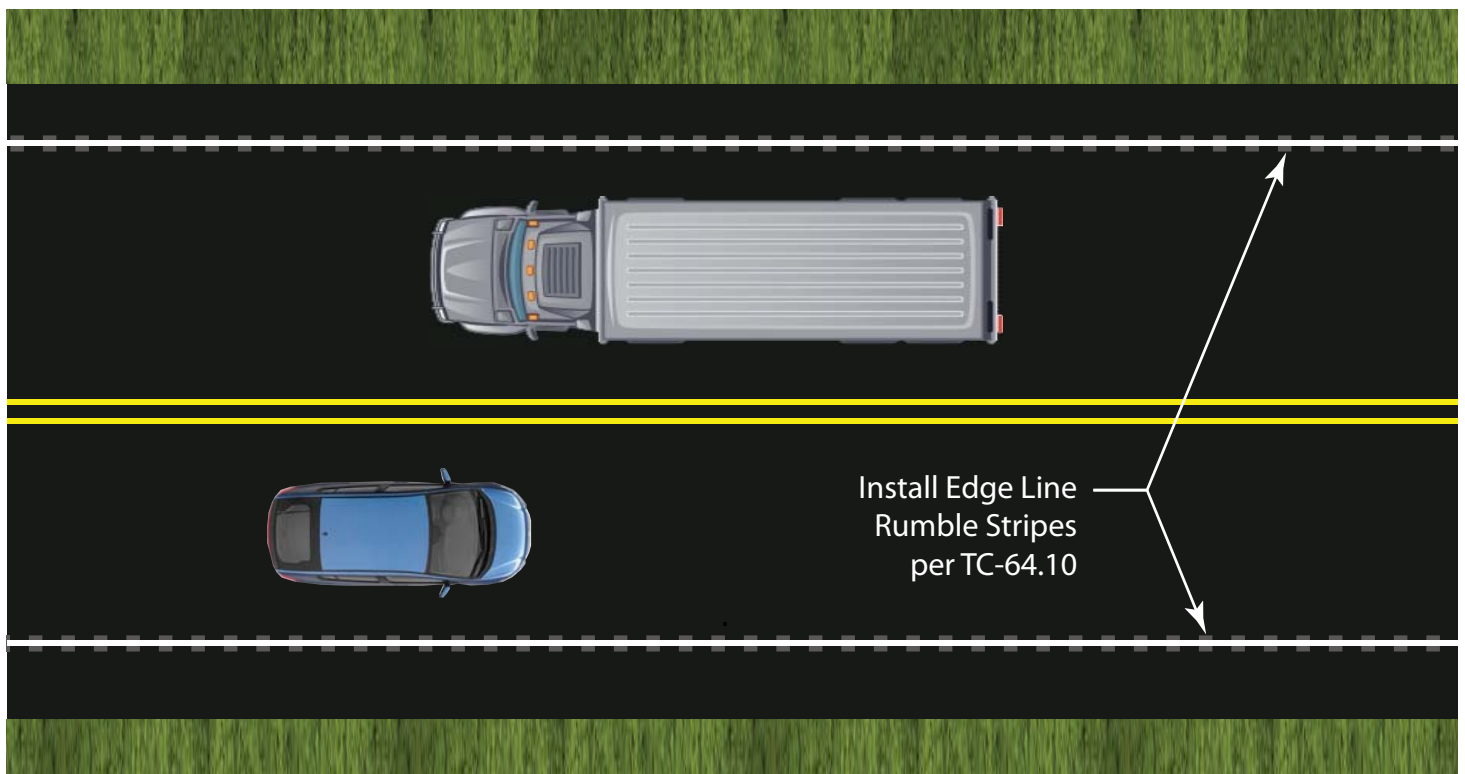
Installing edge line rumble stripes and wider six inch pavement markings would result in an expected crash reduction of 3.4 crashes per year. A comprehensive resigning of the entire segment would result in an expected crash reduction of 2.0 crashes per year. Widening the existing shoulders was considered, but not assessed in detail due to lower feasibility of this improvement given physical constraints and right-of-way impacts.

### Cost / Preliminary Indications

A programmed ODOT resurfacing project (PID 88801) will include the installation of edge line rumble stripes and therefore this alternative was not carried forward with costs or B/C analysis.

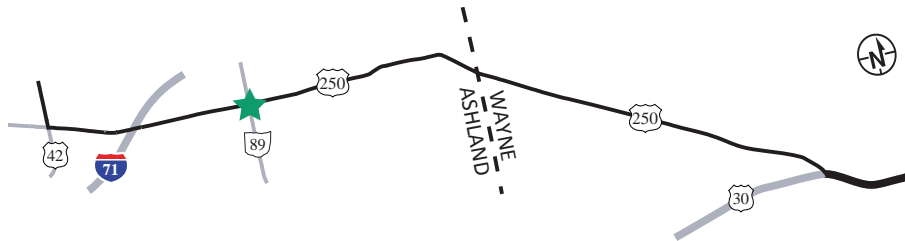
### Benefit-Cost Summary

Proposed Project Cost	\$n/a
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



### INTERSECTION: US 250 & SR 89

ASD-250-20.39



### Location Overview

The unsignalized intersection of US 250 and SR 89 is located in rural Ashland County just over 2 miles east of I-71. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted in order to obtain traffic data at a location between I-71 and the City of Wooster.

### Existing Conditions

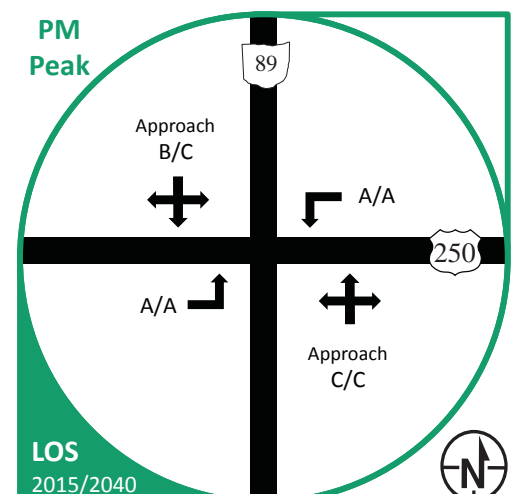
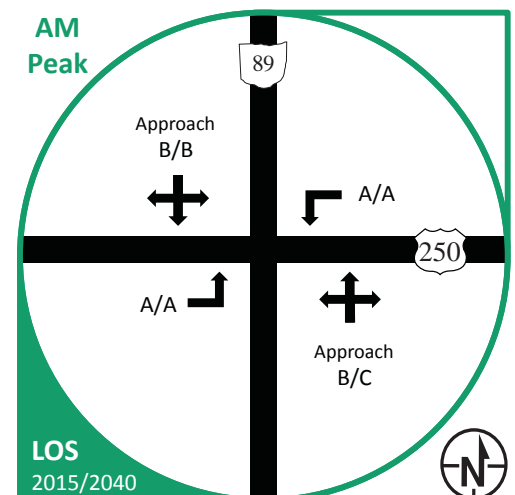
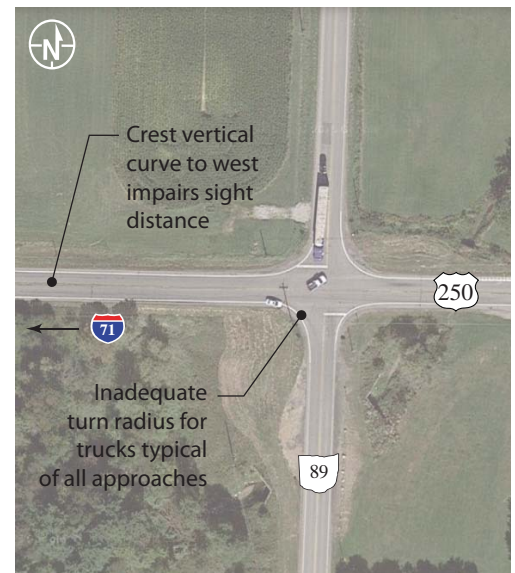
This two-way stop control intersection operates with both SR 89 approaches under stop control with all approaches having a single lane.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows five crashes observed at this intersection during a three-year period (2012 to 2014) with three angle crashes and two crashes involving a truck (both angle crashes). Sight distance at this location is likely deficient due to an adjacent crest vertical curve to the west. AutoTurn analysis shows inadequate turn radii for trucks.

### Problem Statement & Potential Countermeasures

The existing intersection operates at an acceptable LOS, but geometric deficiencies exist including insufficient truck turn radii and sight distance issues. Potential countermeasures should explore pavement widening to facilitate truck turning movements and improved warning signage to mitigate sight distance issues.





### INTERSECTION: US 250 & SR 89 ASD-250-20.39

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the widening of the existing intersection to improve the deficient turn radii at this location and the installation of flashing beacons.

Widening the existing intersection to improve the existing deficient turn radii would facilitate all movements for a WB-62 truck without oversteering.

The installation of flashing beacons were considered at the intersection due to the vertical curve sight distance restriction. However, very few crashes were recorded at this intersection between 2012 and 2014 so this higher cost improvement was not carried forward for preliminary benefit-cost analysis.

#### Cost / Preliminary Indications

The widening of the existing intersection to improve the deficient turn radii at this location is expected to cost approximately \$65,000.

The proposed improvements are qualitative as a safety or operational benefit is unable to be quantified. The proposed improvements will result in qualitative benefits to freight flow by improving the deficient turn radii to accommodate WB-62 trucks.

#### Benefit-Cost Summary

##### Proposed Project Cost

Widen Intersection	\$65,000
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##### Operational

Travel Time Savings (annual)	n/a
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PV Benefits	n/a
-------------	-----

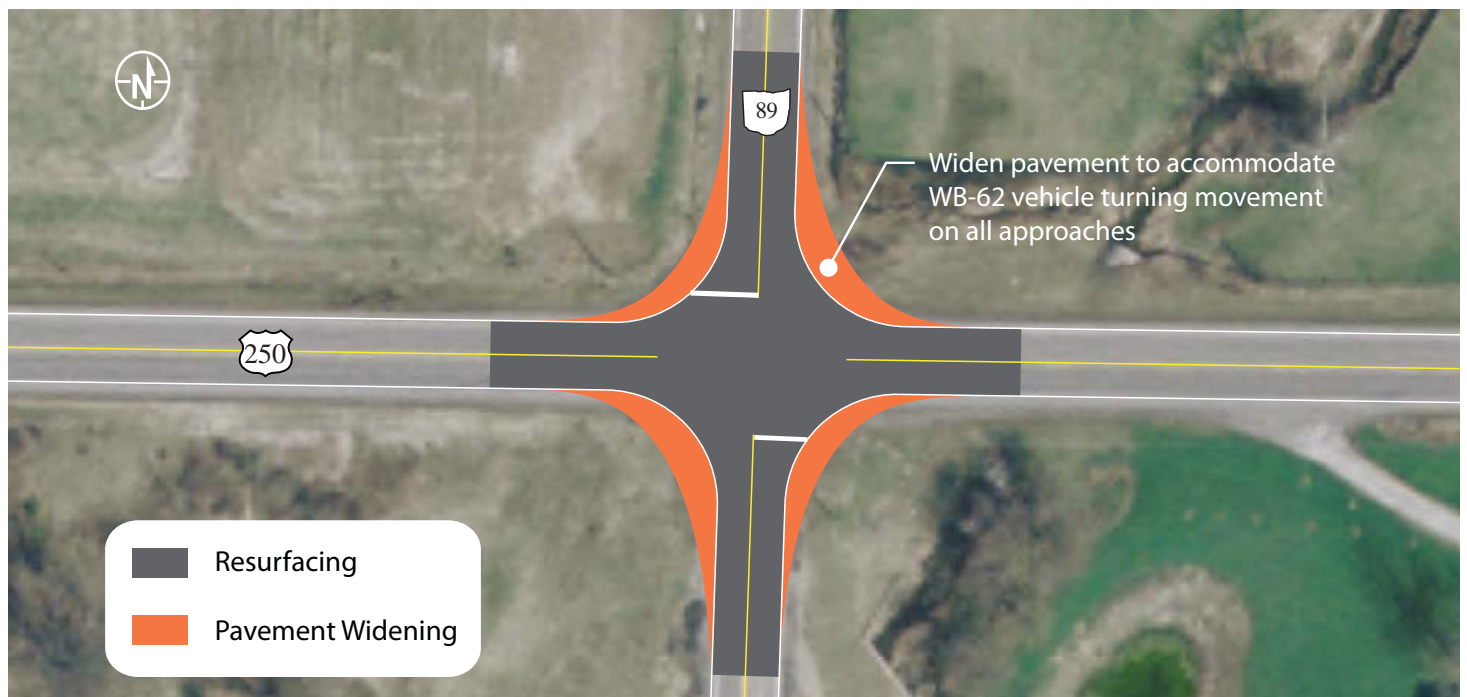
##### Safety

Expected Annual Crash Adjustment	n/a
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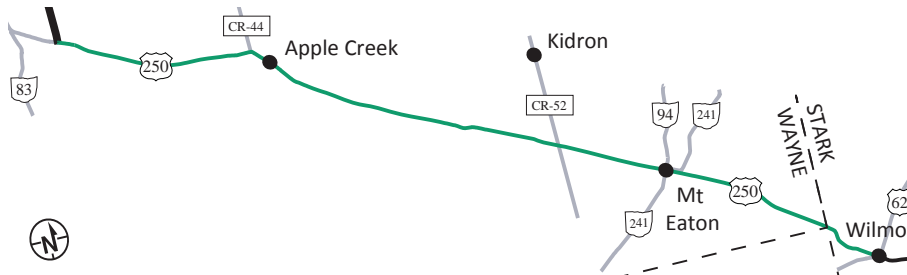
PV Benefits	n/a
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##### Combined

PV Operational & Safety Benefits	n/a
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### SEGMENT: US 250 FROM WOOSTER TO WILMOT WAY-250-14.45 TO STA-250-0.87



#### Location Overview

The two-lane segment of US 250 between Wooster and Wilmot traverses rolling farmland, primarily in rural southeastern Wayne County. This area is home to a large Amish population that travel US 250 on horse drawn buggies.

#### Existing Conditions

Crash analysis shows 182 crashes observed along this segment during a three-year period (2012 to 2014) with the majority being either rear end (38), animal (37) or angle (36). 13 crashes involved Amish Buggies.

57 injury crashes (31%) and four fatal crashes (2%) were observed between 2012-2014. Localized spikes in crashes occurred at Oil City Road and the signalized intersections in the Village of Mount Eaton.

As US 250 weaves northwest to southeast from Wooster to Wilmot, many of the intersecting roadways in the traditional N-S/E-W road grid intersect at less than desirable skew angles possibly contributing to angle crashes. Existing shoulders were widened to six ft. in Wayne County to better accommodate Amish Buggy traffic, but this shoulder width still does not meet the L&D minimum (eight ft.) due to grading and right-of-way constraints. Shoulder widths narrow to less than three ft. in the Stark County section.

In 2014, centerline rumble stripes were installed on the Wayne County portion of US 250 due to a pattern of left-of-center crashes. Crash data is not recent enough to account for any impact from the centerline rumble stripes.

#### Problem Statement & Potential Countermeasures

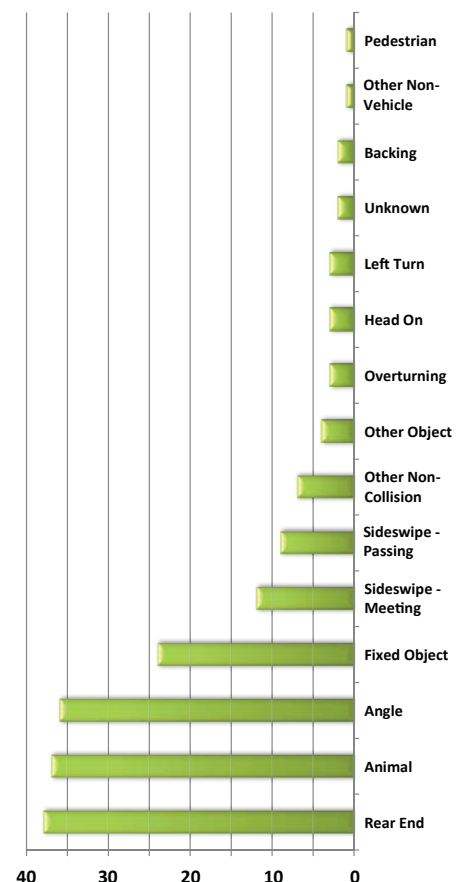
The frequency of crashes along this segment indicate a safety issue may be present. Potential countermeasures include the installation of edge line rumble stripes.



*Pictured Above:*

Looking SE along US 250 in Amish Country where horse-drawn buggies utilize 6' shoulders directly adjacent to freight traffic. Rumble stripes located on the centerline.

#### Frequency of Crashes by Type of Crash



### SEGMENT: US 250 FROM WOOSTER TO WILMOT WAY-250-14.45 TO STA-250-0.87

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered along this segment included installing edge line rumble stripes (where the shoulder width would allow), ground mounted flexible post delineators (where rumble stripes would not be acceptable due to buggy traffic), wider six inch pavement markings, and widening the existing shoulder to a standard eight ft.

Installing edge line rumble stripes with wider six inch pavement markings would result in an expected crash reduction of 6.6 crashes per year. However, this improvement is not desirable through the majority of this segment as edge line rumble stripes interfere with the safe passage of Amish horse-drawn buggies.

Widening the existing shoulders was considered, but not analyzed in detail due to this improvement being infeasible within the existing right-of-way.

Flexible post delineators are intended to be used at specific locations where horizontal curvature is present or with a history of run off the road crashes and are located two to eight ft. off the pavement.

#### Cost / Preliminary Indications

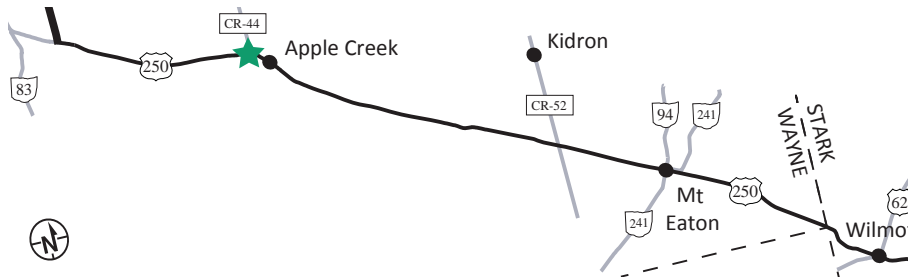
Flexible post delineators are a qualitative improvement as a safety or operational benefit is unable to be quantified. The estimated cost for installation at spot locations along the segment is \$16,000. The proposed improvement will result in increased visibility of horizontal curves and pavement limits.

#### Benefit-Cost Summary

Proposed Project Cost	\$16,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



### INTERSECTION: US 250 AND APPLE CREEK ROAD (CR 44) WAY-250-18.32



#### Location Overview

The unsignalized intersection of US 250 and Apple Creek Road (CR 44) is located in the Village of Apple Creek in Wayne County.

#### Existing Conditions

This intersection is located along a sharp, abrupt horizontal curve. Commercial parking lots are located at the northwest and northeast corners with poorly defined curb cuts.

Crash analysis shows only one crash observed at this intersection during a three-year period (2012 to 2014) that was alcohol-related. The existing horizontal curve radius (697 ft.) meets L&D standards for a 35 mph design speed assuming the curve is properly superelevated.

#### Problem Statement & Potential Countermeasures

Safety analysis does not reveal a crash problem at this location due to a low frequency of observed crashes. However, a potential low-cost countermeasure to reduce expected crashes would be to upgrade advance warning signage.



*Pictured Above:*

Truck headed WB along US 250 around horizontal curve at intersection with Apple Creek Rd (CR 44) at west edge of the Village of Apple Creek.



### INTERSECTION: US 250 AND APPLE CREEK ROAD (CR 44) WAY-250-18.32

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location including upgrading the existing signage.

Although few crashes were recorded in the three year crash history, a proactive approach to upgrade the existing curve warning signage would improve awareness of this abruptly sharp horizontal curve. Upgrades to existing signage include relocating the advanced curve warning signage in accordance with OMUTCD guidelines and replacing the single curve warning signs with dual curve warning signs. In addition, the large arrow signs on the curve should be replaced with larger “oversize” arrow signs.

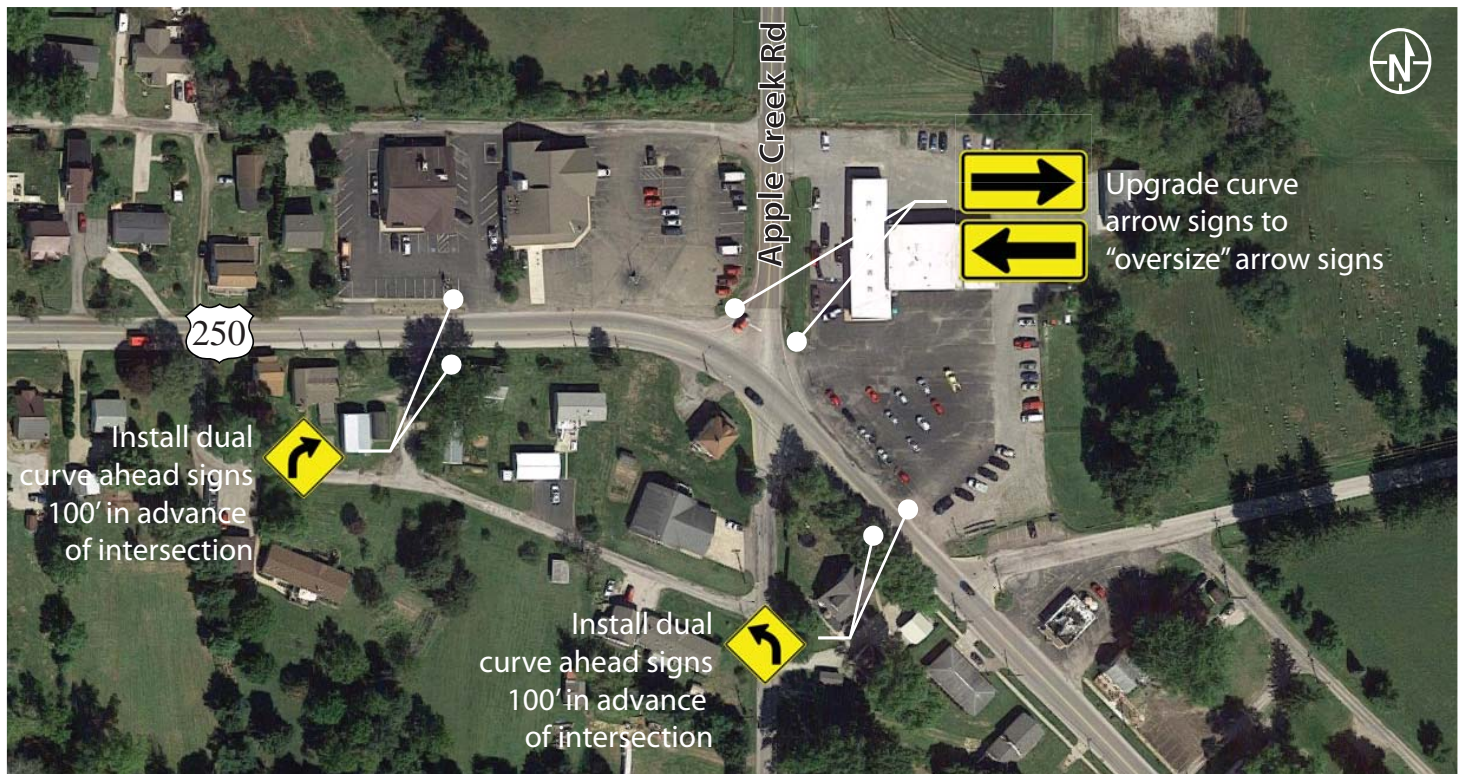
#### Cost / Preliminary Indications

The upgrade of existing signage at this location (including relocation/ installation of dual advance warning signage, and installation of “oversize” arrow signs) is estimated to cost \$5,000.

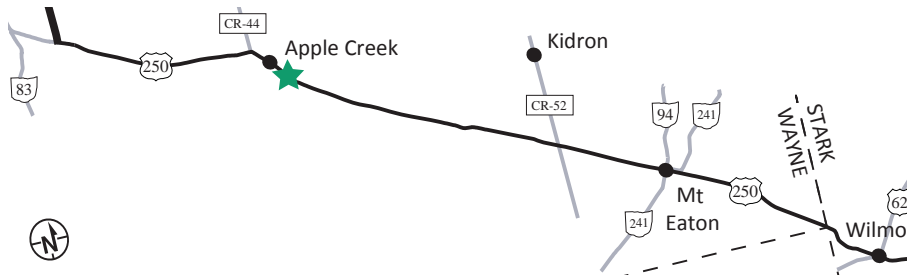
This improvement is a qualitative improvement as a safety or operational benefit is unable to be quantified. The proposed improvements will result in qualitative benefits to freight flow by improving awareness of this horizontal curve.

#### Benefit-Cost Summary

Proposed Project Cost	\$5,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



### BRIDGE: US 250 OVER SPRING RUN CREEK WAY-250-19.29 (SFN 8504830)



#### Location Overview

The concrete slab structure (SFN 8504830) carrying US 250 over Spring Run Creek is located in the Village of Apple Creek in Wayne County.

#### Existing Conditions

This three-span structure was constructed in 1950 and carries a two-lane segment of US 250.

The structure has a General Appraisal of Five indicating it is in Fair Condition. The Load Rating for this structure is 145% of the Ohio Legal Load. Structures with a Load Rating of less than 150% of the Ohio Legal Limit potentially restrict the freight flow of Permit Loads along the corridor.

Lateral clearance along US 250 on this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure has a Load Rating of 140% of the Ohio Legal Load which poses potential freight bottlenecks for overweight loads. Potential countermeasures should explore reconstructing the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit.



