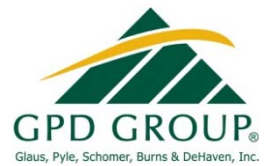


# SAFETY AND CORRIDOR STUDY Wallings Road

City of Broadview Heights, Cuyahoga County, Ohio



## Prepared For:

City of Broadview Heights  
Office of Engineering  
9543 Broadview Road  
Broadview Heights, OH 44147

## Prepared By:

GPD Group  
5595 Transportation Boulevard  
Suite 100  
Cleveland, OH 44215



March 2015

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March 2015

Engineer's Seal

Prepared By:

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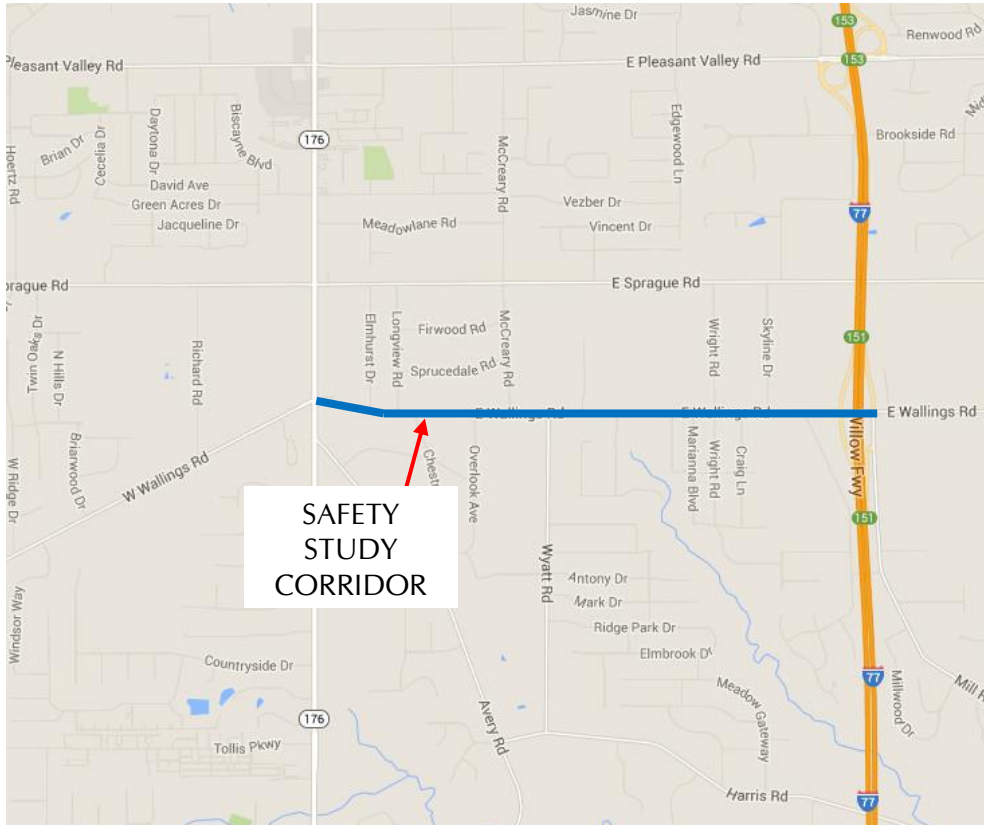
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# I. Study Area:

## Traffic Safety Study ODOT District 12, City of Broadview Heights Wallings Road Corridor



Completed by:  
GPD Group

Completion Date:  
March 2015



<b>LEGEND</b>
 Wallings Road Corridor

## **II. Executive Summary**

### ***Purpose & Need:***

At the request of the City of Broadview Heights, GPD Group was tasked with completing a Safety and Corridor Study for the Wallings Road corridor. This study will determine if any operational or safety deficiencies exist within the study area and what improvements are necessary to correct any that are identified. This corridor includes Wallings Road from the Broadview Road (State Route 176) intersection to the I-77 NB Ramps / Mill Road intersection.

### ***Background:***

In 2015, GPD Group completed a comprehensive tabulation of the crashes for the three (3) most recent crash years (2011 – 2013) along the Wallings Road corridor in the City of Broadview Heights, Ohio. This crash data showed a large number of crashes along the corridor, suggesting that there were safety and operational issues along the corridor and a more detailed analysis was needed to determine the extent of the problem(s) and what could be done to address them.

### ***Brief Overview of Possible Causes:***

A review of the crash patterns indicates that safety issues exist along the Wallings Road corridor. Large numbers of rear-end crashes are occurring at unsignalized intersections and driveways due to the absence of a center two-way left turn lane to separate left turning vehicles from thru vehicles. Motorists are unable to get around the left turning traffic occupying the only available thru lane in the two-lane section of Wallings Road, which causes congestion and rear-end related crashes along the corridor. Congestion is present at the I-77 / Wallings Road interchange on the east end of the project that is contributing to the rear-end crashes occurring on that section of the roadway.

### ***Recommended Countermeasures and Related Costs:***

This study has identified long-term improvement recommendations that would reduce the number of crashes occurring within the study area. The following list outlines these improvements:

#### **Long Term Improvements:**

1. Widen Wallings Road to accommodate a two-way left turn lane throughout the entire study area.
2. Construct a westbound right turn lane at the Wallings Road / McCreary Road intersection.
3. Construct a westbound right turn lane at the Wallings Road / Wright Road intersection.



4. Study the traffic signal currently located at the Wallings Road / Wright Road intersection for removal.
5. Construct an eastbound right turn lane at the Wallings Road / West Mill Road intersection.
6. Reconstruct the Wallings Road Bridge over I-77 to accommodate four (4) travel lanes.
7. Construct a second eastbound left turn lane at the Wallings Road / I-77 NB Ramps / Mill Road intersection.
8. Widen the I-77 NB entrance ramp to accommodate the proposed, dual left turn lane from Wallings Road.
9. Widen Mill Road to accommodate a northbound left turn lane at the Wallings Road / I-77 NB Ramps / Mill Road intersection.
10. Widen the I-77 SB exit ramp to accommodate a second right turn lane and construct a second westbound thru lane on Wallings Road to receive the traffic from these (2) lanes.
11. Widen Wallings Road from just east of West Mill Road to the I-77 NB entrance ramp.

The existing crash problem along Wallings Road points to the need for a two-way left turn lane to be constructed throughout the entire project area. A large portion of rear-end crashes along the study corridor are occurring at unsignalized intersections and driveways and involve a vehicle stopping in traffic to complete a left turn movement. The construction of a center two-way left turn lane will allow the left turning traffic to move out of the thru lanes, which will reduce congestion along the corridor and remove the conflict between left turning and thru vehicles.

The intersection of Wallings Road / McCreary currently meets the volume thresholds necessary for a westbound right turn lane to be constructed. This turn lane will remove turning traffic from the thru lane and reduce the conflicts between thru traffic and right turning traffic. Additionally, a westbound right turn lane should be constructed for the Wallings Road / Wright Road intersection and an eastbound right turn lane should be constructed at the Wallings Road / West Mill Road intersection to reduce these turning movement conflicts and improve operation.

The traffic signal at the Wallings Road / Wright Road intersection is not warranted based upon the Existing Year or Opening Year traffic volumes. For this reason it is recommended that the traffic signal at this intersection be studied for removal. The intersection should operate under two-way stop control once the safety improvements are constructed with Wright Road operating under stop control.

Based on future traffic volumes and capacity demands at the I-77 / Wallings Road interchange, the bridge over Wallings Road will need to be four (4) lanes wide in order to





accommodate the future demand at the interchange. Currently, the bridge is only two (2) lanes and does not provide any left turn lanes for traffic turning left onto I-77. The future configuration calls for dual eastbound left turn lanes for traffic trying to enter I-77 NB. Additionally, a single westbound left turn lane is also needed for left turning traffic onto I-77 SB. The geometry over the bridge calls for the outside eastbound left turn lane to be the entire length of the bridge while the inside eastbound left turn lane should be back-to-back with the proposed 150 foot westbound left turn lane.

In order to accommodate the recommended dual eastbound left turn lanes at the Wallings Road / I-77 NB Ramps / Mill Road intersection, the entrance ramp for I-77 NB will need to be widened. The second lane on the entrance ramp will need to be merged before the traffic enters I-77 mainline.

In order to service the demand for traffic exiting I-77 SB at Wallings Road, an additional lane needs to be added to the exit ramp. In addition to the existing southbound left and southbound right, an additional 225' southbound right turn lane needs to be constructed (creating dual right turn lanes) so the traffic can exit the highway more efficiently and the Wallings Road / I-77 SB Ramps intersection can operate with acceptable Levels-of-Service. Since Wallings Road currently only provides one (1) travel lane in each direction, Wallings Road will need to be widened to two (2) westbound travel lanes west of the interchange. This additional through lane should be merged west of the West Mill Road intersection.

Wallings Road should be widened from just east of West Mill Road to the I-77 NB Ramp / Mill Road intersection. This improvement is recommended to provide additional capacity through the Wallings Road / I-77 SB Ramps intersection as well as allowing traffic to move into the proper lane as the inside thru lane will become the outside dedicated left turn lane at the Wallings Road / I-77 SB Ramps intersection. The outside thru lane will be the thru lane for traffic wishing to continue eastbound on Wallings Road to travel southbound on Mill Road.

Based upon the capacity analysis along the Wallings Road corridor, Wallings Road needs to be widened to five (5) lanes to accommodate future traffic volumes. However, the decision was made not to pursue this option due to the extensive right-of-way and construction costs associated with a five (5) lane corridor. The estimated cost for the five (5) project is approximately 20.4 million dollars. The city viewed this cost as excessive. Additionally it was felt that simply completing the three (3) lane option will improve capacity somewhat.

The estimated cost for the three (3) lane improvements outlined above is approximately 15 million dollars (not including construction inspection or inflation).



### **III. Purpose and Need:**

At the request of the City of Broadview Heights, GPD Group was tasked with completing a Safety and Corridor Study for the Wallings Road corridor. This study will determine if any operational or safety deficiencies exist within the study area and what improvements are necessary to correct any deficiencies that are identified. This corridor includes Wallings Road from the Broadview Road (State Route 176) intersection to the I-77 NB Ramps / Mill Road intersection.

### **IV. Existing Conditions:**

The safety study area is located within the City of Broadview Heights and encompasses Wallings Road from Broadview Road (State Route 176) to the I-77 NB Ramps / Mill Road. The study area will include all intersections along the Wallings Road corridor. The land use surrounding the study area is mainly residential properties along Wallings Road with a couple of commercial properties located adjacent to the Wallings Road / Broadview Road intersection. Additionally, the Lawrence School is located along Wallings Road between Chestnut Boulevard and Overlook Avenue. See **Figure 1** for an aerial photograph of the study area.

The following is a description of the primary roadway traversing the study area as well as a summary of the corridor intersections:

Wallings Road is a two (2) lane asphalt roadway with one (1) lane for eastbound and westbound traffic with left turn lanes at the signalized intersections of Wallings Road / Wright Road, Wallings Road / Wyatt Road and Wallings Road / Broadview Road. The current posted speed limit for Wallings Road is 35 miles per hour throughout the study area. According to information obtained from the Ohio Department of Transportation's website, Wallings Road is classified as an Urban Minor Arterial. Wallings Road is an uncurbed roadway throughout the majority of the study area. Curb and closed drainage exists for approximately 500 feet east of the Broadview Road intersection on both sides of Wallings Road. Curb and closed drainage also exists for approximately 500 feet (250 feet east and 250 feet west) surrounding the Wyatt Road intersection. Additionally, curb and closed drainage is present on both sides of Wallings Road at the I-77 / Wallings Road interchange. The remaining project area is uncurbed with shallow storm sewers and yard drain inlets on both sides of Wallings Road. The existing right-of-way along the roadway varies between 60 feet and 80 feet throughout the corridor. Standard highway easements appear to be present throughout the majority of the corridor with traditional right-of-way present in some areas. Once this project moves forward, all standard highway easements should be converted to right-of-way. Street lighting is located sporadically throughout the study area. The I-77 / Wallings Road interchange is lighted and a single luminaire is present at the majority of study intersections.

The existing roadway geometries for the study intersections are detailed below. Refer to **Figures 2 through 9** for existing condition diagrams of the study area and see **Appendix A** for a site photo log.



#### Wallings Road / Broadview Road Intersection:

This intersection is currently signalized using span wire to support the traffic signal heads with signal poles located on all four (4) corners of the intersection. The intersection consists of four (4) approaches with the following lane configurations: EB Wallings Road – two (2) lanes (left, thru-right), WB Wallings Road – three (3) lanes (left, thru, right) and NB and SB Broadview Road – three (3) lanes (left, thru, thru-right). This traffic signal operates with protected/permissive left turn signal phasing on all four (4) approaches to the intersection. It should be noted that the northbound and southbound left turn lanes on Broadview Road are not striped as dedicated left turn lanes, but instead they are shown as a center two-way left turn lane to the stop bar for the intersection. These unique pavement makings could be leading to traffic not using the left turn lane appropriately at the intersection and vehicles making a left turn from the thru lane.

#### Wallings Road / Elmhurst Drive Intersection:

This intersection is unsignalized with the SB Elmhurst Drive approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (left-thru), WB Wallings Road – one (1) lane (thru-right) and SB Elmhurst Drive – one (1) lane (left-right).

#### Wallings Road / Longview Road Intersection:

This intersection is unsignalized with the SB Longview Road approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (left-thru), WB Wallings Road – one (1) lane (thru-right) and SB Longview Road – one (1) lane (left-right).

#### Wallings Road / Chestnut Boulevard Intersection:

This intersection is unsignalized with the NB Chestnut Boulevard approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – one (1) lane (left-thru) and NB Chestnut Boulevard – one (1) lane (left-right).

#### Wallings Road / Overlook Avenue Intersection:

This intersection is unsignalized with the NB Overlook Avenue approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – one (1) lane (left-thru) and NB Overlook Avenue – one (1) lane (left-right).



#### Wallings Road / McCreary Road Intersection:

This intersection is unsignalized with the SB McCreary Road approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (left-thru), WB Wallings Road – one (1) lane (thru-right) and SB McCreary Road – one (1) lane (left-right).

#### Wallings Road / Wyatt Road Intersection:

This intersection is currently signalized using span wire to support the traffic signal heads with signal poles located on the northwest and southeast corners of the intersection. The intersection consists of three (3) approaches with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – two (2) lanes (left, thru) and NB Wyatt Road – one (1) lane (left -right). This traffic signal operates with protected/permissive left turn signal phasing on the westbound approach to the intersection.

#### Wallings Road / Majestic Oaks Trail Intersection:

This intersection is unsignalized with the SB Majestic Oakes Trail approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (left-thru), WB Wallings Road – one (1) lane (thru-right) and SB Majestic Oakes Trail – one (1) lane (left-right).

#### Wallings Road / Creekside Trace Intersection:

This intersection is unsignalized with the NB Creekside Trace approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – one (1) lane (left-thru) and NB Creekside Trace – one (1) lane (left-right).

#### Wallings Road / Joyce Road / Fire Station Drive Intersection:

This intersection is unsignalized with the NB Joyce Road and SB Fire Station Drive approach operating under stop control. The intersection consists of four (4) legs with the following lane configurations: All four (4) approaches – one (1) lane (left-thru-right).

#### Wallings Road / Marianna Boulevard Intersection:

This intersection is unsignalized with the NB Marianne Boulevard approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – one (1) lane (left-thru) and NB Marianna Boulevard – one (1) lane (left-right).



#### Wallings Road / Wright Road Intersection:

This intersection is currently signalized using span wire to support the traffic signal heads with signal poles located on the northeast and southwest corners of the intersection. The intersection consists of four (4) approaches with the following lane configurations: EB and WB Wallings Road – two (2) lanes (left, thru-right) and NB and SB Wright Road – one (1) lane (left-thru-right). This traffic signal operates with protected/permissive left turn signal phasing on the eastbound and westbound approaches to the intersection.

#### Wallings Road / Craig Lane Intersection:

This intersection is unsignalized with the NB Craig Lane approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – one (1) lane (left-thru) and NB Craig Lane – one (1) lane (left-right).

#### Wallings Road / Skyline Drive Intersection:

This intersection is unsignalized with the SB Skyline Drive approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (left-thru), WB Wallings Road – one (1) lane (thru-right) and SB Skyline Drive – one (1) lane (left-right).

#### Wallings Road / West Mill Road Intersection:

This intersection is unsignalized with the NB West Mill Road approach operating under stop control. The intersection consists of three (3) legs with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – one (1) lane (left-thru) and NB West Mill Road – one (1) lane (left-right).

#### Wallings Road / I-77 SB Ramps Intersection:

This intersection is currently signalized using span wire to support the traffic signal heads with signal poles located on the northwest and southeast corners of the intersection. The intersection consists of three (3) approaches with the following lane configurations: EB Wallings Road – one (1) lane (thru-right), WB Wallings Road – one (1) lane (left-thru) and SB I-77 Ramp – two (2) lanes (left, right). It should be noted that the fourth leg of the intersection exists as a southbound outbound only leg, which is the entrance ramp for I-77 southbound.

#### Wallings Road / I-77 NB Ramps / Mill Road Intersection:

This intersection is currently signalized using span wire to support the traffic signal heads with signal poles located on the northwest and southeast corners of the intersection. The intersection consists of three (3) approaches with the following lane configurations: EB Wallings Road – one (1) lane (left-thru), WB Wallings Road – one (1) lane (thru-right) and NB Mill Road – one (1) lane (left-thru-right). It should be noted that I-77 NB traffic exiting the highway onto Wallings Road, must use Mill





Road northbound to get to Wallings Road as the exit ramp dead-ends into Mill Road. Additionally, the fourth leg of the intersection exists as a northbound only leg, which is the entrance ramp for I-77 northbound.

**Table 1** summarizes the results of the capacity analysis for the signalized intersections within the study area using Existing Year 2015 certified traffic volumes. The analysis is performed utilizing the computer program HCS2010 which is developed by McTrans Corporation and based on the 2010 Highway Capacity Manual and the 2009 Manual of Uniform Traffic Control Devices (MUTCD). Based on criteria established by ODOT, Highway Capacity Software (HCS) is used to determine the required number of lanes and the lane assignments at intersections (i.e. the needed intersection capacity). The analysis was performed for the intersection during the AM and PM peak hours. Existing traffic signal timings including cycle lengths, offsets and splits were obtained from the City of Broadview Heights and ODOT for use in the analysis. See **Appendix B** for the HCS Intersection Capacity Analysis printouts.



Table 1: HCS Intersection Capacity Analysis Summary – Existing Year 2015 Conditions - Signalized Intersections				
Intersection / Movement	AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Broadview Road</b>				
Eastbound Left	D	39.5	D	38.4
Eastbound Thru-Right	F	346.2	E	78.3
<i>Eastbound Approach</i>	F	244.0	E	67.0
Westbound Left	C	25.0	D	36.6
Westbound Thru	D	37.8	F	170.1
Westbound Right	D	35.4	D	37.8
<i>Westbound Approach</i>	C	34.3	F	114.9
Northbound Left	C	32.4	D	38.5
Northbound Thru	F	198.6	E	63.8
Northbound Thru-Right	F	201.1	E	65.1
<i>Northbound Approach</i>	F	191.1	E	59.6
Southbound Left	D	36.5	D	42.3
Southbound Thru	D	50.6	F	148.7
Southbound Thru-Right	D	50.9	F	150.9
<i>Southbound Approach</i>	D	47.8	F	129.5
<b>Intersection Total</b>	<b>F</b>	<b>170.1</b>	<b>F</b>	<b>101.8</b>
<b>Wallings Road / Wyatt Road</b>				
Eastbound Thru-Right	F	106.8	C	25.5
<i>Eastbound Approach</i>	F	106.8	C	25.5
Westbound Left	C	24.4	B	15.7
Westbound Thru	A	8.7	F	88.4
<i>Westbound Approach</i>	B	10.8	E	79.1
Northbound Left-Thru-Right	D	48.9	D	37.1
<i>Northbound Approach</i>	D	48.9	D	37.1
<b>Intersection Total</b>	<b>E</b>	<b>74.9</b>	<b>E</b>	<b>62.5</b>
<b>Wallings Road / Wright Road</b>				
Eastbound Left	A	8.1	B	18.0
Eastbound Thru-Right	F	226.4	C	22.9
<i>Eastbound Approach</i>	F	222.7	C	22.8
Westbound Left	B	18.0	B	10.7
Westbound Thru-Right	B	17.7	F	368.2
<i>Westbound Approach</i>	B	17.7	F	363.2
Northbound Left-Thru-Right	C	32.4	C	32.2
<i>Northbound Approach</i>	C	32.4	C	32.2
Southbound Left-Thru-Right	C	33.1	C	32.4
<i>Southbound Approach</i>	C	33.1	C	32.4
<b>Intersection Total</b>	<b>F</b>	<b>164.9</b>	<b>F</b>	<b>255.6</b>

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.



Table 1: HCS Intersection Capacity Analysis Summary – Existing Year 2015 Conditions - Signalized Intersections				
Intersection / Movement	AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / I-77 Southbound Ramps Intersection</b>				
Eastbound Thru-Right	F	85.6	B	11.2
Eastbound Approach	F	85.6	B	11.2
Westbound Left-Thru	F	307.6	B	12.8
Westbound Approach	F	307.6	B	12.8
Southbound Left	C	26.5	C	30.5
Southbound Thru-Right	C	27.4	F	644.4
Southbound Approach	C	27.0	F	508.0
<b>Intersection Total</b>	<b>F</b>	<b>110.4</b>	<b>F</b>	<b>261.1</b>
<b>Wallings Road / I-77 Northbound Entrance Ramp / Mill Road</b>				
Eastbound Left-Thru-Right	F	243.9	B	13.5
Eastbound Approach	F	243.9	B	13.5
Westbound Left-Thru-Right	A	6.8	A	6.4
Westbound Approach	A	6.8	A	6.4
Northbound Left-Thru-Right	F	174.3	F	277.7
Northbound Approach	F	174.3	F	277.7
<b>Intersection Total</b>	<b>F</b>	<b>180.0</b>	<b>F</b>	<b>101.3</b>

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.

As illustrated in **Table 1**, the Existing Year 2015 analysis indicates that all signalized intersections are operating at LOS E or F overall during both peak hours. The delay at the signalized intersections is caused by two (2) issues. The first issue, which occurs at the I-77 / Wallings Road interchange and the Wallings Road / Broadview Road intersection, is due to capacity issues at the intersection where additional lanes must be added to achieve acceptable Levels-of-Service. The second issue is at the Wallings Road / Wright Road and Wallings Road / Wyatt Road intersections where acceptable Levels-of-Service could be achieved with the existing lane geometries at the intersections if the existing signal timings and cycle lengths were modified.

**Table 2** summarizes the results of the capacity analysis for the unsignalized intersections within the study area using Existing Year 2015 certified traffic volumes. See **Appendix B** for the HCS Intersection Capacity Analysis printouts.



Table 2: HCS Intersection Capacity Analysis Summary – Existing Year 2015 Conditions – Unsignalized Intersections				
Intersection / Movement	AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Elmhurst Drive</b>				
Eastbound Left	A	8.2	B	12.0
Southbound Left-Right	C	23.3	E	43.4
Southbound Approach	C	23.3	E	43.4
<b>Wallings Road / Longview Road</b>				
Eastbound Left	A	8.1	B	12.0
Southbound Left-Right	C	21.6	E	47.7
Southbound Approach	C	21.6	E	47.7
<b>Wallings Road / Chestnut Boulevard</b>				
Westbound Left	B	10.4	A	8.9
Northbound Left-Right	D	26.5	E	44.0
Northbound Approach	D	26.5	E	44.0
<b>Wallings Road / Overlook Avenue</b>				
Westbound Left	B	10.4	A	8.8
Northbound Left-Right	C	23.8	D	33.5
Northbound Approach	C	23.8	D	33.5
<b>Wallings Road / McCreary Road</b>				
Eastbound Left	A	8.2	B	12.5
Southbound Left-Right	D	27.9	F	68.9
Southbound Approach	D	27.9	F	68.9
<b>Wallings Road / Majestic Oaks Trail</b>				
Eastbound Left	A	8.1	B	13.5
Southbound Left-Right	D	27.8	F	68.5
Southbound Approach	D	27.8	F	68.5
<b>Wallings Road / Creekside Terrace</b>				
Westbound Left	B	11.9	A	8.8
Northbound Left-Right	E	35.2	F	88.4
Northbound Approach	E	35.2	F	88.4

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.



Table 2: HCS Intersection Capacity Analysis Summary – Existing Year 2015 Conditions – Unsignalized Intersections				
Intersection / Movement	AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Joyce Road / Fire Station Drive</b>				
Eastbound Left-Thru-Right	A	8.1	B	13.3
Westbound Left-Thru-Right	B	11.9	A	8.7
Northbound Left-Thru-Right	F	62.9	F	196.5
<i>Northbound Approach</i>	F	62.9	F	196.5
Southbound Left-Thru-Right	F	56.4	F	196.5
<i>Southbound Approach</i>	F	56.4	F	196.5
<b>Wallings Road / Marianna Boulevard</b>				
Westbound Left	B	11.9	A	8.8
Northbound Left-Right	E	36.2	F	53.4
<i>Northbound Approach</i>	E	36.2	F	53.4
<b>Wallings Road / Craig Lane</b>				
Westbound Left	B	12.1	A	8.8
Northbound Left-Right	E	38.9	F	58.3
<i>Northbound Approach</i>	E	38.9	F	58.3
<b>Wallings Road / Skyline Drive</b>				
Eastbound Left	A	8.1	B	13.5
Southbound Left-Right	D	31.2	F	72.0
<i>Southbound Approach</i>	D	31.2	F	72.0
<b>Wallings Road / West Mill Road</b>				
Westbound Left	B	12.2	A	8.8
Northbound Left-Right	E	35.9	F	55.4
<i>Northbound Approach</i>	E	35.9	F	55.4

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.

As illustrated in **Table 2**, the Existing Year 2015 analysis indicates that all unsignalized intersections are currently operating with failing movements during the AM or PM peak hour, with the exception of the Wallings Road / Overlook Avenue intersection. These side street failing movements are due to high mainline traffic volumes and the lack of gaps in traffic for vehicles to turn onto Wallings Road.





## **V. Project Traffic Volumes:**

### ***Certified Traffic Volumes***

For this study, manual turning movement traffic counts were performed at the seventeen (17) study intersections between Tuesday, January 27<sup>th</sup>, 2015 and Wednesday, January 28<sup>th</sup>, 2015. The turning movement counts were performed for thirteen (13) hours from 7:00 AM – 8:00 PM at the Broadview Road, McCreary Road, Wyatt Road, I-77 SB and I-77 NB intersections. The remaining counts were performed for four (4) hours from 7:00 AM – 9:00 AM and 4:00 PM and 6:00 PM.

The Existing Year 2015, Opening Year 2020 and Design Year 2040 certified traffic volumes along Wallings Road were developed by GPD Group for the project and submitted to ODOT on March 26<sup>th</sup>, 2015. These certified traffic volumes include traffic volumes at all intersections within the study area. See **Appendix C** for the certified traffic plates sent to the ODOT Office of Statewide Planning and Research. The certified traffic data includes the design designations, the Average Daily Traffic (ADT), the AM Design Hourly Volume (DHV) and the PM DHV.

### ***Historic Growth Trends***

Historic traffic volumes on Broadview Road (State Route 176) in the study area were obtained from ODOT's website. ODOT has been collecting traffic volumes on Broadview Road since 1980 and the Average Daily Traffic (ADT) volumes on this route during this time frame are available on the ODOT website. According to these volumes the City of Broadview Heights experienced a significant amount of growth from 1980 to the early 1990's. Traffic volumes began to level-off and remain steady from 2000 to present day. Due to this leveling off of traffic volumes it was determined that the growth rate should be calculated utilizing traffic volumes from 2000 to present day to avoid over-inflating future traffic volumes. Based on these historic traffic volumes, GPD Group developed a growth trend-line equation for the roadway. Based on the trend-line equation, traffic on Broadview Road has **increased** 0.24% per year (linearly) over the last fifteen (15) years. Based upon the perceived growth potential for traffic in the study area, a 0.50% growth rate has been applied to the traffic volumes to develop the Opening Year 2020 and Design Year 2040 ADT and peak hour volumes. These growth rates were used when creating the certified traffic plates for this project.

### ***Future Traffic Volumes***

The proposed safety improvements are anticipated to be completed in 2020 which will serve as the 'Opening Year' for the study while the 'Design Year' will be 2040. In order to develop the projected future traffic volumes, the annual growth rate of 0.50% was applied linearly to the existing traffic volumes to compute the Opening Year 2020 as well as the Design Year 2040 traffic conditions. This increase in traffic accounts for 'background growth' which consists of additional traffic from non-specific development and general regional growth that could be expected to occur in the future. The Opening Year 2020 traffic incorporates a 2.50% increase in existing traffic (5 years of growth) while the Design Year 2040 traffic incorporates a 12.50% increase in existing traffic (25 years of growth).



## **VI. Safety Analysis:**

Crash data was obtained from ODOT's GCAT for the calendar years of 2011 to 2013 for the entire study area. A total of 158 crashes occurred within the study area and have been analyzed as part of this study. These crashes include 125 rear-end, 11 angle, 7 sideswipe-passing, 6 left turn, 4 fixed object, 3 head-on and 2 pedestrian related crashes. 79% of all crashes occurred in daylight and 62% occurred on dry pavement. 75% of the crashes were property damage only and 25% of the crashes were injury crashes with no fatal crashes occurring during these three (3) years. See **Appendix D** for collision diagrams of the study corridor and **Appendix E** for crash data summary and charts.

The leading crash type within the study area is one hundred twenty-five (125) rear-end related crashes. These crashes appear to be occurring for two (2) distinct reasons. The first is the rear-end collisions that are occurring at the signalized intersections. These collisions are occurring during the peak hours when the signalized intersections within the study corridor experience significant congestion and long traffic queues. These crashes are occurring due to the congestion along the corridor as vehicles are constantly starting and stopping in traffic and routinely need to wait for several cycle signal lengths to pass through the traffic signals. Thirty (30) of these rear-end crashes are occurring at the Wallings Road / I-77 ramp terminal intersections. The proposed interchange improvements will address the current capacity issue that exists at the interchange and will alleviate the existing rear-end crash problem that exists. An additional forty-two (42) rear-end crashes occurred at the other signalized intersections within the study area. These rear-end crashes will be alleviated by the modification of the existing signal timings to provide better Levels-of-Service at the signalized intersection and by improving the existing signal visibility to motorists by reconstructing the signals and by installing backplates on the newly constructed signals.

Second, rear-end crashes are occurring at the unsignalized intersections and driveways due to the lack of left turn lanes at the intersections or a two-way left turn lane throughout the corridor. As vehicles have to wait for gaps in traffic to perform a left turn at the unsignalized intersections or driveways, thru traffic cannot effectively (or legally) go around the turning traffic leading to congestion and rear-end crashes. The remaining fifty-three (53) rear-end crashes occurred along the study corridor at either unsignalized intersection or driveways. These rear-end crashes will be alleviated by the addition of a center two-way left turn lane.

Typically, a field review of the corridor would show that traffic is passing motorists on the right shoulder to avoid the turning motorists. This would be found by looking for tire tread marks in the shoulder and excess pavement raveling on the shoulder. Field evidence does not exist to show that traffic is passing left turning motorists on the right shoulder of the roadway. This is believed to be due to the fact that the shoulders on Wallings Road are currently approximately 3-4 foot wide, which does not give traffic sufficient space to pass turning vehicles on the right side of the roadway. The high instance of rear-ends throughout the corridor can further be attributed to the fact that traffic is unable to go around left turning traffic, leading to even more congestion than would typically be seen in a this type of a situation.



## Crash Statistics

Using the 2011 to 2013 crash data and the existing traffic volumes, the Crash Frequency, Crash Rate, Relative Severity Index (RSI), Equivalent Property Damage Only (EPDO), and EPDO Rate, were calculated for the crashes occurring in the study area. See **Table 3** for the results of these calculations and **Appendix F** for the safety application which performs the necessary calculations.

Study Area Corridors	Number of Crashes	Expected Crash Frequency	Ratio Fatal and Serious Injuries to Total Crashes	RSI	EPDO Index	Volume to Capacity Ratio
Total Crashes	158	47.11	0.01	\$28,480	3.15	2.37

The expected crash frequency is calculated by the Economic Crash Analyst Tool (ECAT), which is calculated based upon the geometric conditions, traffic volumes (ADT) and observed crash frequency. See **Table 3** for the expected crash frequency and **Appendix F** for the safety application.

The Ratio of Observed Fatal and Serious Injuries to Observed Total Crashes is calculated by dividing the total number of fatal crashes and serious injury crashes by the total number of observed crashes. See **Table 3** for the ratio of fatal and serious injuries to total crashes and **Appendix F** for the safety application.

The Relative Severity Index (RSI) is a measure of the relative cost to society due to a particular type of crash. Each crash type is given a cost. The RSI is determined by multiplying the number of each type of crash with its associated cost to society. The RSI is the summation of the total cost for all crashes at an intersection or segment divided by the total number of crashes which occurred at the intersection or segment. The RSI reflects the severity of crashes at a location. See **Table 3** for the Relative Severity Index values and **Appendix F** for the safety application.

The Equivalent Property Damage Only (EPDO) index converts all the crashes at a location to an equivalent property damage value. The summation of the type of crash and multiplier results in the EPDO Value. The EPDO Value is divided by the Average Million Vehicles Entering the Intersection to determine the EPDO rate. See **Table 3** for the EPDO Index and **Appendix F** for the safety application.

The volume to capacity (V/C) ratio is a measure that reflects mobility and quality of travel of a facility. It compares roadway demand (vehicle volumes) with roadway supply (carrying capacity). For example, a V/C ratio of 1.00 indicates the roadway facility is operating at its capacity. See **Table 3** for the volumes to capacity ratio and see **Appendix F** for the safety application.



## **VII. Benefit to Cost Analysis:**

### ***Corridor Improvements***

This study has identified long-term improvement recommendations that would reduce the number of crashes occurring within the study area. The following list outlines these improvements:

#### **Long Term Improvements:**

1. Widen Wallings Road to accommodate a two-way left turn lane throughout the entire study area.
2. Construct a westbound right turn lane at the Wallings Road / McCreary Road intersection.
3. Construct a westbound right turn lane at the Wallings Road / Wright Road intersection.
4. Study the traffic signal currently located at the Wallings Road / Wright Road intersection for removal.
5. Construct an eastbound right turn lane at the Wallings Road / West Mill Road intersection.
6. Reconstruct the Wallings Road Bridge over I-77 to accommodate four (4) travel lanes.
7. Construct a second eastbound left turn lane at the Wallings Road / I-77 NB Ramps / Mill Road intersection.
8. Widen the I-77 NB entrance ramp to accommodate the proposed, dual left turn lane from Wallings Road.
9. Widen Mill Road to accommodate a northbound left turn lane at the Wallings Road / I-77 NB Ramps / Mill Road intersection.
10. Widen the I-77 SB exit ramp to accommodate a second right turn lane and construct a second westbound thru lane on Wallings Road to receive the traffic from these (2) lanes.
11. Widen Wallings Road from just east of West Mill Road to the I-77 NB entrance ramp.

The existing crash problem along Wallings Road points to the need for a two-way left turn lane to be constructed throughout the entire project area. A large portion of rear-end crashes along the study corridor are occurring at unsignalized intersections and driveways and involve a vehicle stopping in traffic to complete a left turn movement. The construction of a center two-way left turn lane will allow the left turning traffic to move out



of the thru lanes, which will reduce congestion along the corridor and remove the conflict between left turning and thru vehicles.

The intersection of Wallings Road / McCreary currently meets the volume thresholds necessary for a westbound right turn lane to be constructed. This turn lane will remove turning traffic from the thru lane and reduce the conflicts between thru traffic and right turning traffic. Additionally, a westbound right turn lane should be constructed for the Wallings Road / Wright Road intersection and an eastbound right turn lane should be constructed at the Wallings Road / West Mill Road intersection to reduce these turning movement conflicts and improve operation.

The traffic signal at the Wallings Road / Wright Road intersection is not warranted based upon the Existing Year or Opening Year traffic volumes. For this reason it is recommended that the traffic signal at this intersection be studied for removal. The intersection should operate under two-way stop control once the safety improvements are constructed with Wright Road operating under stop control.

Based on future traffic volumes and capacity demands at the I-77 / Wallings Road interchange, the bridge over Wallings Road will need to be four (4) lanes wide in order to accommodate the future demand at the interchange. Currently, the bridge is only two (2) lanes and does not provide any left turn lanes for traffic turning left onto I-77. The future configuration calls for dual eastbound left turn lanes for traffic trying to enter I-77 NB. Additionally, a single westbound left turn lane is also needed for left turning traffic onto I-77 SB. The geometry over the bridge calls for the outside eastbound left turn lane to be the entire length of the bridge while the inside eastbound left turn lane should be back-to-back with the proposed 150 foot westbound left turn lane.

In order to accommodate the recommended dual eastbound left turn lanes at the Wallings Road / I-77 NB Ramps / Mill Road intersection, the entrance ramp for I-77 NB will need to be widened. The second lane on the entrance ramp will need to be merged before the traffic enters I-77 mainline.

In order to service the demand for traffic exiting I-77 SB at Wallings Road, an additional lane needs to be added to the exit ramp. In addition to the existing southbound left and southbound right, an additional 225' southbound right turn lane needs to be constructed (creating dual right turn lanes) so the traffic can exit the highway more efficiently and the Wallings Road / I-77 SB Ramps intersection can operate with acceptable Levels-of-Service. Since Wallings Road currently only provides one (1) travel lane in each direction, Wallings Road will need to be widened to two (2) westbound travel lanes west of the interchange. This additional through lane should be merged west of the West Mill Road intersection.

Wallings Road should be widened from just east of West Mill Road to the I-77 NB Ramp / Mill Road intersection. This improvement is recommended to provide additional capacity through the Wallings Road / I-77 SB Ramps intersection as well as allowing traffic to move into the proper lane as the inside thru lane will become the outside dedicated left turn lane at the Wallings Road / I-77 SB Ramps intersection. The outside thru lane will be the thru lane for traffic wishing to continue eastbound on Wallings Road to travel southbound on Mill Road.





Based upon the capacity analysis along the Wallings Road corridor, Wallings Road needs to be widened to five (5) lanes to accommodate future traffic volumes. However, the decision was made not to pursue this option due to the extensive right-of-way and construction costs associated with a five (5) lane corridor. The estimated cost for the five (5) project is approximately 20.4 million dollars. The city viewed this cost as excessive. Additionally it was felt that simply completing the three (3) lane option will improve capacity somewhat. See **Appendix G** for a cost estimate of the five (5) lane roadway improvement.

See **Figures 10-18** for the proposed 3 lane improvement exhibits for the corridor. These exhibits show the proposed future geometry of the corridor. The estimated cost for the three (3) lane improvements outlined above is approximately 15 million dollars (not including construction inspection or inflation). See **Appendix G** for a cost estimate for above listed improvements.

### ***Benefit to Cost Analysis***

The reduction of crashes within the State of Ohio is the top priority of ODOT's Highway Safety Program (HSP). In order to maximize the impacts of their limited funding allocations, a complex spreadsheet was developed which calculates the anticipated Benefit / Cost ratio for all safety improvement projects. This spreadsheet compares the anticipated construction cost of an improvement to the anticipated reduction in crashes of this improvement. The Benefit / Cost ratio for a safety improvement can then be compared to the anticipated Benefit / Cost ratio for all other safety improvement projects throughout the State. The benefit / cost ratio spreadsheet and all necessary rates and typical crash cost were obtained from the ODOT Highway Safety Program's website. The Estimates of Countermeasure Effectiveness Reduction Factors (CRF) utilized for this Safety Study are located in **Appendix H**.

**Table 4** provides a summary of the Cost / Benefit Ratio for the recommended corridor improvements. In order to adhere to ODOT's current procedures, the ECAT was used to calculate the estimated reduction in excess crashes and Benefit / Cost ratio for the improvements. The Benefit / Cost Analysis and Crash Modification Summary worksheets are contained in **Appendix I**.

Table 4: Benefit to Cost Summary Chart		
	Full Project	Safety Request
Benefit to Cost Results	0.48	1.22

The Benefit / Cost Ratio analyses was performed based upon a cost of \$12,799,920 (which is the total cost of the Wallings Road corridor widening and interchange improvement project, not including construction inspection and inflation). This results in a 0.48 Benefit / Cost ratio. The Benefit / Cost Ratio was then computed based upon the \$5,000,000 being requested from the HSP Safety committee and the Benefit / Cost Ratio is 1.22. Based on the Benefit / Cost ratio of the safety request being greater than 1.00, the Wallings Road corridor widening interchange improvement project should be considered a fundable project and should receive the consideration of the funding committee.



## **VIII. Traffic Analyses:**

### ***Signal Warrant Analysis***

Utilizing the existing and proposed traffic volumes, as specified in Section 402-2 of the ODOT Traffic Engineering Manual (TEM), traffic signal warrant analyses were performed for the intersection. The nine (9) traffic signal warrants provided in the 2012 Ohio Manual of Uniform Traffic Control Devices (OMUTCD) define the minimum conditions under which installing traffic control signals is justified. Due to the availability of some thirteen (13) hour turning movement traffic count data, OMUTCD Warrant #'s 1-3 were deemed applicable for the Existing Year 2015 warrant analyses. The warrants are described as follows:

#### *Warrant #1 Eight Hour Vehicular Volume*

The Eight Hour Vehicular Volume warrant is intended for application where the volume of intersection traffic is the principal reason for consideration of the signal installation. Three (3) conditions are possible to satisfy this particular warrant. Condition A applies to specifically minimum vehicular volume requirements. Condition B deals with the interruption of continuous traffic flow. Condition C represents a combination of Conditions A and B being met at reduced volume requirements. When the 85<sup>th</sup> percentile speed of the major street traffic exceeds 40 mph in either an urban or rural area, or when the intersection lies within a built-up area of an isolated community having a population less than 10,000, the Eight Hour Vehicular Volume Warrant is seventy percent (70%) of the base requirements.

#### *Warrant #2 Four Hour Vehicular Volume*

The Four Hour Vehicular Volume warrant is satisfied when for four (4) hours of an average day, minimum volumes are reached on both the major street (total of both approaches) and the highest volume minor street approach (one direction only). When the 85<sup>th</sup> percentile speed of the major street traffic exceeds 40 mph or when the intersection lies within a built-up area of an isolated community having a population less than 10,000, the Four Hour Vehicular Volume requirements are reduced to seventy percent (70%) of the base values.

#### *Warrant #3 Peak Hour Vehicular Volume*

The Peak Hour Vehicular Volume warrant is intended for application when traffic conditions are such that for one hour of the day, minor street traffic suffers undue delay in entering or crossing the major street. The Peak Hour Vehicular Volume warrant is satisfied when the minimum required volumes on the major and highest volume minor approach are met for any one hour period (any four consecutive 15-minute periods) on an average day. When the 85<sup>th</sup> percentile speed of the major street traffic exceeds 40 mph or when the intersection lies within a built up area of an isolated community having a population less than 10,000, the Peak Hour Vehicular Volume warrants are reduced.



In order to determine whether the existing intersection meets a warrant based on the current traffic conditions, the existing traffic data was compared to the volume thresholds for each of the above warrants. The results of the Existing Year 2015 signal warrant analysis are shown in **Table 5**. See **Appendix J** for the traffic signal warrant analysis.

Intersection	Signal Warrants		
	Warrant #1 (Eight Hour Vehicular Volume)	Warrant #2 (Four Hour Vehicular Volume)	Warrant #3 (Peak Hour Vehicular Volume)
Wallings Road / Broadview Road	<b>Satisfied</b>	<b>Satisfied</b>	<b>Satisfied</b>
Wallings Road / Elmhurst Road*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Longview Road*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Chestnut Boulevard*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Overlook Avenue*	N/A	Not Satisfied	Not Satisfied
Wallings Road / McCreary Road*	Not Satisfied	Not Satisfied	Not Satisfied
Wallings Road / Wyatt Road	Not Satisfied	Not Satisfied	Not Satisfied
Wallings Road / Majestic Oaks Trail*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Creekside Trace*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Joyce Road / Fire Station Drive*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Marianna Boulevard*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Wright Road	Not Satisfied	Not Satisfied	Not Satisfied
Wallings Road / Craig Lane*	N/A	Not Satisfied	Not Satisfied
Wallings Road / Skyline Drive*	N/A	Not Satisfied	Not Satisfied
Wallings Road / West Mill Road*	N/A	Not Satisfied	Not Satisfied
Wallings Road / I-77 SB Ramps	<b>Satisfied</b>	<b>Satisfied</b>	<b>Satisfied</b>
Wallings Road / I-77 NB Ramps / Mill Road	<b>Satisfied</b>	<b>Satisfied</b>	<b>Satisfied</b>

\* - Intersection is currently unsignalized.

As shown in **Table 5**, all existing unsignalized intersections fail to meet the minimum volumes thresholds to warrant a traffic signal based on existing volumes. Additionally, the two (2) signalized intersections of Wallings Road / Wyatt Road and Wallings Road / Wright Road fail to meet a volume based signal warrant based on the existing volumes. It should be noted that Warrant #1 (Eight Hour Vehicular Volume) could not be analyzed for the majority of the traffic counts since only four (4) hour counts were performed.



Since the traffic volumes are anticipated to change in future years due to the traffic growth that is expected to occur along this corridor, the Opening Year 2020 traffic volumes at the study intersections were compared to the volume thresholds for the peak hour warrant (Warrant #3). Traffic signal warrants were once again evaluated for all study intersections. The results of the Opening Year 2020 'Build' traffic signal warrant analysis are shown in **Table 6**. See **Appendix J** for the traffic signal warrant analysis.

Table 6: Traffic Signal Warrant Analysis Summary – Opening Year 2020 'Build' Conditions	
Intersection	Signal Warrants
	Warrant #3 (Peak Hour Vehicular Volume)
Wallings Road / Broadview Road	<b>Satisfied</b>
Wallings Road / Elmhurst Road*	Not Satisfied
Wallings Road / Longview Road*	Not Satisfied
Wallings Road / Chestnut Boulevard*	Not Satisfied
Wallings Road / Overlook Avenue*	Not Satisfied
Wallings Road / McCreary Road*	Not Satisfied
Wallings Road / Wyatt Road	<b>Satisfied</b>
Wallings Road / Majestic Oaks Trail*	Not Satisfied
Wallings Road / Creekside Trace*	Not Satisfied
Wallings Road / Joyce Road / Fire Station Drive*	Not Satisfied
Wallings Road / Marianna Boulevard*	Not Satisfied
Wallings Road / Wright Road	Not Satisfied
Wallings Road / Craig Lane*	Not Satisfied
Wallings Road / Skyline Drive*	Not Satisfied
Wallings Road / West Mill Road*	Not Satisfied
Wallings Road / I-77 SB Ramps	<b>Satisfied</b>
Wallings Road / I-77 NB Ramps / Mill Road	<b>Satisfied</b>

\* - Intersection is currently unsignalized.

The Opening Year 2020 results are the same as the Existing Year 2015 results with the exception of the Wallings Road / Wyatt Road intersection. This intersection is currently signalized and a volume based traffic signal warrant has been satisfied under the Opening Year 2020 traffic volumes.

The only signalized intersection within the study are that did not meet a warrant is the Walling Road / Wright Road intersection. This signal is to be analyzed as unsignalized in the 'Build' conditions within this report, and will be recommended to be studied for removal.



### ***Auxiliary Turning Lane Warrants***

Utilizing the projected Design Year 2040 traffic volumes, auxiliary turn lane warrant analyses were performed for each unsignalized intersection within the study area under the Design Year 2040 'Build' traffic conditions. ODOT publishes the State Highway Access Management Manual which includes warrant charts for auxiliary turn lanes. These warrant charts were utilized to determine if auxiliary turn lanes will be required at the unsignalized intersections. The results of the auxiliary turn lane analyses for the Design Year 2040 'Build' traffic scenarios are summarized in **Table 7**. See **Appendix K** for the auxiliary turn lane warrant analysis.

Intersection	Auxiliary Turn Lane Warrants			
	Eastbound Left Turn Lane Warrant	Eastbound Right Turn Lane Warrant	Westbound Left Turn Lane Warrant	Westbound Right Turn Lane Warrant
Wallings Road / Elmhurst Road	<b>Satisfied</b>	N/A	N/A	Not Satisfied
Wallings Road / Longview Road	<b>Satisfied</b>	N/A	N/A	Not Satisfied
Wallings Road / Chestnut Boulevard	N/A	Not Satisfied	<b>Satisfied</b>	N/A
Wallings Road / Overlook Avenue	N/A	Not Satisfied	<b>Satisfied</b>	N/A
Wallings Road / McCreary Road	<b>Satisfied</b>	N/A	N/A	<b>Satisfied</b>
Wallings Road / Majestic Oaks Trail	<b>Satisfied</b>	N/A	N/A	Not Satisfied
Wallings Road / Creekside Trace	N/A	Not Satisfied	<b>Satisfied</b>	
Wallings Road / Joyce Road / Fire Station Drive	<b>Satisfied</b>	<b>Satisfied</b>	<b>Satisfied</b>	Not Satisfied
Wallings Road / Marianna Boulevard	N/A	Not Satisfied	<b>Satisfied</b>	N/A
Wallings Road / Wright Road	<b>Satisfied</b>	Not Satisfied	<b>Satisfied</b>	<b>Satisfied</b>
Wallings Road / Craig Lane	N/A	Not Satisfied	<b>Satisfied</b>	N/A
Wallings Road / Skyline Drive	<b>Satisfied</b>	N/A	N/A	Not Satisfied
Wallings Road / West Mill Road	N/A	<b>Satisfied</b>	<b>Satisfied</b>	N/A

As shown in **Table 7**, multiple turn lane warrants are satisfied at the unsignalized intersections within the study area. As noted in the table, left turn lanes are warranted at all unsignalized intersections within the study area. Additionally, there are four (4) right turn lanes that are warranted within the study area. The first is a westbound right turn lane at the Wallings Road / McCreary Road intersection. Additionally, eastbound right turn lanes are warranted at the Wallings Road / Joyce Road / Fire Station Drive and Wallings Road / West Mill Road. Lastly, a westbound right turn lane is warranted at the Wallings Road / Wright Road intersection.



### ***Intersection Capacity Analysis***

Intersection capacity analyses were performed for the Opening Year 2020 and Design Year 2040 conditions in order to determine the operating conditions experienced by each intersection. The quality of the operating conditions experienced by an intersection is measured in terms of Level-of-Service (LOS). Levels-of-Service can range from LOS A to LOS F. Level-of-Service ratings of A, B, and C are considered to be in the acceptable range. Level-of-Service D is typically considered acceptable in urban areas (which the study area utilized for this project have been determined to be within). Levels-of-Service E and F are considered below average with significant levels of delay experienced by vehicles. The Level-of-Service thresholds vary for signalized and unsignalized intersections. The thresholds related to average control delay for both signalized and unsignalized intersections are as follows:

<b>Level-of-Service</b>	<b>Delay Threshold – Signalized (Sec)</b>	<b>Delay Threshold – Unsignalized (Sec)</b>
A	< 10	< 10
B	> 10 - 20	> 10 – 15
C	> 20 - 35	> 15 – 25
D	> 35 - 55	> 25 – 35
E	> 55 - 80	> 35 – 50
F	> 80	> 50

The analysis is performed utilizing the computer program HCS2010 which is developed by McTrans Corporation and based on the 2010 Highway Capacity Manual and the 2009 Manual of Uniform Traffic Control Devices (MUTCD). Based on criteria established by ODOT, Highway Capacity Software (HCS) is used to determine the required number of lanes and the lane assignments at intersections (i.e. the needed intersection capacity). The analysis was performed for the intersection during the AM and PM peak hours. Existing traffic signal timings including cycle lengths, offsets, and splits were obtained from the City of Broadview Heights and ODOT for use in the analysis.

### ***Opening Year 2020 Capacity Analyses***

**Table 8** summarizes the HCS Intersection Capacity Analysis and details the Levels-of-Service and delay experienced under the Opening Year 2020 ‘No-Build’ and ‘Build’ traffic conditions at the signalized intersections within the study area. The ‘Build’ scenario incorporates all of the transportation improvements listed in Section VII. See **Appendix L** for the HCS Intersection Capacity Analysis printouts.



Table 8: HCS Intersection Capacity Analysis Summary - Opening Year 2020 'No-Build' vs. 'Build' Conditions Signalized Intersections								
Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Broadview Road</b>								
Eastbound Left	D	40.1	D	38.4	D	37.6	F	157.1
Eastbound Thru-Right	F	357.4	F	82.8	D	54.6	C	30.3
Eastbound Approach	F	250.5	E	70.5	D	48.8	E	65.4
Westbound Left	C	25.0	D	40.6	C	34.6	D	50.7
Westbound Thru	D	38.1	F	184.5	C	25.1	E	62.2
Westbound Right	D	35.4	D	37.8	C	23.3	C	22.7
Westbound Approach	C	34.6	F	124.7	C	26.8	D	53.9
Northbound Left	C	32.4	D	38.5	C	24.6	F	112.1
Northbound Thru	F	210.2	E	64.7	D	51.4	D	39.4
Northbound Thru-Right	F	212.7	E	66.2	D	53.2	D	39.7
Northbound Approach	F	202.3	E	60.5	D	50.9	D	52.8
Southbound Left	D	36.5	D	44.0	C	32.8	F	97.8
Southbound Thru	D	50.6	F	164.0	C	29.1	E	56.9
Southbound Thru-Right	D	50.9	F	166.0	C	29.2	E	58.3
Southbound Approach	D	47.8	F	141.9	C	29.9	E	65.3
<b>Intersection Total</b>	<b>F</b>	<b>176.9</b>	<b>F</b>	<b>110.0</b>	<b>D</b>	<b>44.2</b>	<b>E</b>	<b>58.7</b>
<b>Wallings Road / Wyatt Road</b>								
Eastbound Thru-Right	F	116.3	C	27.0	D	50.6	B	10.3
Eastbound Approach	F	116.3	C	27.0	D	50.6	B	10.3
Westbound Left	C	24.4	B	17.2	C	27.3	A	7.4
Westbound Thru	A	8.7	F	99.3	A	7.5	C	34.2
Westbound Approach	B	10.8	F	88.6	B	10.1	C	30.7
Northbound Left-Thru-Right	D	50.9	D	37.1	D	54.6	D	41.2
Northbound Approach	D	50.9	D	37.1	D	54.6	D	41.2
<b>Intersection Total</b>	<b>F</b>	<b>80.7</b>	<b>E</b>	<b>69.1</b>	<b>D</b>	<b>41.9</b>	<b>C</b>	<b>25.5</b>

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.





Table 8: HCS Intersection Capacity Analysis Summary - Opening Year 2020 'No-Build' vs. 'Build' Conditions Signalized Intersections (Cont.)								
Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Wright Road</b>								
Eastbound Left	A	8.2	B	18.0	N/A	N/A	N/A	N/A
Eastbound Thru-Right	F	242.6	C	23.3	N/A	N/A	N/A	N/A
Eastbound Approach	F	238.7	C	23.2	N/A	N/A	N/A	N/A
Westbound Left	B	18.0	B	10.9	N/A	N/A	N/A	N/A
Westbound Thru-Right	B	17.9	F	390.5	N/A	N/A	N/A	N/A
Westbound Approach	B	17.9	F	385.3	N/A	N/A	N/A	N/A
Northbound Left-Thru-Right	C	32.4	C	32.2	N/A	N/A	N/A	N/A
Northbound Approach	C	32.4	C	32.2	N/A	N/A	N/A	N/A
Southbound Left-Thru-Right	C	33.1	C	32.4	N/A	N/A	N/A	N/A
Southbound Approach	C	33.1	C	32.4	N/A	N/A	N/A	N/A
<b>Intersection Total</b>	<b>F</b>	<b>176.5</b>	<b>F</b>	<b>271.8</b>	N/A	N/A	N/A	N/A
<b>Wallings Road / I-77 Southbound Ramps Intersection</b>								
Eastbound Thru	N/A	N/A	N/A	N/A	B	19.4	B	15.4
Eastbound Thru-Right	F	97.7	B	11.3	B	19.7	B	15.4
Eastbound Approach	F	97.7	B	11.3	B	19.5	B	15.4
Westbound Left	F	309.5	B	13.4	C	32.3	B	18.9
Westbound Thru	F	309.5	B	13.4	B	13.2	B	17.1
Westbound Approach	F	309.5	B	13.4	B	17.3	B	17.3
Southbound Left	C	26.5	C	31.1	B	20.0	B	13.6
Southbound Thru	C	27.4	F	679.1	B	19.1	B	18.7
Southbound Right	C	27.0	F	534.5	B	19.6	B	17.4
Southbound Approach	C	27.0	F	534.5	B	19.6	B	17.4
<b>Intersection Total</b>	<b>F</b>	<b>119.5</b>	<b>F</b>	<b>276.7</b>	<b>B</b>	<b>19.2</b>	<b>B</b>	<b>16.9</b>

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.



Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / I-77 Northbound Entrance Ramp / Mill Road</b>								
Eastbound Left	F	265.8	B	14.6	C	33.2	C	34.9
Eastbound Thru-Right					B	14.5	C	31.3
Eastbound Approach	F	265.8	B	14.6	C	28.9	C	32.5
Westbound Left					D	39.0	C	28.6
Westbound Thru	A	6.9	A	6.4	C	28.3	B	17.1
Westbound Right					D	39.2	B	16.7
Westbound Approach	A	6.9	A	6.4	D	36.1	B	17.3
Northbound Left	F	197.2	F	290.0	C	29.6	D	36.8
Northbound Thru-Right					D	39.6	B	19.8
Northbound Approach	F	197.2	F	290.0	D	36.0	C	32.7
<b>Intersection Total</b>	<b>F</b>	<b>197.5</b>	<b>F</b>	<b>105.9</b>	<b>C</b>	<b>32.1</b>	<b>C</b>	<b>29.6</b>

Note: Orange highlighted cells indicate a Level of Service E.  
 Red highlighted cells indicate a Level of Service F.

The Opening Year 2020 'No-Build' results shows results similar to the Existing Year 2015 conditions. The 'Build' results show that all signalized intersections are now anticipated to operate with acceptable Levels-of-Service during both peak hours with the exception of the Wallings Road / Broadview Road intersection. It should be noted that the capacity issues at the Wallings Road / Broadview Road intersection aren't being addressed since this intersection already has a left turn lane for Wallings Road and no geometric improvements are being made. However, the overall intersection delay is improved by 75% in the AM peak hour and by 47% in the PM peak hour by simply optimizing the existing signal timings.

**Table 9** summarizes the HCS Intersection Capacity Analysis and details the Levels-of-Service and delay experienced under the Opening Year 2020 'No-Build' and 'Build' traffic conditions at the unsignalized intersections within the study area.



Table 9: HCS Intersection Capacity Analysis Summary - Opening Year 2020 'No-Build' vs. 'Build' Conditions Unsignalized Intersections								
Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Elmhurst Drive</b>								
Eastbound Left	A	8.2	B	12.2	A	8.2	B	12.2
Southbound Left-Right	C	24.1	E	47.0	C	24.1	E	47.0
Southbound Approach	C	24.1	E	47.0	C	24.1	E	47.0
<b>Wallings Road / Longview Road</b>								
Eastbound Left	A	8.2	B	12.2	A	8.2	B	12.2
Southbound Left-Right	C	22.2	F	52.1	B	22.2	F	52.1
Southbound Approach	C	22.2	F	52.1	B	22.2	F	52.1
<b>Wallings Road / Chestnut Boulevard</b>								
Westbound Left	B	10.5	A	9.0	B	10.4	A	9.0
Northbound Left-Right	D	27.5	E	47.7	D	27.5	E	47.7
Northbound Approach	D	27.5	E	47.7	D	27.5	E	47.7
<b>Wallings Road / Overlook Avenue</b>								
Westbound Left	B	10.5	A	8.9	B	10.5	A	8.9
Northbound Left-Right	C	24.6	E	36.2	C	24.2	E	36.2
Northbound Approach	C	24.6	E	36.2	C	24.2	E	36.2
<b>Wallings Road / McCreary Road</b>								
Eastbound Left	A	8.2	B	12.7	A	8.2	B	12.7
Southbound Left-Right	D	29.3	F	76.9	D	28.6	F	71.0
Southbound Approach	D	29.3	F	76.9	D	28.6	F	71.0
<b>Wallings Road / Majestic Oaks Trail</b>								
Eastbound Left	A	8.2	B	13.8	A	8.2	B	13.8
Southbound Left-Right	D	29.1	F	75.8	D	29.1	F	75.8
Southbound Approach	D	29.1	F	75.8	D	29.1	F	75.8

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.



Table 9: HCS Intersection Capacity Analysis Summary - Opening Year 2020 'No-Build' vs. 'Build' Conditions Unsignalized Intersections (Cont.)								
Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Creekside Terrace</b>								
Westbound Left	B	12.1	A	8.8	B	11.9	A	8.8
Northbound Left-Right	E	37.7	F	100.7	E	38.3	F	100.7
Northbound Approach	E	37.7	F	100.7	E	38.3	F	100.7
<b>Wallings Road / Joyce Road / Fire Station Drive</b>								
Eastbound Left	A	8.1	B	13.7	A	8.1	B	13.7
Westbound Left	B	12.1	A	8.8	B	12.1	A	8.8
Northbound Left-Thru-Right	F	70.0	F	241.8	F	64.8	F	182.1
Northbound Approach	F	70.0	F	241.8	F	64.8	F	182.1
Southbound Left-Thru-Right	F	62.0	F	252.9	F	59.5	F	204.4
Southbound Approach	F	62.0	F	252.9	F	59.5	F	204.4
<b>Wallings Road / Marianna Boulevard</b>								
Westbound Left	B	12.1	A	8.8	B	12.0	A	8.8
Northbound Left-Right	E	38.6	F	58.3	E	38.6	F	58.3
Northbound Approach	E	38.6	F	58.3	E	38.6	F	58.3
<b>Wallings Road / Wright Road</b>								
Eastbound Left	N/A	N/A	N/A	N/A	A	8.1	B	13.7
Westbound Left	N/A	N/A	N/A	N/A	B	11.9	A	8.8
Northbound Left-Thru-Right	N/A	N/A	N/A	N/A	F	115.7	F	466.4
Northbound Approach	N/A	N/A	N/A	N/A	F	115.7	F	466.4
Southbound Left-Thru-Right	N/A	N/A	N/A	N/A	F	307.4	F	385.0
Southbound Approach	N/A	N/A	N/A	N/A	F	307.4	F	385.0
<b>Wallings Road / Craig Lane</b>								
Westbound Left	B	12.3	A	8.9	B	12.3	A	8.9
Northbound Left-Right	E	41.6	F	62.5	E	41.6	F	62.5
Northbound Approach	E	41.6	F	62.5	E	41.6	F	62.5

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.



Table 9: HCS Intersection Capacity Analysis Summary - Opening Year 2020 'No-Build' vs. 'Build' Conditions Unsignalized Intersections (Cont.)								
Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Skyline Drive</b>								
Eastbound Left	A	8.2	B	13.8	A	8.2	B	13.8
Southbound Left-Right	D	32.9	F	80.1	D	32.9	F	80.1
Southbound Approach	D	32.9	F	80.1	D	32.9	F	80.1
<b>Wallings Road / West Mill Road</b>								
Westbound Left	B	12.4	A	8.9	B	12.4	A	8.9
Northbound Left-Right	E	38.1	F	60.8	D	33.3	F	60.8
Northbound Approach	E	38.1	F	60.8	D	33.3	F	60.8

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.

The Opening Year 2020 'No-Build' results shows results similar to the Existing Year 2015 conditions. The 'Build' results show slight improvements at the unsignalized intersections within the study area. The improvements are seen on the mainline Wallings Road left turning movements as opposed to the side street movements. It should be noted that the delay shown above does not show the true capacity benefits of adding the center two-way left turn lane. The HCS 2010 program does not show the delay on the Wallings Road thru movement as it is a free-flow movement. However, moving the left turning traffic out of the thru lane reduces congestion to thru traffic since the left turners will no longer be blocking traffic as they make the left turn movement.

It should be noted that although the unsignalized intersection of Wallings Road / Wright Road is operating with high side street delay, the peak hour delay warrant is not satisfied at this intersection as Wright Road does not meet the minimum side street volume threshold (100 vehicles) to satisfy the peak hour delay warrant.

Additional traffic analysis was completed based upon the results of the 2020 build analysis in order to determine what improvements would be required to provide acceptable Levels of Service. Based upon additional intersection and segment analysis, Wallings Road would need to be widened to five (5) lanes in order to provide LOS D or higher on all movements. Based upon anticipated cost implications of a project of this size combined with the right of way impacts, the City has decided that a five (5) lane project on Wallings Road should not be completed. Additionally, there is also the possibility from a regional basis that traffic may shift away from Wallings Road in the near future once the SR 82 / I-77 Interchange and SR 82 widening west of I-77 are completed. There is the possibility that traffic is currently avoiding the SR 82 corridor and instead is utilizing Wallings Road due to the congestion on SR 82. Once the planned improvements on SR 82 are completed, congestion will be relieved and traffic can flow much more freely on SR 82. In order to prudently plan Capital Improvement Projects, the City of Broadview Heights believes that Wallings Road should only be widened to three (3) lanes at this time.



**Design Year 2040 Capacity Analyses**

**Table 10** summarizes the HCS Intersection Capacity Analysis and details the Levels-of-Service and delay experienced under the Design Year 2040 ‘No-Build’ and ‘Build’ traffic conditions at the signalized intersections within the study area. The ‘Build’ scenario incorporates all of the transportation improvements listed in Section VII. See **Appendix L** for the HCS Intersection Capacity Analysis printouts.

Table 10: HCS Intersection Capacity Analysis Summary - Design Year 2040 ‘No-Build’ vs. ‘Build’ Conditions Signalized Intersections								
Intersection / Movement	‘No-Build’ Conditions				‘Build’ Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Broadview Road</b>								
Eastbound Left	D	42.4	D	39.7	D	48.0	F	182.9
Eastbound Thru-Right	F	438.4	F	102.5	E	69.7	D	41.0
<i>Eastbound Approach</i>	F	306.4	F	84.4	E	62.5	F	81.9
Westbound Left	C	25.2	E	55.4	E	78.0	D	52.5
Westbound Thru	D	38.6	F	236.0	C	27.5	F	98.1
Westbound Right	D	35.7	D	38.5	C	25.4	C	22.3
<i>Westbound Approach</i>	C	34.9	F	159.2	D	38.4	E	75.3
Northbound Left	C	32.7	D	39.8	C	28.0	F	190.8
Northbound Thru	F	267.9	E	73.3	E	63.1	E	56.0
Northbound Thru-Right	F	272.0	E	75.4	E	65.9	E	57.7
<i>Northbound Approach</i>	F	256.9	E	67.8	E	62.4	F	82.2
Southbound Left	D	36.8	D	51.8	D	51.0	E	60.0
Southbound Thru	D	51.2	F	206.5	C	32.6	E	75.1
Southbound Thru-Right	D	51.6	F	208.5	C	32.8	E	77.3
<i>Southbound Approach</i>	D	48.3	F	177.6	D	36.5	E	73.1
<b>Intersection Total</b>	<b>F</b>	<b>217.3</b>	<b>F</b>	<b>136.3</b>	<b>E</b>	<b>55.8</b>	<b>E</b>	<b>76.9</b>
<b>Wallings Road / Wyatt Road</b>								
Eastbound Thru-Right	F	165.9	C	30.5	F	72.5	A	9.4
<i>Eastbound Approach</i>	F	165.9	C	30.5	E	72.5	A	9.4
Westbound Left	C	24.5	C	20.9	C	30.9	A	8.1
Westbound Thru	A	8.9	F	149.2	A	8.0	F	59.6
<i>Westbound Approach</i>	B	11.2	F	133.1	B	11.2	D	53.2
Northbound Left-Thru-Right	E	59.1	D	37.7	E	72.2	D	53.2
<i>Northbound Approach</i>	E	59.1	D	37.7	E	72.2	D	53.2
<b>Intersection Total</b>	<b>F</b>	<b>111.7</b>	<b>F</b>	<b>99.9</b>	<b>E</b>	<b>58.3</b>	<b>D</b>	<b>41.1</b>

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.



Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Wright Road</b>								
Eastbound Left	A	8.5	B	18.0	N/A	N/A	N/A	N/A
Eastbound Thru-Right	F	313.0	C	26.8	N/A	N/A	N/A	N/A
Eastbound Approach	F	308.5	C	26.7	N/A	N/A	N/A	N/A
Westbound Left	B	18.0	B	12.5	N/A	N/A	N/A	N/A
Westbound Thru-Right	B	18.6	F	468.5	N/A	N/A	N/A	N/A
Westbound Approach	B	18.6	F	462.8	N/A	N/A	N/A	N/A
Northbound Left-Thru-Right	C	32.4	C	32.2	N/A	N/A	N/A	N/A
Northbound Approach	C	32.4	C	32.2	N/A	N/A	N/A	N/A
Southbound Left-Thru-Right	C	33.5	C	32.4	N/A	N/A	N/A	N/A
Southbound Approach	C	33.5	C	32.4	N/A	N/A	N/A	N/A
<b>Intersection Total</b>	<b>F</b>	<b>226.7</b>	<b>F</b>	<b>325.1</b>	N/A	N/A	N/A	N/A
<b>Wallings Road / I-77 Southbound Ramps Intersection</b>								
Eastbound Thru	N/A	N/A	N/A	N/A	C	20.3	B	15.6
Eastbound Thru-Right	F	152.3	B	12.7	C	21.0	B	15.6
Eastbound Approach	F	152.3	B	12.7	C	20.7	B	15.6
Westbound Left	F	419.3	C	24.6	D	37.1	C	21.7
Westbound Thru	F	419.3	C	24.6	B	12.5	C	31.1
Westbound Approach	F	419.3	C	24.6	B	18.1	C	30.1
Southbound Left	C	27.0	C	33.5	C	21.3	B	14.9
Southbound Thru	C	28.0	F	771.5	C	20.3	C	35.0
Southbound Right	C	27.5	F	603.8	C	20.8	C	30.2
Southbound Approach	C	27.5	F	603.8	C	20.8	C	30.2
<b>Intersection Total</b>	<b>F</b>	<b>173.0</b>	<b>F</b>	<b>311.2</b>	<b>C</b>	<b>20.3</b>	<b>C</b>	<b>26.5</b>

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.





Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / I-77 Northbound Entrance Ramp / Mill Road</b>								
Eastbound Left	F	369.2	C	21.6	D	40.4	D	37.6
Eastbound Thru-Right					B	14.9	D	48.3
Eastbound Approach	F	369.2	C	21.6	C	34.5	D	44.8
Westbound Left					D	39.0	C	28.6
Westbound Thru	A	7.1	A	6.6	C	28.6	B	17.4
Westbound Right					D	44.3	B	17.0
Westbound Approach	A	7.1	A	6.6	D	39.6	B	17.6
Northbound Left	F	257.8	F	378.0	C	30.1	D	52.3
Northbound Thru-Right					D	45.5	C	20.1
Northbound Approach	F	257.8	F	378.0	D	39.9	D	44.4
<b>Intersection Total</b>	<b>F</b>	<b>271.5</b>	<b>F</b>	<b>140.1</b>	<b>D</b>	<b>36.8</b>	<b>D</b>	<b>39.4</b>

Note: Orange highlighted cells indicate a Level of Service E.  
 Red highlighted cells indicate a Level of Service F.

The Design Year 2040 'No-Build' results shows results similar to the Existing Year 2015 and Opening Year 2020 conditions. The 'Build' results show improvements at the majority of the intersection. The I-77 / Wallings Road interchange intersections are operating with acceptable Levels-of-Service in the Design Year while the other signalized intersections have had their average delay significantly decreased between the 'No-Build' and 'Build' scenarios. For example, although the Wallings Road / Broadview Road intersection is operating with a LOS E during both peak hours under the 'Build' conditions, the overall intersection delay has been reduced by 74% in the AM peak hour and by 44% in the PM peak hour.

**Table 11** summarizes the HCS Intersection Capacity Analysis and details the Levels-of-Service and delay experienced under the Design Year 2040 'No-Build' and 'Build' traffic conditions at the unsignalized intersections within the study area.



Table 11: HCS Intersection Capacity Analysis Summary - Design Year 2040 'No-Build' vs. 'Build' Conditions Unsignalized Intersections								
Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Elmhurst Drive</b>								
Eastbound Left	A	8.4	B	13.1	A	8.4	B	13.1
Southbound Left-Right	D	29.8	F	63.8	D	29.8	F	63.8
Southbound Approach	D	29.8	F	63.8	D	29.8	F	63.8
<b>Wallings Road / Longview Road</b>								
Eastbound Left	A	8.3	B	13.1	A	8.3	B	13.1
Southbound Left-Right	D	26.3	F	70.8	D	26.3	F	70.8
Southbound Approach	D	26.3	F	70.8	D	26.3	F	70.8
<b>Wallings Road / Chestnut Boulevard</b>								
Westbound Left	B	11.0	A	9.3	B	10.9	A	9.3
Northbound Left-Right	D	34.3	F	67.4	D	34.3	F	67.4
Northbound Approach	D	34.3	F	67.4	D	34.3	F	67.4
<b>Wallings Road / Overlook Avenue</b>								
Westbound Left	B	11.1	A	9.1	B	11.1	A	9.1
Northbound Left-Right	D	29.4	E	48.5	D	28.8	E	48.5
Northbound Approach	D	29.4	E	48.5	D	28.8	E	48.5
<b>Wallings Road / McCreary Road</b>								
Eastbound Left	A	8.3	B	13.8	A	8.3	B	13.8
Southbound Left-Right	E	35.9	F	215.4	E	35.1	F	188.9
Southbound Approach	E	35.9	F	215.4	E	35.1	F	188.9
<b>Wallings Road / Majestic Oaks Trail</b>								
Eastbound Left	A	8.3	C	15.2	A	8.3	C	15.2
Southbound Left-Right	E	36.2	F	112.3	E	36.2	F	112.3
Southbound Approach	E	36.2	F	112.3	E	36.2	F	112.3

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.



Table 11: HCS Intersection Capacity Analysis Summary - Design Year 2040 'No-Build' vs. 'Build' Conditions Unsignalized Intersections (Cont.)								
Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Creekside Terrace</b>								
Westbound Left	B	12.9	A	9.1	B	12.8	A	9.1
Northbound Left-Right	F	53.0	F	168.1	F	54.3	F	168.1
Northbound Approach	F	53.0	F	168.1	F	54.3	F	168.1
<b>Wallings Road / Joyce Road / Fire Station Drive</b>								
Eastbound Left-Thru-Right	A	8.3	B	14.9	A	8.2	B	14.9
Westbound Left-Thru-Right	B	13.0	A	9.0	B	13.1	A	9.0
Northbound Left-Thru-Right	F	108.6	*	*	F	98.7	F	357.4
Northbound Approach	F	108.6	*	*	F	98.7	F	357.4
Southbound Left-Thru-Right	F	98.7	*	*	F	88.6	F	377.4
Southbound Approach	F	98.7	*	*	F	88.6	F	377.4
<b>Wallings Road / Marianna Boulevard</b>								
Westbound Left	B	13.1	A	9.1	B	12.9	A	9.1
Northbound Left-Right	F	50.3	F	83.3	F	50.3	F	83.3
Northbound Approach	F	50.3	F	83.3	F	50.3	F	83.3
<b>Wallings Road / Wright Road</b>								
Eastbound Left	N/A	N/A	N/A	N/A	A	8.2	B	14.9
Westbound Left	N/A	N/A	N/A	N/A	B	12.9	A	9.1
Northbound Left-Thru-Right	N/A	N/A	N/A	N/A	F	203.7	F	956.9
Northbound Approach	N/A	N/A	N/A	N/A	F	203.7	F	956.9
Southbound Left-Thru-Right	N/A	N/A	N/A	N/A	F	735.6	F	787.1
Southbound Approach	N/A	N/A	N/A	N/A	F	735.6	F	787.1
<b>Wallings Road / Craig Lane</b>								
Westbound Left	B	13.4	A	9.1	B	13.4	A	9.1
Northbound Left-Right	F	63.2	F	92.5	F	63.2	F	92.5
Northbound Approach	F	63.2	F	92.5	F	63.2	F	92.5

Note: Orange highlighted cells indicate a Level of Service E.  
 Red highlighted cells indicate a Level of Service F.  
 \*Results not reported by HCS



**Table 11: HCS Intersection Capacity Analysis Summary -  
Design Year 2040 'No-Build' vs. 'Build' Conditions Unsignalized Intersections (Cont.)**

Intersection / Movement	'No-Build' Conditions				'Build' Conditions			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
<b>Wallings Road / Skyline Drive</b>								
Eastbound Left	A	8.3	C	15.2	A	8.3	C	15.2
Southbound Left-Right	E	43.2	F	122.0	E	43.2	F	122.0
Southbound Approach	E	43.2	F	122.0	E	43.2	F	122.0
<b>Wallings Road / West Mill Road</b>								
Westbound Left	B	13.6	A	9.2	B	13.6	A	9.1
Northbound Left-Right	F	57.1	D	29.0	E	45.9	F	86.7
Northbound Approach	F	57.1	D	29.0	E	45.9	F	86.7

Note: Orange highlighted cells indicate a Level of Service E.  
Red highlighted cells indicate a Level of Service F.

The Opening Year 2040 'No-Build' results shows results similar to the Existing Year 2015 and Opening Year 2020 conditions. The 'Build' results show slight improvements at the unsignalized intersections within the study area. The improvements are seen on the mainline Wallings Road left turning movements as opposed to the side street movements. It should be noted that the delay shown above does not show the true capacity benefits of adding the center two-way left turn lane. The HCS 2010 program does not show the delay on the Wallings Road thru movement as it is a free-flow movement. However, moving the left turning traffic out of the thru lane reduces congestion to thru traffic since the left turners will no longer be blocking traffic as they make the left turning movement.

Like in the Opening Year 2020 conditions, the unsignalized intersection of Wallings Road / Wright Road is operating with high side street delay, the peak hour delay warrant is not satisfied at this intersection as Wright Road does not meet the minimum side street volume threshold (100 vehicles) to satisfy the peak hour delay warrant.

Similar to the Opening Year 2020 conditions, the Design Year 2040 analysis also reveals the need for additional capacity on Wallings Road. However, based upon previous discussions, only three (3) lanes on Wallings Road will be proposed with this project.

**Turn Lane Storage Length Recommendations**

Storage length calculations are performed in order to determine the required length for each auxiliary turn lane based on the Design Year 2040 peak hour traffic volumes. The required storage length is a function of the signal cycle length (if a signalized intersection is being analyzed), lane assignments, and turning movement demand. The required storage length at a signalized intersection can be minimized by utilizing the shortest, most reasonable signal cycle length.



The ODOT Location and Design Manual, Volume I specifies that a storage length must provide enough storage to contain the number of vehicles per lane group per signal cycle. The manual states that turn lane storage lengths should be a minimum of 100 feet with a maximum of 600 feet for left turn lanes and 800 feet for right turn lanes.

The recommended lengths were determined based on these calculations, site conditions (i.e. the locations of existing private driveways), access management, location of overlapping left turn bays, and engineering judgment. See **Table 12** for a summary of the recommended storage lengths for the auxiliary turn lanes for intersections within the study corridor. All storage lengths shown in the table include the 50 feet diverging taper. See **Appendix M** for actual storage length calculations.

Intersection	Storage Length (ft)		
	Turn Lane Calculated Length	Thru Back-Up	Recommended
Wallings Road / Broadview Road EB Left	425'	675'	425'
Wallings Road / Broadview Road WB Left	450'	775'	450'
Wallings Road / Broadview Road WB Right	250'	775'	250'
Wallings Road / Broadview Road NB Left	250'	472.5'	250'
Wallings Road / Broadview Road SB Left	325'	442.5'	325'
Wallings Road / McCreary Road WB Right	150'	N/A	150'
Wallings Road / Wyatt Road WB Left	225'	800'	225'
Wallings Road / Wright Road WB Right	100'	N/A	100'
Wallings Road / Joyce Road / Fire Station Drive	100'	N/A	100'
Wallings Road / West Mill Road EB Right	200'	N/A	200'
Wallings Road / I-77 SB Ramps WB Left	150'	525'	150'
Wallings Road / I-77 SB Ramps SB Right	855' Total	375'	630' / 225'
Wallings Road / I-77 NB Ramps EB Left 1	525'	500'	525'
Wallings Road / I-77 NB Ramps EB Left 2	475'	500'	475'
Wallings Road / I-77 NB Ramps WB Left	100'	200'	100'
Wallings Road / I-77 NB Ramps WB Right	325'	200'	325'
Wallings Road / I-77 NB Ramps NB Left	500'	350'	500'

As shown on **Table 12**, all of the turn lanes are recommended to be constructed at their calculated storage length. See **Figures 10 through 18** for the proposed roadway improvements along the Wallings Road corridor. These exhibits incorporate the recommended turn-lane lengths specified in **Table 12** to provide a visual representation of the proposed improvements.

## IX. Pavement Condition Ratings:

Pavement Condition Ratings (PCR) are based on a visual inspection of pavement distress. The ability of pavement to carry traffic loads in a safe and smooth manner is adversely affected by observable distress in the pavement. When computing PCR, points are deducted for each type of observable distress. Perfect pavement is considered to have a PCR of 100. Overlaying and rehabilitation of roadways should be considered when the PCR drops below a score of 65. As with any physical infrastructure, the pavement of a roadway continues to degrade over time. The rate at which the pavement degrades is accepted as one (1) to three (3) points per year dependent on the number of vehicles and trucks travelling on the roadway.

The PCR for the study corridor was reviewed in 2012 by ODOT and their findings are summarized in **Table 13** on the following page.

Roadway Name	Beginning Log Point	End Log Point	Description	PCR
Wallings Road	3.09	3.94	Broadview Road to Majestic Oaks Trail	75
Wallings Road	3.94	4.83	Majestic Oaks Trail to I-77 SB Ramps	62
Wallings Road	4.83	4.98	I-77 SB Ramps to I-77 NB Ramps	46

The PCR for Walling Road varies between 42 and 75 depending on the location along the roadway. The pavement on the east end of the project limits is the worst and the pavement gradually gets better the farther west you travel along Wallings Road. Looking at the annual pavement degradation and the current PCR values, the stretch of Wallings Road that doesn't currently meet the threshold for resurfacing, will meet the thresholds by the Opening Year of this project. As such, the entire roadway section is proposed to be overlaid.



## **X. Conclusions and Recommendations:**

At the request of the City of Broadview Heights, GPD Group was tasked with completing a Safety and Corridor Study for the Wallings Road corridor. This study has determined that operational and safety deficiencies exist within the study area and identified the necessary improvements to correct them. This corridor includes Wallings Road from the Broadview Road (State Route 176) intersection to the I-77 NB Ramps / Mill Road intersection.

The following conclusions and recommendations have resulted from this study.

1. A review of the crash patterns indicates that safety issues exist along the Wallings Road corridor. Large numbers of rear-end crashes are occurring at unsignalized intersections and driveways due to the absence of a center two-way left turn lane to separate left turning vehicles from thru vehicles. Motorists are unable to get around the left turning traffic occupying the only available thru lane in the two-lane section of Wallings Road, which causes congestion and rear-end related crashes along the corridor.
2. The Existing Year 2015 analysis indicates that all signalized intersections are operating at LOS E or F overall during both peak hours. The delay at the signalized intersections is caused by two (2) issues. The first issue, which occurs at the I-77 / Wallings Road interchange and the Wallings Road / Broadview Road intersection, is due to capacity issues at the intersection where additional lanes must be added to achieve acceptable Levels-of-Service. The second issue is at the Wallings Road / Wright Road and Wallings Road / Wyatt Road intersections where acceptable Levels-of-Service could be achieved with the existing lane geometries at the intersections if the existing signal timings and cycle lengths were modified.
3. The Existing Year 2015 analysis indicates that all unsignalized intersections are currently operating with failing movements during the AM or PM peak hour, with the exception of the Wallings Road / Overlook Avenue intersection. These side street failing movements are due to high mainline traffic volumes and the lack of gaps in traffic for vehicles to turn onto Wallings Road.
4. Crash data was obtained from ODOT's GCAT for the calendar years of 2011 to 2013 for the entire study area. A total of 158 crashes occurred within the study area and have been analyzed as part of this study. These crashes include 125 rear-end, 11 angle, 7 sideswipe-passing, 6 left turn, 4 fixed object, 3 head-on and 2 pedestrian related crashes. 79% of all crashes occurred in daylight and 62% occurred on dry pavement. 75% of the crashes were property damage only and 25% of the crashes were injury crashes with no fatal crashes occurring during these three (3) years.
5. The leading crash type within the study area is one hundred twenty-five (125) rear-end related crashes. These crashes appear to be occurring for two (2) distinct reasons. The first is the rear-end collisions that are occurring at the signalized intersections. These collisions are occurring during the peak hours when the signalized intersections within the study corridor experience significant congestion





and long traffic queues. These crashes are occurring due to the congestion along the corridor as vehicles are constantly starting and stopping in traffic and routinely need to wait for several cycle signal lengths to pass through the traffic signal. Thirty (30) of these rear-end crashes are occurring at the Wallings Road / I-77 ramp terminal intersections. The proposed improvements will fix the current capacity issue that exists at the interchange and will alleviate the existing rear-end crash problem that exists. An additional forty-two (42) rear-end crashes occurred at the other signalized intersections within the study area. These rear-end crashes will be alleviated by the modification of the existing signal timings to provide better Levels-of-Service at the signalized intersection and by improving the existing signal visibility to motorists by reconstructing the signals and by installing backplates on the newly constructed signals. The rear-end crashes at the Wallings Road / Wright Road intersection will also be reduced due to the traffic signal being removed at that intersection.

6. Second, rear-end crashes are occurring at the unsignalized intersections and driveways due to the lack of left turn lanes at the intersections or a two-way left turn lane throughout the corridor. As vehicles have to wait for gaps in traffic to perform a left turn at the unsignalized intersections or driveways, thru traffic cannot effectively (or legally) go around the turning traffic leading to congestion and rear-end crashes. The remaining fifty-three (53) rear-end crashes occurred along the study corridor at either unsignalized intersection or driveways. These rear-end crashes will be alleviated by the addition of a center two-way left turn lane.
7. The existing crash problem along Wallings Road illustrates the need for a two-way left turn lane to be constructed throughout the entire project area. A large portion of rear-end crashes along the study corridor are occurring at unsignalized intersections and driveways and involve a vehicle stopping in traffic to complete a left turn movement. The construction of a center two-way left turn lane will allow the left turning traffic to move out of the thru lanes, which will reduce congestion along the corridor and remove the conflict between left turning and thru vehicles.
8. The intersection of Wallings Road / McCreary currently meets the volume thresholds necessary for a westbound right turn lane to be constructed. This turn lane will remove turning traffic from the thru lane and reduce the conflicts between thru traffic and right turning traffic. Additionally, a westbound right turn lane should be constructed for the Wallings Road / Wright Road intersection and an eastbound right turn lane should be constructed at the Wallings Road / West Mill Road intersection to reduce these turning movement conflicts.
9. The traffic signal at the Wallings Road / Wright Road intersection is not warranted based upon the Existing Year and Opening Year traffic volumes. For this reason it is recommended that the traffic signal at this intersection be studied for removal. The intersection should operate under two-way stop control once the safety improvements are constructed with Wright Road operating under stop control.
10. Based on future traffic volumes and capacity demands at the I-77 / Wallings Road interchange, the bridge over Wallings Road will need to be four (4) lanes wide in order to accommodate the future demand at the interchange. Currently, the bridge



is only two (2) lanes and does not provide any left turn lanes for traffic turning left onto I-77. The future configuration calls for dual eastbound left turn lanes for traffic trying to enter I-77 NB. Additionally, a single westbound left turn lane is also needed for left turning traffic onto I-77 SB. The geometry over the bridge calls for the outside eastbound left turn lane to be the entire length of the bridge while the inside eastbound left turn lane should be back-to-back with the proposed 150 foot westbound left turn lane.

11. In order to accommodate the recommended dual eastbound left turn lanes at the Wallings Road / I-77 NB Ramps / Mill Road intersection, the entrance ramp for I-77 NB will need to be widened. The second lane on the entrance ramp will need to be merged before the traffic enters I-77 mainline, that way only one (1) ramp lane is entering I-77 merging onto I-77 NB.
12. In order to service the demand exiting I-77 SB, an additional lane needs to be added to the exit ramp. In addition to the existing southbound left and southbound right turn lanes, an additional 225' southbound right turn lane needs to be constructed (creating dual right turn lanes) so the traffic can exit the highway efficiently and the Wallings Road / I-77 SB Ramps intersection can operate with acceptable Levels-of-Service. Since Wallings Road currently only provides one (1) travel lane in each direction, Wallings Road will need to be widened to two (2) westbound travel lanes west of the interchange. This additional through lane should be merged west of the West Mill Road intersection.
13. Wallings Road should be widened from just east of West Mill Road to the I-77 NB Ramp / Mill Road intersection. This improvement is recommended to provide additional capacity through the Wallings Road / I-77 SB Ramps intersection as well as allowing traffic to move into the proper lane as the inside thru lane will become the outside dedicated left turn lane at the Wallings Road / I-77 SB Ramps intersection. The outside thru lane will be the thru lane for traffic wishing to continue eastbound on Wallings Road to travel southbound on Mill Road.
14. Based upon the capacity analysis along the Wallings Road corridor, Wallings Road needs to be widened to five (5) lanes to accommodate future traffic volumes. However, the decision was made not to pursue this option due to the extensive right-of-way and construction costs associated with a five (5) lane corridor.
15. All existing unsignalized intersections fail to meet the minimum volumes thresholds to warrant a traffic signal based on existing volumes. Additionally, the two (2) signalized intersections of Wallings Road / Wyatt Road and Wallings Road / Wright Road fail to meet a volume based signal warrant based on the existing volumes. It should be noted that Warrant #1 (Eight Hour Vehicular Volume) could not be analyzed for the majority of the traffic counts since only four (4) hour counts were performed.
16. The Opening Year 2020 results are the same as the Existing Year 2015 results with the exception of the Wallings Road / Wyatt Road intersection. This intersection is currently signalized and a volume based traffic signal warrant has been satisfied under the Opening Year 2020 traffic volumes. The only signalized intersection



within the study are that did not meet a warrant is the Walling Road / Wright Road intersection. This signal was analyzed as unsignalized in the 'Build' conditions within this report.

