Memo

SUBJECT
Clermont County TID
Bach Buxton Road Roundabouts

TO
Jeremy Evans, PE, PS
Clermont County Engineer

DATE
May 9, 2025

OUR REF
Bach Buxton Road and Shayler Road

DEPARTMENT
Infrastructure

PROJECT NUMBER
30255380

COPIES TO
JK

NAME
Jeff Koehn, PE, CPESC, ENV SP
513.317.3331

1. Introduction

The Clermont County Transportation Improvement District (TID) and the Clermont County Engineer's office retained Arcadis U.S., Inc. (Arcadis) to evaluate converting the signalized intersection of Bach Buxton Road and Shayler Road to a four-leg roundabout and converting the unsignalized intersection of Bach Buxton Road and the northern driveway to Provision Living at West Clermont to a five-leg roundabout.

2. Study Area

Bach Buxton Road is a north-south minor arterial with a posted of 45 miles per hour (mph) and an average daily traffic (ADT) volume of 12,700 vehicles per day (vpd) of which 4 percent is truck traffic. There is one 12-foot-wide lane in each direction with a 1-foot-wide asphalt shoulder. The road is striped with a double yellow centerline and edge lines.

Shayler Road is an east-west major collector with a posted speed limit of 45 mph and an ADT volume of 6,300 vpd of which 2 percent is truck traffic. There is one 12-foot-wide lane in each direction with a 1-foot-wide asphalt shoulder. The road is striped with a double yellow centerline and edge lines.

The northern driveway to Provision Living at West Clermont has one 12-foot-wide lane in each direction.

The intersection of Bach Buxton Road and Shayler Road is signalized. There are left turn lanes on all four approaches. There is lighting. There are no pedestrian accommodations.

The intersection of Bach Buxton Road and the northern driveway to Provision Living at West Clermont is unsignalized. There are no turn lanes, no lighting, and no pedestrian accommodations.

3. Adjacent Development

There are two proposed developments along Bach Buxton Road. To understand how these two developments may impact traffic operations on Bach Buxton Road the Clermont County Engineer provided the following two studies:

- The *Ohio Multifamily Traffic Access Study* was completed in February 2022 to develop a multifamily housing development on 22 acres in the northwest corner of the intersection of Bach Buxton Road and Clepper Lane. Access to the proposed development includes two driveways on Clepper Lane, a commercial right-in/right-out (RIRO) driveway on Bach Buxton Road, and a full access driveway to Bach Buxton Road through the planned roundabout at the northern driveway to Provision Living at West Clermont.

- The *Mixed-Use Development Traffic Impact Study* (TIS) was completed in July 2024 to develop 59 single family homes, two sit down restaurants, a coffee shop with a drive through, a brewery, and 175 multi-family homes in the northwest corner of the intersection of Bach Buxton Road and Clepper Lane. Access to the proposed development includes a RIRO driveway on Bach Buxton Road, a full access driveway to Bach Buxton Road next to the planned roundabout at the northern driveway to Provision Living at West Clermont, and a full access driveway to Bach Buxton Road through the existing southern driveway to Provision Living at West Clermont.

A copy of the *Ohio Multifamily Traffic Access Study* and a copy of the *Mixed-Use Development* TIS is included in Attachment A.

4. Traffic Volumes

Design hourly traffic volumes (DHVs) were developed for the intersection of Bach Buxton Road and Shayler Road and the intersection of Bach Buxton Road and the northern driveway to Provision Living at West Clermont.

a. DHVs – Bach Buxton Road and Shayler Road

To develop DHVs at the intersection of Bach Buxton Road and Shayler Road the Clermont County Engineer provided peak hour turning movement count (TMC) data collected on Wednesday September 9, 2024. The TMC data included traffic volumes from 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m. to capture the a.m. and p.m. peak periods. The weekday a.m. peak hour begins at 7:00 a.m. and the weekday p.m. peak hour begins at 5:00 p.m.

The traffic volume forecast was completed by following ODOT's Low Risk Design Traffic Forecasting Procedure. The process includes applying a 0.31 percent background linear annual growth rate (provided by the Clermont County Engineer from the Ohio-Kentucky-Indiana Regional Council of Governments [OKI]) to the TMC data, rounding the result up to the nearest 10 vehicles, and adding the trips generated by the *Mixed-Use Development* TIS.

b. DHVs – Bach Buxton Road and the northern driveway to Provision Living at West Clermont

To develop DHVs at the intersection of Bach Buxton Road and the northern driveway to Provision Living at West Clermont the Clermont County Engineer provided the *Ohio Multifamily Traffic Access Study* and the *Mixed-Use Development* TIS.

The *Ohio Multifamily Traffic Access Study* documented a commercial RIRO driveway on Bach Buxton Road and a full access driveway to Bach Buxton Road through the planned roundabout at the northern driveway to Provision Living at West Clermont. The study did not assign trips to these two access points. Therefore, no trips generated by the *Ohio Multifamily Traffic Access Study* were included in the DHVs for the intersection of Bach Buxton Road and the northern driveway to Provision Living at West Clermont.

The *Mixed-Use Development* TIS included peak hour TMC data at the intersection of Bach Buxton Road and the northern driveway to Provision Living at West Clermont along with trips generated by the *Mixed-Use Development* TIS that would have access to Bach Buxton Road at the full access driveway to Bach Buxton Road next to the planned roundabout at the northern driveway to Provision Living at West Clermont.

The *Mixed-Use Development* TIS provided no trips generated for the vacant parcel on the south side of Bach-Buxton Road across from the northern driveway to Provision Living at West Clermont. A minimum DHV of 10 vehicles was assigned to the movements into and out of the vacant parcel.

The traffic volume forecast was completed by following ODOT's Low Risk Design Traffic Forecasting Procedure. The process includes applying a 0.31 percent background linear annual growth rate to the TMC data, rounding the result up to the nearest 10 vehicles, and adding the trips generated by the *Mixed-Use Development* TIS.

A copy of the peak hour TMC data, the trips generated by the *Mixed-Use Development* TIS, and the DHVs are included in in Attachment B.

5. HCS Capacity Analysis

A capacity analysis is the primary method for evaluating the efficiency of an intersection as it relates to vehicular traffic. The Highway Capacity Manual version 6 (HCM), published by the Transportation Research Board, outlines capacity analysis procedures and the level of service (LOS) criteria used as a qualitive measure to describe operational conditions. The HCM defines six levels of service, designated by the letters A through F. For roundabouts, LOS is estimated by measuring the control delay per vehicle. The traffic density and vehicular delay conditions for each LOS are defined in Table 2.

*Table **Error! No text of specified style in document.**. Level of Service and Delay Thresholds for Unsignalized Intersections and Roundabouts*

Level of Service	Unsignalized Intersection and Roundabout Delay (seconds)
A	≤ 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35- 60
F	> 60 or V/C ratio > 1

The capacity analyses for the roundabout at Bach Buxton Road and Shayler Road and for the roundabout at Bach Buxton Road and the northern driveway to Provision Living at West Clermont were conducted using Highway Capacity Software (HCS).

a. HCS Capacity Analysis – Bach Buxton Road and Shayler Road

The capacity analysis results for a single lane roundabout at the intersection of Bach Buxton Road and Shayler Road in 2030 are presented in Table 2. A southbound right-turn bypass lane is included in the analysis.

The table shows that, overall, the roundabout operates at LOS **C** during the a.m. peak hour. The northbound approach operates at LOS **C** with a 95th percentile queue that is 9 to 10 vehicles long. The southbound through/left movement operates at LOS **C** with 95th percentile queue that is 6 to 7 vehicles long and the southbound right turn movement operates at LOS **A** with a 95th percentile queue that is 1 vehicle long. The eastbound approach operates at LOS **B** with a 95th percentile queue that is 2 to 3 vehicles long. The westbound approach operates at LOS **E** with 95th percentile queue that is 9 vehicles long.

The table shows that, overall, the roundabout operates at LOS **C** during the p.m. peak hour. The northbound approach operates at LOS **C** with a 95th percentile queue that is 6 to 7 vehicles long. The southbound through/left movement operates at LOS **C** with 95th percentile queue that is 6 to 7 vehicles long and the southbound right turn movement operates at LOS **A** with a 95th percentile queue that is 1 vehicle long. The eastbound approach operates at LOS **C** with a 95th percentile queue that is 5 to 6 vehicles long. The westbound approach operates at LOS **B** with 95th percentile queue that is 2 to 3 vehicles long.

Table 2. Single Lane Roundabout with SBR Bypass Lane (2030) – Bach Buxton Road and Shayler Road – HCS Capacity Analysis Results

Direction	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	Delay (seconds)	95th % Queue (vehicles)	LOS	Delay (seconds)	95th % Queue (vehicles)
Northbound	LTR	C	19.7	9.1	C	16.2	6.1
Southbound	LT	C	20.7	6.9	C	15.9	6.4
	R	A	6.1	0.7	A	4.7	0.5
Eastbound	LTR	B	13.2	2.8	C	23.0	5.7
Westbound	LTR	E	39.3	9.0	B	12.9	2.5
Overall		C	21.8		C	16.1	

The results for the roundabout at Bach Buxton Road and Shayler Road in 2050 are presented in Table 3.

The table shows that, overall, the roundabout with a southbound right-turn bypass lane operates at LOS **D** during the a.m. peak hour. The northbound approach operates at LOS **D** with a 95th percentile queue that is 13 to 14 vehicles long. The southbound through/left movement operates at LOS **D** with 95th percentile queue that is 10 to 11 vehicles long and the southbound right turn movement operates at LOS **A** with a 95th percentile queue that is 1 vehicle long. The eastbound approach operates at LOS **C** with a 95th percentile queue that is 3 to 4 vehicles long. The westbound approach operates at LOS **F** with a 95th percentile queue that is 11 to 12 vehicles long. Adding a westbound right-turn bypass lane improves traffic operations to LOS **C** with a 95th percentile queue that is 3 to 4 vehicles long. Therefore, a westbound right-turn bypass lane may be added in the future if the background linear growth rate predicted by OKI comes to fruition.

The table shows that, overall, the roundabout with a southbound right-turn bypass lane operates at LOS **D** during the p.m. peak hour. The northbound approach operates at LOS **D** with a 95th percentile queue that is 10 to 11 vehicles long. The southbound through/left movement operates at LOS **D** with 95th percentile queue that is 12 to 13 vehicles long and the southbound right turn movement operates at LOS **A** with a 95th percentile queue that is 1 vehicle long. The eastbound approach operates at LOS **E** with a 95th percentile queue that is 9 to 10 vehicles long. The westbound approach operates at LOS **B** with 95th percentile queue that is 2 to 3 vehicles long.

Table 3. Single Lane Roundabout with SBR Bypass Lane (2050) – Bach Buxton Road and Shayler Road – HCS Capacity Analysis Results

Direction	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	Delay (seconds)	95th % Queue (vehicles)	LOS	Delay (seconds)	95th % Queue (vehicles)
Northbound	LTR	D	31.2	13.6	D	30.1	10.5
Southbound	LT	D	31.7	10.7	D	29.8	12.8
	R	A	6.4	0.7	A	4.8	0.6
Eastbound	LTR	C	16.6	3.7	E	45.6	9.8
Westbound	LTR	F	58.5	11.9	B	14.1	2.8
Overall		D	32.7		D	29.0	

The results of the capacity analysis indicate a single lane roundabout at Bach Buxton Road and Shayler Road will operate efficiently. If the growth predicted by OKI comes to fruition a westbound right-turn bypass lane may be necessary by 2050 to maintain efficient traffic flow.

b. HCS Capacity Analysis – Bach Buxton Road and Provision Living at West Clermont

The results for the single lane roundabout at Bach Buxton Road and the northern driveway to Provision Living at West Clermont in 2030 are presented in Table 4.

The table shows that, overall, the single lane roundabout operates at LOS **B** during the a.m. peak hour. The northbound approach operates at LOS **C** with a 95th percentile queue that is 7 to 8 vehicles long. The southbound approach operates at LOS **B** with 95th percentile queue that is 5 to 6 vehicles long. The eastbound approach operates at LOS **B** with a 95th percentile queue that is 1 to 2 vehicles long. The westbound approach operates at LOS **A** with a 95th percentile queue that is 1 vehicle long.

The table shows that, overall, the single lane roundabout operates at LOS **C** during the p.m. peak hour. The northbound approach operates at LOS **B** with a 95th percentile queue that is 4 to 5 vehicles long. The southbound approach operates at LOS **C** with 95th percentile queue that is 11 to 12 vehicles long. The eastbound approach operates at LOS **B** with a 95th percentile queue that is 1 to 2 vehicles long. The westbound approach operates at LOS **A** with a 95th percentile queue that is 1 vehicle long.

Table 4. Single Lane Roundabout (2030) – Bach Buxton Road and Northern Driveway to Provision Living at West Clermont – HCS Capacity Analysis Results

Direction	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	Delay (seconds)	95th % Queue (vehicles)	LOS	Delay (seconds)	95th % Queue (vehicles)
Northbound	LTR	C	16.0	7.5	B	11.8	4.9
Southbound	LTR	B	12.4	5.6	C	21.3	11.6
Eastbound	LTR	B	10.2	1.4	B	12.9	1.4
Westbound	LTR	A	8.3	0.2	A	7.2	0.2
Overall		B	13.7		C	16.9	

The results for the single lane roundabout at Bach Buxton Road and the northern driveway to Provision Living at West Clermont in 2050 are presented in Table 5.

The table shows that, overall, the single lane roundabout operates at LOS **C** during the a.m. peak hour. The northbound approach operates at LOS **C** with a 95th percentile queue that is 8 to 9 vehicles long. The southbound approach operates at LOS **B** with 95th percentile queue that is 6 to 7 vehicles long. The eastbound approach operates at LOS **B** with a 95th percentile queue that is 1 to 2 vehicles long. The westbound approach operates at LOS **A** with a 95th percentile queue that is 1 vehicle long.

The table shows that, overall, the single lane roundabout operates at LOS **C** during the p.m. peak hour. The northbound approach operates at LOS **B** with a 95th percentile queue that is 5 to 6 vehicles long. The southbound approach operates at LOS **D** with 95th percentile queue that is 14 to 15 vehicles long. The eastbound approach operates at LOS **B** with a 95th percentile queue that is 1 to 2 vehicles long. The westbound approach operates at LOS **A** with a 95th percentile queue that is 1 vehicle long.