#### Inspection Summary

Deck	6
Superstructure	6
Substructure	5
Culverts	n/a
Channel	7
Approaches	7
<b>General Appraisal</b>	<b>5</b>

#### Load Rating

<b>% of Ohio Legal Load</b>	<b>140</b>
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#### Clearances

Lateral	8.25'
Vertical	n/a



## US 250 Operations Study

### Needs & Conditions Report

#### BRIDGE: US 250 OVER SPRING RUN CREEK WAY-250-19.29 (SFN 8504830)

##### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit. This improvement would address the substandard load rating that restricts the movement of some overweight freight loads.

##### Cost / Preliminary Indications

The reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit is estimated to cost \$899,000.

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by improving the load rating to accommodate overweight loads.

#### Benefit-Cost Summary

Proposed Project Cost	\$899,000
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##### *Operational*

Travel Time Savings (annual)	n/a
------------------------------	-----

PV Benefits	n/a
-------------	-----

##### *Safety*

Expected Annual Crash Adjustment	n/a
----------------------------------	-----

PV Benefits	n/a
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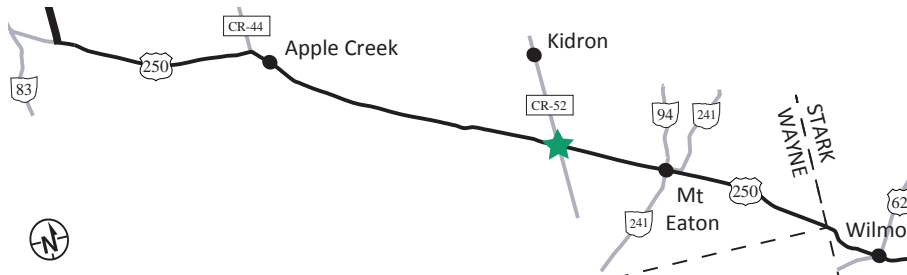
##### *Combined*

PV Operational & Safety Benefits	n/a
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Preliminary B/C Ratio	n/a
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### INTERSECTION: US 250 AND KIDRON ROAD (CR 52) WAY-250-24.37



#### Location Overview

The signalized intersection of US 250 and Kidron Road (CR 52) is located in rural Wayne County 2.6 miles west of SR 94.

#### Existing Conditions

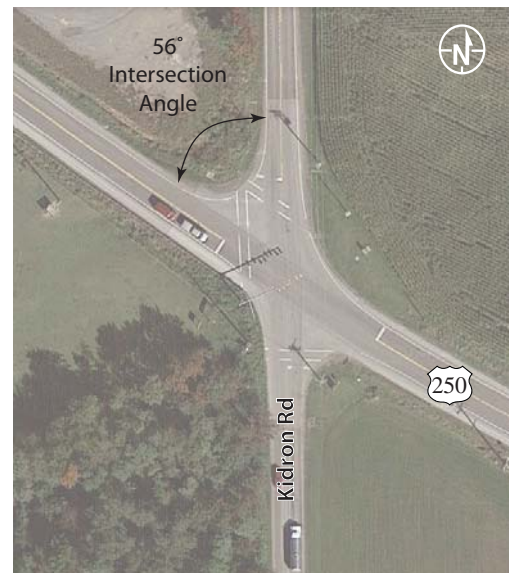
This is the first signalized intersection along the corridor east of I-71 marking the end of a 31-mile stretch where eastbound US 250 traffic is not subject to a traffic signal or stop sign. "Signal Ahead" LED warning signs are present, but are far from the intersection. Other than US 224, Kidron Road is the only traffic signal along the two-lane segments to be located outside of a City or Village.

Crash analysis shows seven crashes observed at this intersection during a three-year period (2012 to 2014) with five angle crashes. Three crashes involved trucks and one involved an Amish Buggy.

The existing intersection angle (56°) is deficient as L&D minimum for a signalized intersection is 60°. In general, this signalized intersection is contrary to driver expectation along this high-speed rural segment of corridor which may account for six of the seven crashes.

#### Problem Statement & Potential Countermeasures

A safety analysis of this intersection indicates crash patterns can be attributed to this signalized intersection being contrary to driver expectation. Potential countermeasures may include additional advance warning signage for the traffic signal.



*Pictured Above:*

Looking NW along US 250 at the skewed intersection with Kidron Rd (CR 52) in Paint Twp, Wayne County.



### INTERSECTION: US 250 AND KIDRON ROAD (CR 52) WAY-250-24.37

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included upgrading the existing signage and upgrading the existing traffic signal. Upgrading the existing signage and the existing traffic signal would improve awareness of the "sudden appearance" this signalized intersection.

Upgrading the existing signage would include relocating the existing intersection warning signs on all four approaches in accordance with OMUTCD guidelines for advanced placement of warning signage for a 55 mph speed. In addition, the installation of dual warning signs should also be considered on the northbound, southbound, and westbound approaches.

Upgrading the existing traffic signal configuration with span wire or new mast arms and signal backplates would potentially reduce driver confusion caused by eight signal heads closely spaced on one mast arm.

#### Cost / Preliminary Indications

Upgrading the existing signage at this intersection is estimated to cost \$5,000. Upgrading the existing signal with span wire or new mast arms and signal backplates is estimated to cost \$155,000.

These improvements are both qualitative as a safety or operational benefit is unable to be quantified. Both improvements will result in qualitative benefits to freight flow by improving awareness of this signalized intersection.

#### Benefit-Cost Summary

##### Proposed Project Cost

Upgrade Signage	\$5,000
Upgrade Traffic Signal	\$155,000

##### Operational

Travel Time Savings (annual)	n/a
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PV Benefits	n/a
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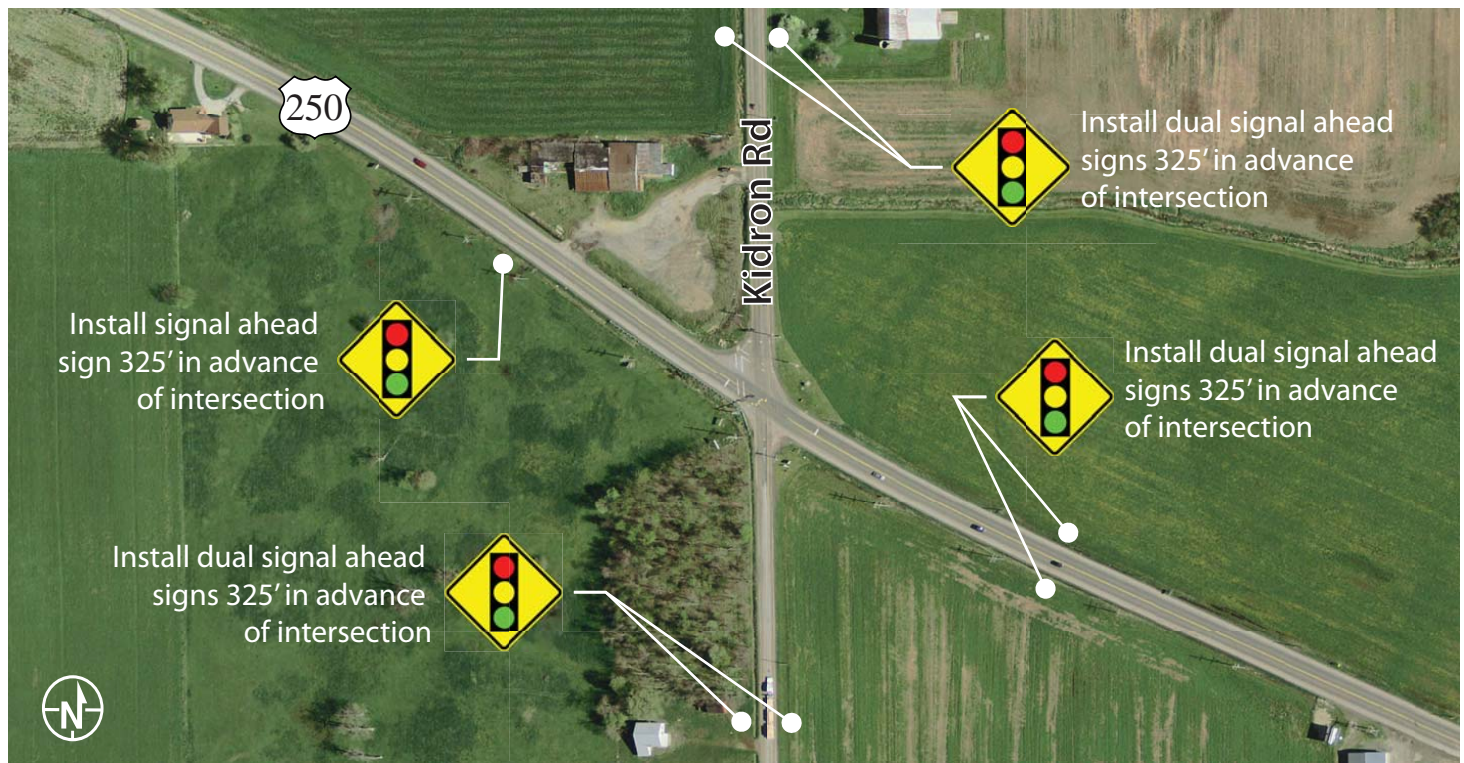
##### Safety

Expected Annual Crash Adjustment	n/a
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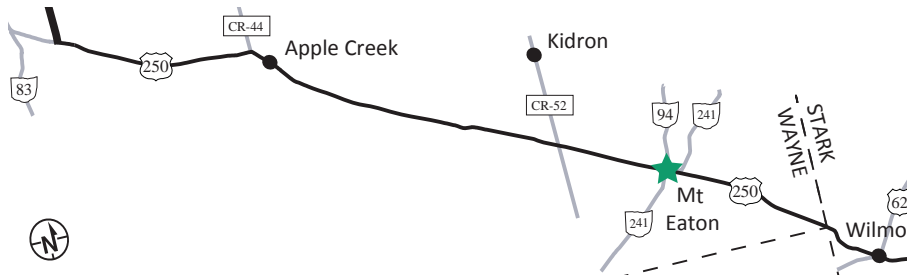
PV Benefits	n/a
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##### Combined

PV Operational & Safety Benefits	n/a
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### INTERSECTION: US 250 & SR 94 / SR 241 (SOUTH) WAY-250-26.92



### Location Overview

The signalized intersection of US 250 and SR 94/SR 241 is located in the Village of Mount Eaton in Wayne County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a potential freight bottleneck (along with the adjacent signalized SR 241 intersection) along an otherwise rural segment of the corridor.

### Existing Conditions

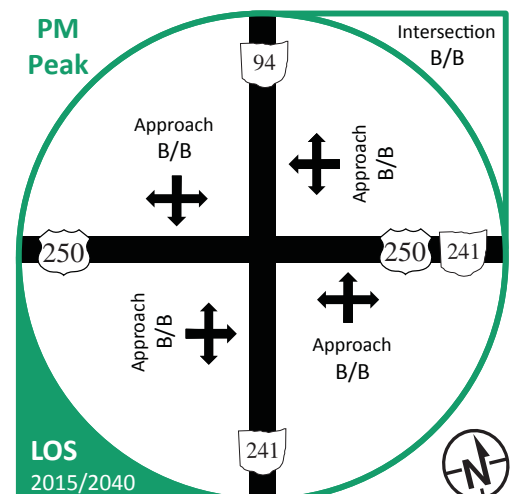
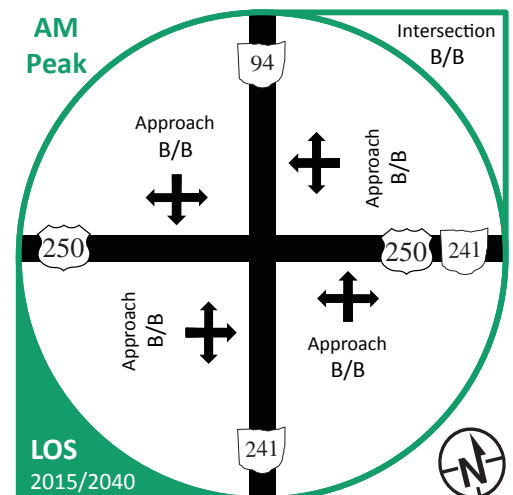
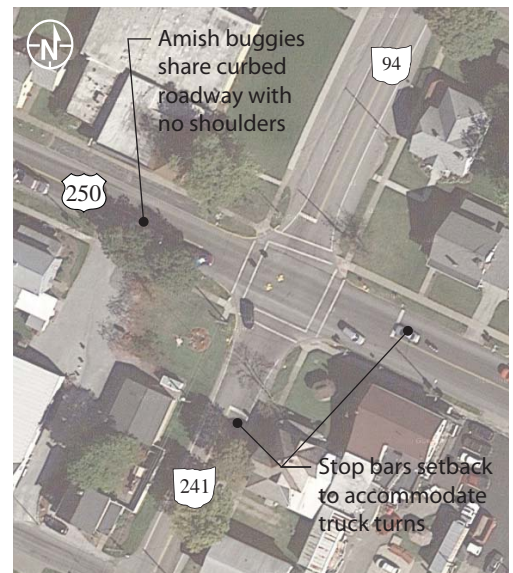
This four-leg intersection is in an urbanized area with all four approaches having a single lane. An adjacent signal is present 730 ft. to the east at SR 241 (north).

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows 12 crashes observed at this intersection during a three-year period (2012 to 2014) with seven rear end crashes. Two crashes involved trucks and two involved Amish buggies. Rear end crashes at a signal are generally indicative of congestion, but capacity analysis shows all approaches operating at LOS B.

### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but crash frequency and type warrants further analysis in conjunction with the adjacent signalized intersection. Potential countermeasures include improving efficiency through timing, coordination, and detection.





### INTERSECTION: US 250 & SR 94 / SR 241 (SOUTH) WAY-250-26.92

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the installation of vehicle detection and implementation of coordination with the adjacent signal.

Vehicle detection and coordination between the signals will improve the operation and safety of the signalized intersection. The resulting HCS capacity analysis for this countermeasure improves operations at the intersection from a LOS B to LOS A in the 2040 PM peak hour equaling an annual travel time savings of 1,322 vehicle hours. Although coordination and detection are expected to improve traffic flow through the area and therefore help reduce rear end crashes, a quantitative safety benefit for the specific improvement was not available.

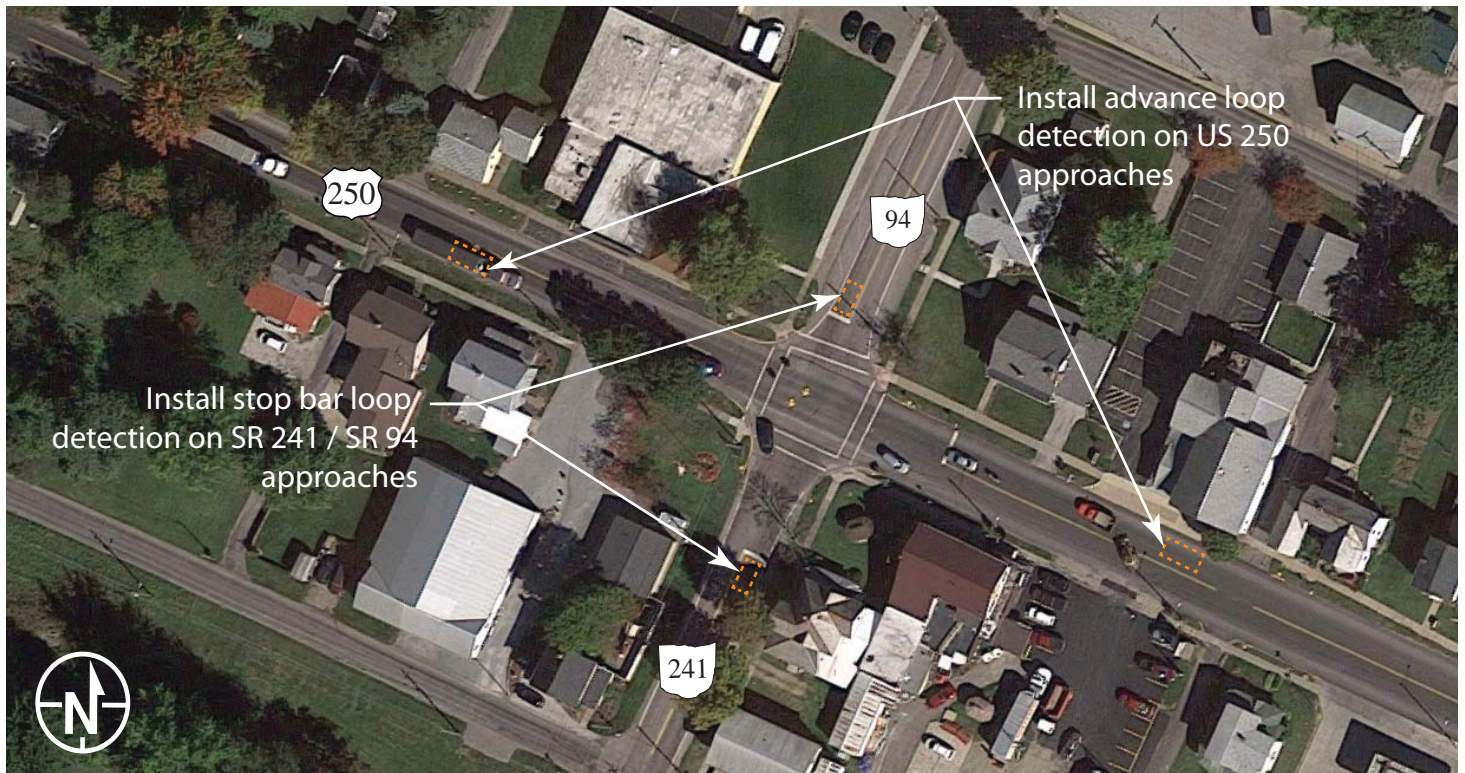
#### Cost / Preliminary Indications

The installation of vehicle detection at this signal and implementing coordination with the existing signal is estimated to cost \$26,000.

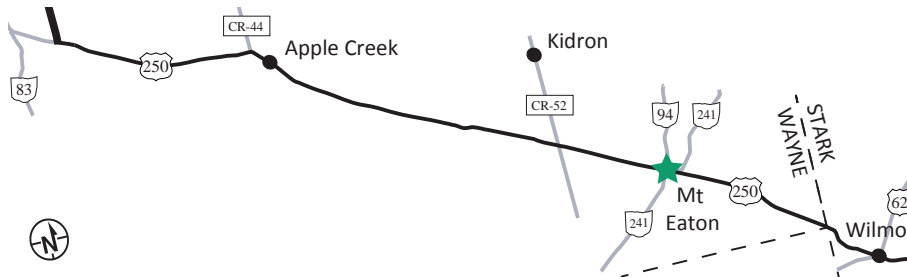
The installation of vehicle detection and coordination between signals at this location provides results in a Preliminary B/C Ratio of 8.40 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

#### Benefit-Cost Summary

Proposed Project Cost	\$26,000
<i>Operational</i>	
Travel Time Savings (annual)	1,322 veh-hrs
PV Benefits	\$218,429
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	\$218,429
Preliminary B/C Ratio	8.40



### INTERSECTION: US 250 & SR 241 (NORTH) WAY-250-27.06



#### Location Overview

The signalized intersection of US 250 and SR 241 is located in the Village of Mount Eaton in Wayne County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a potential freight bottleneck (along with the adjacent signalized SR 94/SR 241 intersection) along an otherwise rural segment of the corridor.

#### Existing Conditions

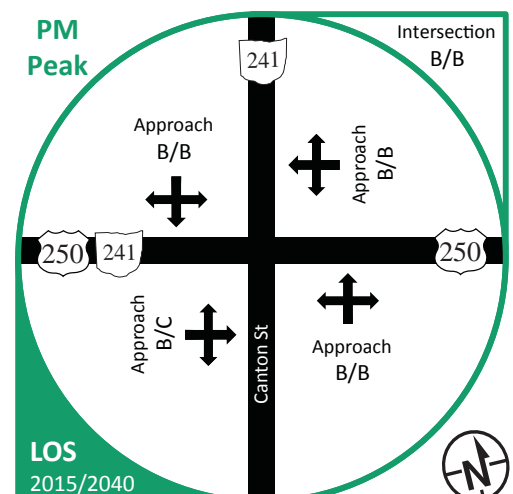
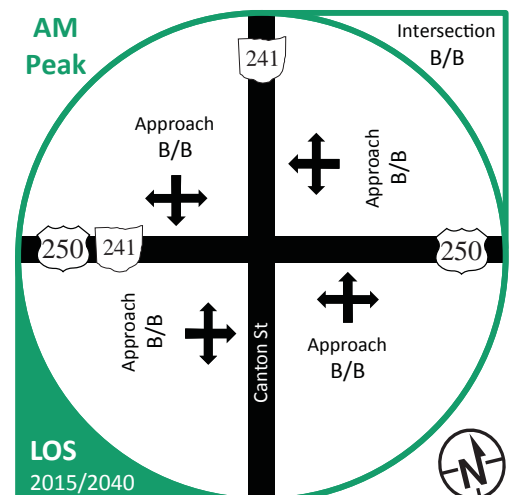
This four-leg intersection is in an urbanized area with all four approaches having a single lane. An adjacent signal is present 730 ft. to the west at SR 94/SR 241.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows only three crashes observed at this intersection during a three-year period (2012 to 2014). One crash involved an oversize load striking a traffic signal.

#### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but crash frequency and type warrants further analysis in conjunction with the adjacent signalized intersection. Potential countermeasures include improving efficiency through timing, coordination, and detection.





### INTERSECTION: US 250 & SR 241 (NORTH) WAY-250-27.06

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the installation of vehicle detection and implementation of coordination with the adjacent signal.

Vehicle detection and coordination between the signals will improve the operation and safety of the signalized intersection. The resulting HCS capacity analysis for this countermeasure improves operations at the intersection from a LOS B to LOS A in the 2040 PM peak hour equaling an annual travel time savings of 1,518 vehicle hours. Although coordination and detection are expected to improve traffic flow through the area and therefore help reduce rear end crashes, a quantitative safety benefit for the specific improvement was not available.

#### Cost / Preliminary Indications

The installation of vehicle detection at this signal and implementing coordination with the existing signal is estimated to cost \$26,000.

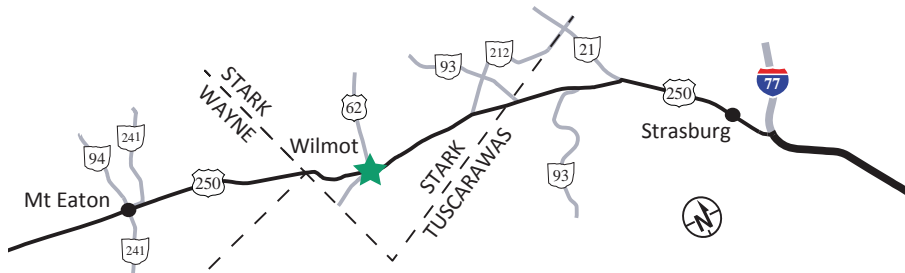
The installation of vehicle detection and coordination between signals at this location provides results in a Preliminary B/C Ratio of 9.78 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

#### Benefit-Cost Summary

Proposed Project Cost	\$26,000
<i>Operational</i>	
Travel Time Savings (annual)	1,518 veh-hrs
PV Benefits	\$228,241
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	\$228,241
Preliminary B/C Ratio	9.78



### INTERSECTION: US 250 & US 62 (WEST) STA-250-1.21



### Location Overview

The signalized intersection of US 250 and US 62 (Winesburg Street) is located in the Village of Wilmot in Stark County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a potential freight bottleneck (along with the adjacent signalized US 62 intersection) along an otherwise rural segment of the corridor.

### Existing Conditions

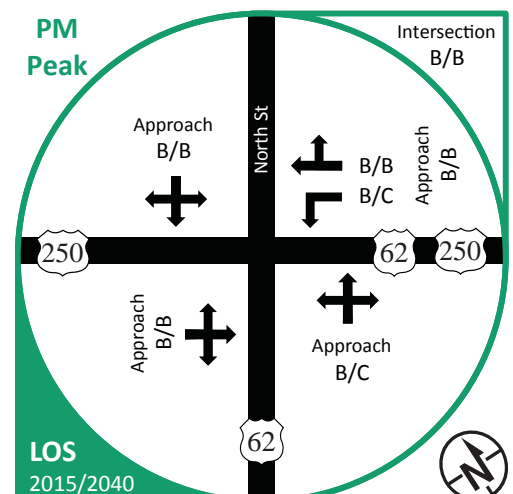
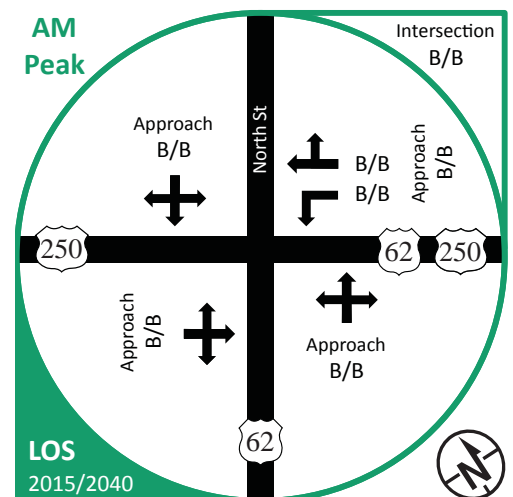
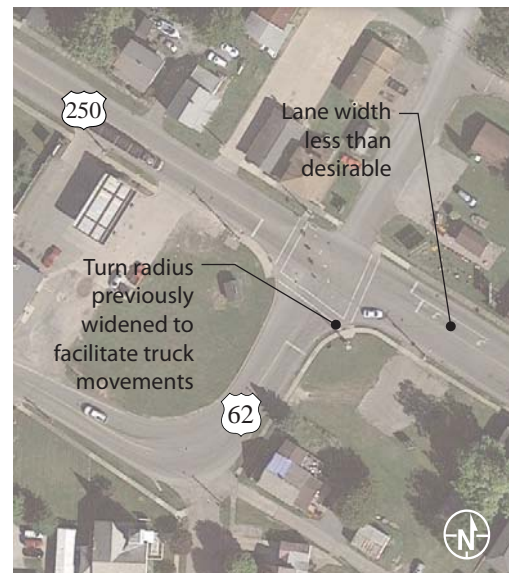
This four-leg intersection is in an urbanized area with the westbound US 250 approach having a 60-ft. left turn lane. An adjacent signal is present 350 ft. to the east at US 62 (east).

