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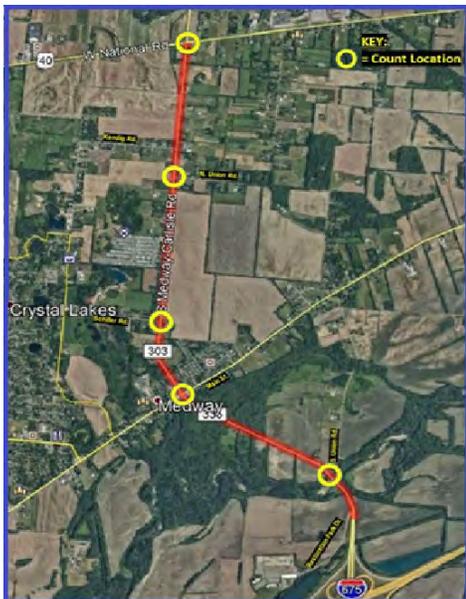
# CR335/CR303 SAFETY STUDY

CR335 (SPANGLER RD.) /  
CR303 (MEDWAY-NEW CARLISLE RD.)  
FROM RESTORATION PARK DR.  
TO US40 (W. NATIONAL RD.)

Safety Study Funding By:



**COUNTY ENGINEERS  
ASSOCIATION OF OHIO**  
"ALL TRAVEL STARTS AND ENDS ON A LOCAL ROAD"



## Districts



PREPARED FOR:  
CLARK COUNTY ENGINEER  
4075 LAYBOURNE RD.  
SPRINGFIELD, OHIO 45505  
AUGUST 2020

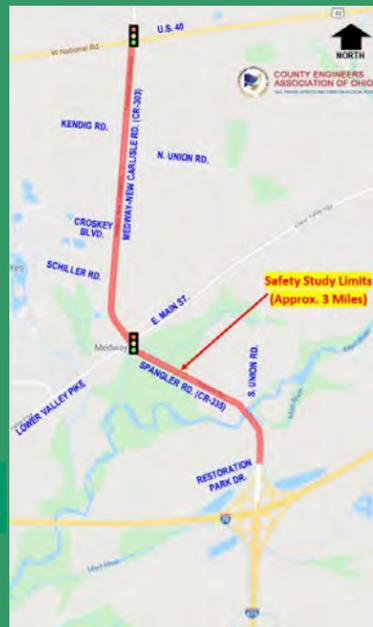


# SAFETY PROJECT SUMMARY

## CLA-CR335/CR303

From Restoration Park Dr. to US40

SAFETY STUDY  
(AUG 2020)  
CLARK CO.  
ENGINEER



**Crash Data (2016-2018)**  
XX% = Statewide Average

TRAFFIC_CRASH_YEAR	Number	%
2016	18	32.1%
2017	17	30.4%
2018	21	37.5%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

CRASH_SEVERITY	Number	%
Fatal Crash	2	3.6%
Injury Crash	13	23.2%
Property Damage Crash	41	73.2%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ROAD_CONDITION	Number	%
Dry	29	51.8%
Wet	17	30.4%
Snow	5	8.9%
Water (Standing, Moving)	3	5.4%
Ice	2	3.6%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

TYPE_OF_CRASH	Number	%
Fixed Object	28	50.0%
Rear End	12	21.4%
Angle	3	5.4%
Animal	3	5.4%
Left Turn	3	5.4%
Other Non-Collision	2	3.6%
Head On	2	3.6%
Parked Vehicle	1	1.8%
Other Object	1	1.8%
Sideswipe - Passing	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ROAD_CONTOUR	Number	%
Straight Level	39	69.6%
Curve Level	12	21.4%
Straight Grade	4	7.1%
Curve Grade	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

### Existing Conditions

- Segments are on High Priority locations in the 2019 County Road High Crash Locations Map for Clark County and is listed as the #3 ranked high crash rural corridor by the local MPO for Spangler Road (CR335) and #27 high crash rural corridor for Medway-New Carlisle Road (CR303);
- Two lane roadway with 11-FT lanes with narrow shoulders (2-FT or less);
- Fixed objects (such as utility poles and trees) are within 3 to 5 feet of travel lanes;
- Three curved segments contributed to 21.4% (12 crashes) of crashes (statewide average is 5.3%);
- Limited sight distance at approach to traffic signal in Medway from roadway curvature & bridge structure;
- Segment of Spangler Road (CR335) from S. Union Road to bridge just south of Medway is within flood zone.

Summary of Proposed Countermeasures	
Location	Description of Improvements
<b>CR335 (Spangler Road)</b>  Restoration Park Drive To Main Street in Medway	<ul style="list-style-type: none"> <li>Regrade earth levy at Restoration Park Drive to improve sight distance of southbound traffic;</li> <li>Re-align South Union Drive intersection further northward to improve sight distance blocked by bridge and add a northbound right turn lane (see Appendix B for turn lane warrants summary) and improve intersection warning signs and add street lights;</li> <li>Raise Spangler Road profile elevation approximately 2.5-FT so to elevate the roadway out of the 100-year flood zone elevation from just north of South Union Road northward to the bridge in Medway; install 4-FT shoulders with rumble stripes; regrade ditches; and remove trees within the extended right-of-way;</li> <li>Replace the bridge on south side of Medway that is on the south side of the intersection with Main Street and widen the new bridge to allow for a northbound left turn lane at the signalized intersection at Main Street to be installed and provide new signing; the new bridge should be re-aligned to eliminate the curved section entering the bridge on its south side that currently exists; the south side of the bridge will need to meet the new profile elevation of Spangler Road that is being raised to bring the roadway above the 100-year flood zone.</li> </ul>
<b>CR303 (Medway-New Carlisle Road)</b>  Main Street in Medway To US40 (National Road)	<ul style="list-style-type: none"> <li>Widen shoulders of curve located on north side of Medway; install enhanced visibility curve signs; provide rumble stripes; and relocate or remove any fixed objects that are too close to the edge of roadway;</li> <li>Install a northbound left turn lane at Schiller Road as turning volumes indicate one is warranted (see Appendix B); widen shoulders at intersection, install street lights and improve intersection signing;</li> <li>Improve intersection signing at Croskey Boulevard intersection; widen shoulders (250FT each side of intersection); and install street lights;</li> <li>Improve intersection signing at Union Road intersection; widen shoulders (250FT each side of the intersection); and install street lights;</li> <li>Improve intersection signing at Kendig Road intersection; widen shoulders (250FT each side of the intersection); and install street lights;</li> <li>Install LED solar powered flashing dual warning signs for signal ahead for northbound traffic at base of hill approaching the signal at US40 (National Road);</li> <li>Resurface roadway to provide enhanced pavement markings and drivability.</li> </ul>

### Roadway Cross Memorial for Fatal Crash Where Tree Was Hit



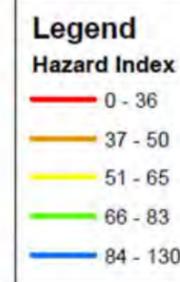
### Crash Data (2016-2018) Highlights

- 56 Crashes Overall
- 2 (3.6%) Fatal Crashes Exceeds Statewide Avg. of 0.3%
- 28 Fixed Object Crashes (50%) Exceeds Statewide Avg. of 18.6%
- 21 Rear End Crashes (21.4%) Exceeds Statewide Avg. of 20.7%
- 12 Crashes on a Curve-Level Section (21.4%) Exceeds Statewide Avg. of 5.3%

### Countermeasures ECAT Analyses (\$5,884,000 Project Cost):

The ECAT analyses projects a safety improvement of reducing predicted crashes from 28.5 down to 18.5 with a Benefit/Cost of 0.97.

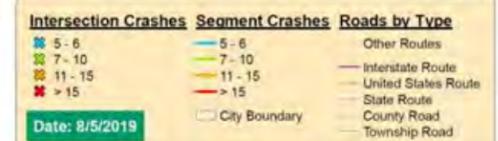
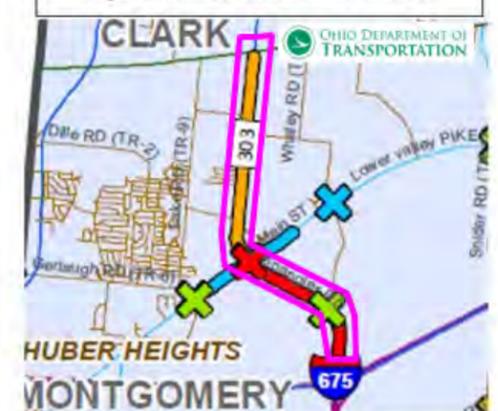
### 2016-2018 Rural Corridor Crash Locations



Clark County-Springfield TCC (Local MPO)  
**High Crash Corridor Rankings:**  
#3 (CR335 from Restoration Park to Lower Valley)  
#27 (CR303 from Lower Valley to US40)



### 2019 County Road High Crash Locations - Clark Co.



CRASH TYPES	CONTRIBUTING FACTORS	ROAD CONDITION	CRASH DESCRIPTION	PAGE SUMMARY	SEVERITY
REAR-END TURNING HEAD ON OVERTURNING	FTG = FAILURE TO STOP FTY = FAILURE TO YIELD FCL = FOLLOWED TOO CLOSELY IPT = IMPROPER TURN IBS = IMPROPER BACKING OVI = OPERATING VEHICLE IMPAIRED URM = UNKNOWN	D = DIRT M = MET I = ICE S = SNOW U = UNKNOWN	DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR RED = 2018 GREEN = 2017 BLUE = 2016	FREQUENCY 5 2018 2 2017 4 2016	6 PROPERTY DAMAGE ONLY (PDO) 4 INJURY 1 FATAL 11 TOTAL CRASHES (CURRENT PAGE)

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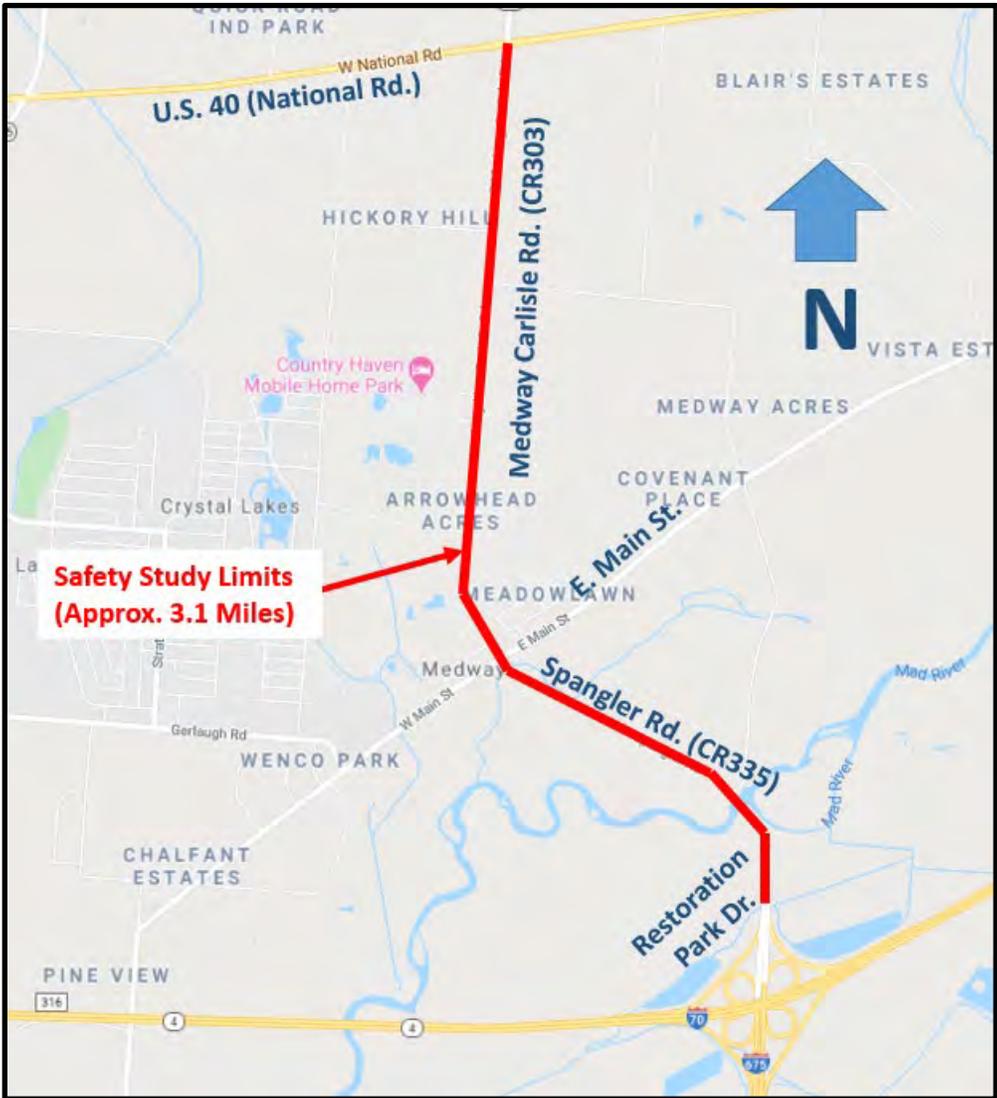
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1.0 EXECUTIVE SUMMARY

1.1 Project Background

This 3.1 mile long project runs along Spangler Road (CR335) which transitions to S. Medway-New Carlisle Road (CR303) to the north. The corridor begins at Restoration Park Drive heading primarily north to West National Road (US-40) located north of Medway, Ohio. The corridor features one (1) lane in each direction, with narrow shoulders and adjacent fixed objects such as utility poles that are in very close proximity to the edge of roadway. The corridor is classified as a Major Collector. Traffic counts conducted for the study indicates 24-hour volumes of 7,730 south of the traffic signal located at East Main Street in Medway and 5,860 north of the intersection. Spangler Road receives northbound traffic on I-675 that do not exit onto I-70, and these vehicles are traveling at a posted 65 MPH speed on the interstate facility. These vehicles must reduce speeds to 55 MPH on Spangler Road, which is difficult to adjust to, after having been traveling on I-675 at the higher speeds.

Figure 1.1 Study Limits



The corridor has various sections that have been routinely listed with high crash locations. On the Ohio Department of Transportation (ODOT) Safety Integrated Project Maps and on the County Road High Crash Locations Maps, the CR335/CR303 corridor has had various high priority crash segments. This section of CR335/CR303 contained 56 crashes with two (2) fatal crashes and thirteen (13) injury crashes in the 2016-2018 period. A particular concern is that 28 of the 56 crashes (or 50%) were Fixed Object related crashes, which compares to a statewide average of 18.6%, as these types of crashes often lead to enhanced severity crashes. The roadway contour is another contributing factor to crash patterns given that 21% occurred on “Curve Level” sections, which is nearly four times higher than the statewide average of 5.3%. To address these issues the Clark County Engineer applied for County Engineers Association of Ohio (CEAO) funding to conduct a Safety Study and was awarded funds for the study for FY2020.

This safety study evaluated existing traffic operations, crash frequencies, and the relative severity index to develop specific improvements for addressing crash patterns along the project corridor. The improvements were then evaluated based on their economic feasibility and potential for addressing crash patterns.

## 1.2 Logical Termini and Independent Utility

The approximately 3.1 mile section of roadway transitions from CR335 (Spangler Road) to CR303 (Medway-New Carlisle Road) north of East Main Street. The proposed project has independent utility in that it will address the transportation needs to improve traffic safety and operations along the CR335/303 corridor within the logical termini of Restoration Park Drive at the southern terminus northward to US40 (National Road). No other improvements outside of the CR335/303 corridor project are necessary to address the purpose and need of the proposed project.

## 1.3 Project Purpose

The Clark County Engineer’s Office had noticed frequent and a higher than anticipated severity of crashes on the CR335/CR303 corridor over the past several years as documented by the local Metropolitan Planning Organization (MPO), which is the Clark County-Springfield Transportation Coordinating Committee (TCC). The TCC’s high crash 2016-2018 Rural Corridor Ranking lists Spangler Road (CR335) from Restoration Park Drive to Lower Valley/Main Street as the 3<sup>rd</sup> Ranked Hazard Index section in the MPO area and the section of Medway-New Carlisle Road (CR303) from Lower Valley/Main Street to US40 is the 27<sup>th</sup> ranked corridor. The corridor also has high crash listings on ODOT’s 2019 County Road High Crash Locations and much of the corridor is listed as a Red High Crash segment on the ODOT 2015 Highway Safety Integrated Project (SIP) Map Local System.

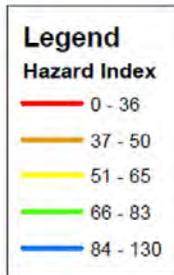
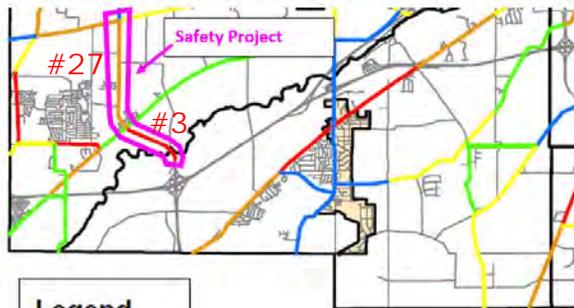
The purpose of the Safety Study is to address identified crash problems of the corridor by proposing countermeasures to alleviate or reduce the likelihood of future crashes. This corridor is a priority location for the Clark County Engineer as the corridor has close proximity of fixed objects to the edge of pavement as well as several curved sections of roadway. To determine needed safety improvements, a crash analysis was performed along the CR335/CR303 corridor for the period of 2016-2018. The crash analysis revealed 56 crashes on this section of roadway. The crash severity of the corridor included 8 injury crashes (14.3%) and 2 fatal (3.57%) crashes. A review of collision diagrams revealed that 73% (11 crashes) of the fatal/injury crashes occurred on the section from Restoration Park Drive northward to East Main Street (1.1 miles), while the other 27% (4 crashes) of the fatal/injury crashes occurred on the section from East Main Street North to W. National Road (US-40) (2.0 miles). The most frequent type of crash on the corridor was that of Fixed Object with 50.0% (or 28 crashes) of the total crashes involving this type of crash, which is higher than the statewide average of 18.6%. A closer look at locations of crashes revealed that 61% of the Fixed Object crashes occurred on the section from Restoration Park Drive North to E Main Street. The two highest spot locations of concentrated crashes were just north of Restoration Park Drive where 18% (10 crashes) occurred and between South Union Road and East Main Street near Aero Composites Inc. LLC where 20% (11 crashes) occurred.

The identified Needs for improving the corridor include:

- **High Crash Listings** – Several ODOT and MPO crash listings indicate that the CR335/303 corridor has higher than expected crashes and crash severity. The ODOT *2019 County Road High Crash Locations* has high crash sections and segments listed on the map; the corridor is listed as a Red High Crash segment on

the ODOT 2015 Highway Safety Integrated Project (SIP) Map Local System; and the TCC (the local MPO) high crash 2016-2018 Rural Corridor Ranking lists Spangler Road (CR335) from Restoration Park Drive to Lower Valley/Main Street as the 3<sup>rd</sup> Ranked Hazard Index section in the MPO area and the section of Medway-New Carlisle Road (CR303) from Lower Valley/Main Street to US40 is the 27<sup>th</sup> ranked corridor.

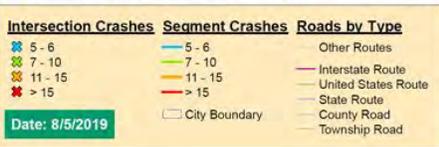
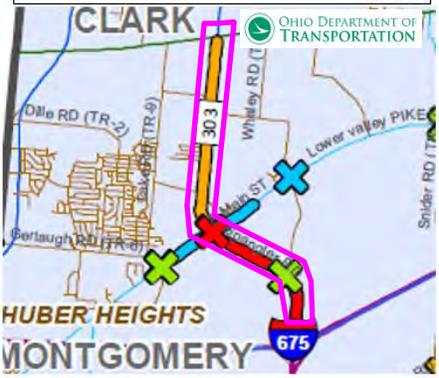
2016-2018 Rural Corridor Crash Locations



Clark County-Springfield TCC (Local MPO)  
 High Crash Corridor Rankings:  
 #3 (CR335 from Restoration Park to Lower Valley)  
 #27 (CR303 from Lower Valley to US40)



2019 County Road High Crash Locations – Clark Co.



Hazard Index Rank	Roadway Section	From	To	Frequency	Frequency Rank	Crash Rate	Crash Rate Rank	FPOD Rate	FPOD Rate Rank	Hazard Index
1	Shrine	Upper Valley	Detrick Jordan	40	9	3.5	32	6.2	21	19.5
2	Old Columbus	Bowman/Mahar	SR54	33	16	3.6	29	7.9	15	19.6
3	Spangler	Restoration Park Dr.	Lower Valley	32	17	3.5	32	7.2	17	21.5
4	SR235	Gerlaugh	Bellefontaine	65	3	3.5	32	5.0	39	22.5
5	Derr	SR334	Moorefield	26	29	5.4	10	5.2	36	25.4
6	US40	Bird	Titus	45	8	3.3	37	4.9	42	26.9
7	SR41	Ridge/Titus	Bird	67	1	4.5	20	3.9	75	28.9
8	Selma	US42	Old Springfield	24	30	3.6	29	5.5	31	30.0
9	Gerlaugh	Osborn	Lower Valley	27	25	4.7	16	4.6	54	31.0
10	US68	SR794	Fairfield	55	6	2.5	59	5.1	38	31.5
11	County Line	Middle Urbana	Urbana	16	56	7.1	6	5.9	25	31.7
12	UVP	US40	Shrine	35	12	4.9	14	3.8	77	32.1
13	Dayton Spfld	Stine	Enon-Xenia	32	17	2.9	47	5.0	39	32.6
14	NC Pike	N. Hampton	Lost	21	43	4.6	18	5.2	36	33.4
15	NC Pike	SR235	N. Hampton	37	11	3.7	27	4.2	70	33.5
16	US40	Enon	SR369	16	56	3.6	29	10.3	9	33.8
17	Upper Valley	SR41	Baker	34	13	4.6	18	3.6	80	34.6
18	SR4	Home/Croft	Villa	34	13	3.1	43	4.5	59	35.8
19	Dayton Spfld	Enon-Xenia	Tecumseh (s. int.)	23	32	2.2	73	12.2	5	36.2
20	Dayton Spfld	Greene CL	Stine	48	7	1.9	85	5.7	29	37.0
21	Selma	Crabill	Leffel	19	47	6.1	8	4.6	54	37.4
22	Lower Valley	IR70 cul-de-sac	Gerlaugh	15	62	7.8	3	4.9	42	38.3
23	Dayton Spfld	Tecumseh (s. int.)	Old Mill	22	39	2.4	64	9.5	12	38.4
24	Leffel	Selma	Burnett	22	39	3.2	40	5.0	39	39.3
25	Moorefield	Derr	Middle Urbana	32	17	5.5	9	2.8	105	41.0
26	SR72	GRE CL	SR794	38	10	1.7	91	5.4	33	41.2
27	Medway-Carlisle	Lower Valley	US40	23	32	2.1	77	6.2	21	42.2

- **Crash History** – A review of the crash history from 2016-2018 revealed several key focus areas:
  - **Fixed Object Crashes** – A total of 49.12% of the 56 crashes on the corridor involved Fixed Object type crashes, which is higher than the statewide average of 34.58%. Upon a review of the collision-diagrams, the majority of the Fixed Object crashes occurred on straight roadway sections. A site visit revealed the corridor has utility poles, trees, mailboxes, and signs that are typically 3 to 5 feet from the edge of roadway and has a narrow 2-foot shoulder or less in width;
  - **Curved Roadway Crashes** – Nearly 23% (13) of all crashes were on a curved section of roadway, which is double the statewide average. The combination of narrow shoulders of less than 2-FT; lack of adequate signing of curves; and close proximity of fixed objects to the roadway are contributing factors to higher than statewide averages of curves;

- Rear End Crashes – Over 21% (12) of all crashes were rear-end crashes which occurred at site driveways and intersecting roads where no turn lanes are provided and no street lighting is present other than at one or two intersections in Medway, Ohio and the data indicates 27% of all crashes occurred in the “dark” condition of light which compares to the statewide average of 1.78%;
- Flood Zone – The section of roadway from South Union Road northward to the small bridge just south of the traffic signal at Main Street in Medway is within a flood zone that causes the roadway to flood during high water events, which has contributed to standing water and wet pavement crashes on this section.

#### 1.4 Overview of Safety Issues and Possible Causes

Upon a review of crash types, crash patterns/locations, roadway conditions, and site visits of the corridor, there were several contributing factors identified that may be leading to higher than predicted crash frequencies which include the roadway geometry, appurtenances and lighting.

The roadway geometry has one lane in each direction with 11-foot lanes and narrow 2-foot or less shoulder widths with three curves. The roadway contour was a contributing factor of crash occurrences given the data shows nearly 23% (13) of all crashes were on a curved section of roadway, which is twice as high as the 10.3% statewide average.

There are appurtenances/fixed objects that are in close proximity to the edge of pavement along the roadway (typically 3 to 5 feet beyond the edge line). The CR335/CR303 corridor has utility poles, mail boxes, trees, bridge abutments, guardrails, and signs along both sides of the roadway. The narrow shoulder along the roadway and travel speeds provide minimal separation from the travel lane to the various fixed objects.

Initially night time/lighting conditions appeared not to be an issue based on crash data from the CAM-Tool indicating that the 15 (27%) crashes that occurred in the dark happened at locations where street lighting was present. However, after a review of the actual OH-1 crash reports and a site visit to the corridor there are essentially no locations with street lights other than a couple of street lights in the community of Medway. Thus, the 27% of the crashes that occurred in dark conditions (which had no street lighting) represent a contributing factor given this 27% is 13 times higher than the statewide average of 2% for crashes in dark conditions without lighting. Thus, the lack of street lighting does appear to be a contributing factor on the corridor, and particularly at intersections where slowed or stopped vehicles are making turning movements.

The section of CR335 (Spangler Road) from South Union Street northward to the small bridge located just south of Main Street in Medway, has much of the roadway profile that is below the 100-year flood zone elevation and it has narrow shoulders (2-FT or less) with fixed objects including utility poles, trees, and guardrails that are within 3 to 5 feet of the edge of roadway. This section of roadway has crash history showing standing water (flood events) crashes; wet/snow pavement issue crashes (trees shade roadway and prevent drying and melting of snow); and fixed object crashes as being higher than statewide averages.

#### 1.5 Previously Implemented Countermeasures and Studies

There have been several low cost countermeasures implemented along the CR335/CR303 corridor by the Clark County Engineer over the last several years including:

- Maintaining good pavement markings (painted in 2018 and planned for 2020)
- Several curved locations with chevron warning signs (2014-2015)
- Intersection ahead warning signs at several locations (2014-2016)
- Centerline Raised Pavement Markers installed (2013)
- Clearing fallen trees near roadway (continuous as needed)
- Signal ahead solar flashing beacon warning signs northbound at Medway signal at Main Street (2010)
- Single warning sign of signal ahead northbound approach at US40 signal (2007)

Unfortunately, these countermeasures have not reduced the frequency and severity of crashes on the corridor and the facility continues to be a problematic location for crashes in Clark County. The lack of effectiveness of these previously implemented low cost countermeasures is evidenced by the continued listing of high crash locations by both ODOT and the local MPO on crash studies.

There was a Safety Study by ODOT District 7 (CLA-70-2.85 Safety Study dated 3/19/2019), for the interchange area of I70 and Spangler Road which is located just south of the Restoration Park Drive intersection. The study recommended several weave countermeasures and exit ramp countermeasures to improve safety and reduce crashes.

## 1.6 Recommended Countermeasures & Related Costs

The recommended countermeasures for CR335/CR303 from Restoration Park Drive to West National Road (US40) involve the following short-term (interim) improvements and long-term improvements to address the crash problems identified along the corridor:

### Short-Term (Interim) Improvements for Consideration:

- Maintain good pavement markings (planned for 2020) conditions and *OMUTCD* compliant signing
- Install raised pavement marker reflectors on edge lines
- Trim vegetation that limits sight distance where needed
- Install edge lit LED solar powered warning signs for intersections ahead at Restoration Park Drive; South Union Road; and Kendig Road
- Install edge lit LED solar powered dual warning signs for northbound CR303 on approach to the US40 traffic signal in advance of the hill that blocks the view of the signal
- Clear vegetation from within the public right-of-way that are limiting sight distance at intersections or is limiting views of roadway signs.

### Long-Term Improvements:

The following proposed safety countermeasures are recommended based on the findings of the crash patterns/history, site visits, and input from the Clark County Engineer and the local MPO (Clark County-Springfield Transportation Coordinating Committee):

- Improve limited sight distance from earth levy at Restoration Park Drive;
- Re-align South Union Drive at CR335 (Spangler Road) to enhance sight distance; add street lighting; and provide northbound right turn lane;
- Upgrade guardrail to current standards at several locations throughout corridor;
- Provide 6-INCH edge line rumble stripes on curves and provide widened paved shoulders on curves;
- Install improved signing at intersections and on intersection approaches throughout corridor;
- Install improved curve warning signs at curved locations throughout corridor;
- Raise the roadway profile approximately 2.5-FT above existing profile on the section of CR335 (Spangler Road) from near South Union Road northward to the small bridge located just south of the signalized intersection of Main Street (aka Lower Valley Pike) to elevate the roadway out of the 100 year flood zone. As part of this improvement, provide 4-FT treated shoulders and regrade ditches and relocate fixed objects from the edge of roadway and provide rumble stripes on this section of roadway;
- Replace small bridge structure located just south of Main Street in Medway to allow for the straightening of the curved section leading into the bridge and to provide a new structure that allows for installation of a northbound left turn lane at the traffic signal at Main Street. The realignment of this roadway and geometric improvements is a recommendation of the MPO's Long Range Transportation Plan (2040);
- Widen shoulders of curve located on northern limits of Medway on CR303 (Medway-New Carlisle Road) and provide rumble stripes, relocated fixed objects further from roadway, and enhance warning signs;
- Install a northbound left turn lane at Schiller Road which was documented as warranted based on turning traffic volumes and provide street lighting at intersection;

- Install street lights and enhanced warning signs at North Union Road and at Kendig Road and provide wider shoulders at these two intersections with CR303 (Medway-New Carlisle Road);
- Install dual solar powered LED signal ahead warning signs for the northbound approach of the traffic signal at US40 prior to the hill that limits the view of the approaching traffic signal;
- Resurface roadway to provide enhanced pavement markings and improved drivability over widened shoulders and added turn lanes where proposed.

The proposed project has a cost estimate of \$5,884,000 for the long-term recommendations. An analysis of crash data along CR335/303 was performed using ODOT's Economic Crash Analysis Tool (ECAT). The ECAT calculates predicted/expected crash frequencies using Safety Performance Functions (SPFs), Crash Modification Factors (CMFs), and ODOT calibration factors to evaluate site-specific conditions based on existing physical characteristics, traffic volumes, and crash history. The projected safety improvement for implementing long-term countermeasures is 10.0 crashes per year by reducing the existing conditions predicted crashes from 28.5 to a proposed conditions prediction of 18.5 crashes per year. The preliminary benefit-cost ratio of these planning level costs provide a positive Benefit/Cost Ratio of 0.97.

### 1.7 Recent Crash Occurrences in 2020

On February 9, 2020 a Fatal Crash occurred on CR303 (Medway-New Carlisle Road at Kendig Road in which a teenager was killed and sent three others to the hospital.

On 6/2/2020 during a site visit of the corridor, there was a crash that had occurred that was being cleaned up in which a utility pole and sign were struck on the eastern side of Spangler Road just south of the small bridge structure leading into Medway, Ohio. Fortunately no injuries were reported, but this crash further shows the potential of severity given the close proximity of fixed objects on this roadway segment.



Published 2/11/20

### Crash kills teen; 3 others in hospital

Jason Whitt of New Carlisle remembered for kindness.



A member of the Ohio Highway Patrol helps family members look for a cellphone around the utility pole that Jason Whitt struck along Medway-New Carlisle Road on Sunday night. Whitt, 17, was killed in the crash. Three other teenagers in the car were injured.

BILL LACKEY / STAFF

The picture below shows a roadside grave marker where a tree was struck by a vehicle that led to a fatality. The other large tree in the photograph also shows the bark torn away from another crash. The section of CR335 (Spangler Road) from South Union Road northward to the intersection with Main Street in Medway, Ohio has fixed objects that are within 3 to 5 feet of the travel lane.



## 2.0 EXISTING CONDITIONS

### 2.1 Background

No major recent improvements have occurred on the corridor. Only minor maintenance and low cost safety enhancements (such as signs, pavement markings, etc.) have been implemented in recent years. In 2020, the Clark County Engineer secured funding from the CEAO to conduct a safety study of the 3.1 mile corridor involving CR335 (Spangler Road)/CR303 (Medway-New Carlisle Road) from Restoration Park Drive northward to US40 (National Road). The safety study was conducted to document existing conditions, crash history, and to develop recommendations to implement countermeasures to improve the safety and operations of the corridor.

### 2.2 Conditions Diagrams

The existing conditions of the CR335/CR303 corridor are displayed on Figure 3.1 (Existing Conditions Diagram). Detailed descriptions of subsections of the corridor are discussed in Section 3.3.

### 2.3 Physical Conditions Write-up

Physical conditions of the CR335/CR303 corridor are illustrated in Figure 3.1. All side streets intersecting CR335/CR303 are under two-way stop control, except for the two intersections of Main Street and that of US40 (National Road) which are both signalized intersections. Land uses along the corridor are primarily residential, farmland, and small community areas. Detailed information regarding project corridor intersections/segments is provided in the following sections.

#### 2.3.1 Physical Conditions of CR335 (Spangler Road)

This approximately 1.1-mile segment of CR335 (Spangler Road) from Restoration Park Drive northward to Main Street in Medway, Ohio is a two lane roadway with 11-FT lanes and narrow shoulders of typically 2-FT or less. The pavement is in fair condition with erosion along the edges of the roadway that can lead to degrading of the pavement. The roadway was last paved in 2011 and last striped in 2018 with a planned re-striping in 2020. Much of the section of roadway is below the elevation of the 100-year flood elevation that leads to periodic flooding events. These flooding events washes away berm materials along Spangler Road that creates a hazard and a maintenance issue. There are two (2) public roadway intersections along this section with all side streets under stop control to CR335 traffic, which is free-flow with a posted speed of 55 MPH. Fixed objects are found along the corridor in close proximity to the roadway (typically 3 to 5 FT from the edge of roadway) such as utility poles, trees, mailboxes, and signs. There are two curved sections of roadway on this segment that limits sight distance of intersections and the traffic signal located at Main Street in Medway. Much of the property along this section is owned by the Clark County Park District (see map to the right). Any proposed improvements along this section of roadway will involve coordination with the Park District and will also include environmental coordination for environmentally sensitive areas such as wetlands.

Potential countermeasures for this segment to consider would address the following concerns:

- Much of roadway segment has a profile elevation below the 100-year flood zone elevation;



- Limited sight distance exists at the intersections at Restoration Park Drive and at South Union Road;
- The approach into the small bridge structure located just south of the traffic signal at Main Street in Medway has an alignment that creates a sharp curve on the south side of the bridge that limits view of the signal at Main Street and it also prevents having a warranted northbound left turn lane on Spangler Road at the signalized intersection;
- Narrow shoulders and fixed objects that are in close proximity to the edge of roadway are leading to serious injury and fatal crashes;
- The absence of street lighting, particularly at intersections is leading to higher than statewide average nighttime crashes in the dark condition.



Limited sight distance at Restoration Park Drive looking northward for southbound traffic that is caused from the earth levee



Limited sight distance at South Union Road looking southward for northbound traffic limited by intersection being too close to bridge



Roadside grave marker where a recent fatal crash occurred when a vehicle struck a tree (both large trees show marks from crashes)



Sharp curve heading into small bridge structure entering Medway, that limits view of traffic signal (skid marks on roadway going into curve)

### 2.3.2 Physical Conditions of CR303 (Medway-New Carlisle Road)

This approximately 2.0-mile segment of CR303 (Medway-New Carlisle Road) from the intersection of Main Street in Medway northward to US40 (National Road) is a two lane roadway with 11-FT lanes and narrow shoulders of typically 2-FT or less. The pavement is in fair condition with erosion along the edges of the roadway that can lead to degrading of the pavement. The roadway was last paved in 2013 and last striped in 2018 with a planned re-striping in 2020. There are eight (8) public roadway intersections along this section with all side streets under stop control to CR303 traffic except for the signalized intersections at Main Street and at US40. The corridor has free-flow with posted speed of 55 MPH (except for a 40 MPH section in Medway). Fixed objects are found along the corridor in close proximity to the roadway (typically 3 to 5 FT from the edge of roadway) such as utility poles, trees, mailboxes, and signs. There is one curved section of roadway located on the north side of Medway, Ohio. This curve limits sight distance of approaching traffic and has shoulders of 2FT or less with fixed objects like utility poles within 3 to 5 feet of the roadway edge. Much of the property along this section is residential and farmland. All intersections outside of Medway do not include any

turn lanes and have no intersection lighting. There is a hill located just south of the traffic signal at US40 that limits view of the approaching signal for northbound traffic on CR303.

Potential countermeasures for this segment should be considered to address the following concerns:

- Intersections are difficult to see with limited signing to warn of approaching intersections, shoulders are narrow at the intersections; and none of the intersections have street lights;
- The intersection of Schiller Road shows evidence by wear on the shoulders that a northbound left turn lane may be warranted, as this location has limited shoulders;
- The curved section of roadway on the northern limits of Medway has limited shoulders and fixed objects that are within 3 to 5 feet of the edge of roadway;
- Several sections of guardrails have outdated end treatments that should be upgraded to current standards;
- The eastbound shoulder at Schiller Road shows wear that indicates need for a northbound left turn lane



Curved sections within roadway corridor have limited shoulder widths and could use enhanced signing to warn motorists of the curves



Utility pole on curved section of roadway that has been struck as it is about 3 to 4 feet from the roadway edge



School busses on roadway emphasize the need to improve the safety of the corridor



Non-Standard guardrail end treatments that are in need of upgrades



Hill limits the sight distance of approaching signal at US40 intersection for northbound traffic on CR303



Shoulder wear that shows possible need for northbound left turn lane at Schiller Road with intersection of CR303



CALCULATED  
MDF  
CHECKED  
XXX

**FIGURE 2.1  
EXISTING CONDITIONS DIAGRAM**

**CLARK - CR335 / CR303**



100-YEAR FLOODPLAIN 



MATCH LINE (SHEET 3 OF 6)

100-YEAR FLOODPLAIN 



MATCH LINE (SHEET 1 OF 6)

CALCULATED  
MDF  
CHECKED  
XXX

0 100 200  
HORIZONTAL  
SCALE IN FEET



FIGURE 2.1  
EXISTING CONDITIONS DIAGRAM

CLARK - CR335 / CR303

2



100-YEAR FLOODPLAIN

CALCULATED  
MDF  
CHECKED  
XXX

0 100 200  
50  
HORIZONTAL  
SCALE IN FEET

MATCH LINE (SHEET 4 OF 6)

**FIGURE 2.1**  
**EXISTING CONDITIONS DIAGRAM**

CLARK - CR335 / CR303

MATCH LINE (SHEET 2 OF 6)

MATCH LINE (SHEET 3 OF 6)



MATCH LINE (SHEET 5 OF 6)

MATCH LINE (SHEET 4 OF 6)



MATCH LINE (SHEET 6 OF 6)

6/5

CLARK - CR335 / CR303

**FIGURE 2.1  
EXISTING CONDITIONS DIAGRAM**

CALCULATED	MDF
0	XXX
CHECKED	



MATCH LINE (SHEET 5 OF 6)



CLARK - CR335 / CR303

FIGURE 2.1  
EXISTING CONDITIONS DIAGRAM

CALCULATED	MDP	CHECKED	XXX
------------	-----	---------	-----

0 50 100 200  
HORIZONTAL SCALE IN FEET

### 3.0 CRASH DATA & PROPOSED COUNTERMEASURES EVALUATION

#### 3.1 Crash Data Summaries and Tables

An analysis of the corridor revealed in the period from 2016-2018, there were a total of 56 crashes on this section of roadway. In 2016 there were 18 crashes, in 2017 there were 17 crashes, and in 2018 there were 21 crashes. Two (2) of the total crashes, (3.6% of crashes) were fatal, which is higher than the statewide average of 0.3%. Of the remaining crashes, 23.2% involved an injury, and this is nearly the same as the statewide average of 23.5%. The most prominent type of crash on the corridor was that of Fixed Object with 50% (28 crashes) of the total crashes involving this type of crash, which is over two times higher than the statewide average of 18.6%. Other types of crashes above statewide averages involved Rear End (21.4%); Left Turn (5.4%); and Head On (3.6%). These crash types are all above or near statewide averages as highlighted in yellow on the crash data tables shown to the right. The remaining tables shown indicates Wet, Snow Water (Standing, Moving) and Ice all occur higher than statewide averages on the corridor. Curved sections of roadway accounted for 23.2% of all crashes compared to statewide averages of 10.3%.