17. The Opening Year 2020 'No-Build' results shows results similar to the Existing Year 2015 conditions. The 'Build' results show that all signalized intersections are now anticipated to operate with acceptable Levels-of-Service during both peak hours with the exception of the Wallings Road / Broadview Road intersection. It should be noted that the capacity issues at the Wallings Road / Broadview Road intersection aren't being addressed since this intersection already has a left turn lane for Wallings Road and no geometric improvements are being made. However, the overall intersection delay is improved by 75% in the AM peak hour and by 47% in the PM peak hour by simply optimizing the existing signal timings.
18. The Opening Year 2020 'No-Build' results shows results similar to the Existing Year 2015 conditions. The 'Build' results show slight improvements at the unsignalized intersections within the study area. The improvements are seen on the mainline Wallings Road left turning movements as opposed to the side street movements. It should be noted that the delay shown above does not show the true capacity benefits of adding the center two-way left turn lane. The HCS 2010 program does not show the delay on the Wallings Road thru movement as it is a free-flow movement. However, moving the left turning traffic out of the thru lane reduces congestion to thru traffic since the left turners will no longer be blocking traffic as they make the left turn movement.
19. The Design Year 2040 'No-Build' results shows results similar to the Existing Year 2015 conditions. The 'Build' results show improvements at the majority of the intersection. The I-77 / Wallings Road interchange intersections are operating with acceptable Levels-of-Service in the Design Year while the other signalized intersections have had their average delay significantly decreased between the 'No-Build' and 'Build' scenarios. For example, although the Wallings Road / Wyatt Road intersection is operating with a LOS F during both peak hours under the 'Build' conditions, the overall intersection delay has been reduced by 51% in the AM peak hour and by 65% in the PM peak hour.
20. The Opening Year 2040 'No-Build' results shows results similar to the Existing Year 2015 and Opening Year 2020 conditions. The 'Build' results show slight improvements at the unsignalized intersections within the study area. The improvements are seen on the mainline Wallings Road left turning movements as opposed to the side street movements. It should be noted that the delay shown above does not show the true capacity benefits of adding the center two-way left turn lane. The HCS 2010 program does not show the delay on the Wallings Road thru movement as it is a free-flow movement. However, moving the left turning traffic out of the thru lane reduces congestion to thru traffic since the left turners will no longer be blocking traffic as they make the left turning movement.
21. The PCR for Walling Road varies between 42 and 75 depending on the location along the roadway. The pavement on the east end of the project limits is the worst and the pavement gradually gets better the farther west you travel along Walling



Road. Looking at the annual pavement degradation and the current PCR values, the stretch of Wallings Road that doesn't currently meet the threshold for resurfacing, will meet the thresholds by the Opening Year of this project.

22. The Benefit / Cost Ratio analyses was performed based upon a cost of \$12,799,920 (which is the total cost of the Wallings Road corridor widening and interchange improvement project, not including construction inspection and inflation). This results in a 0.48 Benefit / Cost ratio. The Benefit / Cost Ratio was then computed based upon the \$5,000,000 being requested from the HSP Safety committee and the Benefit / Cost Ratio is 1.22. Based on the Benefit / Cost ratio of the safety request being greater than 1.00, the Wallings Road corridor widening interchange improvement project should be considered a fundable project and should receive the consideration of the funding committee.

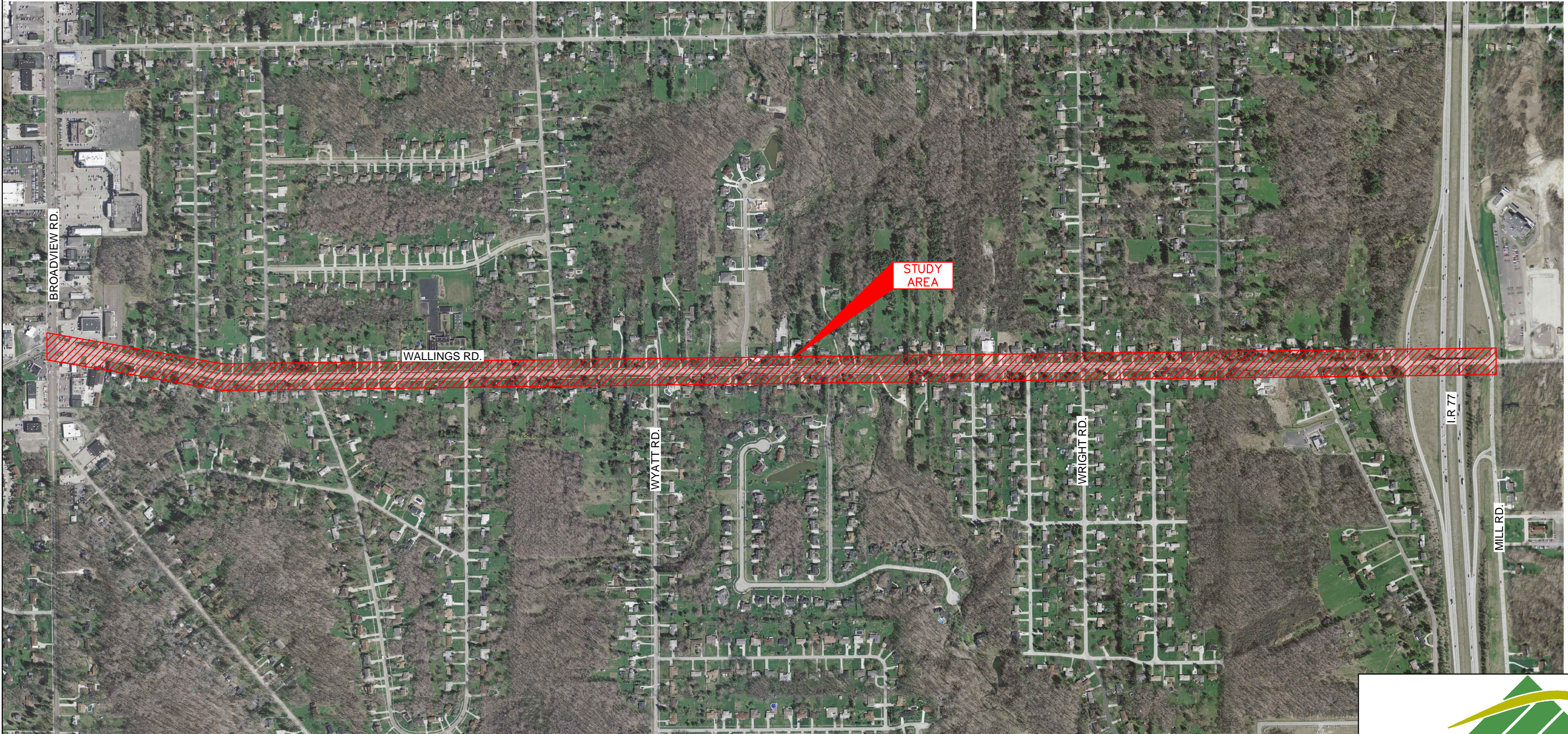
Based on the results of the analysis contained in this report, GPD Group recommends the following:

1. The City of Broadview Heights should pursue the Wallings Road corridor widening and interchange improvement project outlined in this study.
2. The City of Broadview Heights should create a financial plan and apply for safety funding to secure funds for the construction of the proposed improvements. The funding plan should address the funding of the entire project.



## **FIGURES**





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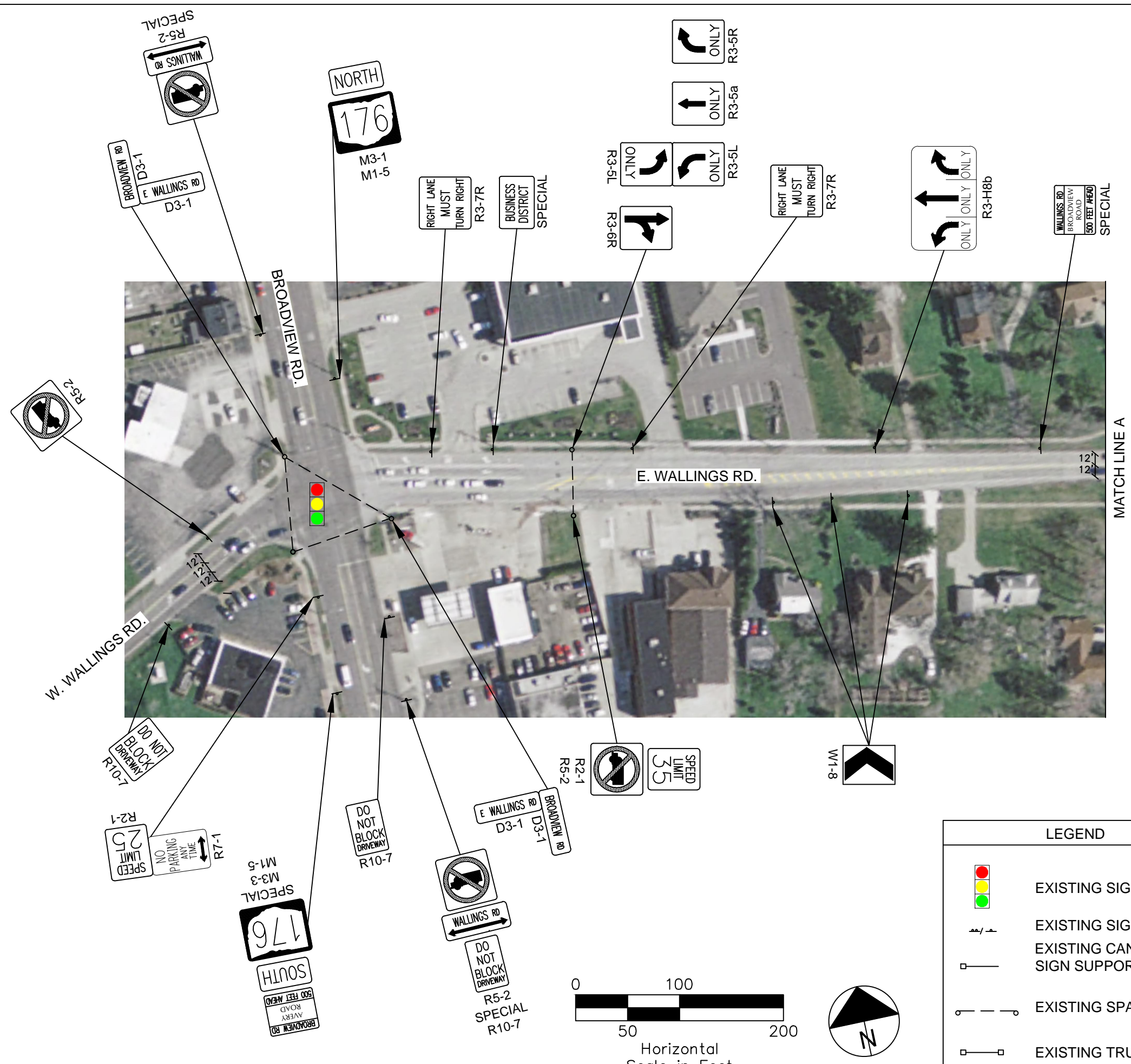


FIGURE 1

AERIAL PHOTOGRAPH


MARCH 2015





MATCH LINE A

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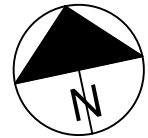
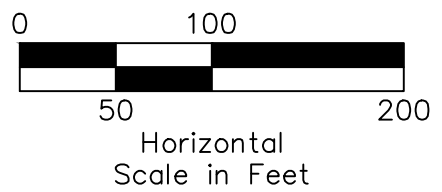
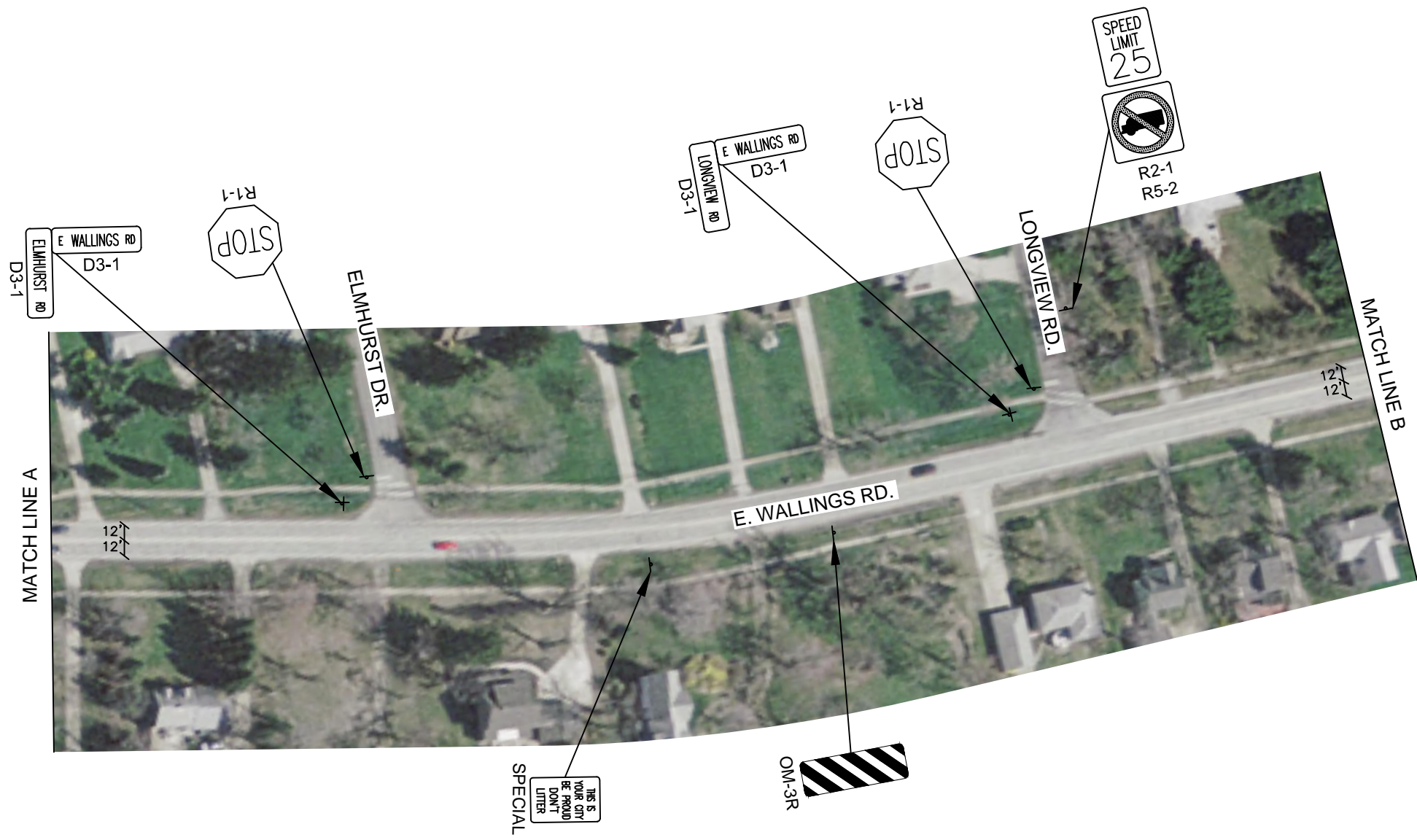
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FIGURE 2

EXISTING CONDITIONS DIAGRAM  
1 OF 8

MARCH 2015

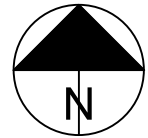
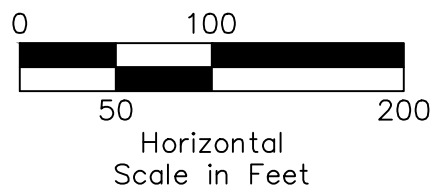
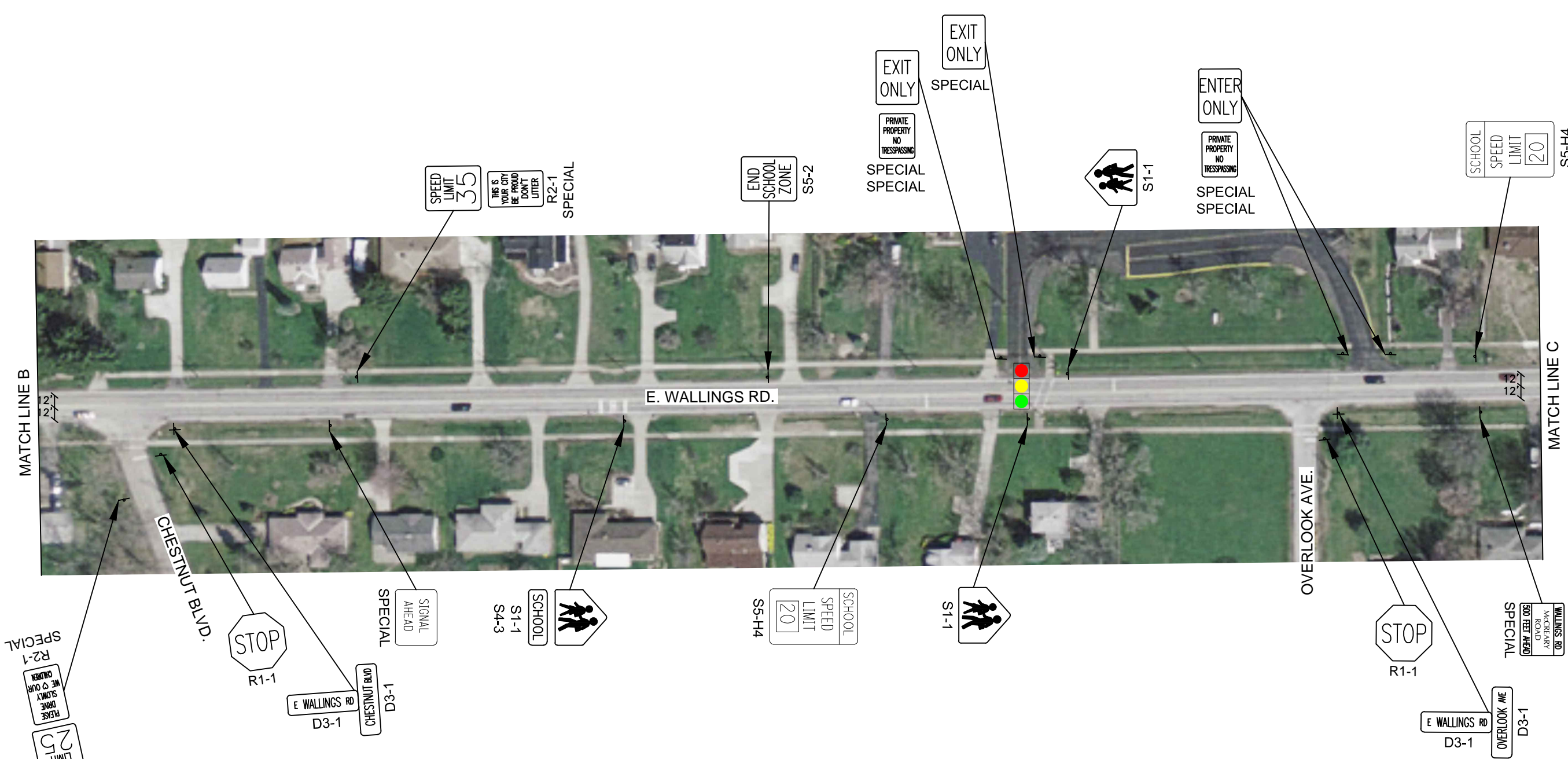





LEGEND	
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FIGURE 3



LEGEND	
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	EXISTING CANTILEVER SIGN SUPPORT
	EXISTING SPAN WIRE
	EXISTING TRUSS SIGN SUPPORT



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FIGURE 4

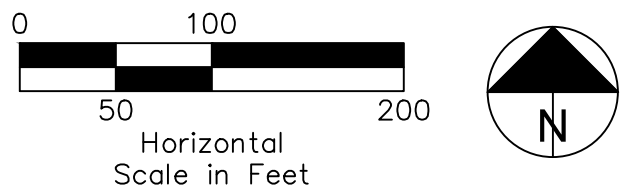
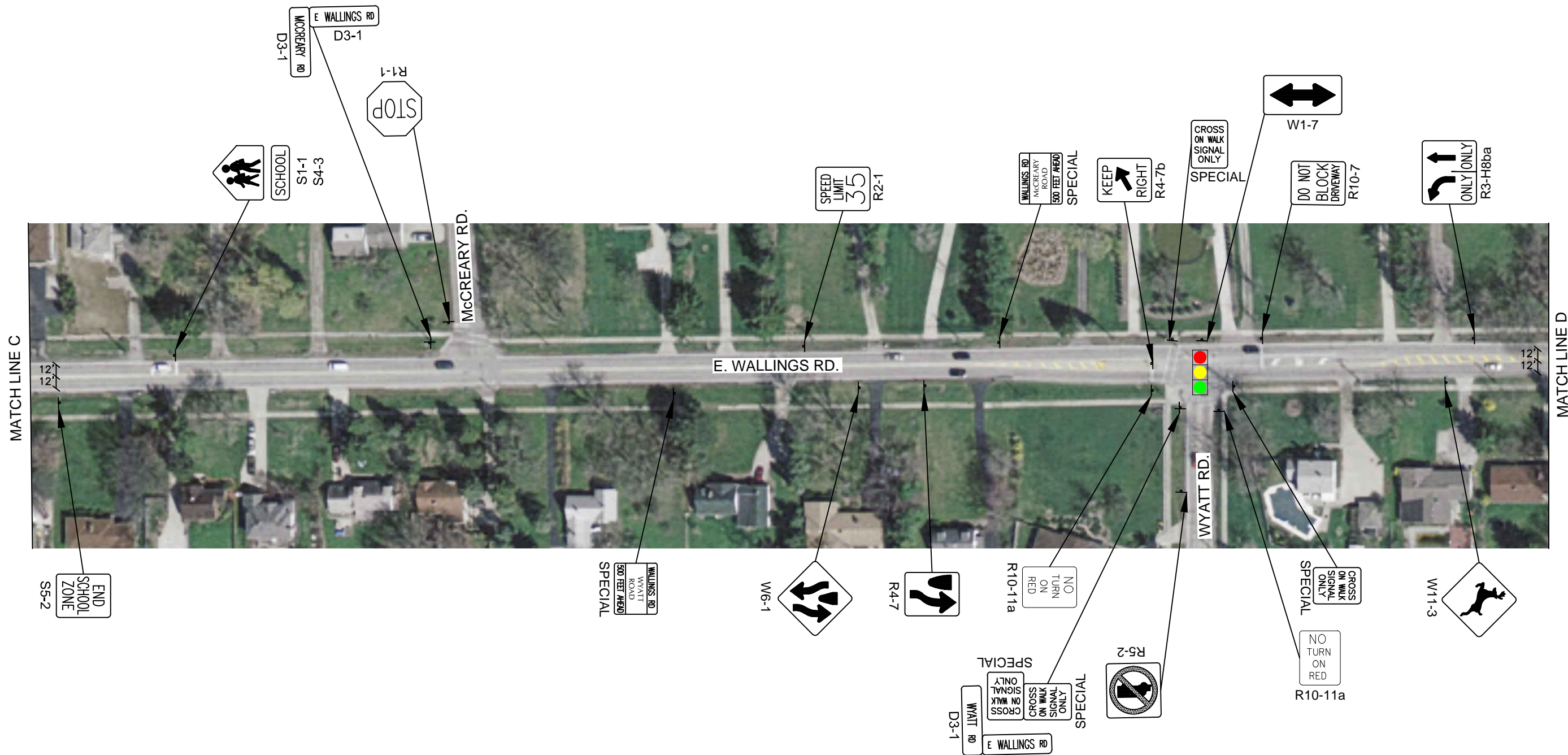
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EXISTING CONDITIONS DIAGRAM  
3 OF 8


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MARCH 2015





LEGEND	
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FIGURE 5

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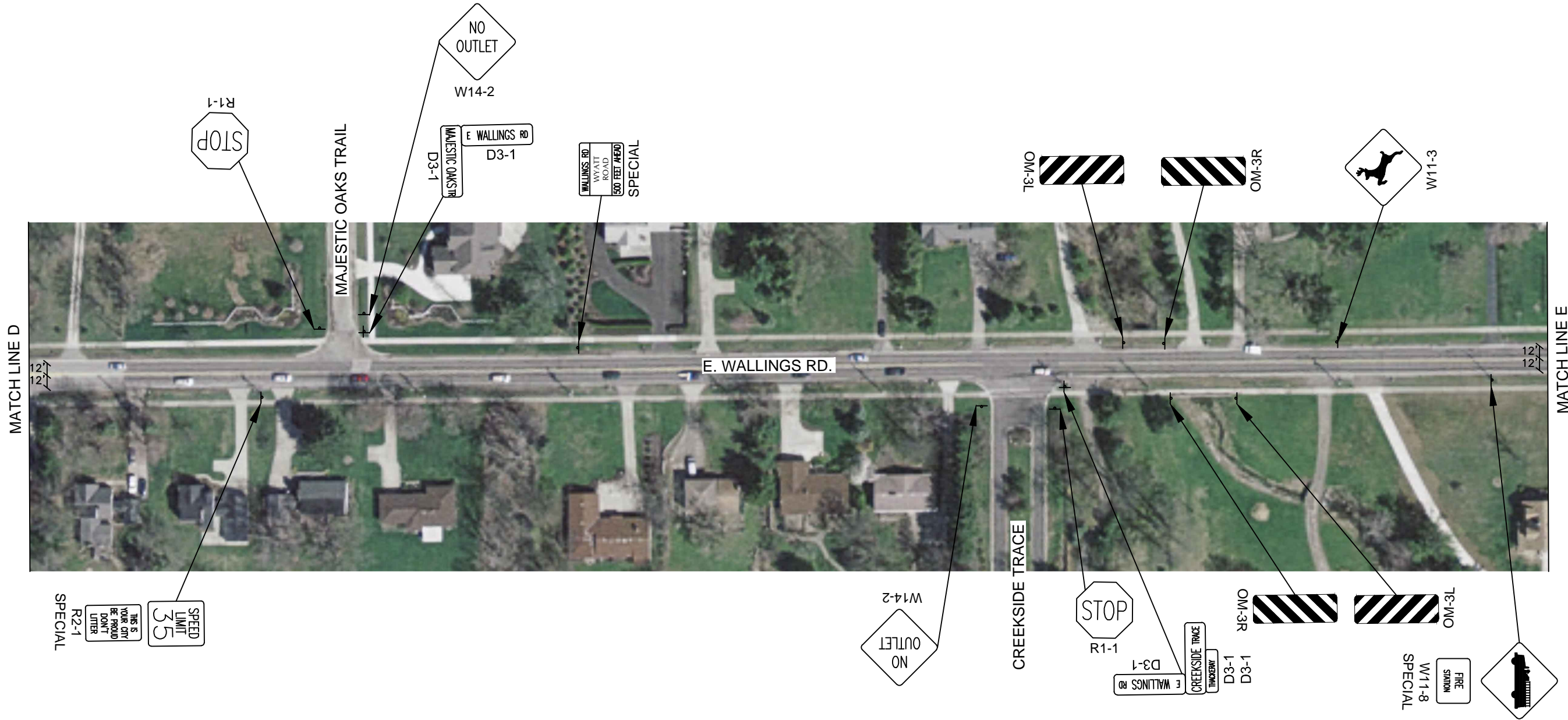
EXISTING CONDITIONS DIAGRAM  
4 OF 8

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MARCH 2015

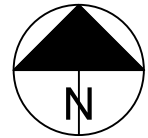
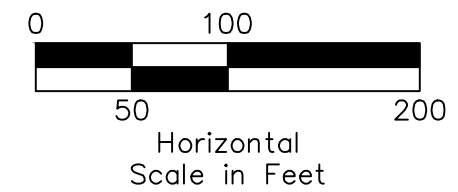
MATCH LINE C

MATCH LINE D




MATCH LINE D

MATCH LINE E



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FIGURE 6

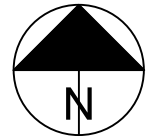
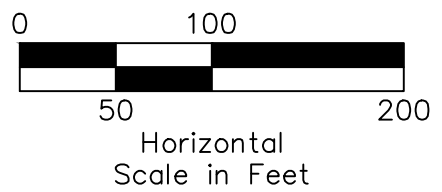
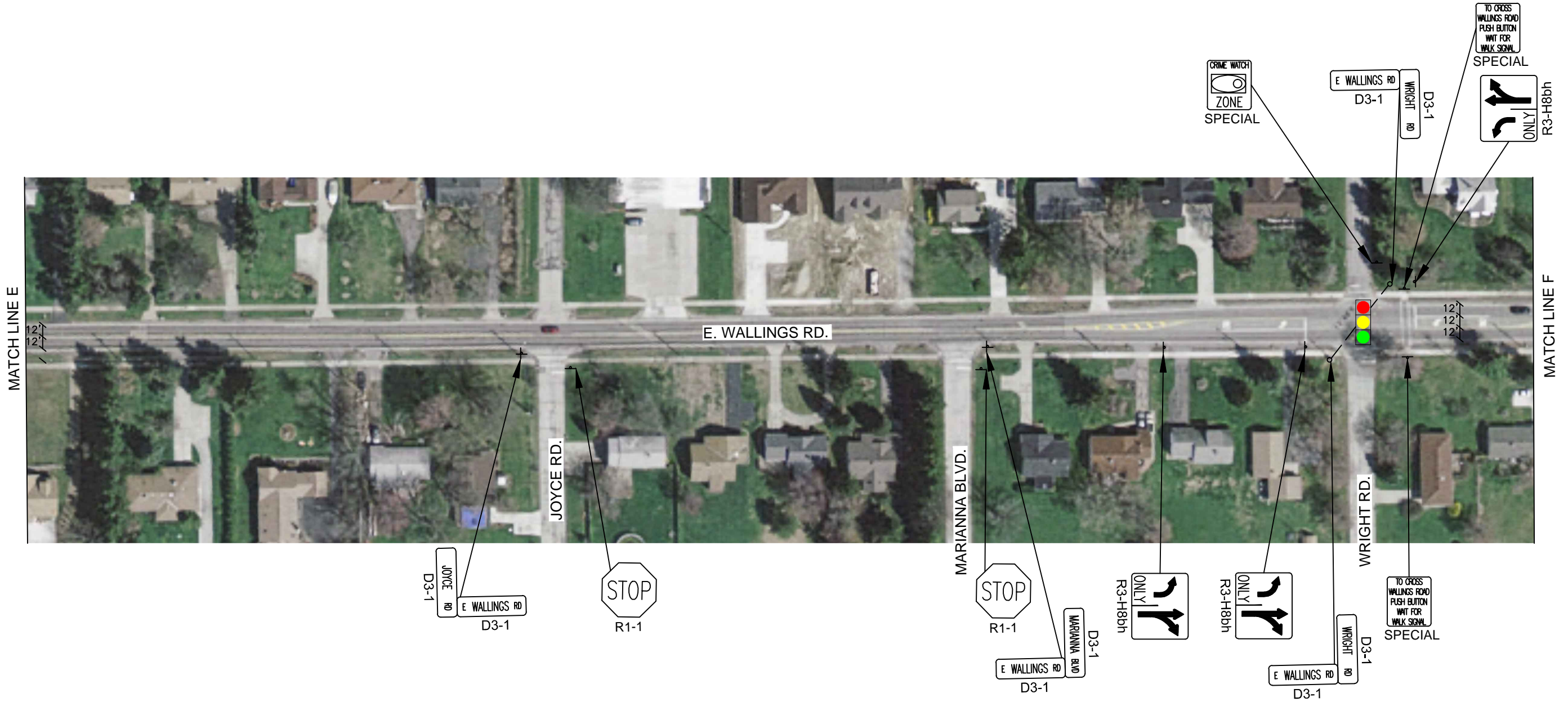
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EXISTING CONDITIONS DIAGRAM  
5 OF 8


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MARCH 2015





LEGEND	
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	EXISTING SPAN WIRE
	EXISTING TRUSS SIGN SUPPORT



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FIGURE 7

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EXISTING CONDITIONS DIAGRAM  
6 OF 8

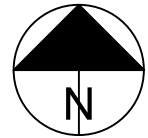
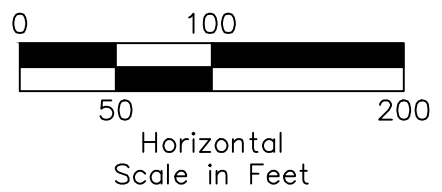
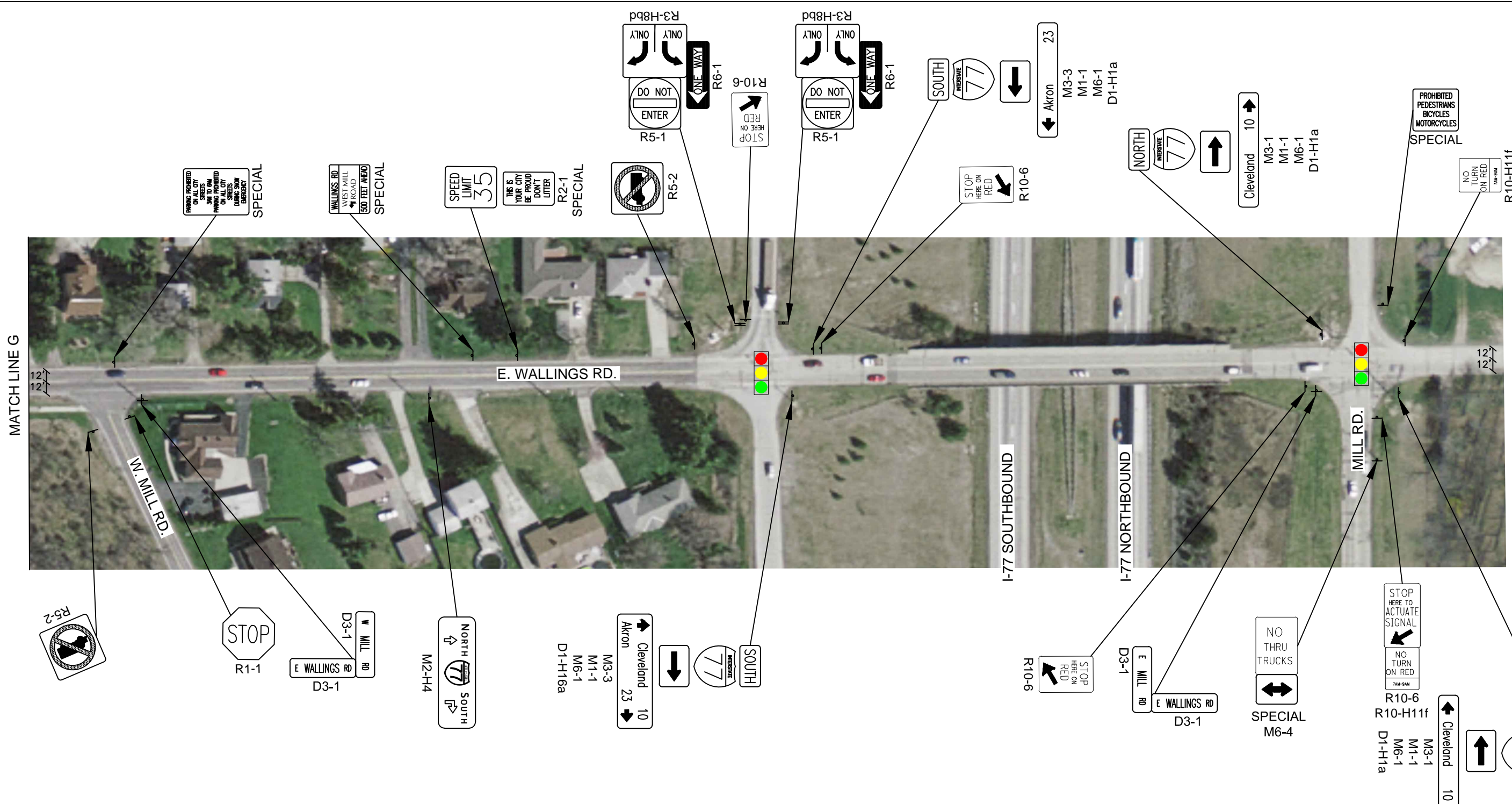
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MARCH 2015


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LEGEND	
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	EXISTING SPAN WIRE
	EXISTING TRUSS SIGN SUPPORT



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FIGURE 9




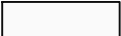

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EXISTING CONDITIONS DIAGRAM  
8 OF 8

---

MARCH 2015

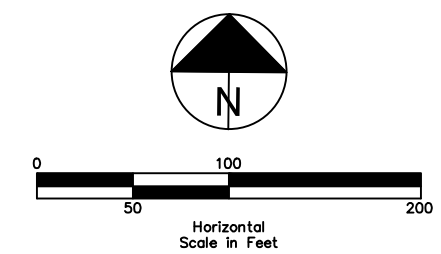



LEGEND	
	PROPOSED BRIDGE
	EXISTING PAVEMENT
	PROPOSED CURB AND GUTTER
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT



Drawing File: C:\2014\2014-2015\Traffic\Figures\Rendering 3 Lanes & Interchange.dwg Layout: 001  
 Date: 02/20/15 Time: 8:50 am Page: 0

Technician: ddombrsky





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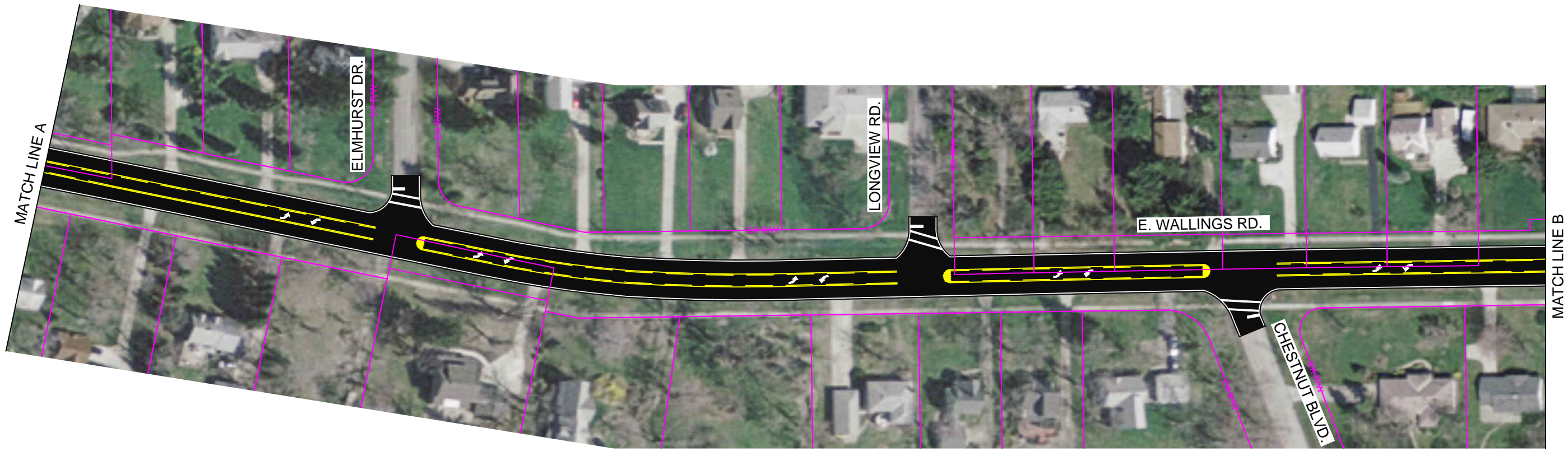
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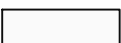

**FIGURE 10**

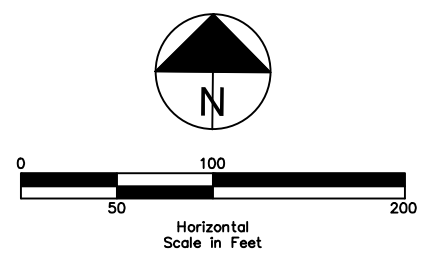
**CORRIDOR IMPROVEMENT  
 RENDERING  
 SHEET 1 OF 9**


---

**MARCH 2015**



LEGEND	
	PROPOSED BRIDGE
	EXISTING PAVEMENT
	PROPOSED CURB AND GUTTER
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT





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**FIGURE 11**

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**CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 2 OF 9**

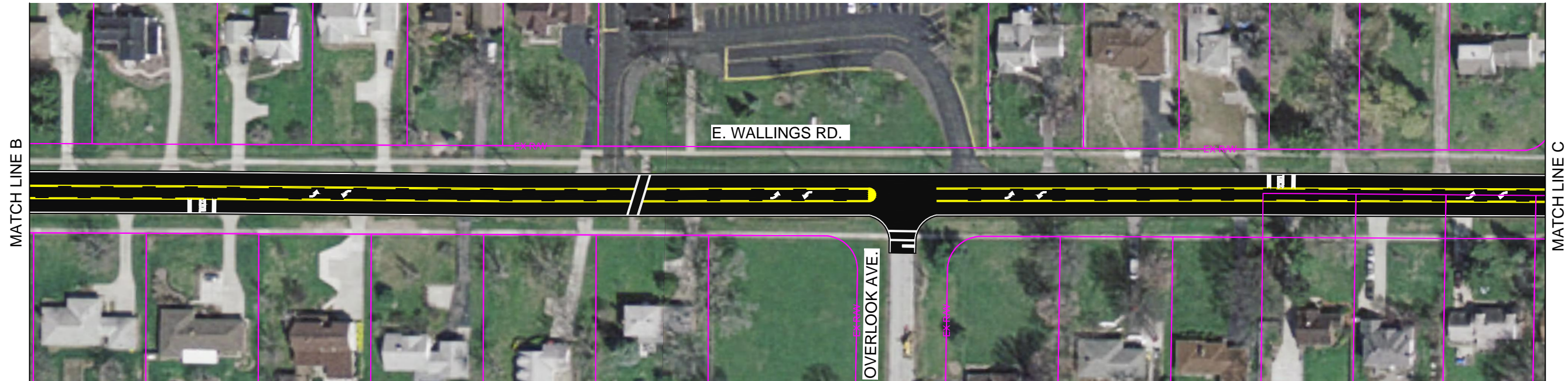
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**MARCH 2015**


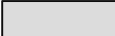
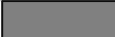


Drawing File: C:\2014\20143883 Traffic\Figures\Rendering 3 lane & interchange.dwg Layout: 002  
 Date: Apr 02, 2015 Time: 7:49 am Page: 0

Technician: ddombrsky





LEGEND

-  PROPOSED BRIDGE
-  EXISTING PAVEMENT
-  PROPOSED CURB AND GUTTER
-  PROPOSED SIDEWALK
-  PROPOSED PAVEMENT

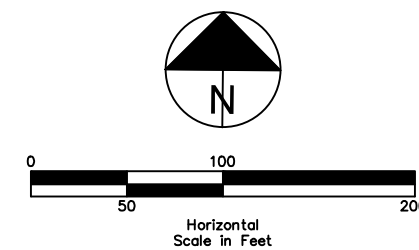
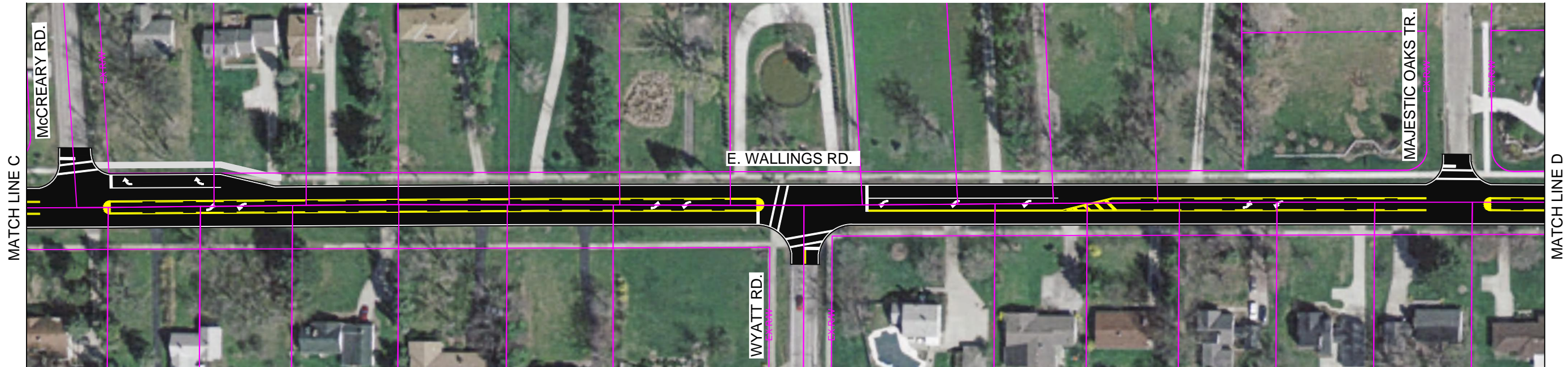

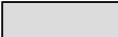





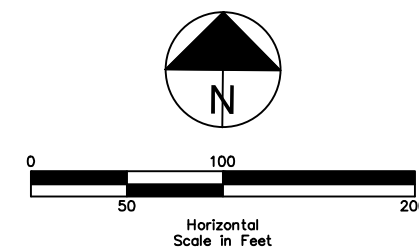
FIGURE 12


CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 3 OF 9

MARCH 2015



LEGEND	
	PROPOSED BRIDGE
	EXISTING PAVEMENT
	PROPOSED CURB AND GUTTER
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT





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**FIGURE 13**

**CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 4 OF 9**

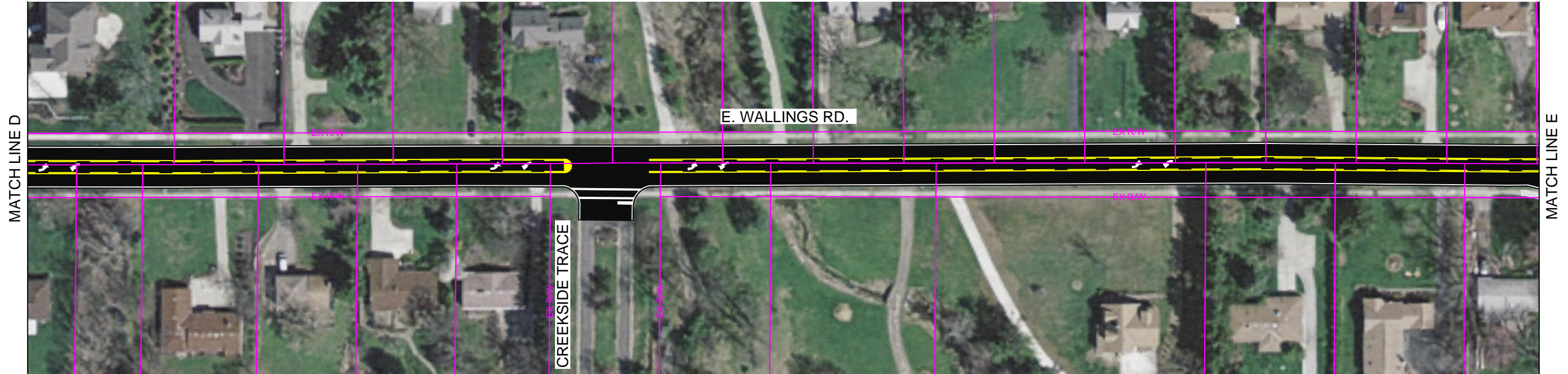
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**MARCH 2015**

Drawing File: C:\2014\20140828\Traffic\Figures\Rendering 3 lane & interchange.dwg Layout: 004  
 Date: Apr 02, 2015 Time: 7:50 am Page: 0

Technician: ddombrsky






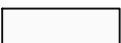



MATCH LINE D

MATCH LINE E

E. WALLINGS RD.

CREEKSIDE TRACE

LEGEND	
	PROPOSED BRIDGE
	EXISTING PAVEMENT
	PROPOSED CURB AND GUTTER
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT

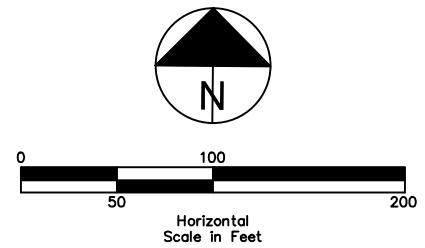
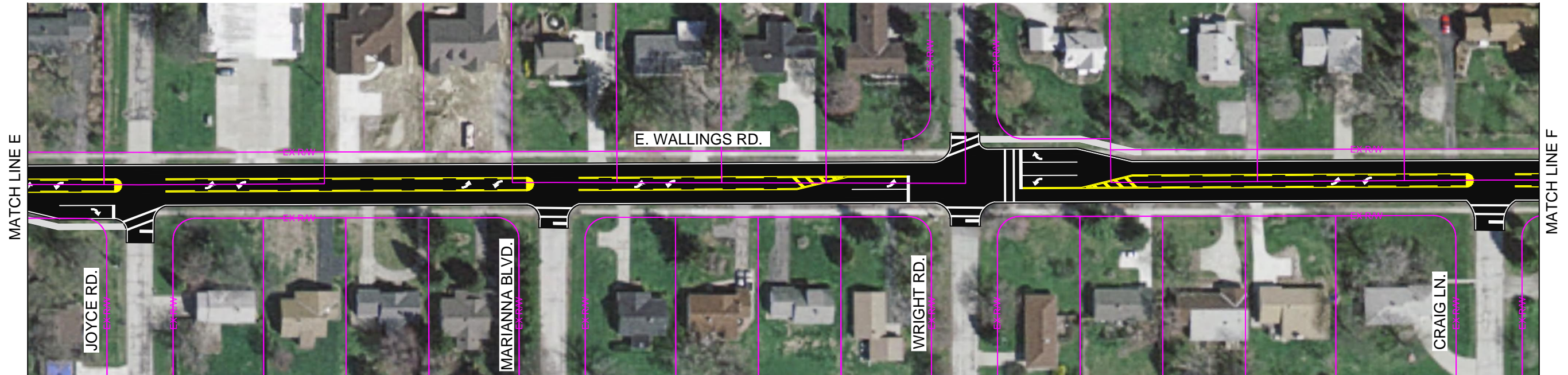



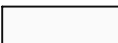



FIGURE 14

CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 5 OF 9

MARCH 2015



LEGEND	
	PROPOSED BRIDGE
	EXISTING PAVEMENT
	PROPOSED CURB AND GUTTER
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT

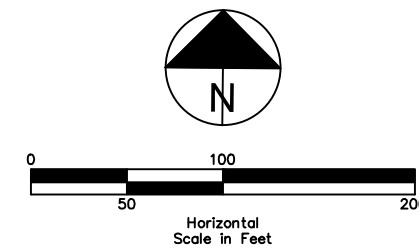


FIGURE 15




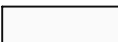

CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 6 OF 9

MARCH 2015





Drawing File: C:\2014\20140831 Traffic\Figures\Rendering 3 lane & interchange.dwg Layout: 007  
 Date: Apr 02, 2015 Time: 7:53 am Page: 0

LEGEND	
	PROPOSED BRIDGE
	EXISTING PAVEMENT
	PROPOSED CURB AND GUTTER
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT

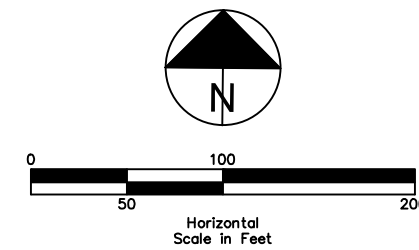


FIGURE 16

CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 7 OF 9

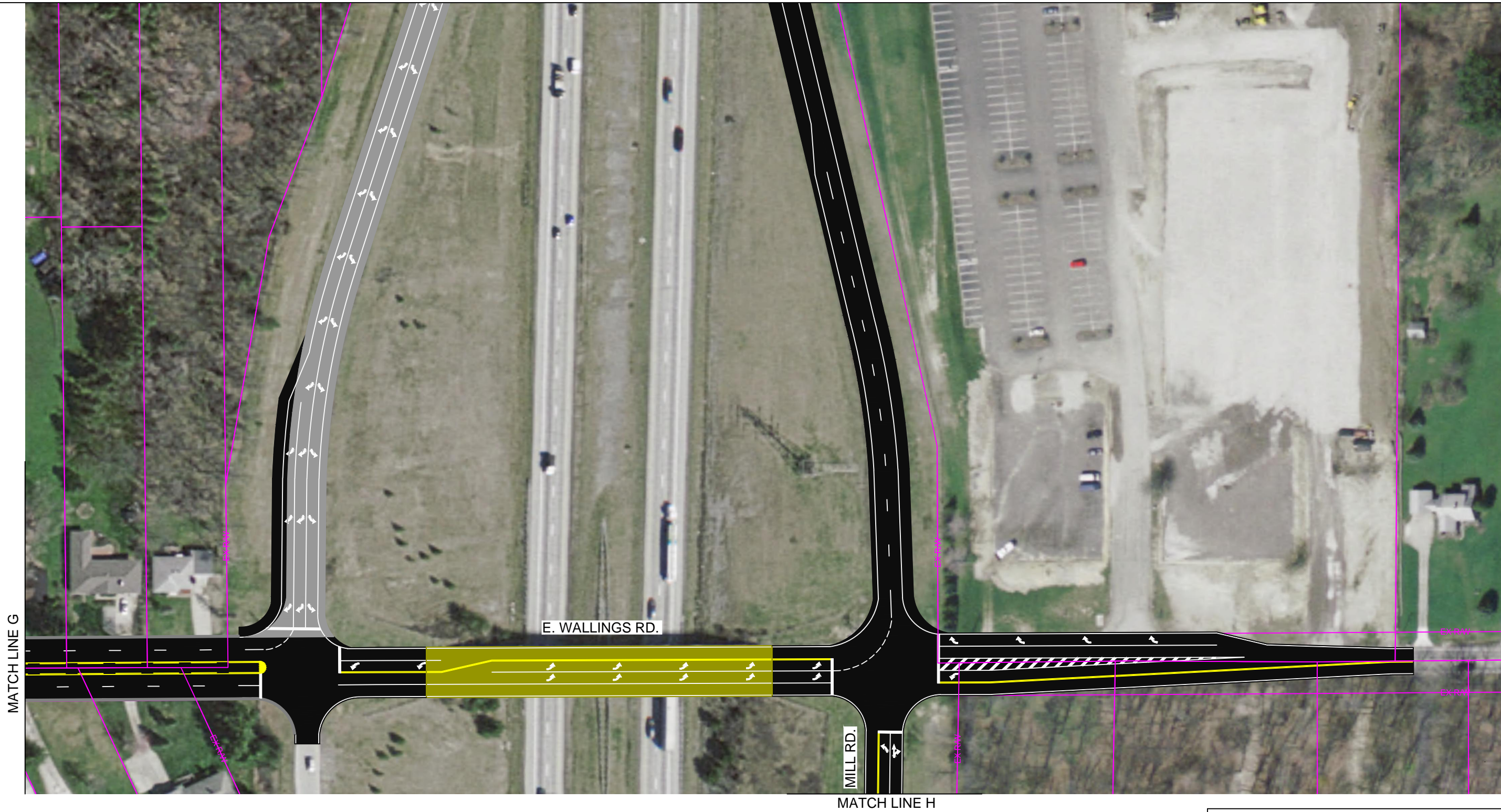
MARCH 2015






Technician: ddombrosky

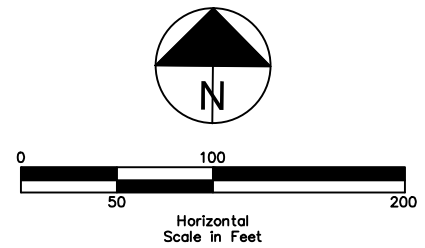



Drawing File: C:\2014\20140831\Traffic\Figures\Rendering 3 lane & interchange.dwg Layout: 008  
Date: Apr 02, 2015 Time: 7:54 am Page: 0

Technician: ddombrsky



LEGEND	
	PROPOSED BRIDGE
	EXISTING PAVEMENT
	PROPOSED CURB AND GUTTER
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT





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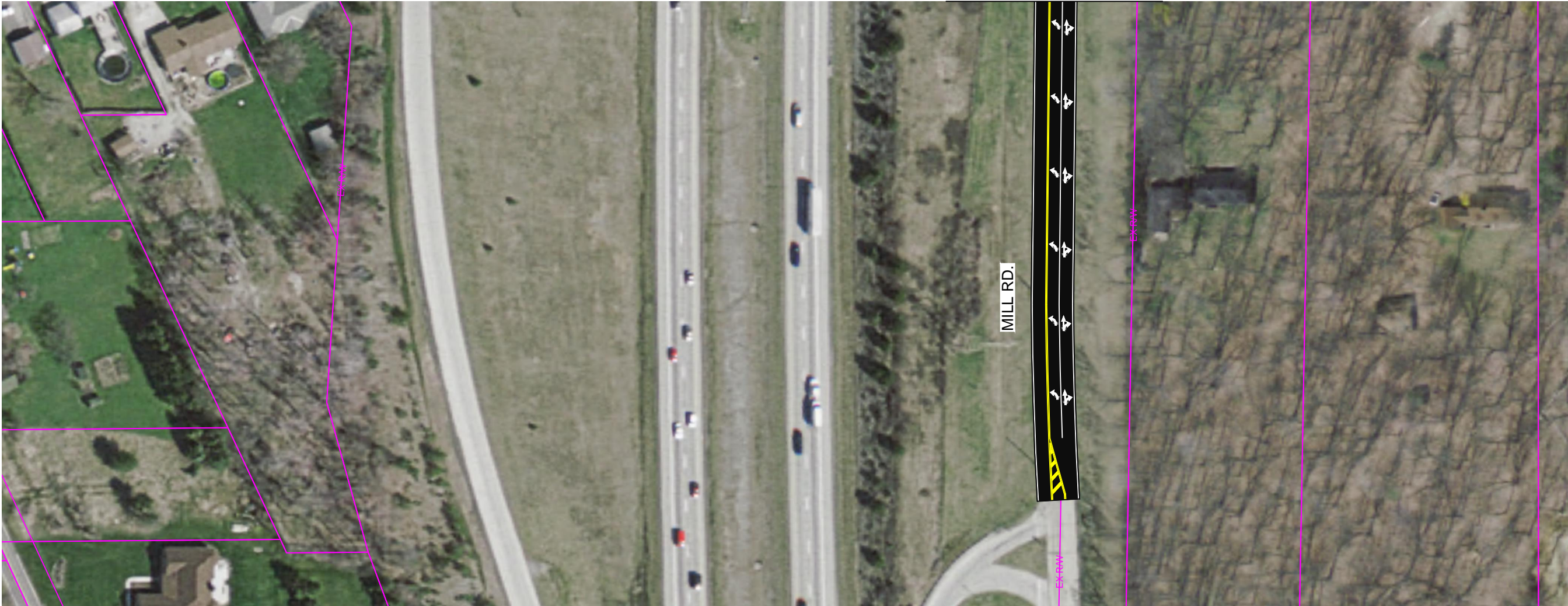
FIGURE 17

CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 8 OF 9

MARCH 2015



MATCH LINE H


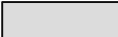





MILL RD.

EX-RW

EX-RW

LEGEND

-  PROPOSED BRIDGE
-  EXISTING PAVEMENT
-  PROPOSED CURB AND GUTTER
-  PROPOSED SIDEWALK
-  PROPOSED PAVEMENT

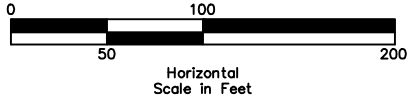


FIGURE 18

CORRIDOR IMPROVEMENT  
RENDERING  
SHEET 9 OF 9

MARCH 2015

**APPENDIX A  
SITE PHOTO LOG**



Looking north on Mill Road toward the Wallings Road intersection



Looking west on Wallings Road toward the Mill Road / I-77 NB Entrance Ramp intersection





Looking east on Wallings Road toward the Mill Road / I-77 NB Entrance Ramp intersection



Looking west on Wallings Road toward the I-77 SB Ramps intersection



Looking east on Wallings Road toward the I-77 SB Ramps intersection



Looking north on I-77 SB Exit Ramp toward the Wallings Road intersection



Looking north on West Mill Road toward  
the Wallings Road intersection



Looking east on Wallings Road toward  
the West Mill Road intersection





Looking west on Wallings Road toward the West Mill Road intersection



Looking south on Skyline Drive toward the Wallings Road intersection



Looking west on Wallings Road toward the Skyline Drive intersection



Looking east on Wallings Road toward the Skyline Drive intersection



Looking east on Wallings Road toward the Craig Lane intersection



Looking west on Wallings Road toward the Craig Lane intersection





Looking north on Craig lane toward the Wallings Road intersection



Looking west on Wallings Road toward the Wright Road intersection



Looking east on Wallings Road toward the Wright Road intersection



Looking south on Wright Road toward the Wallings Road intersection





Looking north on Wright Road toward  
the Wallings Road intersection



Looking east on Wallings Road toward  
the Marianna Boulevard intersection



Looking west on Wallings Road toward the Marianna Boulevard intersection



Looking north on Marianna Boulevard toward the Wallings Road intersection



Looking west on Wallings Road toward the Joyce Road intersection



Looking east on Wallings Road toward the Joyce Road intersection





Looking north on Joyce Road toward the Wallings Road intersection



Looking south on Fire Station Drive toward the Wallings Road intersection





Looking west on Wallings Road toward the Creekside Terrace intersection



Looking east on Wallings Road toward the Creekside Terrace intersection



Looking north on Creekside Terrace toward the Wallings Road intersection



Looking west on Wallings Road toward the Majestic Oaks Trail intersection



Looking east on Wallings Road toward the Majestic Oaks Trail intersection



Looking south on Majestic Oaks Trail toward the Wallings Road intersection





Looking east on Wallings Road toward the Wyatt Road intersection



Looking west on Wallings Road toward the Wyatt Road intersection





Looking north on Wyatt Road toward the Wallings Road intersection



Looking west on Wallings Road toward the McCreary Road intersection



Looking east on Wallings Road toward the McCreary Road intersection



Looking south on McCreary Road toward the Wallings Road intersection



Looking west on Wallings Road toward the Overlook Avenue intersection



Looking east on Wallings Road toward the Overlook Avenue intersection





Looking north on Overlook Avenue toward the Wallings Road intersection



Looking west on Wallings Road toward the Chestnut Boulevard intersection



Looking east on Wallings Road toward the Chestnut Boulevard intersection



Looking north on Chestnut Boulevard toward the Wallings Road intersection



Looking west on Wallings Road toward the Longview Road intersection



Looking east on Wallings Road toward the Longview Road intersection





Looking south on Longview Road toward the Wallings Road intersection



Looking west on Wallings Road toward the Elmhurst Drive intersection



Looking east on Wallings Road toward the Elmhurst Drive intersection



Looking south on Elmhurst Drive toward the Wallings Road intersection



Looking west on Wallings Road toward the Broadview Road intersection



Looking east on Wallings Road toward the Broadview Road intersection





Looking north on Broadview Road toward the Wallings Road intersection



Looking south on Broadview Road toward the Wallings Road intersection

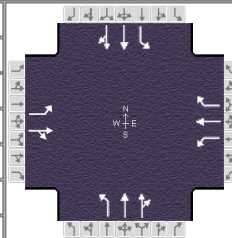
**APPENDIX B**  
**EXISTING HCS INTERSECTION CAPACITY ANALYSIS**

EXISTING YEAR 2015 CONDITIONS



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Broadview F	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	1. Wallings Rd_Broadview Rd_Existing AM.xus				
Project Description	Existing Year 2015 AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	310	550	70	80	190	80	50	550	370	70	190	80

Signal Information				Signal Timing and Phases											
Cycle, s	154.4	Reference Phase	2	Green			Yellow			Red			Phase Diagrams (1-8)		
Offset, s	0	Reference Point	End	22.0	35.0	22.0	12.4	35.0	0.0						
Uncoordinated	Yes	Simult. Gap E/W	On	3.6	3.6	3.6	3.6	3.6	0.0						
Force Mode	Fixed	Simult. Gap N/S	On	2.0	2.0	2.0	2.0	2.0	0.0						

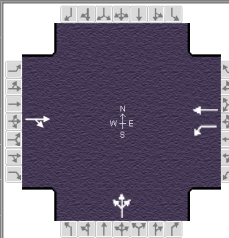
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	27.6	40.6	45.6	58.6	27.6	40.6	27.6	40.6
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	24.0	37.0	6.0	14.8	5.1	37.0	6.4	12.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.3	3.9	0.1	0.0	0.2	5.9
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	0.00	0.04	0.00	1.00	0.00	0.11

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	337	674		87	207	87	54	536	464	76	151	143
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1844		1757	1845	1563	1774	1863	1611	1774	1900	1712
Queue Service Time (g <sub>s</sub> ), s	22.0	35.0		4.0	12.8	6.0	3.1	35.0	35.0	4.4	10.3	10.9
Cycle Queue Clearance Time (g <sub>c</sub> ), s	22.0	35.0		4.0	12.8	6.0	3.1	35.0	35.0	4.4	10.3	10.9
Green Ratio (g/C)	0.37	0.23		0.50	0.34	0.34	0.37	0.23	0.23	0.37	0.23	0.23
Capacity (c), veh/h	570	418		502	633	537	454	422	365	299	431	388
Volume-to-Capacity Ratio (X)	0.591	1.612		0.173	0.326	0.162	0.120	1.270	1.270	0.254	0.350	0.368
Available Capacity (c <sub>a</sub> ), veh/h	570	418		502	633	537	454	422	365	299	431	388
Back of Queue (Q), veh/ln (50th percentile)	10.2	49.5		1.7	5.9	2.3	1.4	32.9	28.7	2.0	5.0	4.8
Queue Storage Ratio (RQ) (50th percentile)	2.57	0.00		0.35	0.00	0.18	0.12	0.00	0.00	0.17	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	37.8	59.7		24.8	37.5	35.3	32.3	59.7	59.7	36.1	50.1	50.4
Incremental Delay (d <sub>2</sub> ), s/veh	1.6	286.5		0.2	0.3	0.1	0.1	138.9	141.4	0.4	0.5	0.6
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	39.5	346.2		25.0	37.8	35.4	32.4	198.6	201.1	36.5	50.6	50.9
Level of Service (LOS)	D	F		C	D	D	C	F	F	D	D	D
Approach Delay, s/veh / LOS	244.0	F		34.3	C		191.1	F		47.8	D	
Intersection Delay, s/veh / LOS	170.1						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Existing AM.xus				
Project Description	Existing Year 2015 AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		950	10	50	320		40	0	230			

Signal Information															
Cycle, s	121.8	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	15.0	60.0	30.0	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0					

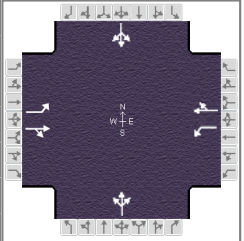
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		65.6	20.6	86.2		35.6		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.5		
Queue Clearance Time (g <sub>s</sub> ), s		62.0	3.5	11.8		22.5		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		1.00	0.00	0.00		0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		1043		54	348			293				
Adjusted Saturation Flow Rate (s), veh/h/ln		1859		1723	1810			1605				
Queue Service Time (g <sub>s</sub> ), s		60.0		1.5	9.8			20.5				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		60.0		1.5	9.8			20.5				
Green Ratio (g/C)		0.49		0.63	0.66			0.25				
Capacity (c), veh/h		916		271	1197			395				
Volume-to-Capacity Ratio (X)		1.139		0.200	0.290			0.742				
Available Capacity (c <sub>a</sub> ), veh/h		916		271	1197			395				
Back of Queue (Q), veh/ln (50th percentile)		44.7		0.8	3.6			8.9				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.20	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		30.9		24.3	8.6			42.3				
Incremental Delay (d <sub>2</sub> ), s/veh		75.9		0.1	0.0			6.5				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		106.8		24.4	8.7			48.9				
Level of Service (LOS)		F		C	A			D				
Approach Delay, s/veh / LOS	106.8	F		10.8	B		48.9	D		0.0		
Intersection Delay, s/veh / LOS			74.9						E			

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wright Road	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	12. Wallings Rd_Wright Rd_Existing AM.xus				
Project Description	Existing Year 2015 AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	20	1160	10	10	340	10	20	20	10	50	10	10

Signal Information													
Cycle, s	98.4	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green		15.0	47.0	20.0	0.0	0.0	0.0				
		Yellow		3.6	3.6	3.2	0.0	0.0	0.0				
		Red		2.0	2.0	2.0	0.0	0.0	0.0				

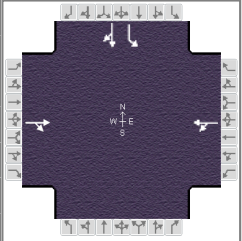
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	20.6	52.6	20.6	52.6		25.2		25.2
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6		5.2		5.2
Max Allow Headway (MAH), s	3.1	6.0	3.1	6.0		4.3		4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.5	49.0	2.2	15.6		4.4		6.2
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	23.6		0.3		0.3
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		1.00
Max Out Probability	0.00	1.00	0.00	0.69		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	22	1272		11	380			54			76	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1860		1740	1818			1621			1442	
Queue Service Time (g <sub>s</sub> ), s	0.5	47.0		0.2	13.6			0.0			1.7	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.5	47.0		0.2	13.6			2.4			4.2	
Green Ratio (g/C)	0.63	0.48		0.63	0.48			0.20			0.20	
Capacity (c), veh/h	662	888		338	868			381			356	
Volume-to-Capacity Ratio (X)	0.033	1.432		0.032	0.438			0.143			0.214	
Available Capacity (c <sub>a</sub> ), veh/h	662	888		338	868			381			356	
Back of Queue (Q), veh/ln (50th percentile)	0.2	68.5		0.1	5.5			1.1			1.6	
Queue Storage Ratio (RQ) (50th percentile)	0.04	0.00		0.04	0.00			0.00			0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	8.1	25.7		18.0	17.0			32.2			32.8	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	200.7		0.0	0.7			0.2			0.3	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	8.1	226.4		18.0	17.7			32.4			33.1	
Level of Service (LOS)	A	F		B	B			C			C	
Approach Delay, s/veh / LOS	222.7	F		17.7	B		32.4	C		33.1	C	
Intersection Delay, s/veh / LOS	164.9						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Existing AM.xus				
Project Description	Existing Year 2015 AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		930	210	60	210					140	10	150

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.5	24.5	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.0	0.0	0.0	0.0	0.0			
				Red	1.9	2.5	0.0	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		8.0				10.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R <sub>c</sub> ), s		5.5		5.5				5.5
Max Allow Headway (MAH), s		2.3		2.3				4.2
Queue Clearance Time (g <sub>s</sub> ), s		56.5		56.5				10.2
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0				1.0
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		1.00		1.00				0.01

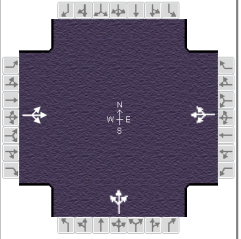
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		1239			293					152	174	
Adjusted Saturation Flow Rate (s), veh/h/ln		1821			230					1740	1563	
Queue Service Time (g <sub>s</sub> ), s		54.5			0.0					6.3	8.2	
Cycle Queue Clearance Time (g <sub>c</sub> ), s		54.5			54.5					6.3	8.2	
Green Ratio (g/C)		0.61			0.61					0.27	0.27	
Capacity (c), veh/h		1103			188					474	426	
Volume-to-Capacity Ratio (X)		1.124			1.560					0.321	0.409	
Available Capacity (c <sub>a</sub> ), veh/h		1103			188					474	426	
Back of Queue (Q), veh/ln (50th percentile)		39.7			17.3					2.6	3.0	
Queue Storage Ratio (RQ) (50th percentile)		0.00			0.00					0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh		17.8			31.4					26.1	26.8	
Incremental Delay (d <sub>2</sub> ), s/veh		67.9			276.2					0.4	0.6	
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0					0.0	0.0	
Control Delay (d), s/veh		85.6			307.6					26.5	27.4	
Level of Service (LOS)		F			F					C	C	
Approach Delay, s/veh / LOS	85.6	F		307.6	F		0.0			27.0	C	
Intersection Delay, s/veh / LOS	110.4						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Existing AM.xus				
Project Description	Existing Year 2015 AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	820	170	80	20	110	250	160	220	70			

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	0.0	59.7	19.7	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	3.6	3.0	0.0	0.0	0.0			
				Red	2.9	1.7	2.3	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		4		
Case Number	0.0	14.0		8.3		12.0		
Phase Duration, s	0.0	65.0		65.0		25.0		
Change Period, (Y+R <sub>c</sub> ), s	6.9	5.3		5.3		5.3		
Max Allow Headway (MAH), s	0.0	2.7		2.7		5.2		
Queue Clearance Time (g <sub>s</sub> ), s		61.7		11.9		21.7		
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		2.4		0.0		
Phase Call Probability		1.00		1.00		1.00		
Max Out Probability		1.00		0.33		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	1163			413			489					
Adjusted Saturation Flow Rate (s), veh/h/ln	1074			1751			1764					
Queue Service Time (g <sub>s</sub> ), s	6.0			0.0			19.7					
Cycle Queue Clearance Time (g <sub>c</sub> ), s	59.7			9.9			19.7					
Green Ratio (g/C)	0.66			0.66			0.22					
Capacity (c), veh/h	783			1204			386					
Volume-to-Capacity Ratio (X)	1.485			0.343			1.267					
Available Capacity (c <sub>a</sub> ), veh/h	783			1204			386					
Back of Queue (Q), veh/ln (50th percentile)	64.4			2.9			23.3					
Queue Storage Ratio (RQ) (50th percentile)	0.00			0.00			0.00					
Uniform Delay (d <sub>1</sub> ), s/veh	18.6			6.8			35.2					
Incremental Delay (d <sub>2</sub> ), s/veh	225.2			0.1			139.2					
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0			0.0			0.0					
Control Delay (d), s/veh	243.9			6.8			174.3					
Level of Service (LOS)	F			A			F					
Approach Delay, s/veh / LOS	243.9	F		6.8	A		174.3	F		0.0		
Intersection Delay, s/veh / LOS	180.0						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	50	940			340	10		
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	54	1021	0	0	369	10		
Percent Heavy Vehicles	2	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	54						20	
C (m) (veh/h)	1179						217	
v/c	0.05						0.09	
95% queue length	0.14						0.30	
Control Delay (s/veh)	8.2						23.3	
LOS	A						C	
Approach Delay (s/veh)	--	--					23.3	
Approach LOS	--	--					C	

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2015		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	30	920			340	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	32	999	0	0	369	10	
Percent Heavy Vehicles	2	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LT						TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	32						20
C (m) (veh/h)	1179						237
v/c	0.03						0.08
95% queue length	0.08						0.27
Control Delay (s/veh)	8.1						21.6
LOS	A						C
Approach Delay (s/veh)	--	--					21.6
Approach LOS	--	--					C

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2015		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		920	10	10	330		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	0	999	10	10	358	0	
Percent Heavy Vehicles	2	--	--	4	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	20		30				
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	21	0	32	0	0	0	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (veh/h)		10		53			
C (m) (veh/h)		679		220			
v/c		0.01		0.24			
95% queue length		0.04		0.91			
Control Delay (s/veh)		10.4		26.5			
LOS		B		D			
Approach Delay (s/veh)	--	--	26.5				
Approach LOS	--	--	D				



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		940	10	10	330			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1021	10	10	358	0		
Percent Heavy Vehicles	2	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	32	0	0	0		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		42				
C (m) (veh/h)		674		233				
v/c		0.01		0.18				
95% queue length		0.05		0.64				
Control Delay (s/veh)		10.4		23.8				
LOS		B		C				
Approach Delay (s/veh)	--	--	23.8					
Approach LOS	--	--	C					

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	30	940			330	30		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	32	1021	0	0	358	32		
Percent Heavy Vehicles	2	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				20		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	32					31		
C (m) (veh/h)	1169					188		
v/c	0.03					0.16		
95% queue length	0.08					0.58		
Control Delay (s/veh)	8.2					27.9		
LOS	A					D		
Approach Delay (s/veh)	--	--				27.9		
Approach LOS	--	--				D		

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	1170			360	10		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	1271	0	0	391	10		
Percent Heavy Vehicles	2	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	10						20	
C (m) (veh/h)	1158						178	
v/c	0.01						0.11	
95% queue length	0.03						0.37	
Control Delay (s/veh)	8.1						27.8	
LOS	A						D	
Approach Delay (s/veh)	--	--					27.8	
Approach LOS	--	--					D	

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1170	10	10	360			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1271	10	10	391	0		
Percent Heavy Vehicles	2	--	--	4	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		40					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	43	0	0	0		
Percent Heavy Vehicles	3	0	3	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		53				
C (m) (veh/h)		535		171				
v/c		0.02		0.31				
95% queue length		0.06		1.24				
Control Delay (s/veh)		11.9		35.2				
LOS		B		E				
Approach Delay (s/veh)	--	--	35.2					
Approach LOS	--	--	E					



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	1170	30	10	350	10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	1271	32	10	380	10		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration	LTR			LTR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10	10	10	10	10	10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration		LTR			LTR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR	LTR			LTR		
v (veh/h)	10	10	30			30		
C (m) (veh/h)	1169	535	91			99		
v/c	0.01	0.02	0.33			0.30		
95% queue length	0.03	0.06	1.27			1.15		
Control Delay (s/veh)	8.1	11.9	62.9			56.4		
LOS	A	B	F			F		
Approach Delay (s/veh)	--	--	62.9			56.4		
Approach LOS	--	--	F			F		

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1180	10	10	360			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1282	10	10	391	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		533		135				
v/c		0.02		0.15				
95% queue length		0.06		0.50				
Control Delay (s/veh)		11.9		36.2				
LOS		B		E				
Approach Delay (s/veh)	--	--	36.2					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1210	10	10	350			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1315	10	10	380	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		40					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	43	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		53				
C (m) (veh/h)		518		158				
v/c		0.02		0.34				
95% queue length		0.06		1.37				
Control Delay (s/veh)		12.1		38.9				
LOS		B		E				
Approach Delay (s/veh)	--	--	38.9					
Approach LOS	--	--	E					

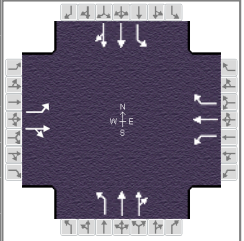
TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	20	1230			350	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	1336	0	0	380	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT			TR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	21					20		
C (m) (veh/h)	1174					157		
v/c	0.02					0.13		
95% queue length	0.05					0.43		
Control Delay (s/veh)	8.1					31.2		
LOS	A					D		
Approach Delay (s/veh)	--	--				31.2		
Approach LOS	--	--				D		



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/W Mill Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1090	150	10	350			
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	1184	163	10	380	0		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		50					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	0	54	0	0	0		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		64				
C (m) (veh/h)		508		179				
v/c		0.02		0.36				
95% queue length		0.06		1.51				
Control Delay (s/veh)		12.2		35.9				
LOS		B		E				
Approach Delay (s/veh)	--	--	35.9					
Approach LOS	--	--	E					

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	GPD Group			Duration, h	0.25		
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other		
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92		
Intersection	Wallings Road/Broadview F	Analysis Year	2015	Analysis Period	1 > 7:00		
File Name	1. Wallings Rd_Broadview Rd_Existing PM.xus						
Project Description	Existing Year 2015 PM Peak Hour						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	130	230	100	350	720	160	130	430	140	200	600	260

Signal Information				Signal Timing (s)										
Cycle, s	154.4	Reference Phase	2											
Offset, s	0	Reference Point	End	Green	22.0	35.0	22.0	12.4	35.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	0.0				

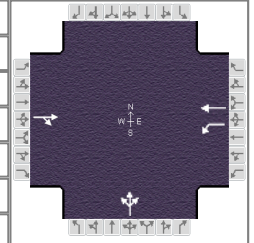
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	27.6	40.6	45.6	58.6	27.6	40.6	27.6	40.6
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	10.3	32.1	24.8	55.0	10.4	27.3	15.6	37.0
Green Extension Time (g <sub>e</sub> ), s	0.3	1.7	1.2	0.0	0.3	4.1	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	1.00	0.01	1.00	0.00	0.72	0.25	1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	141	359		380	783	174	141	322	298	217	493	442
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1784		1757	1845	1563	1774	1863	1706	1774	1900	1704
Queue Service Time (g <sub>s</sub> ), s	8.3	30.1		22.8	53.0	12.7	8.4	24.9	25.3	13.6	35.0	35.0
Cycle Queue Clearance Time (g <sub>c</sub> ), s	8.3	30.1		22.8	53.0	12.7	8.4	24.9	25.3	13.6	35.0	35.0
Green Ratio (g/C)	0.37	0.23		0.50	0.34	0.34	0.37	0.23	0.23	0.37	0.23	0.23
Capacity (c), veh/h	302	404		534	633	537	299	422	387	340	431	386
Volume-to-Capacity Ratio (X)	0.468	0.887		0.712	1.236	0.324	0.472	0.762	0.770	0.640	1.144	1.144
Available Capacity (c <sub>a</sub> ), veh/h	302	404		534	633	537	299	422	387	340	431	386
Back of Queue (Q), veh/ln (50th percentile)	3.8	15.8		9.6	45.2	5.0	3.8	12.8	12.0	6.4	27.6	25.0
Queue Storage Ratio (RQ) (50th percentile)	0.95	0.00		1.96	0.00	0.39	0.32	0.00	0.00	0.54	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	37.3	57.8		32.2	50.7	37.5	37.3	55.8	55.9	38.3	59.7	59.7
Incremental Delay (d <sub>2</sub> ), s/veh	1.1	20.5		4.4	119.4	0.3	1.2	8.0	9.2	4.0	89.0	91.2
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	38.4	78.3		36.6	170.1	37.8	38.5	63.8	65.1	42.3	148.7	150.9
Level of Service (LOS)	D	E		D	F	D	D	E	E	D	F	F
Approach Delay, s/veh / LOS	67.0	E		114.9	F		59.6	E		129.5	F	
Intersection Delay, s/veh / LOS	101.8						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Existing PM.xus				
Project Description	Existing Year 2015 PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		520	50	180	1240		50	0	50			

Signal Information														
Cycle, s	121.8	Reference Phase	2	Green	15.0	60.0	30.0	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

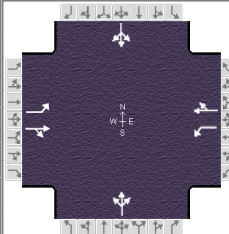
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		65.6	20.6	86.2		35.6		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.4		
Queue Clearance Time (g <sub>s</sub> ), s		33.5	7.7	82.6		8.4		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.00	0.00	1.00		0.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		620		196	1348			109				
Adjusted Saturation Flow Rate (s), veh/h/ln		1834		1723	1810			1671				
Queue Service Time (g <sub>s</sub> ), s		31.5		5.7	80.6			6.4				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		31.5		5.7	80.6			6.4				
Green Ratio (g/C)		0.49		0.63	0.66			0.25				
Capacity (c), veh/h		903		453	1197			411				
Volume-to-Capacity Ratio (X)		0.686		0.432	1.126			0.264				
Available Capacity (c <sub>a</sub> ), veh/h		903		453	1197			411				
Back of Queue (Q), veh/ln (50th percentile)		13.6		2.1	52.1			2.7				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.54	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		23.7		15.5	20.6			37.0				
Incremental Delay (d <sub>2</sub> ), s/veh		1.8		0.2	67.8			0.1				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		25.5		15.7	88.4			37.1				
Level of Service (LOS)		C		B	F			D				
Approach Delay, s/veh / LOS	25.5	C		79.1	E		37.1	D		0.0		
Intersection Delay, s/veh / LOS	62.5						E					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wright Road	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	12. Wallings Rd_Wright Rd_Existing PM.xus				
Project Description	Existing Year 2015 PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	10	550	10	20	1370	30	20	10	10	20	10	20

Signal Information				Signal Timing (s)									Signal Phases											
Cycle, s	98.4	Reference Phase	2	Green	15.0	47.0	20.0	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		
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.2	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	
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	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	
Force Mode	Fixed	Simult. Gap N/S	On																					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	20.6	52.6	20.6	52.6		25.2		25.2
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6		5.2		5.2
Max Allow Headway (MAH), s	3.1	6.0	3.1	6.0		4.3		4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.2	27.1	2.5	49.0		4.0		4.6
Green Extension Time (g <sub>e</sub> ), s	0.0	19.0	0.0	0.0		0.2		0.2
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		1.00
Max Out Probability	0.00	0.96	0.00	1.00		0.00		0.00

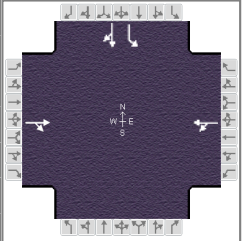
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	11	609		22	1522			43			54	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1857		1740	1820			1549			1539	
Queue Service Time (g <sub>s</sub> ), s	0.2	25.1		0.5	47.0			0.0			0.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.2	25.1		0.5	47.0			2.0			2.6	
Green Ratio (g/C)	0.63	0.48		0.63	0.48			0.20			0.20	
Capacity (c), veh/h	344	887		499	869			370			364	
Volume-to-Capacity Ratio (X)	0.032	0.686		0.044	1.751			0.118			0.149	
Available Capacity (c <sub>a</sub> ), veh/h	344	887		499	869			370			364	
Back of Queue (Q), veh/ln (50th percentile)	0.1	10.8		0.2	101.3			0.9			1.1	
Queue Storage Ratio (RQ) (50th percentile)	0.03	0.00		0.05	0.00			0.00			0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	18.0	20.0		10.6	25.7			32.0			32.3	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	2.9		0.0	342.5			0.1			0.2	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	18.0	22.9		10.7	368.2			32.2			32.4	
Level of Service (LOS)	B	C		B	F			C			C	
Approach Delay, s/veh / LOS	22.8	C		363.2	F		32.2	C		32.4	C	
Intersection Delay, s/veh / LOS	255.6						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Existing PM.xus				
Project Description	Existing Year 2015 PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		470	110	60	520					260	10	900

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.5	24.5	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.0	0.0	0.0	0.0	0.0			
				Red	1.9	2.5	0.0	0.0	0.0	0.0			

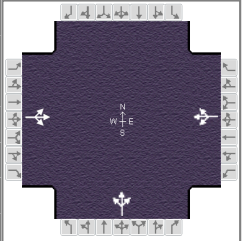
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		8.0				10.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R <sub>c</sub> ), s		5.5		5.5				5.5
Max Allow Headway (MAH), s		2.2		2.2				4.3
Queue Clearance Time (g <sub>s</sub> ), s		20.8		28.8				26.5
Green Extension Time (g <sub>e</sub> ), s		1.0		1.0				0.0
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		630		630						283	989	
Adjusted Saturation Flow Rate (s), veh/h/ln		1819		1520						1740	1551	
Queue Service Time (g <sub>s</sub> ), s		18.8		8.0						12.7	24.5	
Cycle Queue Clearance Time (g <sub>c</sub> ), s		18.8		26.8						12.7	24.5	
Green Ratio (g/C)		0.61		0.61						0.27	0.27	
Capacity (c), veh/h		1102		965						474	422	
Volume-to-Capacity Ratio (X)		0.572		0.653						0.597	2.343	
Available Capacity (c <sub>a</sub> ), veh/h		1102		965						474	422	
Back of Queue (Q), veh/ln (50th percentile)		6.6		6.9						5.4	80.5	
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.00						0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh		10.7		11.6						28.5	32.8	
Incremental Delay (d <sub>2</sub> ), s/veh		0.5		1.3						2.0	611.6	
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0						0.0	0.0	
Control Delay (d), s/veh		11.2		12.8						30.5	644.4	
Level of Service (LOS)		B		B						C	F	
Approach Delay, s/veh / LOS	11.2	B		12.8	B		0.0			508.0	F	
Intersection Delay, s/veh / LOS	261.1						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2015	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Existing PM.xus				
Project Description	Existing Year 2015 PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	240	360	130	10	180	120	400	70	60			

Signal Information				Signal Phases									
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	0.0	59.7	19.7	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	3.6	3.0	0.0	0.0	0.0			
				Red	2.9	1.7	2.3	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		4		
Case Number	0.0	14.0		8.3		12.0		
Phase Duration, s	0.0	65.0		65.0		25.0		
Change Period, (Y+R <sub>c</sub> ), s	6.9	5.3		5.3		5.3		
Max Allow Headway (MAH), s	0.0	2.3		2.3		5.3		
Queue Clearance Time (g <sub>s</sub> ), s		33.0		9.2		21.7		
Green Extension Time (g <sub>e</sub> ), s	0.0	1.1		1.1		0.0		
Phase Call Probability		1.00		1.00		1.00		
Max Out Probability		0.00		0.02		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	793			337			576					
Adjusted Saturation Flow Rate (s), veh/h/ln	1487			1737			1743					
Queue Service Time (g <sub>s</sub> ), s	6.0			0.0			19.7					
Cycle Queue Clearance Time (g <sub>c</sub> ), s	31.0			7.2			19.7					
Green Ratio (g/C)	0.66			0.66			0.22					
Capacity (c), veh/h	1042			1193			382					
Volume-to-Capacity Ratio (X)	0.762			0.282			1.510					
Available Capacity (c <sub>a</sub> ), veh/h	1042			1193			382					
Back of Queue (Q), veh/ln (50th percentile)	9.5			2.2			33.9					
Queue Storage Ratio (RQ) (50th percentile)	0.00			0.00			0.00					
Uniform Delay (d <sub>1</sub> ), s/veh	10.5			6.3			35.2					
Incremental Delay (d <sub>2</sub> ), s/veh	3.0			0.0			242.6					
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0			0.0			0.0					
Control Delay (d), s/veh	13.5			6.4			277.7					
Level of Service (LOS)	B			A			F					
Approach Delay, s/veh / LOS	13.5	B		6.4	A		277.7	F		0.0		
Intersection Delay, s/veh / LOS	101.3						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	560			1210	10		
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	608	0	0	1315	10		
Percent Heavy Vehicles	1	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		20		
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	21		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	10						31	
C (m) (veh/h)	525						124	
v/c	0.02						0.25	
95% queue length	0.06						0.93	
Control Delay (s/veh)	12.0						43.4	
LOS	B						E	
Approach Delay (s/veh)	--	--					43.4	
Approach LOS	--	--					E	

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2015		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	560			1210	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	608	0	0	1315	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration	LT			TR			
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT					LR	
v (veh/h)	10					20	
C (m) (veh/h)	525					104	
v/c	0.02					0.19	
95% queue length	0.06					0.67	
Control Delay (s/veh)	12.0					47.7	
LOS	B					E	
Approach Delay (s/veh)	--	--				47.7	
Approach LOS	--	--				E	



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		540	30	40	1210			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	586	32	43	1315	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		43		20				
C (m) (veh/h)		967		112				
v/c		0.04		0.18				
95% queue length		0.14		0.62				
Control Delay (s/veh)		8.9		44.0				
LOS		A		E				
Approach Delay (s/veh)	--	--	44.0					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		540	10	30	1240			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	586	10	32	1347	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		20					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	21	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		32		31				
C (m) (veh/h)		985		157				
v/c		0.03		0.20				
95% queue length		0.10		0.71				
Control Delay (s/veh)		8.8		33.5				
LOS		A		D				
Approach Delay (s/veh)	--	--	33.5					
Approach LOS	--	--	D					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	550			1230	60		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	597	0	0	1336	65		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				20		40		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	43		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	10						64	
C (m) (veh/h)	491						116	
v/c	0.02						0.55	
95% queue length	0.06						2.63	
Control Delay (s/veh)	12.5						68.9	
LOS	B						F	
Approach Delay (s/veh)	--	--					68.9	
Approach LOS	--	--					F	