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows only one crash observed at this intersection during a three-year period (2012 to 2014). 11-ft. lane widths between the two signalized intersections are less than desirable. AutoTurn analysis shows inadequate turn radii for westbound trucks turning left from US 250 to westbound US 62.

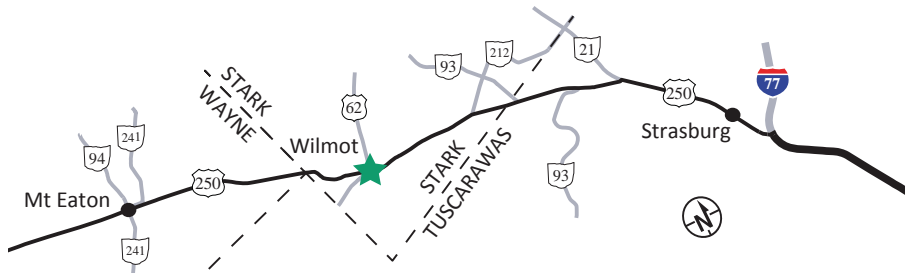
### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS and the low crash frequency indicates there are no safety issues. No countermeasures are recommended at this location.





### INTERSECTION: US 250 & US 62 (EAST) STA-250-1.27



### Location Overview

The signalized intersection of US 250 and US 62 (Massillon Street) is located in the Village of Wilmot in Stark County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a potential freight bottleneck (along with the adjacent signalized US 62 intersection) along an otherwise rural segment of the corridor.

### Existing Conditions

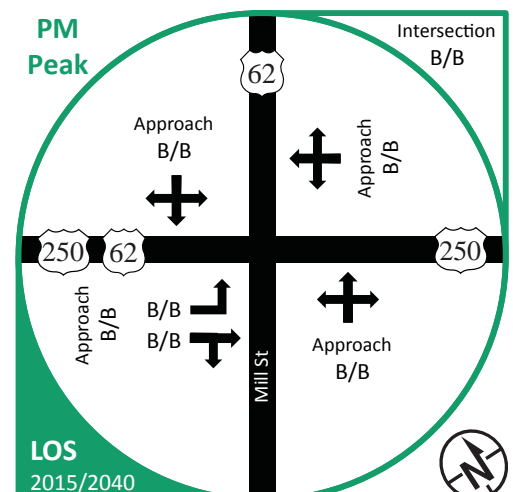
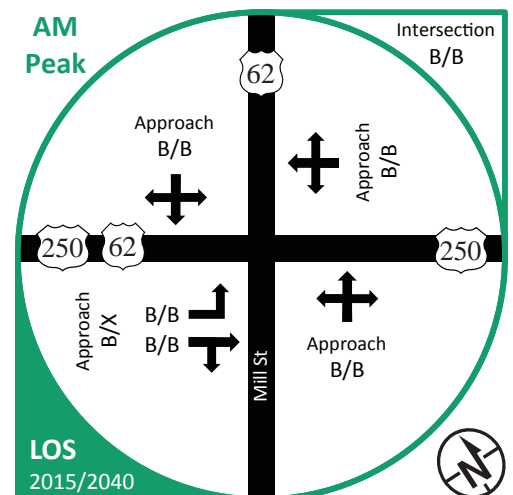
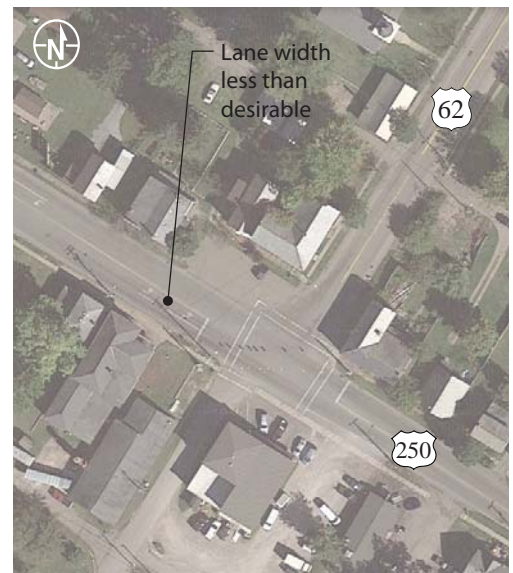
This four-leg intersection is in an urbanized area with the eastbound US 250 approach having a 60-ft. left turn lane. An adjacent signal is present 350 ft. to the west at US 62 (west).

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

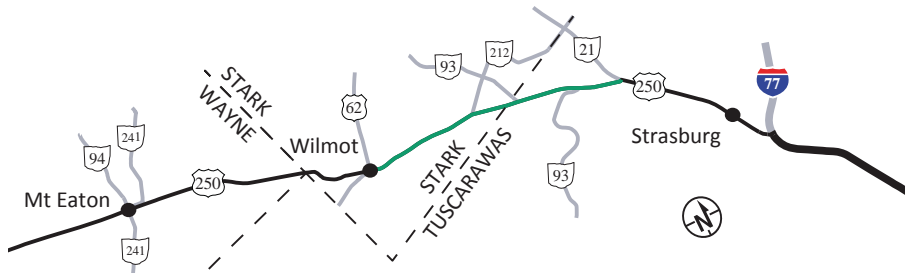
Crash analysis shows zero crashes observed at this intersection during a three-year period (2012 to 2014). 11-ft. lane widths between the two signalized intersections are less than desirable. AutoTurn analysis shows adequate turn radii exist at this intersection.

### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS and the low crash frequency indicates there are no safety issues. No countermeasures are recommended at this location.



### SEGMENT: US 250 FROM WILMOT TO SR 21 STA-250-1.27 TO TUS-250-2.22



#### Location Overview

The two-lane segment of US 250 between Wilmot and SR 21 traverses horizontal curves and rolling terrain in rural southwestern Stark County and northwestern Tuscarawas County.

#### Existing Conditions

Crash analysis shows 53 crashes observed along this 5.1-mile segment during a three-year period (2012 to 2014) with the majority being either fixed object (21) or rear end (12).

The crash analysis does not indicate a crash pattern heading westbound into Wilmot around a horizontal curve and vertical curve as anticipated. Only one Amish Buggy crash was observed along this segment. 43% of crashes occurred in dark conditions indicative of possible poor pavement marking and/or signage reflectivity.

Shoulder widths vary along this segment but are typically 1.5 to 2.5 ft. which is substandard as the L&D requires eight-foot paved shoulders. Shoulder width may be a contributing factor to fixed object crashes. Vertical sight distance issues may contribute to both rear end and fixed object crashes.

In addition, ponding was noted at various locations throughout the segment.

#### Problem Statement & Potential Countermeasures

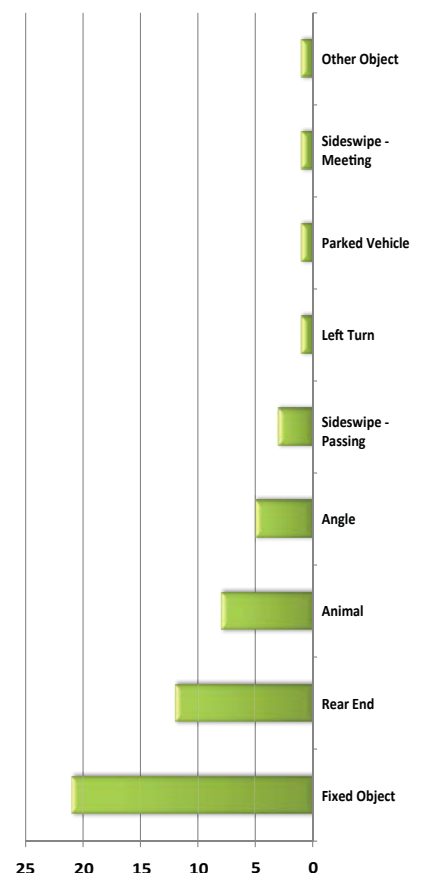
This segment has a high frequency of fixed object crashes, substandard shoulder widths, and possible sight distance issues. Shoulder widening along this segment may prove cost-prohibitive due to topographic constraints. Potential low-cost countermeasures include improved warning signage, installation of edge line rumble stripes (where shoulder width is sufficient, positive drainage is present or can be achieved, and they will not affect buggy traffic) and provided flexible delineator posts where rumble stripes are not feasible.



*Pictured Above:*

Looking WB along US 250 approaching a horizontal curve at the east edge of the Village of Wilmot.

**Frequency of Crashes  
by Type of Crash**





### SEGMENT: US 250 FROM WILMOT TO SR 21 STA-250-1.27 TO TUS-250-2.22

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered along this segment included installing edge line rumble stripes (where the shoulder width would allow), ground mounted flexible post delineators (where rumble stripes would not be acceptable due to buggy traffic, insufficient shoulder width, or in areas with ponding issues), wider six inch pavement markings, and widening the existing shoulder to a standard eight ft.

Installing edge line rumble stripes with wider six inch pavement markings would result in an expected crash reduction of 2.6 crashes per year. However, this improvement may not be desirable along the entire segment as edge line rumble stripes interfere with the safe passage of Amish horse-drawn buggies.

Flexible post delineators are intended to be used at specific locations where horizontal curvature is present or with a history of run off the road crashes and are located two to eight ft. off the pavement.

Widening the existing shoulders was considered, but not analyzed in detail due to this improvement being infeasible within the existing right-of-way

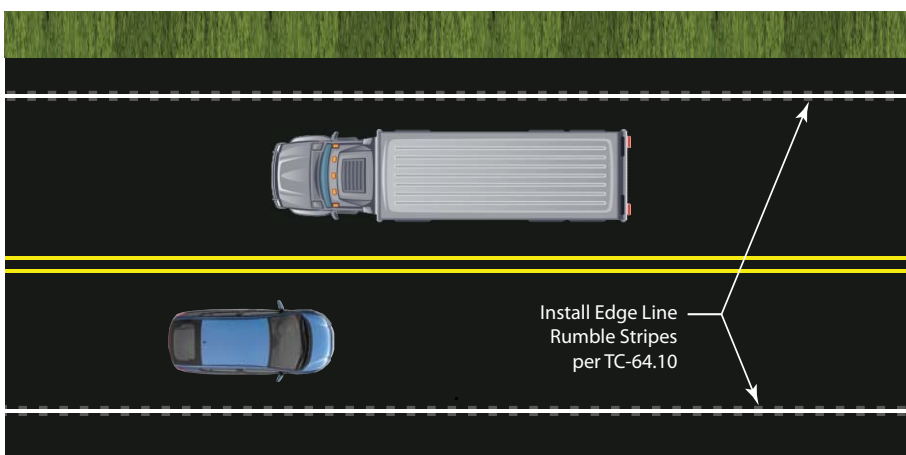
#### Cost / Preliminary Indications

The installation of edge line rumble stripes, wider six inch pavement markings with increased reflectivity, and flexible post delineators in spot locations is estimated to cost \$85,000.

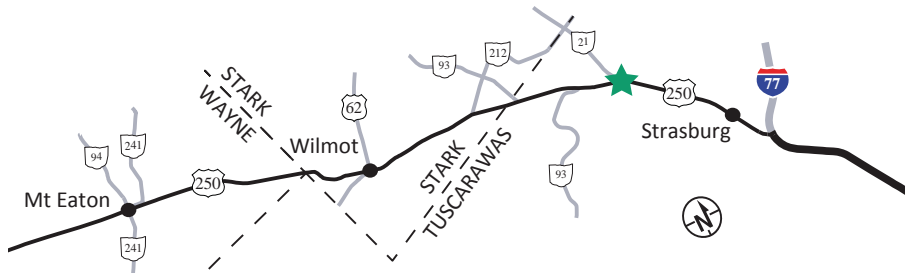
The installation of edge line rumble stripes and wider six inch pavement markings with increased reflectivity along this segment results in a Preliminary B/C Ratio of 8.19 as summarized in the table displayed right. Flexible post delineators provide a qualitative benefit of increased visibility of roadway alignment and pavement limits.

#### Benefit-Cost Summary

Proposed Project Cost	\$85,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-2.609
PV Benefits	\$1,761,215
<i>Combined</i>	
PV Operational & Safety Benefits	\$1,761,215
Preliminary B/C Ratio	8.19



### INTERSECTION: US 250 & SR 21 TUS-250-2.22



### Location Overview

The unsignalized intersection of US 250 and SR 21 is located in rural northwestern Tuscarawas County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a major freight diversion point along US 250 as over one-third of westbound trucks depart for SR 21 northbound towards Massillon.

### Existing Conditions

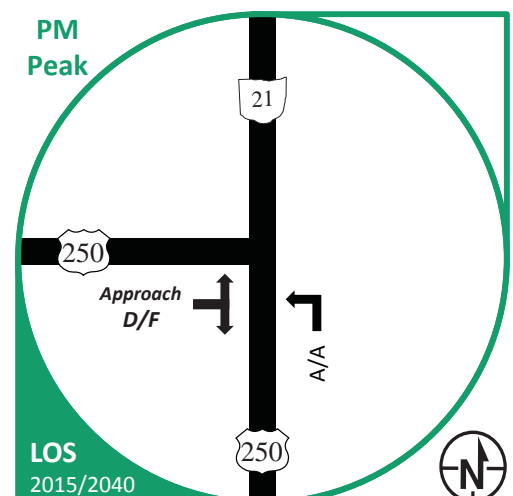
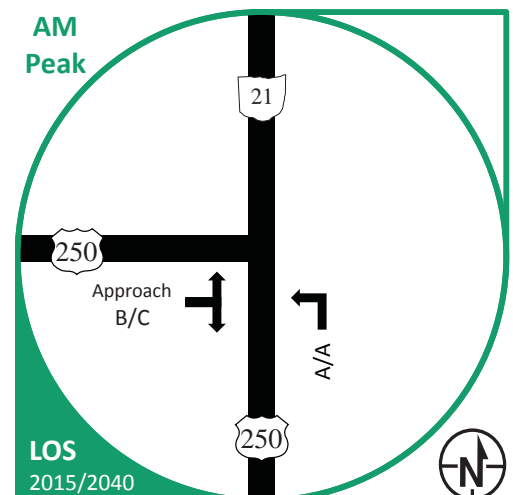
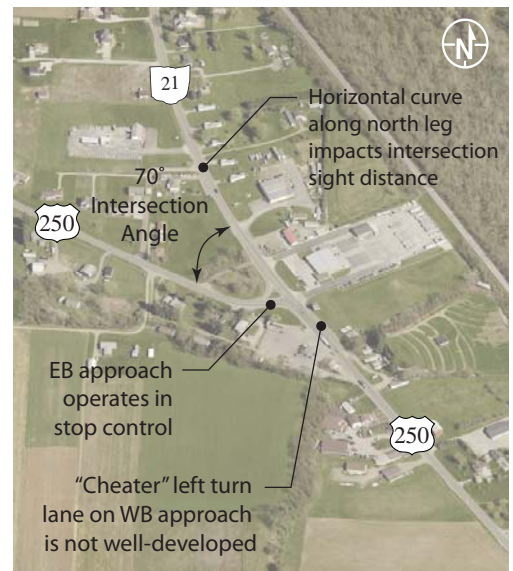
This three-leg intersection operates with westbound US 250 and southbound SR 21 in free flow, while eastbound US 250 is stop control. The existing intersection configuration does not give priority to US 250 through traffic as eastbound US 250 traffic is subject to a stop control condition, while westbound US 250 traffic must make a left turn and yield to southbound SR 21 traffic in order to continue westward along US 250.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. The stop control approach operates at an acceptable LOS during the AM peak hour, but operates at an unacceptable LOS during the PM peak hour.

Crash analysis shows 17 crashes observed at this intersection during a three-year period (2012 to 2014) with the majority being either rear end (nine crashes) or angle (five crashes). Rear end crashes may be attributed to congestion at the stop control approach, while angle crashes may be attributed to sight distance restrictions for turning vehicles. The intersection has an intersection angle of 70° which meets L&D standards, but its geometry should be evaluated further based on intersection sight distance restrictions at the stop control approach due to a horizontal curve on the northern leg.

### Problem Statement & Potential Countermeasures

The existing intersection operates at unacceptable LOS in the PM peak hour and its overall configuration does not give priority to US 250 through movements which is contrary to driver expectation along the corridor. Potential countermeasures should explore reconfiguring the intersection (i.e. installation of a roundabout) in a manner that operates at an acceptable LOS, provides potential for safety improvement by addressing geometric deficiencies, and gives preferential treatment to the dominant US 250 through movements.



### INTERSECTION: US 250 & SR 21 TUS-250-2.22

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included installing a roundabout, installing a traffic signal (with and without turn lanes), installing an eastbound left turn lane, and converting the southbound SR 21 approach to stop control with US 250 in free flow.

Installing a single-lane roundabout would provide an annual travel time savings of 11,640 vehicle hours and result in an expected crash reduction of 1.57 crashes per year. A roundabout as shown below would accommodate a WB-62 truck without special provisions, while oversized loads on US 250 could be escorted across the southwest corner of the roundabout in both directions.

The installation of a traffic signal was also considered at this intersection, but a traffic signal provides a much lower travel time savings (2,052 vehicle-hours annually) and results in an expected crash increase of 7.51 crashes per year.

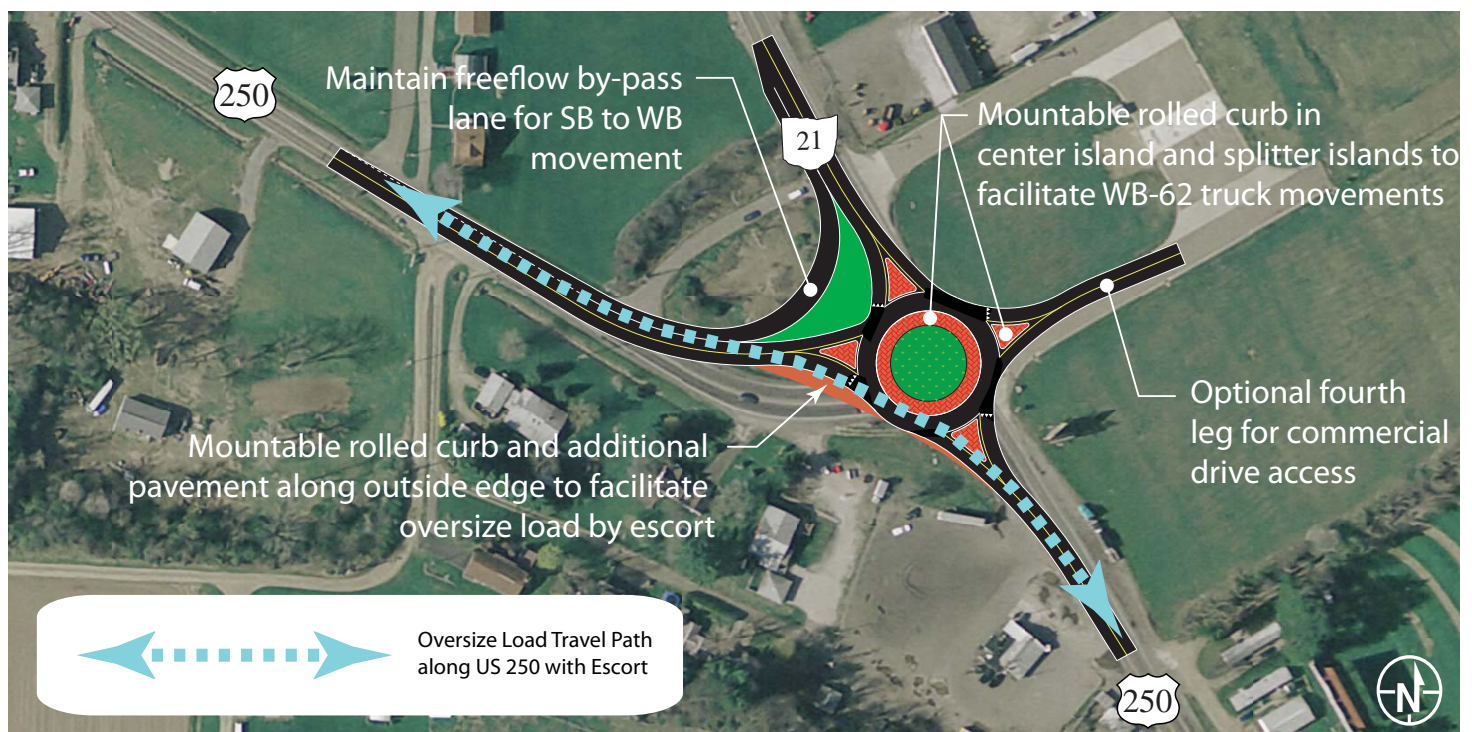
The installation of an eastbound left turn lane (without signaling the intersection), and converting the southbound SR 21 approach to stop control with US 250 in free flow both had movements with LOS F, therefore these countermeasures were not explored further.

#### Cost / Preliminary Indications

The installation of roundabout, including right of way, is estimated to cost \$1,155,000. This improvement results in a Preliminary B/C Ratio of 2.44 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

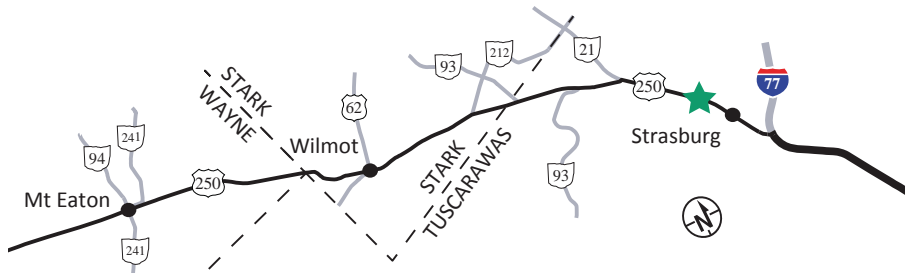
#### Benefit-Cost Summary

Proposed Project Cost	\$1,155,000
<i>Operational</i>	
Travel Time Savings (annual)	11,640 veh-hrs
PV Benefits	\$1,906,706
<i>Safety</i>	
Expected Annual Crash Adjustment	-1.570
PV Benefits	\$784,804
<i>Combined</i>	
PV Operational & Safety Benefits	\$2,691,509
Preliminary B/C Ratio	2.33





### INTERSECTION: US 250 & 12TH STREET TUS-250-3.32



### Location Overview

The unsignalized intersection of US 250 and 12th Street is located at the northern edge of the Village of Strasburg in Tuscarawas County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a freight diversion point along US 250 servicing local industry including the Schlumberger oil and gas completion services facility to the east of the intersection.

### Existing Conditions

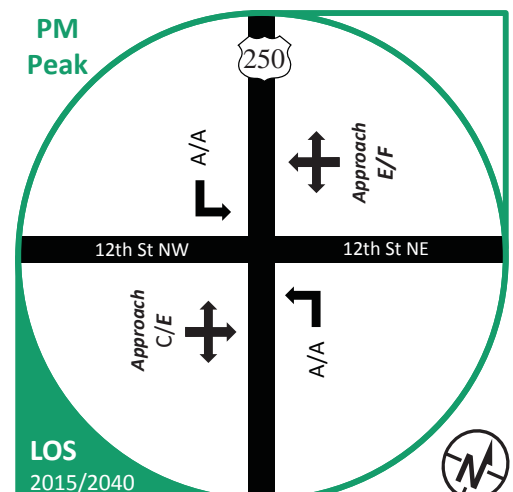
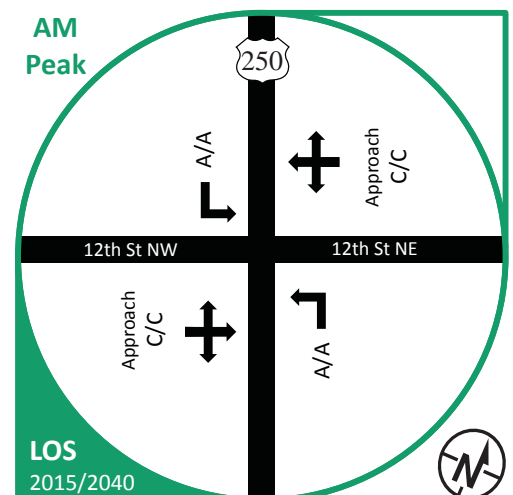
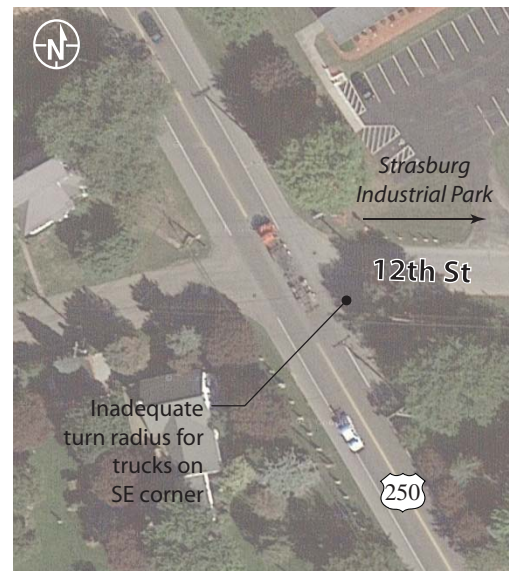
This two-way stop control intersection operates with both 12th Street approaches under stop control with all approaches having a single lane.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. Both 12th Street approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during the AM peak hour. The southbound 12th Street approach operates a LOS E/F in the 2015/2040 PM peak hour.

Crash analysis shows only one crash observed at this intersection during a three-year period (2012 to 2014). AutoTurn analysis shows inadequate turn radii for trucks turning to and from the east 12th Street approach and Schlumberger facility.

### Problem Statement & Potential Countermeasures

The existing intersection operates at unacceptable LOS in the PM peak hour, but does not meet a signal warrant. Potential countermeasures to improve operation on the southbound approach are limited as improvements would degrade operation on the much higher volume US 250 approaches so rerouting local freight traffic to another access point along US 250 should be explored. If freight traffic cannot be rerouted, potential countermeasures at 12th Street should explore pavement widening to facilitate truck turning movements.