#### 3.2 Collision Diagrams

A set of collision diagrams were developed (Figure 3.1) for the corridor based on a review of OH-1 Crash Reports obtained from ODOT. A review of collision diagrams revealed that the majority of crashes occurred on the 1.1-mile section of CR335 (Spangler Road) from Restoration Park Drive to Main Street in Medway as this section accounted for 57% (32 crashes) of the total 56 crashes and contained 73% (11 crashes) of the 15 fatal/injury crashes within the study limits. The remaining 2.0-mile section of the corridor study limits on CR303 (Medway-New Carlisle Road) contained 43% (24 crashes) of all crashes and 27% (4 crashes) of the fatal/injury crashes. The predominant crash type of the CR335 (Spangler Road) section included 18 Fixed Object crashes (56% of crashes on this section) that resulted in 7 injury crashes and one (1) fatal crash. The majority of these Fixed Object Crashes involved leaving the roadway and hitting either a utility pole or tree which are typically within 3 to 5 feet of the edge of the roadway that has shoulders of 2-FT or less.

The two curves on this section appeared to also be contributing factors to crashes as they limited sight distance of approaching items such as the intersection of South Union Road and the traffic signal at Main Street in Medway that involves a small bridge on the south leg of the intersection that has a sharp curve leading into the bridge on its south side. The corridor on CR303 (Medway-New Carlisle Road) north of Main Street has a predominance of the crashes occurring at the vicinity of intersections, which is where countermeasures should be focused.

#### Crash Data (2016-2018)

XX% = Statewide Average

TRAFFIC_CRASH_YEAR	Number	%
2016	18	32.1%
2017	17	30.4%
2018	21	37.5%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

CRASH_SEVERITY	Number	%
Fatal Crash	2	3.6%
Injury Crash	13	23.2%
Property Damage Crash	41	73.2%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ROAD_CONDITION	Number	%
Dry	29	51.8%
Wet	17	30.4%
Snow	5	8.9%
Water (Standing, Moving)	3	5.4%
Ice	2	3.6%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

TYPE_OF_CRASH	Number	%
Fixed Object	28	50.0%
Rear End	12	21.4%
Angle	3	5.4%
Animal	3	5.4%
Left Turn	3	5.4%
Other Non-Collision	2	3.6%
Head On	2	3.6%
Parked Vehicle	1	1.8%
Other Object	1	1.8%
Sideswipe - Passing	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ROAD_CONTOUR	Number	%
Straight Level	39	69.6%
Curve Level	12	21.4%
Straight Grade	4	7.1%
Curve Grade	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

Light Conditions	Crashes by Light Conditions	
	Site Average	Statewide Average
Daylight	58.93%	48.48%
Dawn	7.14%	4.51%
Dusk	5.36%	1.95%
Dark - Lighted Roadway	26.79%	1.78%



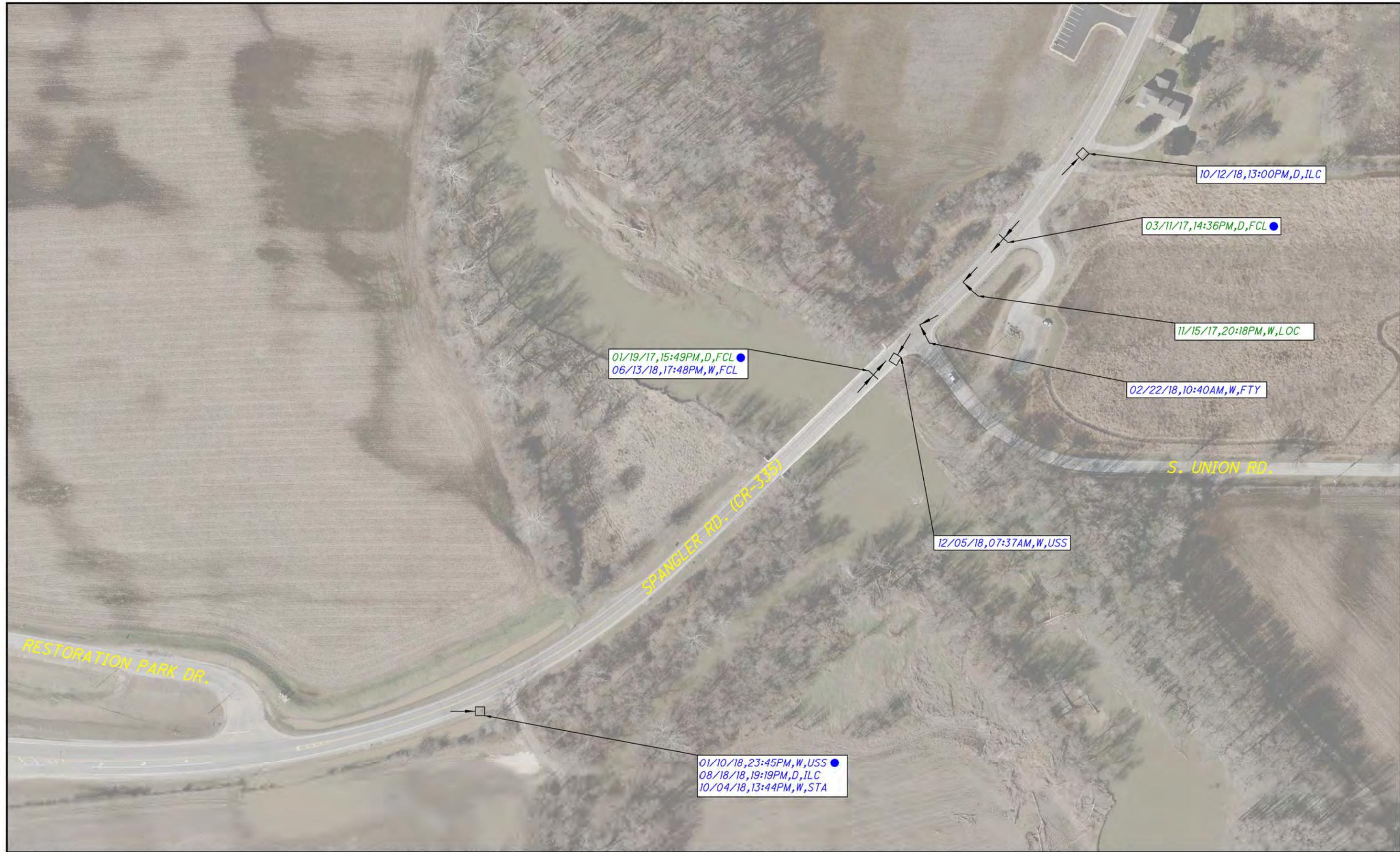


FIGURE 3.1  
COLLISION DIAGRAM

CLARK - CR335 / CR303

**CRASH TYPES:**

- |  |             |  |                     |  |                |
|--|-------------|--|---------------------|--|----------------|
|  | REAR-END    |  | BACKING             |  | OTHER          |
|  | TURNING     |  | FIXED OBJECT        |  | PARKED VEHICLE |
|  | HEAD ON     |  | SIDESWIPE (MEETING) |  | ANIMAL         |
|  | OVERTURNING |  | SIDESWIPE (PASSING) |  | BICYCLE        |
|  |             |  | ANGLE               |  | PEDESTRIAN     |

**CONTRIBUTING FACTORS:**

- |                                  |   |
|----------------------------------|---|
| FTC = FAILURE TO CONTROL         | ODE = OPERATING DEFECTIVE EQUIPMENT         |
| FTS = FAILURE TO STOP            | INT = INATTENTIVE                           |
| FTY = FAILURE TO YIELD           | USS = UNSAFE SPEED                          |
| FCL = FOLLOWED TOO CLOSELY       | OIA = OTHER IMPROPER ACTION                 |
| ILC = IMPROPER LANE CHANGE       | STA = SWERVE TO AVOID                       |
| IPT = IMPROPER TURN              | RSS = RAN STOP SIGN                         |
| IPB = IMPROPER BACKING           | RRL = RAN RED LIGHT                         |
| OVI = OPERATING VEHICLE IMPAIRED | LOC = LEFT OF CENTER                        |
| UKN = UNKNOWN                    | WRS = WRONG SIDE/WRONG WAY                  |
|                                  | ISP = IMPROPER START FROM A PARKED POSITION |
|                                  | ONM = OPERATING VEHICLE IN NEGLIGENT MANNER |

**ROAD CONDITION:**

- D = DRY  
W = WET  
I = ICE  
S = SNOW  
U = UNKNOWN
- SEVERITY:**  
● INJURY  
● FATAL

**CRASH DESCRIPTION**

DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR

RED = 2016  
GREEN = 2017  
BLUE = 2018

**PAGE SUMMARY**

FREQUENCY	SEVERITY
5 2016	6 PROPERTY DAMAGE ONLY (PDO)
2 2017	4 INJURY
4 2018	1 FATAL
	11 TOTAL CRASHES (CURRENT PAGE)



FIGURE 3.1  
COLLISION DIAGRAM

**CRASH TYPES:**

	REAR-END		BACKING		OTHER
	TURNING		FIXED OBJECT		PARKED VEHICLE
	HEAD ON		SIDESWIPE (MEETING)		ANIMAL
	OVERTURNING		SIDESWIPE (PASSING)		BICYCLE
			ANGLE		PEDESTRIAN

**CONTRIBUTING FACTORS:**

FTC = FAILURE TO CONTROL	ODE = OPERATING DEFECTIVE EQUIPMENT
FTS = FAILURE TO STOP	INT = INATTENTIVE
FTY = FAILURE TO YIELD	USS = UNSAFE SPEED
FCL = FOLLOWED TOO CLOSELY	OIA = OTHER IMPROPER ACTION
ILC = IMPROPER LANE CHANGE	STA = SWERVE TO AVOID
IPT = IMPROPER TURN	RSS = RAN STOP SIGN
IPB = IMPROPER BACKING	RRL = RAN RED LIGHT
OVI = OPERATING VEHICLE IMPAIRED	LOC = LEFT OF CENTER
UKN = UNKNOWN	WRS = WRONG SIDE/WRONG WAY
	ISP = IMPROPER START FROM A PARKED POSITION
	ONM = OPERATING VEHICLE IN NEGLIGENT MANNER

**ROAD CONDITION:**

D = DRY
W = WET
I = ICE
S = SNOW
U = UNKNOWN
<b>SEVERITY:</b>
● INJURY
● FATAL

**CRASH DESCRIPTION**

DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR
RED = 2016
GREEN = 2017
BLUE = 2018

**PAGE SUMMARY**

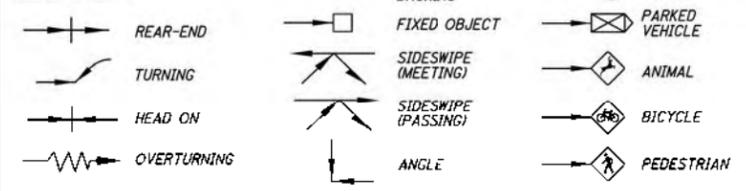
FREQUENCY	SEVERITY
1 2016	2 PROPERTY DAMAGE ONLY (PDO)
2 2017	1 INJURY
0 2018	0 FATAL
	3 TOTAL CRASHES (CURRENT PAGE)



FIGURE 3.1  
COLLISION DIAGRAM

CLARK - CR335 / CR303

**CRASH TYPES:**



**CONTRIBUTING FACTORS:**

FTC = FAILURE TO CONTROL  
 FTS = FAILURE TO STOP  
 FTY = FAILURE TO YIELD  
 FCL = FOLLOWED TOO CLOSELY  
 ILC = IMPROPER LANE CHANGE  
 IPT = IMPROPER TURN  
 IPB = IMPROPER BACKING  
 OVI = OPERATING VEHICLE IMPAIRED  
 UKN = UNKNOWN  
 ODE = OPERATING DEFECTIVE EQUIPMENT  
 INT = INATTENTIVE  
 USS = UNSAFE SPEED  
 OIA = OTHER IMPROPER ACTION  
 STA = SWERVE TO AVOID  
 RSS = RAN STOP SIGN  
 RRL = RAN RED LIGHT  
 LOC = LEFT OF CENTER  
 WRS = WRONG SIDE/WRONG WAY  
 ISP = IMPROPER START FROM A PARKED POSITION  
 ONM = OPERATING VEHICLE IN NEGLIGENT MANNER

**ROAD CONDITION:**

D = DRY  
 W = WET  
 I = ICE  
 S = SNOW  
 U = UNKNOWN  
**SEVERITY:**  
 ● INJURY  
 ● FATAL

**CRASH DESCRIPTION**

DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR

RED = 2016  
 GREEN = 2017  
 BLUE = 2018

**PAGE SUMMARY**

FREQUENCY	SEVERITY
5 2016	6 PROPERTY DAMAGE ONLY (PDO)
2 2017	4 INJURY
4 2018	1 FATAL
	11 TOTAL CRASHES (CURRENT PAGE)



FIGURE 3.1  
COLLISION DIAGRAM

CLARK - CR335 / CR303

**CRASH TYPES:**

	REAR-END		BACKING		OTHER
	TURNING		FIXED OBJECT		PARKED VEHICLE
	HEAD ON		SIDESWIPE (MEETING)		ANIMAL
	OVERTURNING		SIDESWIPE (PASSING)		BICYCLE
			ANGLE		PEDESTRIAN

**CONTRIBUTING FACTORS:**

FTC = FAILURE TO CONTROL	ODE = OPERATING DEFECTIVE EQUIPMENT
FTS = FAILURE TO STOP	INT = INATTENTIVE
FTY = FAILURE TO YIELD	USS = UNSAFE SPEED
FCL = FOLLOWED TOO CLOSELY	OIA = OTHER IMPROPER ACTION
ILC = IMPROPER LANE CHANGE	STA = SWERVE TO AVOID
IPT = IMPROPER TURN	RSS = RAN STOP SIGN
IPB = IMPROPER BACKING	RRL = RAN RED LIGHT
OVI = OPERATING VEHICLE IMPAIRED	LOC = LEFT OF CENTER
UKN = UNKNOWN	WRS = WRONG SIDE/WRONG WAY
	ISP = IMPROPER START FROM A PARKED POSITION
	ONM = OPERATING VEHICLE IN NEGLIGENT MANNER

**ROAD CONDITION:**

D = DRY
W = WET
I = ICE
S = SNOW
U = UNKNOWN

**SEVERITY:**

<span style="color: blue;">●</span> INJURY
<span style="color: red;">●</span> FATAL

**CRASH DESCRIPTION**

DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR
RED = 2016
GREEN = 2017
BLUE = 2018

**PAGE SUMMARY**

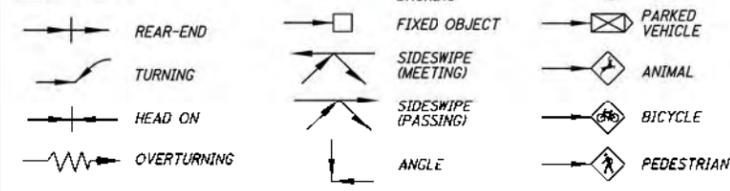
FREQUENCY	SEVERITY
6 2016	12 PROPERTY DAMAGE ONLY (PDO)
5 2017	2 INJURY
3 2018	0 FATAL
	14 TOTAL CRASHES (CURRENT PAGE)



FIGURE 3.1  
COLLISION DIAGRAM

CLARK - CR335 / CR303

**CRASH TYPES:**



**CONTRIBUTING FACTORS:**

FTC = FAILURE TO CONTROL	ODE = OPERATING DEFECTIVE EQUIPMENT
FTS = FAILURE TO STOP	INT = INATTENTIVE
FTY = FAILURE TO YIELD	USS = UNSAFE SPEED
FCL = FOLLOWED TOO CLOSELY	OIA = OTHER IMPROPER ACTION
ILC = IMPROPER LANE CHANGE	STA = SWERVE TO AVOID
IPT = IMPROPER TURN	RSS = RAN STOP SIGN
IPB = IMPROPER BACKING	RRL = RAN RED LIGHT
OVI = OPERATING VEHICLE IMPAIRED	LOC = LEFT OF CENTER
UKN = UNKNOWN	WRS = WRONG SIDE/WRONG WAY
	ISP = IMPROPER START FROM A PARKED POSITION
	ONM = OPERATING VEHICLE IN NEGLIGENT MANNER

**ROAD CONDITION:**

D = DRY  
W = WET  
I = ICE  
S = SNOW  
U = UNKNOWN

**SEVERITY:**  
● INJURY  
● FATAL

**CRASH DESCRIPTION**

DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR

RED = 2016  
GREEN = 2017  
BLUE = 2018

**PAGE SUMMARY**

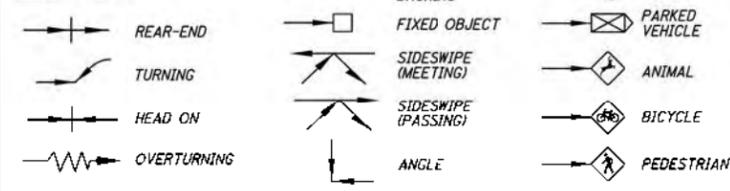
FREQUENCY		SEVERITY	
3	2016	2	PROPERTY DAMAGE ONLY (PDO)
0	2017	1	INJURY
0	2018	0	FATAL
		3	TOTAL CRASHES (CURRENT PAGE)



FIGURE 3.1  
COLLISION DIAGRAM

CLARK - CR335 / CR303

**CRASH TYPES:**



**CONTRIBUTING FACTORS:**

FTC = FAILURE TO CONTROL  
 FTS = FAILURE TO STOP  
 FTY = FAILURE TO YIELD  
 FCL = FOLLOWED TOO CLOSELY  
 ILC = IMPROPER LANE CHANGE  
 IPT = IMPROPER TURN  
 IPB = IMPROPER BACKING  
 OVI = OPERATING VEHICLE IMPAIRED  
 UKN = UNKNOWN

ODE = OPERATING DEFECTIVE EQUIPMENT  
 INT = INATTENTIVE  
 USS = UNSAFE SPEED  
 OIA = OTHER IMPROPER ACTION  
 STA = SWERVE TO AVOID  
 RSS = RAN STOP SIGN  
 RRL = RAN RED LIGHT  
 LOC = LEFT OF CENTER  
 WRS = WRONG SIDE/WRONG WAY  
 ISP = IMPROPER START FROM A PARKED POSITION  
 ONM = OPERATING VEHICLE IN NEGLIGENT MANNER

**ROAD CONDITION:**

D = DRY  
 W = WET  
 I = ICE  
 S = SNOW  
 U = UNKNOWN

**SEVERITY:**  
 ● INJURY  
 ● FATAL

**CRASH DESCRIPTION**

DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR

RED = 2016  
 GREEN = 2017  
 BLUE = 2018

**PAGE SUMMARY**

FREQUENCY		SEVERITY	
2	2016	1	PROPERTY DAMAGE ONLY (PDO)
0	2017	1	INJURY
1	2018	1	FATAL
		3	TOTAL CRASHES (CURRENT PAGE)



FIGURE 3.1  
COLLISION DIAGRAM



CLARK - CR335 / CR303

CRASH TYPES:			CONTRIBUTING FACTORS:			ROAD CONDITION:		CRASH DESCRIPTION		PAGE SUMMARY	
	REAR-END		BACKING		OTHER	D = DRY	DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR	FREQUENCY	SEVERITY	3	PROPERTY DAMAGE ONLY (PDO)
	TURNING		FIXED OBJECT		PARKED VEHICLE	W = WET					0
	HEAD ON		SIDESWIPE (MEETING)		ANIMAL	I = ICE		0	2017	0	FATAL
	OVERTURNING		SIDESWIPE (PASSING)		BICYCLE	S = SNOW		4	2018	4	TOTAL CRASHES (CURRENT PAGE)
			ANGLE		PEDESTRIAN	U = UNKNOWN					



FIGURE 3.1  
COLLISION DIAGRAM

CLARK - CR335 / CR303

CRASH TYPES:			CONTRIBUTING FACTORS:			ROAD CONDITION:		CRASH DESCRIPTION		PAGE SUMMARY	
	REAR-END		BACKING		FTC = FAILURE TO CONTROL	D = DRY	DATE, TIME, ROAD CONDITION, CONTRIBUTING FACTOR	FREQUENCY	SEVERITY	5	PROPERTY DAMAGE ONLY (PDO)
	TURNING		FIXED OBJECT		FTS = FAILURE TO STOP	W = WET					
	HEAD ON		SIDESWIPE (MEETING)		FTY = FAILURE TO YIELD	I = ICE		2	2017	0	FATAL
	OVERTURNING		SIDESWIPE (PASSING)		FCL = FOLLOWED TOO CLOSELY	S = SNOW		2	2018	5	TOTAL CRASHES (CURRENT PAGE)
			ANGLE		ILC = IMPROPER LANE CHANGE	U = UNKNOWN					
			OTHER		IPT = IMPROPER TURN						
			PARKED VEHICLE		IPB = IMPROPER BACKING						
			ANIMAL		OVI = OPERATING VEHICLE IMPAIRED						
			BICYCLE		UKN = UNKNOWN						
			PEDESTRIAN								

3.3 Crash Summary Narrative and Potential Countermeasures

As discussed previously, the predominant crash type is “Fixed Object” as this accounts for 50% of the total crashes on the corridor as shown in Table 3.1. These Fixed Object crashes accounted for 10 (or 67%) of the fatal/injury crashes within the study limits. Given this, countermeasures should include a focus on improvements that would reduce the likelihood of leaving the roadway and hitting fixed objects.

Table 3.1 Crash History			
Crash Type	Number of Crashes	% of Total Crashes	Statewide Average % of Crashes
Fixed Object	28	50.0%	18.6%
Rear End	12	21.4%	20.7%
Angle	3	5.4%	17.6%
Animal	3	5.4%	6.4%
Left Turn	3	5.4%	3.9%
Other Non-Collision	2	3.5%	1.7%
Head On	2	3.5%	0.7%
Parked Vehicle	1	1.8%	10.6%
Other Object	1	1.8%	1.7%
Sideswipe – Passing	1	1.8%	6.9%
Total Crashes	56	100%	N/A

Note: Red text indicates crash types that are higher than statewide percentages.

In addition to the documented Fixed Object crash problem of the corridor, there were other notable crash patterns that stand out as key contributors to elevated crash frequencies and severity. These other key contributing factors include curved sections of roadway; wet/snow/ice & standing water pavement conditions; and crashes occurring during dark/dawn/dusk light conditions. There are three (3) locations on the corridor that includes curved sections of roadway and the crash data indicates 23.2% of all crashes occurred on curved sections, which is double the statewide average of 10.3% of crashes occurring on curved sections. The crash data indicates wet, snow, ice, and standing water roadway conditions account for higher percentages of crashes as compared to statewide averages. The majority of these crashes (including 3 standing water crashes) occurred on the section of CR335 (Spangler Road) south of Medway to the intersection with South Union Road. This section of roadway is within a 100-year flood zone, and the roadway profile is approximately 2.5-FT below the flood elevation. In addition, this section of roadway has trees and utility poles that are within 3 to 5 feet of the roadway edge. Raising the roadway profile by approximately 2.5-FT would eliminate the standing water crashes except for extreme flood events. Furthermore, grading out ditches and relocating utility poles and eliminating trees close to the roadway with the regraded ditches will reduce Fixed Object crashes and will allow the roadway to have more direct sunlight hit the pavement surface which will dry the roadway and to melt snow/ice in the winter as it will no longer be shaded by the trees. All of these improvements would reduce the crashes occurring on this problematic section of roadway. This section would also benefit from widening the shoulder and utilizing thermoplastic 6-INCH edge line rumble stripes to warn motorists if they are leaving the roadway travel lane.

Additional countermeasures on the CR335 (Spangler Road) section south of Medway would involve addressing curve section crash issues and sight distance limitations. The intersection of Restoration Park Drive has sight distance issues involved with the earth levy on the northwest corner of the intersection, which could be regraded to improve line of sight of southbound approaching traffic. The South Union Road intersection has sight distance issues seeing northbound traffic because of the bridge barrier walls, which could be improved by relocating the intersection further north and there should be a northbound right turn lane added (which is warranted based on volumes) for improved safety. Finally, the curved roadway on the south approach to the bridge coming into Medway should be straightened out to provide improved sight distance of the approach to the traffic signal at Main Street and CR335 (Spangler Road). Replacing the bridge (which is starting to deteriorate) would allow for straightening of the curved roadway, and would allow for

providing a wider bridge to allow for a northbound left turn lane at the traffic signal, which is a warranted turn lane based on volumes. Currently, without a left turn lane, the capacity analyses indicate a 0.80 v/c ratio in the PM peak period and a queue of 430 feet which backs across the small bridge and into the curve. The section of the corridor on CR303 (Medway-New Carlisle Road) from north of the Main Street intersection to US40 (National Road) primarily has crash occurrences at the curved section on the north side of Medway and then at the public intersections along the route. Improving the curve on the north side of Medway by providing wider paved shoulders and relocating utility poles further from the edge of roadway would reduce crashes. The installation of enhanced curve signing and rumble stripes on the curve would also be beneficial to this location. Given the prevalence of crashes being in the vicinity of intersections, improvements should be made to enhance intersection safety such as enhanced warning signs of approaching intersections; wider shoulders through intersections; street lighting at intersections; and at the intersection of Schiller Road, turn lane warrants indicate a northbound left turn lane is warranted and thus is recommended. Several sections of guardrails should be upgraded to current design standards. The final safety improvement would be to install dual LED solar powered signal ahead warning signs in advance of the traffic signal at US40 given the hill blocks the view of the traffic signal.

### 3.4 Design Evaluation

Several site visits to the corridor during the safety study evaluation noticed that there were skid marks at several of the curved sections that indicated curved sections of roadway were problematic, which is supported by the crash data. The standing water crashes (three total) on the section of CR335 (Spangler Road) from south of Medway to South Union Road indicates flooding events are problematic and that elevating the roadway would be beneficial in reducing these crashes as well as widening the shoulders and relocating utility poles further from the roadway edge will enhance safety. The Cost-Benefit analysis using ECAT indicates a positive return on investment. There will be right-of-way needed to accomplish this and there are wetlands adjacent to the roadway that will need to be evaluated for impacts. Coordination with the Clark County Park District will be required for the bridge replacement near Medway; the widening/raising of the roadway profile; and the realignment of the South Union Road intersection. A site visit revealed various locations where utility poles and large trees had been struck further supporting the need to further distance the fixed objects from the edge of roadway. Finally, the site visit revealed the bridge being recommended for replacement is starting to deteriorate as evidenced by the picture to the right.



### 3.5 Proposed Countermeasures Evaluation

The proposed countermeasures for CR335 (Spangler Road)/CR303 (Medway-New Carlisle Road) involves the following key improvements on the corridor:

CR335 (Spangler Road) from Restoration Park Drive (just north of interchange) to Main Street in Medway, Ohio

- Regrade earth levy at Restoration Park Drive to improve sight distance of southbound traffic;
- Re-align South Union Drive intersection further northward to improve sight distance blocked by bridge and add a northbound right turn lane (see Appendix B for turn lane warrants summary) and improve intersection warning signs and add street lights;
- Raise Spangler Road profile elevation approximately 2.5-FT so to elevate the roadway out of the 100-year flood zone elevation from just north of South Union Road northward to the bridge in Medway, which will impact adjacent properties and require additional right-of-way; install 4-FT shoulders with rumble stripes; regrade ditches; and remove trees within the extended right-of-way;
- Replace the bridge on south side of Medway that is on the south side of the intersection with Main Street and widen the new bridge to allow for a northbound left turn lane at the signalized intersection at Main Street to be installed; the new bridge should be re-aligned to eliminate the curved section entering the bridge on its

south side that currently exists; the south side of the bridge will need to meet the new profile elevation of Spangler Road that is being raised to bring the roadway above the 100-year flood zone.

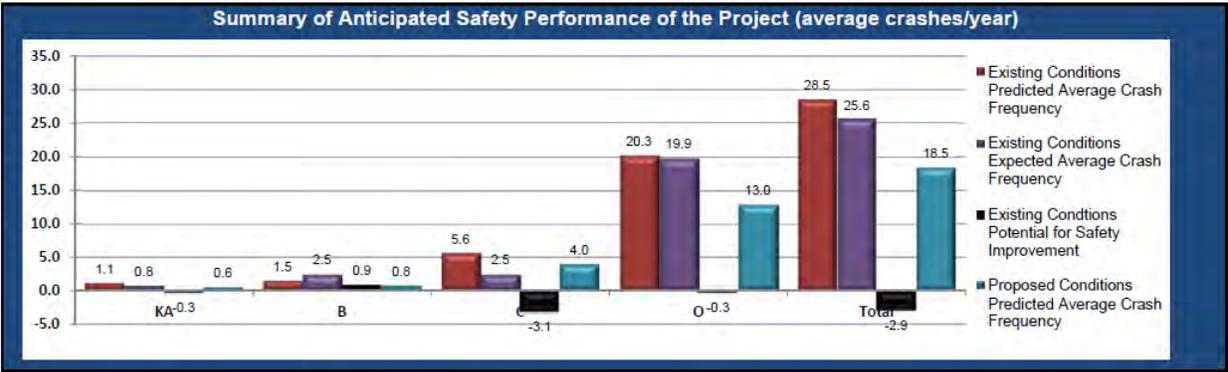
- Provide a northbound left turn lane at intersection with Main Street (there would be a small corresponding southbound left turn lane for lane balancing & alignment if it is feasible given close proximity of buildings), and provide improved signing.

CR303 (Medway-New Carlisle Road) from Main Street in Medway, Ohio to US40 (National Road)

- Widen shoulders of curve located on north side of Medway; install enhanced visibility curve signs; provide rumble stripes; and relocate or remove any fixed objects that are too close to the edge of roadway;
- Install a northbound left turn lane at Schiller Road as turning volumes indicate one is warranted (see Appendix B); widen shoulders at intersection, install street lights and improve intersection signing;
- Improve intersection signing at Croskey Boulevard; widen shoulders (~250 FT); and install street lights;
- Improve intersection signing at North Union Road; widen shoulders (~250 FT); and install street lights;
- Improve intersection signing at Kendig Road; widen shoulders (~250 FT); and install street lights;
- Install LED solar powered flashing dual warning signs for signal ahead for northbound traffic at base of hill approaching the signal at US40 (National Road);
- Resurface roadway to provide enhanced pavement markings and improved drivability over widened shoulders and added turn lanes where proposed.

The above countermeasures have a planning level cost estimate of \$5,884,000 with construction anticipated to begin in FY2024.

An analysis of crash data and the proposed countermeasures were performed using ODOT’s Economic Crash Analysis Tool (ECAT). The ECAT calculates predicted/expected crash frequencies using Safety Performance Functions (SPFs), Crash Modification Factors (CMFs), and ODOT calibration factors to evaluate site-specific conditions based on existing physical characteristics, traffic volumes, and crash history. The projected safety improvement for implementing long-term countermeasures is 10.0 crashes per year by reducing the existing conditions predicted crashes from 28.5 to a proposed conditions prediction of 18.5 crashes per year.



3.6 Countermeasures Conclusions

The ODOT’s Economic Crash Analysis Tool (ECAT) spreadsheet was used to evaluate the safety performance of each of the proposed countermeasures compared to the amount of funding needed to construct them in determining the benefit cost ratio. It should be noted that the ECAT analysis is limited to improvements that have been researched sufficiently to develop Crash Modification Factors; therefore, not all countermeasures that are expected to create a positive change in safety are expected to be accounted for in this analysis. The total project cost entered into the ECAT spreadsheet, is the total cost estimated for the long-term countermeasures and includes preliminary engineering, final engineering, and construction engineering. The following tables and charts document the cost/benefit output of the ECAT analysis spreadsheets.

County Road 335/303 Safety Study – Clark County, Ohio (2020)

Benefit - Cost Calculator		Expected Annual Crash Adjustment	
Net Present Value of Project	\$5,117,620.00	Number of Fatal & Incapacitating Injury Crashes	-0.468
Net Present Value of Safety Benefits	\$4,942,467.73	Number of Injury Crashes	-2.436
Net Benefit	(\$175,152.27)	Number of Total Crashes	-9.160
Benefit / Cost Ratio	0.97		



Use of ODOT's Economic Crash Analysis Tool (ECAT) for the proposed improvements revealed a 0.97 positive Benefit/Cost Ratio with the proposed countermeasures applied to the corridor. With these improvements it is expected that a positive return on investments will be observed after 15 years.

#### 4.0 SUMMARY OF TRAFFIC OPERATIONS

##### 4.1 Traffic Operations

Future traffic operations were evaluated for the AM and PM peak hour at five (5) locations along the Spangler Road (CR 335/303) corridor including the locations:

- Spangler Road & South Union Road
- Spangler Road & Main Street
- Medway-New Carlisle Road & Schiller Road
- Medway-New Carlisle Road & North Union Road
- Medway-New Carlisle Road & National Road (US40)

Traffic operations were evaluated using Highway Capacity Software (HCS) and Synchro 10. Signalized intersections were analyzed using Synchro 10 while unsignalized intersections were analyzed in HCS. Both programs provide several measures of effectiveness (MOEs) for traffic operations based on Highway Capacity Manual 2010 (HCM 2010) methodology. The primary MOE for this analysis will be level-of-service (LOS).

Level-of-service provides a letter grade for traffic operations based on the amount of delay experienced at an intersection, along an intersection approach (i.e., eastbound, westbound), or for an intersection lane group (i.e., eastbound left, westbound through). LOS can range from A to F, with A representing the conditions that experience the least amount of delay, and F representing the conditions that experience the most delay. Typically, LOS values from A to D represent satisfactory traffic operations, while LOS values E and F represent unsatisfactory traffic operations. Unsatisfactory traffic operations generally necessitate changes to traffic control or roadway geometry to reduce delays for vehicles. LOS for this analysis will be evaluated at the intersection level. Delay thresholds for LOS are shown in Table 4.1

Table 4.1 Delay Thresholds for Level-of-Service (LOS)		
LOS	Delay in Seconds (Signalized)	Delay in Seconds (Un-Signalized)
A	0.0 – 10.0	0.0 – 10.0
B	10.1 – 20.0	10.1 – 15.0
C	20.1 – 35.0	15.1 – 25.0
D	35.1 – 55.0	25.1 – 35.0
E	55.0 – 80.0	35.1 – 50.0
F	>80.0	>50.0

In this section, traffic operations were evaluated during the AM and PM peak hours for the 2025 and 2045 No Build conditions. Results of the analysis are shown in Table 4.2.

Location	2025 No Build (LOS Delay Seconds)		2045 No Build (LOS Delay Seconds)	
	AM	PM	AM	PM
	Spangler Road & S Union Road (Un-Signalized)*	C (16.1)	C (18.4)	C (17.7)
Spangler Road & Main Street (Signalized)	B (12.5)	B (17.4)	B (13.4)	C (20.2)
Medway-New Carlisle Road & Schiller Road (Un-Signalized)*	B (11.2)	B (11.7)	B (11.6)	B (12.2)
Medway-New Carlisle Road & N Union Road (Un-Signalized)*	B (10.1)	B (11.6)	B (10.3)	B (12.1)
Medway-New Carlisle Road & National Road (Signalized)	C (34.0)	C (34.1)	D (41.9)	C (33.9)

\* LOS for the approach with the highest delay is reported for unsignalized intersections

During the AM and PM peak hours under the 2025 and 2045 conditions, all of the analysis intersections had LOS grades of D or better. Several of the proposed improvements are targeted to improving crash frequency along the corridor, therefore some intersections will not show a benefit in terms of operational performance. Table 4.3 summarizes the levels of service for the AM and PM peak hours for the 2025 and 2045 years with the recommended improvements implemented. Detailed traffic count and HCS output reports are provided for reference in Appendix A.

Location	2025 Build (LOS Delay in Seconds)		2045 Build (LOS Delay in Seconds)	
	AM	PM	AM	PM
	Spangler Road & S Union Road (Un-Signalized)*	C (16.0)	C (17.7)	C (17.5)
Spangler Road & Main Street (Signalized)	B (18.3)	C (21.8)	B (19.3)	C (23.1)
Medway-New Carlisle Road & Schiller Road (Un-Signalized)*	B (11.2)	B (11.7)	B (11.6)	B (12.2)
Medway-New Carlisle Road & N Union Road (Un-Signalized)*	B (10.1)	B (11.6)	B (10.3)	B (12.1)
Medway-New Carlisle Road & National Road (Signalized)	C (34.0)	C (34.1)	D (41.9)	C (33.9)

With the proposed improvements applied, some intersections are expected to perform exactly as they did in the No Build conditions. At the intersection of Spangler Road and South Union Road, the overall delay is expected to be improved as a result of the recommended improvements. At the intersection of Spangler Road and Main Street, the overall delay is predicted to increase slightly by approximately four seconds. This increase is from fewer gaps in through movements being created for left turning vehicles blocking through traffic as the through/left lane would be eliminated

as the approach becomes a left turn lane and a through/right lane. Although the slight increase in delay is predicted, the intersection remains at acceptable levels of performance through design year, and the added safety benefit of the designated left turn lanes will be of greater importance at this location.

**5.0 RECOMMENDATIONS & PRIORITIZATION**

**5.1 Countermeasure Recommendations and Implementation Plan**

A summary of the proposed countermeasures for the CR335/CR303 corridor improvements are outlined in Table 5.1 below, as well as displayed on Figure 5.1. An analysis of crash data and the proposed countermeasures were performed using ODOT’s Economic Crash Analysis Tool (ECAT). The ECAT calculates predicted/expected crash frequencies using Safety Performance Functions (SPFs), Crash Modification Factors (CMFs), and ODOT calibration factors to evaluate site-specific conditions based on existing physical characteristics, traffic volumes, and crash history. The projected safety improvement for implementing long-term countermeasures results in 10.0 fewer crashes per year, as the countermeasures would reduce existing conditions predicted crashes from 28.5 to a proposed conditions prediction of 18.5 crashes per year. The Total cost of improvements is \$5,884,000.

