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2019 0025

TRU-62-7.67 SAFETY STUDY

VAR-D4/D11 GES (PID 106621) – Task 04-01

ODOT District 4

February 25, 2020

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1.0 PURPOSE AND NEED

In 2018, the intersection of US-62 and Bedford Road experienced an angle collision that resulted in a fatality. From 2014 to 2018, the intersection averaged approximately three crashes per year with the majority of those crashes coded as injury. Crash records show that the majority of the crashes coded injury were the result of angle collisions, and several injuries were also coded as a result of rear end collisions occurring as a trailing vehicle struck a vehicle turning off US-62 onto Bedford Road.

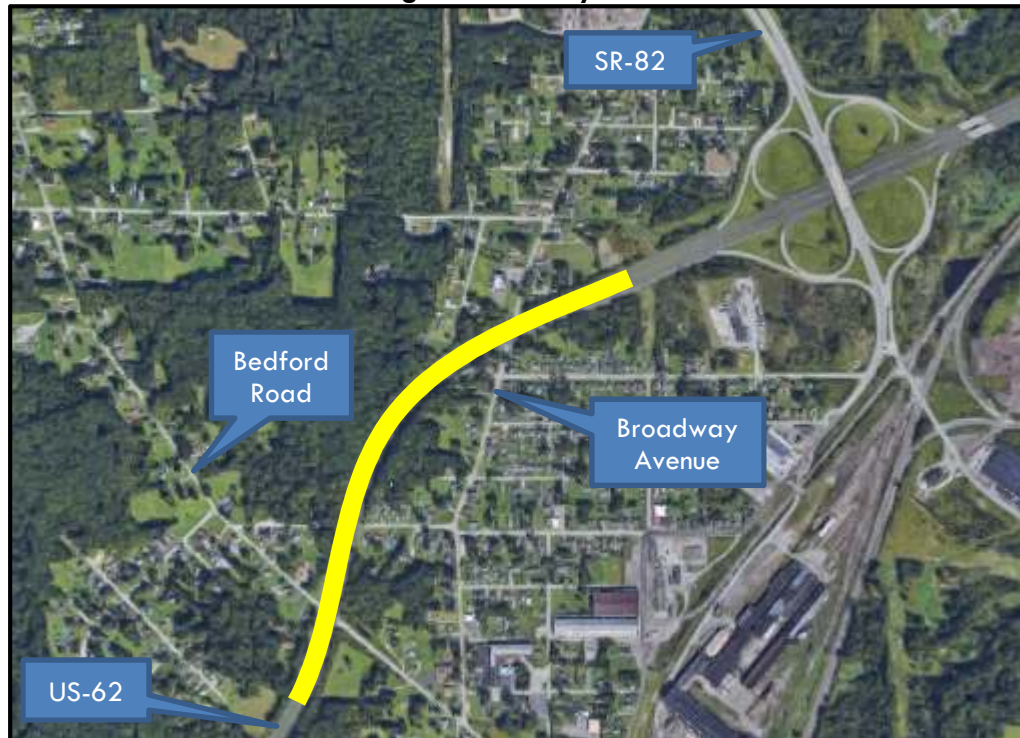
Further examination of crash records along this segment of US-62 show similar crash types occurring at the intersection of US-62 and Broadway Avenue and several additional segment crashes occurring between the two intersections. The study area defined as US-62 west of Bedford Road to US-62 east of Broadway Avenue experiences approximately five crashes per year. While the Bedford Road intersection shows a pattern of injury crashes, a need for a comprehensive investigation of the segment was identified by the Ohio Department of Transportation (ODOT) and is the subject of this study.

The purpose of this study was to identify crash trends, develop and examine potential countermeasures, and evaluate countermeasures using Highway Safety Manual methodology and cost-benefit analyses. Traditional improvements such as installing a traffic signal or turn lanes as well as unique solutions such as Restricted Crossing U-Turn (RCUT) treatments were investigated to mitigate crashes. Methodology, results, and recommendations are included below.

2.0 EXISTING CONDITIONS

The study area is located in northeast Ohio near the Ohio-Pennsylvania border. US-62 passes through the residential area of Masury, Ohio, providing access from residential and industrial areas to SR-82 and Pennsylvania to the east and IR-80 south of the study area. The segment of US-62 from Bedford Road to Broadway Avenue is the subject of this safety study. **Figure 1** shows the study area indicated in yellow.

Figure 1 – Study Area



US-62 is a four lane divided highway with a 30-foot grass median throughout the study area. The roadway has a 55 MPH posted speed limit with eight-foot paved outside shoulders and two-foot paved inside shoulders. Vertical curvature is present through the length of study area, and two horizontal curves are present as well. The intersections with Bedford Road and Broadway Avenue are unsignalized with minor approach stop control. A full cloverleaf interchange with SR-82 is located just east of the Broadway Avenue intersection. No additional connections or access points are located on US-62 within the study area.

Bedford Road is located at the west end of the study area and runs northwest/southeast in the vicinity of its intersection with US-62. The intersection is located on a tangent section between the two US-62 horizontal curves mentioned above, and Bedford Road meets US-62 at a slight skew. Bedford Road has single-lane approaches at the intersection and is the stop-controlled roadway. At the intersection, the roadway is generally level with the southeast leg sloping down away from the intersection and the northwest leg sloping up away from the intersection. Both approaches are signed for 35 MPH. Bedford Road is curbed in the vicinity of the intersection, and single-lot residential dwellings are present with direct access along the roadway.

Broadway Avenue is located at the east end of the study area and runs north/south in the vicinity of its intersection with US-62. The intersection is located approximately where the horizontal curve meets the tangent section between Broadway Avenue and SR-82, and the approaches are relatively flat compared to the steeper inclines at Bedford Road. Broadway Avenue meets US-62 at a skew, and the combination of the skew angle, horizontal curvature, and vertical curvature (along with an overgrown tree line) create limited sight distance for northbound traffic. Both approaches are signed for 35 MPH and lead into residential areas.

An existing condition diagram showing roadway characteristics at the study intersection and a crash diagram depicting crashes from 2014 to 2018 are provided in **Appendix A**.

3.0 PRELIMINARY TRAFFIC ANALYSIS

ODOT provided EMH&T with approximately 13 hours of count data taken at both study intersections on Thursday June 13, 2019. These counts were completed to obtain more than eight hours of volume data needed to complete traffic signal warrants. Traffic counts were also used to develop traffic projections as outlined below.

In addition to existing count data, EMH&T was also provided with traffic projections for use in capacity evaluations. ODOT District 4 supplied a completed Simplified Highway Forecasting Tool (SHIFT) analysis with Opening Year 2022 and Horizon Year 2042 volumes. EMH&T developed traffic plates showing traffic redistributed based on proposed improvements. The count data, SHIFT analysis volumes, and traffic plates with redistributed volumes can be found in **Appendix B**.

Traffic signal warrants were evaluated at the subject intersection to provide a basis for countermeasure recommendations. These warrants were all completed using existing count data taken at the study intersection. Eight-Hour, Four-Hour, and Peak Hour traffic signal warrants were evaluated using ODOT Traffic Engineering Manual (TEM) and the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) guidance.

Traffic signal warrants were performed with high-speed 70% volume thresholds per OMUTCD guidance and without right turn reduction applied at both study intersections. Based on the results of the traffic signal warrant evaluation, a traffic signal is not warranted at either study intersection based on eight hour, four hour, or peak hour warrants despite using the 70% volume thresholds without right turn reduction applied. The complete signal warrant evaluation can be found in **Appendix D**.

EMH&T completed turn lane warrants using the ODOT Location and Design Manual, Volume 1 (L&D Manual) procedures. As discussed above, traffic was redistributed based on turning movement restrictions created by the proposed improvements. Turn lane warrants were evaluated for the existing intersection lane configurations and with traffic redistributed based on proposed restrictions. Based on the results of this analysis, no turn lanes are warranted under any scenario at either intersection. The turn lane warrant graphs are provided in **Appendix D**.

4.0 ALTERNATIVES CONSIDERED

To address the documented safety concerns at each intersection, various infrastructure modification alternatives were evaluated for each location. A description of each considered alternative is provided below:

Alternative Considered for Both Intersections – No-Build Alternative

The No-Build Alternative would result in each intersection remaining in its current configuration, whereby not addressing the documented safety concerns at each location. The No-Build Alternative does not satisfy the purpose & need for the project and as such, was dismissed as a viable alternative for each intersection location.

Alternatives Considered - US-62 & Bedford Road Intersection

Restricted Crossing U-Turn (RCUT), No left turns from US-62: Closes the median entirely, shifts all left turn movements to new U-turn locations that will be created approximately 600 feet on either side of the intersection. This Alternative eliminates all left turn movements to and from high speed US-62 traffic.

Restricted Crossing U-Turn (RCUT), Traditional: Allows only right turn movements from Bedford Road, while still allowing left turn movements from US-62 to Bedford Road. This Alternative creates U-turn locations approximately 600 feet on each side of the intersection for drivers desiring to make a left turn from Bedford Road to US-62.

Turn Lanes: This alternative maintains all existing movements and creates additional right and left turn lanes on US-62, which allows turning vehicles to move out of the through traffic lanes.

- Based on the traffic analysis discussed in Section 3.0, traffic volumes do not meet the minimum thresholds required to justify left or right turn lanes at this intersection, and **is removed from further consideration.**

Traffic Signal: This alternative maintains all existing movements utilizing the installation of a traffic signal at the US-62 & Bedford Road intersection.

- Based on the traffic analysis discussed in Section 3.0, traffic volumes do not meet the minimum thresholds required to justify traffic signals at this intersection, and **is removed from further consideration.**

Alternatives Considered - US-62 & Broadway Avenue Intersection

CUL-DE-SAC/“T” Intersection: Eliminates the intersection of US-62 and the south leg of Broadway Avenue, which is responsible for nearly half the crashes at this intersection. This alternative creates a “T” intersection with US-62 and the north leg of Broadway Avenue, which reduces the number of potential intersection conflict points. This alternative eliminates all movements from the south leg of Broadway Avenue.

Restricted Crossing U-Turn (RCUT), Traditional: Allows only right turn movements from Broadway Avenue, while still allowing left turn movements from US-62 to Broadway Avenue. This alternative creates U-turn locations located at least 600 feet on each side of the intersection.

- Due to the local geography, there is inadequate sight distance for motorists using the southern U-turn. Additionally, the northern U-turn would have to be located too close to the SR-82 interchange and would not meet ODOT's current design standards. As this alternative is not feasible, **is removed from further consideration.**

Restricted Crossing U-Turn (RCUT), No U-turns Provided: Allows only right turn movements from Broadway Avenue, while still allowing left turn movements from US-62 to Broadway Avenue. No U-turns would be provided to accommodate left turn movements from Broadway Avenue. This alternative utilizes the loop ramps at the SR-82 interchange as an alternate route to perform U-turns for northbound Broadway Avenue traffic.

Right-in, Right-Out only for NB & SB Broadway Avenue: Closes the median entirely and allows only right turns from Broadway Avenue onto US-62 and from US-62 onto Broadway Avenue. This alternative eliminates all left turn movements to and from high speed US-62 traffic. This alternative utilizes the loop ramps at the SR-82 interchange as an alternate route to perform U-turns for northbound Broadway Avenue traffic.

Turn Lanes: This alternative maintains all existing movement utilizing the additional right and left turn lanes on US-62 to allow for turning vehicles to move out of the through traffic lanes.

- Based on the traffic analysis discussed in Section 3.0, traffic volumes do not meet the minimum thresholds required to justify left or right turn lanes at this intersection, and **is removed from further consideration.**

Traffic Signal: This alternative maintains all existing movement utilizing the installation of a traffic signal at the US-62 & Broadway Avenue intersection.

Based on the traffic analysis discussed in Section 3.0, traffic volumes do not meet the minimum thresholds required to justify traffic signals at this intersection, and **is removed from further consideration.**

Plan view exhibits of alternatives (that were not initially dismissed) are included in **Appendix F.**

5.0 STAKEHOLDER COORDINATION

A stakeholder meeting was held on November 20, 2019 to present the alternatives considered for both intersections. The meeting was attended by project team representatives from both ODOT and EMH&T, as well as Brookfield Township Trustees, Trumbull County, Brookfield Township Fire and Police Departments, and Eastgate Regional Council of Governments (Eastgate).

A presentation was given to introduce the alternatives being considered and included a review of an Alternatives Comparison Matrix and feasible alternative exhibits. Potential impacts to emergency service routes were considered as part of this study and exhibits showing alternate routes for EMS/Fire responses in the project area were shared at the meeting for feedback. These exhibits included the estimated increase in travel time and can be found in **Appendix H.** A copy of

the meeting minutes developed for the November 2019 Stakeholder Coordination Meeting can be found in **Appendix G**. Additional discussion on stakeholder feedback is included in **Section 8.0 Preferred Alternatives** below.

6.0 SAFETY ANALYSIS

ODOT provided EMH&T with 2014 to 2018 crash data via a completed CAM Tool at the subject location. Crash reports were referenced as needed to investigate crash trends, but no additional review of the crash data was scoped. The fatal crash occurred at the intersection of US-62 and Bedford Road and was the result of an angle collision between an eastbound vehicle on US-62 striking a vehicle traveling southbound on Bedford Road. **Table 1** shows a summary of the crash data taken from the CAM Tool.

Table 1 – Crash Summary

CRASH_SEVERITY	Number	%
Fatal Crash	1	2.6%
Injury Crash	17	43.6%
Property Damage Crash	21	53.8%
Grand Total	39	100.0%

TYPE_OF_CRASH	Number	%
Angle	21	53.8%
Fixed Object	7	17.9%
Left Turn	6	15.4%
Rear End	2	5.1%
Right Turn	1	2.6%
Sideswipe - Passing	1	2.6%
Sideswipe - Meeting	1	2.6%
Grand Total	39	100.0%

SEVERITY	CRASH_SEVERITY			
TRAFFIC_CRASH_YEAR	Property Damage Crash	Injury Crash	Fatal Crash	
2014	3	4	0	
2015	5	3	0	
2016	6	5	0	
2017	4	3	0	
2018	3	2	1	
Grand Total	21	17	1	

TRAFFIC_CRASH_YEAR	INJ_TYPE2_SERIOUS_VISIBLE	INJ_TYPE3_MINOR_VISIBLE	INJ_TYPE4_NO_VISIBLE
2014	0	2	3
2015	0	2	5
2016	1	4	3
2017	0	5	1
2018	0	5	1
Grand Total	1	18	13

EMH&T investigated crash patterns throughout the length of the segment and at the two study intersections. The predominant crash type along the segment is run-off-the-road/fixed-object type crashes, while the intersections show a pattern of predominantly angle type crashes. Angle crashes at Bedford Road appear to be nearly evenly split between the north and south approaches, while

the crashes at Broadway Avenue appear to mainly involve ingress or egress movements on the south approach.

The ODOT Economic Crash Analysis Tool (ECAT) was used to evaluate conditions at the subject site. EMH&T used ADT values taken from the SHIFT analysis and did not apply a growth rate¹. Based on the characteristics of the study area and existing crash patterns, ECAT shows that the expected total crash frequency exceeds the predicted crash frequency. The Predicted Average Crash Frequency is **7.7 Crashes/Year** while the Expected Average Crash Frequency is **8.0 Crashes/Year** for the existing conditions indicating there is potential for safety improvement.

Figure 2 shows the existing condition anticipated safety performance and **Figure 3** shows the potential safety improvement for each element in the study area. Cells highlighted in red indicate potential for safety improvement. The existing condition ECAT analysis shows that the potential for safety improvement is driven primarily by the Bedford Road intersection. The sum of the values in the Total column corresponds to the **0.3 Crashes/Year** value potential for safety improvement for total crashes in **Figure 2**.

Figure 2 – Existing Condition Anticipated Corridor Safety Performance

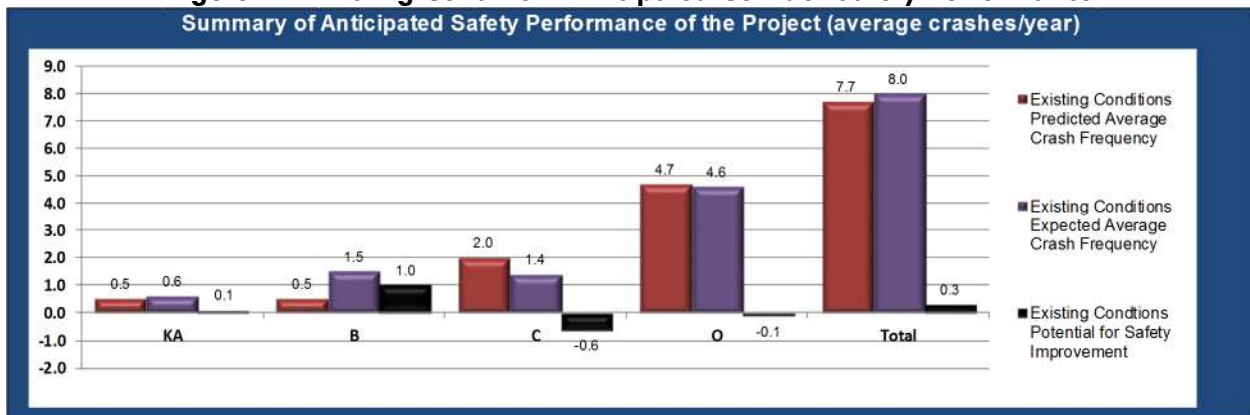


Figure 3 – Study Area Potential for Safety Improvement

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)						
Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 7.47-7.66	Start of Study Area to Bedford Road	-0.0011	0.0196	-0.032	-0.0499	-0.0634
US62: 7.67-8.09	Bedford Road to Broadway Avenue	-0.0023	0.0431	-0.0715	-0.0117	-0.0424
US62: 8.1-8.29	Broadway Avenue to End of Study Area	-0.0011	0.0196	-0.032	-0.0499	-0.0634
US62: 7.67	US-62 at Bedford Road	0.1018	0.6199	-0.0868	-0.0002	0.6347
US62: 8.1	US-62 at Broadway Avenue	-0.0251	0.2833	-0.4132	-0.0002	-0.1552

In general, the segments do not show a potential for safety improvement and are near or below zero. US-62 at Bedford Road shows **0.63 Crashes/Year** as its potential for safety improvement driven by the fatal/severe and visible injury categories. The intersection of US-62 and Broadway Avenue also shows **0.3 Crashes/Year** as its potential for safety improvement in the visible injury category. Based on these results, the intersections are the focus for safety improvements in this area.

¹ Per ODOT correspondence with Eastgate Regional Council of Governments, the area has experienced negative growth since the year 2000. Therefore, 0% growth was assumed in analysis.

EMH&T consulted the Federal Highway Administration (FHWA) Crash Modification Factor (CMF) Clearinghouse to obtain values for the RCUT conversion at Bedford Road and Right-In/Right-Out restriction implementation at Broadway Avenue. FHWA provides a quality rating for each CMF from 0 to 5 as a weighted aggregate score of several factors such as study design, sample size, and data source. The factors selected for this evaluation both score 4 out of 5 based on this quality criteria. CMF Clearinghouse print outs for these CMFs are provided in **Appendix C**.

Based on crash patterns at Bedford Road and US-62 and stakeholder input on preferred improvements, EMH&T evaluated the safety benefit of an RCUT treatment at this intersection. The CMF Clearinghouse provides a CMF of 0.652 for all crashes, indicating a reduction in crashes after installation of the treatment.

EMH&T also evaluated a RI/RO treatment at Broadway Avenue, with a CMF Clearinghouse CMF value of 0.55 for all crashes. The Clearinghouse research indicates that this CMF is for three-leg intersections in urban areas and does not include a CMF for RI/RO treatments in rural areas. However, the volume criteria shows intersections investigated in the research had low minor approach volume and significantly higher mainline volume. Therefore, this CMF was used to evaluate the treatment as volume characteristics are similar and no exact match is present in available research.

Figure 4 shows the overall corridor anticipated safety performance, while **Figure 5 & Figure 6** show a comparison of the anticipated existing performance and proposed performance with the intersection CMFs applied. The full ECAT reports comparing the two alternatives to the existing conditions and their predicted impact can be found in **Appendix C**.

Figure 4 – Proposed Condition Anticipated Corridor Safety Performance

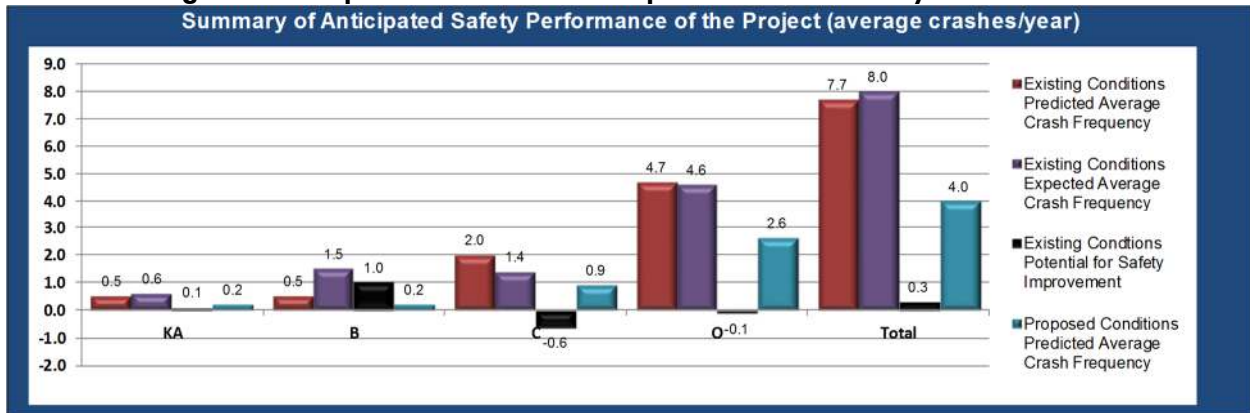


Figure 5 – Anticipated Existing Safety Performance

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)						
Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US62: 7.47-7.66	Start of Study Area to Bedford Road	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67-8.09	Bedford Road to Broadway Avenue	0.0311	0.0311	0.1116	0.3543	0.5281
US62: 8.1-8.29	Broadway Avenue to End of Study Area	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67	US-62 at Bedford Road	0.211	0.211	0.8903	2.0091	3.3214
US62: 8.1	US-62 at Broadway Avenue	0.2113	0.2113	0.8916	2.0152	3.3294

Figure 6 – Anticipated Proposed Safety Performance

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)						
Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US62: 7.47-7.66	Start of Study Area to Bedford Road	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67-8.09	Bedford Road to Broadway Avenue	0.0311	0.0311	0.1116	0.3543	0.5281
US62: 8.1-8.29	Broadway Avenue to End of Study Area	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67	US-62 at Bedford Road	0.058	0.058	0.2435	0.7668	1.1263
US62: 8.1	US-62 at Broadway Avenue	0.1162	0.1162	0.4904	1.1084	1.8312

Benefit-Cost analysis was also performed for the preferred improvements. Preliminary opinions of probable cost were developed for the RCUT improvement and implementing the RI/RO restriction. A construction cost of \$1,765,000 was used for the RCUT and \$170,000 was used for the RI/RO implementation. An additional 10% Engineering Design fee was added and a 20% contingency was also applied to the listed construction costs for use in the ECAT analysis.

The Benefit-Cost ratio for these improvements falls under 1.0, with a value of **0.85** returned when comparing the Net Present Value of Project to Net Present Value of Safety Benefits. The Benefit-Cost analysis can also be found in **Appendix C** and includes preliminary opinions of cost for both alternatives.

7.0 CAPACITY ANALYSIS

EMH&T used Highway Capacity Software, Version 7 (HCS) to evaluate Level of Service (LOS) and delay under existing TWSC and proposed alternatives at the study intersections. An RCUT intersection configuration was evaluated at Bedford Road as a potential safety improvement because the intersection does not meet signal warrants. The RCUT settings in HCS 7 and measurements taken from preliminary layouts were used to determine capacity results for the RCUT alternative. **Table 2** shows the results of the TWSC capacity analyses which returns acceptable operations in both peaks for Design Year traffic volumes.

Table 2 – TWSC Capacity Analysis Results

Time Period	Year	Traffic Control	EBLT	EBTH	EBRT	EB TOTAL	WBLT	WBTH	WBRT	WB TOTAL	NBLT	NBTH	NBRT	NB TOTAL	SBLT	SBTH	SBRT	SB TOTAL	TOTAL
US - 62 / Bedford Road																			
AM Peak Hour	2042	TWSC	A/8.0	---	---	A/0.2	A/8.2	---	---	A/0.3	B/13.1	B/13.1	B/12.3	B/12.3	B/12.3	B/12.3	B/12.3	B/12.3	*
PM Peak Hour	2042	TWSC	A/8.7	---	---	A/0.5	A/8.4	---	---	A/0.2	B/14.6	B/14.6	B/13.9	B/13.9	B/13.9	B/13.9	B/13.9	B/13.9	*
US - 62 / Broadway Avenue																			
AM Peak Hour	2042	TWSC	A/7.9	---	---	A/0.7	A/8.2	---	---	A/0.3	B/12.9	B/12.9	B/12.4	B/12.4	B/12.4	B/12.4	B/12.4	B/12.4	*
PM Peak Hour	2042	TWSC	A/8.5	---	---	A/0.2	A/8.5	---	---	A/0.6	B/14.7	B/14.7	B/13.9	B/13.9	B/13.9	B/13.9	B/13.9	B/13.9	*

XX/XX = LOS/Delay (s)

*Note - TWSC HCS Reports do not provide an overall Delay or LOS result

The RCUT configuration was also evaluated in HCS 7 to determine delay for the minor approach vehicles. HCS 7 provides control delay and travel time to calculate LOS for the stop controlled movements. Based on preliminary layouts, the distance from the main intersection to the U-turn areas

is approximately 650 feet; this value was used in the HCS 7 calculations. **Table 3** shows the results of the RCUT capacity analysis.

Table 3 – RCUT Capacity Analysis Results

Time Period	Year	Traffic Control	EBLT	EBTH	EBRT	EB TOTAL	WBLT	WBTH	WBRT	WB TOTAL	NBLT	NBTH	NBRT	NB TOTAL	SBLT	SBTH	SBRT	SB TOTAL	TOTAL
US - 62 / Bedford Road																			
AM Peak Hour	2042	RCUT	8.0	0.0	0.0	A/0.2	8.3	0.0	0.0	A/0.3	18.5	18.5	9.9	C/27.4	18.4	18.4	9.5	C/25.2	A/2.6
			0.0	0.0	0.0		0.0	0.0	0.0		0.0	14.7	14.7		0.0	14.7	14.7		
P.M Peak Hour	2042	RCUT	8.7	0.0	0.0	A/0.4	8.5	0.0	0.0	A/0.2	19.5	19.5	10.1	C/26.2	19.6	19.6	10.5	C/22.4	A/1.8
			0.0	0.0	0.0		0.0	0.0	0.0		14.7	14.7	0.0		14.7	14.7	0.0		

Top Value - Control Delay (s)

Bottom Value - HCS 7 Extra Distance Travel Time, EDTT (s)

Total - Experienced Travel Time, ETT (s)

The RCUT analysis shows that control delay values are similar to the TWSC condition, and the increased travel time brings the average LOS to a C and delay to approximately 25 seconds. This is a reduction of one LOS value and approximately 10 additional seconds on average. However, these results show the intersection still operates within acceptable LOS and delay criteria despite the increase in distance traveled for displaced movements from the minor approaches.

The full capacity result reports for the TWSC and RCUT analysis are provided in **Appendix E**.

8.0 PREFERRED ALTERNATIVES

Each alternative was considered as it relates to addressing the known safety concerns at each intersection, with additional input from the stakeholder group. The following provides a summary of the evaluation of alternatives for each of the intersections:

US-62 & Bedford Road Intersection

As noted in Section 4.0, four (4) alternatives were considered to address the safety issues associated with the existing US-62 & Bedford Road intersection. Two of the alternatives, Turn Lanes and Traffic Signal, were dismissed as analyses determined that neither turn lane nor traffic signal warrants were met. The remaining two alternatives, Restricted Crossing U-Turn (RCUT) with no left turns from US-62 and a Traditional RCUT, were advanced for further consideration and presented to the project Stakeholders as part of November 2019 stakeholder coordination activities.

Following a review of the safety and traffic analyses completed for the US-62 & Bedford Road intersection, the stakeholder group concurred that both RCUT alternatives address the existing safety concerns. However, given the lack of a nearby alternative route and the crash history not showing a pattern of crashes involving left turning vehicles from US-62, the group concurred that there was no apparent reason to restrict the left turns from US-62 to Bedford Road. Given these factors, the **Traditional RCUT alternative was selected as the preferred alternative** to be carried

forward for the US-62 & Bedford Road intersection. A conceptual rendering of the preferred alternative can be found in **Appendix I**.

A 2019 preliminary opinion of construction costs was developed for the US-62 & Bedford Road intersection preferred alternative. Construction costs, including contingency, are estimated to be approximately \$1,765,000.

US-62 & Broadway Avenue Intersection

As noted in Section 4.0, six (6) alternatives were considered to address the safety issues associated with the existing US-62 & Broadway Avenue intersection. Similar to the US-62 & Bedford Road intersection, two of the alternatives, Turn Lanes and Traffic Signal, were dismissed as analyses determined that neither turn lane nor traffic signal warrants were met. A third alternative, a Traditional Restricted Crossing U-Turn (RCUT), was also eliminated from consideration due to the fact that the location of the proposed U-turns would not meet current sight distance requirements and/or are placed too close to the existing US-62 & SR-82 interchange. The final three alternatives, CUL-DE-SAC/T-intersection, RCUT with no U-Turns, and Right-in/Right-out only for NB & SB Broadway, were advanced for further consideration and presented to the project Stakeholders as part of November 2019 stakeholder coordination activities.

The analysis of viable alternatives for this intersection included a review of current intersection geometrics, crash history, and safety improvement countermeasures previously implemented at the intersection (installation of a flashing signal). The CUL-DE-SAC/T-intersection alternative was dismissed due to the fact that it still allows for left turns from Broadway Avenue to US-62 from the north leg and eliminates access to US-62 entirely for the south leg, which currently has direct access. In addition, right-of-way impacts for this option would have been substantial, including a total take of a residence.

In evaluation of the remaining two (2) alternatives, the following items were considered and discussed amongst ODOT, the stakeholders, and the design team:

- Crash history and crash patterns
- Previous attempts to address safety concerns at the intersection
- Proximity of alternative routes for movements that would be eliminated

Given the proximity of the SR-82 ramps and easily accessible alternative routes, the stakeholder group concurred that the best option would be to eliminate any crossing movements that increase the potential for high-speed angle crashes, such as the RCUT with no U-Turns alternative. As such, the **Right-in/Right-out only option was selected as the preferred alternative** to be carried forward for the US-62 & Broadway Avenue intersection.

Emergency vehicle response times were discussed at the stakeholder meeting and it was suggested that EMH&T investigate adding an emergency vehicle turn around east of Broadway Avenue and west of the interchange for access to incidents occurring between Broadway and SR-82. Due to the location of the on-ramp from SR-82, the suggested location is approximately 800' east of Broadway Avenue as shown in **Appendix I**. No horizontal or vertical sight restrictions are anticipated at this proposed location and it being included as an added element to the preferred alternative.

A 2019 preliminary opinion of construction costs was developed for the US-62 & Broadway Avenue intersection preferred alternative. The construction costs, including contingency, are estimated to be approximately \$170,000.

9.0 CONCLUSIONS AND RECOMMENDATIONS

In 2018, the intersection of US-62 and Bedford Road experienced an angle collision that resulted in a fatality. From 2014 to 2018, the intersection averaged approximately three crashes per year with the majority of those crashes coded as injury. A safety evaluation was completed to develop alternatives that would reduce crashes associated with the existing divided US-62 four lane highway configuration. The Broadway Avenue intersection has similar geometric characteristics and was included in the study area as part of a comprehensive solution for the corridor.

A safety analysis for the entire corridor was conducted to investigate existing trends. This analysis shows that the intersections have potential for safety benefit, while the segments are performing similar to peer locations and do not return a potential for safety benefit. Mitigation of crashes at the two intersections was the focus of improvements based on these findings.

Traffic signal warrants at the intersections were evaluated and found to not meet warrant thresholds for eight-hour, four-hour, or peak-hour analyses. Since installation of a traffic signal is not supported by warrants, un-signalized options were evaluated to provide potential safety benefit in the study area.

ODOT and the design team coordinated with stakeholders to obtain input on several alternatives for the study intersections. Preferred alternatives were selected using this input along with traffic and safety analyses completed for the proposed improvements. Accommodations to address stakeholder concerns were added, such as the vehicle turnaround to maintain access for emergency response vehicles near the Broadway intersection.

The Preferred Alternatives for the two studied intersections are listed below based on stakeholder input, safety analyses, and traffic analyses:

- US-62 & Bedford Road Intersection – Traditional RCUT (allowing mainline left turns)
 - Alternative includes mainline left turn lanes and an add lane to allow for deceleration leading into the two U-turn areas.
 - Mainline right turn lanes are not warranted
- US-62 & Broadway Avenue Intersection – Close the median to create Right In/Right Out restrictions for both approaches
 - Mainline right turn lanes are not warranted

APPENDIX A:

Existing Condition Diagram & Crash Diagram

APPENDIX B:

Count Data & SHIFT Analysis Results

Study Name TRU-62-7.67
Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Site Code

Overview

This report contains turning movement volume (TMV) data of vehicular traffic in the intersection of study.