### INTERSECTION: US 250 & 12TH STREET TUS-250-3.32

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the widening of the existing intersection to improve the deficient turn radii at this location, installing four-way stop control, adding turn lanes on US 250, and rerouting freight traffic between Strasburg Industrial Park and US 250 via an alternate route.

Widening the existing intersection to improve the existing deficient turn radii, particularly at the southeast corner, would facilitate all movements to and from Strasburg Industrial Park for a WB-62 truck without oversteering.

Rerouting freight traffic between Strasburg Industrial Park and US 250 via an alternate route was considered, but Zeltman Avenue was only existing alternative route and stakeholders indicate that a hearing impaired child living along this street precluded it from being traveled by freight traffic.

Installing four-way stop control, and installing turn lanes on US 250 were considered but both improvements failed to improve the LOS on 12th Street to an acceptable level. Therefore, neither concept was assessed further.

#### Cost / Preliminary Indications

The widening of the existing intersection to improve the deficient turn radii at this location is expected to cost approximately \$60,000, which includes right way costs.

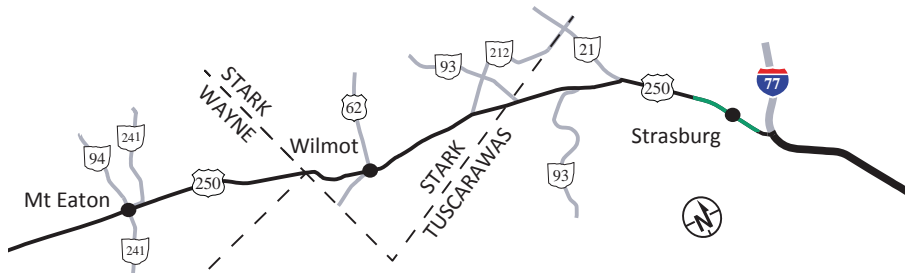
The proposed improvement is qualitative as a safety or operational benefit is unable to be quantified. The proposed improvement will result in qualitative benefits to freight flow by improving the deficient turn radii to accommodate WB-62 trucks as this intersection serves as the interface between US 250 and Strasburg Industrial Park.

#### Benefit-Cost Summary

Proposed Project Cost	\$60,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



#### SEGMENT: US 250 IN VILLAGE OF STRASBURG TUS-250-3.32 TO TUS-250-5.07



#### Location Overview

The two-lane segment of US 250 in the Village of Strasburg in Tuscarawas County traverses an area marked by numerous curb cuts. On-street parallel parking is permitted from 2nd Street to southeast of 1st Street.

#### Existing Conditions

This segment of US 250 between SR 21 and I-77 is the only two-lane segment of the corridor with an ADT greater than 10,000 east of I-71.

Crash analysis shows 79 crashes observed along this segment during a three-year period (2012 to 2014) with the majority (44) being rear end crashes. Crashes along segment do not appear to be geometric related as the high percentage of rear end crashes along segment is generally indicative of congestion and/or access.

#### Problem Statement & Potential Countermeasures

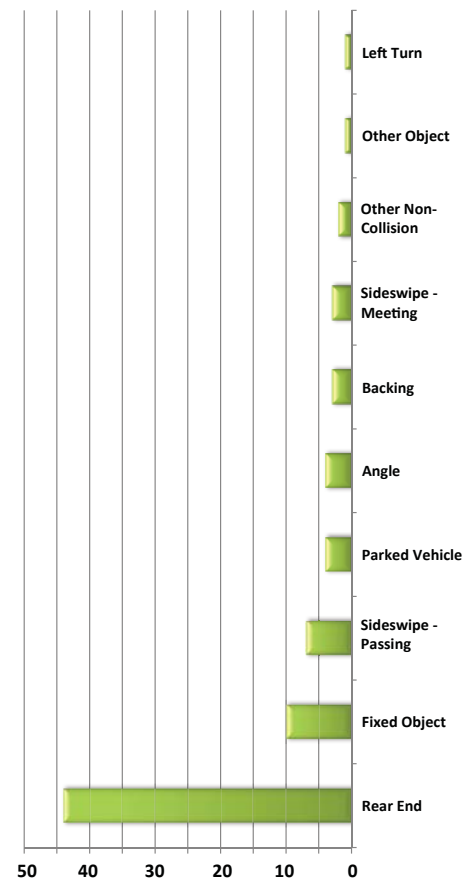
This segment of the corridor experienced a high frequency of rear end crashes due to congestion and access issues. Potential countermeasures include restriping the existing 40-ft. pavement section from two lanes to three lanes with a two-way left turn lane to avoid left turns blocking through traffic as there are numerous side streets and commercial drives present in the Village of Strasburg.



*Pictured Above:*

Looking southeast along US 250 in the Village of Strasburg where potential exists to restripe the existing pavement section as 3-lanes with a 2-way left-turn lane.

**Frequency of Crashes  
by Type of Crash**



**SEGMENT: US 250 IN VILLAGE OF STRASBURG**  
**TUS-250-3.32 TO TUS-250-5.07**

### Concepts / Countermeasures & Operational Analysis

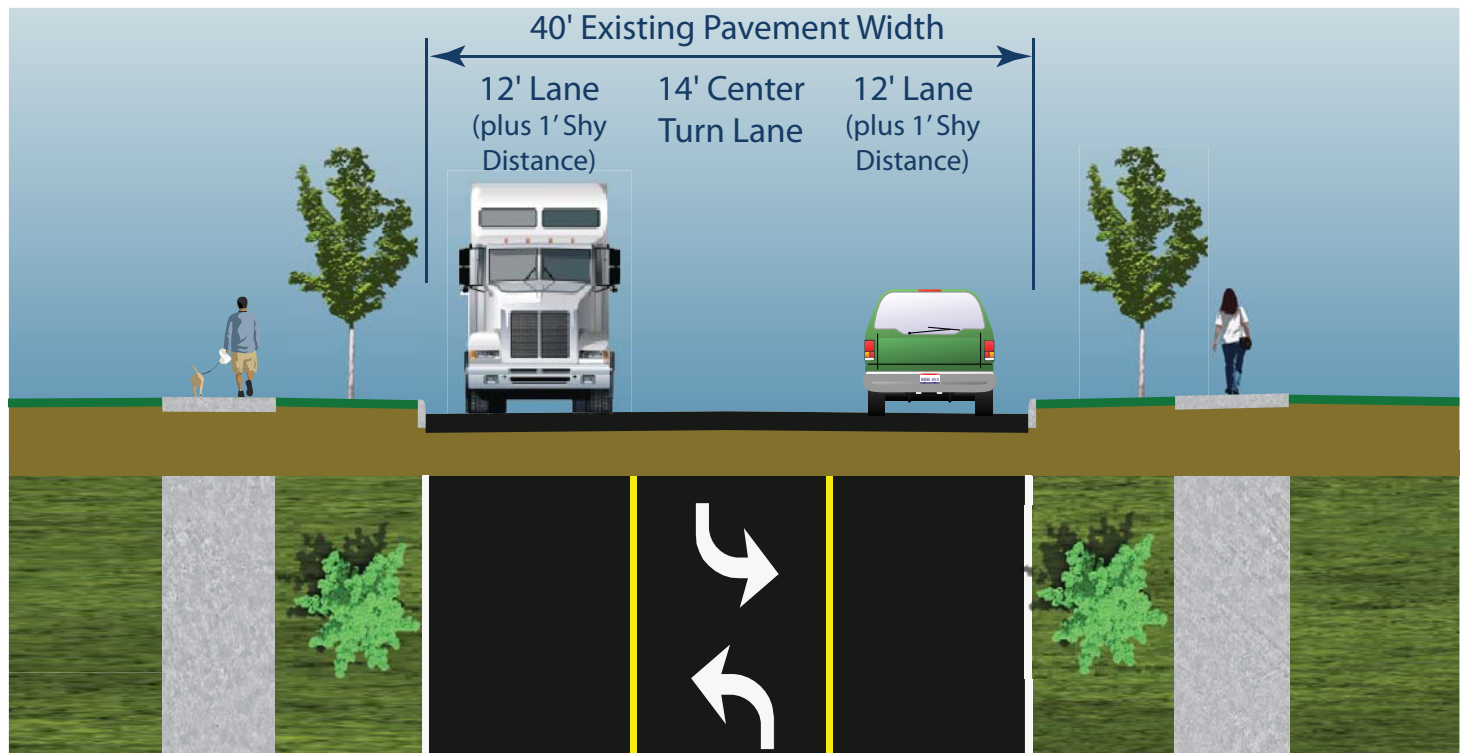
Countermeasures considered along this segment included the installation of a two-way left turn utilizing the existing two-lane pavement section, and implementing driveway access management. Installing a two-way left turn along this segment will address both safety issues (particularly rear end crashes) and operational inefficiencies associated with a large number of access points.

Installing a two-way left-turn lane is proposed as a potential countermeasure to address the high number of rear end crashes along this segment with numerous drive access points. Currently, the existing pavement width through this segment is 40 ft. and is sufficient to restripe with the additional lane without pavement widening. The proposed improvement is expected to reduce crashes by approximately 1.7 crashes per year. Although a two-way left-turn lane will improve traffic flow and therefore help reduce overall travel time, an associated travel time savings is not available. The removal and/or consolidation of drive access at spot locations should be considered in the future if crash problems persist after installation of the two-way left turn lane.

### Cost / Preliminary Indications

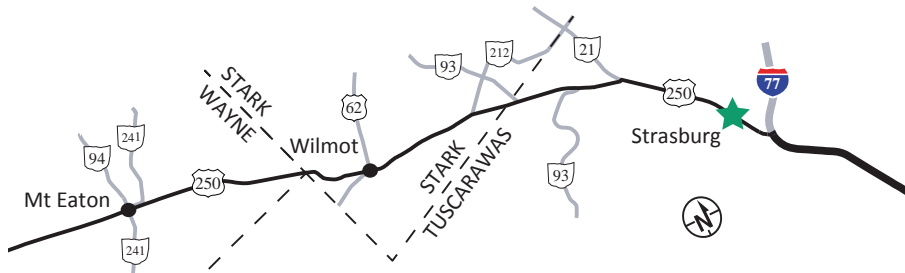
The restriping of the existing pavement from two to three lanes along this segment is estimated to cost \$46,000. This improvement results in a Preliminary B/C Ratio of 5.71 as summarized in the table displayed right.

Benefit-Cost Summary	
Proposed Project Cost	\$46,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-1.684
PV Benefits	\$788,558
<i>Combined</i>	
PV Operational & Safety Benefits	\$788,558
Preliminary B/C Ratio	5.71





### INTERSECTION: US 250 & 2ND STREET TUS-250-4.34



#### Location Overview

The signalized intersection of US 250 and 2nd Street is located in the Village of Strasburg in Tuscarawas County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a potential freight bottleneck (along with the adjacent signalized 1st Street intersection) in Downtown Strasburg.

#### Existing Conditions

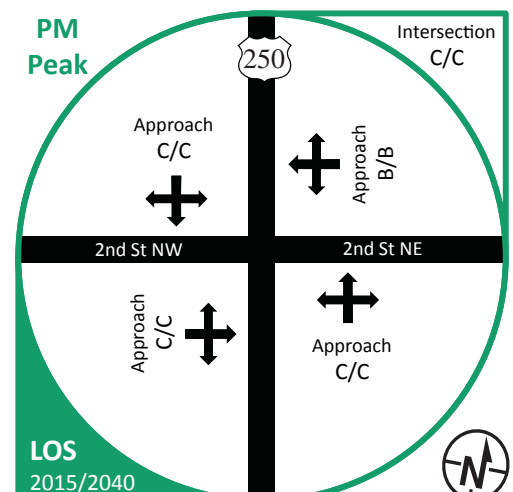
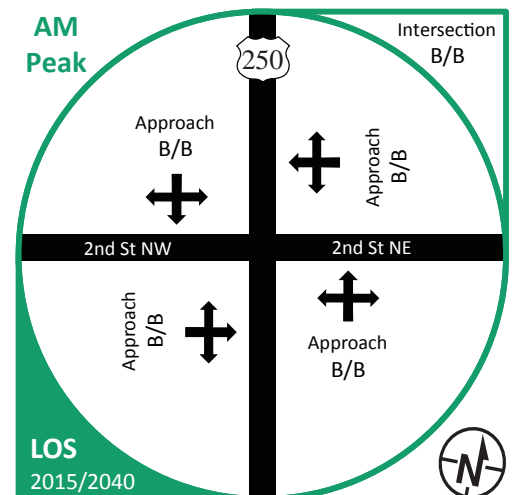
This four-leg intersection is in an urbanized area with on-street parallel parking present on both sides of the US 250 approach to the east. An adjacent signal is present 480 ft. to the east at 1st Street.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows 31 crashes observed at this intersection and the adjacent signalized intersection during a three-year period (2012 to 2014). The high frequency of crashes is indicative of congestion, but capacity analysis shows all approaches operating at LOS B/C.

#### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but crash frequency and type warrants further analysis in conjunction with the adjacent signalized intersection. Potential countermeasures include improving efficiency through timing, coordination, and detection.





### INTERSECTION: US 250 & 2ND STREET TUS-250-4.34

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the installation of vehicle detection and implementation of coordination with the adjacent signal.

Vehicle detection and coordination between the signals will improve the operation and safety of the signalized intersection. The resulting HCS capacity analysis for this countermeasure improves operations at the intersection from a LOS C to LOS A in the 2040 PM peak hour equaling an annual travel time savings of 4,555 vehicle hours. Although coordination and detection are expected to improve traffic flow through the area and therefore help reduce rear end crashes, a quantitative safety benefit for the specific improvement was not available.

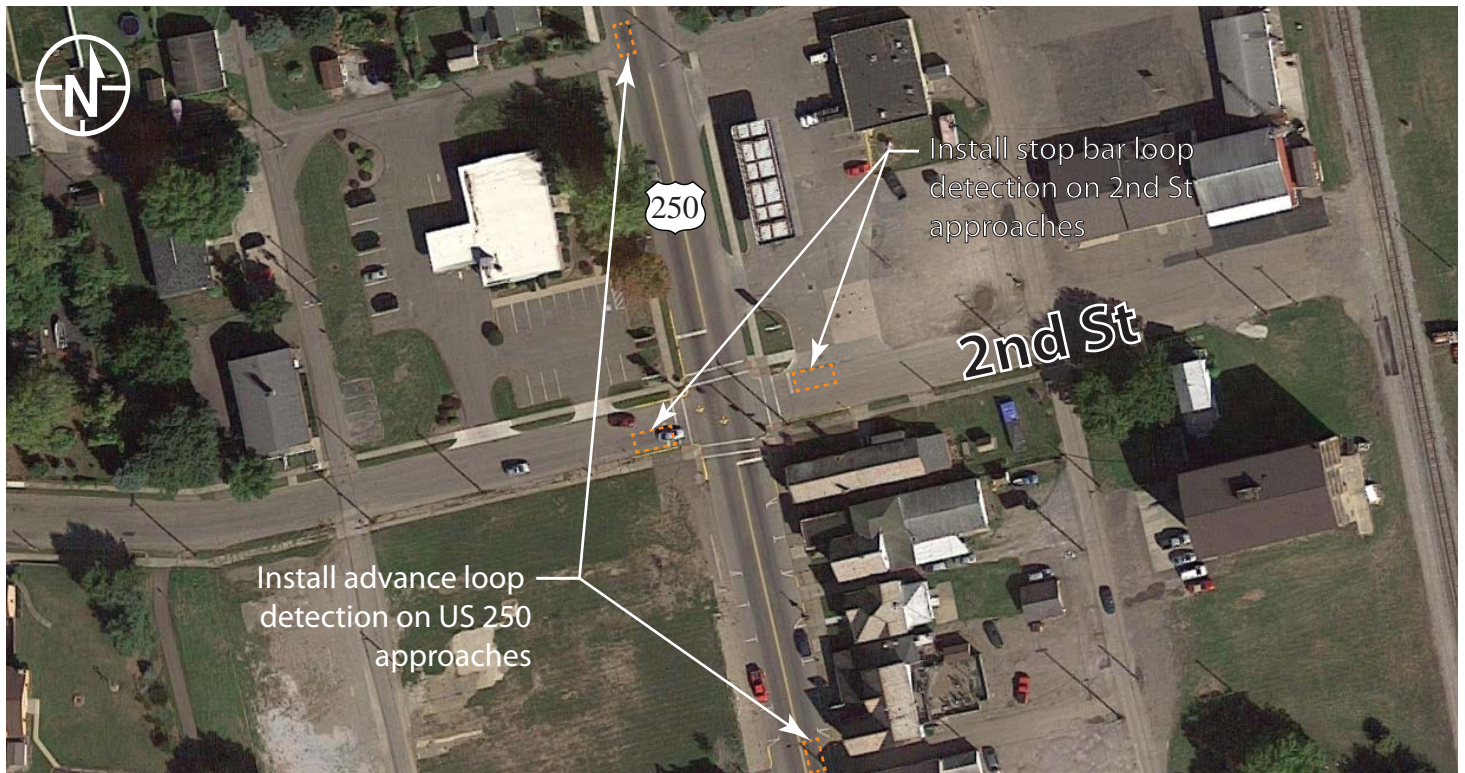
#### Cost / Preliminary Indications

The installation of vehicle detection at this signal and implementing coordination with the existing signal is estimated to cost \$26,000.

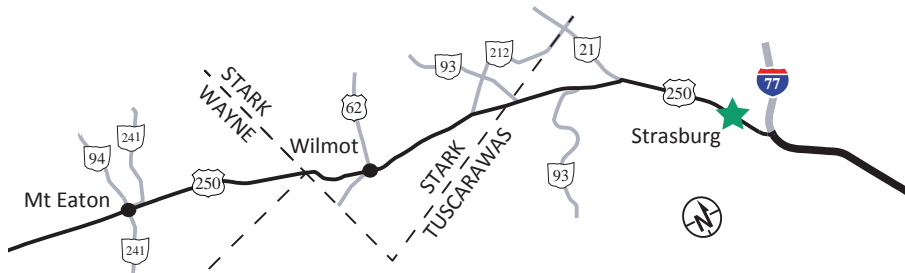
The installation of vehicle detection and coordination between signals at this location provides results in a Preliminary B/C Ratio of 28.26 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

#### Benefit-Cost Summary

Proposed Project Cost	\$26,000
<i>Operational</i>	
Travel Time Savings (annual)	4,555 veh-hrs
PV Benefits	\$734,713
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	\$734,713
Preliminary B/C Ratio	28.26



#### INTERSECTION: US 250 & 1ST STREET TUS-250-4.43



#### Location Overview

The signalized intersection of US 250 and 1st Street is located in the Village of Strasburg in Tuscarawas County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a potential freight bottleneck (along with the adjacent signalized 2nd Street intersection) in Downtown Strasburg.

#### Existing Conditions

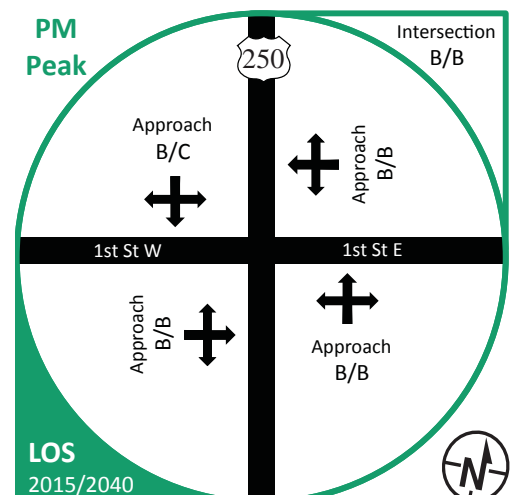
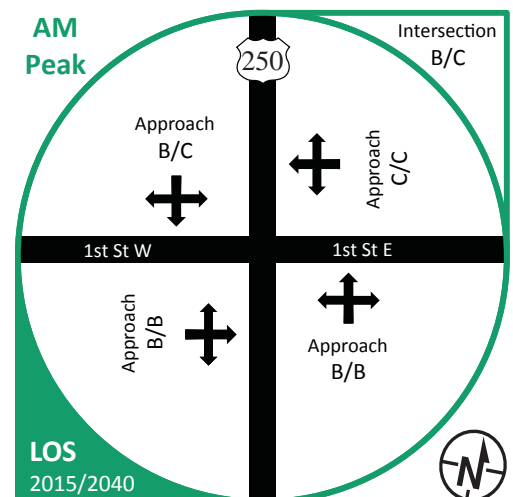
This four-leg intersection is in an urbanized area with on-street parallel parking present on both sides of the US 250 approaches. An adjacent signal is present 480 ft. to the west at 2nd Street.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows 31 crashes observed at this intersection and the adjacent signalized intersection during a three-year period (2012 to 2014). The high frequency of crashes is indicative of congestion, but capacity analysis shows all approaches operating at LOS B/C.

#### Problem Statement & Potential Countermeasures

The existing intersection currently operates at an acceptable LOS, but crash frequency and type warrants further analysis in conjunction with the adjacent signalized intersection. Potential countermeasures include improving efficiency through timing, coordination, and detection.





### INTERSECTION: US 250 & 1ST STREET TUS-250-4.43

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the installation of vehicle detection and implementation of coordination with the adjacent signal.

Vehicle detection and coordination between the signals will improve the operation and safety of the signalized intersection. The resulting HCS capacity analysis for this countermeasure improves operations at the intersection from a LOS B to LOS A in the 2040 PM peak hour equaling an annual travel time savings of 3,557 vehicle hours. Although coordination and detection are expected to improve traffic flow through the area and therefore help reduce rear end crashes, a quantitative safety benefit for the specific improvement was not available.

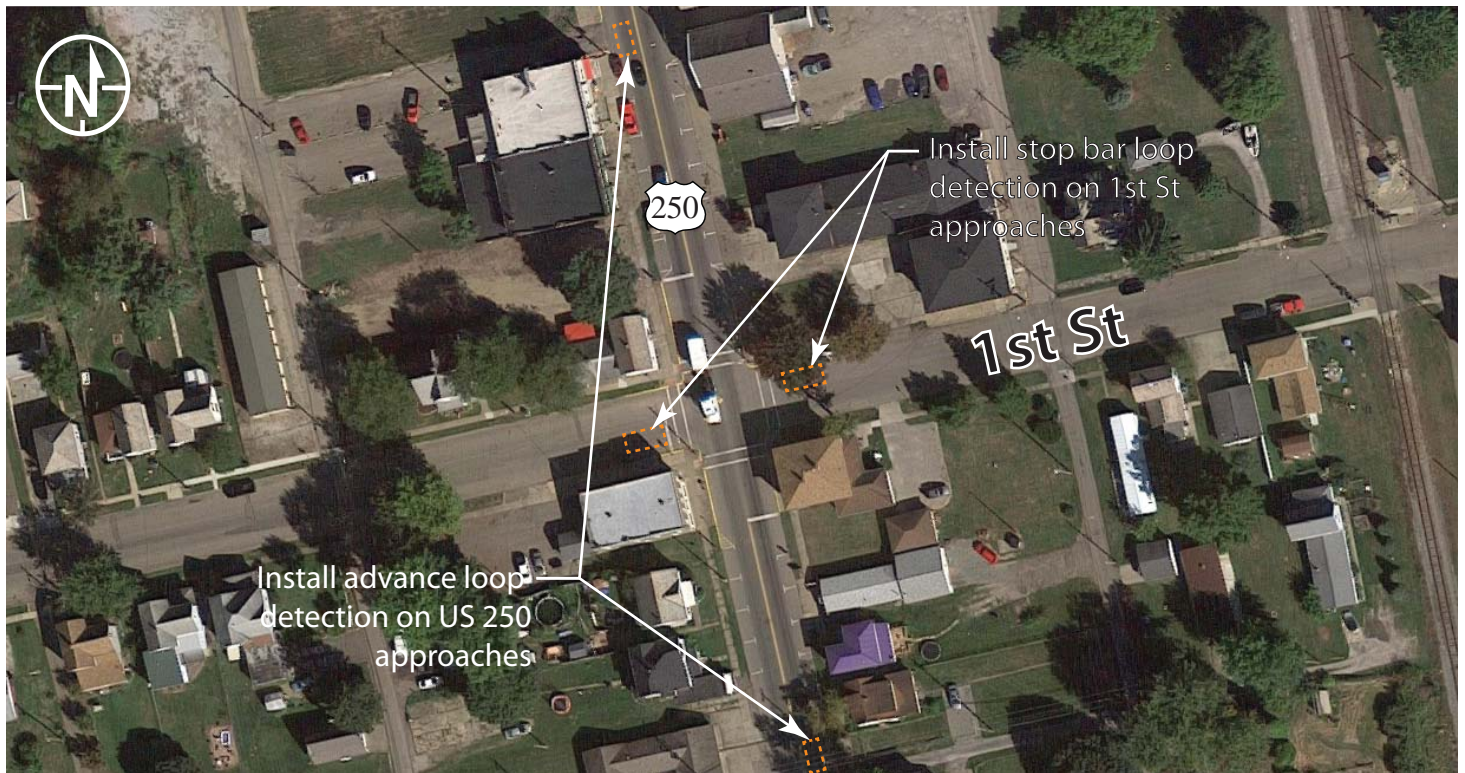
#### Cost / Preliminary Indications

The installation of vehicle detection at this signal and implementing coordination with the existing signal is estimated to cost \$26,000.

The installation of vehicle detection and coordination between signals at this location provides results in a Preliminary B/C Ratio of 21.87 as summarized in the table displayed right. A full B/C Ratio incorporating overall economic benefits will be provided as part of the subsequent Evaluation phase of this study.

#### Benefit-Cost Summary

Proposed Project Cost	\$26,000
<i>Operational</i>	
Travel Time Savings (annual)	3,557 veh-hrs
PV Benefits	\$568,578
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	\$568,578
Preliminary B/C Ratio	21.87







### BRIDGE: US 250 NB TO SR 39 EB RAMP OVER STONE CREEK TUS-250-12.33 (SFN 7904770)



#### Location Overview

The steel beam structure (SFN 7904770) carrying the US 250 westbound to SR-39 eastbound ramp over Stone Creek is located just outside the City of New Philadelphia in Tuscarawas County.