Table 5.1 Summary of Proposed Countermeasures	
Location	Description of Improvements
<p>CR335 (Spangler Road)</p> <p>Restoration Park Drive To Main Street in Medway</p>	<ul style="list-style-type: none"> <li>• Regrade earth levy at Restoration Park Drive to improve sight distance of southbound traffic;</li> <li>• Re-align South Union Drive intersection further northward to improve sight distance blocked by bridge and add a northbound right turn lane (see Appendix B for turn lane warrants summary) and improve intersection warning signs and add street lights;</li> <li>• Raise Spangler Road profile elevation approximately 2.5-FT so to elevate the roadway out of the 100-year flood zone elevation from just north of South Union Road northward to the bridge in Medway; install 4-FT shoulders with rumble stripes; regrade ditches; and remove trees within the extended right-of-way;</li> <li>• Replace the bridge on south side of Medway that is on the south side of the intersection with Main Street and widen the new bridge to allow for a northbound left turn lane at the signalized intersection at Main Street to be installed and provide new signing; the new bridge should be re-aligned to eliminate the curved section entering the bridge on its south side that currently exists; the south side of the bridge will need to meet the new profile elevation of Spangler Road that is being raised to bring the roadway above the 100-year flood zone.</li> </ul>
<p>CR303 (Medway-New Carlisle Road)</p> <p>Main Street in Medway To US40 (National Road)</p>	<ul style="list-style-type: none"> <li>• Widen shoulders of curve located on north side of Medway; install enhanced visibility curve signs; provide rumble stripes; and relocate or remove any fixed objects that are too close to the edge of roadway;</li> <li>• Install a northbound left turn lane at Schiller Road as turning volumes indicate one is warranted (see Appendix B); widen shoulders at intersection, install street lights and improve intersection signing;</li> <li>• Improve intersection signing at Croskey Boulevard intersection; widen shoulders (250FT each side of intersection); and install street lights;</li> <li>• Improve intersection signing at Union Road intersection; widen shoulders (250FT each side of the intersection); and install street lights;</li> <li>• Improve intersection signing at Kendig Road intersection; widen shoulders (250FT each side of the intersection); and install street lights;</li> <li>• Install LED solar powered flashing dual warning signs for signal ahead for northbound traffic at base of hill approaching the signal at US40 (National Road);</li> <li>• Resurface roadway to provide enhanced pavement markings and drivability.</li> </ul>

## 5.2 Proposed Improvements

The proposed improvements outlined in Table 5.1 have been displayed in the two designated County Route numbers associated with the corridor, with those being CR335 (Spangler Road) which is the segment south of Medway, and CR303 (Medway-New Carlisle Road) which is the segment north of Medway. All the improvements are shown on Figure 5.1. The overall project cost is estimated to be \$5,884,000. A review of collision diagrams revealed that the majority of crashes occurred on the 1.1-mile section of CR335 (Spangler Road) from Restoration Park Drive to Main Street in Medway as this section accounted for 57% (32 crashes) of the total 56 crashes and contained 73% (11 crashes) of the 15 fatal/injury crashes within the study limits. The remaining 2.0-mile section of the corridor study limits on CR303 (Medway-New Carlisle Road) contained 43% (24 crashes) of all crashes and 27% (4 crashes) of the fatal/injury crashes. The predominant crash type of the CR335 (Spangler Road) section included 18 Fixed Object crashes (56% of crashes on this section) that resulted in 7 injury crashes and one (1) fatal crash. The projected safety improvement for implementing all the long-term countermeasures results in 10.0 fewer crashes per year, as the countermeasures would reduce existing conditions predicted crashes from 28.5 to a proposed conditions prediction of 18.5 crashes per year.

## 5.3 Project Implementation

In regards to funding the long term recommendations of this safety study, the Clark County Engineer is encouraged to utilize this CEAO funded Safety Study to apply to the ODOT Safety Program given the good cost-benefit ratio from the ECAT analyses and the higher than statewide averages of fatal/injury crashes that are occurring on the corridor. The portion of the project on CR335 (Spangler Road) is also listed in the Clark County-Springfield Transportation Coordinating Committee’s *Transportation Long Range Plan* (see graphic below). In addition, the corridor is on several ODOT high crash mapping lists and the local MPO crash listings. If by chance the project does not win funding from the ODOT program, other funding sources such as the CEAO safety program could be applied to as well. A second source of funding that could be considered is to pursue OPWC funds for some of the improvements. If OPWC funds were awarded, this would benefit submitting an application to the Safety Program of either CEAO or ODOT, as it would show an additional funding source, which would reduce the percentage of safety funds needed, which can result in additional ranking points to improve funding chances.

### Long Range SFY2021-2030

Key	Time Frame	Location	Project Description	Type	Air	Total Cost 2015	Total Cost Inflated to Expenditure Year*	FED	STATE	Local
18	2021-2030	New Carlisle-Springfield Connector Trail Phase 1	Miami County Line, through New Carlisle, to Lower Valley Pike and Enon Road	Trail Construction	E	\$1,300,000	\$1,799,155	\$1,439,324		\$359,831
19	2021-2030	Tecumseh Trail Phase 3	Extend planned trail from former YMCA to Park Layne	Trail Construction	A	\$1,300,000	\$1,799,155	\$1,439,324		\$359,831
20	2021-2030	Bird Road	Widen roadway from US40 to SR41 and improve intersection at Bird Road and US40	Widening	A	\$1,500,000	\$2,075,948	\$1,660,758		\$415,189
21	2021-2030	Mad River Trail	Greene County Line to Enon Road; north to Lower Valley Pike, south to Enon Park	New Bike/Ped	E	\$1,300,000	\$1,799,155	\$1,439,324		\$359,831
22	2021-2030	Burnett Road	Extend roadway north from Columbus Avenue to SR4 (Belmont Avenue)	New Construction	A	\$1,000,000	\$1,383,965	\$1,107,172		\$276,793
23	2021-2030	Little Miami Scenic Trail	Construct spur from the Little Miami Scenic Trail at Jackson Road to Young's Jersey Dairy	Trail Construction	E	\$300,000	\$415,188	\$332,151		\$83,037
24	2021-2030	Spangler Road	Realign roadway south of Lower Valley Pike	Geometric Improvements	E	\$800,000	\$1,107,171	\$885,737		\$221,434
25	2021-2030	Middle Urbana Road	334 to Moorefield, add center turn lane	Widening		\$1,500,000	\$2,075,948	\$1,660,758		\$415,189
26	2021-2030	Downtown Transit Intermodal Facility	Springfield Downtown area	Transit	E	\$3,000,000	\$4,151,896	\$3,321,517		\$830,379
						<b>\$12,000,000</b>	<b>\$16,607,581</b>	<b>\$13,286,065</b>		<b>\$3,321,514</b>

The Long Range Transportation Plan (2040 Horizon Year) by the Clark County-Springfield Transportation Coordinating Committee lists the segment of CR335 (Spangler Road) south of Main Street (Lower Valley Road) as a project in the plan.

100-YEAR FLOODPLAIN 

-RAISE SPANGLER RD APPROXIMATELY 2.5' OUT OF 100-YEAR FLOODPLAIN  
-REALIGN S. UNION RD WITH SPANGLER RD  
-ADD A NORTHBOUND RIGHT TURN LANE ON SPANGLER RD  
-INSTALL STREET LIGHTS AT S. UNION INTERSECTION

INSTALL RUMBLE STRIPES THROUGH THE SECTION OF ROADWAY BEING ELEVATED OUT OF THE FLOODPLAIN. RELOCATE UTILITY POLES FURTHER FROM THE EDGE OF THE ROADWAY.

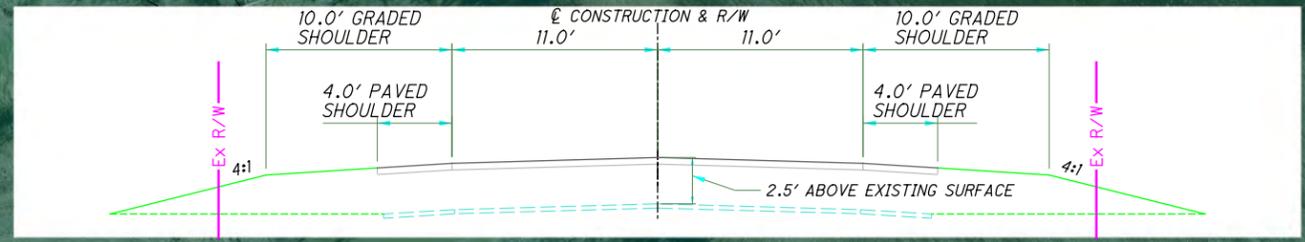
REGRADE PART OF EARTH LEVEE FURTHER FROM ROADWAY TO IMPROVE SIGHT DISTANCE LOOKING NORTHWARD FROM RESTORATION PARK DRIVE. THIS WILL LIKELY REQUIRE ADDITIONAL RIGHT-OF-WAY.

RESTORATION PARK DRIVE

NEW STREET LIGHT

S. UNION RD

SPANGLER ROAD (CR-335)



CALCULATED  
MDF  
CHECKED  
XXX

0 100 200  
50  
HORIZONTAL  
SCALE IN FEET



FIGURE 5.1  
PROPOSED IMPROVEMENTS



MATCH LINE (SHEET 3 OF 6)

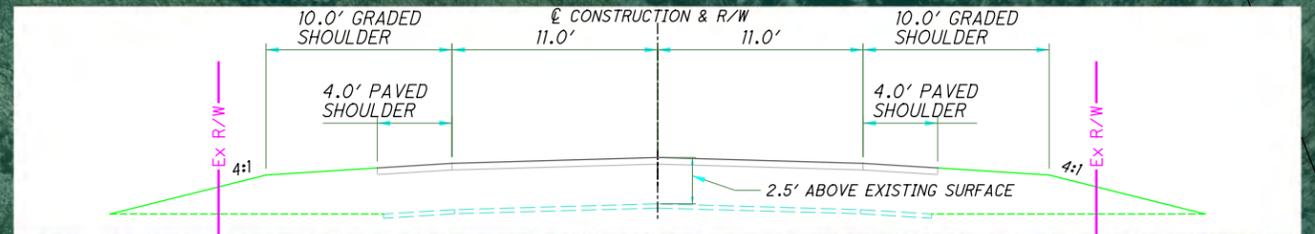
100-YEAR FLOODPLAIN



RAISE SPANGLER RD APPROXIMATELY 2.5' OUT OF 100-YEAR FLOODPLAIN

SPANGLER ROAD (CR-335)

INSTALL RUMBLE STRIPES THROUGH THE SECTION OF ROADWAY BEING ELEVATED OUT OF THE FLOODPLAIN. RELOCATE UTILITY POLES FURTHER FROM THE EDGE OF ROADWAY.



MATCH LINE (SHEET 1 OF 6)



0 100 200  
50' HORIZONTAL SCALE IN FEET

CALCULATED  
MDF  
CHECKED  
XXX

FIGURE 5.1  
PROPOSED IMPROVEMENTS

CLARK - CR335 / CR303



CALCULATED  
MDF  
CHECKED  
XXX

MATCH LINE (SHEET 4 OF 6)

**FIGURE 5.1**  
**PROPOSED IMPROVEMENTS**

**CLARK - CR335 / CR303**



100-YEAR FLOODPLAIN

RAISE SPANGLER RD APPROXIMATELY 2.5' OUT OF 100-YEAR FLOODPLAIN  
- SPANGLER ROAD CURVATURE NEW RADIUS FOR 40 MPH  
- ADD NORTH AND SOUTHBOUND TURN LANES AT SPANGLER AND MAIN  
- ADD 4' SHOULDERS TO MEDWAY-CARLISLE RD CURVATURE  
- OVERLAY ROADWAY 1.5' NORTH OF MAIN STREET  
- REPLACE BRIDGE OVER CREEK

INSTALL RUMBLE STRIPES THROUGH THE SECTION OF ROADWAY BEING ELEVATED OUT OF THE FLOODPLAIN. RELOCATE UTILITY POLES FURTHER FROM THE EDGE OF ROADWAY.

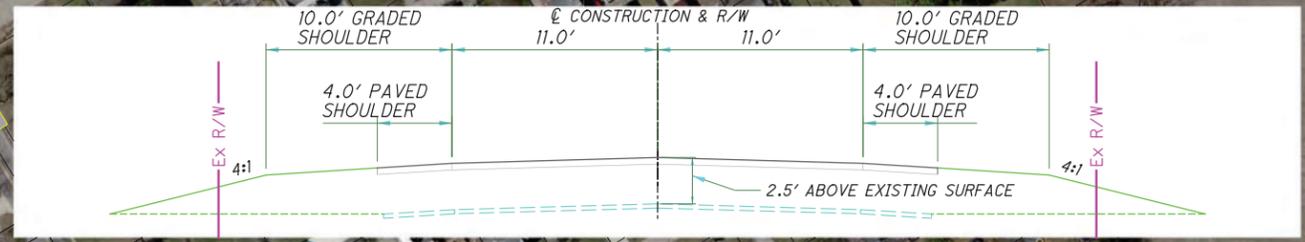
REPLACE BRIDGE TO ALLOW FOR NORTHBOUND LEFT TURN LANE TO MAIN STREET AT THE EXISTING SIGNAL AND IMPROVE CURVATURE HEADING INTO BRIDGE.

PROPOSED GUARDRAIL  
NEW BRIDGE

SIGNAL UPGRADE

MEDWAY-NEW CARLISLE ROAD (CR-303)

WIDEN SHOULDERS OF CURVE; IMPROVED WARNING SIGNS; AND PROVIDE RUMBLE STRIPES.



MATCH LINE (SHEET 2 OF 6)

MATCH LINE (SHEET 3 OF 6)



-ADD NORTHBOUND LEFT TURN LANE AT SCHILLER RD  
 -INSTALL STREET LIGHTS AT SCHILLER RD INTERSECTION  
 -INSTALL STREET LIGHTS AT CROSKEY BLVD INTERSECTION  
 -OVERLAY ROADWAY 1.5"

MATCH LINE (SHEET 5 OF 6)

MATCH LINE (SHEET 4 OF 6)



-INSTALL STREET LIGHTS AT UNION RD INTERSECTION  
 -INSTALL STREET LIGHTS AT KENDIG RD INTERSECTION  
 -ADD 4' SHOULDERS ALONG MEDWAY-NEW CARLISLE RD  
 AT N. UNION RD AND KENDIG RD  
 -OVERLAY ROADWAY 1.5"

MATCH LINE (SHEET 6 OF 6)

CALCULATED  
 MDJ  
 CHECKED  
 XXX

0 100 200  
 50  
 HORIZONTAL  
 SCALE IN FEET

N

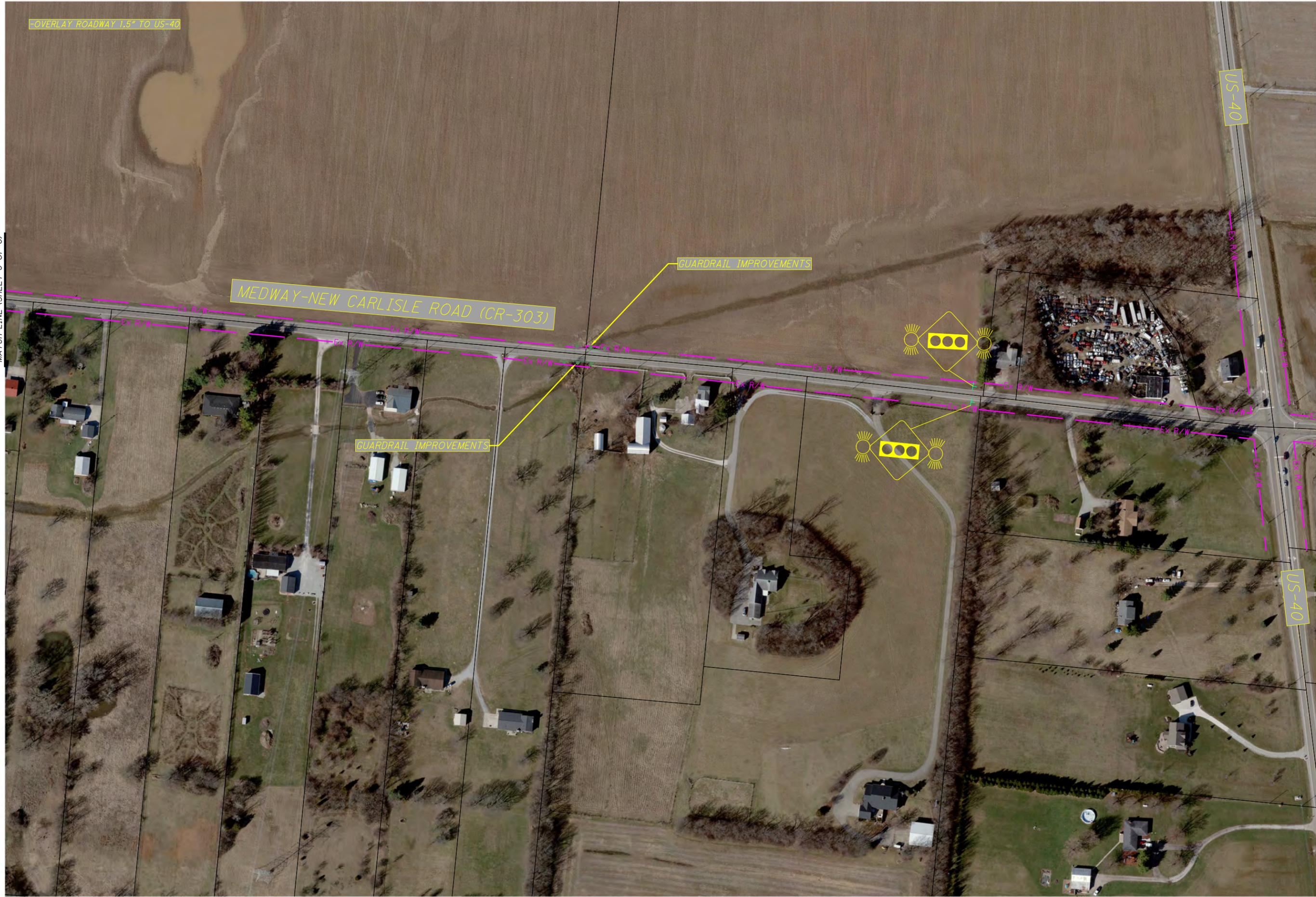
**FIGURE 5.1**  
**PROPOSED IMPROVEMENTS**

CLARK - CR335 / CR303

51

MATCH LINE (SHEET 5 OF 6)

OVERLAY ROADWAY 1.5" TO US-40



CALCULATED	MDF	CHECKED	XXX
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0 100 200  
HORIZONTAL SCALE IN FEET

FIGURE 5.1  
PROPOSED IMPROVEMENTS

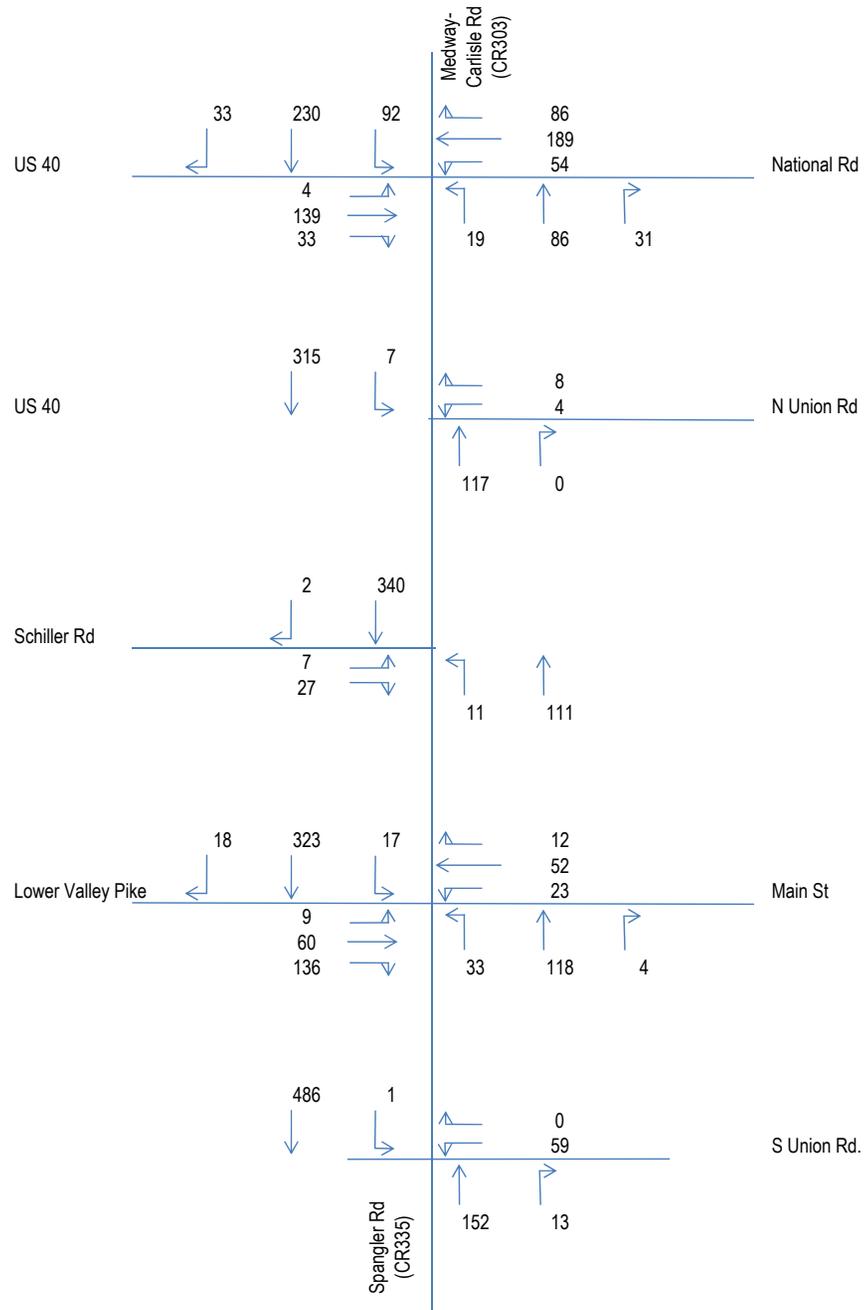
APPENDIX A  
TRAFFIC COUNTS & HCS REPORTS



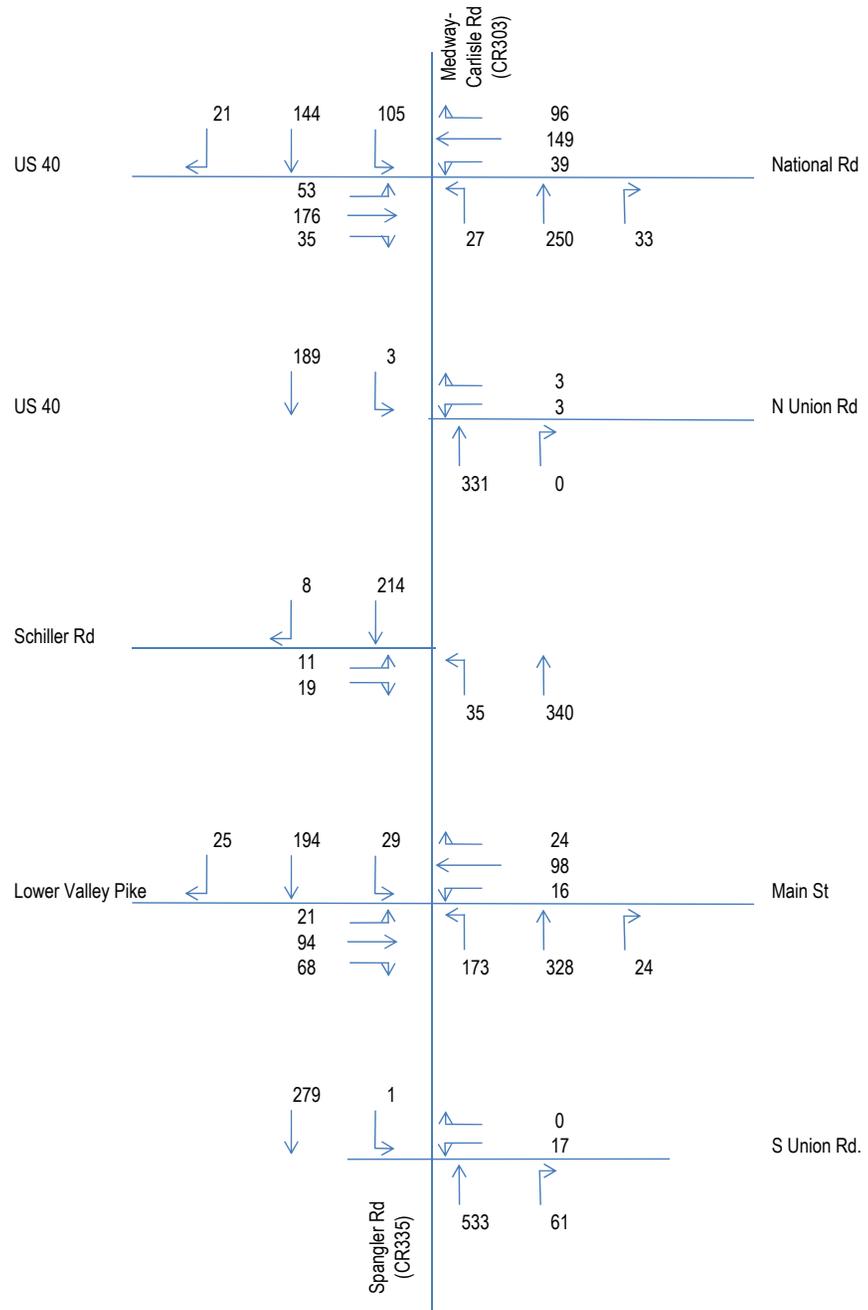
Growth 0.5 % per year

Location	Intersection	2020 ADT	2025 ADT	2045 ADT
North of Main St	Main St & Spangler Rd	5858	6004	6590
South of Main St	Main St & Spangler Rd	7725	7918	8691

# AM Existing 2020 Traffic Volumes



# PM Existing 2020 Traffic Volumes

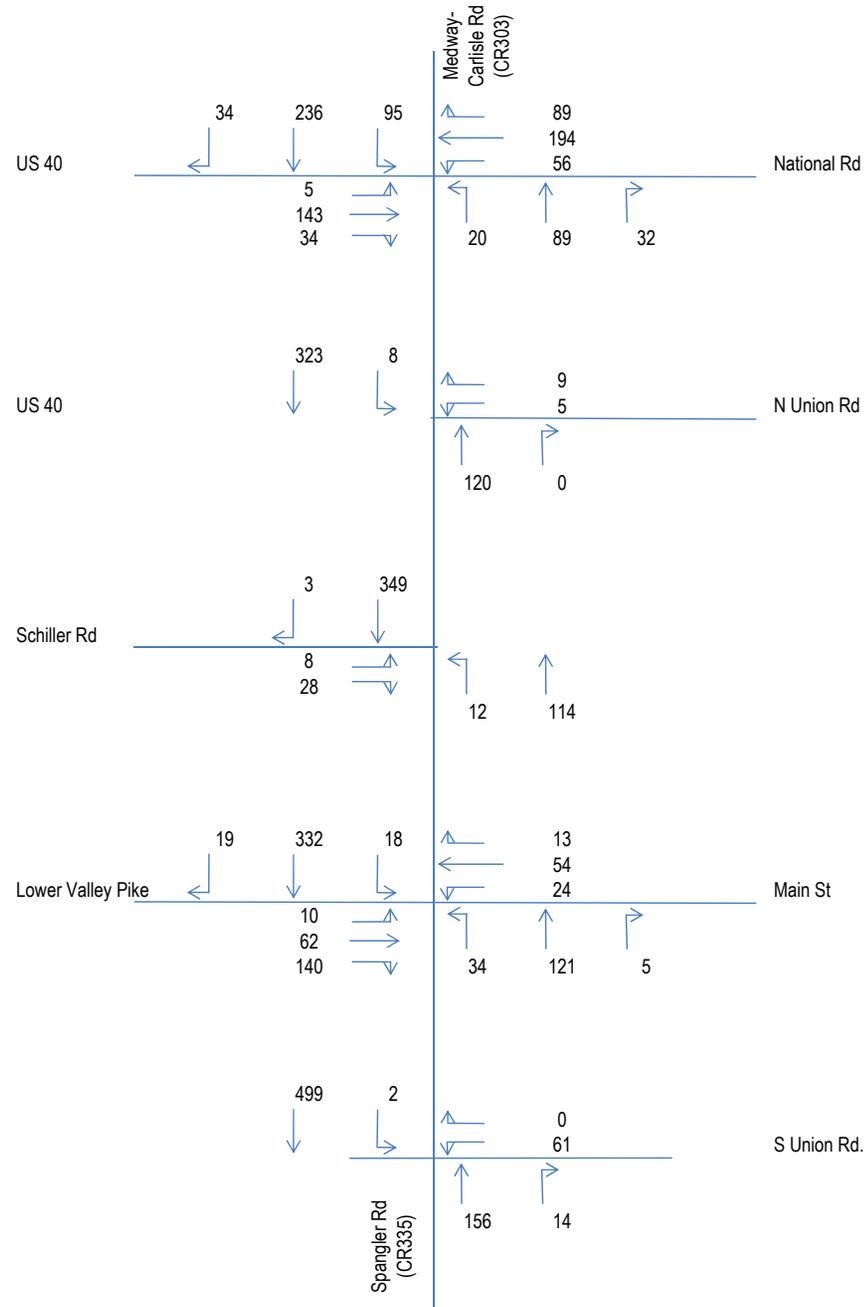


# AM 2025 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

↑  
North

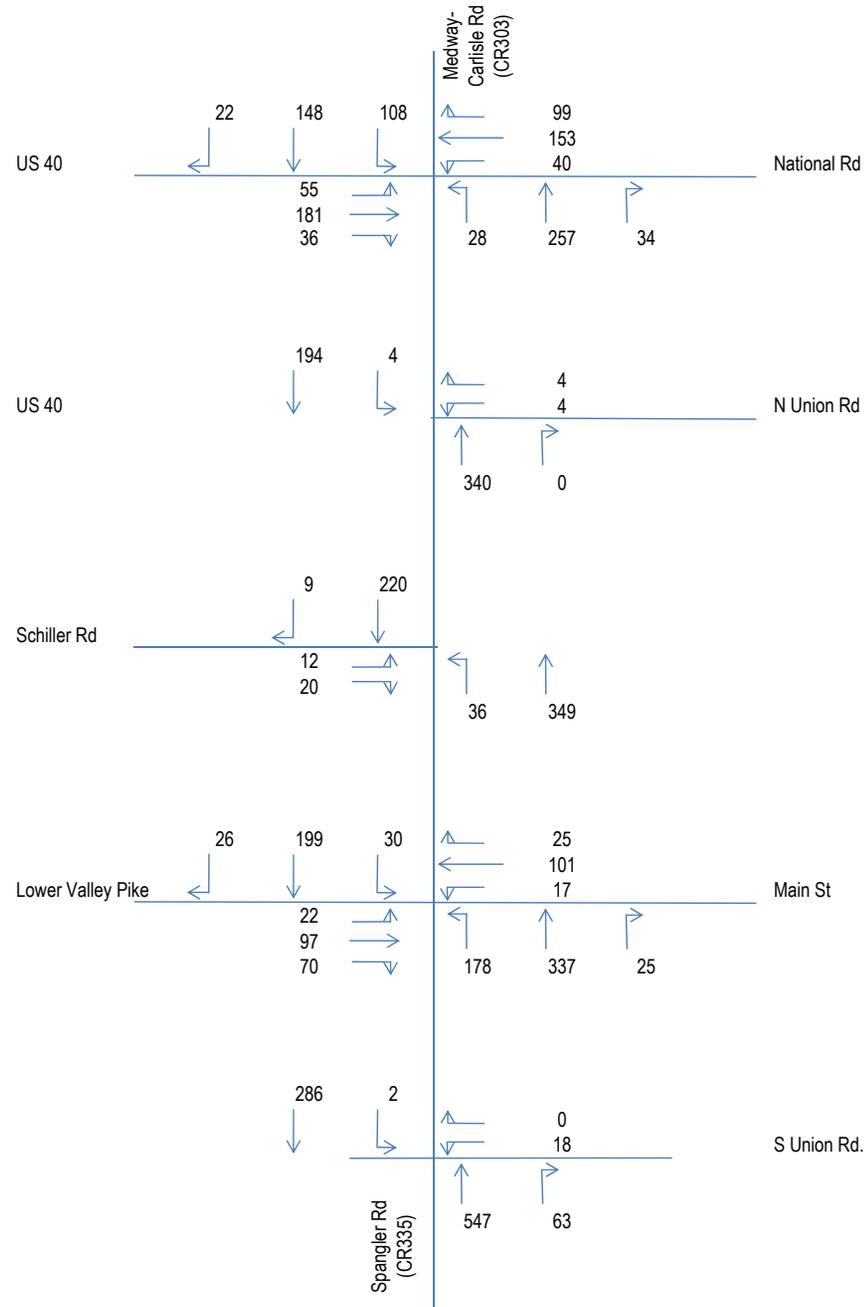


# PM 2025 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

↑  
North

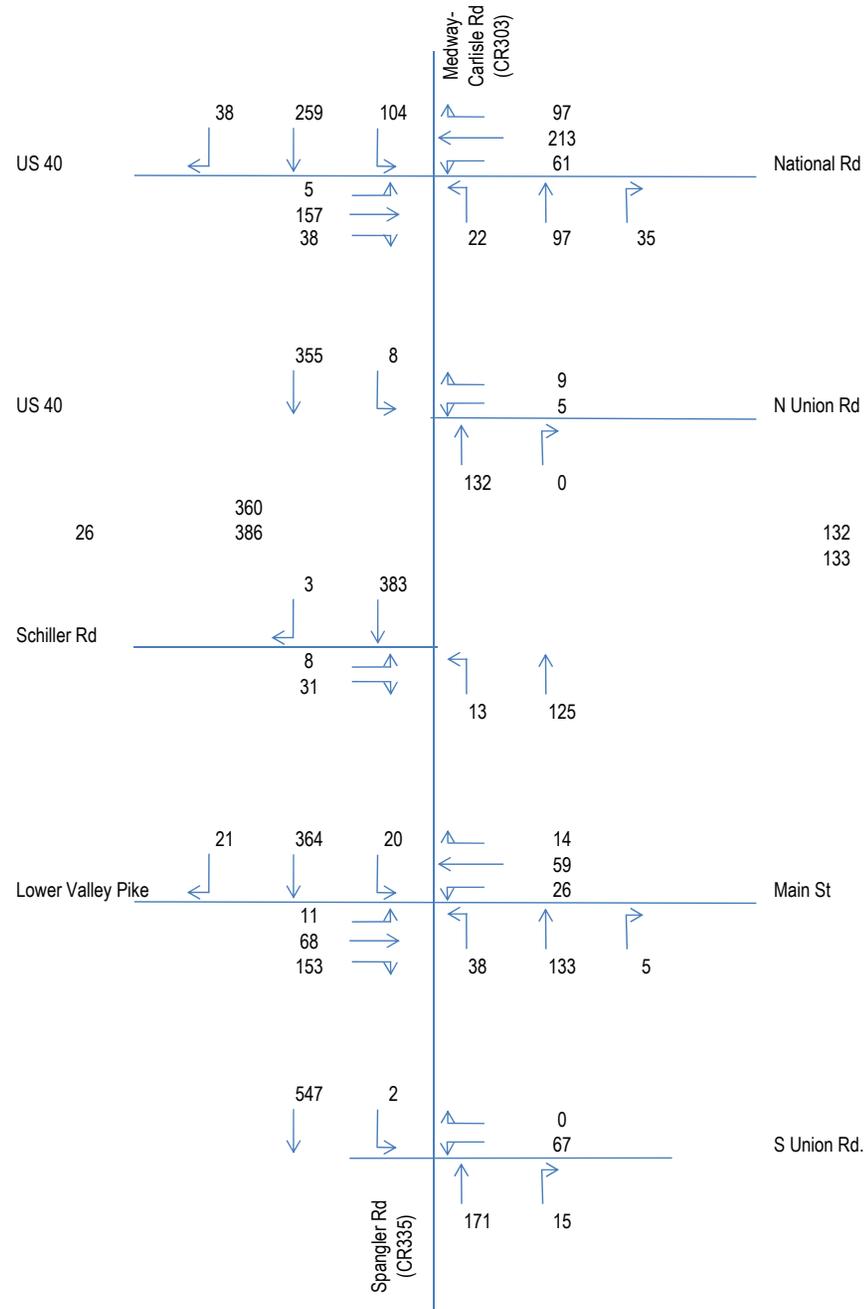


# AM 2045 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

↑  
North

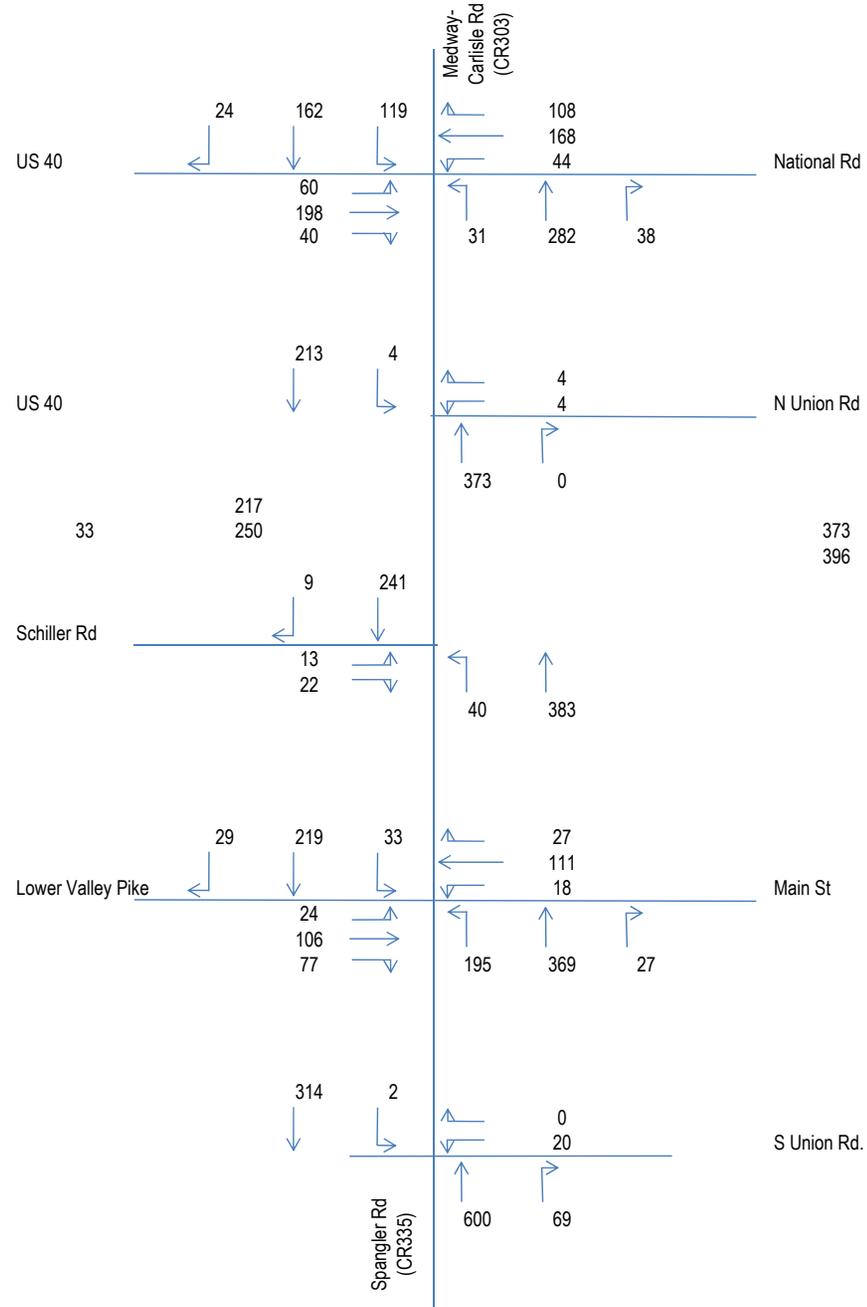


# PM 2045 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

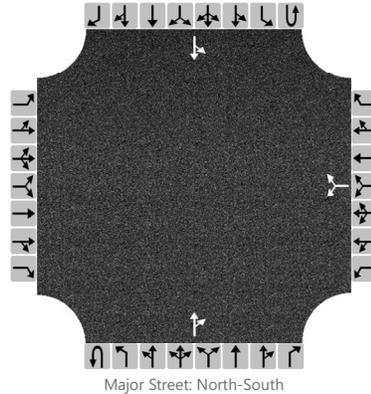
↑  
North



# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & N Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	N Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 AM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 AM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						5		9			120	0		8	323	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