Content

Summary Contains a TMV summary of all vehicular traffic in the intersection for defined peak periods
TMV Table Contains a pivot table of the TMV road and crosswalk data
TMV Data Contains measured TMV data of all vehicular traffic in the intersection for each approach

Traffic Study

Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Classification Categories Lights, Other Vehicles
06/13/2019 AM Peaks 7:15 AM - 8:15 AM
06/13/2019 PM Peaks 4:45 PM - 5:45 PM

Study Name TRU-62-7.67
Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Site Code

Report Summary

Time Period	Class.	Southbound						Westbound						Northbound						Eastbound						Total
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	
Peak 1	Lights	8	269	3	0	280	366	11	2	17	0	30	19	12	345	9	0	366	299	13	4	10	0	27	19	703
Specified Period	%	100%	93%	100%	0%	93%	91%	92%	100%	100%	0%	97%	95%	100%	91%	100%	0%	92%	94%	100%	80%	100%	0%	96%	100%	93%
5:45 AM - 12:00 PM	Other Vehicle:	0	20	0	0	20	35	1	0	0	0	1	1	0	34	0	0	34	20	0	1	0	0	1	0	56
One Hour Peak	%	0%	7%	0%	0%	7%	9%	8%	0%	0%	0%	3%	5%	0%	9%	0%	0%	9%	6%	0%	20%	0%	0%	4%	0%	7%
7:15 AM - 8:15 AM	Total	8	289	3	0	300	401	12	2	17	0	31	20	12	379	9	0	400	319	13	5	10	0	28	19	759
	PHF	0.5	0.79	0.38	0	0.82	0.75	0.75	0.5	0.61	0	0.78	0.62	0.75	0.76	0.56	0	0.76	0.81	0.54	0.42	0.5	0	0.88	0.68	0.94
	Approach %					40%	53%					4%	3%					53%	42%					4%	3%	
Peak 2	Lights	14	477	11	0	502	469	10	5	10	0	25	37	19	447	20	1	487	504	16	7	12	0	35	39	1049
Specified Period	%	100%	97%	100%	0%	97%	99%	100%	100%	91%	0%	96%	100%	100%	98%	100%	100%	99%	97%	100%	100%	100%	0%	100%	100%	98%
12:00 PM - 7:30 PM	Other Vehicle:	0	14	0	0	14	7	0	0	1	0	1	0	0	7	0	0	7	15	0	0	0	0	0	0	22
One Hour Peak	%	0%	3%	0%	0%	3%	1%	0%	0%	9%	0%	4%	0%	0%	2%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%	2%
4:45 PM - 5:45 PM	Total	14	491	11	0	516	476	10	5	11	0	26	37	19	454	20	1	494	519	16	7	12	0	35	39	1071
	PHF	0.7	0.91	0.55	0	0.93	0.92	0.36	0.62	0.39	0	0.72	0.66	0.59	0.92	0.83	0.25	0.91	0.93	0.57	0.88	0.75	0	0.73	0.89	0.95
	Approach %					48%	44%					2%	3%					46%	48%					3%	4%	

Study Name TRU-62-7.67
Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Site Code

Road Volumes

TMV Interval	Movement Southbound				Southbound To Westbound					Westbound To Northbound					Northbound To Eastbound					Eastbound To Grand Total	
	R	T	L	U	R	T	L	U	R	T	L	U	R	T	L	U	R	T	L		U
6/13/2019 5:45	0	31	2	0	33	3	1	1	0	5	5	35	0	0	40	3	2	1	0	6	84
Lights	0	28	2	0	30	3	1	1	0	5	5	30	0	0	35	3	2	1	0	6	76
Other Vehicles	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	8
6/13/2019 6:00	0	43	0	0	43	0	0	2	0	2	1	32	0	0	33	2	0	0	0	2	80
Lights	0	42	0	0	42	0	0	2	0	2	1	26	0	0	27	2	0	0	0	2	73
Other Vehicles	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
6/13/2019 6:15	1	58	0	0	59	1	1	5	0	7	1	56	0	0	57	5	0	1	0	6	129
Lights	1	57	0	0	58	1	1	5	0	7	1	53	0	0	54	5	0	1	0	6	125
Other Vehicles	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
6/13/2019 6:30	0	68	1	0	69	2	1	3	0	6	2	75	0	0	77	1	0	3	0	4	156
Lights	0	67	1	0	68	2	1	3	0	6	2	67	0	0	69	1	0	3	0	4	147
Other Vehicles	0	1	0	0	1	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	9
6/13/2019 6:45	0	44	0	0	44	2	0	3	0	5	4	95	2	0	101	6	0	1	0	7	157
Lights	0	43	0	0	43	2	0	3	0	5	4	84	2	0	90	6	0	1	0	7	145
Other Vehicles	0	1	0	0	1	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	12
6/13/2019 7:00	0	86	3	0	89	0	0	5	0	5	2	59	0	0	61	3	1	0	0	4	159
Lights	0	85	3	0	88	0	0	5	0	5	2	51	0	0	53	3	1	0	0	4	150
Other Vehicles	0	1	0	0	1	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	9
6/13/2019 7:15	4	79	2	0	85	3	0	7	0	10	4	77	2	0	83	6	0	0	0	6	184
Lights	4	73	2	0	79	3	0	7	0	10	4	68	2	0	74	6	0	0	0	6	169
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	15
6/13/2019 7:30	1	91	0	0	92	3	0	2	0	5	3	81	1	0	85	5	1	1	0	7	189
Lights	1	86	0	0	87	3	0	2	0	5	3	77	1	0	81	5	1	1	0	7	180
Other Vehicles	0	5	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	9
6/13/2019 7:45	1	53	1	0	55	4	1	3	0	8	4	125	2	0	131	0	3	4	0	7	201
Lights	1	49	1	0	51	3	1	3	0	7	4	111	2	0	117	0	3	4	0	7	182
Other Vehicles	0	4	0	0	4	1	0	0	0	1	0	14	0	0	14	0	0	0	0	0	19
6/13/2019 8:00	2	66	0	0	68	2	1	5	0	8	1	96	4	0	101	2	1	5	0	8	185
Lights	2	61	0	0	63	2	1	5	0	8	1	89	4	0	94	2	0	5	0	7	172
Other Vehicles	0	5	0	0	5	0	0	0	0	0	0	7	0	0	7	0	1	0	0	1	13
6/13/2019 8:15	0	61	0	0	61	1	1	3	0	5	2	83	1	0	86	1	1	4	0	6	158
Lights	0	58	0	0	58	1	1	3	0	5	1	73	1	0	75	1	1	4	0	6	144
Other Vehicles	0	3	0	0	3	0	0	0	0	0	1	10	0	0	11	0	0	0	0	0	14
6/13/2019 8:30	1	54	0	0	55	4	1	5	0	10	4	88	0	0	92	1	2	1	0	4	161
Lights	1	53	0	0	54	4	1	5	0	10	4	82	0	0	86	1	2	1	0	4	154
Other Vehicles	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
6/13/2019 8:45	1	61	0	0	62	1	0	2	0	3	2	82	1	0	85	4	1	4	0	9	159
Lights	1	55	0	0	56	1	0	2	0	3	2	68	1	0	71	4	1	4	0	9	139
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	20
6/13/2019 9:00	2	54	1	0	57	2	2	3	0	7	1	68	2	0	71	2	1	5	0	8	143
Lights	2	43	1	0	46	2	2	3	0	7	1	60	2	0	63	2	0	5	0	7	123
Other Vehicles	0	11	0	0	11	0	0	0	0	0	0	8	0	0	8	0	1	0	0	1	20
6/13/2019 9:15	1	52	0	1	54	0	0	3	0	3	2	60	0	1	63	2	0	1	0	3	123
Lights	1	46	0	0	47	0	0	3	0	3	2	52	0	1	55	2	0	1	0	3	108
Other Vehicles	0	6	0	1	7	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	15
6/13/2019 9:30	2	65	0	0	67	1	2	2	0	5	3	76	1	1	81	2	0	1	0	3	156
Lights	2	58	0	0	60	1	1	2	0	4	3	61	1	1	66	2	0	1	0	3	133
Other Vehicles	0	7	0	0	7	0	1	0	0	1	0	15	0	0	15	0	0	0	0	0	23
6/13/2019 9:45	4	72	0	0	76	3	0	5	0	8	3	76	0	0	79	1	1	1	0	3	166
Lights	4	62	0	0	66	3	0	5	0	8	3	69	0	0	72	1	1	1	0	3	149
Other Vehicles	0	10	0	0	10	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	17
6/13/2019 10:00	2	65	2	0	69	0	0	5	0	5	1	65	1	0	67	2	1	1	0	4	145
Lights	2	61	2	0	65	0	0	5	0	5	1	54	1	0	56	2	1	1	0	4	130
Other Vehicles	0	4	0	0	4	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	15
6/13/2019 10:15	0	71	0	0	71	3	0	1	0	4	5	62	0	0	67	1	1	1	0	3	145
Lights	0	61	0	0	61	3	0	1	0	4	5	52	0	0	57	1	1	1	0	3	125

Other Vehicles	0	10	0	0	10	0	0	0	0	0	0	10	0	0	10	0	0	0	0	20	
6/13/2019 10:30	0	60	2	0	62	7	2	5	0	14	1	79	0	1	81	1	0	1	0	2	159
Lights	0	53	2	0	55	7	2	5	0	14	1	74	0	1	76	1	0	1	0	2	147
Other Vehicles	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	12
6/13/2019 10:45	2	77	3	1	83	1	2	1	0	4	0	71	0	0	71	3	2	1	0	6	164
Lights	2	69	3	0	74	1	2	1	0	4	0	66	0	0	66	3	1	1	0	5	149
Other Vehicles	0	8	0	1	9	0	0	0	0	0	0	5	0	0	5	0	1	0	0	1	15
6/13/2019 11:00	0	77	2	1	80	0	0	4	0	4	0	67	2	0	69	1	2	1	0	4	157
Lights	0	71	2	1	74	0	0	4	0	4	0	58	2	0	60	1	2	1	0	4	142
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	15
6/13/2019 11:15	0	74	3	0	77	0	1	6	0	7	3	83	0	0	86	0	2	1	0	3	173
Lights	0	67	3	0	70	0	1	6	0	7	3	73	0	0	76	0	1	1	0	2	155
Other Vehicles	0	7	0	0	7	0	0	0	0	0	0	10	0	0	10	0	1	0	0	1	18
6/13/2019 11:30	0	67	1	0	68	3	4	3	0	10	4	67	2	0	73	3	1	0	0	4	155
Lights	0	64	1	0	65	3	4	3	0	10	4	60	2	0	66	3	1	0	0	4	145
Other Vehicles	0	3	0	0	3	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	10
6/13/2019 11:45	1	69	2	0	72	1	4	5	0	10	4	86	2	0	92	4	5	4	0	13	187
Lights	1	67	2	0	70	1	3	5	0	9	3	69	2	0	74	4	4	4	0	12	165
Other Vehicles	0	2	0	0	2	0	1	0	0	1	1	17	0	0	18	0	1	0	0	1	22
6/13/2019 12:00	1	83	3	0	87	2	1	3	0	6	2	77	1	0	80	3	2	2	0	7	180
Lights	1	76	3	0	80	2	1	3	0	6	2	66	1	0	69	3	2	2	0	7	162
Other Vehicles	0	7	0	0	7	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	18
6/13/2019 12:15	2	73	1	0	76	0	1	5	0	6	4	88	0	0	92	2	1	0	0	3	177
Lights	2	69	1	0	72	0	0	5	0	5	4	80	0	0	84	2	1	0	0	3	164
Other Vehicles	0	4	0	0	4	0	1	0	0	1	0	8	0	0	8	0	0	0	0	0	13
6/13/2019 12:30	3	75	0	0	78	1	0	6	0	7	5	71	0	0	76	4	1	0	0	5	166
Lights	3	69	0	0	72	1	0	6	0	7	5	67	0	0	72	4	1	0	0	5	156
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	10
6/13/2019 12:45	2	79	1	0	82	5	0	1	0	6	2	81	3	0	86	4	2	0	0	6	180
Lights	2	75	1	0	78	5	0	1	0	6	2	72	3	0	77	4	2	0	0	6	167
Other Vehicles	0	4	0	0	4	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	13
6/13/2019 13:00	0	60	0	0	60	1	2	3	0	6	4	77	2	0	83	2	1	1	0	4	153
Lights	0	54	0	0	54	1	2	3	0	6	4	70	2	0	76	2	1	1	0	4	140
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	13
6/13/2019 13:15	2	69	2	0	73	2	2	3	0	7	4	75	3	0	82	2	2	3	0	7	169
Lights	2	63	2	0	67	2	2	3	0	7	4	70	3	0	77	2	2	3	0	7	158
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	11
6/13/2019 13:30	7	85	3	0	95	1	0	2	0	3	4	68	3	0	75	4	1	1	0	6	179
Lights	7	79	3	0	89	1	0	1	0	2	4	64	3	0	71	4	1	1	0	6	168
Other Vehicles	0	6	0	0	6	0	0	1	0	1	0	4	0	0	4	0	0	0	0	0	11
6/13/2019 13:45	2	87	5	0	94	0	2	3	0	5	2	101	4	0	107	2	2	3	0	7	213
Lights	2	79	5	0	86	0	2	3	0	5	2	90	4	0	96	2	2	3	0	7	194
Other Vehicles	0	8	0	0	8	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	19
6/13/2019 14:00	3	69	2	0	74	2	2	1	0	5	5	83	3	0	91	1	0	2	0	3	173
Lights	3	65	2	0	70	2	2	1	0	5	5	72	3	0	80	1	0	2	0	3	158
Other Vehicles	0	4	0	0	4	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	15
6/13/2019 14:15	7	87	3	0	97	3	1	5	0	9	8	106	0	0	114	4	2	1	0	7	227
Lights	7	80	3	0	90	2	1	5	0	8	7	100	0	0	107	4	2	1	0	7	212
Other Vehicles	0	7	0	0	7	1	0	0	0	1	1	6	0	0	7	0	0	0	0	0	15
6/13/2019 14:30	2	90	2	0	94	2	3	3	0	8	9	109	2	0	120	0	2	3	0	5	227
Lights	2	86	2	0	90	2	3	3	0	8	9	104	2	0	115	0	2	3	0	5	218
Other Vehicles	0	4	0	0	4	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	9
6/13/2019 14:45	2	83	3	0	88	2	4	3	0	9	3	86	2	0	91	3	0	3	0	6	194
Lights	2	77	3	0	82	2	4	3	0	9	3	83	2	0	88	3	0	3	0	6	185
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	9
6/13/2019 15:00	1	99	3	0	103	3	1	5	0	9	6	80	1	0	87	0	2	1	0	3	202
Lights	1	93	3	0	97	3	1	5	0	9	6	76	0	0	82	0	2	1	0	3	191
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	11
6/13/2019 15:15	4	101	2	0	107	3	1	6	0	10	2	100	4	0	106	5	3	2	0	10	233
Lights	4	92	2	0	98	3	1	6	0	10	2	91	4	0	97	5	3	2	0	10	215
Other Vehicles	0	9	0	0	9	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	18
6/13/2019 15:30	2	112	6	0	120	3	3	9	0	15	3	88	4	0	95	7	4	3	0	14	244
Lights	2	105	6	0	113	3	3	9	0	15	3	84	4	0	91	7	4	3	0	14	233
Other Vehicles	0	7	0	0	7	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	11
6/13/2019 15:45	1	97	3	0	101	0	1	9	0	10	7	99	6	1	113	2	3	1	0	6	230
Lights	1	86	3	0	90	0	1	9	0	10	7	93	6	1	107	2	3	1	0	6	213
Other Vehicles	0	11	0	0	11	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	17

6/13/2019 16:00	1	99	1	0	101	1	6	3	0	10	2	97	5	0	104	3	1	3	0	7	222
Lights	1	93	1	0	95	1	6	3	0	10	2	95	5	0	102	3	1	3	0	7	214
Other Vehicles	0	6	0	0	6	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	8
6/13/2019 16:15	0	108	2	0	110	1	1	0	0	2	3	134	7	0	144	3	1	6	0	10	266
Lights	0	106	2	0	108	1	1	0	0	2	3	132	7	0	142	3	1	6	0	10	262
Other Vehicles	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
6/13/2019 16:30	3	121	1	0	125	2	1	4	0	7	4	101	3	0	108	2	2	4	0	8	248
Lights	3	117	1	0	121	2	1	4	0	7	4	99	3	0	106	2	2	4	0	8	242
Other Vehicles	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
6/13/2019 16:45	3	122	4	0	129	3	1	2	0	6	8	123	4	0	135	7	2	3	0	12	282
Lights	3	117	4	0	124	3	1	2	0	6	8	119	4	0	131	7	2	3	0	12	273
Other Vehicles	0	5	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	9
6/13/2019 17:00	3	135	0	0	138	0	2	0	0	2	5	101	5	1	112	4	2	2	0	8	260
Lights	3	132	0	0	135	0	2	0	0	2	5	100	5	1	111	4	2	2	0	8	256
Other Vehicles	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
6/13/2019 17:15	5	129	5	0	139	7	0	2	0	9	3	114	6	0	123	4	1	4	0	9	280
Lights	5	125	5	0	135	7	0	2	0	9	3	113	6	0	122	4	1	4	0	9	275
Other Vehicles	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
6/13/2019 17:30	3	105	2	0	110	0	2	7	0	9	3	116	5	0	124	1	2	3	0	6	249
Lights	3	103	2	0	108	0	2	6	0	8	3	115	5	0	123	1	2	3	0	6	245
Other Vehicles	0	2	0	0	2	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	4
6/13/2019 17:45	2	76	1	0	79	1	1	6	0	8	2	73	3	0	78	3	0	2	0	5	170
Lights	2	73	1	0	76	1	1	6	0	8	2	73	3	0	78	3	0	2	0	5	167
Other Vehicles	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
6/13/2019 18:00	3	101	1	0	105	3	1	3	0	7	5	101	1	0	107	3	4	3	0	10	229
Lights	3	98	1	0	102	3	1	3	0	7	5	98	1	0	104	3	4	3	0	10	223
Other Vehicles	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	6
6/13/2019 18:15	1	59	5	0	65	1	2	1	0	4	7	78	2	0	87	1	1	3	0	5	161
Lights	1	58	5	0	64	1	2	1	0	4	7	73	2	0	82	1	1	3	0	5	155
Other Vehicles	0	1	0	0	1	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	6
6/13/2019 18:30	4	74	1	0	79	3	4	1	0	8	3	77	6	0	86	4	1	2	0	7	180
Lights	4	74	1	0	79	3	4	1	0	8	3	72	6	0	81	4	1	2	0	7	175
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	5
6/13/2019 18:45	1	53	2	0	56	0	1	1	0	2	3	55	4	0	62	4	2	0	0	6	126
Lights	1	53	2	0	56	0	1	1	0	2	3	52	4	0	59	3	2	0	0	5	122
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	4
6/13/2019 19:00	0	57	0	0	57	0	1	2	0	3	3	48	4	0	55	3	3	3	0	9	124
Lights	0	57	0	0	57	0	1	2	0	3	3	45	4	0	52	3	3	3	0	9	121
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
6/13/2019 19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	95	4186	89	3	4373	99	71	188	0	358	183	4451	116	5	4755	148	78	107	0	333	9819

Study Name TRU-62-8.10
Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Site Code

Overview

This report contains turning movement volume (TMV) data of vehicular traffic in the intersection of study.

Content

Summary Contains a TMV summary of all vehicular traffic in the intersection for defined peak periods
TMV Table Contains a pivot table of the TMV road and crosswalk data
TMV Data Contains measured TMV data of all vehicular traffic in the intersection for each approach

Traffic Study

Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Classification Categories Lights, Other Vehicles
06/13/2019 AM Peaks 7:15 AM - 8:15 AM
06/13/2019 PM Peaks 4:45 PM - 5:45 PM

Study Name TRU-62-8.10
Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Site Code

Report Summary

Time Period	Class.	Southbound						Westbound						Northbound						Eastbound						Total
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	
Peak 1	Lights	6	3	32	0	41	37	7	257	6	1	271	379	11	4	10	0	25	12	3	335	26	1	365	274	702
Specified Period	%	100%	100%	100%	0%	100%	95%	100%	94%	100%	100%	94%	92%	100%	100%	100%	0%	100%	100%	100%	91%	93%	100%	91%	94%	93%
5:45 AM - 12:00 PM	Other Vehicle:	0	0	0	0	0	2	0	17	0	0	17	33	0	0	0	0	0	0	0	33	2	0	35	17	52
One Hour Peak	%	0%	0%	0%	0%	0%	5%	0%	6%	0%	0%	6%	8%	0%	0%	0%	0%	0%	0%	0%	9%	7%	0%	9%	6%	7%
7:15 AM - 8:15 AM	Total	6	3	32	0	41	39	7	274	6	1	288	412	11	4	10	0	25	12	3	368	28	1	400	291	754
	PHF	0.5	0.38	0.8	0	0.79	0.81	0.58	0.82	0.75	0.25	0.81	0.77	0.92	0.5	0.62	0	0.78	0.75	0.38	0.74	0.7	0.25	0.75	0.8	0.92
	Approach %					5%	5%					38%	55%					3%	2%					53%	39%	
Peak 2	Lights	36	8	17	0	61	47	28	451	28	3	510	472	11	8	6	0	25	46	10	441	11	1	463	494	1059
Specified Period	%	97%	100%	100%	0%	98%	100%	100%	97%	100%	100%	98%	99%	100%	100%	100%	0%	100%	100%	100%	98%	100%	100%	99%	97%	98%
12:00 PM - 7:30 PM	Other Vehicle:	1	0	0	0	1	0	0	13	0	0	13	7	0	0	0	0	0	0	0	7	0	0	7	14	21
One Hour Peak	%	3%	0%	0%	0%	2%	0%	0%	3%	0%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	3%	2%
4:45 PM - 5:45 PM	Total	37	8	17	0	62	47	28	464	28	3	523	479	11	8	6	0	25	46	10	448	11	1	470	508	1080
	PHF	0.92	0.67	0.61	0	0.91	0.78	0.88	0.91	0.7	0.38	0.92	0.91	0.46	0.67	0.5	0	0.57	0.72	0.5	0.9	0.69	0.25	0.91	0.93	0.93
	Approach %					6%	4%					48%	44%					2%	4%					44%	47%	

Study Name TRU-62-8.10
Start Date Thursday, June 13, 2019 5:45 AM
End Date Thursday, June 13, 2019 7:30 PM
Site Code

Road Volumes

TMV Interval	Movement Southbound				Southbound To Westbound					Westbound To Northbound					Northbound To Eastbound					Eastbound To Grand Total	
	R	T	L	U	R	T	L	U	R	T	L	U	R	T	L	U	R	T	L	U	
6/13/2019 5:45	1	0	2	0	3	0	31	3	0	34	0	0	1	0	1	0	38	3	0	41	79
Lights	1	0	2	0	3	0	29	3	0	32	0	0	1	0	1	0	33	3	0	36	72
Other Vehicles	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	5	0	0	5	7
6/13/2019 6:00	2	0	4	0	6	2	39	1	0	42	0	1	1	0	2	0	32	0	0	32	82
Lights	2	0	4	0	6	2	38	1	0	41	0	1	1	0	2	0	26	0	0	26	75
Other Vehicles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	7
6/13/2019 6:15	3	1	3	0	7	1	55	1	0	57	1	1	1	0	3	0	57	1	1	59	126
Lights	3	1	3	0	7	1	54	1	0	56	1	0	1	0	2	0	54	1	1	56	121
Other Vehicles	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	3	0	0	3	5
6/13/2019 6:30	4	1	5	0	10	2	61	2	0	65	1	1	3	0	5	1	75	4	0	80	160
Lights	4	1	5	0	10	2	60	2	0	64	1	1	3	0	5	1	66	4	0	71	150
Other Vehicles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	9	0	0	9	10
6/13/2019 6:45	0	0	6	0	6	3	41	0	0	44	3	1	1	0	5	5	83	8	0	96	151
Lights	0	0	6	0	6	3	40	0	0	43	3	1	1	0	5	5	75	8	0	88	142
Other Vehicles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	8	0	0	8	9
6/13/2019 7:00	3	1	2	0	6	0	89	2	0	91	1	1	4	0	6	2	59	2	0	63	166
Lights	3	1	2	0	6	0	87	2	0	89	1	1	4	0	6	2	48	2	0	52	153
Other Vehicles	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	11	0	0	11	13
6/13/2019 7:15	1	2	8	0	11	1	79	1	0	81	3	1	0	0	4	0	73	5	1	79	175
Lights	1	2	8	0	11	1	75	1	0	77	3	1	0	0	4	0	64	5	1	70	162
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	9	0	0	9	13
6/13/2019 7:30	3	0	10	0	13	3	84	2	0	89	3	1	4	0	8	2	80	4	0	86	196
Lights	3	0	10	0	13	3	79	2	0	84	3	1	4	0	8	2	77	3	0	82	187
Other Vehicles	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	3	1	0	4	9
6/13/2019 7:45	0	1	7	0	8	1	53	1	0	55	2	2	3	0	7	0	125	9	0	134	204
Lights	0	1	7	0	8	1	49	1	0	51	2	2	3	0	7	0	111	8	0	119	185
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	14	1	0	15	19
6/13/2019 8:00	2	0	7	0	9	2	58	2	1	63	3	0	3	0	6	1	90	10	0	101	179
Lights	2	0	7	0	9	2	54	2	1	59	3	0	3	0	6	1	83	10	0	94	168
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	7	0	0	7	11
6/13/2019 8:15	0	3	4	0	7	0	60	2	0	62	2	4	0	0	6	2	80	5	0	87	162
Lights	0	3	4	0	7	0	58	2	0	60	2	4	0	0	6	2	70	5	0	77	150
Other Vehicles	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	10	0	0	10	12
6/13/2019 8:30	2	1	8	0	11	0	54	5	0	59	2	3	1	0	6	1	90	3	0	94	170
Lights	2	1	8	0	11	0	52	5	0	57	2	3	1	0	6	1	84	3	0	88	162
Other Vehicles	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	8
6/13/2019 8:45	3	1	3	0	7	1	51	5	0	57	4	0	2	0	6	0	88	2	0	90	160
Lights	3	1	3	0	7	1	47	4	0	52	4	0	2	0	6	0	74	2	0	76	141
Other Vehicles	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	14	0	0	14	19
6/13/2019 9:00	1	0	2	0	3	4	53	2	0	59	2	1	3	0	6	2	72	3	0	77	145
Lights	1	0	2	0	3	4	43	2	0	49	2	1	3	0	6	2	64	3	0	69	127
Other Vehicles	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	8	0	0	8	18
6/13/2019 9:15	2	1	3	0	6	3	50	5	0	58	3	0	1	0	4	1	59	1	0	61	129
Lights	2	1	3	0	6	3	44	5	0	52	3	0	1	0	4	1	50	1	0	52	114
Other Vehicles	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	9	0	0	9	15
6/13/2019 9:30	4	2	2	0	8	1	64	2	1	68	4	0	1	0	5	3	72	5	0	80	161
Lights	4	2	2	0	8	1	57	1	1	60	4	0	1	0	5	3	57	5	0	65	138
Other Vehicles	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	15	0	0	15	23
6/13/2019 9:45	2	3	8	0	13	6	69	1	1	77	1	2	4	0	7	0	79	3	0	82	179
Lights	2	3	8	0	13	6	60	1	1	68	1	1	4	0	6	0	73	3	0	76	163
Other Vehicles	0	0	0	0	0	0	9	0	0	9	0	1	0	0	1	0	6	0	0	6	16
6/13/2019 10:00	5	0	5	1	11	2	62	2	1	67	4	1	3	0	8	0	58	4	0	62	148
Lights	5	0	5	1	11	2	58	2	1	63	4	1	3	0	8	0	51	4	0	55	137
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	7	0	0	7	11
6/13/2019 10:15	3	2	7	0	12	1	61	0	0	62	0	1	2	0	3	1	66	4	0	71	148
Lights	3	2	6	0	11	1	53	0	0	54	0	1	1	0	2	1	56	3	0	60	127

Other Vehicles	0	0	1	0	1	0	8	0	0	8	0	0	1	0	1	0	10	1	0	11	21
6/13/2019 10:30	4	1	4	0	9	1	58	2	2	63	3	3	1	0	7	3	82	2	0	87	166
Lights	3	1	4	0	8	1	54	2	2	59	3	3	1	0	7	3	76	2	0	81	155
Other Vehicles	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	6	0	0	6	11
6/13/2019 10:45	5	2	3	0	10	4	76	2	0	82	0	1	1	0	2	0	65	2	0	67	161
Lights	5	2	3	0	10	3	67	2	0	72	0	1	1	0	2	0	61	1	0	62	146
Other Vehicles	0	0	0	0	0	1	9	0	0	10	0	0	0	0	0	0	4	1	0	5	15
6/13/2019 11:00	1	3	2	0	6	3	77	1	0	81	1	3	3	0	7	1	71	3	0	75	169
Lights	1	3	2	0	6	3	72	1	0	76	1	3	3	0	7	1	61	3	0	65	154
Other Vehicles	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	10	0	0	10	15
6/13/2019 11:15	4	1	5	0	10	1	72	3	0	76	0	3	3	0	6	0	78	6	0	84	176
Lights	4	1	5	0	10	1	66	3	0	70	0	3	3	0	6	0	68	6	0	74	160
Other Vehicles	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	10	0	0	10	16
6/13/2019 11:30	2	2	5	0	9	5	67	9	0	81	3	1	2	0	6	1	67	2	0	70	166
Lights	2	2	5	0	9	5	65	9	0	79	3	1	2	0	6	1	61	2	0	64	158
Other Vehicles	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	8
6/13/2019 11:45	4	4	1	0	9	4	64	4	1	73	2	2	2	0	6	0	87	5	0	92	180
Lights	4	4	1	0	9	4	60	4	1	69	2	2	2	0	6	0	71	4	0	75	159
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	16	1	0	17	21
6/13/2019 12:00	8	2	2	0	12	5	79	7	0	91	2	1	0	0	3	4	75	2	1	82	188
Lights	8	2	2	0	12	5	70	7	0	82	2	1	0	0	3	4	64	1	1	70	167
Other Vehicles	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	11	1	0	12	21
6/13/2019 12:15	5	3	4	0	12	6	70	5	0	81	3	3	0	0	6	4	79	6	0	89	188
Lights	5	3	4	0	12	6	66	5	0	77	3	3	0	0	6	4	71	6	0	81	176
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	8	0	0	8	12
6/13/2019 12:30	6	1	2	0	9	4	70	2	0	76	3	1	1	0	5	2	59	6	0	67	157
Lights	6	1	2	0	9	4	64	2	0	70	2	1	0	0	3	2	56	6	0	64	146
Other Vehicles	0	0	0	0	0	0	6	0	0	6	1	0	1	0	2	0	3	0	0	3	11
6/13/2019 12:45	3	3	6	0	12	3	70	3	0	76	1	0	3	0	4	1	83	6	0	90	182
Lights	3	2	6	0	11	3	66	3	0	72	1	0	3	0	4	1	73	6	0	80	167
Other Vehicles	0	1	0	0	1	0	4	0	0	4	0	0	0	0	0	0	10	0	0	10	15
6/13/2019 13:00	1	1	5	0	7	4	58	9	0	71	2	0	0	0	2	1	74	6	0	81	161
Lights	1	1	5	0	7	4	53	8	0	65	2	0	0	0	2	1	67	6	0	74	148
Other Vehicles	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	0	7	0	0	7	13
6/13/2019 13:15	2	1	3	0	6	3	68	5	1	77	1	2	1	0	4	3	72	1	0	76	163
Lights	2	1	3	0	6	3	64	5	1	73	1	2	1	0	4	3	67	1	0	71	154
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	5	0	0	5	9
6/13/2019 13:30	5	2	1	0	8	4	78	4	0	86	3	2	3	0	8	1	68	8	0	77	179
Lights	5	2	1	0	8	4	74	3	0	81	3	2	3	0	8	1	64	8	0	73	170
Other Vehicles	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	4	0	0	4	9
6/13/2019 13:45	1	1	6	0	8	6	93	4	0	103	1	0	2	0	3	0	103	2	0	105	219
Lights	1	1	5	0	7	6	85	4	0	95	1	0	2	0	3	0	92	2	0	94	199
Other Vehicles	0	0	1	0	1	0	8	0	0	8	0	0	0	0	0	0	11	0	0	11	20
6/13/2019 14:00	3	1	3	0	7	2	68	8	0	78	3	1	2	0	6	3	79	1	0	83	174
Lights	3	1	3	0	7	2	64	7	0	73	3	1	2	0	6	3	69	1	0	73	159
Other Vehicles	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	10	0	0	10	15
6/13/2019 14:15	1	2	4	0	7	3	93	8	0	104	0	1	1	0	2	2	112	0	0	114	227
Lights	1	1	4	0	6	3	84	8	0	95	0	1	1	0	2	2	103	0	0	105	208
Other Vehicles	0	1	0	0	1	0	9	0	0	9	0	0	0	0	0	0	9	0	0	9	19
6/13/2019 14:30	4	0	1	0	5	6	90	6	0	102	2	3	1	0	6	1	109	4	0	114	227
Lights	3	0	1	0	4	6	88	6	0	100	2	3	1	0	6	1	104	4	0	109	219
Other Vehicles	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	5	0	0	5	8
6/13/2019 14:45	3	2	3	0	8	6	83	6	0	95	2	3	1	0	6	0	90	1	0	91	200
Lights	3	2	2	0	7	6	76	6	0	88	2	3	1	0	6	0	86	1	0	87	188
Other Vehicles	0	0	1	0	1	0	7	0	0	7	0	0	0	0	0	0	4	0	0	4	12
6/13/2019 15:00	5	5	4	0	14	7	97	3	0	107	3	3	2	0	8	3	77	4	0	84	213
Lights	4	5	4	0	13	7	93	3	0	103	3	3	2	0	8	3	73	4	0	80	204
Other Vehicles	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	4	0	0	4	9
6/13/2019 15:15	3	1	7	0	11	4	103	5	0	112	2	6	4	0	12	1	101	6	0	108	243
Lights	3	1	7	0	11	4	94	5	0	103	2	6	4	0	12	1	91	5	0	97	223
Other Vehicles	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	10	1	0	11	20
6/13/2019 15:30	4	1	1	0	6	4	111	10	0	125	2	3	2	0	7	3	88	2	0	93	231
Lights	4	1	1	0	6	4	105	10	0	119	2	3	2	0	7	3	84	2	0	89	221
Other Vehicles	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	10
6/13/2019 15:45	4	1	2	0	7	5	93	6	0	104	3	2	2	0	7	1	95	2	0	98	216
Lights	4	1	2	0	7	5	82	6	0	93	3	2	2	0	7	1	89	2	0	92	199
Other Vehicles	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	6	0	0	6	17

6/13/2019 16:00	5	3	7	0	15	8	98	3	0	109	1	7	1	0	9	0	101	4	0	105	238
Lights	5	3	7	0	15	8	93	3	0	104	1	7	1	0	9	0	99	4	0	103	231
Other Vehicles	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
6/13/2019 16:15	3	1	5	0	9	9	99	9	0	117	4	2	3	0	9	2	134	5	0	141	276
Lights	3	1	5	0	9	9	97	9	0	115	4	2	3	0	9	2	132	5	0	139	272
Other Vehicles	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
6/13/2019 16:30	11	3	2	0	16	9	107	8	0	124	0	4	3	0	7	2	103	0	0	105	252
Lights	11	3	2	0	16	9	104	8	0	121	0	4	3	0	7	2	102	0	0	104	248
Other Vehicles	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
6/13/2019 16:45	10	3	2	0	15	8	121	4	1	134	1	2	1	0	4	3	115	3	1	122	275
Lights	9	3	2	0	14	8	118	4	1	131	1	2	1	0	4	3	111	3	1	118	267
Other Vehicles	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	8
6/13/2019 17:00	9	1	6	0	16	5	127	10	0	142	1	1	0	0	2	5	94	1	0	100	260
Lights	9	1	6	0	16	5	123	10	0	138	1	1	0	0	2	5	93	1	0	99	255
Other Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	5
6/13/2019 17:15	10	2	2	0	14	8	123	6	2	139	3	3	2	0	8	0	125	4	0	129	290
Lights	10	2	2	0	14	8	120	6	2	136	3	3	2	0	8	0	124	4	0	128	286
Other Vehicles	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
6/13/2019 17:30	8	2	7	0	17	7	93	8	0	108	6	2	3	0	11	2	114	3	0	119	255
Lights	8	2	7	0	17	7	90	8	0	105	6	2	3	0	11	2	113	3	0	118	251
Other Vehicles	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
6/13/2019 17:45	4	3	0	0	7	4	75	4	0	83	3	1	2	0	6	2	76	6	0	84	180
Lights	4	3	0	0	7	4	73	4	0	81	3	1	2	0	6	2	76	6	0	84	178
Other Vehicles	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
6/13/2019 18:00	6	1	7	0	14	13	100	9	0	122	3	3	2	0	8	1	99	6	0	106	250
Lights	6	1	7	0	14	13	97	9	0	119	3	3	2	0	8	1	96	6	0	103	244
Other Vehicles	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	6
6/13/2019 18:15	1	3	4	0	8	6	58	4	0	68	3	1	2	0	6	0	78	4	0	82	164
Lights	1	3	4	0	8	6	57	4	0	67	3	1	2	0	6	0	73	4	0	77	158
Other Vehicles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5	0	0	5	6
6/13/2019 18:30	1	3	3	0	7	5	71	5	0	81	2	2	5	0	9	4	80	0	0	84	181
Lights	1	3	3	0	7	5	71	5	0	81	2	2	5	0	9	4	75	0	0	79	176
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	5
6/13/2019 18:45	2	1	1	0	4	4	50	3	0	57	0	3	2	0	5	1	53	4	0	58	124
Lights	2	1	1	0	4	4	50	3	0	57	0	3	2	0	5	1	50	4	0	55	121
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
6/13/2019 19:00	2	0	4	0	6	4	49	9	0	62	2	3	3	0	8	1	44	4	0	49	125
Lights	2	0	4	0	6	4	49	9	0	62	2	3	3	0	8	1	41	4	0	46	122
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
6/13/2019 19:15	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Lights	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Other Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	191	85	220	1	497	214	4024	233	11	4482	110	99	104	0	313	79	4407	197	4	4687	9979



Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



Safety Study - TRU 62 at Bedford Rd

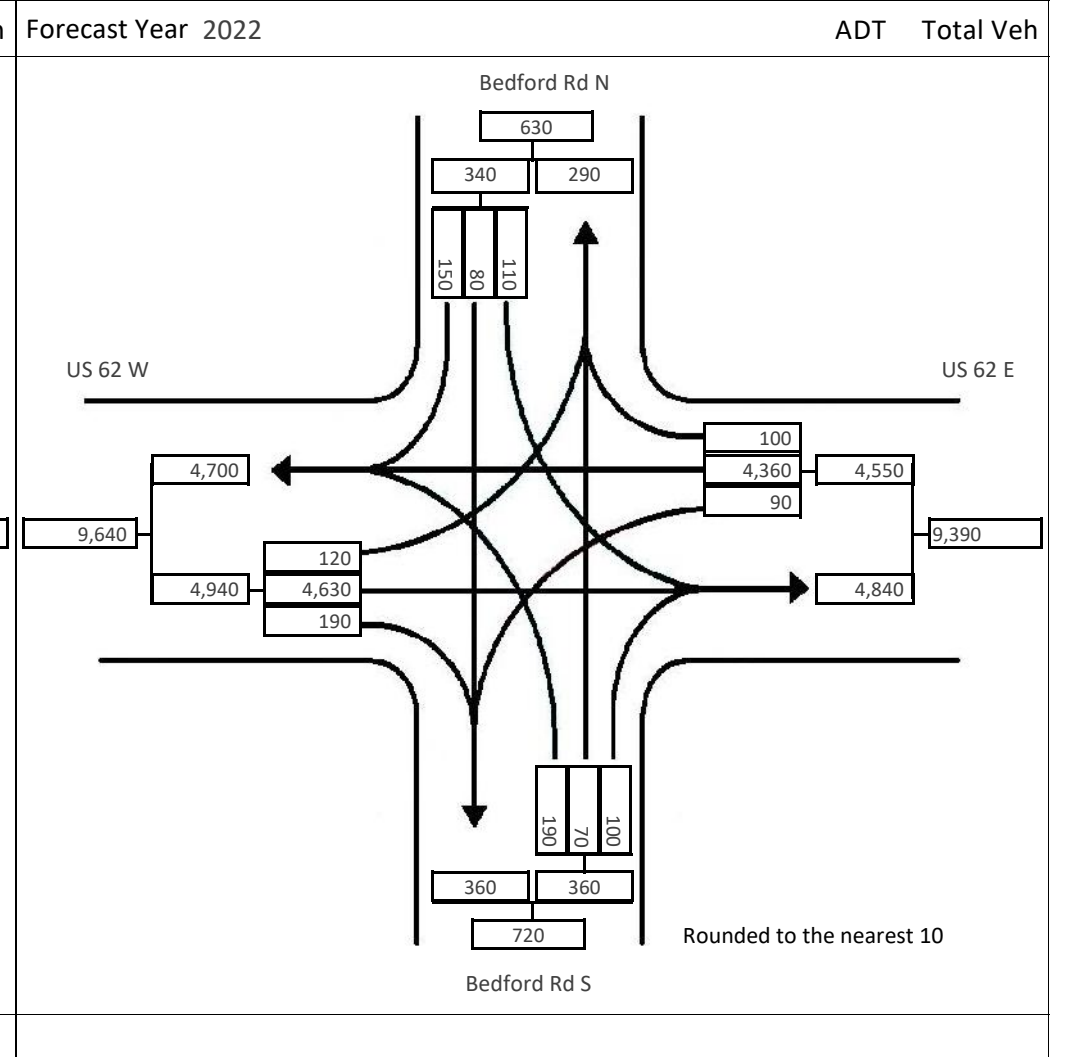
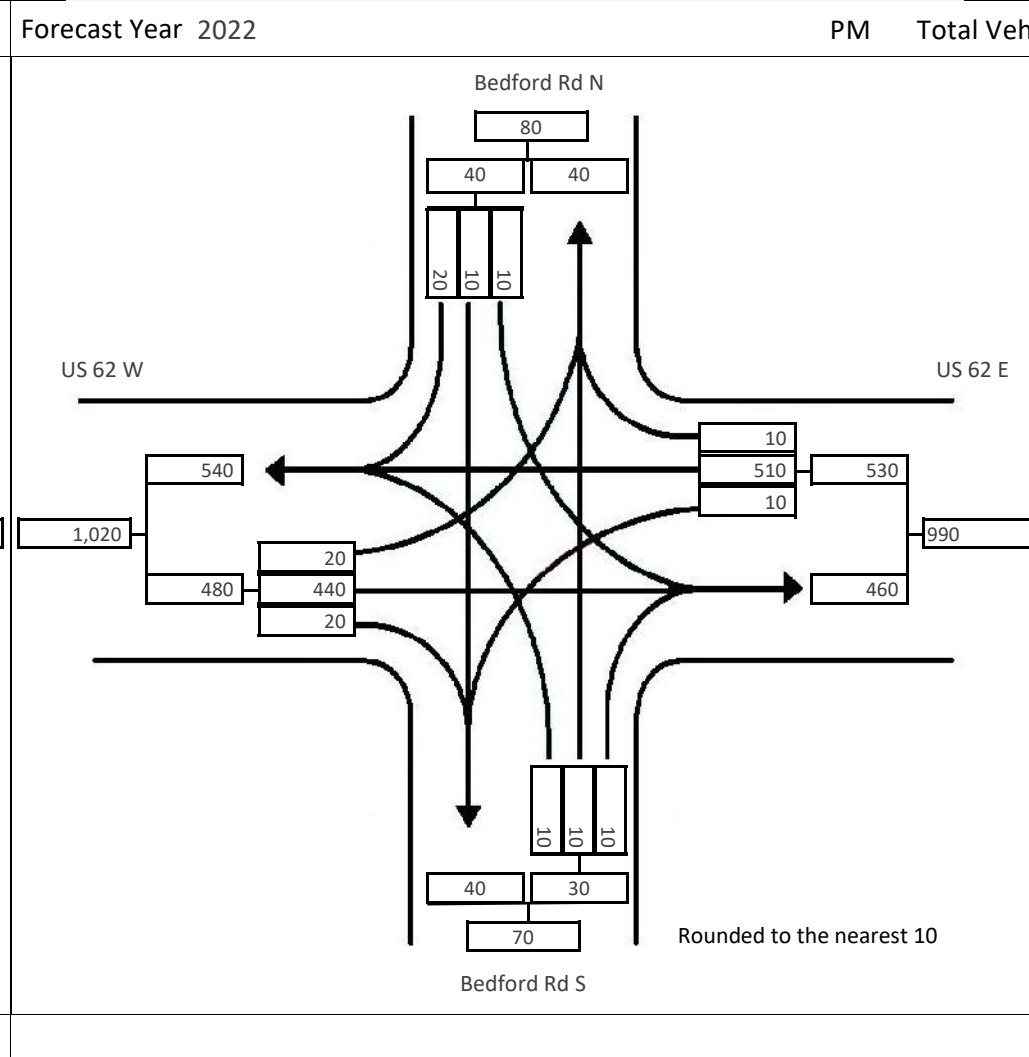
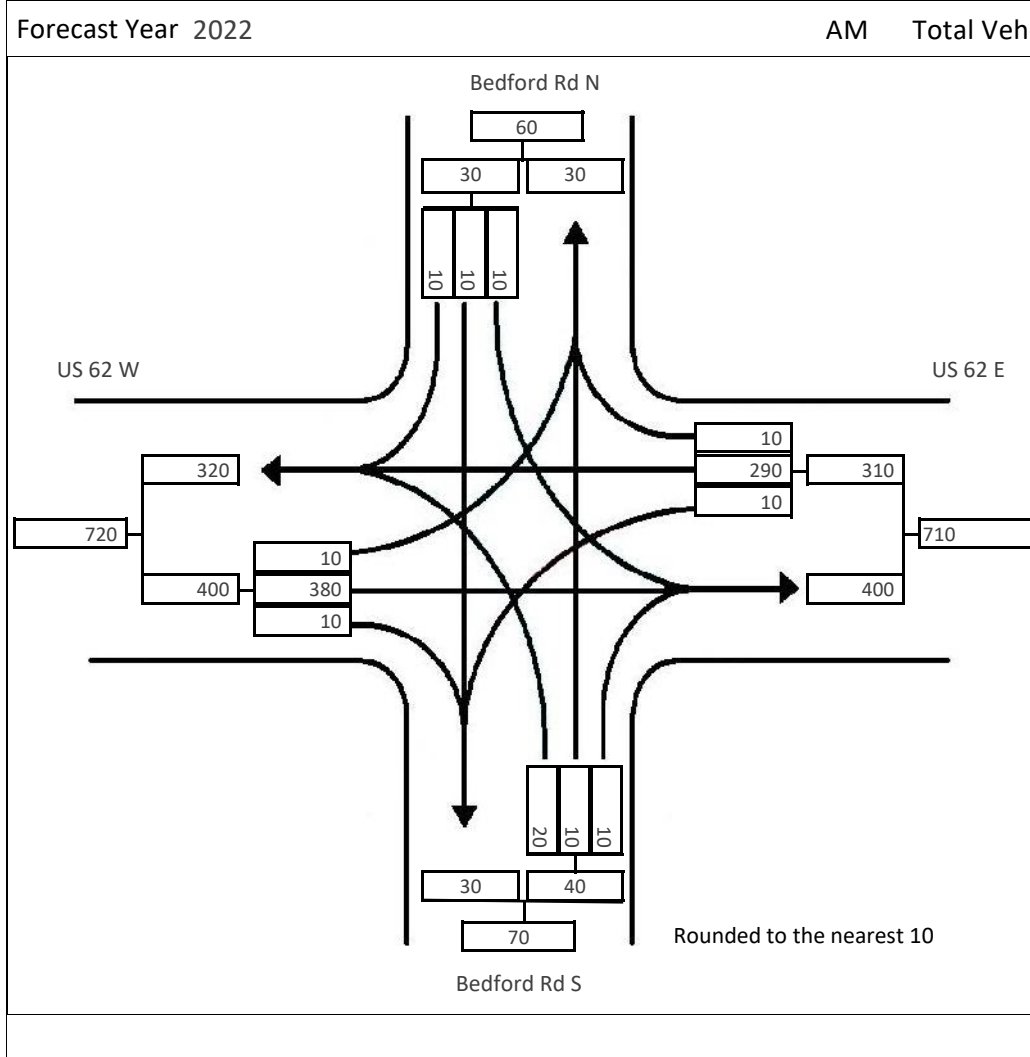


Method: IPF

Growth rates were obtained from Eastgate for Bedford Rd. There has been negative growth in this area since 2000 so a growth rate of 0.00% was used.

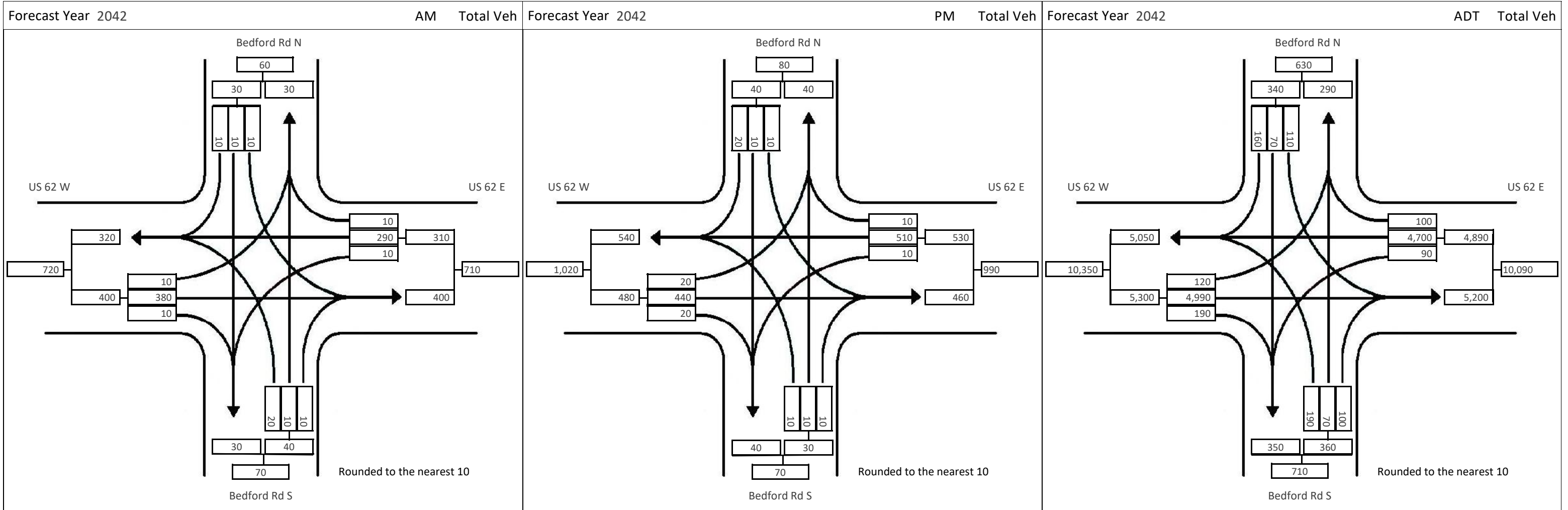
Location	US 62 W	US 62 E	Bedford Rd N	Bedford Rd S
	West Leg STRU00062R 6.24	East Leg STRU00062R 6.24	North Leg	South Leg
2022 ADT	9,650 *	9,400 *	630 *	720 *
2042 ADT	10,400 *	10,100 *	630 *	710 *
K	0.08	0.08	0.08 *	0.08 *
DHV	830	810	50	60
D	0.52	0.53	0.51	0.61
T24	0.07	0.07	0.02	0.02
TD	0.02	0.02	0.00	0.00