Table 5. Single Lane Roundabout (2050) – Bach Buxton Road and Northern Driveway to Provision Living at West Clermont – HCS Capacity Analysis Results

Direction	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	Delay (seconds)	95th % Queue (vehicles)	LOS	Delay (seconds)	95th % Queue (vehicles)
Northbound	LTR	C	18.2	8.8	B	12.6	5.5
Southbound	LTR	B	13.6	6.5	D	26.7	14.4
Eastbound	LTR	B	10.8	1.5	B	14.2	1.6
Westbound	LTR	A	8.7	0.2	A	7.5	0.2
Overall		C	15.3		C	20.2	

The results of the capacity analysis indicate a single lane roundabout at Bach Buxton Road and the northern driveway to Provision Living at West Clermont will operate efficiently. Even if the growth predicted by OKI comes to fruition a single lane roundabout will operate efficiently in 2050.

However, the *Mixed-Use Development Traffic Impact Study* (TIS) completed in July 2024 included no trips generated for the vacant parcel on the south side of Bach-Buxton Road across from the northern driveway to Provision Living at West Clermont. Development on that vacant parcel may impact the operation of the proposed single lane roundabout at Bach Buxton Road and the northern driveway to Provision Living at West Clermont.

6. Conceptual Schematic

A conceptual schematic was developed for the roundabout at Bach Buxton Road and Shayler Road and for the roundabout at Bach Buxton Road and the northern driveway to Provision Living at West Clermont. Each roundabout design was developed in coordination with the Clermont County Engineer's Office and adjacent property stakeholders to minimize impacts and accommodate design vehicle requirements.

a. Bach Buxton Road and Shayler Road

The single lane roundabout at Bach Buxton Road and Shayler Road was designed to avoid impacting the above-ground utility bank along the western leg while also minimizing effects on the Kindercare facility located at the northwest corner. An additional southbound right-turn lane with a minimum storage length of 300 feet is required, allowing right-turning vehicles to bypass the southbound thru-left queue. A single-lane roundabout with an inscribed diameter of 140 feet was selected to maintain entry speeds below 25 mph. Per direction from the Clermont County Engineer's Office, Arcadis utilized a WB-50 design vehicle for evaluating truck turning movements.

b. Bach Buxton Road and the northern driveway to Provision Living at West Clermont

The single-lane roundabout at Bach Buxton Road and the northern driveway to Provision Living at West Clermont was strategically located to minimize right-of-way impacts. Its placement was coordinated with both the western developer and Provision Living to support their preferred site access. A roundabout with an inscribed diameter of 140 feet was selected to maintain entry speeds below 25 mph. As approved by the Clermont County Engineer's Office, a mountable splitter island is proposed on the eastern leg to provide additional clearance for truck turning movements. Per direction from the Clermont County Engineer's Office, Arcadis utilized a WB-50 design vehicle for evaluating truck turning movements.

7. Included Items for Both Roundabouts

The following items were included for both roundabout locations.

- **ODOT Critical Design Parameters Worksheets**
  Documentation verifying compliance with ODOT standards for geometric and operational elements.
- **Roundabout Layouts**
  Plan view layouts illustrating lane configurations, inscribed diameter, entry/exit geometry, and splitter island design.
- **Fastest Path Analyses**
  Display and analysis of vehicle travel paths through each roundabout, confirming entry speeds remain below 25 mph per design intent.

- **WB-50 Design Vehicle Turning Movements**
  Diagrams demonstrating that a WB-50 truck can safely navigate each roundabout, including mountable curb provisions where required.

8. Conclusion

A single lane roundabout with a southbound right-turn bypass lane will operate efficiently at the intersection of Bach Buxton Road and Shayler Road.

A single lane roundabout will operate efficiently at the intersection of Bach Buxton Road and the northern driveway to Provision Living at West Clermont.

ATTACHMENT A

Traffic Impact Studies

ATTACHMENT A

Ohio Multifamily Traffic Access Study

American Structurepoint, Inc.

2550 Corporate Exchange Drive, Suite 300
Columbus, Ohio 43231
TEL 614.901.2235
FAX 614.901.2236

www.structurepoint.com

T E C H N I C A L M E M O R A N D U M

DATE: February 10, 2022

TO: Doug Royer and Jeremy Evans – Clermont County Engineer's Office

FROM: Shane Morris, PE and Jacob Watson, EI – American Structurepoint, Inc.

RE: Union Township, Clermont County, Ohio Multifamily Traffic Access Study

CC: Shawn Goodwin, PE - American Structurepoint, Inc.

Introduction

Vision Development is planning to develop a multifamily housing development situated on 22.2± acres located in the northwest corner of the intersection of Clepper Lane and Bach Buxton Road in Union County Township, Clermont County, Ohio. 20.12± of the acres will be used specifically for the housing development while 2.08± acres will be reserved for drainage requirements.

Access to the proposed development will consist of a full access driveway located in the northern corner of the property on Clepper Lane as well as a right-in, right-out (RIRO) on Clepper Lane south of the full access driveway. There will also be a full access driveway going to Bach Buxton Road that will utilize the planned roundabout that will be constructed as part of a separate project. A RIRO on Bach Buxton Road will be located between the future roundabout and the signalized intersection. This RIRO will only be accessible to the commercial development.

This Traffic Access Study will analyze the full access driveway on Clepper Lane to determine the extent of improvements that will be required to ensure that the access operates at an acceptable level in both the opening year (2022) and the horizon year (2042).

Study Area and Background

The proposed development is located in Union Township in Clermont County, Ohio just south of SR 32 as shown in **Figure 1**. The proposed development is located within the footprint of the Eastern Corridor Segment IV(a) Project which is meant to improve the local roadway network and access in response to the growth the area is experiencing.

Clepper Lane in the vicinity of the proposed development was recently constructed in Clermont County's project (CLE-TR 252-Clepper Ln Ext (Phase 2) PID 82552) to extend Clepper Lane from west of Gate Drive to Bach Buxton Road. This extension is part of a larger effort of both Clermont County and the Ohio Department of

Transportation to provide a more extensive local roadway network and access to this area from SR-32 to promote growth and safer travel. This is Phase 2 of the Eastern Corridor Segment IV(a) Project. Clepper Lane is classified as an urban major collector and consists of a two-lane section in the study area. The posted speed limit is 35 mph.

Bach Buxton Road in the study area is to undergo widening and realignment as part of CLE-CR388 (Phase 4) (PID 103953) of the Eastern Corridor Segment IV(a) Project. This road is classified as an urban minor arterial with a posted speed limit of 45 mph.

The site is proposed to be developed as a Multifamily housing development that includes 451 dwelling units. A total of 455 dwelling units was used in the analysis as a conservative estimate to generate trips for the multifamily housing development.

Figure 1: Study Area

The study scenarios for these intersections focus on traffic volumes for the opening year (2022) and horizon year (2042). The traffic analysis will study the scenarios for this project as listed below in **Table 1**.

Table 1: Study Scenarios

Scenario	Traffic Volume
1	Opening Year (2022)
2	Opening Year (2022) + Full Build Generated Trips
3	Horizon Year (2042) + Full Build Generated Trips

Traffic Counts

Traffic volume data was collected from the appendix of *SR 32 at Proposed Interchange Near Newberry Drive/Bach Buxton Road Interchange Justification Study, Segment IV(a), CLE-32-2.25* performed in 2015. The 2017 certified traffic data was used as the basis for this study and projected to the opening year (2022) and horizon year (2042).

The opening year (2022) peak hour volumes for the intersection of Clepper Lane and Bach Buxton Road are shown on **Figure 2**, and the certified traffic plates from the previous study are provided in **Attachment C**.

Figure 2: Opening Year (2022) Peak Hour No Build Traffic Volumes

Traffic Forecasting

In order to account for growth in the regional background traffic and from any future developments that are being planned but not considered as part of this study, a linear annual growth rate of 1% per year was applied to the 2017 traffic counts to obtain the background traffic for the opening year (2022) and the horizon year (2042).

The projected opening year (2022) and horizon year (2042) traffic volumes at the study intersections are shown on **Figure 3** and **Figure 4** respectively.

Figure 3: Opening Year (2022) Peak Hour Build Traffic Volumes

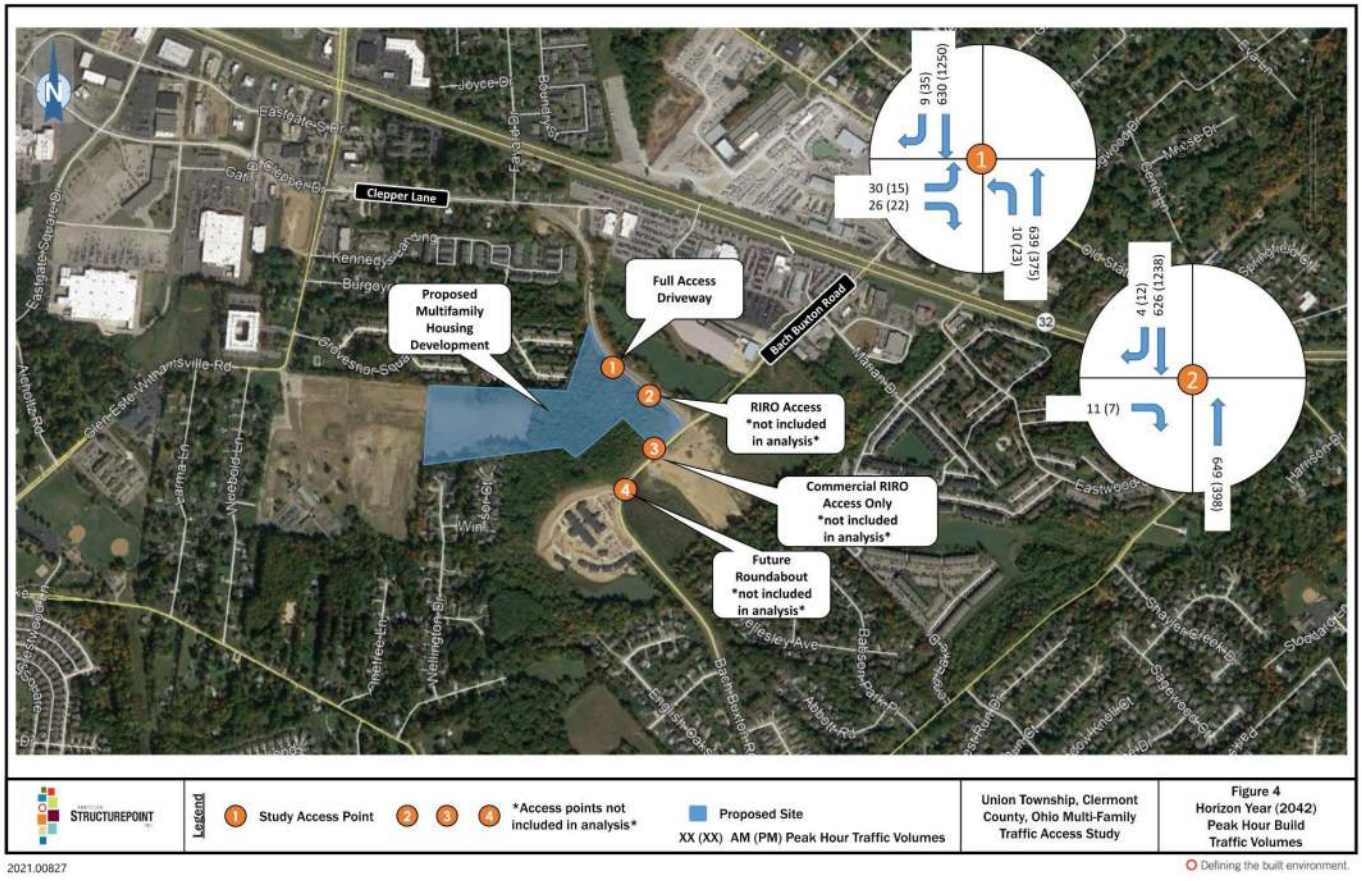


Figure 4: Horizon Year (2042) Peak Hour Build Traffic Volumes

Trip Generation Forecasting

Trips for the proposed site were generated using standard Institute of Transportation Engineers (ITE) practices and *Trip Generation Manual* (10th Edition) data via the Online Traffic Impact Study Software (OTISS). The trip generation estimate used in this study is based on the latest site plan available. A total of 455 dwelling units was used in the analysis as a conservative estimate to generate trips for the multifamily housing development. All calculations in this study are based on the land use types and sizes shown in **Table 2**. Any significant changes to the land use, sizes, or roadway connectivity may require further analysis.

Table 2 – Trip Generation with Reductions

No.	ITE Code	Land Use Type	Size	Base Vehicle Trips			
				AM Peak		PM Peak	
				Enter	Exit	Enter	Exit
1	221	Multifamily Housing (Mid-Rise)	455 DU	39	112	116	74
Total Peak Hour Trips Generated				**39**	**112**	**116**	**74**

Trip Distribution

Trip distribution percentages were calculated based on the 2017 traffic volume data collected from the previous study. The trip assignment percentages were then adjusted at each site access and intersection based on knowledge of the surrounding area and engineering judgement. The full trip distribution can be found in **Attachment E.**

Capacity Analysis

Capacity analysis for the full access drive under the No-Build Opening Year (2022), the Full Build Opening Year (2022) and the Full Build Horizon Year (2042) scenarios was performed using Highway Capacity Software (HCS 7), which utilizes the methodology outlined in the *Highway Capacity Manual* (HCM).

The standard parameter used to evaluate traffic operating conditions is referred to as the level of service (LOS). There are six LOS (A through F) which relate to driving conditions. LOS for intersections is defined in terms of control delay per vehicle, which is a direct correlation to driver discomfort, frustration, fuel consumption, and lost travel time. **Table 3** provides the LOS criteria as defined in the HCM.