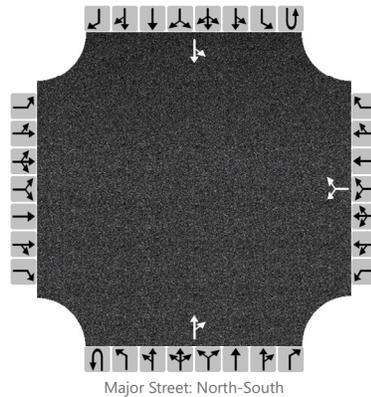
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						15								9		
Capacity, c (veh/h)						724								1448		
v/c Ratio						0.02								0.01		
95% Queue Length, Q <sub>95</sub> (veh)						0.1								0.0		
Control Delay (s/veh)						10.1								7.5		
Level of Service, LOS						B								A		
Approach Delay (s/veh)					10.1								0.2			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & N Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	N Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 PM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 PM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						4		4			340	0		4	194	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

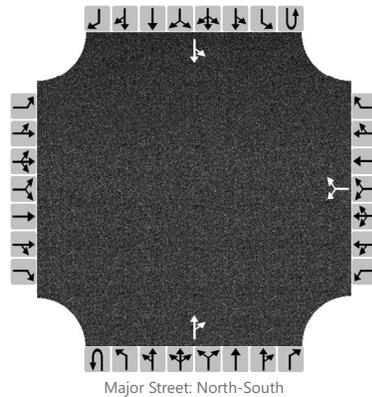
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9								4		
Capacity, c (veh/h)						552								1182		
v/c Ratio						0.02								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.0								0.0		
Control Delay (s/veh)						11.6								8.1		
Level of Service, LOS						B								A		
Approach Delay (s/veh)					11.6								0.2			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & N Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	N Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 AM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 AM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						5		9			132	0		8	355	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

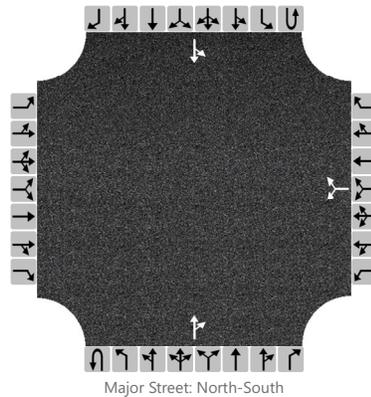
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						15								9		
Capacity, c (veh/h)						696								1432		
v/c Ratio						0.02								0.01		
95% Queue Length, Q <sub>95</sub> (veh)						0.1								0.0		
Control Delay (s/veh)						10.3								7.5		
Level of Service, LOS						B								A		
Approach Delay (s/veh)					10.3								0.2			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & N Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	N Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 PM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 PM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						4		4			373	0		4	213	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

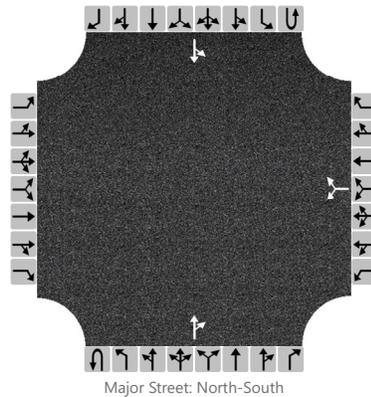
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9								4		
Capacity, c (veh/h)						517								1147		
v/c Ratio						0.02								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.1								0.0		
Control Delay (s/veh)						12.1								8.2		
Level of Service, LOS						B								A		
Approach Delay (s/veh)					12.1								0.2			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 AM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 AM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						61		0			156	14		2	499	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

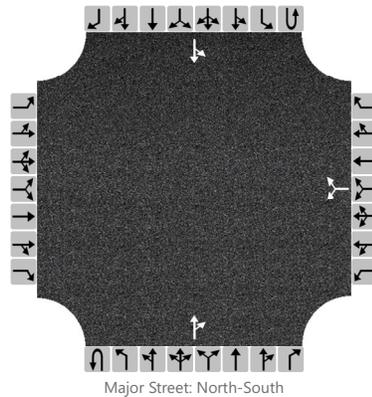
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						66								2		
Capacity, c (veh/h)						390								1382		
v/c Ratio						0.17								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.6								0.0		
Control Delay (s/veh)						16.1								7.6		
Level of Service, LOS						C								A		
Approach Delay (s/veh)					16.1								0.0			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 PM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 PM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR			LT	
Volume, V (veh/h)						18		0			547	63		2	286	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

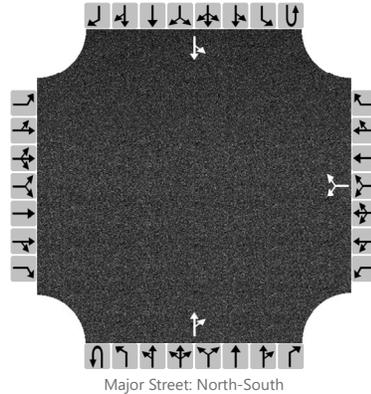
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						20								2		
Capacity, c (veh/h)						289								920		
v/c Ratio						0.07								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.2								0.0		
Control Delay (s/veh)						18.4								8.9		
Level of Service, LOS						C								A		
Approach Delay (s/veh)					18.4								0.1			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 AM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 AM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						67		0			171	15		2	547	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

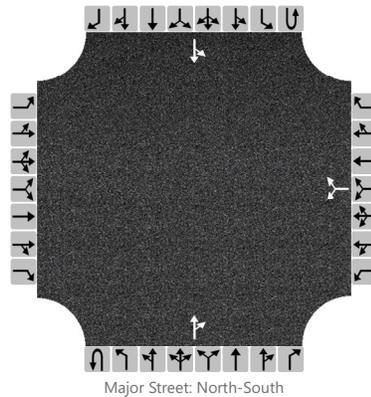
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						73								2		
Capacity, c (veh/h)						355								1362		
v/c Ratio						0.20								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.8								0.0		
Control Delay (s/veh)						17.7								7.6		
Level of Service, LOS						C								A		
Approach Delay (s/veh)					17.7								0.0			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 PM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 PM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0		0	1	0		0	1	0
Configuration							LR					TR			LT	
Volume, V (veh/h)						20		0			600	69		2	314	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

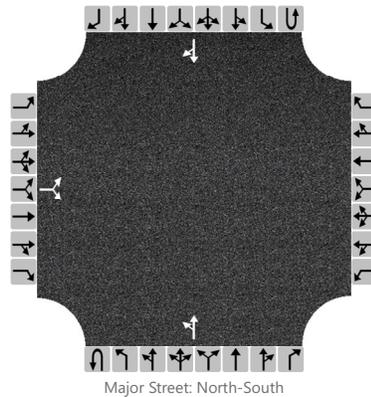
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						22								2		
Capacity, c (veh/h)						255								871		
v/c Ratio						0.09								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.3								0.0		
Control Delay (s/veh)						20.4								9.1		
Level of Service, LOS						C								A		
Approach Delay (s/veh)					20.4								0.1			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & Schiller Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Schiller Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 AM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 AM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		8		28						12	114				349	3
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

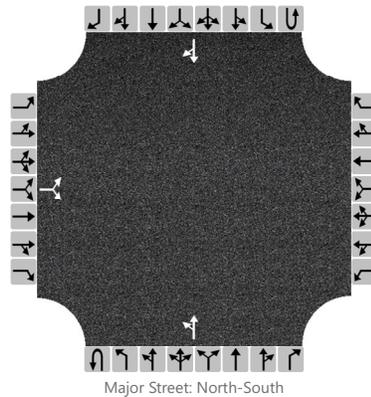
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			39							13						
Capacity, c (veh/h)			619							1169						
v/c Ratio			0.06							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.0						
Control Delay (s/veh)			11.2							8.1						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		11.2								0.9						
Approach LOS		B														

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & Schiller Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Schiller Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 PM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 PM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		12		20						36	349					220
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

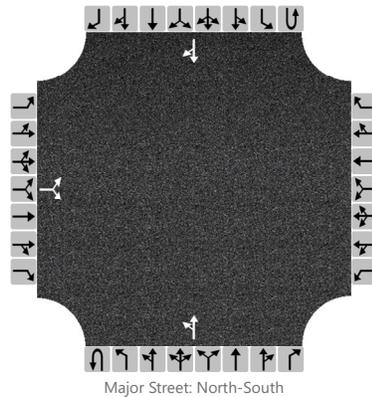
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			35							39						
Capacity, c (veh/h)			572							1309						
v/c Ratio			0.06							0.03						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.1						
Control Delay (s/veh)			11.7							7.8						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		11.7								1.0						
Approach LOS		B								A						

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & Schiller Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Schiller Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 AM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 AM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		8		31						13	125				383	3
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

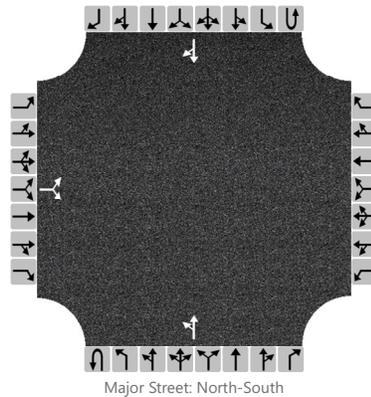
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			42							14						
Capacity, c (veh/h)			590							1133						
v/c Ratio			0.07							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.0						
Control Delay (s/veh)			11.6							8.2						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		11.6								0.9						
Approach LOS		B														

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Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 PM No Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 PM No Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement																	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0	
Configuration			LR							LT						TR	
Volume, V (veh/h)		13		22						40	383				241	9	
Percent Heavy Vehicles (%)		3		3						3							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized		No					No					No					
Median Type/Storage		Undivided															

## Critical and Follow-up Headways

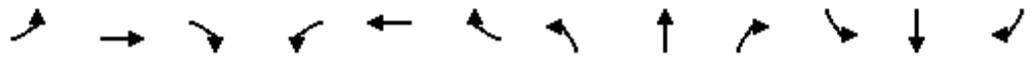
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			38							43						
Capacity, c (veh/h)			536							1284						
v/c Ratio			0.07							0.03						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.1						
Control Delay (s/veh)			12.2							7.9						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		12.2										1.1				
Approach LOS		B														

3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street  
Timings

Clark Co Study  
2025 AM No Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	62	140	24	54	13	34	121	5	18	332	19
Future Volume (vph)	10	62	140	24	54	13	34	121	5	18	332	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.56	0.88	0.85	0.72	0.87	0.60	0.69	0.84	1.00	0.71	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	1%	4%	4%	8%	0%	9%	25%	6%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	253	0	0	117	0	0	198	0	0	476	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.1			5.1			5.5			5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effect Green (s)		11.5			11.5			34.6			34.6	
Actuated g/C Ratio		0.20			0.20			0.61			0.61	
v/c Ratio		0.63			0.39			0.22			0.43	
Control Delay		21.6			21.9			6.3			7.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		21.6			21.9			6.3			7.9	
LOS		C			C			A			A	
Approach Delay		21.6			21.9			6.3			7.9	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		53			31			25			71	
Queue Length 95th (ft)		111			67			57			123	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)												
Base Capacity (vph)		913			761			906			1107	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.28			0.15			0.22			0.43	

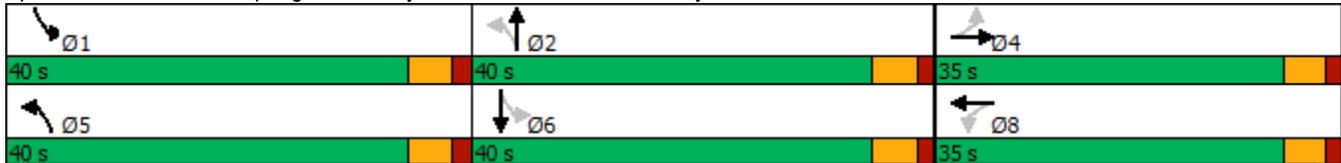
Intersection Summary

### 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street Timings

Clark Co Study  
2025 AM No Build

Cycle Length: 115	
Actuated Cycle Length: 56.7	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 43.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
Timings

Clark Co Study  
2025 AM No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	143	34	56	194	89	20	89	32	95	236	34
Future Volume (vph)	5	143	34	56	194	89	20	89	32	95	236	34
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.46	0.64	0.40	0.61	0.44	0.59	0.80	0.35	0.43	0.85	0.59
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	7%	0%	4%	9%	9%	11%	13%	3%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	364	0	140	520	0	0	236	0	0	557	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	60.0	60.0		60.0	60.0		55.0	55.0		55.0	55.0	
Total Split (%)	52.2%	52.2%		52.2%	52.2%		47.8%	47.8%		47.8%	47.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	55.6	55.6		55.6	55.6			48.2			48.2	
Actuated g/C Ratio	0.49	0.49		0.49	0.49			0.43			0.43	
v/c Ratio	0.03	0.42		0.35	0.63			0.36			0.97	
Control Delay	16.2	20.1		21.5	24.1			20.1			61.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	16.2	20.1		21.5	24.1			20.1			61.7	
LOS	B	C		C	C			C			E	
Approach Delay		20.0			23.5			20.1			61.7	
Approach LOS		C			C			C			E	
Queue Length 50th (ft)	4	166		63	260			96			382	
Queue Length 95th (ft)	8	103		42	205			135			#556	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	293	869		401	828			679			605	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.03	0.42		0.35	0.63			0.35			0.92	

Intersection Summary



### 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street Timings

Clark Co Study  
2025 PM No Build



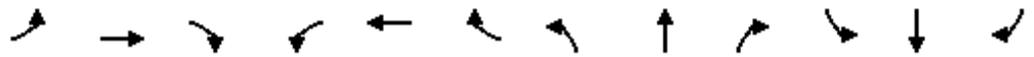
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	22	97	70	17	101	25	178	337	25	30	199	26
Future Volume (vph)	22	97	70	17	101	25	178	337	25	30	199	26
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.53	0.62	0.85	0.67	0.72	0.67	0.94	0.92	0.75	0.66	0.85	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	3%	2%	0%	3%	0%	1%	2%	4%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	280	0	0	202	0	0	588	0	0	317	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.1			5.1			5.5			5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)		14.8			14.8			34.6			34.6	
Actuated g/C Ratio		0.25			0.25			0.58			0.58	
v/c Ratio		0.67			0.47			0.70			0.33	
Control Delay		27.2			22.1			16.0			8.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		27.2			22.1			16.0			8.4	
LOS		C			C			B			A	
Approach Delay		27.2			22.1			16.0			8.4	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)		85			59			131			50	
Queue Length 95th (ft)		93			84			#325			105	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)												
Base Capacity (vph)		834			856			843			948	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.34			0.24			0.70			0.33	

#### Intersection Summary



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
Timings

Clark Co Study  
2025 PM No Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	181	36	40	153	99	28	257	34	108	148	22
Future Volume (vph)	55	181	36	40	153	99	28	257	34	108	148	22
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.66	0.94	0.62	0.70	0.81	0.75	0.84	0.87	0.75	0.94	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	0%	0%	1%	2%	0%	4%	12%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	251	0	57	321	0	0	373	0	0	334	0
Turn Type	Perm	NA										
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	65.0	65.0		65.0	65.0		50.0	50.0		50.0	50.0	
Total Split (%)	56.5%	56.5%		56.5%	56.5%		43.5%	43.5%		43.5%	43.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	61.0	61.0		61.0	61.0			31.9			31.9	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.31			0.31	
v/c Ratio	0.14	0.23		0.09	0.30			0.70			0.99	
Control Delay	12.2	11.0		11.7	10.9			37.0			79.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.2	11.0		11.7	10.9			37.0			79.6	
LOS	B	B		B	B			D			E	
Approach Delay		11.3			11.0			37.0			79.6	
Approach LOS		B			B			D			E	
Queue Length 50th (ft)	22	65		15	80			207			210	
Queue Length 95th (ft)	42	141		32	149			290			269	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	584	1072		661	1069			765			485	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.14	0.23		0.09	0.30			0.49			0.69	

Intersection Summary

8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
 Timings

Clark Co Study  
 2025 PM No Build

Cycle Length: 115	
Actuated Cycle Length: 102	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 34.1	Intersection LOS: C
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)



3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street  
Timings

Clark Co Study  
2045 AM No Build

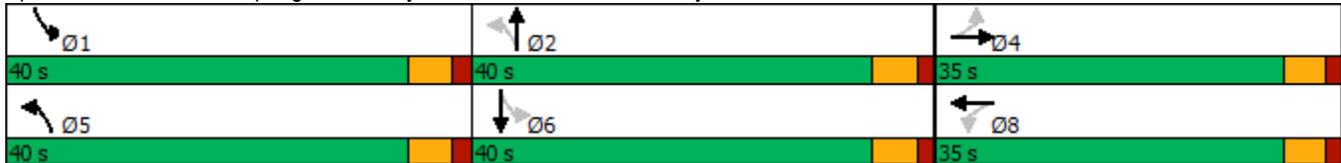
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	68	153	26	59	14	38	133	5	20	364	21
Future Volume (vph)	11	68	153	26	59	14	38	133	5	20	364	21
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.56	0.88	0.85	0.72	0.87	0.60	0.69	0.84	1.00	0.71	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	1%	4%	4%	8%	0%	9%	25%	6%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	277	0	0	127	0	0	218	0	0	523	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.1			5.1			5.5			5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)		12.3			12.3			34.6			34.6	
Actuated g/C Ratio		0.21			0.21			0.60			0.60	
v/c Ratio		0.67			0.42			0.25			0.48	
Control Delay		22.8			22.1			7.0			9.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		22.8			22.1			7.0			9.0	
LOS		C			C			A			A	
Approach Delay		22.8			22.1			7.0			9.0	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		61			35			30			86	
Queue Length 95th (ft)		123			73			67			147	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)												
Base Capacity (vph)		900			734			872			1089	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.31			0.17			0.25			0.48	
Intersection Summary												

### 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street Timings

Clark Co Study  
2045 AM No Build

Cycle Length: 115	
Actuated Cycle Length: 57.6	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 13.4	Intersection LOS: B
Intersection Capacity Utilization 46.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)

Clark Co Study

Timings

2045 AM No Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	157	38	61	213	97	22	97	35	104	259	38
Future Volume (vph)	5	157	38	61	213	97	22	97	35	104	259	38
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.46	0.64	0.40	0.61	0.44	0.59	0.80	0.35	0.43	0.85	0.59
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	7%	0%	4%	9%	9%	11%	13%	3%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	400	0	153	569	0	0	258	0	0	611	0
Turn Type	Perm	NA										
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	60.0	60.0		60.0	60.0		55.0	55.0		55.0	55.0	
Total Split (%)	52.2%	52.2%		52.2%	52.2%		47.8%	47.8%		47.8%	47.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	55.5	55.5		55.5	55.5			50.5			50.5	
Actuated g/C Ratio	0.48	0.48		0.48	0.48			0.44			0.44	
v/c Ratio	0.04	0.47		0.43	0.70			0.39			1.05	
Control Delay	16.4	21.6		24.0	27.3			20.8			82.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	16.4	21.6		24.0	27.3			20.8			82.7	
LOS	B	C		C	C			C			F	
Approach Delay		21.5			26.6			20.8			82.7	
Approach LOS		C			C			C			F	
Queue Length 50th (ft)	4	187		72	299			108			~490	
Queue Length 95th (ft)	8	113		46	231			150			#650	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	242	851		359	812			657			583	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.04	0.47		0.43	0.70			0.39			1.05	

Intersection Summary



3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street  
Timings

Clark Co Study  
2045 PM No Build



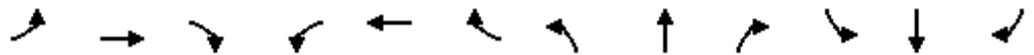
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	24	106	77	18	111	27	195	369	27	33	219	29
Future Volume (vph)	24	106	77	18	111	27	195	369	27	33	219	29
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.53	0.62	0.85	0.67	0.72	0.67	0.94	0.92	0.75	0.66	0.85	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	3%	2%	0%	3%	0%	1%	2%	4%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	307	0	0	221	0	0	644	0	0	350	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.1			5.1			5.5			5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effct Green (s)		16.2			16.2			34.6			34.6	
Actuated g/C Ratio		0.26			0.26			0.56			0.56	
v/c Ratio		0.68			0.48			0.80			0.38	
Control Delay		27.4			21.8			22.0			9.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		27.4			21.8			22.0			9.7	
LOS		C			C			C			A	
Approach Delay		27.4			21.8			22.0			9.7	
Approach LOS		C			C			C			A	
Queue Length 50th (ft)		96			66			168			62	
Queue Length 95th (ft)		101			91			#432			128	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)												
Base Capacity (vph)		813			834			807			910	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.38			0.26			0.80			0.38	

Intersection Summary



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
Timings

Clark Co Study  
2045 PM No Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	198	40	44	168	108	31	282	38	119	162	24
Future Volume (vph)	60	198	40	44	168	108	31	282	38	119	162	24
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.66	0.94	0.62	0.70	0.81	0.75	0.84	0.87	0.75	0.94	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	0%	0%	1%	2%	0%	4%	12%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%				0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	276	0	63	351	0	0	412	0	0	367	0
Turn Type	Perm	NA										
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	65.0	65.0		65.0	65.0		50.0	50.0		50.0	50.0	
Total Split (%)	56.5%	56.5%		56.5%	56.5%		43.5%	43.5%		43.5%	43.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	60.8	60.8		60.8	60.8			37.6			37.6	
Actuated g/C Ratio	0.57	0.57		0.57	0.57			0.35			0.35	
v/c Ratio	0.18	0.27		0.11	0.35			0.69			0.98	
Control Delay	14.4	13.2		13.6	13.2			35.9			75.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	14.4	13.2		13.6	13.2			35.9			75.6	
LOS	B	B		B	B			D			E	
Approach Delay		13.5			13.2			35.9			75.6	
Approach LOS		B			B			D			E	
Queue Length 50th (ft)	31	91		20	114			236			243	
Queue Length 95th (ft)	46	156		35	165			328			307	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	515	1015		593	1014			719			455	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.18	0.27		0.11	0.35			0.57			0.81	

Intersection Summary

8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
 Timings

Clark Co Study  
 2045 PM No Build

Cycle Length: 115	
Actuated Cycle Length: 107.5	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 33.9	Intersection LOS: C
Intersection Capacity Utilization 74.2%	ICU Level of Service D
Analysis Period (min) 15	

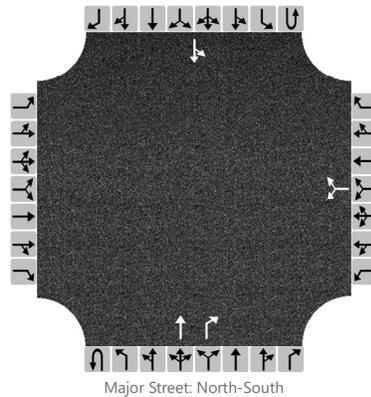
Splits and Phases: 8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)



# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 AM Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 AM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	1	0	0	1	0
Configuration							LR				T	R		LT		
Volume, V (veh/h)						61		0			156	14		2	499	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

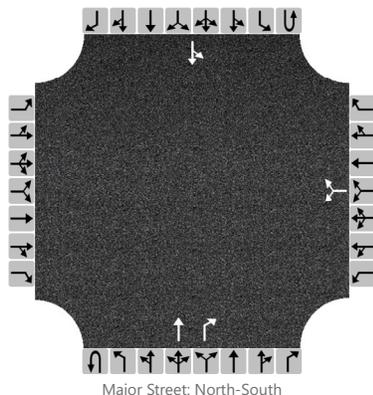
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							66								2	
Capacity, c (veh/h)							395								1382	
v/c Ratio							0.17								0.00	
95% Queue Length, Q <sub>95</sub> (veh)							0.6								0.0	
Control Delay (s/veh)							16.0								7.6	
Level of Service, LOS							C								A	
Approach Delay (s/veh)					16.0								0.0			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 PM Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 PM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0		0	1	1		0	1	0
Configuration							LR				T	R		LT		
Volume, V (veh/h)						18		0			547	63		2	286	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

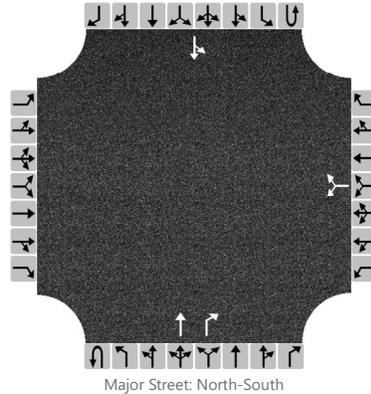
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							20								2	
Capacity, c (veh/h)							303								920	
v/c Ratio							0.06								0.00	
95% Queue Length, Q <sub>95</sub> (veh)							0.2								0.0	
Control Delay (s/veh)							17.7								8.9	
Level of Service, LOS							C								A	
Approach Delay (s/veh)					17.7								0.1			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 AM Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 AM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	1	0	0	1	0
Configuration							LR				T	R		LT		
Volume, V (veh/h)						67		0			171	15		2	547	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

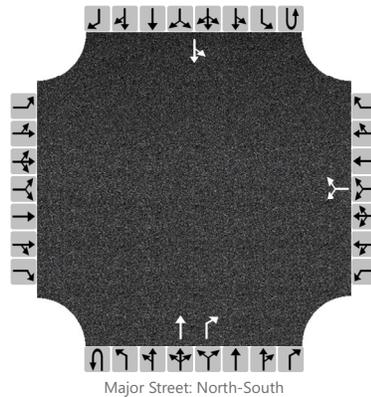
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							73								2	
Capacity, c (veh/h)							359								1362	
v/c Ratio							0.20								0.00	
95% Queue Length, Q <sub>95</sub> (veh)							0.7								0.0	
Control Delay (s/veh)							17.5								7.6	
Level of Service, LOS							C								A	
Approach Delay (s/veh)					17.5								0.0			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & S Union Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Union Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 PM Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 PM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	1	0	0	1	0
Configuration							LR				T	R		LT		
Volume, V (veh/h)						20		0			600	69		2	314	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

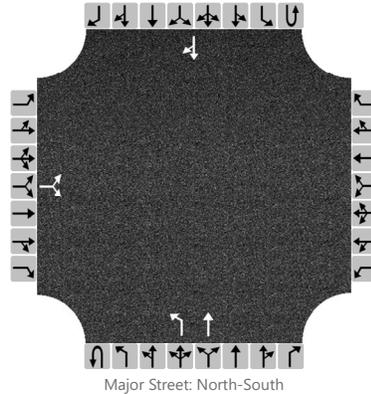
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							22								2	
Capacity, c (veh/h)							268								871	
v/c Ratio							0.08								0.00	
95% Queue Length, Q <sub>95</sub> (veh)							0.3								0.0	
Control Delay (s/veh)							19.6								9.1	
Level of Service, LOS							C								A	
Approach Delay (s/veh)					19.6								0.1			
Approach LOS					C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst				Intersection	Spangler Rd & Schiller Rd		
Agency/Co.	The Mannik & Smith Group			Jurisdiction			
Date Performed	6/16/2020			East/West Street	Schiller Rd		
Analysis Year	2020			North/South Street	Spangler Rd (CR335)		
Time Analyzed	2025 AM Build			Peak Hour Factor	0.92		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	2025 AM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume, V (veh/h)		8		28						12	114				349	3
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

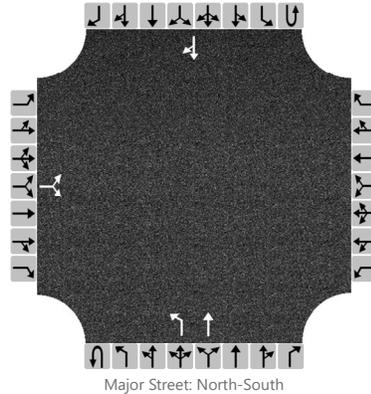
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			39							13						
Capacity, c (veh/h)			619							1169						
v/c Ratio			0.06							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.0						
Control Delay (s/veh)			11.2							8.1						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		11.2								0.8						
Approach LOS		B														

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & Schiller Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Schiller Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2025 PM Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2025 PM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0
Configuration			LR							L	T					TR
Volume, V (veh/h)		12		20						36	349				220	9
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

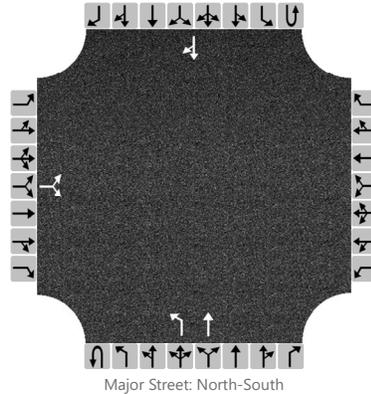
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			35							39						
Capacity, c (veh/h)			572							1309						
v/c Ratio			0.06							0.03						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.1						
Control Delay (s/veh)			11.7							7.8						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		11.7								0.7						
Approach LOS		B														

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & Schiller Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Schiller Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 AM Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 AM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement																	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0	
Configuration			LR							L	T					TR	
Volume, V (veh/h)		8		31						13	125				383	3	
Percent Heavy Vehicles (%)		3		3						3							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized		No					No					No					
Median Type/Storage		Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

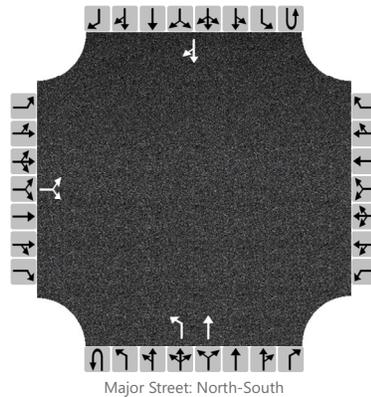
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			42							14						
Capacity, c (veh/h)			590							1133						
v/c Ratio			0.07							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.0						
Control Delay (s/veh)			11.6							8.2						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		11.6										0.8				
Approach LOS		B														

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst		Intersection	Spangler Rd & Schiller Rd				
Agency/Co.	The Mannik & Smith Group	Jurisdiction					
Date Performed	6/16/2020	East/West Street	Schiller Rd				
Analysis Year	2020	North/South Street	Spangler Rd (CR335)				
Time Analyzed	2045 PM Build	Peak Hour Factor	0.92				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	2045 PM Build						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement																	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	0	
Configuration			LR							L	T					TR	
Volume, V (veh/h)		13		22						40	383				241	9	
Percent Heavy Vehicles (%)		3		3						3							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized		No					No					No					
Median Type/Storage		Undivided															

## Critical and Follow-up Headways

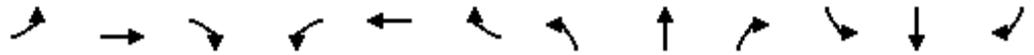
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			38							43						
Capacity, c (veh/h)			536							1284						
v/c Ratio			0.07							0.03						
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.1						
Control Delay (s/veh)			12.2							7.9						
Level of Service, LOS			B							A						
Approach Delay (s/veh)		12.2										0.7				
Approach LOS		B														

3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street  
Timings

Clark Co Study  
2025 AM Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Volume (vph)	10	62	140	24	54	13	34	121	5	18	332	19
Future Volume (vph)	10	62	140	24	54	13	34	121	5	18	332	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.56	0.88	0.85	0.72	0.87	0.60	0.69	0.84	1.00	0.71	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	1%	4%	4%	8%	0%	9%	25%	6%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	253	0	0	117	0	49	149	0	25	451	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.1			5.1		5.5	5.5		5.5	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effect Green (s)		12.9			12.9		41.9	38.4		40.9	35.6	
Actuated g/C Ratio		0.19			0.19		0.62	0.57		0.61	0.53	
v/c Ratio		0.67			0.46		0.08	0.15		0.03	0.46	
Control Delay		27.3			30.0		5.4	10.6		5.3	15.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		27.3			30.0		5.4	10.6		5.3	15.0	
LOS		C			C		A	B		A	B	
Approach Delay		27.3			30.0			9.3			14.5	
Approach LOS		C			C			A			B	
Queue Length 50th (ft)		74			44		6	20		3	137	
Queue Length 95th (ft)		142			87		15	76		10	205	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)							325			175		
Base Capacity (vph)		799			599		1041	981		1040	974	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.32			0.20		0.05	0.15		0.02	0.46	

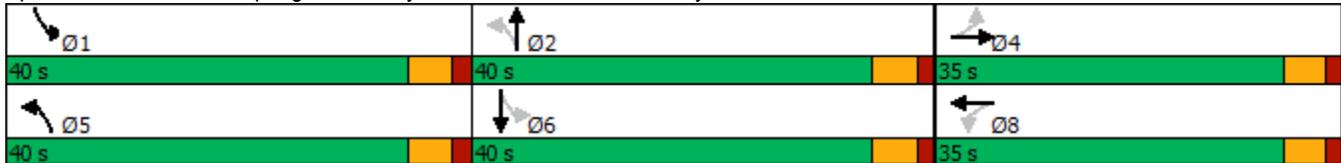
Intersection Summary

### 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street Timings

Clark Co Study  
2025 AM Build

Cycle Length: 115	
Actuated Cycle Length: 67.6	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)

Clark Co Study

2025 AM Build

Timings

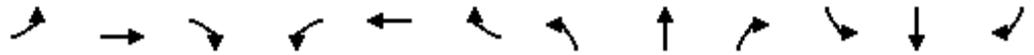
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	143	34	56	194	89	20	89	32	95	236	34
Future Volume (vph)	5	143	34	56	194	89	20	89	32	95	236	34
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.46	0.64	0.40	0.61	0.44	0.59	0.80	0.35	0.43	0.85	0.59
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	7%	0%	4%	9%	9%	11%	13%	3%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	364	0	140	520	0	0	236	0	0	557	0
Turn Type	Perm	NA										
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	60.0	60.0		60.0	60.0		55.0	55.0		55.0	55.0	
Total Split (%)	52.2%	52.2%		52.2%	52.2%		47.8%	47.8%		47.8%	47.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	55.6	55.6		55.6	55.6			48.2			48.2	
Actuated g/C Ratio	0.49	0.49		0.49	0.49			0.43			0.43	
v/c Ratio	0.03	0.42		0.35	0.63			0.36			0.97	
Control Delay	16.2	20.1		21.5	24.1			20.1			61.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	16.2	20.1		21.5	24.1			20.1			61.7	
LOS	B	C		C	C			C			E	
Approach Delay		20.0			23.5			20.1			61.7	
Approach LOS		C			C			C			E	
Queue Length 50th (ft)	4	166		63	260			96			382	
Queue Length 95th (ft)	8	103		42	205			135			#556	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	293	869		401	828			679			605	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.03	0.42		0.35	0.63			0.35			0.92	

Intersection Summary



3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street  
Timings

Clark Co Study  
2025 PM Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Volume (vph)	22	97	70	17	101	25	178	337	25	30	199	26
Future Volume (vph)	22	97	70	17	101	25	178	337	25	30	199	26
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.53	0.62	0.85	0.67	0.72	0.67	0.94	0.92	0.75	0.66	0.85	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	3%	2%	0%	3%	0%	1%	2%	4%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	280	0	0	202	0	189	399	0	45	272	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.1			5.1		5.5	5.5		5.5	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effect Green (s)		18.0			18.0		48.9	42.3		44.8	34.7	
Actuated g/C Ratio		0.23			0.23		0.61	0.53		0.56	0.43	
v/c Ratio		0.74			0.53		0.28	0.41		0.07	0.34	
Control Delay		39.4			31.2		7.9	16.0		7.1	17.4	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		39.4			31.2		7.9	16.0		7.1	17.4	
LOS		D			C		A	B		A	B	
Approach Delay		39.4			31.2			13.4			16.0	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)		120			83		33	132		7	82	
Queue Length 95th (ft)		129			115		77	247		17	161	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)							325			175		
Base Capacity (vph)		617			628		964	974		987	805	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.45			0.32		0.20	0.41		0.05	0.34	

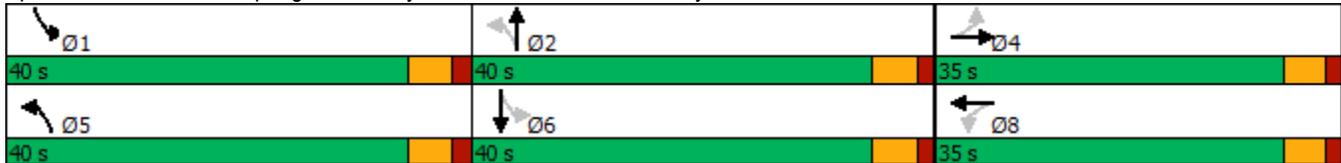
Intersection Summary

### 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street Timings

Clark Co Study  
2025 PM Build

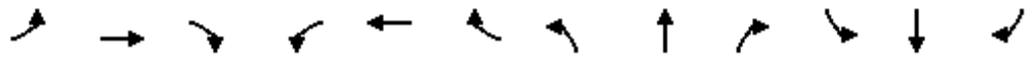
Cycle Length: 115	
Actuated Cycle Length: 79.9	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 21.8	Intersection LOS: C
Intersection Capacity Utilization 55.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
Timings

Clark Co Study  
2025 PM Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	181	36	40	153	99	28	257	34	108	148	22
Future Volume (vph)	55	181	36	40	153	99	28	257	34	108	148	22
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.66	0.94	0.62	0.70	0.81	0.75	0.84	0.87	0.75	0.94	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	0%	0%	1%	2%	0%	4%	12%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%				0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	251	0	57	321	0	0	373	0	0	334	0
Turn Type	Perm	NA										
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	65.0	65.0		65.0	65.0		50.0	50.0		50.0	50.0	
Total Split (%)	56.5%	56.5%		56.5%	56.5%		43.5%	43.5%		43.5%	43.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	61.0	61.0		61.0	61.0			31.9			31.9	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.31			0.31	
v/c Ratio	0.14	0.23		0.09	0.30			0.70			0.99	
Control Delay	12.2	11.0		11.7	10.9			37.0			79.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.2	11.0		11.7	10.9			37.0			79.6	
LOS	B	B		B	B			D			E	
Approach Delay		11.3			11.0			37.0			79.6	
Approach LOS		B			B			D			E	
Queue Length 50th (ft)	22	65		15	80			207			210	
Queue Length 95th (ft)	42	141		32	149			290			269	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	584	1072		661	1069			765			485	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.14	0.23		0.09	0.30			0.49			0.69	

Intersection Summary

8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
 Timings

Clark Co Study  
 2025 PM Build

Cycle Length: 115	
Actuated Cycle Length: 102	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 34.1	Intersection LOS: C
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)



3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street  
Timings

Clark Co Study  
2045 AM Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	68	153	26	59	14	38	133	5	20	364	21
Future Volume (vph)	11	68	153	26	59	14	38	133	5	20	364	21
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.56	0.88	0.85	0.72	0.87	0.60	0.69	0.84	1.00	0.71	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	1%	4%	4%	8%	0%	9%	25%	6%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	277	0	0	127	0	55	163	0	28	495	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.1			5.1		5.5	5.5		5.5	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effect Green (s)		14.3			14.3		41.9	38.4		40.9	35.6	
Actuated g/C Ratio		0.21			0.21		0.61	0.56		0.59	0.52	
v/c Ratio		0.69			0.47		0.09	0.17		0.04	0.52	
Control Delay		28.1			29.7		6.0	11.4		5.8	16.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		28.1			29.7		6.0	11.4		5.8	16.6	
LOS		C			C		A	B		A	B	
Approach Delay		28.1			29.7			10.0			16.0	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		86			49		8	24		4	161	
Queue Length 95th (ft)		159			95		18	85		11	238	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)							325			175		
Base Capacity (vph)		783			578		1012	962		1017	955	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.35			0.22		0.05	0.17		0.03	0.52	