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	560			1410	10		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	608	0	0	1532	10		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	10						20	
C (m) (veh/h)	433						76	
v/c	0.02						0.26	
95% queue length	0.07						0.94	
Control Delay (s/veh)	13.5						68.5	
LOS	B						F	
Approach Delay (s/veh)	--	--					68.5	
Approach LOS	--	--					F	



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		560	10	10	1400			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	608	10	10	1521	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	21	0	10	0	0	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		31				
C (m) (veh/h)		967		72				
v/c		0.01		0.43				
95% queue length		0.03		1.70				
Control Delay (s/veh)		8.8		88.4				
LOS		A		F				
Approach Delay (s/veh)	--	--	88.4					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2015		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	550	10	10	1390	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	597	10	10	1510	10	
Percent Heavy Vehicles	1	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LTR			LTR			
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LTR	LTR		LTR			LTR
v (veh/h)	10	10		30			30
C (m) (veh/h)	442	976		43			43
v/c	0.02	0.01		0.70			0.70
95% queue length	0.07	0.03		2.64			2.64
Control Delay (s/veh)	13.3	8.7		196.5			196.5
LOS	B	A		F			F
Approach Delay (s/veh)	--	--		196.5			196.5
Approach LOS	--	--		F			F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		560	10	10	1400			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	608	10	10	1521	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		967		94				
v/c		0.01		0.21				
95% queue length		0.03		0.75				
Control Delay (s/veh)		8.8		53.4				
LOS		A		F				
Approach Delay (s/veh)	--	--	53.4					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		570	10	10	1410			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	619	10	10	1532	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		948		87				
v/c		0.01		0.23				
95% queue length		0.03		0.82				
Control Delay (s/veh)		8.8		58.3				
LOS		A		F				
Approach Delay (s/veh)	--	--	58.3					
Approach LOS	--	--	F					



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2015			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	570			1410	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	619	0	0	1532	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT			TR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	10						20	
C (m) (veh/h)	433						73	
v/c	0.02						0.27	
95% queue length	0.07						0.99	
Control Delay (s/veh)	13.5						72.0	
LOS	B					F		
Approach Delay (s/veh)	--	--				72.0		
Approach LOS	--	--				F		

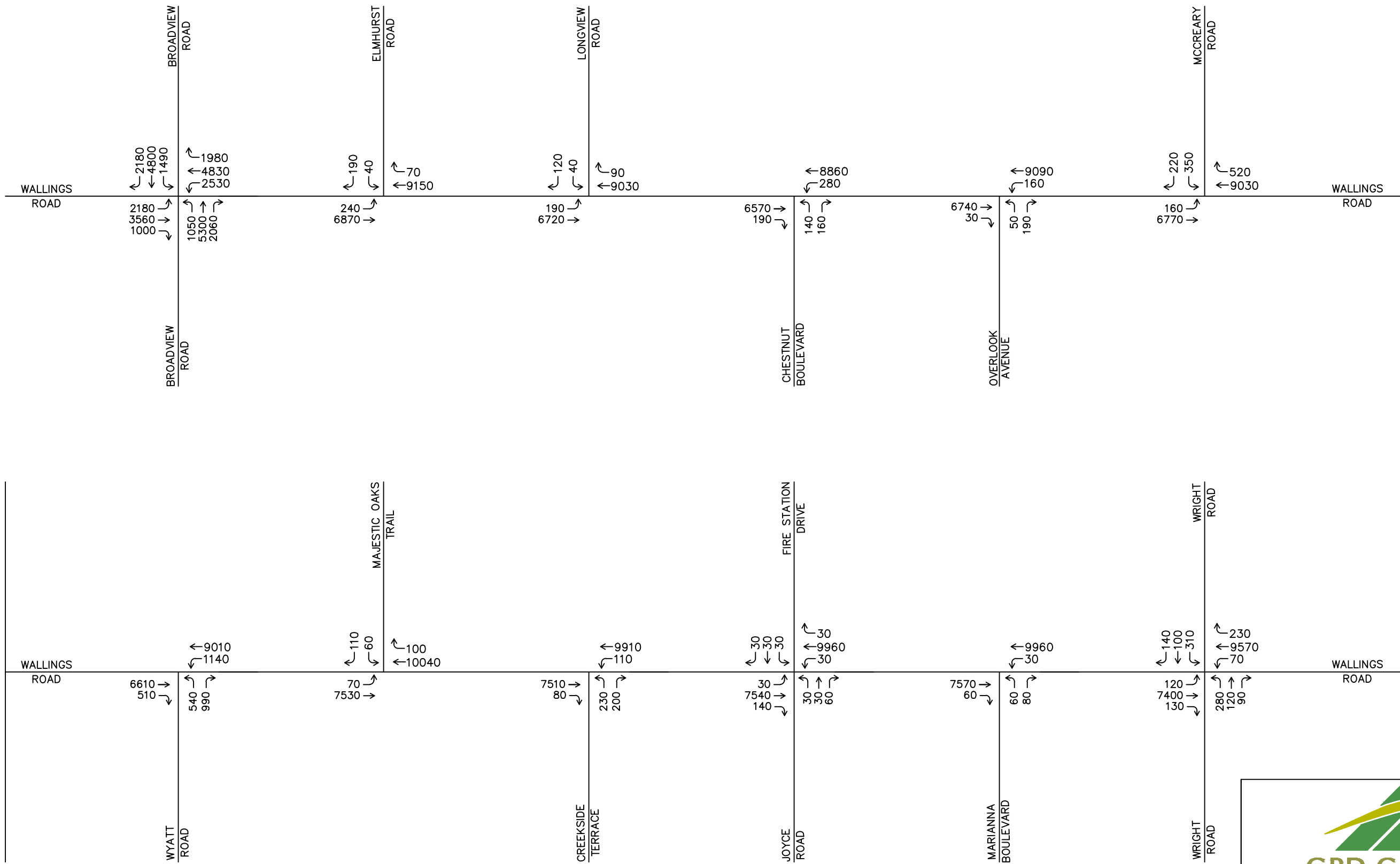
TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/W Mill Rd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2015		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		570	10	10	1410		
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63	
Hourly Flow Rate, HFR (veh/h)	0	619	10	10	1532	0	
Percent Heavy Vehicles	1	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		10				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79	
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0	
Percent Heavy Vehicles	2	0	2	4	0	4	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (veh/h)		10		20			
C (m) (veh/h)		948		91			
v/c		0.01		0.22			
95% queue length		0.03		0.78			
Control Delay (s/veh)		8.8		55.4			
LOS		A		F			
Approach Delay (s/veh)	--	--	55.4				
Approach LOS	--	--	F				


**APPENDIX C**  
**CERTIFIED TRAFFIC PLATES**

MATCHLINE 'A'  
SEE THIS SHEET

MATCHLINE 'B'  
SEE SHEET 2

MATCHLINE 'A'  
SEE THIS SHEET





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**PLATE 1**

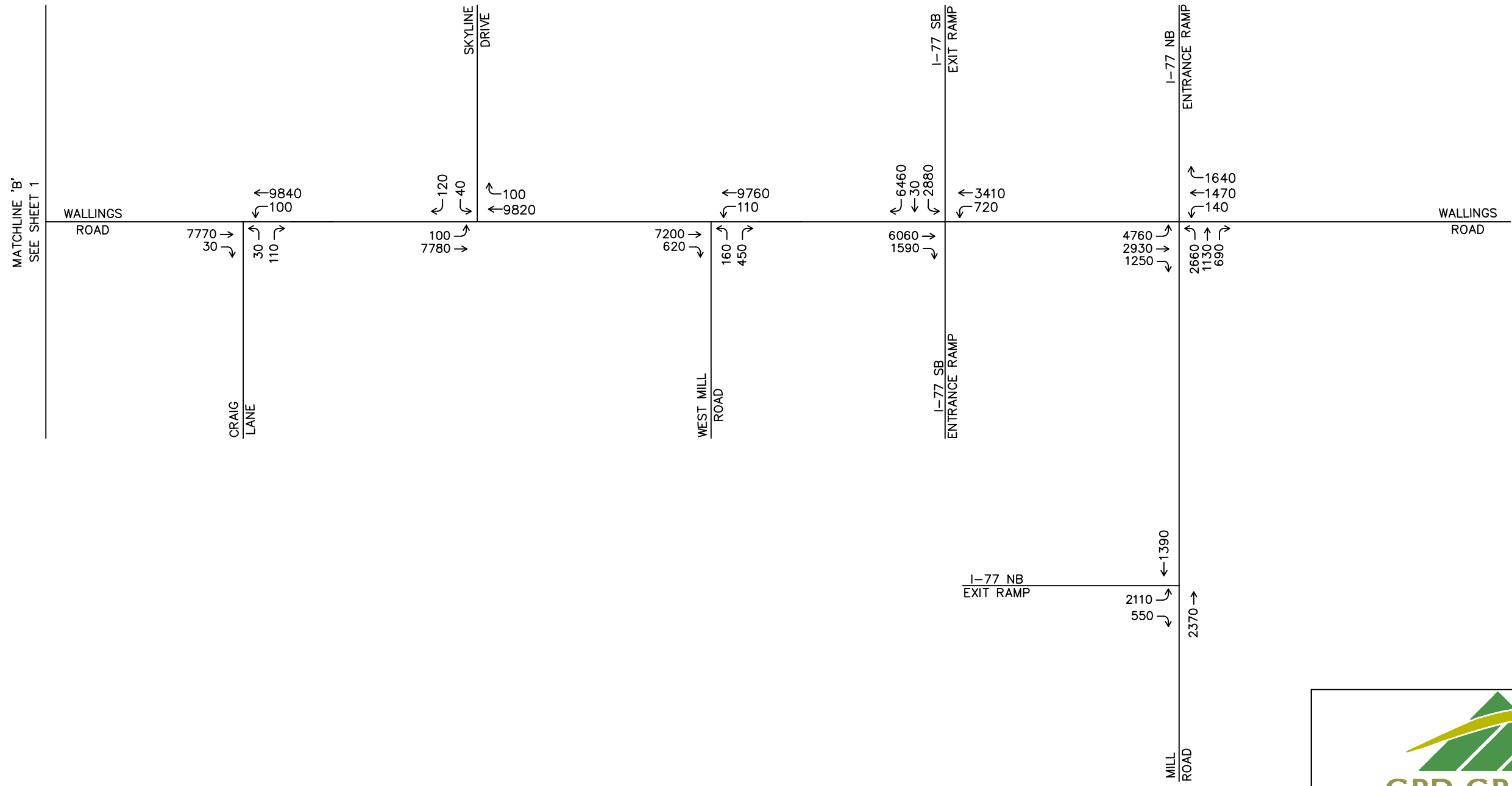
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**EXISTING YEAR 2015  
 ADT VOLUMES  
 SHEET 1 OF 2**

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**MARCH 2015**







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**PLATE 1**

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**EXISTING YEAR 2015  
 ADT VOLUMES  
 SHEET 2 OF 2**

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**MARCH 2015**

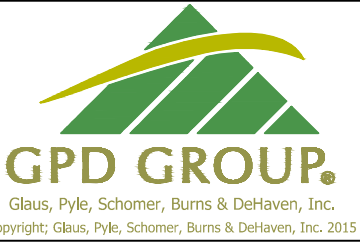
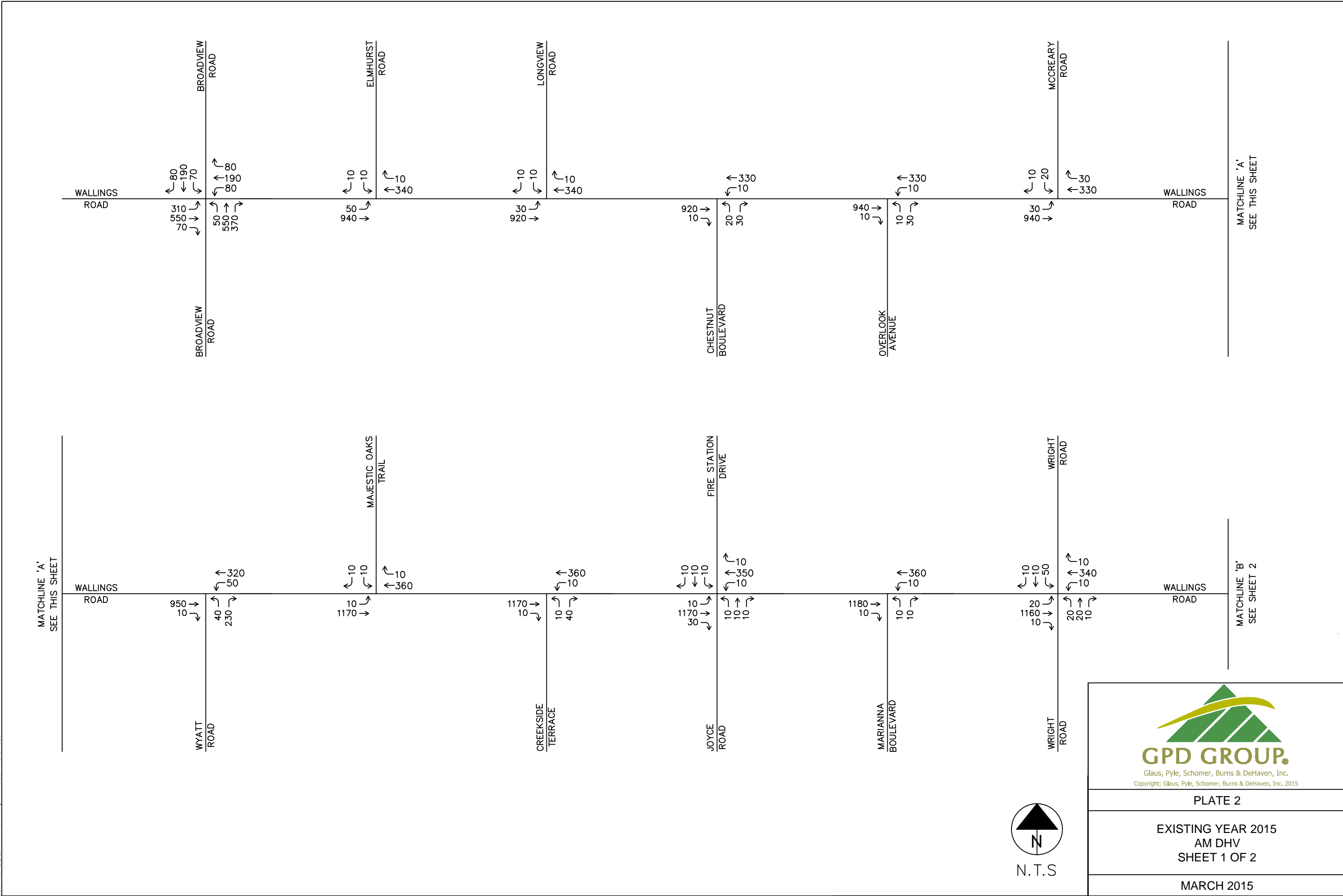
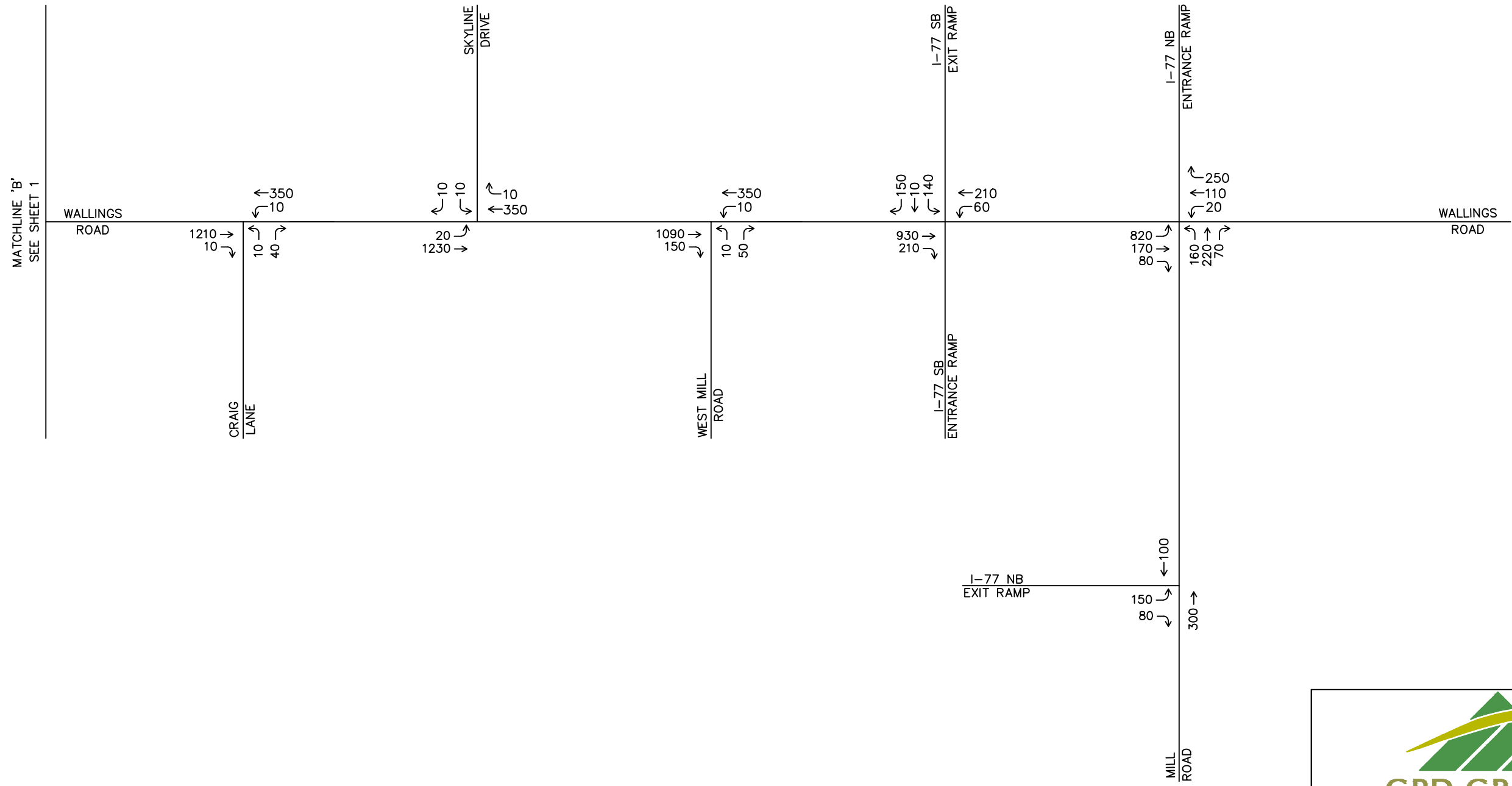


PLATE 2

EXISTING YEAR 2015  
 AM DHV  
 SHEET 1 OF 2

MARCH 2015



MATCHLINE 'B'  
SEE SHEET 1

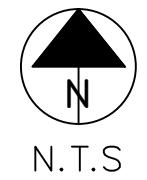


PLATE 2
EXISTING YEAR 2015 AM DHV SHEET 2 OF 2
MARCH 2015

MATCHLINE 'A'  
SEE THIS SHEET

MATCHLINE 'A'  
SEE THIS SHEET

MATCHLINE 'B'  
SEE SHEET 2

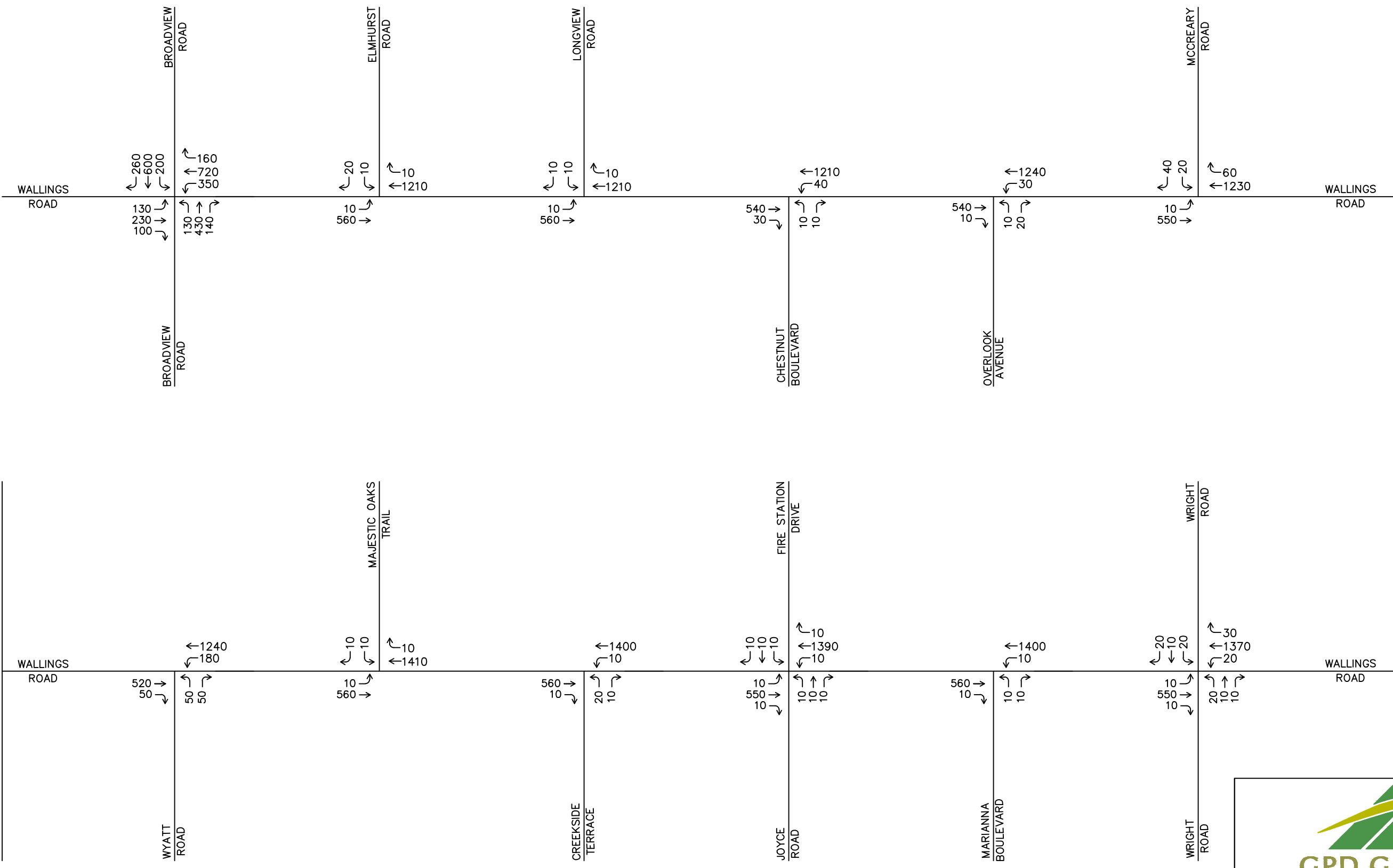


PLATE 3

EXISTING YEAR 2015  
PM DHV  
SHEET 1 OF 2

MARCH 2015



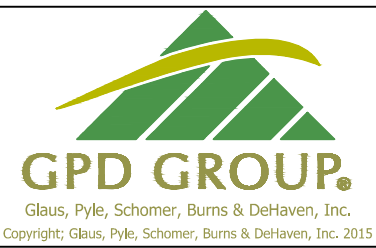
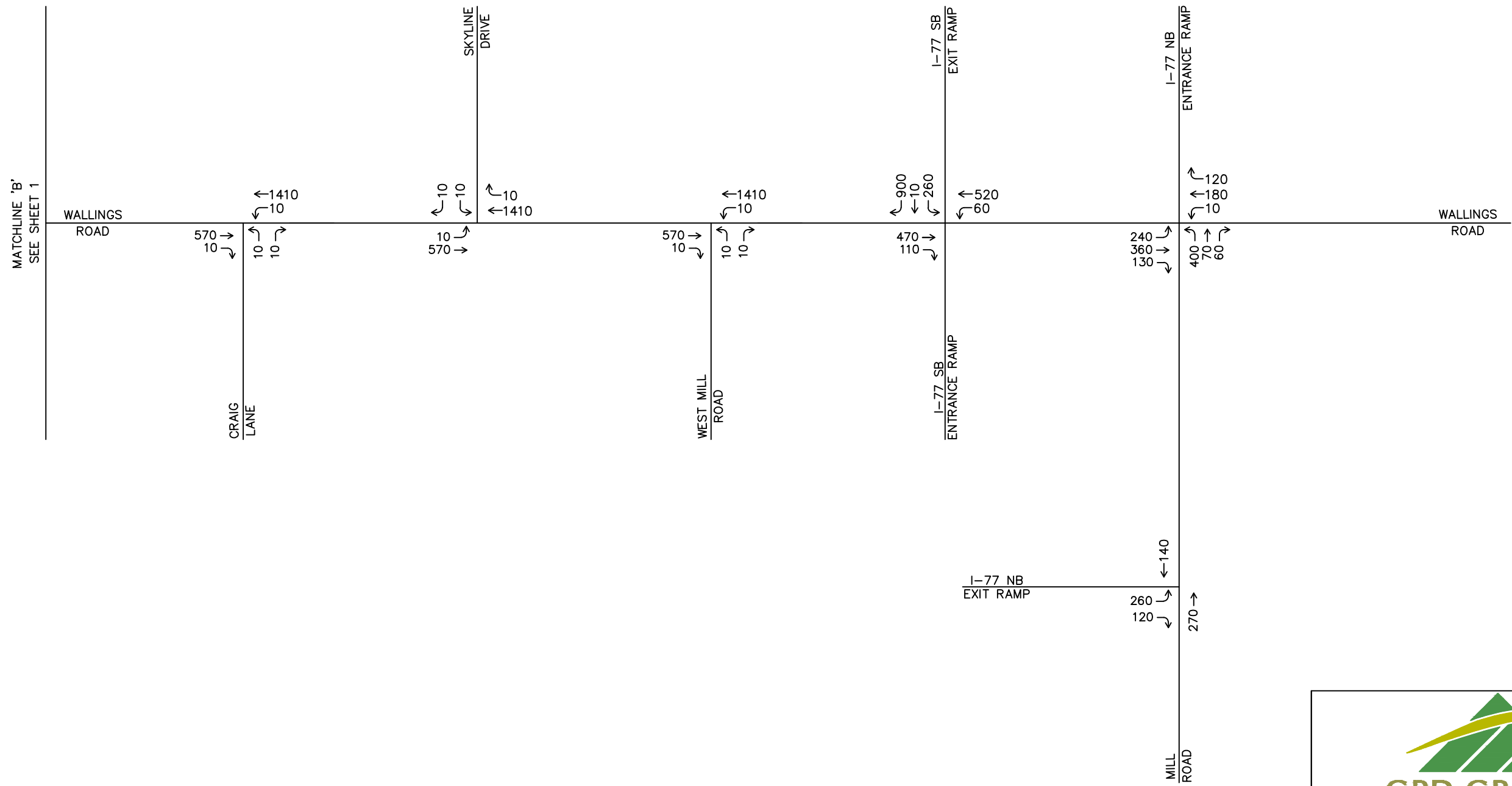
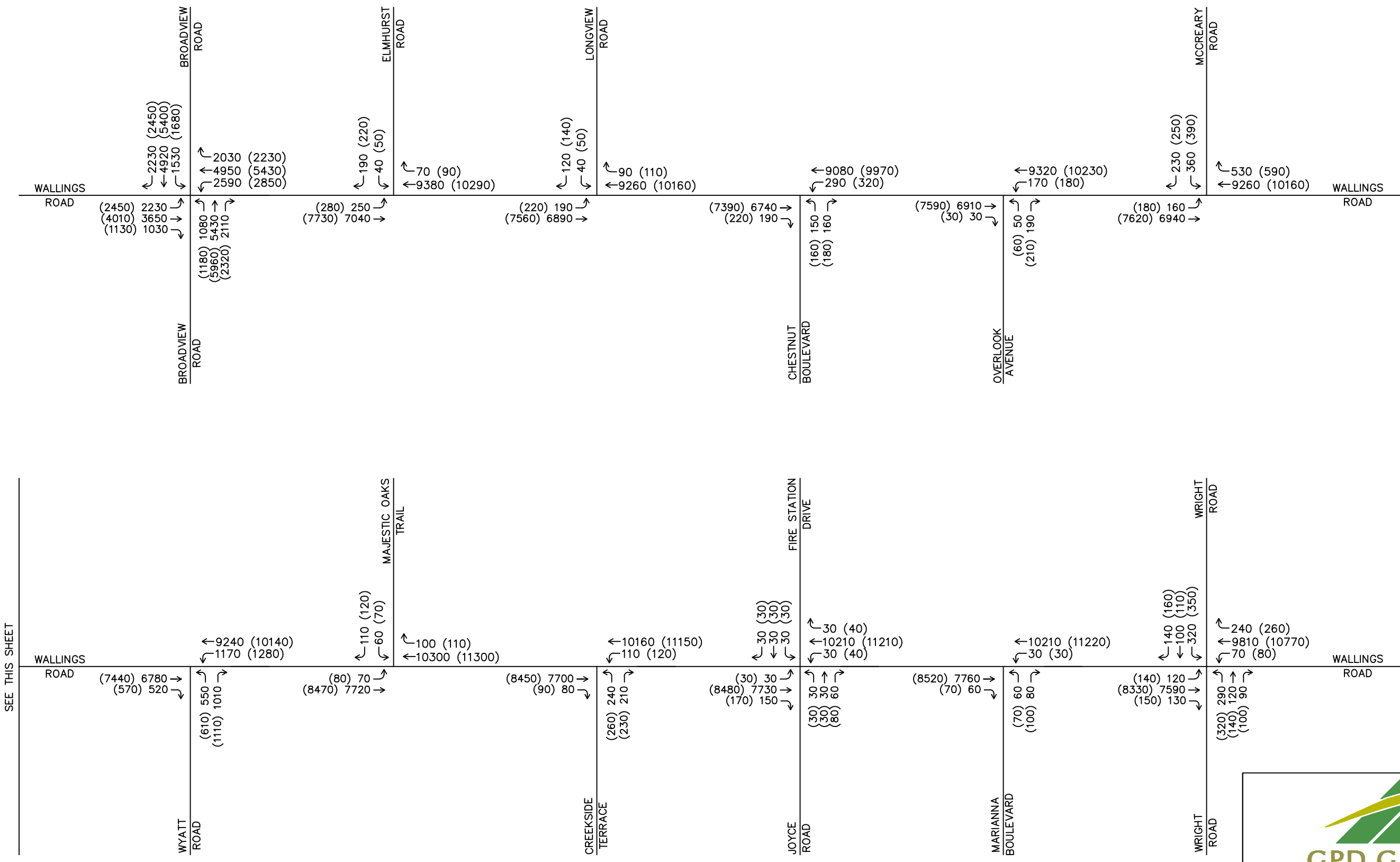


PLATE 3
EXISTING YEAR 2015 PM DHV SHEET 2 OF 2
MARCH 2015

MATCHLINE 'A'  
SEE THIS SHEET



MATCHLINE 'A'  
SEE THIS SHEET

MATCHLINE 'B'  
SEE SHEET 2

**LEGEND**  
 ## = YEAR 2020  
 (##) = YEAR 2040

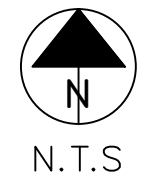
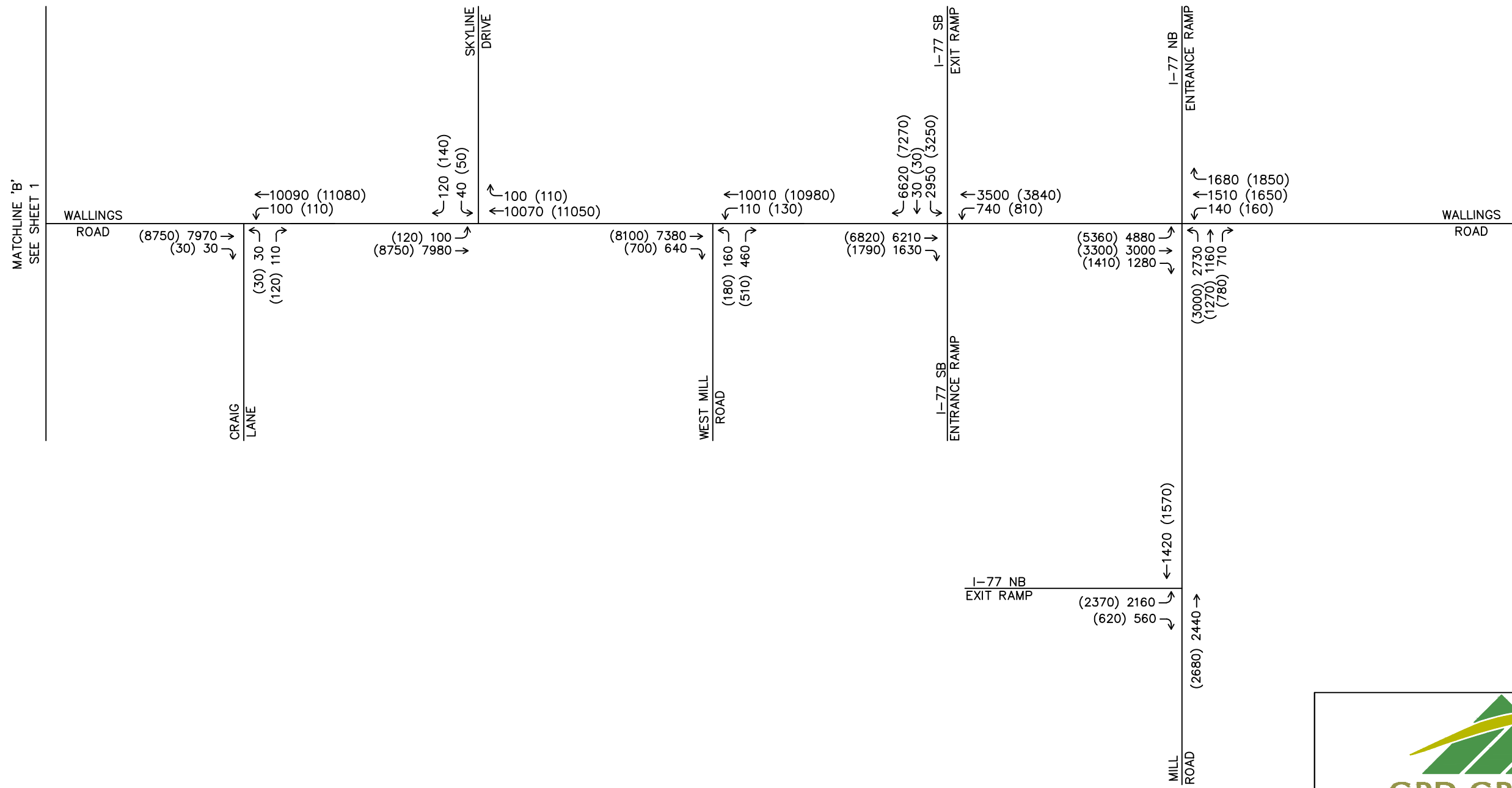


PLATE 4

YEAR 2020 / YEAR 2040  
 ADT VOLUMES  
 SHEET 1 OF 2

MARCH 2015



**LEGEND**  
 ## = YEAR 2020  
 (##) = YEAR 2040



PLATE 4

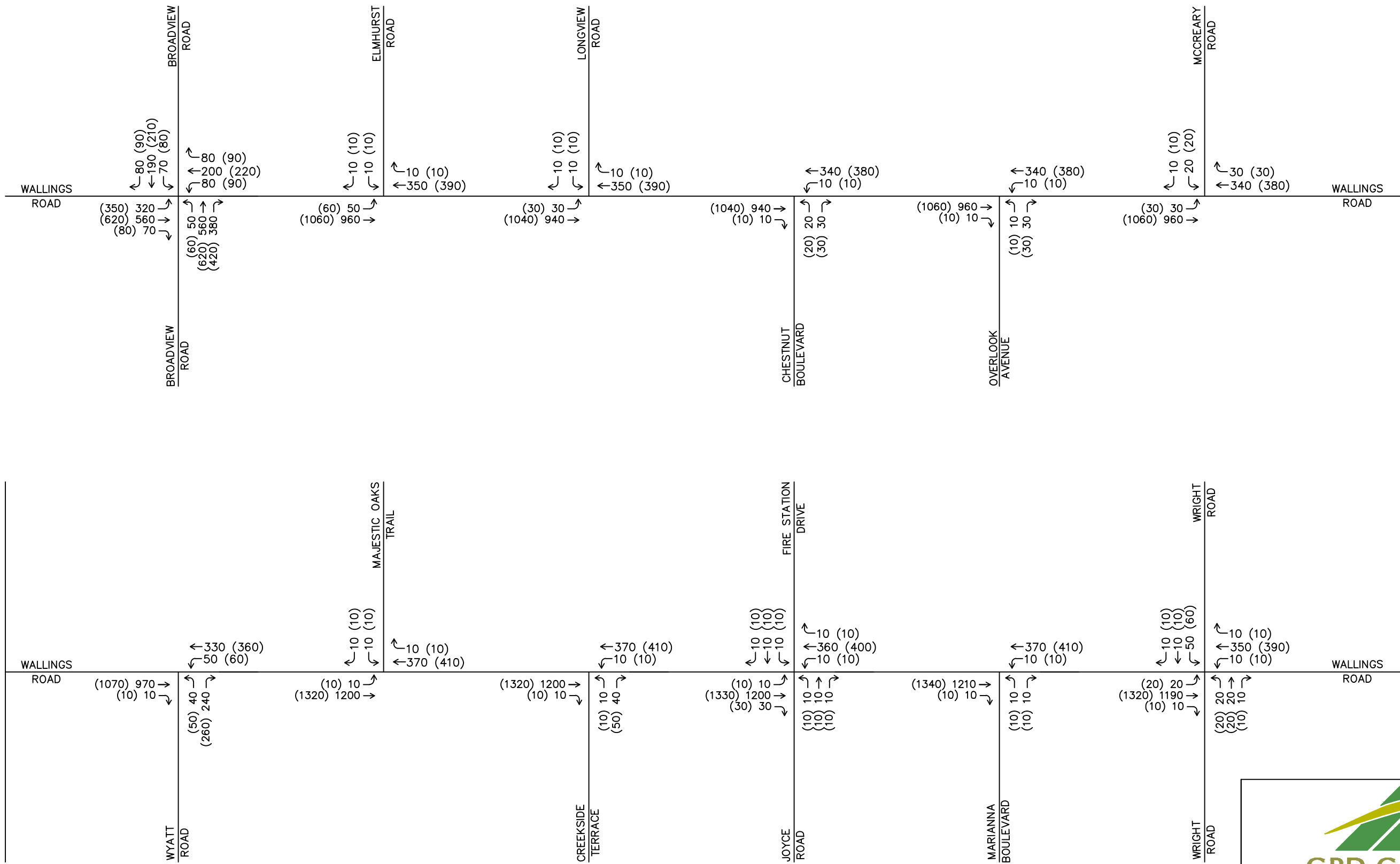
YEAR 2020 / YEAR 2040  
 ADT VOLUMES  
 SHEET 2 OF 2

MARCH 2015

MATCHLINE 'A'  
SEE THIS SHEET


MATCHLINE 'A'  
SEE THIS SHEET

MATCHLINE 'B'  
SEE SHEET 2



**LEGEND**  
 ## = YEAR 2020  
 (##) = YEAR 2040





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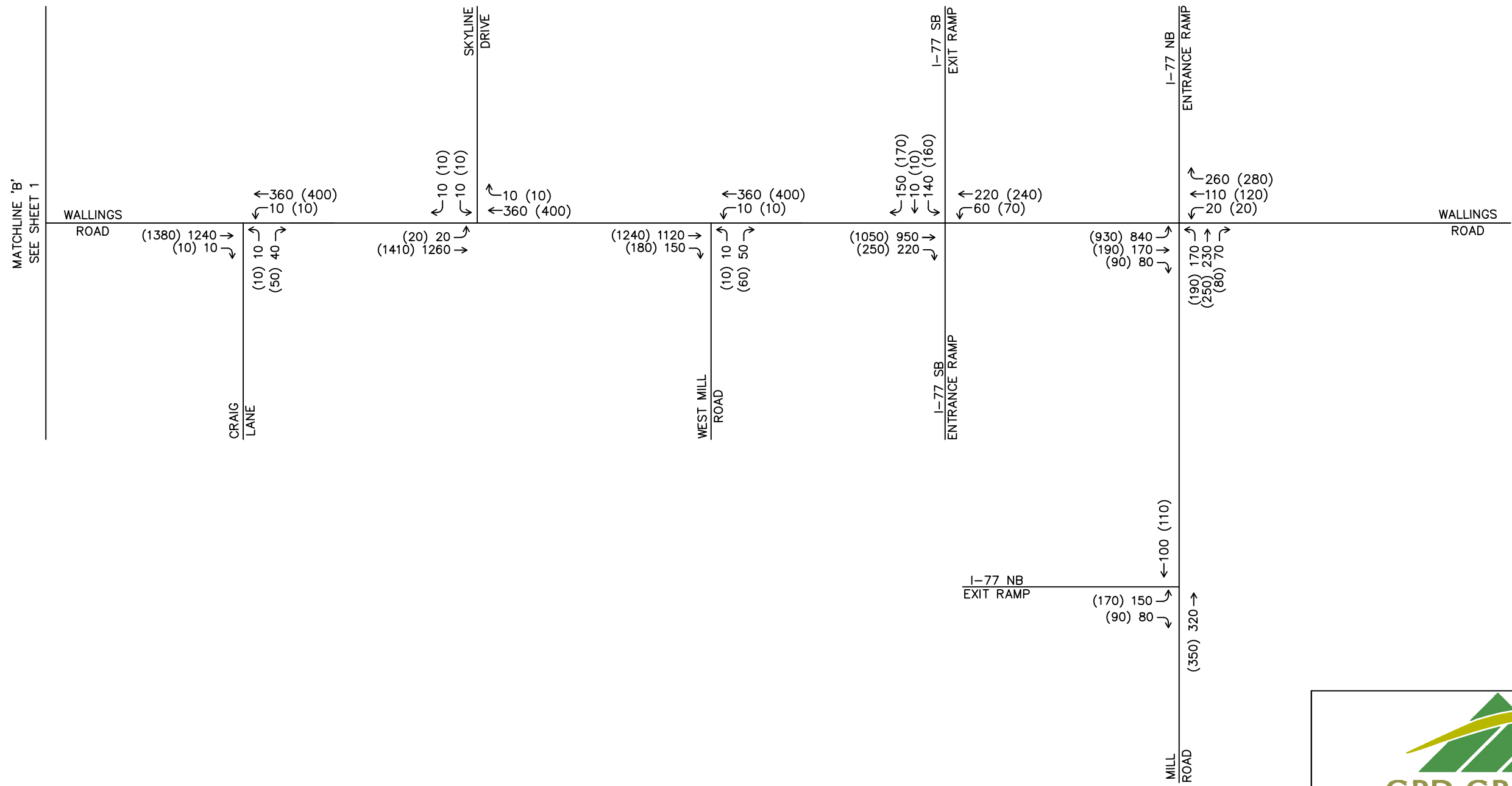
**PLATE 5**

---

**YEAR 2020 / YEAR 2040  
 AM DHV  
 SHEET 1 OF 2**

---

**MARCH 2015**



**LEGEND**  
 ## = YEAR 2020  
 (##) = YEAR 2040

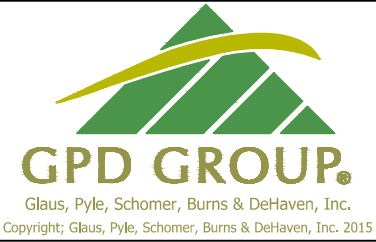
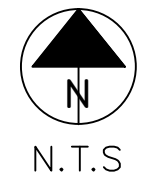
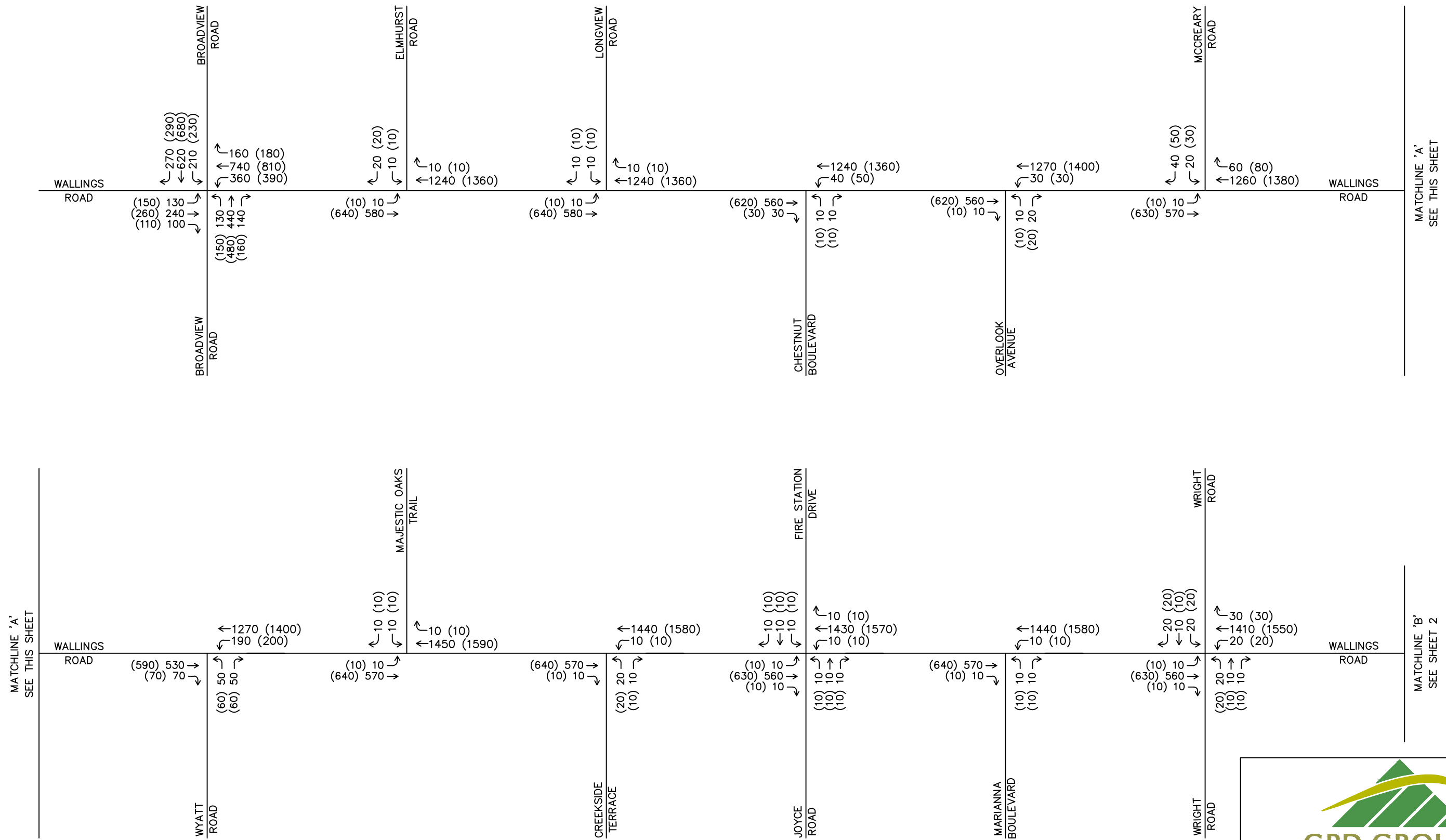


PLATE 5

YEAR 2020 / YEAR 2040  
 AM DHV  
 SHEET 2 OF 2

MARCH 2015





MATCHLINE 'A'  
SEE THIS SHEET

MATCHLINE 'A'  
SEE THIS SHEET

MATCHLINE 'B'  
SEE SHEET 2

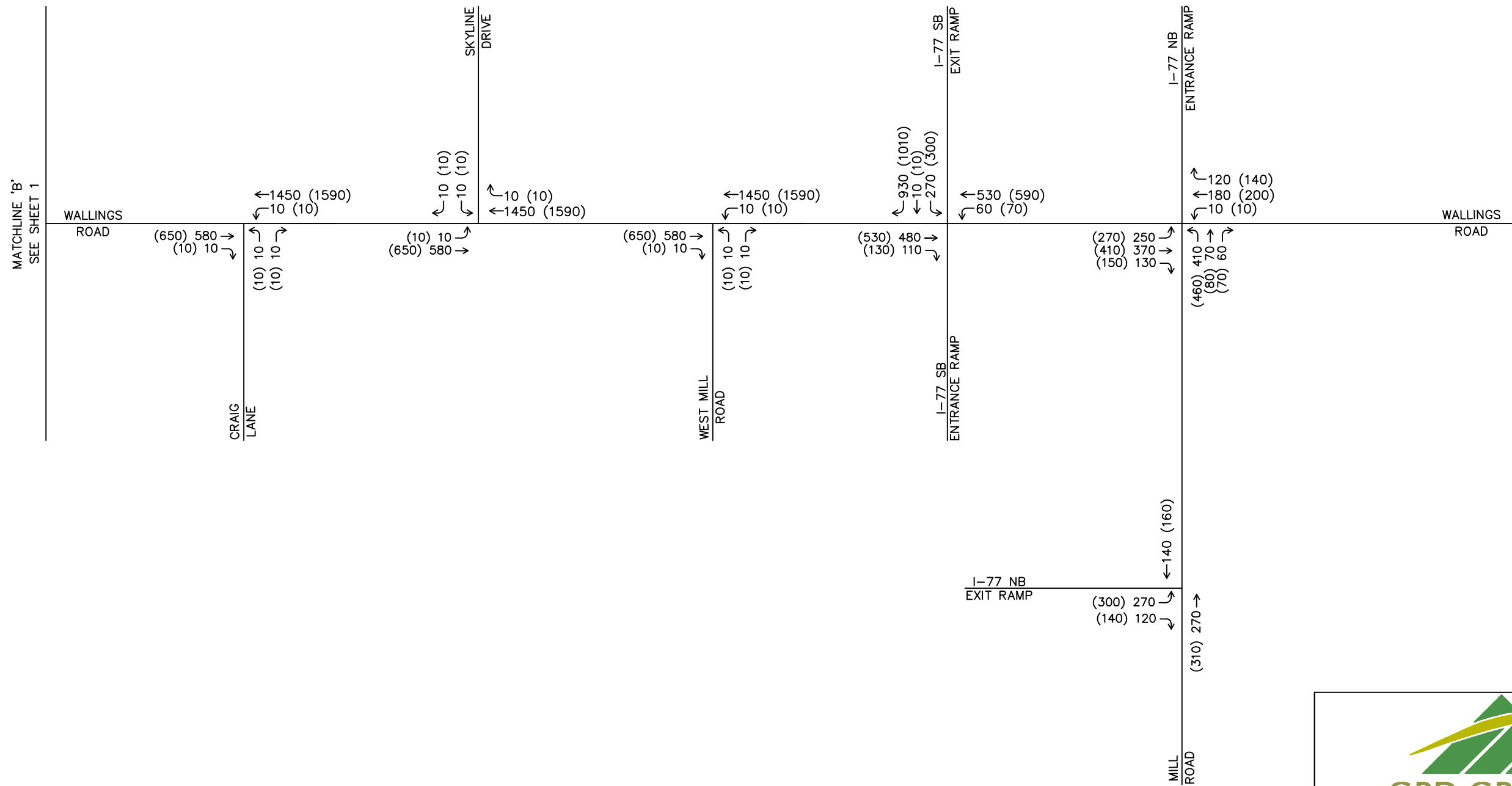
**LEGEND**  
 ## = YEAR 2020  
 (##) = YEAR 2040



PLATE 6


YEAR 2020 / YEAR 2040  
 PM DHV  
 SHEET 1 OF 2

MARCH 2015



**LEGEND**  
 ## = YEAR 2020  
 (##) = YEAR 2040





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**PLATE 6**

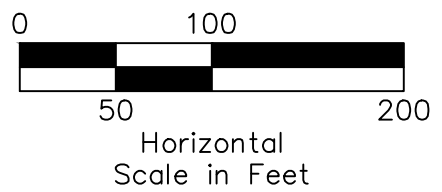
---

**YEAR 2020 / YEAR 2040  
 PM DHV  
 SHEET 2 OF 2**

---

**MARCH 2015**

**APPENDIX D**  
**COLLISION DIAGRAMS**



LEGEND			
←	MOVING VEHICLE	→→→	REAR END
←←←	BACKING VEHICLE	→→→	HEAD ON
←	NON CONTACT VEHICLE	←←←	OUT OF CONTROL
X	PEDESTRIANS	←	LEFT TURN
□	PARKED VEHICLE	↗↘	SIDESWIPE
□	FIXED OBJECT	↗↘	ANGLE
●	FATAL CRASH		
○	INJURY CRASH		
■	NO FAULT CRASH		

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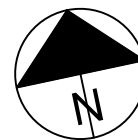
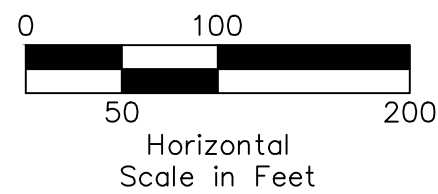
**WALLINGS ROAD**

**CRASH DIAGRAM**  
1 OF 8

**MARCH 2015**



Drawing File: C:\2014\2014-4983-Traffic\Crash Data\Wallings\_Crash Diagrams.dwg    Layout: 002  
 Date: Mar 13, 2015    Time: 11:18 am    Title: -137078633  
 Technician: cdeibel



LEGEND			
←	MOVING VEHICLE	→→→	REAR END
↔	BACKING VEHICLE	→→→	HEAD ON
⋯	NON CONTACT VEHICLE	←	OUT OF CONTROL
X	PEDESTRIANS	←	LEFT TURN
□	PARKED VEHICLE	↔	SIDESWIPE
□	FIXED OBJECT	↔	ANGLE
●	FATAL CRASH		
○	INJURY CRASH		
■	NO FAULT CRASH		



WALLINGS ROAD

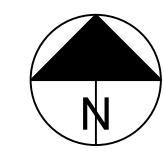
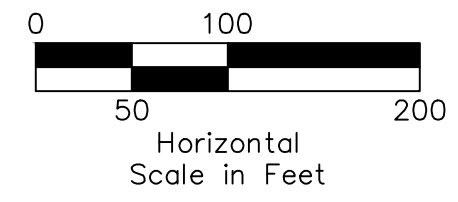
CRASH DIAGRAM  
2 OF 8

MARCH 2015






Drawing File: C:\2014\2014-4983\Traffic\Crash Data\Wallings\_Crash Diagrams.dwg    Layout: 003  
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 Technician: cdeibel



LEGEND			
←	MOVING VEHICLE	→→	REAR END
←←	BACKING VEHICLE	→→	HEAD ON
←- -	NON CONTACT VEHICLE	← 8	OUT OF CONTROL
X	PEDESTRIANS	←	LEFT TURN
□	PARKED VEHICLE	↘↗	SIDESWIPE
□	FIXED OBJECT	↘↗	ANGLE
●	FATAL CRASH		
○	INJURY CRASH		
■	NO FAULT CRASH		



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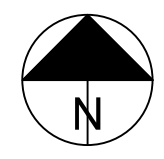
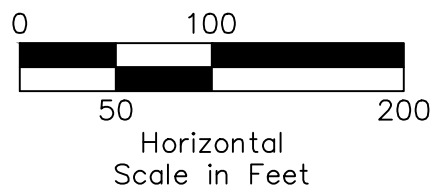
WALLINGS ROAD

---

CRASH DIAGRAM  
3 OF 8

---

MARCH 2015



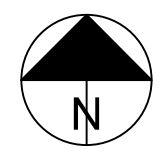
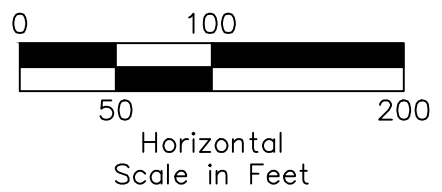
LEGEND	
←	MOVING VEHICLE
↔	BACKING VEHICLE
⚡	NON CONTACT VEHICLE
X	PEDESTRIANS
□	PARKED VEHICLE
□	FIXED OBJECT
●	FATAL CRASH
○	INJURY CRASH
■	NO FAULT CRASH
↔↔	REAR END
↔↔	HEAD ON
↔↔	OUT OF CONTROL
↔↔	LEFT TURN
↔↔	SIDESWIPE
↔↔	ANGLE

**WALLINGS ROAD**


**CRASH DIAGRAM**  
4 OF 8

**MARCH 2015**





LEGEND			
←	MOVING VEHICLE	→→→	REAR END
←←←	BACKING VEHICLE	→→→	HEAD ON
←-←	NON CONTACT VEHICLE	←-←	OUT OF CONTROL
X	PEDESTRIANS	←-←	LEFT TURN
□	PARKED VEHICLE	←-←	SIDESWIPE
□	FIXED OBJECT	←-←	ANGLE
●	FATAL CRASH		
○	INJURY CRASH		
■	NO FAULT CRASH		



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WALLINGS ROAD

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CRASH DIAGRAM  
 5 OF 8

---

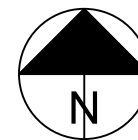
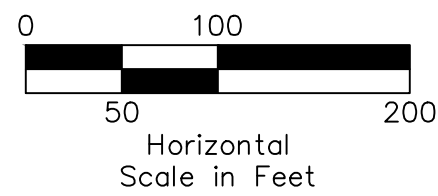
MARCH 2015




MATCH LINE E

MATCH LINE F

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 Date: Mar 13, 2015    Time: 11:18 am    Title: -137078633  
 Technician: cdeibel



LEGEND	
← MOVING VEHICLE	→ REAR END
↔ BACKING VEHICLE	→ HEAD ON
⋯ NON CONTACT VEHICLE	⊗ OUT OF CONTROL
✕ PEDESTRIANS	↙ LEFT TURN
▣ PARKED VEHICLE	↘ SIDESWIPE
□ FIXED OBJECT	↗ ANGLE
● FATAL CRASH	
○ INJURY CRASH	
■ NO FAULT CRASH	



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WALLINGS ROAD

---

CRASH DIAGRAM  
6 OF 8

---

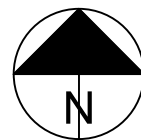
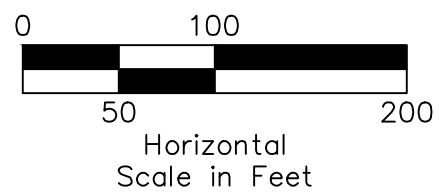
MARCH 2015



MATCH LINE F



MATCH LINE G



LEGEND			
←	MOVING VEHICLE	→	REAR END
↔	BACKING VEHICLE	→	HEAD ON
↔	NON CONTACT VEHICLE	↔	OUT OF CONTROL
X	PEDESTRIANS	↔	LEFT TURN
□	PARKED VEHICLE	↔	SIDESWIPE
□	FIXED OBJECT	↔	ANGLE
●	FATAL CRASH		
○	INJURY CRASH		
■	NO FAULT CRASH		

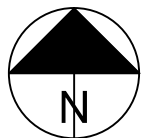
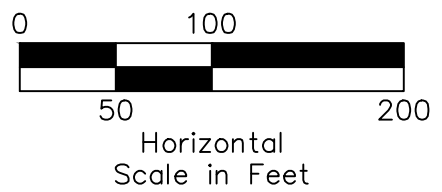
**WALLINGS ROAD**

**CRASH DIAGRAM**  
7 OF 8


**MARCH 2015**



MATCH LINE G



LEGEND			
←	MOVING VEHICLE	→→→	REAR END
←←←	BACKING VEHICLE	→→→	HEAD ON
⋮	NON CONTACT VEHICLE	←←←	OUT OF CONTROL
X	PEDESTRIANS	←	LEFT TURN
□	PARKED VEHICLE	↘	SIDESWIPE
□	FIXED OBJECT	↙	ANGLE
●	FATAL CRASH		
○	INJURY CRASH		
■	NO FAULT CRASH		



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WALLINGS ROAD

---

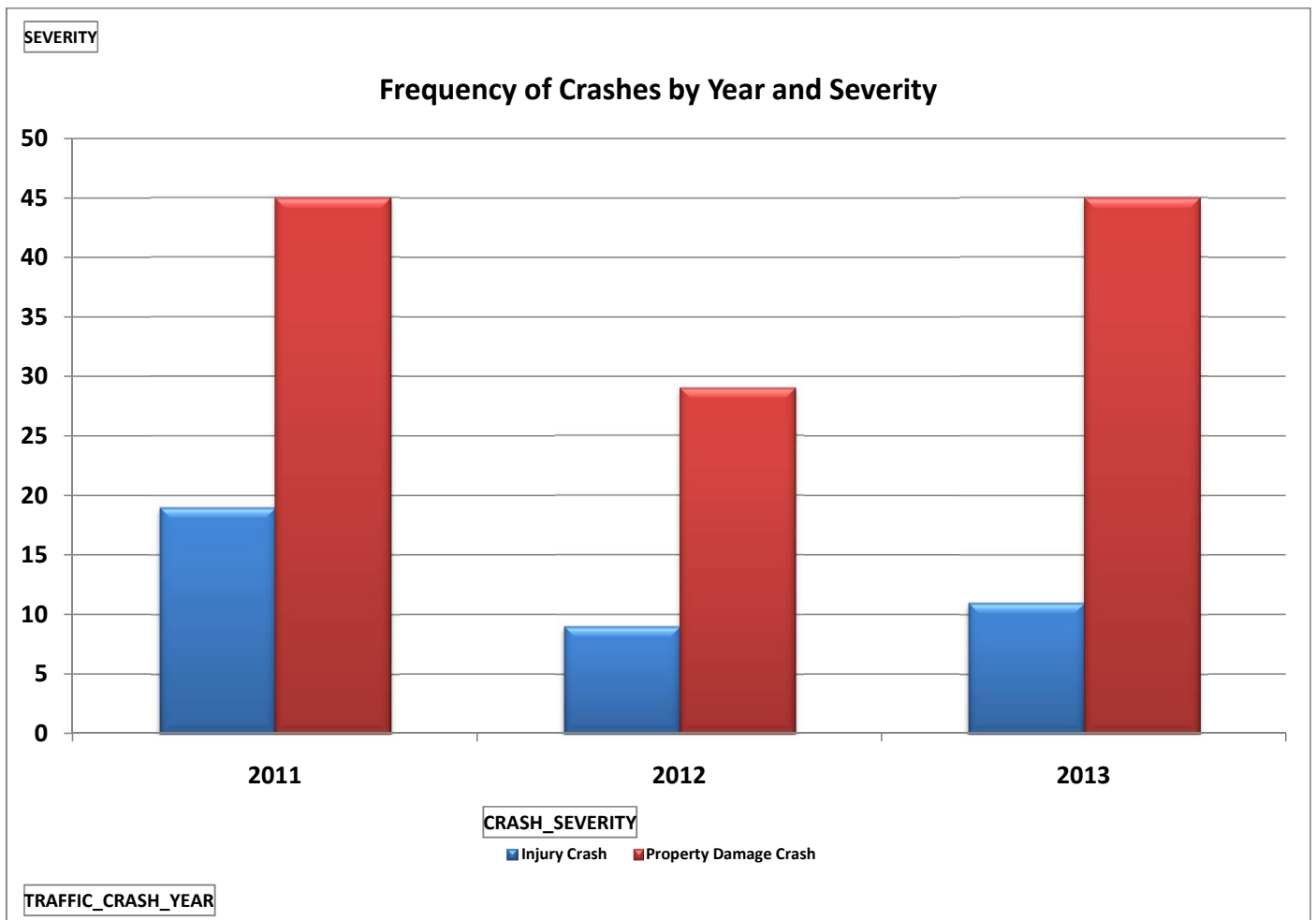
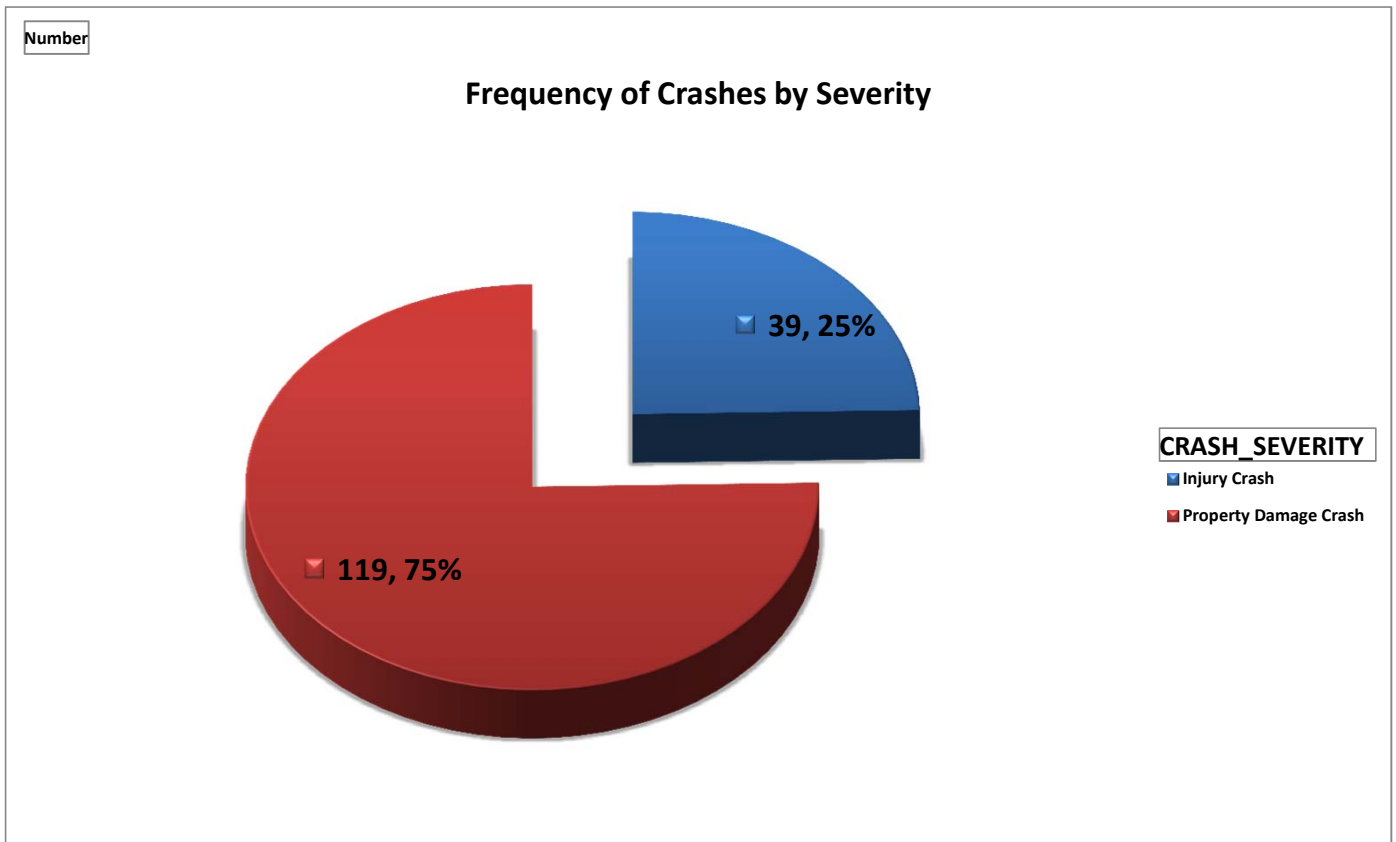
CRASH DIAGRAM  
8 OF 8

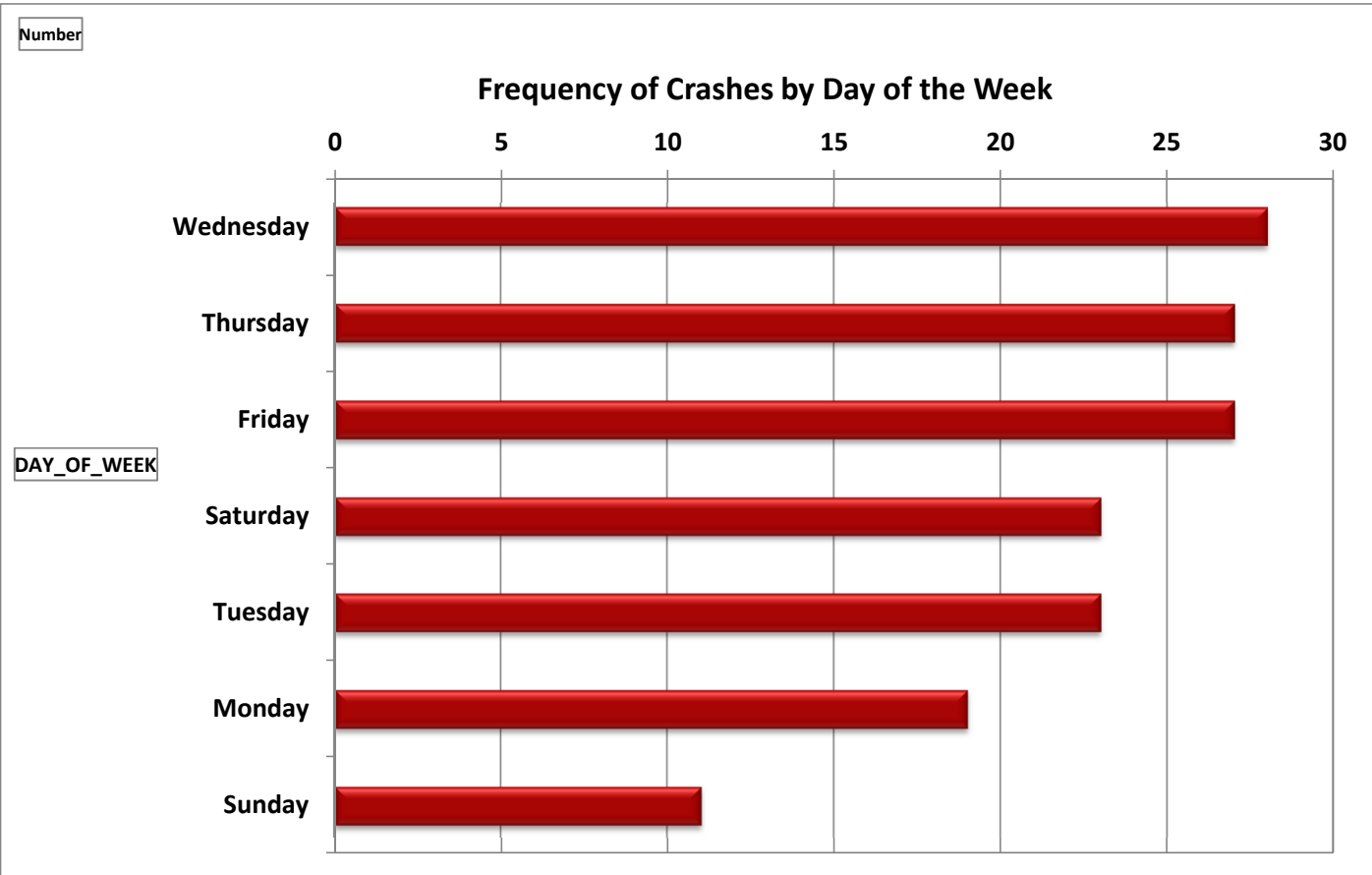
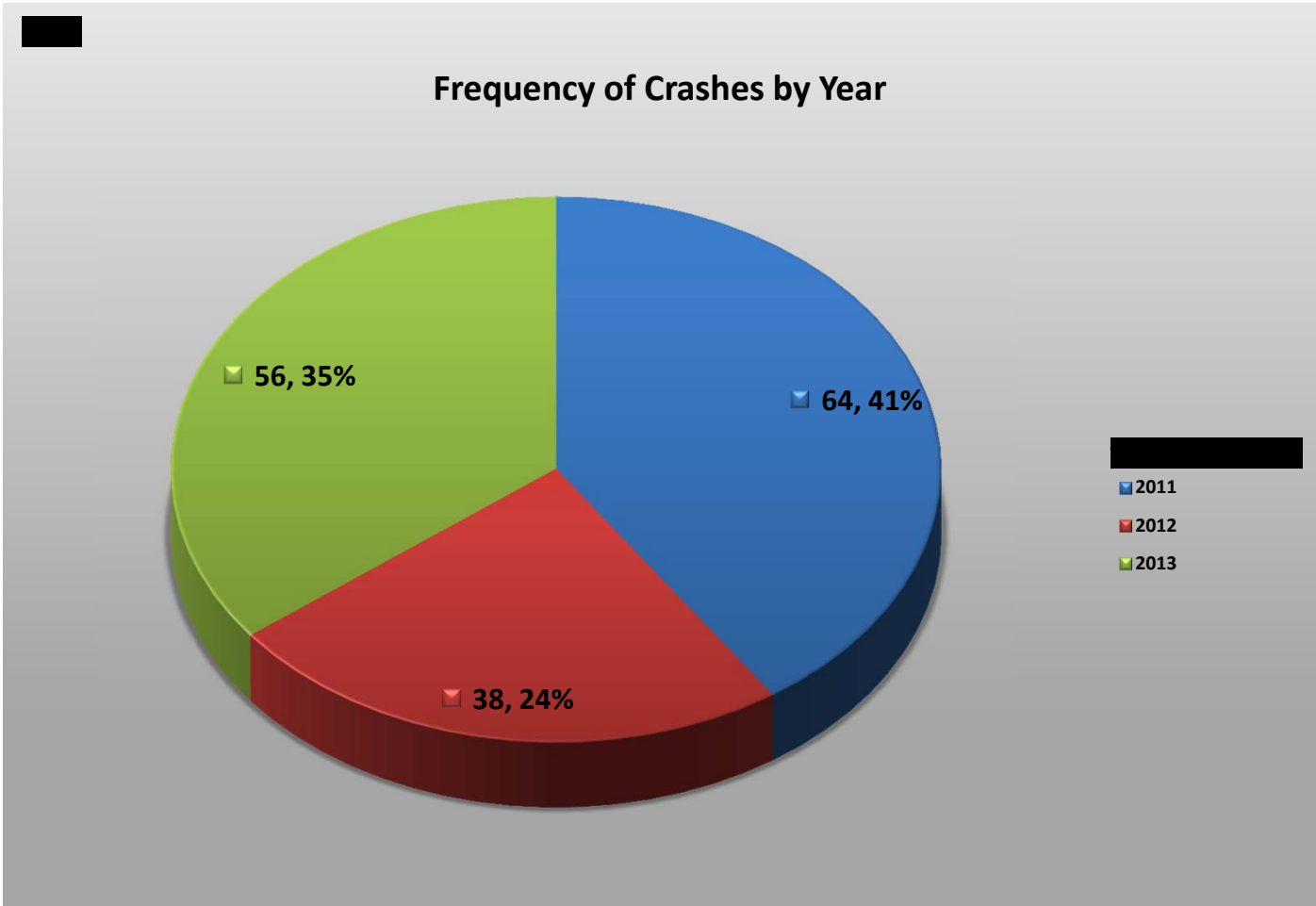
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MARCH 2015

**APPENDIX E**  
**COLLISION DATA SUMMARY & CHARTS**

-- (-) From // to //



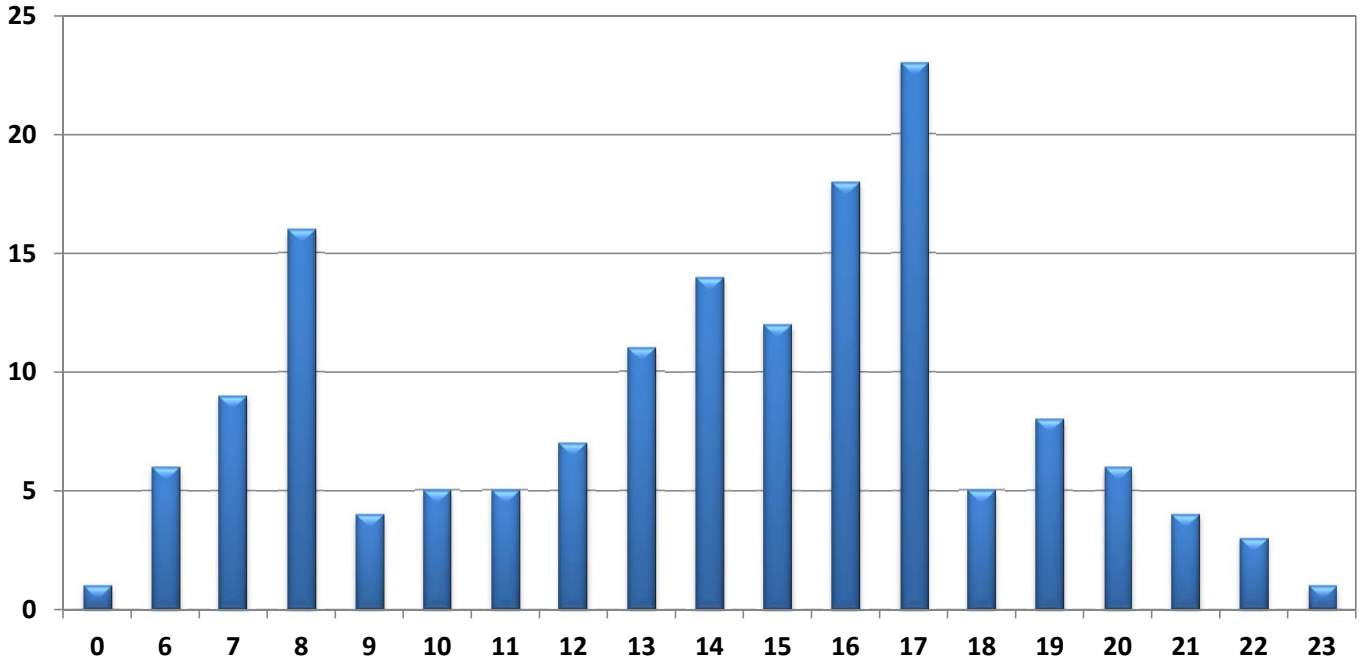




-- (-) From // to //

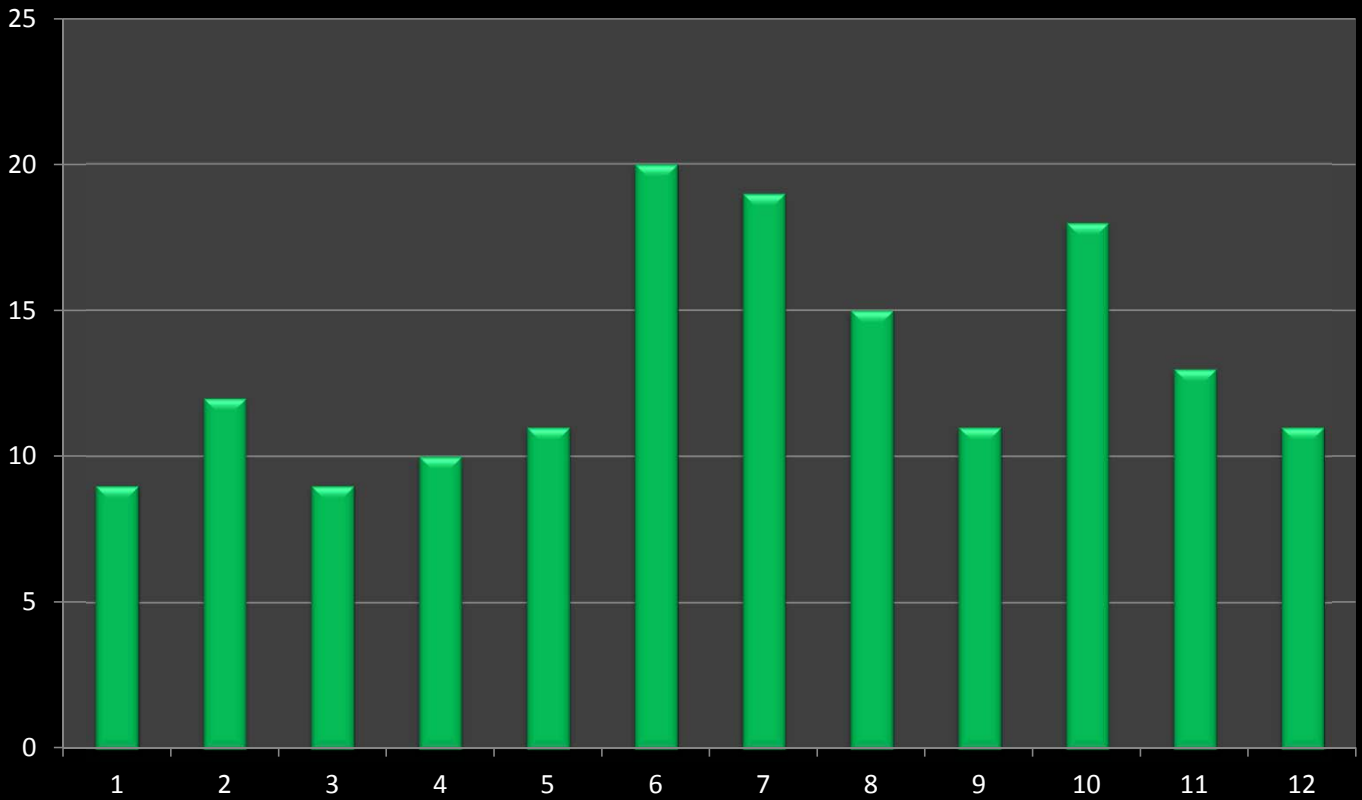


### Frequency of Crashes by Hour



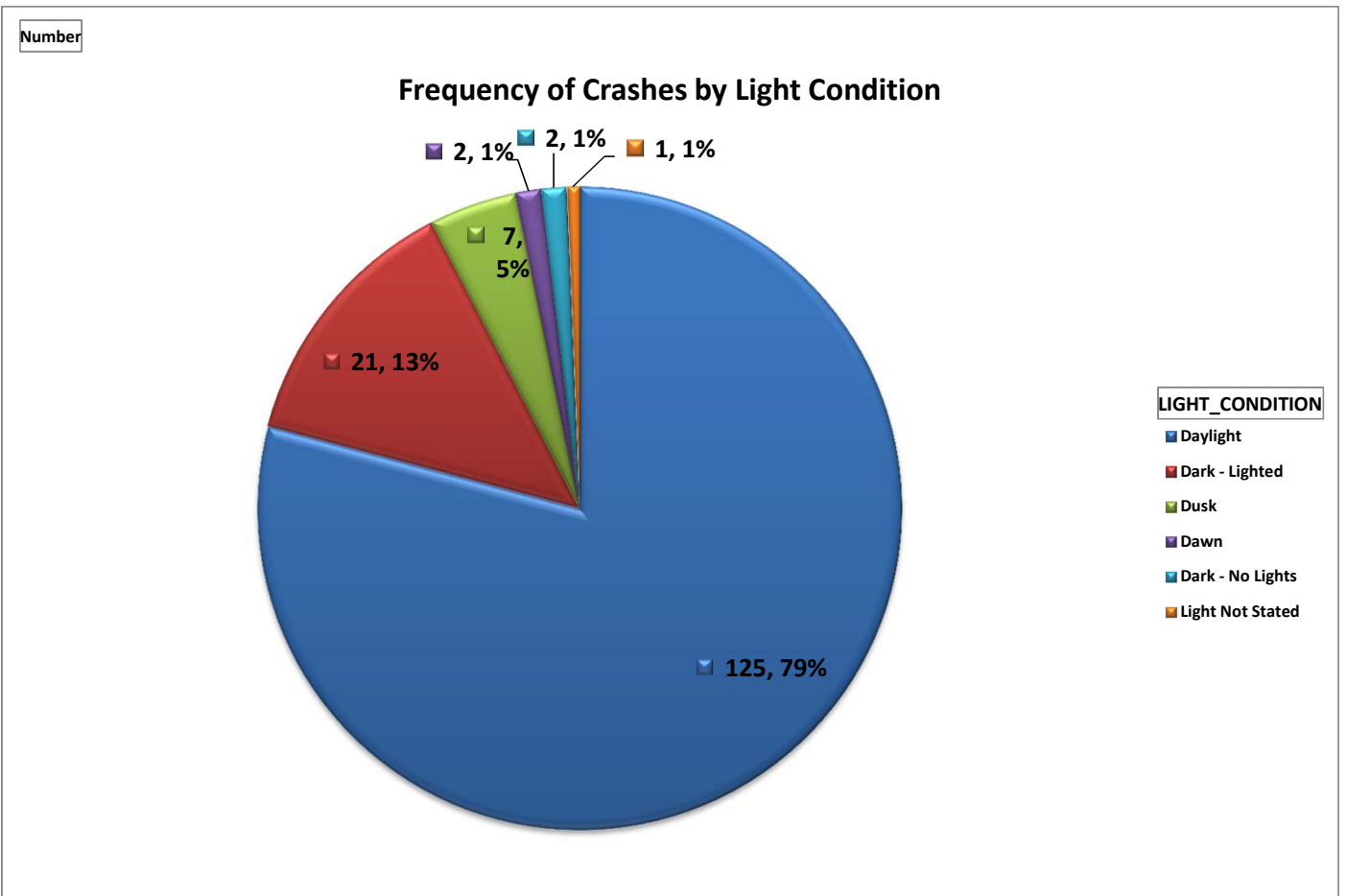
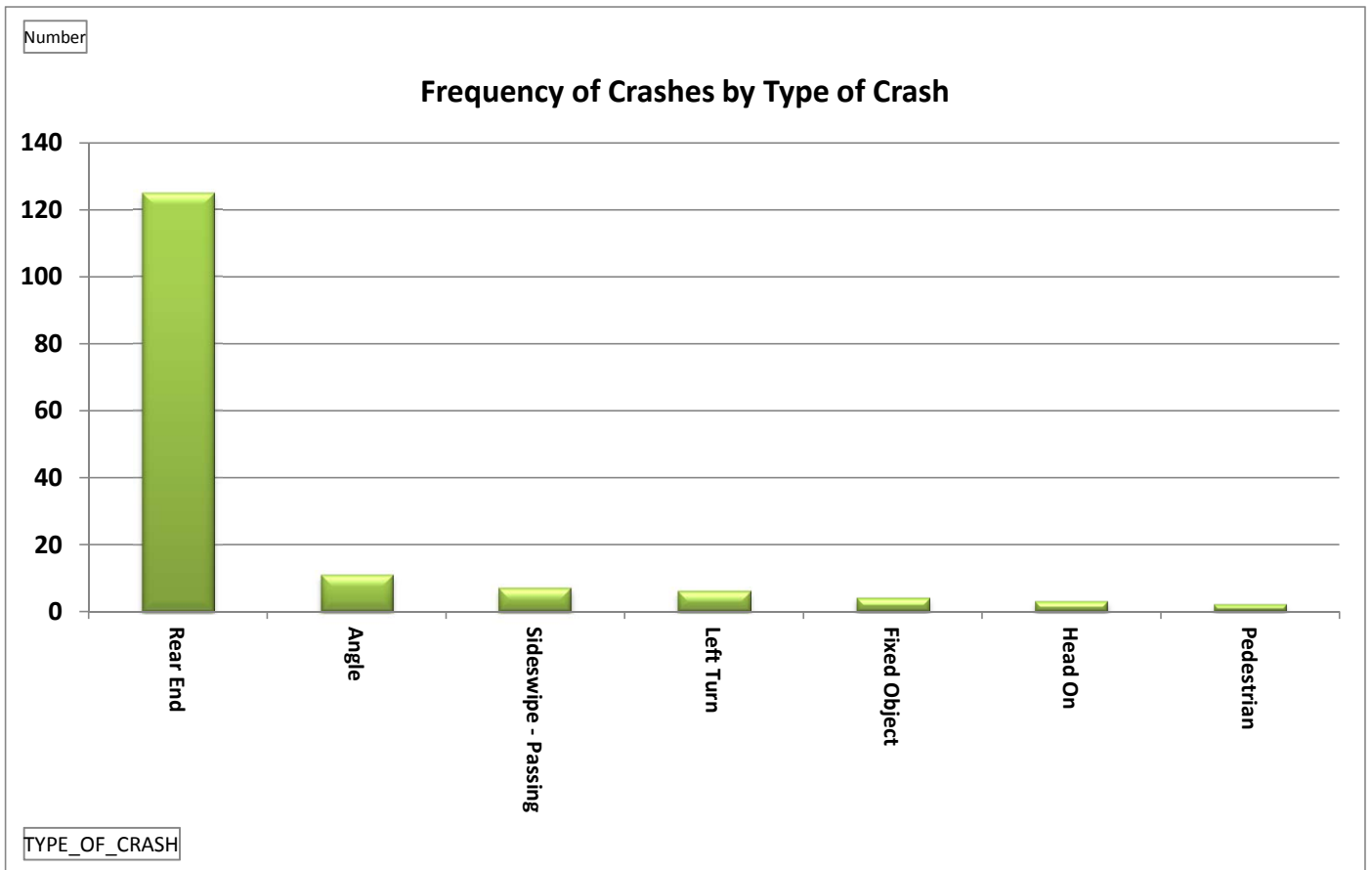
Number