* pivot from turn movement count ADT



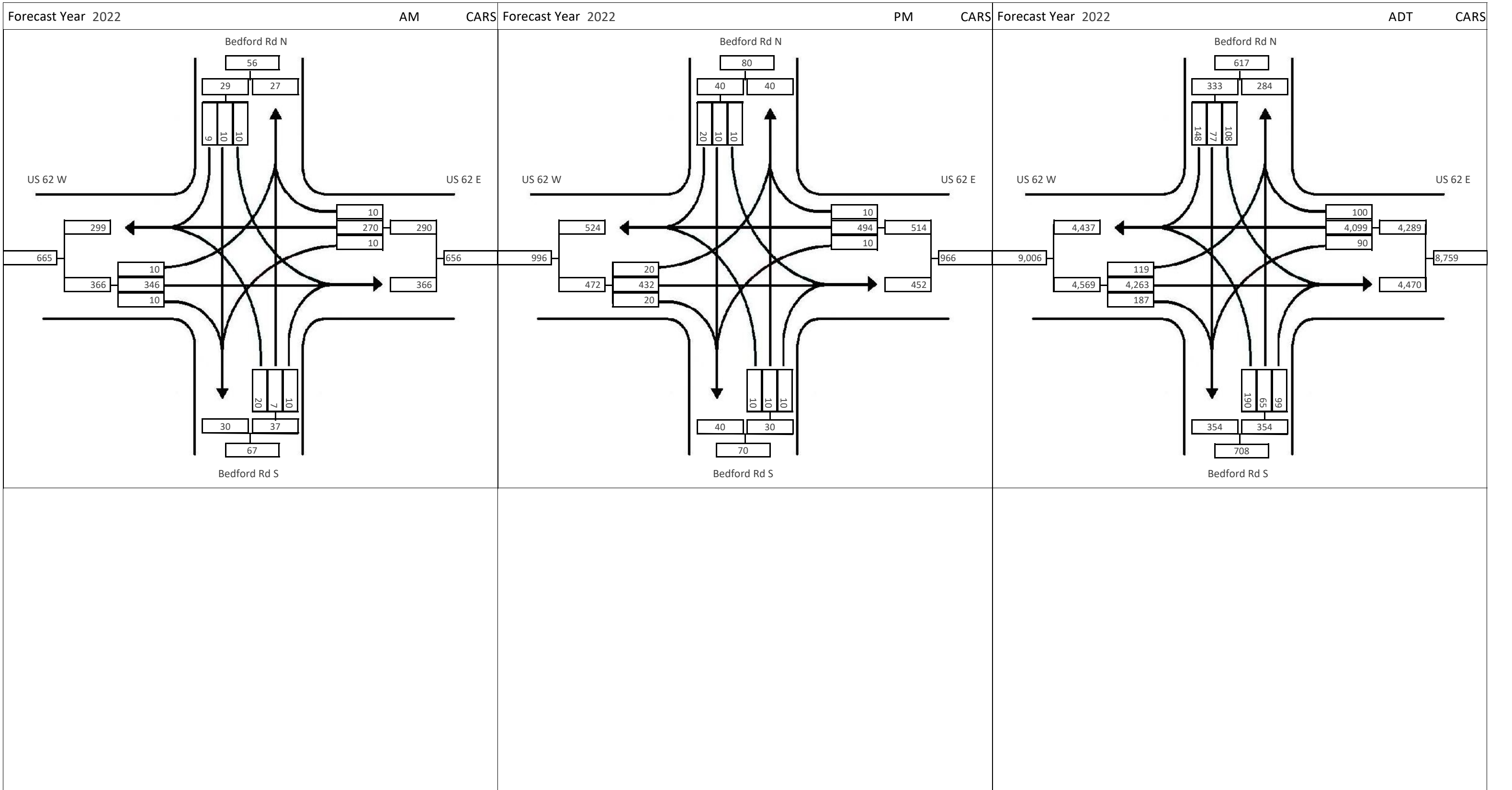


Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



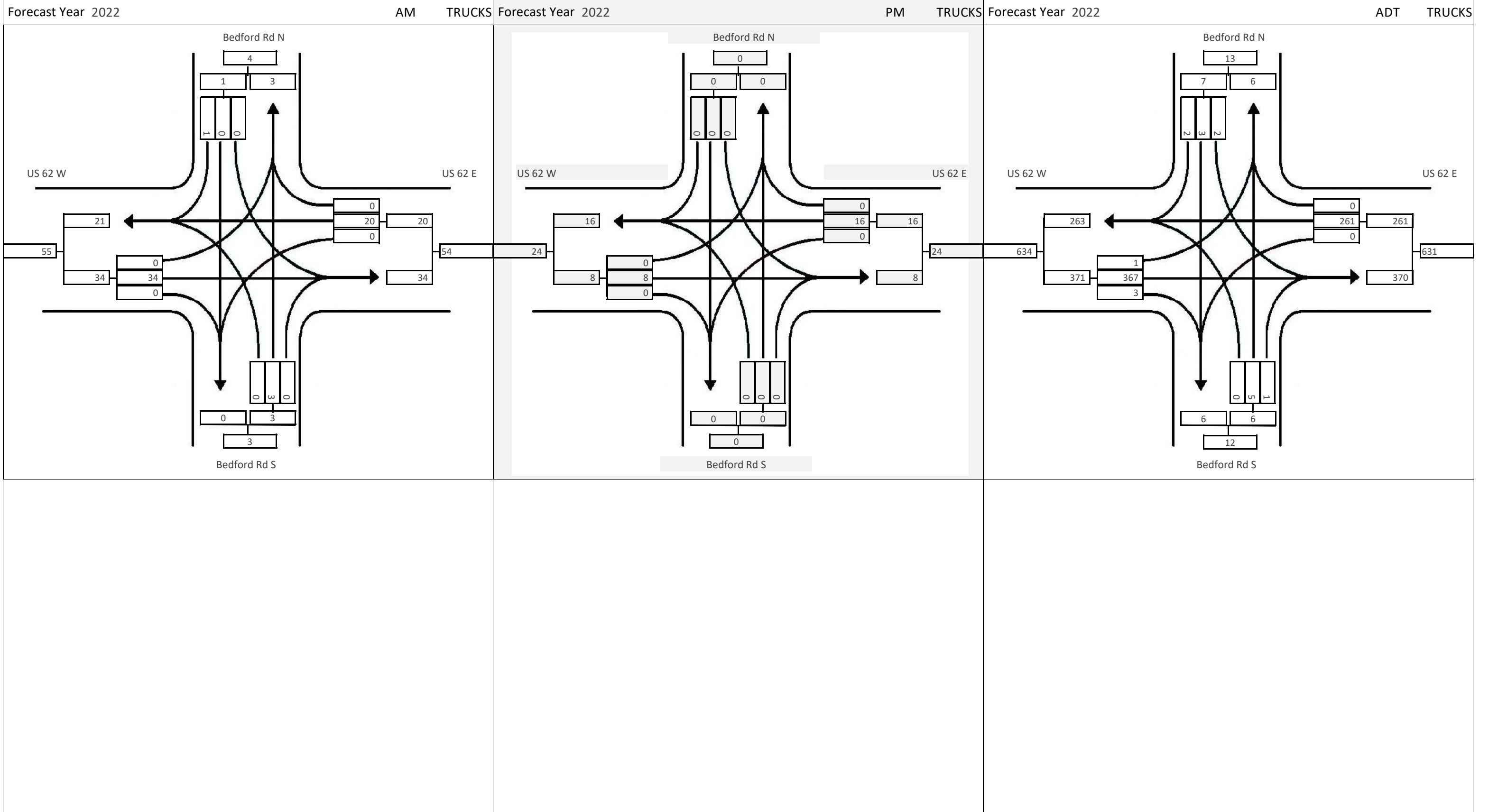


Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



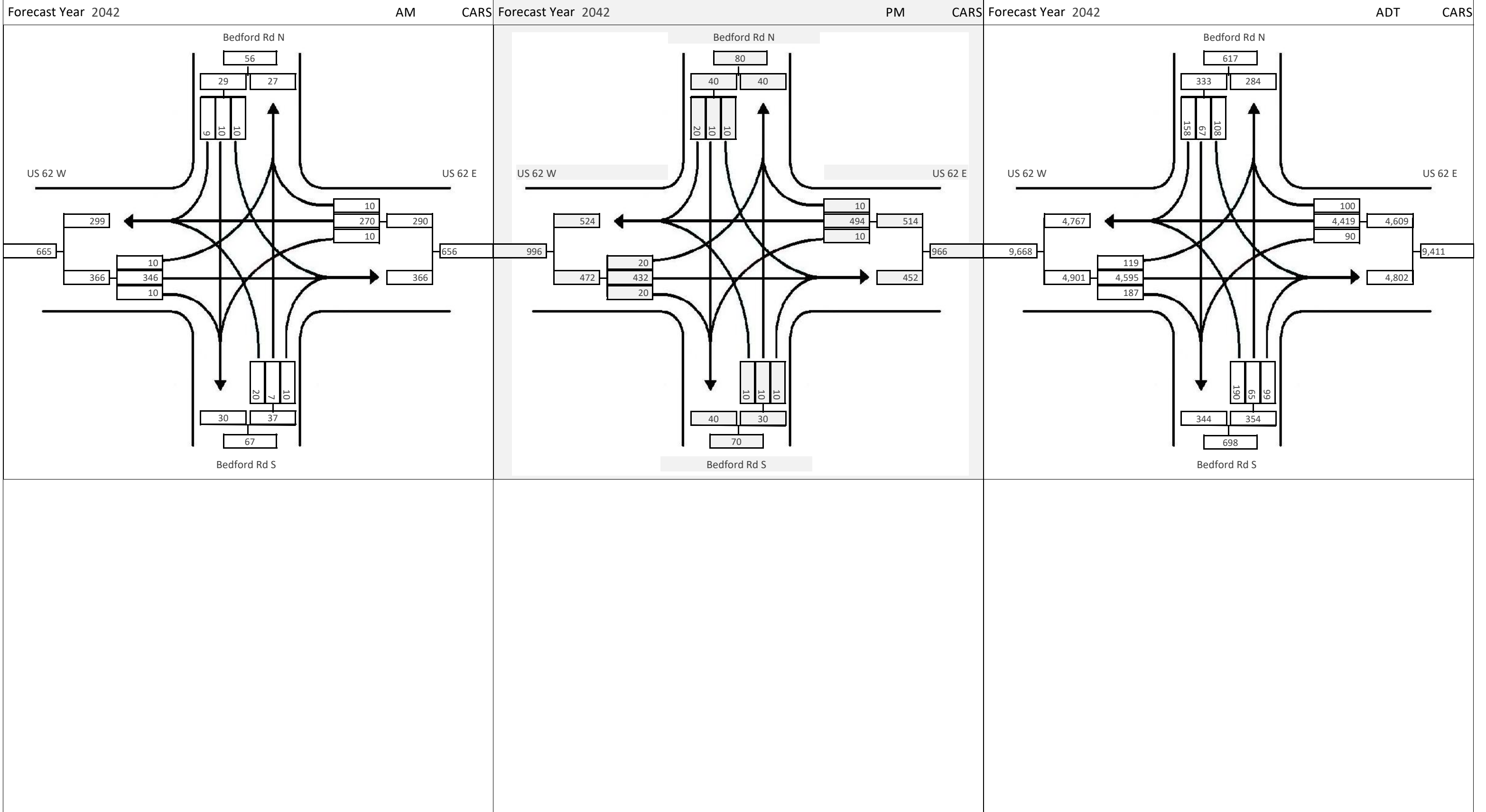


Simplified Highway Forecasting Tool (SHIFT)
 Design Designation





Simplified Highway Forecasting Tool (SHIFT)
 Design Designation

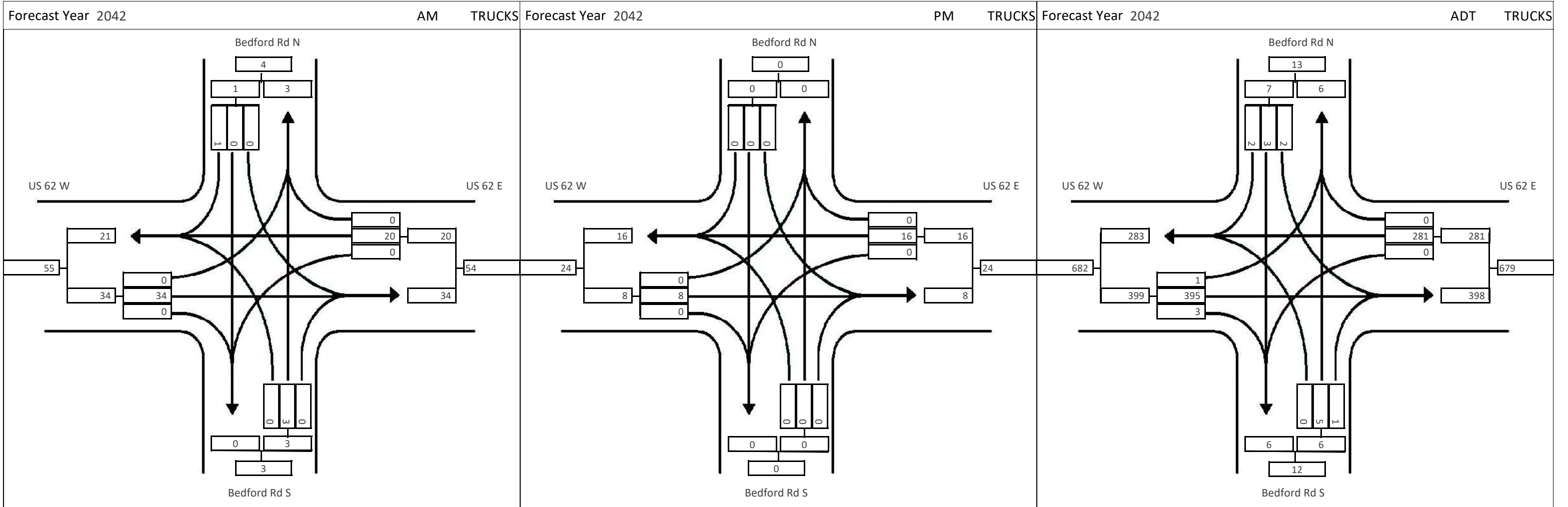




Simplified Highway Forecasting Tool (SHIFT)
 Design Designation

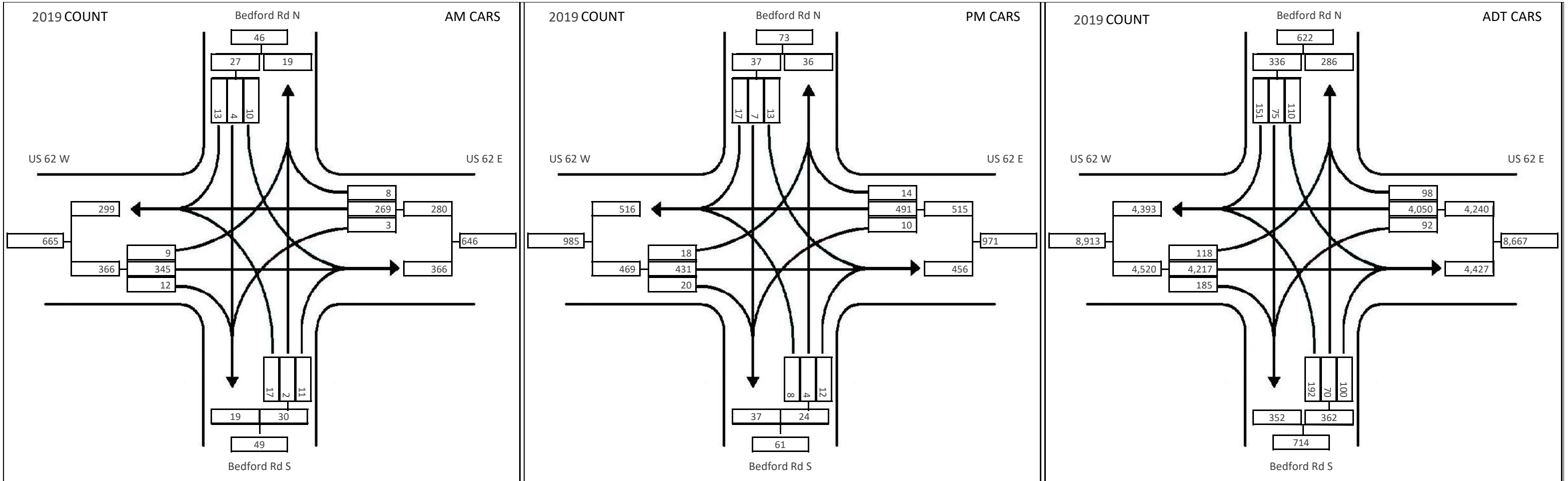


PID NONE Location US62 at Bedford Rd-Brookfield T



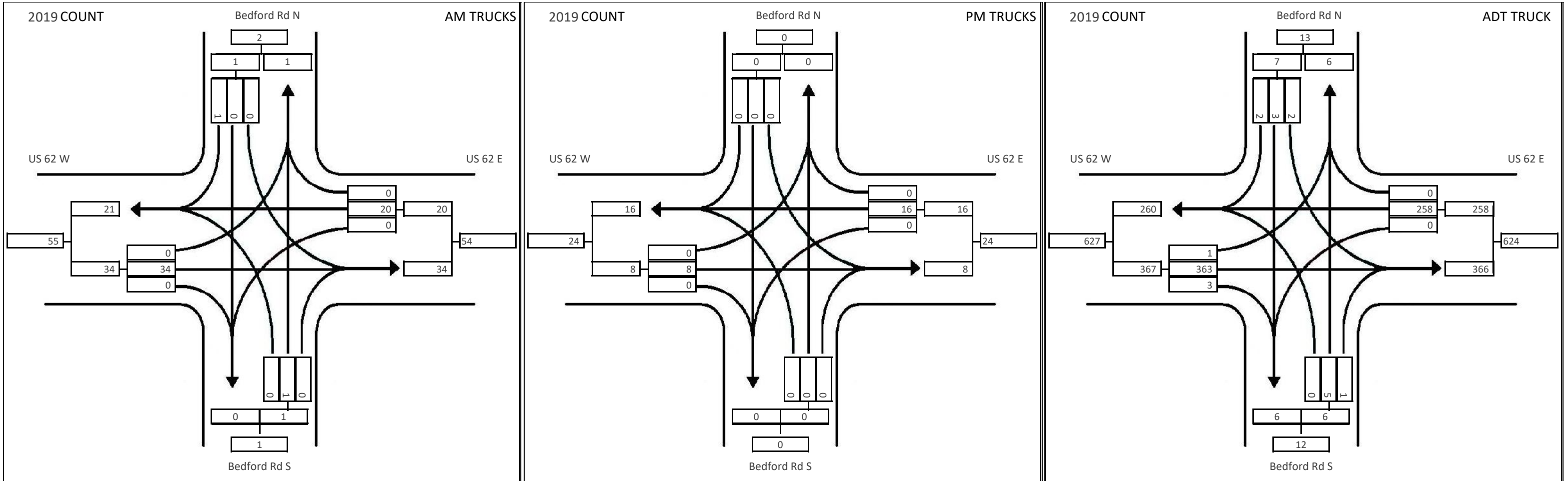


Simplified Highway Forecasting Tool (SHIFT)
 Design Designation





Simplified Highway Forecasting Tool (SHIFT)
 Design Designation

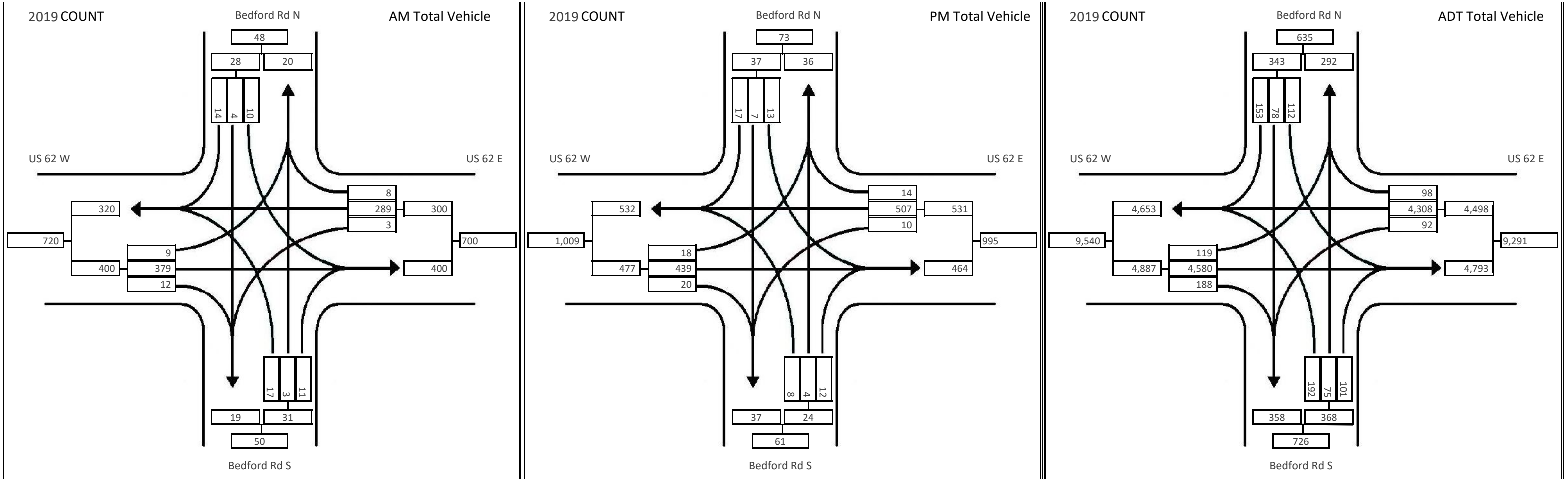




Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



Pivot Forecast From TurnsCount: Yes





Simplified Highway Forecasting Tool (SHIFT)
Design Designation



PID NONE Location US62 at Bedford Rd-Brookfield T

RptIntersectionTbl

ID		INTERSECTION TABLE VALUES																					
1 (1-Design Yr, 2-Opening Year)		Target Forecast Volumes										Counted ADT					ADT Annual Growth Rate						
Leg	Forecast Year	AM	AM Keved	PM	PM Keved	ADT	ADT Keved	Leg DHV	K ₃₀	K Keved	Year	Yr Keved	Vol.	CNT Keved	Car+TK	G Keved	%	PCT Keved	2040 ADT Vol	Route	Car	TRK	
1	US 62 E	568	<input checked="" type="checkbox"/>	808	<input checked="" type="checkbox"/>	10106	<input checked="" type="checkbox"/>	808	0.08	<input type="checkbox"/>	2019	<input checked="" type="checkbox"/>	9,291	<input checked="" type="checkbox"/>	35.4	<input type="checkbox"/>	0.34%	<input type="checkbox"/>	11,100		21.4	14.0	
2	Bedford Rd S	48	<input checked="" type="checkbox"/>	58	<input checked="" type="checkbox"/>	726	<input checked="" type="checkbox"/>	58	0.08	<input checked="" type="checkbox"/>	2019	<input checked="" type="checkbox"/>	726	<input checked="" type="checkbox"/>	0.0	<input type="checkbox"/>	0.00%	<input checked="" type="checkbox"/>					
3	US 62 W	591	<input checked="" type="checkbox"/>	828	<input checked="" type="checkbox"/>	10355	<input checked="" type="checkbox"/>	828	0.08	<input type="checkbox"/>	2019	<input checked="" type="checkbox"/>	9,540	<input checked="" type="checkbox"/>	35.4	<input type="checkbox"/>	0.34%	<input type="checkbox"/>	11,100		21.0	14.0	
4	Bedford Rd N	36	<input checked="" type="checkbox"/>	51	<input checked="" type="checkbox"/>	635	<input checked="" type="checkbox"/>	51	0.08	<input checked="" type="checkbox"/>	2019	<input checked="" type="checkbox"/>	635	<input checked="" type="checkbox"/>	0.0	<input type="checkbox"/>	0.00%	<input checked="" type="checkbox"/>					
Turning Mvmt Count Year		2019		<input checked="" type="checkbox"/> Pivot from turncounts to target volume										<input type="checkbox"/> 1 Rate for all									
OTHER Keyed		CMS SHIFT Data																					
Leg1	0	2042 ADT=11394.1184 DHV=911.529472, 2022 ADT=10685.6864 DHV=854.854912STRUUS00062**C, 7.67 25691,25691,STRU00062R,6240,,1431,2005,9300,720,10020,2008,9360,850,10210,2011,9880,570,10450,2013,9924,570,10494,2015,9114,1003,10117,2018,9718,826,10544,6,0,2040,9677,816,9921,711,9621,827,9872,719,9486,921,9733,813,10122,1020,10818,722,9719,1111,10483,8,1679,979,500,716,460,1444,755,1064,721,2129,953,367,297,5,5,5,5,5,8674,472,7707,479,272,10,13990,736,17151,1225,1134,30,11331,1135,62,81,6,3,A,0.45,11274,-12705,12153,1.07,11331,11742,MRAT,0.62,1050,-514,1190,1.27,1080,1135,RAF,10162,1029,10614,837,9815,1109,10329,887,8700,1883,9133,1692,0,3,0,1,0,1,0,0,MODEL,MODEL,4210,12958,-662,3884,8468,10818,722,1978,10196,10963,1050,1190,4210,12958,-662,3884,0.0019,0.0051,0,0.0036,-0.0058,-0.0027,0.0021,0.0042,0.0048,-0.0027,0.0022,0.0024,0.0058,0.0025,0.0042,-0.0258,0.0152,0.0022,0.0107,-0.0057,0.0157,-0.0025,0.0634,0.0469,0.0112,0.0006,0.0156,0.0034,0.0582,0.0477,0.017,0.0123,0.02,0.014,0.017,-0.0819,0.1683,0.017,2,10614,837,10000,1100,11100,0.08,0.62,0.1,0.04,0.43,S,TRU,62,R,6.24,1.431																					
Leg2	0																						
Leg3	0	2042 ADT=11394.1184 DHV=911.529472, 2022 ADT=10685.6864 DHV=854.854912STRUUS00062**C, 7.67 25691,25691,STRU00062R,6240,,1431,2005,9300,720,10020,2008,9360,850,10210,2011,9880,570,10450,2013,9924,570,10494,2015,9114,1003,10117,2018,9718,826,10544,6,0,2040,9677,816,9921,711,9621,827,9872,719,9486,921,9733,813,10122,1020,10818,722,9719,1111,10483,8,1679,979,500,716,460,1444,755,1064,721,2129,953,367,297,5,5,5,5,5,8674,472,7707,479,272,10,13990,736,17151,1225,1134,30,11331,1135,62,81,6,3,A,0.45,11274,-12705,12153,1.07,11331,11742,MRAT,0.62,1050,-514,1190,1.27,1080,1135,RAF,10162,1029,10614,837,9815,1109,10329,887,8700,1883,9133,1692,0,3,0,1,0,1,0,0,MODEL,MODEL,4210,12958,-662,3884,8468,10818,722,1978,10196,10963,1050,1190,4210,12958,-662,3884,0.0019,0.0051,0,0.0036,-0.0058,-0.0027,0.0021,0.0042,0.0048,-0.0027,0.0022,0.0024,0.0058,0.0025,0.0042,-0.0258,0.0152,0.0022,0.0107,-0.0057,0.0157,-0.0025,0.0634,0.0469,0.0112,0.0006,0.0156,0.0034,0.0582,0.0477,0.017,0.0123,0.02,0.014,0.017,-0.0819,0.1683,0.017,2,10614,837,10000,1100,11100,0.08,0.62,0.1,0.04,0.43,S,TRU,62,R,6.24,1.431																					
Leg4	0																						
URL1	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.193284,-80.561271&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.206527,-80.541103&sensor=false&path=color:0xff0000ff weight:5 41.193284,-80.561271 41.193284,-80.550866 41.200001,-80.550866 41.202487,-80.544989 41.206527,-80.541103																						
URL2																							
URL3	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.193284,-80.561271&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.206527,-80.541103&sensor=false&path=color:0xff0000ff weight:5 41.193284,-80.561271 41.193284,-80.550866 41.200001,-80.550866 41.202487,-80.544989 41.206527,-80.541103																						
URL4																							
URLIX	http://maps.googleapis.com/maps/api/staticmap?size=260x257&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:X%7C41.193284,-80.561271&sensor=false&path=color:0xff0000ff weight:5 41.206527,-80.541103 41.202487,-80.544989 41.200001,-80.550866 41.197214,-80.556696 41.197214,-80.561271 41.193284,-80.561271 41.197214,-80.556696 41.200001,-80.550866 41.202487,-80.544989 41.206527,-80.541103																						



Simplified Highway Forecasting Tool (SHIFT)
Design Designation



PID NONE Location US62 at Bedford Rd-Brookfield T

ID		2 (1-Design Yr, 2-Opening Year)		INTERSECTION TABLE VALUES																	
Leg #	Forecast Year	2022	Target Forecast Volumes				Counted ADT				ADT Annual Growth Rate				2040						
			AM	PM	ADT	Leg DHV	K ₃₀	K	Year	Yr	Vol.	CNT	Car+TK	G	%	PCT	ADT Vol	Route	Car	TRK	
1	US 62 E	529	752	9397	752	0.08		2019		9,291		35.4		0.34%		11,100		21.4	14.0		
2	Bedford Rd S	50	0	726	0	0.08		2019		726		0.0		0.00%							
3	US 62 W	551	772	9646	772	0.08		2019		9,540		35.4		0.34%		11,100		21.0	14.0		
4	Bedford Rd N	48	0	635	0	0.08		2019		635		0.0		0.00%							

Turning Mvmt Count Year **2019** Pivot from turnscouts to target volume 1 Rate for all

OTH
OTHER Keyed CMS SHIFT Data

Leg1 0
2042 ADT=11394.1184 DHV=911.529472, 2022 ADT=10685.6864 DHV=854.854912STRUUS00062**C, 7.67
|25691,25691,STRU00062R,6240,,1431,2005,9300,720,10020,2008,9360,850,10210,2011,9880,570,10450,2013,9924,570,10494,2015,9114,1003,10117,2018,9718,826,10544,6,0,2040,9677,816,9921,711,9621,827,9872,719,9486,921,9733,813,10122,1020,10818,722,9719,1111,10483,8,1679,979,500,716,460,1444,755,1064,721,2129,953,367,297,5,5,5,5,5,8674,472,7707,479,272,10,13990,736,17151,1225,1134,30,11331,1135,62,81,6,3,A,0.45,11274,-12705,12153,1.07,11331,11742,MRAT,0.62,1050,-514,1190,1.27,1080,1135,RAF,10162,1029,10614,837,9815,1109,10329,887,8700,1883,9133,1692,0,3,0,1,0,1,0,0,MODEL,MODEL,4210,12958,-662,3884,8468,10818,722,1978,10196,10963,1050,1190,4210,12958,-662,3884,0.0019,0.0051,0,0.0036,-0.0058,-0.0027,0.0021,0.0042,0.0048,-0.0027,0.0022,0.0024,0.0058,0.0025,0.0042,-0.0258,0.0152,0.0022,0.0107,-0.0057,0.0157,-0.0025,0.0634,0.0469,0.0112,0.0006,0.0156,0.0034,0.0582,0.0477,0.017,0.0123,0.02,0.014,0.017,-0.0819,0.1683,0.017,2,10614,837,10000,1100,11100,0.08,0.62,0.1,0.04,0.43,S,TRU,62,R,6.24,1.431

Leg2

Leg3 0
2042 ADT=11394.1184 DHV=911.529472, 2022 ADT=10685.6864 DHV=854.854912STRUUS00062**C, 7.67
|25691,25691,STRU00062R,6240,,1431,2005,9300,720,10020,2008,9360,850,10210,2011,9880,570,10450,2013,9924,570,10494,2015,9114,1003,10117,2018,9718,826,10544,6,0,2040,9677,816,9921,711,9621,827,9872,719,9486,921,9733,813,10122,1020,10818,722,9719,1111,10483,8,1679,979,500,716,460,1444,755,1064,721,2129,953,367,297,5,5,5,5,5,8674,472,7707,479,272,10,13990,736,17151,1225,1134,30,11331,1135,62,81,6,3,A,0.45,11274,-12705,12153,1.07,11331,11742,MRAT,0.62,1050,-514,1190,1.27,1080,1135,RAF,10162,1029,10614,837,9815,1109,10329,887,8700,1883,9133,1692,0,3,0,1,0,1,0,0,MODEL,MODEL,4210,12958,-662,3884,8468,10818,722,1978,10196,10963,1050,1190,4210,12958,-662,3884,0.0019,0.0051,0,0.0036,-0.0058,-0.0027,0.0021,0.0042,0.0048,-0.0027,0.0022,0.0024,0.0058,0.0025,0.0042,-0.0258,0.0152,0.0022,0.0107,-0.0057,0.0157,-0.0025,0.0634,0.0469,0.0112,0.0006,0.0156,0.0034,0.0582,0.0477,0.017,0.0123,0.02,0.014,0.017,-0.0819,0.1683,0.017,2,10614,837,10000,1100,11100,0.08,0.62,0.1,0.04,0.43,S,TRU,62,R,6.24,1.431

Leg4

URL1 <http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.193284,-80.561271&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.206527,-80.541103&sensor=false&path=color:0xff0000ff|weight:5|41.193284,-80.561271|41.193284,-80.556696|41.200001,-80.550866|41.202487,-80.544989|41.206527,-80.541103>

URL2

URL3 <http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.193284,-80.561271&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.206527,-80.541103&sensor=false&path=color:0xff0000ff|weight:5|41.193284,-80.561271|41.193284,-80.556696|41.200001,-80.550866|41.202487,-80.544989|41.206527,-80.541103>

URL4

URLIX <http://maps.googleapis.com/maps/api/staticmap?size=260x257&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:X%7C41.193284,-80.561271&sensor=false&path=color:0xff0000ff|weight:5|41.206527,-80.541103|41.202487,-80.544989|41.200001,-80.550866|41.197214,-80.556696|41.193284,-80.561271|41.193284,-80.561271|41.197214,-80.556696|41.200001,-80.550866|41.202487,-80.544989|41.206527,-80.541103>



Simplified Highway Forecasting Tool (SHIFT)
Design Designation



PID NONE Location US62 at Bedford Rd-Brookfield T

TurnsCount

TurnsCount		Tuesday, January 28, 2020										
		1:37:21 PM										
ID	LEG NUM	Tm Period	Time	PA LEFT	PAT HRU	PA RIGHT	PA TOTAL	BC LEFT	BC THRU	BC RIGHT	BC TOTAL	TOTAL VEH
93	1	AM	7:15 AM	2	73	4	79	0	6	0	6	85
110	1	AM	7:30 AM	0	86	1	87	0	5	0	5	92
111	1	AM	7:45 AM	1	49	1	51	0	4	0	4	55
112	1	AM	8:00 AM	0	61	2	63	0	5	0	5	68
113	2	AM	7:15 AM	7	0	3	10	0	0	0	0	10
114	2	AM	7:30 AM	2	0	3	5	0	0	0	0	5
115	2	AM	7:45 AM	3	1	3	7	0	0	0	0	7
116	2	AM	8:00 AM	5	1	2	8	0	1	0	1	9
117	3	AM	7:15 AM	2	68	4	74	0	9	0	9	83
118	3	AM	7:30 AM	1	77	3	81	0	4	0	4	85
119	3	AM	7:45 AM	2	111	4	117	0	14	0	14	131
120	3	AM	8:00 AM	4	89	1	94	0	7	0	7	101
121	4	AM	7:15 AM	0	0	6	6	0	0	0	0	6
122	4	AM	7:30 AM	1	1	5	7	0	0	0	0	7
123	4	AM	7:45 AM	4	3	0	7	0	0	1	1	8
124	4	AM	8:00 AM	5	0	2	7	0	0	0	0	7
125	0			0	0	0	0	0	0	0	0	0
126	1	PM	4:30 PM	1	117	3	121	0	4	0	4	125
127	1	PM	4:45 PM	4	117	3	124	0	5	0	5	129
128	1	PM	5:00 PM	0	132	3	135	0	3	0	3	138
129	1	PM	5:15 PM	5	125	5	135	0	4	0	4	139
130	2	PM	4:30 PM	4	1	2	7	0	0	0	0	7
131	2	PM	4:45 PM	2	1	3	6	0	0	0	0	6
132	2	PM	5:00 PM	0	2	0	2	0	0	0	0	2
133	2	PM	5:15 PM	2	0	7	9	0	0	0	0	9
134	3	PM	4:30 PM	3	99	4	106	0	2	0	2	108
135	3	PM	4:45 PM	4	119	8	131	0	4	0	4	135
136	3	PM	5:00 PM	5	100	5	110	0	1	0	1	111
137	3	PM	5:15 PM	6	113	3	122	0	1	0	1	123
138	4	PM	4:30 PM	4	2	2	8	0	0	0	0	8
139	4	PM	4:45 PM	3	2	7	12	0	0	0	0	12
140	4	PM	5:00 PM	2	2	4	8	0	0	0	0	8
141	4	PM	5:15 PM	4	1	4	9	0	0	0	0	9
142	1	ADT	12:00 AM	92	4050	98	4,240	0	258	0	258	4,498
143	2	ADT	12:00 AM	192	70	100	362	0	5	1	6	368
144	3	ADT	12:00 AM	118	4217	185	4,520	1	363	3	367	4,887
145	4	ADT	12:00 AM	110	75	151	336	2	3	2	7	343



Simplified Highway Forecasting Tool (SHIFT)
Design Designation



IXRptWarnings



Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



Safety Study - TRU 62 at Broadway Ave

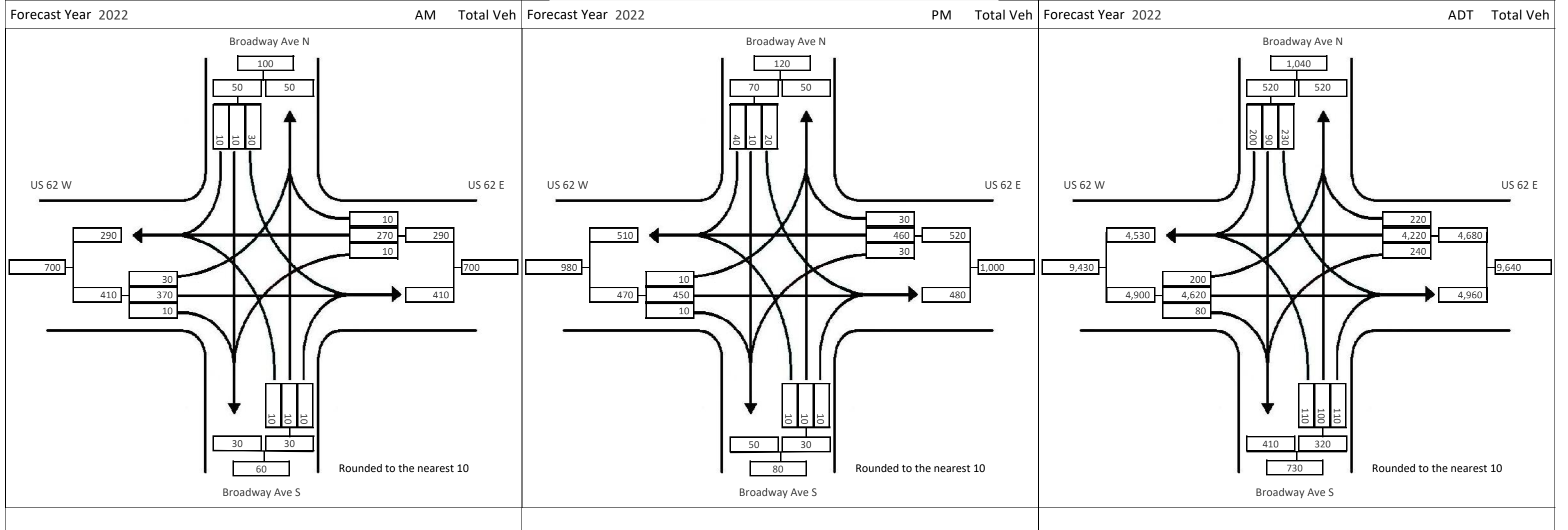


Method: IPF

Location	US 62 W		US 62 E		Broadway Ave N		Broadway Ave S	
	West Leg	East Leg	West Leg	East Leg	North Leg	South Leg	North Leg	South Leg
	STRU00062R	STRU00062R						
	8.09	8.09						
2022 ADT	9,450 *	9,650 *	1,050 *	730 *				
2042 ADT	10,200 *	10,400 *	1,050 *	740 *				
K	0.08	0.08	0.08 *	0.08 *				
DHV	820	830	80	60				
D	0.52	0.52	0.56	0.65				
T24	0.07	0.06	0.02	0.02				
TD	0.02	0.02	0.01	0.00				

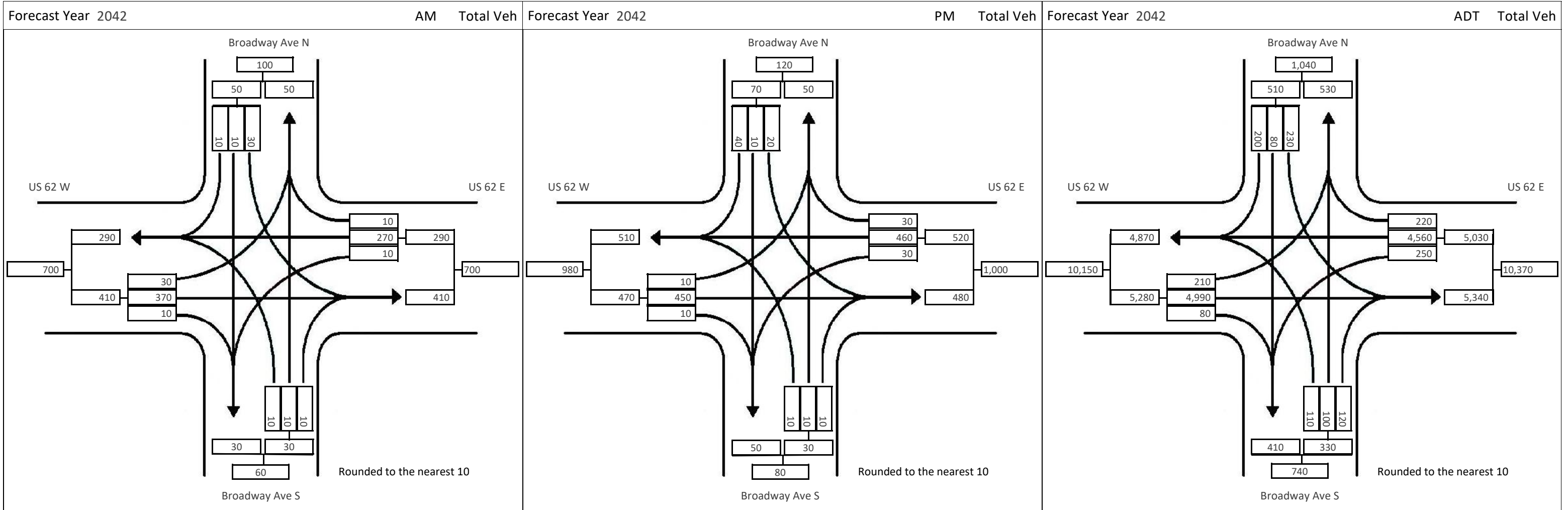
Growth rates were obtained from Eastgate for Bedford Rd. There has been negative growth in this area since 2000 so a growth rate of 0.00% was used.