Intersection Summary

### 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street Timings

Clark Co Study  
2045 AM Build

Cycle Length: 115

Actuated Cycle Length: 69

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 19.3

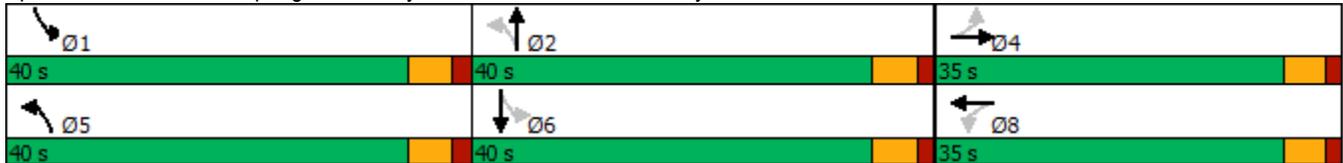
Intersection LOS: B

Intersection Capacity Utilization 55.3%

ICU Level of Service B

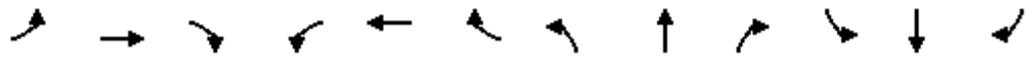
Analysis Period (min) 15

Splits and Phases: 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
Timings

Clark Co Study  
2045 AM Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	157	38	61	213	97	22	97	35	104	259	38
Future Volume (vph)	5	157	38	61	213	97	22	97	35	104	259	38
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.46	0.64	0.40	0.61	0.44	0.59	0.80	0.35	0.43	0.85	0.59
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	7%	0%	4%	9%	9%	11%	13%	3%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	400	0	153	569	0	0	258	0	0	611	0
Turn Type	Perm	NA										
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	60.0	60.0		60.0	60.0		55.0	55.0		55.0	55.0	
Total Split (%)	52.2%	52.2%		52.2%	52.2%		47.8%	47.8%		47.8%	47.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	55.5	55.5		55.5	55.5			50.5			50.5	
Actuated g/C Ratio	0.48	0.48		0.48	0.48			0.44			0.44	
v/c Ratio	0.04	0.47		0.43	0.70			0.39			1.05	
Control Delay	16.4	21.6		24.0	27.3			20.8			82.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	16.4	21.6		24.0	27.3			20.8			82.7	
LOS	B	C		C	C			C			F	
Approach Delay		21.5			26.6			20.8			82.7	
Approach LOS		C			C			C			F	
Queue Length 50th (ft)	4	187		72	299			108			~490	
Queue Length 95th (ft)	8	113		46	231			150			#650	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	242	851		359	812			657			583	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.04	0.47		0.43	0.70			0.39			1.05	

Intersection Summary



3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street  
Timings

Clark Co Study  
2045 PM Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	106	77	18	111	27	195	369	27	33	219	29
Future Volume (vph)	24	106	77	18	111	27	195	369	27	33	219	29
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.53	0.62	0.85	0.67	0.72	0.67	0.94	0.92	0.75	0.66	0.85	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	3%	2%	0%	3%	0%	1%	2%	4%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	307	0	0	221	0	207	437	0	50	300	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.1	23.1		23.1	23.1		23.5	23.5		15.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.4%	30.4%		30.4%	30.4%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.9	3.9		3.9	3.9	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.1			5.1		5.5	5.5		5.5	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Max		None	Max	
Act Effect Green (s)		20.1			20.1		50.0	42.9		44.9	34.8	
Actuated g/C Ratio		0.24			0.24		0.61	0.52		0.54	0.42	
v/c Ratio		0.76			0.54		0.32	0.46		0.08	0.38	
Control Delay		40.0			31.2		9.0	17.7		8.1	19.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		40.0			31.2		9.0	17.7		8.1	19.6	
LOS		D			C		A	B		A	B	
Approach Delay		40.0			31.2			14.9			17.9	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)		135			93		40	158		9	97	
Queue Length 95th (ft)		143			127		91	292		20	192	
Internal Link Dist (ft)		819			914			903			695	
Turn Bay Length (ft)							325			175		
Base Capacity (vph)		596			606		925	956		947	780	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.52			0.36		0.22	0.46		0.05	0.38	

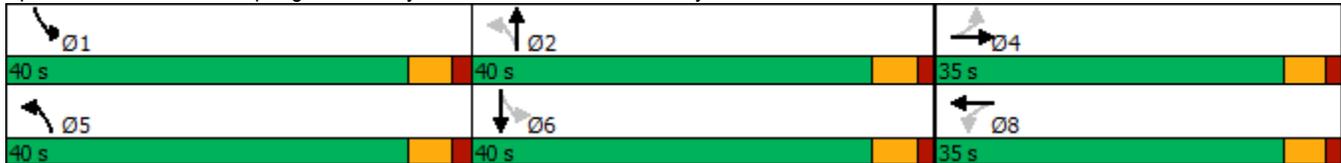
Intersection Summary

### 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street Timings

Clark Co Study  
2045 PM Build

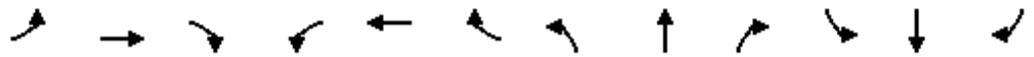
Cycle Length: 115	
Actuated Cycle Length: 82.6	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 23.1	Intersection LOS: C
Intersection Capacity Utilization 58.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Spangler Road/Sycamore Street & Lower Valley Pike/Main Street



8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
Timings

Clark Co Study  
2045 PM Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	198	40	44	168	108	31	282	38	119	162	24
Future Volume (vph)	60	198	40	44	168	108	31	282	38	119	162	24
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.66	0.94	0.62	0.70	0.81	0.75	0.84	0.87	0.75	0.94	0.78	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	0%	0%	1%	2%	0%	4%	12%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	276	0	63	351	0	0	412	0	0	367	0
Turn Type	Perm	NA										
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	65.0	65.0		65.0	65.0		50.0	50.0		50.0	50.0	
Total Split (%)	56.5%	56.5%		56.5%	56.5%		43.5%	43.5%		43.5%	43.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	60.8	60.8		60.8	60.8			37.6			37.6	
Actuated g/C Ratio	0.57	0.57		0.57	0.57			0.35			0.35	
v/c Ratio	0.18	0.27		0.11	0.35			0.69			0.98	
Control Delay	14.4	13.2		13.6	13.2			35.9			75.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	14.4	13.2		13.6	13.2			35.9			75.6	
LOS	B	B		B	B			D			E	
Approach Delay		13.5			13.2			35.9			75.6	
Approach LOS		B			B			D			E	
Queue Length 50th (ft)	31	91		20	114			236			243	
Queue Length 95th (ft)	46	156		35	165			328			307	
Internal Link Dist (ft)		1131			1323			1259			765	
Turn Bay Length (ft)	115			270								
Base Capacity (vph)	515	1015		593	1014			719			455	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.18	0.27		0.11	0.35			0.57			0.81	

Intersection Summary

8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)  
 Timings

Clark Co Study  
 2045 PM Build

Cycle Length: 115	
Actuated Cycle Length: 107.5	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 33.9	Intersection LOS: C
Intersection Capacity Utilization 74.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 8: Medway Carlisle Rd /Medway Carlisle Rd & National Rd (US 40)



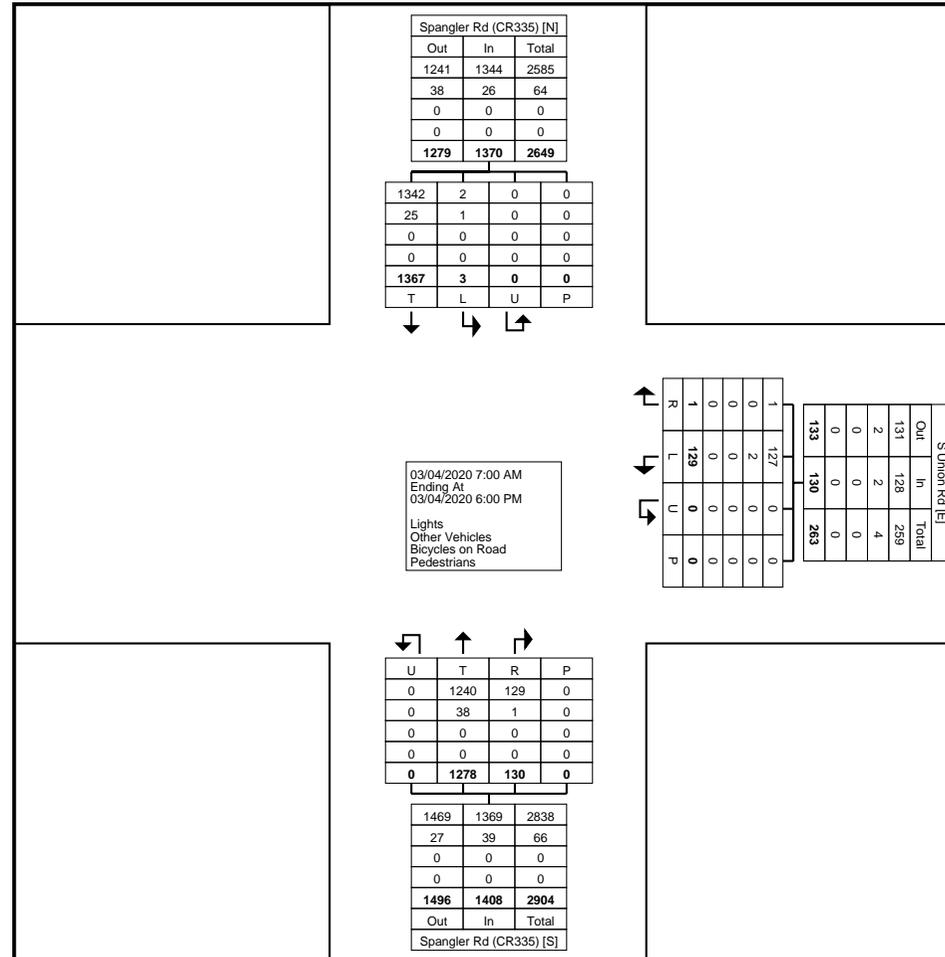




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manksmithgroup.com

Count Name: S Union Rd & Spangler Rd  
(CR335)  
Site Code:  
Start Date: 03/04/2020  
Page No: 2



Turning Movement Data Plot

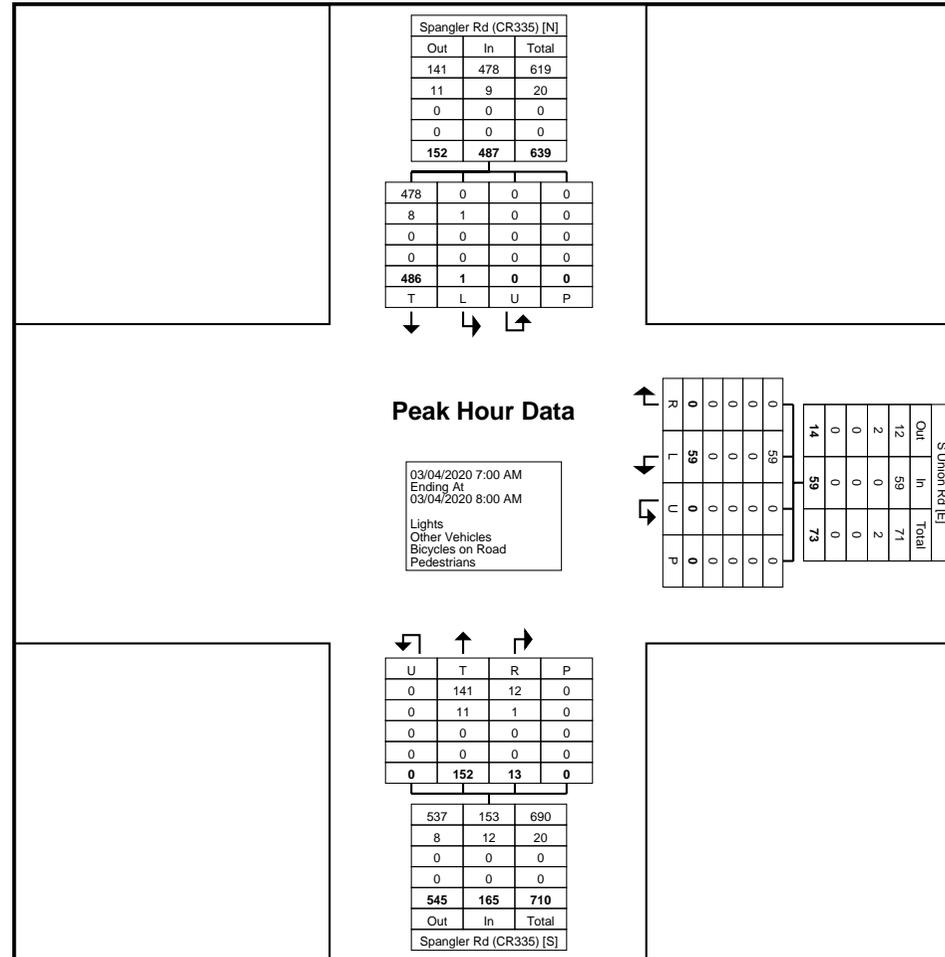




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manniksmithgroup.com

Count Name: S Union Rd & Spangler Rd  
(CR335)  
Site Code:  
Start Date: 03/04/2020  
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)







Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manniksmithgroup.com

Count Name: Main St & Sycamore St (CR335)

Site Code:

Start Date: 03/04/2020

Page No: 1

### Turning Movement Data

Start Time	Sycamore St Southbound						Main St Westbound						Spangler Rd Northbound						Main St Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
12:00 AM	1	1	1	0	0	3	0	2	0	0	0	2	1	1	5	0	0	7	1	3	0	0	0	4	16
12:15 AM	0	1	0	0	0	1	0	1	1	0	0	2	1	2	3	0	0	6	2	0	2	0	0	4	13
12:30 AM	0	0	0	0	0	0	1	1	0	0	0	2	1	1	3	0	0	5	1	0	0	0	0	1	8
12:45 AM	1	1	0	0	0	2	1	2	1	0	0	4	0	3	4	0	0	7	2	0	0	0	0	2	15
Hourly Total	2	3	1	0	0	6	2	6	2	0	0	10	3	7	15	0	0	25	6	3	2	0	0	11	52
1:00 AM	1	0	0	0	0	1	0	0	0	0	0	0	1	1	4	0	0	6	3	1	0	0	0	4	11
1:15 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	2	2	0	0	4	0	0	0	0	0	0	6
1:30 AM	0	2	1	0	0	3	0	2	0	0	0	2	0	0	0	0	0	0	2	1	0	0	0	3	8
1:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	1	0	0	0	0	1	3
Hourly Total	1	2	1	0	0	4	0	4	1	0	0	5	2	3	6	0	0	11	6	2	0	0	0	8	28
2:00 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	2	4	0	0	6	3	2	1	0	0	6	13
2:15 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	2	0	0	0	0	2	4
2:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	5	4	0	0	0	0	4	9
2:45 AM	2	0	0	0	0	2	0	0	0	0	0	0	1	0	1	0	0	2	0	2	0	0	0	2	6
Hourly Total	2	1	0	0	0	3	0	1	0	0	0	1	1	5	8	0	0	14	9	4	1	0	0	14	32
3:00 AM	0	5	0	0	0	5	0	0	1	0	0	1	0	2	1	0	0	3	2	1	1	0	0	4	13
3:15 AM	0	2	0	0	0	2	0	1	0	0	0	1	0	2	0	0	0	2	1	0	0	0	0	1	6
3:30 AM	0	5	1	0	0	6	1	0	1	0	0	2	0	2	2	0	0	4	5	2	0	0	0	7	19
3:45 AM	0	2	0	0	0	2	1	0	2	0	0	3	0	3	0	0	0	3	2	0	0	0	0	2	10
Hourly Total	0	14	1	0	0	15	2	1	4	0	0	7	0	9	3	0	0	12	10	3	1	0	0	14	48
4:00 AM	0	4	0	0	0	4	0	0	1	0	0	1	0	2	0	0	0	2	2	0	1	0	0	3	10
4:15 AM	0	4	0	0	0	4	0	2	1	0	0	3	0	2	1	0	0	3	3	2	0	0	0	5	15
4:30 AM	0	8	1	0	0	9	2	2	0	0	0	4	1	2	0	0	0	3	7	2	0	0	0	9	25
4:45 AM	0	9	0	0	0	9	0	4	1	0	0	5	0	3	0	0	0	3	4	1	0	0	0	5	22
Hourly Total	0	25	1	0	0	26	2	8	3	0	0	13	1	9	1	0	0	11	16	5	1	0	0	22	72
5:00 AM	0	10	1	0	0	11	1	2	0	0	0	3	0	8	0	0	0	8	11	2	0	0	0	13	35
5:15 AM	1	24	1	0	0	26	0	2	4	0	0	6	0	2	2	0	0	4	14	7	1	0	0	22	58
5:30 AM	1	24	0	0	0	25	0	4	4	0	0	8	0	2	4	0	0	6	13	4	1	0	0	18	57
5:45 AM	3	18	2	0	0	23	6	6	4	0	0	16	0	7	3	0	0	10	9	6	1	0	0	16	65
Hourly Total	5	76	4	0	0	85	7	14	12	0	0	33	0	19	9	0	0	28	47	19	3	0	0	69	215
6:00 AM	0	36	0	0	0	36	0	5	1	0	0	6	1	6	0	0	0	7	11	9	1	0	0	21	70
6:15 AM	3	43	3	0	0	49	0	7	5	0	0	12	0	24	2	0	0	26	15	17	4	0	0	36	123
6:30 AM	0	52	1	0	0	53	2	3	6	0	0	11	1	20	3	0	0	24	24	8	1	0	0	33	121
6:45 AM	1	55	3	0	0	59	6	6	8	0	0	20	2	35	8	0	0	45	29	12	7	0	0	48	172
Hourly Total	4	186	7	0	0	197	8	21	20	0	0	49	4	85	13	0	0	102	79	46	13	0	0	138	486

7:00 AM	4	88	6	0	0	98	4	11	3	0	0	18	1	26	8	0	0	35	28	14	4	0	0	46	197
7:15 AM	4	79	6	0	0	89	5	14	8	0	0	27	1	22	4	0	0	27	40	14	2	0	0	56	199
7:30 AM	4	104	3	0	0	111	2	12	8	0	0	22	1	35	9	0	0	45	35	17	2	0	0	54	232
7:45 AM	6	52	2	0	0	60	1	15	4	0	0	20	1	35	12	0	0	48	33	15	1	0	0	49	177
Hourly Total	18	323	17	0	0	358	12	52	23	0	0	87	4	118	33	0	0	155	136	60	9	0	0	205	805
8:00 AM	3	65	6	0	0	74	3	10	3	0	0	16	2	17	5	0	0	24	28	12	2	0	0	42	156
8:15 AM	2	69	6	0	0	77	5	12	7	0	0	24	1	25	11	0	0	37	14	6	2	0	0	22	160
8:30 AM	5	69	9	0	0	83	4	11	6	0	0	21	0	32	11	0	0	43	23	18	1	0	0	42	189
8:45 AM	3	42	7	0	0	52	3	12	4	0	0	19	0	20	9	0	0	29	14	15	3	0	0	32	132
Hourly Total	13	245	28	0	0	286	15	45	20	0	0	80	3	94	36	0	0	133	79	51	8	0	0	138	637
9:00 AM	4	23	2	0	0	29	4	8	4	0	0	16	1	36	12	0	0	49	16	10	3	0	0	29	123
9:15 AM	1	47	3	0	0	51	5	9	2	0	0	16	2	21	11	0	0	34	19	7	5	0	0	31	132
9:30 AM	2	32	3	0	0	37	4	5	2	0	0	11	2	27	14	0	0	43	30	10	3	0	0	43	134
9:45 AM	3	25	2	0	0	30	0	4	2	0	0	6	3	21	16	0	0	40	19	7	4	0	0	30	106
Hourly Total	10	127	10	0	0	147	13	26	10	0	0	49	8	105	53	0	0	166	84	34	15	0	0	133	495
10:00 AM	6	28	3	0	1	37	3	6	2	0	1	11	0	18	11	0	0	29	12	9	2	0	0	23	100
10:15 AM	5	30	4	0	1	39	0	9	5	0	0	14	3	28	16	0	0	47	8	10	0	0	0	18	118
10:30 AM	2	25	1	0	0	28	3	13	0	0	0	16	2	28	13	0	0	43	23	10	3	0	0	36	123
10:45 AM	2	29	5	0	0	36	1	13	1	0	0	15	1	33	13	0	0	47	10	6	6	0	0	22	120
Hourly Total	15	112	13	0	2	140	7	41	8	0	1	56	6	107	53	0	0	166	53	35	11	0	0	99	461
11:00 AM	2	28	1	0	0	31	5	21	3	0	0	29	1	19	16	0	0	36	14	13	5	0	0	32	128
11:15 AM	2	31	6	0	0	39	5	18	2	0	0	25	2	27	14	0	0	43	13	18	2	0	0	33	140
11:30 AM	0	30	4	0	0	34	3	13	0	0	0	16	3	39	17	0	0	59	16	16	2	0	0	34	143
11:45 AM	3	19	2	0	0	24	7	14	2	0	0	23	1	30	23	0	0	54	16	10	2	0	0	28	129
Hourly Total	7	108	13	0	0	128	20	66	7	0	0	93	7	115	70	0	0	192	59	57	11	0	0	127	540
12:00 PM	5	40	2	0	0	47	6	12	1	0	0	19	2	33	13	0	0	48	19	9	3	0	0	31	145
12:15 PM	3	27	7	0	0	37	4	15	0	0	0	19	1	33	17	0	0	51	16	21	2	0	0	39	146
12:30 PM	4	23	2	0	0	29	4	8	4	0	0	16	2	27	20	0	0	49	20	17	3	0	0	40	134
12:45 PM	7	36	2	0	0	45	6	20	3	0	0	29	2	27	15	0	0	44	11	19	2	0	0	32	150
Hourly Total	19	126	13	0	0	158	20	55	8	0	0	83	7	120	65	0	0	192	66	66	10	0	0	142	575
1:00 PM	5	36	1	0	0	42	0	14	1	0	0	15	2	19	24	0	0	45	17	20	6	0	0	43	145
1:15 PM	4	25	5	0	0	34	5	15	4	0	0	24	4	19	13	0	0	36	20	13	6	0	0	39	133
1:30 PM	5	23	2	0	0	30	4	17	0	0	0	21	0	41	11	0	0	52	16	19	8	0	0	43	146
1:45 PM	5	25	4	0	0	34	3	8	2	0	0	13	4	45	22	0	0	71	11	16	7	0	0	34	152
Hourly Total	19	109	12	0	0	140	12	54	7	0	0	73	10	124	70	0	0	204	64	68	27	0	0	159	576
2:00 PM	6	31	8	0	0	45	3	20	4	0	0	27	3	30	15	0	0	48	13	14	8	0	0	35	155
2:15 PM	6	27	6	0	0	39	2	24	2	0	0	28	6	34	33	1	0	74	18	18	9	0	0	45	186
2:30 PM	11	28	12	0	2	51	5	20	0	0	0	25	3	43	28	0	1	74	10	16	5	0	0	31	181
2:45 PM	2	39	5	0	0	46	5	22	1	0	0	28	3	51	35	0	0	89	9	21	9	0	1	39	202
Hourly Total	25	125	31	0	2	181	15	86	7	0	0	108	15	158	111	1	1	285	50	69	31	0	1	150	724
3:00 PM	7	15	10	0	0	32	6	31	2	0	0	39	3	45	15	0	0	63	19	27	7	0	0	53	187
3:15 PM	6	27	7	0	0	40	3	26	3	0	0	32	4	52	36	0	0	92	9	14	6	1	0	30	194
3:30 PM	5	45	8	0	0	58	2	24	4	0	0	30	5	51	33	0	0	89	23	24	8	0	0	55	232
3:45 PM	4	33	6	0	0	43	6	23	3	0	0	32	4	76	27	0	0	107	19	21	10	0	0	50	232
Hourly Total	22	120	31	0	0	173	17	104	12	0	0	133	16	224	111	0	0	351	70	86	31	1	0	188	845
4:00 PM	7	41	5	0	0	53	5	23	3	0	0	31	2	72	32	0	0	106	16	29	4	0	0	49	239
4:15 PM	6	32	2	0	0	40	6	23	2	0	0	31	8	85	31	0	0	124	22	26	9	0	0	57	252
4:30 PM	9	57	10	0	0	76	3	21	2	0	0	26	8	67	36	0	0	111	19	38	10	0	0	67	280
4:45 PM	5	47	3	0	0	55	9	20	3	0	0	32	6	89	46	0	0	141	10	23	2	0	0	35	263
Hourly Total	27	177	20	0	0	224	23	87	10	0	0	120	24	313	145	0	0	482	67	116	25	0	0	208	1034
5:00 PM	6	44	11	0	0	61	8	34	5	0	0	47	3	85	46	0	0	134	20	19	6	0	0	45	287
5:15 PM	5	46	5	0	0	56	4	23	6	0	0	33	7	87	45	0	0	139	19	14	3	0	0	36	264

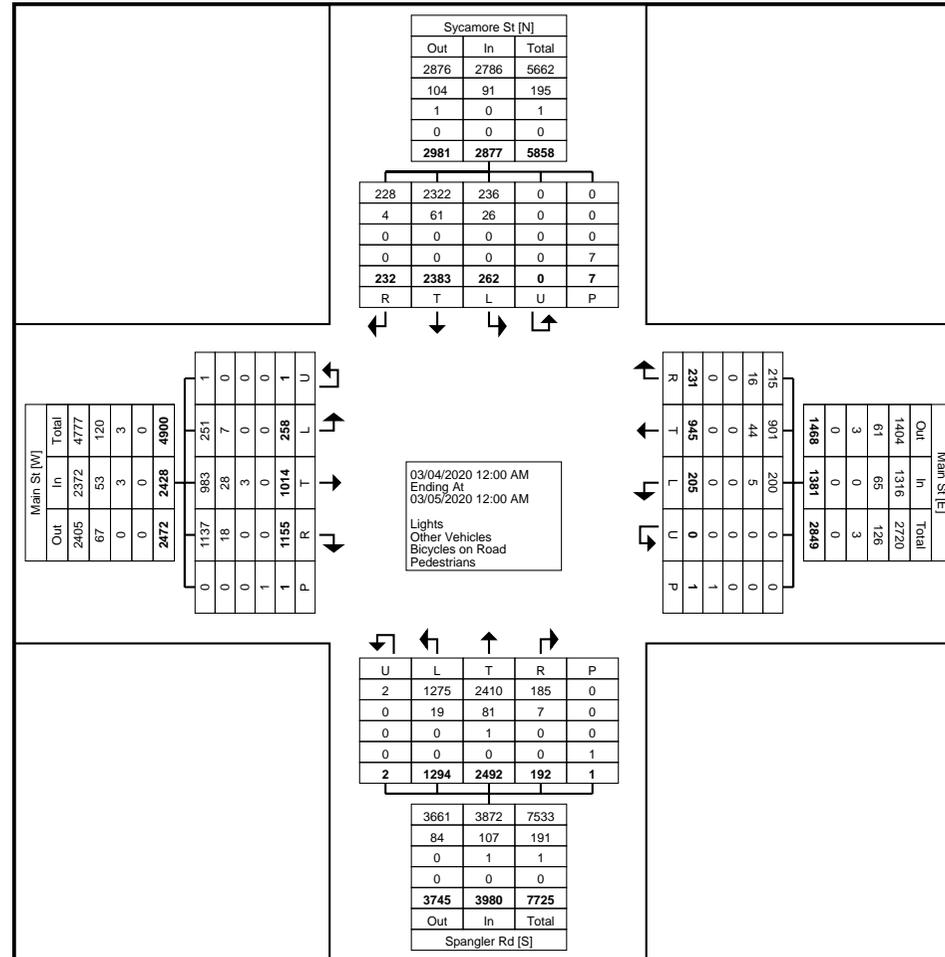
5:30 PM	4	46	5	0	0	55	2	25	3	0	0	30	2	78	40	0	0	120	23	16	2	0	0	41	246
5:45 PM	5	33	2	0	0	40	5	16	5	0	0	26	4	68	34	0	0	106	24	21	3	0	0	48	220
Hourly Total	20	169	23	0	0	212	19	98	19	0	0	136	16	318	165	0	0	499	86	70	14	0	0	170	1017
6:00 PM	2	40	3	0	0	45	2	15	2	0	0	19	2	43	19	0	0	64	16	14	3	0	0	33	161
6:15 PM	4	37	5	0	1	46	3	11	7	0	0	21	4	54	29	0	0	87	14	19	2	0	0	35	189
6:30 PM	1	22	0	0	2	23	4	25	6	0	0	35	2	37	31	0	0	70	15	15	3	0	0	33	161
6:45 PM	3	24	3	0	0	30	2	11	3	0	0	16	5	38	21	0	0	64	15	9	2	0	0	26	136
Hourly Total	10	123	11	0	3	144	11	62	18	0	0	91	13	172	100	0	0	285	60	57	10	0	0	127	647
7:00 PM	2	19	0	0	0	21	0	10	2	0	0	12	4	37	16	0	0	57	10	14	3	0	0	27	117
7:15 PM	1	33	2	0	0	36	0	15	0	0	0	15	3	29	23	0	0	55	4	14	3	0	0	21	127
7:30 PM	0	22	1	0	0	23	2	8	2	0	0	12	6	32	20	0	0	58	16	22	3	0	0	41	134
7:45 PM	0	12	1	0	0	13	1	8	2	0	0	11	2	32	16	0	0	50	11	19	5	0	0	35	109
Hourly Total	3	86	4	0	0	93	3	41	6	0	0	50	15	130	75	0	0	220	41	69	14	0	0	124	487
8:00 PM	1	16	1	0	0	18	0	10	1	0	0	11	10	34	14	0	0	58	7	14	3	0	0	24	111
8:15 PM	2	10	1	0	0	13	3	6	0	0	0	9	4	36	20	0	0	60	5	13	7	0	0	25	107
8:30 PM	1	14	5	0	0	20	3	5	1	0	0	9	2	28	25	0	0	55	3	8	1	0	0	12	96
8:45 PM	0	10	2	0	0	12	2	9	2	0	0	13	4	21	12	0	0	37	4	9	0	0	0	13	75
Hourly Total	4	50	9	0	0	63	8	30	4	0	0	42	20	119	71	0	0	210	19	44	11	0	0	74	389
9:00 PM	0	13	2	0	0	15	1	7	1	0	0	9	3	36	14	0	0	53	5	6	2	0	0	13	90
9:15 PM	2	9	3	0	0	14	1	4	1	0	0	6	4	18	9	0	0	31	7	7	1	0	0	15	66
9:30 PM	0	10	0	0	0	10	6	4	0	0	0	10	0	15	9	0	0	24	5	5	0	0	0	10	54
9:45 PM	0	10	0	0	0	10	3	5	1	0	0	9	4	13	8	0	0	25	5	2	1	0	0	8	52
Hourly Total	2	42	5	0	0	49	11	20	3	0	0	34	11	82	40	0	0	133	22	20	4	0	0	46	262
10:00 PM	2	5	2	0	0	9	2	6	0	0	0	8	0	8	8	0	0	16	9	9	0	0	0	18	51
10:15 PM	1	7	1	0	0	9	0	5	0	0	0	5	1	12	5	1	0	19	5	4	1	0	0	10	43
10:30 PM	1	4	1	0	0	6	0	4	0	0	0	4	0	10	6	0	0	16	2	4	1	0	0	7	33
10:45 PM	0	4	1	0	0	5	2	0	1	0	0	3	2	9	8	0	0	19	1	5	1	0	0	7	34
Hourly Total	4	20	5	0	0	29	4	15	1	0	0	20	3	39	27	1	0	70	17	22	3	0	0	42	161
11:00 PM	0	4	1	0	0	5	0	1	0	0	0	1	0	5	4	0	0	9	2	1	0	0	0	3	18
11:15 PM	0	4	0	0	0	4	0	2	0	0	0	2	1	7	3	0	0	11	2	3	1	0	0	6	23
11:30 PM	0	4	1	0	0	5	0	1	0	0	0	1	0	2	4	0	0	6	4	1	0	0	0	5	17
11:45 PM	0	2	0	0	0	2	0	4	0	0	0	4	2	3	3	0	0	8	1	3	2	0	0	6	20
Hourly Total	0	14	2	0	0	16	0	8	0	0	0	8	3	17	14	0	0	34	9	8	3	0	0	20	78
Grand Total	232	2383	262	0	7	2877	231	945	205	0	1	1381	192	2492	1294	2	1	3980	1155	1014	258	1	1	2428	10666
Approach %	8.1	82.8	9.1	0.0	-	-	16.7	68.4	14.8	0.0	-	-	4.8	62.6	32.5	0.1	-	-	47.6	41.8	10.6	0.0	-	-	-
Total %	2.2	22.3	2.5	0.0	-	27.0	2.2	8.9	1.9	0.0	-	12.9	1.8	23.4	12.1	0.0	-	37.3	10.8	9.5	2.4	0.0	-	22.8	-
Lights	228	2322	236	0	-	2786	215	901	200	0	-	1316	185	2410	1275	2	-	3872	1137	983	251	1	-	2372	10346
% Lights	98.3	97.4	90.1	-	-	96.8	93.1	95.3	97.6	-	-	95.3	96.4	96.7	98.5	100.0	-	97.3	98.4	96.9	97.3	100.0	-	97.7	97.0
Other Vehicles	4	61	26	0	-	91	16	44	5	0	-	65	7	81	19	0	-	107	18	28	7	0	-	53	316
% Other Vehicles	1.7	2.6	9.9	-	-	3.2	6.9	4.7	2.4	-	-	4.7	3.6	3.3	1.5	0.0	-	2.7	1.6	2.8	2.7	0.0	-	2.2	3.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	3	0	0	-	3	4
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.3	0.0	0.0	-	0.1	0.0
Pedestrians	-	-	-	-	7	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manniksmithgroup.com

Count Name: Main St & Sycamore St (CR335)  
Site Code:  
Start Date: 03/04/2020  
Page No: 4



Turning Movement Data Plot







Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manniksmithgroup.com

Count Name: Main St & Sycamore St (CR335)  
Site Code:  
Start Date: 03/04/2020  
Page No: 7

### Turning Movement Peak Hour Data (4:30 PM)

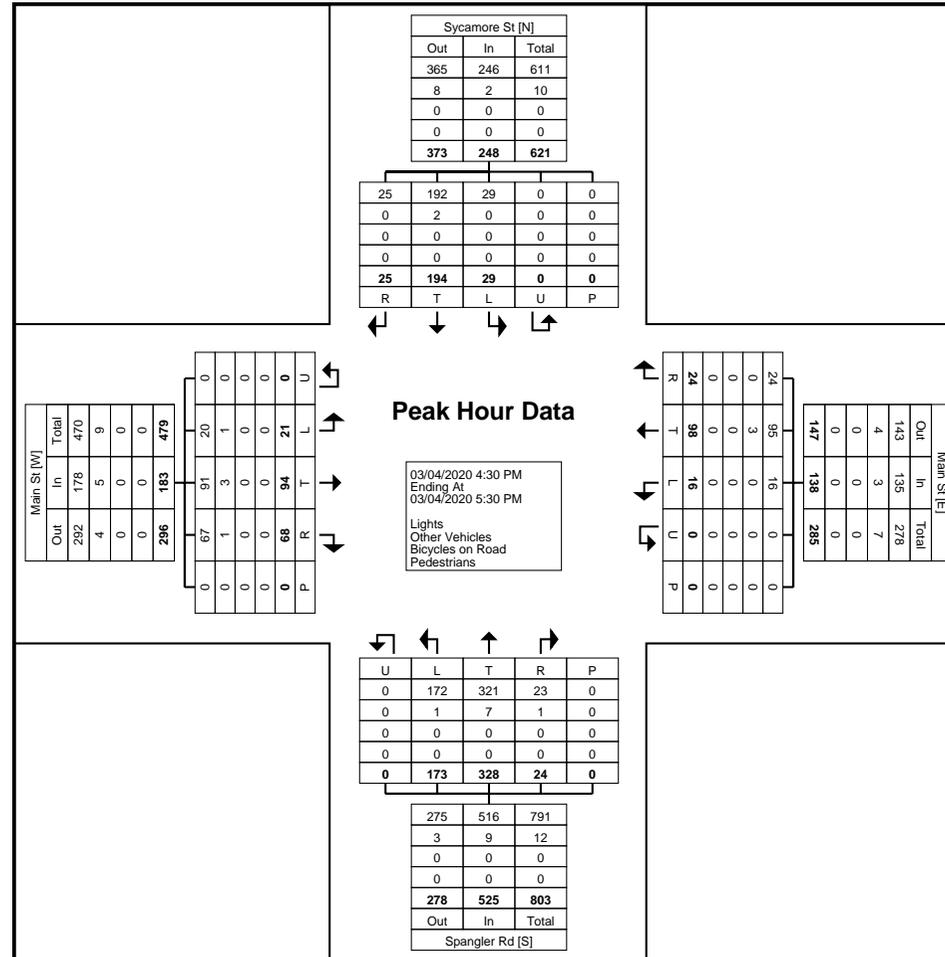
Start Time	Sycamore St Southbound						Main St Westbound						Spangler Rd Northbound						Main St Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:30 PM	9	57	10	0	0	76	3	21	2	0	0	26	8	67	36	0	0	111	19	38	10	0	0	67	280
4:45 PM	5	47	3	0	0	55	9	20	3	0	0	32	6	89	46	0	0	141	10	23	2	0	0	35	263
5:00 PM	6	44	11	0	0	61	8	34	5	0	0	47	3	85	46	0	0	134	20	19	6	0	0	45	287
5:15 PM	5	46	5	0	0	56	4	23	6	0	0	33	7	87	45	0	0	139	19	14	3	0	0	36	264
Total	25	194	29	0	0	248	24	98	16	0	0	138	24	328	173	0	0	525	68	94	21	0	0	183	1094
Approach %	10.1	78.2	11.7	0.0	-	-	17.4	71.0	11.6	0.0	-	-	4.6	62.5	33.0	0.0	-	-	37.2	51.4	11.5	0.0	-	-	-
Total %	2.3	17.7	2.7	0.0	-	22.7	2.2	9.0	1.5	0.0	-	12.6	2.2	30.0	15.8	0.0	-	48.0	6.2	8.6	1.9	0.0	-	16.7	-
PHF	0.694	0.851	0.659	0.000	-	0.816	0.667	0.721	0.667	0.000	-	0.734	0.750	0.921	0.940	0.000	-	0.931	0.850	0.618	0.525	0.000	-	0.683	0.953
Lights	25	192	29	0	-	246	24	95	16	0	-	135	23	321	172	0	-	516	67	91	20	0	-	178	1075
% Lights	100.0	99.0	100.0	-	-	99.2	100.0	96.9	100.0	-	-	97.8	95.8	97.9	99.4	-	-	98.3	98.5	96.8	95.2	-	-	97.3	98.3
Other Vehicles	0	2	0	0	-	2	0	3	0	0	-	3	1	7	1	0	-	9	1	3	1	0	-	5	19
% Other Vehicles	0.0	1.0	0.0	-	-	0.8	0.0	3.1	0.0	-	-	2.2	4.2	2.1	0.6	-	-	1.7	1.5	3.2	4.8	-	-	2.7	1.7
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mannik & Smith Group (OH)  
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Count Name: Main St & Sycamore St (CR335)  
Site Code:  
Start Date: 03/04/2020  
Page No: 8



Turning Movement Peak Hour Data Plot (4:30 PM)