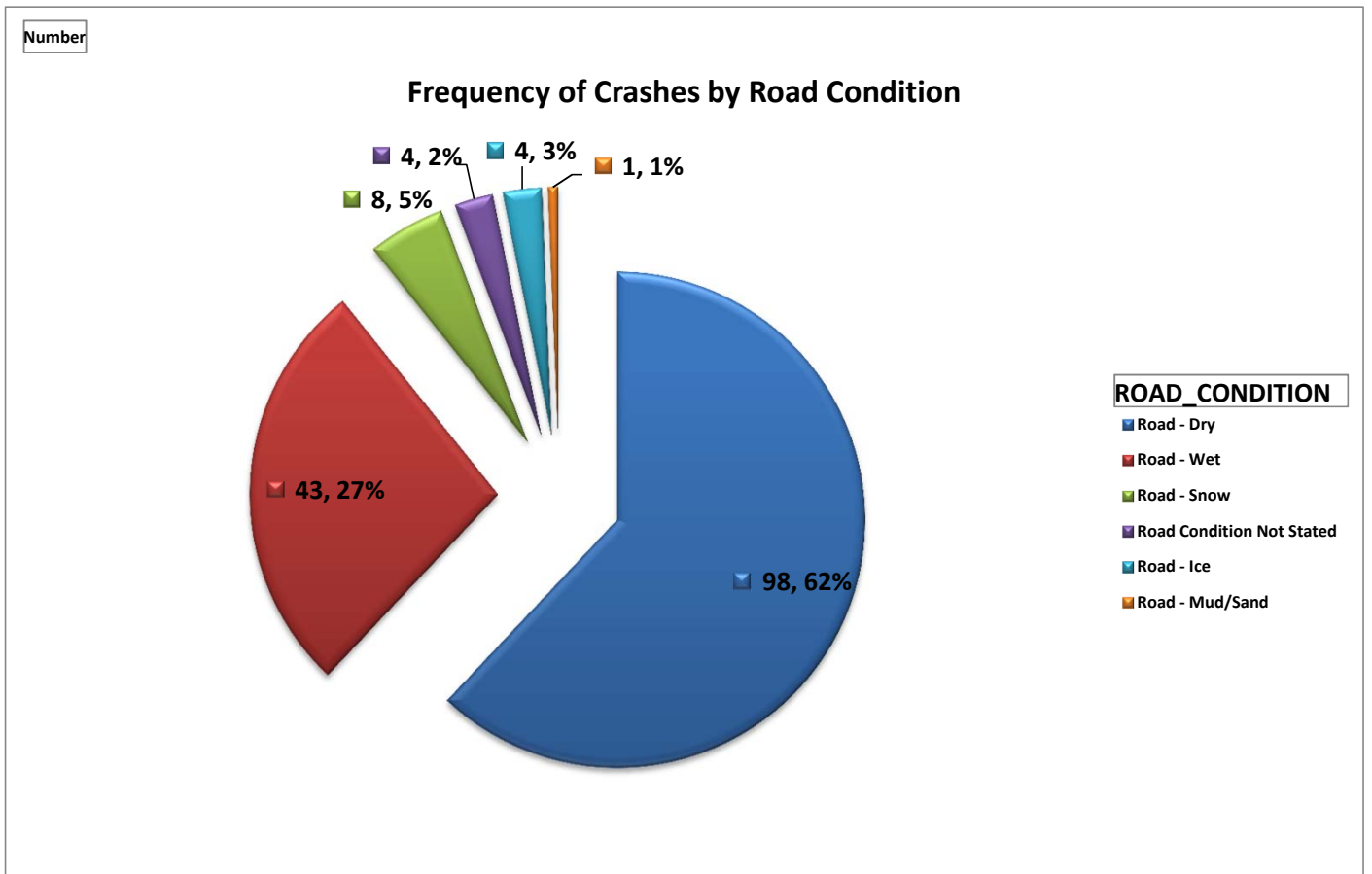
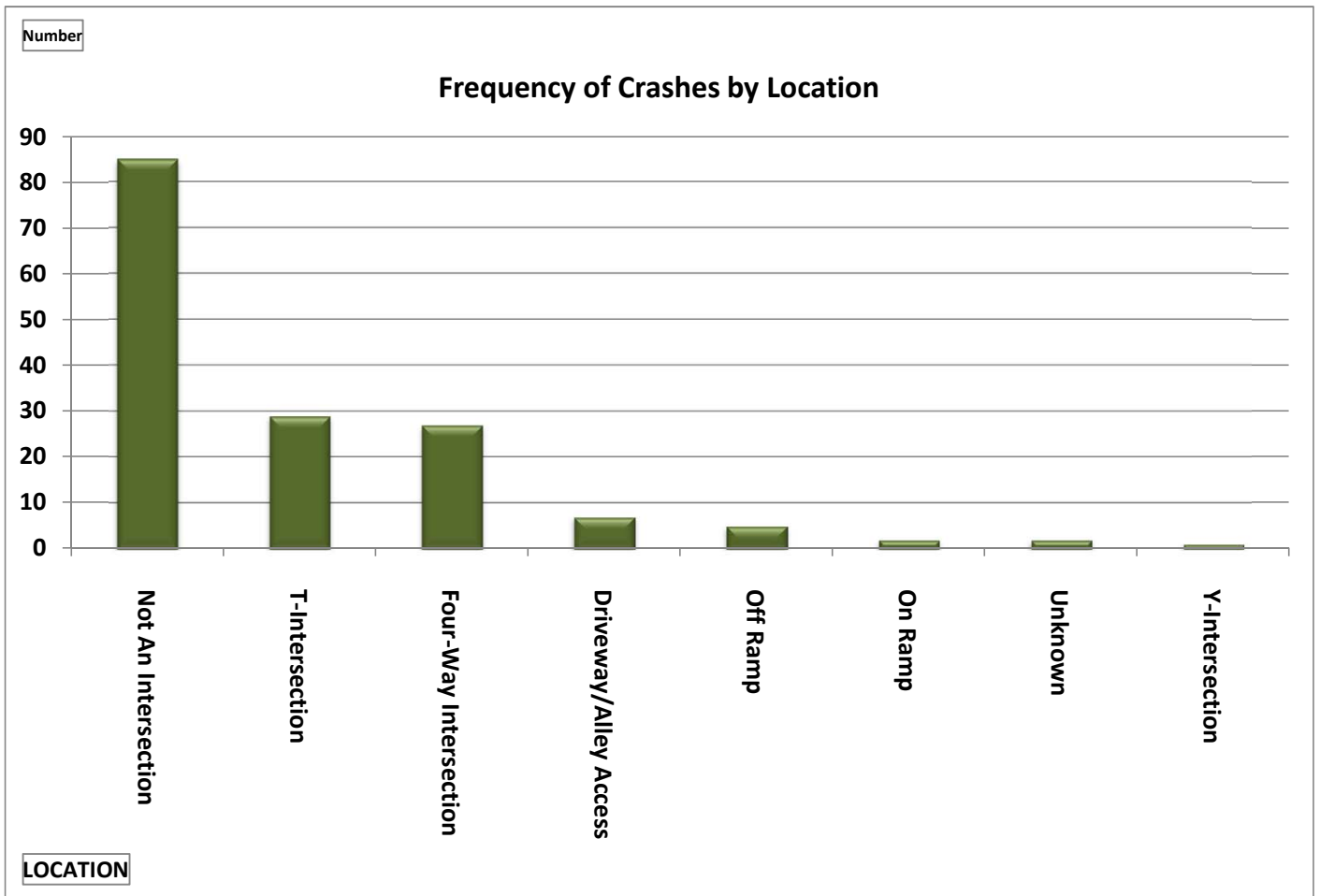
### Frequency of Crashes by Month

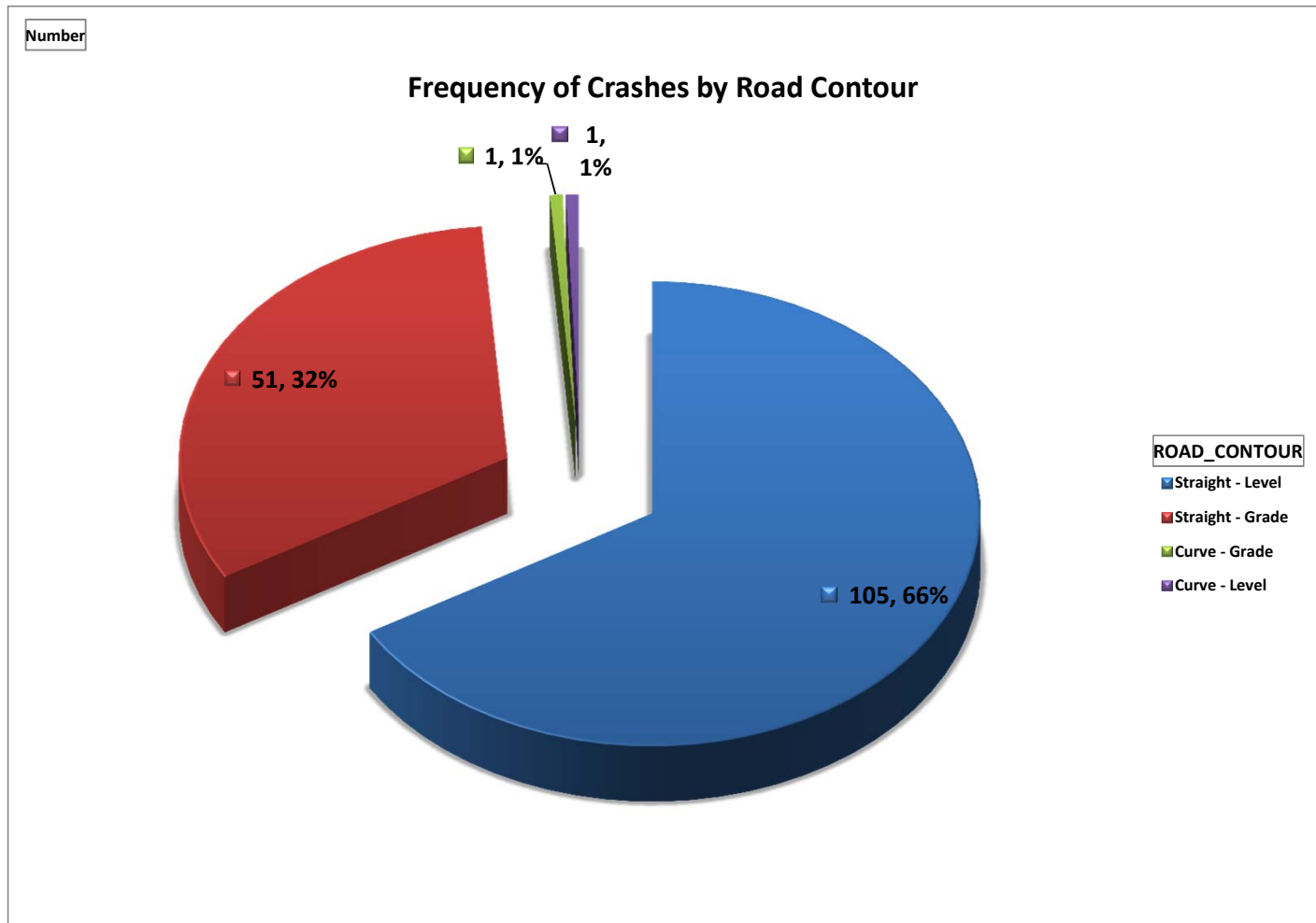
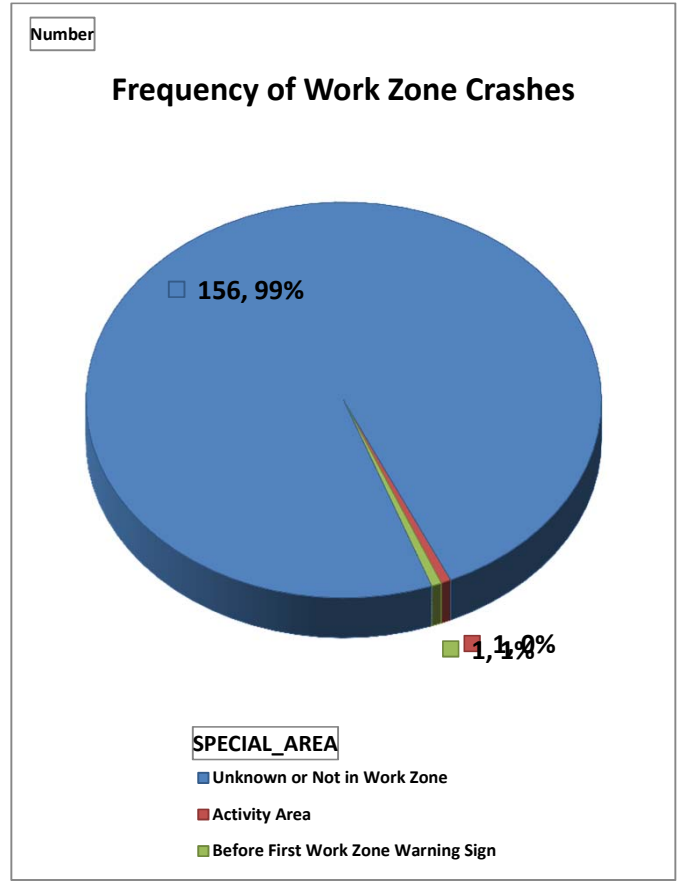
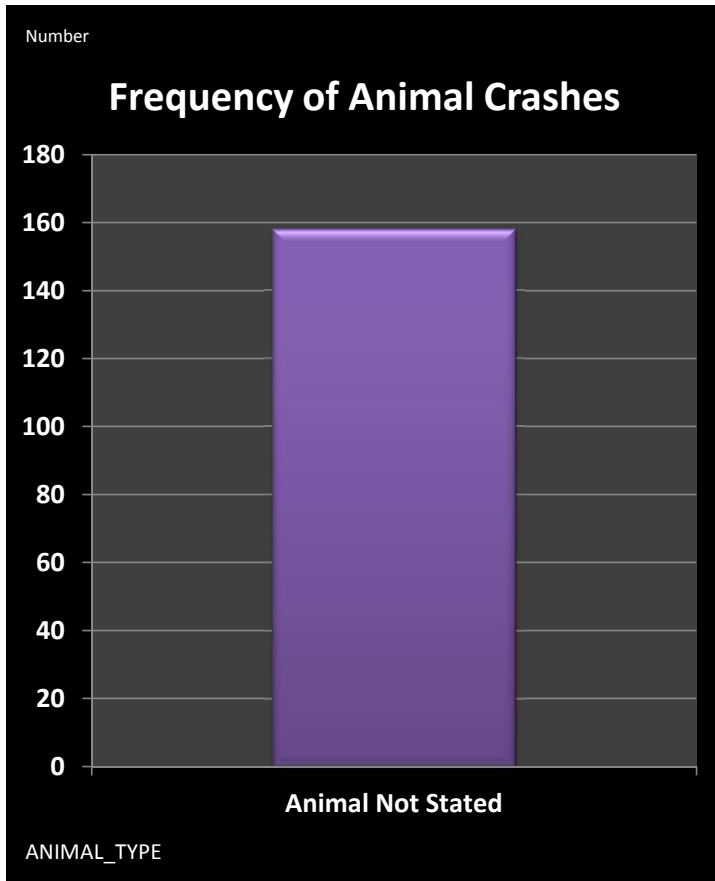


CRASH\_MONTH\_NBR

-- (-) From // to //



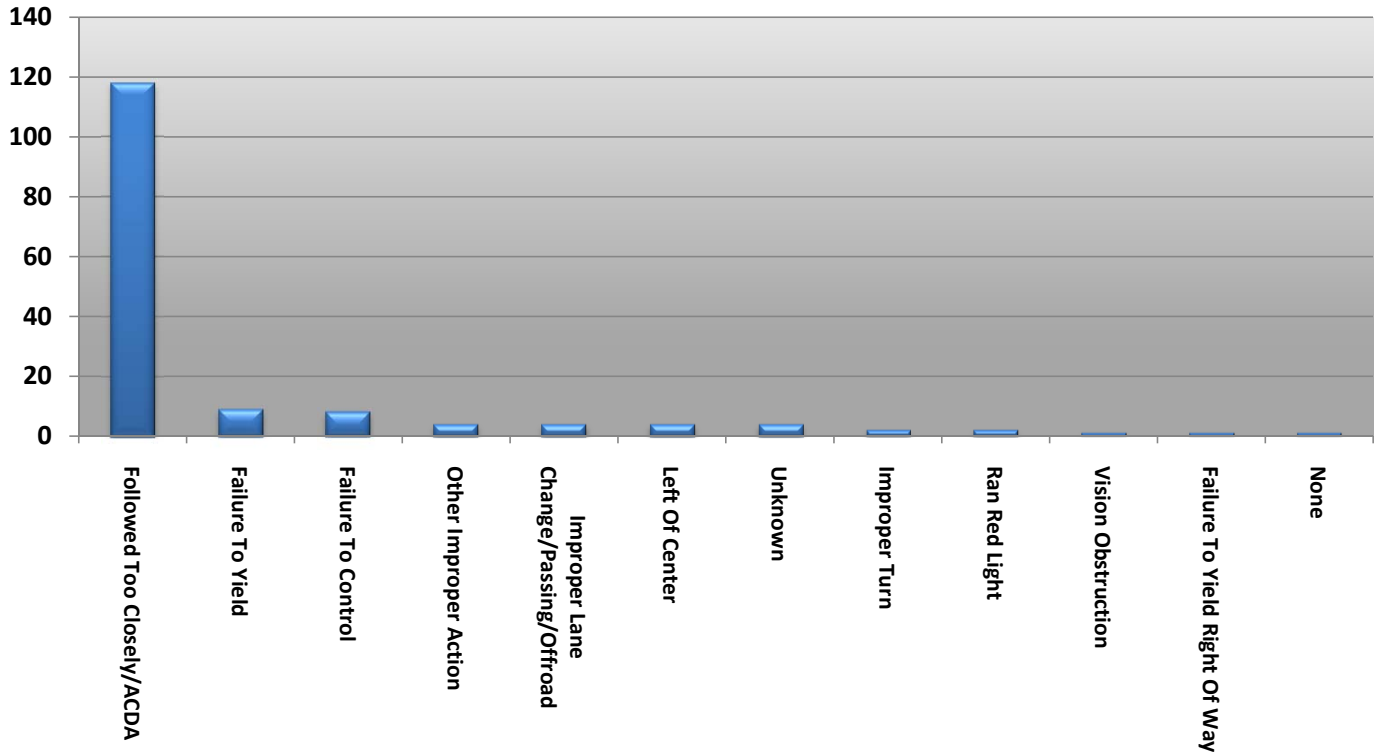




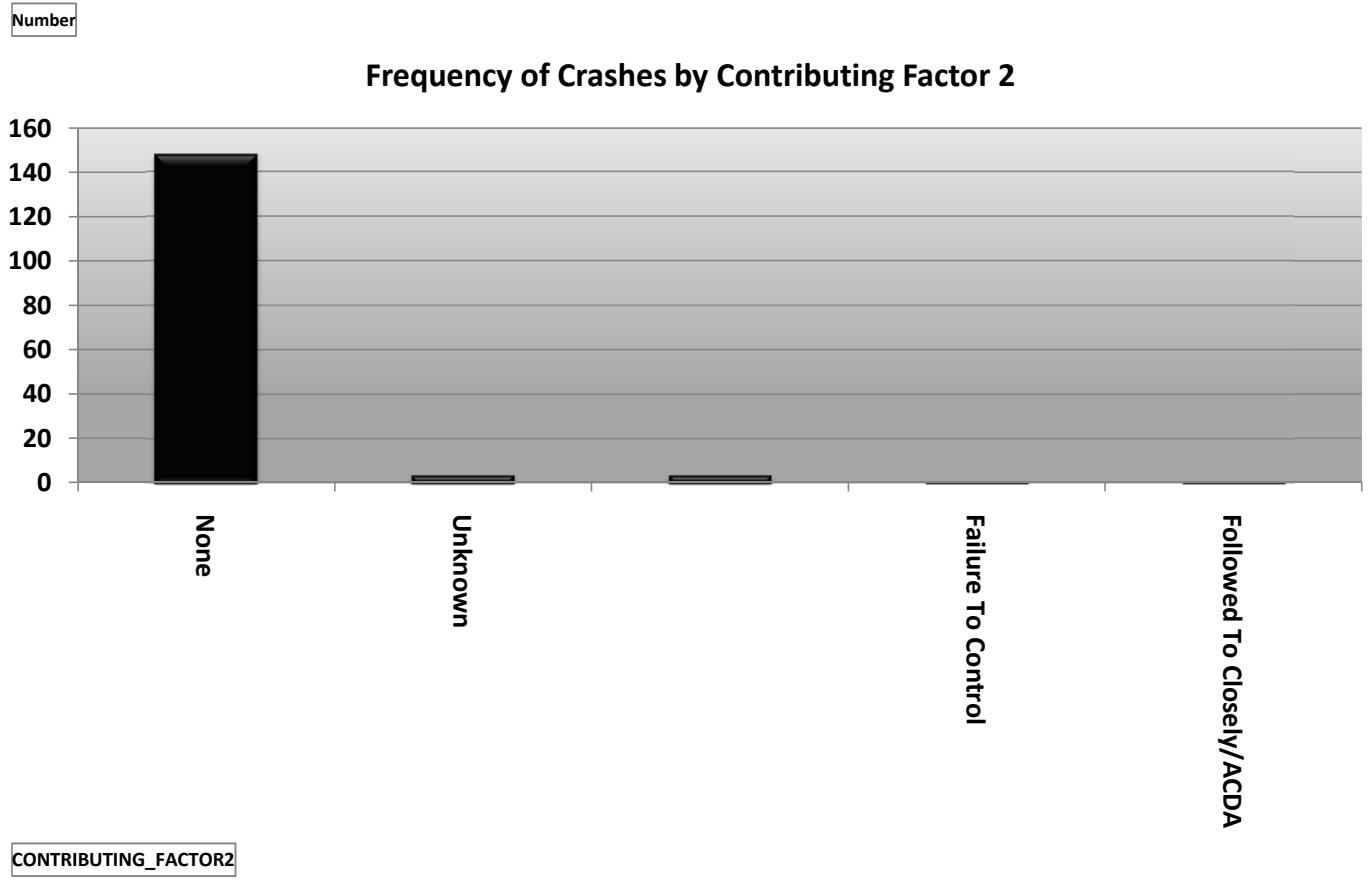
-- (-) From // to //



### Frequency of Crashes by Contributing Factor 1

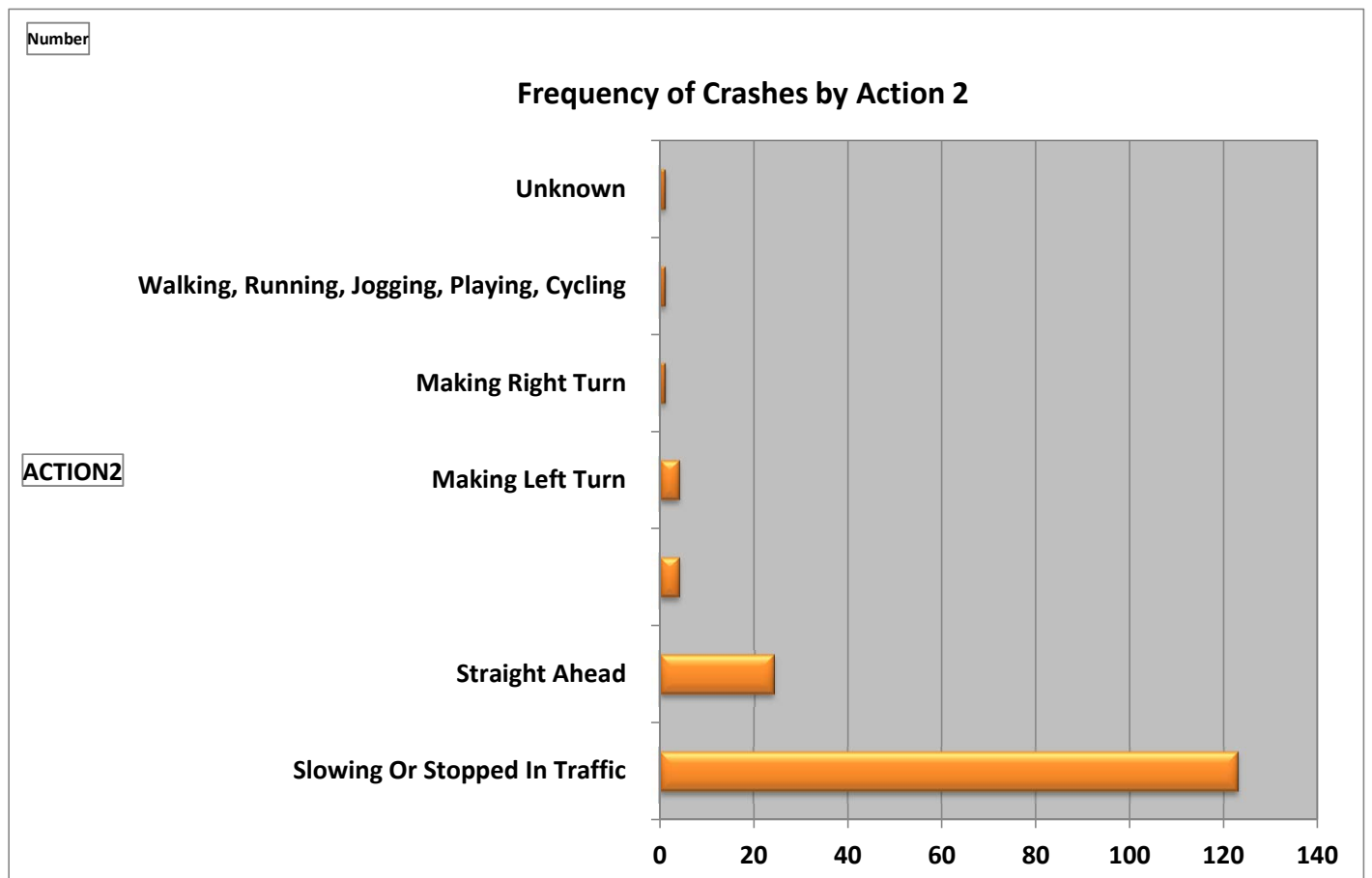
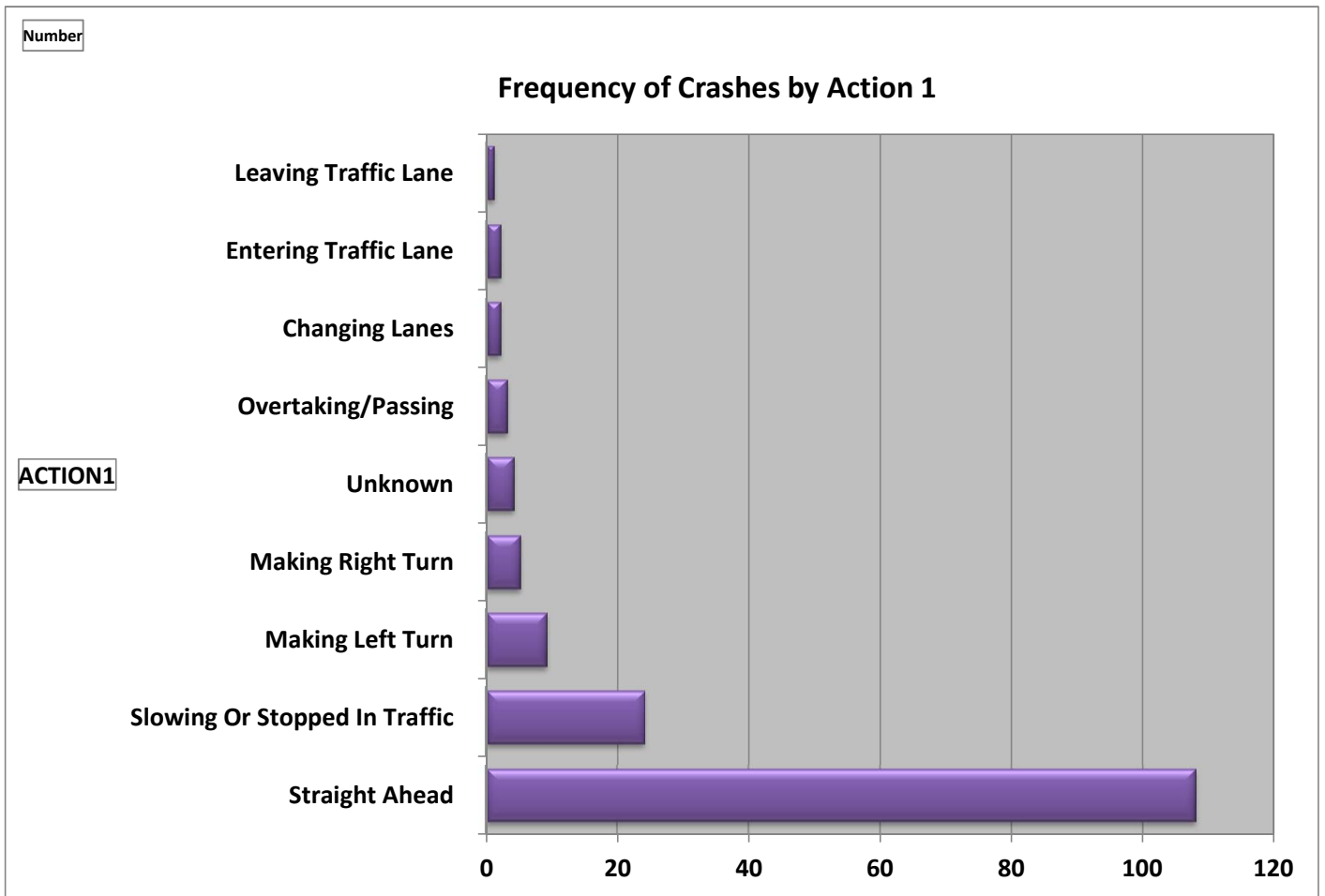


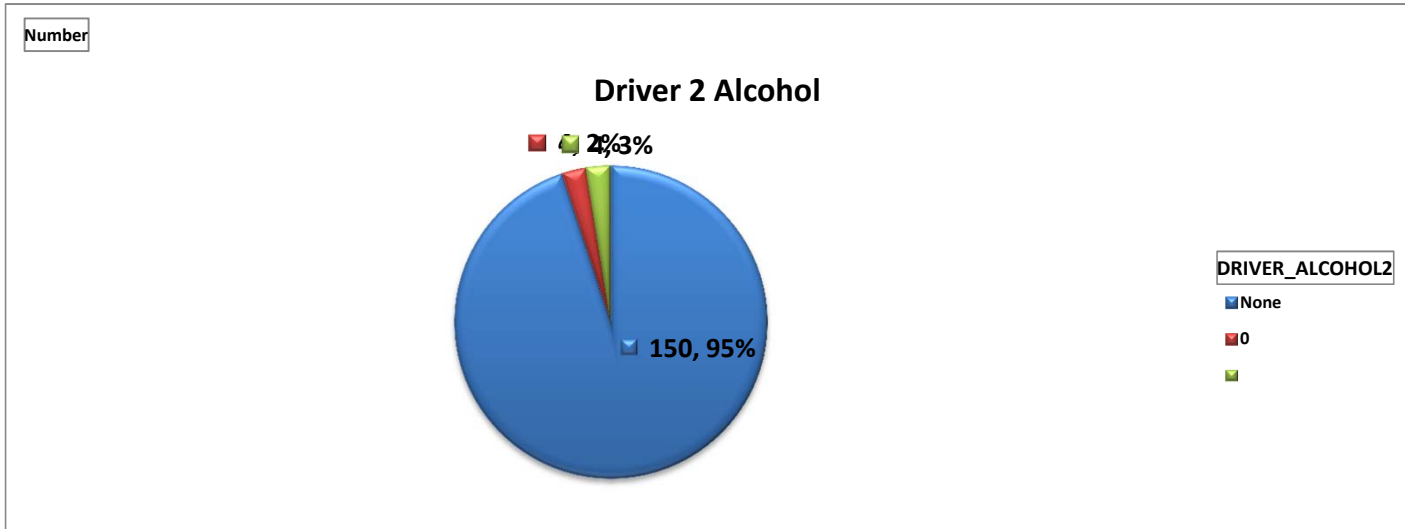
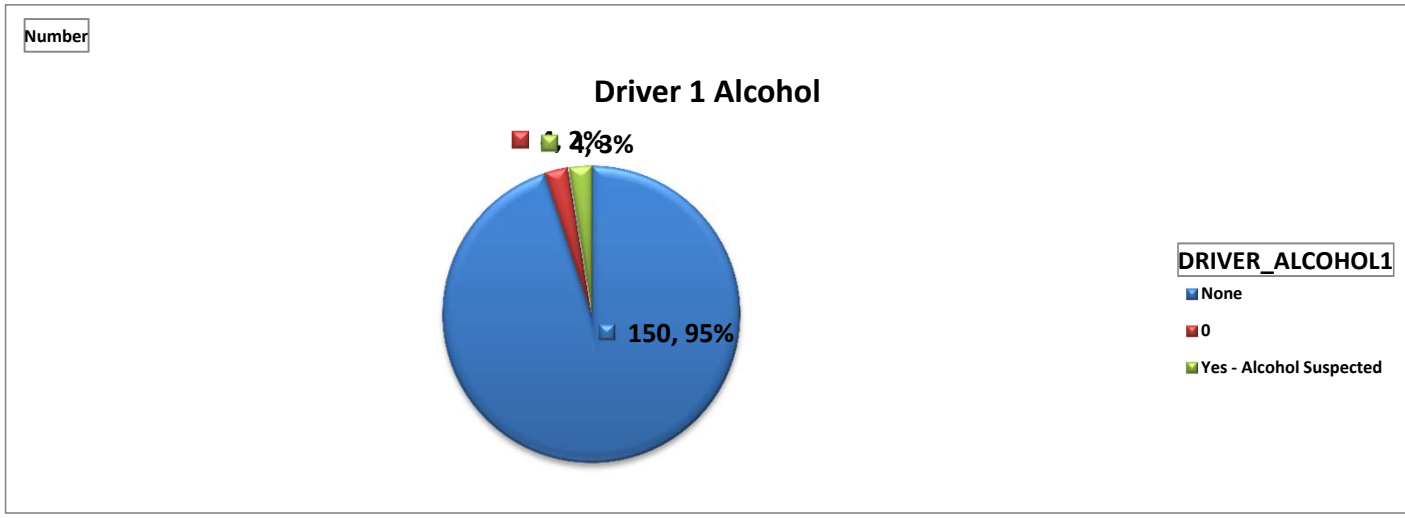
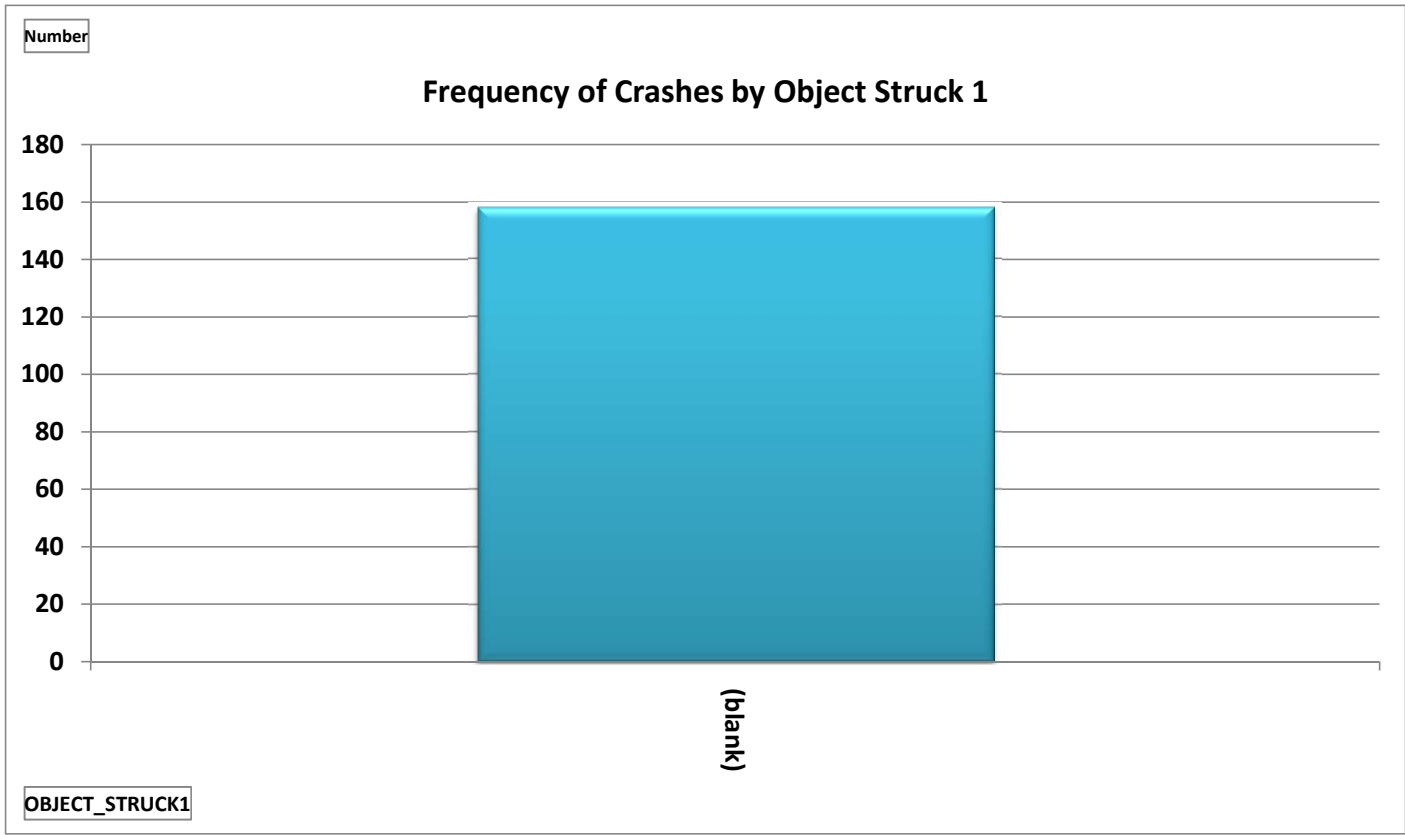
### Frequency of Crashes by Contributing Factor 2



CONTRIBUTING\_FACTOR2







**APPENDIX F**  
**SAFETY APPLICATION**

<b>General Project Information</b>	
<b>Project Sponsoring Agency</b>	City of Broadview Heights
<b>Project Name</b>	Wallings Road Safety and Corridor Study
<b>PID</b>	Safety and Corridor Study
<b>Project Manager</b>	Mr. Eugene Esser, P.E., P.S.
<b>Contact Phone</b>	(440) 838-4705
<b>Contact Email</b>	<a href="mailto:epesser@broadview-heights.org">epesser@broadview-heights.org</a>

<b>Location Information</b>			
<b>ODOT District</b>	12	<b>County</b>	CUY
<b>Route Number</b>	CR-57	<b>Road Name</b>	Wallings Road
<b>Begin Logpoint</b>	3.090	<b>End Logpoint</b>	4.940
<b>Begin Latitude</b>	41.345	<b>Begin Longitude</b>	-81.685
<b>End Latitude</b>	41.345	<b>End Longitude</b>	-81.649

<b>Project Description</b>
----------------------------

<b>Summary of Crash Patterns</b>
----------------------------------

A review of the crash patterns indicates that safety issues exist along the Wallings Road corridor. Large numbers of rear-end crashes are occurring at unsignalized intersections and driveways due to the absence of a center two-way left turn lane to separate left turning vehicles from thru vehicles. Motorists are unable to get around the left turning traffic occupying the only available thru lane in the two-lane section of Wallings Road, which causes congestion and rear-end related crashes along the corridor. Congestion is present at the I-77 / Wallings Road interchange on the east end of the project that is contributing to the rear-end crashes occurring on that section of the roadway.

<b>Summary of Recommended Countermeasures</b>
---

1. Widen Wallings Road to accommodate a two-way left turn lane throughout the entire study area.
2. Construct a westbound right turn lane at the Wallings Road / McCreary Road intersection.
3. Construct a westbound right turn lane at the Wallings Road / Wright Road intersection.
4. Remove the traffic signal currently located at the Wallings Road / Wright Road intersection.
5. Construct an eastbound right turn lane at the Wallings Road / West Mill Road intersection.
6. Reconstruct the Wallings Road Bridge over I-77 to accommodate four (4) travel lanes.
7. Construct a second eastbound left turn lane at the Wallings Road / I-77 NB Ramps / Mill Road intersection.
8. Widen the I-77 NB entrance ramp to accommodate the proposed, dual left turn lane from Wallings Road.
9. Widen Mill Road to accommodate a northbound left turn lane at the Wallings Road / I-77 NB Ramps / Mill Road intersection.
10. Widen the I-77 SB exit ramp to accommodate a second right turn lane and construct a second westbound thru lane on Wallings Road to receive the traffic from these (2) lanes.
11. Widen Wallings Road from just east of West Mill Road to the I-77 NB entrance ramp.

<b>Project Priority Information</b>
-------------------------------------

Crash Data					
Crash Totals					
	Fatal & Serious Injury (KA)	Visible Injury (B)	Non-Visible (C)	Property Damage Only (O)	Total
Existing Conditions: Predicted Crash Frequency	1.2402	5.1100	7.3751	26.1375	39.86
Existing Conditions: Expected Crash Frequency	1.2222	5.0261	7.5353	31.7163	45.50
Potential for Safety Improvement	-0.0180	-0.0839	0.1602	5.5788	5.64
Proposed Conditions: Predicted Crash Frequency	0.7710	3.0997	4.3357	16.6029	24.81
Observed Crashes	0.3333	3.6667	9.0000	39.6667	52.67
Observed People Injury Totals					
	Fatal Injury (K)	Serious Injury (A)	Visible Injury (B)	Non-Visible (C)	Total
Observed People Injury Totals	0.0000	0.3333	6.6667	14.6667	21.67

Application Scoring				
Category	Scoring Value	Points Awarded	Points Possible	
Expected Crash Frequency	45.50	10	10	
Ratio of Observed Fatal and Serious Injuries to Observed Total Crashes	0.01	1	5	
% of the Potential for Safety Improvement to Total Expected Crashes	12.40%	20	20	
Relative Severity Index	\$28,524	10	10	
Equivalent Property Damage Only Index	3.14	3	10	
Volume to Capacity Ratio	2.39	10	10	
Benefit Cost Ratio	0.48	0	30	
Safety Funding Request Percentage	34.18%	5	5	
<b>Total</b>		<b>59</b>	<b>100</b>	

Strategic Highway Safety Plan	
Functional Class	Minor Arterial Roadway
Major Route AADT	17,650
Ohio Emphasis Area	Emphasis Area V - Incident and Congestion Related Crashes
Ohio Emphasis Area Subcategory	Rear End Crashes
FHWA Emphasis Area	Other
FHWA Improvement Category	Roadway
FHWA Improvement Subcategory	Roadway widening - add lane(s) along segment

Work Locations					
NLFID	Begin Logpoint	End Logpoint	Begin Latitude	Begin Longitude	Location Termini (i.e. from Street 1 to Street 2)
CCUYCR00057**C	3.090	4.940	41.345	-81.6846	Broadview Road (SR 176) to I-77 Interchange



Project Funding							
Project Phase	Safety Study	Interchange Mod. Study	PE - Environmental	PE - Detailed Design	Right of Way /Utilities	Construction	Total
Fiscal Year	2015	2016	2017	2018	2019	2020	
Project Phase Completed	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	
Previous Safety	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
New Safety	\$0.00	\$72,000.00	\$726,048.00	\$726,048.00	\$937,800.00	\$2,538,104.00	\$5,000,000.00
Sponsor Funding	\$0.00	\$8,000.00	\$80,672.00	\$80,672.00	\$104,200.00	\$2,378,950.60	\$2,652,494.60
Future Funding Requests	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$6,977,698.40	\$6,977,698.40
Total	\$0.00	\$80,000.00	\$806,720.00	\$806,720.00	\$1,042,000.00	\$11,894,753.00	\$14,630,193.00

**Additional Funding Detail**  
 Future funding request will be made to NOACA and for ODOT Bridge Funds. Local funds will be paid for by the City of Broadview Heights. A future ODOT Urban Paving application will also be made.

Project Development		
Project Phase	Completed by	Completion Date
Safety Study	GPD Group	3/31/2015

Applicant Information		
Name	Title	Phone Number
Samuel J. Alai	City of Broadview Heights Mayor	(440) 525-3651
Signature		Date
		March 31, 2015

Version: 20140214

The following information should be included in submission of the safety project application:

1. An electronic copy of the Safety Engineering Study
2. All Excel Analysis Files  
     May include Crash Analysis Module (CAM) Tool, Economic Crash Analysis Tool (ECAT), HSIP Application and Scoring Tool.
3. Benefit-Cost Results (Economic Analysis)
4. DSRT approval signatures

**APPENDIX G  
COST ESTIMATE**

3 LANE OPTION

**Wallings Road (County Road 57)  
Preliminary Cost Estimate  
3-Lanes Curbed**

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
<b>ROADWAY</b>					
201	CLEARING AND GRUBBING	1	LUMP	\$25,000	\$25,000
202	CONCRETE WALK REMOVED	2,750	SQ FT	\$5	\$13,750
202	CURB REMOVED	3,050	FT	\$3	\$9,150
202	PAVEMENT REMOVED	3,200	SY	\$10	\$32,000
202	PIPE REMOVED, 24" AND UNDER	12,250	FT	\$4	\$49,000
202	CATCH BASIN OR INLET REMOVED	60	EACH	\$100	\$6,000
202	MANHOLE REMOVED (STORM)	11	EACH	\$500	\$5,500
203	EXCAVATION	2,000	CU YD	\$10	\$20,000
203	EMBANKMENT	200	CU YD	\$10	\$2,000
608	6" CONCRETE WALK	2,750	SQ FT	\$7	\$19,250
608	CURB RAMP, TYPE A1	29	EACH	\$1,000	\$29,000
623	MONUMENT BOX ADJUSTED TO GRADE	5	EACH	\$750	\$3,750
690	MAILBOX SUPPORT SYSTEM, SINGLE	134	EACH	\$100	\$13,400
<b>ROADWAY SUBTOTAL:</b>					<b>\$228,000</b>
<b>EROSION CONTROL</b>					
659	SEEDING AND MULCHING	40,000	SQ YD	\$3	\$120,000
832	STORM WATER POLLUTION PREVENTION PLAN	1	EACH	\$10,000	\$10,000
832	EROSION CONTROL	50,000	EACH	\$1	\$50,000
895	POST CONSTRUCTION BMPS (WATER QUALITY STRUCTURE)	2	EACH	\$15,000	\$30,000
<b>EROSION CONTROL SUBTOTAL:</b>					<b>\$210,000</b>
<b>DRAINAGE</b>					
605	4" BASE PIPE UNDERDRAINS W/ FABRIC WRAP	22,250	FT	\$9	\$200,250
611	12" CONDUIT, TYPE B	1,350	FT	\$50	\$67,500
611	18"-36" CONDUIT, TYPE B (TRUNK SEWER)	10,300	FT	\$100	\$1,030,000
611	CATCH BASIN, NO. 3A	87	EACH	\$1,750	\$152,250
611	MANHOLE, NO. 3	44	EACH	\$4,000	\$176,000
<b>DRAINAGE SUBTOTAL:</b>					<b>\$1,626,000</b>
<b>PAVEMENT</b>					
253	PAVEMENT REPAIR	600	SQ YD	\$50	\$30,000
254	PAVEMENT PLANING, ASPHALT CONCRETE	59,200	SQ YD	\$2	\$118,400
441	3" ASPHALT RESURFACING	59,200	SQ YD	\$20	\$1,184,000
441	FULL DEPTH ASPHALT PAVEMENT (INCLUDES EXCAVATION)	20,700	SQ YD	\$52	\$1,076,400
452	6" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC MS (INCL. EXCAV.)	4,250	SQ YD	\$62	\$263,500
609	CURB, TYPE 6	22,250	FT	\$12	\$267,000
<b>PAVEMENT SUBTOTAL:</b>					<b>\$2,939,000</b>
<b>WATER WORKS</b>					
638	FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE	15	EACH	\$1,500	\$22,500
638	SERVICE BOX ADJUSTED TO GRADE	134	EACH	\$175	\$23,450
<b>WATER WORKS SUBTOTAL:</b>					<b>\$46,000</b>
<b>SANITARY SEWER</b>					
611	MANHOLE ADJUSTED TO GRADE	33	EACH	\$400	\$13,200
<b>SANITARY SEWER SUBTOTAL:</b>					<b>\$13,000</b>

**Wallings Road (County Road 57)  
Preliminary Cost Estimate  
3-Lanes Curbed**

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
<b>TRAFFIC CONTROL</b>					
	SIGNING	1	LUMP	\$40,000	\$40,000
	PAVEMENT MARKINGS	1	LUMP	\$45,000	\$45,000
<b>TRAFFIC CONTROL SUBTOTAL:</b>					<b>\$85,000</b>
<b>SIGNALIZATION</b>					
632	TRAFFIC SIGNAL REMOVED	1	EACH	\$2,500	\$2,500
632	TRAFFIC SIGNAL	4	EACH	\$150,000	\$600,000
<b>SIGNALIZATION SUBTOTAL:</b>					<b>\$603,000</b>
<b>STRUCTURES</b>					
	WALLINGS ROAD BRIDGE EXISTING DECK REMOVAL	10,800	SQ FT	\$20	\$216,000
	WALLINGS ROAD BRIDGE RE-DECKING	8,000	SQ FT	\$80	\$640,000
	WALLINGS ROAD BRIDGE WIDENING	8,800	SQ FT	\$150	\$1,320,000
<b>STRUCTURES SUBTOTAL:</b>					<b>\$2,176,000</b>
<b>MAINTENANCE OF TRAFFIC</b>					
	MAINTENANCE OF TRAFFIC	1	LUMP	\$200,000	\$200,000
<b>MAINTENANCE OF TRAFFIC SUBTOTAL:</b>					<b>\$200,000</b>
<b>MISCELLANEOUS</b>					
614	MAINTAINING TRAFFIC	1	LUMP	\$100,000	\$100,000
619	FIELD OFFICE	18	MNTH	\$2,000	\$36,000
623	CONSTRUCTION LAYOUT STAKES	1	LUMP	\$60,000	\$60,000
624	MOBILIZATION	1	LUMP	\$200,000	\$200,000
SPECIAL	PERFORMANCE BOND	1	LUMP	\$60,000	\$60,000
<b>MISCELLANEOUS SUBTOTAL:</b>					<b>\$456,000</b>
<b>RIGHT OF WAY</b>					
	TEMPORARY R/W TAKE - RESIDENTIAL	111	EACH	\$2,000	\$222,000
	TEMPORARY R/W TAKE - COMMERCIAL	3	EACH	\$5,000	\$15,000
	PERMANENT STRIP R/W TAKE - RESIDENTIAL	19	EACH	\$5,000	\$95,000
	PERMANENT STRIP R/W TAKE - COMMERCIAL (MAJOR)	1	EACH	\$20,000	\$20,000
	ACQUISITION SERVICES - PER PARCEL - RESIDENTIAL	130	EACH	\$5,000	\$650,000
	ACQUISITION SERVICES - PER PARCEL - COMMERCIAL	4	EACH	\$10,000	\$40,000
<b>RIGHT OF WAY SUBTOTAL:</b>					<b>\$1,042,000</b>
<b>TOTAL CONSTRUCTION AND RIGHT OF WAY COST:</b>					<b>\$9,624,000</b>
<b>DESIGN ENGINEERING COST:</b>		(12% OF CONSTR. & R/W COST)			<b>\$1,154,880</b>
<b>GEOTECHNICAL ENGINEERING COST:</b>		(2% OF CONSTR. & R/W COST)			<b>\$192,480</b>
<b>ENVIRONMENTAL COST:</b>		(2% OF CONSTR. & R/W COST)			<b>\$192,480</b>
<b>SUBSURFACE UTILITY ENGINEERING (SUE):</b>		(2% OF CONSTR. & R/W COST)			<b>\$192,480</b>
<b>DESIGN CONTINGENCY COSTS</b>		(15% OF CONSTR. & R/W COST)			<b>\$1,443,600</b>
<b>PROJECT SUBTOTAL:</b>					<b>\$12,799,920</b>
<b>3% INFLATION CONTINGENCY OVER 4 YEARS (12%):</b>					<b>\$1,535,990</b>
<b>PROJECT TOTAL WITHOUT CONSTRUCTION INSPECTION</b>					<b>\$14,335,910</b>
<b>CONSTRUCTION INSPECTION COST:</b>		(5% OF PROJECT TOTAL)			<b>\$630,180</b>
<b>TOTAL:</b>					<b>\$14,966,090</b>



5 LANE OPTION

**Wallings Road (County Road 57)  
Preliminary Cost Estimate  
5-Lanes Curbed**

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
<b>ROADWAY</b>					
201	CLEARING AND GRUBBING	1	LUMP	\$50,000	\$50,000
202	CONCRETE WALK REMOVED	51,600	SQ FT	\$5	\$258,000
202	CURB REMOVED	3,050	FT	\$3	\$9,150
202	PAVEMENT REMOVED	6,400	SY	\$10	\$64,000
202	PIPE REMOVED, 24" AND UNDER	12,250	FT	\$4	\$49,000
202	CATCH BASIN OR INLET REMOVED	65	EACH	\$100	\$6,500
202	MANHOLE REMOVED (STORM)	11	EACH	\$500	\$5,500
203	EXCAVATION	2,000	CU YD	\$10	\$20,000
203	EMBANKMENT	200	CU YD	\$10	\$2,000
608	6" CONCRETE WALK	51,600	SQ FT	\$7	\$361,200
608	CURB RAMP, TYPE A1	29	EACH	\$1,000	\$29,000
623	MONUMENT BOX ADJUSTED TO GRADE	5	EACH	\$750	\$3,750
690	MAILBOX SUPPORT SYSTEM, SINGLE	134	EACH	\$100	\$13,400
<b>ROADWAY SUBTOTAL:</b>					<b>\$872,000</b>
<b>EROSION CONTROL</b>					
659	SEEDING AND MULCHING	40,000	SQ YD	\$3	\$120,000
832	STORM WATER POLLUTION PREVENTION PLAN	1	EACH	\$10,000	\$10,000
832	EROSION CONTROL	50,000	EACH	\$1	\$50,000
895	POST CONSTRUCTION BMPS (WATER QUALITY STRUCTURE)	2	EACH	\$15,000	\$30,000
<b>EROSION CONTROL SUBTOTAL:</b>					<b>\$210,000</b>
<b>DRAINAGE</b>					
605	4" BASE PIPE UNDERDRAINS W/ FABRIC WRAP	22,250	FT	\$9	\$200,250
611	12" CONDUIT, TYPE B	2,100	FT	\$50	\$105,000
611	18"-36" CONDUIT, TYPE B (TRUNK SEWER)	10,300	FT	\$100	\$1,030,000
611	CATCH BASIN, NO. 3A	87	EACH	\$1,750	\$152,250
611	MANHOLE, NO. 3	44	EACH	\$4,000	\$176,000
<b>DRAINAGE SUBTOTAL:</b>					<b>\$1,664,000</b>
<b>PAVEMENT</b>					
253	PAVEMENT REPAIR	600	SQ YD	\$50	\$30,000
254	PAVEMENT PLANING, ASPHALT CONCRETE	59,200	SQ YD	\$2	\$118,400
441	3" ASPHALT RESURFACING	59,200	SQ YD	\$20	\$1,184,000
441	FULL DEPTH ASPHALT PAVEMENT (INCLUDES EXCAVATION)	46,800	SQ YD	\$52	\$2,433,600
452	6" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC MS (INCL. EXCAV.)	4,250	SQ YD	\$62	\$263,500
609	CURB, TYPE 6	22,250	FT	\$12	\$267,000
<b>PAVEMENT SUBTOTAL:</b>					<b>\$4,297,000</b>
<b>WATER WORKS</b>					
638	FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE	22	EACH	\$1,500	\$33,000
638	SERVICE BOX ADJUSTED TO GRADE	134	EACH	\$175	\$23,450
<b>WATER WORKS SUBTOTAL:</b>					<b>\$56,000</b>
<b>SANITARY SEWER</b>					
611	MANHOLE ADJUSTED TO GRADE	43	EACH	\$400	\$17,200
<b>SANITARY SEWER SUBTOTAL:</b>					<b>\$17,000</b>

**Wallings Road (County Road 57)  
Preliminary Cost Estimate  
5-Lanes Curbed**

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
<b>TRAFFIC CONTROL</b>					
	SIGNING	1	LUMP	\$40,000	\$40,000
	PAVEMENT MARKINGS	1	LUMP	\$55,000	\$55,000
<b>TRAFFIC CONTROL SUBTOTAL:</b>					<b>\$95,000</b>
<b>SIGNALIZATION</b>					
632	TRAFFIC SIGNAL REMOVED	1	EACH	\$2,500	\$2,500
632	TRAFFIC SIGNAL	4	EACH	\$150,000	\$600,000
<b>SIGNALIZATION SUBTOTAL:</b>					<b>\$603,000</b>
<b>STRUCTURES</b>					
	REPLACE STRUCTURE OVER WATERWAY EAST OF CREEKSIDE TRACE	1	EACH	\$250,000	\$250,000
	WALLINGS ROAD BRIDGE EXISTING DECK REMOVAL	10,800	SQ FT	\$20	\$216,000
	WALLINGS ROAD BRIDGE RE-DECKING	8,000	SQ FT	\$80	\$640,000
	WALLINGS ROAD BRIDGE WIDENING	8,800	SQ FT	\$150	\$1,320,000
<b>STRUCTURES SUBTOTAL:</b>					<b>\$2,426,000</b>
<b>MAINTENANCE OF TRAFFIC</b>					
	MAINTENANCE OF TRAFFIC	1	LUMP	\$200,000	\$200,000
<b>MAINTENANCE OF TRAFFIC SUBTOTAL:</b>					<b>\$200,000</b>
<b>MISCELLANEOUS</b>					
614	MAINTAINING TRAFFIC	1	LUMP	\$100,000	\$100,000
619	FIELD OFFICE	18	MNTH	\$2,000	\$36,000
623	CONSTRUCTION LAYOUT STAKES	1	LUMP	\$80,000	\$80,000
624	MOBILIZATION	1	LUMP	\$200,000	\$200,000
SPECIAL	PERFORMANCE BOND	1	LUMP	\$80,000	\$80,000
<b>MISCELLANEOUS SUBTOTAL:</b>					<b>\$496,000</b>
<b>RIGHT OF WAY</b>					
	TEMPORARY R/W TAKE - RESIDENTIAL	0	EACH	\$2,000	\$0
	TEMPORARY R/W TAKE - COMMERCIAL	0	EACH	\$5,000	\$0
	PERMANENT STRIP R/W TAKE - RESIDENTIAL	130	EACH	\$10,000	\$1,300,000
	PERMANENT STRIP R/W TAKE - COMMERCIAL (MAJOR)	4	EACH	\$50,000	\$200,000
	ACQUISITION SERVICES - PER PARCEL - RESIDENTIAL	130	EACH	\$5,000	\$650,000
	ACQUISITION SERVICES - PER PARCEL - COMMERCIAL	4	EACH	\$10,000	\$40,000
<b>RIGHT OF WAY SUBTOTAL:</b>					<b>\$2,190,000</b>
<b>TOTAL CONSTRUCTION AND RIGHT OF WAY COST:</b>					<b>\$13,126,000</b>
<b>DESIGN ENGINEERING COST:</b>		(12% OF CONSTR. & R/W COST)			<b>\$1,575,120</b>
<b>GEOTECHNICAL ENGINEERING COST:</b>		(2% OF CONSTR. & R/W COST)			<b>\$262,520</b>
<b>ENVIRONMENTAL COST:</b>		(2% OF CONSTR. & R/W COST)			<b>\$262,520</b>
<b>SUBSURFACE UTILITY ENGINEERING (SUE):</b>		(2% OF CONSTR. & R/W COST)			<b>\$262,520</b>
<b>DESIGN CONTINGENCY COSTS</b>		(15% OF CONSTR. & R/W COST)			<b>\$1,968,900</b>
<b>PROJECT SUBTOTAL:</b>					<b>\$17,457,580</b>
<b>3% INFLATION CONTINGENCY OVER 4 YEARS (12%):</b>					<b>\$2,094,910</b>
<b>PROJECT TOTAL WITHOUT CONSTRUCTION INSPECTION</b>					<b>\$19,552,490</b>
<b>CONSTRUCTION INSPECTION COST:</b>		(5% OF PROJECT TOTAL)			<b>\$859,490</b>
<b>TOTAL:</b>					<b>\$20,411,980</b>

**APPENDIX H**  
**ESTIMATES OF COUNTERMEASURE EFFECTIVENESS**  
**REDUCTION FACTORS (CRF)**



## CMF / CRF Details

**CMF ID: 3941**

**Improve signal visibility**

**Description:** Includes such treatments as larger signal heads and reflective backboards.

**Prior Condition:** Unknown

**Category:** Intersection traffic control

**Study:** [\*A full Bayes multivariate intervention model with random parameters among matched pairs for before-after safety evaluation, El-Basyouny and Sayed, 2011\*](#)

**Star Quality Rating:**



[\[View score details\]](#)

### Crash Modification Factor (CMF)

**Value:** 0.71

**Adjusted Standard Error:**

**Unadjusted Standard Error:**

### Crash Reduction Factor (CRF)



<b>Value:</b>	29 ( <i>This value indicates a <b>decrease</b> in crashes</i> )
<b>Adjusted Standard Error:</b>	
<b>Unadjusted Standard Error:</b>	

<b>Applicability</b>	
----------------------	--

<b>Crash Type:</b>	All
<b>Crash Severity:</b>	Fatal, Serious injury, Minor injury
<b>Roadway Types:</b>	Not Specified
<b>Number of Lanes:</b>	
<b>Road Division Type:</b>	
<b>Speed Limit:</b>	
<b>Area Type:</b>	Urban
<b>Traffic Volume:</b>	
<b>Time of Day:</b>	All

<b><i>If countermeasure is intersection-based</i></b>	
---	--

<b>Intersection Type:</b>	Roadway/roadway (not interchange related)
<b>Intersection Geometry:</b>	Not specified
<b>Traffic Control:</b>	Signalized
<b>Major Road Traffic Volume:</b>	

**Minor Road Traffic  
Volume:**

### Development Details

**Date Range of Data Used:** 2001 to 2008

**Municipality:**

**State:**

**Country:** Canada

**Type of Methodology  
Used:** Before/after using empirical Bayes or full Bayes

**Sample Size Used:** Site-years

**Before Sample Size Used:** 37 Site-years

**After Sample Size Used:** 26 Site-years

### Other Details

**Included in Highway  
Safety Manual?** No

**Date Added to  
Clearinghouse:** 06-04-2012

**Comments:**

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## CMF / CRF Details

**CMF ID: 3943**

**Improve signal visibility**

**Description:** Includes such treatments as larger signal heads and reflective backboards.

**Prior Condition:** Unknown

**Category:** Intersection traffic control

**Study:** [\*A full Bayes multivariate intervention model with random parameters among matched pairs for before-after safety evaluation, El-Basyouny and Sayed, 2011\*](#)

**Star Quality Rating:**



[\[View score details\]](#)

### Crash Modification Factor (CMF)

**Value:** 0.79

**Adjusted Standard Error:**

**Unadjusted Standard Error:**

### Crash Reduction Factor (CRF)

<b>Value:</b>	21 ( <i>This value indicates a <b>decrease</b> in crashes</i> )
<b>Adjusted Standard Error:</b>	
<b>Unadjusted Standard Error:</b>	

<b>Applicability</b>	
----------------------	--

<b>Crash Type:</b>	All
<b>Crash Severity:</b>	Property damage only (PDO)
<b>Roadway Types:</b>	Not Specified
<b>Number of Lanes:</b>	
<b>Road Division Type:</b>	
<b>Speed Limit:</b>	
<b>Area Type:</b>	Urban
<b>Traffic Volume:</b>	
<b>Time of Day:</b>	All

<b><i>If countermeasure is intersection-based</i></b>	
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<b>Intersection Type:</b>	Roadway/roadway (not interchange related)
<b>Intersection Geometry:</b>	Not specified
<b>Traffic Control:</b>	Signalized
<b>Major Road Traffic Volume:</b>	

**Minor Road Traffic  
Volume:**

### Development Details

**Date Range of Data Used:** 2001 to 2008

**Municipality:**

**State:**

**Country:** Canada

**Type of Methodology  
Used:** Before/after using empirical Bayes or full Bayes

**Sample Size Used:** Site-years

**Before Sample Size Used:** 37 Site-years

**After Sample Size Used:** 26 Site-years

### Other Details

**Included in Highway  
Safety Manual?** No

**Date Added to  
Clearinghouse:** 06-04-2012

**Comments:**

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## CMF / CRF Details

**CMF ID: 2375**

### Install curb and gutter

**Description:** Install AASHTO Type B curb along the outside (right) shoulder of four-lane suburban roadways.

**Prior Condition:** Suburban four-lane facilities without curb on the outside (right) shoulder. All roads have either two-way left-turn lanes or non-traversable medians.

**Category:** Shoulder treatments

**Study:** [\*Collision Models for Multilane Highway Segments to Examine the Safety of Curbs, Baek and Hummer, 2008\*](#)

Star Quality Rating:



[\[View score details\]](#)

### Crash Modification Factor (CMF)

Value: 0.89

Adjusted Standard Error:

Unadjusted Standard Error:

## Crash Reduction Factor (CRF)

**Value:** 11 (*This value indicates a **decrease** in crashes*)

**Adjusted Standard Error:**

**Unadjusted Standard Error:**

## Applicability

**Crash Type:** All

**Crash Severity:** All

**Roadway Types:** Not Specified

**Number of Lanes:** 4

**Road Division Type:** Divided by Median

**Speed Limit:** 45-55mph

**Area Type:** Suburban

**Traffic Volume:** 8333 to 57138

**Time of Day:** All

### *If countermeasure is intersection-based*

**Intersection Type:**

**Intersection Geometry:**

**Traffic Control:**

**Major Road Traffic Volume:**

<b>Minor Road Traffic Volume:</b>	
-----------------------------------	--

### Development Details

<b>Date Range of Data Used:</b>	2001 to 2003
---------------------------------	--------------

<b>Municipality:</b>	
----------------------	--

<b>State:</b>	NC
---------------	----

<b>Country:</b>	
-----------------	--

<b>Type of Methodology Used:</b>	Regression cross-section
----------------------------------	--------------------------

<b>Sample Size Used:</b>	2274 Crashes
--------------------------	--------------

### Other Details

<b>Included in Highway Safety Manual?</b>	No
---	----

<b>Date Added to Clearinghouse:</b>	01-07-2010
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<b>Comments:</b>	
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**APPENDIX I**  
**BENEFIT / COST WORKSHEETS**

FULL PROJECT AMOUNT





# Safety Benefit - Cost Analysis

## General Information

Project Name	Wallings Road	Contact Email	cdeibel@gpdgroup.com
Project Description	Safety and Corridor Study	Contact Phone	(330) 572-2495
Reference Number	2014383	Date Performed	4/2/2015
Analyst	Curtis J. Deibel, E.I.	Analysis Year	2019
Agency/Company	GPD Group		

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
Widen Wallings Road to 3 Lanes	20	\$6,378,813.00			\$6,378,813.00	\$6,378,813.00	-8.234	\$2,919,881
Remove Traffic Signal at Wallings Road / Wright Road Intersection	20	\$3,325.00			\$3,325.00	\$3,325.00		
Addition of 3 Turning Lanes	20	\$598,500.00			\$598,500.00	\$598,500.00		
Widen Wallings Road Bridge over I-77	20	\$2,894,080.00			\$2,894,080.00	\$2,894,080.00		
CMF 1 - Improve Signal Visibility	20	\$798,000.00			\$798,000.00	\$798,000.00	-6.073	\$2,846,342
CMF 2 - Install Curb and Gutter	20	\$355,110.00			\$355,110.00	\$355,110.00	-0.687	\$277,332
CMF 3 - Resurface pavement	20	\$1,772,092.00			\$1,772,092.00	\$1,772,092.00	-0.058	\$59,749
		\$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
		\$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
		\$0.00			\$0.00	\$0.00	0.000	\$0
<b>Totals</b>		<b>\$12,799,920.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$12,799,920.00</b>	<b>\$12,799,920.00</b>	<b>-15.053</b>	<b>\$6,103,304</b>



# Safety Benefit - Cost Analysis

## General Information

Project Name	Wallings Road	Contact Email	cdeibel@gpdgroup.com
Project Description	Safety and Corridor Study	Contact Phone	(330) 572-2495
Reference Number	2014383	Date Performed	4/2/2015
Analyst	Curtis J. Deibel, E.I.	Analysis Year	2019
Agency/Company	GPD Group		

### Benefit - Cost Calculator

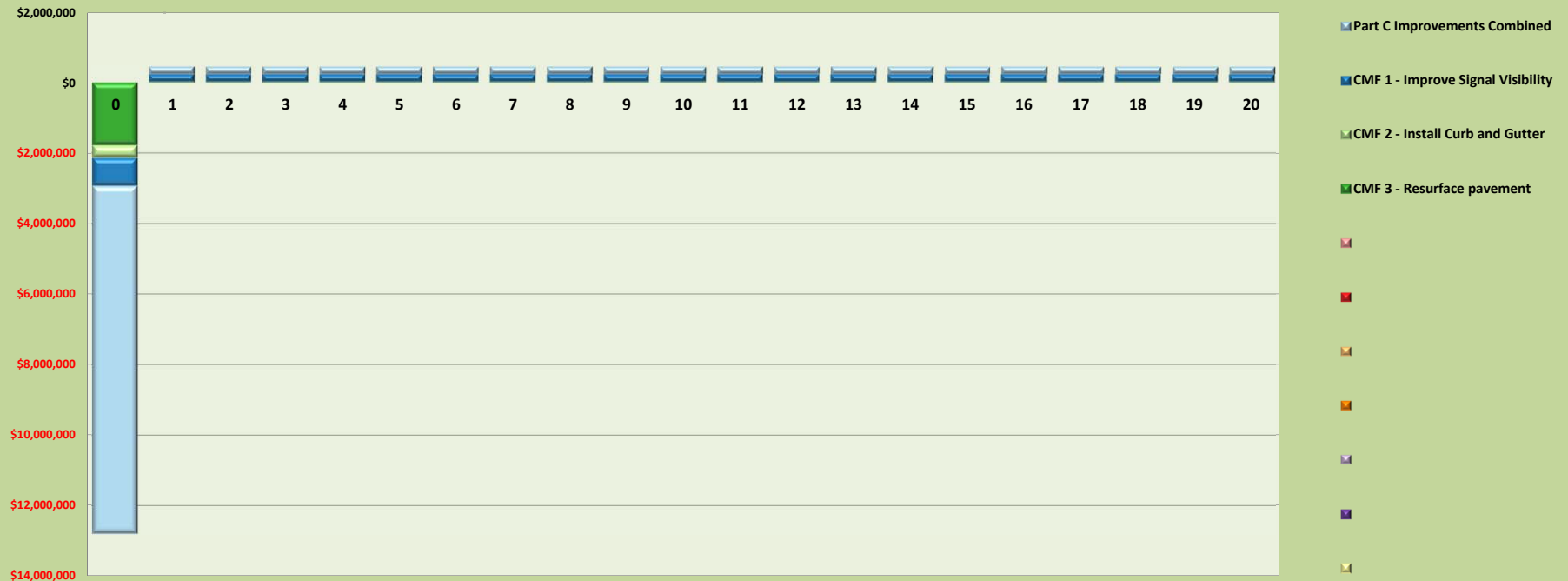
Net Present Value of Project	\$12,799,920.00
Net Present Value of Safety Benefits	\$6,103,304.29
Net Benefit	(\$6,696,615.71)
Benefit / Cost Ratio	0.48

### Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.469
Number of Injury Crashes	-5.519
Number of Total Crashes	-15.053

### Comments:

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





# Safety Benefit - Cost Analysis

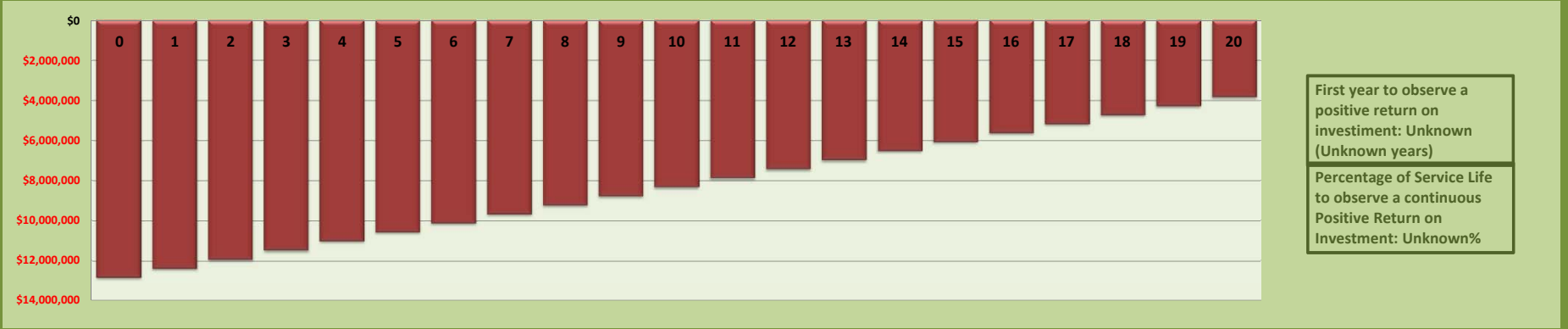
## General Information

Project Name	Wallings Road	Contact Email	cdeibel@gpdgroup.com
Project Description	Safety and Corridor Study	Contact Phone	(330) 572-2495
Reference Number	2014383	Date Performed	4/2/2015
Analyst	Curtis J. Deibel, E.I.	Analysis Year	2019
Agency/Company	GPD Group		

### Project Costs Only Cash Flows By Countermeasure Per Year



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



SAFETY REQUEST ONLY



# Safety Benefit - Cost Analysis

## General Information

Project Name	Wallings Road	Contact Email	cdeibel@gpdgroup.com
Project Description	Safety and Corridor Study	Contact Phone	(330) 572-2495
Reference Number	2014383	Date Performed	4/2/2015
Analyst	Curtis J. Deibel, E.I.	Analysis Year	2019
Agency/Company	GPD Group		

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
Widen Wallings Road to 3 Lanes	20	\$5,000,000.00			\$5,000,000.00	\$5,000,000.00	-8.234	\$2,919,881
Remove Traffic Signal at Wallings Road / Wright Road Intersection	20	\$0.00			\$0.00	\$0.00		
Addition of 3 Turning Lanes	20	\$0.00			\$0.00	\$0.00		
Widen Wallings Road Bridge over I-77	20	\$0.00			\$0.00	\$0.00		
CMF 1 - Improve Signal Visibility	20	\$0.00			\$0.00	\$0.00	-6.073	\$2,846,342
CMF 2 - Install Curb and Gutter	20	\$0.00			\$0.00	\$0.00	-0.687	\$277,332
CMF 3 - Resurface pavement	20	\$0.00			\$0.00	\$0.00	-0.058	\$59,749
		\$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
		\$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
		\$0.00			\$0.00	\$0.00	0.000	\$0
<b>Totals</b>		<b>\$5,000,000.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$5,000,000.00</b>	<b>\$5,000,000.00</b>	<b>-15.053</b>	<b>\$6,103,304</b>





# Safety Benefit - Cost Analysis

## General Information

Project Name	Wallings Road	Contact Email	cdeibel@gpdgroup.com
Project Description	Safety and Corridor Study	Contact Phone	(330) 572-2495
Reference Number	2014383	Date Performed	4/2/2015
Analyst	Curtis J. Deibel, E.I.	Analysis Year	2019
Agency/Company	GPD Group		

### Benefit - Cost Calculator

Net Present Value of Project **\$5,000,000.00**

Net Present Value of Safety Benefits **\$6,103,304.29**

Net Benefit **\$1,103,304.29**

Benefit / Cost Ratio **1.22**

### Expected Annual Crash Adjustment

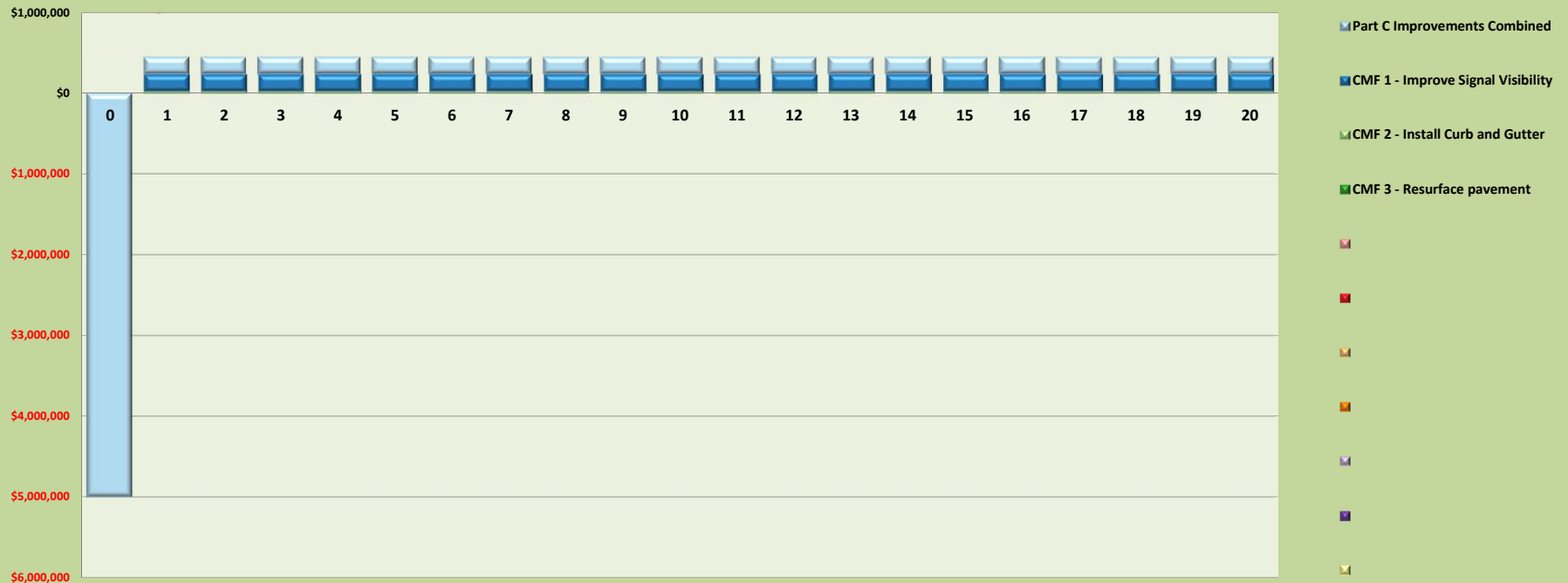
Number of Fatal & Incapacitating Injury Crashes **-0.469**

Number of Injury Crashes **-5.519**

Number of Total Crashes **-15.053**

### Comments:

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





# Safety Benefit - Cost Analysis

## General Information

Project Name	Wallings Road	Contact Email	cdeibel@gpdgroup.com
Project Description	Safety and Corridor Study	Contact Phone	(330) 572-2495
Reference Number	2014383	Date Performed	4/2/2015
Analyst	Curtis J. Deibel, E.I.	Analysis Year	2019
Agency/Company	GPD Group		

### Project Costs Only Cash Flows By Countermeasure Per Year



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



**APPENDIX J**  
**TRAFFIC SIGNAL WARRANT ANALYSIS**

EXISTING YEAR 2015 CONDITIONS

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Northbound: Broadview Road**

Number of Lanes: 2

Approach Speed: 25

Total Approach Volume: 5,801

**Southbound: Broadview Road**

Number of Lanes: 2

Approach Speed: 25

Total Approach Volume: 5,858

### Minor Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1

Total Approach Volume: 4,599

**Westbound: Wallings Road**

Number of Lanes: 1

Total Approach Volume: 5,677

---

### Warrant Summary (Urban values apply.)

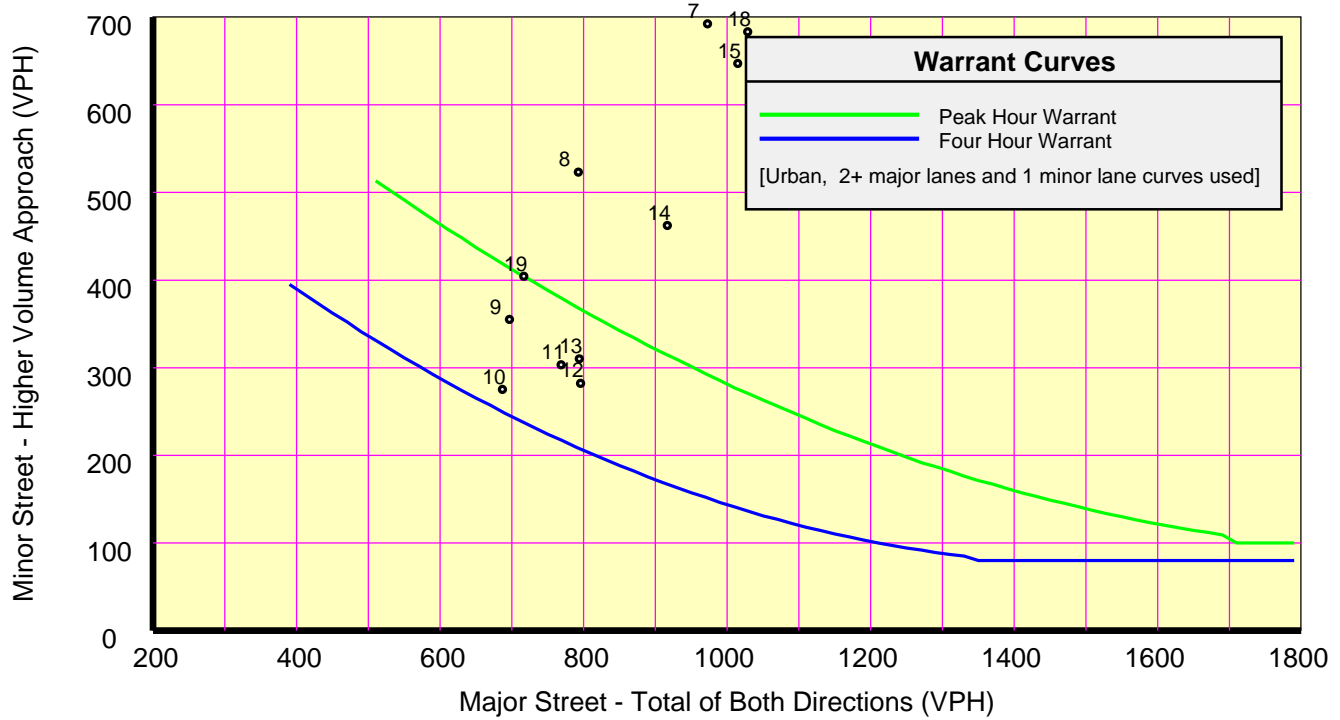
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> ..... <b>Satisfied</b>	
Required volumes reached for 13 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> ..... <b>Not Satisfied</b>	
Required volumes reached for 6 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> ..... <b>Satisfied</b>	
Required volumes reached for 10 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Satisfied</b>
Number of hours (13) volumes exceed minimum $\geq$ minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> ..... <b>Not Satisfied</b>	
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> ..... <b>Satisfied</b>	
Volumes exceed minimums for at least one hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>



# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311  
 (330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor Vol	Dir	War-1A			War-1B			War-1A&B		
				Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
01:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
02:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
03:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
04:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
05:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
06:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
07:00	973	692	EB	600-Yes	150-Yes	Both	900-Yes	75-Yes	Both	720-Yes	120-Yes	Both
08:00	793	523	EB	600-Yes	150-Yes	Both	900-No	75-Yes	Minor	720-Yes	120-Yes	Both
09:00	697	355	EB	600-Yes	150-Yes	Both	900-No	75-Yes	Minor	720-No	120-Yes	Minor
10:00	687	275	EB	600-Yes	150-Yes	Both	900-No	75-Yes	Minor	720-No	120-Yes	Minor
11:00	769	303	WB	600-Yes	150-Yes	Both	900-No	75-Yes	Minor	720-Yes	120-Yes	Both
12:00	796	282	EB	600-Yes	150-Yes	Both	900-No	75-Yes	Minor	720-Yes	120-Yes	Both
13:00	794	310	WB	600-Yes	150-Yes	Both	900-No	75-Yes	Minor	720-Yes	120-Yes	Both
14:00	917	462	WB	600-Yes	150-Yes	Both	900-Yes	75-Yes	Both	720-Yes	120-Yes	Both
15:00	1,015	647	WB	600-Yes	150-Yes	Both	900-Yes	75-Yes	Both	720-Yes	120-Yes	Both
16:00	1,189	807	WB	600-Yes	150-Yes	Both	900-Yes	75-Yes	Both	720-Yes	120-Yes	Both
17:00	1,283	838	WB	600-Yes	150-Yes	Both	900-Yes	75-Yes	Both	720-Yes	120-Yes	Both
18:00	1,029	683	WB	600-Yes	150-Yes	Both	900-Yes	75-Yes	Both	720-Yes	120-Yes	Both
19:00	717	404	WB	600-Yes	150-Yes	Both	900-No	75-Yes	Minor	720-No	120-Yes	Minor
20:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
21:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
22:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---
23:00	0	0	EB	600-No	150-No	---	900-No	75-No	---	720-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

#### **Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 1,984

#### **Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,121

### Minor Street Approaches

#### **Northbound:**

Number of Lanes: 1

Total Approach Volume: 0

#### **Southbound: Elmhurst Road**

Number of Lanes: 1

Total Approach Volume: 45

---

### Warrant Summary (Urban values apply.)

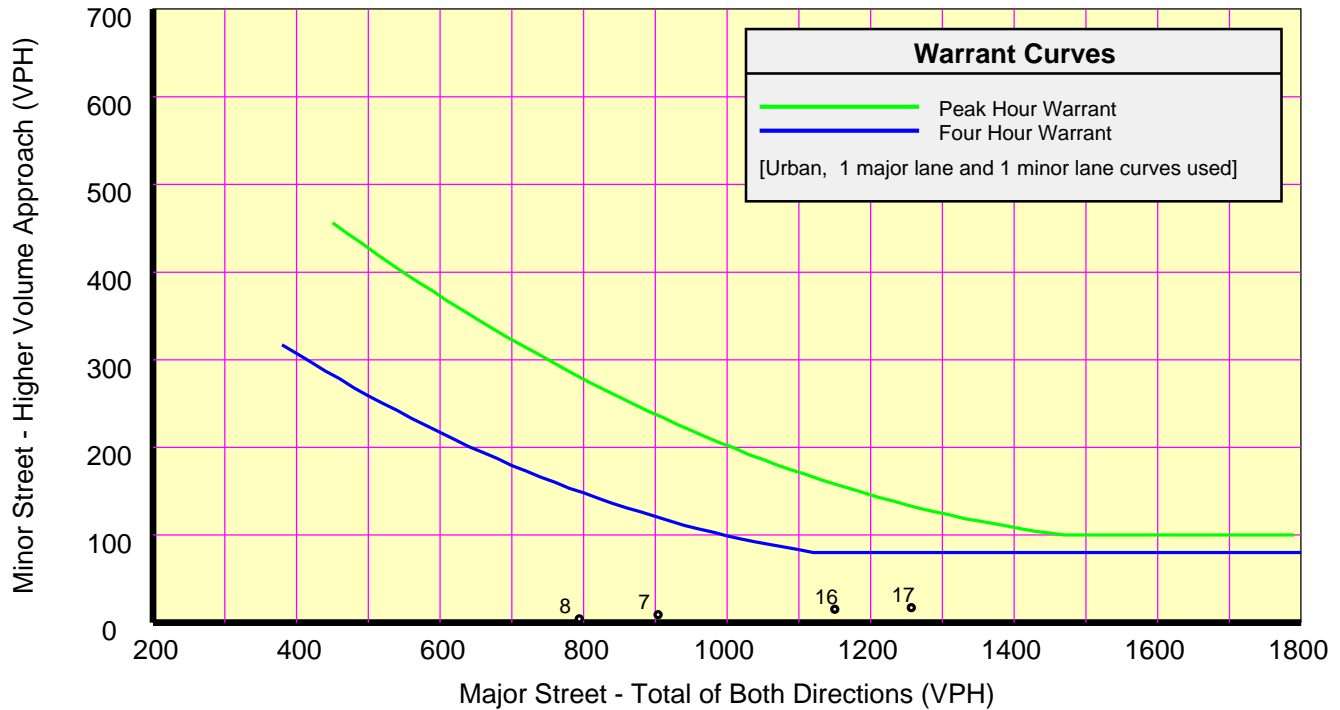
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (0) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor Vol	Dir	War-1A			War-1B			War-1A&B		
				Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	904	9	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	794	4	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,150	15	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,257	17	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 1,933

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,132

### Minor Street Approaches

**Northbound:**

Number of Lanes: 1

Total Approach Volume: 0

**Southbound: Longview Road**

Number of Lanes: 1

Total Approach Volume: 30

---

### Warrant Summary (Urban values apply.)

**Warrant 1 - Eight Hour Vehicular Volumes ..... Not Satisfied**

**Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes ..... Not Satisfied**

Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour ..... Not Satisfied**

**Warrant 3A - Peak Hour Delay ..... Not Satisfied**

Total approach volumes and delays on minor street do not exceed minimums for any hour.