* pivot from turn movement count ADT



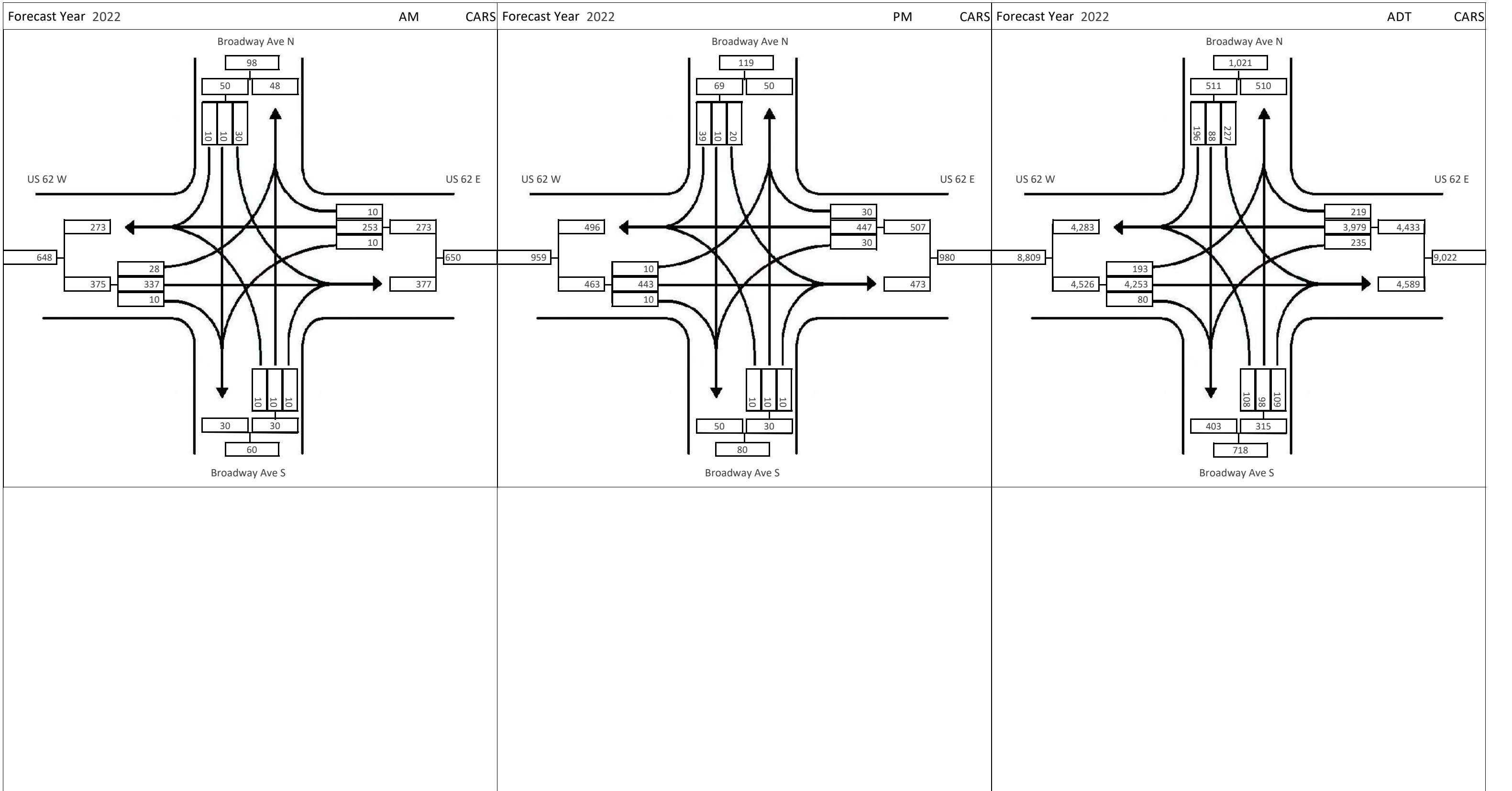


Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



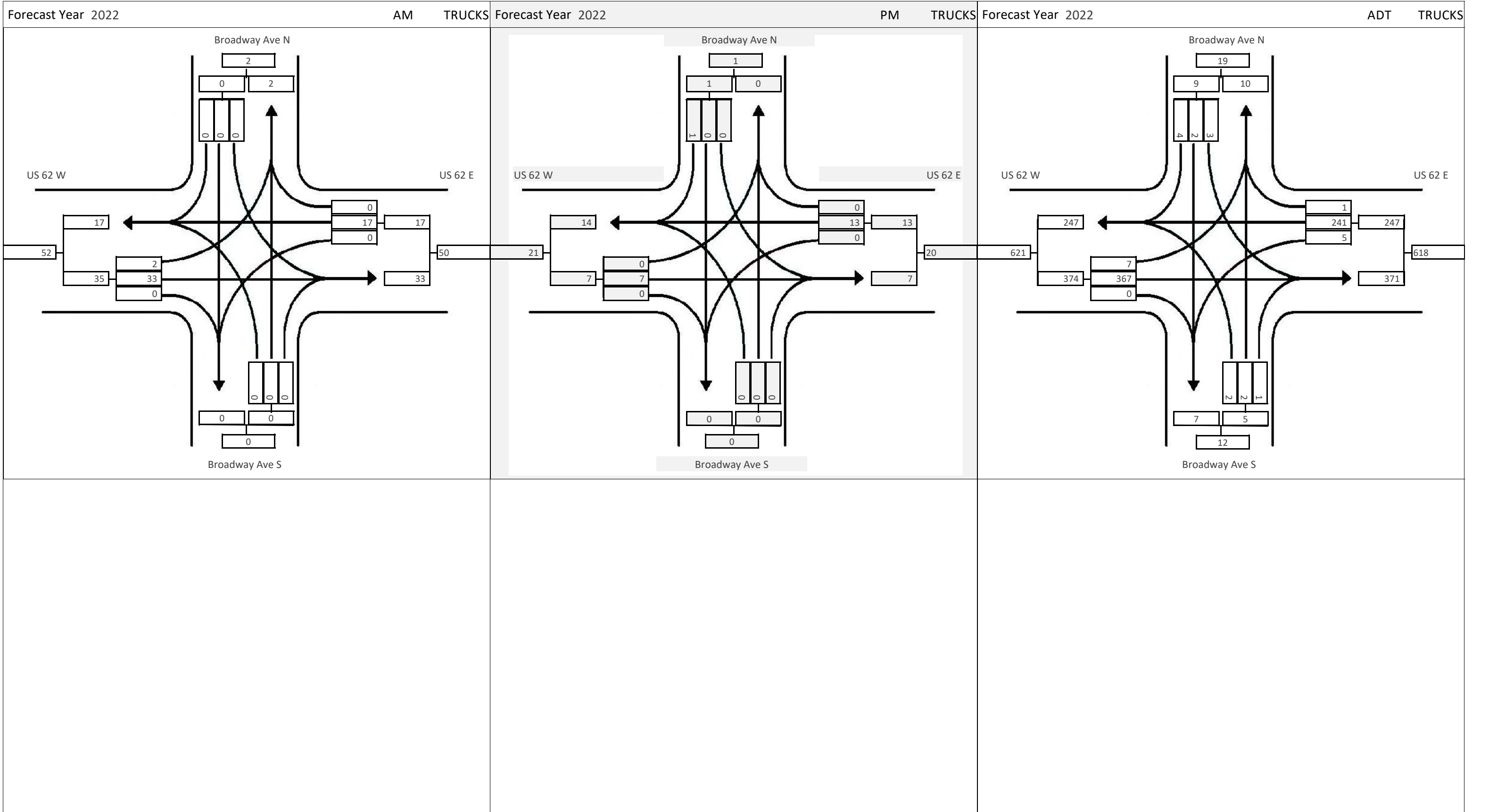


Simplified Highway Forecasting Tool (SHIFT)
 Design Designation





Simplified Highway Forecasting Tool (SHIFT)
 Design Designation

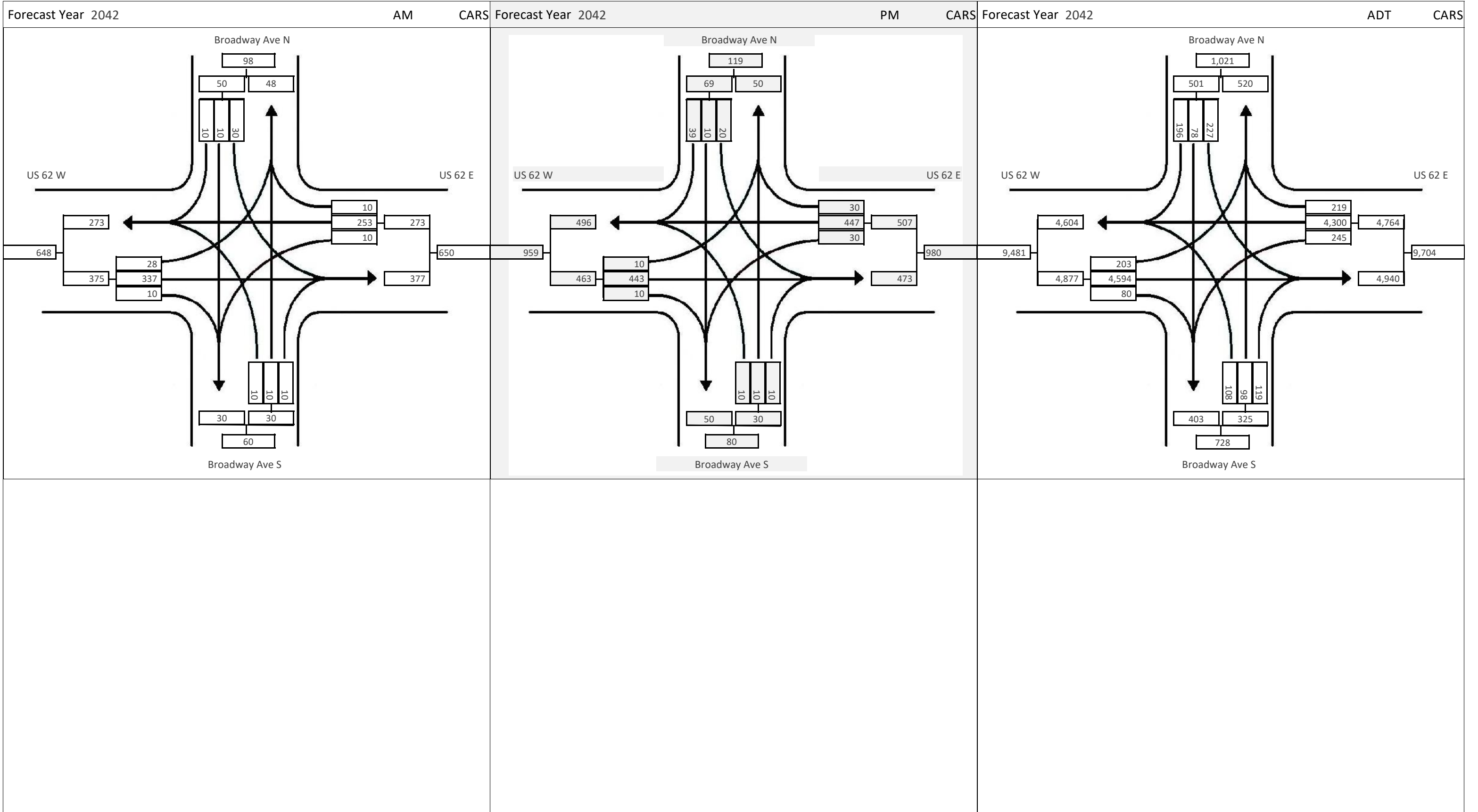




Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



PID NONE Location US62 at Broadway Ave-Brookfield

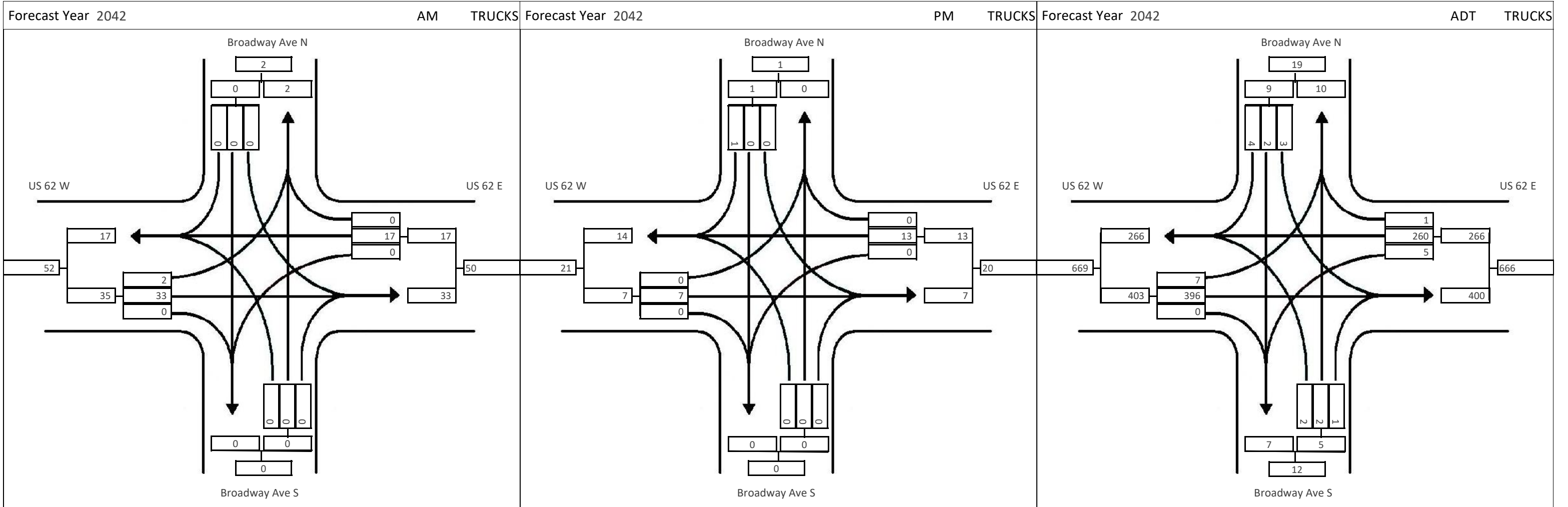




Simplified Highway Forecasting Tool (SHIFT)
 Design Designation

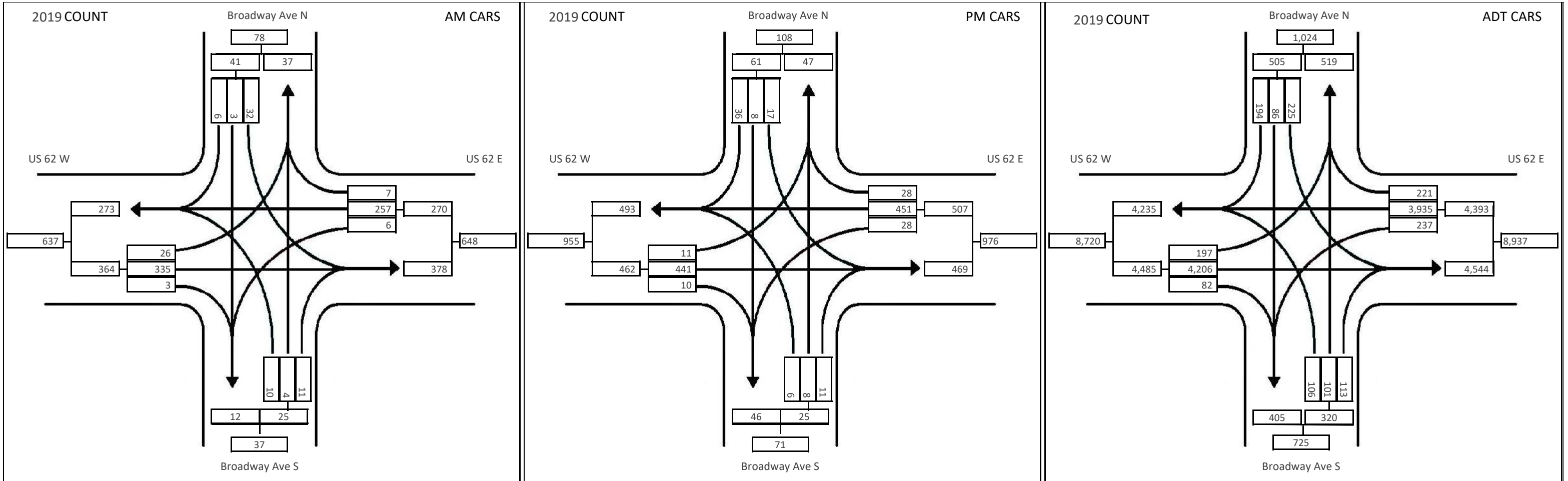


PID NONE Location US62 at Broadway Ave-Brookfield



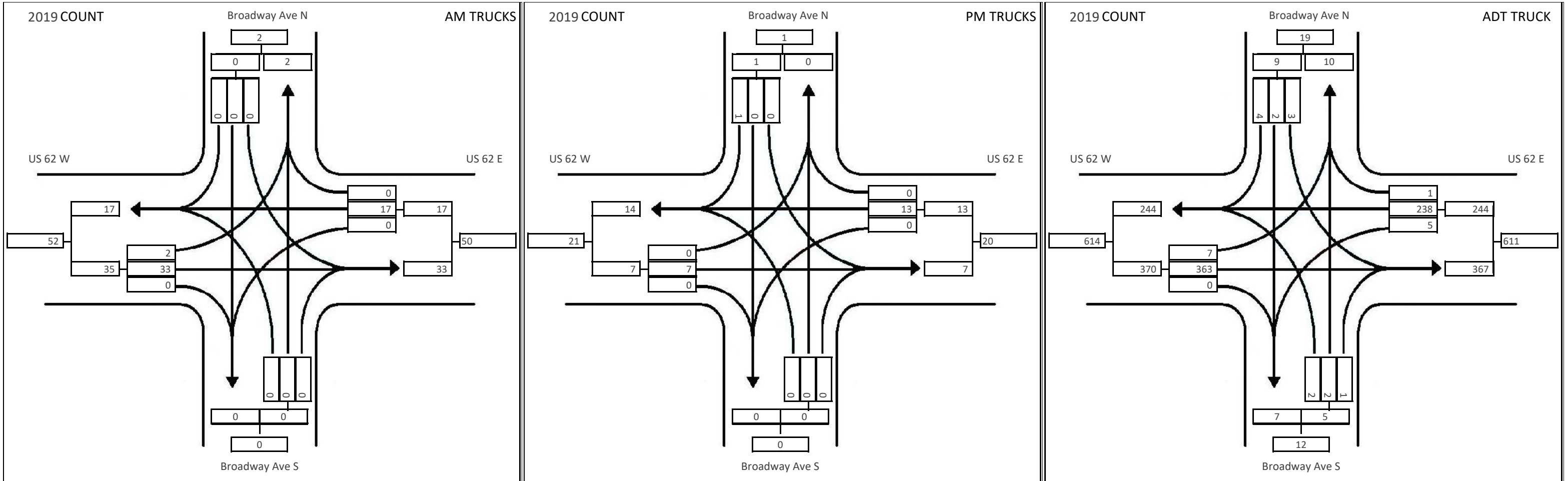


Simplified Highway Forecasting Tool (SHIFT)
 Design Designation





Simplified Highway Forecasting Tool (SHIFT)
 Design Designation

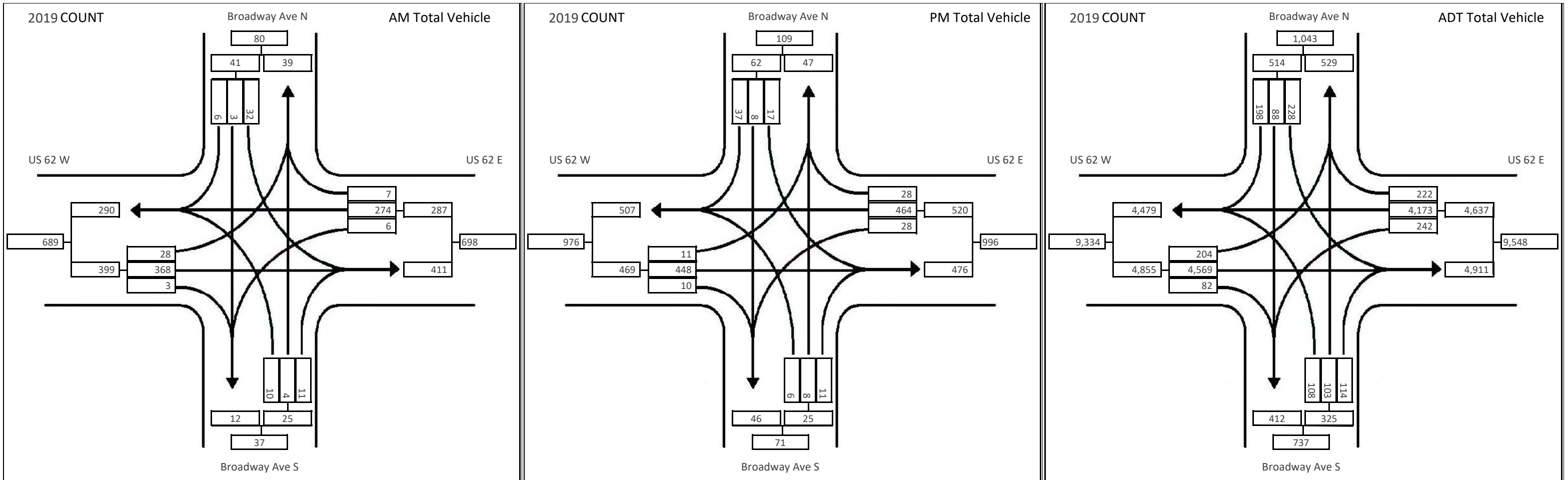




Simplified Highway Forecasting Tool (SHIFT)
 Design Designation



Pivot Forecast From TurnsCount: Yes





Simplified Highway Forecasting Tool (SHIFT)
Design Designation



PID NONE Location US62 at Broadway Ave-Brookfield

RptIntersectionTbl

ID		INTERSECTION TABLE VALUES																			
1 (1-Design Yr, 2-Opening Year)		Target Forecast Volumes										Counted ADT					ADT Annual Growth Rate				
Leg #	Forecast Year	AM	PM	ADT	Leg DHV	K ₃₀	K _{Keved}	Year	Yr Keved	Vol.	CNT Keved	Car+TK	G _{Keved}	%	PCT Keved	2040 ADT Vol	Route	Car	TRK		
1	2042	581	829	10365	829	0.08		2019		9,548		35.5		0.34%	11,200		20.4	15.1			
2	2042	37	0	737	0	0.08		2019		737				0.00%							
3	2042	573	812	10151	812	0.08		2019		9,334		35.5		0.34%	11,200		20.0	15.0			
4	2042	80	0	1043	0	0.08		2019		1,043				0.00%							

Turning Mvmt Count Year 2019 Pivot from turncounts to target volume 1 Rate for all

OTHER Keyed CMS SHIFT Data	
Leg1	0
Leg2	
Leg3	0
Leg4	
URL1	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.211443,-80.536993&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.213553,-80.530623&sensor=false&path=color:0xff0000ff weight:5 41.211443,-80.536993 41.212516,-80.53376 41.213035,-80.532192 41.213553,-80.530623
URL2	
URL3	http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.211443,-80.536993&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.213553,-80.530623&sensor=false&path=color:0xff0000ff weight:5 41.211443,-80.536993 41.212516,-80.53376 41.213035,-80.532192 41.213553,-80.530623
URL4	
URLIX	



Simplified Highway Forecasting Tool (SHIFT)

Design Designation



PID NONE Location US62 at Broadway Ave-Brookfield

ID		INTERSECTION TABLE VALUES																			
Leg #	Forecast Year	Target Forecast Volumes					Counted ADT				ADT Annual Growth Rate				2040						
#	Street Name	AM Keved	PM Keved	ADT	ADT Keved	Leg DHV	K ₃₀	K Keved	Year	Yr Keved	Vol.	CNT Keved	Car+TK	G Keved	%	PCT Keved	ADT Vol	Route	Car	TRK	
1	US 62 E	541	772	9655	772	0.08		2019		9,548		35.5		0.34%		11,200		20.4	15.1		
2	Broadway Ave S	37	0	737	0	0.08		2019		737				0.00%							
3	US 62 W	533	755	9441	755	0.08		2019		9,334		35.5		0.34%		11,200		20.0	15.0		
4	Broadway Ave N	80	0	1043	0	0.08		2019		1,043				0.00%							

Turning Mvmt Count Year Pivot from turncounts to target volume 1 Rate for all

OTH
 OTHER Keved CMS SHIFT Data

Leg1 2042 ADT=11396.5664 DHV=911.725312, 2022 ADT=10686.0944 DHV=854.887552STRUUS00062**C, 8.1
 |25693,25693,STRU00062R,8093,,372,2005,9300,720,10020,2008,9360,850,10210,2011,9880,570,10450,2013,9924,570,10494,2015,9114,1003,10117,2018,9718,826,10544,6,0,2040,9677,816,9921,711,9621,827,9872,719,9486,921,9733,813,10122,1020,10818,722,9719,1111,10483,
 ,1679,979,500,716,460,1444,755,1064,721,2129,953,367,297,5,5,5,5,5,8268,384,7671,436,225,8,12576,570,13753,1015,969,22,10866,1158,60,81,6,3,A,0.5,10758,-10455,10969,1.02,10762,10866,RAF,0.76,1103,-
 261,1190,1.34,1125,1158,RAF,10162,1029,10614,837,9815,1109,10329,887,8700,1883,9133,1692,0,3,0,1,0,1,0,0,AVG,MODEL,4210,12958,-662,3884,8468,10818,722,1978,9637,9779,1103,1190,4210,12958,-662,3884,0.0019,0.0051,0,0.0036,-0.0058,-0.0027,0.0021,0.0042,0.000
 0.0027,0,-0.0003,0.0003,-0.0004,0,-0.0258,0.0152,0.0021,0.0107,-0.0057,0.0157,-0.0025,0.0634,0.0469,0.0112,0.0006,0.0156,0.0034,0.0582,0.0477,0.0183,0.0152,0.02,0.0165,0.0183,-0.0819,0.1683,0.0183,2,10614,837,10000,1200,11200,0.08,0.64,0.1,0.04,0.43,S,TRU

Leg2

Leg3 2042 ADT=11396.5664 DHV=911.725312, 2022 ADT=10686.0944 DHV=854.887552STRUUS00062**C, 8.1
 |25693,25693,STRU00062R,8093,,372,2005,9300,720,10020,2008,9360,850,10210,2011,9880,570,10450,2013,9924,570,10494,2015,9114,1003,10117,2018,9718,826,10544,6,0,2040,9677,816,9921,711,9621,827,9872,719,9486,921,9733,813,10122,1020,10818,722,9719,1111,10483,
 ,1679,979,500,716,460,1444,755,1064,721,2129,953,367,297,5,5,5,5,5,8268,384,7671,436,225,8,12576,570,13753,1015,969,22,10866,1158,60,81,6,3,A,0.5,10758,-10455,10969,1.02,10762,10866,RAF,0.76,1103,-
 261,1190,1.34,1125,1158,RAF,10162,1029,10614,837,9815,1109,10329,887,8700,1883,9133,1692,0,3,0,1,0,1,0,0,AVG,MODEL,4210,12958,-662,3884,8468,10818,722,1978,9637,9779,1103,1190,4210,12958,-662,3884,0.0019,0.0051,0,0.0036,-0.0058,-0.0027,0.0021,0.0042,0.000
 0.0027,0,-0.0003,0.0003,-0.0004,0,-0.0258,0.0152,0.0021,0.0107,-0.0057,0.0157,-0.0025,0.0634,0.0469,0.0112,0.0006,0.0156,0.0034,0.0582,0.0477,0.0183,0.0152,0.02,0.0165,0.0183,-0.0819,0.1683,0.0183,2,10614,837,10000,1200,11200,0.08,0.64,0.1,0.04,0.43,S,TRU

Leg4

URL1 <http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.211443,-80.536993&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.213553,-80.530623&sensor=false&path=color:0xff0000ff|weight:5|41.211443,-80.536993|41.213553,28|41.212516,-80.53376|41.213035,-80.532192|41.213553,-80.530623>

URL2

URL3 <http://maps.googleapis.com/maps/api/staticmap?size=360x357&maptype=roadmap&markers=size:mid%7Ccolor:blue%7Clabel:S%7C41.211443,-80.536993&markers=size:mid%7Ccolor:green%7Clabel:E%7C41.213553,-80.530623&sensor=false&path=color:0xff0000ff|weight:5|41.211443,-80.536993|41.213553,28|41.212516,-80.53376|41.213035,-80.532192|41.213553,-80.530623>

URL4

URLIX



Simplified Highway Forecasting Tool (SHIFT)
Design Designation



PID NONE Location US62 at Broadway Ave-Brookfield

TurnsCount

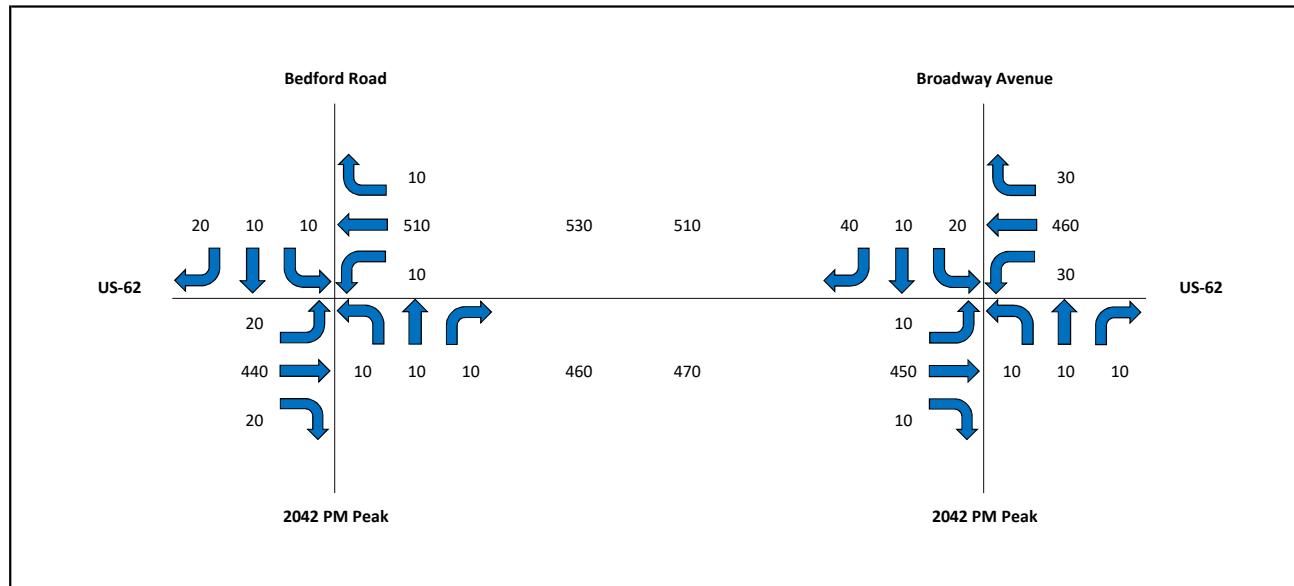
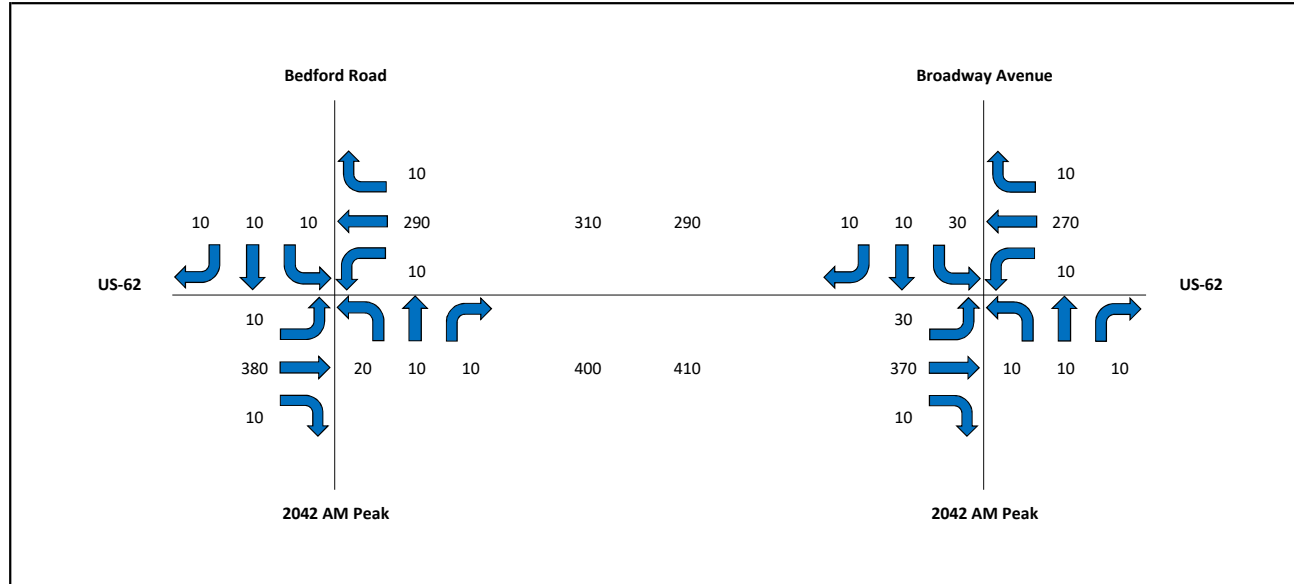
TurnsCount		Tuesday, January 28, 2020										
		12:36:42 PM										
ID	LEG NUM	Tm Period	Time	PA LEFT	PAT HRU	PA RIGHT	PA TOTAL	BC LEFT	BC THRU	BC RIGHT	BC TOTAL	TOTAL VEH
93	1	AM	7:15 AM	1	75	1	77	0	4	0	4	81
110	1	AM	7:30 AM	2	79	3	84	0	5	0	5	89
111	1	AM	7:45 AM	1	49	1	51	0	4	0	4	55
112	1	AM	8:00 AM	2	54	2	58	0	4	0	4	62
113	2	AM	7:15 AM	0	1	3	4	0	0	0	0	4
114	2	AM	7:30 AM	4	1	3	8	0	0	0	0	8
115	2	AM	7:45 AM	3	2	2	7	0	0	0	0	7
116	2	AM	8:00 AM	3	0	3	6	0	0	0	0	6
117	3	AM	7:15 AM	5	64	0	69	0	9	0	9	78
118	3	AM	7:30 AM	3	77	2	82	1	3	0	4	86
119	3	AM	7:45 AM	8	111	0	119	1	14	0	15	134
120	3	AM	8:00 AM	10	83	1	94	0	7	0	7	101
121	4	AM	7:15 AM	8	2	1	11	0	0	0	0	11
122	4	AM	7:30 AM	10	0	3	13	0	0	0	0	13
123	4	AM	7:45 AM	7	1	0	8	0	0	0	0	8
124	4	AM	8:00 AM	7	0	2	9	0	0	0	0	9
125	0			0	0	0	0	0	0	0	0	0
126	1	PM	4:45 PM	4	118	8	130	0	3	0	3	133
127	1	PM	5:00 PM	10	123	5	138	0	4	0	4	142
128	1	PM	5:15 PM	6	120	8	134	0	3	0	3	137
129	1	PM	5:30 PM	8	90	7	105	0	3	0	3	108
130	2	PM	4:45 PM	1	2	1	4	0	0	0	0	4
131	2	PM	5:00 PM	0	1	1	2	0	0	0	0	2
132	2	PM	5:15 PM	2	3	3	8	0	0	0	0	8
133	2	PM	5:30 PM	3	2	6	11	0	0	0	0	11
134	3	PM	4:45 PM	3	111	3	117	0	4	0	4	121
135	3	PM	5:00 PM	1	93	5	99	0	1	0	1	100
136	3	PM	5:15 PM	4	124	0	128	0	1	0	1	129
137	3	PM	5:30 PM	3	113	2	118	0	1	0	1	119
138	4	PM	4:45 PM	2	3	9	14	0	0	1	1	15
139	4	PM	5:00 PM	6	1	9	16	0	0	0	0	16
140	4	PM	5:15 PM	2	2	10	14	0	0	0	0	14
141	4	PM	5:30 PM	7	2	8	17	0	0	0	0	17
142	1	ADT	12:00 AM	237	3935	221	4,393	5	238	1	244	4,637
143	2	ADT	12:00 AM	106	101	113	320	2	2	1	5	325
144	3	ADT	12:00 AM	197	4206	82	4,485	7	363	0	370	4,855
145	4	ADT	12:00 AM	225	86	194	505	3	2	4	9	514

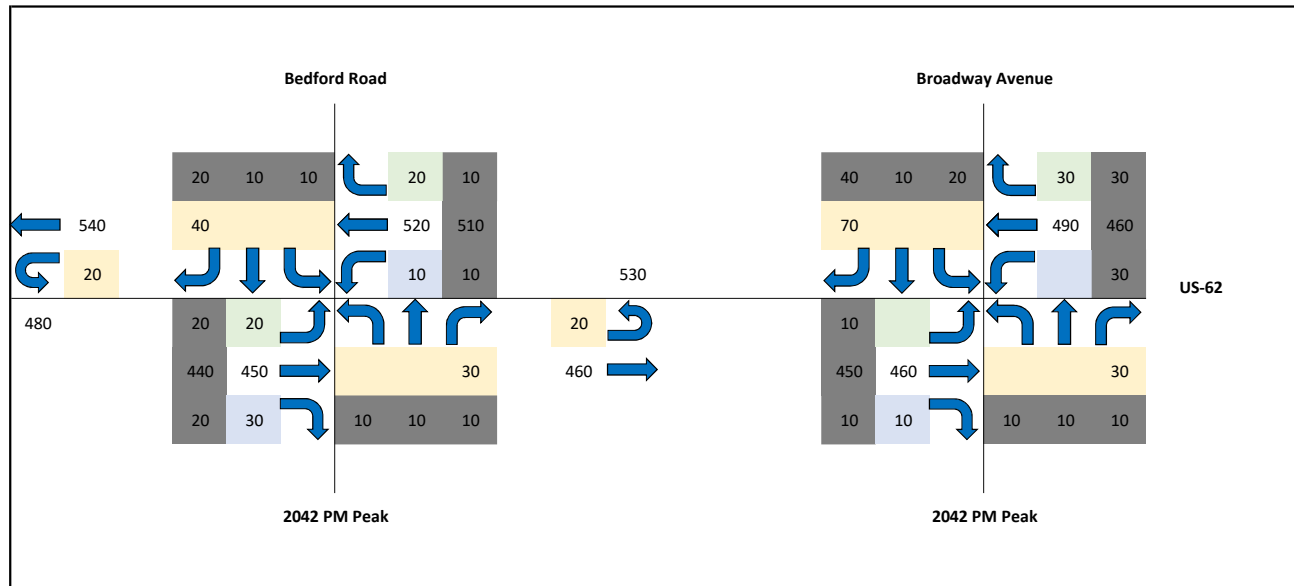
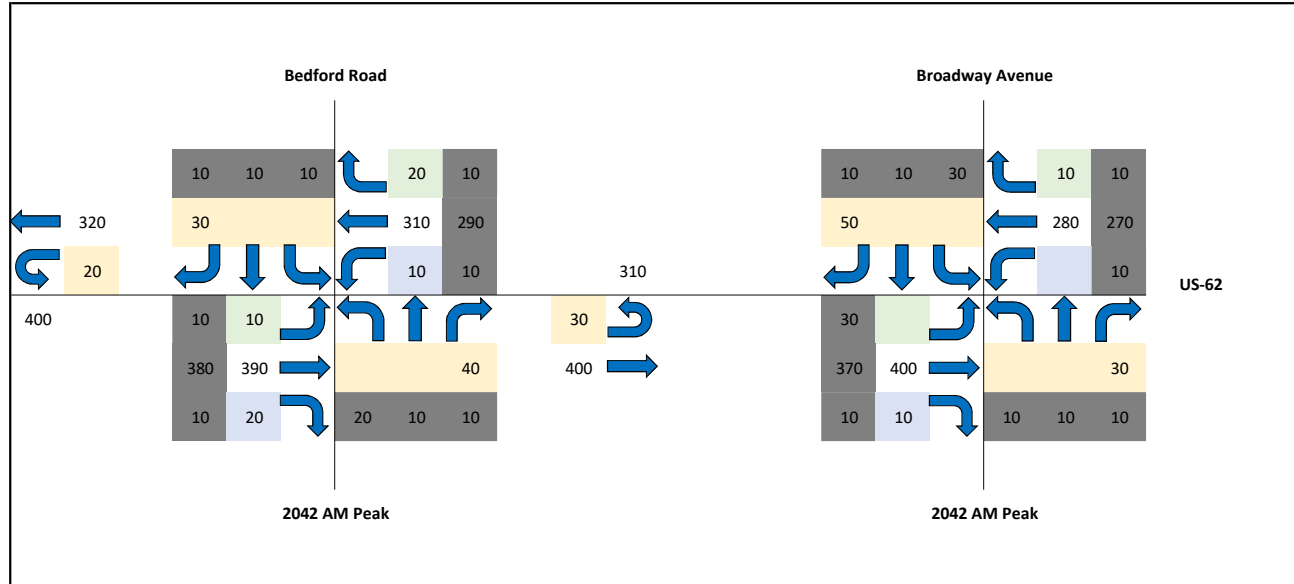


Simplified Highway Forecasting Tool (SHIFT)
Design Designation



IXRptWarnings





APPENDIX C:
ECAT Results & Benefit-Cost Analysis

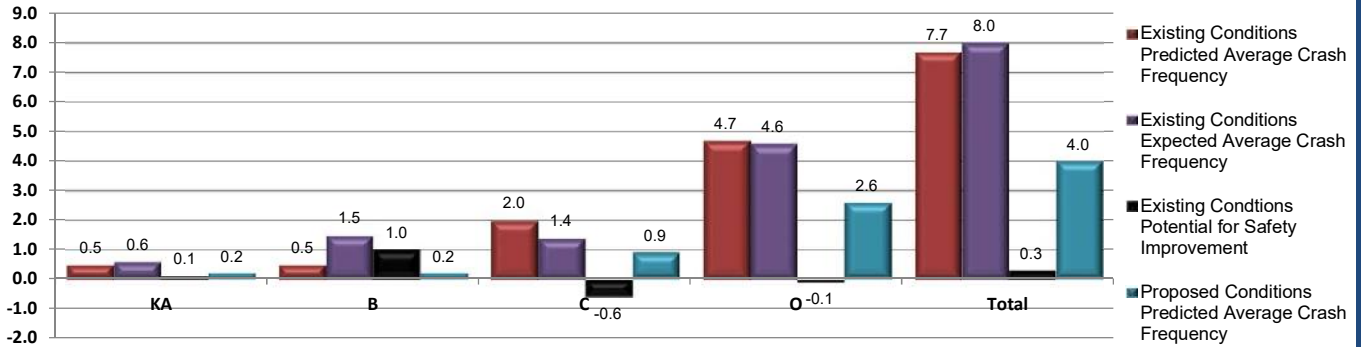


Project Safety Performance Report

General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

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



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
N_{predicted} - Existing Conditions	0.4818	0.4818	1.9937	4.6992	7.6565
N_{expected} - Existing Conditions	0.5540	1.4673	1.3582	4.5873	7.9668
N_{potential for improvement} - Existing Conditions	0.0722	0.9855	-0.6355	-0.1119	0.3103
N_{expected} - Proposed Conditions	0.2337	0.2337	0.9457	2.5501	3.9632



Project Safety Performance Report

General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US62: 7.47-7.66	Start of Study Area to Bedford Road	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67-8.09	Bedford Road to Broadway Avenue	0.0311	0.0311	0.1116	0.3543	0.5281
US62: 8.1-8.29	Broadway Avenue to End of Study Area	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67	US-62 at Bedford Road	0.211	0.211	0.8903	2.0091	3.3214
US62: 8.1	US-62 at Broadway Avenue	0.2113	0.2113	0.8916	2.0152	3.3294



Project Safety Performance Report

General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US62: 7.47-7.66	Start of Study Area to Bedford Road	0.0131	0.0338	0.0181	0.1104	0.1754
US62: 7.67-8.09	Bedford Road to Broadway Avenue	0.0288	0.0742	0.0401	0.3426	0.4857
US62: 8.1-8.29	Broadway Avenue to End of Study Area	0.0131	0.0338	0.0181	0.1104	0.1754
US62: 7.67	US-62 at Bedford Road	0.3128	0.8309	0.8035	2.0089	3.9561
US62: 8.1	US-62 at Broadway Avenue	0.1862	0.4946	0.4784	2.015	3.1742



Project Safety Performance Report

General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US62: 7.47-7.66	Start of Study Area to Bedford Road	-0.0011	0.0196	-0.032	-0.0499	-0.0634
US62: 7.67-8.09	Bedford Road to Broadway Avenue	-0.0023	0.0431	-0.0715	-0.0117	-0.0424
US62: 8.1-8.29	Broadway Avenue to End of Study Area	-0.0011	0.0196	-0.032	-0.0499	-0.0634
US62: 7.67	US-62 at Bedford Road	0.1018	0.6199	-0.0868	-0.0002	0.6347
US62: 8.1	US-62 at Broadway Avenue	-0.0251	0.2833	-0.4132	-0.0002	-0.1552



Project Safety Performance Report

General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US62: 7.47-7.66	Start of Study Area to Bedford Road	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67-8.09	Bedford Road to Broadway Avenue	0.0311	0.0311	0.1116	0.3543	0.5281
US62: 8.1-8.29	Broadway Avenue to End of Study Area	0.0142	0.0142	0.0501	0.1603	0.2388
US62: 7.67	US-62 at Bedford Road	0.058	0.058	0.2435	0.7668	1.1263
US62: 8.1	US-62 at Broadway Avenue	0.1162	0.1162	0.4904	1.1084	1.8312



Project Safety Performance Report

General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	1.5805	0.0421	-1.5384	1.0480
Head On	0.0349	0.0449	0.0100	0.0228
Rear End	1.4310	2.0612	0.6302	1.0183
Backing	0.1748	0.1843	0.0095	0.1214
Sideswipe - Meeting	0.1034	0.1233	0.0199	0.0744
Sideswipe - Passing	0.7071	0.8378	0.1307	0.5169
Angle	1.5871	2.1398	0.5527	1.0620
Parked Vehicle	0.2349	0.2712	0.0363	0.1645
Pedestrian	0.0655	0.0846	0.0191	0.0427
Animal	1.0320	0.8980	-0.1340	1.0377
Train	0.0008	0.0008	0.0000	0.0005
Pedalcycles	0.0327	0.0578	0.0251	0.0210
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	1.0481	1.2674	0.2193	0.8098
Other Object	0.0866	0.0864	-0.0002	0.0734
Overturning	0.0996	0.0975	-0.0021	0.0768
Other Non-Collision	0.1492	0.1441	-0.0051	0.1173
Left Turn	0.4351	0.6177	0.1826	0.2914
Right Turn	0.0000	0.0000	0.0000	0.0000

Project Cost Estimate

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

Engineering Design %	10%
Contingency %	20%

Countermeasures	Construction Costs	Right of Way Costs	Engineering Design Costs	Contingency Amount	Total Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value
Site Characteristic Improvements (i.e. Lane widening)			\$0.00	\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Lighting)			\$0.00	\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Signal Phasing)			\$0.00	\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Added Right Turn Lane)			\$0.00	\$0.00	\$0.00		
CMF 1 - Install J-Turn (RCUT) Intersection	\$1,765,000.00		\$176,500.00	\$353,000.00	\$2,294,500.00		
CMF 2 - Implement Right-In/Right Out Only Restriction	\$170,000.00		\$17,000.00	\$34,000.00	\$221,000.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
			\$0.00	\$0.00	\$0.00		
Totals	\$1,935,000.00	\$0.00	\$193,500.00	\$387,000.00	\$2,515,500.00	\$0.00	\$0.00

Inflation %	7%
-------------	----

Final Construction Cost:	\$2,699,131.50
--------------------------	-----------------------

*Final construction cost should match the Project Cost Estimate



Safety Benefit - Cost Analysis

General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

Comments:

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

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (i.e. Lane widening)		\$0.00			\$0.00	\$0.00	-1.594	\$1,098,151
Site Characteristic Improvements (i.e. Lighting)		\$0.00			\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Signal Phasing)		\$0.00			\$0.00	\$0.00		
Site Characteristic Improvements (i.e. Added Right Turn Lane)		\$0.00			\$0.00	\$0.00		
CMF 1 - Install J-Turn (RCUT) Intersection	20	\$2,461,998.50			\$2,461,998.50	\$2,461,998.50	-0.601	\$301,741
CMF 2 - Implement Right-In/Right Out Only Restriction	20	\$237,133.00			\$237,133.00	\$237,133.00	-1.498	\$886,188
		\$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
		\$0.00			\$0.00	\$0.00	0.000	\$0
Totals		\$2,699,131.50	\$0.00	\$0.00	\$2,699,131.50	\$2,699,131.50	-3.693	\$2,286,080