Table 3: LOS Thresholds

LOS	Signalized/ Roundabout Intersection Control Delay per Vehicle (seconds)	Stop Controlled Intersection Control Delay per Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

The operating conditions are generally considered to be acceptable if found to operate at LOS D or better for the overall intersection, with no approach operating worse than LOS E. The capacity analysis results for the study intersection are summarized in **Table 4**, for the AM and PM peak hours. Capacity analysis output are provided in **Attachment F**.

Table 4: Capacity Analysis Results – Stop Controlled Intersection

Peak Hour	Intersection Name	Traffic Control Type	Movement	Scenerio 2		Scenerio 3	
				Full Build + 2022 Opening Year Background Traffic		Full Build + 2042 Horizon Year Background Traffic	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS
AM	Clepper Lane & Full Access Drive	Unsignalized	SB Approach	-	-	-	-
			NB Approach	0.2	A	0.1	A
			EB Approach	19.5	C	25.1	D
			Intersection	-	-	-	-
PM	Clepper Lane & Full Access Drive	Unsignalized	SB Approach	-	-	-	-
			NB Approach	0.8	A	0.7	A
			EB Approach	28.6	D	41.1	E
			Intersection	-	-	-	-

For the stop controlled driveway, the eastbound approach operates at an acceptable LOS for both AM and PM peak hours for both the opening and horizon year. LOS E is considered to be an acceptable level of operation for individual approaches.

Turn Lane Warrant Analysis

A left and right turn lane warrant analysis was evaluated at the full access driveway for the 2042 Horizon Year full build scenario on Clepper Lane. The turn lane warrant and length calculations were performed in accordance with ODOT's *Location and Design Manual, Volume 1*. Based on the results of the warrant analysis, a southbound right turn lane and a northbound left turn lane are required. The turn lane warrants and length calculations can be found in **Attachment G.**

Table 5: Turn Lane Length

Turn Lane Lengths			
Clepper Lane	AM*	PM*	Recommended Turn Lane*
	(ft)	(ft)	(ft)
Northbound Left	100	100	100
Southbound Right	100	100	100

* Inclusive of 50' diverging taper length

Signal Warrant Analysis

With the stop controlled full access driveway operating at an acceptable LOS, a signal warrant analysis was still assessed for this study intersection. The warrants were conducted per the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) and the Traffic Engineering Manual (TEM). The ADT and peak hour traffic volumes from the previous study were used in conjunction with other nearby counts so that the warrants could be evaluated. This background traffic data was projected to the opening year (2022) and horizon year (2042). The weekday trip generations for the proposed development were dispersed to the hourly traffic volumes using a

similar hourly distribution as the background traffic. The signal warrant analysis results for the study intersection are summarized in **Table 6 and Table 7.** The full signal warrant calculations can be found in **Attachment H.**

Table 6: Signal Warrant Results – 2022

Signal Warrant Analysis Summary: Clepper Lane & Site Access #1 - 2022 Volumes		
Warrant	Description	Warrant Met?
1A	8-hour Vehicular Volume, Condition A	NOT MET
1B	8-hour Vehicular Volume, Condition B	NOT MET
2	4-hour Vehicular Volume	NOT MET
3	Peak Hour	NOT MET
4	Pedestrian Volume	N/A
5	School Crossing	N/A
6	Coordinated Signal System	N/A
7	Crash Experience	N/A
8	Roadway Network	N/A
9	Intersection Near a Grade Crossing	N/A

Table 7: Signal Warrant Results – 2042

Signal Warrant Analysis Summary: Clepper Lane & Site Access #1 - 2042 Volumes		
Warrant	Description	Warrant Met?
1A	8-hour Vehicular Volume, Condition A	NOT MET
1B	8-hour Vehicular Volume, Condition B	NOT MET
2	4-hour Vehicular Volume	NOT MET
3	Peak Hour	NOT MET
4	Pedestrian Volume	N/A
5	School Crossing	N/A
6	Coordinated Signal System	N/A
7	Crash Experience	N/A
8	Roadway Network	N/A
9	Intersection Near a Grade Crossing	N/A

Findings

Based on the results of the turn lane warrant analysis, it is recommended that a 100’ southbound right turn lane (inclusive of a 50’ diverging taper) and a 100’ northbound left turn lane (inclusive of a 50’ diverging taper) from Clepper Lane into the proposed development.

Based on the results of the capacity analysis and signal warrant analysis, it is recommended that the intersection of Clepper Lane and the full access driveway be two-way stop controlled with the stop sign located on the full access driveway.

List of Attachments

Attachment A – Memorandum of Understanding

Attachment B – Access Point Concept Plan

Attachment C – Traffic Volume Data

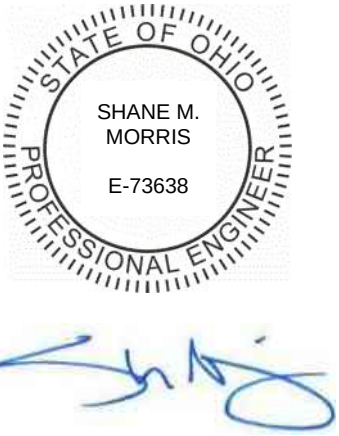
Attachment D – Trip Generation Output

Attachment E – Trip Distribution Exhibits

Attachment F – Capacity Analysis

Attachment G – Turn Lane Warrant Analysis

Attachment H – Signal Warrant Analysis



Attachment A

Memorandum of Understanding

From: Evans, Jeremy <jpevans@clermontcountyohio.gov>
Sent: Thursday, January 27, 2022 8:47 AM
To: Goodwin, Shawn; Beiting, Amanda
Cc: Morris, Shane; Miller, Darrell
Subject: RE: <<EXTERNAL>>: RE: Vision TAS - Follow Up

My apologies for the delay. This approach makes sense on our end.

-Jeremy

From: Goodwin, Shawn <SGoodwin@structurepoint.com>
Sent: Thursday, January 27, 2022 6:11 AM
To: Evans, Jeremy <jpevans@clermontcountyohio.gov>; Beiting, Amanda <abeiting@clermontcountyohio.gov>
Cc: Morris, Shane <smorris@structurepoint.com>; Miller, Darrell <dMiller@structurepoint.com>
Subject: <<EXTERNAL>>: RE: Vision TAS - Follow Up

Good morning Jeremy and Amanda,

Following up on the below. Thoughts on this approach?

Thanks!

Shawn Goodwin
614-429-7978

From: Goodwin, Shawn
Sent: Monday, January 24, 2022 3:12 PM
To: 'Evans, Jeremy' <jpevans@clermontcountyohio.gov>; Beiting, Amanda <abeiting@clermontcountyohio.gov>
Cc: Shane Morris (smorris@structurepoint.com) <smorris@structurepoint.com>; Miller, Darrell <dMiller@structurepoint.com>
Subject: Vision TAS - Follow Up

Hi Jeremy

I left you a VM, but got a quick follow up question for you on the TIS. I believe we may have over complicated it with the commercial and have a solution we would like to run by you. Since the commercial will be going 100% to Bach Buxton, is there any reason to analyze it with our TAS? Seems like the appropriate path is to discount our traffic for the residential development from Clepper to Bach Buxton. We are thinking 60% of the residential traffic goes to Clepper Lane and 40% goes to Bach Buxton.

Our current submitted TAS only includes the residential, so we would just need to update that to show a portion of the traffic heading to Bach Buxton.

Thoughts on this approach?

Thanks again for the help!

Shawn L. Goodwin, PE
Regional Services Director

2550 Corporate Exchange Drive, Suite 300
Columbus, Ohio 43231
614.901.2235 OFFICE
614.429.7978 CELL
structurepoint.com WEB

AMERICAN STRUCTUREPOINT INC.

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AMERICAN STRUCTUREPOINT INC.

June 10, 2021

Doug Royer, PE
Clermont County Engineer
2381 Clermont Center Drive
Batavia, Ohio 45103

Subject: Union Township, Clermont County, Ohio Multi-Family Traffic Access Study Memorandum of Understanding

Dear Mr. Royer,

This Memorandum of Understanding is submitted to document the scope of the Traffic Access Study (TAS) for a proposed development in the northwest corner of the Clepper Road & Bach-Buxton Road intersection in Union Township, Clermont County, Ohio. Following your concurrence, American Structurepoint, Inc. ("we") will prepare a traffic access study in accordance with the methodologies and assumptions described herein.

Proposed Development and Access Plan

Vision Development is planning a 398 unit multifamily housing development in the northwest corner of the Clepper Road & Bach-Buxton Road intersection. The complete site will consist of approximately 12.19 acres of residential area and 5.43 acres dedicated to commercial use.

Intersections to Analyze

The proposed full access site driveway on Clepper Road will be analyzed as part of this TAS.

Data Collection

We will utilize turning movement counts from recent nearby projects. These turning movement counts will be provided by Clermont County and will be the basis of the study.

Trip Generation

Site generated trip ends will be forecast using the data and methodology provided in the *ITE Trip Generation Manual, 10th Edition.* Weekday peak hour traffic volumes will be estimated using ITE Land Use Code #221 (Multifamily Housing (Mid Rise)).

Additionally, the proposed commercial area will be included when determining the site generated trips. The commercial area have approximately 75,000 square feet of building space and the trips generated as part of this study will be a mixture of:

- ITE Land Use Code #710 (General Office Building)
- ITE Lane Use Code #720 (Medical-Dental Office Building)
- ITE Land Use Code #932 (High-Turnover (Sit-Down) Restaurant

Trip Distribution

Site generated traffic volumes will be assigned to the proposed access point and to the existing street system based on existing traffic volumes, area knowledge/observed travel patterns, and engineering judgement.

Traffic Projections

The Opening Year (2022) and 20-Year Horizon Year (2042) traffic volumes will be calculated for Build and No-Build, AM and PM Peak Hours based on area growth rates and the traffic distribution.

Growth rates for the background traffic will be based upon information in the recent traffic studies in the area or as provided by OKI.

Traffic Analyses

Intersection Capacity Analyses

The Highway Capacity Manual and Synchro will be used to evaluate the operational characteristics of the access point mentioned above. Three (3) scenarios for the AM and PM Weekday Peak Hours will be evaluated:

- Scenario 1 – Existing Background Traffic
- Scenario 2 – Full Build + Existing Background Traffic
- Scenario 3 – Full Build + 20-Year Horizon Background Traffic

If acceptable Level of Service (LOS) is not obtained under these scenarios, improvements will be recommended that will obtain an acceptable LOS.

Traffic Signal Warrant Analysis

A traffic signal warrant will be performed at the proposed full access drive of the site on Clepper Road based on ODOT criteria.

Turn Lane Warrant Analysis

A left-turn and right-turn lane warrant analysis based on ODOT criteria will be performed at the proposed access point of the site. Design lengths for turn lanes which are warranted will be per ODOT criteria.

Report Preparation
A detailed report including the applicable figures and tables will be prepared to summarize the study methodologies, analysis, findings, and recommendations. The report will be submitted to Clermont County for review.

Please signify your concurrence with the scope of work outlined herein by signing below and returning this Memorandum of Understanding.

Should you have questions or comments during your review or if I may be of further assistance, please contact me at (614) 901-2235 or smorris@structurepoint.com.

Sincerely,

American Structurepoint, Inc.

Shane Morris, PE
Project Manager

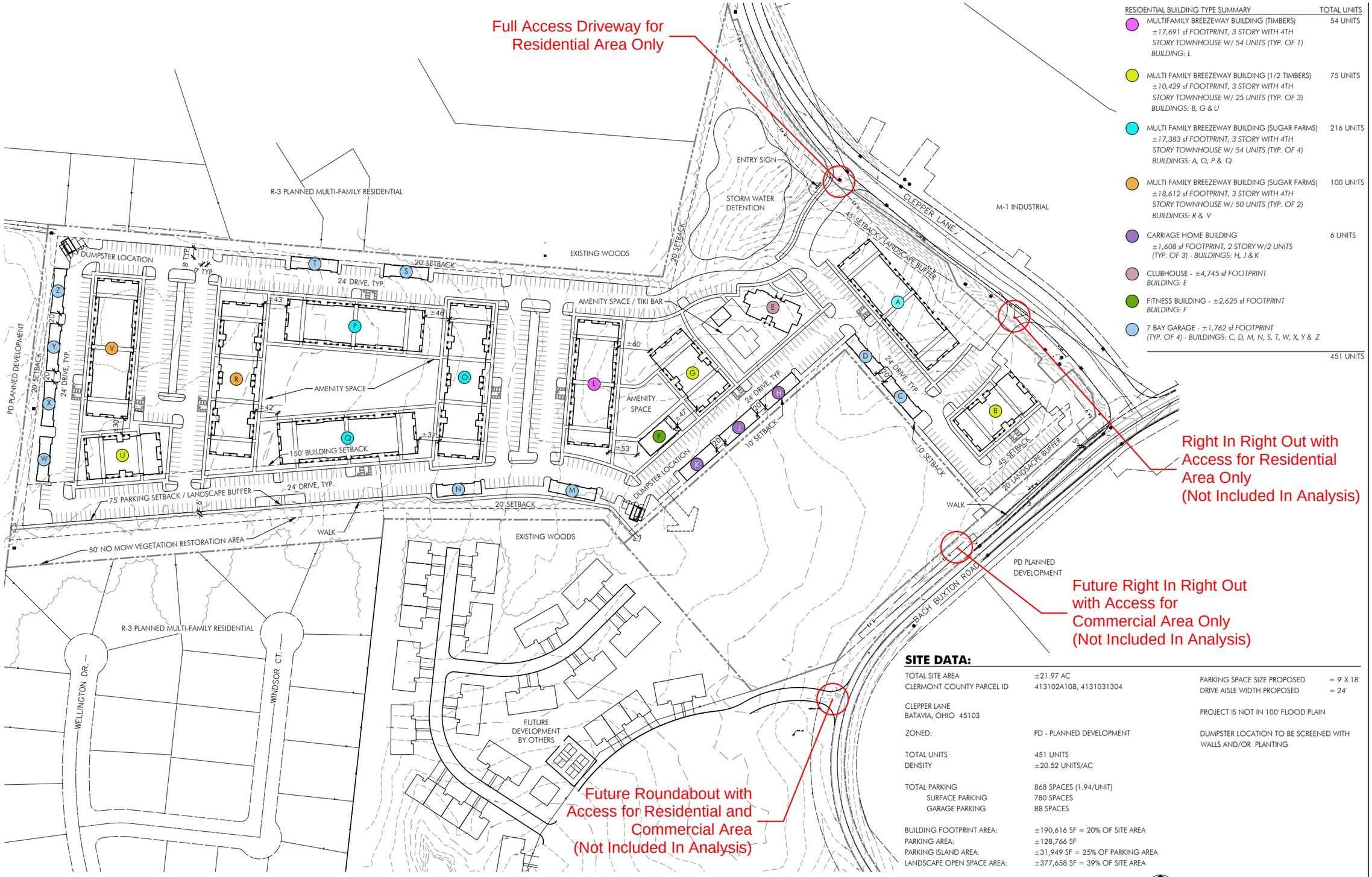
ACCEPTANCE AND APPROVAL OF MEMORANDUM OF UNDERSTANDING