**Warrant 3B - Peak Hour Volumes ..... Not Satisfied**

Volumes do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes ..... Not Evaluated**

**Warrant 5 - School Crossing ..... Not Evaluated**

**Warrant 6 - Coordinated Signal System ..... Not Evaluated**

**Warrant 7 - Crash Experience ..... Not Evaluated**

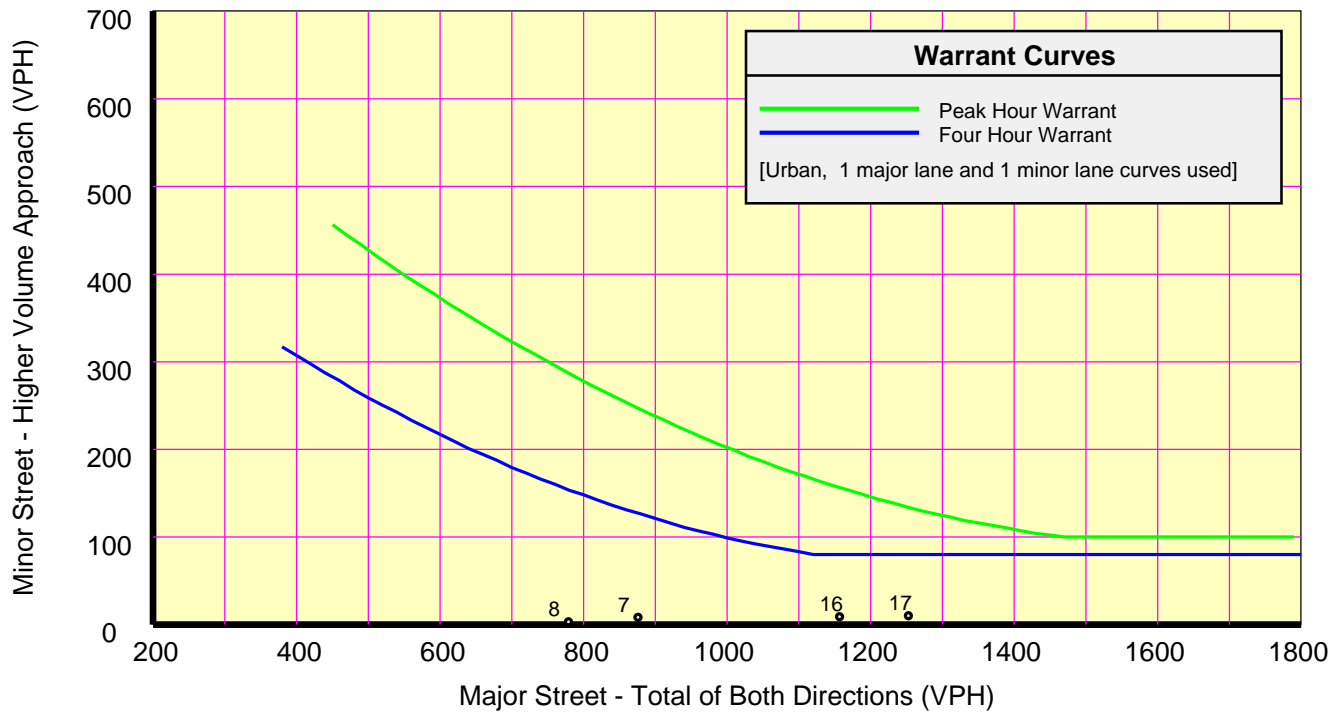
**Warrant 8 - Roadway Network ..... Not Evaluated**

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	876	8	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	779	3	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,157	9	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,253	10	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---



# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 1,915

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,163

### Minor Street Approaches

**Northbound: Chestnut Boulevard**

Number of Lanes: 1  
  
Total Approach Volume: 66

**Southbound:**

Number of Lanes: 1  
  
Total Approach Volume: 0

---

### Warrant Summary (Urban values apply.)

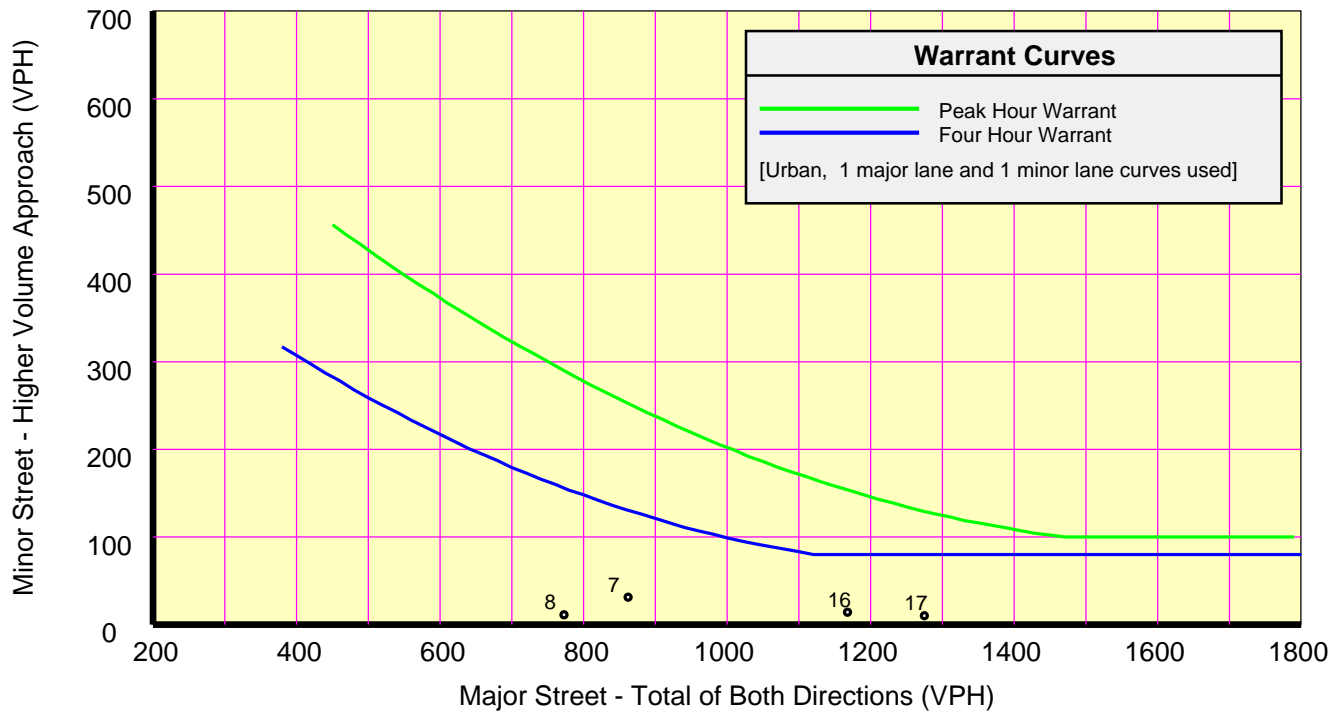
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (0) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	862	31	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	773	11	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,168	14	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,275	10	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 1,950

**Westbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 2,207

### Minor Street Approaches

**Northbound: Overlook Avenue**

Number of Lanes: 1

Total Approach Volume: 55

**Southbound:**

Number of Lanes: 1

Total Approach Volume: 0

---

### Warrant Summary (Urban values apply.)

**Warrant 1 - Eight Hour Vehicular Volumes ..... Not Satisfied**

**Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes ..... Not Satisfied**

Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour ..... Not Satisfied**

**Warrant 3A - Peak Hour Delay ..... Not Satisfied**

Total approach volumes and delays on minor street do not exceed minimums for any hour.

**Warrant 3B - Peak Hour Volumes ..... Not Satisfied**

Volumes do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes ..... Not Evaluated**

**Warrant 5 - School Crossing ..... Not Evaluated**

**Warrant 6 - Coordinated Signal System ..... Not Evaluated**

**Warrant 7 - Crash Experience ..... Not Evaluated**

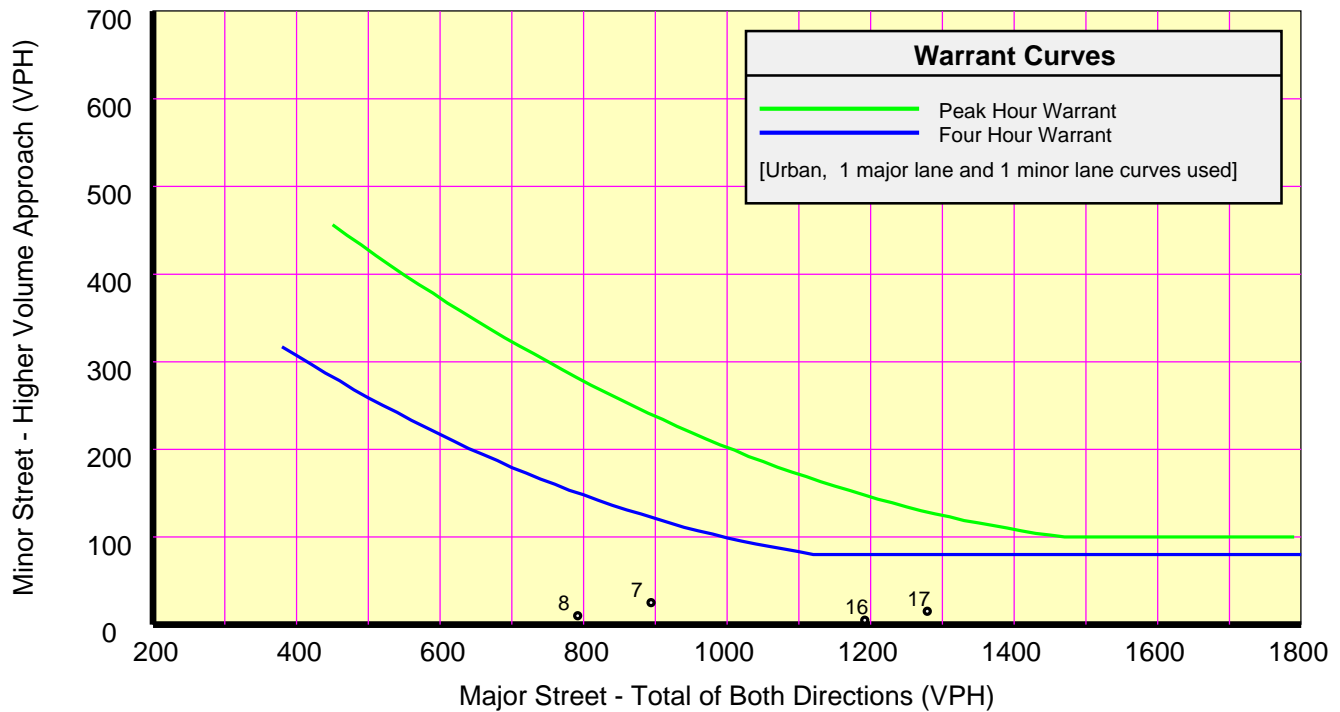
**Warrant 8 - Roadway Network ..... Not Evaluated**

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	894	25	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	792	10	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,192	5	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,279	15	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 4,823

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 5,957

### Minor Street Approaches

**Northbound:**

Number of Lanes: 1

Total Approach Volume: 0

**Southbound: McCreary Road**

Number of Lanes: 1

Total Approach Volume: 391

---

### Warrant Summary (Urban values apply.)

**Warrant 1 - Eight Hour Vehicular Volumes ..... Not Satisfied**

**Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes ..... Not Satisfied**

Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour ..... Not Satisfied**

**Warrant 3A - Peak Hour Delay ..... Not Satisfied**

Total approach volumes and delays on minor street do not exceed minimums for any hour.

**Warrant 3B - Peak Hour Volumes ..... Not Satisfied**

Volumes do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes ..... Not Evaluated**

**Warrant 5 - School Crossing ..... Not Evaluated**

**Warrant 6 - Coordinated Signal System ..... Not Evaluated**

**Warrant 7 - Crash Experience ..... Not Evaluated**

**Warrant 8 - Roadway Network ..... Not Evaluated**

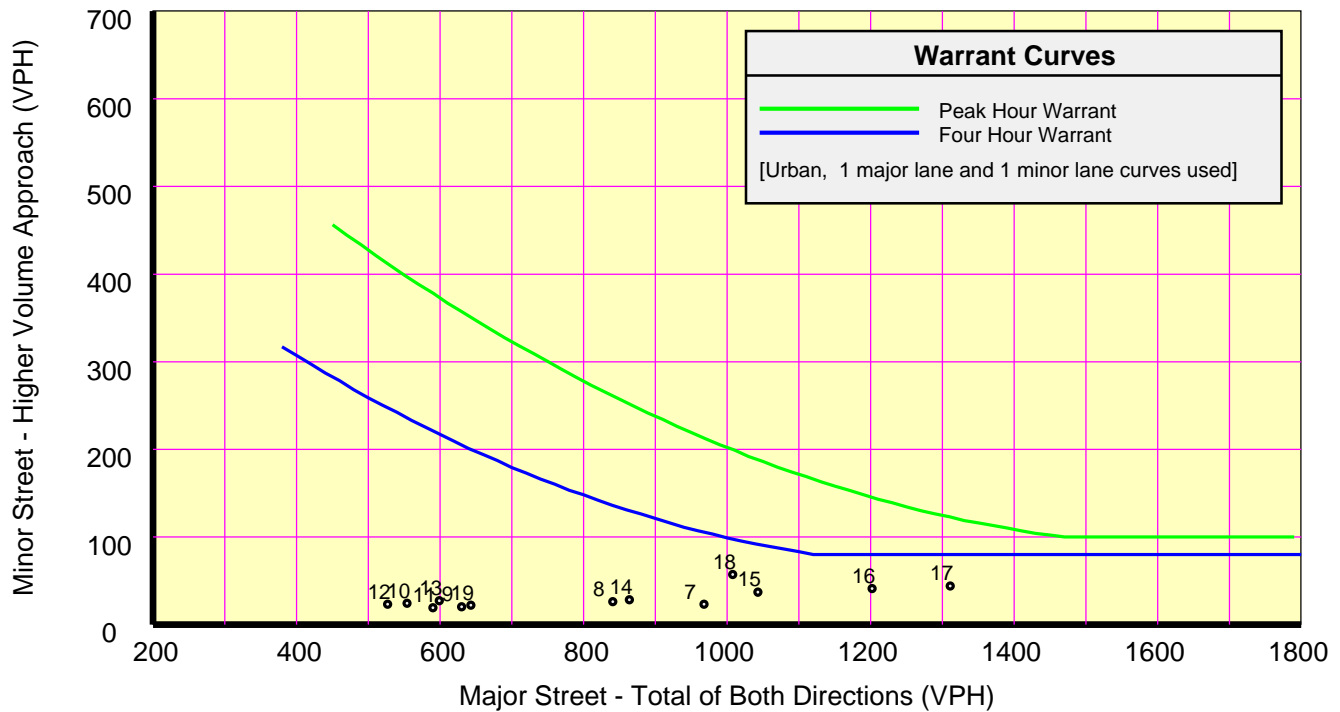


# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor Vol	Dir	War-1A			War-1B			War-1A&B		
				Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	968	23	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	841	26	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	630	20	SB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
10:00	554	24	SB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
11:00	590	19	SB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
12:00	527	23	SB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
13:00	599	27	SB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
14:00	864	28	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
15:00	1,043	37	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
16:00	1,202	41	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,311	44	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	1,008	57	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
19:00	643	22	SB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 4,957

**Westbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 6,279

### Minor Street Approaches

**Northbound: Wyatt Road**

Number of Lanes: 1

Total Approach Volume: 1,042

**Southbound:**

Number of Lanes: 1

Total Approach Volume: 0

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### Warrant Summary (Urban values apply.)

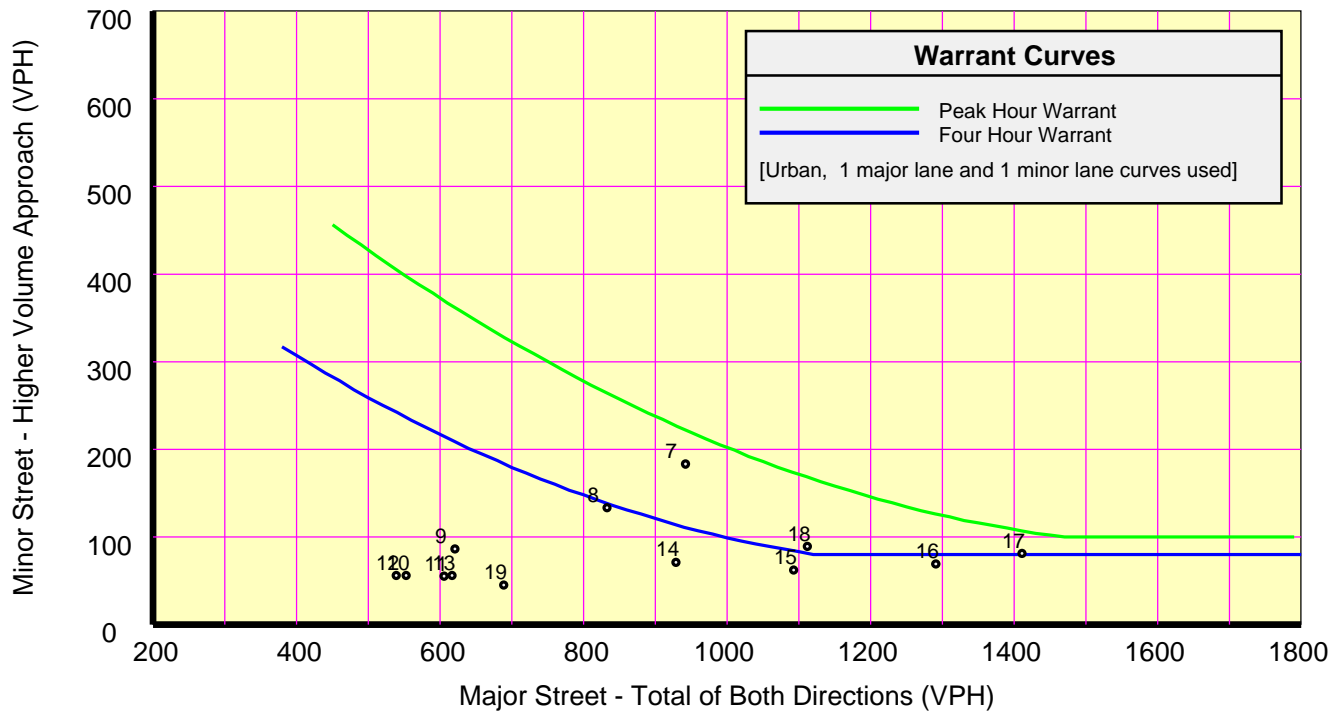
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 1 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 4 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 2 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (3) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor Vol	Dir	War-1A			War-1B			War-1A&B		
				Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	942	183	NB	500-Yes	150-Yes	Both	750-Yes	75-Yes	Both	600-Yes	120-Yes	Both
08:00	833	133	NB	500-Yes	150-No	Major	750-Yes	75-Yes	Both	600-Yes	120-Yes	Both
09:00	621	86	NB	500-Yes	150-No	Major	750-No	75-Yes	Minor	600-Yes	120-No	Major
10:00	553	56	NB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
11:00	606	55	NB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
12:00	539	56	NB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
13:00	617	56	NB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
14:00	929	71	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
15:00	1,093	62	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
16:00	1,291	69	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,411	81	NB	500-Yes	150-No	Major	750-Yes	75-Yes	Both	600-Yes	120-No	Major
18:00	1,112	89	NB	500-Yes	150-No	Major	750-Yes	75-Yes	Both	600-Yes	120-No	Major
19:00	689	45	NB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,247

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,443

### Minor Street Approaches

**Northbound:**

Number of Lanes: 1

Total Approach Volume: 0

**Southbound: Majestic Oaks Trail**

Number of Lanes: 1

Total Approach Volume: 37

---

### Warrant Summary (Urban values apply.)

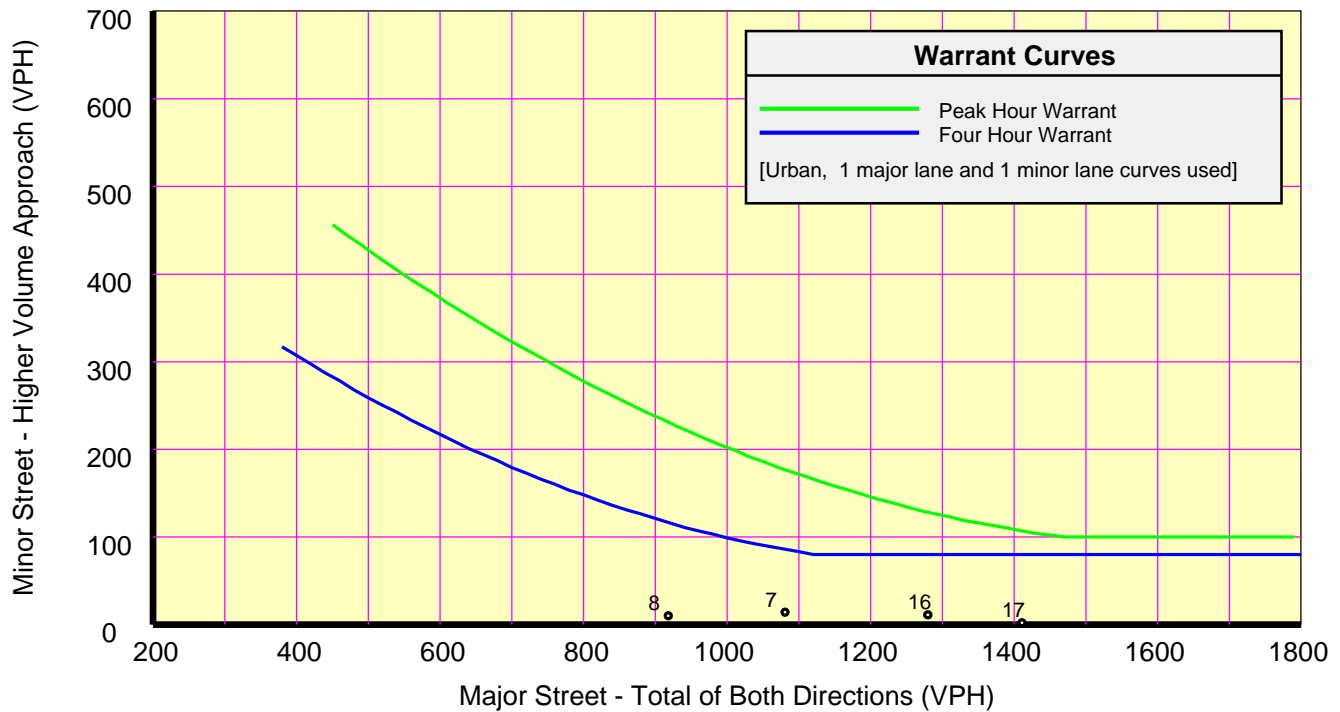
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (0) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,081	14	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	918	10	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,280	11	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,411	2	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

### Major Street Approaches

#### Eastbound: Wallings Road

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 2,289

#### Westbound: Wallings Road

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 2,466

### Minor Street Approaches

#### Northbound: Creekside Trace

Number of Lanes: 1

Total Approach Volume: 96

#### Southbound:

Number of Lanes: 1

Total Approach Volume: 0

### Warrant Summary (Urban values apply.)

**Warrant 1 - Eight Hour Vehicular Volumes** ..... **Not Satisfied**

**Warrant 1A - Minimum Vehicular Volume** ..... **Not Satisfied**

    Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic** ..... **Not Satisfied**

    Required volumes reached for 0 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants** ..... **Not Satisfied**

    Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes** ..... **Not Satisfied**

    Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour** ..... **Not Satisfied**

**Warrant 3A - Peak Hour Delay** ..... **Not Satisfied**

    Total approach volumes and delays on minor street do not exceed minimums for any hour.

**Warrant 3B - Peak Hour Volumes** ..... **Not Satisfied**

    Volumes do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes** ..... **Not Evaluated**

**Warrant 5 - School Crossing** ..... **Not Evaluated**

**Warrant 6 - Coordinated Signal System** ..... **Not Evaluated**

**Warrant 7 - Crash Experience** ..... **Not Evaluated**

**Warrant 8 - Roadway Network** ..... **Not Evaluated**

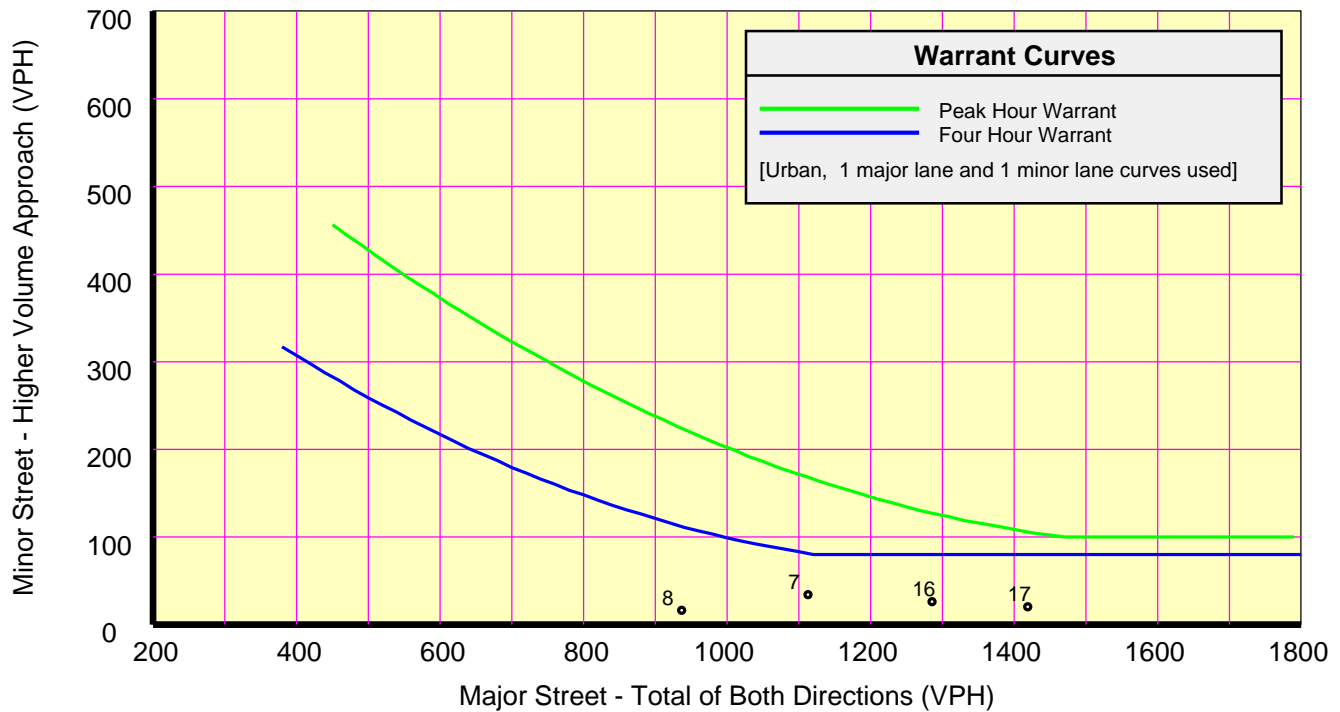


# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,113	34	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	937	16	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,286	26	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,419	20	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,332

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,459

### Minor Street Approaches

**Northbound: Joyce Road**

Number of Lanes: 1  
  
Total Approach Volume: 21

**Southbound: Firestation Drive**

Number of Lanes: 1  
  
Total Approach Volume: 10

---

### Warrant Summary (Urban values apply.)

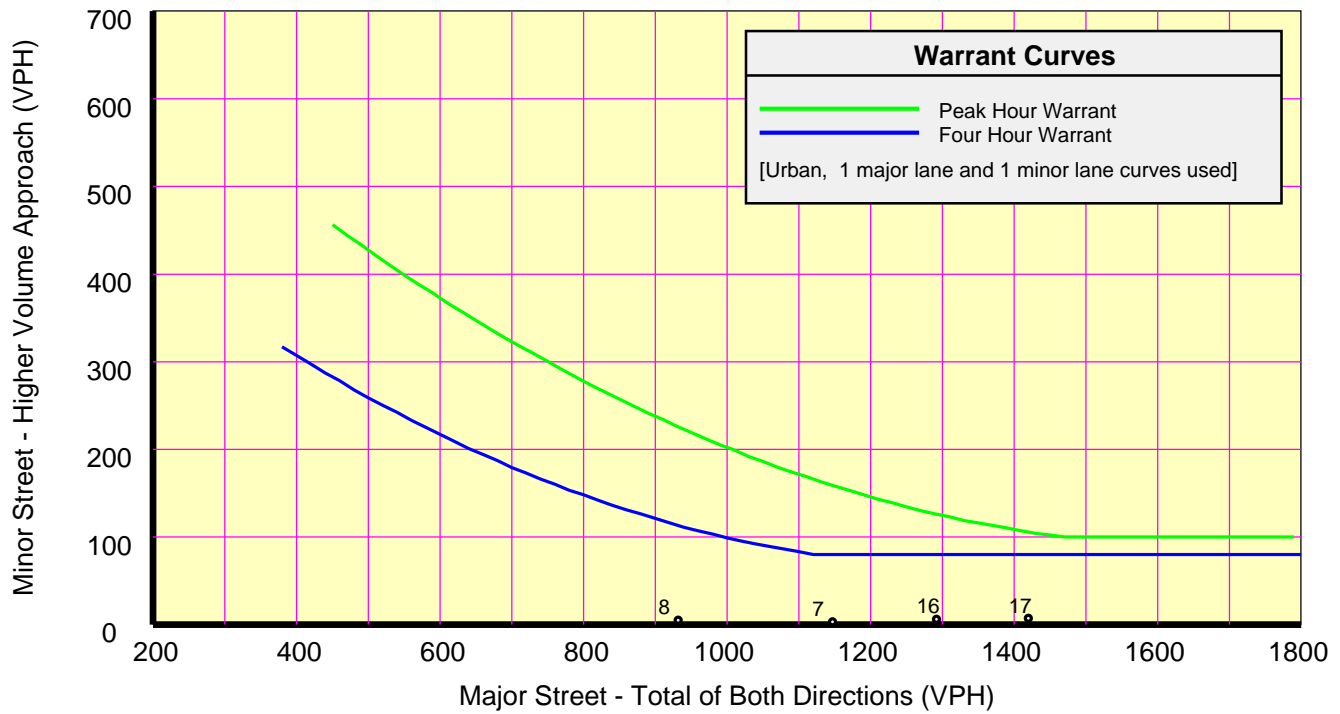
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (0) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,147	3	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	932	5	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,292	6	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,420	7	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,313

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,445

### Minor Street Approaches

**Northbound: Marianna Boulevard**

Number of Lanes: 1  
  
Total Approach Volume: 31

**Southbound:**

Number of Lanes: 1  
  
Total Approach Volume: 0

---

### Warrant Summary (Urban values apply.)

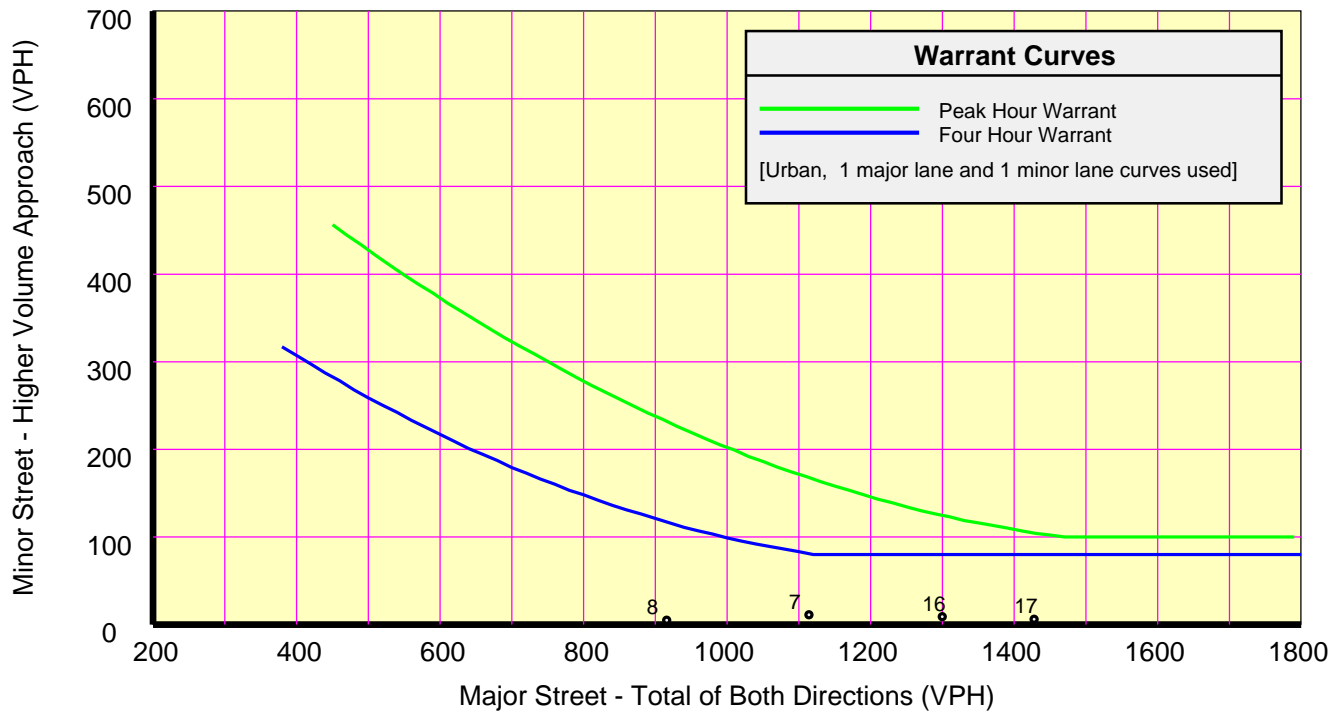
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (0) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,114	11	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	916	5	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,300	9	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,428	6	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 5,282

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 6,198

### Minor Street Approaches

**Northbound: Wright Road**

Number of Lanes: 1  
  
Total Approach Volume: 334

**Southbound: Wright Road**

Number of Lanes: 1  
  
Total Approach Volume: 370

---

### Warrant Summary (Urban values apply.)

<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (0) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

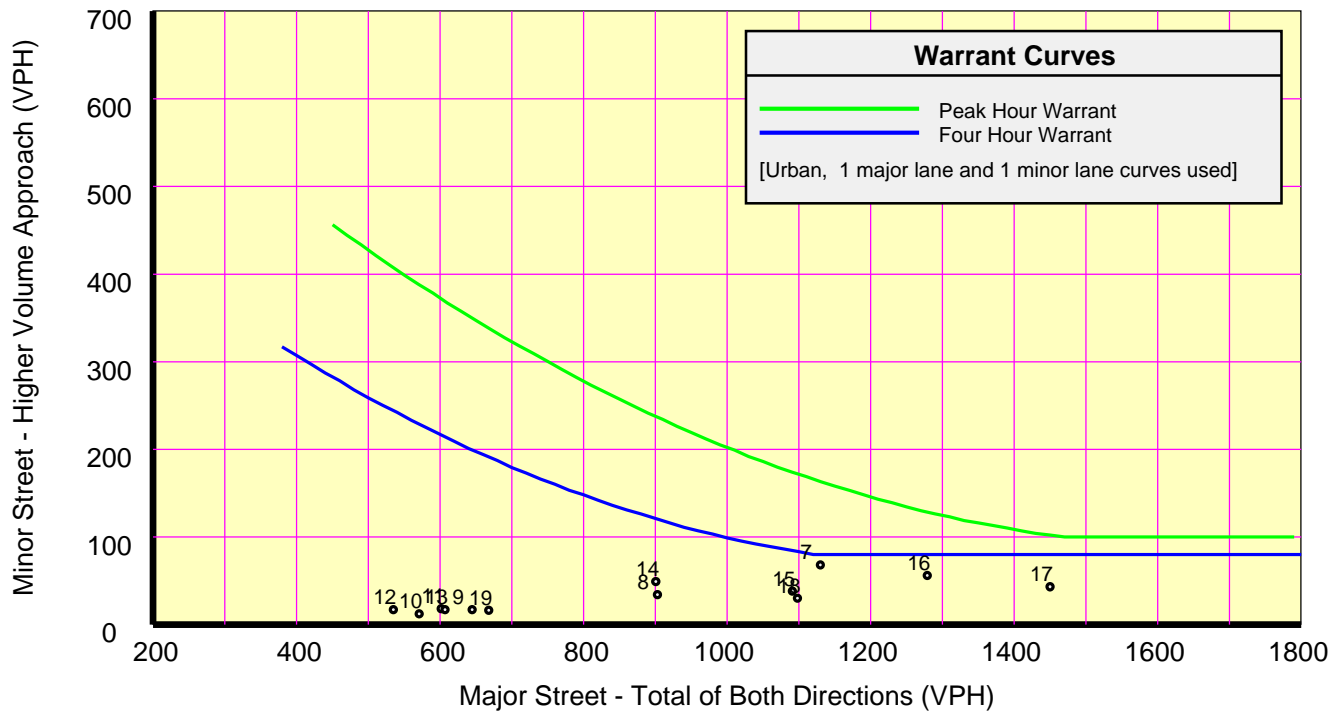


# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor Vol	Dir	War-1A			War-1B			War-1A&B		
				Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,130	68	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	903	34	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	645	17	SB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
10:00	571	12	NB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
11:00	602	18	SB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
12:00	535	17	NB	500-Yes	150-No	Major	750-No	75-No	---	600-No	120-No	---
13:00	607	17	NB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
14:00	901	49	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
15:00	1,091	38	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
16:00	1,279	56	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,450	43	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	1,098	30	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
19:00	668	16	SB	500-Yes	150-No	Major	750-No	75-No	---	600-Yes	120-No	Major
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,383

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,479

### Minor Street Approaches

**Northbound: Craig Lane**

Number of Lanes: 1  
  
Total Approach Volume: 33

**Southbound:**

Number of Lanes: 1  
  
Total Approach Volume: 0

---

### Warrant Summary (Urban values apply.)

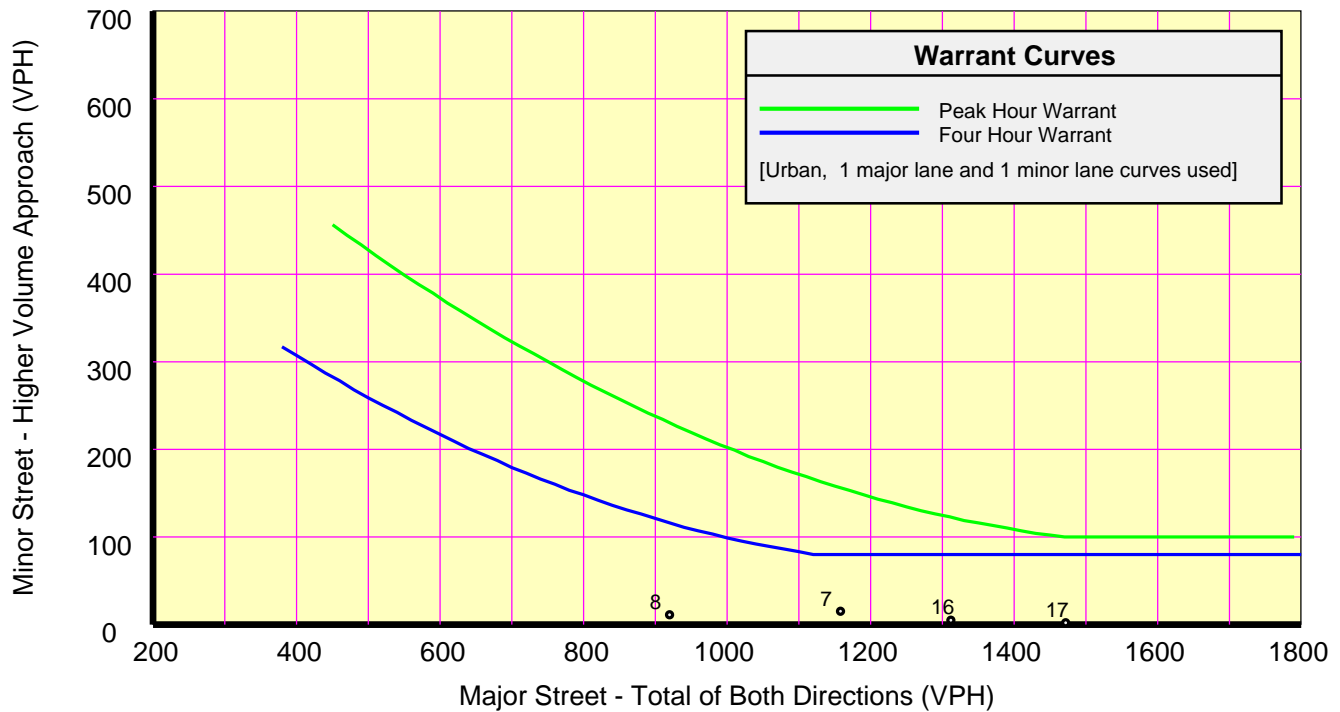
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Not Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> .....	<b>Not Satisfied</b>
Required volumes reached for 0 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Not Satisfied</b>
Number of hours (0) volumes exceed minimum < minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Not Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> .....	<b>Not Satisfied</b>
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> .....	<b>Not Satisfied</b>
Volumes do not exceed minimums for any hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,158	15	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	920	11	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,312	5	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,472	2	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

#### **Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,398

#### **Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,474

### Minor Street Approaches

#### **Northbound:**

Number of Lanes: 1

Total Approach Volume: 0

#### **Southbound: Skyline Drive**

Number of Lanes: 1

Total Approach Volume: 35

---

### Warrant Summary (Urban values apply.)

**Warrant 1 - Eight Hour Vehicular Volumes** ..... **Not Satisfied**

**Warrant 1A - Minimum Vehicular Volume** ..... **Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic** ..... **Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants** ..... **Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes** ..... **Not Satisfied**

Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour** ..... **Not Satisfied**

**Warrant 3A - Peak Hour Delay** ..... **Not Satisfied**

Total approach volumes and delays on minor street do not exceed minimums for any hour.

**Warrant 3B - Peak Hour Volumes** ..... **Not Satisfied**

Volumes do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes** ..... **Not Evaluated**

**Warrant 5 - School Crossing** ..... **Not Evaluated**

**Warrant 6 - Coordinated Signal System** ..... **Not Evaluated**

**Warrant 7 - Crash Experience** ..... **Not Evaluated**

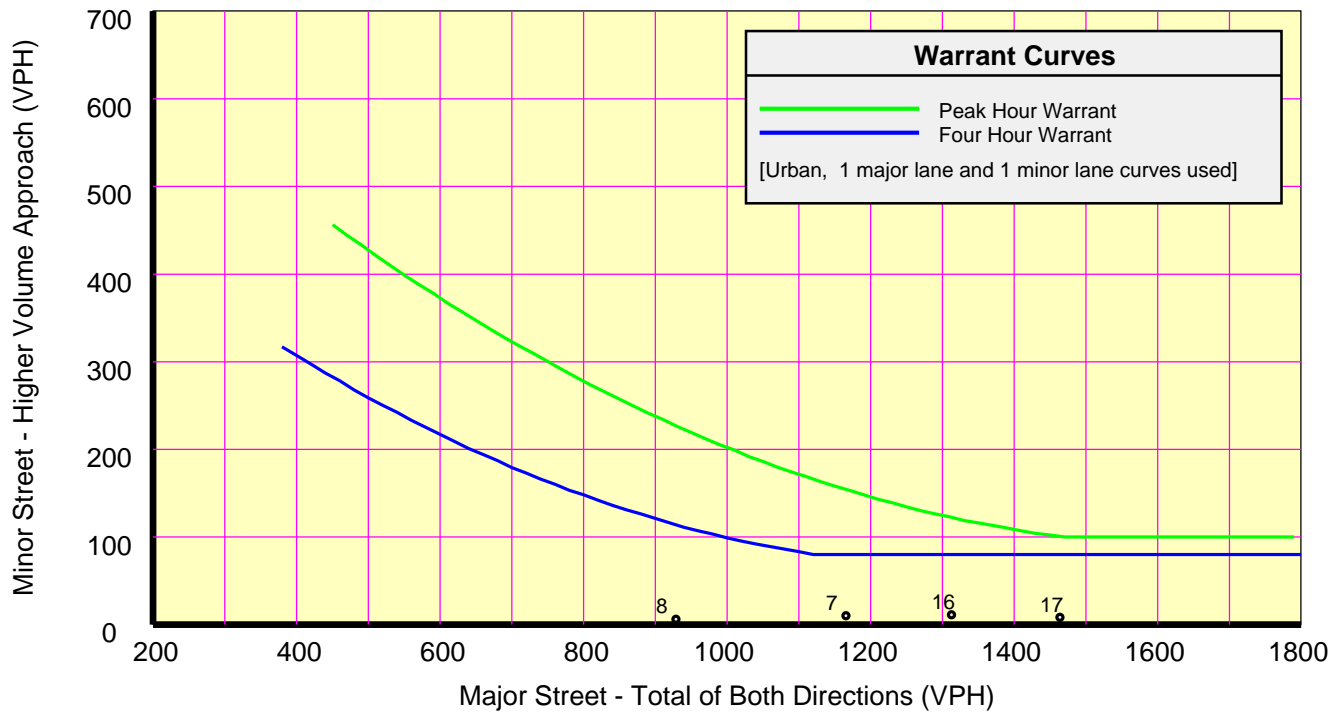
**Warrant 8 - Roadway Network** ..... **Not Evaluated**

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,166	10	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	929	6	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,313	11	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,464	8	SB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 2,420

**Westbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 2,515

### Minor Street Approaches

**Northbound: Mill Road**

Number of Lanes: 1

Total Approach Volume: 149

**Southbound:**

Number of Lanes: 1

Total Approach Volume: 0

---

### Warrant Summary (Urban values apply.)

**Warrant 1 - Eight Hour Vehicular Volumes ..... Not Satisfied**

**Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants ..... Not Satisfied**

Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes ..... Not Satisfied**

Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour ..... Not Satisfied**

**Warrant 3A - Peak Hour Delay ..... Not Satisfied**

Total approach volumes and delays on minor street do not exceed minimums for any hour.

**Warrant 3B - Peak Hour Volumes ..... Not Satisfied**

Volumes do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes ..... Not Evaluated**

**Warrant 5 - School Crossing ..... Not Evaluated**

**Warrant 6 - Coordinated Signal System ..... Not Evaluated**

**Warrant 7 - Crash Experience ..... Not Evaluated**

**Warrant 8 - Roadway Network ..... Not Evaluated**

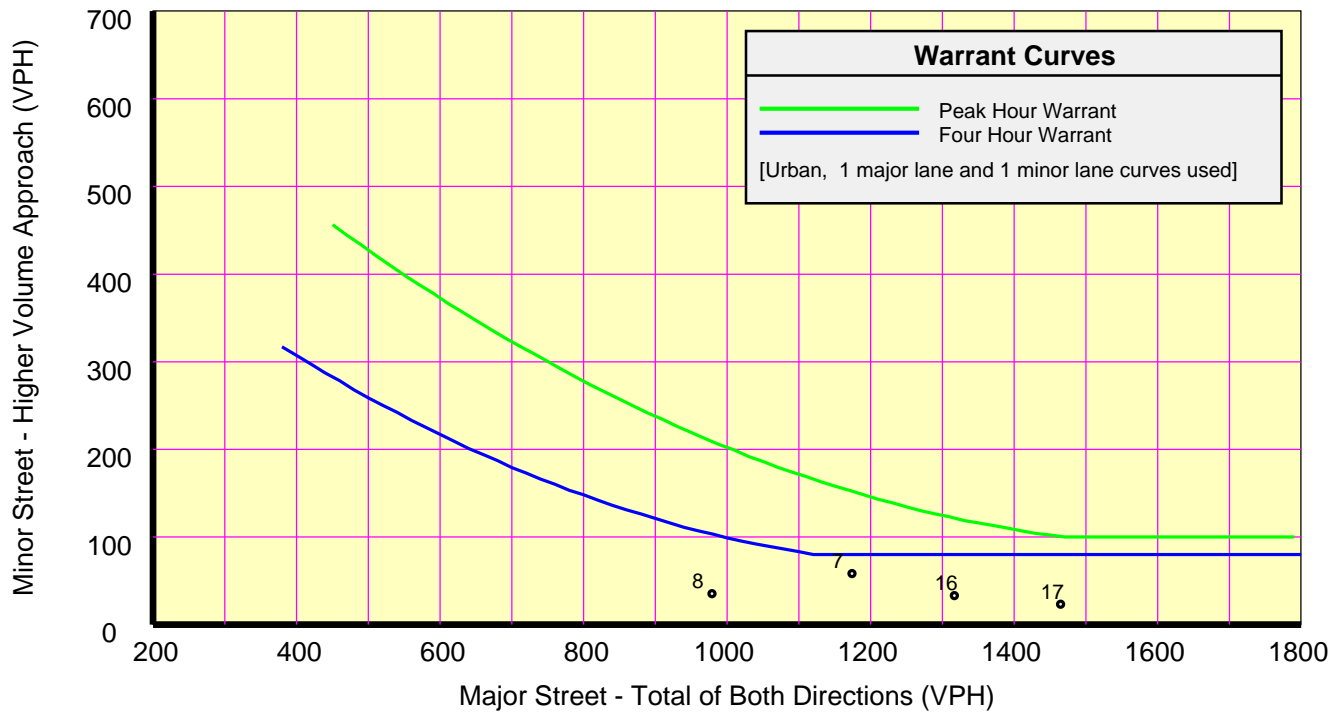


# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor		War-1A			War-1B			War-1A&B		
		Vol	Dir	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,174	58	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
08:00	979	35	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
09:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
10:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
11:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
12:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
13:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
14:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
15:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
16:00	1,317	33	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
17:00	1,465	23	NB	500-Yes	150-No	Major	750-Yes	75-No	Major	600-Yes	120-No	Major
18:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
19:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 5,210

**Westbound: Wallings Road**

Number of Lanes: 1  
Approach Speed: 35  
Total Approach Volume: 2,764

### Minor Street Approaches

**Northbound:**

Number of Lanes: 1  
  
Total Approach Volume: 0

**Southbound: I-77 SB Exit Ramp**

Number of Lanes: 1  
  
Total Approach Volume: 6,184

---

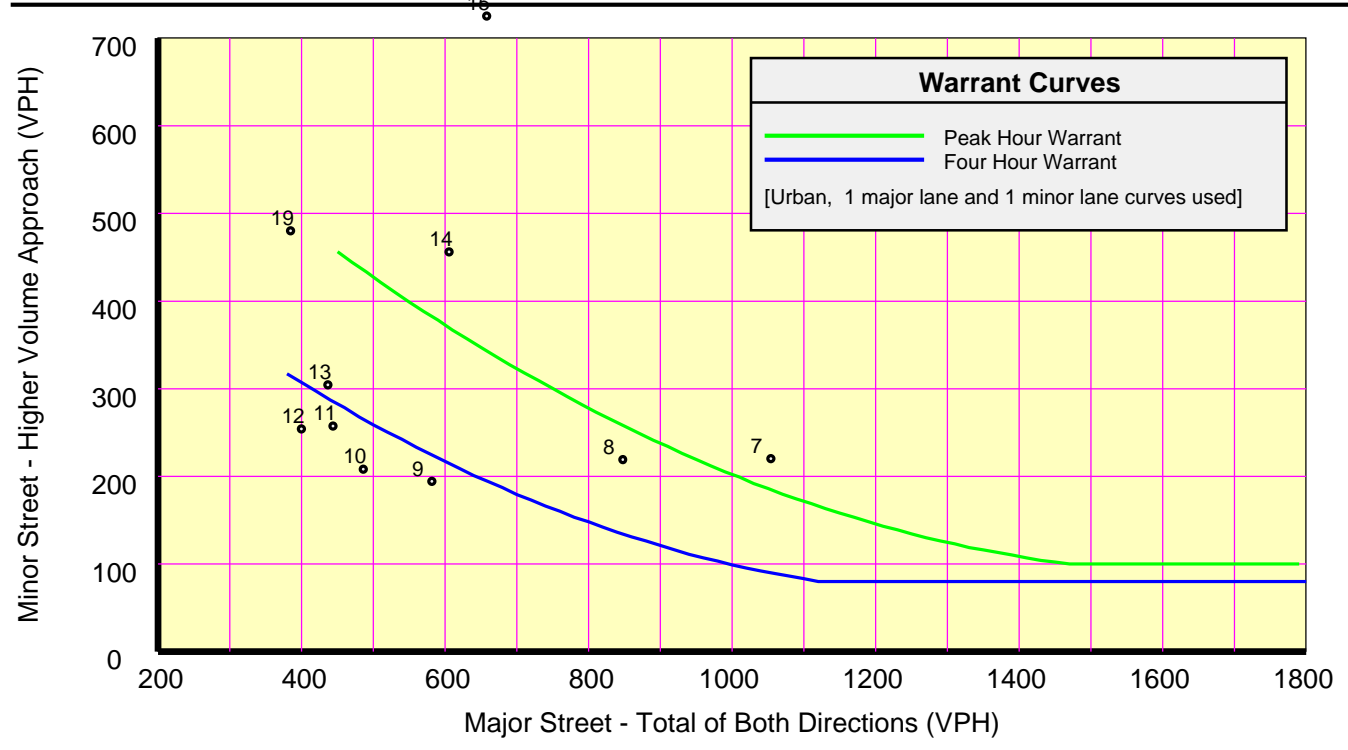
### Warrant Summary (Urban values apply.)

<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> ..... <b>Satisfied</b>	
Required volumes reached for 8 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> ..... <b>Not Satisfied</b>	
Required volumes reached for 2 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> ..... <b>Not Satisfied</b>	
Required volumes reached for 7 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Satisfied</b>
Number of hours (9) volumes exceed minimum >= minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> ..... <b>Not Satisfied</b>	
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> ..... <b>Satisfied</b>	
Volumes exceed minimums for at least one hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311  
(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

Hour Begin	Major Total	Higher Minor Vol	Dir	War-1A			War-1B			War-1A&B		
				Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,054	220	SB	500-Yes	150-Yes	Both	750-Yes	75-Yes	Both	600-Yes	120-Yes	Both
08:00	848	219	SB	500-Yes	150-Yes	Both	750-Yes	75-Yes	Both	600-Yes	120-Yes	Both
09:00	582	194	SB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-No	120-Yes	Minor
10:00	486	208	SB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
11:00	444	257	SB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
12:00	400	254	SB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
13:00	437	304	SB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
14:00	606	456	SB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
15:00	658	725	SB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
16:00	719	986	SB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
17:00	742	1,057	SB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
18:00	613	824	SB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
19:00	385	480	SB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary

---

### Major Street Approaches

**Eastbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 6,100

**Westbound: Wallings Road**

Number of Lanes: 1

Approach Speed: 35

Total Approach Volume: 2,269

### Minor Street Approaches

**Northbound: I-77 NB Exit Ramp / Mill Road**

Number of Lanes: 1

Total Approach Volume: 2,988

**Southbound:**

Number of Lanes: 1

Total Approach Volume: 0

---

### Warrant Summary (Urban values apply.)

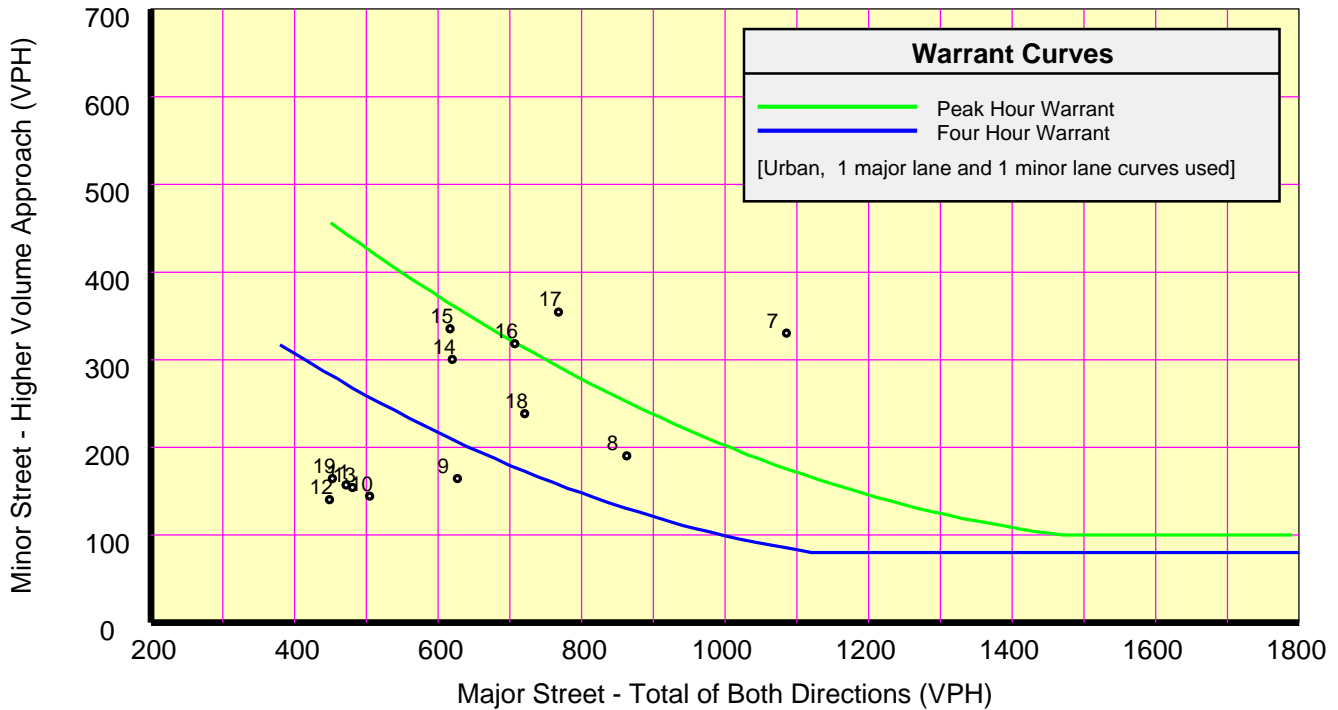
<b>Warrant 1 - Eight Hour Vehicular Volumes</b> .....	<b>Satisfied</b>
<b>Warrant 1A - Minimum Vehicular Volume</b> ..... <b>Satisfied</b>	
Required volumes reached for 8 hours, 8 are needed	
<b>Warrant 1B - Interruption of Continuous Traffic</b> ..... <b>Not Satisfied</b>	
Required volumes reached for 3 hours, 8 are needed	
<b>Warrant 1 A&amp;B - Combination of Warrants</b> ..... <b>Satisfied</b>	
Required volumes reached for 8 hours, 8 are needed	
<b>Warrant 2 - Four Hour Volumes</b> .....	<b>Satisfied</b>
Number of hours (7) volumes exceed minimum >= minimum required (4).	
<b>Warrant 3 - Peak Hour</b> .....	<b>Satisfied</b>
<b>Warrant 3A - Peak Hour Delay</b> ..... <b>Not Satisfied</b>	
Total approach volumes and delays on minor street do not exceed minimums for any hour.	
<b>Warrant 3B - Peak Hour Volumes</b> ..... <b>Satisfied</b>	
Volumes exceed minimums for at least one hour.	
<b>Warrant 4 - Pedestrian Volumes</b> .....	<b>Not Evaluated</b>
<b>Warrant 5 - School Crossing</b> .....	<b>Not Evaluated</b>
<b>Warrant 6 - Coordinated Signal System</b> .....	<b>Not Evaluated</b>
<b>Warrant 7 - Crash Experience</b> .....	<b>Not Evaluated</b>
<b>Warrant 8 - Roadway Network</b> .....	<b>Not Evaluated</b>

# GPD Group

520 South Main Street, Suite 2531, Akron, Ohio 44311

(330) 572-2100

## Signal Warrants - Summary



### Analysis of 8-Hour Volume Warrants:

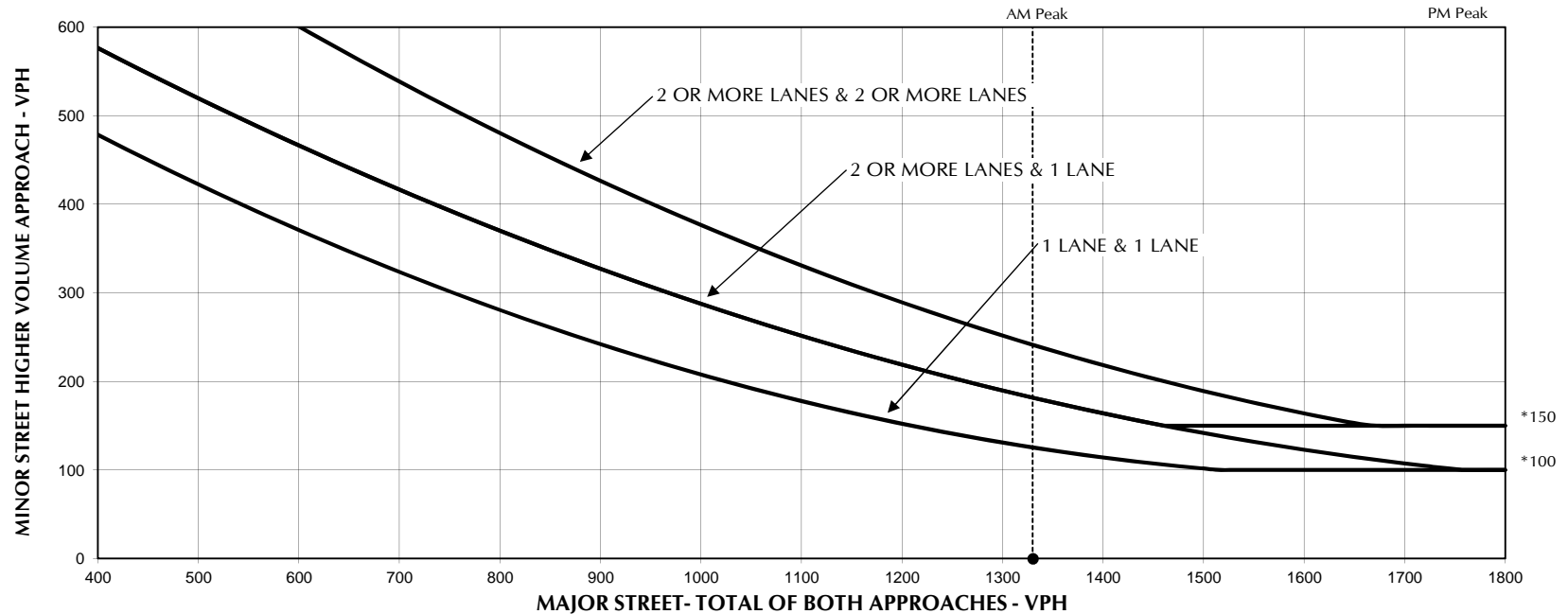
Hour Begin	Major Total	Higher Minor Vol	Dir	War-1A			War-1B			War-1A&B		
				Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?	Major Crit	Minor Crit	Meets?
00:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
01:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
02:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
03:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
04:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
05:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
06:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
07:00	1,086	330	NB	500-Yes	150-Yes	Both	750-Yes	75-Yes	Both	600-Yes	120-Yes	Both
08:00	863	190	NB	500-Yes	150-Yes	Both	750-Yes	75-Yes	Both	600-Yes	120-Yes	Both
09:00	627	164	NB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
10:00	505	144	NB	500-Yes	150-No	Major	750-No	75-Yes	Minor	600-No	120-Yes	Minor
11:00	472	157	NB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
12:00	449	140	NB	500-No	150-No	---	750-No	75-Yes	Minor	600-No	120-Yes	Minor
13:00	481	154	NB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
14:00	620	300	NB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
15:00	617	335	NB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
16:00	707	318	NB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
17:00	768	354	NB	500-Yes	150-Yes	Both	750-Yes	75-Yes	Both	600-Yes	120-Yes	Both
18:00	721	238	NB	500-Yes	150-Yes	Both	750-No	75-Yes	Minor	600-Yes	120-Yes	Both
19:00	453	164	NB	500-No	150-Yes	Minor	750-No	75-Yes	Minor	600-No	120-Yes	Minor
20:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
21:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
22:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---
23:00	0	0	NB	500-No	150-No	---	750-No	75-No	---	600-No	120-No	---

OPENING YEAR 2020 'BUILD' CONDITIONS



### Broadview Road / Wallings Road Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Broadview Road	2
Minor Road	Wallings Road	2

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1330
Minor Street - Higher Volume Approach =	950
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1810
Minor Street - Higher Volume Approach =	1260

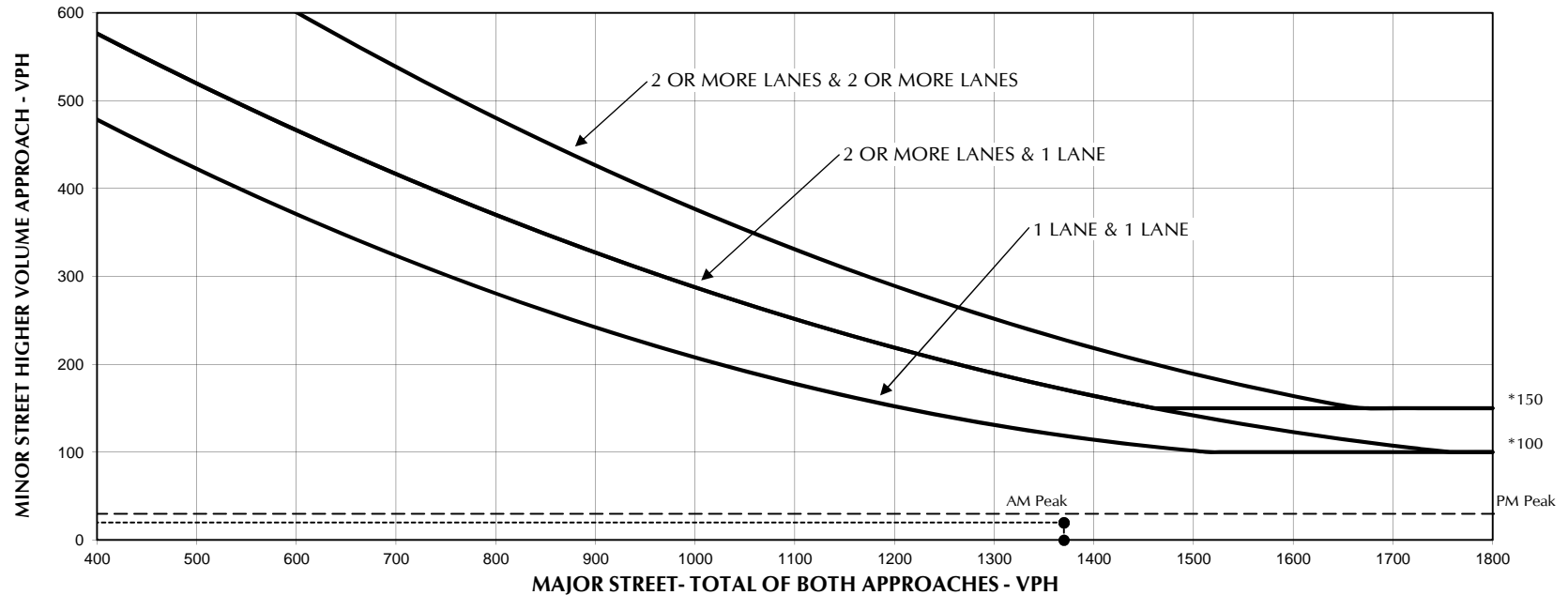
Warrant #3 Met?	Yes
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### Wallings Road / Elmhurst Drive Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Elmhurst Drive	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

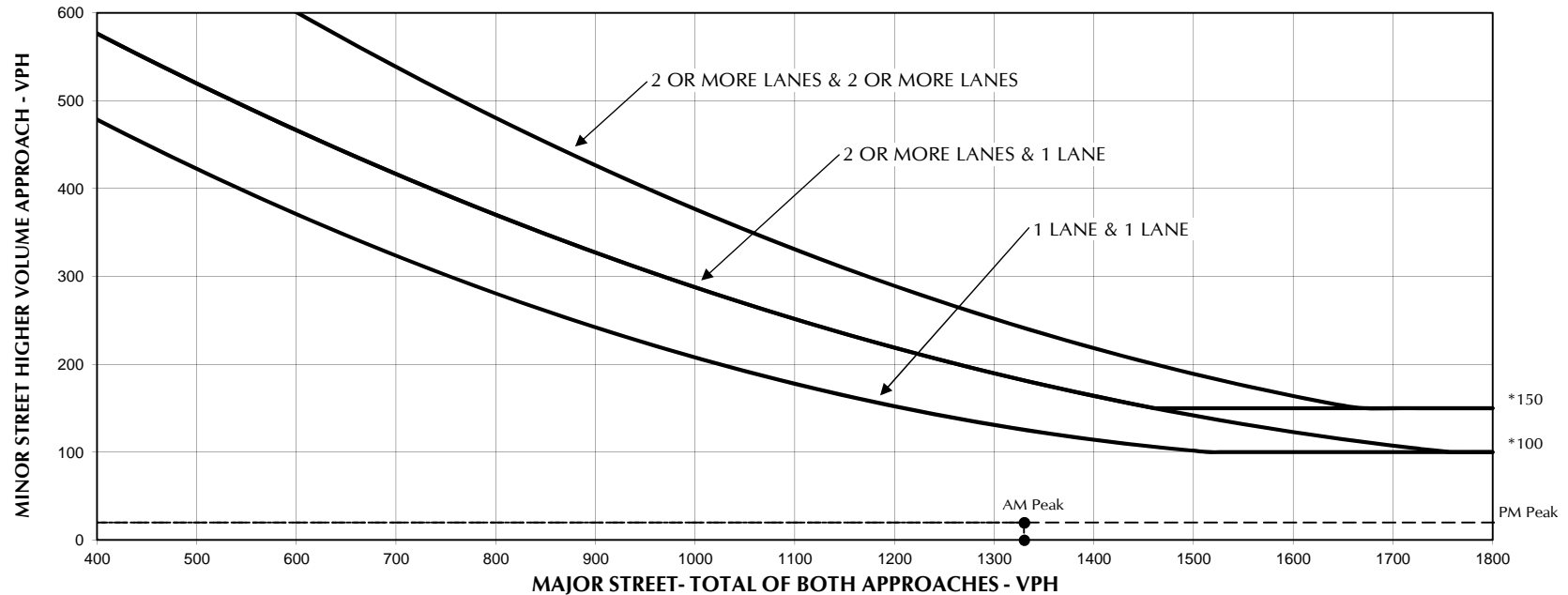
AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1370
Minor Street - Higher Volume Approach =	20
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1840
Minor Street - Higher Volume Approach =	30

Warrant #3 Met?	<b>No</b>
-----------------	-----------



### Wallings Road / Longview Road Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Longview Road	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1330
Minor Street - Higher Volume Approach =	20
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1840
Minor Street - Higher Volume Approach =	20

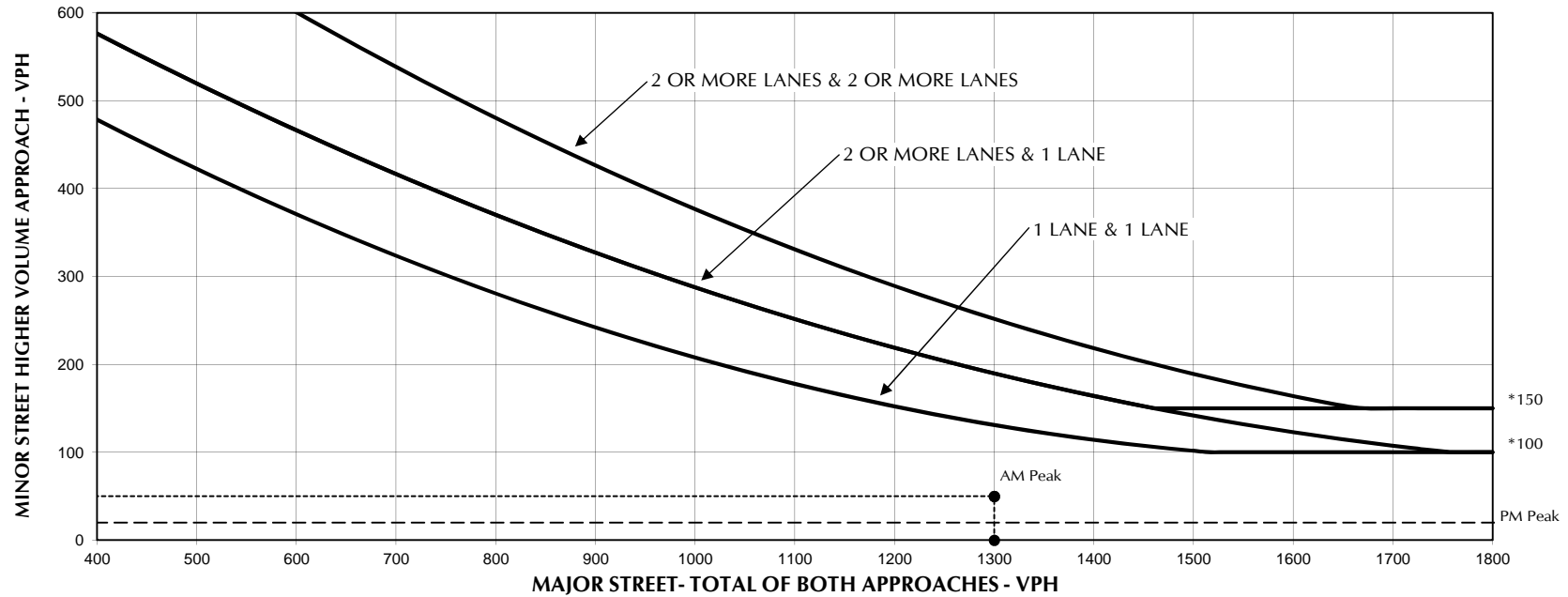
Warrant #3 Met?	<b>No</b>
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### Wallings Road / Chestnut Boulevard Intersection

**FIGURE 4C-3. Warrant 3, Peak Hour**



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Chestnut Boulevard	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

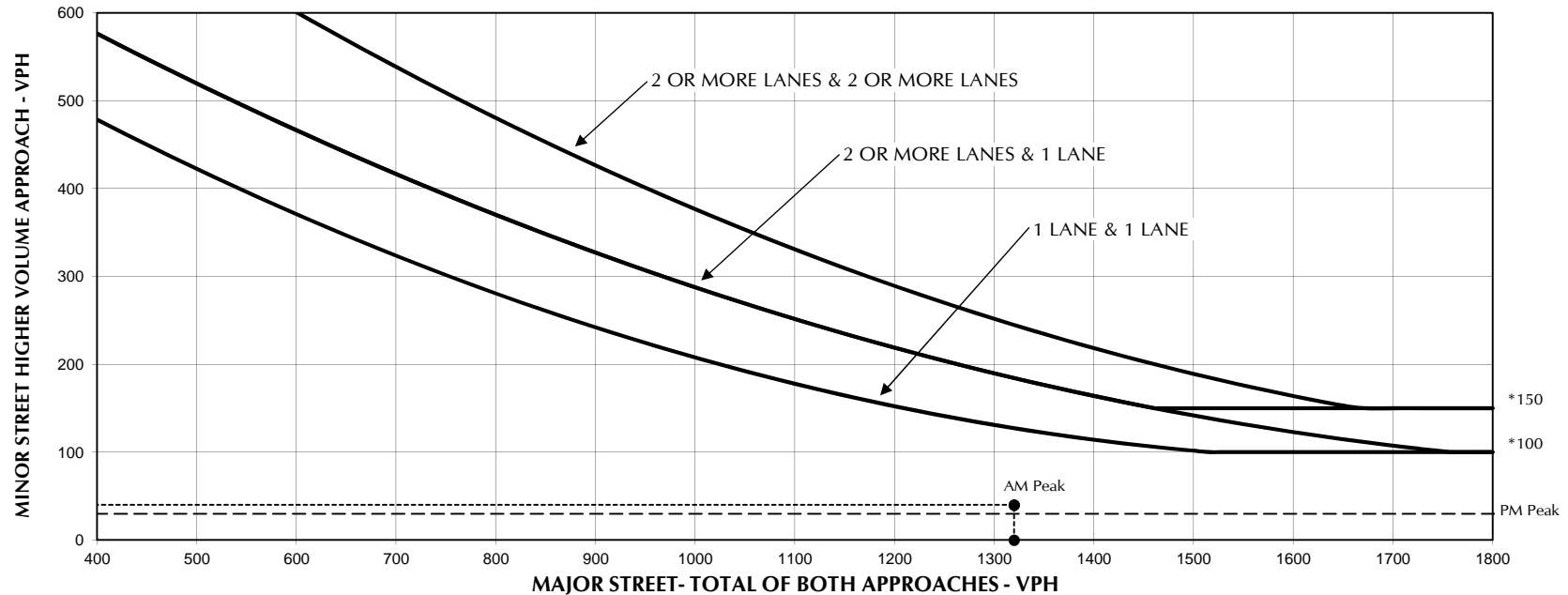
AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1300
Minor Street - Higher Volume Approach =	50
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1870
Minor Street - Higher Volume Approach =	20

Warrant #3 Met?	<b>No</b>
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### Wallings Road / Overlook Avenue Intersection

**FIGURE 4C-3. Warrant 3, Peak Hour**



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Overlook Avenue	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1320
Minor Street - Higher Volume Approach =	40
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1870
Minor Street - Higher Volume Approach =	30

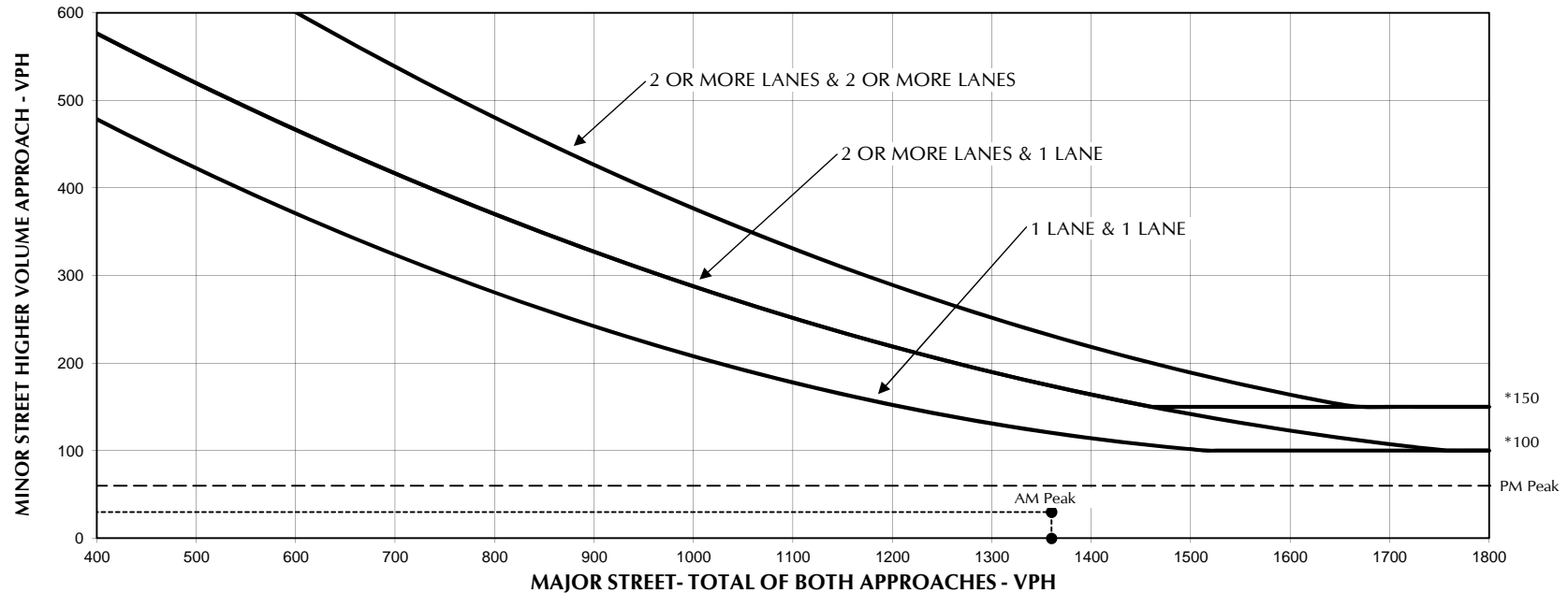
Warrant #3 Met?	<b>No</b>
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### Wallings Road / McCreary Road Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	McCreary Road	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1360
Minor Street - Higher Volume Approach =	30
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1900
Minor Street - Higher Volume Approach =	60

Warrant #3 Met?	<b>No</b>
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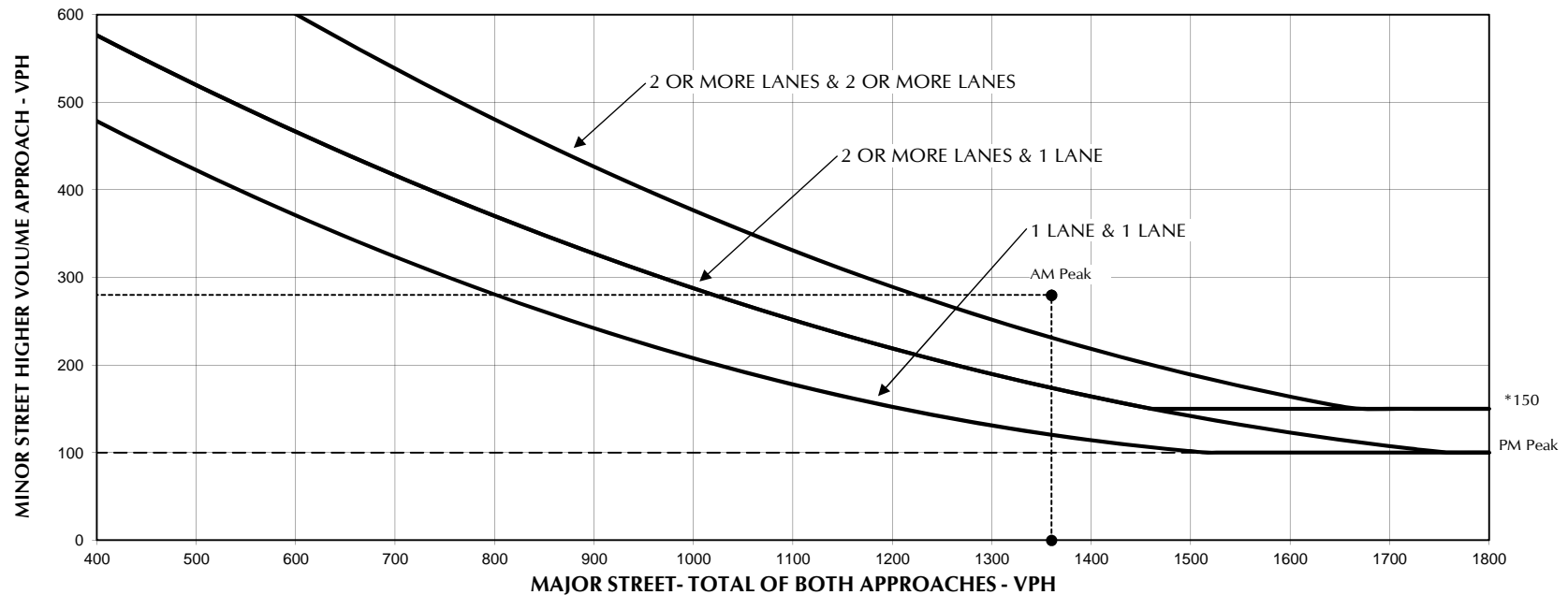


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### Wallings Road / Wyatt Road Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Wyatt Road	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1360
Minor Street - Higher Volume Approach =	280
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2060
Minor Street - Higher Volume Approach =	100

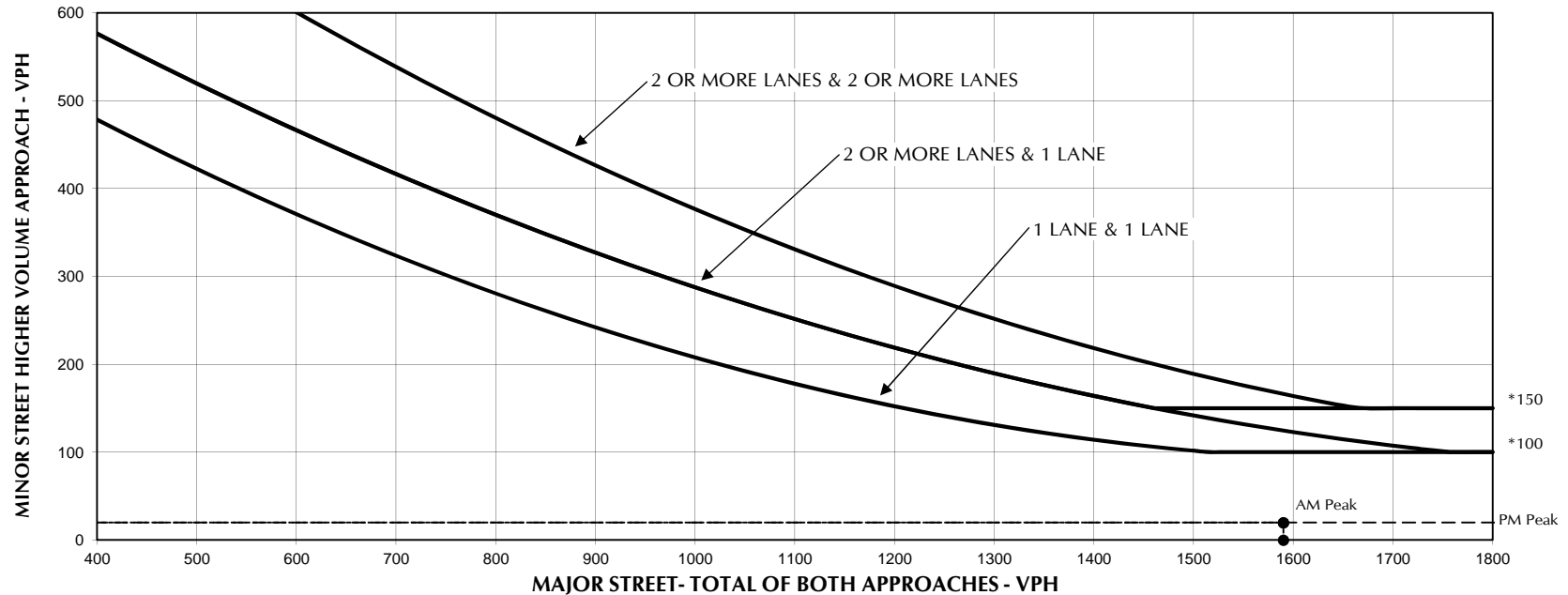
Warrant #3 Met?	Yes
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### Wallings Road / Majestic Oaks Trail Intersection

**FIGURE 4C-3. Warrant 3, Peak Hour**



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Majestic Oaks Trail	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

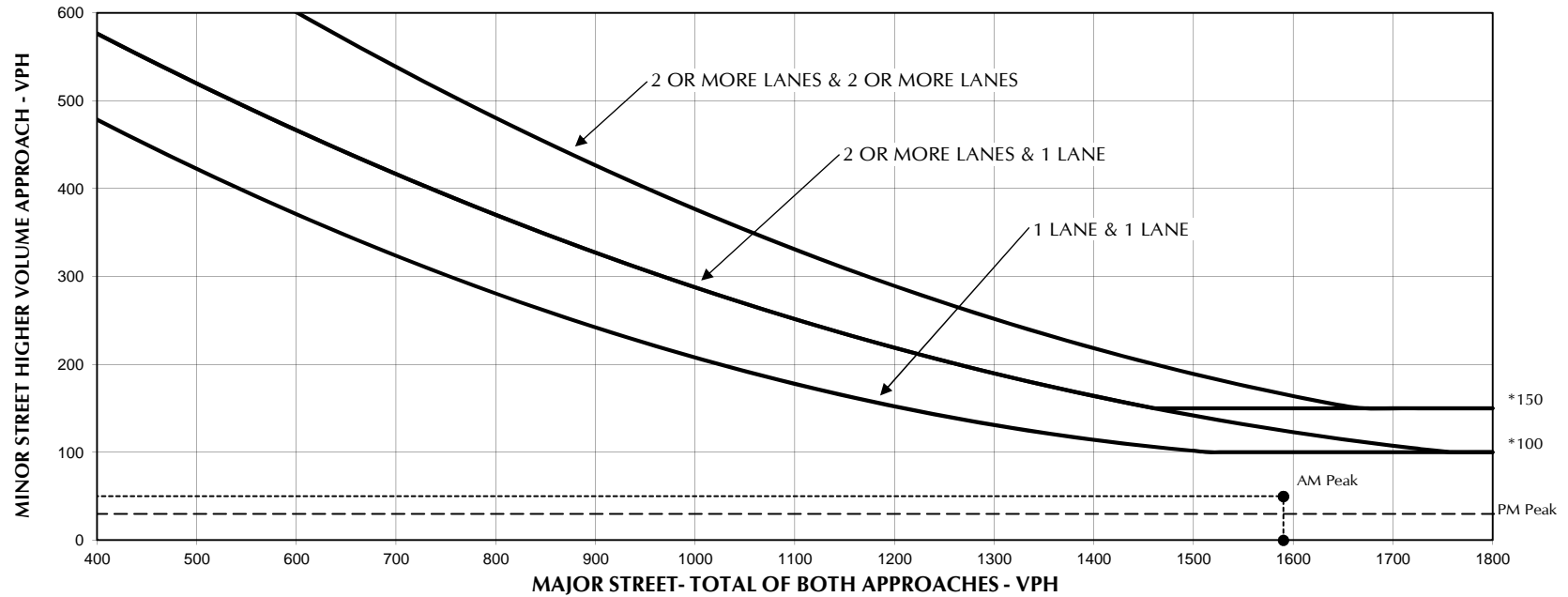
AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1590
Minor Street - Higher Volume Approach =	20
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2040
Minor Street - Higher Volume Approach =	20

Warrant #3 Met?	<b>No</b>
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### Wallings Road / Creekside Trace Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Creekside Trace	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1590
Minor Street - Higher Volume Approach =	50
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2030
Minor Street - Higher Volume Approach =	30

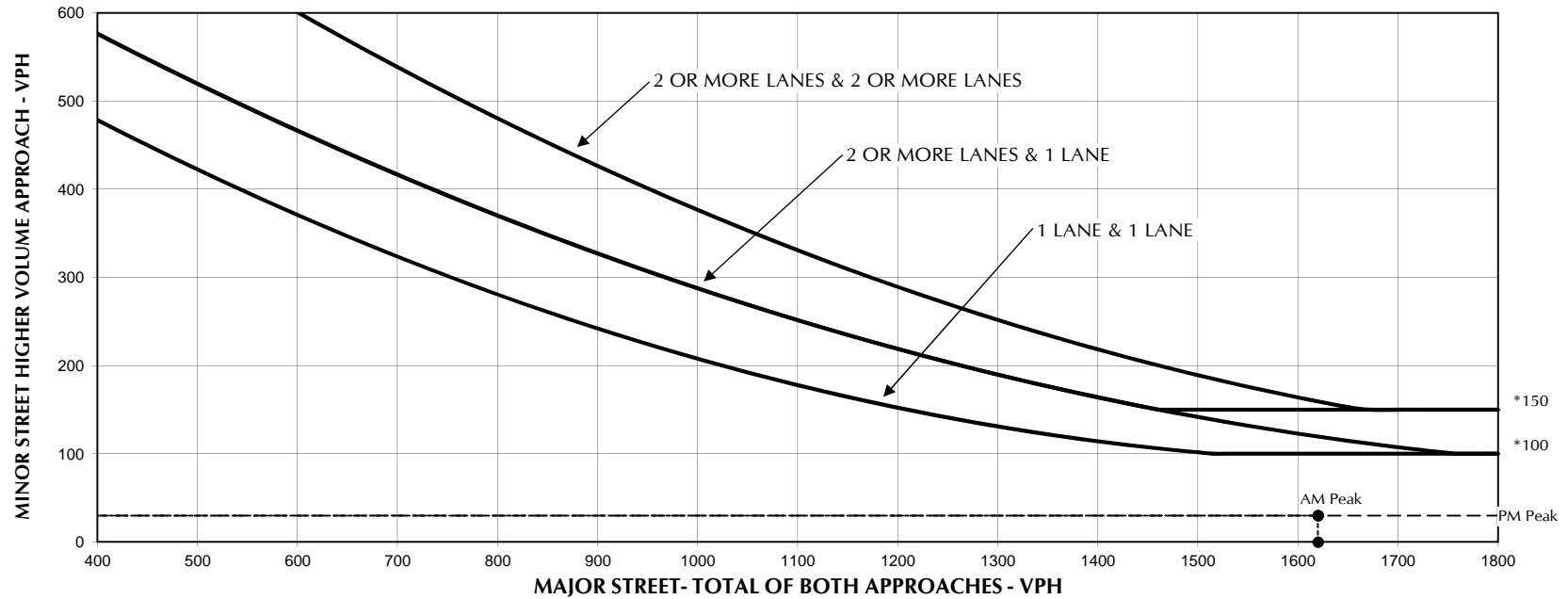
Warrant #3 Met?	<b>No</b>
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### Wallings Road / Joyce Road Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Joyce Road	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1620
Minor Street - Higher Volume Approach =	30
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2030
Minor Street - Higher Volume Approach =	30