#### Existing Conditions

This three-span structure was constructed in 1964 and carries a single-lane freeway ramp segment of US 250.

The structure has a General Appraisal of Three indicating it is in Serious Condition and Structurally Deficient. The substructure has a Summary Rating of Three due to the concrete piers being in poor condition. The Load Rating for this structure is 150% of the Ohio Legal Load.

Lateral clearance along US 250 on this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure is programmed to be replaced under PID 88945 in 2016. No further countermeasures are recommended at this location.



#### Inspection Summary

Deck	6
Superstructure	7
<b>Substructure</b>	<b>3</b>
Culverts	n/a
Channel	7
Approaches	9
<b>General Appraisal</b>	<b>3</b>

#### Load Rating

% of Ohio Legal Load	150
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#### Clearances

Lateral	6'
Vertical	n/a

### SEGMENT: US 250 FROM SR 800 TO HARRISON COUNTY TUS-250-23.46 TO TUS-250-27.15



#### Location Overview

The two-lane segment of US 250 between SR 800 and Harrison County traverses several reverse horizontal curves in rural southwestern Tuscarawas County.

#### Existing Conditions

Crash analysis shows 97 crashes observed along this segment during a three-year period (2012 to 2014) with 37 crashes citing a vehicle leaving the travel lane.

This segment contains a series of horizontal curves with 1100 ft.-1249 ft. radii which meet L&D standards for 45 mph assuming max superelevation is provided. Per L&D Vol. 1, 301-5cE a 1146 ft. radius curve with a 45 mph design speed requires two ft. of curve widening. Shoulder widths vary along this segment and are less than the eight-ft. L&D standard.

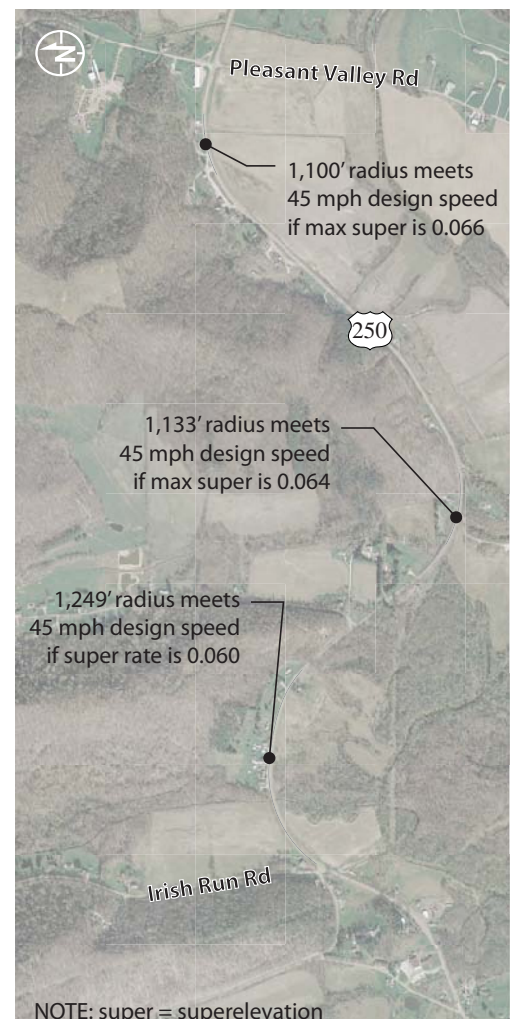
#### Problem Statement & Potential Countermeasures

Further safety analysis is needed to determine cause of high frequency of vehicle leaving lane crashes and high crash severity (three fatal crashes). Shoulder and/or curve widening along this segment may prove cost-prohibitive due to topographic constraints. Potential low-cost countermeasures include improved warning signage and installation of centerline/shoulder rumble strips.



*Pictured Above:*

Looking EB headed along a horizontal curve on US 250 in Union Twp in southeastern Tuscarawas County.



**SEGMENT: US 250 FROM SR 800 TO HARRISON COUNTY**  
**TUS-250-23.46 TO TUS-250-27.15**

### Concepts / Countermeasures & Operational Analysis

Countermeasures considered along this segment included installing edge line rumble stripes and wider six inch pavement markings, comprehensive resigning of the entire segment, and widening the existing shoulder from three ft. to a standard eight ft.

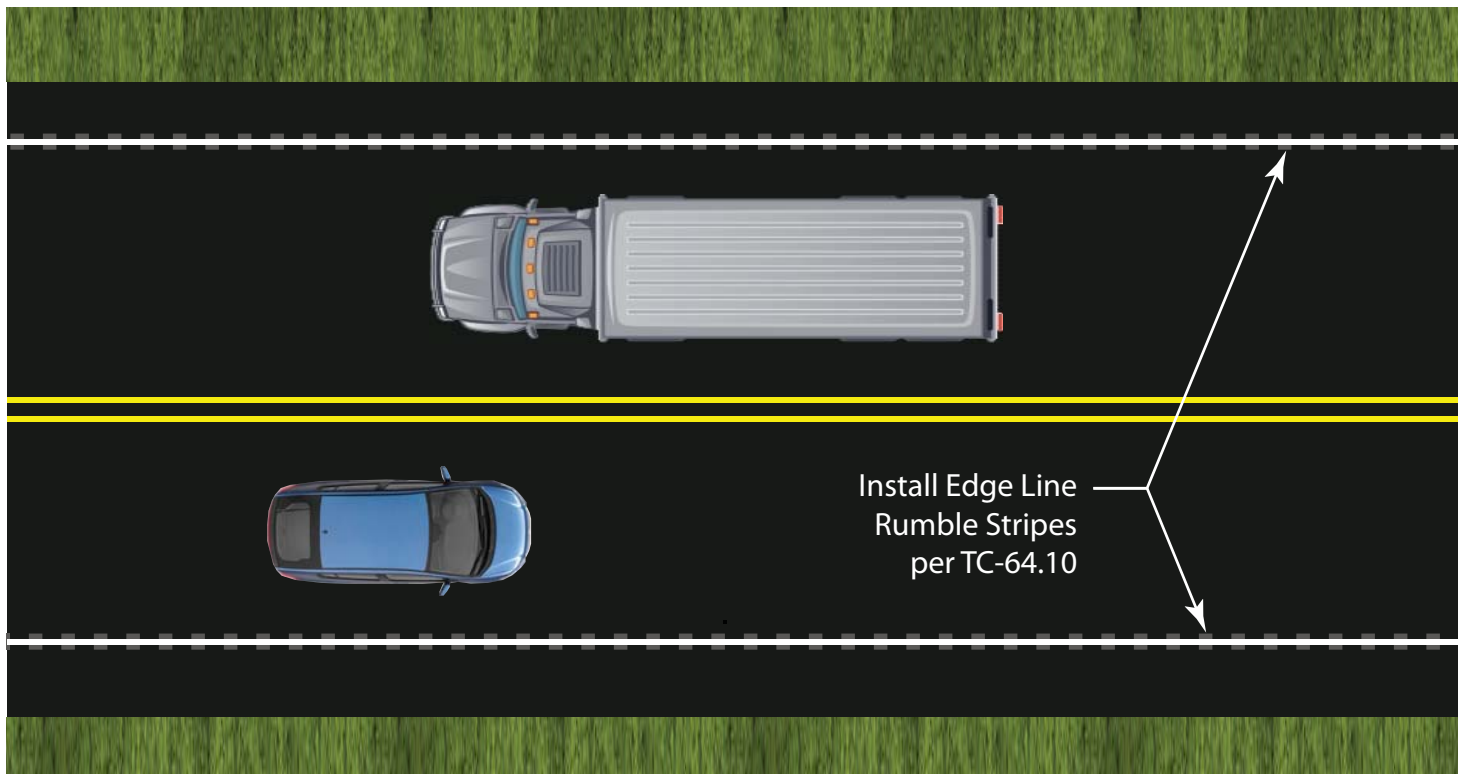
Installing edge line rumble stripes and wider six inch pavement markings would result in an expected crash reduction of 3.0 crashes per year. A comprehensive resigning of the entire segment would result in an expected crash reduction of 1.35 crashes per year. Widening the existing shoulders was considered, but not assessed in detail due to lower feasibility of this improvement due to physical constraints and right-of-way impacts.

### Cost / Preliminary Indications

The installation of edge line rumble stripes and wider six inch pavement markings is estimated to cost \$63,000. The comprehensive resigning of this segment is estimated to cost \$107,000. The installation of shoulder rumble stripes and wider six inch pavement markings along this segment results in a Preliminary B/C Ratio of 12.70 as summarized in the table displayed right. The Preliminary B/C Ratio (2.87) was not as favorable for comprehensive resigning.

### Benefit-Cost Summary

Proposed Project Cost	\$63,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-3.051
PV Benefits	\$2,011,017
<i>Combined</i>	
PV Operational & Safety Benefits	\$2,011,017
Preliminary B/C Ratio	12.70





### INTERSECTION: US 250 & SR 151 HAS-250-0.77



#### Location Overview

The unsignalized intersection of US 250 and SR 151 is located in rural western Harrison County. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a oil and gas freight diversion point along US 250.

#### Existing Conditions

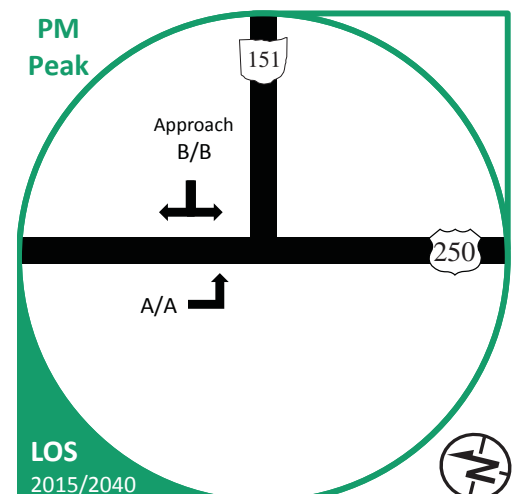
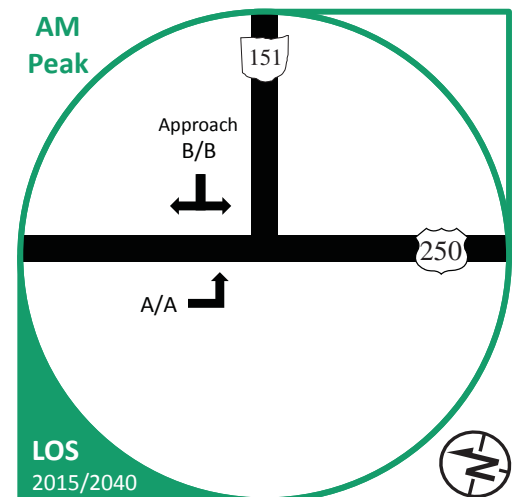
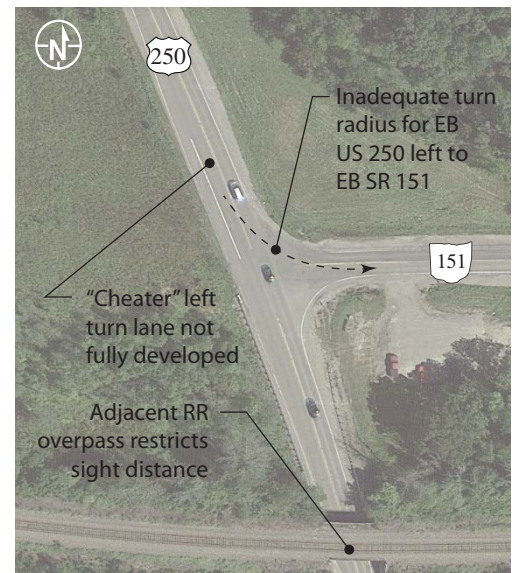
This three-leg stop control intersection operates with SR 151 under stop control and US 250 in free flow. Eastbound US 250 has a “cheater” left turn lane that is not fully developed.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows nine crashes observed at this intersection during a three-year period (2012 to 2014) with three rear end crashes and one fatal. AutoTurn analysis shows inadequate turn radii for trucks with eastbound lefts turns overlapping the SR 151 westbound lane and westbound right turns tracking off the pavement. Sight distance is approximately 230 ft. for right turns from SR 151.

#### Problem Statement & Potential Countermeasures

The existing intersection operates at an acceptable LOS, but geometric deficiencies exist including insufficient truck turn radii and sight distance issues. Potential countermeasures should explore moving stop bars/pavement widening to facilitate truck turning movements, improving warning signage to mitigate sight distance issues, and fully developing the existing “cheater” left turn lane along US 250 eastbound.



### INTERSECTION: US 250 & SR 151 HAS-250-0.77

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included upgraded pavement markings, upgraded signage, widening the intersection to improve turn radii, and installing a fully developed left turn lane along eastbound US 250.

Upgrading pavement markings at this location entails installing stop ahead pavement markings on the SR 151 approach. Based on safety analysis the installation of stop ahead pavement markings would result in an expected crash reduction of 0.35 crashes per year.

Upgrading signage at this location entails improving intersection warning signage. This countermeasure would include relocating the existing dual stop ahead warning signs on SR 151 in accordance with OMUTCD guidelines for advanced placement of warning signage for a 45 mph speed. In addition, intersection warning signage should be installed on both US 250 approaches where no signs currently exist.

Widening the existing intersection to improve the existing deficient turn radii, particularly at the southeast corner, would facilitate movements to and from SR 151, frequently traveled by oil and gas exploration freight, for a WB-62 truck without oversteering.

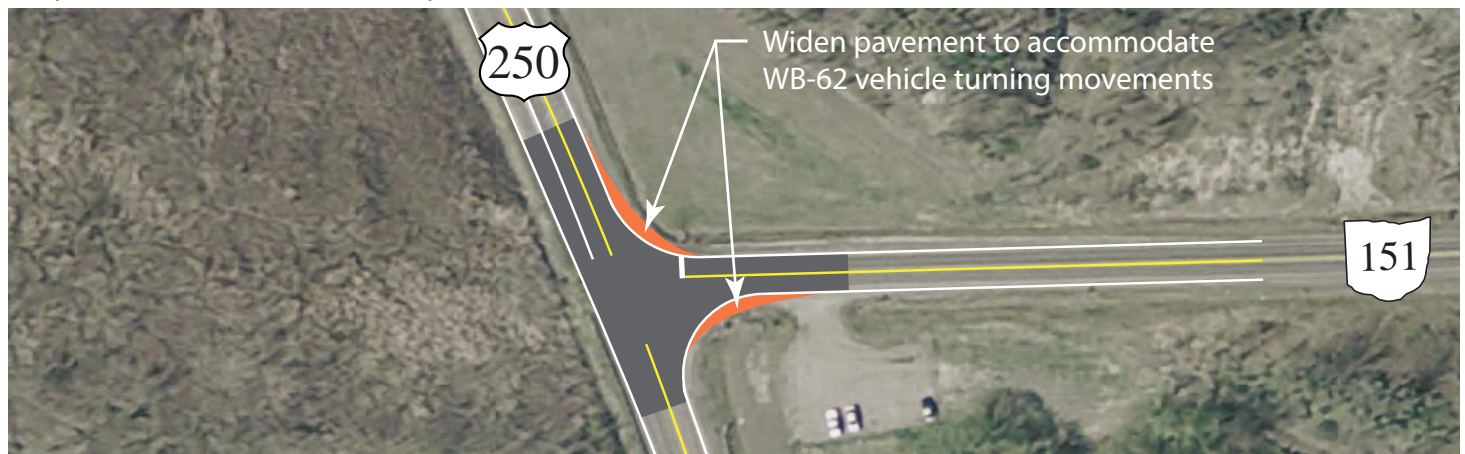
Widening US 250 to fully develop an eastbound left turn lane to replace the existing "cheater" left turn lane was considered, but pavement widths at the intersection are restricted by the lateral clearance of an adjacent railroad overpass to the south. Thus this countermeasure was not analyzed in detail with respect to costs and benefits, but should be considered in conjunction with any future replacement of the adjacent railroad overpass.

#### Cost / Preliminary Indications

The installation of "Stop Ahead" pavement markings is estimated to cost \$1,000. This improvement results in a Preliminary B/C Ratio of 54.67 as summarized in the table displayed right. The upgrade of existing signage at this location (including relocating stop ahead signs and installing intersection warning signage along US 250) is estimated to cost \$5,000. The widening of the existing intersection to improve the deficient turn radii at this location is expected to cost approximately \$45,000. Both the upgrade of signage and intersection widening are considered qualitative improvements as neither a safety or operational benefit is able to be quantified.

#### Benefit-Cost Summary

Proposed Project Cost	\$6,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-0.357
PV Benefits	\$54,675
<i>Combined</i>	
PV Operational & Safety Benefits	\$54,675
Preliminary B/C Ratio	54.67

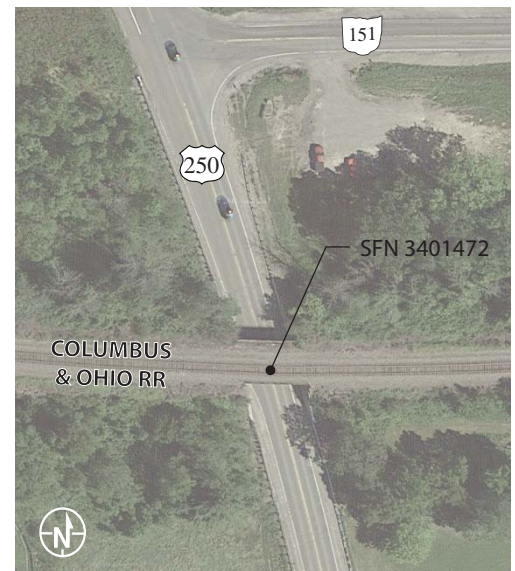


### BRIDGE: COLUMBUS & OHIO RR OVER US 250 HAS-250-0.81



#### Location Overview

The concrete slab structure (SFN 3401472) carrying Columbus & Ohio RR over US 250 is located in rural western Harrison County just 200 feet east of SR 151.



#### Existing Conditions

This single-span structure was constructed in 1941 and carries a single Columbus & Ohio RR track over a two-lane segment of US 250.

The structure has a General Appraisal of Six indicating it is in Satisfactory Condition.

The existing vertical clearance (13.8 ft.) along US 250 under this structure is substandard as it does not meet the L&D minimum of 16.5 ft. The minimum lateral clearance for an arterial is eight-ft. per L&D Vol. 1, 302-1E. Lateral clearance along US 250 under this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure has a substandard vertical clearance of 13.8 ft., which poses a potential freight bottlenecks for oversize loads. Potential countermeasures should explore reconstructing the existing structure or lowering the roadway profile to improve the vertical clearance to a standard 16.5 ft.

#### Inspection Summary

Deck	6
Superstructure	6
Substructure	7
Culverts	n/a
Channel	n/a
Approaches	8
General Appraisal	6

#### Load Rating

% of Ohio Legal Load	n/a
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#### Clearances

Lateral	8'
<b>Vertical</b>	<b>13'-10"</b>



### BRIDGE: COLUMBUS & OHIO RR OVER US 250 HAS-250-0.81

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location include the reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase the vertical clearance below along US 250 to a standard 16.5 ft.

The estimated cost of this improvement is \$9,386,000.

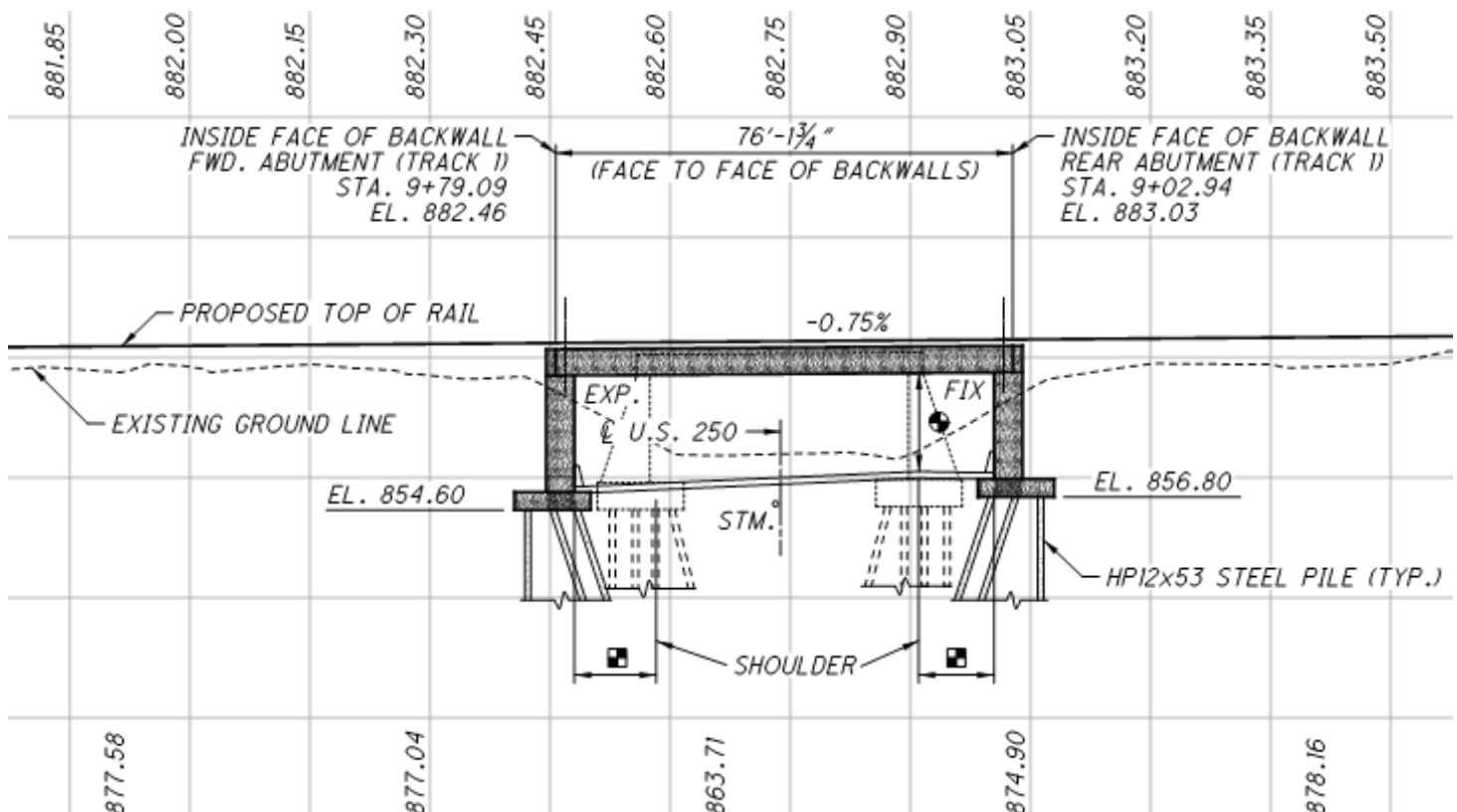
#### Cost / Preliminary Indications

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by increasing its vertical clearance to accommodate oversize loads.

An Alternative Study for this proposed structure was prepared for ODOT, dated February 20, 2015. ODOT is currently pursuing federal funding assistance for the proposed countermeasures under PID 99427.

#### Benefit-Cost Summary

Proposed Project Cost	\$9,386,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



### SEGMENT: US 250 ALONG TAPPAN LAKE HAS-250-2.14 TO HAS-250-11.09



#### Location Overview

The two-lane segment of US 250 along Tappan Lake in Harrison County traverses a series of horizontal curves offering panoramic views of the watershed. This segment of the corridor is marked by heavy tourist and sightseeing traffic with multiple boat launches and a marina located along US 250.

#### Existing Conditions

Crash analysis shows 47 crashes observed along this segment during a three-year period (2012 to 2014) with 23 crashes citing a vehicle leaving the travel lane and 15 rear end crashes. Crash severity was high with three fatal and seven injury crashes.

This segment contains a series of horizontal curves with approximately 1100 ft. radii which meet L&D standards for 55 mph assuming max superelevation is provided. Shoulder widths vary along this segment and are less than the eight-ft. standard in many locations. The lateral clearance (6-6.25') at four structures (SFNs 3401561, 3401588, 3401650 & 3401715) is less than the eight-ft. standard lateral clearance prescribed by L&D Vol. 1, Section 302-1E.

#### Problem Statement & Potential Countermeasures

Further safety analysis is needed to determine cause of high frequency of vehicle leaving lane crashes and high crash severity (three fatal crashes). While shoulder widths are substandard along this segment, limited space is available for pavement widening due to the adjacent lake and recreational area. Potential countermeasures include the installation of edge line rumble stripes and the installation of turn lanes where space permits at major tourist destinations (i.e. the rest area, marina and boat launch).



*Pictured Above:*

Oil & Gas tanker traveling WB on US 250 alongside Tappan Lake in Harrison County.

### SEGMENT: US 250 ALONG TAPPAN LAKE HAS-250-2.14 TO HAS-250-11.09

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered along this segment included reducing the posted speed limit, installing edge line rumble stripes and wider six inch pavement markings, comprehensive resigning of the entire segment, and widening the existing shoulder from three ft. to a standard eight ft.

Implementing a 10% reduction in the posted speed limit along this segment would result in an expected crash reduction of 1.3 crashes per year. Based on the crash history, roadway features and mixture of recreational and pass through traffic, a speed zone study of the Tappan Lake segment should be considered to determine if a lower speed limit is warranted.

Installing edge line rumble stripes and wider six inch pavement markings would result in an expected crash reduction of 3.0 crashes per year. A comprehensive resigning of the entire segment would result in an expected crash reduction of 1.9 crashes per year. Widening shoulders and installing spot turn lanes was considered, but not assessed in detail due to lower feasibility of this improvement due to physical constraints and right-of-way impacts.