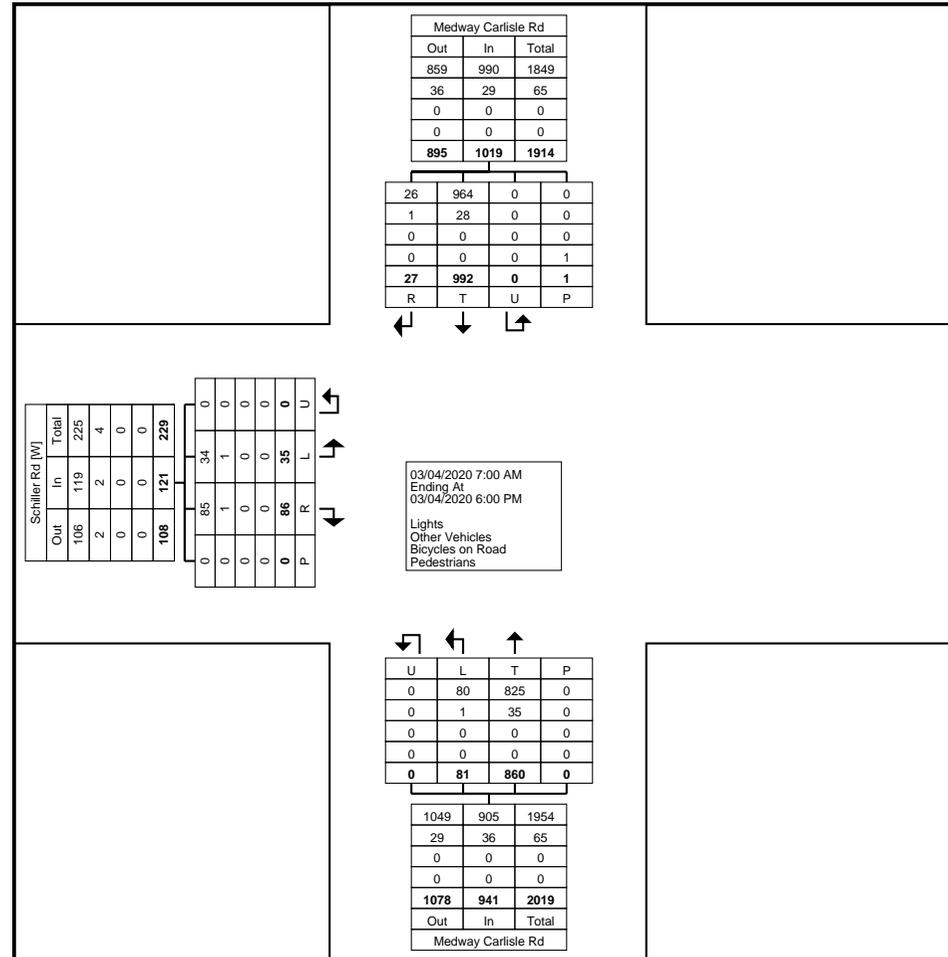




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manna-smithgroup.com

Count Name: Schiller Rd & Medway Carlisle Rd  
(CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 2



Turning Movement Data Plot

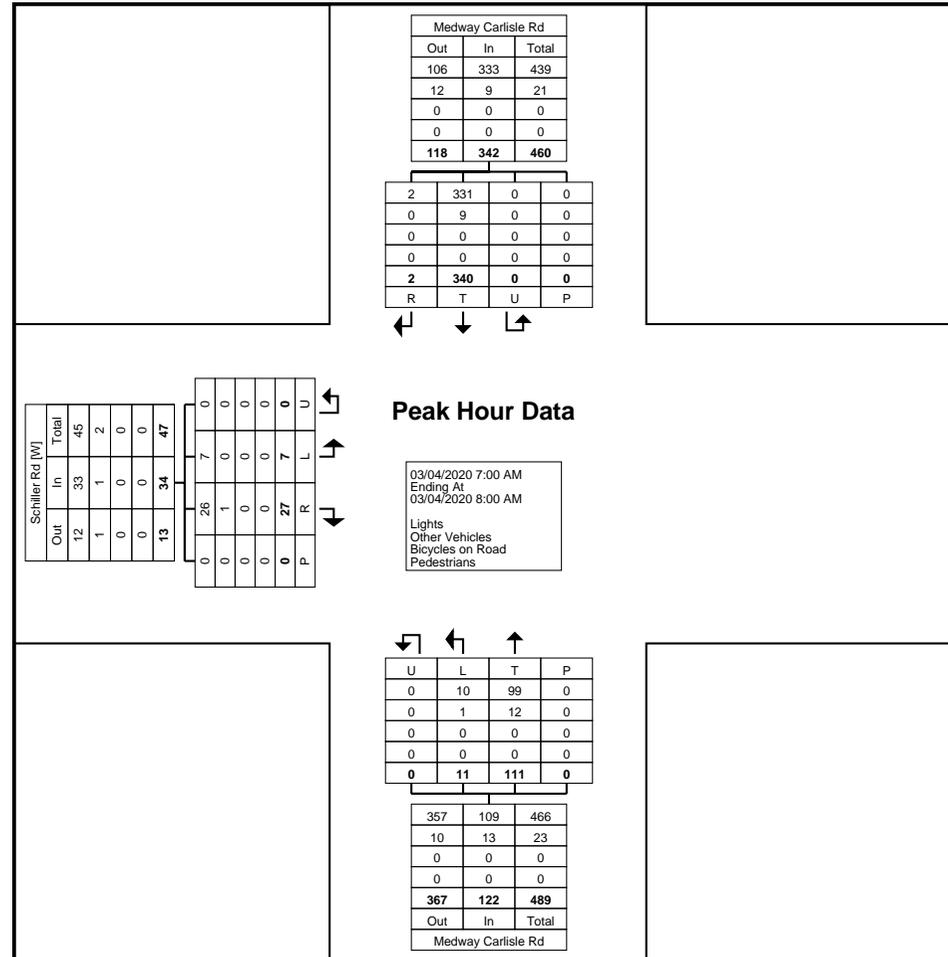




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manniksmithgroup.com

Count Name: Schiller Rd & Medway Carlisle Rd  
(CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)

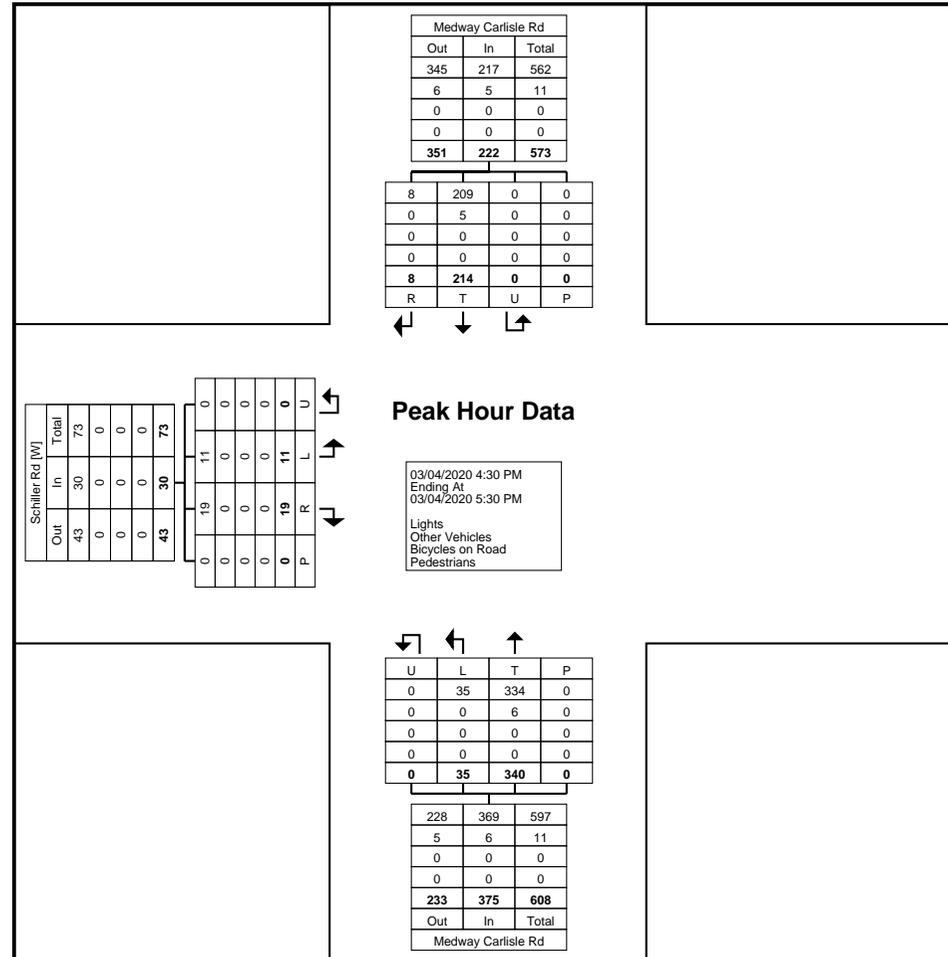




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manksmithgroup.com

Count Name: Schiller Rd & Medway Carlisle Rd  
(CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 6



Turning Movement Peak Hour Data Plot (4:30 PM)

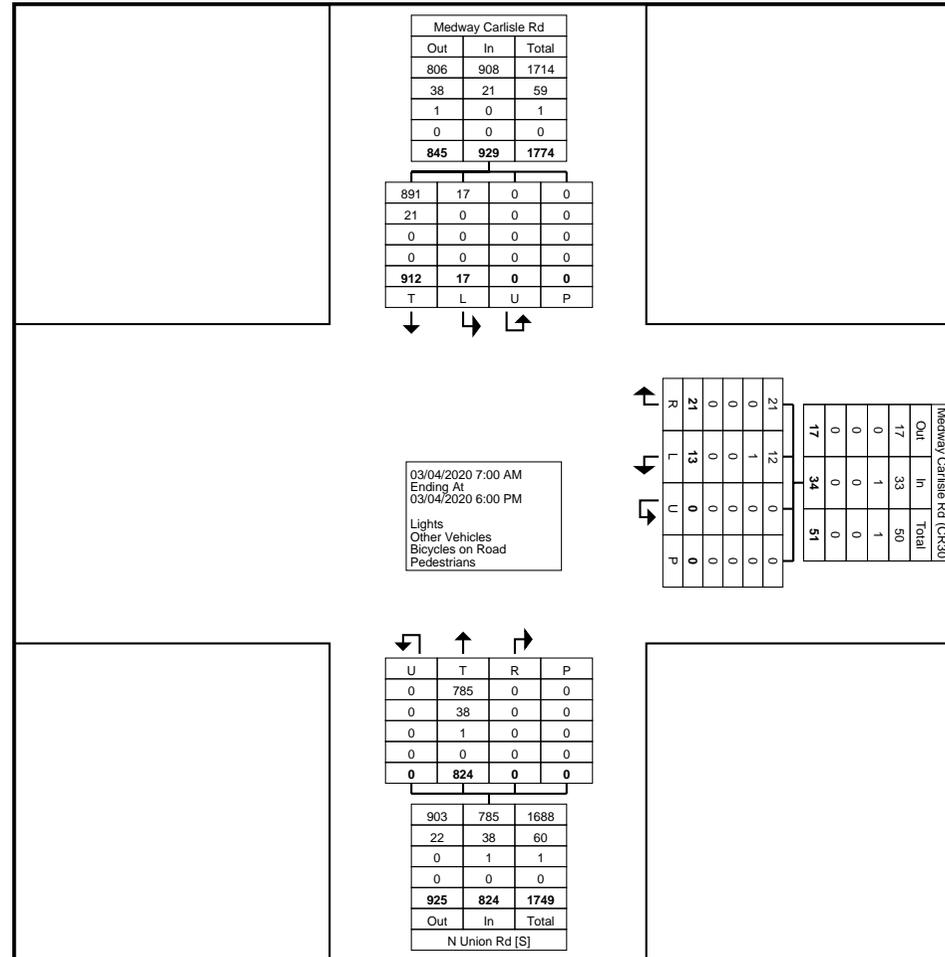




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manniksmithgroup.com

Count Name: N Union Rd & Medway Carlisle Rd  
(CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 2



Turning Movement Data Plot

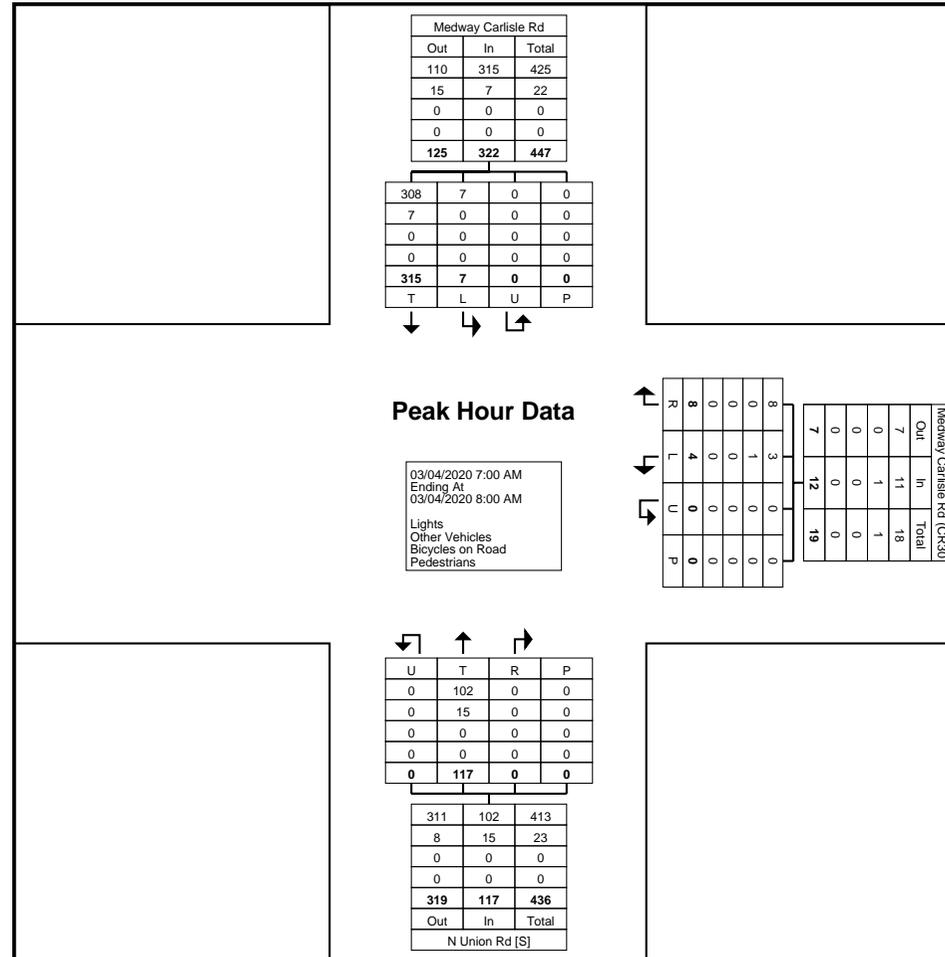




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

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Count Name: N Union Rd & Medway Carlisle Rd  
(CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)

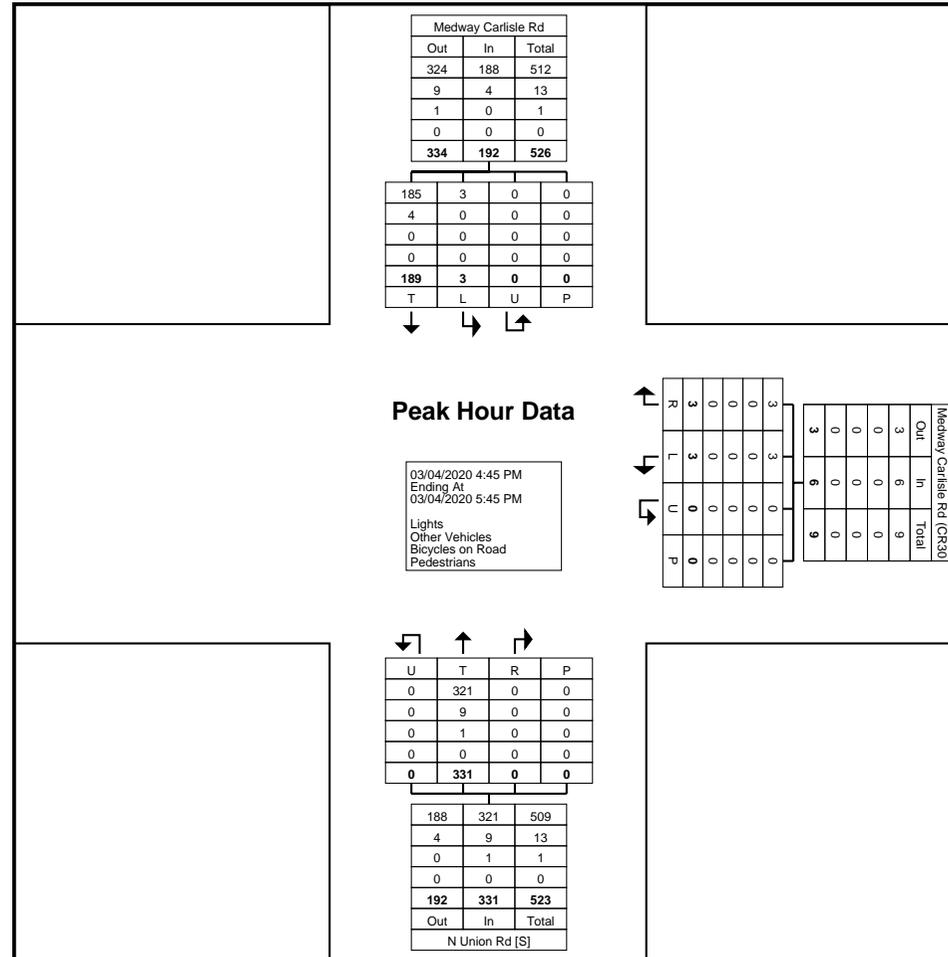




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manniksmithgroup.com

Count Name: N Union Rd & Medway Carlisle Rd  
(CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 6



Turning Movement Peak Hour Data Plot (4:45 PM)



Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@mannaiksmithgroup.com

Count Name: National Rd (US40) & Medway  
Carlisle Rd (CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 1

### Turning Movement Data

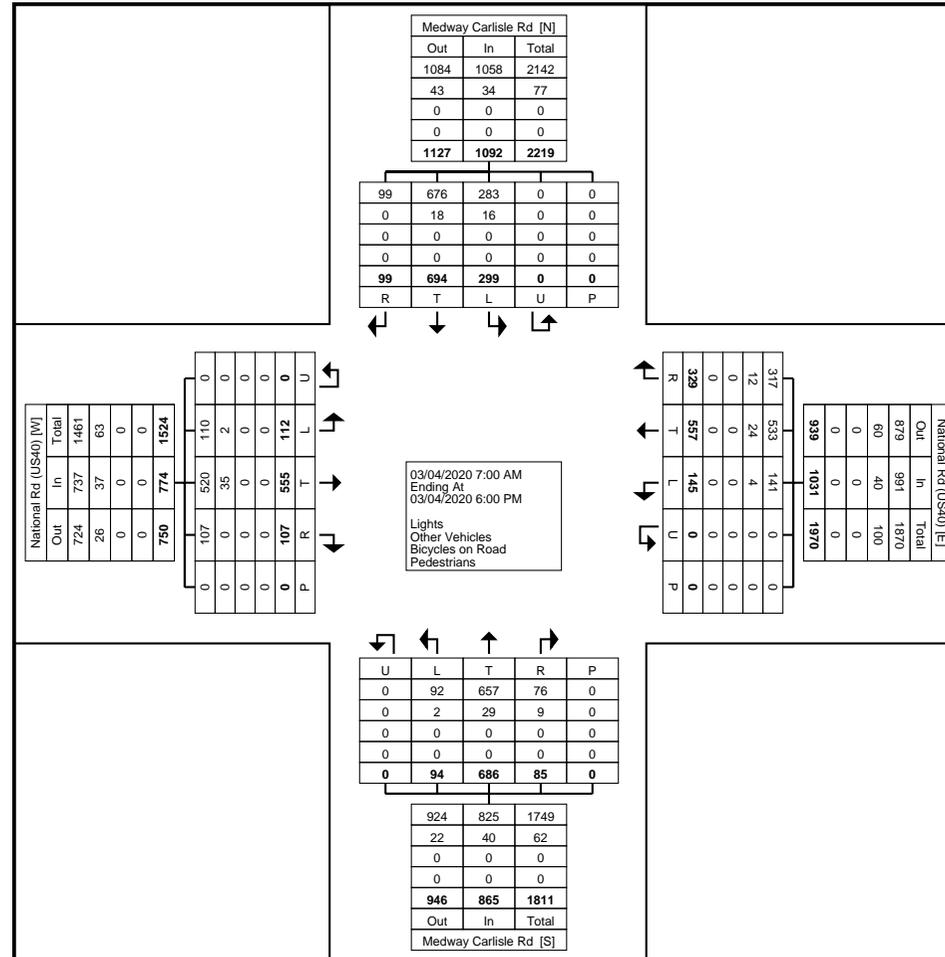
Start Time	Medway Carlisle Rd Southbound						National Rd (US40) Westbound						Medway Carlisle Rd Northbound						National Rd (US40) Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:00 AM	5	58	53	0	0	116	49	77	34	0	0	160	22	18	8	0	0	48	6	75	2	0	0	83	407
7:15 AM	7	59	16	0	0	82	17	43	14	0	0	74	5	19	2	0	0	26	13	19	1	0	0	33	215
7:30 AM	7	68	15	0	0	90	9	36	4	0	0	49	2	22	6	0	0	30	8	23	1	0	0	32	201
7:45 AM	14	45	8	0	0	67	11	33	2	0	0	46	2	27	3	0	0	32	6	22	0	0	0	28	173
Hourly Total	33	230	92	0	0	355	86	189	54	0	0	329	31	86	19	0	0	136	33	139	4	0	0	176	996
8:00 AM	8	60	12	0	0	80	11	30	6	0	0	47	0	13	5	0	0	18	6	20	1	0	0	27	172
8:15 AM	4	54	13	0	0	71	15	33	6	0	0	54	5	22	5	0	0	32	5	30	2	0	0	37	194
8:30 AM	10	51	13	0	0	74	12	34	11	0	0	57	2	23	6	0	0	31	2	26	1	0	0	29	191
8:45 AM	3	33	6	0	0	42	13	23	7	0	0	43	0	18	5	0	0	23	7	14	4	0	0	25	133
Hourly Total	25	198	44	0	0	267	51	120	30	0	0	201	7	76	21	0	0	104	20	90	8	0	0	118	690
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	5	24	18	0	0	47	25	26	6	0	0	57	5	66	7	0	0	78	7	53	11	0	0	71	253
4:15 PM	5	32	28	0	0	65	19	27	6	0	0	52	11	68	8	0	0	87	7	41	6	0	0	54	258
4:30 PM	7	31	26	0	0	64	28	46	14	0	0	88	6	48	8	0	0	62	9	47	10	0	0	66	280
4:45 PM	5	46	26	0	0	77	32	44	11	0	0	87	10	62	4	0	0	76	5	45	17	0	0	67	307
Hourly Total	22	133	98	0	0	253	104	143	37	0	0	284	32	244	27	0	0	303	28	186	44	0	0	258	1098
5:00 PM	4	35	25	0	0	64	17	32	8	0	0	57	6	72	7	0	0	85	14	43	20	0	0	77	283
5:15 PM	7	32	8	0	0	47	32	28	4	0	0	64	3	72	9	0	0	84	3	35	8	0	0	46	241
5:30 PM	4	36	17	0	0	57	22	19	7	0	0	48	1	75	6	0	0	82	8	33	12	0	0	53	240
5:45 PM	4	30	15	0	0	49	17	26	5	0	0	48	5	61	5	0	0	71	1	29	16	0	0	46	214
Hourly Total	19	133	65	0	0	217	88	105	24	0	0	217	15	280	27	0	0	322	26	140	56	0	0	222	978
Grand Total	99	694	299	0	0	1092	329	557	145	0	0	1031	85	686	94	0	0	865	107	555	112	0	0	774	3762
Approach %	9.1	63.6	27.4	0.0	-	-	31.9	54.0	14.1	0.0	-	-	9.8	79.3	10.9	0.0	-	-	13.8	71.7	14.5	0.0	-	-	-
Total %	2.6	18.4	7.9	0.0	-	29.0	8.7	14.8	3.9	0.0	-	27.4	2.3	18.2	2.5	0.0	-	23.0	2.8	14.8	3.0	0.0	-	20.6	-
Lights	99	676	283	0	-	1058	317	533	141	0	-	991	76	657	92	0	-	825	107	520	110	0	-	737	3611
% Lights	100.0	97.4	94.6	-	-	96.9	96.4	95.7	97.2	-	-	96.1	89.4	95.8	97.9	-	-	95.4	100.0	93.7	98.2	-	-	95.2	96.0
Other Vehicles	0	18	16	0	-	34	12	24	4	0	-	40	9	29	2	0	-	40	0	35	2	0	-	37	151
% Other Vehicles	0.0	2.6	5.4	-	-	3.1	3.6	4.3	2.8	-	-	3.9	10.6	4.2	2.1	-	-	4.6	0.0	6.3	1.8	-	-	4.8	4.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mannik & Smith Group (OH)  
1800 Indian Wood Circle

Maumee, Ohio, United States 43537  
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Count Name: National Rd (US40) & Medway  
Carlisle Rd (CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 2



Turning Movement Data Plot



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1800 Indian Wood Circle

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Count Name: National Rd (US40) & Medway  
Carlisle Rd (CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 3

### Turning Movement Peak Hour Data (7:00 AM)

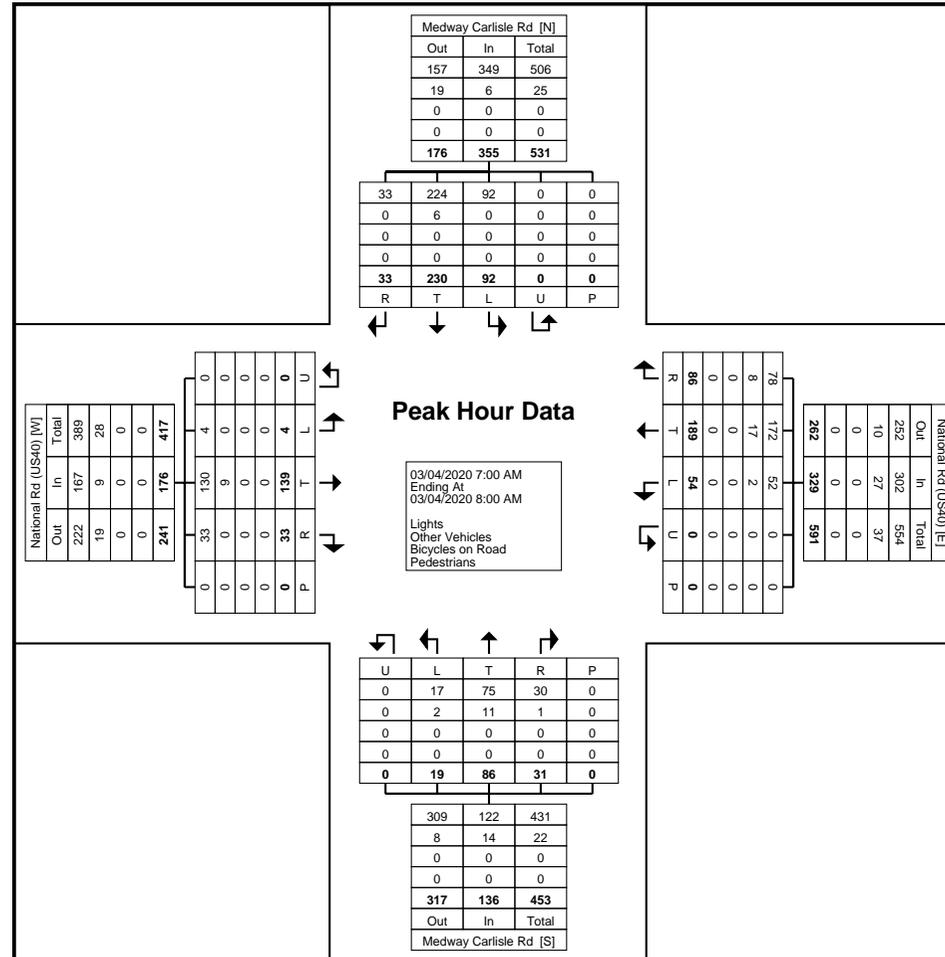
Start Time	Medway Carlisle Rd Southbound						National Rd (US40) Westbound						Medway Carlisle Rd Northbound						National Rd (US40) Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:00 AM	5	58	53	0	0	116	49	77	34	0	0	160	22	18	8	0	0	48	6	75	2	0	0	83	407
7:15 AM	7	59	16	0	0	82	17	43	14	0	0	74	5	19	2	0	0	26	13	19	1	0	0	33	215
7:30 AM	7	68	15	0	0	90	9	36	4	0	0	49	2	22	6	0	0	30	8	23	1	0	0	32	201
7:45 AM	14	45	8	0	0	67	11	33	2	0	0	46	2	27	3	0	0	32	6	22	0	0	0	28	173
<b>Total</b>	<b>33</b>	<b>230</b>	<b>92</b>	<b>0</b>	<b>0</b>	<b>355</b>	<b>86</b>	<b>189</b>	<b>54</b>	<b>0</b>	<b>0</b>	<b>329</b>	<b>31</b>	<b>86</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>136</b>	<b>33</b>	<b>139</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>176</b>	<b>996</b>
Approach %	9.3	64.8	25.9	0.0	-	-	26.1	57.4	16.4	0.0	-	-	22.8	63.2	14.0	0.0	-	-	18.8	79.0	2.3	0.0	-	-	-
Total %	3.3	23.1	9.2	0.0	-	35.6	8.6	19.0	5.4	0.0	-	33.0	3.1	8.6	1.9	0.0	-	13.7	3.3	14.0	0.4	0.0	-	17.7	-
PHF	0.589	0.846	0.434	0.000	-	0.765	0.439	0.614	0.397	0.000	-	0.514	0.352	0.796	0.594	0.000	-	0.708	0.635	0.463	0.500	0.000	-	0.530	0.612
Lights	33	224	92	0	-	349	78	172	52	0	-	302	30	75	17	0	-	122	33	130	4	0	-	167	940
% Lights	100.0	97.4	100.0	-	-	98.3	90.7	91.0	96.3	-	-	91.8	96.8	87.2	89.5	-	-	89.7	100.0	93.5	100.0	-	-	94.9	94.4
Other Vehicles	0	6	0	0	-	6	8	17	2	0	-	27	1	11	2	0	-	14	0	9	0	0	-	9	56
% Other Vehicles	0.0	2.6	0.0	-	-	1.7	9.3	9.0	3.7	-	-	8.2	3.2	12.8	10.5	-	-	10.3	0.0	6.5	0.0	-	-	5.1	5.6
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Mannik & Smith Group (OH)  
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Maumee, Ohio, United States 43537  
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Count Name: National Rd (US40) & Medway  
Carlisle Rd (CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)

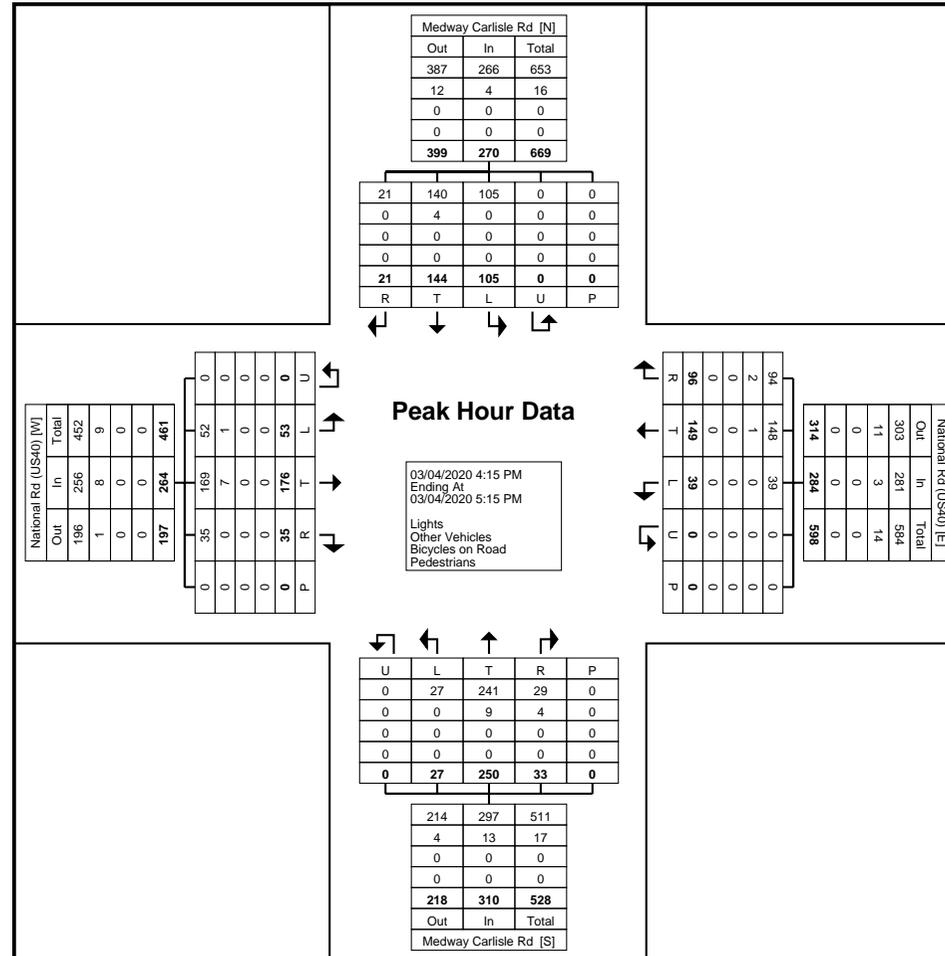




Mannik & Smith Group (OH)  
1800 Indian Wood Circle

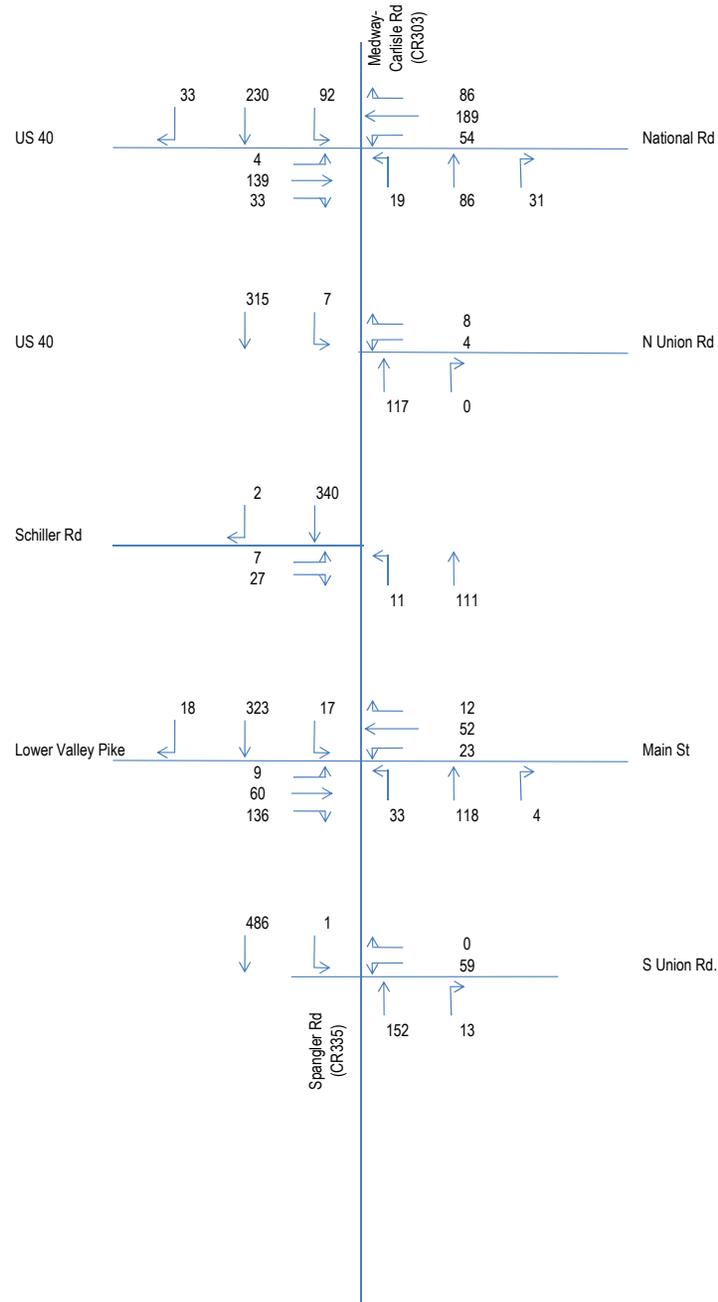
Maumee, Ohio, United States 43537  
(419) 891-2222 ncarter@manksmithgroup.com

Count Name: National Rd (US40) & Medway  
Carlisle Rd (CR303)  
Site Code:  
Start Date: 03/04/2020  
Page No: 6

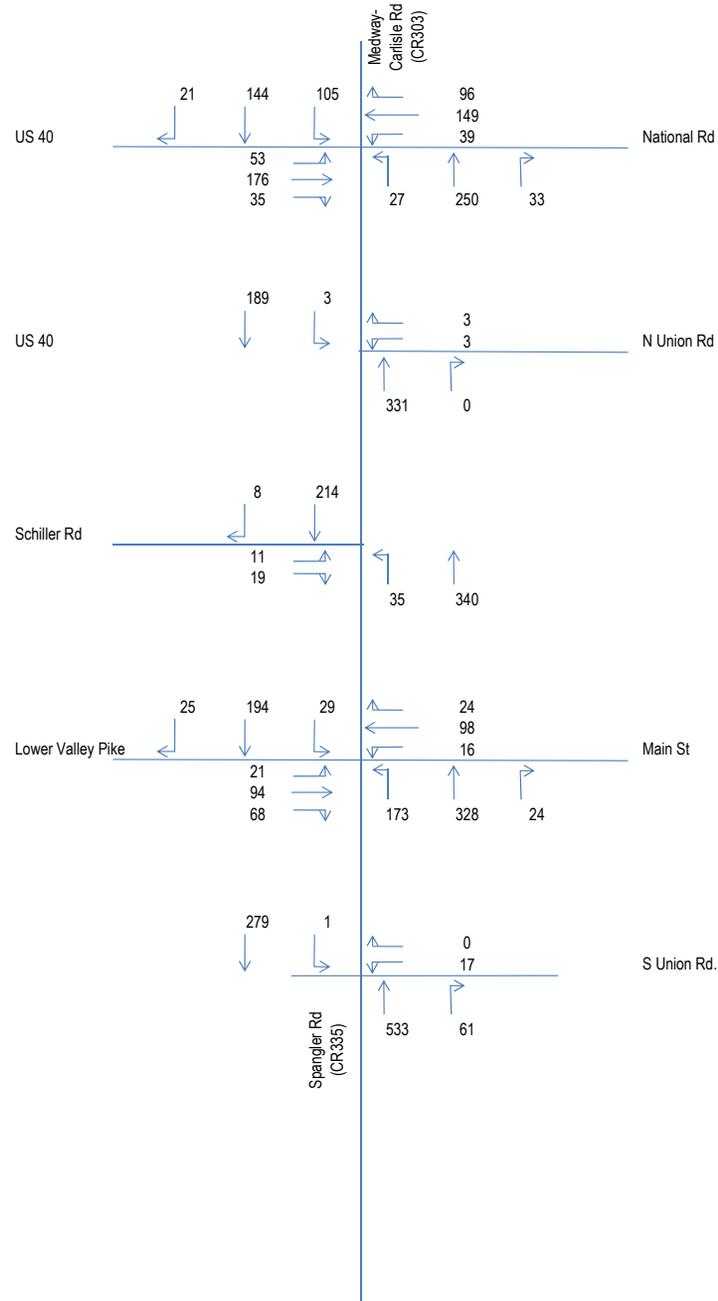


Turning Movement Peak Hour Data Plot (4:15 PM)