Safety Benefit - Cost Analysis

General Information

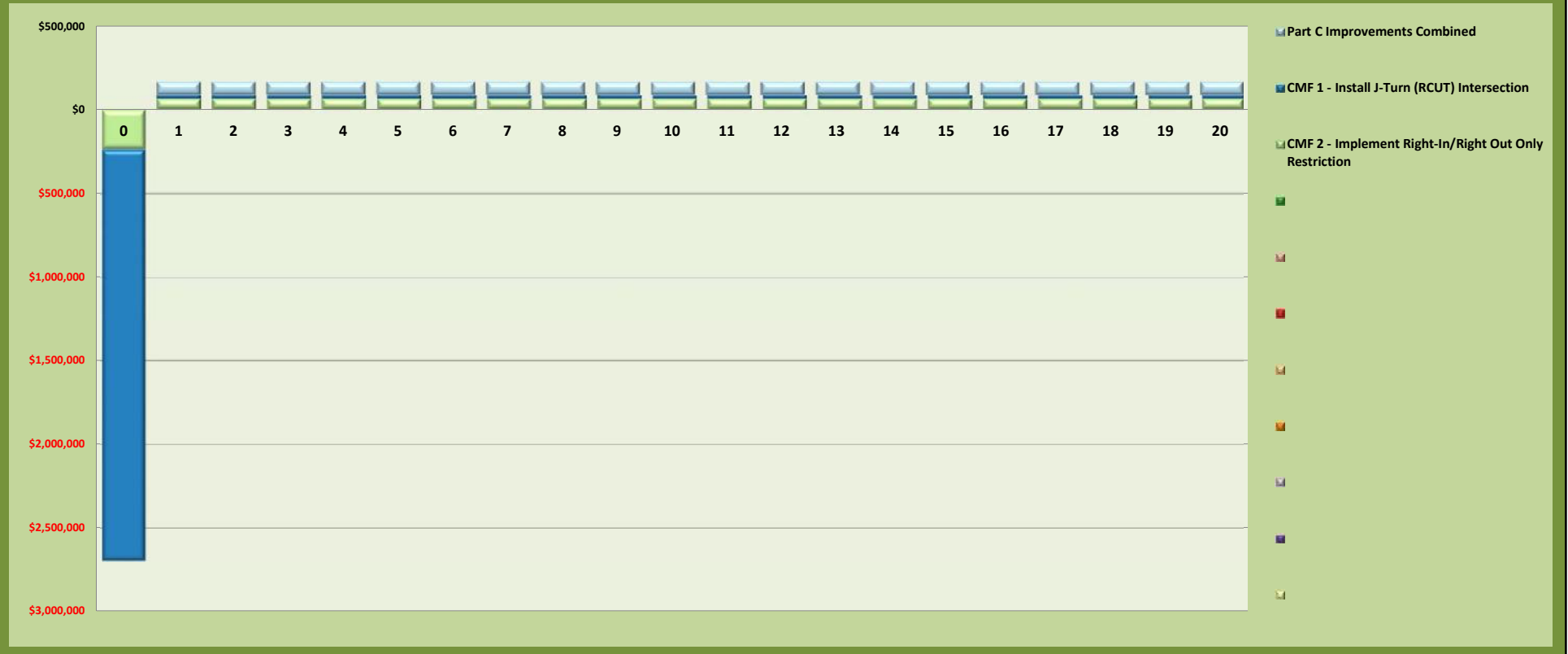
Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

Benefit - Cost Calculator	
Net Present Value of Project	\$2,699,131.50
Net Present Value of Safety Benefits	\$2,286,080.16
Net Benefit	(\$413,051.34)
Benefit / Cost Ratio	0.85

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-0.248
Number of Injury Crashes	-1.544
Number of Total Crashes	-3.693

Comments:

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





Safety Benefit - Cost Analysis

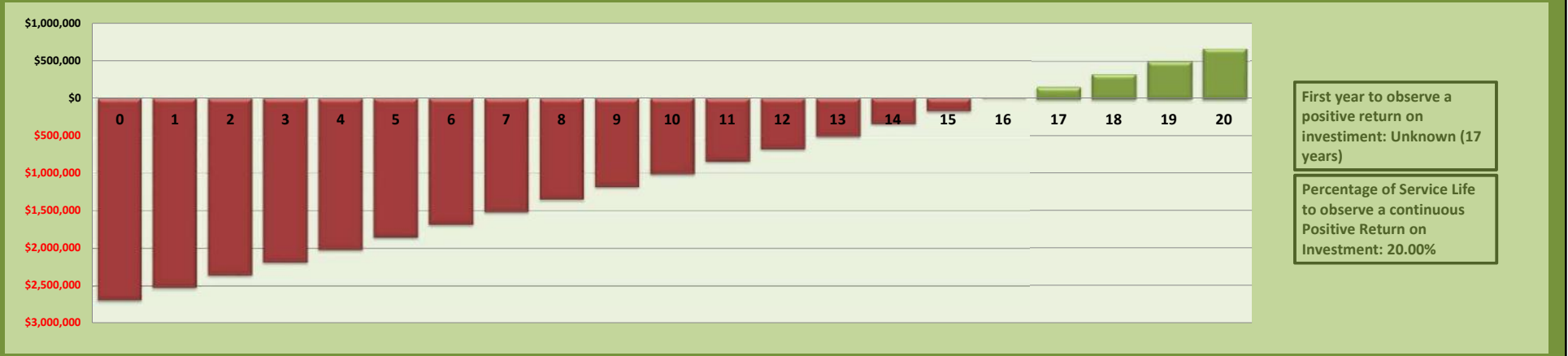
General Information

Project Name	TRU-62 Safety Study	Contact Email	nbrady@emht.com
Project Description		Contact Phone	(614) 775-4654
Reference Number		Date Performed	2/3/2020
Analyst	NRB	Analysis Year	2014-2018
Agency/Company	EMH&T		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



TRU-62

Preliminary Opinion of Construction Cost

January 20, 2020

Summary of Project Costs	Bedford & US-62	Broadway & US-62
Roadway Subtotal	\$ 314,740	\$ 36,400
Erosion Control Subtotal	\$ 31,355	\$ 3,365
Drainage Subtotal	\$ 218,075	\$ 22,100
Pavement Subtotal	\$ 547,145	\$ 37,126
Maintenance of Traffic Subtotal	\$ 100,000	\$ 37,126
Lighting Subtotal	\$ 200,000	\$ -
Traffic Control Subtotal	\$ 60,000	\$ 10,000
Miscellaneous Subtotal	\$ 62,600	\$ -
<u>2019 Preliminary Opinion of Construction Cost Total</u>	<u>\$1,533,915</u>	<u>\$146,117</u>
Contingency (15%)	\$231,000	\$22,000
2019 Preliminary Opinion of Construction Cost including Contingency	\$1,764,915	\$168,117
	\$1,933,032	

Notes & Clarifications

Estimate does not include , Reimbursement to Private Utilities, Design, and Construction Engineering.

Inflation has not been included.

ROW acquisition has not been included

Pricing reflects probable construction costs obtainable in the project locality on the date of this opinion. Unit rates have been obtained from historical records and/or discussion with contractors. The unit rates reflect current bid costs in the area. This estimate is an opinion of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every portion of the construction work for all subcontractors and general contractors. Experience indicates that a fewer number of bidders may result in higher bids, conversely an increased number of bidders may result in more competitive bids.

Since EMH&T has no control over the cost of labor, material, equipment, or over the contractor's method of determining prices, or over the competitive bidding or market conditions at the time of bid, the cost opinion is based on industry practice, professional experience and qualifications, and represents EMH&T's best judgment as a consultant familiar with the construction industry. EMH&T does not guarantee that the proposals, bids, or the construction cost will not vary from opinions of probable cost prepared by them.



CMF / CRF Details

CMF ID: 5555

Install J-Turn intersection

Description: Install J-Turn intersection

Prior Condition: Two way stop controlled intersection

Category: Intersection geometry

Study: [Evaluation of J-turn Intersection Design Performance in Missouri, Edara et al., 2013](#)

Star Quality Rating:



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

Crash Modification Factor (CMF)

Value: 0.652

Adjusted Standard Error:

Unadjusted Standard Error:

Crash Reduction Factor (CRF)

Value: 34.8 (This value indicates a **decrease** in crashes)

Adjusted Standard Error:

Unadjusted Standard Error:

Applicability

Crash Type:

All

Crash Severity:

All

Roadway Types:

Principal Arterial Other Freeways and Expressways

Number of Lanes:

Road Division Type:

Divided by Median

Speed Limit:

65-70

Area Type:

Rural

Traffic Volume:

Time of Day:

All

If countermeasure is intersection-based

Intersection Type:

Roadway/roadway (not interchange related)

Intersection Geometry:

3-leg,4-leg

Traffic Control:

Other

Major Road Traffic Volume:

10326 to 26470 Annual Average Daily Traffic (AADT)

Minor Road Traffic Volume:

434 to 1389 Annual Average Daily Traffic (AADT)

Development Details

Date Range of Data Used:

2004 to 2013

Municipality:

State:

MO

Country:	USA
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	
Before Sample Size Used:	86
After Sample Size Used:	27

Other Details	
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Aug-12-2014
Comments:	

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in the CMF Clearinghouse. The information contained in the CMF Clearinghouse does not constitute a standard, specification, or regulation, nor is it a substitute for sound engineering judgment.



CMF / CRF Details

CMF ID: 9821

Install right-in-right-out (RIRO) operations at stop-controlled intersections

Description:

Prior Condition: *No Prior Condition(s)*

Category: Access management

Study: [*Safety Effects of Turning Movement Restrictions at Stop-Controlled Intersections, Le et al., 2018*](#)

Star Quality Rating:



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

Crash Modification Factor (CMF)

Value: 0.55

Adjusted Standard Error:

Unadjusted Standard Error: 0.09

Crash Reduction Factor (CRF)

Value: 45 (*This value indicates a **decrease** in crashes*)

Adjusted Standard Error:

Unadjusted Standard Error:

9

Applicability

Crash Type:

All

Crash Severity:

All

Roadway Types:

Not specified

Number of Lanes:

4 and 6

Road Division Type:

Divided by Median

Speed Limit:

Area Type:

Urban

Traffic Volume:

Time of Day:

All

If countermeasure is intersection-based

Intersection Type:

Roadway/roadway (not interchange related)

Intersection Geometry:

3-leg

Traffic Control:

Stop-controlled

Major Road Traffic Volume:

13433 to 75000 Annual Average Daily Traffic (AADT)

Minor Road Traffic Volume:

51 to 2600 Annual Average Daily Traffic (AADT)

Development Details

Date Range of Data Used:

Municipality:

State:

CA

Country:	USA
Type of Methodology Used:	Regression cross-section
Sample Size Used:	

Other Details	
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Oct-27-2018
Comments:	This CMF compares urban, three-legged, stop-controlled intersections with RIRO operation to full movement. This CMF looks at Total crashes. Total crashes are defined as all crashes within 100 ft of intersection (all types and severities combined)

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APPENDIX D:

Signal Warrant & Turn Lane Warrant Results

Bedford Road Eight Hour Traffic Signal Warrant

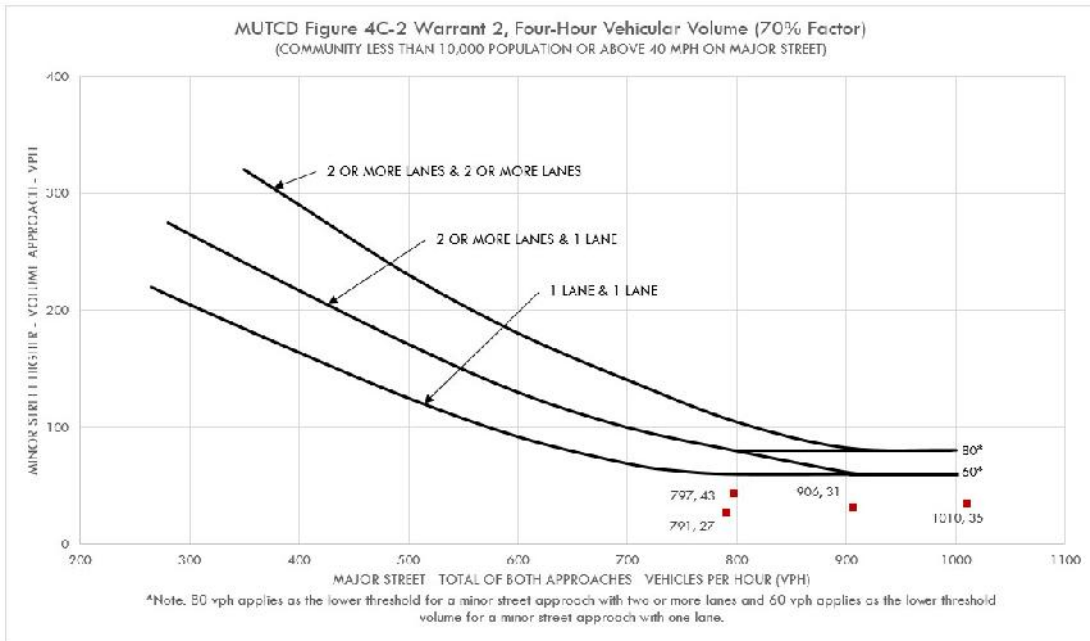
SIGNAL WARRANT WORKSHEET

Warrant 1 Ohio Manual of Uniform Traffic Control Devices

CONDITION	# OF LANES	MAJOR STREET			MINOR STREET			Condition A				Condition B			
		1-WAY	1-WAY	2-WAY	1-WAY	1-WAY	1-WAY	MAJ	MIN	80%	80%	MAJ	MIN	80%	80%
Standard	1							500	150	400	120	750	75	600	60
Standard	2+							600	200	480	160	900	100	720	80
High Speed	1						X	350	105	280	84	525	53	420	42
High Speed	2+			X				420	140	336	112	630	70	504	56
6:15 - 7:15 AM		261	296	557	23	21	23	YES	NO	YES	NO	NO	NO	YES	NO
7:15 - 8:15 AM		300	400	700	31	28	31	YES	NO	YES	NO	YES	NO	YES	NO
8:15 - 9:15 AM		235	334	569	25	27	27	YES	NO	YES	NO	NO	NO	YES	NO
9:15 - 10:15 AM		266	290	556	21	13	21	YES	NO	YES	NO	NO	NO	YES	NO
10:15 - 11:15 AM		296	288	584	26	15	26	YES	NO	YES	NO	NO	NO	YES	NO
11:45 AM - 12:45 PM		313	340	653	29	28	29	YES	NO	YES	NO	YES	NO	YES	NO
12:45 - 1:45 PM		310	326	636	22	23	23	YES	NO	YES	NO	YES	NO	YES	NO
1:45 - 2:45 PM		359	432	791	27	22	27	YES	NO	YES	NO	YES	NO	YES	NO
2:45 - 3:45 PM		418	379	797	43	33	43	YES	NO	YES	NO	YES	NO	YES	YES
3:45 - 4:45 PM		437	469	906	29	31	31	YES	NO	YES	NO	YES	NO	YES	NO
4:45 - 5:45 PM		516	494	1010	26	35	35	YES	NO	YES	NO	YES	NO	YES	NO
5:45 - 6:45 PM		328	358	686	27	27	27	YES	NO	YES	NO	YES	NO	YES	NO
				0			0	NO	NO	NO	NO	NO	NO	NO	NO
Hours Met								12	0	12	0	8	0	12	1
Hours Warrant Met								0	0	0	0	0	1		
Warrant Satisfied ?								NO	NO	NO	NO	NO	NO		

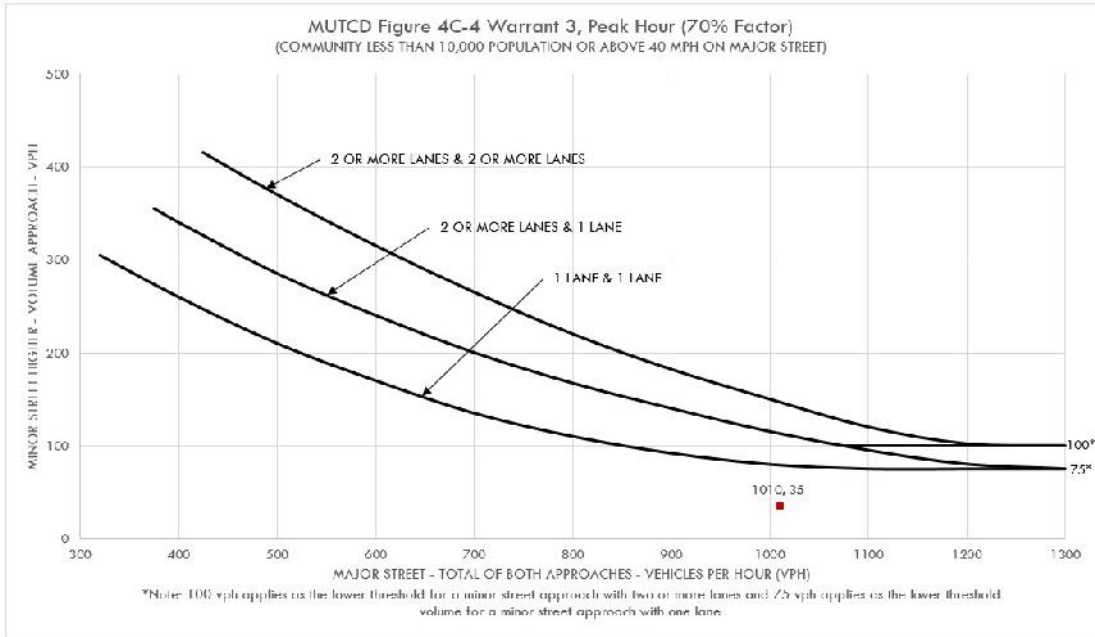
Condition A : NOT MET
 Condition B : NOT MET
 80% of Condition A and B : NOT MET

Bedford Road Four Hour Traffic Signal Warrant





Bedford Road Peak Hour Traffic Signal Warrant



Broadway Avenue Eight Hour Traffic Signal Warrant

SIGNAL WARRANT WORKSHEET

Warrant 1

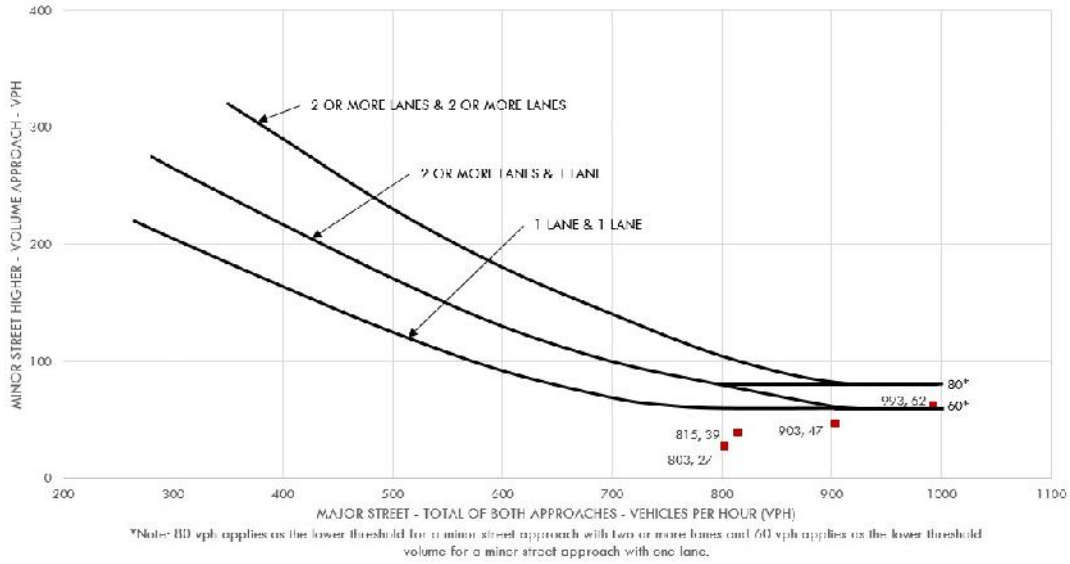
Ohio Manual of Uniform Traffic Control Devices

CONDITION	# OF LANES	MAJOR STREET			MINOR STREET			Condition A				Condition B			
		1-WAY	1-WAY	2-WAY	1-WAY	1-WAY	1-WAY	MAJ	MIN	80%	80%	MAJ	MIN	80%	80%
Standard	1							500	150	400	120	750	75	600	60
Standard	2+							600	200	480	160	900	100	720	80
High Speed	1						X	350	105	280	84	525	53	420	42
High Speed	2+			X				420	140	336	112	630	70	504	56
6:15 - 7:15 AM		257	298	555	29	19	29	YES	NO	YES	NO	NO	NO	YES	NO
7:15 - 8:15 AM		288	400	688	41	25	41	YES	NO	YES	NO	YES	NO	YES	NO
8:15 - 9:15 AM		237	348	585	28	24	28	YES	NO	YES	NO	NO	NO	YES	NO
9:15 - 10:15 AM		270	285	555	38	24	38	YES	NO	YES	NO	NO	NO	YES	NO
10:15 - 11:15 AM		288	300	588	37	19	37	YES	NO	YES	NO	NO	NO	YES	NO
11:45 AM - 12:45 PM		321	330	651	42	20	42	YES	NO	YES	NO	YES	NO	YES	NO
12:45 - 1:45 PM		310	324	634	33	18	33	YES	NO	YES	NO	YES	NO	YES	NO
1:45 - 2:45 PM		387	416	803	27	17	27	YES	NO	YES	NO	YES	NO	YES	NO
2:45 - 3:45 PM		439	376	815	39	33	39	YES	NO	YES	NO	YES	NO	YES	NO
3:45 - 4:45 PM		454	449	903	47	32	47	YES	NO	YES	NO	YES	NO	YES	YES
4:45 - 5:45 PM		523	470	993	62	25	62	YES	NO	YES	NO	YES	YES	YES	YES
5:45 - 6:45 PM		354	356	710	36	29	36	YES	NO	YES	NO	YES	NO	YES	NO
				0			0	NO	NO	NO	NO	NO	NO	NO	NO
Hours Met								12	0	12	0	8	1	12	2
Hours Warrant Met								0		0		1		2	
Warrant Satisfied ?								NO		NO		NO		NO	

Condition A : NOT MET
 Condition B : NOT MET
 80% of Condition A and B : NOT MET

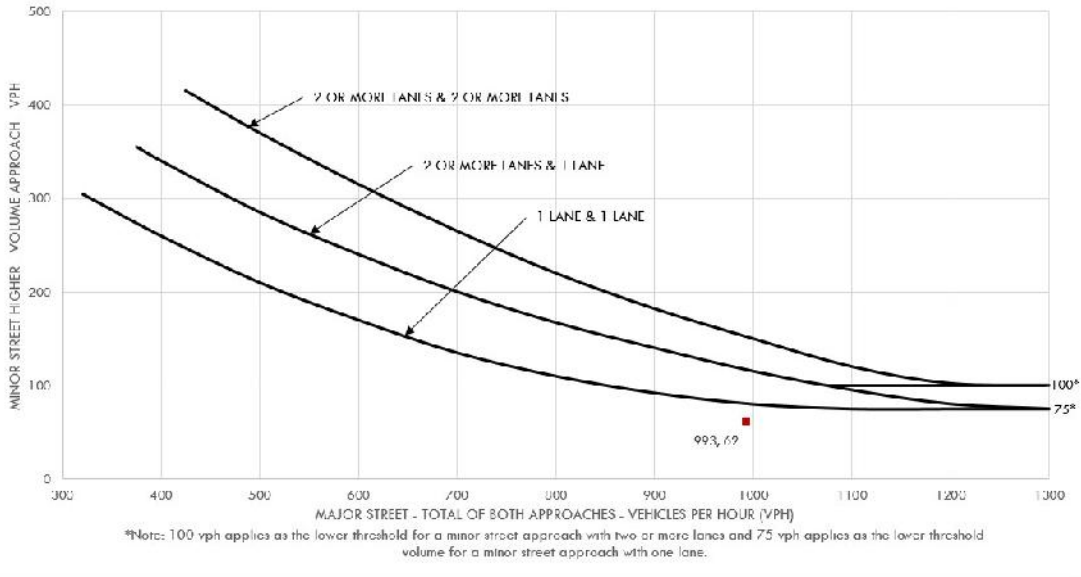
Broadway Avenue Four Hour Traffic Signal Warrant

MUTCD Figure 4C-2 Warrant 2, Four-Hour Vehicular Volume (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

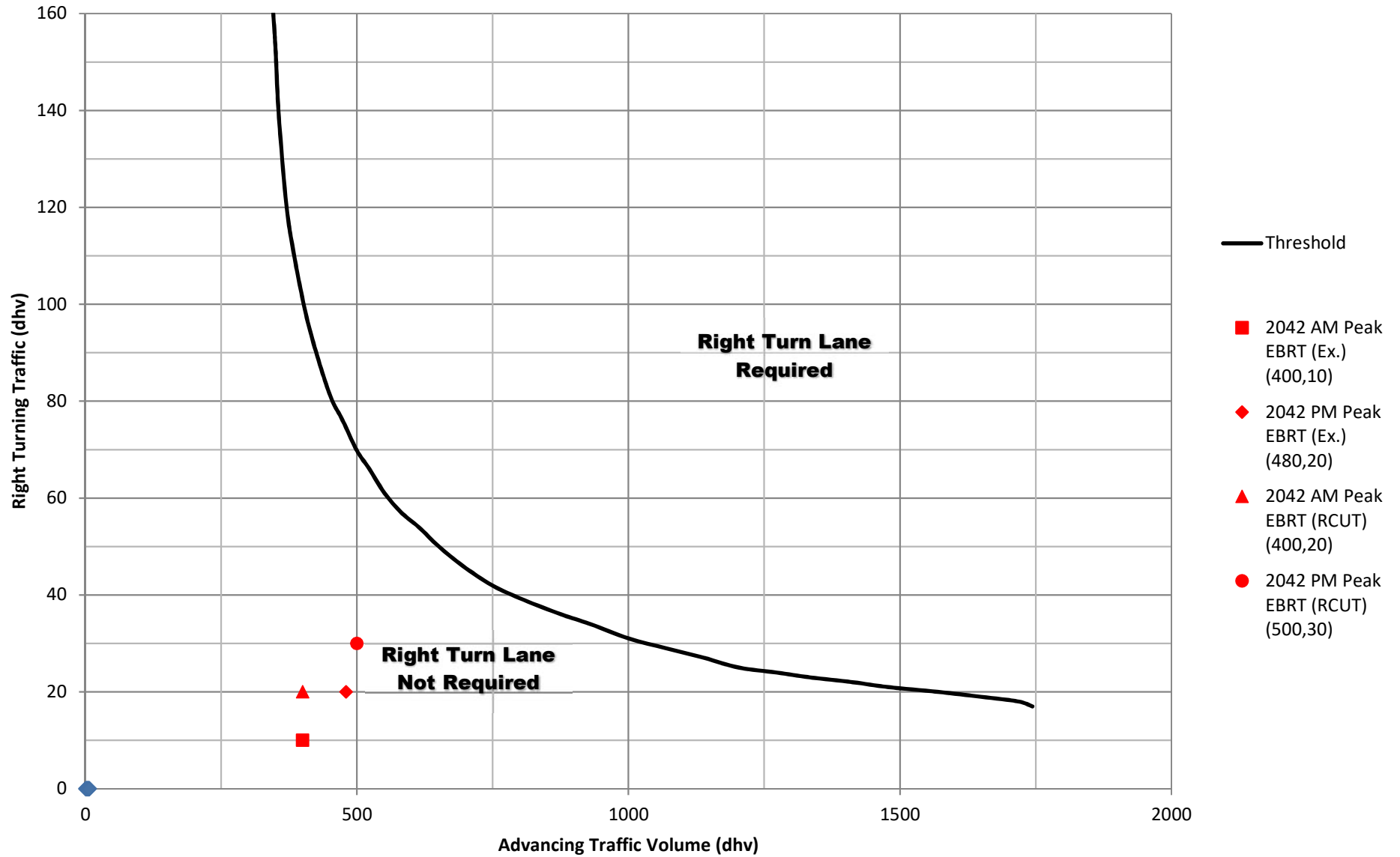


Broadway Avenue Peak Hour Traffic Signal Warrant

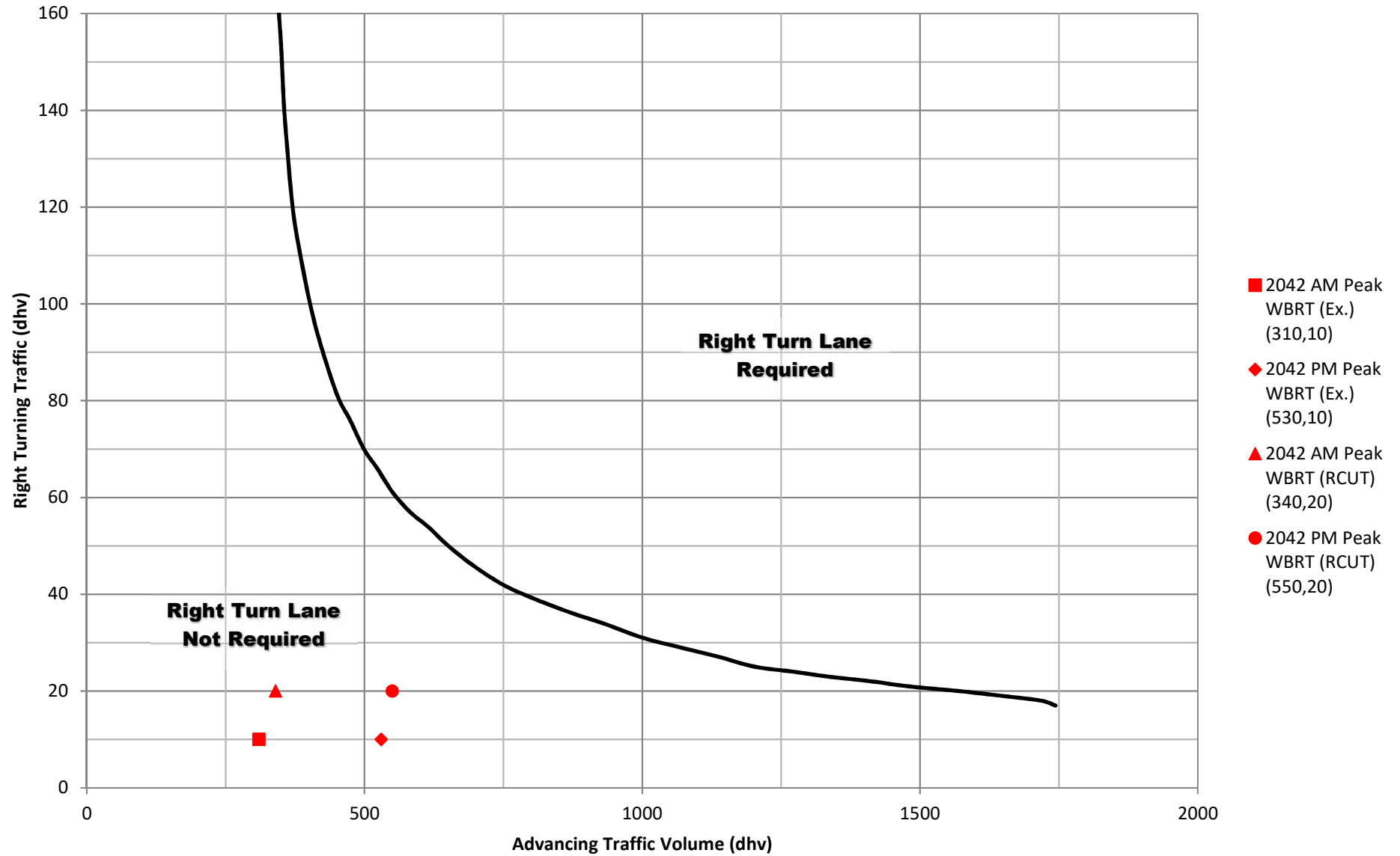
MUTCD Figure 4C-4 Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



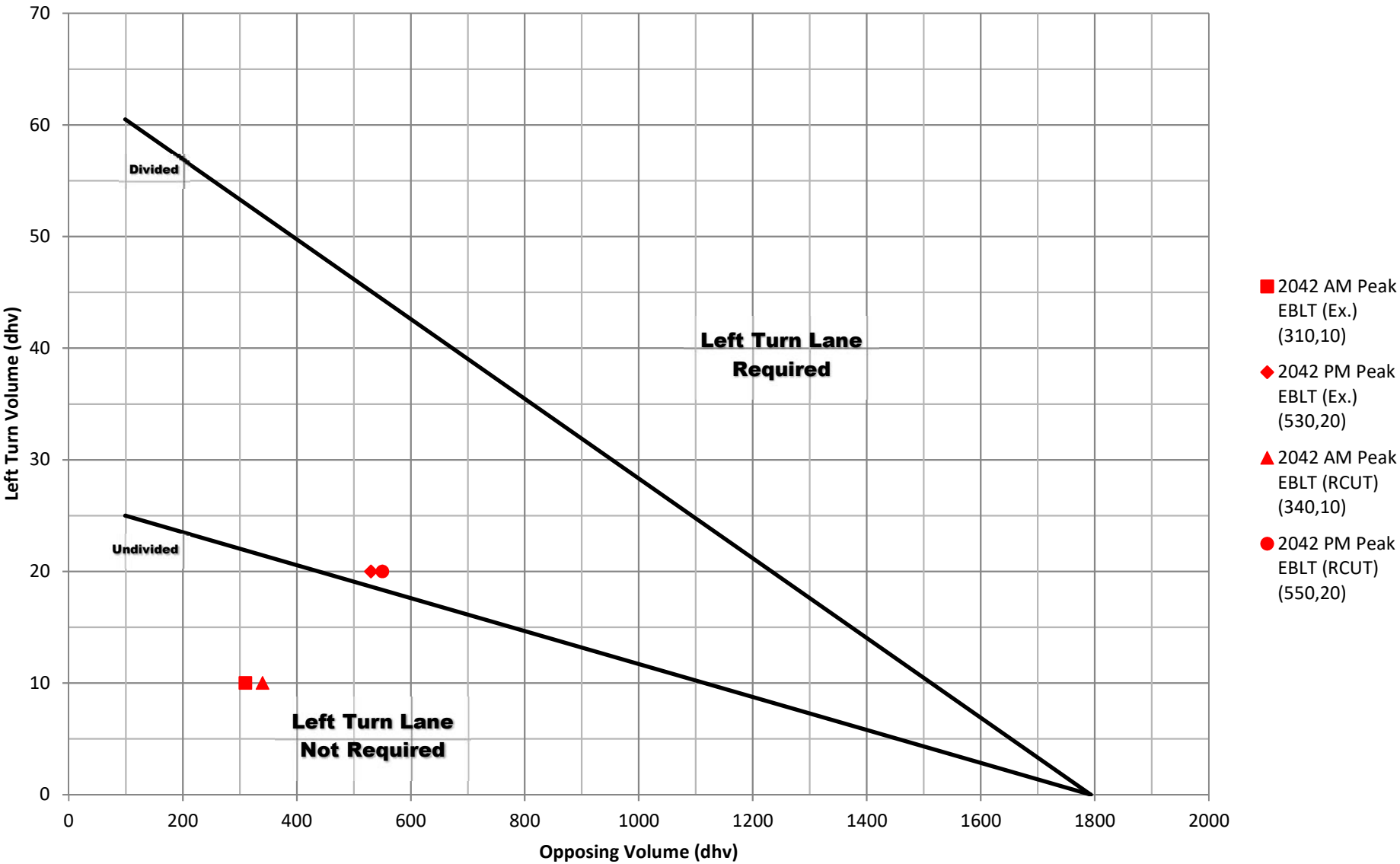
US-62 @ Bedford Road
4-Lane Highway Right Turn Lane Warrant
 >40 mph or 70 kph Posted Speed