BY: _____
Clermont County

DATE: _____

Attachment B

Access Point Concept Plan



Site Development Plan
SCALE: 1" = 80'-0"

RESIDENTIAL BUILDING TYPE SUMMARY	TOTAL UNITS
MULTIFAMILY BREEZEWAY BUILDING (TIMBERS) *±17,691 sf FOOTPRINT, 3 STORY WITH 4TH STORY TOWNHOUSE W/ 54 UNITS (TYP. OF 1)* *BUILDING: L*	54 UNITS
MULTI FAMILY BREEZEWAY BUILDING (1/2 TIMBERS) *±10,429 sf FOOTPRINT, 3 STORY WITH 4TH STORY TOWNHOUSE W/ 25 UNITS (TYP. OF 3)* *BUILDINGS: B, G & U*	75 UNITS
MULTI FAMILY BREEZEWAY BUILDING (SUGAR FARMS) *±17,383 sf FOOTPRINT, 3 STORY WITH 4TH STORY TOWNHOUSE W/ 54 UNITS (TYP. OF 4)* *BUILDINGS: A, O, P & Q*	216 UNITS
MULTI FAMILY BREEZEWAY BUILDING (SUGAR FARMS) *±18,612 sf FOOTPRINT, 3 STORY WITH 4TH STORY TOWNHOUSE W/ 50 UNITS (TYP. OF 2)* *BUILDINGS: R & V*	100 UNITS
CARRIAGE HOME BUILDING *±1,608 sf FOOTPRINT, 2 STORY W/2 UNITS (TYP. OF 3) - BUILDINGS: H, J & K*	6 UNITS
CLUBHOUSE - *±4,745 sf FOOTPRINT* *BUILDING: E*	
FITNESS BUILDING - *±2,625 sf FOOTPRINT* *BUILDING: F*	
7 BAY GARAGE - *±1,762 sf FOOTPRINT (TYP. OF 4) - BUILDINGS: C, D, M, N, S, T, W, X, Y & Z*	
	451 UNITS

SITE DATA:

TOTAL SITE AREA	±21.97 AC
CLERMONT COUNTY PARCEL ID	413102A108, 4131031304
CLEPPER LANE BATAVIA, OHIO 45103	
ZONED:	PD - PLANNED DEVELOPMENT
TOTAL UNITS	451 UNITS
DENSITY	±20.52 UNITS/AC
TOTAL PARKING	868 SPACES (1.94/UNIT)
SURFACE PARKING	780 SPACES
GARAGE PARKING	88 SPACES
BUILDING FOOTPRINT AREA:	±190,616 SF = 20% OF SITE AREA
PARKING AREA:	±128,766 SF
PARKING ISLAND AREA:	±31,949 SF = 25% OF PARKING AREA
LANDSCAPE OPEN SPACE AREA:	±377,658 SF = 39% OF SITE AREA

PARKING SPACE SIZE PROPOSED	= 9' X 18'
DRIVE AISLE WIDTH PROPOSED	= 24'

PROJECT IS NOT IN 100' FLOOD PLAIN

DUMPSTER LOCATION TO BE SCREENED WITH WALLS AND/OR PLANTING

0 40 80 160

POD design

Columbus
100 Northwoods Blvd, Ste A
Columbus, Ohio 43235
p 614.255.3399

Cincinnati
20 Village Square, Floor 3
Cincinnati, Ohio 45246
p 614.360.3066

PODdesign.net

Project Name

Vision Union Township

Union Township, Ohio

VISION DEVELOPMENT

Prepared For

Vision Development
3300 Riverside Drive
Suite 100
Upper Arlington, Ohio, 43221

Project Info

Project #	21042
Date	12/01/2021
By	GB/RY/TF
Scale	As Shown

Revisions

Sheet Title

SITE DEVELOPMENT PLAN

Sheet #

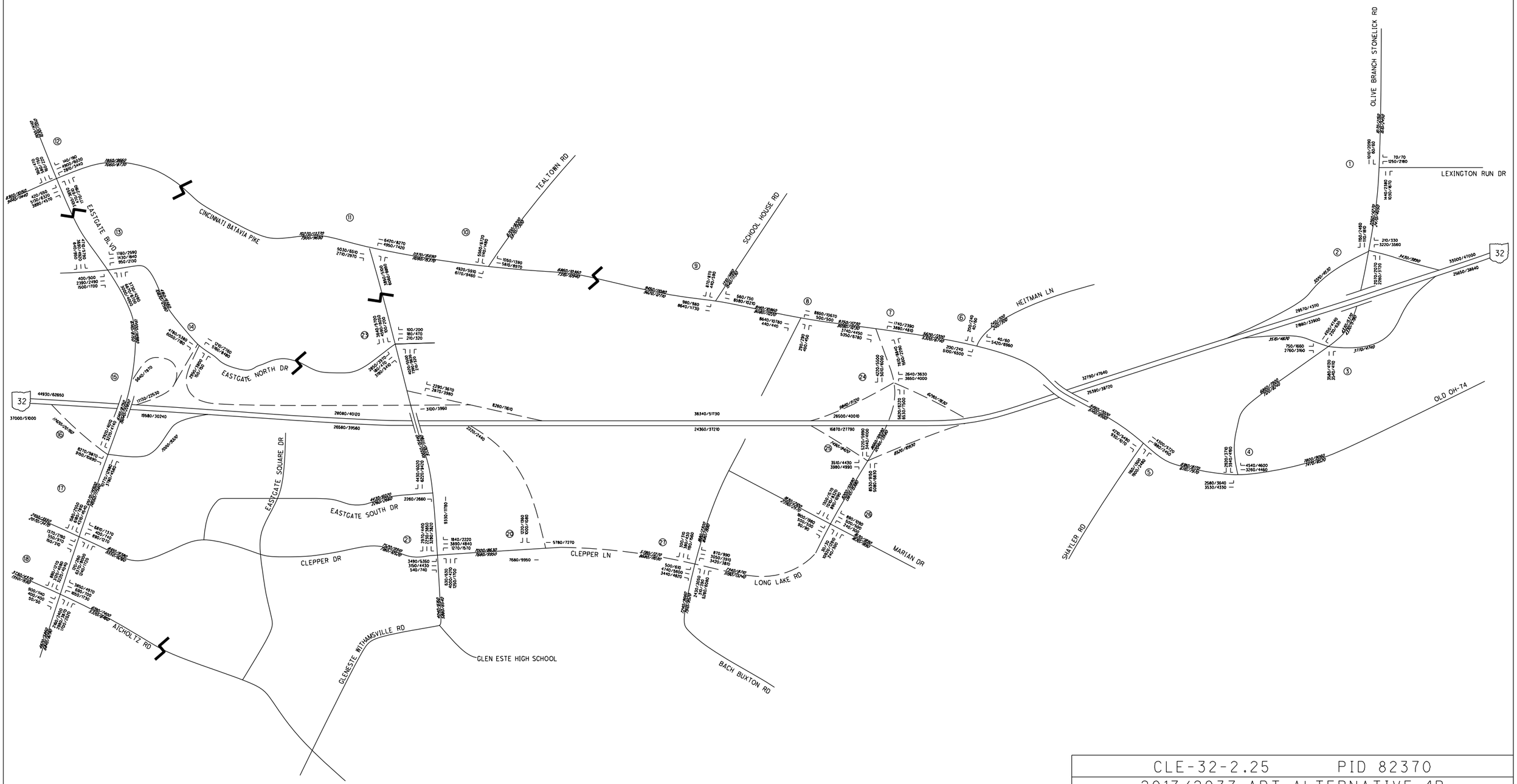
L1.0

Attachment C

Traffic Volume Data

CLE-32-2.25
PID 82370
PLATE 16 OF 19

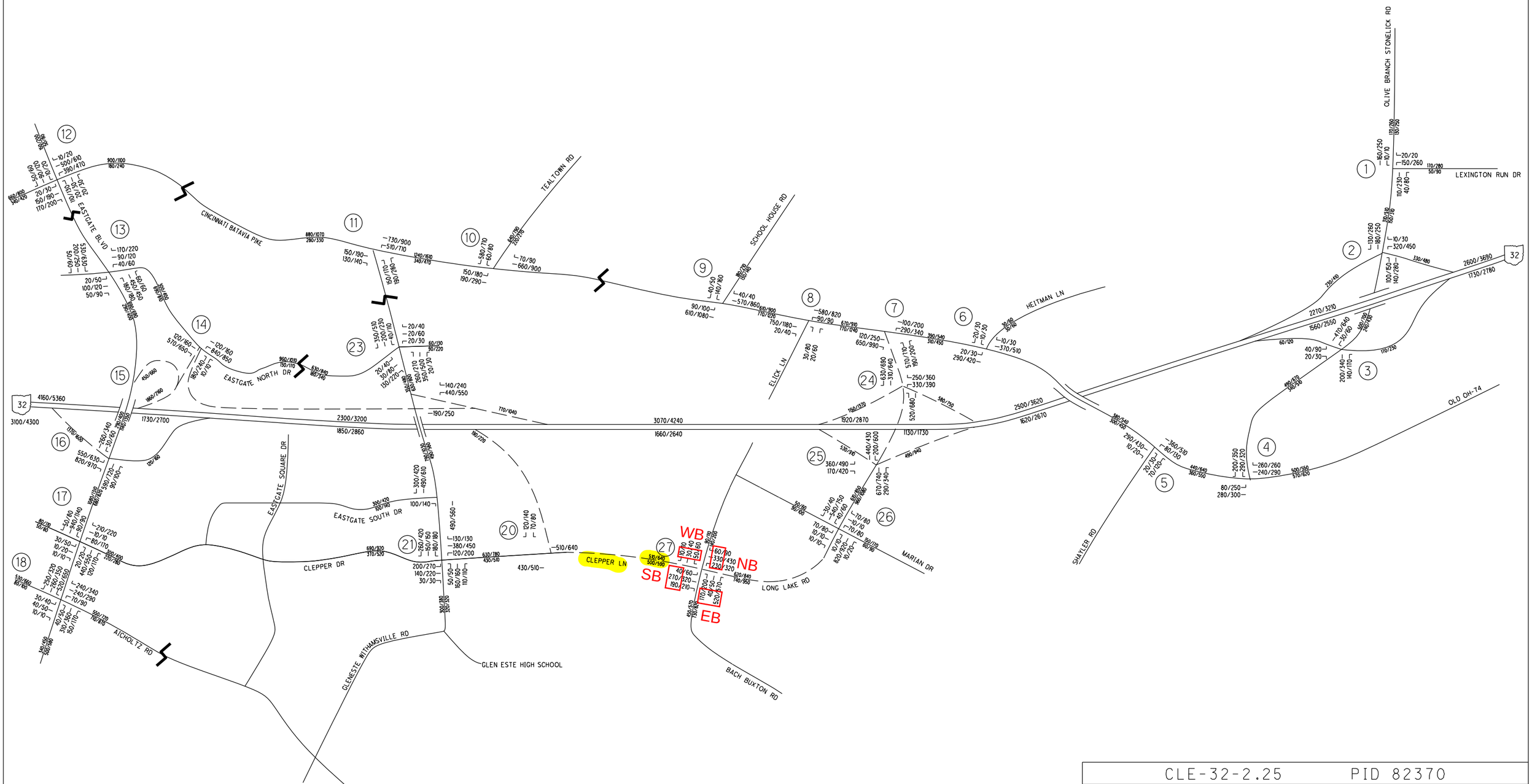
ALTERNATIVE 4B



CLE-32-2.25	PID 82370
2017/2037 ADT ALTERNATIVE 4B	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MARCH 21, 2014	NOT TO SCALE