# AM Existing 2020 Traffic Volumes



# PM Existing 2020 Traffic Volumes

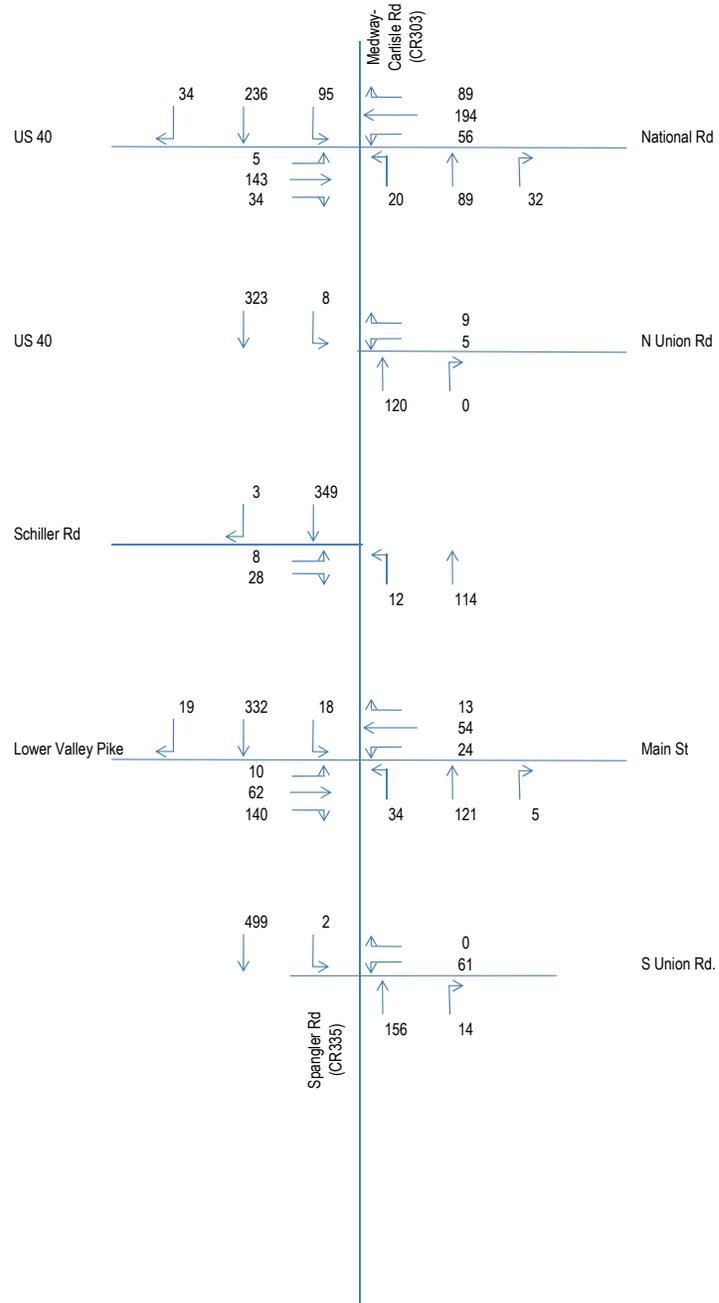


# AM 2025 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

↑  
North

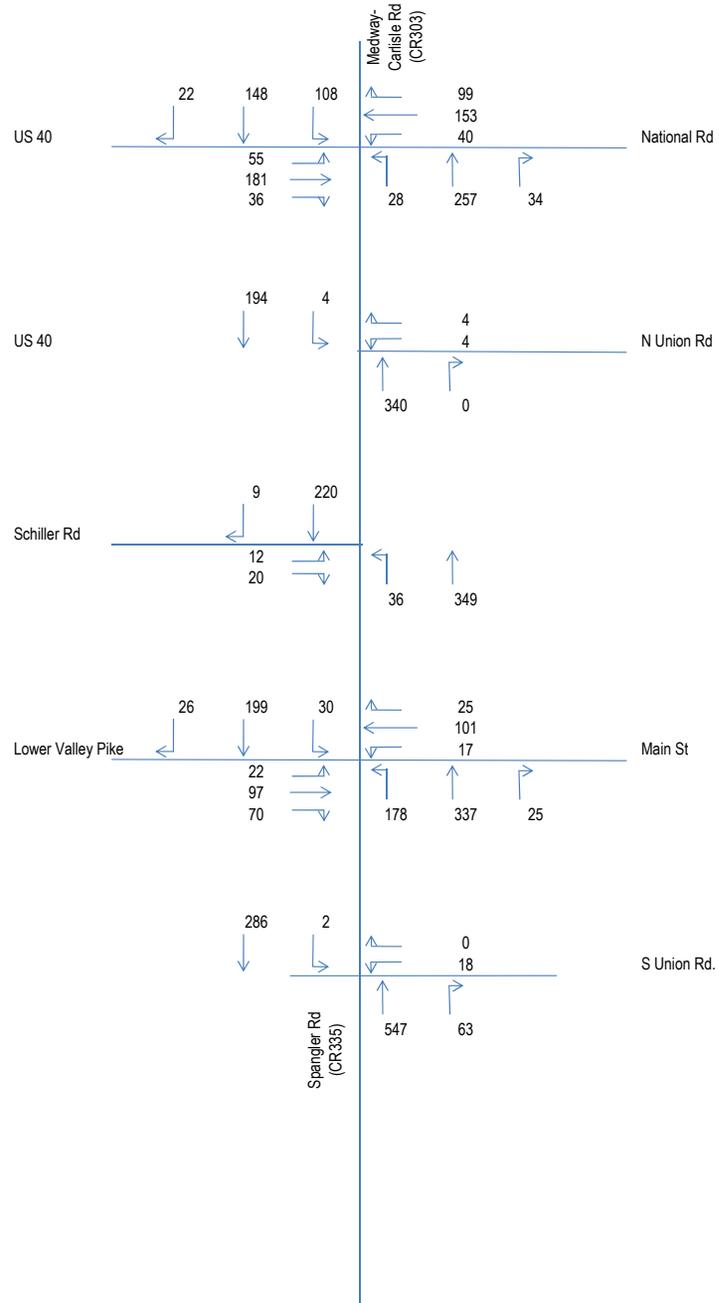


# PM 2025 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

↑  
North

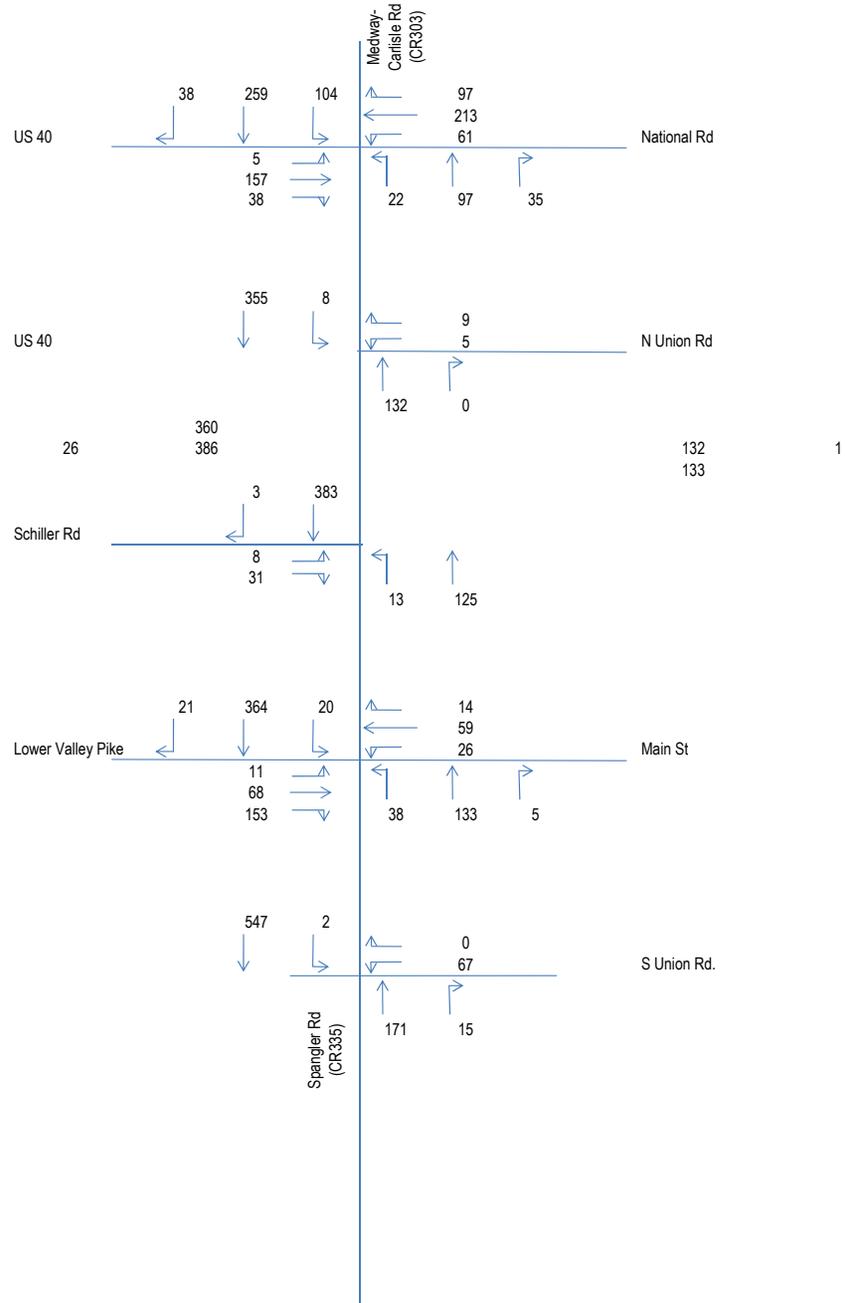


# AM 2045 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

↑  
North

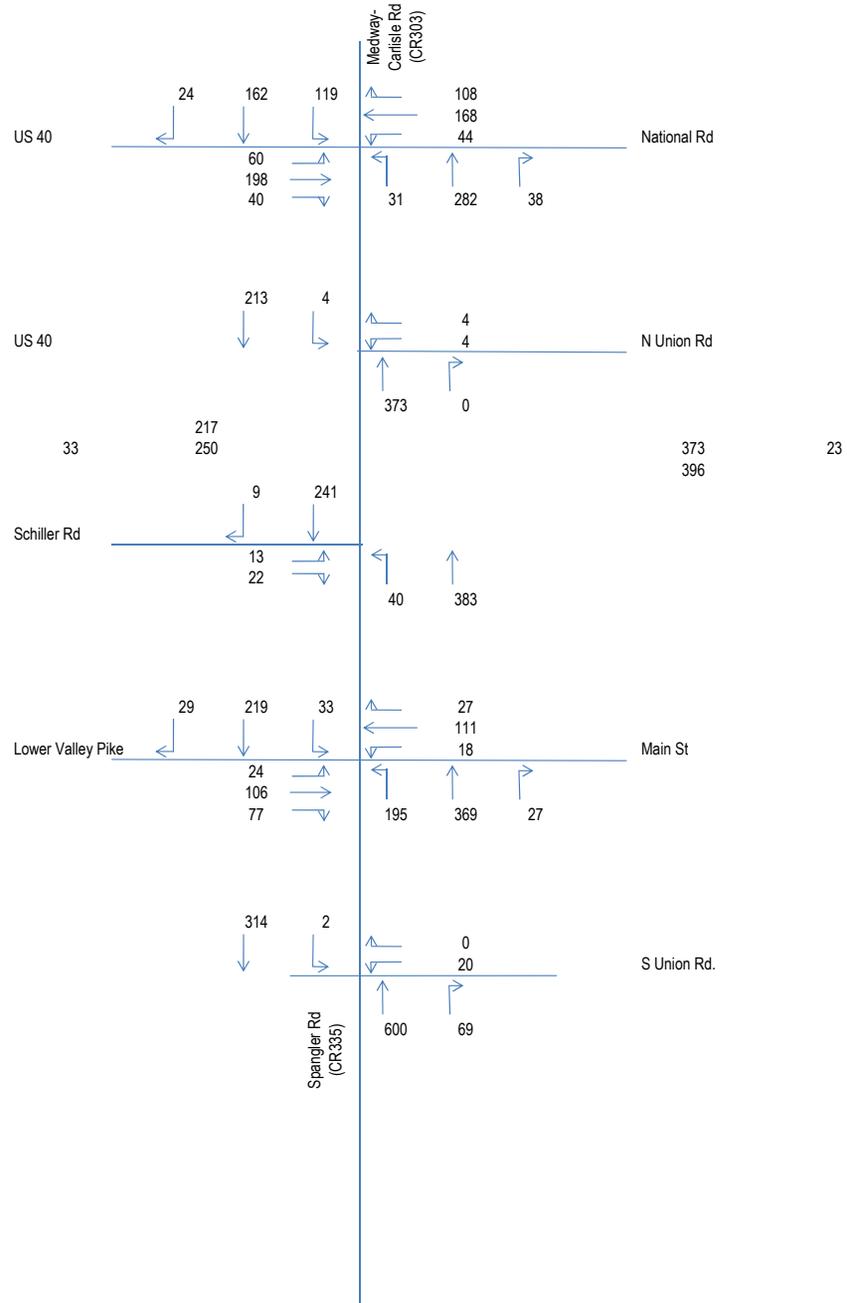


# PM 2045 Traffic Volumes

Growth Rate 0.5% per year

2025 1.03  
2045 1.13

↑  
North

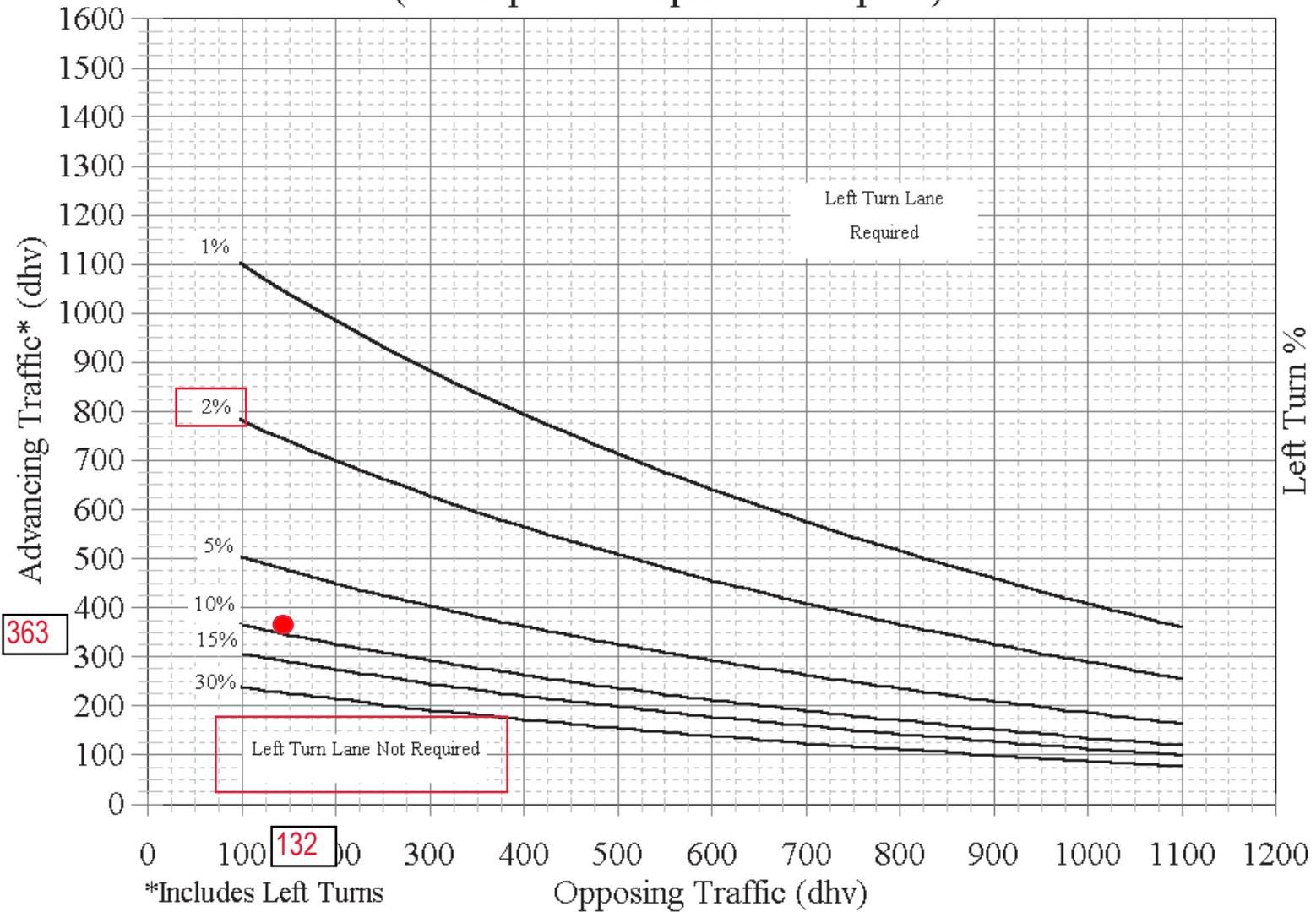


APPENDIX B  
SUPPLEMENTAL INFORMATION



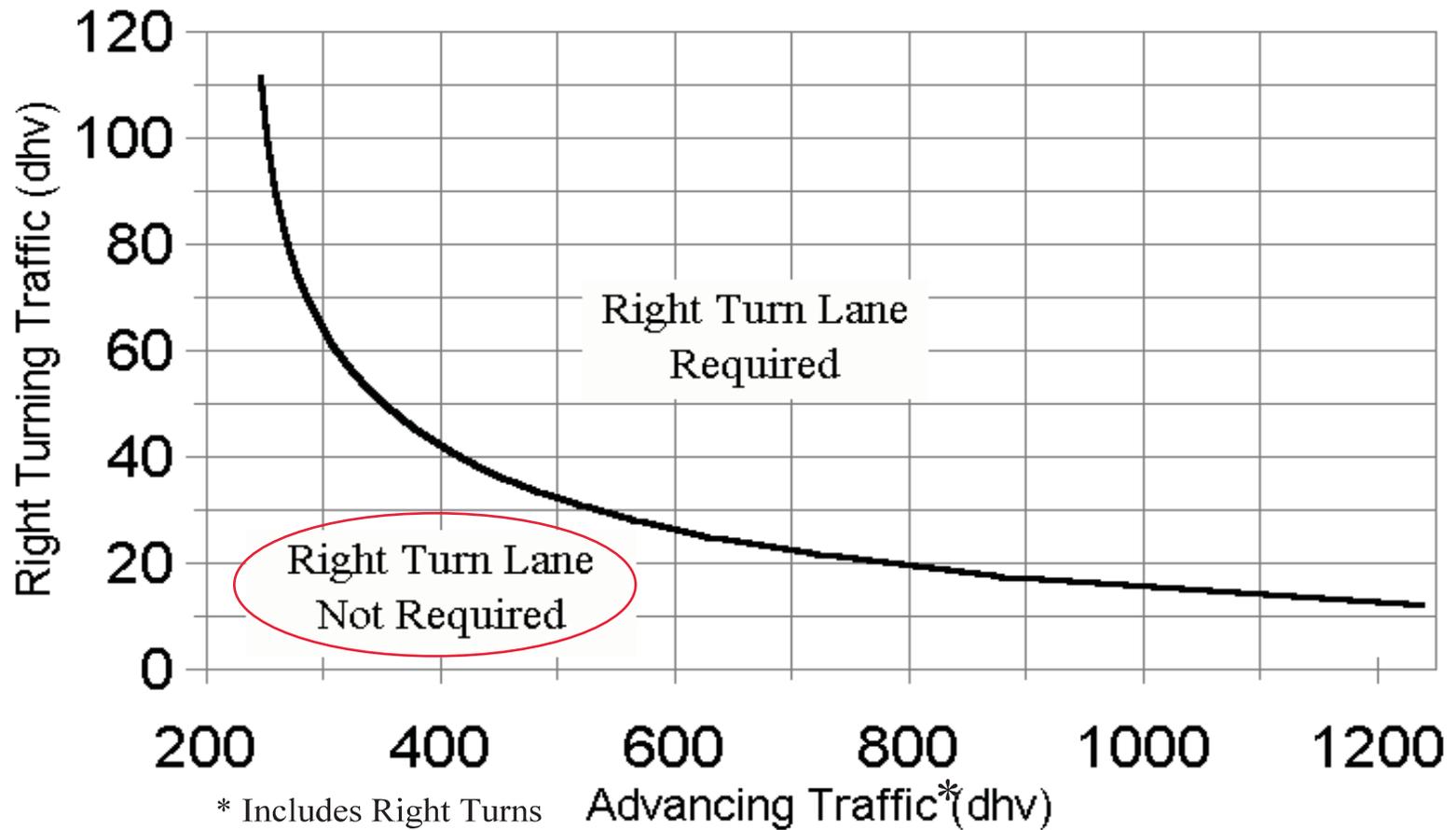
Intersection	Movement	Turn Lane warranted?	Required Storage (including 50' taper)
N Union Rd & Medway-Carlisle Rd	SBL	No	NA
	NBR	No	NA
Schiller Rd & Medway-Carlisle Rd	NBL	Yes	175'
	NBR	No	NA
Spangler Rd & Main St (Signalized) turn lane warrants must be based upon capacity analyses @ signalized intersections	NBL	Yes	325'
	SBL	No (needed to maintain intersection alignment)	175'
S Union Rd & Spangler Rd	SBL	No	NA
	NBR	Yes	345'
Mobile Home Park Driveway	NBL	No	NA

## 2-Lane Highway Left Turn Lane Warrant (>40 mph or 70 kph Posted Speed)



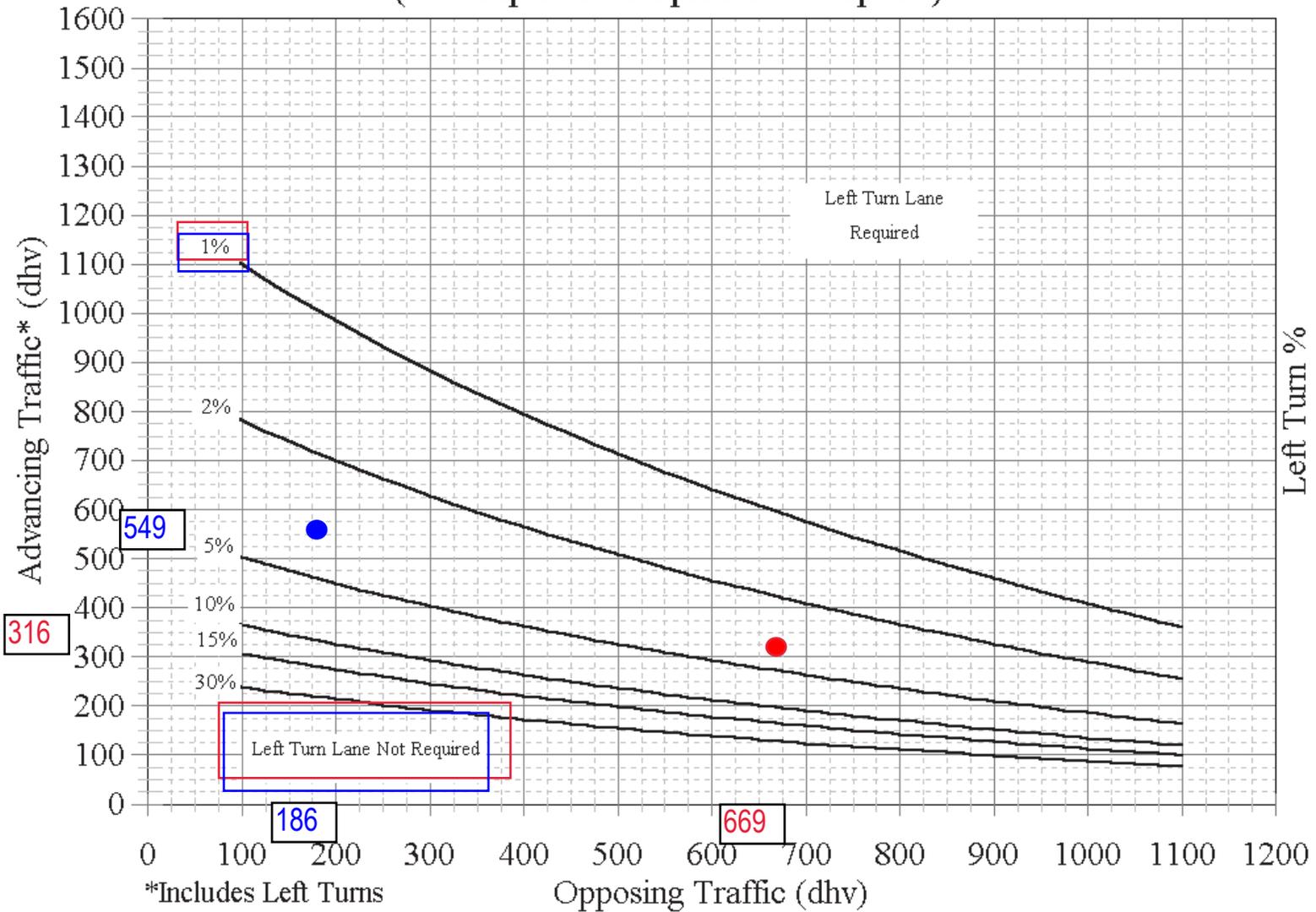
## 2-Lane Highway Right Turn Lane Warrant

> 40 mph or 70 kph Posted Speed



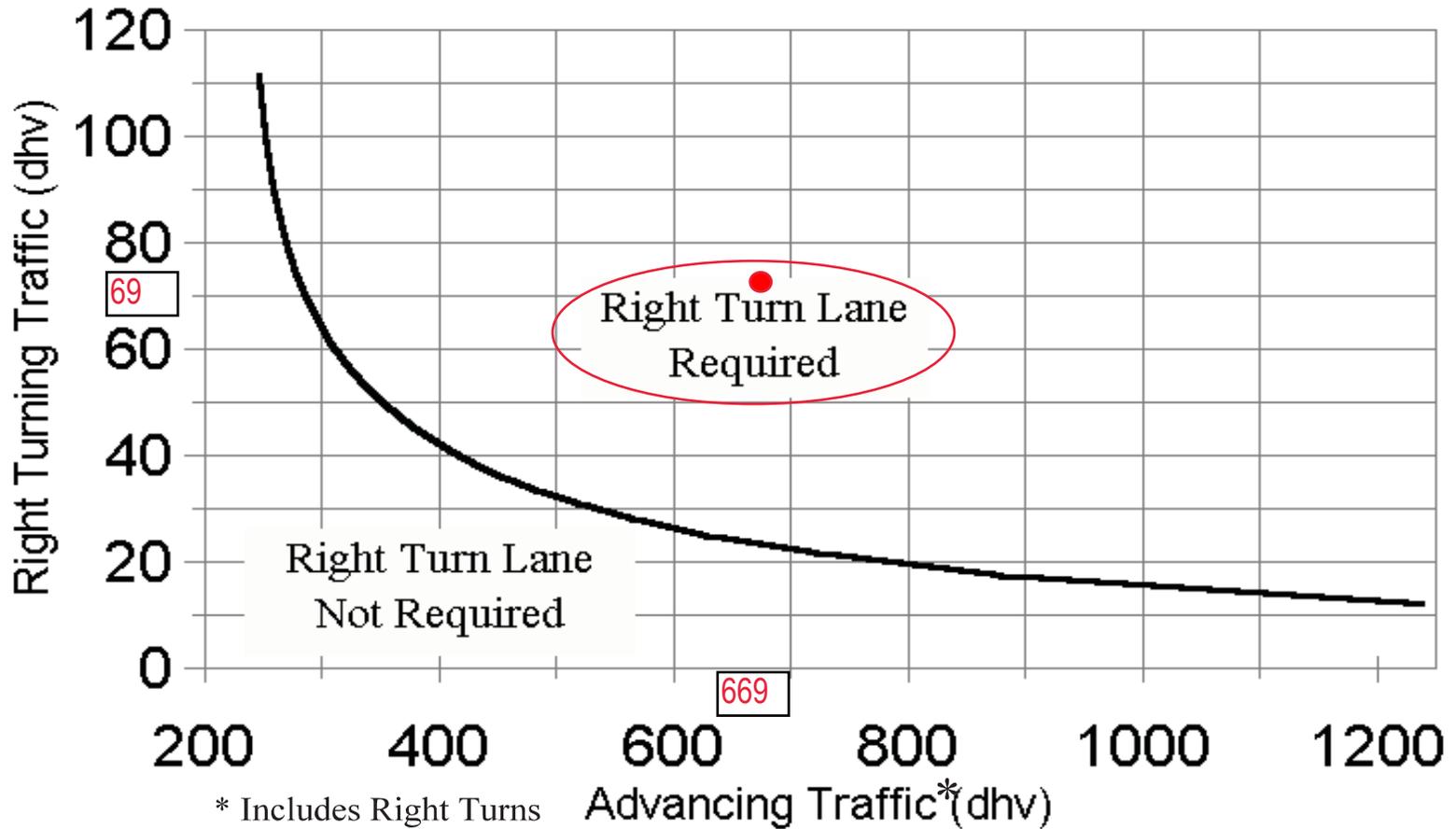
S Union Rd  
 SBL  
 AM  
 PM

## 2-Lane Highway Left Turn Lane Warrant (>40 mph or 70 kph Posted Speed)

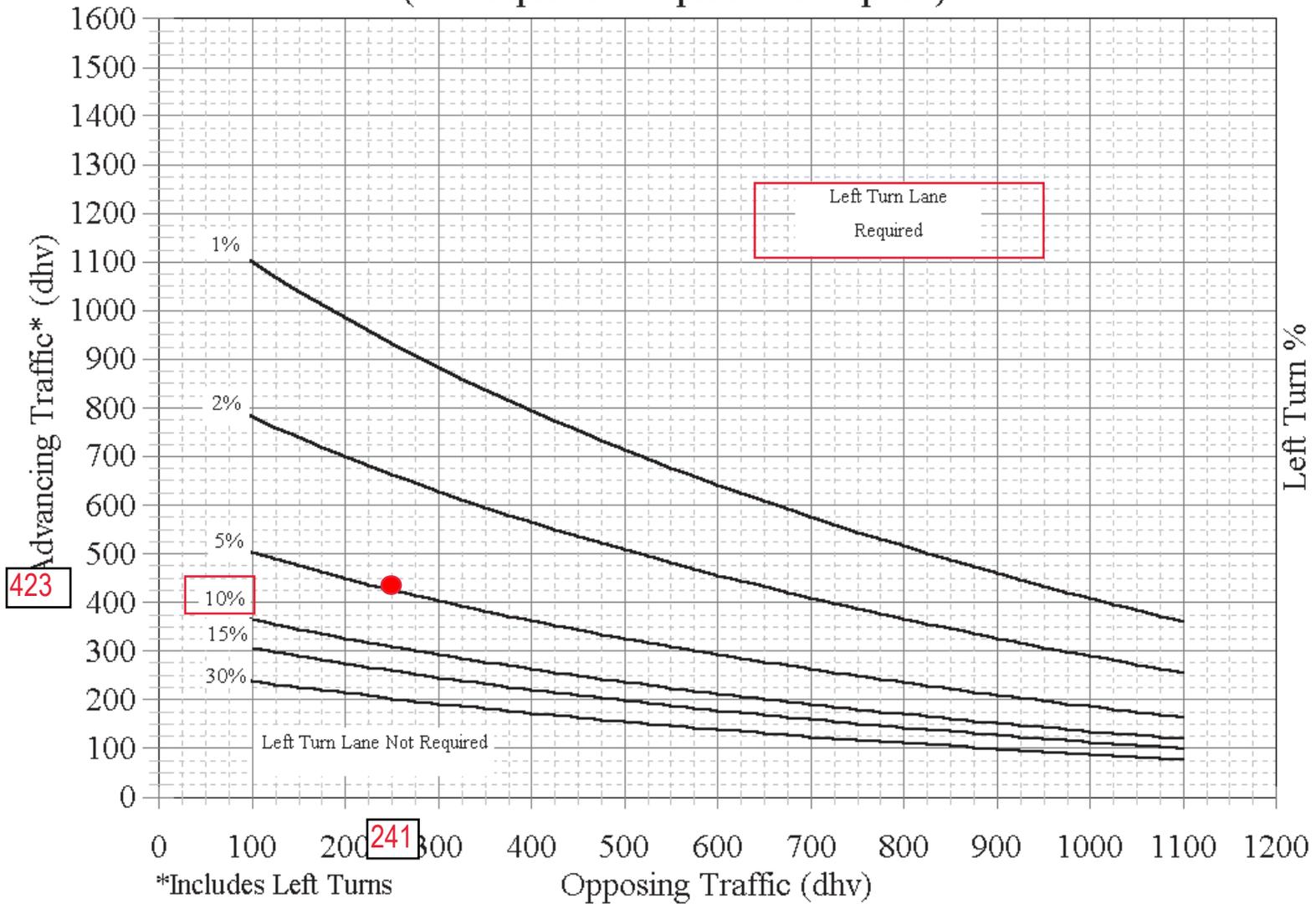


## 2-Lane Highway Right Turn Lane Warrant

> 40 mph or 70 kph Posted Speed

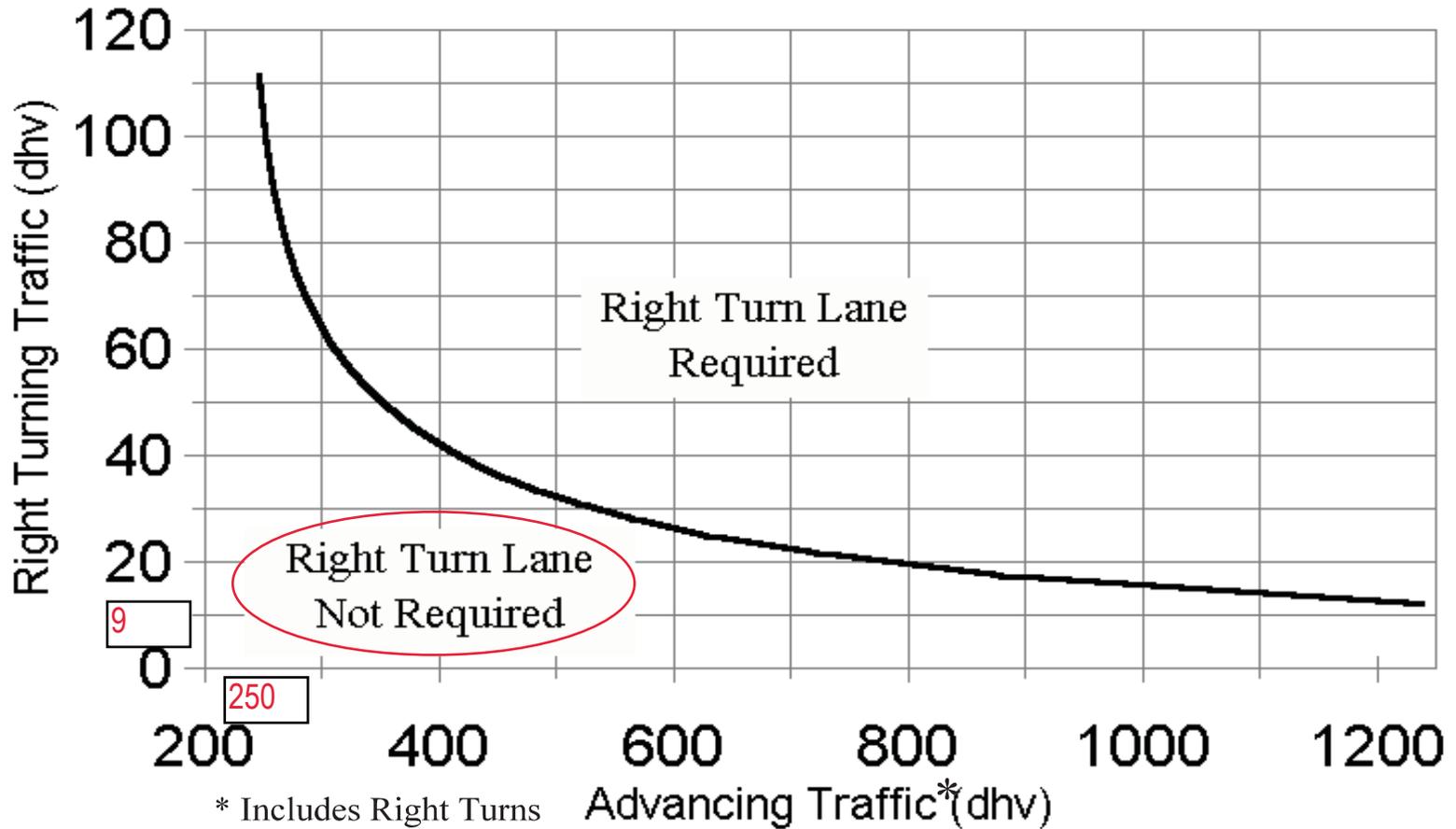


## 2-Lane Highway Left Turn Lane Warrant (>40 mph or 70 kph Posted Speed)



## 2-Lane Highway Right Turn Lane Warrant

> 40 mph or 70 kph Posted Speed



## Type 'Heading' Here

	Number
Total	56

CRASH_SEVERITY	Number	%
Fatal Crash	2	3.6%
Injury Crash	13	23.2%
Property Damage Crash	41	73.2%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

TRAFFIC_CRASH_YEAR	Number	%
2016	18	32.1%
2017	17	30.4%
2018	21	37.5%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

DAY_OF_WEEK	Number	%
Saturday	14	25.0%
Tuesday	13	23.2%
Wednesday	13	23.2%
Thursday	5	8.9%
Friday	4	7.1%
Sunday	4	7.1%
Monday	3	5.4%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

HOUR_OF_DAY	Number	%
0	2	3.6%
2	1	1.8%
4	2	3.6%
5	1	1.8%
6	3	5.4%
7	5	8.9%
8	2	3.6%
10	2	3.6%
11	1	1.8%
12	3	5.4%
13	5	8.9%
14	3	5.4%
15	5	8.9%
16	3	5.4%
17	6	10.7%
18	4	7.1%
19	1	1.8%
20	2	3.6%
22	2	3.6%
23	3	5.4%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

TYPE_OF_CRASH	Number	%
Fixed Object	28	50.0%
Rear End	12	21.4%
Angle	3	5.4%
Animal	3	5.4%
Left Turn	3	5.4%
Other Non-Collision	2	3.6%
Head On	2	3.6%
Parked Vehicle	1	1.8%
Other Object	1	1.8%
Sideswipe - Passing	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

Type 'Heading' Here

WEATHER_CONDITION	Number	%
Data Not Valid or Not Provided	56	100.0%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ROAD_CONDITION	Number	%
Dry	29	51.8%
Wet	17	30.4%
Snow	5	8.9%
Water (Standing, Moving)	3	5.4%
Ice	2	3.6%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

LIGHT_CONDITION	Number	%
Daylight	33	58.9%
Dark - Lighted Roadway	15	26.8%
Dawn	4	7.1%
Dusk	3	5.4%
Unknown	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

NUMBER_OF_VEHICLES	Number	%
1	34	60.7%
2	18	32.1%
3	4	7.1%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

LOCATION	Number	%
Not An Intersection	44	78.6%
T-Intersection	7	12.5%
Four-Way Intersection	5	8.9%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

CRASH_MONTH_NBR	Number	%
1	7	12.5%
2	3	5.4%
3	3	5.4%
4	5	8.9%
5	2	3.6%
6	5	8.9%
7	3	5.4%
8	4	7.1%
9	1	1.8%
10	5	8.9%
11	10	17.9%
12	8	14.3%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ROAD_CONTOUR	Number	%
Straight Level	39	69.6%
Curve Level	12	21.4%
Straight Grade	4	7.1%
Curve Grade	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

SPECIAL_AREA	Number	%
(blank)	56	100.0%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ANIMAL_TYPE	Number	%
(blank)	56	100.0%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

Type 'Heading' Here

<b>ACTION1</b>	<b>Number</b>	<b>%</b>
Straight Ahead	47	83.9%
Making Left Turn	6	10.7%
Negotiating A Curve	2	3.6%
Leaving Traffic Lane	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>CONTRIBUTING_FACTOR1</b>	<b>Number</b>	<b>%</b>
Followed To Closely/ACDA	14	25.0%
Left Of Center	12	21.4%
None-Motorist	8	14.3%
Unknown	7	12.5%
Exceeded Speed Limit	5	8.9%
Failure To Yield	5	8.9%
Swerving To Avoid	2	3.6%
Improper Turn	2	3.6%
Load Shifting/Falling/Spilling	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