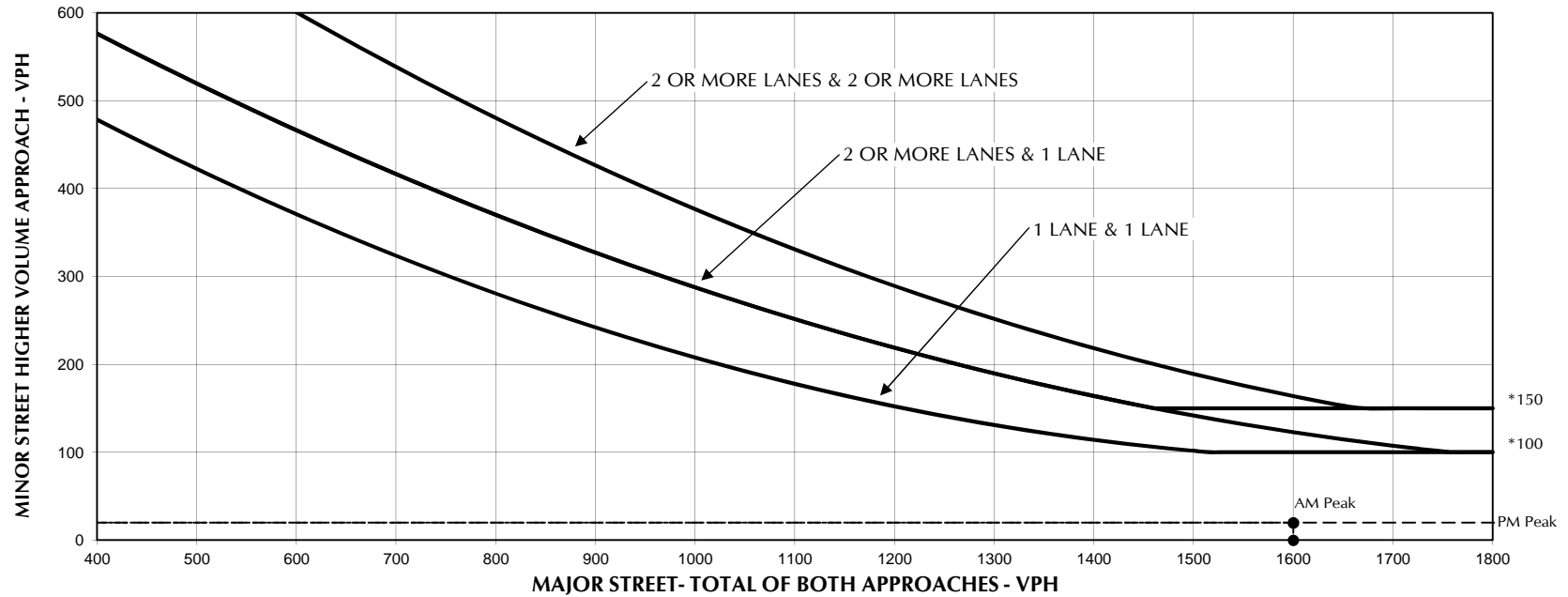
Warrant #3 Met?	<b>No</b>
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### Wallings Road / Marianna Boulevard Intersection

**FIGURE 4C-3. Warrant 3, Peak Hour**



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Marianna Boulevard	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1600
Minor Street - Higher Volume Approach =	20
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2030
Minor Street - Higher Volume Approach =	20

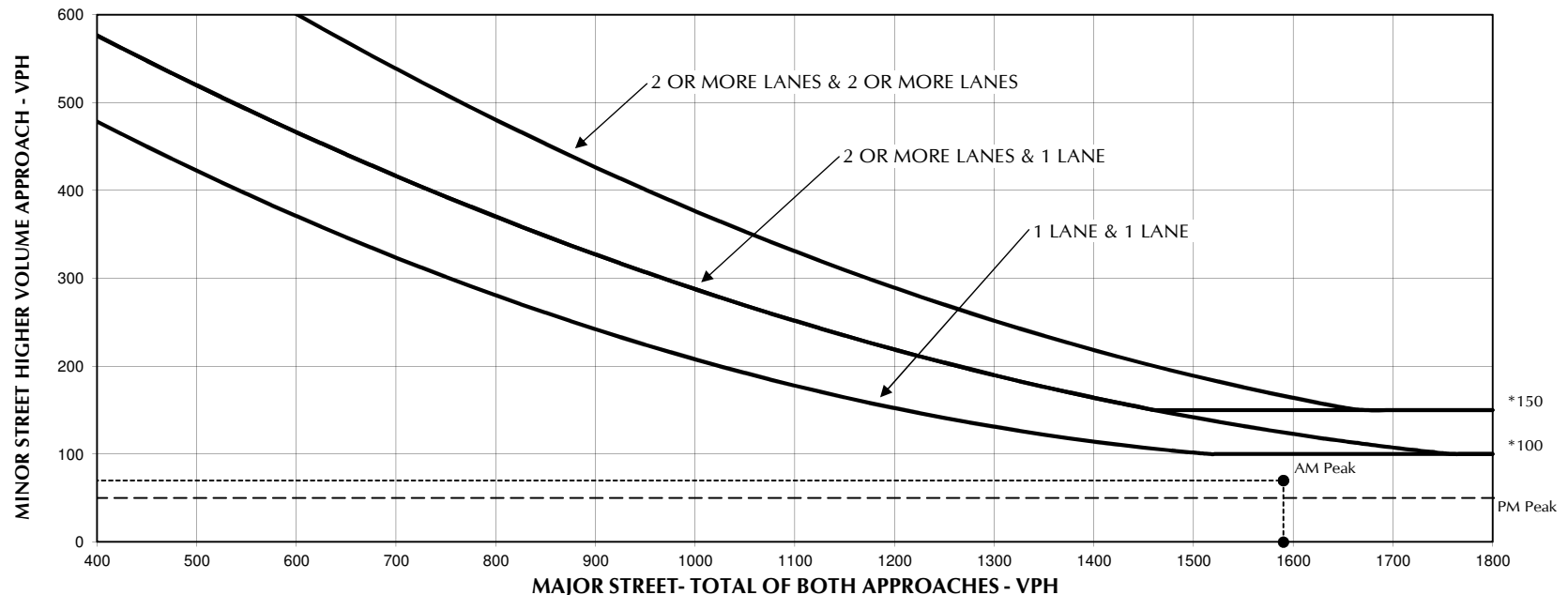
Warrant #3 Met?	<b>No</b>
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### Wallings Road / Wright Road Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Wright Road	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1590
Minor Street - Higher Volume Approach =	70
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2040
Minor Street - Higher Volume Approach =	50

Warrant #3 Met?	<b>No</b>
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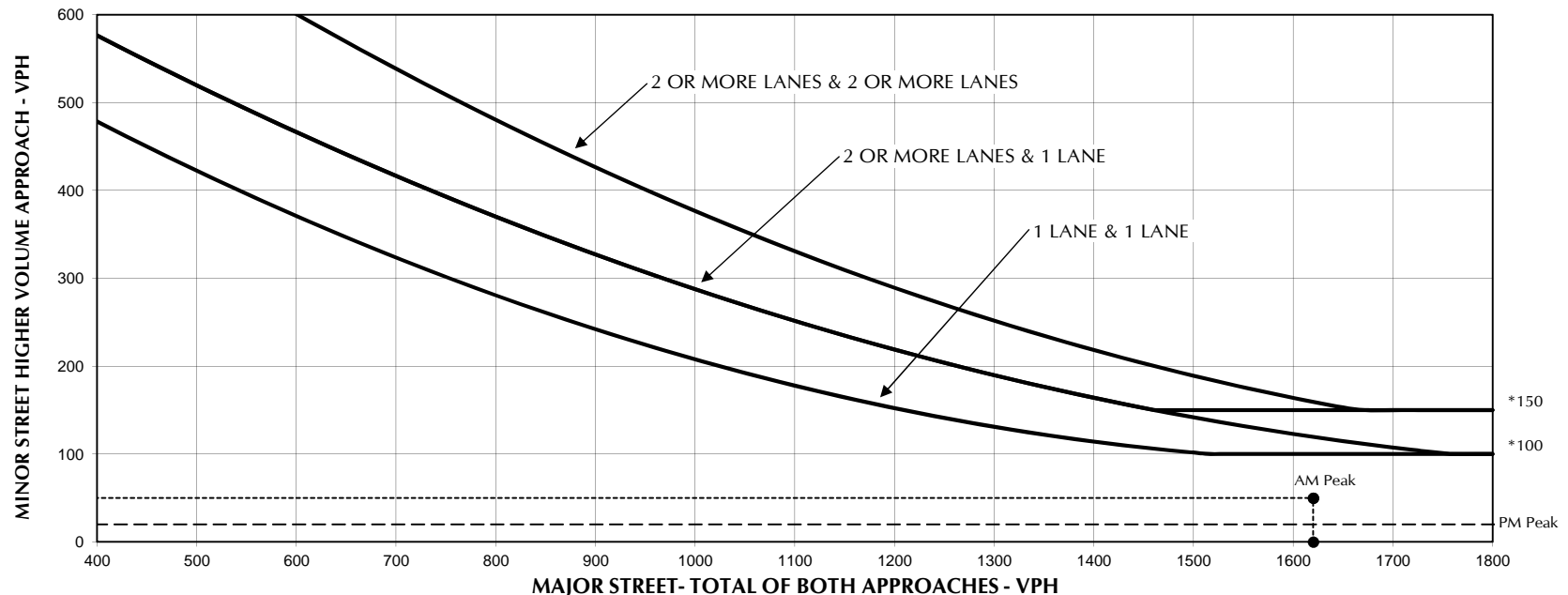


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### Wallings Road / Craig Lane Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Craig Lane	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1620
Minor Street - Higher Volume Approach =	50
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2050
Minor Street - Higher Volume Approach =	20

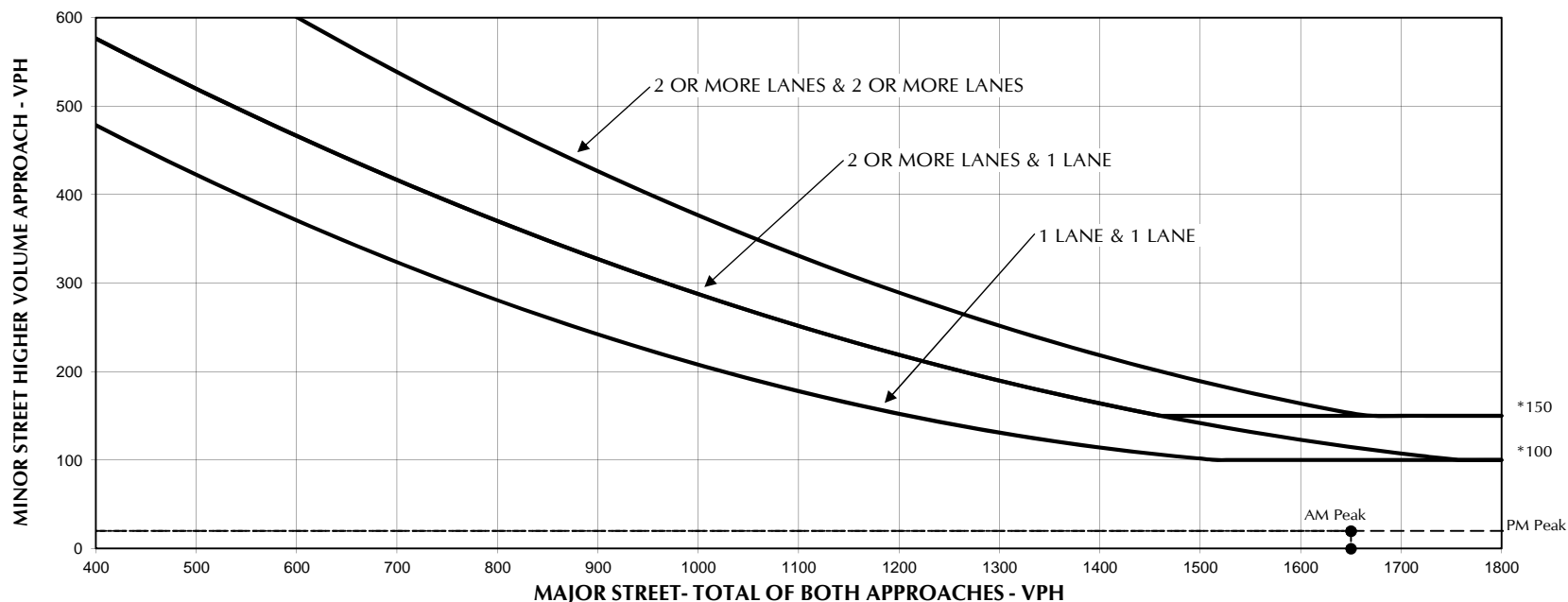
Warrant #3 Met?	<b>No</b>
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### Wallings Road / Skyline Drive Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	Skyline Drive	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1650
Minor Street - Higher Volume Approach =	20
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2050
Minor Street - Higher Volume Approach =	20

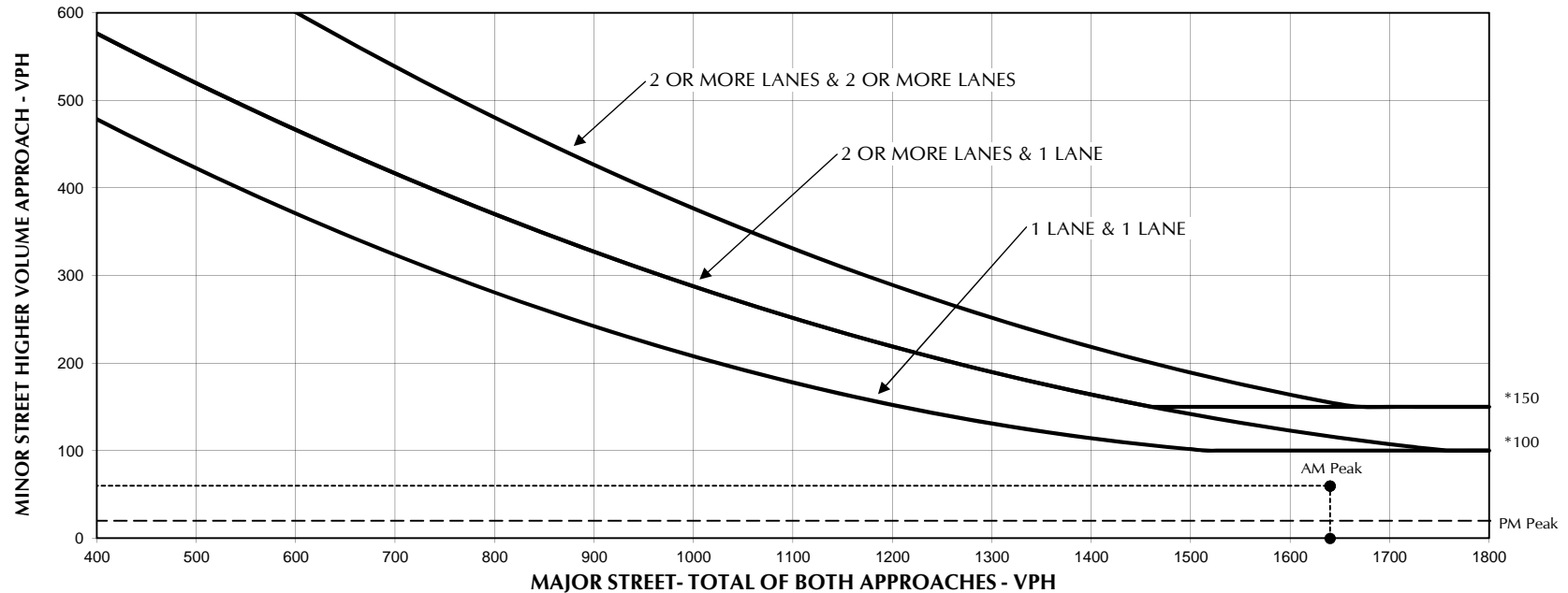
Warrant #3 Met?	<b>No</b>
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### Wallings Road / West Mill Road Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	West Mill Road	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1640
Minor Street - Higher Volume Approach =	60
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	2050
Minor Street - Higher Volume Approach =	20

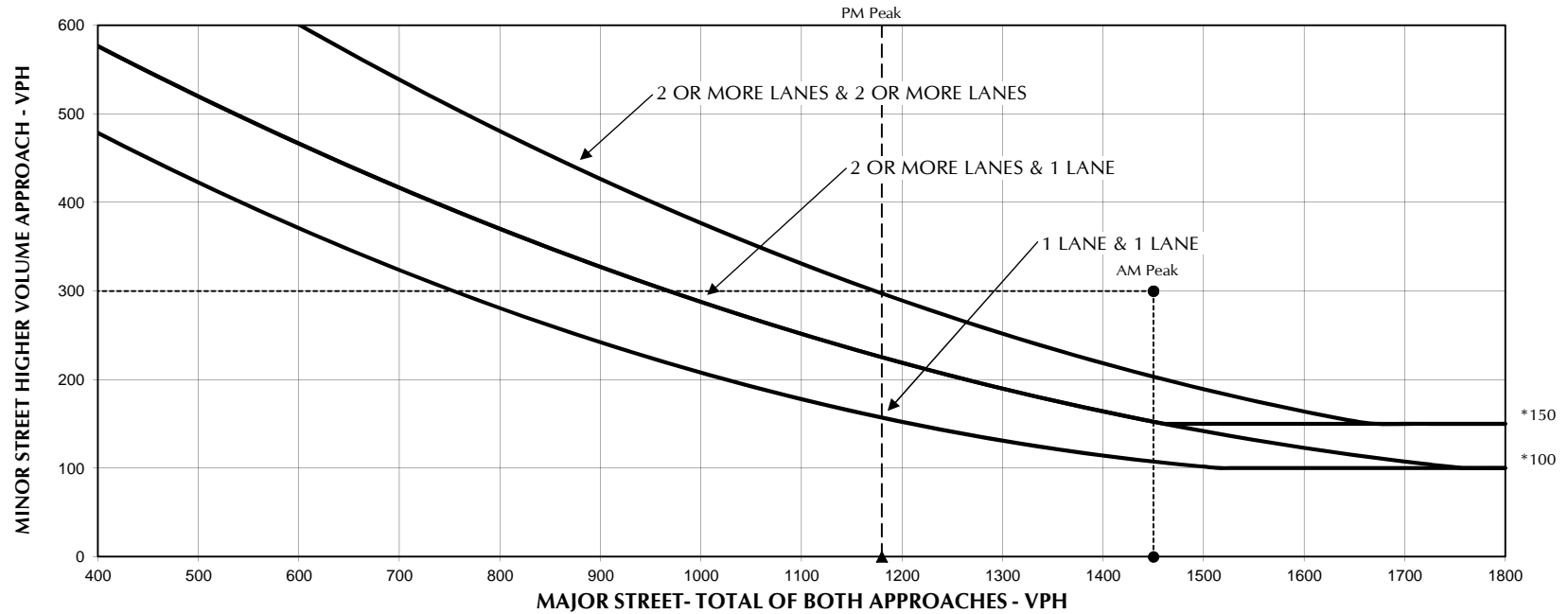
Warrant #3 Met?	<b>No</b>
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### Wallings Road / I-77 SB Ramps Intersection

FIGURE 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	I-77 SB Ramps	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1450
Minor Street - Higher Volume Approach =	300
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1180
Minor Street - Higher Volume Approach =	1210

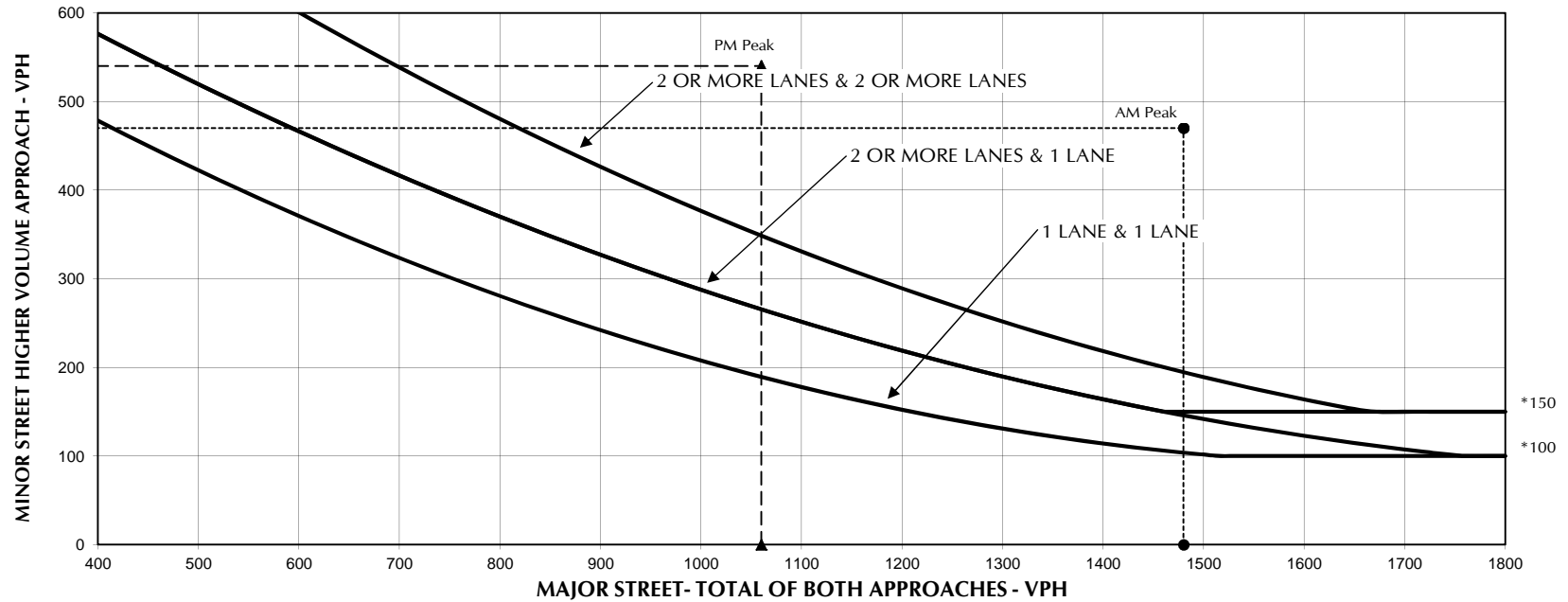
Warrant #3 Met?	Yes
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### Wallings Road / I-77 NB Ramps Intersection

**FIGURE 4C-3. Warrant 3, Peak Hour**



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies a the lower threshold volume for a minor-street with one lane.

Roadway		Lanes
Major Road	Wallings Road	2
Minor Road	I-77 NB Ramps	1

Traffic Volume Scenario:
Opening Year 2020 Conditions

AM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1480
Minor Street - Higher Volume Approach =	470
Midday Peak Hour Volumes	
Major Street - Total of Both Approaches =	N/A
Minor Street - Higher Volume Approach =	N/A
PM Peak Hour Volumes	
Major Street - Total of Both Approaches =	1060
Minor Street - Higher Volume Approach =	540

Warrant #3 Met?	<b>Yes</b>
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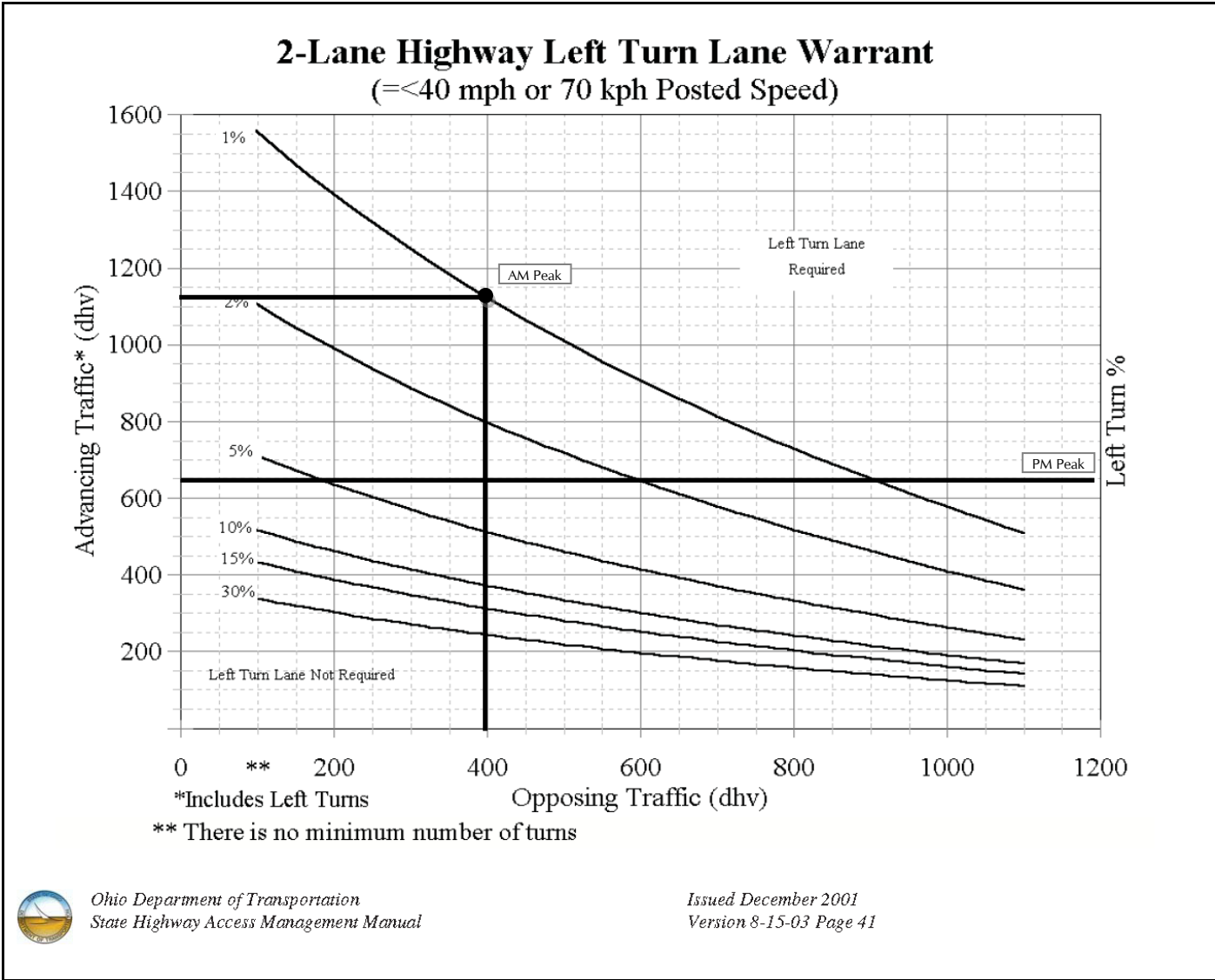
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**APPENDIX K**  
**AUXILIARY TURN LANE WARRANT ANALYSIS**



DESIGN YEAR 2040 'BUILD' CONDITIONS

Wallings Road / Elmhurst Drive Intersection  
Eastbound Left Turn



Design Year 2040 'Build' Conditions

AM Peak Hour:  
 Advancing Traffic = 1120 Veh  
 Left Turn Traffic = 60 Veh  
 Opposing Traffic = 400 Veh  
 Left Turn % = 5.4%

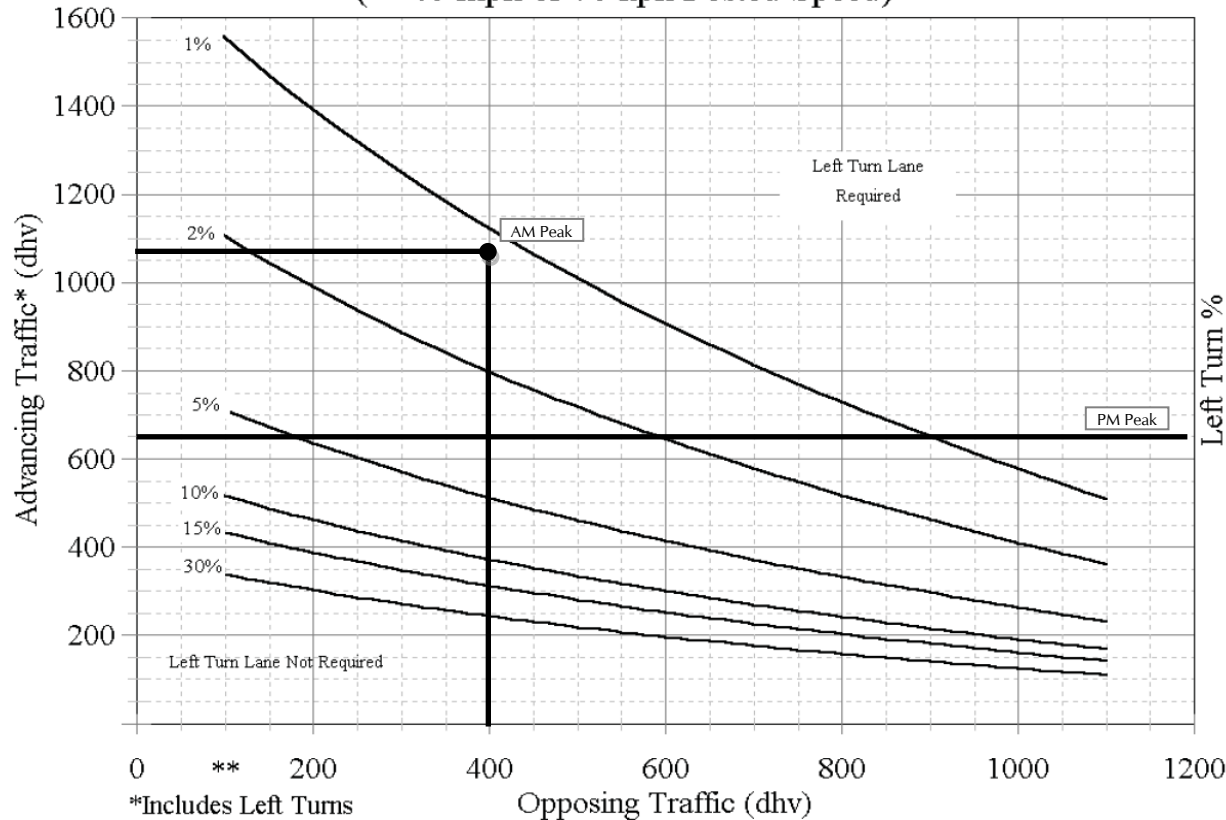
PM Peak Hour:  
 Advancing Traffic = 650 Veh  
 Left Turn Traffic = 10 Veh  
 Opposing Traffic = 1370 Veh  
 Left Turn % = 1.5%

Turn Lane Warranted



Wallings Road / Longview Road Intersection  
Eastbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1070 Veh  
Left Turn Traffic = 30 Veh  
Opposing Traffic = 400 Veh  
Left Turn % = 2.8%

PM Peak Hour:

Advancing Traffic = 650 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1370 Veh  
Left Turn % = 1.5%

Turn Lane Warranted



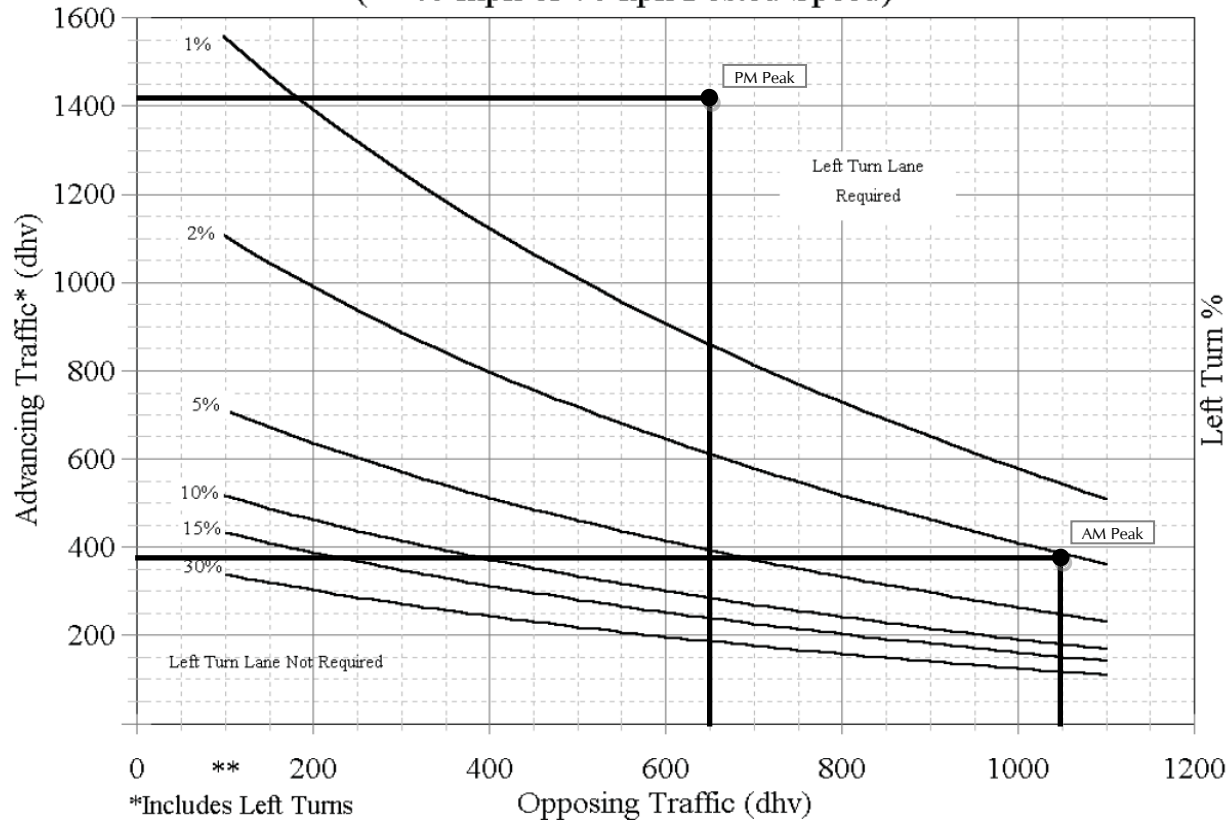
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Wallings Road / Chestnut Boulevard Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 390 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1050 Veh  
Left Turn % = 2.6%

PM Peak Hour:

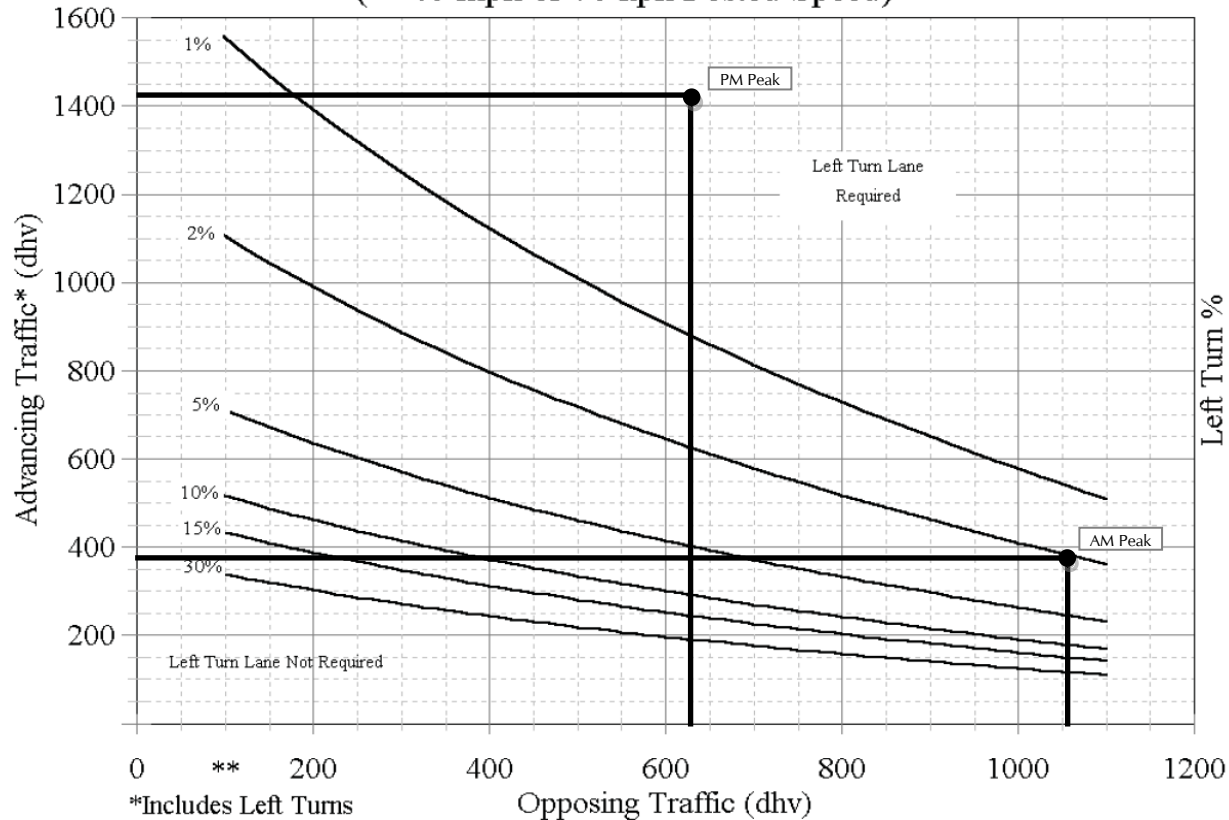
Advancing Traffic = 1410 Veh  
Left Turn Traffic = 50 Veh  
Opposing Traffic = 650 Veh  
Left Turn % = 3.5%

Turn Lane Warranted



Wallings Road / Overlook Avenue Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 390 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1070 Veh  
Left Turn % = 2.6%

PM Peak Hour:

Advancing Traffic = 1430 Veh  
Left Turn Traffic = 30 Veh  
Opposing Traffic = 630 Veh  
Left Turn % = 2.1%

Turn Lane Warranted



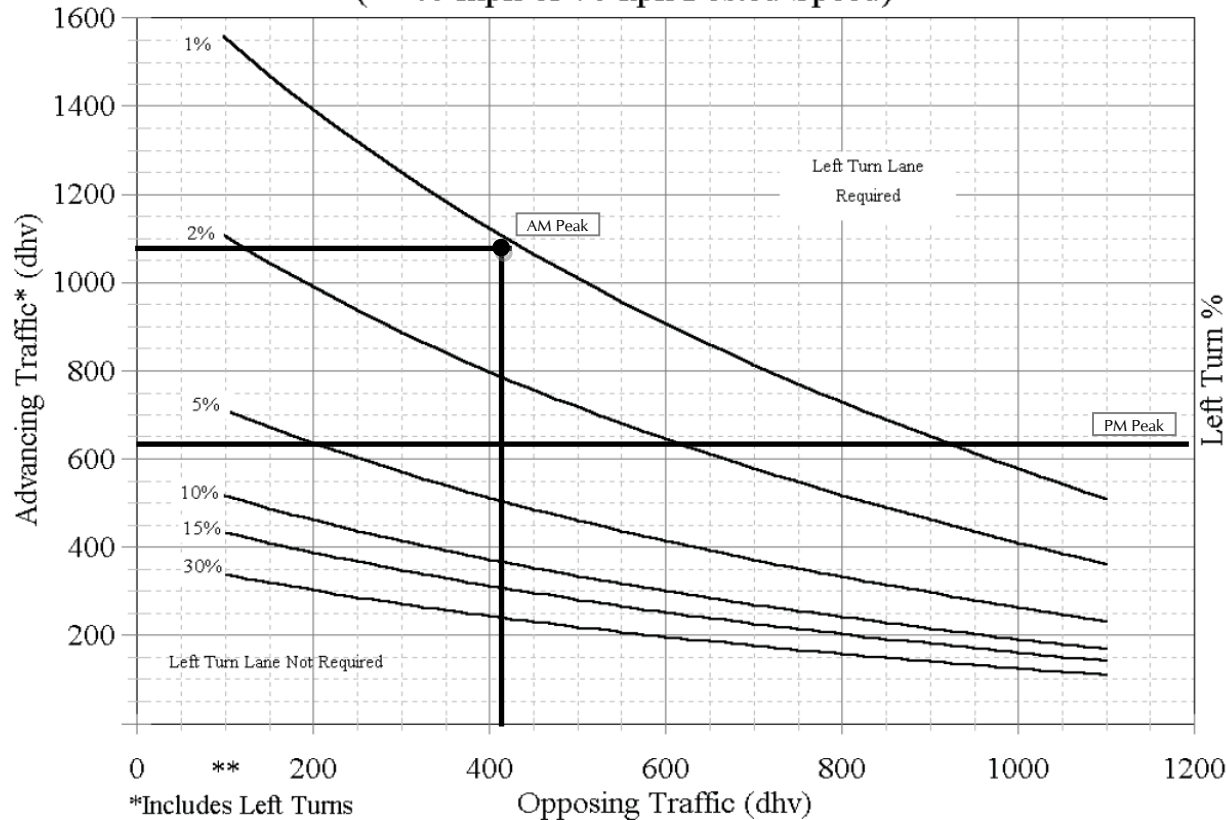
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Wallings Road / McCreary Road Intersection  
Eastbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1090 Veh  
Left Turn Traffic = 30 Veh  
Opposing Traffic = 410 Veh  
Left Turn % = 2.8%

PM Peak Hour:

Advancing Traffic = 640 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1460 Veh  
Left Turn % = 1.6%

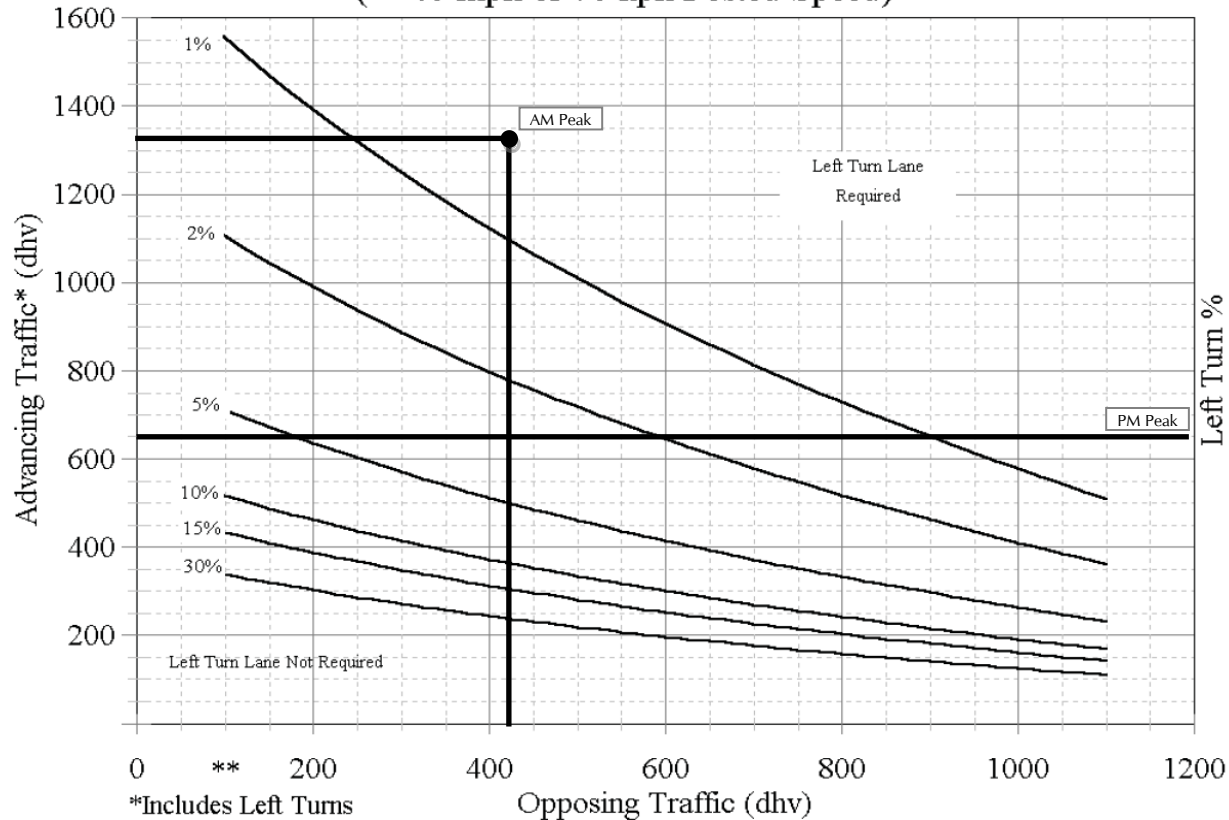
Turn Lane Warranted





Wallings Road / Majestic Oaks Trail Intersection  
Eastbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1330 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 420 Veh  
Left Turn % = 0.8%

PM Peak Hour:

Advancing Traffic = 650 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1600 Veh  
Left Turn % = 1.5%

Turn Lane Warranted



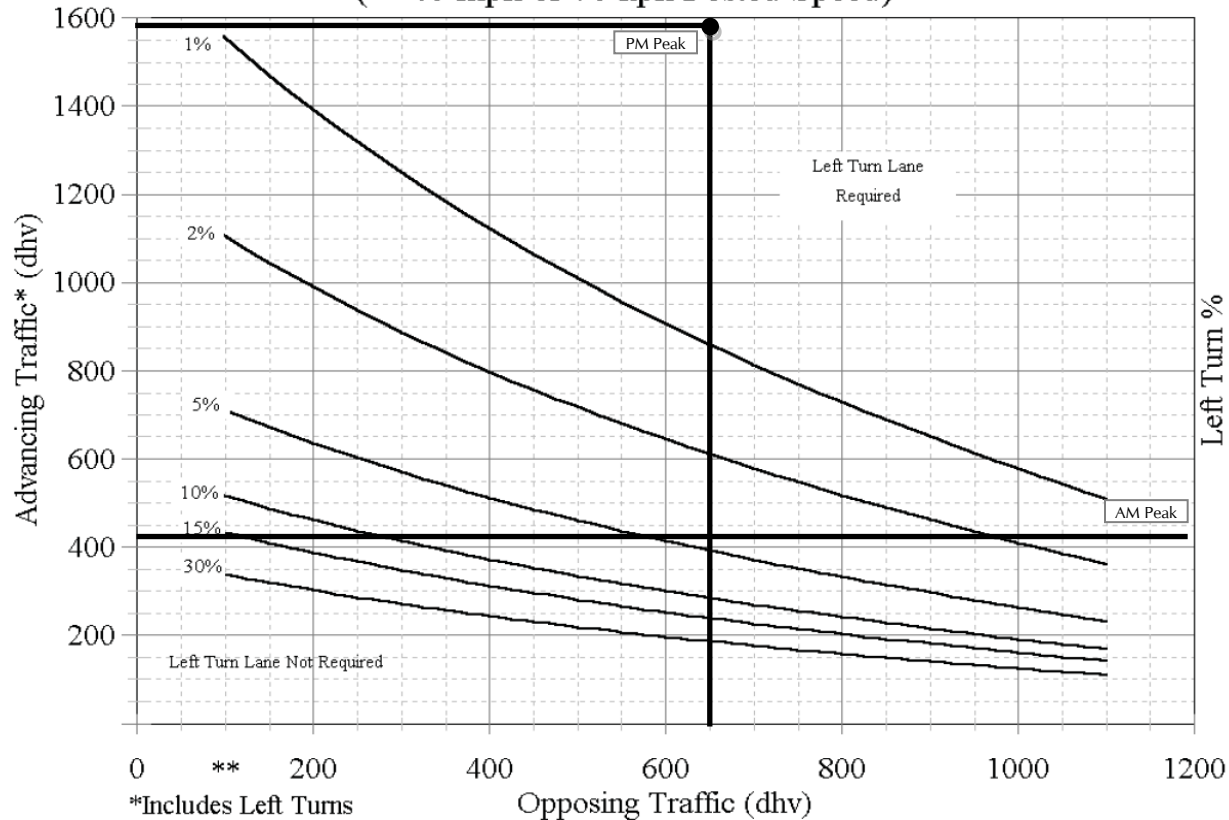
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Wallings Road / Creekside Terrace Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 420 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1330 Veh  
Left Turn % = 2.4%

PM Peak Hour:

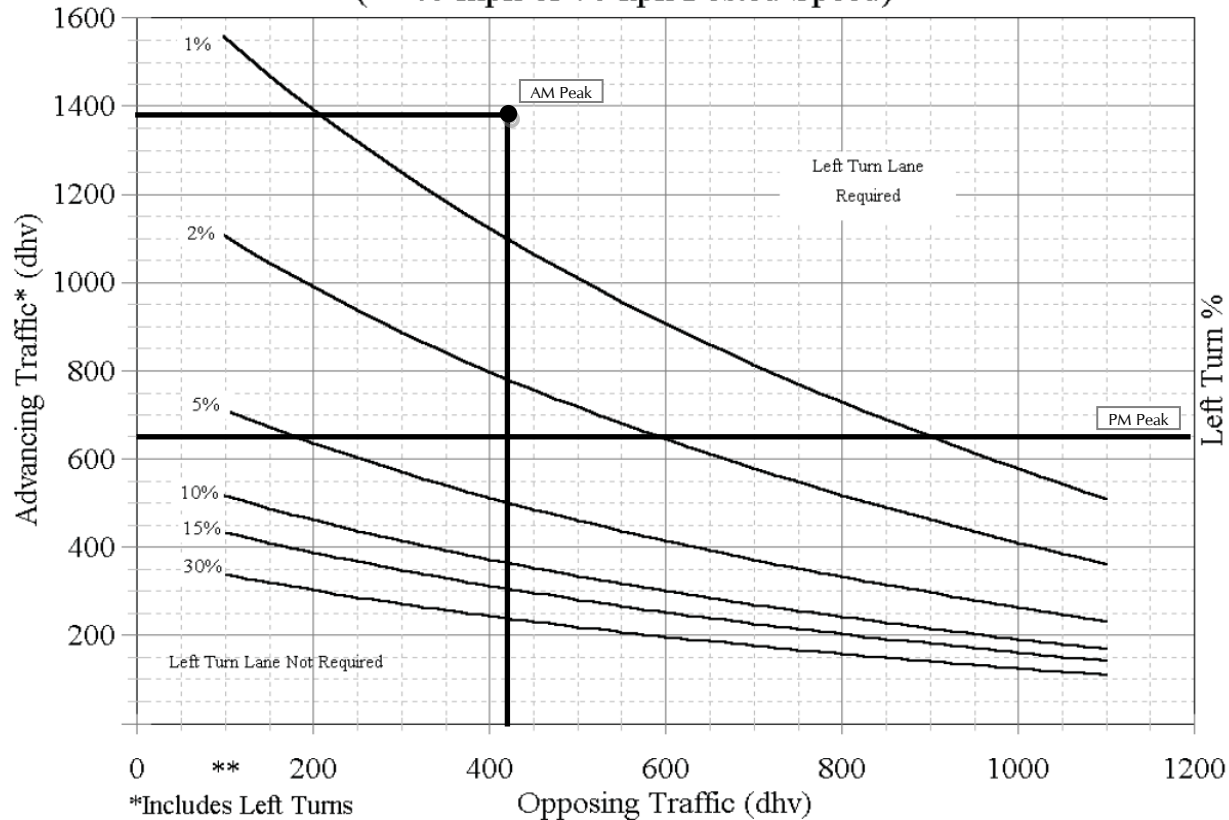
Advancing Traffic = 1590 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 650 Veh  
Left Turn % = 0.6%

Turn Lane Warranted



Wallings Road / Joyce Road / Fire Station Drive Intersection  
Eastbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1370 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 420 Veh  
Left Turn % = 0.7%

PM Peak Hour:

Advancing Traffic = 650 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1590 Veh  
Left Turn % = 1.5%

Turn Lane Warranted



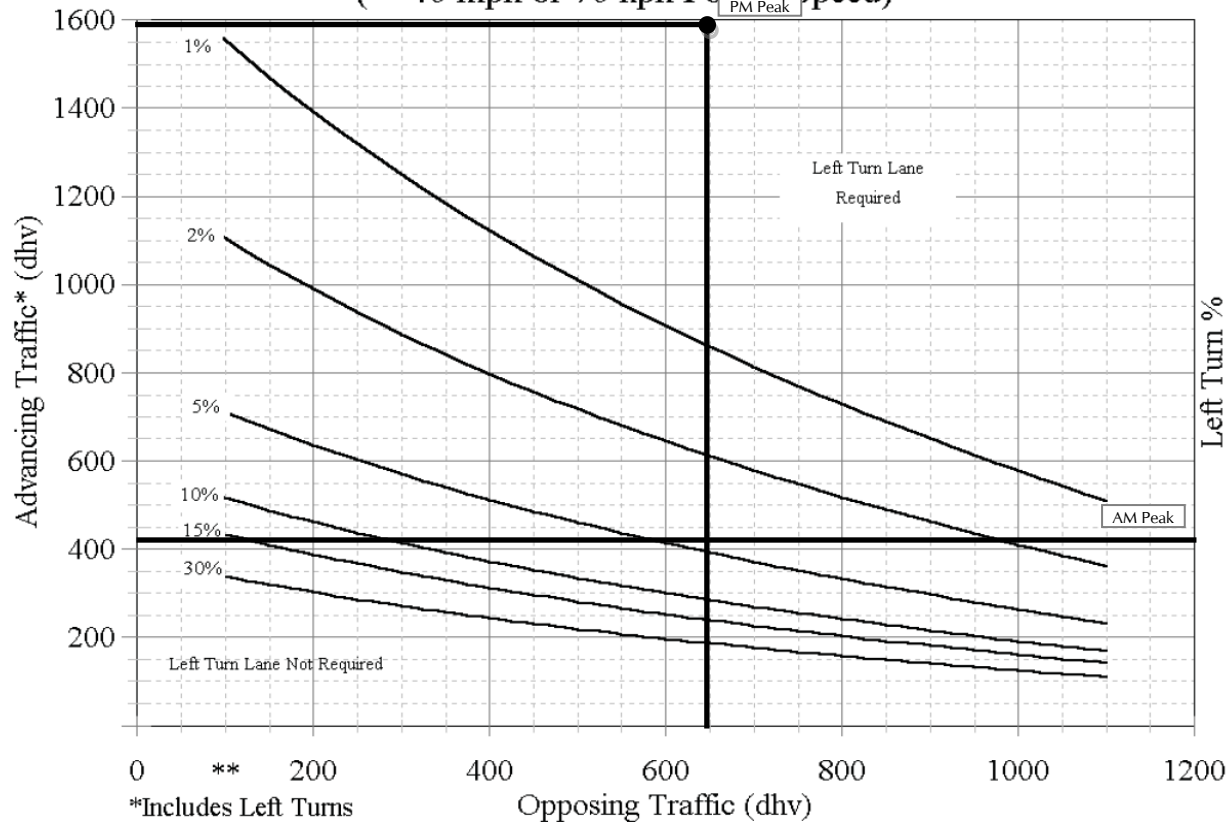
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Wallings Road / Joyce Road / Fire Station Drive Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 420 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1370 Veh  
Left Turn % = 2.4%

PM Peak Hour:

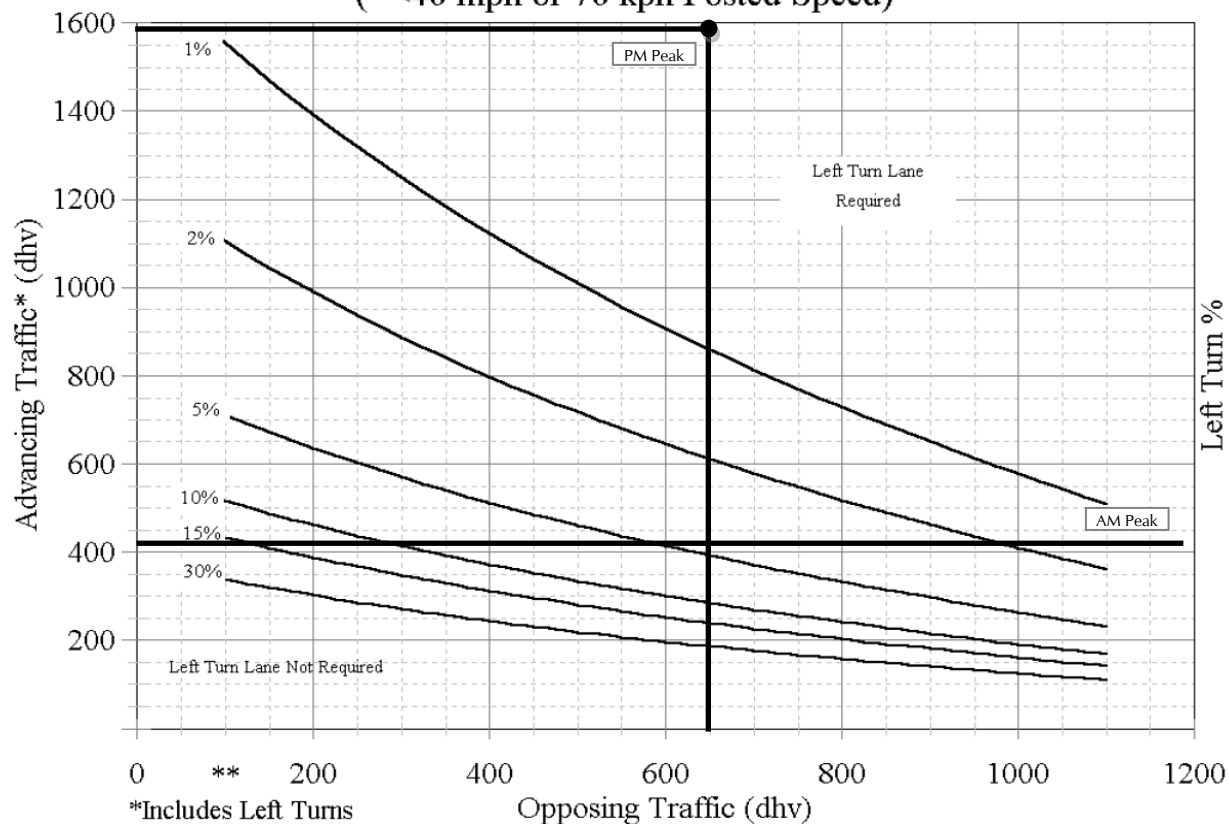
Advancing Traffic = 1590 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 650 Veh  
Left Turn % = 0.6%

Turn Lane Warranted



Wallings Road / Marianna Boulevard Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 420 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1350 Veh  
Left Turn % = 2.4%

PM Peak Hour:

Advancing Traffic = 1590 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 650 Veh  
Left Turn % = 0.6%

Turn Lane Warranted



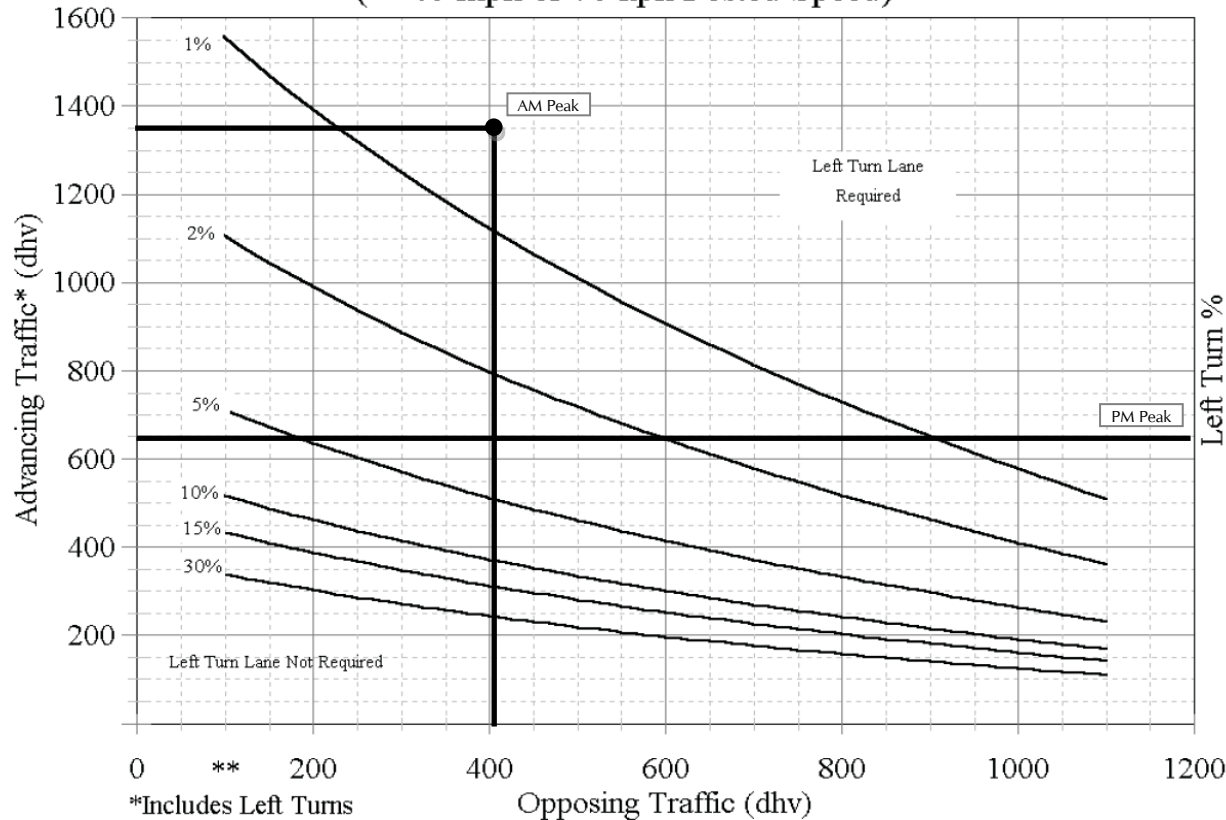
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Wallings Road / Wright Road Intersection  
Eastbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1350 Veh  
Left Turn Traffic = 20 Veh  
Opposing Traffic = 410 Veh  
Left Turn % = 1.5%

PM Peak Hour:

Advancing Traffic = 650 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1600 Veh  
Left Turn % = 1.5%

Turn Lane Warranted



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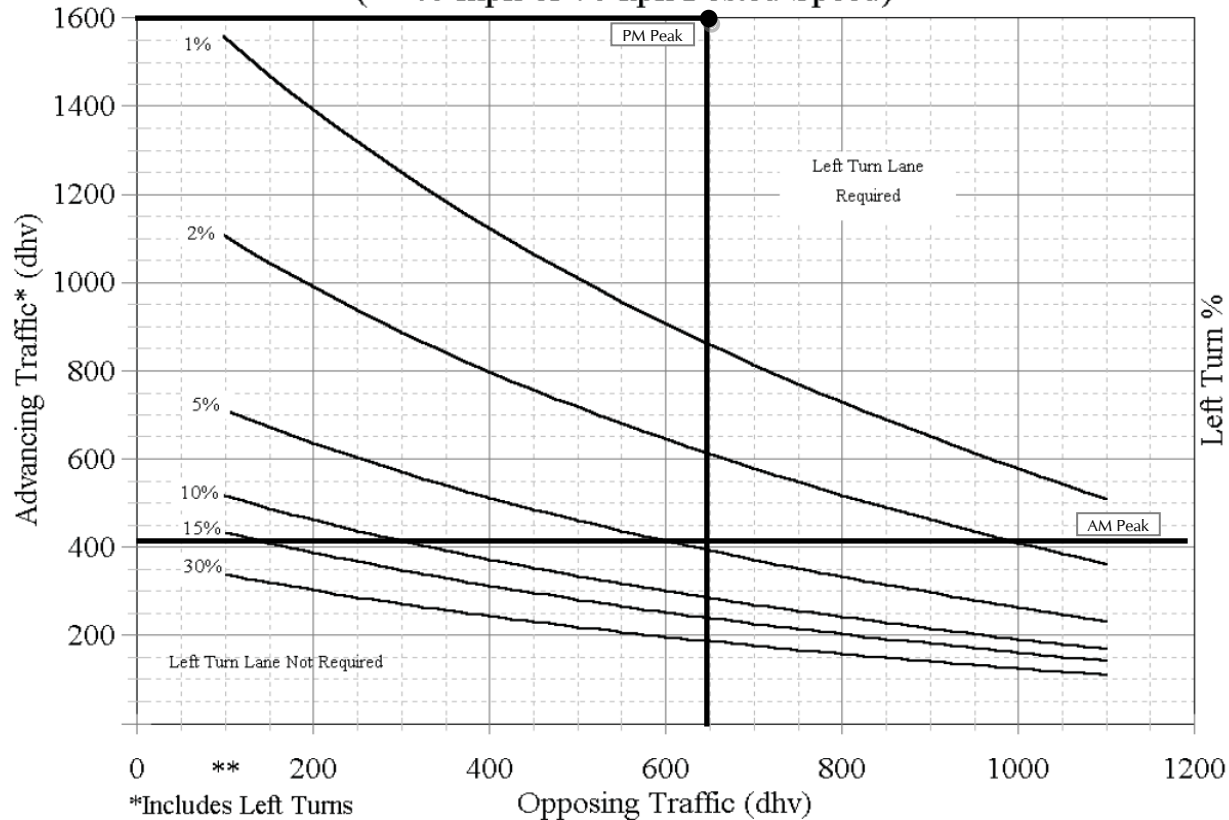
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Wallings Road / Wright Road Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 410 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1350 Veh  
Left Turn % = 2.4%

PM Peak Hour:

Advancing Traffic = 1600 Veh  
Left Turn Traffic = 20 Veh  
Opposing Traffic = 650 Veh  
Left Turn % = 1.3%

Turn Lane Warranted



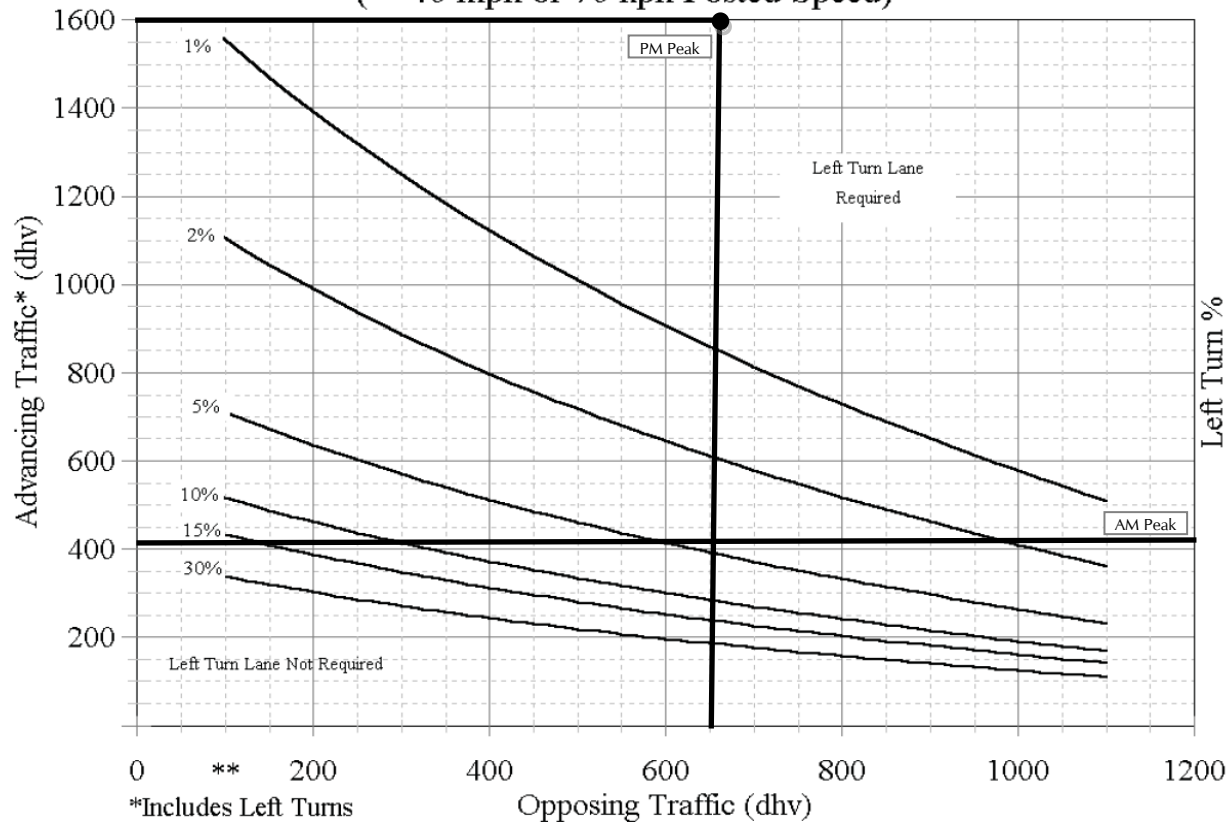
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Wallings Road / Craig Lane Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 410 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1390 Veh  
Left Turn % = 2.4%

PM Peak Hour:

Advancing Traffic = 1600 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 660 Veh  
Left Turn % = 0.6%

Turn Lane Warranted



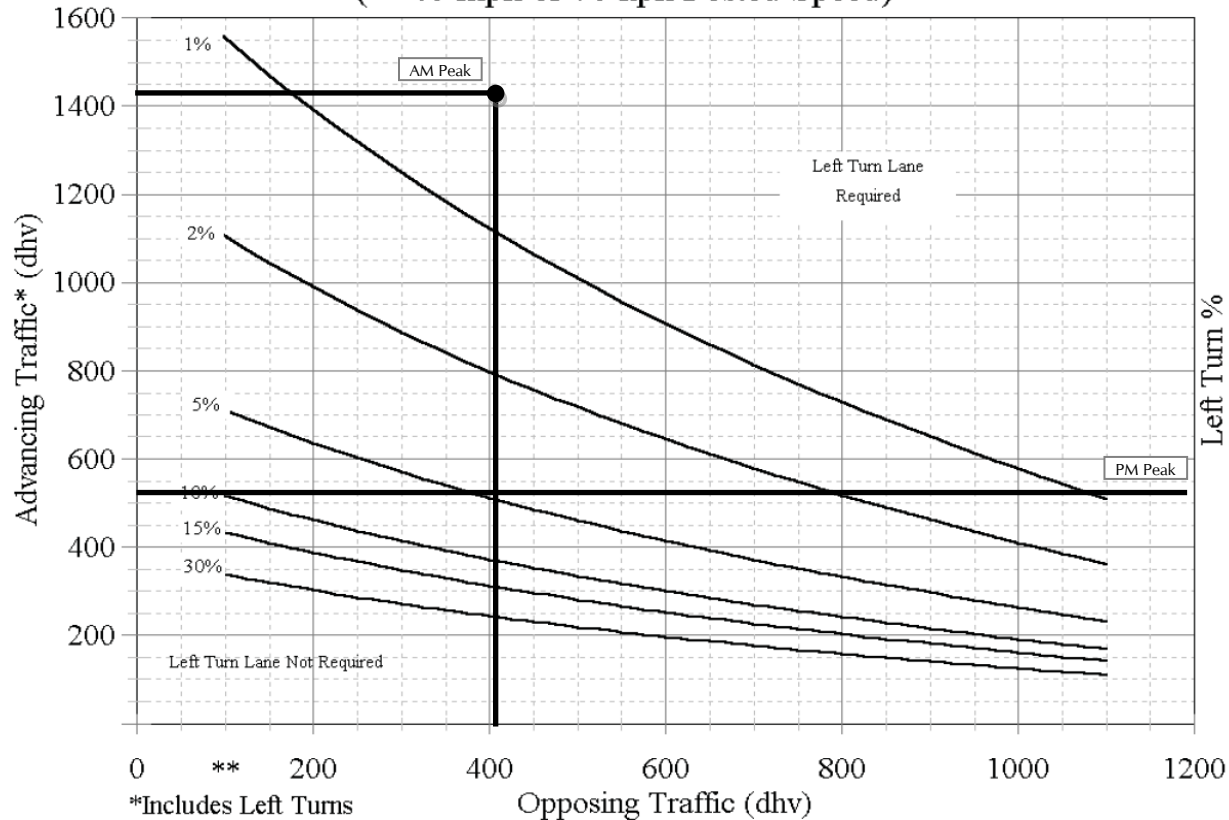
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Wallings Road / Skyline Drive Intersection  
Eastbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1430 Veh  
Left Turn Traffic = 20 Veh  
Opposing Traffic = 410 Veh  
Left Turn % = 1.4%

PM Peak Hour:

Advancing Traffic = 660 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1600 Veh  
Left Turn % = 1.5%

Turn Lane Warranted



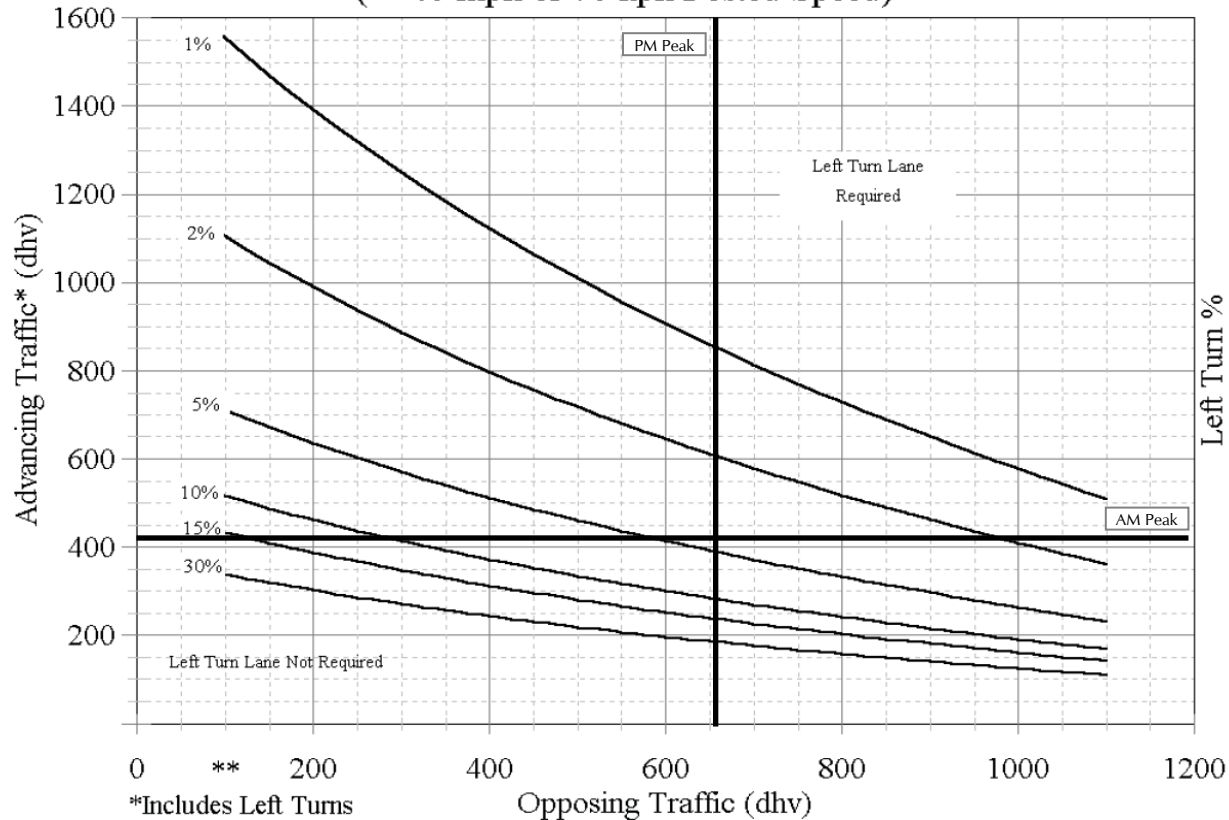
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Wallings Road / West Mill Road Intersection  
Westbound Left Turn

**2-Lane Highway Left Turn Lane Warrant**  
(= $\leq$ 40 mph or 70 kph Posted Speed)



\*Includes Left Turns  
\*\* There is no minimum number of turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 410 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 1420 Veh  
Left Turn % = 2.4%

PM Peak Hour:

Advancing Traffic = 1600 Veh  
Left Turn Traffic = 10 Veh  
Opposing Traffic = 660 Veh  
Left Turn % = 0.6%

Turn Lane Warranted



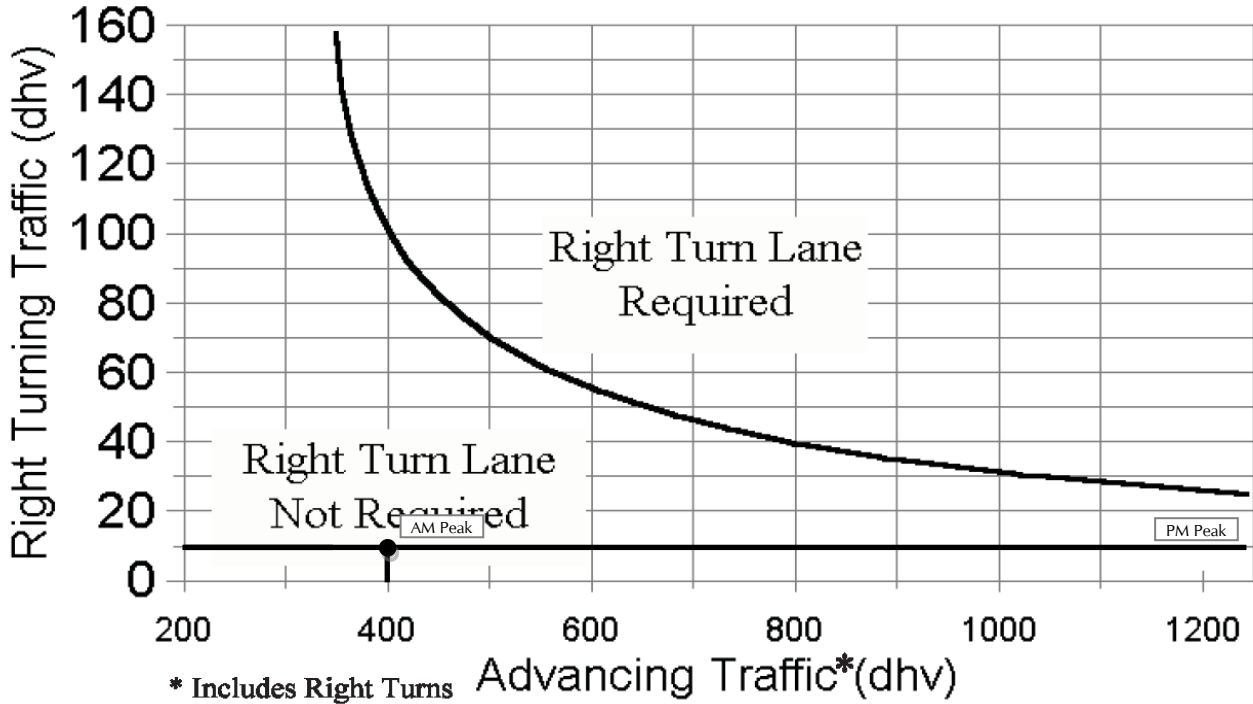
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Wallings Road / Elmhurst Drive Intersection  
Westbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

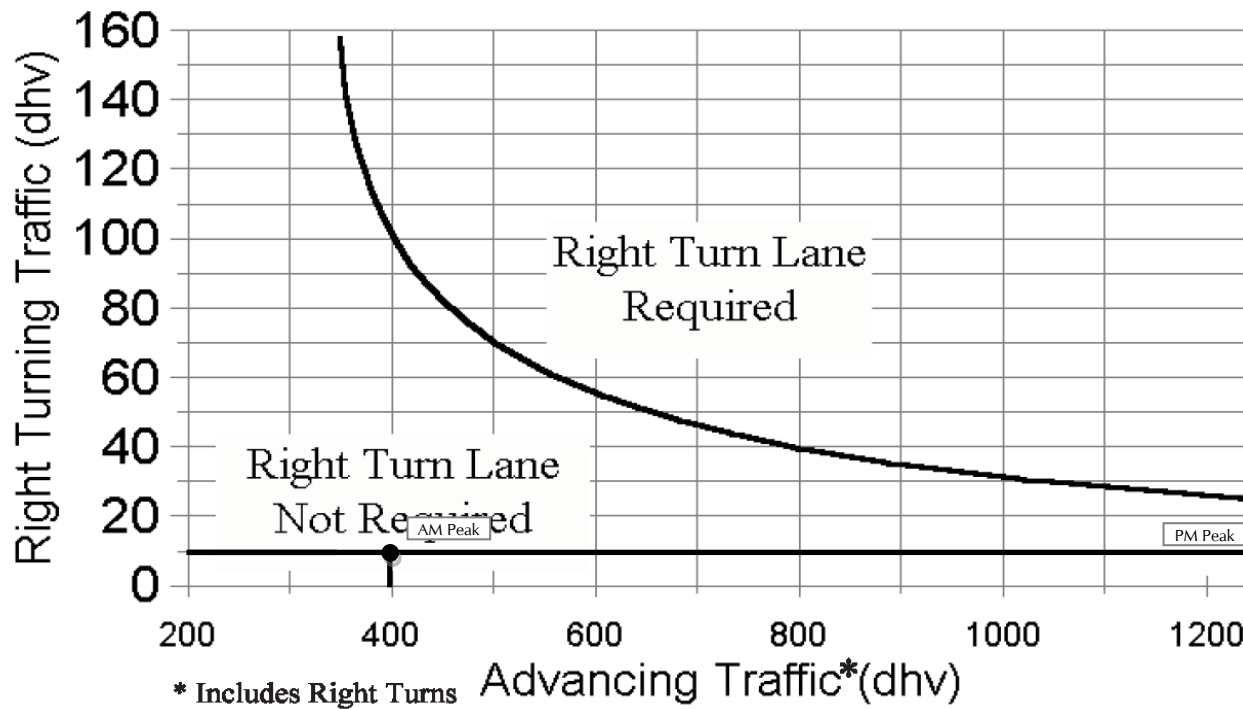
AM Peak Hour:  
 Advancing Traffic = 400 Veh  
 Right Turn Traffic = 10 Veh

PM Peak Hour:  
 Advancing Traffic = 1370 Veh  
 Right Turn Traffic = 10 Veh

Turn Lane Not Warranted

Wallings Road / Longview Road Intersection  
Westbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 400 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 1370 Veh

Right Turn Traffic = 10 Veh

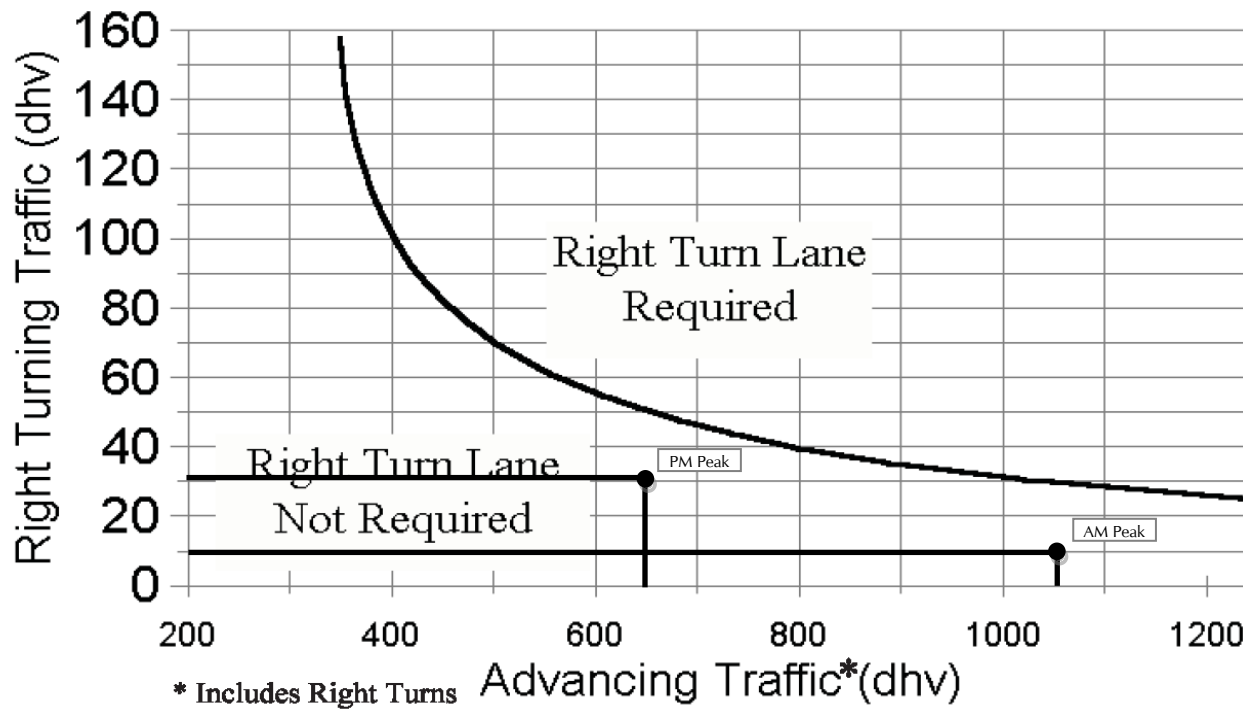
Turn Lane Not Warranted





Wallings Road / Chestnut Boulevard Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1050 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 650 Veh

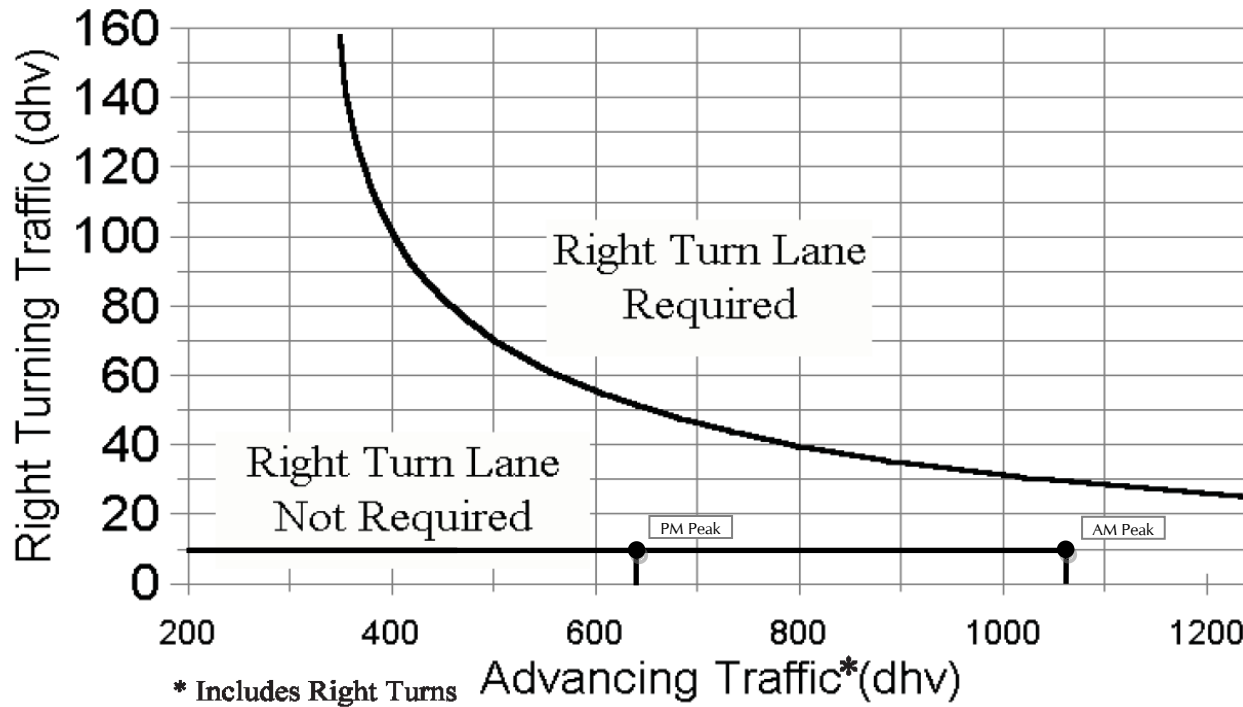
Right Turn Traffic = 30 Veh

Turn Lane Not Warranted



Wallings Road / Overlook Avenue Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1070 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 630 Veh

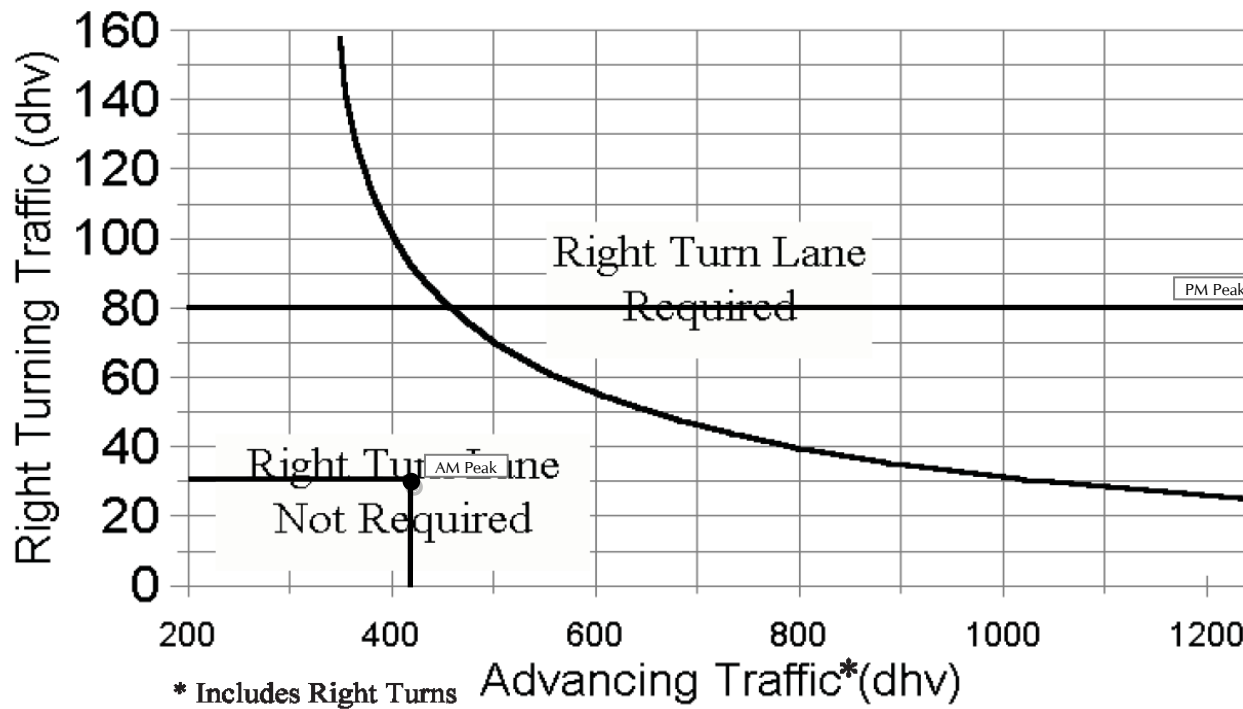
Right Turn Traffic = 10 Veh

Turn Lane Not Warranted



Wallings Road / McCreary Road Intersection  
Westbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 410 Veh