CLE-32-2.25
PID 82370
PLATE 17 OF 19

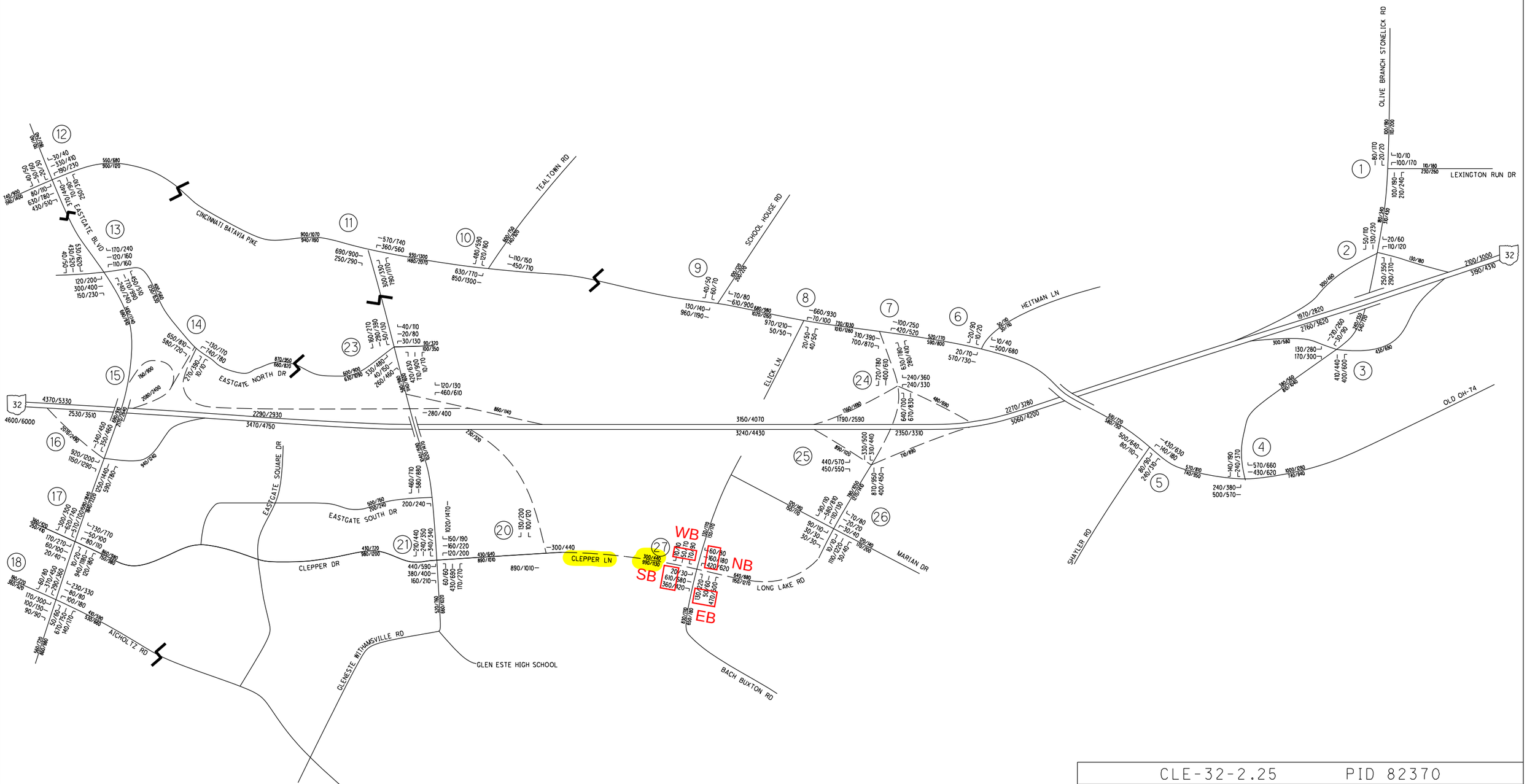
ALTERNATIVE 4B



CLE-32-2.25	PID 82370
2017/2037 AM PEAK ALTERNATIVE 4B	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MARCH 21, 2014	NOT TO SCALE

CLE-32-2.25
PID 82370
PLATE 18 OF 19

ALTERNATIVE 4B



CLE-32-2.25	PID 82370
2017/2037 PM PEAK ALTERNATIVE 4B	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MARCH 21, 2014	NOT TO SCALE

Attachment D

Trip Generation Output

Scenario - 3

Scenario Name: AM - No Commercial
User Group:
Dev. phase: 1
No. of Years to Project Traffic : 20
Analyst Note:
Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period	Method Rate/Equation	Entry Split%	Exit Split%	Total
221 - Multifamily Housing (Mid-Rise)	General Urban/Suburban	Dwelling Units	455	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LOG)	39	112	151
Data Source: Trip Generation Manual, 10th Ed +					Ln(T) =0.98Ln(X) - 0.98	26%	74%	

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
221 - Multifamily Housing (Mid-Rise)	100	100	1	1	26	74

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	39	112	0	0	39	112
	151		0		151	

VEHICLE TRIPS AFTER MULTI-MODAL ADJUSTMENT

MODE SHARE:

Land Use	Personal Passenger Vehicle		Truck		Other Modes	
	Entry (%)	Exit (%)	Entry (%)	Exit (%)	Entry (%)	Exit (%)
221 - Multifamily Housing (Mid-Rise)	100%	100%	0%	0%	0%	0%

OCCUPANCY:

Land Use	Vehicle	
	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	1.00	1.00

ADJUSTED VEHICLE TRIPS:

Land Use	Entry				Exit			
	Person Trips	Vehicle Mode Share (%)	Vehicle Occupancy	Vehical Trips	Person Trips	Vehicle Mode Share (%)	Vehicle Occupancy	Vehical Trips
221 - Multifamily Housing (Mid-Rise)	39	100%	1.00	39	112	100%	1.00	112

INTERNAL VEHICLE TRIP REDUCTION

LAND USE GROUP ASSIGNMENT:

Land Use	Land Use Group

221 - Multifamily Housing (Mid-Rise)	Residential

BALANCED PERSON TRIPS:

INTERNAL PERSON TRIPS:
221 - Multifamily Housing (Mid-Rise)

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	**0**	**0**	**0**

INTERNAL VEHICLE TRIPS AND CAPTURE:
221 - Multifamily Housing (Mid-Rise)

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	**0**	**0**	**0**
Total External Vehicle Trips	39	112	151
Internal Vehicle Trip Capture	**0%**	**0%**	**0%**

PASS-BY VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Pass-by Vehicle Trip %		Pass-by Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	39	112	0.00%	0.00%	0	0

DIVERTED VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Diverted Vehicle Trip %		Diverted Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	39	112	0.00%	0.00%	0	0

EXTRA VEHICLE TRIP REDUCTION

Land Use	(External - (Pass-by + Diverted)) Vehicle Trips		Extra Vehicle Trip Reduction %		Extra Reduced Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	39	112	0.00%	0.00%	0	0

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips		
	Entry	Exit	Total
221 - Multifamily Housing (Mid-Rise)	39	112	151

Land Use	New Vehicle Trips (PPV)		
	Entry	Exit	Total
221 - Multifamily Housing (Mid-Rise)	39	112	151

Land Use	New Vehicle Trips (Truck)		
	Entry	Exit	Total
221 - Multifamily Housing (Mid-Rise)	0	0	0

RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	39	112	151
Vehicle Trips After Multi-modal Adjustment	39	112	151
Internal Vehicle Trips	0	0	0
External Vehicle Trips	39	112	151
Internal Vehicle Trip Capture	0%	0%	0%
Pass-by Vehicle Trips	0	0	0
Diverted Vehicle Trips	0	0	0
Extra Reduced Vehicle Trips	0	0	0
New Vehicle Trips	39	112	151
PPV	39	112	151
Truck	0	0	0
Person Trips by Other Modes	0	0	0

Scenario - 4

Scenario Name: PM - No Commercial
User Group:
Dev. phase: 1
No. of Years to Project Traffic : 20
Analyst Note:
Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period	Method Rate/Equation	Entry Split%	Exit Split%	Total
221 - Multifamily Housing (Mid-Rise)	General Urban/Suburban	Dwelling Units	455	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LOG)	116	74	190
Data Source: Trip Generation Manual, 10th Ed +					Ln(T) =0.96Ln(X) - 0.63	61%	39%	

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
221 - Multifamily Housing (Mid-Rise)	100	100	1	1	61	39

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	116	74	0	0	116	74
	190		0		190	

VEHICLE TRIPS AFTER MULTI-MODAL ADJUSTMENT

MODE SHARE:

Land Use	Personal Passenger Vehicle		Truck		Other Modes	
	Entry (%)	Exit (%)	Entry (%)	Exit (%)	Entry (%)	Exit (%)
221 - Multifamily Housing (Mid-Rise)	100%	100%	0%	0%	0%	0%

OCCUPANCY:

Land Use	Vehicle	
	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	1.00	1.00

ADJUSTED VEHICLE TRIPS:

Land Use	Entry				Exit			
	Person Trips	Vehicle Mode Share (%)	Vehicle Occupancy	Vehical Trips	Person Trips	Vehicle Mode Share (%)	Vehicle Occupancy	Vehical Trips
221 - Multifamily Housing (Mid-Rise)	116	100%	1.00	116	74	100%	1.00	74

INTERNAL VEHICLE TRIP REDUCTION

LAND USE GROUP ASSIGNMENT:

Land Use	Land Use Group

221 - Multifamily Housing (Mid-Rise)	Residential

BALANCED PERSON TRIPS:

INTERNAL PERSON TRIPS:
221 - Multifamily Housing (Mid-Rise)

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	**0**	**0**	**0**

INTERNAL VEHICLE TRIPS AND CAPTURE:
221 - Multifamily Housing (Mid-Rise)

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	**0**	**0**	**0**
Total External Vehicle Trips	116	74	190
Internal Vehicle Trip Capture	**0%**	**0%**	**0%**

PASS-BY VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Pass-by Vehicle Trip %		Pass-by Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	116	74	0.00%	0.00%	0	0

DIVERTED VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Diverted Vehicle Trip %		Diverted Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	116	74	0.00%	0.00%	0	0

EXTRA VEHICLE TRIP REDUCTION

Land Use	(External - (Pass-by + Diverted)) Vehicle Trips		Extra Vehicle Trip Reduction %		Extra Reduced Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
221 - Multifamily Housing (Mid-Rise)	116	74	0.00%	0.00%	0	0

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips		
	Entry	Exit	Total
221 - Multifamily Housing (Mid-Rise)	116	74	190

Land Use	New Vehicle Trips (PPV)		
	Entry	Exit	Total
221 - Multifamily Housing (Mid-Rise)	116	74	190

Land Use	New Vehicle Trips (Truck)		
	Entry	Exit	Total
221 - Multifamily Housing (Mid-Rise)	0	0	0

RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	116	74	190
Vehicle Trips After Multi-modal Adjustment	116	74	190
Internal Vehicle Trips	0	0	0
External Vehicle Trips	116	74	190
Internal Vehicle Trip Capture	0%	0%	0%
Pass-by Vehicle Trips	0	0	0
Diverted Vehicle Trips	0	0	0
Extra Reduced Vehicle Trips	0	0	0
New Vehicle Trips	116	74	190
PPV	116	74	190
Truck	0	0	0
Person Trips by Other Modes	0	0	0

PROJECT DETAILS

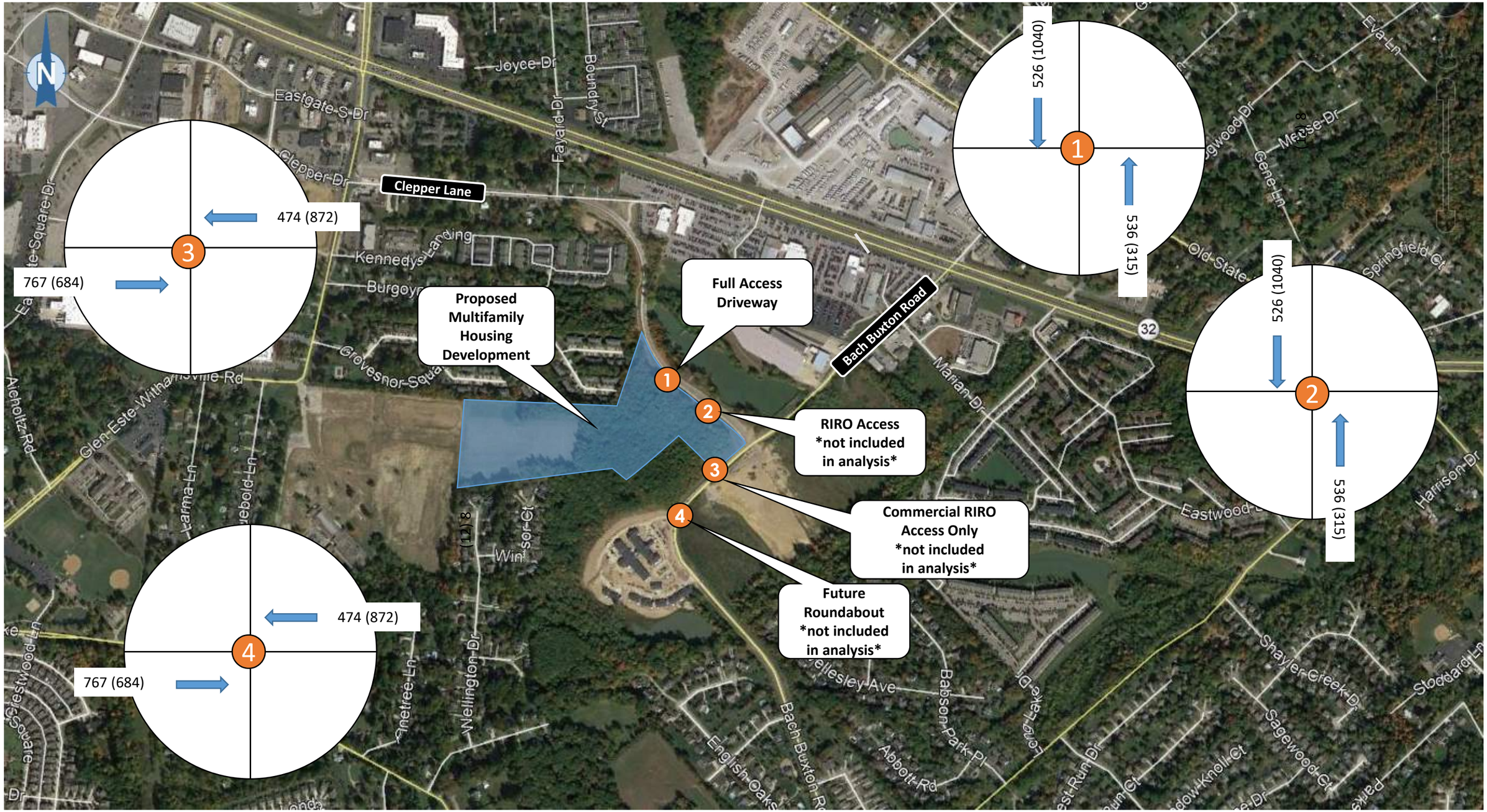
Project Name:	Union Township - Vision	Type of Project:	
Project No:		City:	
Country:		Built-up Area(Sq.ft):	
Analyst Name:	IT Support	Clients Name:	
Date:	7/31/2021	ZIP/Postal Code:	
State/Province:		No. of Scenarios:	4
Analysis Region:			

SCENARIO SUMMARY

Scenarios	Name	No. of Land Uses	Phases of Development	No. of Years to Project Traffic	User Group	Estimated New Vehicle Trips		
						Entry	Exit	Total
Scenario - 3	AM - No Commercial	1	1	20		39	112	151
Scenario - 4	PM - No Commercial	1	1	20		116	74	190