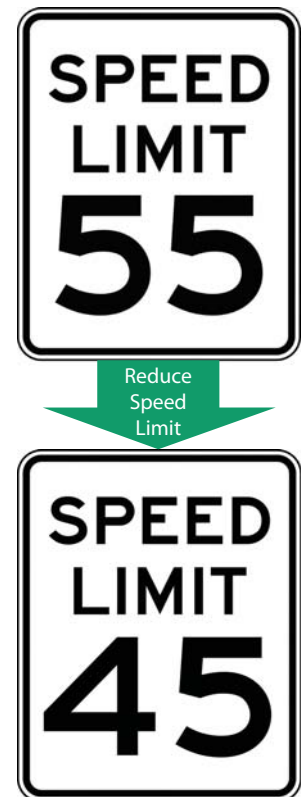
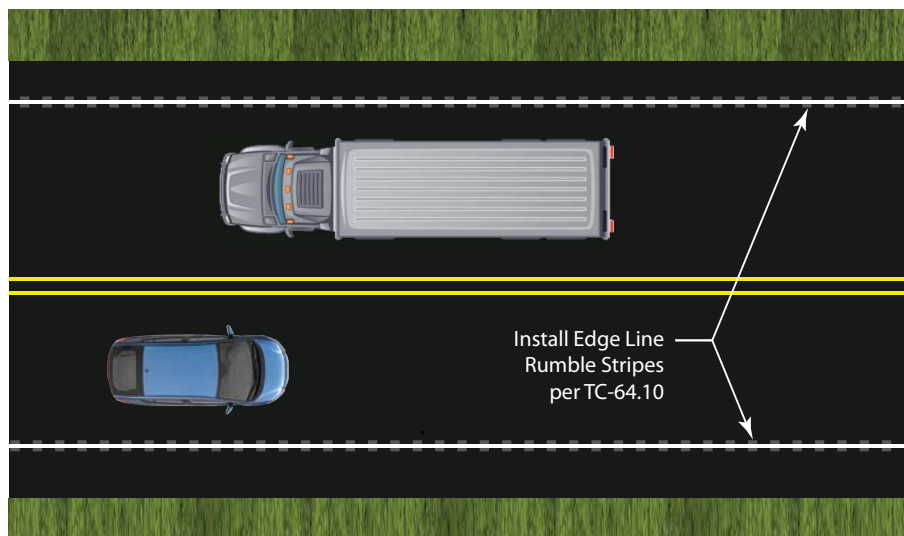
#### Cost / Preliminary Indications

Reducing the existing speed limit from 55 mph to 45 mph, and installing edge line rumble stripes and wider six inch pavement markings is estimated to cost \$153,000. The comprehensive resigning of this segment is estimated to cost \$430,000.

Reducing the existing speed limit from 55 mph to 45 mph, and installing edge line rumble stripes and wider six inch pavement markings along this segment results in a Preliminary B/C Ratio of 8.44 as summarized in the table displayed right. The Preliminary B/C Ratio (1.10) was not as favorable for comprehensive resigning.

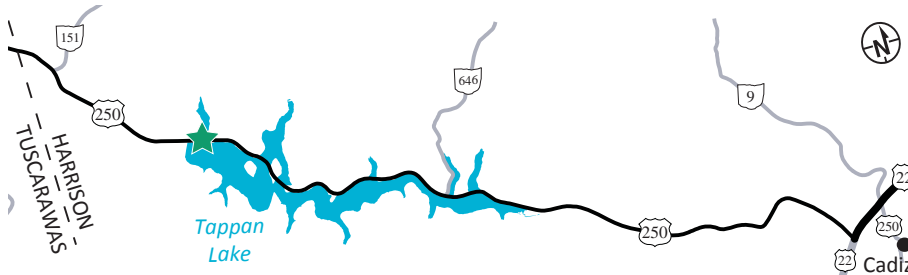
#### Benefit-Cost Summary

Proposed Project Cost	\$153,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-4.478
PV Benefits	\$3,214,065
<i>Combined</i>	
PV Operational & Safety Benefits	\$3,214,065
Preliminary B/C Ratio	8.44





### BRIDGE: US 250 OVER TAPPAN LAKE HAS-250-3.70 (SFN 3401561)



#### Location Overview

The concrete slab structure (SFN 3401561) carrying US 250 over Tappan Lake is located in rural Harrison County near the west end of the lake.

#### Existing Conditions

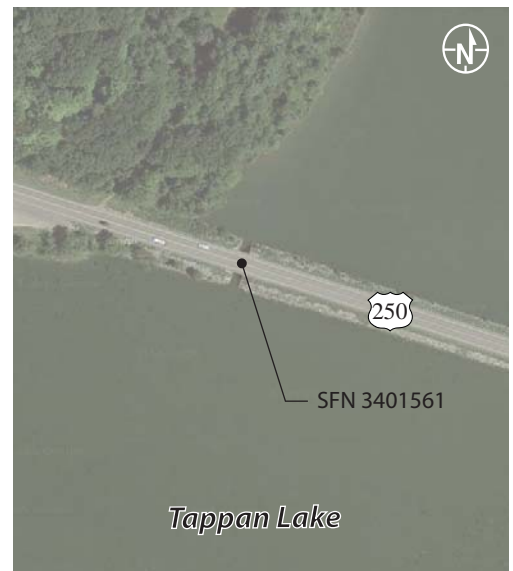
This single-span structure was constructed in 1936 and carries a two-lane segment of US 250.

The structure has a General Appraisal of Six indicating it is in Satisfactory Condition. The Load Rating for this structure is 145% of the Ohio Legal Load. Structures with a Load Rating of less than 150% of the Ohio Legal Limit potentially restrict the freight flow of Permit Loads along the corridor.

The existing lateral clearance (7.25') along US 250 on this structure is substandard. The minimum lateral clearance for an arterial is eight-ft. per L&D Vol. 1, 302-1E.

#### Problem Statement & Potential Countermeasures

The existing structure has a Load Rating of 145% of the Ohio Legal Load and a substandard lateral clearance of 7.25 ft., both of which pose potential freight bottlenecks for oversize/overweight loads. Potential countermeasures should explore rehabilitating/reconstructing the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increasing lateral clearance to a standard eight-ft.



#### Inspection Summary

Deck	6
Superstructure	6
Substructure	6
Culverts	n/a
Channel	8
Approaches	7
General Appraisal	6

#### Load Rating

% of Ohio Legal Load	145
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#### Clearances

Lateral	7.25'
Vertical	n/a

### BRIDGE: US 250 OVER TAPPAN LAKE HAS-250-3.70 (SFN 3401561)

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase its lateral clearance to a standard eight ft. This improvement would address the substandard load rating and lateral clearance that restrict the movement of some overweight/oversize freight loads.

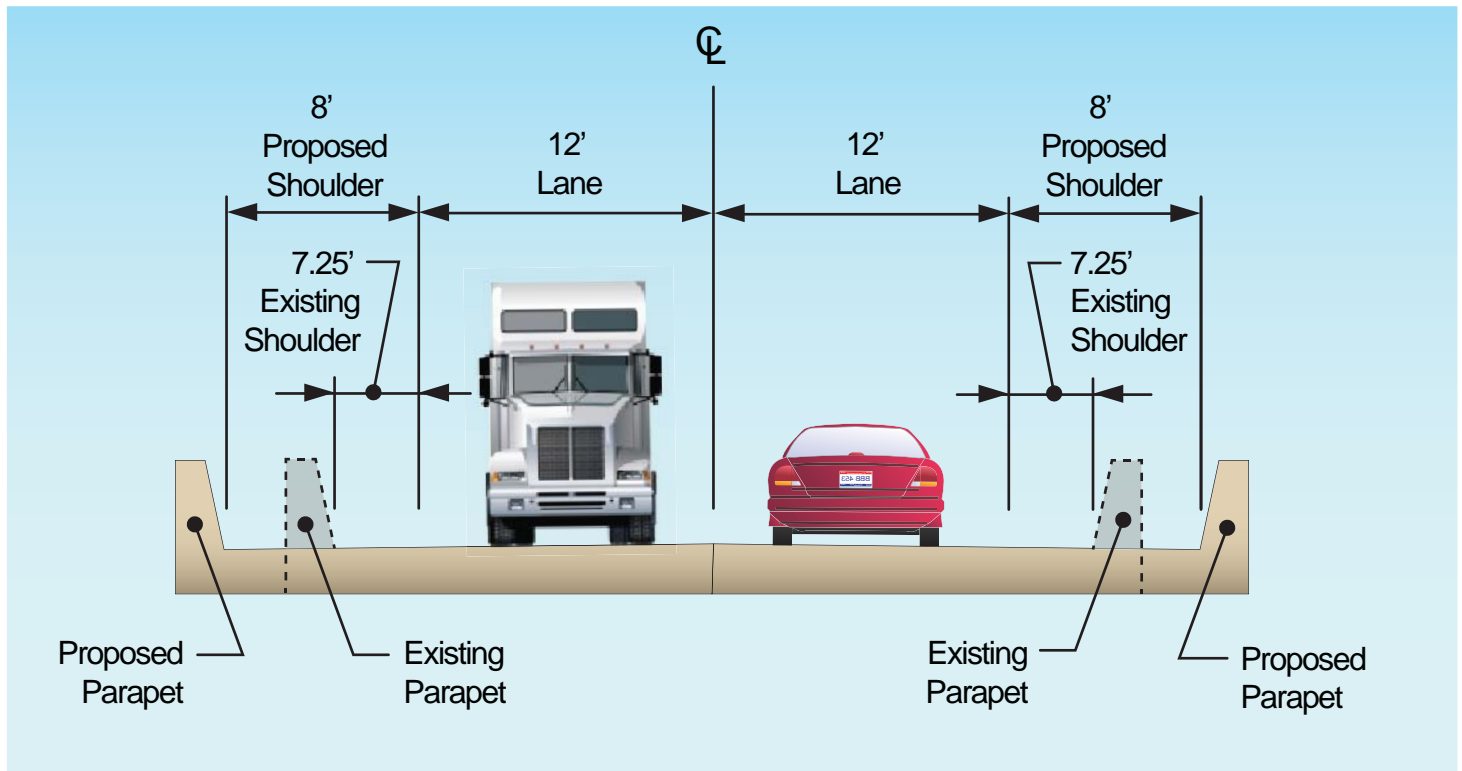
#### Cost / Preliminary Indications

The reconstruction of the existing structure to improve its Load Rating to 150% of the Ohio Legal Limit and increase its lateral clearance to a standard eight ft. is estimated to cost \$159,000.

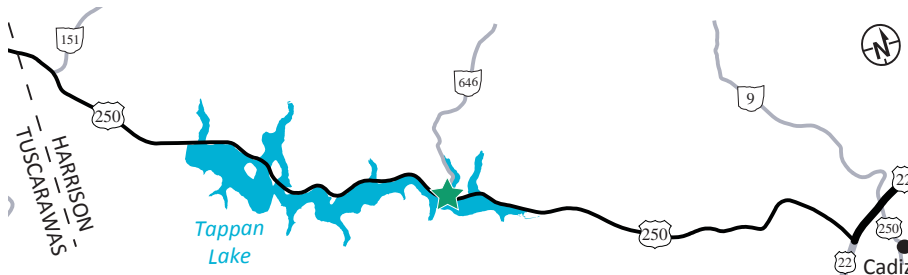
The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by improving the load rating to accommodate overweight loads and increasing the lateral clearance to accommodate oversize loads.

#### Benefit-Cost Summary

Proposed Project Cost	\$159,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a



### INTERSECTION: US 250 & SR 646 HAS-250-9.28



### Location Overview

The unsignalized intersection of US 250 and SR 646 is located in rural Harrison County at the east end of Tappan Lake. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a oil and gas freight diversion point along US 250.

### Existing Conditions

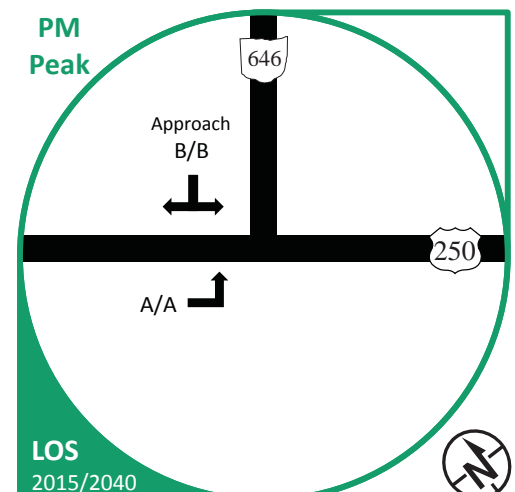
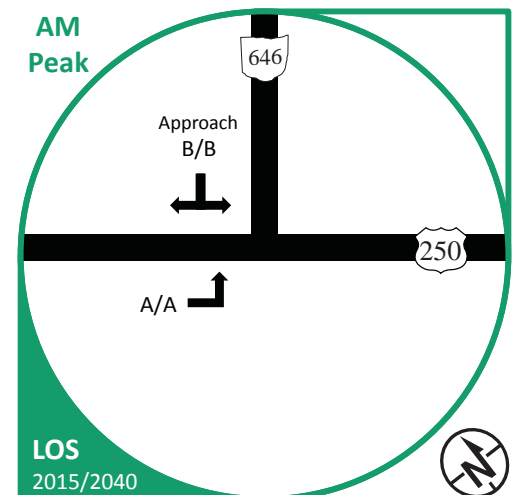
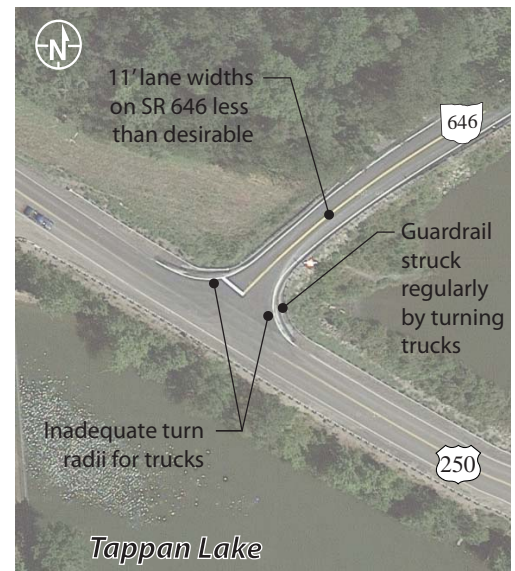
This three-leg stop control intersection operates with SR 646 under stop control and US 250 in free flow with all approaches having a single lane.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in both 2015 and 2040 during both the AM and PM peak hours.

Crash analysis shows six crashes observed at this intersection during a three-year period (2012 to 2014) with crash severity being high (two fatal and one injury). Sight distance from SR 646 at this location is deficient. The guardrail at the northeast corner is repeatedly struck by oil and gas trucks making a westbound left from US 250 to SR 646. AutoTurn analysis confirms inadequate turn radii for trucks.

### Problem Statement & Potential Countermeasures

The existing intersection operates at an acceptable LOS, but geometric deficiencies exist including insufficient truck turn radii, substandard 11-ft. lane width on SR 646 and sight distance issues. Pavement widening at this location is desirable to improve turn radii, but is probably not feasible due to the directly adjacent Tappan Lake. Potential countermeasures should explore moving stop bars to facilitate truck turning movements and improved warning signage to mitigate sight distance issues.





### INTERSECTION: US 250 & SR 646 HAS-250-9.28

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included upgrading signage, installing flashing beacons, widened pavement to facilitate truck turning movements, and installing a left turn lane along eastbound US 250.

Upgrading signage at this location entails replacing existing intersection warning signs with solar powered flashing LED lights. In addition, the warning sign on the eastbound approach should be relocated closer to the intersection in accordance with OMUTCD guidelines. Installing flashing beacons at the intersection is recommended if crash issues persist after upgrading signage.

Widening the existing intersection to improve the existing deficient turn radii, particularly at the northeast corner, would facilitate movements to and from SR 646, frequently traveled by oil and gas exploration freight, for a WB-62 truck without oversteering. Feasibility of this countermeasure is physically restricted by the adjacent Tappan Lake. Widening US 250 to install an eastbound left turn lane was considered, but pavement widths at the intersection are restricted by the adjacent Tappan Lake.

#### Cost / Preliminary Indications

The upgrade of signage at the intersection to install one flashing LED intersection ahead sign on each approach is \$6,000. The installation of flashing beacons at the intersection is estimated to cost \$35,000.

These improvements are considered qualitative as a safety or operational benefit is unable to be quantified. The proposed improvements will provide qualitative benefits to freight flow by enhancing awareness of this intersection.

#### Benefit-Cost Summary

##### Proposed Project Cost

Upgrade Signage	\$6,000
Install Flashing Beacon	\$35,000

##### Operational

Travel Time Savings (annual)	n/a
PV Benefits	n/a

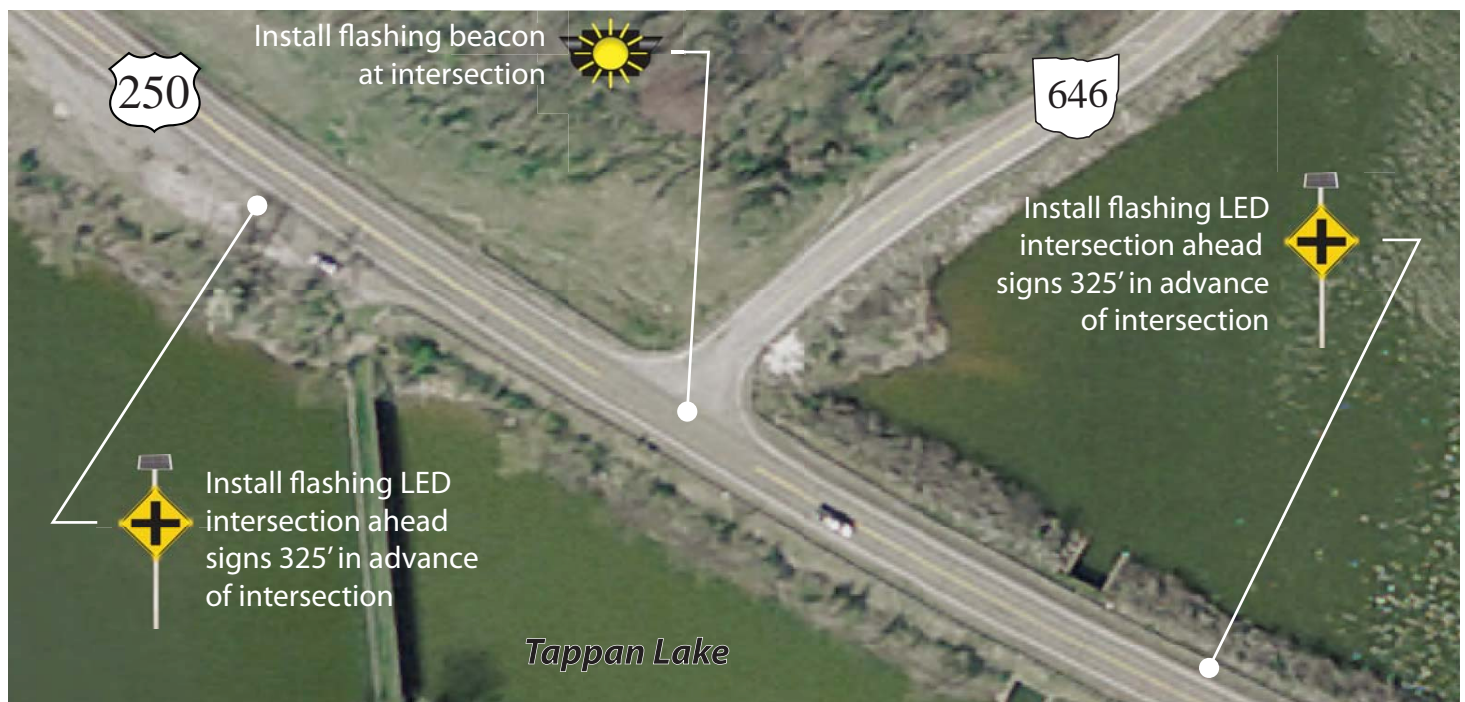
##### Safety

Expected Annual Crash Adjustment	n/a
PV Benefits	n/a

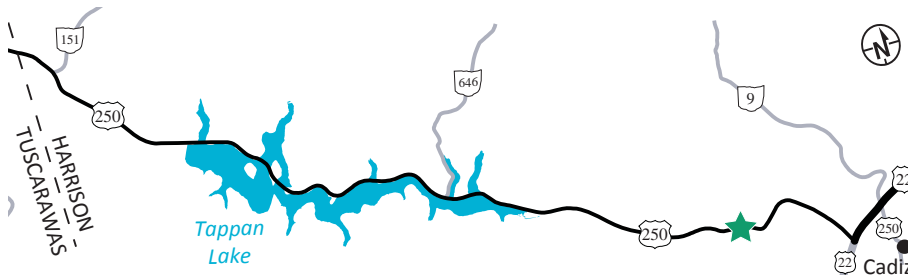
##### Combined

PV Operational & Safety Benefits	n/a
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Preliminary B/C Ratio	n/a
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### BRIDGE: US 250 OVER STANDINGSTONE FORK HAS-250-14.94 (SFN 3401804)



#### Location Overview

The concrete slab structure (SFN 3401804) carrying US 250 over Standingstone Fork is located in rural Harrison County 2.7 miles west of US 22.

#### Existing Conditions

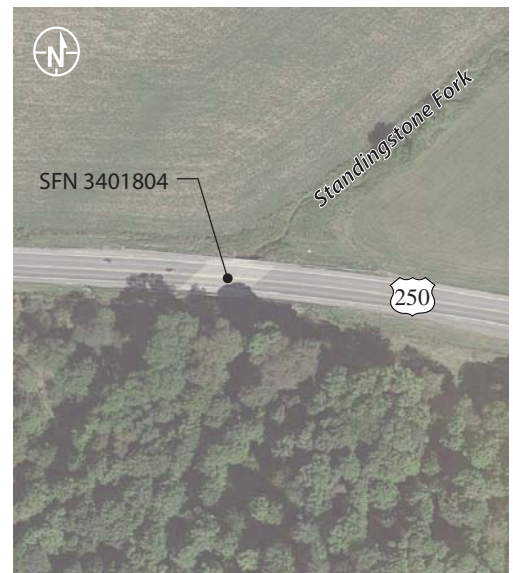
This single-span structure was constructed in 1932 and rehabilitated in 1984. It carries a two-lane segment of US 250.

The structure has a General Appraisal of Seven indicating it is in Good Condition. The Load Rating for this structure is 150% of the Ohio Legal Load.

The existing lateral clearance (six-ft.) along US 250 on this structure is substandard. The minimum lateral clearance for an arterial is eight-ft. per L&D Vol. 1, 302-1E. Lateral clearance along US 250 on this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure has a substandard lateral clearance of six-ft. which poses a potential freight bottleneck for oversize loads. Potential countermeasures should explore reconstructing the existing structure to increase its lateral clearance to a standard eight-ft.



#### Inspection Summary

Deck	7
Superstructure	7
Substructure	7
Culverts	n/a
Channel	6
Approaches	8
<b>General Appraisal</b>	<b>7</b>

#### Load Rating

% of Ohio Legal Load	150
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#### Clearances

<b>Lateral</b>	<b>6'</b>
Vertical	n/a

### BRIDGE: US 250 OVER STANDINGSTONE FORK HAS-250-14.94 (SFN 3401804)

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to increase its lateral clearance to a standard eight ft. This improvement would address the substandard lateral clearance that restrict the movement of some oversize freight loads.

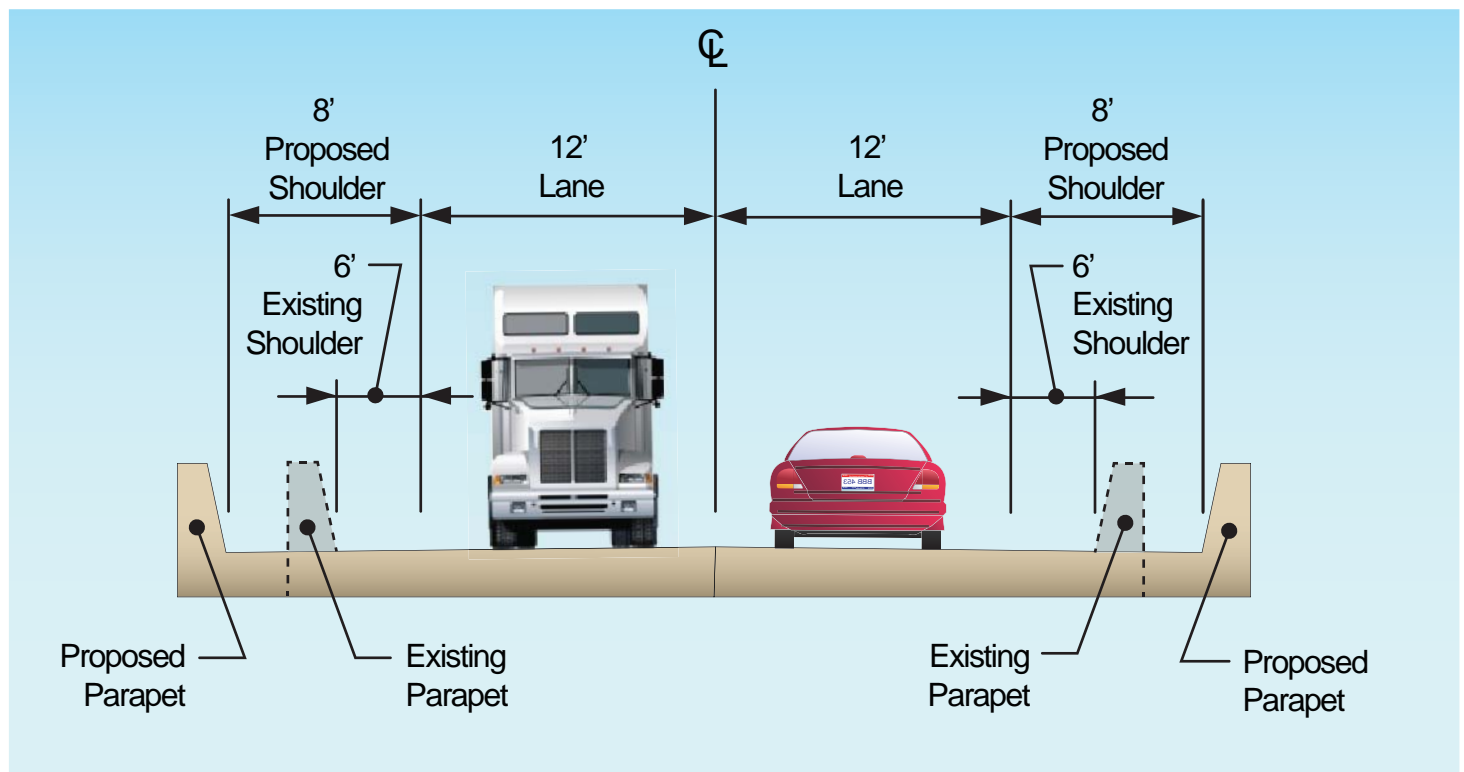
#### Cost / Preliminary Indications

The reconstruction of the existing structure to increase its lateral clearance to a standard eight ft. is estimated to cost \$179,000.