Right Turn Traffic = 30 Veh

PM Peak Hour:

Advancing Traffic = 1460 Veh

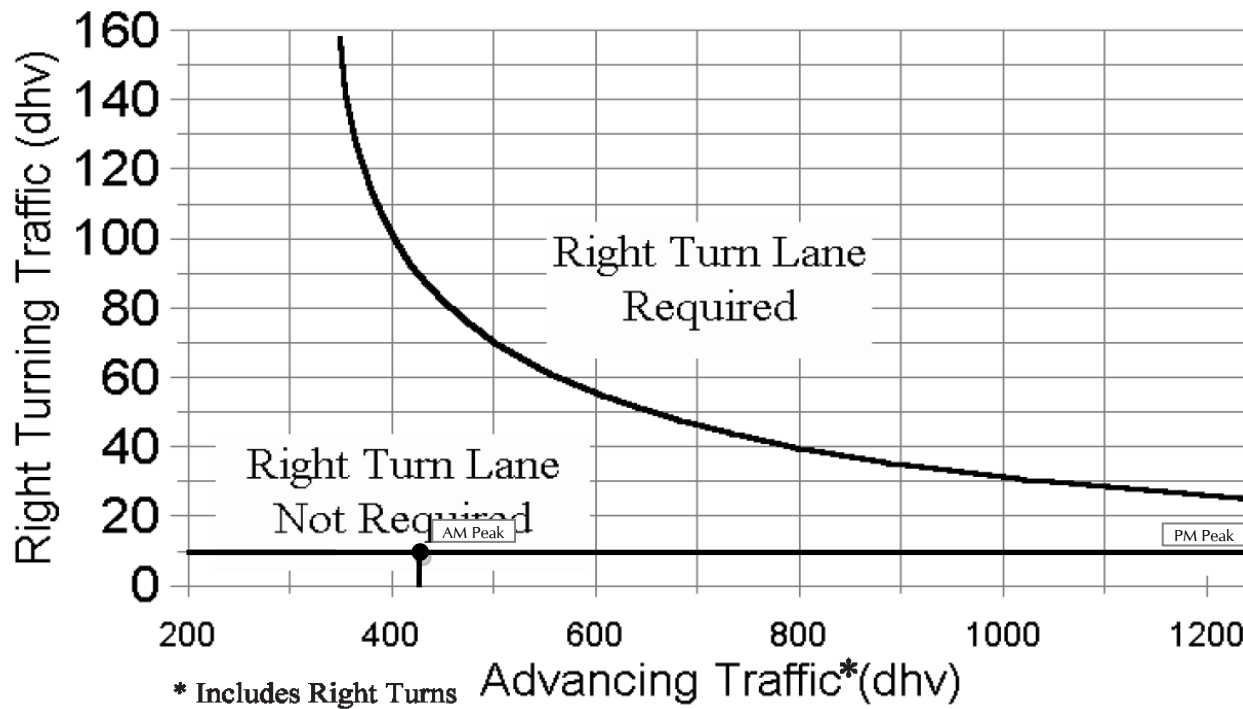
Right Turn Traffic = 80 Veh

Turn Lane Warranted



Wallings Road / Majestic Oaks Trail Intersection  
Westbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



\* Includes Right Turns

Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 420 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 1600 Veh

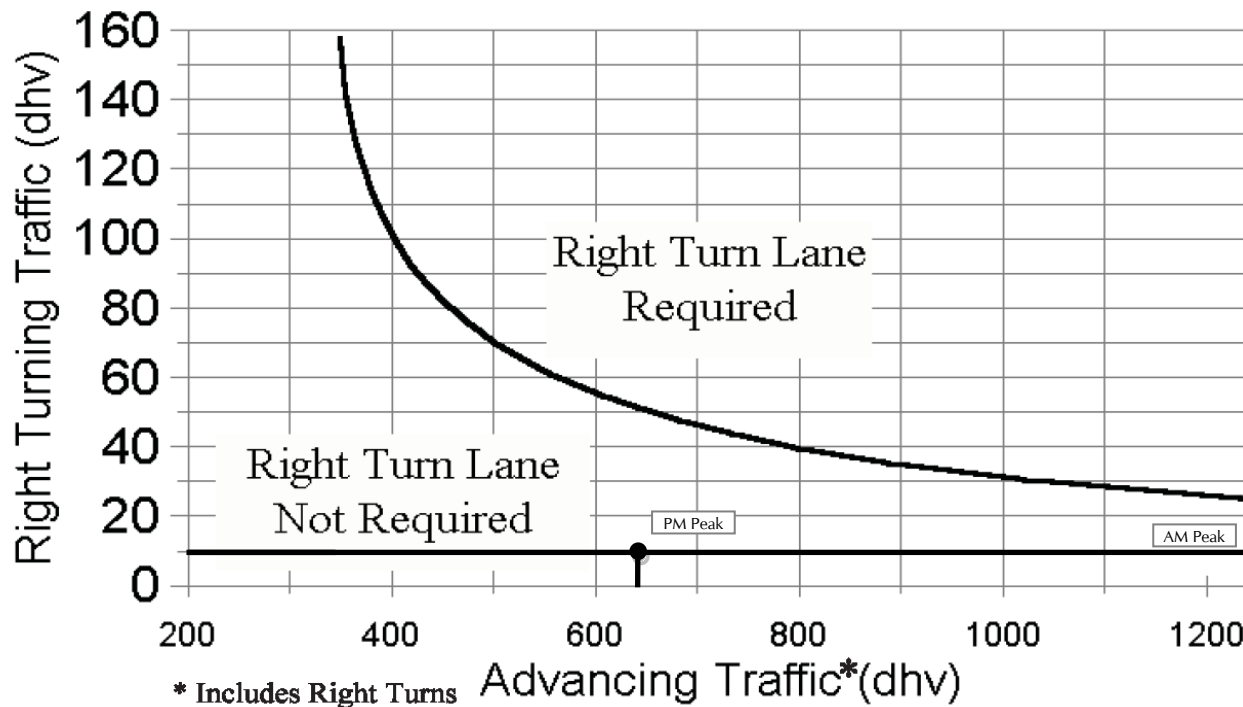
Right Turn Traffic = 10 Veh

Turn Lane Not Warranted



Wallings Road / Creekside Terrace Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1330 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 640 Veh

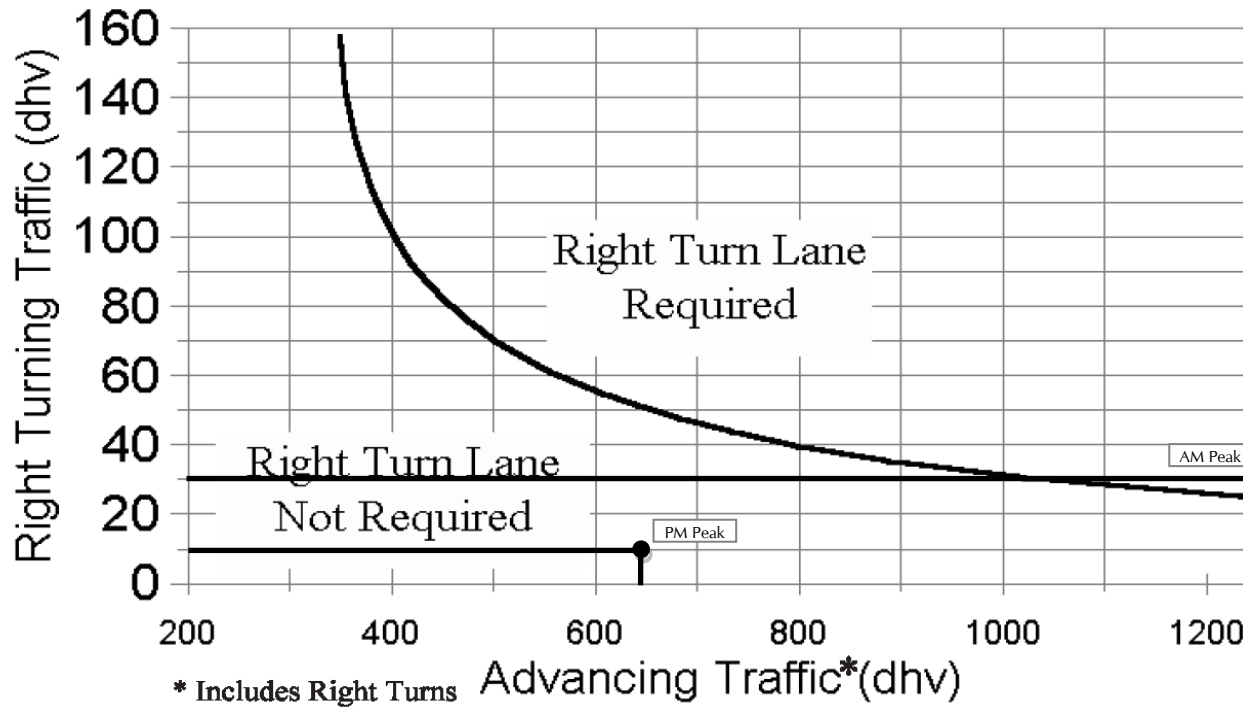
Right Turn Traffic = 10 Veh

Turn Lane Not Warranted



Wallings Road / Joyce Road / Fire Station Drive Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1370 Veh

Right Turn Traffic = 30 Veh

PM Peak Hour:

Advancing Traffic = 650 Veh

Right Turn Traffic = 10 Veh

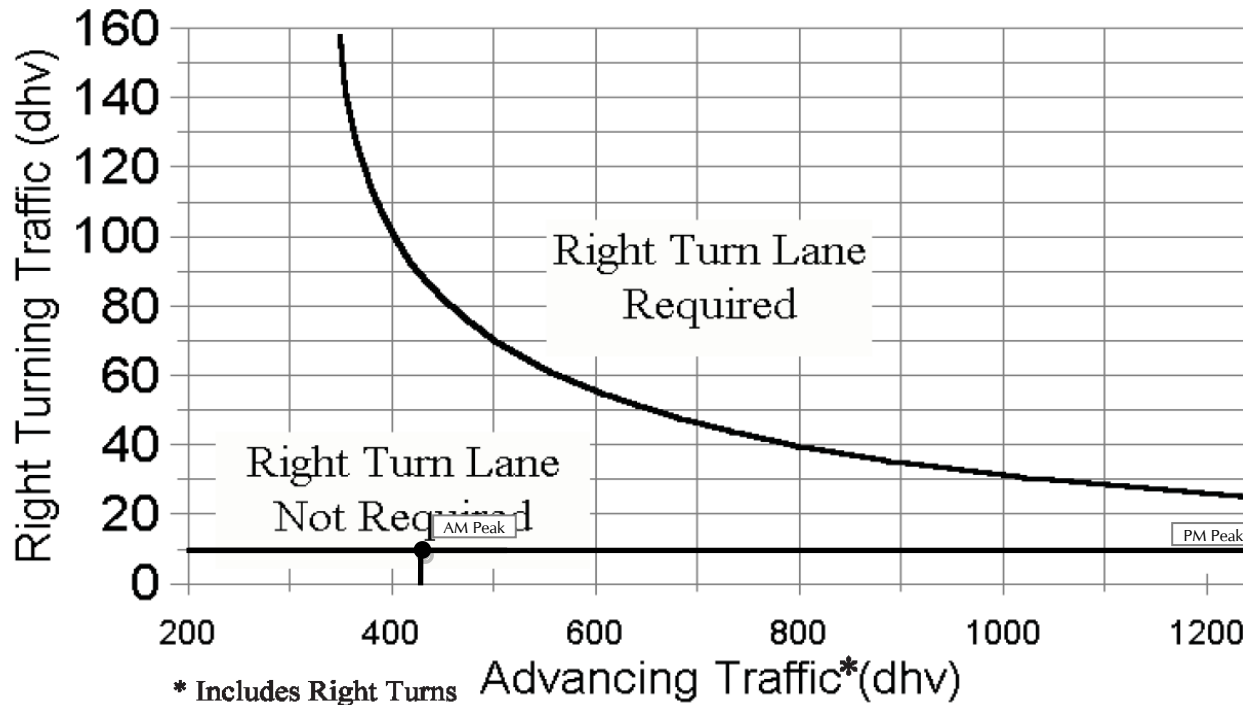
**Turn Lane Warranted**





Wallings Road / Joyce Road / Fire Station Drive Intersection  
Westbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 420 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 1590 Veh

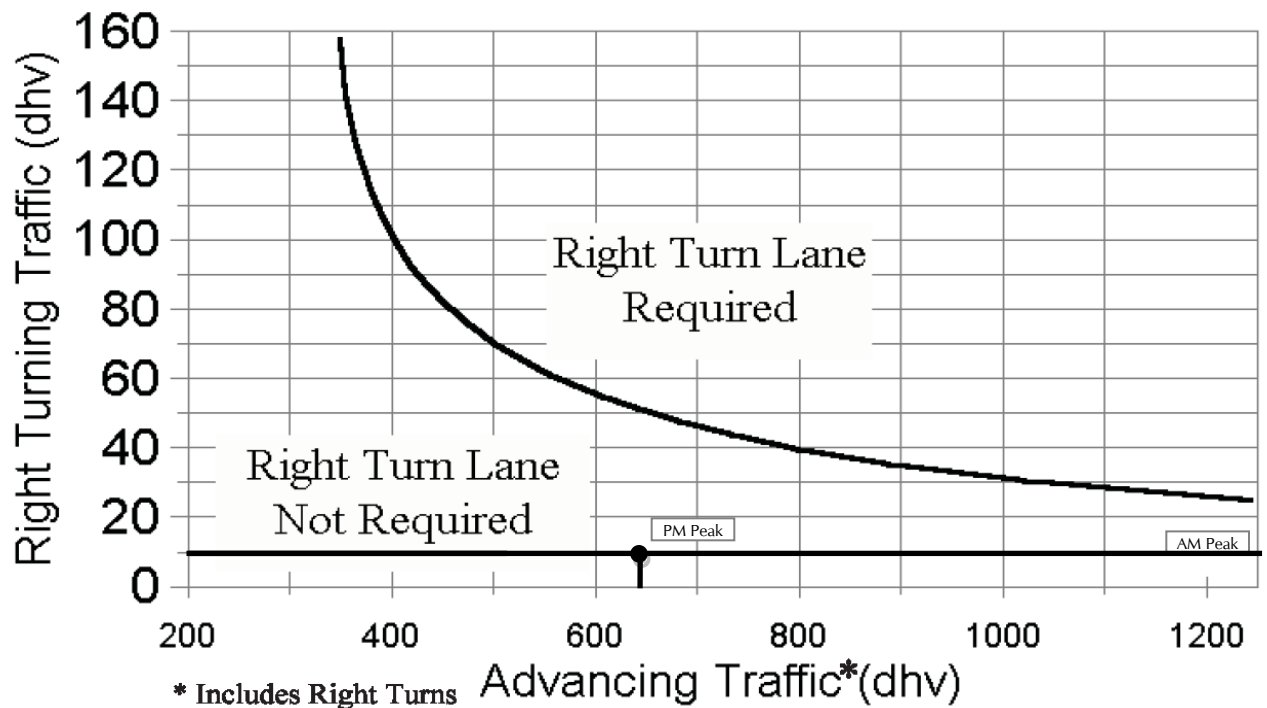
Right Turn Traffic = 10 Veh

Turn Lane Not Warranted



Wallings Road / Marianna Boulevard Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1350 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 650 Veh

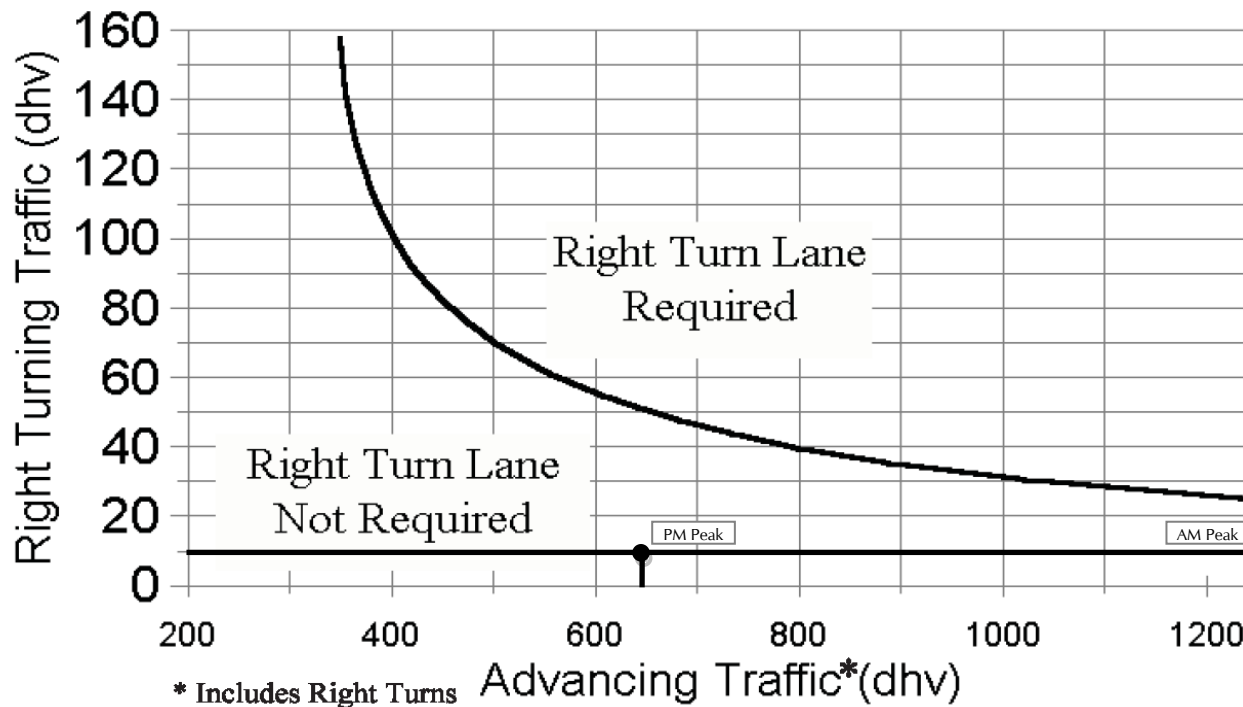
Right Turn Traffic = 10 Veh

Turn Lane Not Warranted



Wallings Road / Wright Road Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1350 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 650 Veh

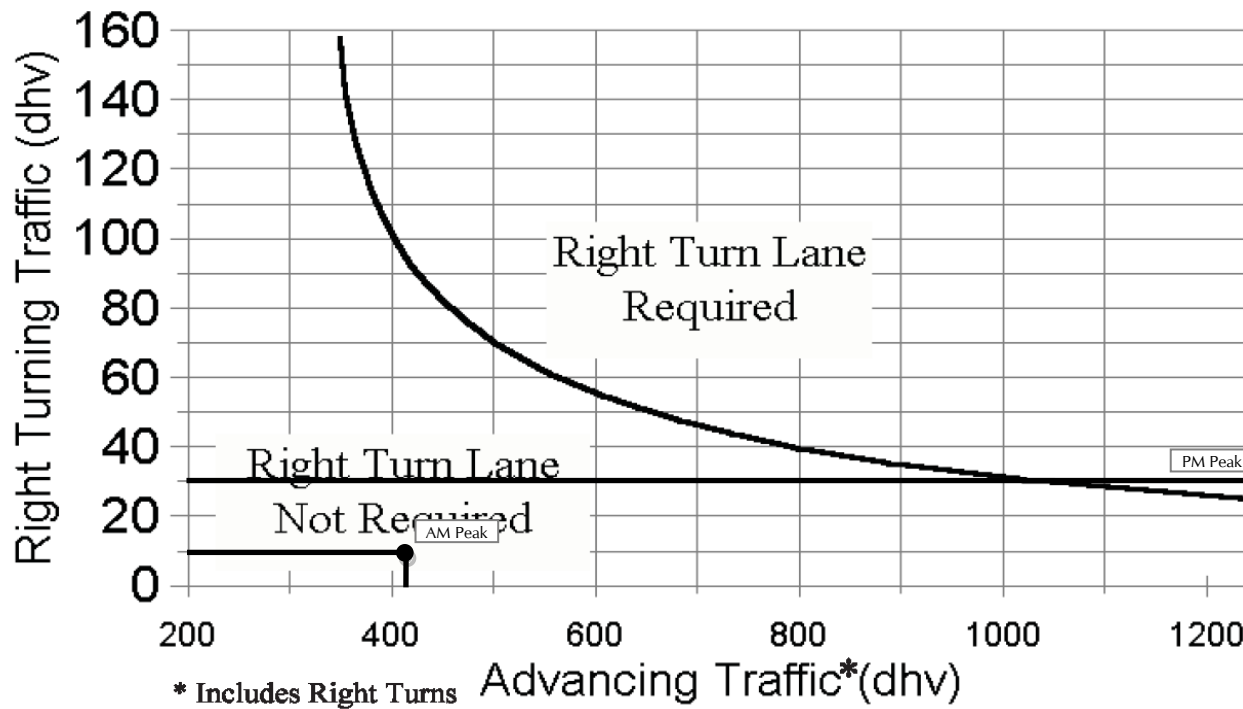
Right Turn Traffic = 10 Veh

Turn Lane Not Warranted



Wallings Road / Wright Road Intersection  
Westbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 410 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 1600 Veh

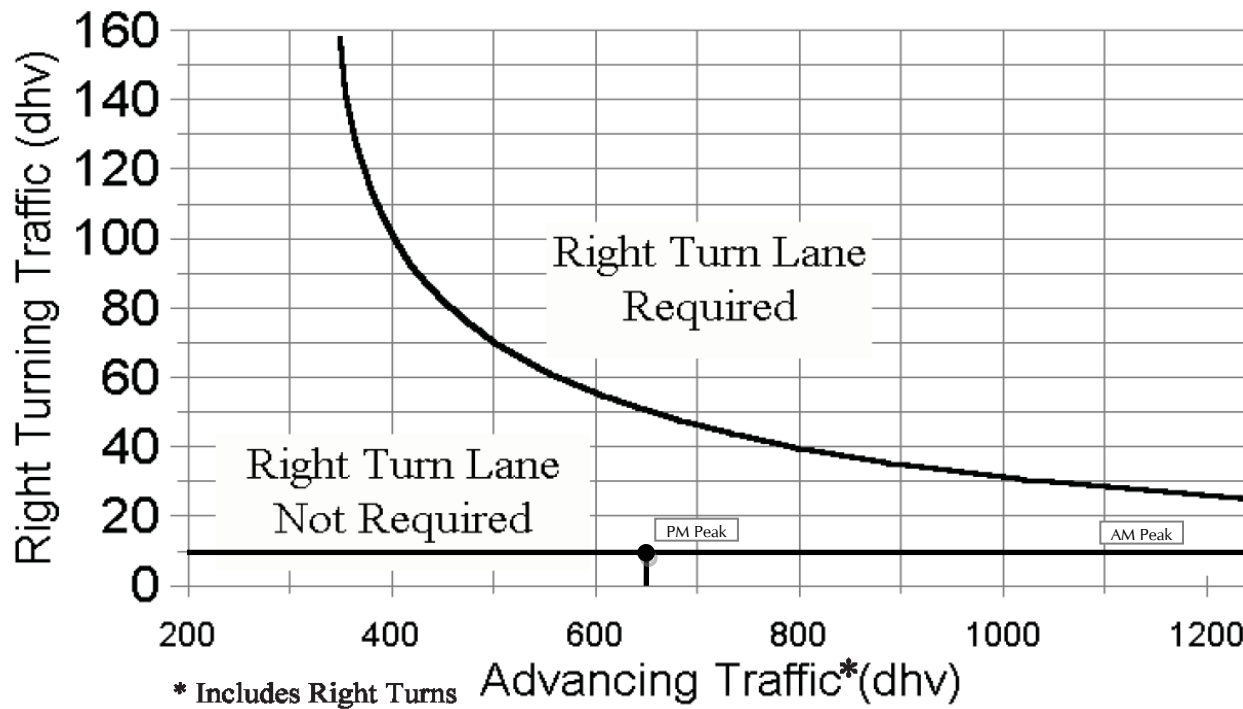
Right Turn Traffic = 30 Veh

Turn Lane Warranted



Wallings Road / Craig Lane Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1390 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 660 Veh

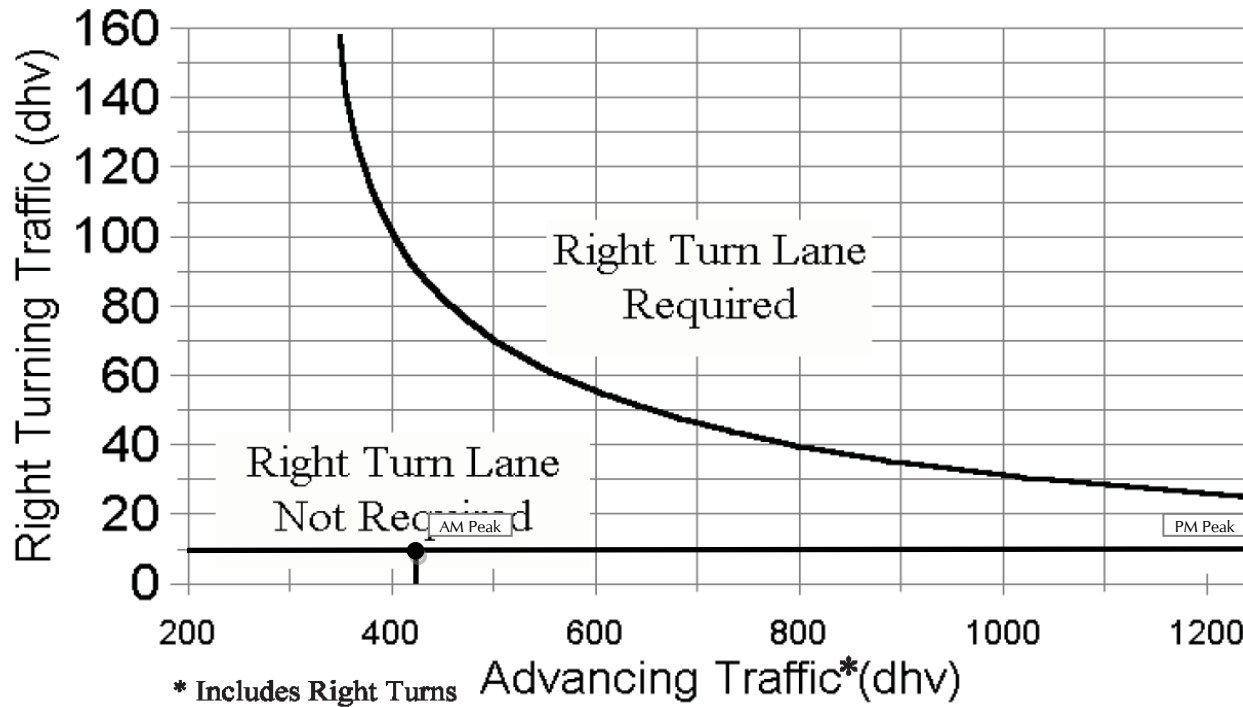
Right Turn Traffic = 10 Veh

Turn Lane Not Warranted



Wallings Road / Skyline Drive Intersection  
Westbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 410 Veh

Right Turn Traffic = 10 Veh

PM Peak Hour:

Advancing Traffic = 1600 Veh

Right Turn Traffic = 10 Veh

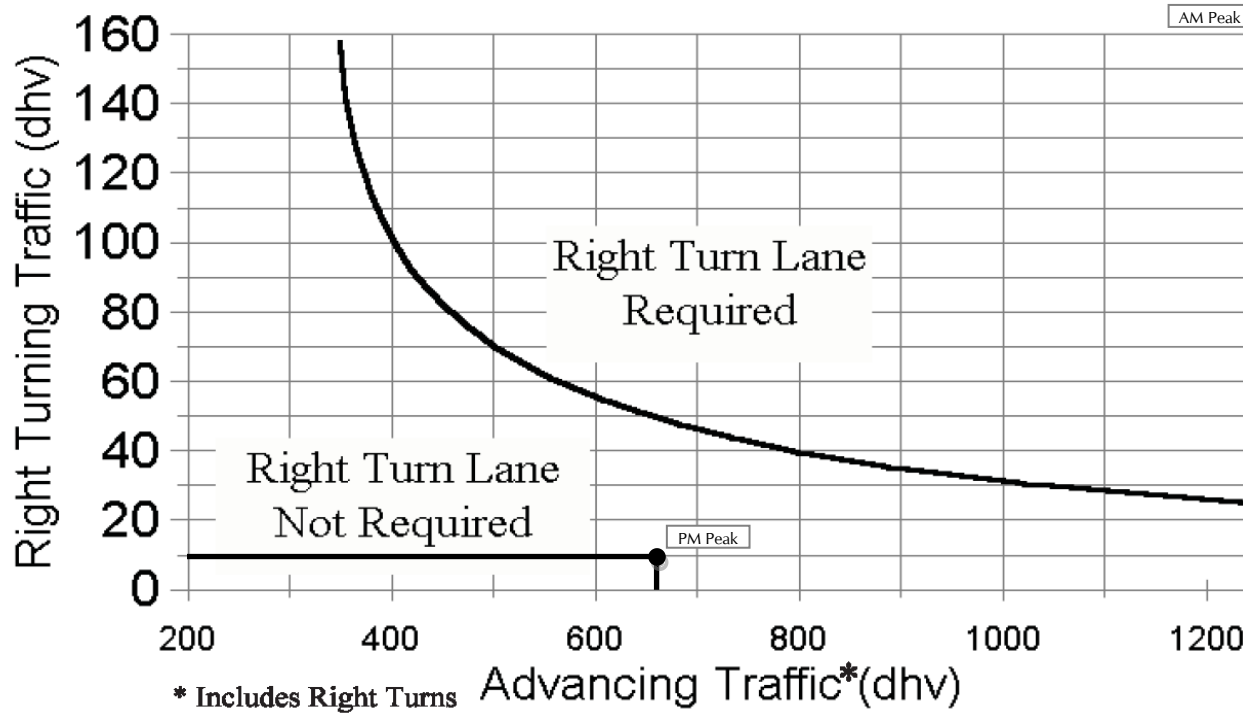
Turn Lane Not Warranted





Wallings Road / West Mill Road Intersection  
Eastbound Right Turn

**2-Lane Highway Right Turn Lane Warrant**  
=< 40 mph or 70 kph Posted Speed



Design Year 2040 'Build' Conditions

AM Peak Hour:

Advancing Traffic = 1420 Veh

Right Turn Traffic = 180 Veh

PM Peak Hour:

Advancing Traffic = 660 Veh

Right Turn Traffic = 10 Veh

Turn Lane Warranted

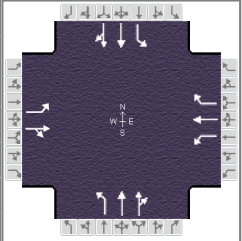


**APPENDIX L**  
**HCS INTERSECTION CAPACITY ANALYSIS**

OPENING YEAR 2020 'NO-BUILD' CONDITIONS

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Broadview F	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	1. Wallings Rd_Broadview Rd_Opening Year 2020 'No-Build' AM.xus				
Project Description	Opening Year 2020 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	320	560	70	80	200	80	50	560	380	70	190	80

Signal Information													
Cycle, s	154.4	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	22.0	35.0	22.0	12.4	35.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0			
				Red	2.0	2.0	2.0	2.0	2.0	0.0			

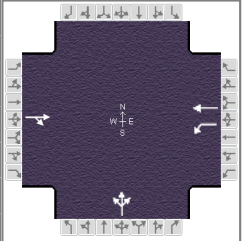
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	27.6	40.6	45.6	58.6	27.6	40.6	27.6	40.6
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	24.0	37.0	6.0	15.5	5.1	37.0	6.4	12.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.3	4.0	0.1	0.0	0.2	6.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	0.00	0.05	0.00	1.00	0.00	0.12

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	348	685		87	217	87	54	548	474	76	151	143
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1844		1757	1845	1563	1774	1863	1610	1774	1900	1712
Queue Service Time (g <sub>s</sub> ), s	22.0	35.0		4.0	13.5	6.0	3.1	35.0	35.0	4.4	10.3	10.9
Cycle Queue Clearance Time (g <sub>c</sub> ), s	22.0	35.0		4.0	13.5	6.0	3.1	35.0	35.0	4.4	10.3	10.9
Green Ratio (g/C)	0.37	0.23		0.50	0.34	0.34	0.37	0.23	0.23	0.37	0.23	0.23
Capacity (c), veh/h	567	418		502	633	537	454	422	365	299	431	388
Volume-to-Capacity Ratio (X)	0.613	1.638		0.173	0.343	0.162	0.120	1.298	1.298	0.254	0.350	0.368
Available Capacity (c <sub>a</sub> ), veh/h	567	418		502	633	537	454	422	365	299	431	388
Back of Queue (Q), veh/ln (50th percentile)	10.6	50.8		1.7	6.2	2.3	1.4	34.3	29.9	2.0	5.0	4.8
Queue Storage Ratio (RQ) (50th percentile)	2.68	0.00		0.35	0.00	0.18	0.12	0.00	0.00	0.17	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	38.1	59.7		24.8	37.7	35.3	32.3	59.7	59.7	36.1	50.1	50.4
Incremental Delay (d <sub>2</sub> ), s/veh	2.0	297.7		0.2	0.3	0.1	0.1	150.5	153.0	0.4	0.5	0.6
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	40.1	357.4		25.0	38.1	35.4	32.4	210.2	212.7	36.5	50.6	50.9
Level of Service (LOS)	D	F		C	D	D	C	F	F	D	D	D
Approach Delay, s/veh / LOS	250.5	F		34.6	C		202.3	F		47.8	D	
Intersection Delay, s/veh / LOS	176.9						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Opening Year 2020 'No-Build' AM.xus				
Project Description	Opening Year 2020 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		970	10	50	330		40	0	240			

Signal Information														
Cycle, s	121.8	Reference Phase	2	Green	15.0	60.0	30.0	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

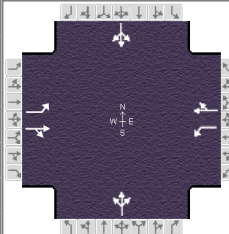
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		65.6	20.6	86.2		35.6		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.5		
Queue Clearance Time (g <sub>s</sub> ), s		62.0	3.5	12.2		23.5		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		1.00	0.00	0.00		0.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		1065		54	359			304				
Adjusted Saturation Flow Rate (s), veh/h/ln		1859		1723	1810			1604				
Queue Service Time (g <sub>s</sub> ), s		60.0		1.5	10.2			21.5				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		60.0		1.5	10.2			21.5				
Green Ratio (g/C)		0.49		0.63	0.66			0.25				
Capacity (c), veh/h		916		271	1197			395				
Volume-to-Capacity Ratio (X)		1.163		0.200	0.300			0.770				
Available Capacity (c <sub>a</sub> ), veh/h		916		271	1197			395				
Back of Queue (Q), veh/ln (50th percentile)		47.1		0.8	3.8			9.5				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.20	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		30.9		24.3	8.7			42.7				
Incremental Delay (d <sub>2</sub> ), s/veh		85.4		0.1	0.1			8.2				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		116.3		24.4	8.7			50.9				
Level of Service (LOS)		F		C	A			D				
Approach Delay, s/veh / LOS	116.3	F		10.8	B		50.9	D		0.0		
Intersection Delay, s/veh / LOS			80.7						F			

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wright Road	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	12. Wallings Rd_Wright Rd_Opening Year 2020 'No-Build' AM.xus				
Project Description	Opening Year 2020 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	20	1190	10	10	350	10	20	20	10	50	10	10

Signal Information													
Cycle, s	98.4	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	15.0	47.0	20.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.2	0.0	0.0	0.0			
				Red	2.0	2.0	2.0	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	20.6	52.6	20.6	52.6		25.2		25.2
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6		5.2		5.2
Max Allow Headway (MAH), s	3.1	6.0	3.1	6.0		4.3		4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.5	49.0	2.2	16.1		4.4		6.2
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	24.1		0.3		0.3
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		1.00
Max Out Probability	0.00	1.00	0.00	0.73		0.00		0.00

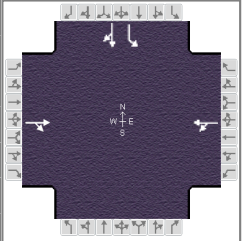
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	22	1304		11	391			54			76	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1860		1740	1818			1621			1442	
Queue Service Time (g <sub>s</sub> ), s	0.5	47.0		0.2	14.1			0.0			1.7	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.5	47.0		0.2	14.1			2.4			4.2	
Green Ratio (g/C)	0.63	0.48		0.63	0.48			0.20			0.20	
Capacity (c), veh/h	654	888		338	868			381			356	
Volume-to-Capacity Ratio (X)	0.033	1.468		0.032	0.451			0.143			0.214	
Available Capacity (c <sub>a</sub> ), veh/h	654	888		338	868			381			356	
Back of Queue (Q), veh/ln (50th percentile)	0.2	72.5		0.1	5.8			1.1			1.6	
Queue Storage Ratio (RQ) (50th percentile)	0.04	0.00		0.04	0.00			0.00			0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	8.2	25.7		18.0	17.1			32.2			32.8	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	216.9		0.0	0.8			0.2			0.3	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	8.2	242.6		18.0	17.9			32.4			33.1	
Level of Service (LOS)	A	F		B	B			C			C	
Approach Delay, s/veh / LOS	238.7	F		17.9	B			32.4	C		33.1	C
Intersection Delay, s/veh / LOS	176.5						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Opening Year 2020 'No-Build' AM.xus				
Project Description	Opening Year 2020 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		950	220	60	220					140	10	150

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.5	24.5	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.0	0.0	0.0	0.0	0.0			
				Red	1.9	2.5	0.0	0.0	0.0	0.0			

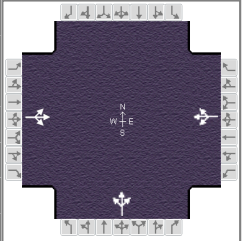
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		8.0				10.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R <sub>c</sub> ), s		5.5		5.5				5.5
Max Allow Headway (MAH), s		2.3		2.3				4.2
Queue Clearance Time (g <sub>s</sub> ), s		56.5		56.5				10.2
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0				1.0
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		1.00		1.00				0.01

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		1272			304					152	174	
Adjusted Saturation Flow Rate (s), veh/h/ln		1820			241					1740	1563	
Queue Service Time (g <sub>s</sub> ), s		54.5			0.0					6.3	8.2	
Cycle Queue Clearance Time (g <sub>c</sub> ), s		54.5			54.5					6.3	8.2	
Green Ratio (g/C)		0.61			0.61					0.27	0.27	
Capacity (c), veh/h		1102			194					474	426	
Volume-to-Capacity Ratio (X)		1.154			1.565					0.321	0.409	
Available Capacity (c <sub>a</sub> ), veh/h		1102			194					474	426	
Back of Queue (Q), veh/ln (50th percentile)		43.3			18.0					2.6	3.0	
Queue Storage Ratio (RQ) (50th percentile)		0.00			0.00					0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh		17.8			31.6					26.1	26.8	
Incremental Delay (d <sub>2</sub> ), s/veh		80.0			277.9					0.4	0.6	
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0					0.0	0.0	
Control Delay (d), s/veh		97.7			309.5					26.5	27.4	
Level of Service (LOS)		F			F					C	C	
Approach Delay, s/veh / LOS	97.7	F		309.5	F		0.0			27.0	C	
Intersection Delay, s/veh / LOS	119.5						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Opening Year 2020 'No-Build' AM.xus				
Project Description	Opening Year 2020 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	840	170	80	20	110	260	170	230	70			

Signal Information				Signal Phases									
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	0.0	59.7	19.7	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	3.6	3.0	0.0	0.0	0.0			
				Red	2.9	1.7	2.3	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		4		
Case Number	0.0	14.0		8.3		12.0		
Phase Duration, s	0.0	65.0		65.0		25.0		
Change Period, (Y+R <sub>c</sub> ), s	6.9	5.3		5.3		5.3		
Max Allow Headway (MAH), s	0.0	2.8		2.8		5.2		
Queue Clearance Time (g <sub>s</sub> ), s		61.7		12.2		21.7		
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		2.5		0.0		
Phase Call Probability		1.00		1.00		1.00		
Max Out Probability		1.00		0.38		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h		1185			424			511				
Adjusted Saturation Flow Rate (s), veh/h/ln		1057			1750			1765				
Queue Service Time (g <sub>s</sub> ), s		6.0			0.0			19.7				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		59.7			10.2			19.7				
Green Ratio (g/C)		0.66			0.66			0.22				
Capacity (c), veh/h		772			1203			386				
Volume-to-Capacity Ratio (X)		1.534			0.353			1.322				
Available Capacity (c <sub>a</sub> ), veh/h		772			1203			386				
Back of Queue (Q), veh/ln (50th percentile)		68.3			3.0			25.7				
Queue Storage Ratio (RQ) (50th percentile)		0.00			0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		18.8			6.8			35.2				
Incremental Delay (d <sub>2</sub> ), s/veh		247.0			0.1			162.0				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0			0.0				
Control Delay (d), s/veh		265.8			6.9			197.2				
Level of Service (LOS)		F			A			F				
Approach Delay, s/veh / LOS	265.8	F		6.9	A		197.2	F		0.0		
Intersection Delay, s/veh / LOS			197.5						F			

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	50	960			350	10		
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	54	1043	0	0	380	10		
Percent Heavy Vehicles	2	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration	LT						TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	54						20	
C (m) (veh/h)	1169						208	
v/c	0.05						0.10	
95% queue length	0.15						0.31	
Control Delay (s/veh)	8.2						24.1	
LOS	A						C	
Approach Delay (s/veh)	--	--					24.1	
Approach LOS	--	--					C	

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	30	940			350	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	32	1021	0	0	380	10	
Percent Heavy Vehicles	2	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration	LT					TR	
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	32						20
C (m) (veh/h)	1169						229
v/c	0.03						0.09
95% queue length	0.08						0.28
Control Delay (s/veh)	8.2						22.2
LOS	A						C
Approach Delay (s/veh)	--	--					22.2
Approach LOS	--	--					C

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		940	10	10	340			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1021	10	10	369	0		
Percent Heavy Vehicles	2	--	--	4	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	21	0	32	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		53				
C (m) (veh/h)		666		212				
v/c		0.02		0.25				
95% queue length		0.05		0.95				
Control Delay (s/veh)		10.5		27.5				
LOS		B		D				
Approach Delay (s/veh)	--	--	27.5					
Approach LOS	--	--	D					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		960	10	10	340			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1043	10	10	369	0		
Percent Heavy Vehicles	2	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	32	0	0	0		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		42				
C (m) (veh/h)		661		225				
v/c		0.02		0.19				
95% queue length		0.05		0.67				
Control Delay (s/veh)		10.5		24.6				
LOS		B		C				
Approach Delay (s/veh)	--	--	24.6					
Approach LOS	--	--	C					



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	30	960			340	30		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	32	1043	0	0	369	32		
Percent Heavy Vehicles	2	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT			TR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				20		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	32					31		
C (m) (veh/h)	1158					179		
v/c	0.03					0.17		
95% queue length	0.09					0.61		
Control Delay (s/veh)	8.2					29.3		
LOS	A					D		
Approach Delay (s/veh)	--	--				29.3		
Approach LOS	--	--				D		

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	1200			370	10	
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	1304	0	0	402	10	
Percent Heavy Vehicles	2	--	--	2	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration	LT						TR
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	4	0	4	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	10						20
C (m) (veh/h)	1147						169
v/c	0.01						0.12
95% queue length	0.03						0.39
Control Delay (s/veh)	8.2						29.1
LOS	A						D
Approach Delay (s/veh)	--	--					29.1
Approach LOS	--	--					D

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1200	10	10	370			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1304	10	10	402	0		
Percent Heavy Vehicles	2	--	--	4	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		40					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	43	0	0	0		
Percent Heavy Vehicles	3	0	3	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		53				
C (m) (veh/h)		520		162				
v/c		0.02		0.33				
95% queue length		0.06		1.33				
Control Delay (s/veh)		12.1		37.7				
LOS		B		E				
Approach Delay (s/veh)	--	--	37.7					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	1200	30	10	360	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	1304	32	10	391	10	
Percent Heavy Vehicles	2	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LTR			LTR			
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LTR	LTR		LTR			LTR
v (veh/h)	10	10		30			30
C (m) (veh/h)	1158	520		84			92
v/c	0.01	0.02		0.36			0.33
95% queue length	0.03	0.06		1.38			1.25
Control Delay (s/veh)	8.1	12.1		70.0			62.0
LOS	A	B		F			F
Approach Delay (s/veh)	--	--		70.0			62.0
Approach LOS	--	--		F			F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1210	10	10	370			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1315	10	10	402	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		518		127				
v/c		0.02		0.16				
95% queue length		0.06		0.54				
Control Delay (s/veh)		12.1		38.6				
LOS		B		E				
Approach Delay (s/veh)	--	--	38.6					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Craig Ln		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		1240	10	10	360		
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76	
Hourly Flow Rate, HFR (veh/h)	0	1347	10	10	391	0	
Percent Heavy Vehicles	2	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		40				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70	
Hourly Flow Rate, HFR (veh/h)	10	0	43	0	0	0	
Percent Heavy Vehicles	7	0	7	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (veh/h)		10		53			
C (m) (veh/h)		504		150			
v/c		0.02		0.35			
95% queue length		0.06		1.46			
Control Delay (s/veh)		12.3		41.6			
LOS		B		E			
Approach Delay (s/veh)	--	--	41.6				
Approach LOS	--	--	E				

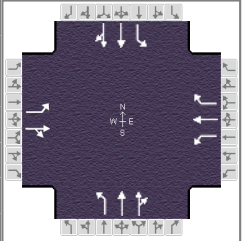


TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	20	1260			360	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	1369	0	0	391	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT			TR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	21					20		
C (m) (veh/h)	1163					149		
v/c	0.02					0.13		
95% queue length	0.06					0.45		
Control Delay (s/veh)	8.2					32.9		
LOS	A					D		
Approach Delay (s/veh)	--	--				32.9		
Approach LOS	--	--				D		

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/W Mill Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1120	150	10	360			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63		
Hourly Flow Rate, HFR (veh/h)	0	1217	163	10	391	0		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		50					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79		
Hourly Flow Rate, HFR (veh/h)	10	0	54	0	0	0		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		64				
C (m) (veh/h)		494		171				
v/c		0.02		0.37				
95% queue length		0.06		1.60				
Control Delay (s/veh)		12.4		38.1				
LOS		B		E				
Approach Delay (s/veh)	--	--	38.1					
Approach LOS	--	--	E					

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Broadview F	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	1. Wallings Rd_Broadview Rd_Opening Year 2020 'No-Build' PM.xus				
Project Description	Opening Year 2020 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	130	240	100	360	740	160	130	440	140	210	620	270

Signal Information				Signal Timing (s)																				
Cycle, s	154.4	Reference Phase	2	Green	22.0	35.0	22.0	12.4	35.0	0.0	Yellow	3.6	3.6	3.6	3.6	3.6	0.0	Red	2.0	2.0	2.0	2.0	2.0	0.0
Offset, s	0	Reference Point	End																					
Uncoordinated	Yes	Simult. Gap E/W	On																					
Force Mode	Fixed	Simult. Gap N/S	On																					

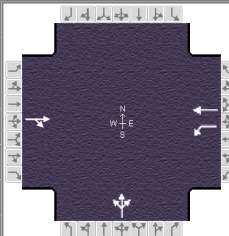
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	27.6	40.6	45.6	58.6	27.6	40.6	27.6	40.6
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	10.3	33.1	26.7	55.0	10.4	27.8	16.4	37.0
Green Extension Time (g <sub>e</sub> ), s	0.3	1.1	1.2	0.0	0.3	4.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	1.00	0.01	1.00	0.00	0.76	0.43	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	141	370		391	804	174	141	327	303	228	510	457
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1787		1757	1845	1563	1774	1863	1708	1774	1900	1703
Queue Service Time (g <sub>s</sub> ), s	8.3	31.1		24.7	53.0	12.7	8.4	25.4	25.8	14.4	35.0	35.0
Cycle Queue Clearance Time (g <sub>c</sub> ), s	8.3	31.1		24.7	53.0	12.7	8.4	25.4	25.8	14.4	35.0	35.0
Green Ratio (g/C)	0.37	0.23		0.50	0.34	0.34	0.37	0.23	0.23	0.37	0.23	0.23
Capacity (c), veh/h	302	405		527	633	537	299	422	387	337	431	386
Volume-to-Capacity Ratio (X)	0.468	0.913		0.743	1.270	0.324	0.472	0.775	0.783	0.678	1.184	1.184
Available Capacity (c <sub>a</sub> ), veh/h	302	405		527	633	537	299	422	387	337	431	386
Back of Queue (Q), veh/ln (50th percentile)	3.8	16.8		10.1	47.7	5.0	3.8	13.1	12.3	6.9	29.5	26.6
Queue Storage Ratio (RQ) (50th percentile)	0.95	0.00		2.06	0.00	0.39	0.32	0.00	0.00	0.58	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	37.3	58.2		35.0	50.7	37.5	37.3	56.0	56.1	38.6	59.7	59.7
Incremental Delay (d <sub>2</sub> ), s/veh	1.1	24.6		5.6	133.8	0.3	1.2	8.7	10.0	5.4	104.3	106.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	38.4	82.8		40.6	184.5	37.8	38.5	64.7	66.2	44.0	164.0	166.0
Level of Service (LOS)	D	F		D	F	D	D	E	E	D	F	F
Approach Delay, s/veh / LOS	70.5	E		124.7	F		60.5	E		141.9	F	
Intersection Delay, s/veh / LOS	110.0						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Opening Year 2020 'No-Build' PM.xus				
Project Description	Opening Year 2020 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		530	70	190	1270		50	0	50			

Signal Information														
Cycle, s	121.8	Reference Phase	2	Green	15.0	60.0	30.0	0.0	0.0	0.0	1	2	3	4
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0	5	6	7	8
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

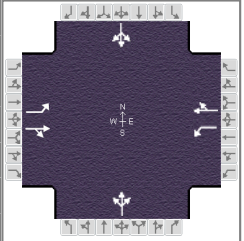
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		65.6	20.6	86.2		35.6		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.4		
Queue Clearance Time (g <sub>s</sub> ), s		36.4	8.1	82.6		8.4		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.00	0.00	1.00		0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		652		207	1380			109				
Adjusted Saturation Flow Rate (s), veh/h/ln		1824		1723	1810			1671				
Queue Service Time (g <sub>s</sub> ), s		34.4		6.1	80.6			6.4				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		34.4		6.1	80.6			6.4				
Green Ratio (g/C)		0.49		0.63	0.66			0.25				
Capacity (c), veh/h		899		430	1197			411				
Volume-to-Capacity Ratio (X)		0.726		0.480	1.153			0.264				
Available Capacity (c <sub>a</sub> ), veh/h		899		430	1197			411				
Back of Queue (Q), veh/ln (50th percentile)		14.9		2.2	55.7			2.7				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.58	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		24.4		16.8	20.6			37.0				
Incremental Delay (d <sub>2</sub> ), s/veh		2.6		0.3	78.7			0.1				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		27.0		17.2	99.3			37.1				
Level of Service (LOS)		C		B	F			D				
Approach Delay, s/veh / LOS	27.0	C		88.6	F		37.1	D		0.0		
Intersection Delay, s/veh / LOS			69.1					E				

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wright Road	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	12. Wallings Rd_Wright Rd_Opening Year 2020 'No-Build' PM.xus				
Project Description	Opening Year 2020 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	10	560	10	20	1410	30	20	10	10	20	10	20

Signal Information													
Cycle, s	98.4	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green		15.0	47.0	20.0	0.0	0.0	0.0				
		Yellow		3.6	3.6	3.2	0.0	0.0	0.0				
		Red		2.0	2.0	2.0	0.0	0.0	0.0				

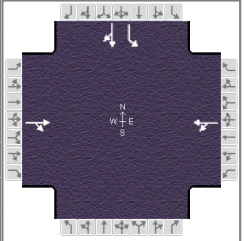
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	20.6	52.6	20.6	52.6		25.2		25.2
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6		5.2		5.2
Max Allow Headway (MAH), s	3.1	6.0	3.1	6.0		4.3		4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.2	27.7	2.5	49.0		4.0		4.6
Green Extension Time (g <sub>e</sub> ), s	0.0	18.6	0.0	0.0		0.2		0.2
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		1.00
Max Out Probability	0.00	0.97	0.00	1.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	11	620		22	1565			43			54	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1857		1740	1820			1549			1539	
Queue Service Time (g <sub>s</sub> ), s	0.2	25.7		0.5	47.0			0.0			0.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.2	25.7		0.5	47.0			2.0			2.6	
Green Ratio (g/C)	0.63	0.48		0.63	0.48			0.20			0.20	
Capacity (c), veh/h	344	887		492	869			370			364	
Volume-to-Capacity Ratio (X)	0.032	0.699		0.044	1.800			0.118			0.149	
Available Capacity (c <sub>a</sub> ), veh/h	344	887		492	869			370			364	
Back of Queue (Q), veh/ln (50th percentile)	0.1	11.1		0.2	106.7			0.9			1.1	
Queue Storage Ratio (RQ) (50th percentile)	0.03	0.00		0.05	0.00			0.00			0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	18.0	20.1		10.8	25.7			32.0			32.3	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	3.1		0.0	364.8			0.1			0.2	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	18.0	23.3		10.9	390.5			32.2			32.4	
Level of Service (LOS)	B	C		B	F			C			C	
Approach Delay, s/veh / LOS	23.2	C		385.3	F		32.2	C		32.4	C	
Intersection Delay, s/veh / LOS	271.8						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Opening Year 2020 'No-Build' PM.xus				
Project Description	Opening Year 2020 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		480	110	60	530					270	10	930

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.5	24.5	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.0	0.0	0.0	0.0	0.0			
				Red	1.9	2.5	0.0	0.0	0.0	0.0			

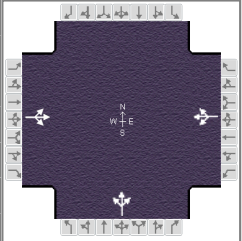
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		8.0				10.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R <sub>c</sub> ), s		5.5		5.5				5.5
Max Allow Headway (MAH), s		2.2		2.2				4.3
Queue Clearance Time (g <sub>s</sub> ), s		21.3		30.3				26.5
Green Extension Time (g <sub>e</sub> ), s		1.0		1.0				0.0
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		641			641					293	1022	
Adjusted Saturation Flow Rate (s), veh/h/ln		1820			1506					1740	1551	
Queue Service Time (g <sub>s</sub> ), s		19.3			9.0					13.3	24.5	
Cycle Queue Clearance Time (g <sub>c</sub> ), s		19.3			28.3					13.3	24.5	
Green Ratio (g/C)		0.61			0.61					0.27	0.27	
Capacity (c), veh/h		1102			956					474	422	
Volume-to-Capacity Ratio (X)		0.582			0.671					0.620	2.420	
Available Capacity (c <sub>a</sub> ), veh/h		1102			956					474	422	
Back of Queue (Q), veh/ln (50th percentile)		6.8			7.1					5.6	84.5	
Queue Storage Ratio (RQ) (50th percentile)		0.00			0.00					0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh		10.8			11.9					28.7	32.8	
Incremental Delay (d <sub>2</sub> ), s/veh		0.5			1.5					2.5	646.3	
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0					0.0	0.0	
Control Delay (d), s/veh		11.3			13.4					31.1	679.1	
Level of Service (LOS)		B			B					C	F	
Approach Delay, s/veh / LOS	11.3	B		13.4	B		0.0			534.5	F	
Intersection Delay, s/veh / LOS	276.7						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Opening Year 2020 'No-Build' PM.xus				
Project Description	Opening Year 2020 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	250	370	130	10	180	120	410	70	60			

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	0.0	59.7	19.7	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	3.6	3.0	0.0	0.0	0.0			
				Red	2.9	1.7	2.3	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		4		
Case Number	0.0	14.0		8.3		12.0		
Phase Duration, s	0.0	65.0		65.0		25.0		
Change Period, (Y+R <sub>c</sub> ), s	6.9	5.3		5.3		5.3		
Max Allow Headway (MAH), s	0.0	2.3		2.3		5.3		
Queue Clearance Time (g <sub>s</sub> ), s		35.3		9.2		21.7		
Green Extension Time (g <sub>e</sub> ), s	0.0	1.2		1.1		0.0		
Phase Call Probability		1.00		1.00		1.00		
Max Out Probability		0.00		0.02		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	815			337			587					
Adjusted Saturation Flow Rate (s), veh/h/ln	1482			1736			1744					
Queue Service Time (g <sub>s</sub> ), s	6.0			0.0			19.7					
Cycle Queue Clearance Time (g <sub>c</sub> ), s	33.3			7.2			19.7					
Green Ratio (g/C)	0.66			0.66			0.22					
Capacity (c), veh/h	1039			1193			382					
Volume-to-Capacity Ratio (X)	0.785			0.282			1.538					
Available Capacity (c <sub>a</sub> ), veh/h	1039			1193			382					
Back of Queue (Q), veh/ln (50th percentile)	10.3			2.2			35.3					
Queue Storage Ratio (RQ) (50th percentile)	0.00			0.00			0.00					
Uniform Delay (d <sub>1</sub> ), s/veh	10.9			6.3			35.2					
Incremental Delay (d <sub>2</sub> ), s/veh	3.7			0.0			254.9					
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0			0.0			0.0					
Control Delay (d), s/veh	14.6			6.4			290.0					
Level of Service (LOS)	B			A			F					
Approach Delay, s/veh / LOS	14.6	B		6.4	A		290.0	F		0.0		
Intersection Delay, s/veh / LOS	105.9						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	580			1240	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	630	0	0	1347	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration	LT						TR
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		20	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	21	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Configuration	LT						LR
v (veh/h)	10						31
C (m) (veh/h)	510						116
v/c	0.02						0.27
95% queue length	0.06						1.00
Control Delay (s/veh)	12.2						47.0
LOS	B						E
Approach Delay (s/veh)	--	--					47.0
Approach LOS	--	--					E

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	580			1240	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	630	0	0	1347	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LT						TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	10						20
C (m) (veh/h)	510						96
v/c	0.02						0.21
95% queue length	0.06						0.73
Control Delay (s/veh)	12.2						52.1
LOS	B						F
Approach Delay (s/veh)	--	--					52.1
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		560	30	40	1240			
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	608	32	43	1347	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		43		20				
C (m) (veh/h)		949		104				
v/c		0.05		0.19				
95% queue length		0.14		0.67				
Control Delay (s/veh)		9.0		47.7				
LOS		A		E				
Approach Delay (s/veh)	--	--	47.7					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		560	10	30	1270			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	608	10	32	1380	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		20					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	21	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		32		31				
C (m) (veh/h)		967		146				
v/c		0.03		0.21				
95% queue length		0.10		0.77				
Control Delay (s/veh)		8.9		36.2				
LOS		A		E				
Approach Delay (s/veh)	--	--	36.2					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	570			1260	60		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	619	0	0	1369	65		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT			TR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				20		40		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	43		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	10					64		
C (m) (veh/h)	477					109		
v/c	0.02					0.59		
95% queue length	0.06					2.84		
Control Delay (s/veh)	12.7					76.9		
LOS	B					F		
Approach Delay (s/veh)	--	--				76.9		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	570			1450	10	
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	619	0	0	1576	10	
Percent Heavy Vehicles	1	--	--	2	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LT						TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	4	0	4	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	10						20
C (m) (veh/h)	417						70
v/c	0.02						0.29
95% queue length	0.07						1.03
Control Delay (s/veh)	13.8						75.8
LOS	B						F
Approach Delay (s/veh)	--	--					75.8
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		570	10	10	1440			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	619	10	10	1565	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	21	0	10	0	0	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		31				
C (m) (veh/h)		958		66				
v/c		0.01		0.47				
95% queue length		0.03		1.86				
Control Delay (s/veh)		8.8		100.7				
LOS		A		F				
Approach Delay (s/veh)	--	--	100.7					
Approach LOS	--	--	F					



TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	560	10	10	1430	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	608	10	10	1554	10	
Percent Heavy Vehicles	1	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LTR			LTR			
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration		LTR			LTR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LTR	LTR		LTR			LTR
v (veh/h)	10	10		30			30
C (m) (veh/h)	425	967		38			37
v/c	0.02	0.01		0.79			0.81
95% queue length	0.07	0.03		2.89			2.95
Control Delay (s/veh)	13.7	8.8		241.8			252.9
LOS	B	A		F			F
Approach Delay (s/veh)	--	--		241.8			252.9
Approach LOS	--	--		F			F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		570	10	10	1440			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	619	10	10	1565	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		958		87				
v/c		0.01		0.23				
95% queue length		0.03		0.82				
Control Delay (s/veh)		8.8		58.3				
LOS		A		F				
Approach Delay (s/veh)	--	--	58.3					
Approach LOS	--	--	F					

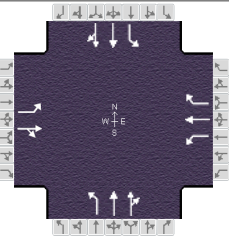
TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		580	10	10	1450			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	630	10	10	1576	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		939		82				
v/c		0.01		0.24				
95% queue length		0.03		0.87				
Control Delay (s/veh)		8.9		62.5				
LOS		A		F				
Approach Delay (s/veh)	--	--	62.5					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	580			1450	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	630	0	0	1576	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT			TR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	10					20		
C (m) (veh/h)	417					67		
v/c	0.02					0.30		
95% queue length	0.07					1.08		
Control Delay (s/veh)	13.8					80.1		
LOS	B					F		
Approach Delay (s/veh)	--	--				80.1		
Approach LOS	--	--				F		

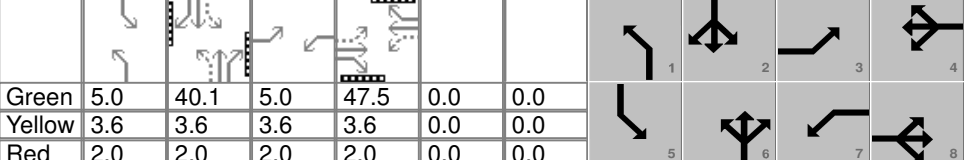
TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/W Mill Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		580	10	10	1450			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63		
Hourly Flow Rate, HFR (veh/h)	0	630	10	10	1576	0		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		939		84				
v/c		0.01		0.24				
95% queue length		0.03		0.85				
Control Delay (s/veh)		8.9		60.8				
LOS		A		F				
Approach Delay (s/veh)	--	--	60.8					
Approach LOS	--	--	F					

OPENING YEAR 2020 'BUILD' CONDITIONS

# HCS 2010 Signalized Intersection Results Summary

General Information					Intersection Information		
Agency	GPD Group				Duration, h	0.25	
Analyst	BMF	Analysis Date	Mar 2, 2015		Area Type	Other	
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour		PHF	0.92	
Intersection	Wallings Road/Broadview F	Analysis Year	2020		Analysis Period	1 > 7:00	
File Name	1. Wallings Rd_Broadview Rd_Opening Year 2020 'Build' AM.xus						
Project Description	Opening Year 2020 'Build' AM Peak Hour						

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	320	560	70	80	200	80	50	560	380	70	190	80

Signal Information																	
Cycle, s	120.0	Reference Phase	2	Green	5.0	40.1	5.0	47.5	0.0	0.0	Red	2.0	2.0	2.0	2.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	3.6	0.0	0.0	Force Mode	Fixed	Simult. Gap N/S	On			
Uncoordinated	Yes	Simult. Gap E/W	On														

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	10.6	53.1	10.6	53.1	10.6	45.7	10.6	45.7
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	7.0	44.8	5.5	11.7	4.4	35.3	5.4	9.3
Green Extension Time (g <sub>e</sub> ), s	0.0	1.2	0.0	4.3	0.0	2.5	0.0	6.5
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.00	1.00	0.94	1.00	0.04

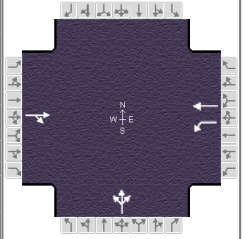
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	348	685		87	217	87	54	548	474	76	151	143
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1844		1757	1845	1563	1774	1863	1610	1774	1900	1712
Queue Service Time (g <sub>s</sub> ), s	5.0	42.8		3.5	9.7	4.3	2.4	33.3	33.3	3.4	6.9	7.3
Cycle Queue Clearance Time (g <sub>c</sub> ), s	5.0	42.8		3.5	9.7	4.3	2.4	33.3	33.3	3.4	6.9	7.3
Green Ratio (g/C)	0.44	0.40		0.44	0.40	0.40	0.38	0.33	0.33	0.38	0.33	0.33
Capacity (c), veh/h	484	730		150	730	619	412	622	538	156	635	572
Volume-to-Capacity Ratio (X)	0.719	0.938		0.580	0.298	0.141	0.132	0.880	0.881	0.488	0.237	0.249
Available Capacity (c <sub>a</sub> ), veh/h	484	730		150	730	619	412	622	538	156	635	572
Back of Queue (Q), veh/ln (50th percentile)	7.2	22.5		1.7	4.2	1.6	1.0	17.5	15.4	1.7	3.2	3.1
Queue Storage Ratio (RQ) (50th percentile)	0.48	0.00		0.11	0.00	0.12	0.12	0.00	0.00	0.17	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	32.5	34.8		29.1	24.8	23.2	24.5	37.7	37.7	30.4	28.9	29.0
Incremental Delay (d <sub>2</sub> ), s/veh	5.1	19.7		5.5	0.2	0.1	0.1	13.8	15.5	2.4	0.2	0.2
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	37.6	54.6		34.6	25.1	23.3	24.6	51.4	53.2	32.8	29.1	29.2
Level of Service (LOS)	D	D		C	C	C	C	D	D	C	C	C
Approach Delay, s/veh / LOS	48.8	D		26.8	C		50.9	D		29.9	C	
Intersection Delay, s/veh / LOS	44.2						D					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Opening Year 2020 'Build' AM.xus				
Project Description	Opening Year 2020 'Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		970	10	50	330		40	0	240			

Signal Information														
Cycle, s	110.0	Reference Phase	2	Green	5.0	63.1	25.1	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

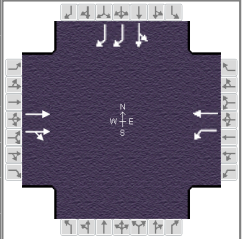
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		68.7	10.6	79.3		30.7		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.5		
Queue Clearance Time (g <sub>s</sub> ), s		64.9	3.3	11.0		21.9		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		1.00	0.15	0.00		0.04		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		1065		54	359			304				
Adjusted Saturation Flow Rate (s), veh/h/ln		1859		1723	1810			1604				
Queue Service Time (g <sub>s</sub> ), s		62.9		1.3	9.0			19.9				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		62.9		1.3	9.0			19.9				
Green Ratio (g/C)		0.57		0.64	0.67			0.23				
Capacity (c), veh/h		1067		145	1212			366				
Volume-to-Capacity Ratio (X)		0.999		0.376	0.296			0.832				
Available Capacity (c <sub>a</sub> ), veh/h		1067		145	1212			366				
Back of Queue (Q), veh/ln (50th percentile)		32.8		0.8	3.1			9.3				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.10	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		23.4		26.7	7.5			40.4				
Incremental Delay (d <sub>2</sub> ), s/veh		27.2		0.6	0.0			14.1				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		50.6		27.3	7.5			54.6				
Level of Service (LOS)		D		C	A			D				
Approach Delay, s/veh / LOS	50.6	D		10.1	B		54.6	D		0.0		
Intersection Delay, s/veh / LOS			41.9						D			

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Opening Year 2020 'Build' AM.xus				
Project Description	Opening Year 2020 'Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		950	220	60	220					140	10	150

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	44.8	33.2	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

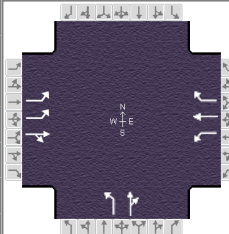
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		6.0				11.0
Phase Duration, s		50.8		50.8				39.2
Change Period, (Y+R <sub>c</sub> ), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		2.3		2.3				4.2
Queue Clearance Time (g <sub>s</sub> ), s		26.4		39.0				7.9
Green Extension Time (g <sub>e</sub> ), s		1.5		1.2				1.3
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.28				0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		655	616	65	239						163	163
Adjusted Saturation Flow Rate (s), veh/h/ln		1881	1758	425	1792						1745	1370
Queue Service Time (g <sub>s</sub> ), s		24.0	24.4	12.6	7.0						5.9	3.6
Cycle Queue Clearance Time (g <sub>c</sub> ), s		24.0	24.4	37.0	7.0						5.9	3.6
Green Ratio (g/C)		0.50	0.50	0.50	0.50						0.37	0.37
Capacity (c), veh/h		936	875	176	892						644	1011
Volume-to-Capacity Ratio (X)		0.700	0.704	0.370	0.268						0.253	0.161
Available Capacity (c <sub>a</sub> ), veh/h		936	875	176	892						644	1011
Back of Queue (Q), veh/ln (50th percentile)		10.0	9.5	1.3	2.6						2.3	1.1
Queue Storage Ratio (RQ) (50th percentile)		0.00	0.00	0.33	0.00						0.08	0.04
Uniform Delay (d <sub>1</sub> ), s/veh		17.4	17.5	31.8	13.1						19.8	19.1
Incremental Delay (d <sub>2</sub> ), s/veh		2.0	2.2	0.5	0.1						0.2	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0	0.0	0.0	0.0						0.0	0.0
Control Delay (d), s/veh		19.4	19.7	32.3	13.2						20.0	19.1
Level of Service (LOS)		B	B	C	B						B	B
Approach Delay, s/veh / LOS	19.5	B		17.3	B		0.0			19.6	B	
Intersection Delay, s/veh / LOS	19.2						B					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Opening Year 2020 'Build' AM.xus				
Project Description	Opening Year 2020 'Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	840	170	80	20	110	260	170	230	70			

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	7.0	16.0	21.1	21.9	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0			
				Red	2.0	2.0	2.0	2.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		
Case Number	2.0	4.0	2.0	3.0		10.0		
Phase Duration, s	35.0	49.1	13.0	27.1		27.9		
Change Period, (Y+R <sub>c</sub> ), s	6.0	6.0	6.0	6.0		6.0		
Max Allow Headway (MAH), s	4.1	2.2	2.1	2.2		5.2		
Queue Clearance Time (g <sub>s</sub> ), s	24.0	10.5	3.1	16.7		17.4		
Green Extension Time (g <sub>e</sub> ), s	2.0	0.5	0.0	0.3		1.3		
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		
Max Out Probability	0.82	0.00	0.01	0.17		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	913	272		22	120	283	185	326				
Adjusted Saturation Flow Rate (s), veh/h/ln	1723	1779		1740	1881	1610	1810	1770				
Queue Service Time (g <sub>s</sub> ), s	22.0	8.5		1.1	4.7	14.7	7.7	15.4				
Cycle Queue Clearance Time (g <sub>c</sub> ), s	22.0	8.5		1.1	4.7	14.7	7.7	15.4				
Green Ratio (g/C)	0.32	0.48		0.08	0.23	0.23	0.24	0.24				
Capacity (c), veh/h	1110	852		135	441	377	440	431				
Volume-to-Capacity Ratio (X)	0.822	0.319		0.161	0.271	0.749	0.420	0.757				
Available Capacity (c <sub>a</sub> ), veh/h	1110	852		135	441	377	440	431				
Back of Queue (Q), veh/ln (50th percentile)	9.4	3.2		0.4	2.1	6.2	3.5	7.5				
Queue Storage Ratio (RQ) (50th percentile)	0.29	0.00		0.04	0.00	0.57	0.19	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh	28.1	14.4		38.8	28.2	32.0	28.7	31.6				
Incremental Delay (d <sub>2</sub> ), s/veh	5.1	0.1		0.2	0.1	7.2	0.9	8.0				
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0				
Control Delay (d), s/veh	33.2	14.5		39.0	28.3	39.2	29.6	39.6				
Level of Service (LOS)	C	B		D	C	D	C	D				
Approach Delay, s/veh / LOS	28.9	C		36.1	D		36.0	D		0.0		
Intersection Delay, s/veh / LOS	32.1						C					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	50	960			350	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	54	1043	0	0	380	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	54						20
C (m) (veh/h)	1174						208
v/c	0.05						0.10
95% queue length	0.14						0.31
Control Delay (s/veh)	8.2						24.1
LOS	A						C
Approach Delay (s/veh)	--	--					24.1
Approach LOS	--	--					C

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Road/Longview Road			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	30	940			350	10		
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	32	1021	0	0	380	10		
Percent Heavy Vehicles	1	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	32						20	
C (m) (veh/h)	1174						229	
v/c	0.03						0.09	
95% queue length	0.08						0.28	
Control Delay (s/veh)	8.2						22.2	
LOS	A						C	
Approach Delay (s/veh)	--	--					22.2	
Approach LOS	--	--					C	

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		940	10	10	340		
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86	
Hourly Flow Rate, HFR (veh/h)	0	1021	10	10	369	0	
Percent Heavy Vehicles	2	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	1	1	0	
Configuration			TR	L	T		
Upstream Signal		0			0		
<b>Minor Street</b>		Northbound			Southbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	20		30				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67	
Hourly Flow Rate, HFR (veh/h)	21	0	32	0	0	0	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		L		LR			
v (veh/h)		10		53			
C (m) (veh/h)		678		212			
v/c		0.01		0.25			
95% queue length		0.04		0.95			
Control Delay (s/veh)		10.4		27.5			
LOS		B		D			
Approach Delay (s/veh)	--	--	27.5				
Approach LOS	--	--	D				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		960	10	10	340			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1043	10	10	369	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	32	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		42				
C (m) (veh/h)		665		229				
v/c		0.02		0.18				
95% queue length		0.05		0.66				
Control Delay (s/veh)		10.5		24.2				
LOS		B		C				
Approach Delay (s/veh)	--	--	24.2					
Approach LOS	--	--	C					



TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	30	960			340	30	
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	32	1043	0	0	369	32	
Percent Heavy Vehicles	1	--	--	2	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1	1	
Configuration	L	T			T	R	
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				20		10	
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	10	
Percent Heavy Vehicles	4	0	4	0	0	0	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	32						31
C (m) (veh/h)	1163						183
v/c	0.03						0.17
95% queue length	0.08						0.59
Control Delay (s/veh)	8.2						28.6
LOS	A						D
Approach Delay (s/veh)	--	--					28.6
Approach LOS	--	--					D

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	1200			370	10		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	1304	0	0	402	10		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	1	0	0	1		0	
Configuration	L	T					TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	10						20	
C (m) (veh/h)	1152						169	
v/c	0.01						0.12	
95% queue length	0.03						0.39	
Control Delay (s/veh)	8.2						29.1	
LOS	A						D	
Approach Delay (s/veh)	--	--					29.1	
Approach LOS	--	--					D	

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1200	10	10	370			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1304	10	10	402	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		40					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	43	0	0	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		53				
C (m) (veh/h)		530		160				
v/c		0.02		0.33				
95% queue length		0.06		1.35				
Control Delay (s/veh)		11.9		38.3				
LOS		B		E				
Approach Delay (s/veh)	--	--	38.3					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	1200	30	10	360	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	1304	32	10	391	10	
Percent Heavy Vehicles	1	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	1	1	1		0
Configuration	L	T	R	L			TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L	L		LTR			LTR
v (veh/h)	10	10		30			30
C (m) (veh/h)	1163	520		89			95
v/c	0.01	0.02		0.34			0.32
95% queue length	0.03	0.06		1.30			1.21
Control Delay (s/veh)	8.1	12.1		64.8			59.5
LOS	A	B		F			F
Approach Delay (s/veh)	--	--		64.8			59.5
Approach LOS	--	--		F			F

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1210	10	10	370			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1315	10	10	402	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		20				
C (m) (veh/h)		525		127				
v/c		0.02		0.16				
95% queue length		0.06		0.54				
Control Delay (s/veh)		12.0		38.6				
LOS		B		E				
Approach Delay (s/veh)	--	--	38.6					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Wright Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Wright Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>		Eastbound			Westbound			
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	20	1190	10	10	350	10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	1293	10	10	380	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0					0
Lanes	1	1	0	1	1	1		
Configuration	L		TR	L	T	R		
Upstream Signal		0			0			
<b>Minor Street</b>		Northbound			Southbound			
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20	20	10	50	10	10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	21	10	54	10	10		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		LTR			LTR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LTR		
v (veh/h)	21	10	52			74		
C (m) (veh/h)	1174	528	78			60		
v/c	0.02	0.02	0.67			1.23		
95% queue length	0.05	0.06	3.08			6.22		
Control Delay (s/veh)	8.1	11.9	115.7			307.4		
LOS	A	B	F			F		
Approach Delay (s/veh)	--	--	115.7			307.4		
Approach LOS	--	--	F			F		

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1240	10	10	360			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1347	10	10	391	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		40					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	43	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		53				
C (m) (veh/h)		504		150				
v/c		0.02		0.35				
95% queue length		0.06		1.46				
Control Delay (s/veh)		12.3		41.6				
LOS		B		E				
Approach Delay (s/veh)	--	--	41.6					
Approach LOS	--	--	E					

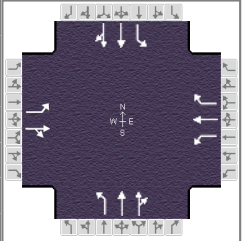


TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	20	1260			360	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	1369	0	0	391	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	21						20	
C (m) (veh/h)	1163						149	
v/c	0.02						0.13	
95% queue length	0.06						0.45	
Control Delay (s/veh)	8.2						32.9	
LOS	A						D	
Approach Delay (s/veh)	--	--					32.9	
Approach LOS	--	--					D	

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/W Mill Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1120	150	10	360			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63		
Hourly Flow Rate, HFR (veh/h)	0	1217	163	10	391	0		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	1	1	1		0	
Configuration		T	R	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		50					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79		
Hourly Flow Rate, HFR (veh/h)	10	0	54	0	0	0		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		64				
C (m) (veh/h)		494		190				
v/c		0.02		0.34				
95% queue length		0.06		1.40				
Control Delay (s/veh)		12.4		33.3				
LOS		B		D				
Approach Delay (s/veh)	--	--	33.3					
Approach LOS	--	--	D					

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Broadview F	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	1. Wallings Rd_Broadview Rd_Opening Year 2020 'Build' PM.xus				
Project Description	Opening Year 2020 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	130	240	100	360	740	160	130	440	140	210	620	270

Signal Information				Signal Timing (s)																				
Cycle, s	130.0	Reference Phase	2	Green	5.0	39.8	5.0	0.4	51.8	0.0	Yellow	3.6	3.6	3.6	3.6	3.6	0.0	Red	2.0	2.0	2.0	2.0	2.0	0.0
Offset, s	0	Reference Point	End																					
Uncoordinated	Yes	Simult. Gap E/W	On																					
Force Mode	Fixed	Simult. Gap N/S	On																					

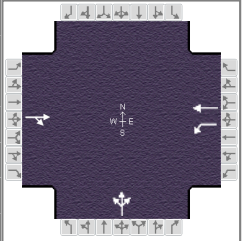
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	10.6	57.4	16.6	63.4	10.6	45.4	10.6	45.4
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	7.0	22.4	13.0	57.8	7.0	21.5	7.0	35.1
Green Extension Time (g <sub>e</sub> ), s	0.0	6.5	0.0	0.0	0.0	6.9	0.0	2.9
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	0.05	1.00	1.00	1.00	0.28	1.00	0.96

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	141	370		391	804	174	141	327	303	228	510	457
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1787		1757	1845	1563	1774	1863	1708	1774	1900	1703
Queue Service Time (g <sub>s</sub> ), s	5.0	20.4		11.0	55.8	9.0	5.0	19.2	19.5	5.0	33.1	33.1
Cycle Queue Clearance Time (g <sub>c</sub> ), s	5.0	20.4		11.0	55.8	9.0	5.0	19.2	19.5	5.0	33.1	33.1
Green Ratio (g/C)	0.44	0.40		0.50	0.44	0.44	0.34	0.31	0.31	0.34	0.31	0.31
Capacity (c), veh/h	124	712		445	820	695	145	570	523	235	582	521
Volume-to-Capacity Ratio (X)	1.137	0.519		0.879	0.981	0.250	0.978	0.574	0.580	0.970	0.877	0.877
Available Capacity (c <sub>a</sub> ), veh/h	124	712		445	820	695	145	570	523	235	582	521
Back of Queue (Q), veh/ln (50th percentile)	8.5	8.8		9.0	30.3	3.4	2.7	9.1	8.5	3.3	17.9	16.3
Queue Storage Ratio (RQ) (50th percentile)	0.57	0.00		0.58	0.00	0.26	0.31	0.00	0.00	0.33	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	34.9	29.7		32.8	35.6	22.6	44.2	38.0	38.0	47.9	42.8	42.8
Incremental Delay (d <sub>2</sub> ), s/veh	122.2	0.7		17.9	26.6	0.2	67.9	1.4	1.6	49.9	14.2	15.5
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	157.1	30.3		50.7	62.2	22.7	112.1	39.4	39.7	97.8	56.9	58.3
Level of Service (LOS)	F	C		D	E	C	F	D	D	F	E	E
Approach Delay, s/veh / LOS	65.4	E		53.9	D		52.8	D		65.3	E	
Intersection Delay, s/veh / LOS	58.7						E					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Opening Year 2020 'Build' PM.xus				
Project Description	Opening Year 2020 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		530	70	190	1270		50	0	50			

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	7.0	56.2	10.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0			
				Red	2.0	2.0	2.0	0.0	0.0	0.0			

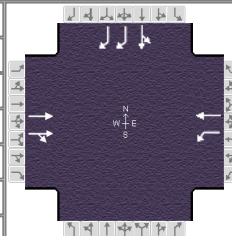
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		61.8	12.6	74.4		15.6		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.4		
Queue Clearance Time (g <sub>s</sub> ), s		20.8	5.4	70.2		7.6		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.00	0.30	1.00		0.07		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		652		207	1380		109					
Adjusted Saturation Flow Rate (s), veh/h/ln		1824		1723	1810		1671					
Queue Service Time (g <sub>s</sub> ), s		18.8		3.4	68.2		5.6					
Cycle Queue Clearance Time (g <sub>c</sub> ), s		18.8		3.4	68.2		5.6					
Green Ratio (g/C)		0.62		0.72	0.76		0.11					
Capacity (c), veh/h		1139		528	1383		186					
Volume-to-Capacity Ratio (X)		0.572		0.391	0.998		0.586					
Available Capacity (c <sub>a</sub> ), veh/h		1139		528	1383		186					
Back of Queue (Q), veh/ln (50th percentile)		6.5		0.9	25.2		2.4					
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.10	0.00		0.00					
Uniform Delay (d <sub>1</sub> ), s/veh		9.9		7.2	10.5		38.0					
Incremental Delay (d <sub>2</sub> ), s/veh		0.5		0.2	23.7		3.2					
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0		0.0					
Control Delay (d), s/veh		10.3		7.4	34.2		41.2					
Level of Service (LOS)		B		A	C		D					
Approach Delay, s/veh / LOS	10.3	B		30.7	C		41.2	D		0.0		
Intersection Delay, s/veh / LOS	25.5						C					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Opening Year 2020 'Build' PM.xus				
Project Description	Opening Year 2020 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		370	110	40	350					270	10	820

Signal Information														
Cycle, s	70.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	27.2	30.8	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
				Red	2.0	2.0	0.0	0.0	0.0	0.0				

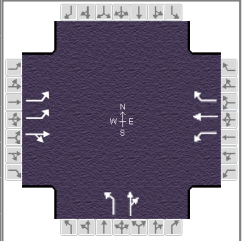
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		6.0				11.0
Phase Duration, s		33.2		33.2				36.8
Change Period, (Y+R <sub>c</sub> ), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		2.1		2.1				4.3
Queue Clearance Time (g <sub>s</sub> ), s		9.3		13.5				20.9
Green Extension Time (g <sub>e</sub> ), s		0.7		0.7				4.2
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.00				0.44

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		269	252	43	380						304	891
Adjusted Saturation Flow Rate (s), veh/h/ln		1881	1733	860	1792						1743	1370
Queue Service Time (g <sub>s</sub> ), s		7.1	7.3	2.7	11.5						8.3	18.9
Cycle Queue Clearance Time (g <sub>c</sub> ), s		7.1	7.3	10.0	11.5						8.3	18.9
Green Ratio (g/C)		0.39	0.39	0.39	0.39						0.44	0.44
Capacity (c), veh/h		731	674	347	696						767	1206
Volume-to-Capacity Ratio (X)		0.368	0.375	0.125	0.546						0.397	0.739
Available Capacity (c <sub>a</sub> ), veh/h		731	674	347	696						767	1206
Back of Queue (Q), veh/ln (50th percentile)		2.8	2.6	0.5	4.3						2.9	5.5
Queue Storage Ratio (RQ) (50th percentile)		0.00	0.00	0.13	0.00						0.10	0.19
Uniform Delay (d <sub>1</sub> ), s/veh		15.3	15.3	18.9	16.6						13.3	16.3
Incremental Delay (d <sub>2</sub> ), s/veh		0.1	0.1	0.1	0.5						0.3	2.4
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0	0.0	0.0	0.0						0.0	0.0
Control Delay (d), s/veh		15.4	15.4	18.9	17.1						13.6	18.7
Level of Service (LOS)		B	B	B	B						B	B
Approach Delay, s/veh / LOS	15.4	B		17.3	B		0.0			17.4	B	
Intersection Delay, s/veh / LOS	16.9						B					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2020	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Opening Year 2020 'Build' PM.xus				
Project Description	Opening Year 2020 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	250	370	130	10	180	120	410	70	60			

Signal Information				Signal Phases									
Cycle, s	70.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	7.0	1.0	23.8	20.2	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	0.0	4.0	4.0	0.0	0.0			
				Red	2.0	0.0	2.0	2.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		
Case Number	2.0	4.0	2.0	3.0		10.0		
Phase Duration, s	14.0	30.8	13.0	29.8		26.2		
Change Period, (Y+R <sub>c</sub> ), s	6.0	6.0	6.0	6.0		6.0		
Max Allow Headway (MAH), s	4.1	2.1	2.1	2.1		5.3		
Queue Clearance Time (g <sub>s</sub> ), s	7.3	21.6	2.4	7.4		18.3		
Green Extension Time (g <sub>e</sub> ), s	0.1	0.4	0.0	0.6		0.7		
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		
Max Out Probability	1.00	0.47	0.00	0.00		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	272	543		11	196	130	446	141				
Adjusted Saturation Flow Rate (s), veh/h/ln	1723	1797		1740	1881	1610	1810	1703				
Queue Service Time (g <sub>s</sub> ), s	5.3	19.6		0.4	5.4	4.1	16.3	4.5				
Cycle Queue Clearance Time (g <sub>c</sub> ), s	5.3	19.6		0.4	5.4	4.1	16.3	4.5				
Green Ratio (g/C)	0.11	0.35		0.10	0.34	0.34	0.29	0.29				
Capacity (c), veh/h	394	637		174	640	547	522	491				
Volume-to-Capacity Ratio (X)	0.690	0.854		0.062	0.306	0.238	0.853	0.287				
Available Capacity (c <sub>a</sub> ), veh/h	394	637		174	640	547	522	491				
Back of Queue (Q), veh/ln (50th percentile)	2.4	9.2		0.2	2.1	1.4	8.5	1.8				
Queue Storage Ratio (RQ) (50th percentile)	0.07	0.00		0.02	0.00	0.13	0.47	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh	29.8	20.9		28.5	17.0	16.6	23.5	19.3				
Incremental Delay (d <sub>2</sub> ), s/veh	5.1	10.4		0.1	0.1	0.1	13.3	0.5				
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0				
Control Delay (d), s/veh	34.9	31.3		28.6	17.1	16.7	36.8	19.8				
Level of Service (LOS)	C	C		C	B	B	D	B				
Approach Delay, s/veh / LOS	32.5	C		17.3	B		32.7	C		0.0		
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	580			1240	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	630	0	0	1347	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		20	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	21	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	10						31
C (m) (veh/h)	510						116
v/c	0.02						0.27
95% queue length	0.06						1.00
Control Delay (s/veh)	12.2						47.0
LOS	B						E
Approach Delay (s/veh)	--	--					47.0
Approach LOS	--	--					E



TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	580			1240	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	630	0	0	1347	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	10						20
C (m) (veh/h)	510						96
v/c	0.02						0.21
95% queue length	0.06						0.73
Control Delay (s/veh)	12.2						52.1
LOS	B						F
Approach Delay (s/veh)	--	--					52.1
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		560	30	40	1240			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	608	32	43	1347	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1		0	
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		43		20				
C (m) (veh/h)		949		104				
v/c		0.05		0.19				
95% queue length		0.14		0.67				
Control Delay (s/veh)		9.0		47.7				
LOS		A		E				
Approach Delay (s/veh)	--	--	47.7					
Approach LOS	--	--	E					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		560	10	30	1270		
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86	
Hourly Flow Rate, HFR (veh/h)	0	608	10	32	1380	0	
Percent Heavy Vehicles	2	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	1	1		0
Configuration			TR	L	T		
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		20				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67	
Hourly Flow Rate, HFR (veh/h)	10	0	21	0	0	0	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0		0
Configuration		LR					
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		L		LR			
v (veh/h)		32		31			
C (m) (veh/h)		967		146			
v/c		0.03		0.21			
95% queue length		0.10		0.77			
Control Delay (s/veh)		8.9		36.2			
LOS		A		E			
Approach Delay (s/veh)	--	--	36.2				
Approach LOS	--	--	E				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	570			1260	60		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	619	0	0	1369	65		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	1		
Configuration	L	T			T	R		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				20		40		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	43		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	10						64	
C (m) (veh/h)	477						114	
v/c	0.02						0.56	
95% queue length	0.06						2.69	
Control Delay (s/veh)	12.7						71.0	
LOS	B						F	
Approach Delay (s/veh)	--	--					71.0	
Approach LOS	--	--					F	

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	570			1450	10	
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	619	0	0	1576	10	
Percent Heavy Vehicles	1	--	--	2	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	4	0	4	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	10						20
C (m) (veh/h)	417						70
v/c	0.02						0.29
95% queue length	0.07						1.03
Control Delay (s/veh)	13.8						75.8
LOS	B						F
Approach Delay (s/veh)	--	--					75.8
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description Wallings Road Safety & Corridor Study								
East/West Street: Wallings Road				North/South Street: Creekside Terrace				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		570	10	10	1440			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	619	10	10	1565	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	21	0	10	0	0	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		31				
C (m) (veh/h)		958		66				
v/c		0.01		0.47				
95% queue length		0.03		1.86				
Control Delay (s/veh)		8.8		100.7				
LOS		A		F				
Approach Delay (s/veh)	--	--	100.7					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	560	10	10	1430	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	608	10	10	1554	10	
Percent Heavy Vehicles	1	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	1	1	1		0
Configuration	L	T	R	L			TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L	L	LTR			LTR	
v (veh/h)	10	10		30			30
C (m) (veh/h)	425	967		45			42
v/c	0.02	0.01		0.67			0.71
95% queue length	0.07	0.03		2.55			2.69
Control Delay (s/veh)	13.7	8.8		182.1			204.4
LOS	B	A		F			F
Approach Delay (s/veh)	--	--	182.1			204.4	
Approach LOS	--	--	F			F	



TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		570	10	10	1440			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	619	10	10	1565	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		20				
C (m) (veh/h)		958		87				
v/c		0.01		0.23				
95% queue length		0.03		0.82				
Control Delay (s/veh)		8.8		58.3				
LOS		A		F				
Approach Delay (s/veh)	--	--	58.3					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Wright Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Wright Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	560	10	20	1410	30		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	608	10	21	1532	32		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	1		
Configuration	L		TR	L	T	R		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20	10	10	20	10	20		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	10	10	21	10	21		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		LTR			LTR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LTR		
v (veh/h)	10	21	41			52		
C (m) (veh/h)	425	957	31			41		
v/c	0.02	0.02	1.32			1.27		
95% queue length	0.07	0.07	4.60			5.16		
Control Delay (s/veh)	13.7	8.8	466.4			385.0		
LOS	B	A	F			F		
Approach Delay (s/veh)	--	--	466.4			385.0		
Approach LOS	--	--	F			F		

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Craig Ln		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		580	10	10	1450		
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76	
Hourly Flow Rate, HFR (veh/h)	0	630	10	10	1576	0	
Percent Heavy Vehicles	2	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	1	1	0	
Configuration			TR	L	T		
Upstream Signal		0			0		
<b>Minor Street</b>		Northbound			Southbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		10				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70	
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0	
Percent Heavy Vehicles	7	0	7	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		L		LR			
v (veh/h)		10		20			
C (m) (veh/h)		939		82			
v/c		0.01		0.24			
95% queue length		0.03		0.87			
Control Delay (s/veh)		8.9		62.5			
LOS		A		F			
Approach Delay (s/veh)	--	--	62.5				
Approach LOS	--	--	F				

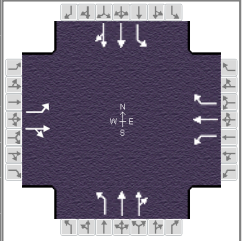
TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2020 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	580			1450	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	630	0	0	1576	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	10						20	
C (m) (veh/h)	417						67	
v/c	0.02						0.30	
95% queue length	0.07						1.08	
Control Delay (s/veh)	13.8						80.1	
LOS	B						F	
Approach Delay (s/veh)	--	--					80.1	
Approach LOS	--	--					F	

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/W Mill Rd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2020 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		580	10	10	1450		
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63	
Hourly Flow Rate, HFR (veh/h)	0	630	10	10	1576	0	
Percent Heavy Vehicles	1	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	1	1	1		0
Configuration		T	R	L	T		
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		10				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79	
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0	
Percent Heavy Vehicles	2	0	2	4	0	4	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0		0
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		L		LR			
v (veh/h)		10		20			
C (m) (veh/h)		939		84			
v/c		0.01		0.24			
95% queue length		0.03		0.85			
Control Delay (s/veh)		8.9		60.8			
LOS		A		F			
Approach Delay (s/veh)	--	--	60.8				
Approach LOS	--	--	F				

DESIGN YEAR 2040 'NO-BUILD' CONDITIONS

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Broadview F	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	1. Wallings Rd_Broadview Rd_Design Year 2040 'No-Build' AM.xus				
Project Description	Design Year 2040 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	350	620	80	90	220	90	60	620	420	80	210	90

Signal Information				Signal Timing (s)										
Cycle, s	154.4	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	22.0	35.0	22.0	12.4	35.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0				
				Red	2.0	2.0	2.0	2.0	2.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	27.6	40.6	45.6	58.6	27.6	40.6	27.6	40.6
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	24.0	37.0	6.6	17.1	5.7	37.0	7.0	14.2
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.3	4.5	0.1	0.0	0.2	6.8
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	0.00	0.10	0.00	1.00	0.00	0.19

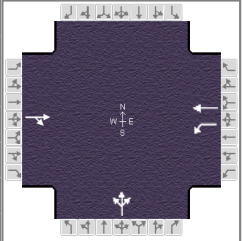
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	380	761		98	239	98	65	605	525	87	168	158
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1843		1757	1845	1563	1774	1863	1611	1774	1900	1710
Queue Service Time (g <sub>s</sub> ), s	22.0	35.0		4.6	15.1	6.8	3.7	35.0	35.0	5.0	11.6	12.2
Cycle Queue Clearance Time (g <sub>c</sub> ), s	22.0	35.0		4.6	15.1	6.8	3.7	35.0	35.0	5.0	11.6	12.2
Green Ratio (g/C)	0.37	0.23		0.50	0.34	0.34	0.37	0.23	0.23	0.37	0.23	0.23
Capacity (c), veh/h	562	418		502	633	537	441	422	365	299	431	388
Volume-to-Capacity Ratio (X)	0.677	1.821		0.195	0.378	0.182	0.148	1.433	1.438	0.290	0.390	0.408
Available Capacity (c <sub>a</sub> ), veh/h	562	418		502	633	537	441	422	365	299	431	388
Back of Queue (Q), veh/ln (50th percentile)	12.2	60.2		1.9	7.0	2.6	1.7	41.1	35.9	2.3	5.7	5.4
Queue Storage Ratio (RQ) (50th percentile)	3.07	0.00		0.39	0.00	0.21	0.14	0.00	0.00	0.19	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	39.2	59.7		25.0	38.3	35.5	32.6	59.7	59.7	36.3	50.6	50.9
Incremental Delay (d <sub>2</sub> ), s/veh	3.2	378.7		0.2	0.4	0.2	0.2	208.2	212.3	0.5	0.6	0.7
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	42.4	438.4		25.2	38.6	35.7	32.7	267.9	272.0	36.8	51.2	51.6
Level of Service (LOS)	D	F		C	D	D	C	F	F	D	D	D
Approach Delay, s/veh / LOS	306.4	F		34.9	C		256.9	F		48.3	D	
Intersection Delay, s/veh / LOS	217.3						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Design Year 2040 'No-Build' AM.xus				
Project Description	Design Year 2040 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1070	10	60	360		50	0	260			

Signal Information														
Cycle, s	121.8	Reference Phase	2	Green	15.0	60.0	30.0	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

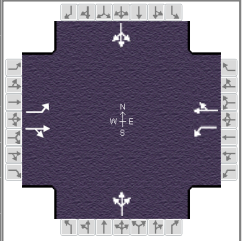
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		65.6	20.6	86.2		35.6		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.5		
Queue Clearance Time (g <sub>s</sub> ), s		62.0	3.8	13.4		26.4		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		1.00	0.00	0.00		0.02		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		1174		65	391			337				
Adjusted Saturation Flow Rate (s), veh/h/ln		1860		1723	1810			1607				
Queue Service Time (g <sub>s</sub> ), s		60.0		1.8	11.4			24.4				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		60.0		1.8	11.4			24.4				
Green Ratio (g/C)		0.49		0.63	0.66			0.25				
Capacity (c), veh/h		916		271	1197			396				
Volume-to-Capacity Ratio (X)		1.281		0.240	0.327			0.851				
Available Capacity (c <sub>a</sub> ), veh/h		916		271	1197			396				
Back of Queue (Q), veh/ln (50th percentile)		59.8		0.9	4.2			11.4				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.24	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		30.9		24.3	8.9			43.8				
Incremental Delay (d <sub>2</sub> ), s/veh		135.0		0.2	0.1			15.4				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		165.9		24.5	8.9			59.1				
Level of Service (LOS)		F		C	A			E				
Approach Delay, s/veh / LOS	165.9	F		11.2	B		59.1	E		0.0		
Intersection Delay, s/veh / LOS	111.7						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wright Road	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	12. Wallings Rd_Wright Rd_Design Year 2040 'No-Build' AM.xus				
Project Description	Design Year 2040 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	20	1320	10	10	390	10	20	20	10	60	10	10

Signal Information														
Cycle, s	98.4	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On	Green	15.0	47.0	20.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.2	0.0	0.0	0.0				
				Red	2.0	2.0	2.0	0.0	0.0	0.0				

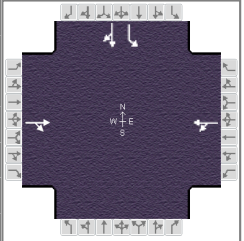
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	20.6	52.6	20.6	52.6		25.2		25.2
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6		5.2		5.2
Max Allow Headway (MAH), s	3.1	6.0	3.1	6.0		4.3		4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.5	49.0	2.2	18.1		4.4		6.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	25.4		0.4		0.3
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		1.00
Max Out Probability	0.00	1.00	0.00	0.86		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	22	1446		11	435			54			87	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1860		1740	1819			1623			1429	
Queue Service Time (g <sub>s</sub> ), s	0.5	47.0		0.2	16.1			0.0			2.5	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.5	47.0		0.2	16.1			2.4			4.9	
Green Ratio (g/C)	0.63	0.48		0.63	0.48			0.20			0.20	
Capacity (c), veh/h	622	889		338	869			381			354	
Volume-to-Capacity Ratio (X)	0.035	1.627		0.032	0.500			0.143			0.245	
Available Capacity (c <sub>a</sub> ), veh/h	622	889		338	869			381			354	
Back of Queue (Q), veh/ln (50th percentile)	0.2	89.9		0.1	6.6			1.1			1.8	
Queue Storage Ratio (RQ) (50th percentile)	0.04	0.00		0.04	0.00			0.00			0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	8.5	25.7		18.0	17.6			32.2			33.1	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	287.3		0.0	1.0			0.2			0.4	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	8.5	313.0		18.0	18.6			32.4			33.5	
Level of Service (LOS)	A	F		B	B			C			C	
Approach Delay, s/veh / LOS	308.5	F		18.6	B		32.4	C		33.5	C	
Intersection Delay, s/veh / LOS	226.7						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Design Year 2040 'No-Build' AM.xus				
Project Description	Design Year 2040 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1050	250	70	240					160	10	170

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	54.5	24.5	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.0	0.0	0.0	0.0	0.0			
				Red	1.9	2.5	0.0	0.0	0.0	0.0			

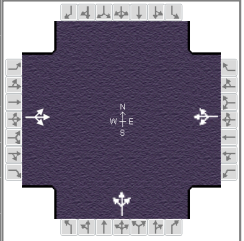
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		8.0				10.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R <sub>c</sub> ), s		5.5		5.5				5.5
Max Allow Headway (MAH), s		2.3		2.3				4.2
Queue Clearance Time (g <sub>s</sub> ), s		56.5		56.5				11.4
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0				1.1
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		1.00		1.00				0.02

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		1413			337					174	196	
Adjusted Saturation Flow Rate (s), veh/h/ln		1818			225					1740	1561	
Queue Service Time (g <sub>s</sub> ), s		54.5			0.0					7.3	9.4	
Cycle Queue Clearance Time (g <sub>c</sub> ), s		54.5			54.5					7.3	9.4	
Green Ratio (g/C)		0.61			0.61					0.27	0.27	
Capacity (c), veh/h		1101			185					474	425	
Volume-to-Capacity Ratio (X)		1.283			1.817					0.367	0.460	
Available Capacity (c <sub>a</sub> ), veh/h		1101			185					474	425	
Back of Queue (Q), veh/ln (50th percentile)		60.0			22.8					3.0	3.5	
Queue Storage Ratio (RQ) (50th percentile)		0.00			0.00					0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh		17.8			31.3					26.5	27.2	
Incremental Delay (d <sub>2</sub> ), s/veh		134.5			388.0					0.5	0.8	
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0					0.0	0.0	
Control Delay (d), s/veh		152.3			419.3					27.0	28.0	
Level of Service (LOS)		F			F					C	C	
Approach Delay, s/veh / LOS	152.3	F		419.3	F		0.0			27.5	C	
Intersection Delay, s/veh / LOS	173.0						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Design Year 2040 'No-Build' AM.xus				
Project Description	Design Year 2040 'No-Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	930	190	90	20	120	280	190	250	80			

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	0.0	59.7	19.7	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	3.6	3.0	0.0	0.0	0.0			
				Red	2.9	1.7	2.3	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		4		
Case Number	0.0	14.0		8.3		12.0		
Phase Duration, s	0.0	65.0		65.0		25.0		
Change Period, (Y+R <sub>c</sub> ), s	6.9	5.3		5.3		5.3		
Max Allow Headway (MAH), s	0.0	2.9		2.9		5.2		
Queue Clearance Time (g <sub>s</sub> ), s		61.7		13.3		21.7		
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		2.8		0.0		
Phase Call Probability		1.00		1.00		1.00		
Max Out Probability		1.00		0.58		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	1315			457			565					
Adjusted Saturation Flow Rate (s), veh/h/ln	1016			1746			1764					
Queue Service Time (g <sub>s</sub> ), s	6.0			0.0			19.7					
Cycle Queue Clearance Time (g <sub>c</sub> ), s	59.7			11.3			19.7					
Green Ratio (g/C)	0.66			0.66			0.22					
Capacity (c), veh/h	745			1200			386					
Volume-to-Capacity Ratio (X)	1.766			0.380			1.464					
Available Capacity (c <sub>a</sub> ), veh/h	745			1200			386					
Back of Queue (Q), veh/ln (50th percentile)	87.4			3.4			32.2					
Queue Storage Ratio (RQ) (50th percentile)	0.00			0.00			0.00					
Uniform Delay (d <sub>1</sub> ), s/veh	19.2			7.0			35.2					
Incremental Delay (d <sub>2</sub> ), s/veh	350.0			0.1			222.7					
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0			0.0			0.0					
Control Delay (d), s/veh	369.2			7.1			257.8					
Level of Service (LOS)	F			A			F					
Approach Delay, s/veh / LOS	369.2	F		7.1	A		257.8	F		0.0		
Intersection Delay, s/veh / LOS	271.5						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	60	1060			390	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	65	1152	0	0	423	10	
Percent Heavy Vehicles	2	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration	LT					TR	
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	65						20
C (m) (veh/h)	1127						165
v/c	0.06						0.12
95% queue length	0.18						0.40
Control Delay (s/veh)	8.4						29.8
LOS	A						D
Approach Delay (s/veh)	--	--					29.8
Approach LOS	--	--					D

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	30	1040			390	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	32	1130	0	0	423	10	
Percent Heavy Vehicles	2	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration	LT					TR	
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	32						20
C (m) (veh/h)	1127						189
v/c	0.03						0.11
95% queue length	0.09						0.35
Control Delay (s/veh)	8.3						26.3
LOS	A						D
Approach Delay (s/veh)	--	--					26.3
Approach LOS	--	--					D

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1040	10	10	380			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1130	10	10	413	0		
Percent Heavy Vehicles	2	--	--	4	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	21	0	32	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		53				
C (m) (veh/h)		606		175				
v/c		0.02		0.30				
95% queue length		0.05		1.21				
Control Delay (s/veh)		11.0		34.3				
LOS		B		D				
Approach Delay (s/veh)	--	--	34.3					
Approach LOS	--	--	D					



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1060	10	10	380			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1152	10	10	413	0		
Percent Heavy Vehicles	2	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	32	0	0	0		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		42				
C (m) (veh/h)		601		189				
v/c		0.02		0.22				
95% queue length		0.05		0.82				
Control Delay (s/veh)		11.1		29.4				
LOS		B		D				
Approach Delay (s/veh)	--	--	29.4					
Approach LOS	--	--	D					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>			<b>Site Information</b>					
Analyst	BMF		Intersection	Wallings Rd/McCreary Rd				
Agency/Co.	GPD Group		Jurisdiction	City of Broadview Heights				
Date Performed	3/2/2015		Analysis Year	2040 'No-Build'				
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>			North/South Street: <i>McCreary Road</i>					
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>0.25</i>					
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	30	1060			380	30		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	32	1152	0	0	413	32		
Percent Heavy Vehicles	2	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				20		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	32						31	
C (m) (veh/h)	1115						147	
v/c	0.03						0.21	
95% queue length	0.09						0.76	
Control Delay (s/veh)	8.3						35.9	
LOS	A						E	
Approach Delay (s/veh)	--	--					35.9	
Approach LOS	--	--					E	

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	1320			410	10	
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	1434	0	0	445	10	
Percent Heavy Vehicles	2	--	--	2	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LT						TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	4	0	4	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	10						20
C (m) (veh/h)	1106						135
v/c	0.01						0.15
95% queue length	0.03						0.50
Control Delay (s/veh)	8.3						36.2
LOS	A						E
Approach Delay (s/veh)	--	--					36.2
Approach LOS	--	--					E

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1320	10	10	410			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1434	10	10	445	0		
Percent Heavy Vehicles	2	--	--	4	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		50					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	54	0	0	0		
Percent Heavy Vehicles	3	0	3	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		64				
C (m) (veh/h)		463		136				
v/c		0.02		0.47				
95% queue length		0.07		2.15				
Control Delay (s/veh)		12.9		53.0				
LOS		B		F				
Approach Delay (s/veh)	--	--	53.0					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	1330	30	10	400	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	1445	32	10	434	10	
Percent Heavy Vehicles	2	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LTR			LTR			
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LTR	LTR		LTR			LTR
v (veh/h)	10	10		30			30
C (m) (veh/h)	1116	459		62			66
v/c	0.01	0.02		0.48			0.45
95% queue length	0.03	0.07		1.91			1.79
Control Delay (s/veh)	8.3	13.0		108.6			98.7
LOS	A	B		F			F
Approach Delay (s/veh)	--	--		108.6			98.7
Approach LOS	--	--		F			F

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		1340	10	10	410		
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76	
Hourly Flow Rate, HFR (veh/h)	0	1456	10	10	445	0	
Percent Heavy Vehicles	2	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		10				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70	
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (veh/h)		10		20			
C (m) (veh/h)		457		99			
v/c		0.02		0.20			
95% queue length		0.07		0.71			
Control Delay (s/veh)		13.1		50.3			
LOS		B		F			
Approach Delay (s/veh)	--	--	50.3				
Approach LOS	--	--	F				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1380	10	10	400			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1499	10	10	434	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		50					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	54	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		64				
C (m) (veh/h)		440		122				
v/c		0.02		0.52				
95% queue length		0.07		2.47				
Control Delay (s/veh)		13.4		63.2				
LOS		B		F				
Approach Delay (s/veh)	--	--	63.2					
Approach LOS	--	--	F					

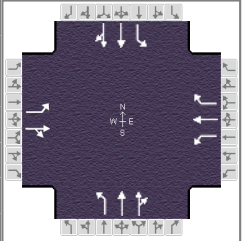


TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>			<b>Site Information</b>					
Analyst	BMF		Intersection	Wallings Rd/Skyline Dr				
Agency/Co.	GPD Group		Jurisdiction	City of Broadview Heights				
Date Performed	3/2/2015		Analysis Year	2040 'No-Build'				
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>			North/South Street: <i>Skyline Drive</i>					
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>0.25</i>					
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	20	1410			400	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	1532	0	0	434	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	21					20		
C (m) (veh/h)	1121					114		
v/c	0.02					0.18		
95% queue length	0.06					0.61		
Control Delay (s/veh)	8.3					43.2		
LOS	A					E		
Approach Delay (s/veh)	--	--				43.2		
Approach LOS	--	--				E		

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		1240	180	10	400		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	0	1347	195	10	434	0	
Percent Heavy Vehicles	1	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
<b>Minor Street</b>		Northbound			Southbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		60				
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	0	65	0	0	0	
Percent Heavy Vehicles	2	0	2	4	0	4	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (veh/h)		10		75			
C (m) (veh/h)		428		140			
v/c		0.02		0.54			
95% queue length		0.07		2.62			
Control Delay (s/veh)		13.6		57.1			
LOS		B		F			
Approach Delay (s/veh)	--	--	57.1				
Approach LOS	--	--	F				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Broadview F	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	1. Wallings Rd_Broadview Rd_Design Year 2040 'No-Build' PM.xus				
Project Description	Design Year 2040 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	150	260	110	390	810	180	150	480	160	230	680	290

Signal Information				Signal Timing (s)																				
Cycle, s	154.4	Reference Phase	2	Green	22.0	35.0	22.0	12.4	35.0	0.0	Yellow	3.6	3.6	3.6	3.6	3.6	0.0	Red	2.0	2.0	2.0	2.0	2.0	0.0
Offset, s	0	Reference Point	End																					
Uncoordinated	Yes	Simult. Gap E/W	On																					
Force Mode	Fixed	Simult. Gap N/S	On																					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	27.6	40.6	45.6	58.6	27.6	40.6	27.6	40.6
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	11.8	36.7	32.8	55.0	11.9	31.1	18.0	37.0
Green Extension Time (g <sub>e</sub> ), s	0.3	0.0	1.0	0.0	0.4	2.7	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.01	1.00	0.26	1.00	0.01	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	163	402		424	880	196	163	362	333	250	555	499
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1786		1757	1845	1563	1774	1863	1703	1774	1900	1706
Queue Service Time (g <sub>s</sub> ), s	9.8	34.7		30.8	53.0	14.5	9.9	28.8	29.1	16.0	35.0	35.0
Cycle Queue Clearance Time (g <sub>c</sub> ), s	9.8	34.7		30.8	53.0	14.5	9.9	28.8	29.1	16.0	35.0	35.0
Green Ratio (g/C)	0.37	0.23		0.50	0.34	0.34	0.37	0.23	0.23	0.37	0.23	0.23
Capacity (c), veh/h	302	405		504	633	537	299	422	386	318	431	387
Volume-to-Capacity Ratio (X)	0.540	0.994		0.842	1.390	0.365	0.545	0.858	0.864	0.785	1.289	1.290
Available Capacity (c <sub>a</sub> ), veh/h	302	405		504	633	537	299	422	386	318	431	387
Back of Queue (Q), veh/ln (50th percentile)	4.5	20.4		12.4	56.8	5.7	4.5	15.6	14.6	8.2	34.5	31.2
Queue Storage Ratio (RQ) (50th percentile)	1.12	0.00		2.53	0.00	0.45	0.38	0.00	0.00	0.69	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	37.8	59.6		43.2	50.7	38.1	37.8	57.3	57.4	39.6	59.7	59.7
Incremental Delay (d <sub>2</sub> ), s/veh	1.9	42.9		12.2	185.3	0.4	2.0	16.0	18.0	12.2	146.8	148.8
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	39.7	102.5		55.4	236.0	38.5	39.8	73.3	75.4	51.8	206.5	208.5
Level of Service (LOS)	D	F		E	F	D	D	E	E	D	F	F
Approach Delay, s/veh / LOS	84.4	F		159.2	F		67.8	E		177.6	F	
Intersection Delay, s/veh / LOS	136.3						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	640			1360	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	695	0	0	1478	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration	LT					TR	
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		20	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	21	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	10						31
C (m) (veh/h)	455						91
v/c	0.02						0.34
95% queue length	0.07						1.32
Control Delay (s/veh)	13.1						63.8
LOS	B						F
Approach Delay (s/veh)	--	--					63.8
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	640			1360	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	695	0	0	1478	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration	LT					TR	
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT						LR
v (veh/h)	10						20
C (m) (veh/h)	455						74
v/c	0.02						0.27
95% queue length	0.07						0.97
Control Delay (s/veh)	13.1						70.8
LOS	B						F
Approach Delay (s/veh)	--	--					70.8
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		620	30	50	1360			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	673	32	54	1478	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		54		20				
C (m) (veh/h)		898		77				
v/c		0.06		0.26				
95% queue length		0.19		0.93				
Control Delay (s/veh)		9.3		67.4				
LOS		A		F				
Approach Delay (s/veh)	--	--	67.4					
Approach LOS	--	--	F					

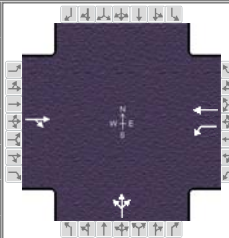
TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		620	10	30	1400			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	673	10	32	1521	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		20					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	21	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		32		31				
C (m) (veh/h)		915		113				
v/c		0.03		0.27				
95% queue length		0.11		1.03				
Control Delay (s/veh)		9.1		48.5				
LOS		A		E				
Approach Delay (s/veh)	--	--	48.5					
Approach LOS	--	--	E					



TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	630			1380	80	
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	684	0	0	1499	86	
Percent Heavy Vehicles	1	--	--	2	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration	LT						TR
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				30		50	
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	32	0	54	
Percent Heavy Vehicles	4	0	4	0	0	0	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration				LR			
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LT					LR	
v (veh/h)	10						86
C (m) (veh/h)	417						80
v/c	0.02						1.08
95% queue length	0.07						6.07
Control Delay (s/veh)	13.8						215.4
LOS	B					F	
Approach Delay (s/veh)	--	--				215.4	
Approach LOS	--	--				F	

# HCS 2010 Signalized Intersection Results Summary

General Information					Intersection Information	
Agency	GPD Group			Duration, h	0.25	
Analyst	BMF	Analysis Date	Mar 2, 2015		Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour		PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2040		Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Design Year 2040 'No-Build' PM.xus					
Project Description	Design Year 2040 'No-Build' PM Peak Hour					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		590	70	200	1400		60	0	60			

Signal Information														
Cycle, s	121.8	Reference Phase	2	Green	15.0	60.0	30.0	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		65.6	20.6	86.2		35.6		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.4		
Queue Clearance Time (g <sub>s</sub> ), s		41.9	8.5	82.6		9.8		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.00	0.00	1.00		0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		717		217	1522			130				
Adjusted Saturation Flow Rate (s), veh/h/ln		1828		1723	1810			1671				
Queue Service Time (g <sub>s</sub> ), s		39.9		6.5	80.6			7.8				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		39.9		6.5	80.6			7.8				
Green Ratio (g/C)		0.49		0.63	0.66			0.25				
Capacity (c), veh/h		900		388	1197			411				
Volume-to-Capacity Ratio (X)		0.797		0.560	1.271			0.317				
Available Capacity (c <sub>a</sub> ), veh/h		900		388	1197			411				
Back of Queue (Q), veh/ln (50th percentile)		17.8		2.8	72.3			3.2				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.73	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		25.8		19.8	20.6			37.5				
Incremental Delay (d <sub>2</sub> ), s/veh		4.7		1.1	128.6			0.2				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		30.5		20.9	149.2			37.7				
Level of Service (LOS)		C		C	F			D				
Approach Delay, s/veh / LOS	30.5	C		133.1	F		37.7	D		0.0		
Intersection Delay, s/veh / LOS			99.9						F			

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	640			1590	10		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	695	0	0	1728	10		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration	LT						TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	10						20	
C (m) (veh/h)	364						52	
v/c	0.03						0.38	
95% queue length	0.08						1.39	
Control Delay (s/veh)	15.2						112.3	
LOS	C						F	
Approach Delay (s/veh)	--	--					112.3	
Approach LOS	--	--					F	

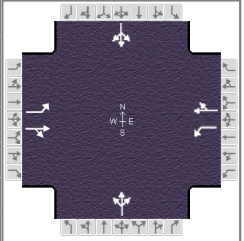
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		640	10	10	1580			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	695	10	10	1717	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	21	0	10	0	0	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		31				
C (m) (veh/h)		898		48				
v/c		0.01		0.65				
95% queue length		0.03		2.51				
Control Delay (s/veh)		9.1		168.1				
LOS		A		F				
Approach Delay (s/veh)	--	--	168.1					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	630	10	10	1570	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	684	10	10	1706	10	
Percent Heavy Vehicles	1	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration	LTR			LTR			
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1		0
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	LTR	LTR		LTR			LTR
v (veh/h)	10	10		30			30
C (m) (veh/h)	372	906					
v/c	0.03	0.01					
95% queue length	0.08	0.03					
Control Delay (s/veh)	14.9	9.0					
LOS	B	A					
Approach Delay (s/veh)	--	--					
Approach LOS	--	--					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		640	10	10	1580			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	695	10	10	1717	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		898		65				
v/c		0.01		0.31				
95% queue length		0.03		1.11				
Control Delay (s/veh)		9.1		83.3				
LOS		A		F				
Approach Delay (s/veh)	--	--	83.3					
Approach LOS	--	--	F					

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	GPD Group			Duration, h	0.25		
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other		
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92		
Intersection	Wallings Road/Wright Road	Analysis Year	2040	Analysis Period	1 > 7:00		
File Name	12. Wallings Rd_Wright Rd_Design Year 2040 'No-Build' PM.xus						
Project Description	Design Year 2040 'No-Build' PM Peak Hour						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	10	630	10	20	1550	30	20	10	10	20	10	20

Signal Information				Signal Timing (s)									Signal Phases					
Cycle, s	98.4	Reference Phase	2	Green	15.0	47.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On															

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	20.6	52.6	20.6	52.6		25.2		25.2
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6		5.2		5.2
Max Allow Headway (MAH), s	3.1	6.0	3.1	6.0		4.3		4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.2	32.8	2.5	49.0		4.0		4.6
Green Extension Time (g <sub>e</sub> ), s	0.0	14.1	0.0	0.0		0.2		0.2
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		1.00
Max Out Probability	0.00	0.99	0.00	1.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	11	696		22	1717		43			54		
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1858		1740	1821		1549			1539		
Queue Service Time (g <sub>s</sub> ), s	0.2	30.8		0.5	47.0		0.0			0.0		
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.2	30.8		0.5	47.0		2.0			2.6		
Green Ratio (g/C)	0.63	0.48		0.63	0.48		0.20			0.20		
Capacity (c), veh/h	344	887		444	870		370			364		
Volume-to-Capacity Ratio (X)	0.032	0.784		0.049	1.975		0.118			0.149		
Available Capacity (c <sub>a</sub> ), veh/h	344	887		444	870		370			364		
Back of Queue (Q), veh/ln (50th percentile)	0.1	13.7		0.2	125.5		0.9			1.1		
Queue Storage Ratio (RQ) (50th percentile)	0.03	0.00		0.05	0.00		0.00			0.00		
Uniform Delay (d <sub>1</sub> ), s/veh	18.0	21.5		12.4	25.7		32.0			32.3		
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	5.4		0.0	442.8		0.1			0.2		
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0		0.0			0.0		
Control Delay (d), s/veh	18.0	26.8		12.5	468.5		32.2			32.4		
Level of Service (LOS)	B	C		B	F		C			C		
Approach Delay, s/veh / LOS	26.7	C		462.8	F		32.2	C		32.4	C	
Intersection Delay, s/veh / LOS	325.1						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



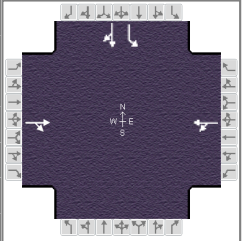
TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		650	10	10	1590			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	706	10	10	1728	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		880		60				
v/c		0.01		0.33				
95% queue length		0.03		1.21				
Control Delay (s/veh)		9.1		92.5				
LOS		A		F				
Approach Delay (s/veh)	--	--	92.5					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	650			1590	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	706	0	0	1728	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT			TR				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration				LR				
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT					LR		
v (veh/h)	10					20		
C (m) (veh/h)	364					49		
v/c	0.03					0.41		
95% queue length	0.08					1.47		
Control Delay (s/veh)	15.2					122.0		
LOS	C					F		
Approach Delay (s/veh)	--	--				122.0		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'No-Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		650	10	10	1590			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63		
Hourly Flow Rate, HFR (veh/h)	0	706	10	10	1728	0		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		10		20				
C (m) (veh/h)		880		63				
v/c		0.01		0.32				
95% queue length		0.03		1.15				
Control Delay (s/veh)		9.1		86.7				
LOS		A		F				
Approach Delay (s/veh)	--	--	86.7					
Approach LOS	--	--	F					

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Design Year 2040 'No-Build' PM.xus				
Project Description	Design Year 2040 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		530	130	70	590					300	10	1010

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	54.5	24.5	0.0	0.0	0.0	0.0				
		Yellow	3.6	3.0	0.0	0.0	0.0	0.0				
		Red	1.9	2.5	0.0	0.0	0.0	0.0				

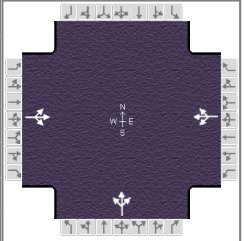
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		8.0				10.0
Phase Duration, s		60.0		60.0				30.0
Change Period, (Y+R <sub>c</sub> ), s		5.5		5.5				5.5
Max Allow Headway (MAH), s		2.2		2.2				4.3
Queue Clearance Time (g <sub>s</sub> ), s		25.2		48.0				26.5
Green Extension Time (g <sub>e</sub> ), s		1.2		1.0				0.0
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.15				1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		717			717					326	1109	
Adjusted Saturation Flow Rate (s), veh/h/ln		1817			1314					1740	1551	
Queue Service Time (g <sub>s</sub> ), s		23.2			22.8					15.1	24.5	
Cycle Queue Clearance Time (g <sub>c</sub> ), s		23.2			46.0					15.1	24.5	
Green Ratio (g/C)		0.61			0.61					0.27	0.27	
Capacity (c), veh/h		1100			840					474	422	
Volume-to-Capacity Ratio (X)		0.652			0.854					0.688	2.627	
Available Capacity (c <sub>a</sub> ), veh/h		1100			840					474	422	
Back of Queue (Q), veh/ln (50th percentile)		8.3			13.9					6.6	95.4	
Queue Storage Ratio (RQ) (50th percentile)		0.00			0.00					0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh		11.6			16.4					29.3	32.8	
Incremental Delay (d <sub>2</sub> ), s/veh		1.1			8.2					4.2	738.8	
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0					0.0	0.0	
Control Delay (d), s/veh		12.7			24.6					33.5	771.5	
Level of Service (LOS)		B			C					C	F	
Approach Delay, s/veh / LOS	12.7	B		24.6	C		0.0			603.8	F	
Intersection Delay, s/veh / LOS	311.2						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Design Year 2040 'No-Build' PM.xus				
Project Description	Design Year 2040 'No-Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	270	410	150	10	200	140	460	80	70			

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	0.0	59.7	19.7	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	3.6	3.0	0.0	0.0	0.0			
				Red	2.9	1.7	2.3	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		4		
Case Number	0.0	14.0		8.3		12.0		
Phase Duration, s	0.0	65.0		65.0		25.0		
Change Period, (Y+R <sub>c</sub> ), s	6.9	5.3		5.3		5.3		
Max Allow Headway (MAH), s	0.0	2.4		2.4		5.3		
Queue Clearance Time (g <sub>s</sub> ), s		46.9		10.4		21.7		
Green Extension Time (g <sub>e</sub> ), s	0.0	1.4		1.3		0.0		
Phase Call Probability		1.00		1.00		1.00		
Max Out Probability		0.01		0.06		1.00		

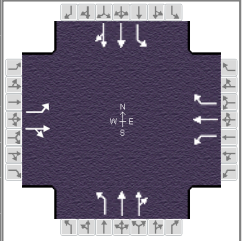
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	902			380			663					
Adjusted Saturation Flow Rate (s), veh/h/ln	1461			1746			1743					
Queue Service Time (g <sub>s</sub> ), s	6.0			0.0			19.7					
Cycle Queue Clearance Time (g <sub>c</sub> ), s	44.9			8.4			19.7					
Green Ratio (g/C)	0.66			0.66			0.22					
Capacity (c), veh/h	1024			1199			382					
Volume-to-Capacity Ratio (X)	0.881			0.317			1.738					
Available Capacity (c <sub>a</sub> ), veh/h	1024			1199			382					
Back of Queue (Q), veh/ln (50th percentile)	14.6			2.6			44.6					
Queue Storage Ratio (RQ) (50th percentile)	0.00			0.00			0.00					
Uniform Delay (d <sub>1</sub> ), s/veh	12.9			6.5			35.2					
Incremental Delay (d <sub>2</sub> ), s/veh	8.7			0.1			342.8					
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0			0.0			0.0					
Control Delay (d), s/veh	21.6			6.6			378.0					
Level of Service (LOS)	C			A			F					
Approach Delay, s/veh / LOS	21.6	C		6.6	A		378.0	F		0.0		
Intersection Delay, s/veh / LOS	140.1						F					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

DESIGN YEAR 2040 'BUILD' CONDITIONS

# HCS 2010 Signalized Intersection Results Summary

General Information					Intersection Information			
Agency	GPD Group				Duration, h	0.25		
Analyst	BMF	Analysis Date	Mar 2, 2015		Area Type	Other		
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour		PHF	0.92		
Intersection	Wallings Road/Broadview F	Analysis Year	2040		Analysis Period	1 > 7:00		
File Name	1. Wallings Rd_Broadview Rd_Design Year 2040 'Build' AM.xus							
Project Description	Design Year 2040 'Build' AM Peak Hour							



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	350	620	80	90	220	90	60	620	420	80	210	90

Signal Information				Signal Timing (s)									Signal Phases			
Cycle, s	140.0	Reference Phase	2	Green	5.0	49.1	5.0	58.5	0.0	0.0	1	2	3	4		
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	3.6	0.0	0.0	5	6	7	8		
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	2.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On													

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	10.6	64.1	10.6	64.1	10.6	54.7	10.6	54.7
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	7.0	59.3	6.5	14.1	5.3	46.0	6.4	11.3
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	5.1	0.0	2.0	0.0	7.7
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.03

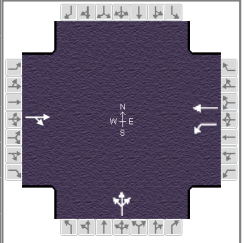
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	380	761		98	239	98	65	605	525	87	168	158
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1843		1757	1845	1563	1774	1863	1611	1774	1900	1710
Queue Service Time (g <sub>s</sub> ), s	5.0	57.3		4.5	12.1	5.4	3.3	43.7	44.0	4.4	8.8	9.3
Cycle Queue Clearance Time (g <sub>c</sub> ), s	5.0	57.3		4.5	12.1	5.4	3.3	43.7	44.0	4.4	8.8	9.3
Green Ratio (g/C)	0.45	0.42		0.45	0.42	0.42	0.39	0.35	0.35	0.39	0.35	0.35
Capacity (c), veh/h	479	770		114	771	653	398	653	565	126	666	600
Volume-to-Capacity Ratio (X)	0.794	0.988		0.857	0.310	0.150	0.164	0.926	0.930	0.691	0.252	0.264
Available Capacity (c <sub>a</sub> ), veh/h	479	770		114	771	653	398	653	565	126	666	600
Back of Queue (Q), veh/ln (50th percentile)	10.8	31.6		3.3	5.4	2.1	1.5	23.8	21.1	3.7	4.2	4.0
Queue Storage Ratio (RQ) (50th percentile)	0.73	0.00		0.21	0.00	0.16	0.16	0.00	0.00	0.37	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	39.1	40.4		34.4	27.3	25.3	27.8	43.7	43.8	36.1	32.4	32.5
Incremental Delay (d <sub>2</sub> ), s/veh	9.0	29.3		43.6	0.2	0.1	0.2	19.4	22.1	14.9	0.2	0.2
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	48.0	69.7		78.0	27.5	25.4	28.0	63.1	65.9	51.0	32.6	32.8
Level of Service (LOS)	D	E		E	C	C	C	E	E	D	C	C
Approach Delay, s/veh / LOS	62.5	E		38.4	D		62.4	E		36.5	D	
Intersection Delay, s/veh / LOS	55.8						E					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Design Year 2040 'Build' AM.xus				
Project Description	Design Year 2040 'Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1070	10	60	360		50	0	260			

Signal Information														
Cycle, s	120.0	Reference Phase	2	Green	5.0	70.8	27.4	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

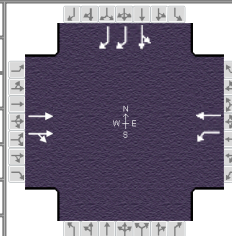
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		76.4	10.6	87.0		33.0		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.5		
Queue Clearance Time (g <sub>s</sub> ), s		72.8	3.7	12.7		26.6		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		1.00	0.51	0.00		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		1174		65	391			337				
Adjusted Saturation Flow Rate (s), veh/h/ln		1860		1723	1810			1607				
Queue Service Time (g <sub>s</sub> ), s		70.8		1.7	10.7			24.6				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		70.8		1.7	10.7			24.6				
Green Ratio (g/C)		0.59		0.65	0.68			0.23				
Capacity (c), veh/h		1097		132	1227			367				
Volume-to-Capacity Ratio (X)		1.070		0.495	0.319			0.918				
Available Capacity (c <sub>a</sub> ), veh/h		1097		132	1227			367				
Back of Queue (Q), veh/ln (50th percentile)		42.8		1.2	3.8			12.6				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.13	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		24.6		29.8	7.9			45.2				
Incremental Delay (d <sub>2</sub> ), s/veh		47.9		1.1	0.1			27.0				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		72.5		30.9	8.0			72.2				
Level of Service (LOS)		F		C	A			E				
Approach Delay, s/veh / LOS	72.5	E		11.2	B		72.2	E		0.0		
Intersection Delay, s/veh / LOS		58.3							E			

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Design Year 2040 'Build' AM.xus				
Project Description	Design Year 2040 'Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1050	250	70	240					160	10	170

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	46.2	31.8	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

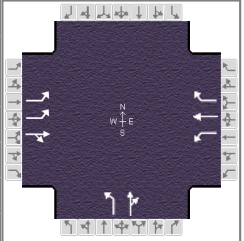
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		6.0				11.0
Phase Duration, s		52.2		52.2				37.8
Change Period, (Y+R <sub>c</sub> ), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		2.4		2.4				4.2
Queue Clearance Time (g <sub>s</sub> ), s		30.1		48.2				8.9
Green Extension Time (g <sub>e</sub> ), s		1.8		0.0				1.5
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.02		1.00				0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		726	687	76	261						185	185
Adjusted Saturation Flow Rate (s), veh/h/ln		1881	1756	372	1792						1745	1370
Queue Service Time (g <sub>s</sub> ), s		27.4	28.1	18.1	7.5						6.9	4.2
Cycle Queue Clearance Time (g <sub>c</sub> ), s		27.4	28.1	46.2	7.5						6.9	4.2
Green Ratio (g/C)		0.51	0.51	0.51	0.51						0.35	0.35
Capacity (c), veh/h		966	902	155	920						617	968
Volume-to-Capacity Ratio (X)		0.752	0.762	0.492	0.284						0.300	0.191
Available Capacity (c <sub>a</sub> ), veh/h		966	902	155	920						617	968
Back of Queue (Q), veh/ln (50th percentile)		11.5	11.1	1.7	2.8						2.7	1.3
Queue Storage Ratio (RQ) (50th percentile)		0.00	0.00	0.43	0.00						0.09	0.04
Uniform Delay (d <sub>1</sub> ), s/veh		17.4	17.5	36.2	12.5						21.0	20.2
Incremental Delay (d <sub>2</sub> ), s/veh		3.0	3.5	0.9	0.1						0.3	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0	0.0	0.0	0.0						0.0	0.0
Control Delay (d), s/veh		20.3	21.0	37.1	12.5						21.3	20.3
Level of Service (LOS)		C	C	D	B						C	C
Approach Delay, s/veh / LOS	20.7	C		18.1	B		0.0			20.8	C	
Intersection Delay, s/veh / LOS	20.3						C					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	AM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Design Year 2040 'Build' AM.xus				
Project Description	Design Year 2040 'Build' AM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	930	190	90	20	120	280	190	250	80			

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	7.0	16.0	21.0	22.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0			
				Red	2.0	2.0	2.0	2.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		
Case Number	2.0	4.0	2.0	3.0		10.0		
Phase Duration, s	35.0	49.0	13.0	27.0		28.0		
Change Period, (Y+R <sub>c</sub> ), s	6.0	6.0	6.0	6.0		6.0		
Max Allow Headway (MAH), s	4.1	2.2	2.1	2.2		5.2		
Queue Clearance Time (g <sub>s</sub> ), s	27.3	11.7	3.1	18.1		19.3		
Green Extension Time (g <sub>e</sub> ), s	0.9	0.6	0.0	0.3		0.9		
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		
Max Out Probability	1.00	0.00	0.01	0.59		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	1011	304		22	130	304	207	359				
Adjusted Saturation Flow Rate (s), veh/h/ln	1723	1778		1740	1881	1610	1810	1768				
Queue Service Time (g <sub>s</sub> ), s	25.3	9.7		1.1	5.1	16.1	8.8	17.3				
Cycle Queue Clearance Time (g <sub>c</sub> ), s	25.3	9.7		1.1	5.1	16.1	8.8	17.3				
Green Ratio (g/C)	0.32	0.48		0.08	0.23	0.23	0.24	0.24				
Capacity (c), veh/h	1110	850		135	439	376	442	432				
Volume-to-Capacity Ratio (X)	0.911	0.358		0.161	0.297	0.810	0.467	0.830				
Available Capacity (c <sub>a</sub> ), veh/h	1110	850		135	439	376	442	432				
Back of Queue (Q), veh/ln (50th percentile)	11.6	3.7		0.4	2.3	7.2	3.9	8.9				
Queue Storage Ratio (RQ) (50th percentile)	0.36	0.00		0.04	0.00	0.66	0.22	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh	29.3	14.8		38.8	28.4	32.6	29.0	32.2				
Incremental Delay (d <sub>2</sub> ), s/veh	11.1	0.1		0.2	0.1	11.7	1.1	13.3				
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0				
Control Delay (d), s/veh	40.4	14.9		39.0	28.6	44.3	30.1	45.5				
Level of Service (LOS)	D	B		D	C	D	C	D				
Approach Delay, s/veh / LOS	34.5	C		39.6	D		39.9	D		0.0		
Intersection Delay, s/veh / LOS	36.8						D					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	60	1060			390	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	65	1152	0	0	423	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	1	1	0	0	1	0	
Configuration	L	T				TR	
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	65						20
C (m) (veh/h)	1132						165
v/c	0.06						0.12
95% queue length	0.18						0.40
Control Delay (s/veh)	8.4						29.8
LOS	A						D
Approach Delay (s/veh)	--	--					29.8
Approach LOS	--	--					D

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	30	1040			390	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	32	1130	0	0	423	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	32						20
C (m) (veh/h)	1132						189
v/c	0.03						0.11
95% queue length	0.09						0.35
Control Delay (s/veh)	8.3						26.3
LOS	A						D
Approach Delay (s/veh)	--	--					26.3
Approach LOS	--	--					D

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1040	10	10	380			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1130	10	10	413	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	21	0	32	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		53				
C (m) (veh/h)		617		175				
v/c		0.02		0.30				
95% queue length		0.05		1.21				
Control Delay (s/veh)		10.9		34.3				
LOS		B		D				
Approach Delay (s/veh)	--	--	34.3					
Approach LOS	--	--	D					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1060	10	10	380			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	1152	10	10	413	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		30					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	32	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		42				
C (m) (veh/h)		605		193				
v/c		0.02		0.22				
95% queue length		0.05		0.80				
Control Delay (s/veh)		11.1		28.8				
LOS		B		D				
Approach Delay (s/veh)	--	--	28.8					
Approach LOS	--	--	D					



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	30	1060			380	30		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	32	1152	0	0	413	32		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	1		
Configuration	L	T			T	R		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				20		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	21	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	32						31	
C (m) (veh/h)	1121						150	
v/c	0.03						0.21	
95% queue length	0.09						0.74	
Control Delay (s/veh)	8.3						35.1	
LOS	A						E	
Approach Delay (s/veh)	--	--					35.1	
Approach LOS	--	--					E	

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	1320			410	10	
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	1434	0	0	445	10	
Percent Heavy Vehicles	1	--	--	2	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	4	0	4	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	10						20
C (m) (veh/h)	1111						135
v/c	0.01						0.15
95% queue length	0.03						0.50
Control Delay (s/veh)	8.3						36.2
LOS	A						E
Approach Delay (s/veh)	--	--					36.2
Approach LOS	--	--					E

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1320	10	10	410			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1434	10	10	445	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		50					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	54	0	0	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		64				
C (m) (veh/h)		473		134				
v/c		0.02		0.48				
95% queue length		0.06		2.19				
Control Delay (s/veh)		12.8		54.3				
LOS		B		F				
Approach Delay (s/veh)	--	--	54.3					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	1330	30	10	400	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	1445	32	10	434	10	
Percent Heavy Vehicles	1	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	1	1	1		0
Configuration	L	T	R	L			TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L	L		LTR			LTR
v (veh/h)	10	10		30			30
C (m) (veh/h)	1121	459		66			71
v/c	0.01	0.02		0.45			0.42
95% queue length	0.03	0.07		1.79			1.66
Control Delay (s/veh)	8.2	13.0		98.7			88.6
LOS	A	B		F			F
Approach Delay (s/veh)	--	--		98.7			88.6
Approach LOS	--	--		F			F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1340	10	10	410			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1456	10	10	445	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		20				
C (m) (veh/h)		463		99				
v/c		0.02		0.20				
95% queue length		0.07		0.71				
Control Delay (s/veh)		12.9		50.3				
LOS		B		F				
Approach Delay (s/veh)	--	--	50.3					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>			<b>Site Information</b>				
Analyst	BMF		Intersection	Wallings Rd/Wright Rd			
Agency/Co.	GPD Group		Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015		Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>			North/South Street: <i>Wright Road</i>				
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	20	1320	10	10	390	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	21	1434	10	10	423	10	
Percent Heavy Vehicles	1	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	1	1	0	1	1	1	
Configuration	L		TR	L	T	R	
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	20	20	10	60	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	21	21	10	65	10	10	
Percent Heavy Vehicles	2	0	2	4	0	4	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	1	0	0	1	0	
Configuration		LTR			LTR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L	L	LTR			LTR	
v (veh/h)	21	10	52			85	
C (m) (veh/h)	1132	466	58			40	
v/c	0.02	0.02	0.90			2.13	
95% queue length	0.06	0.07	4.06			9.12	
Control Delay (s/veh)	8.2	12.9	203.7			735.6	
LOS	A	B	F			F	
Approach Delay (s/veh)	--	--	203.7			735.6	
Approach LOS	--	--	F			F	

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1380	10	10	400			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	1499	10	10	434	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		50					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	54	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		64				
C (m) (veh/h)		440		122				
v/c		0.02		0.52				
95% queue length		0.07		2.47				
Control Delay (s/veh)		13.4		63.2				
LOS		B		F				
Approach Delay (s/veh)	--	--	63.2					
Approach LOS	--	--	F					

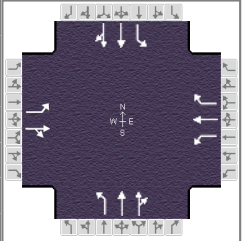


TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	20	1410			400	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	1532	0	0	434	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	21						20	
C (m) (veh/h)	1121						114	
v/c	0.02						0.18	
95% queue length	0.06						0.61	
Control Delay (s/veh)	8.3						43.2	
LOS	A						E	
Approach Delay (s/veh)	--	--					43.2	
Approach LOS	--	--					E	

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/West Mill Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	AM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		1240	180	10	400			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63		
Hourly Flow Rate, HFR (veh/h)	0	1347	195	10	434	0		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	1	1	1		0	
Configuration		T	R	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		60					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79		
Hourly Flow Rate, HFR (veh/h)	10	0	65	0	0	0		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		75				
C (m) (veh/h)		428		160				
v/c		0.02		0.47				
95% queue length		0.07		2.19				
Control Delay (s/veh)		13.6		45.9				
LOS		B		E				
Approach Delay (s/veh)	--	--	45.9					
Approach LOS	--	--	E					

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Broadview F	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	1. Wallings Rd_Broadview Rd_Design Year 2040 'Build' PM.xus				
Project Description	Design Year 2040 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	150	260	110	390	810	180	150	480	160	230	680	290

Signal Information												
Cycle, s	120.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	5.0	1.9	28.2	5.0	8.7	37.6		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	3.6		
				Red	2.0	2.0	2.0	2.0	2.0	2.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	1	6	5	2
Case Number	1.1	4.0	1.1	3.0	1.1	4.0	1.1	4.0
Phase Duration, s	10.6	43.2	24.9	57.5	10.6	33.8	18.1	41.3
Change Period, (Y+R <sub>c</sub> ), s	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Max Allow Headway (MAH), s	4.1	4.1	4.1	4.1	4.3	4.3	4.3	4.3
Queue Clearance Time (g <sub>s</sub> ), s	7.0	26.0	21.3	53.9	7.0	24.4	14.5	36.9
Green Extension Time (g <sub>e</sub> ), s	0.0	4.7	0.0	0.0	0.0	2.6	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	0.57	1.00	1.00	1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h	163	402		424	880	196	163	362	333	250	555	499
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1786		1757	1845	1563	1774	1863	1703	1774	1900	1706
Queue Service Time (g <sub>s</sub> ), s	5.0	24.0		19.3	51.9	9.7	5.0	22.2	22.4	12.5	34.8	34.9
Cycle Queue Clearance Time (g <sub>c</sub> ), s	5.0	24.0		19.3	51.9	9.7	5.0	22.2	22.4	12.5	34.8	34.9
Green Ratio (g/C)	0.35	0.31		0.49	0.43	0.43	0.28	0.23	0.23	0.36	0.30	0.30
Capacity (c), veh/h	135	560		453	798	676	134	438	400	281	565	508
Volume-to-Capacity Ratio (X)	1.211	0.719		0.936	1.104	0.289	1.217	0.827	0.833	0.889	0.982	0.983
Available Capacity (c <sub>a</sub> ), veh/h	135	560		453	798	676	134	438	400	281	565	508
Back of Queue (Q), veh/ln (50th percentile)	7.0	11.0		11.1	36.5	3.6	7.1	11.8	11.0	7.6	21.5	19.6
Queue Storage Ratio (RQ) (50th percentile)	0.47	0.00		0.71	0.00	0.28	0.81	0.00	0.00	0.77	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	37.8	36.5		25.4	34.1	22.1	43.1	43.6	43.7	32.6	41.8	41.9
Incremental Delay (d <sub>2</sub> ), s/veh	145.1	4.4		27.1	64.1	0.2	147.7	12.4	14.0	27.4	33.3	35.5
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	182.9	41.0		52.5	98.1	22.3	190.8	56.0	57.7	60.0	75.1	77.3
Level of Service (LOS)	F	D		D	F	C	F	E	E	E	E	E
Approach Delay, s/veh / LOS	81.9	F		75.3	E		82.2	F		73.1	E	
Intersection Delay, s/veh / LOS	76.9						E					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Road/Elmhurst Drive		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Elmhurst Drive</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	640			1360	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	695	0	0	1478	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
<b>Minor Street</b>	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		20	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	21	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	10						31
C (m) (veh/h)	455						91
v/c	0.02						0.34
95% queue length	0.07						1.32
Control Delay (s/veh)	13.1						63.8
LOS	B						F
Approach Delay (s/veh)	--	--					63.8
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Road/Longview Road		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Longview Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	640			1360	10	
Peak-Hour Factor, PHF	0.92	0.92	1.00	1.00	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	695	0	0	1478	10	
Percent Heavy Vehicles	1	--	--	0	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	0	0	1		0
Configuration	L	T					TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				10		10	
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.92	1.00	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L						LR
v (veh/h)	10						20
C (m) (veh/h)	455						74
v/c	0.02						0.27
95% queue length	0.07						0.97
Control Delay (s/veh)	13.1						70.8
LOS	B						F
Approach Delay (s/veh)	--	--					70.8
Approach LOS	--	--					F

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Chestnut Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Chestnut Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		620	30	50	1360			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	673	32	54	1478	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1		0	
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		54		20				
C (m) (veh/h)		898		77				
v/c		0.06		0.26				
95% queue length		0.19		0.93				
Control Delay (s/veh)		9.3		67.4				
LOS		A		F				
Approach Delay (s/veh)	--	--	67.4					
Approach LOS	--	--	F					

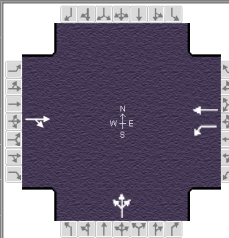
TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Overlook Ave			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Overlook Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		620	10	30	1400			
Peak-Hour Factor, PHF	0.88	0.92	0.92	0.92	0.92	0.86		
Hourly Flow Rate, HFR (veh/h)	0	673	10	32	1521	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		20					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.67	1.00	0.67		
Hourly Flow Rate, HFR (veh/h)	10	0	21	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		32		31				
C (m) (veh/h)		915		113				
v/c		0.03		0.27				
95% queue length		0.11		1.03				
Control Delay (s/veh)		9.1		48.5				
LOS		A		E				
Approach Delay (s/veh)	--	--	48.5					
Approach LOS	--	--	E					



TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/McCreary Rd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>McCreary Road</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>		Eastbound			Westbound			
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	630			1380	80		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	684	0	0	1499	86		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0					0
Lanes	1	1	0	0	1	1		
Configuration	L	T			T	R		
Upstream Signal		0			0			
<b>Minor Street</b>		Northbound			Southbound			
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				30		50		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	32	0	54		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	10						86	
C (m) (veh/h)	417						85	
v/c	0.02						1.01	
95% queue length	0.07						5.74	
Control Delay (s/veh)	13.8						188.9	
LOS	B						F	
Approach Delay (s/veh)	--	--					188.9	
Approach LOS	--	--					F	

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/Wyatt Road	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	7. Wallings Rd_Wyatt Rd_Design Year 2040 'Build' PM.xus				
Project Description	Design Year 2040 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		590	70	200	1400		60	0	60			

Signal Information														
Cycle, s	110.0	Reference Phase	2	Green	5.0	75.3	12.9	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		4		
Case Number		8.3	1.0	4.0		12.0		
Phase Duration, s		80.9	10.6	91.5		18.5		
Change Period, (Y+R <sub>c</sub> ), s		5.6	5.6	5.6		5.6		
Max Allow Headway (MAH), s		1.0	1.1	1.0		1.4		
Queue Clearance Time (g <sub>s</sub> ), s		24.4	6.0	87.9		10.2		
Green Extension Time (g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.00	1.00	1.00		0.04		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		7	4	14			
Adjusted Flow Rate (v), veh/h		717		217	1522			130				
Adjusted Saturation Flow Rate (s), veh/h/ln		1828		1723	1810			1671				
Queue Service Time (g <sub>s</sub> ), s		22.4		4.0	85.9			8.2				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		22.4		4.0	85.9			8.2				
Green Ratio (g/C)		0.68		0.75	0.78			0.12				
Capacity (c), veh/h		1251		485	1413			196				
Volume-to-Capacity Ratio (X)		0.573		0.448	1.077			0.666				
Available Capacity (c <sub>a</sub> ), veh/h		1251		485	1413			196				
Back of Queue (Q), veh/ln (50th percentile)		7.8		1.2	41.8			3.8				
Queue Storage Ratio (RQ) (50th percentile)		0.00		0.14	0.00			0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		9.0		7.9	12.1			46.5				
Incremental Delay (d <sub>2</sub> ), s/veh		0.4		0.2	47.6			6.7				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0		0.0	0.0			0.0				
Control Delay (d), s/veh		9.4		8.1	59.6			53.2				
Level of Service (LOS)		A		A	F			D				
Approach Delay, s/veh / LOS	9.4	A		53.2	D		53.2	D		0.0		
Intersection Delay, s/veh / LOS			41.1						D			

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Majestic Oaks Tr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Majestic Oaks Trail</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	640			1590	10		
Peak-Hour Factor, PHF	0.92	0.92	0.89	0.82	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	695	0	0	1728	10		
Percent Heavy Vehicles	1	--	--	2	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	1	0	0	1		0	
Configuration	L	T					TR	
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.57	1.00	0.57	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	4	0	4	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	10						20	
C (m) (veh/h)	364						52	
v/c	0.03						0.38	
95% queue length	0.08						1.39	
Control Delay (s/veh)	15.2						112.3	
LOS	C						F	
Approach Delay (s/veh)	--	--					112.3	
Approach LOS	--	--					F	

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Creekside Trce			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Creekside Terrace</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		640	10	10	1580			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	695	10	10	1717	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	21	0	10	0	0	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		31				
C (m) (veh/h)		898		48				
v/c		0.01		0.65				
95% queue length		0.03		2.51				
Control Delay (s/veh)		9.1		168.1				
LOS		A		F				
Approach Delay (s/veh)	--	--	168.1					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	BMF			Intersection	Wallings Rd/Joyce Rd/Firehouse		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Joyce Road/Firehouse</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	10	630	10	10	1570	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	684	10	10	1706	10	
Percent Heavy Vehicles	1	--	--	1	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	1	1	1	1	1		0
Configuration	L	T	R	L			TR
Upstream Signal		0			0		
Minor Street	Northbound			Southbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10	10	10	10	10	10	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	10	10	10	10	10	10	
Percent Heavy Vehicles	0	0	0	0	0	0	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration		LTR			LTR		
Delay, Queue Length, and Level of Service							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L	L	LTR			LTR	
v (veh/h)	10	10		30			30
C (m) (veh/h)	372	906		30			29
v/c	0.03	0.01		1.00			1.03
95% queue length	0.08	0.03		3.35			3.42
Control Delay (s/veh)	14.9	9.0		357.4			377.4
LOS	B	A		F			F
Approach Delay (s/veh)	--	--	357.4			377.4	
Approach LOS	--	--	F			F	

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	BMF			Intersection	Wallings Rd/Marianna Blvd			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Marianna Boulevard</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		640	10	10	1580			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	695	10	10	1717	0		
Percent Heavy Vehicles	2	--	--	1	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1	0		
Configuration			TR	L	T			
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		20				
C (m) (veh/h)		898		65				
v/c		0.01		0.31				
95% queue length		0.03		1.11				
Control Delay (s/veh)		9.1		83.3				
LOS		A		F				
Approach Delay (s/veh)	--	--	83.3					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>			<b>Site Information</b>					
Analyst	BMF		Intersection	Wallings Rd/Wright Rd				
Agency/Co.	GPD Group		Jurisdiction	City of Broadview Heights				
Date Performed	3/2/2015		Analysis Year	2040 'Build'				
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>			North/South Street: <i>Wright Road</i>					
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>0.25</i>					
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	630	10	20	1550	30		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	684	10	21	1684	32		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	<i>Undivided</i>							
RT Channelized			0			0		
Lanes	1	1	0	1	1	1		
Configuration	L		TR	L	T	R		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	20	10	10	20	10	20		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	21	10	10	21	10	21		
Percent Heavy Vehicles	2	0	2	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		LTR			LTR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LTR		
v (veh/h)	10	21	41			52		
C (m) (veh/h)	372	897	19			26		
v/c	0.03	0.02	2.16			2.00		
95% queue length	0.08	0.07	5.53			6.33		
Control Delay (s/veh)	14.9	9.1	956.9			787.1		
LOS	B	A	F			F		
Approach Delay (s/veh)	--	--	956.9			787.1		
Approach LOS	--	--	F			F		

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Craig Ln			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Craig Lane</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		650	10	10	1590			
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.76		
Hourly Flow Rate, HFR (veh/h)	0	706	10	10	1728	0		
Percent Heavy Vehicles	2	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	1	1		0	
Configuration			TR	L	T			
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		10					
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.70	1.00	0.70		
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0		
Percent Heavy Vehicles	7	0	7	0	0	0		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0		0	
Configuration		LR						
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		10		20				
C (m) (veh/h)		880		60				
v/c		0.01		0.33				
95% queue length		0.03		1.21				
Control Delay (s/veh)		9.1		92.5				
LOS		A		F				
Approach Delay (s/veh)	--	--	92.5					
Approach LOS	--	--	F					

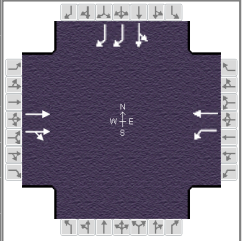


TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	BMF			Intersection	Wallings Rd/Skyline Dr			
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights			
Date Performed	3/2/2015			Analysis Year	2040 'Build'			
Analysis Time Period	PM Peak Hour							
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>								
East/West Street: <i>Wallings Road</i>				North/South Street: <i>Skyline Drive</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	650			1590	10		
Peak-Hour Factor, PHF	0.92	0.92	0.81	0.78	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	706	0	0	1728	10		
Percent Heavy Vehicles	1	--	--	3	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				10		10		
Peak-Hour Factor, PHF	0.63	1.00	0.63	0.92	1.00	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	10	0	10		
Percent Heavy Vehicles	7	0	7	4	0	4		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	10						20	
C (m) (veh/h)	364						49	
v/c	0.03						0.41	
95% queue length	0.08						1.47	
Control Delay (s/veh)	15.2						122.0	
LOS	C						F	
Approach Delay (s/veh)	--	--					122.0	
Approach LOS	--	--					F	

TWO-WAY STOP CONTROL SUMMARY							
<b>General Information</b>				<b>Site Information</b>			
Analyst	BMF			Intersection	Wallings Rd/W Mill Rd		
Agency/Co.	GPD Group			Jurisdiction	City of Broadview Heights		
Date Performed	3/2/2015			Analysis Year	2040 'Build'		
Analysis Time Period	PM Peak Hour						
Project Description <i>Wallings Road Safety &amp; Corridor Study</i>							
East/West Street: <i>Wallings Road</i>				North/South Street: <i>West Mill Road</i>			
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>			
<b>Vehicle Volumes and Adjustments</b>							
<b>Major Street</b>		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		650	10	10	1590		
Peak-Hour Factor, PHF	0.80	0.92	0.92	0.92	0.92	0.63	
Hourly Flow Rate, HFR (veh/h)	0	706	10	10	1728	0	
Percent Heavy Vehicles	1	--	--	3	--	--	
Median Type	Undivided						
RT Channelized			0			0	
Lanes	0	1	1	1	1	0	
Configuration		T	R	L	T		
Upstream Signal		0			0		
<b>Minor Street</b>		Northbound			Southbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)	10		10				
Peak-Hour Factor, PHF	0.92	1.00	0.92	0.79	1.00	0.79	
Hourly Flow Rate, HFR (veh/h)	10	0	10	0	0	0	
Percent Heavy Vehicles	2	0	2	4	0	4	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration		LR					
<b>Delay, Queue Length, and Level of Service</b>							
Approach	Eastbound	Westbound	Northbound			Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		L		LR			
v (veh/h)		10		20			
C (m) (veh/h)		880		63			
v/c		0.01		0.32			
95% queue length		0.03		1.15			
Control Delay (s/veh)		9.1		86.7			
LOS		A		F			
Approach Delay (s/veh)	--	--	86.7				
Approach LOS	--	--	F				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road / I-77 SB	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	16. Wallings Rd_I-77 SB_Design Year 2040 'Build' PM.xus				
Project Description	Design Year 2040 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		530	130	70	590					300	10	1010

Signal Information													
Cycle, s	70.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	28.4	29.6	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

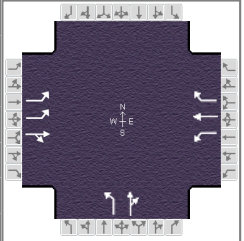
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				8
Case Number		8.0		6.0				11.0
Phase Duration, s		34.4		34.4				35.6
Change Period, (Y+R <sub>c</sub> ), s		6.0		6.0				6.0
Max Allow Headway (MAH), s		2.2		2.2				4.3
Queue Clearance Time (g <sub>s</sub> ), s		12.3		25.2				29.0
Green Extension Time (g <sub>e</sub> ), s		1.1		0.7				0.4
Phase Call Probability		1.00		1.00				1.00
Max Out Probability		0.00		0.63				1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement		2	12	1	6					3	8	18
Adjusted Flow Rate (v), veh/h		371	347	76	641						337	1098
Adjusted Saturation Flow Rate (s), veh/h/ln		1881	1753	717	1792						1743	1370
Queue Service Time (g <sub>s</sub> ), s		10.1	10.3	6.2	23.2						9.7	27.0
Cycle Queue Clearance Time (g <sub>c</sub> ), s		10.1	10.3	16.4	23.2						9.7	27.0
Green Ratio (g/C)		0.41	0.41	0.41	0.41						0.42	0.42
Capacity (c), veh/h		763	711	289	727						737	1159
Volume-to-Capacity Ratio (X)		0.485	0.488	0.264	0.882						0.457	0.947
Available Capacity (c <sub>a</sub> ), veh/h		763	711	289	727						737	1159
Back of Queue (Q), veh/ln (50th percentile)		3.9	3.7	1.0	10.8						3.5	9.9
Queue Storage Ratio (RQ) (50th percentile)		0.00	0.00	0.25	0.00						0.12	0.34
Uniform Delay (d <sub>1</sub> ), s/veh		15.4	15.4	21.5	19.2						14.5	19.5
Incremental Delay (d <sub>2</sub> ), s/veh		0.2	0.2	0.2	11.8						0.4	15.5
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0	0.0	0.0	0.0						0.0	0.0
Control Delay (d), s/veh		15.6	15.6	21.7	31.1						14.9	35.0
Level of Service (LOS)		B	B	C	C						B	C
Approach Delay, s/veh / LOS	15.6	B		30.1	C		0.0			30.2	C	
Intersection Delay, s/veh / LOS	26.5						C					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	GPD Group			Duration, h	0.25
Analyst	BMF	Analysis Date	Mar 2, 2015	Area Type	Other
Jurisdiction	City of Broadview Heights	Time Period	PM Peak Hour	PHF	0.92
Intersection	Wallings Road/I-77 NB/Mill	Analysis Year	2040	Analysis Period	1 > 7:00
File Name	17. Wallings Rd_I-77 NB_Mill Rd_Design Year 2040 'Build' PM.xus				
Project Description	Design Year 2040 'Build' PM Peak Hour				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	270	410	150	10	200	140	460	80	70			

Signal Information				Signal Phases									
Cycle, s	70.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	7.0	1.0	23.7	20.3	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	0.0	4.0	4.0	0.0	0.0			
				Red	2.0	0.0	2.0	2.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		
Case Number	2.0	4.0	2.0	3.0		10.0		
Phase Duration, s	14.0	30.7	13.0	29.7		26.3		
Change Period, (Y+R <sub>c</sub> ), s	6.0	6.0	6.0	6.0		6.0		
Max Allow Headway (MAH), s	4.1	2.1	2.1	2.1		5.3		
Queue Clearance Time (g <sub>s</sub> ), s	7.8	25.3	2.4	8.0		21.0		
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.7		0.0		
Phase Call Probability	1.00	1.00	1.00	1.00		1.00		
Max Out Probability	1.00	1.00	0.00	0.00		1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14			
Adjusted Flow Rate (v), veh/h	293	609		11	217	152	500	163				
Adjusted Saturation Flow Rate (s), veh/h/ln	1723	1795		1740	1881	1610	1810	1702				
Queue Service Time (g <sub>s</sub> ), s	5.8	23.3		0.4	6.0	4.8	19.0	5.3				
Cycle Queue Clearance Time (g <sub>c</sub> ), s	5.8	23.3		0.4	6.0	4.8	19.0	5.3				
Green Ratio (g/C)	0.11	0.35		0.10	0.34	0.34	0.29	0.29				
Capacity (c), veh/h	394	633		174	637	545	525	494				
Volume-to-Capacity Ratio (X)	0.745	0.961		0.062	0.341	0.279	0.953	0.330				
Available Capacity (c <sub>a</sub> ), veh/h	394	633		174	637	545	525	494				
Back of Queue (Q), veh/ln (50th percentile)	2.7	13.3		0.2	2.4	1.7	11.8	2.1				
Queue Storage Ratio (RQ) (50th percentile)	0.08	0.00		0.02	0.00	0.15	0.65	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh	30.0	22.2		28.5	17.3	16.9	24.4	19.5				
Incremental Delay (d <sub>2</sub> ), s/veh	7.5	26.2		0.1	0.1	0.1	27.9	0.6				
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0				
Control Delay (d), s/veh	37.6	48.3		28.6	17.4	17.0	52.3	20.1				
Level of Service (LOS)	D	D		C	B	B	D	C				
Approach Delay, s/veh / LOS	44.8		D	17.6		B	44.4		D	0.0		
Intersection Delay, s/veh / LOS	39.4						D					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

**APPENDIX M**  
**STORAGE LENGTH CALCULATIONS**

DESIGN YEAR 2040 'BUILD' CONDITIONS

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / BROADVIEW ROAD

ANTICIPATED CYCLE LENGTH: 100 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	350		620		80
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	350			700	
NUMBER OF LANES:	1			1	
VEHICLES PER CYCLE:	10			20	
CONTROLLING LANE GROUP:				X	
DECELERATION LENGTH:	50				
STORAGE LENGTH:	375			675	
<b>TOTAL TURN LANE LENGTH:</b>	<b>425</b>			<b>675</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>425</b>			<b>675</b>	

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	90		220		90
LANE GROUP:	LEFT		THRU		RIGHT
LANE GROUP VOLUME:	90		220		90
NUMBER OF LANES:	1		1		1
VEHICLES PER CYCLE:	3		7		3
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:	50				50
STORAGE LENGTH:	150		275		150
<b>TOTAL TURN LANE LENGTH:</b>	<b>200</b>		<b>275</b>		<b>200</b>
<b>TURN LANE LENGTH PER LANE</b>	<b>200</b>		<b>275</b>		<b>200</b>

### BROADVIEW ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	60		620		420
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	60			1040	
NUMBER OF LANES:	1			2	
VEHICLES PER CYCLE:	2			29	
CONTROLLING LANE GROUP:				X	
DECELERATION LENGTH:	50				
STORAGE LENGTH:	100			945	
<b>TOTAL TURN LANE LENGTH:</b>	<b>150</b>			<b>945</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>150</b>			<b>472.5</b>	

### BROADVIEW ROAD SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	80		210		90
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	80			300	
NUMBER OF LANES:	1			2	
VEHICLES PER CYCLE:	3			9	
CONTROLLING LANE GROUP:	X				
DECELERATION LENGTH:	50				
STORAGE LENGTH:	150			350	
<b>TOTAL TURN LANE LENGTH:</b>	<b>200</b>			<b>350</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>200</b>			<b>175</b>	

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / BROADVIEW ROAD

ANTICIPATED CYCLE LENGTH: 100 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	150		260		110
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	150			370	
NUMBER OF LANES:	1			1	
VEHICLES PER CYCLE:	5			11	
CONTROLLING LANE GROUP:				X	
DECELERATION LENGTH:	50				
STORAGE LENGTH:	200			400	
<b>TOTAL TURN LANE LENGTH:</b>	<b>250</b>			<b>400</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>250</b>			<b>400</b>	

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	390		810		180
LANE GROUP:	LEFT		THRU		RIGHT
LANE GROUP VOLUME:	390		810		180
NUMBER OF LANES:	1		1		1
VEHICLES PER CYCLE:	11		23		5
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:	50				50
STORAGE LENGTH:	400		775		200
<b>TOTAL TURN LANE LENGTH:</b>	<b>450</b>		<b>775</b>		<b>250</b>
<b>TURN LANE LENGTH PER LANE</b>	<b>450</b>		<b>775</b>		<b>250</b>

### BROADVIEW ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	150		480		160
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	150			640	
NUMBER OF LANES:	1			2	
VEHICLES PER CYCLE:	5			18	
CONTROLLING LANE GROUP:				X	
DECELERATION LENGTH:	50				
STORAGE LENGTH:	200			625	
<b>TOTAL TURN LANE LENGTH:</b>	<b>250</b>			<b>625</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>250</b>			<b>312.5</b>	

### BROADVIEW ROAD SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	230		680		290
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	230			970	
NUMBER OF LANES:	1			2	
VEHICLES PER CYCLE:	7			27	
CONTROLLING LANE GROUP:				X	
DECELERATION LENGTH:	50				
STORAGE LENGTH:	275			885	
<b>TOTAL TURN LANE LENGTH:</b>	<b>325</b>			<b>885</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>325</b>			<b>442.5</b>	

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*



# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / McCREARY ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	30		1060		0
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	0		380		30
LANE GROUP:					RIGHT
LANE GROUP VOLUME:					30
NUMBER OF LANES:					1
VEHICLES PER CYCLE:					1
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:					50
STORAGE LENGTH:					50
<b>TOTAL TURN LANE LENGTH:</b>					<b>100</b>
<b>TURN LANE LENGTH PER LANE</b>					<b>100</b>

### NORTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	0		0		0
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### McCREARY ROAD SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	20		0		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / McCREARY ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		630		0
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	0		1380		80
LANE GROUP:					RIGHT
LANE GROUP VOLUME:					80
NUMBER OF LANES:					1
VEHICLES PER CYCLE:					2
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:					50
STORAGE LENGTH:					100
<b>TOTAL TURN LANE LENGTH:</b>					<b>150</b>
<b>TURN LANE LENGTH PER LANE</b>					<b>150</b>

### NORTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	0		0		0
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### McCREARY ROAD SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	30		0		50
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / WYATT ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:			1070		10
LANE GROUP:			THRU/RIGHT		
LANE GROUP VOLUME:			1080		
NUMBER OF LANES:			1		
VEHICLES PER CYCLE:			18		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:					
STORAGE LENGTH:			625		
<b>TOTAL TURN LANE LENGTH:</b>			<b>625</b>		
<b>TURN LANE LENGTH PER LANE</b>			<b>625</b>		

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	60		360		
LANE GROUP:	LEFT		THRU		
LANE GROUP VOLUME:	60		360		
NUMBER OF LANES:	1		1		
VEHICLES PER CYCLE:	1		6		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:	50				
STORAGE LENGTH:	50		250		
<b>TOTAL TURN LANE LENGTH:</b>	<b>100</b>		<b>250</b>		
<b>TURN LANE LENGTH PER LANE</b>	<b>100</b>		<b>250</b>		

### WYATT ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	50				260
LANE GROUP:			LEFT/RIGHT		
LANE GROUP VOLUME:			310		
NUMBER OF LANES:			1		
VEHICLES PER CYCLE:			6		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:					
STORAGE LENGTH:			250		
<b>TOTAL TURN LANE LENGTH:</b>			<b>250</b>		
<b>TURN LANE LENGTH PER LANE</b>			<b>250</b>		

### SOUTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:					
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / WYATT ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:			590		70
LANE GROUP:			THRU/RIGHT		
LANE GROUP VOLUME:			660		
NUMBER OF LANES:			1		
VEHICLES PER CYCLE:			11		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:					
STORAGE LENGTH:			400		
<b>TOTAL TURN LANE LENGTH:</b>			<b>400</b>		
<b>TURN LANE LENGTH PER LANE</b>			<b>400</b>		

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	200		1400		
LANE GROUP:	LEFT		THRU		
LANE GROUP VOLUME:	200		1400		
NUMBER OF LANES:	1		1		
VEHICLES PER CYCLE:	4		24		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:	50				
STORAGE LENGTH:	175		800		
<b>TOTAL TURN LANE LENGTH:</b>	<b>225</b>		<b>800</b>		
<b>TURN LANE LENGTH PER LANE</b>	<b>225</b>		<b>800</b>		

### WYATT ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	60				60
LANE GROUP:			LEFT/RIGHT		
LANE GROUP VOLUME:			120		
NUMBER OF LANES:			1		
VEHICLES PER CYCLE:			2		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:					
STORAGE LENGTH:			100		
<b>TOTAL TURN LANE LENGTH:</b>			<b>100</b>		
<b>TURN LANE LENGTH PER LANE</b>			<b>100</b>		

### SOUTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:					
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / JOYCE ROAD / FIRESTATION DRIVE

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		1330		30
LANE GROUP:					RIGHT
LANE GROUP VOLUME:					30
NUMBER OF LANES:					1
VEHICLES PER CYCLE:					1
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:					50
STORAGE LENGTH:					50
<b>TOTAL TURN LANE LENGTH:</b>					<b>100</b>
<b>TURN LANE LENGTH PER LANE</b>					<b>100</b>

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		400		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### JOYCE ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		10		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### FIRE STATION DRIVE SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		10		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / JOYCE ROAD / FIRESTATION DRIVE

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		630		10
LANE GROUP:					RIGHT
LANE GROUP VOLUME:					10
NUMBER OF LANES:					1
VEHICLES PER CYCLE:					1
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:					50
STORAGE LENGTH:					50
<b>TOTAL TURN LANE LENGTH:</b>					<b>100</b>
<b>TURN LANE LENGTH PER LANE</b>					<b>100</b>

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		1570		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### JOYCE ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		10		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### FIRE STATION DRIVE SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		10		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / WRIGHT ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	20		1320		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		390		10
LANE GROUP:					RIGHT
LANE GROUP VOLUME:					10
NUMBER OF LANES:					1
VEHICLES PER CYCLE:					1
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:					50
STORAGE LENGTH:					50
<b>TOTAL TURN LANE LENGTH:</b>					<b>100</b>
<b>TURN LANE LENGTH PER LANE</b>					<b>100</b>

### WRIGHT ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	20		20		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### WRIGHT ROAD SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	60		10		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / WRIGHT ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		630		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	20		1550		30
LANE GROUP:					RIGHT
LANE GROUP VOLUME:					30
NUMBER OF LANES:					1
VEHICLES PER CYCLE:					1
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:					50
STORAGE LENGTH:					50
<b>TOTAL TURN LANE LENGTH:</b>					<b>100</b>
<b>TURN LANE LENGTH PER LANE</b>					<b>100</b>

### WRIGHT ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	20		10		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### WRIGHT ROAD SOUTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	20		10		20
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*



# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / WEST MILL ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT	THRU	RIGHT
VOLUME:	0	1240	180
LANE GROUP:			RIGHT
LANE GROUP VOLUME:			180
NUMBER OF LANES:			1
VEHICLES PER CYCLE:			3
CONTROLLING LANE GROUP:			X
DECELERATION LENGTH:			50
STORAGE LENGTH:			150
<b>TOTAL TURN LANE LENGTH:</b>			<b>200</b>
<b>TURN LANE LENGTH PER LANE</b>			<b>200</b>

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT	THRU	RIGHT
VOLUME:	10	400	0
LANE GROUP:			
LANE GROUP VOLUME:			
NUMBER OF LANES:			
VEHICLES PER CYCLE:			
CONTROLLING LANE GROUP:			
DECELERATION LENGTH:			
STORAGE LENGTH:			
<b>TOTAL TURN LANE LENGTH:</b>			
<b>TURN LANE LENGTH PER LANE</b>			

### WEST MILL ROAD NORTHBOUND

MOVEMENT:	LEFT	THRU	RIGHT
VOLUME:	10	0	60
LANE GROUP:			
LANE GROUP VOLUME:			
NUMBER OF LANES:			
VEHICLES PER CYCLE:			
CONTROLLING LANE GROUP:			
DECELERATION LENGTH:			
STORAGE LENGTH:			
<b>TOTAL TURN LANE LENGTH:</b>			
<b>TURN LANE LENGTH PER LANE</b>			

### SOUTHBOUND N/A

MOVEMENT:	LEFT	THRU	RIGHT
VOLUME:			
LANE GROUP:			
LANE GROUP VOLUME:			
NUMBER OF LANES:			
VEHICLES PER CYCLE:			
CONTROLLING LANE GROUP:			
DECELERATION LENGTH:			
STORAGE LENGTH:			
<b>TOTAL TURN LANE LENGTH:</b>			
<b>TURN LANE LENGTH PER LANE</b>			

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / WEST MILL ROAD

ANTICIPATED CYCLE LENGTH: 60 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	0		650		10
LANE GROUP:					RIGHT
LANE GROUP VOLUME:					10
NUMBER OF LANES:					1
VEHICLES PER CYCLE:					1
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:					50
STORAGE LENGTH:					50
<b>TOTAL TURN LANE LENGTH:</b>					<b>100</b>
<b>TURN LANE LENGTH PER LANE</b>					<b>100</b>

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		1590		0
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### WEST MILL ROAD NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		0		10
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### SOUTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:					
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / INTERSTATE 77 SB RAMPS

ANTICIPATED CYCLE LENGTH: 90 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:			1050		250
LANE GROUP:			THRU/RIGHT		
LANE GROUP VOLUME:				1300	
NUMBER OF LANES:				2	
VEHICLES PER CYCLE:				33	
CONTROLLING LANE GROUP:				X	
DECELERATION LENGTH:					
STORAGE LENGTH:				1065	
<b>TOTAL TURN LANE LENGTH:</b>				<b>1065</b>	
<b>TURN LANE LENGTH PER LANE</b>				<b>532.5</b>	

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	70		240		
LANE GROUP:	LEFT		THRU		
LANE GROUP VOLUME:	70		240		
NUMBER OF LANES:	1		1		
VEHICLES PER CYCLE:	2		6		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:	50				
STORAGE LENGTH:	100		250		
<b>TOTAL TURN LANE LENGTH:</b>	<b>150</b>		<b>250</b>		
<b>TURN LANE LENGTH PER LANE</b>	<b>150</b>		<b>250</b>		

### NORTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:					
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### I-77 SB EXIT RAMP

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	160		10		170
LANE GROUP:		LEFT/THRU			RIGHT
LANE GROUP VOLUME:		170			170
NUMBER OF LANES:		1			2
VEHICLES PER CYCLE:		5			5
CONTROLLING LANE GROUP:		X			
DECELERATION LENGTH:		50			
STORAGE LENGTH:		200			200
<b>TOTAL TURN LANE LENGTH:</b>		<b>250</b>			<b>200</b>
<b>TURN LANE LENGTH PER LANE</b>		<b>250</b>			<b>100</b>

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / INTERSTATE 77 SB RAMPS

ANTICIPATED CYCLE LENGTH: 70 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:			530		130
LANE GROUP:			THRU/RIGHT		
LANE GROUP VOLUME:			660		
NUMBER OF LANES:			2		
VEHICLES PER CYCLE:			17		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:					
STORAGE LENGTH:			600		
<b>TOTAL TURN LANE LENGTH:</b>			<b>600</b>		
<b>TURN LANE LENGTH PER LANE</b>			<b>300</b>		

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	70		590		
LANE GROUP:	LEFT		THRU		
LANE GROUP VOLUME:	70		590		
NUMBER OF LANES:	1		1		
VEHICLES PER CYCLE:	2		15		
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:	50				
STORAGE LENGTH:	100		525		
<b>TOTAL TURN LANE LENGTH:</b>	<b>150</b>		<b>525</b>		
<b>TURN LANE LENGTH PER LANE</b>	<b>150</b>		<b>525</b>		

### NORTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:					
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

### I-77 SB EXIT RAMP

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	300		10		1010
LANE GROUP:		LEFT/THRU			RIGHT
LANE GROUP VOLUME:		310			1010
NUMBER OF LANES:		1			2
VEHICLES PER CYCLE:		8			26
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:		50			
STORAGE LENGTH:		325			855
<b>TOTAL TURN LANE LENGTH:</b>		<b>375</b>			<b>855</b>
<b>TURN LANE LENGTH PER LANE</b>		<b>375</b>			<b>427.5</b>

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - AM PEAK HOUR



## WALLINGS ROAD / I-77 NB RAMPS

ANTICIPATED CYCLE LENGTH: 90 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	930		190		90
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	930			280	
NUMBER OF LANES:	2			1	
VEHICLES PER CYCLE:	24			7	
CONTROLLING LANE GROUP:	X				
DECELERATION LENGTH:	125	75			
STORAGE LENGTH:	400	400		275	
<b>TOTAL TURN LANE LENGTH:</b>	<b>525</b>	<b>475</b>		<b>275</b>	
<b>TURN LANE LENGTH PER LANE</b>				<b>275</b>	

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	20		120		280
LANE GROUP:	LEFT		THRU		RIGHT
LANE GROUP VOLUME:	20		120		280
NUMBER OF LANES:	1		1		1
VEHICLES PER CYCLE:	1		3		7
CONTROLLING LANE GROUP:					X
DECELERATION LENGTH:	50		50		50
STORAGE LENGTH:	50		150		275
<b>TOTAL TURN LANE LENGTH:</b>	<b>100</b>		<b>200</b>		<b>325</b>
<b>TURN LANE LENGTH PER LANE</b>	<b>100</b>		<b>200</b>		<b>325</b>

### I-77 NB RAMPS NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	190		250		80
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	190			330	
NUMBER OF LANES:	1			1	
VEHICLES PER CYCLE:	5			9	
CONTROLLING LANE GROUP:				X	
DECELERATION LENGTH:	50				
STORAGE LENGTH:	200			350	
<b>TOTAL TURN LANE LENGTH:</b>	<b>250</b>			<b>350</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>250</b>			<b>350</b>	

### SOUTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:					
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*

# STORAGE LENGTH CALCULATIONS

DESIGN YEAR 2040 'BUILD' TRAFFIC VOLUMES - PM PEAK HOUR



## WALLINGS ROAD / I-77 NB RAMPS

ANTICIPATED CYCLE LENGTH: 70 SEC.  
DESIGN SPEED: 35 MPH

### WALLINGS ROAD EASTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	270		410		150
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	270			560	
NUMBER OF LANES:	2			1	
VEHICLES PER CYCLE:	7			14	
CONTROLLING LANE GROUP:	X			X	
DECELERATION LENGTH:	125	75			
STORAGE LENGTH:	137.5	137.5		500	
<b>TOTAL TURN LANE LENGTH:</b>	<b>262.5</b>	<b>212.5</b>		<b>500</b>	
<b>TURN LANE LENGTH PER LANE</b>				<b>500</b>	

### WALLINGS ROAD WESTBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	10		200		140
LANE GROUP:	LEFT		THRU		RIGHT
LANE GROUP VOLUME:	10		200		140
NUMBER OF LANES:	1		1		1
VEHICLES PER CYCLE:	1		5		4
CONTROLLING LANE GROUP:			X		
DECELERATION LENGTH:	50				50
STORAGE LENGTH:	50		200		175
<b>TOTAL TURN LANE LENGTH:</b>	<b>100</b>		<b>200</b>		<b>225</b>
<b>TURN LANE LENGTH PER LANE</b>	<b>100</b>		<b>200</b>		<b>225</b>

### I-77 NB RAMPS NORTHBOUND

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:	460		80		70
LANE GROUP:	LEFT		THRU/RIGHT		
LANE GROUP VOLUME:	460			150	
NUMBER OF LANES:	1			1	
VEHICLES PER CYCLE:	12			4	
CONTROLLING LANE GROUP:	X				
DECELERATION LENGTH:	50				
STORAGE LENGTH:	450			175	
<b>TOTAL TURN LANE LENGTH:</b>	<b>500</b>			<b>175</b>	
<b>TURN LANE LENGTH PER LANE</b>	<b>500</b>			<b>175</b>	

### SOUTHBOUND N/A

MOVEMENT:	LEFT		THRU		RIGHT
VOLUME:					
LANE GROUP:					
LANE GROUP VOLUME:					
NUMBER OF LANES:					
VEHICLES PER CYCLE:					
CONTROLLING LANE GROUP:					
DECELERATION LENGTH:					
STORAGE LENGTH:					
<b>TOTAL TURN LANE LENGTH:</b>					
<b>TURN LANE LENGTH PER LANE</b>					

\*RECOMMENDED STORAGE LENGTHS INCLUDE 50' DIVERGING TAPER\*