Attachment E

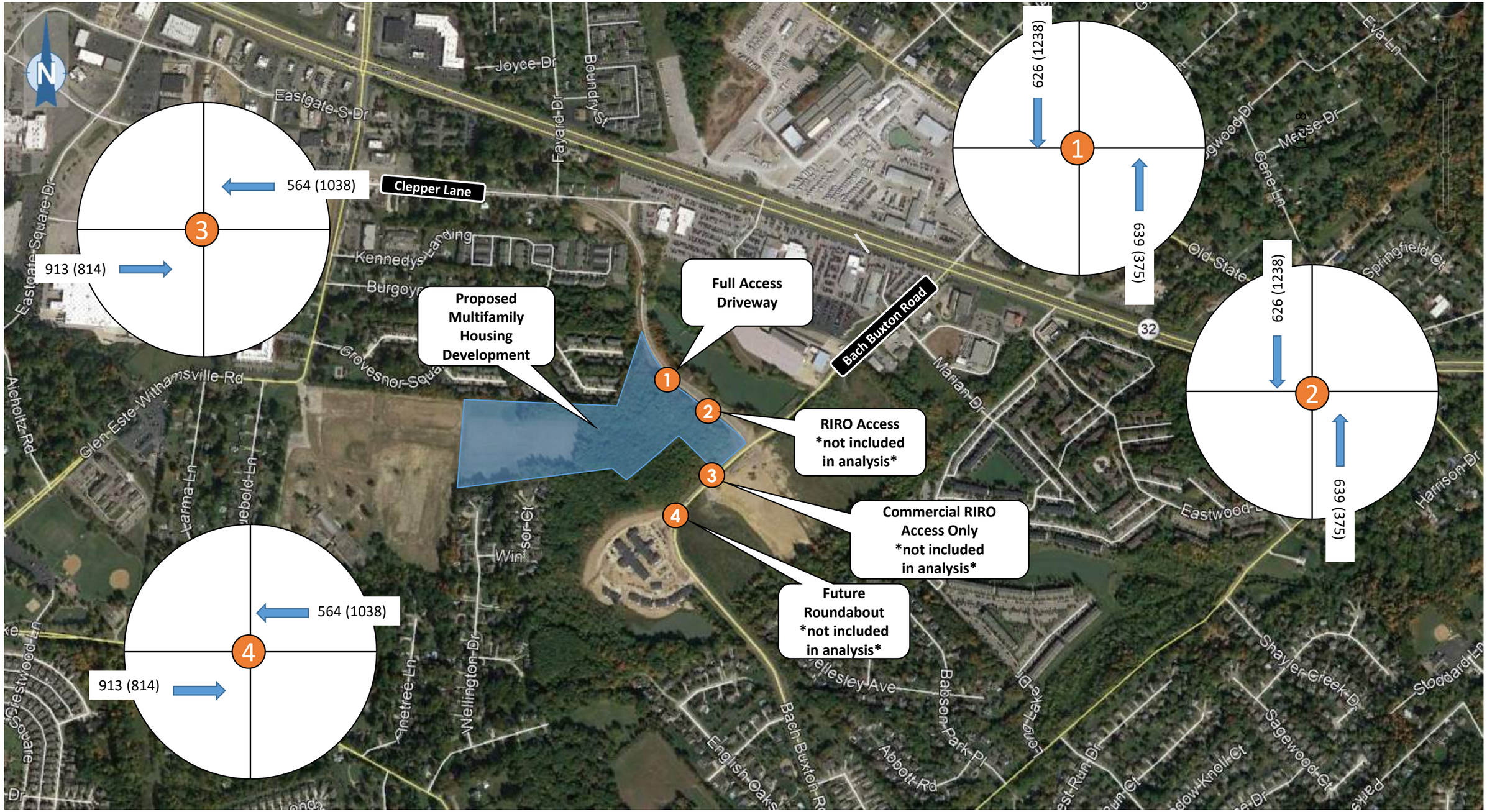
Trip Distribution Exhibits



AMERICAN STRUCTUREPOINT INC.	Legend: 1 2 3 4 Study Access Point; *Access points not included in analysis*; Proposed Site; XX (XX) AM (PM) Peak Hour Traffic Volumes	Union Township, Clermont County, Ohio Multi-Family Traffic Access Study	Plate A 2022 Peak Hour Background Traffic Volumes

2021.00827

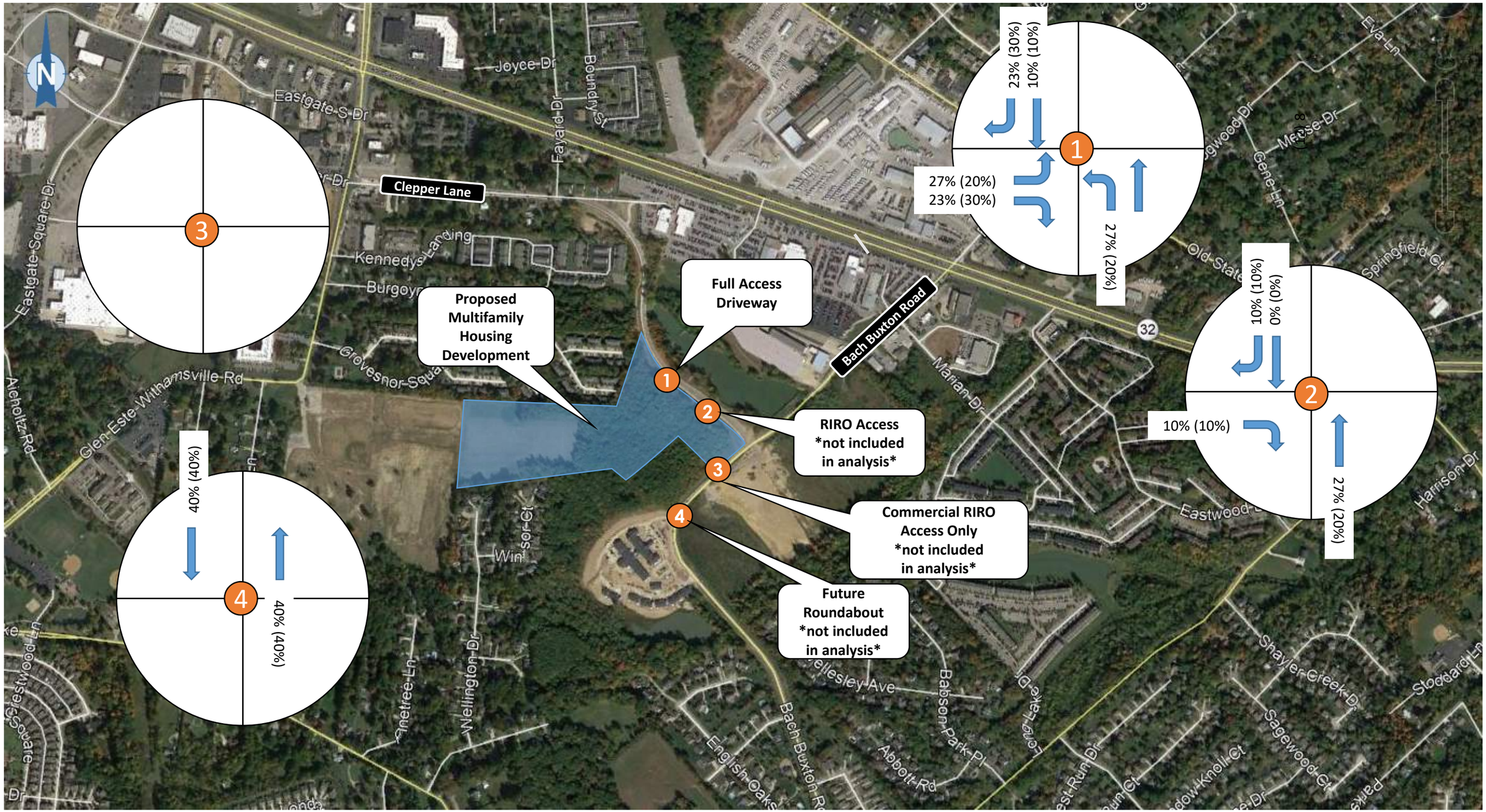
Defining the built environment.



AMERICAN STRUCTUREPOINT INC.	Legend: 1 2 3 4 Study Access Point; *Access points not included in analysis*; Proposed Site; XX (XX) AM (PM) Peak Hour Traffic Volumes	Union Township, Clermont County, Ohio Multi-Family Traffic Access Study	Plate B 2042 Peak Hour Background Traffic Volumes

2021.00827

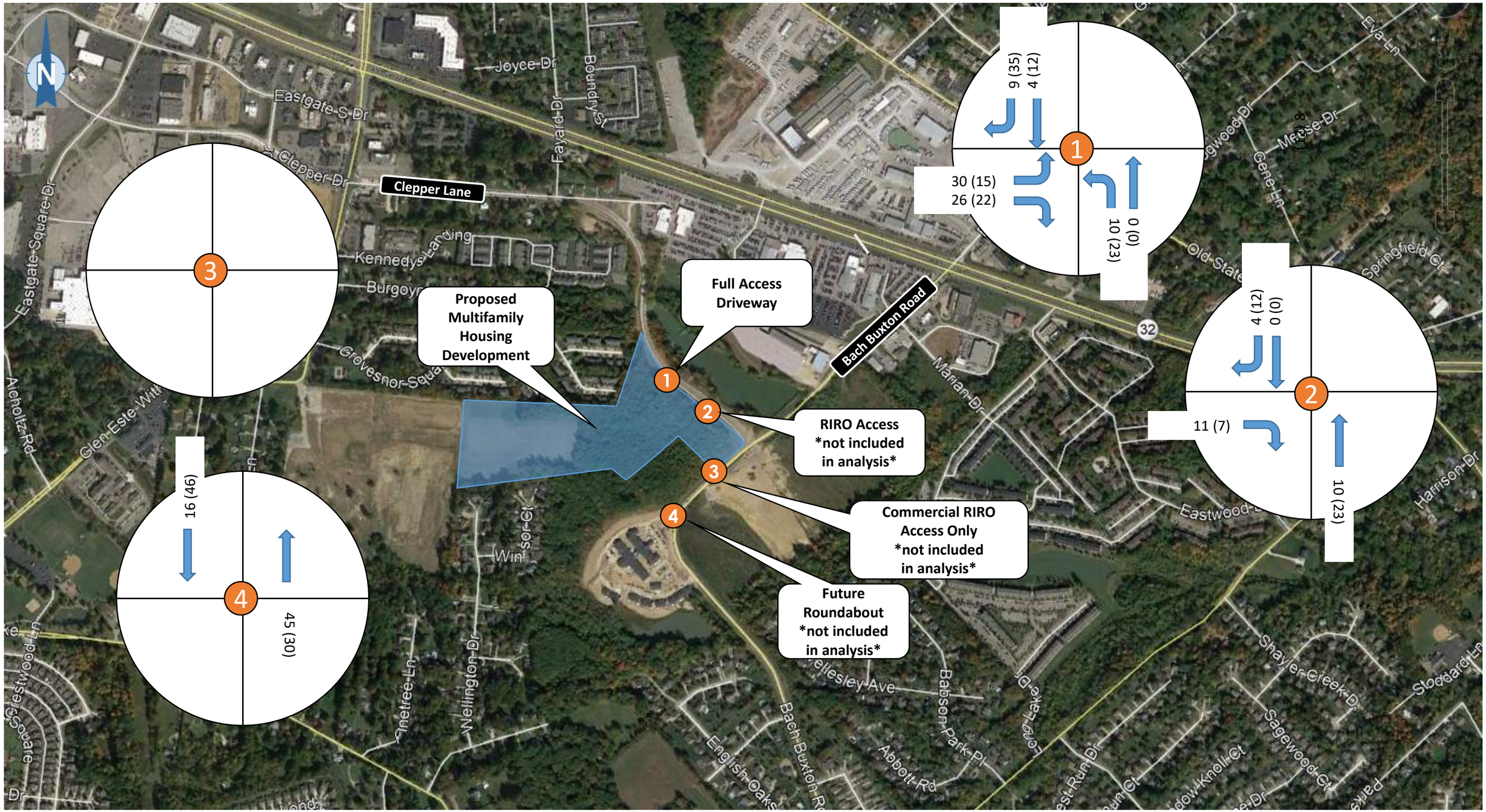
Defining the built environment.