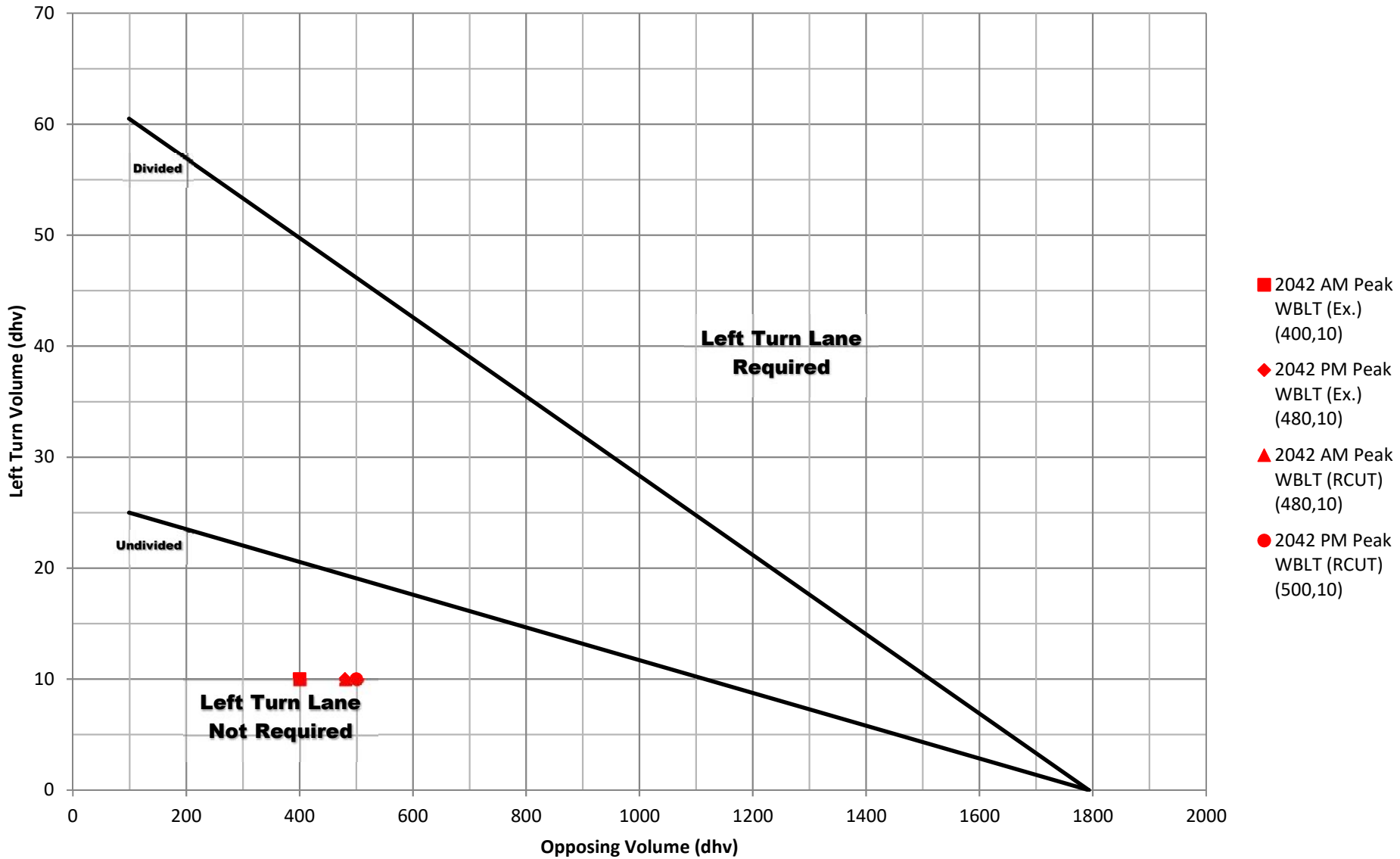
US-62 @ Bedford Road
4-Lane Highway Right Turn Lane Warrant
 >40 mph or 70 kph Posted Speed



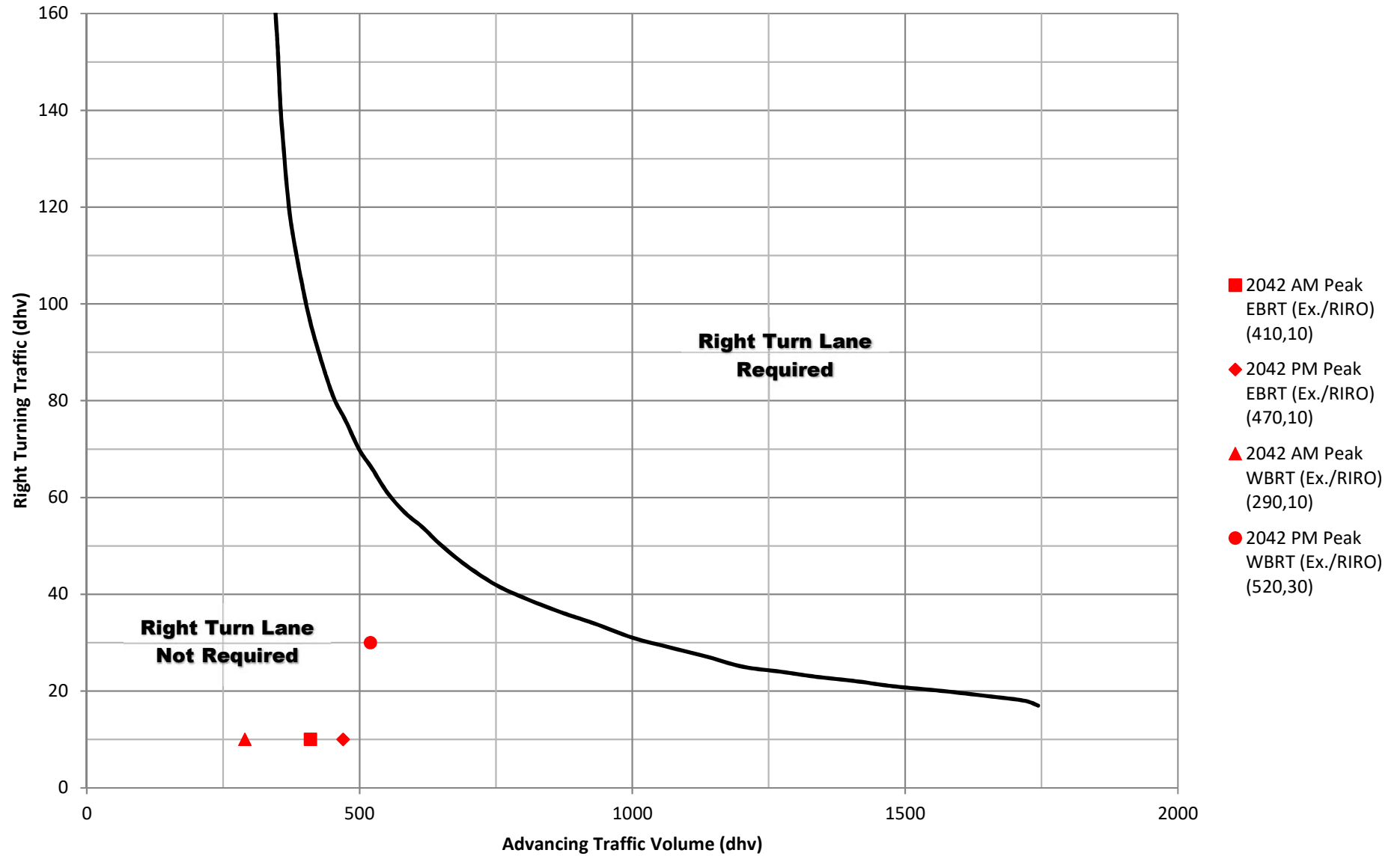
US-62 @ Bedford Road
4-Lane Highway Left Turn Lane Warrant



**US-62 @ Bedford Road
4-Lane Highway Left Turn Lane Warrant**



US-62 @ Broadway Avenue
4-Lane Highway Right Turn Lane Warrant
 >40 mph or 70 kph Posted Speed

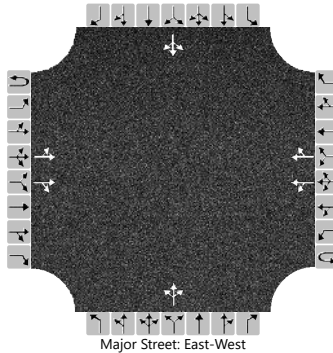


APPENDIX E:
Capacity Analysis Results

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	NRB			Intersection	US-62 & Bedford Road		
Agency/Co.	EMH&T			Jurisdiction	ODOT District 4		
Date Performed	2/3/2020			East/West Street	US-62		
Analysis Year	2042			North/South Street	Bedford Road		
Time Analyzed	AM Peak			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	TRU-62 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Priority																	
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0	
Configuration		LT		TR		LT		TR			LTR				LTR		
Volume (veh/h)		10	380	10		10	290	10		20	10	10		10	10	10	
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2	
Proportion Time Blocked																	
Percent Grade (%)										0				0			
Right Turn Channelized																	
Median Type Storage					Left + Thru								1				

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32

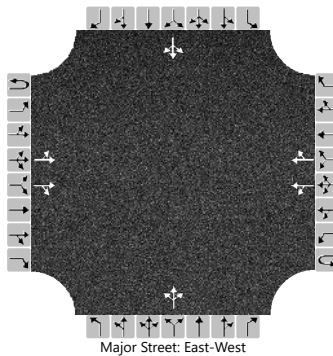
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				11					43					33	
Capacity, c (veh/h)		1230				1132					490					527	
v/c Ratio		0.01				0.01					0.09					0.06	
95% Queue Length, Q ₉₅ (veh)		0.0				0.0					0.3					0.2	
Control Delay (s/veh)		8.0				8.2					13.1					12.3	
Level of Service (LOS)		A				A					B					B	
Approach Delay (s/veh)		0.2				0.3				13.1				12.3			
Approach LOS		B				B				B				B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	NRB			Intersection	US-62 & Bedford Road		
Agency/Co.	EMH&T			Jurisdiction	ODOT District 4		
Date Performed	2/3/2020			East/West Street	US-62		
Analysis Year	2042			North/South Street	Bedford Road		
Time Analyzed	PM Peak			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	TRU-62 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	2	0	0	0	2	0	0	1	0		0	1	0	
Configuration		LT		TR		LT		TR		LTR				LTR		
Volume (veh/h)		20	440	20		10	510	10		10	10	10		10	10	20
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage					Left + Thru								1			

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32

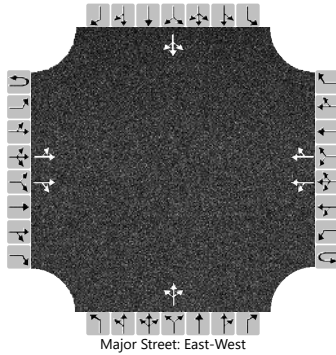
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		22				11				33				43		
Capacity, c (veh/h)		1003				1060				406				449		
v/c Ratio		0.02				0.01				0.08				0.10		
95% Queue Length, Q ₉₅ (veh)		0.1				0.0				0.3				0.3		
Control Delay (s/veh)		8.7				8.4				14.6				13.9		
Level of Service (LOS)		A				A				B				B		
Approach Delay (s/veh)	0.5				0.2				14.6				13.9			
Approach LOS									B				B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	NRB			Intersection	US-62 & Broadway Avenue		
Agency/Co.	EMH&T			Jurisdiction	ODOT District 4		
Date Performed	2/3/2020			East/West Street	US-62		
Analysis Year	2042			North/South Street	Broadway Avenue		
Time Analyzed	AM Peak			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	TRU-62 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	2	0	0	0	2	0	0	1	0		0	1	0	
Configuration		LT		TR		LT		TR		LTR				LTR		
Volume (veh/h)		30	370	10		10	270	10		10	10	10		10	10	10
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage					Left + Thru								1			

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32

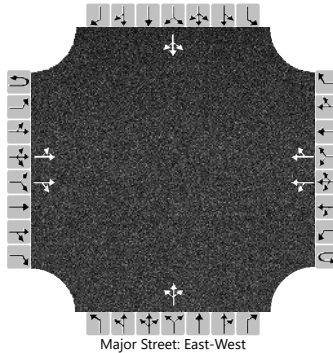
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		33				11				33				33		
Capacity, c (veh/h)		1253				1142				489				516		
v/c Ratio		0.03				0.01				0.07				0.06		
95% Queue Length, Q ₉₅ (veh)		0.1				0.0				0.2				0.2		
Control Delay (s/veh)		7.9				8.2				12.9				12.4		
Level of Service (LOS)		A				A				B				B		
Approach Delay (s/veh)		0.7				0.3				12.9				12.4		
Approach LOS										B				B		

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	NRB			Intersection	US-62 & Broadway Avenue		
Agency/Co.	EMH&T			Jurisdiction	ODOT District 4		
Date Performed	2/3/2020			East/West Street	US-62		
Analysis Year	2042			North/South Street	Broadway Avenue		
Time Analyzed	PM Peak			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	TRU-62 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	2	0	0	0	2	0	0	1	0		0	1	0	
Configuration		LT		TR		LT		TR		LTR					LTR	
Volume (veh/h)		10	450	10		30	460	30		10	10	10		20	10	40
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage					Left + Thru								1			

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32

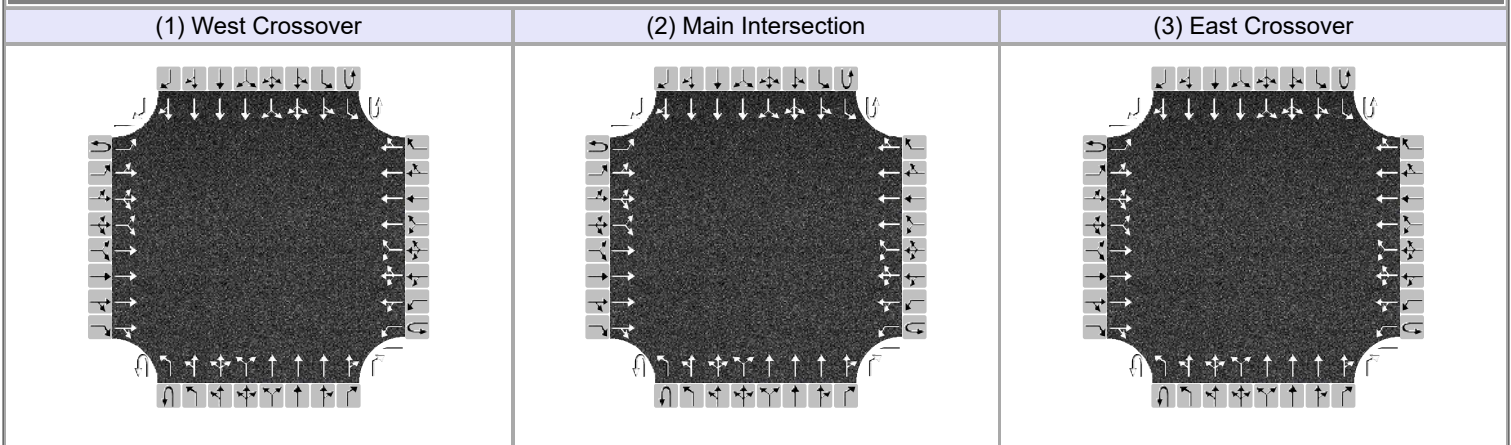
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				33				33						76
Capacity, c (veh/h)		1031				1060				404						480
v/c Ratio		0.01				0.03				0.08						0.16
95% Queue Length, Q ₉₅ (veh)		0.0				0.1				0.3						0.6
Control Delay (s/veh)		8.5				8.5				14.7						13.9
Level of Service (LOS)		A				A				B						B
Approach Delay (s/veh)	0.2				0.6				14.7				13.9			
Approach LOS									B				B			

HCS7 Alternative Intersections Results Summary

General Information				Alternative Intersection Information			
Agency	EMH&T			Intersection Type	RCUT with TWSC		
Analyst	NRB	Analysis Date	2/3/2020	Segment One Distance, ft	650		
Jurisdiction	ODOT District 4	Duration, h	0.25	Segment Two Distance, ft	650		
Intersection	US-62 & Bedford Road	PHF	0.92	Arterial Direction	East-West		
Main Intersection File	(11) - 2042 AM Peak - Bedford Road RCUT Main Intersection.xtw						
West Crossover File	(11W) - 2042 AM Peak - Bedford Road RCUT West U-Turn.xtw						
East Crossover File	(11E) - 2042 AM Peak - Bedford Road RCUT East U-Turn.xtw						
Project Description	TRU-62 Safety Study						

Demand	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Intersection One Demand (v), veh/h			400		20		320									
Intersection Two Demand (v), veh/h	0	10	390	20	0	10	310	20				40				30
Intersection Three Demand (v), veh/h	30		400				310									



Queue-to-Storage Ratio	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Intersection One (R _q)					0.00											
Intersection Two (R _q)		0.00				0.00						0.02				0.01
Intersection Three (R _q)	0.00															

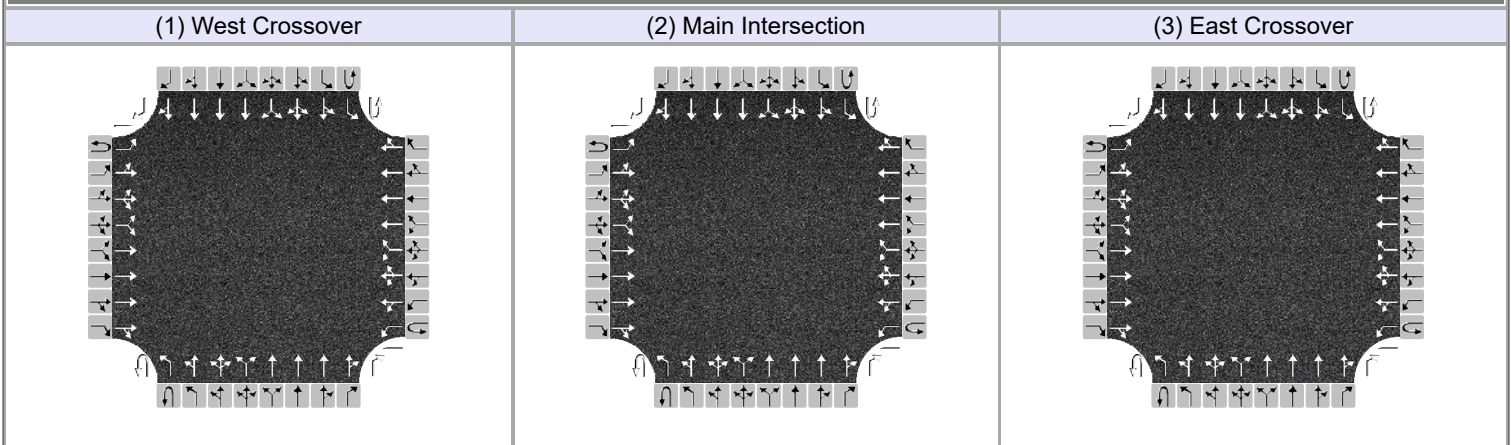
Alternative Intersection Results									
O-D	O-D Movements	Flow Rate (veh/h)	Control Delay (s/veh)	EDTT (s/veh)	ETT (s/veh)	v/c>1?	R _q >1?	LOS	
EBL	EBL(2)	11	8.0	--	8.0	No	No	A	
EBT	EBT(2)	413	0.0	--	0.0	--	--	A	
EBR	EBR(2)	11	0.0	--	0.0	--	--	A	
WBL	WBL(2)	11	8.3	--	8.3	No	No	A	
WBT	WBT(2)	315	0.0	--	0.0	--	--	A	
WBR	WBR(2)	11	0.0	--	0.0	--	--	A	
NBL	NBR(2) + EBU(3) + WBT(2)	22	18.5	14.7	33.2	No	No	C	
NBT	NBR(2) + EBU(3) + WBR(2)	11	18.5	14.7	33.2	No	No	C	
NBR	NBR(2)	11	9.9	--	9.9	No	No	A	
SBL	SBR(2) + WBU(1) + EBT(2)	11	18.4	14.7	33.1	No	No	C	
SBT	SBR(2) + WBU(1) + EBR(2)	11	18.4	14.7	33.1	No	No	C	
SBR	SBR(2)	11	9.5	--	9.5	No	No	A	

Overall Results	EB		WB		NB		SB	
Approach ETT, s/veh LOS	0.2	A	0.3	A	27.4	C	25.2	C
Intersection ETT, s/veh LOS	2.6				A			

HCS7 Alternative Intersections Results Summary

General Information				Alternative Intersection Information			
Agency	EMH&T			Intersection Type	RCUT with TWSC		
Analyst	NRB	Analysis Date	2/3/2020	Segment One Distance, ft	650		
Jurisdiction	ODOT District 4	Duration, h	0.25	Segment Two Distance, ft	650		
Intersection	US-62 & Bedford Road	PHF	0.92	Arterial Direction	East-West		
Main Intersection File	(12) - 2042 PM Peak - Bedford Road RCUT Main Intersection.xtw						
West Crossover File	(12W) - 2042 PM Peak - Bedford Road RCUT West U-Turn.xtw						
East Crossover File	(12E) - 2042 PM Peak - Bedford Road RCUT East U-Turn.xtw						
Project Description	TRU-62 Safety Study						

Demand	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Intersection One Demand (v), veh/h			480		20		540									
Intersection Two Demand (v), veh/h	0	20	450	30	0	10	520	20				30				40
Intersection Three Demand (v), veh/h	20		460				530									



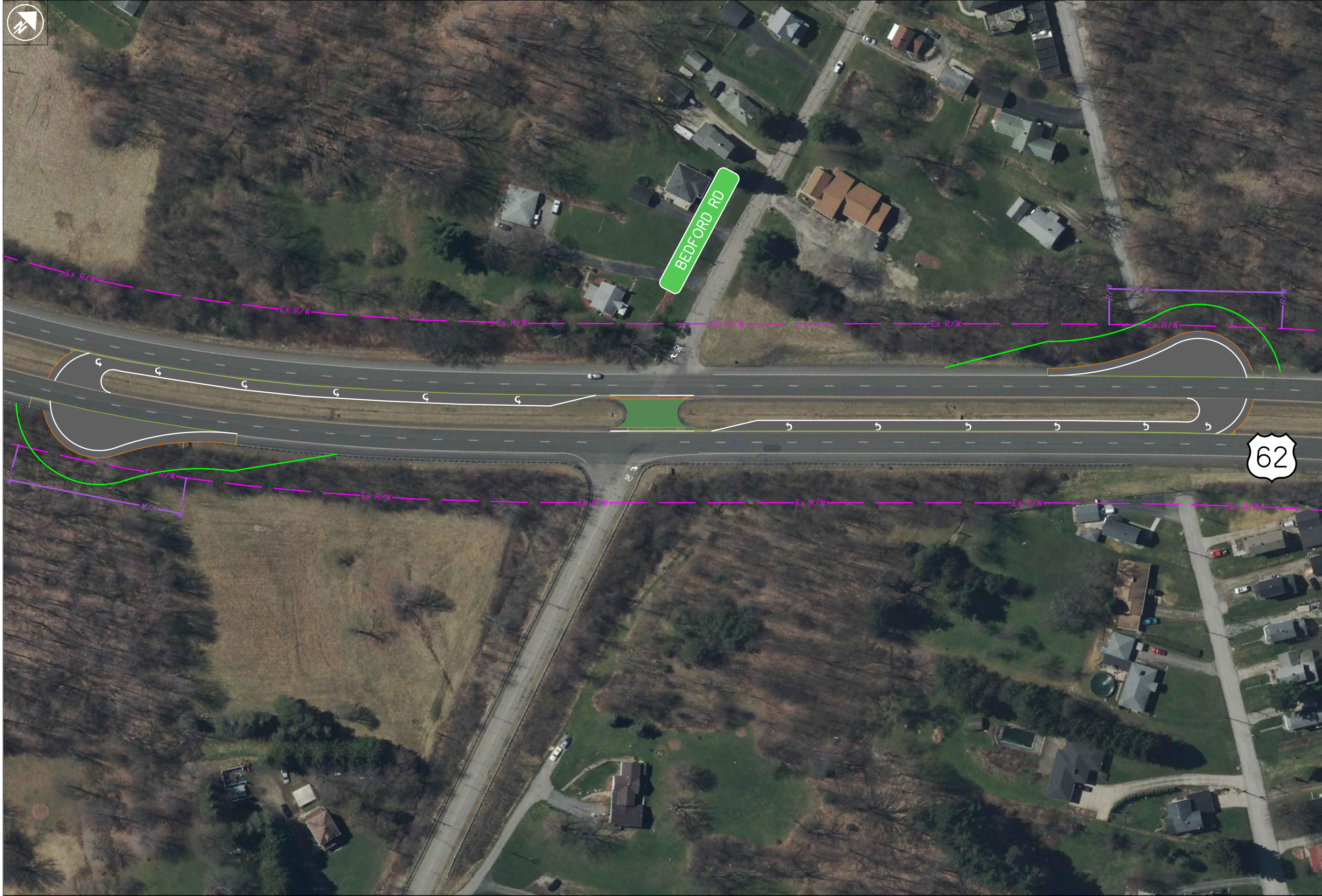
Queue-to-Storage Ratio	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Intersection One (R _q)					0.00											
Intersection Two (R _q)		0.00				0.00						0.01				0.02
Intersection Three (R _q)																

Alternative Intersection Results									
O-D	O-D Movements	Flow Rate (veh/h)	Control Delay (s/veh)	EDTT (s/veh)	ETT (s/veh)	v/c>1?	R _q >1?	LOS	
EBL	EBL(2)	22	8.7	--	8.7	No	No	A	
EBT	EBT(2)	478	0.0	--	0.0	--	--	A	
EBR	EBR(2)	22	0.0	--	0.0	--	--	A	
WBL	WBL(2)	11	8.5	--	8.5	No	No	A	
WBT	WBT(2)	554	0.0	--	0.0	--	--	A	
WBR	WBR(2)	11	0.0	--	0.0	--	--	A	
NBL	NBR(2) + EBU(3) + WBT(2)	11	19.5	14.7	34.2	No	No	C	
NBT	NBR(2) + EBU(3) + WBR(2)	11	19.5	14.7	34.2	No	No	C	
NBR	NBR(2)	11	10.1	--	10.1	No	No	B	
SBL	SBR(2) + WBU(1) + EBT(2)	11	19.6	14.7	34.3	No	No	C	
SBT	SBR(2) + WBU(1) + EBR(2)	11	19.6	14.7	34.3	No	No	C	
SBR	SBR(2)	22	10.5	--	10.5	No	No	B	

Overall Results	EB		WB		NB		SB	
Approach ETT, s/veh LOS	0.4	A	0.2	A	26.2	C	22.4	C
Intersection ETT, s/veh LOS	1.8				A			

APPENDIX F:

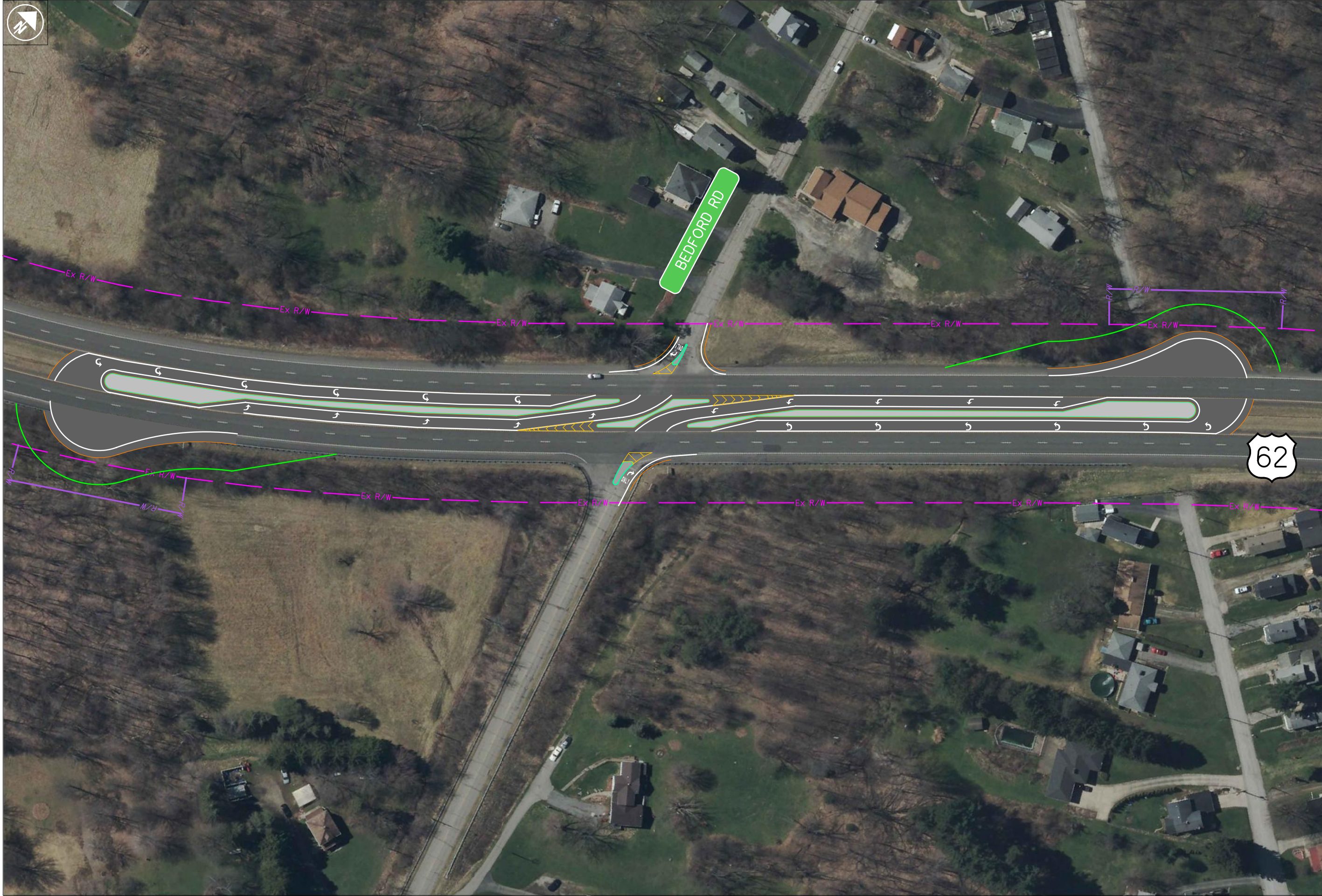
Alternatives Comparison Matrix & Preliminary Layouts