	<b>Number</b>	<b>%</b>
<b>Total</b>	<b>56</b>	<b>100.0%</b>

<b>TRAFFIC_CONTROL1</b>	<b>Number</b>	<b>%</b>
School Zone	51	91.1%
Stop Sign	4	7.1%
Traffic Signal	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>DRIVER_ALCOHOL1</b>	<b>Number</b>	<b>%</b>
No	51	91.1%
Yes	5	8.9%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>DRIVER_DRUGS1</b>	<b>Number</b>	<b>%</b>
No	51	91.1%
Yes	5	8.9%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

Type 'Heading' Here

DIRECTION_FROM1	Number	%
South	26	46.4%
North	20	35.7%
Southeast	4	7.1%
East	2	3.6%
Northeast	1	1.8%
Southwest	1	1.8%
West	1	1.8%
Northwest	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

DIRECTION_TO1	Number	%
North	21	37.5%
South	20	35.7%
West	5	8.9%
Northwest	4	7.1%
Northeast	2	3.6%
East	2	3.6%
Southeast	1	1.8%
Southwest	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

POSTED_SPEED1	Number	%
55	37	66.1%
45	9	16.1%
40	6	10.7%
35	3	5.4%
50	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

ESTIMATED_SPEED1	Number	%
45	10	17.9%
50	7	12.5%
0	7	12.5%
55	6	10.7%
35	6	10.7%
40	5	8.9%
20	5	8.9%
25	3	5.4%
60	1	1.8%
30	1	1.8%
1	1	1.8%
52	1	1.8%
42	1	1.8%
15	1	1.8%
5	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

VEHICLE_TYPE1	Number	%
Sub-Compact	28	50.0%
Mid Size	13	23.2%
Full Size	10	17.9%
Unknown Or Hit/Skip	3	5.4%
Compact	2	3.6%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

VEHICLE_TYPE2	Number	%
Sub-Compact	34	60.7%
Full Size	13	23.2%
Mid Size	4	7.1%
Compact	4	7.1%
Compact	1	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

Type 'Heading' Here

<b>ACTION2</b>	<b>Number</b>	<b>%</b>
Straight Ahead	<b>34</b>	60.7%
Slowing Or Stopped In Traffic	<b>11</b>	19.6%
Parked	<b>9</b>	16.1%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>CONTRIBUTING_FACTOR2</b>	<b>Number</b>	<b>%</b>
None-Motorist	<b>34</b>	60.7%
Left Of Center	<b>20</b>	35.7%
Unknown	<b>1</b>	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>DIRECTION_FROM2</b>	<b>Number</b>	<b>%</b>
North	<b>9</b>	16.1%
South	<b>8</b>	14.3%
Southeast	<b>3</b>	5.4%
Northwest	<b>1</b>	1.8%
West	<b>1</b>	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>DIRECTION_TO2</b>	<b>Number</b>	<b>%</b>
South	<b>34</b>	60.7%
North	<b>9</b>	16.1%
Northwest	<b>8</b>	14.3%
Southeast	<b>3</b>	5.4%
East	<b>1</b>	1.8%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>DRIVER_ALCOHOL2</b>	<b>Number</b>	<b>%</b>
(blank)	<b>56</b>	100.0%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

<b>DRIVER_DRUGS2</b>	<b>Number</b>	<b>%</b>
(blank)	<b>56</b>	100.0%
<b>Grand Total</b>	<b>56</b>	<b>100.0%</b>

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SEVERITY	CRASH_SEVERITY		
TRAFFIC_CRASH_YEAR	Property Damage Crash	Injury Crash	Fatal Crash
2016	11	6	1
2017	13	4	0
2018	17	3	1
<b>Grand Total</b>	<b>41</b>	<b>13</b>	<b>2</b>

TRAFFIC_CRASH_YEAR	Fatalities	Incapacitating Injuries
2016	1	0
2017	0	0
2018	1	0
<b>Grand Total</b>	<b>2</b>	<b>0</b>

TRAFFIC_CRASH_YEAR	INJ_TYPE2_SERIOUS_VISIBLE	INJ_TYPE3_MINOR_VISIBLE	INJ_TYPE4_NO_VISIBLE
2016	0	4	4
2017	0	2	4
2018	0	0	5
<b>Grand Total</b>	<b>0</b>	<b>6</b>	<b>13</b>

## Crash Percentage Analysis (2010-2014)

### Crash Severity

	Fatal Crash	Injury Crash	Property Damage Only Crash
State System (IR, US, SR)	0.4%	25.5%	74.1%
Freeway (IR, US, SR)	0.3%	24.1%	75.6%
Non-Freeway (US, SR)	0.4%	26.1%	73.5%
<b>Non-State System</b>	<b>0.3%</b>	<b>23.5%</b>	<b>76.2%</b>
All Crashes Statewide	0.3%	24.5%	75.2%

### Crash Type

	Rear End	Fixed Object	Angle	Sideswipe - Passing	Animal	Parked Vehicle	Left Turn	Backing	Sideswipe - Meeting	Head On	Pedestrian	Pedalcycles	Overturning	Other Type
State System (IR, US, SR)	30.8%	17.3%	12.4%	11.3%	11.1%	2.7%	4.1%	2.1%	1.9%	0.5%	0.6%	0.4%	1.0%	3.6%
Freeway (IR, US, SR)	29.9%	26.1%	2.4%	18.6%	9.1%	1.9%	0.9%	0.8%	0.5%	0.1%	0.2%	0.1%	1.5%	7.8%
Non-Freeway (US, SR)	31.1%	14.1%	16.0%	8.7%	11.8%	3.0%	5.3%	2.6%	2.4%	0.7%	0.8%	0.6%	0.9%	2.0%
<b>Non-State System</b>	<b>20.7%</b>	<b>18.6%</b>	<b>17.6%</b>	<b>6.9%</b>	<b>6.4%</b>	<b>10.6%</b>	<b>3.9%</b>	<b>6.7%</b>	<b>3.1%</b>	<b>0.7%</b>	<b>1.2%</b>	<b>0.8%</b>	<b>0.9%</b>	<b>1.7%</b>
All Crashes Statewide	25.7%	18.0%	15.0%	9.1%	8.7%	6.7%	4.0%	4.5%	2.5%	0.6%	0.9%	0.6%	1.0%	2.6%

### Road Condition

	Dry	Wet	Snow	Ice	Other Road Condition
State System (IR, US, SR)	68.2%	22.0%	5.8%	2.8%	1.2%
Freeway (IR, US, SR)	62.0%	24.3%	7.9%	4.3%	1.5%
Non-Freeway (US, SR)	70.4%	21.2%	5.0%	2.2%	1.2%
<b>Non-State System</b>	<b>69.4%</b>	<b>19.4%</b>	<b>6.1%</b>	<b>3.1%</b>	<b>2.0%</b>
All Crashes Statewide	68.8%	20.7%	5.9%	2.9%	1.6%

### Light Condition

	Day	Dark	Dawn	Dusk	Other
State System (IR, US, SR)	65.3%	28.8%	2.3%	2.3%	1.2%
Freeway (IR, US, SR)	62.2%	31.7%	2.7%	2.3%	1.1%
Non-Freeway (US, SR)	66.4%	27.8%	2.2%	2.4%	1.3%
<b>Non-State System</b>	<b>64.1%</b>	<b>29.1%</b>	<b>1.9%</b>	<b>2.5%</b>	<b>2.3%</b>
All Crashes Statewide	64.7%	29.0%	2.1%	2.4%	1.8%

### Location Type

	Non-Intersection	Intersection / Intersection Related	Driveway Access	Other Location
State System (IR, US, SR)	60.1%	34.5%	4.2%	1.2%
Freeway (IR, US, SR)	84.2%	13.5%	0.2%	2.1%
Non-Freeway (US, SR)	51.3%	42.1%	5.6%	0.9%
Non-State System	52.7%	39.2%	6.7%	1.3%
All Crashes Statewide	56.4%	36.9%	5.5%	1.3%

### Road Contour

	Straight - Level	Straight - Grade	Curve - Grade	Curve - Level	Contour Not Stated
State System (IR, US, SR)	72.2%	16.9%	6.0%	4.5%	0.4%
Freeway (IR, US, SR)	63.3%	19.8%	10.6%	5.9%	0.4%
Non-Freeway (US, SR)	75.4%	15.9%	4.4%	4.0%	0.4%
Non-State System	73.0%	16.1%	5.0%	5.3%	0.6%
All Crashes Statewide	72.6%	16.5%	5.5%	4.9%	0.5%

APPENDIX C  
COST ESTIMATES



**CR-303 and CR-335 Safety Improvements (Clark County)**  
**MSG PROJ#: C2780001 (From Restoration Park Drive to U.S. 40 (Approx. 3.1 miles))**

**ESTIMATED COST**

**Preliminary Cost Estimate**  
**Recommended Safety Countermeasures**

\* Extended Costs rounded to nearest \$1000.

Major Cost Drivers

Description	Est. Quantity	Unit	Unit Cost	Extended Cost *	Group Total
<b>SOUTH SECTION (CR-335)</b>					
<b>Roadway</b>					
Embankment	11500	CY	\$ 9.00	\$104,000	
Excavation	1150	CY	\$ 8.00	\$9,000	
MGS Guardrail	127	LF	\$ 16.00	\$2,000	
MGS Anchor Assembly, Type E	4	EACH	\$ 2,235.00	\$9,000	
<b>Erosion Control</b>					
Estimated Erosion Control Costs		LS	\$ 85,000.00	\$85,000	\$97,500
Erosion Control Plan		LS	\$ 12,500.00	\$12,500	
<b>Drainage</b>					
Culvert Crossing	4	EACH	\$ 9,600.00	\$38,000	
Underdrain	11311	LF	\$ 10.00	\$113,000	
<b>Pavement</b>					
Pavement Resurfacing	58	CY	\$ 275.00	\$16,000	
Full Depth Pavement	19087	SY	\$ 55.00	\$1,050,000	
Pavement Planing	1397	SY	\$ 1.65	\$2,000	
<b>Traffic Control</b>					
Signing	1	LS	\$ 20,000.00	\$20,000	
Pavement Marking	1	LS	\$ 5,000.00	\$5,000	
Signal Upgrade	1	LS	\$ 160,000.00	\$160,000	
<b>Bridge Replacement</b>					
Total Bridge Cost (Incl. Contingency)	1	LS	\$ 589,313.00	\$589,000	\$589,000
<b>South Section Subtotal Major Items</b>					
					<b>\$2,214,500</b>
<b>Miscellaneous Costs</b>					
MOT - not including temp signals (6%)		LS	\$133,000		\$133,000
<b>Subtotal Miscellaneous Costs</b>					
					<b>\$133,000</b>
<b>Total Construction Cost Before Contingency &amp; Inflationary Factor</b>					
					<b>\$2,347,500</b>
<i>PDP Design Risk Contingency (30%)</i>					
					<b>\$704,000</b>
<b>Subtotal after Risk Contingency</b>					
					<b>\$3,051,500</b>
<i>Inflation per ODOT Business Plan Inflation Calculator (July 2024)</i>					
					<b>\$406,000</b>
					<b>\$3,457,500</b>
<b>South Section Total Preliminary Construction Cost Estimate</b>					
<b>\$3,457,500</b>					
<b>NORTH SECTION (CR-303)</b>					
<b>Roadway</b>					
Embankment	338	CY	\$ 9.00	\$3,000	
Excavation	1350	CY	\$ 8.00	\$11,000	
MGS Guardrail	0	LF	\$ 16.00	\$0	
MGS Anchor Assembly, Type E	4	EACH	\$ 2,235.00	\$9,000	
<b>Erosion Control</b>					
Estimated Erosion Control Costs		LS	\$ 15,000.00	\$15,000	\$27,500
Erosion Control Plan		LS	\$ 12,500.00	\$12,500	
<b>Drainage</b>					
Culvert Crossing	0	EACH	\$ 9,600.00	\$0	
Underdrain	4601	LF	\$ 10.00	\$46,000	
<b>Pavement</b>					
Pavement Resurfacing	965	CY	\$ 275.00	\$265,000	
Full Depth Pavement	3240	SY	\$ 55.00	\$178,000	
Pavement Planing	23168	SY	\$ 1.65	\$38,000	
<b>Traffic Control</b>					
Signing	1	LS	\$ 20,000.00	\$20,000	
Pavement Marking	1	LS	\$ 5,000.00	\$5,000	
Street Lighting	5	EACH	\$ 500.00	\$3,000	
<b>North Section Subtotal Major Items</b>					
					<b>\$605,500</b>
<b>Miscellaneous Costs</b>					
MOT - not including temp signals (6%)		LS	\$36,000		\$36,000
<b>Subtotal Miscellaneous Costs</b>					
					<b>\$36,000</b>
<b>Total Construction Cost Before Contingency &amp; Inflationary Factor</b>					
					<b>\$641,500</b>
<i>PDP Design Risk Contingency (30%)</i>					
					<b>\$192,000</b>
<b>Subtotal after Risk Contingency</b>					
					<b>\$833,500</b>
<i>Inflation per ODOT Business Plan Inflation Calculator (July 2024)</i>					
					<b>\$111,000</b>
					<b>\$944,500</b>
<b>North Section Total Preliminary Construction Cost Estimate</b>					
					<b>\$944,500</b>
<b>South Section Total Preliminary Construction Cost Estimate</b>					
					<b>\$3,457,500</b>
<b>GRAND TOTAL</b>					
					<b>\$4,402,000</b>
<i>Right-of-Way Budgetary Estimate (Does not include acquisition related fees)</i>					
					<b>\$250,000</b>
<i>Preliminary Eng./Surveying/Standard Geotech/Environmental-NEPA (15%)</i>					
					<b>\$660,000</b>
<i>Final Engineering (5%)</i>					
					<b>\$220,000</b>
<i>Construction Engineering (8%)</i>					
					<b>\$352,000</b>
<b>Total Project Cost Estimate</b>					
					<b>\$5,884,000</b>

APPENDIX D  
EXISTING ECAT CONDITIONS



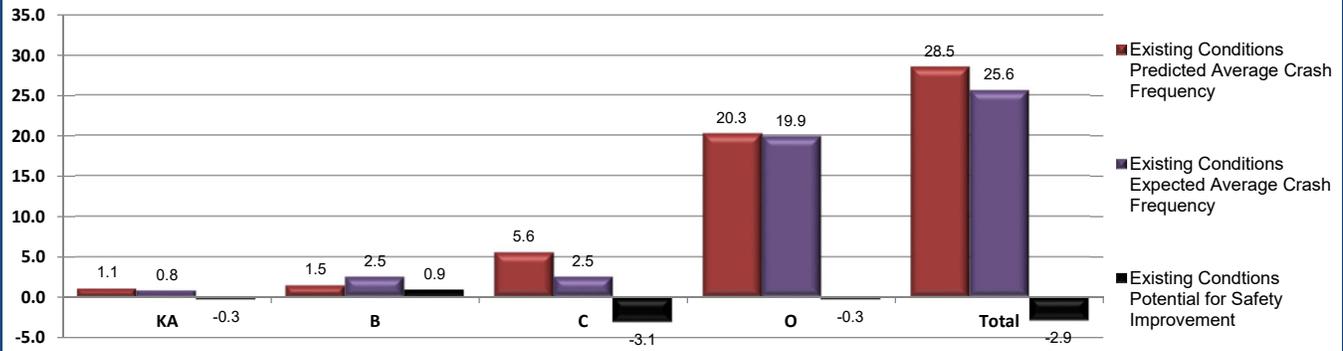


# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Existing)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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



## Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
<b>N<sub>predicted</sub> - Existing Conditions</b>	1.0931	1.5449	5.6209	20.2660	28.5249
<b>N<sub>expected</sub> - Existing Conditions</b>	0.7596	2.4579	2.4748	19.9269	25.6192
<b>N<sub>potential for improvement</sub> - Existing Conditions</b>	-0.3335	<b>0.9130</b>	-3.1461	-0.3391	-2.9057



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Existing)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
<a href="#">CR303: 0-0.447</a>	Spangler Rd from Main St to Schiller Rd	0.0437	0.1025	0.1093	0.5308	0.7863
<a href="#">CR303: 0.447-1.27</a>	Spangler Rd from Schiller Rd to N Union Rd	0.0554	0.1302	0.1381	0.6768	1.0005
<a href="#">CR303: 1.27-2.056</a>	Spangler Rd from N Union Rd to National Rd	0.0678	0.0678	0.2611	0.9304	1.3271
<a href="#">CR335: 0.4-0.7</a>	Spangler Rd from Restoration Dr to S Union R	0.0659	0.0659	0.2541	0.9047	1.2906
<a href="#">CR335: 0.7-1.583</a>	Spangler Rd from S Union to Main St	0.4503	0.4503	1.7378	6.1863	8.8247
<a href="#">CR303: 0</a>	Spangler Rd & Main St	0.0791	0.3533	0.484	2.6547	3.5711
<a href="#">CR303: 0.447</a>	Spangler Rd & Schiller Rd	0.0081	0.0352	0.0498	0.1529	0.246
<a href="#">CR303: 1.27</a>	Spangler Rd & N Union Rd	0.005	0.0219	0.0312	0.0793	0.1374
<a href="#">CR303: 2.056</a>	Spangler Rd & National Rd	0.2255	0.2255	2.1865	6.9961	9.6336
<a href="#">CR335: 0.7</a>	Spangler & S Union Rd	0.0923	0.0923	0.369	1.154	1.7076



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Existing)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
<a href="#">CR303: 0-0.447</a>	Spangler Rd from Main St to Schiller Rd	0.0416	0.0975	0.1033	0.5666	0.809
<a href="#">CR303: 0.447-1.27</a>	Spangler Rd from Schiller Rd to N Union Rd	0.0519	0.1217	0.1283	0.86	1.1619
<a href="#">CR303: 1.27-2.056</a>	Spangler Rd from N Union Rd to National Rd	0.0604	0.1718	0.1147	1.0946	1.4415
<a href="#">CR335: 0.4-0.7</a>	Spangler Rd from Restoration Dr to S Union R	0.0503	0.1434	0.0955	1.0899	1.3791
<a href="#">CR335: 0.7-1.583</a>	Spangler Rd from S Union to Main St	0.2622	0.7465	0.4986	6.1955	7.7028
<a href="#">CR303: 0</a>	Spangler Rd & Main St	0.0673	0.2962	0.3992	1.8964	2.6591
<a href="#">CR303: 0.447</a>	Spangler Rd & Schiller Rd	0.0072	0.0325	0.0467	0.1697	0.2561
<a href="#">CR303: 1.27</a>	Spangler Rd & N Union Rd	0.0045	0.0206	0.0298	0.0911	0.146
<a href="#">CR303: 2.056</a>	Spangler Rd & National Rd	0.1432	0.6221	0.9091	6.9961	8.6705
<a href="#">CR335: 0.7</a>	Spangler & S Union Rd	0.071	0.2056	0.1496	0.967	1.3932



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Existing)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
<a href="#">CR303: 0-0.447</a>	Spangler Rd from Main St to Schiller Rd	-0.0021	-0.005	-0.006	0.0358	0.0227
<a href="#">CR303: 0.447-1.27</a>	Spangler Rd from Schiller Rd to N Union Rd	-0.0035	-0.0085	-0.0098	0.1832	0.1614
<a href="#">CR303: 1.27-2.056</a>	Spangler Rd from N Union Rd to National Rd	-0.0074	0.104	-0.1464	0.1642	0.1144
<a href="#">CR335: 0.4-0.7</a>	Spangler Rd from Restoration Dr to S Union R	-0.0156	0.0775	-0.1586	0.1852	0.0885
<a href="#">CR335: 0.7-1.583</a>	Spangler Rd from S Union to Main St	-0.1881	0.2962	-1.2392	0.0092	-1.1219
<a href="#">CR303: 0</a>	Spangler Rd & Main St	-0.0118	-0.0571	-0.0848	-0.7583	-0.912
<a href="#">CR303: 0.447</a>	Spangler Rd & Schiller Rd	-0.0009	-0.0027	-0.0031	0.0168	0.0101
<a href="#">CR303: 1.27</a>	Spangler Rd & N Union Rd	-0.0005	-0.0013	-0.0014	0.0118	0.0086
<a href="#">CR303: 2.056</a>	Spangler Rd & National Rd	-0.0823	0.3966	-1.2774	0	-0.9631
<a href="#">CR335: 0.7</a>	Spangler & S Union Rd	-0.0213	0.1133	-0.2194	-0.187	-0.3144



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Existing)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Existing)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

## Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Expected Crash Frequency
Unknown	3.9568	0.0603	-3.8965	
Head On	0.1949	0.1622	-0.0327	
Rear End	7.2837	7.8118	<b>0.5281</b>	
Backing	1.3335	1.3753	<b>0.0418</b>	
Sideswipe - Meeting	0.9164	0.9399	<b>0.0235</b>	
Sideswipe - Passing	2.0626	2.0503	-0.0123	
Angle	2.8495	2.9799	<b>0.1303</b>	
Parked Vehicle	1.6241	1.7321	<b>0.1080</b>	
Pedestrian	0.3004	0.2670	-0.0334	
Animal	3.1040	3.2725	<b>0.1684</b>	
Train	0.0092	0.0088	-0.0004	
Pedalcycles	0.2331	0.2427	<b>0.0096</b>	
Other Non-Vehicle	0.0005	0.0004	-0.0001	
Fixed Object	5.5718	5.8294	<b>0.2576</b>	
Other Object	0.1836	0.1888	<b>0.0051</b>	
Overtuning	0.3466	0.2984	-0.0482	
Other Non-Collision	0.2800	0.2889	<b>0.0089</b>	
Left Turn	1.3146	1.3503	<b>0.0357</b>	
Right Turn	0.0000	0.0000	0.0000	

APPENDIX E  
PROPOSED ECAT CONDITIONS





## Safety Benefit - Cost Analysis

### General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

All Sites

**Comments:**

### Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (i.e. Lane widening)		\$0.00			\$0.00	\$0.00	0.000	\$0
Site Characteristic Improvements (i.e. Lighting)		\$0.00			\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Signal Phasing)		\$0.00			\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Added Right Turn Lane)		\$0.00			\$0.00	\$0.00		
CMF 1 - Install intersection lighting	20	\$4,740.00			\$4,740.00	\$4,740.00	0.000	\$0
CMF 2 - Install Right turn lane	20	\$877,216.00			\$877,216.00	\$877,216.00	-0.125	\$45,993
CMF 3 - Install left turn lane at signalized intersection	20	\$1,525,016.00			\$1,525,016.00	\$1,525,016.00	-1.250	\$492,022
CMF 4 - Install left turn lane at stop controlled intersection	20	\$877,216.00			\$877,216.00	\$877,216.00	-0.076	\$39,401
CMF 5 - Improve signing at stop controlled intersections	20	\$79,000.00			\$79,000.00	\$79,000.00	-0.453	\$258,758
CMF 6 - Install centerline and shoulder rumble strips	20	\$877,216.00			\$877,216.00	\$877,216.00	-4.591	\$2,561,551
CMF 7 - Pave shoulder	20	\$877,216.00			\$877,216.00	\$877,216.00	-2.666	\$1,544,743
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
<b>Totals</b>		<b>\$5,117,620.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$5,117,620.00</b>	<b>\$5,117,620.00</b>	<b>-9.160</b>	<b>\$4,942,468</b>



# Safety Benefit - Cost Analysis

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

### Benefit - Cost Calculator

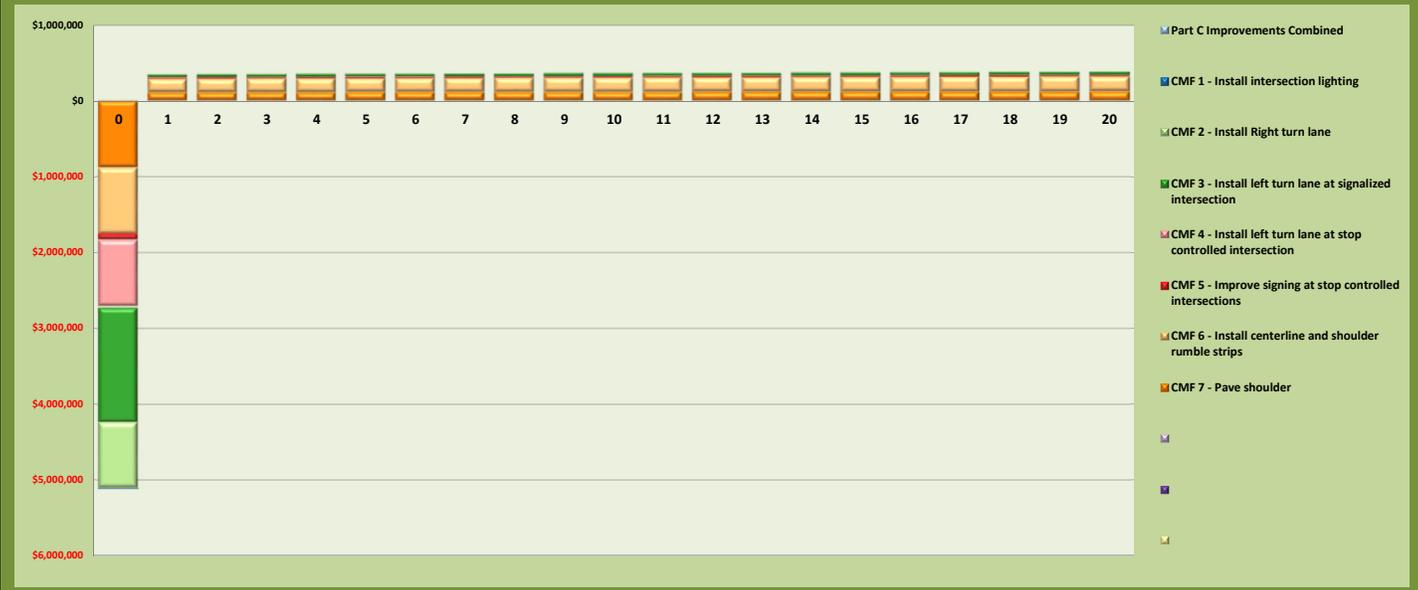
Net Present Value of Project	\$5,117,620.00
Net Present Value of Safety Benefits	\$4,942,467.73
Net Benefit	(\$175,152.27)
Benefit / Cost Ratio	0.97

### Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.468
Number of Injury Crashes	-2.436
Number of Total Crashes	-9.160

### Comments:

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



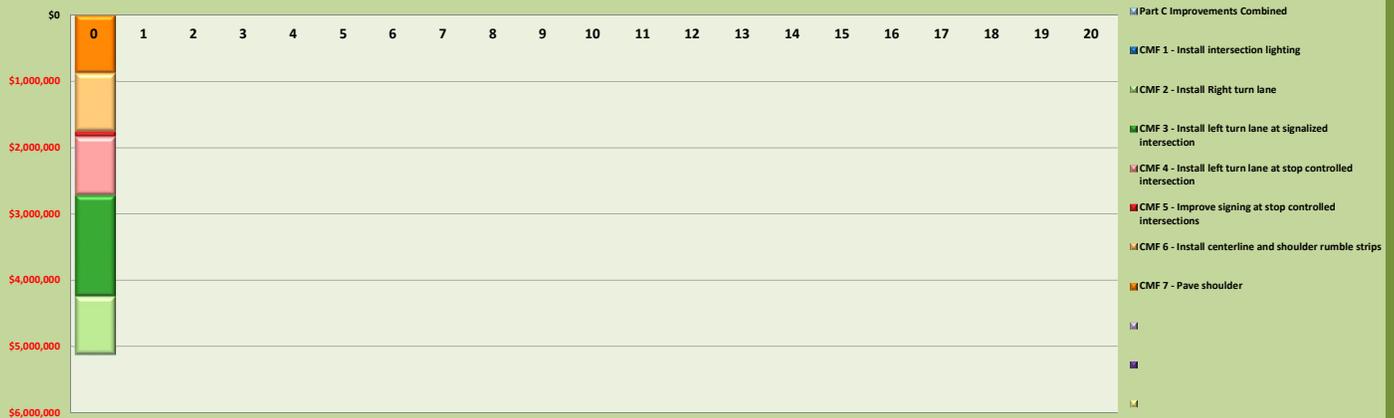


# Safety Benefit - Cost Analysis

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

## Project Costs Only Cash Flows By Countermeasure Per Year



## Return on Investment (Safety Benefits and Project Investments)



## Project Cost Estimate

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

Engineering Design %	28%
Contingency %	30%

Countermeasures	Construction Costs	Right of Way Costs	Engineering Design Costs	Contingency Amount	Total Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value
Site Characteristic Improvements (i.e. Lane widening)			\$0.00	\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Lighting)			\$0.00	\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Signal Phasing)			\$0.00	\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Added Right Turn Lane)			\$0.00	\$0.00	\$0.00		
CMF 1 - Install intersection lighting	\$3,000.00		\$840.00	\$900.00	\$4,740.00		
CMF 2 - Install Right turn lane	\$555,200.00		\$155,456.00	\$166,560.00	\$877,216.00		
CMF 3 - Install left turn lane at signalized intersection	\$715,200.00	\$250,000.00	\$270,256.00	\$289,560.00	\$1,525,016.00		
CMF 4 - Install left turn lane at stop controlled intersection	\$555,200.00		\$155,456.00	\$166,560.00	\$877,216.00		
CMF 5 - Improve signing at stop controlled intersections	\$50,000.00		\$14,000.00	\$15,000.00	\$79,000.00		
CMF 6 - Install centerline and shoulder rumble strips	\$555,200.00		\$155,456.00	\$166,560.00	\$877,216.00		
CMF 7 - Pave shoulder	\$555,200.00		\$155,456.00	\$166,560.00	\$877,216.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
<b>Totals</b>	<b>\$2,989,000.00</b>	<b>\$250,000.00</b>	<b>\$906,920.00</b>	<b>\$971,700.00</b>	<b>\$5,117,620.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

Inflation %	13%
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Final Construction Cost:	<b>\$5,798,263.46</b>
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\*Final construction cost should match the Project Cost Estimate

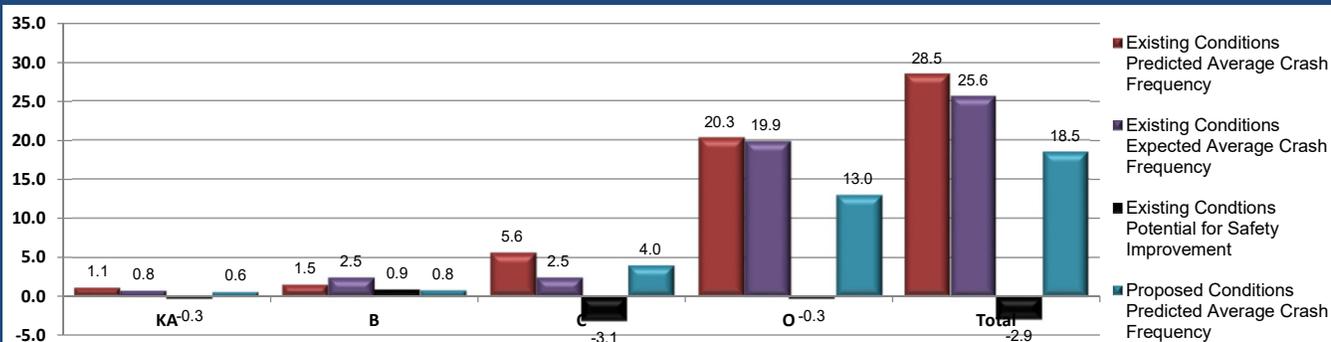


# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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



## Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
<b>N<sub>predicted</sub> - Existing Conditions</b>	1.0931	1.5449	5.6209	20.2660	28.5249
<b>N<sub>expected</sub> - Existing Conditions</b>	0.7596	2.4579	2.4748	19.9269	25.6192
<b>N<sub>potential for improvement</sub> - Existing Conditions</b>	-0.3335	<b>0.9130</b>	-3.1461	-0.3391	-2.9057
<b>N<sub>predicted</sub> - Proposed Conditions</b>	0.5834	0.8492	4.0096	13.0152	18.4574



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
<a href="#">CR303: 0-0.447</a>	Spangler Rd from Main St to Schiller Rd	0.0437	0.1025	0.1093	0.5308	0.7863
<a href="#">CR303: 0.447-1.27</a>	Spangler Rd from Schiller Rd to N Union Rd	0.0554	0.1302	0.1381	0.6768	1.0005
<a href="#">CR303: 1.27-2.056</a>	Spangler Rd from N Union Rd to National Rd	0.0678	0.0678	0.2611	0.9304	1.3271
<a href="#">CR335: 0.4-0.7</a>	Spangler Rd from Restoration Dr to S Union R	0.0659	0.0659	0.2541	0.9047	1.2906
<a href="#">CR335: 0.7-1.583</a>	Spangler Rd from S Union to Main St	0.4503	0.4503	1.7378	6.1863	8.8247
<a href="#">CR303: 0</a>	Spangler Rd & Main St	0.0791	0.3533	0.484	2.6547	3.5711
<a href="#">CR303: 0.447</a>	Spangler Rd & Schiller Rd	0.0081	0.0352	0.0498	0.1529	0.246
<a href="#">CR303: 1.27</a>	Spangler Rd & N Union Rd	0.005	0.0219	0.0312	0.0793	0.1374
<a href="#">CR303: 2.056</a>	Spangler Rd & National Rd	0.2255	0.2255	2.1865	6.9961	9.6336
<a href="#">CR335: 0.7</a>	Spangler & S Union Rd	0.0923	0.0923	0.369	1.154	1.7076



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
<a href="#">CR303: 0-0.447</a>	Spangler Rd from Main St to Schiller Rd	0.0416	0.0975	0.1033	0.5666	0.809
<a href="#">CR303: 0.447-1.27</a>	Spangler Rd from Schiller Rd to N Union Rd	0.0519	0.1217	0.1283	0.86	1.1619
<a href="#">CR303: 1.27-2.056</a>	Spangler Rd from N Union Rd to National Rd	0.0604	0.1718	0.1147	1.0946	1.4415
<a href="#">CR335: 0.4-0.7</a>	Spangler Rd from Restoration Dr to S Union R	0.0503	0.1434	0.0955	1.0899	1.3791
<a href="#">CR335: 0.7-1.583</a>	Spangler Rd from S Union to Main St	0.2622	0.7465	0.4986	6.1955	7.7028
<a href="#">CR303: 0</a>	Spangler Rd & Main St	0.0673	0.2962	0.3992	1.8964	2.6591
<a href="#">CR303: 0.447</a>	Spangler Rd & Schiller Rd	0.0072	0.0325	0.0467	0.1697	0.2561
<a href="#">CR303: 1.27</a>	Spangler Rd & N Union Rd	0.0045	0.0206	0.0298	0.0911	0.146
<a href="#">CR303: 2.056</a>	Spangler Rd & National Rd	0.1432	0.6221	0.9091	6.9961	8.6705
<a href="#">CR335: 0.7</a>	Spangler & S Union Rd	0.071	0.2056	0.1496	0.967	1.3932



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
<a href="#">CR303: 0-0.447</a>	Spangler Rd from Main St to Schiller Rd	-0.0021	-0.005	-0.006	0.0358	0.0227
<a href="#">CR303: 0.447-1.27</a>	Spangler Rd from Schiller Rd to N Union Rd	-0.0035	-0.0085	-0.0098	0.1832	0.1614
<a href="#">CR303: 1.27-2.056</a>	Spangler Rd from N Union Rd to National Rd	-0.0074	0.104	-0.1464	0.1642	0.1144
<a href="#">CR335: 0.4-0.7</a>	Spangler Rd from Restoration Dr to S Union R	-0.0156	0.0775	-0.1586	0.1852	0.0885
<a href="#">CR335: 0.7-1.583</a>	Spangler Rd from S Union to Main St	-0.1881	0.2962	-1.2392	0.0092	-1.1219
<a href="#">CR303: 0</a>	Spangler Rd & Main St	-0.0118	-0.0571	-0.0848	-0.7583	-0.912
<a href="#">CR303: 0.447</a>	Spangler Rd & Schiller Rd	-0.0009	-0.0027	-0.0031	0.0168	0.0101
<a href="#">CR303: 1.27</a>	Spangler Rd & N Union Rd	-0.0005	-0.0013	-0.0014	0.0118	0.0086
<a href="#">CR303: 2.056</a>	Spangler Rd & National Rd	-0.0823	0.3966	-1.2774	0	-0.9631
<a href="#">CR335: 0.7</a>	Spangler & S Union Rd	-0.0213	0.1133	-0.2194	-0.187	-0.3144



# Project Safety Performance Report

## General Information

Project Name	C2780001	Contact Email	
Project Description	Clark County Safety Study (Proposed)	Contact Phone	419-891-2222
Reference Number		Date Performed	
Analyst		Analysis Year	2020
Agency/Company	The Mannik & Smith Group Inc.		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
<a href="#">CR303: 0-0.447</a>	Spangler Rd from Main St to Schiller Rd	0.0201	0.0478	0.0554	0.2412	0.3645
<a href="#">CR303: 0.447-1.27</a>	Spangler Rd from Schiller Rd to N Union Rd	0.0362	0.085	0.0901	0.442	0.6533
<a href="#">CR303: 1.27-2.056</a>	Spangler Rd from N Union Rd to National Rd	0.0443	0.0443	0.1705	0.6076	0.8667
<a href="#">CR335: 0.4-0.7</a>	Spangler Rd from Restoration Dr to S Union R	0.043	0.043	0.1659	0.5908	0.8427
<a href="#">CR335: 0.7-1.583</a>	Spangler Rd from S Union to Main St	0.1619	0.1619	1.0027	2.5417	3.8682
<a href="#">CR303: 0</a>	Spangler Rd & Main St	0.0459	0.2113	0.2938	1.4828	2.0338
<a href="#">CR303: 0.447</a>	Spangler Rd & Schiller Rd	0.0035	0.016	0.0234	0.0647	0.1076
<a href="#">CR303: 1.27</a>	Spangler Rd & N Union Rd	0.003	0.0144	0.0213	0.0483	0.087
<a href="#">CR303: 2.056</a>	Spangler Rd & National Rd	0.2255	0.2255	2.1865	6.9961	9.6336
<a href="#">CR335: 0.7</a>	Spangler & S Union Rd					0



# Project Safety Performance Report

## General Information

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Agency/Company	The Mannik & Smith Group Inc.		

## Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Expected Crash Frequency
Unknown	3.9568	0.0603	-3.8965	
Head On	0.1949	0.1622	-0.0327	
Rear End	7.2837	7.8118	<b>0.5281</b>	
Backing	1.3335	1.3753	<b>0.0418</b>	
Sideswipe - Meeting	0.9164	0.9399	<b>0.0235</b>	
Sideswipe - Passing	2.0626	2.0503	-0.0123	
Angle	2.8495	2.9799	<b>0.1303</b>	
Parked Vehicle	1.6241	1.7321	<b>0.1080</b>	
Pedestrian	0.3004	0.2670	-0.0334	
Animal	3.1040	3.2725	<b>0.1684</b>	
Train	0.0092	0.0088	-0.0004	
Pedalcycles	0.2331	0.2427	<b>0.0096</b>	
Other Non-Vehicle	0.0005	0.0004	-0.0001	
Fixed Object	5.5718	5.8294	<b>0.2576</b>	
Other Object	0.1836	0.1888	<b>0.0051</b>	
Overtuning	0.3466	0.2984	-0.0482	
Other Non-Collision	0.2800	0.2889	<b>0.0089</b>	
Left Turn	1.3146	1.3503	<b>0.0357</b>	
Right Turn	0.0000	0.0000	0.0000	

APPENDIX F  
PHOTOS





Limited sight distance at Restoration Park Drive looking northward for southbound traffic that is caused from the earth levee



Limited sight distance at South Union Road looking southward for northbound traffic limited by intersection being too close to bridge



Roadside grave marker where a recent fatal crash occurred when a vehicle struck a tree (both large trees show marks from crashes)



Sharp curve heading into small bridge structure entering Medway, that limits view of traffic signal (skid marks on roadway going into curve)



Curved sections within roadway corridor have limited shoulder widths and could use enhanced signing to warn motorists of the curves



Utility pole on curved section of roadway that has been struck as it is about 3 to 4 feet from the roadway edge



School busses on roadway emphasize the need to improve the safety of the corridor



Non-Standard guardrail end treatments that are in need of upgrades