AMERICAN STRUCTUREPOINT INC.	Legend: 1 Study Access Point; 2 3 4 *Access points not included in analysis*; Proposed Site; XX (XX) AM (PM) Peak Hour Traffic Volumes	Union Township, Clermont County, Ohio Multi-Family Traffic Access Study	Trip Distribution Percentages

2021.00827

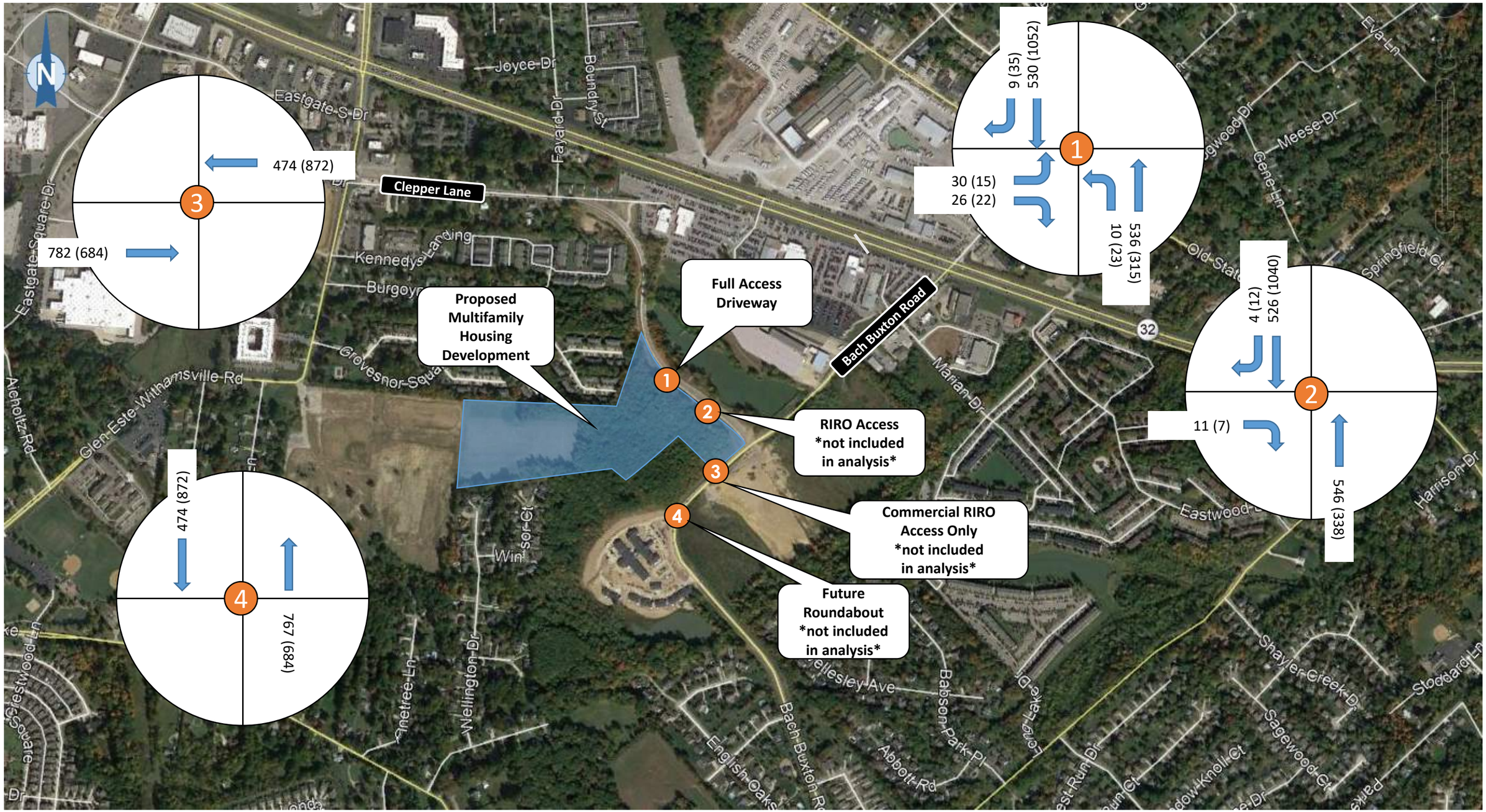
Defining the built environment.



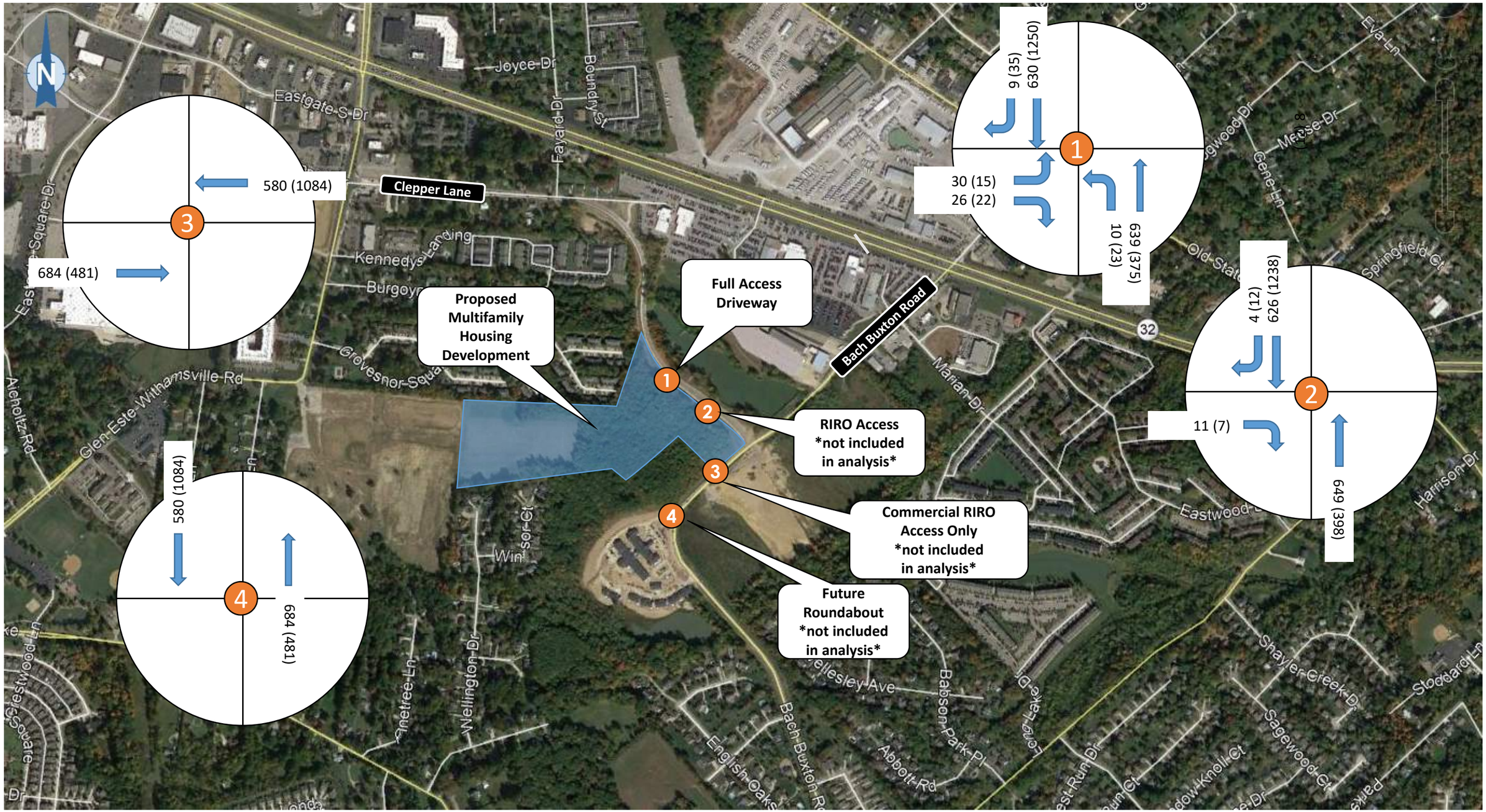
AMERICAN STRUCTUREPOINT INC.	Legend: 1 Study Access Point; 2 3 4 *Access points not included in analysis*; Proposed Site; XX (XX) AM (PM) Peak Hour Traffic Volumes	Union Township, Clermont County, Ohio Multi-Family Traffic Access Study	Plate C Trip Generation Distribution Peak Hour

2021.00827

Defining the built environment.



AMERICAN STRUCTUREPOINT INC.	Legend: 1 Study Access Point; 2 3 4 *Access points not included in analysis*; Proposed Site; XX (XX) AM (PM) Peak Hour Traffic Volumes	Union Township, Clermont County, Ohio Multi-Family Traffic Access Study	Plate D (A + C) 2022 Peak Hour Build Traffic Volumes



AMERICAN STRUCTUREPOINT INC.	Legend: 1 Study Access Point; 2 3 4 *Access points not included in analysis*; Proposed Site; XX (XX) AM (PM) Peak Hour Traffic Volumes	Union Township, Clermont County, Ohio Multi-Family Traffic Access Study	Plate E (B + C) 2042 Peak Hour Build Traffic Volumes

Attachment F

Capacity Analysis

HCS7 Two-Way Stop-Control Report

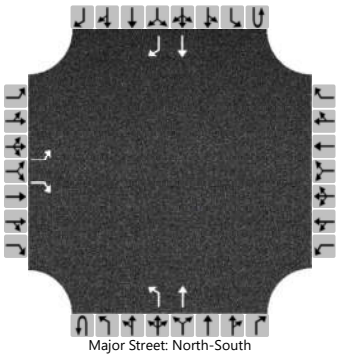
General Information

Analyst	JSW
Agency/Co.	American Structurepoint
Date Performed	2/2/2022
Analysis Year	2022
Time Analyzed	2022 AM - Full Build
Intersection Orientation	North-South
Project Description	Union Township Multi-Family Development

Site Information

Intersection	
Jurisdiction	
East/West Street	Site Access #1
North/South Street	Clepper Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		30		26						10	536				530	9
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		33		28						11						
Capacity, c (veh/h)		207		515						984						
v/c Ratio		0.16		0.05						0.01						
95% Queue Length, Q_{95} (veh)		0.5		0.2						0.0						
Control Delay (s/veh)		25.6		12.4						8.7						
Level of Service (LOS)		D		B						A						
Approach Delay (s/veh)		19.5								0.2						
Approach LOS		C														

HCS7 Two-Way Stop-Control Report

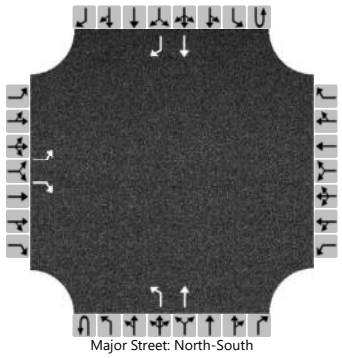
General Information

Analyst	JSW
Agency/Co.	American Structurepoint
Date Performed	2/2/2022
Analysis Year	2022
Time Analyzed	2022 PM - Full Build
Intersection Orientation	North-South
Project Description	Union Township Multi-Family Development

Site Information

Intersection	
Jurisdiction	
East/West Street	Site Access #1
North/South Street	Clepper Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		15		22						23	315				1052	35
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		16		24						25						
Capacity, c (veh/h)		122		242						587						
v/c Ratio		0.13		0.10						0.04						
95% Queue Length, Q_{95} (veh)		0.4		0.3						0.1						
Control Delay (s/veh)		39.1		21.5						11.4						
Level of Service (LOS)		E		C						B						
Approach Delay (s/veh)		28.6								0.8						
Approach LOS		D														

HCS7 Two-Way Stop-Control Report

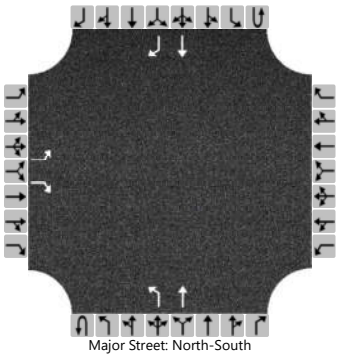
General Information

Analyst	JSW
Agency/Co.	American Structurepoint
Date Performed	2/2/2022
Analysis Year	2022
Time Analyzed	2042 AM - Full Build
Intersection Orientation	North-South
Project Description	Union Township Multi-Family Development

Site Information

Intersection	
Jurisdiction	
East/West Street	Site Access #1
North/South Street	Clepper Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		30		26						10	639				630	9
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		33		28						11						
Capacity, c (veh/h)		152		446						896						
v/c Ratio		0.21		0.06						0.01						
95% Queue Length, Q_{95} (veh)		0.8		0.2						0.0						
Control Delay (s/veh)		35.1		13.6						9.1						
Level of Service (LOS)		E		B						A						
Approach Delay (s/veh)		25.1								0.1						
Approach LOS		D														

HCS7 Two-Way Stop-Control Report

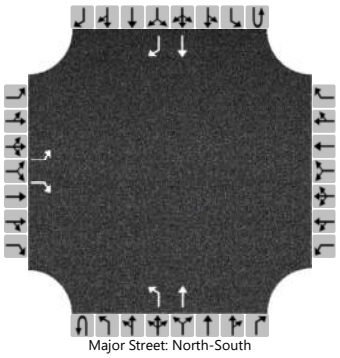
General Information

Analyst	JSW
Agency/Co.	American Structurepoint
Date Performed	2/2/2022
Analysis Year	2022
Time Analyzed	2042 PM - Full Build
Intersection Orientation	North-South
Project Description	Union Township Multi-Family Development

Site Information

Intersection	
Jurisdiction	
East/West Street	Site Access #1
North/South Street	Clepper Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		15		22						23	375				1250	35
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		16		24						25						
Capacity, c (veh/h)		81		181						486						
v/c Ratio		0.20		0.13						0.05						
95% Queue Length, Q_{95} (veh)		0.7		0.4						0.2						
Control Delay (s/veh)		60.5		27.9						12.8						
Level of Service (LOS)		F		D						B						
Approach Delay (s/veh)		41.1								0.7						
Approach LOS		E														