CALCULATED
CHECKED

**US-62 & BEDFORD ROAD INTERSECTION
RCUT, NO LEFT TURNS FROM US-62**

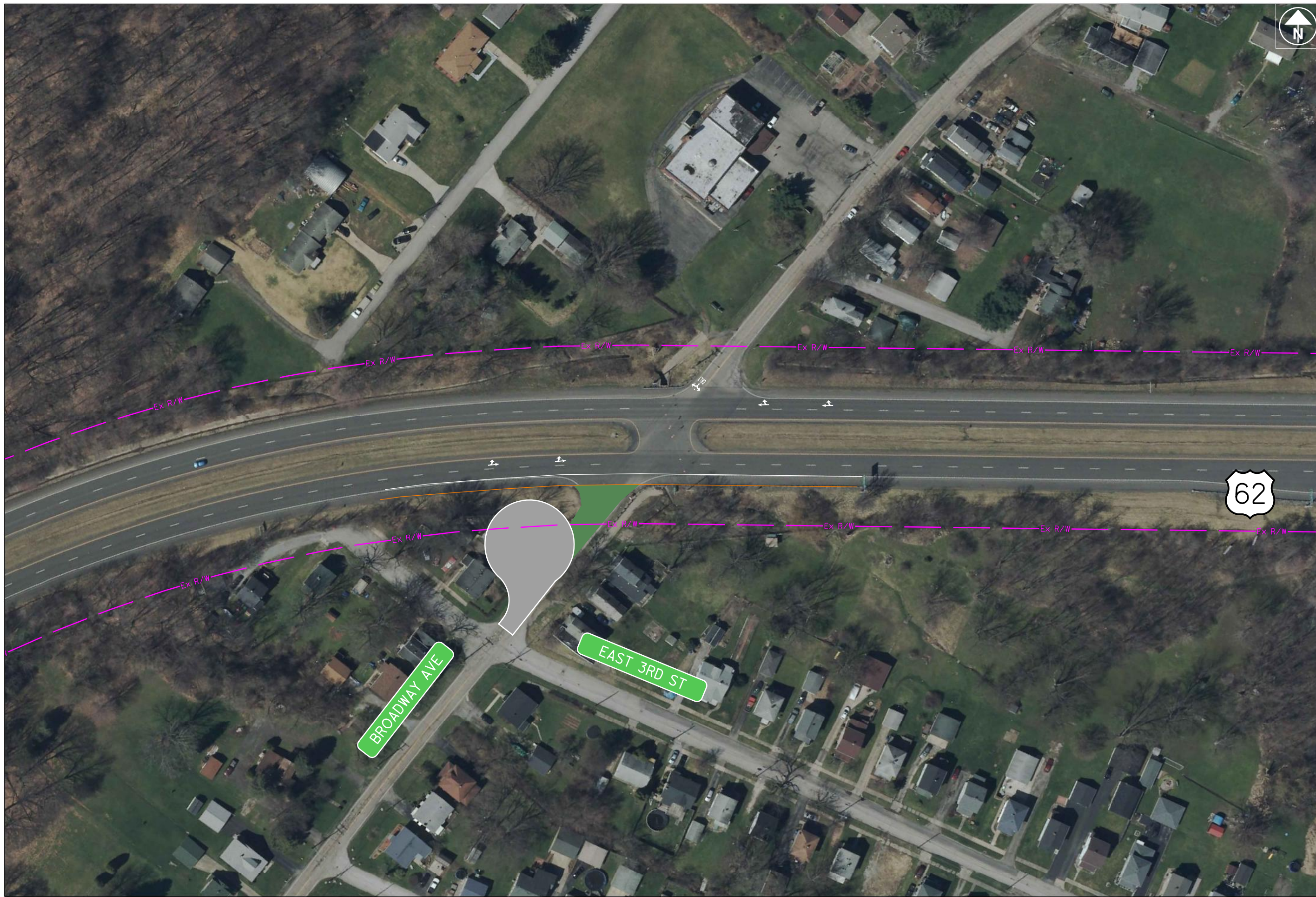
TRU-62-7.67



CALCULATED
CHECKED

**US-62 & BEDFORD ROAD INTERSECTION
RCUT, TRADITIONAL**

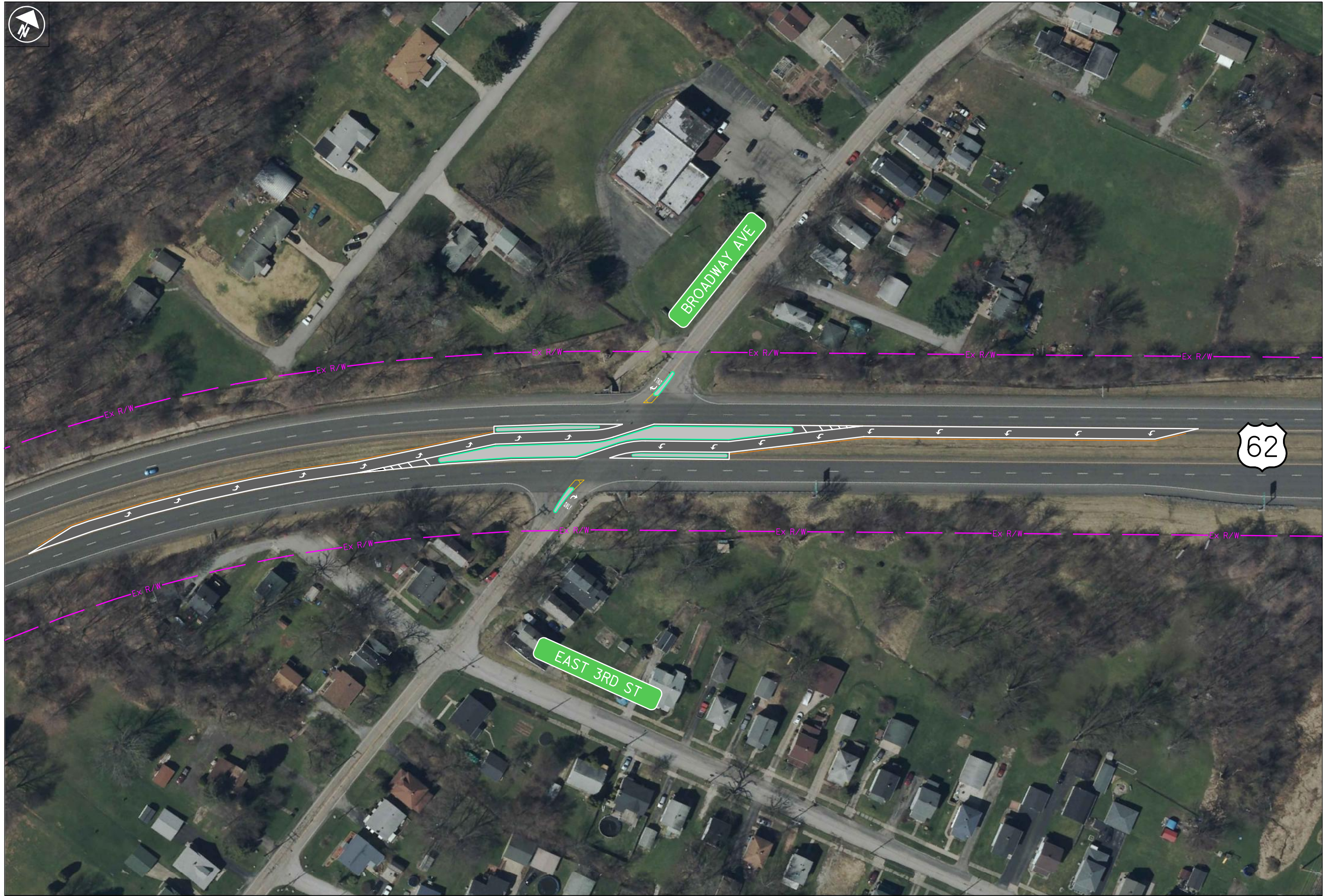
TRU-62-7.67



CALCULATED
GGW
CHECKED
MJR

**US-62 & BROADWAY AVENUE INTERSECTION
CUL-DE-SAC / "T" INTERSECTION**

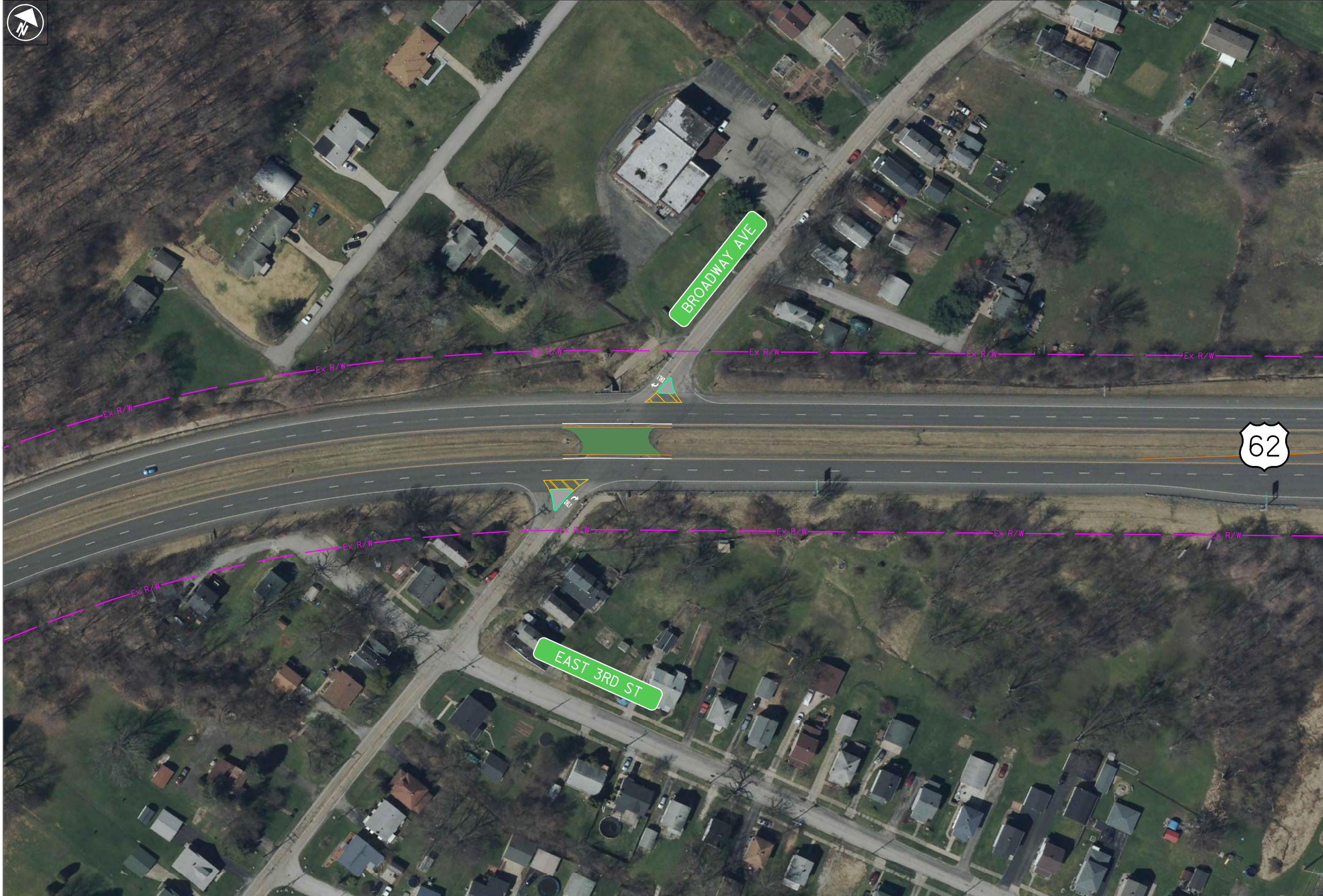
TRU-62-7.67



CALCULATED
CHECKED

**US-62 & BROADWAY AVENUE INTERSECTION
RCUT, NO U-TURNS PROVIDED**

TRU-62-7.67



CALCULATED
CHECKED

**US-62 & BROADWAY AVENUE INTERSECTION
RIGHT-IN, RIGHT-OUT FOR BROADWAY AVENUE**

TRU-62-7.67

5
5



CALCULATED
GGW
CHECKED
MJR

SCHEMATIC PLAN - EMERGENCY U-TURN

TRU-62-7.67



US-62 & BEDFORD ROAD INTERSECTION

ALTERNATIVE	PROS	CONS	NOTES/COMMENTS
Restricted Crossing U-Turn (RCUT), No left turns from US 62	1) Removes left turns and through movements from Bedford Rd to US-62 to the RCUT location. 2) Removes left turns directly from US-62 to Bedford Rd to the RCUT location. 3) Increases volumes at RCUT u-turns, but all exposed left turn movements from high speed US-62 traffic have been removed (per #1 and #2).	1) Increase in travel time for displaced turning movements. 2) Displaces more turning movements than a traditional RCUT intersection.	A) Distance to RCUT (north and south of Bedford Rd) along US-62 is about 600'. B) The deceleration/storage lane for the U-Turn would begin directly after the US-62 & Bedford Rd intersection, to allow for necessary deceleration, storage, and safety for vehicles utilizing the U-Turn location. C) Sight Distance for at the U-Turn locations (horizontal and vertical) has been evaluated and it is acceptable. D) Response times from emergency vehicles will be very minimally impacted as they are coming from north of the intersection.
Restricted Crossing U-Turn (RCUT), Traditional	1) Removes left turns and through movements from Bedford Rd to US-62 to the RCUT location. 2) Preserves "traditional" access (i.e. left turns) from US-62 to Bedford Rd. 3) Crash data does not appear to have pattern of US-62 left turn vehicles crashing with US-62 through vehicles. 4) Reduces the amount of displaced turning movements, compared to the closed median option above. 5) All movements can be made either directly at the intersection or via the U-Turn locations, approximately 600' on either side.	1) Increase in travel time for displaced turning movements.	A) Distance to RCUT (north and south of Bedford Rd) along US-62 is about 600'. B) The deceleration/storage lane for the U-Turn would begin directly after the US-62 & Bedford Rd intersection, to allow for necessary deceleration, storage, and safety for vehicles utilizing the U-Turn location. C) Sight Distance for at the U-Turn locations (horizontal and vertical) has been evaluated and it is acceptable. D) Response times from emergency vehicles will be very minimally impacted as they are coming from north of the intersection.
TURN LANES	-	-	Right Turn and Left Turn lane warrants not met.
TRAFFIC SIGNAL	-	-	Traffic Signal warrants not met.

US-62 & BROADWAY AVENUE INTERSECTION

ALTERNATIVE	PROS	CONS	NOTES/COMMENTS
CUL-DE-SAC/"T" INTERSECTION Close NB Broadway.	1) Removes all ingress and egress from south leg of Broadway Ave at US-62, which has current sight distance issues looking left from the intersection. 2) Creates a "T" intersection which reduces conflict points.	1) Allows EB left turn from US-62 to north leg of Broadway Ave and SB left turns from Broadway to EB US-62 which are conflicting movements. 2) Eliminates access to/from US-62 for neighborhood that currently has direct access. 3) High Right of Way and cost impacts to create appropriate cul-de-sac on the south leg.	A) Response times from emergency vehicles will be impacted. The best alternative route has been evaluated. B) There are alternate routes to accommodate the movements to and from the south leg of Broadway that are being removed.
RCUT Restricted Crossing U-Turn (RCUT), Traditional	1) Removes left turns and through movements from Broadway Ave to US-62. 2) Maintains left turns from US-62 to Broadway, nearly 30 vehicles make these turns during both peak hours. 3) Crash patterns appear to be from vehicles attempting to cross the median from Broadway.	1) Sight distance at a southern U-Turn location does not meet sight distance requirements. 2) Proximity of a northern U-Turn location would be too close to the SR 82 interchange.	A) Alternative not feasible due to U-turn locations.
RCUT Restricted Crossing U-Turn (RCUT), No U-turns provided	1) Removes left turns and through movements from Broadway Ave to US-62. 2) Maintains left turns from US-62 to Broadway, nearly 30 vehicles make these turns during both peak hours. 3) The loop ramps at the interchange provide safe, alternate routes, since U-Turn locations are not feasible. 4) Crash patterns appear to be from vehicles attempting to cross the median from Broadway.	1) May be challenging to sign alternate routes or alternate routes wouldn't be signed at all.	A) Response times from emergency vehicles will be impacted. The best alternative route has been evaluated.
RI/RO Right-in, Right/Out only for NB & SB Broadway	1) Removes all conflict points from the intersection that could result in a high speed angle crash. 2) Crash patterns appear to be from vehicles attempting to cross the median from Broadway.	1) Restricts nearly 30 vehicles in both peak hours from turning left onto Broadway.	A) Response times from emergency vehicles will be impacted. The best alternative route has been evaluated.
TURN LANES	-	-	Right Turn and Left Turn lane warrants not met.
TRAFFIC SIGNAL	-	-	Traffic Signal warrants not met.

CALCULATED
 CHECKED
US-62 AT BEDFORD RD & BROADWAY AVE
ALTERNATIVES COMPARISON MATRIX
 TRU-62-7.67


APPENDIX G:
Stakeholder Meeting Minutes



Engineers, Surveyors, Planners, Scientists

Meeting Notes

Date: November 20, 2019
To: Dave Griffith, PE
From: Abby Cueva, PE
Subject: TRU-62 at Bedford Rd and Broadway Ave - Stakeholder Coordination Meeting
Copies: Township/County/Eastgate/ODOT

Stakeholder Attendees:

David Masirovits (Brookfield Twp. Fire Chief)
Daniel Faustino (Brookfield Twp. Police)
Daniel Suttles (Brookfield Twp.)
Jaime Fredenburg (Brookfield Twp.)
Wayne Hickman (Trumbull County)
Grant Taylor (Eastgate)
Ken Sympson (Eastgate)

Project Team Attendees:

Kim Mondora (ODOT)
Aaron Conley (ODOT)
Lauren Phillis (ODOT)
Laura Beese (ODOT)
Dave Griffith (ODOT)
Justin Chesnic (ODOT)
Ray Marsch (ODOT)
Chad Root (ODOT)
Abby Cueva (EMH&T)

Dave Griffith gave a brief history of the project and introductions were done by the group. Abby presented a PowerPoint presentation presenting alternatives considered and the pros and cons of each. A summary of each alternatives is attached to these meeting minutes. The discussion that followed the presentation is summarized here:

Bedford Road

- The group concurred that there was no apparent reason to restrict the left turns from US 62 to Bedford Road and agreed that the traditional Restricted Crossing U-Turn (RCUT) intersection should be the preferred alternative that is carried forward for Bedford Road.

Broadway Avenue

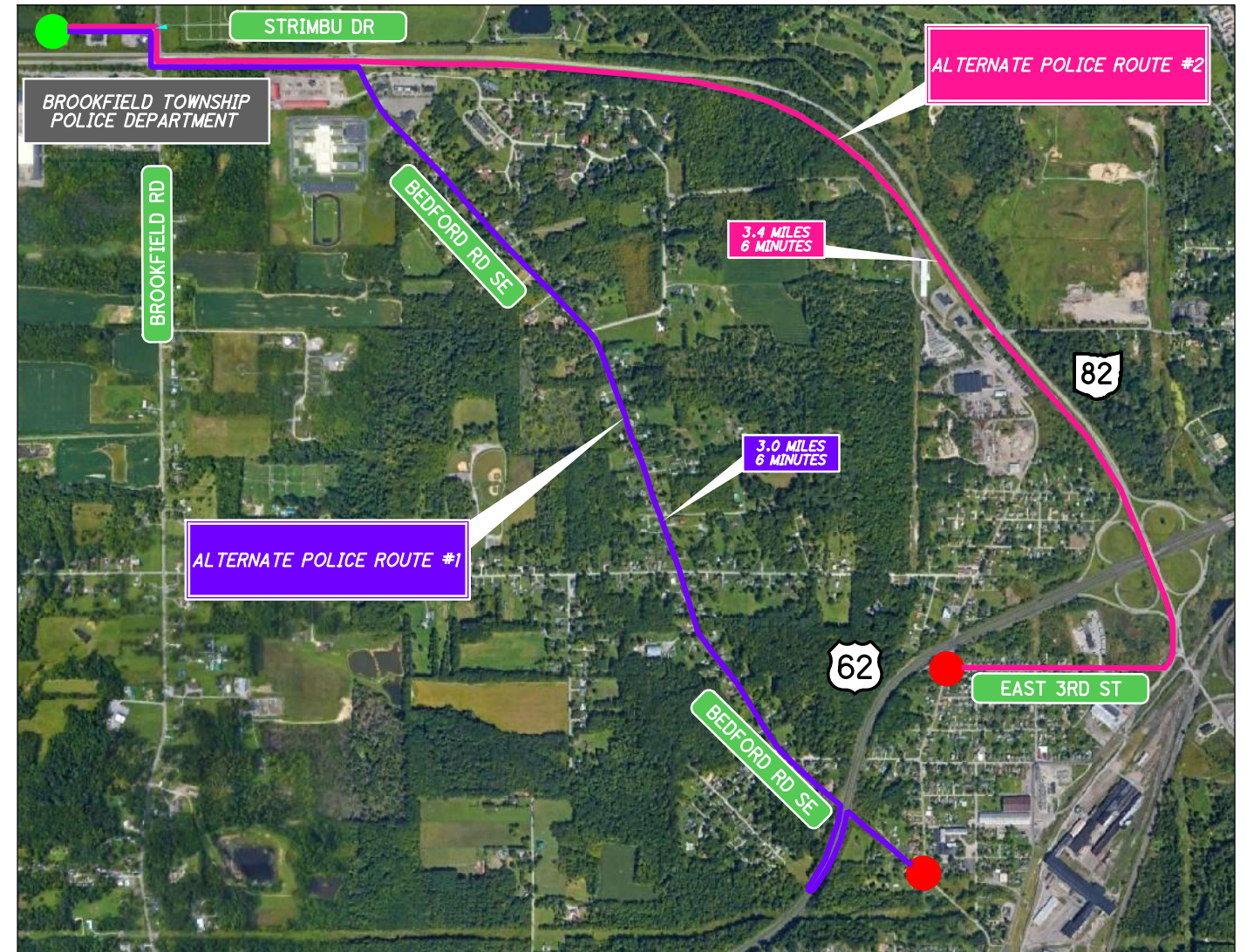
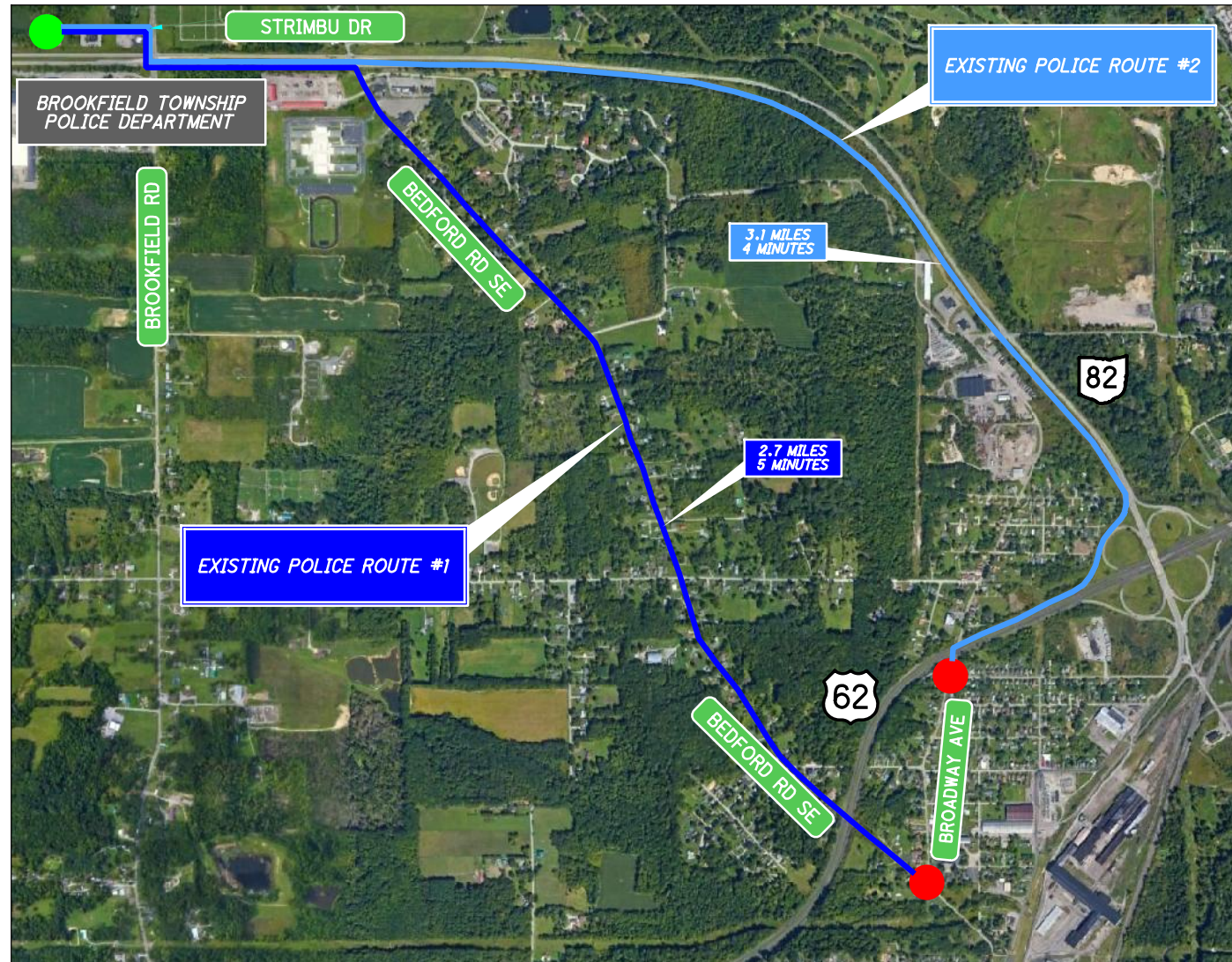
- The group favored both the RCUT with no U-Turns provided and the Closed Median, Right-In/Right-Out (RIRO) option at Broadway.
- We discussed traffic patterns, turning volumes, and the easily accessible alternative routes available if the left turns from US 62 were eliminated at Broadway Avenue.
- Given the sight distance, accident history, and previous attempts to make the intersection safer with the flashing signal - the group preferred to totally eliminate any "crossing" movements that have the potential for high-speed angle crashes.
- With the RIRO option, the Brookfield Township Fire and Police noted that an emergency turn-around, for authorized vehicles only, east of Broadway Avenue would be needed in order to more promptly reach an incident that they previously would have used the open median at the Broadway intersection to access. The District indicated this would likely not be a problem to install as a part of the improvements, but EMH&T will investigate the most appropriate location based upon sight distance and terrain.

- The group discussed school bus routes and the Township indicated that shouldn't be an issue even if it adds a few minutes to the routes. Follow-up: Jaime Fredenburg spoke with the Brookfield Transportation Supervisor and she indicated that buses do not cross US 62 during their routes.
- There is an existing pedestrian tunnel under the Broadway intersection that will not be impacted by the project. However, the stakeholders believe it to be ODOT maintained. ODOT is going to confirm this and look into installing new light bulbs if it is ODOT maintained.
- The Township indicated that there is not pedestrian or bicycle traffic to take into account, nor any farm equipment.

Next Steps

- EMH&T will complete the Feasibility Study and submit to District 4 for review and comment in January. The stakeholder group will also have an opportunity to review and comment prior to finalization.
- EMH&T and D4 will prepare and submit a Safety Application in April of 2020.
- Results of funding process will be finalized by June of 2020.

APPENDIX H:
EMS Route Exhibits



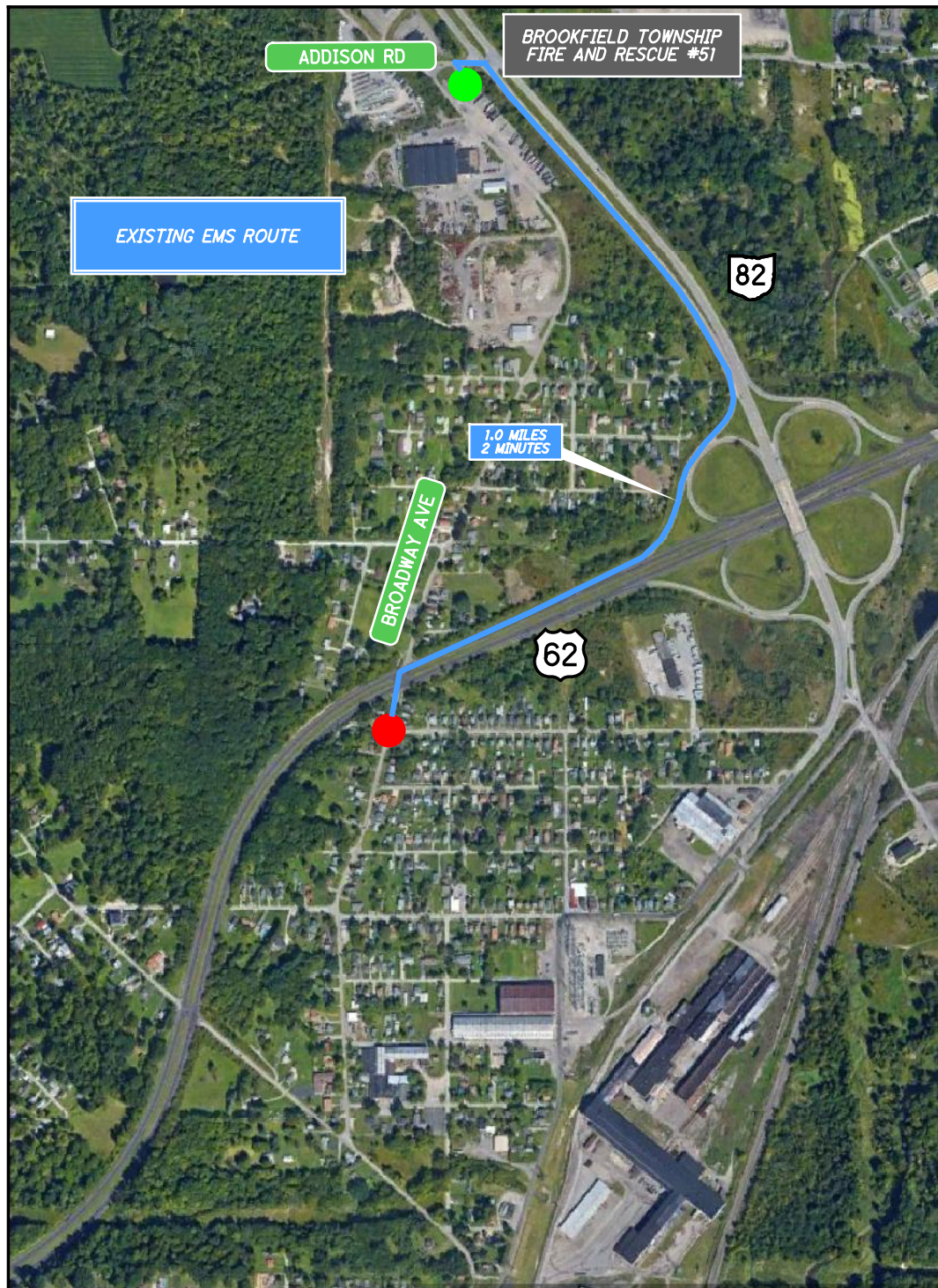
POLICE TRAVEL TIMES TO ADDRESS SOUTH OF US 62

ROUTE COMPARISON FOR EMERGENCY AT ADDRESS SOUTH OF US 62

- EMERGENCY ON THE SOUTH SIDE OF US 62
- BROOKFIELD TOWNSHIP POLICE DEPARTMENT

2.7 MILES-APPROXIMATELY 5 MINUTES -VS- 3.0 MILES-APPROXIMATELY 6 MINUTES

3.1 MILES-APPROXIMATELY 4 MINUTES -VS- 3.4 MILES-APPROXIMATELY 6 MINUTES



EMS TRAVEL TIMES TO ADDRESS SOUTH OF US 62

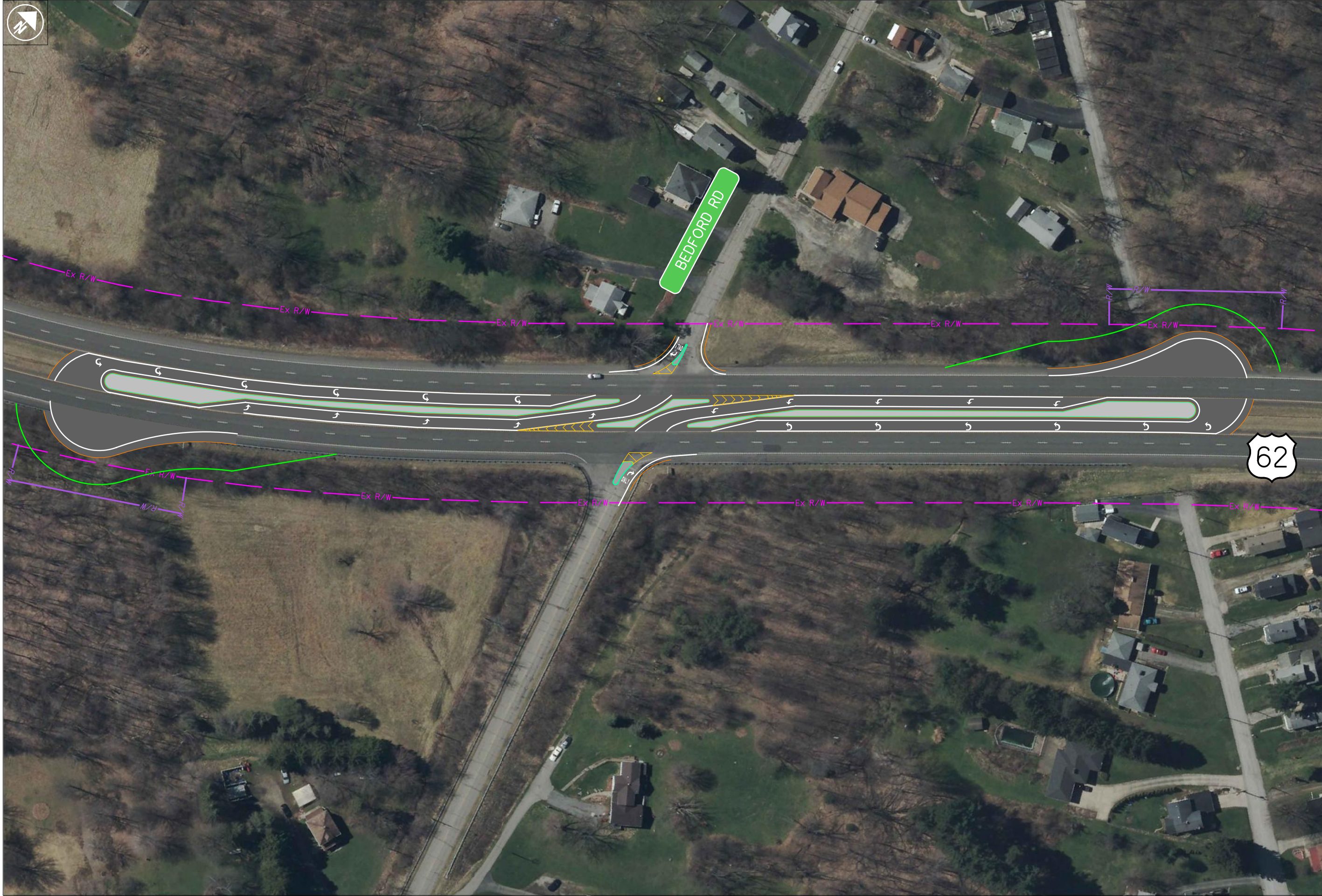
ROUTE COMPARISON FOR EMERGENCY AT ADDRESS SOUTH OF US 62

- EMERGENCY ON THE SOUTH SIDE OF US 62
- BROOKFIELD TOWNSHIP FIRE AND RESCUE #51

1.0 MILES-APPROXIMATELY 2 MINUTES -VS- 1.3 MILES-APPROXIMATELY 3 MINUTES

APPENDIX I:

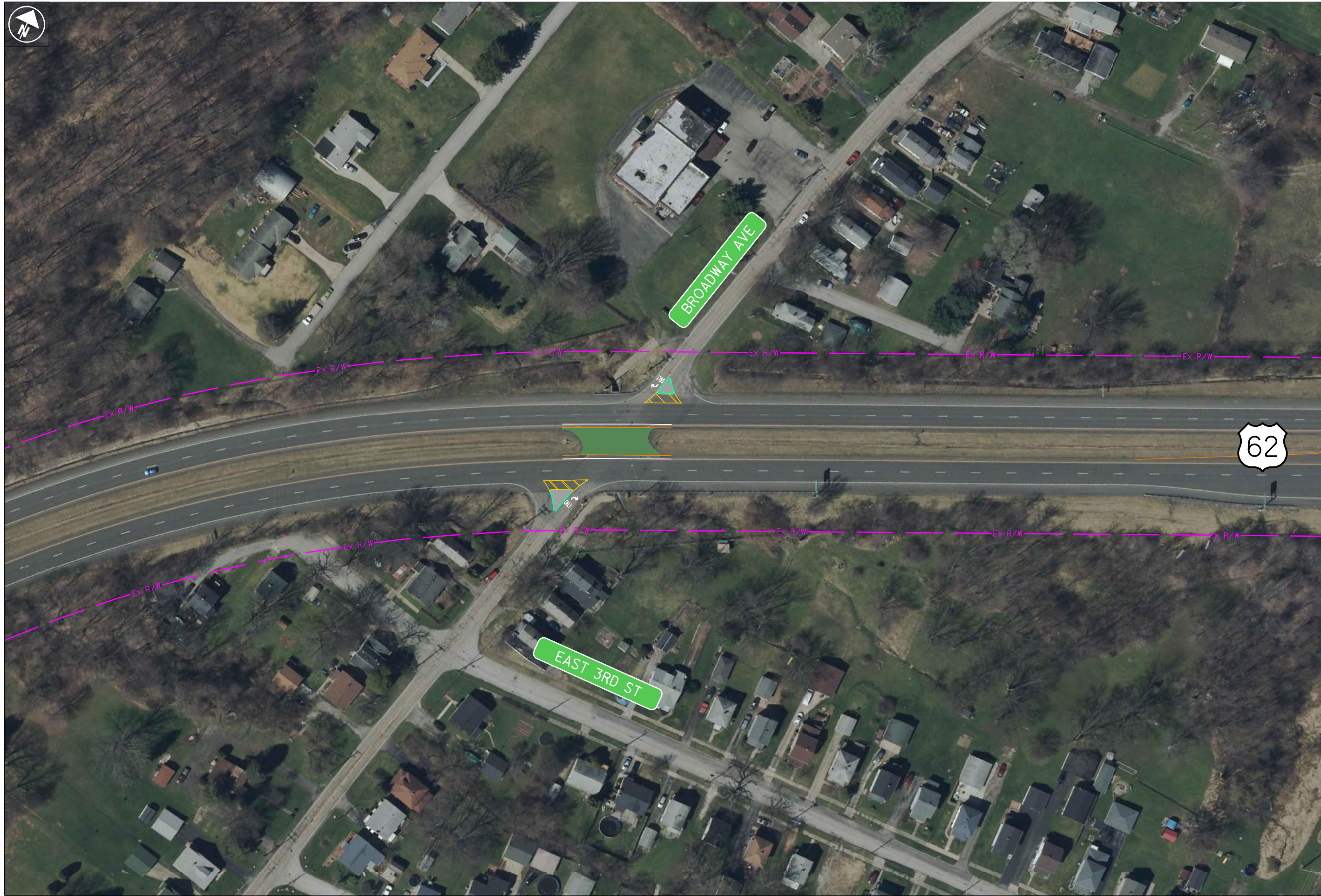
Conceptual Rendering of Preferred Alternatives



CALCULATED
CHECKED

**US-62 & BEDFORD ROAD INTERSECTION
RCUT, TRADITIONAL**

TRU-62-7.67



CALCULATED
CHECKED

**US-62 & BROADWAY AVENUE INTERSECTION
RIGHT-IN, RIGHT-OUT FOR BROADWAY AVENUE**

TRU-62-7.67

5
5



CALCULATED
GGW
CHECKED
MJR

SCHEMATIC PLAN - EMERGENCY U-TURN

TRU-62-7.67