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by increasing the lateral clearance to accommodate oversize loads.

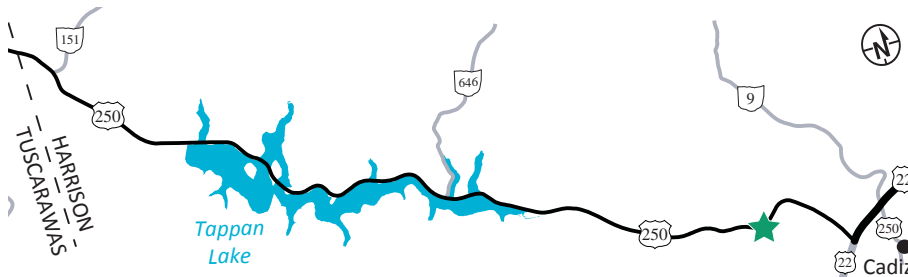
#### Benefit-Cost Summary

Proposed Project Cost	\$179,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	n/a
PV Benefits	n/a
<i>Combined</i>	
PV Operational & Safety Benefits	n/a
Preliminary B/C Ratio	n/a





### SEGMENT: US 250 "HORIZONTAL CURVE AT COUNTY HOME" HAS-250-15.33 TO HAS-250-15.63



#### Location Overview

The two-lane segment of US 250 just west of the Harrison County Home traverses an abruptly sharp horizontal curve.

#### Existing Conditions

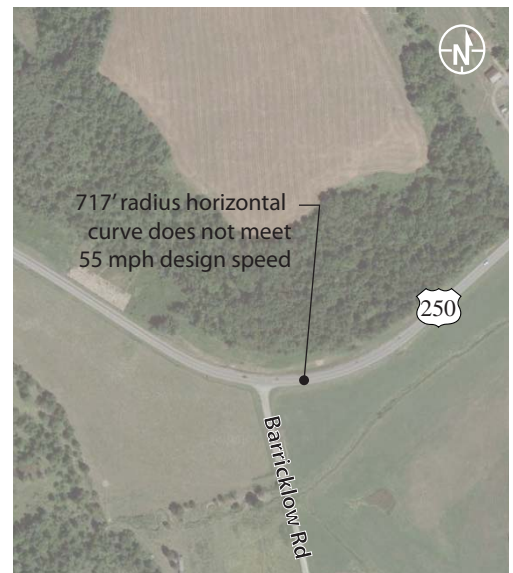
An intersection with a local rural road (Barricklow Road) is located approximately midway through the outside of the curve along the south side of US 250. ADT along this segment of US 250 is 5,680 with 22% trucks.

Crash analysis shows seven crashes observed along this segment during a three-year period (2012 to 2014) with six crashes citing a vehicle leaving the travel lane. Crash severity was high with two fatal crashes and one injury crash.

The horizontal curve radius (716 ft.) is substandard as the L&D requires a minimum radius of 955 ft. (assuming a 0.08 max superelevation) for a 55 mph design speed. Per L&D Vol. 1, 301-5cE a 716 ft. radius curve with a 55 mph design speed requires 4 ft. of curve widening.

#### Problem Statement & Potential Countermeasures

Crash severity at this location is high (two fatal crashes) and horizontal geometry is deficient for a 55 mph design speed. Potential countermeasures include additional warning signage in advance of and along this curve, the installation of rumble strips, and curve widening on this inside of this curve.



*Pictured Above:*

Looking EB along US 250 at sharp horizontal curve just west of the Harrison County Home.

### SEGMENT: US 250 "HORIZONTAL CURVE AT COUNTY HOME" HAS-250-15.33 TO HAS-250-15.63

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered along this segment included upgrading signage, curve widening, or realignment of the roadway.

Upgrading signage along this segment entails installing dual curve ahead signs in advance of the intersection in accordance with OMUTCD standards. In addition existing curve arrow signs should be upgraded to "oversize" arrow signs. These signage upgrades would result in an expected crash reduction of 0.1 crashes per year.

Curve widening and realignment of the existing horizontal curve were considered, but these improvements were not analyzed in detail due to their much higher construction costs.

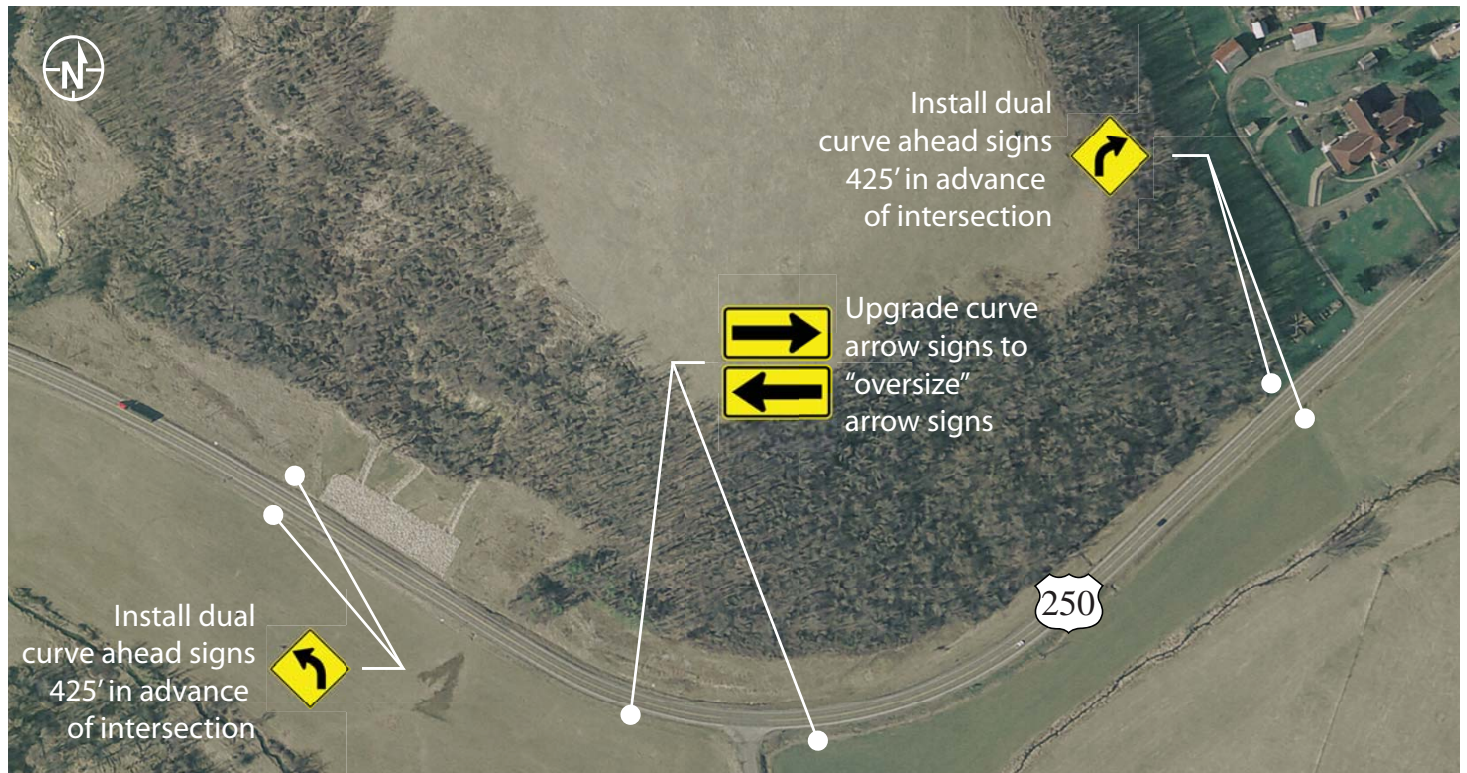
#### Cost / Preliminary Indications

The installation of upgraded curve warning signage in advance and along the curve is estimated to cost \$15,000.

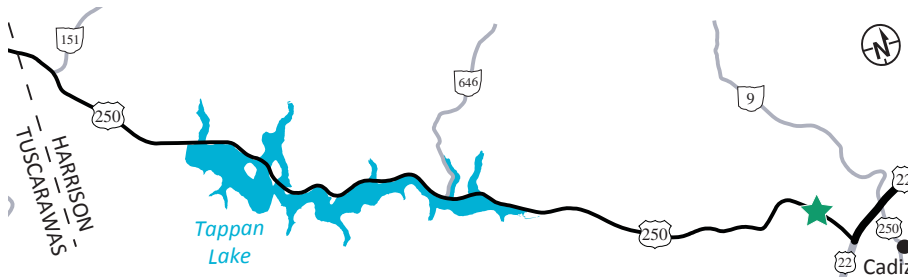
This proposed upgrade of existing signage provides results in a Preliminary B/C Ratio of 1.67 as summarized in the table displayed right.

#### Benefit-Cost Summary

Proposed Project Cost	\$15,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-0.100
PV Benefits	\$25,000
<i>Combined</i>	
PV Operational & Safety Benefits	\$25,000
Preliminary B/C Ratio	1.67



### BRIDGE: US 250 OVER STANDINGSTONE FORK HAS-250-16.64 (SFN 3401839)



#### Location Overview

The concrete slab structure (SFN 3401839) carrying US 250 over Standingstone Fork is located in rural Harrison County 1.0 miles west of US 22.

#### Existing Conditions

This single-span structure was constructed in 1932 and rehabilitated in 1985. It carries a two-lane segment of US 250.

The structure has a General Appraisal of Seven indicating it is in Good Condition. The Load Rating for this structure is 150% of the Ohio Legal Load.

The existing lateral clearance (6.25-ft.) along US 250 on this structure is substandard. The minimum lateral clearance for an arterial is eight-ft. per L&D Vol. 1, 302-1E. Lateral clearance along US 250 on this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure has a substandard lateral clearance of 6.25 ft. which poses a potential freight bottleneck for oversize loads. Potential countermeasures should explore reconstructing the existing structure to increase its lateral clearance to a standard eight-ft.



#### Inspection Summary

Deck	7
Superstructure	7
Substructure	7
Culverts	n/a
Channel	6
Approaches	9
<b>General Appraisal</b>	<b>7</b>

#### Load Rating

% of Ohio Legal Load	150
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#### Clearances

<b>Lateral</b>	<b>6.25'</b>
Vertical	n/a



### BRIDGE: US 250 OVER STANDINGSTONE FORK HAS-250-16.64 (SFN 3401839)

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included the reconstruction of the existing structure to increase its lateral clearance to a standard eight ft. This improvement would address the substandard lateral clearance that restrict the movement of some oversize freight loads.

#### Cost / Preliminary Indications

The reconstruction of the existing structure to increase its lateral clearance to a standard eight ft. is estimated to cost \$160,000.

The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by increasing the lateral clearance to accommodate oversize loads.

#### Benefit-Cost Summary

Proposed Project Cost	\$160,000
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#### Operational

Travel Time Savings (annual)	n/a
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PV Benefits	n/a
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#### Safety

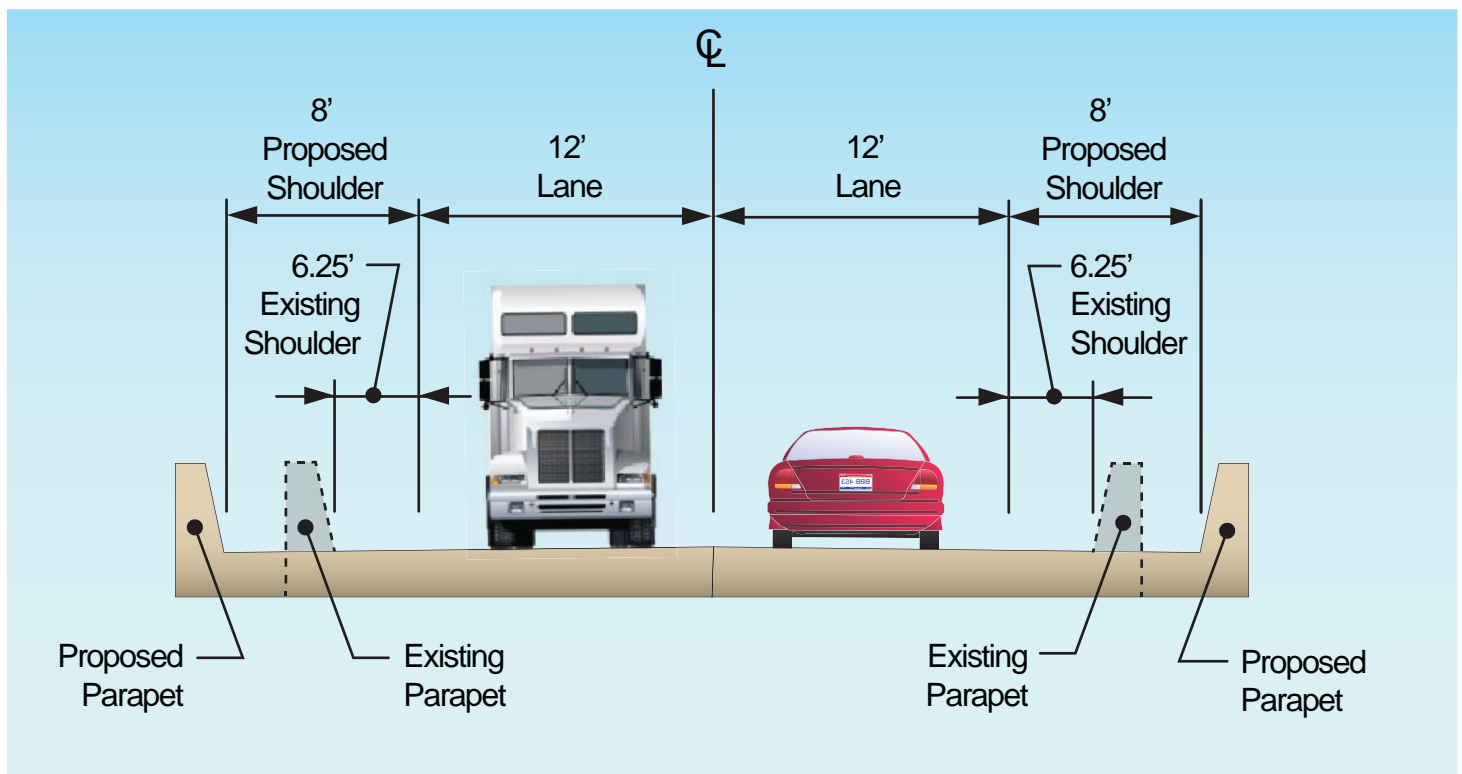
Expected Annual Crash Adjustment	n/a
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PV Benefits	n/a
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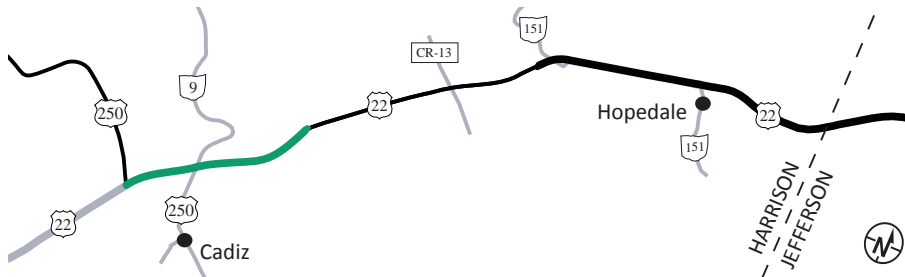
#### Combined

PV Operational & Safety Benefits	n/a
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Preliminary B/C Ratio	n/a
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### SEGMENT: US 22 CADIZ BY-PASS HAS-22-15.20 TO HAS-22-18.99



#### Location Overview

The four-lane segment of US 22 along the north edge of the Village of Cadiz is a limited access facility bypassing the urbanized core of the village.

#### Existing Conditions

This four-lane limited access freeway segment of US 22 has an ADT of 7,484 with 24% trucks.

Per District 11, the US 22 bypass outside Cadiz is the “worst four-lane pavement in D11” with a PCR of 68. It was noted by District 11 that there is a poor pavement subbase contributing to the composite pavement slabs rocking. Field observation confirmed the presence of traverse and longitudinal cracking in the pavement.

#### Problem Statement & Potential Countermeasures

The pavement along this four-lane freeway segment has a PCR of 68 (Fair Condition). Potential countermeasures include full-depth pavement reconstruction.



*Pictured Above:*

Traverse and longitudinal cracking is present in pavement looking west along US 250 / US 22 (Cadiz Bypass) west of US 250 / SR 9 interchange.



# US 250 Operations Study

## Needs & Conditions Report

**SEGMENT: US 22 CADIZ BY-PASS**  
**HAS-22-15.20 TO HAS-22-18.99**

### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location include full depth pavement reconstruction. The full depth reconstruction of the existing pavement along the four-lane section of US 22/US 250 around Cadiz will improve the rideability of the existing pavement that currently has a PCR of 68 (Fair Condition).

### Cost / Preliminary Indications

Full depth asphalt pavement reconstruction is estimated to cost \$7,350,000. Full depth concrete pavement reconstruction is estimated to cost \$11,410,000.

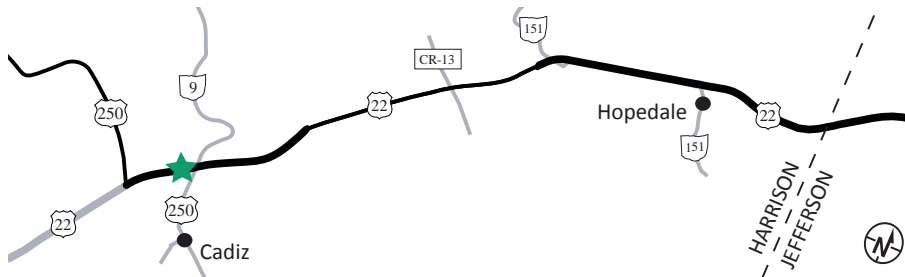
The proposed improvements at this location do not result in quantifiable safety or operational benefits. The proposed improvements will result in qualitative benefits to freight flow by providing a smoother pavement surface that decreases fuel consumption and vehicle operating costs while providing a more safe and comfortable driver experience.

### Benefit-Cost Summary

Proposed Project Cost		
Asphalt		\$7,353,000
Concrete		\$11,410,000
<i>Operational</i>		
Travel Time Savings (annual)		n/a
PV Benefits		n/a
<i>Safety</i>		
Expected Annual Crash Adjustment		n/a
PV Benefits		n/a
<i>Combined</i>		
PV Operational & Safety Benefits		n/a
Preliminary B/C Ratio		n/a



### BRIDGE: TOWNSHIP ROAD 243 OVER US 22/US 250 HAS-22-17.24



#### Location Overview

The steel beam structure (SFN 3400964) carrying Township Road 243 over a four-lane limited access segment of US 22/US 250 is located in the Village of Cadiz in Harrison County 0.25 miles west of the SR 9/US 250 interchange.



#### Existing Conditions

This four-span structure was constructed in 1962 and carries a two-lane Rural Local roadway over US 250.

The structure has a General Appraisal of Four indicating it is in Poor Condition and Structurally Deficient. The deck and superstructure both have Summary Ratings of Four due to poor condition of the floor/sidewalks and rolled steel girders/protective coatings systems, respectively. The Load Rating for this structure is 150% of the Ohio Legal Load.

The existing vertical clearance (15.2-ft.) along US 22/US 250 under this structure is substandard. The minimum vertical clearance for an arterial is 16.5-ft. per L&D Vol. 1, 302-1E. Lateral clearance along US 250 under this structure meets L&D standards.

#### Problem Statement & Potential Countermeasures

The existing structure is programmed to be permanently removed under PID 88923 in 2016. Township Road 243 access will be realigned to Dennison Avenue. No further countermeasures are recommended at this location.

#### Inspection Summary

<b>Deck</b>	<b>4</b>
<b>Superstructure</b>	<b>4</b>
Substructure	7
Culverts	n/a
Channel	n/a
Approaches	5
<b>General Appraisal</b>	<b>4</b>

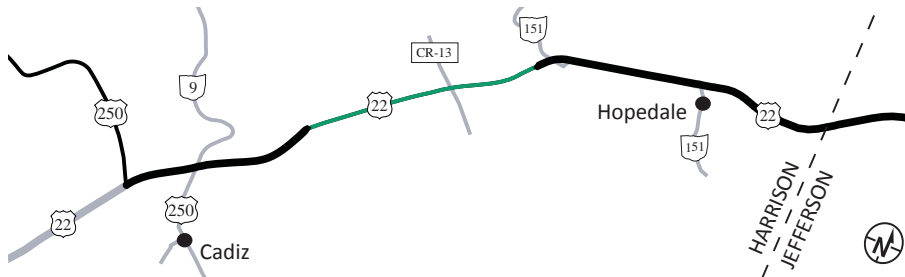
#### Load Rating

% of Ohio Legal Load	150
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#### Clearances

Lateral	10'
<b>Vertical</b>	<b>15'-2"</b>

### SEGMENT: US 22 FROM CADIZ BY-PASS TO SR 151 HAS-22-18.99 TO HAS-22-21.58



#### Location Overview

The 2.6-mile rural segment of US 22 directly east of the Cadiz bypass is the only section of unwidened two-lane highway between Cadiz and Steubenville.

#### Existing Conditions

This segment traverses gently rolling terrain with some gradual horizontal curves. The ADT along this segment is 8,210 with 19% trucks.

Crash analysis shows 31 crashes observed along this segment during a three-year period (2012 to 2014) with nearly half involving a vehicle leaving travel lane. Further safety analysis is needed based on crash severity with three fatal crashes and 11 injury crashes within a 2.59-mile segment.

Shoulder widths along this segment meet L&D standards.

#### Problem Statement & Potential Countermeasures

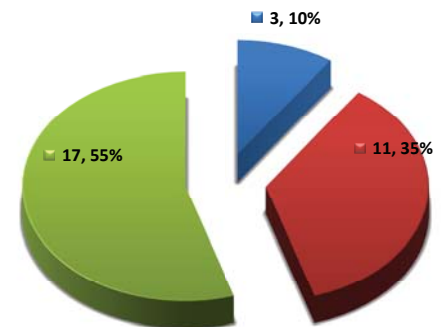
Further safety analysis is needed to determine cause of high frequency of vehicle leaving lane crashes and high crash severity (three fatal crashes). Potential countermeasures include installation of centerline and shoulder rumble strips.



*Pictured Above:*

Looking westbound along the 2-lane segment of US 22 in Harrison County.

#### Frequency of Crashes by Severity



CRASH SEVERITY

Fatal Crash

Injury Crash

Property Damage Crash

**SEGMENT: US 22 FROM CADIZ BY-PASS TO SR 151**  
**HAS-22-18.99 TO HAS-22-21.58**

### Concepts / Countermeasures & Operational Analysis

Countermeasures considered along this segment included installing centerline and edge line rumble stripes and wider six inch pavement markings.

Installing centerline and edge line rumble stripes and wider six inch pavement markings would result in an expected crash reduction of 1.9 crashes per year.

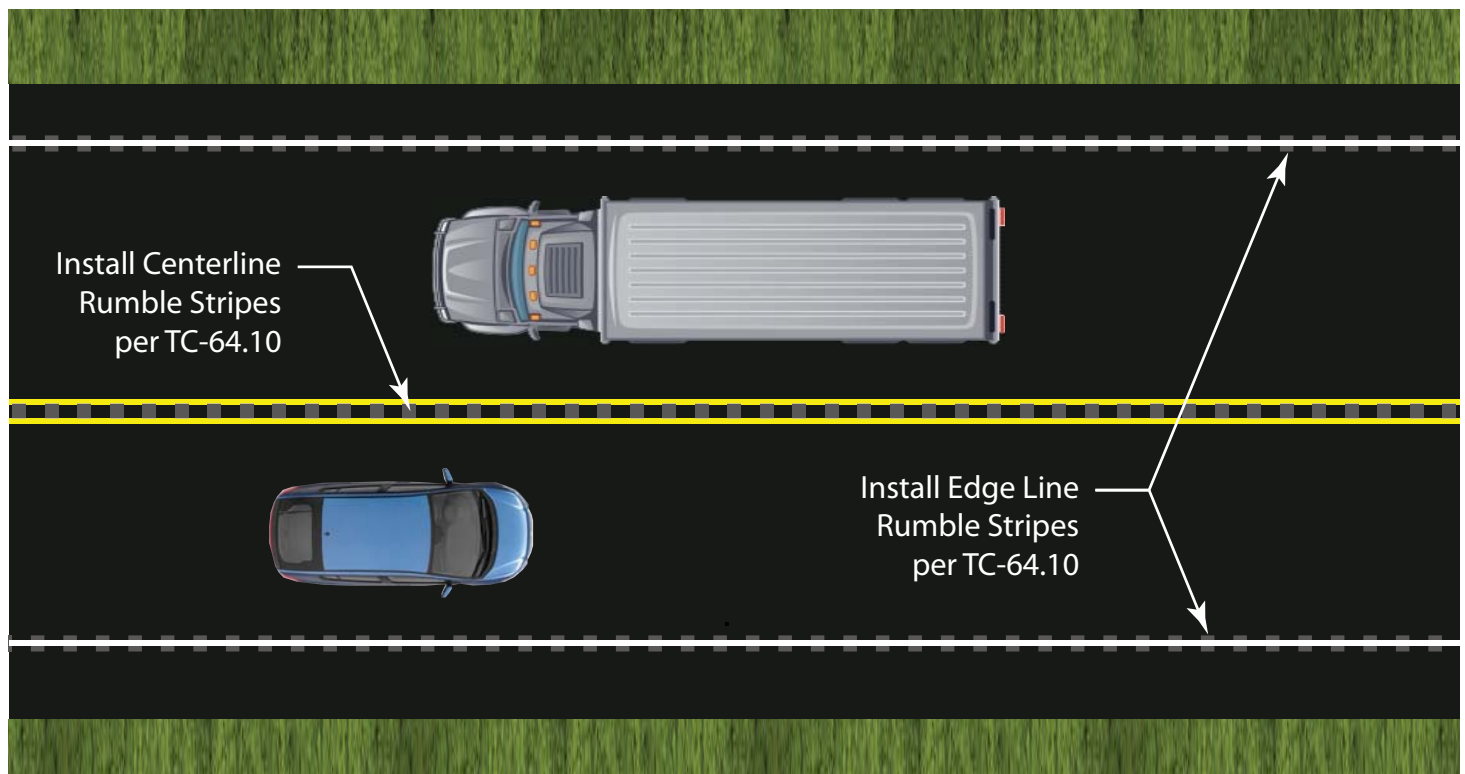
Widening this segment from two to four lanes to match the adjacent four lane segments was considered, but not assessed in detail because of the lower feasibility of this improvement due to physical constraints and right-of-way impacts.

### Cost / Preliminary Indications

The installation of centerline and edge line rumble stripes and wider six inch pavement markings is estimated to cost \$47,000.

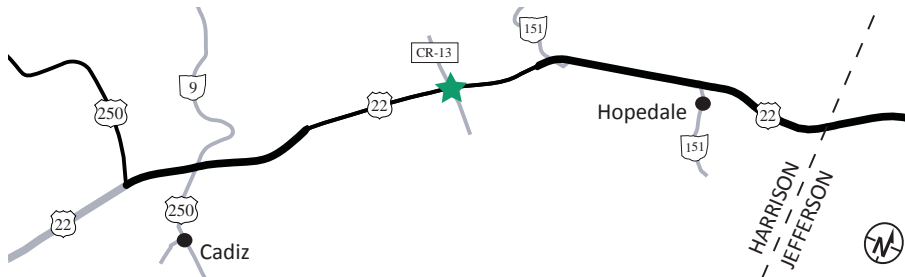
The installation of centerline and edge line rumble stripes and wider six inch pavement markings along this segment results in a Preliminary B/C Ratio of 12.00 as summarized in the table displayed right.

Benefit-Cost Summary	
Proposed Project Cost	\$47,000
<i>Operational</i>	
Travel Time Savings (annual)	n/a
PV Benefits	n/a
<i>Safety</i>	
Expected Annual Crash Adjustment	-1.881
PV Benefits	\$1,305,306
<i>Combined</i>	
PV Operational & Safety Benefits	\$1,305,306
Preliminary B/C Ratio	12.00





### INTERSECTION: US 22 & UNIONVALE-KENWOOD ROAD (CR 13) HAS-22-20.55



#### Location Overview

The unsignalized intersection of US 22 and CR 13 is located in rural Harrison County along the approximately four-mile two-lane segment of US 22. This intersection is one of 20 locations along the corridor where a 12-hour turning movement count was conducted due to it being a oil and gas freight diversion point, as well as to provide a traffic count along the only unimproved two-lane segment of US 22 between Cadiz and Steubenville.

#### Existing Conditions

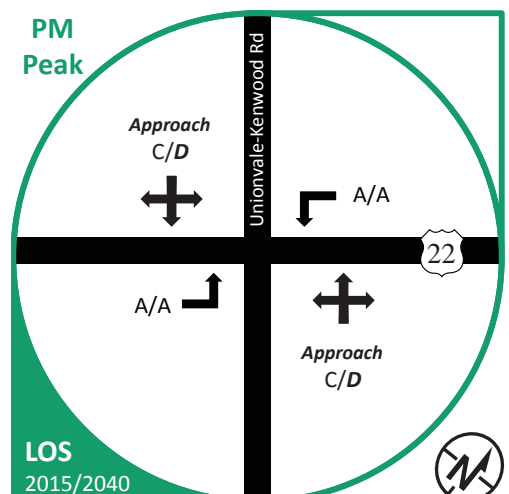
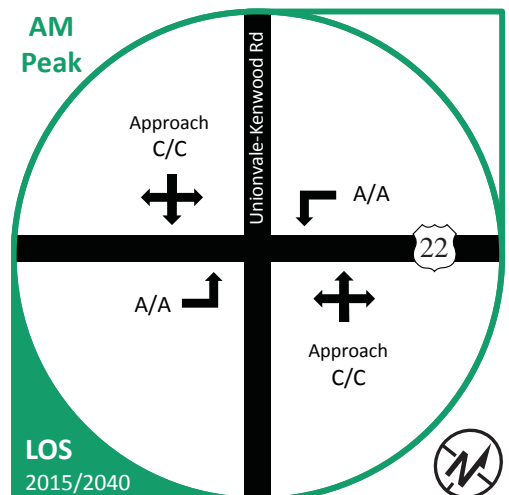
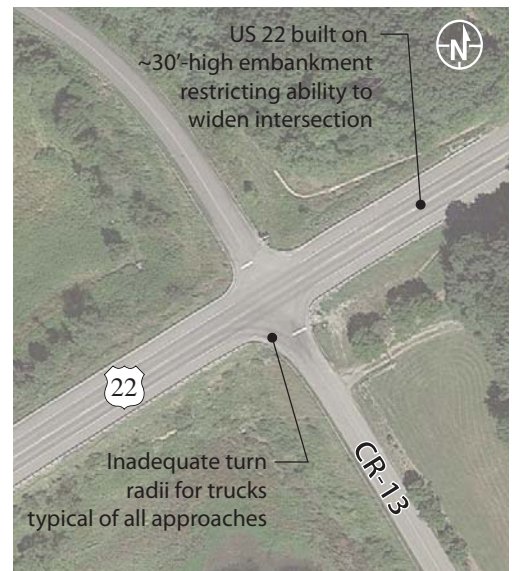
This two-way stop control intersection operates with CR 13 approaches under stop control with all approaches having a single lane. CR 13 is posted to prohibit truck traffic, but is used by local oil and gas-related freight traffic.

Capacity analyses (results displayed right) were performed at this location in both peak hours using HCS for 2015 and 2040. All approaches operate at an acceptable LOS (C or better) in 2015 and 2040 in the AM peak hour. Both stop control approaches operate at an unacceptable LOS D in 2040 in the PM peak hour.

Crash analysis shows eight crashes observed at this intersection during a three-year period (2012 to 2014) with five rear end crashes, two sideswipe meeting, and one angle. Crash severity at this location was high with two fatal crashes and two injury crashes. Field observations showed trucks turning right from the CR 13 stop control approaches had to wait for traffic in both directions along US 22 to clear in order to complete a turning movement. AutoTurn analysis confirms inadequate turn radii for trucks.

#### Problem Statement & Potential Countermeasures

The existing intersection operates at an unacceptable LOS in the 2040 PM peak hour and insufficient truck turn radii exist requiring right turning trucks from CR 13 to utilize both lanes on US 22 to complete a turn. Potential countermeasures to improve operation on the stop control approach are limited as improvements would degrade operation on the much higher volume US 22 approaches so rerouting local freight traffic to another access point along US 22 should be explored. If freight traffic cannot be rerouted, potential countermeasures at CR 13 should explore moving stop bars/pavement widening to facilitate truck turning movements.



### INTERSECTION: US 22 & UNIONVALE-KENWOOD ROAD (CR 13) HAS-22-20.55

#### Concepts / Countermeasures & Operational Analysis

Countermeasures considered at this location included upgrading signage and widening the intersection to improve turn radii.

Upgrading signage at this location entails installing additional (dual) intersection warning signs on both of the US 22 approaches.

Widening the existing intersection to improve the existing deficient turn radii, particularly at the southeast corner, would facilitate movements to and from CR 13, frequently traveled by oil and gas exploration freight, for a WB-62 truck without oversteering.

#### Cost / Preliminary Indications

The upgrade of signage at this intersection is estimated to cost \$5,000. The widening of the existing intersection to improve the deficient turn radii at this location is expected to cost approximately \$75,000.

The proposed improvements are qualitative improvements as a safety or operational benefit is unable to be quantified. Upgrading signage will result in a qualitative benefit by enhancing awareness of this intersection. Widening pavement to improve turn radii will result in a qualitative benefit to freight flow by facilitating turning movements for a WB-62 truck.

#### Benefit-Cost Summary

##### Proposed Project Cost

Upgrade Signage	\$5,000
Pavement widening	\$75,000

##### Operational

Travel Time Savings (annual)	n/a
PV Benefits	n/a

##### Safety

Expected Annual Crash Adjustment	n/a
PV Benefits	n/a

##### Combined

PV Operational & Safety Benefits	n/a
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Preliminary B/C Ratio	n/a
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## US 250 Operations Study

### Needs & Conditions Report

#### EXISTING CORRIDOR ASSESSMENT SUMMARY

##### Overview

Overall, safety and geometry issues were more prevalent along the corridor than traffic operation and physical condition issues. Nearly half of the locations (23 of 51) analyzed exhibited crash patterns indicating the presence of a safety issue, while over half (29 of 51) of the locations exhibited geometric deficiencies. Nine locations were identified as having traffic operation issues based on capacity analyses or historical travel time data. 10 locations were identified as having physical conditions issues with respect to bridge appraisal/load rating (eight bridges) or pavement condition (two segments).

##### Traffic Operation

Among the 20 intersections where a detailed capacity analysis was performed, seven intersections operated with one or more approaches at an unacceptable LOS (D or worse) based on the Highway Capacity Manual. Three of those seven intersections had relatively low-freight volume stop control side street approaches operating at unacceptable LOS, and it is unlikely that any of those three locations will have feasible countermeasures as operational improvements to reduce side street delay would increase the total delay along the more heavily traveled US 250 approaches.

Historical travel time data showed the Sandusky region in Erie County and the segment at the east edge of Ashland near I-71 as the primary sources of travel time delay along the corridor. Both of these segments are five-lanes and are already being improved through a programmed TRAC project and an intersection reconfiguration under construction, respectively.

##### Safety

Safety analysis showed crashes to be fairly well-distributed along the corridor, though severity tended to increase along the eastern portion of the corridor, particularly in Harrison County, where horizontal curvature is more prevalent and the topography is hillier. Animal crashes were notably a major cause of crashes in the flat, straight western segment of the corridor in Huron County. The central portion of the corridor between I-71 and I-77 exhibited a combination of rear end, fixed object, and animal crashes, while Amish Buggy crashes were also observed between Wooster and Wilmot.

##### Geometry

Geometric deficiencies are present all across the corridor, with most segments having substandard shoulder widths and six intersections having inadequate truck turning radii. Vertical clearances are substandard at three overhead structures, and lateral clearances were substandard at most of the bridge locations. Horizontal curvature generally met design standards for posted speed limits with one exception in Harrison County.

##### Physical Condition

Physical condition was identified as an issue at eight bridges, with six having Load Ratings less than 150% of the Ohio Legal Limit and two having General Appraisals of Four or less indicating they are structurally deficient.

Only one location was identified as having a PCR less than 65 (segment from I-71 to Wooster), but this pavement is already programmed for rehabilitation in SFY 2017. The "Cadiz Bypass" segment of US 22 has a PCR of 68 (Fair), but was noted as a physical condition issue based on input provided by District 11 identifying pavement condition along this stretch of four-lane limited access freeway as a top priority and the only four-lane pavement in the district with a PCR below 70.

##### Potential Countermeasures

The Summary of Locations on the following page shows an overview of the issues identified in each location's Problem Statement with correlating Potential Countermeasures. The list of potential countermeasures is not exhaustive and focuses on the most feasible and cost-effective solutions in accordance with this study's overall focus on incremental improvements to improve freight flow along the corridor.

It should be noted that countermeasures were not recommended at 12 locations, with five of those locations already having programmed projects addressing the problem issues. The seven other locations where countermeasures were not recommended are described in detail within the modular summaries.





# US 250 Operations Study

## Needs & Conditions Report

### SUMMARY OF EXISTING CONDITIONS

Page	County	Location Type	Description	Issue				Potential Countermeasures								Addressed by Planned Project	Countermeasures Not Recommended
				Traffic Operation	Safety	Geometry	Physical Condition	Improve Signal Operation	Upgrade Signage/Striping	Reconfigure Intersection	Improve Turn Radius	Widen Shoulder/Bridge	Increase Vert. Clearance	Rehab/ Replace Pavement	Rehab/ Replace Bridge		
1	ERI	Segment	US 6 to SR 2	•	•											•	
2	ERI	Bridge	Turnpike Ramps over US 250			•	•						•		•		
4	ERI	Intersection	at SR 113		•			•									
6	HUR	Intersection	at Whittlesey Ave/League St		•			•									
8	HUR	Intersection	at SR 61 (Main St)	•				•									
10	HUR	Intersection	at WB US 20/SR 18 Ramps														•
11	HUR	Segment	Norwalk to Ashland County Line		•	•							•				
13	HUR	Intersection	at Greenwich Town Line Rd (CR 51)	•													•
14	HUR	Bridge	over Indian Creek			•	•								•		
16	HUR	Intersection	at SR 162 (west)			•							•				
18	HUR	Intersection	at SR 13 (Fitchville River Rd)	•		•				•	•						
20	HUR	Intersection	at SR 162 (east)			•					•						
22	HUR	Bridge	CSX RR over US 250			•	•						•		•		
24	ASD	Intersection	at US 224														•
25	ASD	Bridge	over Myers Branch of Vermilion River			•	•						•		•		
27	ASD	Intersection	at SR 60 (north)			•											•
28	ASD	Bridge	over Branch of Long Creek			•							•				
30	ASD	Intersection	at SR 60/Faultless Drive	•	•					•							
32	ASD	Intersection	at Cleveland Ave (CR 42B)		•				•								
34	ASD	Segment	US 42 to Amberwood Pkwy	•	•											•	
35	ASD	Segment	I-71 to US 30		•	•	•									•	
37	ASD	Intersection	at SR 89			•					•						
39	WAY	Segment	Wooster to Wilmot		•	•			•								
41	WAY	Intersection	at Apple Creek Rd (CR 44)			•			•								
43	WAY	Bridge	over Spring Run Creek			•									•		
45	WAY	Intersection	at Kidron Rd (CR 52)		•	•			•								
47	WAY	Intersection	at SR 94 / SR 241		•			•									
49	WAY	Intersection	at SR 241		•			•									
51	STA	Intersection	at US 62 (Winesburg St)			•											•
52	STA	Intersection	at US 62 (Massillon St)														•
53	STA	Segment	Wilmot to SR 21		•	•			•								
55	TUS	Intersection	at SR 21	•	•					•							
57	TUS	Intersection	at 12th Street	•		•					•						
59	TUS	Segment	Strasburg		•				•								
61	TUS	Intersection	at 2nd St		•			•									
63	TUS	Intersection	at 1st St		•			•									
65	TUS	Intersection	at I-77 NB Ramps														•
66	TUS	Bridge	US 250 NB to SR 39 EB Ramp				•									•	
67	TUS	Segment	SR 800 to Harrison County Line		•	•			•								
69	HAS	Intersection	at SR 151			•					•						
71	HAS	Bridge	Columbus & Ohio RR over US 250			•							•				
73	HAS	Segment	along Tappan Lake		•				•								
75	HAS	Bridge	over Tappan Lake			•	•					•			•		
77	HAS	Intersection	at SR 646		•	•											
79	HAS	Bridge	over Standingstone Fork			•						•					
81	HAS	Segment	Horizontal Curve at County Home		•	•			•								
83	HAS	Bridge	over Standingstone Fork			•						•					
85	HAS	Segment	US 22 (Cadiz Bypass)				•							•			
87	HAS	Bridge	Twp Rd 243 over US 22/US 250			•	•									•	
88	HAS	Segment	US 22 (2-lane)		•				•								
90	HAS	Intersection	US 22 at CR 13	•	•	•					•						



## US 250 Operations Study

### Needs & Conditions Report

#### PROPOSED CORRIDOR ASSESSMENT SUMMARY

##### Overview

Proposed countermeasures were recommended at 39 of the 51 locations assessed along the corridor. The majority of locations (23 of 39) have proposed countermeasures to enhance traffic control which included upgrades to signage, upgrades to pavement markings, installation of flashing beacons, installation of signal detection, and intersection reconfigurations. A comprehensive list of countermeasures considered is included in Appendix A.

##### Traffic Operation

Seven locations have proposed countermeasures that resulted in quantifiable travel time savings with improvements that included intersection reconfigurations (i.e. install four-way stop control, install traffic signal, install roundabout) and implementing signal coordination/detection.

##### Safety

Twelve locations have proposed countermeasures that resulted in quantifiable expected crash reductions using HSM methodology. Numerous other locations have proposed countermeasures that are intended to improve safety, but did not have an accepted crash modification factor available to quantify crash reduction.

##### Geometry

Sixteen locations have proposed countermeasures that improve geometric deficiencies with intersection pavement widening to improve turn radii (six locations) and widening structures to improve lateral clearance (six locations) being most prevalent.

##### Physical Condition

Eleven locations were bridges with recommendations to replace existing structures to improve lateral/vertical clearances and/or increase load ratings. One roadway segment in Harrison County was recommended for full-depth pavement replacement.

##### Cost / Preliminary Indications

The majority of proposed countermeasures were relatively low cost with most locations (21 of 39) having only countermeasures estimated to cost less than \$100,000. Nineteen locations had proposed countermeasures estimated to cost more \$100,000 or more, with only seven of those locations having proposed countermeasures estimated to cost more than \$1,000,000.

Preliminary benefit-cost (B/C) ratios and Return on Investment (ROI) were calculated comparing quantified operational benefits (travel times savings) and safety benefits (expected crash reduction) against estimated project costs. Geometric improvements and physical condition improvements were not able to be quantified, but their respective benefits to freight flow were described qualitatively within the modular summaries. For locations exhibiting quantifiable benefits, preliminary B/C Ratios and ROI are provided in the Summary of Proposed Countermeasures on Page 95.

##### Evaluation Categories

Each proposed countermeasure is categorized in one of the following four groups:

- *Group A* – Improvements that add capacity and/or divert traffic (e.g. adding thru lanes; construction of a bypass)
- *Group B* – Improvements where travel time savings can be quantified (e.g. installation of a traffic signal)
- *Group C* – Improvements where travel time savings cannot be quantified, but safety benefits can be quantified (e.g. installing signage; widening shoulder widths)
- *Group D* – Improvements where neither travel time savings or safety benefits can be quantified (e.g. increase turn radii)

At this stage no proposed improvements were categorized as Group A. Seven locations had proposed countermeasures that were categorized as Group B and are included as Appendix B for insertion into ODOT's Quick Economic Impact Module (QEIM) during the evaluation phase to quantify overall economic benefits. Ten locations had countermeasures with quantified safety benefits, categorized as Group C, and 22 locations had countermeasures with no quantifiable benefits, categorized as Group D.



# US 250 Operations Study

## Needs & Conditions Report

### SUMMARY OF PROPOSED COUNTERMEASURES

Page	County	Location Type	Location Description	Proposed Countermeasures	Preliminary Benefit-Cost Analysis										Evaluation Group
					Estimated Project Cost	Type	Operational	Safety	Combined Operational & Safety						
						Quantitative	Annual Time Travel Savings (veh-hrs)	Expected Annual Crash Adjustment	PV Benefits	PV Benefits	PV Benefits	Preliminary B/C Ratio	Return on Investment (ROI)		
3	ERI	Bridge	Turnpike Ramps over US 250	Replace Structure / Inc. Vert. Clear.	\$1,630,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
5	ERI	Intersection	at SR 113	Adjust yellow / all red signal timings	\$3,000	•	n/a	n/a	-1.063	\$136,934	\$136,934	45.64	44.64	C	
7	HUR	Intersection	at Whittlesey Ave/League St	Adjust yellow / all red signal timings	\$3,000	•	n/a	n/a	-0.59	\$63,128	\$63,128	21.04	20.04	C	
9	HUR	Intersection	at SR 61 (Main St)	Re-evaluate signal timing in future	n/a	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
12	HUR	Segment	Norwalk to Ashland County Line	Widen Shoulders	\$5,857,000	•	n/a	n/a	-5.62	\$3,108,023	\$3,108,023	0.53	-0.47	C	
15	HUR	Bridge	over Indian Creek	Replace & Widen Structure	\$151,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
17	HUR	Intersection	at SR 162 (west)	Widen Pavement	\$65,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
19	HUR	Intersection	at SR 13 (Fitchville River Rd)	Install Traffic Signal	\$140,000	•	63	\$10,841	4.22	-\$394,818	-\$383,977	0.00	-3.74	B	
21	HUR	Intersection	at SR 162 (east)	Widen intersection	\$130,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
23	HUR	Bridge	CSX RR over US 250	Replace Structure / Inc. Vert. Clear.	\$8,356,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
26	ASD	Bridge	over Myers Branch of Vermilion River	Replace & Widen Structure	\$191,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
29	ASD	Bridge	over Branch of Long Creek	Replace & Widen Structure	\$391,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
31	ASD	Intersection	at SR 60 / Faultless Drive	Install 4-way Stop Control	\$14,000	•	-514	-\$84,209	-2.08	\$886,814	\$802,605	57.33	56.33	B	
31	ASD	Intersection	at SR 60 / Faultless Drive	Install Roundabout	\$1,100,000	•	1,667	\$272,927	-2.19	\$1,563,456	\$1,836,383	1.67	0.67	B	
33	ASD	Intersection	at Cleveland Ave (CR 42B)	Upgrade Intersection Signage	\$6,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
38	ASD	Intersection	at SR 89	Upgrade Intersection Signage	\$5,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
38	ASD	Intersection	at SR 89	Widen Pavement	\$65,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
40	WAY	Segment	Wooster to Wilmot	Install Shoulder Rumble Stripes	\$16,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
42	WAY	Intersection	at Apple Creek Rd (CR 44)	Upgrade Signage	\$5,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
44	WAY	Bridge	over Spring Run Creek	Replace Structure	\$899,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
46	WAY	Intersection	at Kidron Rd (CR 52)	Upgrade Signage	\$5,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
46	WAY	Intersection	at Kidron Rd (CR 52)	Upgrade Signal	\$155,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
48	WAY	Intersection	at SR 94 / SR 241	Add Signal Detection	\$26,000	•	1,322	\$218,429	n/a	n/a	\$218,429	8.40	7.40	B	
50	WAY	Intersection	at SR 241	Add Signal Detection	\$26,000	•	1,518	\$254,241	n/a	n/a	\$254,241	9.78	8.78	B	
54	STA	Segment	Wilmot to SR 21	Install Edge Line Rumble Stripes	\$85,000	•	n/a	n/a	-2.61	\$1,761,215	\$1,761,215	8.19	7.19	C	
56	TUS	Intersection	at SR 21	Install Roundabout	\$1,155,000	•	11,640	\$1,906,706	-1.57	\$784,804	\$2,691,510	2.33	1.33	B	
58	TUS	Intersection	at 12th Street	Widen Pavement	\$60,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
60	TUS	Segment	Strasburg	Restripe as 3-Lane Section	\$46,000	•	n/a	n/a	-1.68	\$788,558	\$788,558	5.71	4.71	C	
62	TUS	Intersection	at 2nd St	Add Signal Detection	\$26,000	•	4,555	\$734,713	n/a	n/a	\$734,713	28.26	27.26	B	
64	TUS	Intersection	at 1st St	Add Signal Detection	\$26,000	•	3,557	\$568,578	n/a	n/a	\$568,578	21.87	20.87	B	
68	TUS	Segment	SR 800 to Harrison County Line	Install Edge Line Rumble Stripes	\$63,000	•	n/a	n/a	-3.05	\$2,011,017	\$2,011,017	12.70	11.70	C	
70	HAS	Intersection	at SR 151	Upgrade Pavement Markings	\$1,000	•	n/a	n/a	-0.36	\$54,675	\$54,675	54.68	53.68	C	
70	HAS	Intersection	at SR 151	Upgrade Signage	\$5,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
70	HAS	Intersection	at SR 151	Widen Pavement	\$45,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
72	HAS	Bridge	Columbus & Ohio RR over US 250	Replace Structure / Inc. Vert. Clear.	\$9,386,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
74	HAS	Segment	along Tappan Lake	Install Edge Line Rumble Stripes	\$153,000	•	n/a	n/a	-4.48	\$3,214,065	\$3,214,065	8.44	7.44	C	
76	HAS	Bridge	over Tappan Lake	Replace & Widen Structure	\$159,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
78	HAS	Intersection	at SR 646	Upgrade Signage	\$6,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
78	HAS	Intersection	at SR 646	Install Flashing Beacon	\$35,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
80	HAS	Bridge	over Standingstone Fork	Replace & Widen Structure	\$179,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
82	HAS	Segment	Horizontal Curve at County Home	Upgrade Signage	\$15,000	•	n/a	n/a	-0.10	\$25,000	\$25,000	1.67	0.67	C	
84	HAS	Bridge	over Standingstone Fork	Replace & Widen Structure	\$160,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
86	HAS	Segment	US 22 (Cadiz Bypass)	Full-Depth Pavement Replacement	\$7,353,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
89	HAS	Segment	US 22 (2-lane)	Install Edge Line Rumble Stripes	\$47,000	•	n/a	n/a	-1.88	\$1,305,306	\$1,305,306	12.00	11.00	C	
91	HAS	Intersection	US 22 at CR 13	Upgrade Signage	\$5,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	
91	HAS	Intersection	US 22 at CR 13	Widen Pavement	\$75,000	•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	D	

### NEXT STEPS / ACTIONS

The next phase of this study entails the evaluation of the identified countermeasures by applying Evaluation Criteria to each proposed improvement. Countermeasures with an associated travel time savings (Group B) will have economic benefits quantified using ODOT's EIM. Countermeasures with no associated travel time savings (Groups C and D) will have economic benefits qualitatively described as part of the economic development and goods movement evaluation. The evaluation phase will culminate in the preparation of a Benefit-Cost Analysis Summary Report.