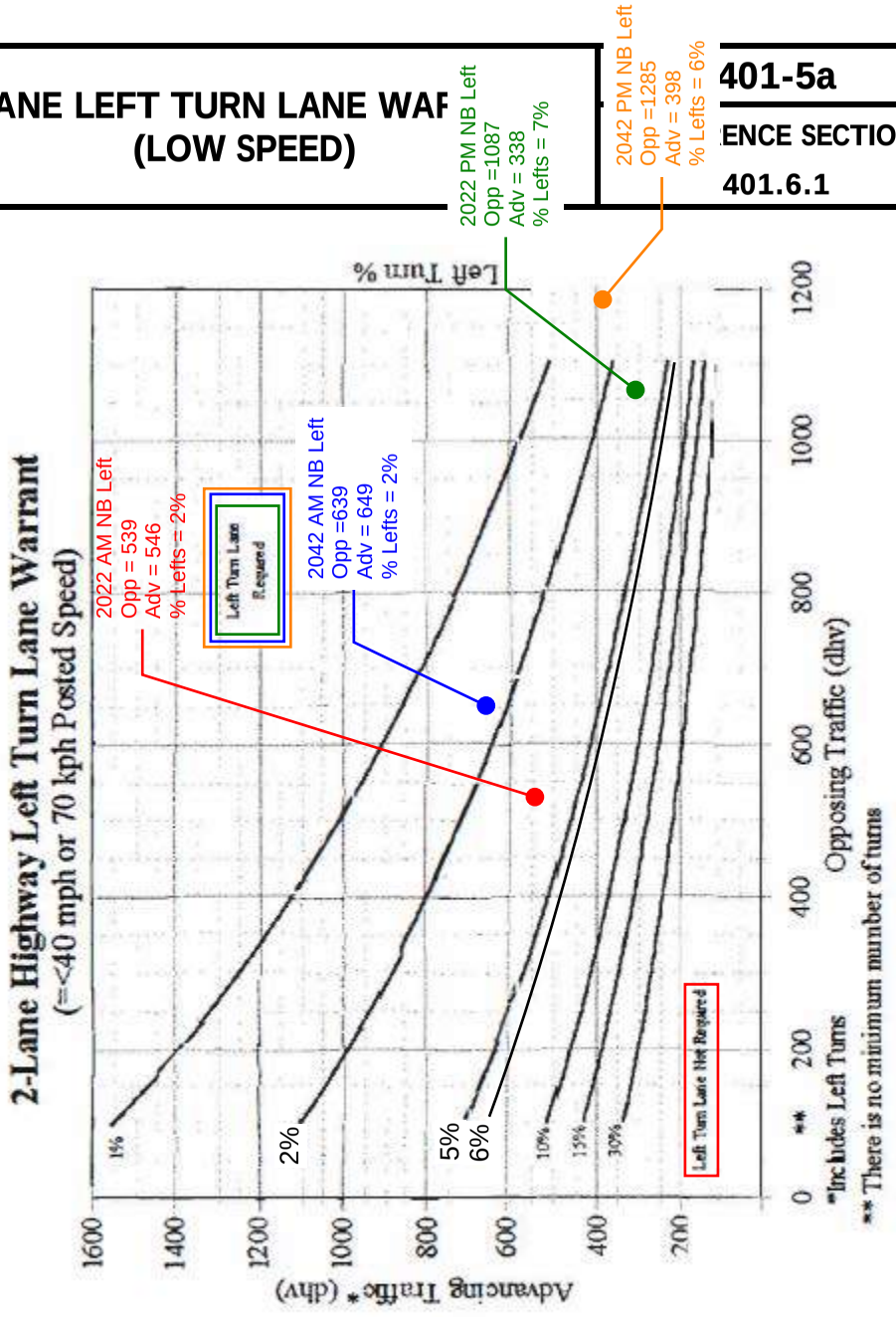
Attachment G

Turn Lane Warrant Analysis

2-LANE LEFT TURN LANE WAR
(LOW SPEED)

401-5a

ENCE SECTION
401.6.1

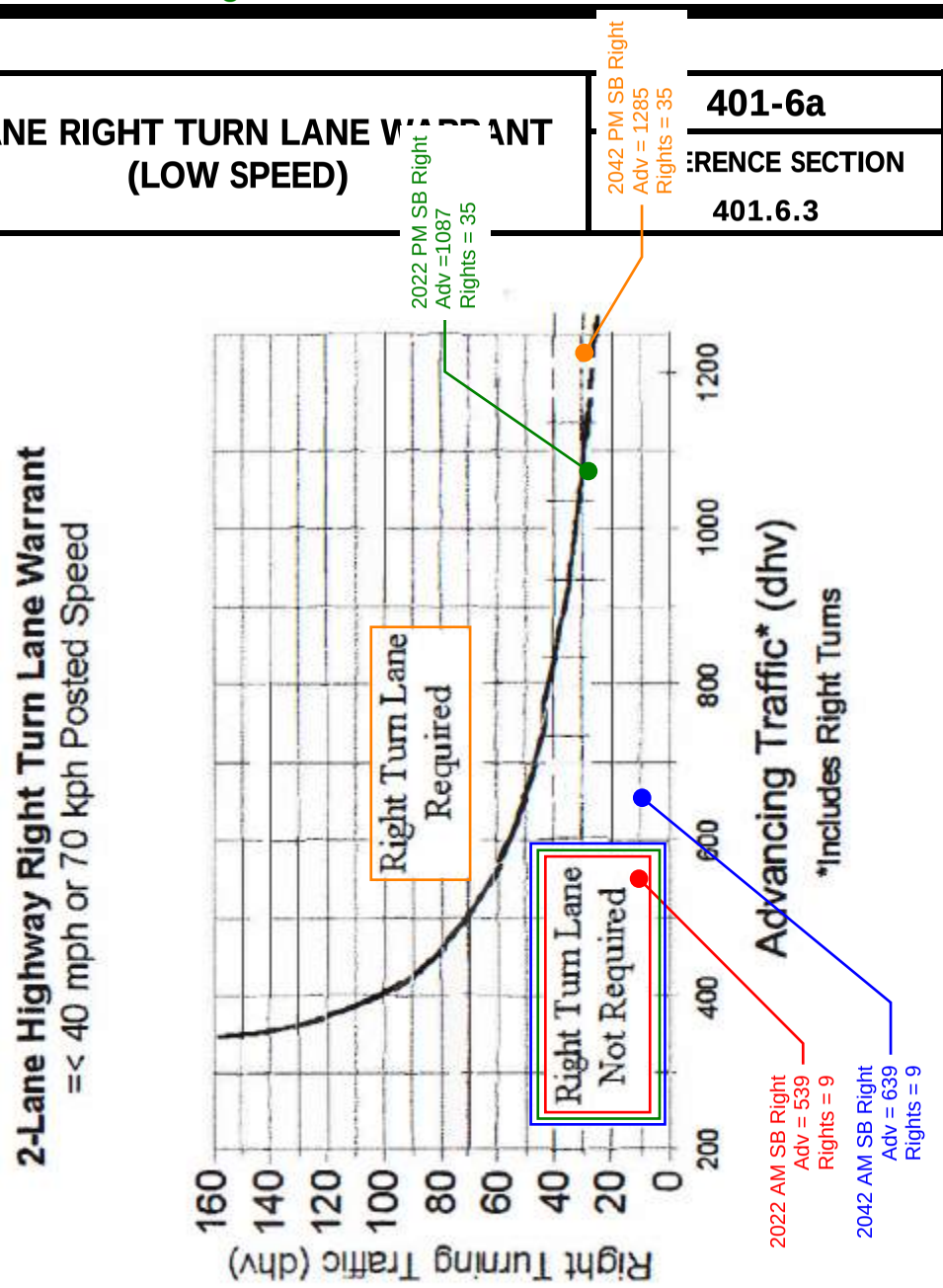


October 2004

2-LANE RIGHT TURN LANE WARRANT
(LOW SPEED)

401-6a

ERENCE SECTION
401.6.3



October 2004

Intersection: Clepper Lane & Site Access

Movement Analyzed: **Northbound Left Turn**
NBL

Speed Limit: 35 Design Year 2042
Design Speed: 35 Peak Hour AM
Type of Traffic Control: UNSIGNALIZED THROUGH ROAD
Turn Demand Volume Type: LOW
Applicable Condition(s): **CONDITION A**
Cycle Length: 60 seconds
Average Vehicles per Cycle: *1 veh/cyc*

CONDITION A STORAGE ONLY

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
NBL	50	50	***100***

CONDITION B HIGH SPEED DECELERATION ONLY

Movement	***Turn Lane Length (ft)***
NBL	***#N/A***

CONDITION C MODERATE SPEED DECELERATION AND STORAGE

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
NBL	#N/A	50	***#N/A***

#N/A

Conclusion: **Use Condition A**
Total Turn Length (ft) 100

Intersection: Clepper Lane & Site Access

Movement Analyzed: **Northbound Left Turn**
NBL

Speed Limit: 35 Design Year 2042
Design Speed: 35 Peak Hour PM
Type of Traffic Control: UNSIGNALIZED THROUGH ROAD
Turn Demand Volume Type: LOW
Applicable Condition(s): **CONDITION A**
Cycle Length: 60 seconds
Average Vehicles per Cycle: *1 veh/cyc*

CONDITION A STORAGE ONLY

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
NBL	50	50	***100***

CONDITION B HIGH SPEED DECELERATION ONLY

Movement	***Turn Lane Length (ft)***
NBL	***#N/A***

CONDITION C MODERATE SPEED DECELERATION AND STORAGE

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
NBL	#N/A	50	***#N/A***

#N/A

Conclusion: **Use Condition A**
Total Turn Length (ft) 100

Intersection: Clepper Lane & Site Access

Movement Analyzed: **Southbound Right Turn**
SBR

Speed Limit: 35 Design Year 2042
Design Speed: 35 Peak Hour PM
Type of Traffic Control: UNSIGNALIZED THROUGH ROAD
Turn Demand Volume Type: LOW
Applicable Condition(s): **CONDITION A**
Cycle Length: 60 seconds
Average Vehicles per Cycle: *1 veh/cyc*

CONDITION A STORAGE ONLY

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
SBR	50	50	***100***

CONDITION B HIGH SPEED DECELERATION ONLY

Movement	***Turn Lane Length (ft)***
SBR	***#N/A***

CONDITION C MODERATE SPEED DECELERATION AND STORAGE

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
SBR	#N/A	50	***#N/A***

#N/A

Conclusion: **Use Condition A**
Total Turn Length (ft) 100

Intersection: **Clepper Lane & Site Access**

Movement Analyzed: **Southbound Right Turn**
SBR

Speed Limit: 35 Design Year 2042
Design Speed: 35 Peak Hour AM
Type of Traffic Control: UNSIGNALIZED THROUGH ROAD
Turn Demand Volume Type: LOW
Applicable Condition(s): **CONDITION A**
Cycle Length: 60 seconds
Average Vehicles per Cycle: *1 veh/cyc*

CONDITION A STORAGE ONLY

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
SBR	50	50	***100***

CONDITION B HIGH SPEED DECELERATION ONLY

Movement	***Turn Lane Length (ft)***
SBR	***#N/A***

CONDITION C MODERATE SPEED DECELERATION AND STORAGE

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	***Total Length (ft)***
SBR	#N/A	50	***#N/A***

#N/A

Conclusion: **Use Condition A**
Total Turn Length (ft) 100

Attachment H

Signal Warrant Analysis

2022 Signal Warrant Analysis - Input Data

Project Name:	Union Township	Project Number:	2021.00827
Intersection:	Clepper Lane & Site Access #1	Count Date:	7/29/2021
Major Street:	Clepper Lane	# of approach lanes:	1
Minor Street:	Site Access	# of approach lanes:	1

Current Intersection Condition: Unsignalized

Isolated community with population less than 10,000?	NO	
85th Percentile speed greater than 40 mph on major street?	NO	<---- 100% values used

TRAFFIC VOLUMES

Union Township

INTERSECTION: **Clepper Lane & Site Access #1**

DATA DATE: 7/29/2021 **DURATION:** 6:00 AM - 12:00 PM

VEHICLES - TOTAL **AM Peak**

	NB			SB			EB			WB				
	Clepper Lane			**Clepper Lane**			**Site Access #1**			**Site Access #1**				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT		
TIME BEGIN													INTERVAL TOTAL	HOUR TOTAL
06:00AM	8	148			381	12	24		37				610	610
06:15AM													0	994
06:30AM													0	994
06:45AM													0	994
07:00AM	19	363			555	18	20		19				994	994
07:15AM													0	920
07:30AM													0	920
07:45AM													0	920
08:00AM	17	309			525	17	26		26				920	920
08:15AM													0	729
08:30AM													0	729
08:45AM													0	729
09:00AM	12	220			444	14	18		21				729	729
09:15AM													0	810
09:30AM													0	810
09:45AM													0	810
10:00AM	13	251			493	16	17		20				810	810
10:15AM													0	910
10:30AM													0	910
10:45AM													0	910
11:00AM	17	306			532	17	19		19				910	910
11:15AM													0	--
11:30AM													0	--
11:45AM													0	--

TRAFFIC VOLUMES

Union Township

INTERSECTION: **Clepper Lane & Site Access #1**

DATA DATE: 7/29/2021 **DURATION:** 12:00 PM - 6:00 PM

VEHICLES - TOTAL **PM Peak**

	NB			SB			EB			WB				
	Clepper Lane			**Clepper Lane**			**N Service Rd**			**N Service Rd**				
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT		
TIME BEGIN													INTERVAL TOTAL	HOUR TOTAL
12:00PM	20	366			554	18	18		16				992	992
12:15PM													0	962
12:30PM													0	962
12:45PM													0	962
01:00PM	20	368			528	17	16		13				962	962
01:15PM													0	1017
01:30PM													0	1017
01:45PM													0	1017
02:00PM	21	402			550	18	14		12				1017	1017
02:15PM													0	1352
02:30PM													0	1352
02:45PM													0	1352
03:00PM	29	538			728	23	19		15				1352	1352
03:15PM													0	1339
03:30PM													0	1339
03:45PM													0	1339
04:00PM	29	527			723	23	20		17				1339	1339
04:15PM													0	1571
04:30PM													0	1571
04:45PM													0	1571
05:00PM	33	609			867	28	18		16				1571	1571
05:15PM													0	--
05:30PM													0	--
05:45PM													0	--

2022 Signal Warrant Analysis - Input Data
12-Hr Data

Union Township

Time of Day	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
6:00-7:00AM	8	148	0	0	381	12	24	0	37	0	0	0
7:00-8:00AM	19	363	0	0	555	18	20	0	19	0	0	0
8:00-9:00AM	17	309	0	0	525	17	26	0	26	0	0	0
9:00-10:00AM	12	220	0	0	444	14	18	0	21	0	0	0
10:00-11:00AM	13	251	0	0	493	16	17	0	20	0	0	0
11:00-12:00PM	17	306	0	0	532	17	19	0	19	0	0	0
12:00-1:00PM	20	366	0	0	554	18	18	0	16	0	0	0
1:00-2:00PM	20	368	0	0	528	17	16	0	13	0	0	0
2:00-3:00PM	21	402	0	0	550	18	14	0	12	0	0	0
3:00-4:00PM	29	538	0	0	728	23	19	0	15	0	0	0
4:00-5:00PM	29	527	0	0	723	23	20	0	17	0	0	0
5:00-6:00PM	33	609	0	0	867	28	18	0	16	0	0	0

AMERICAN STRUCTUREPOINT INC.

Defining the built environment.

2022 Signal Warrant Analysis - Input Data
12-Hr Data (RTOR red.)

Union Township

Time of Day	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
6:00-7:00AM	8	148	0	0	381	12	24	0	9	0	0	0
7:00-8:00AM	19	363	0	0	555	18	20	0	5	0	0	0
8:00-9:00AM	17	309	0	0	525	17	26	0	7	0	0	0
9:00-10:00AM	12	220	0	0	444	14	18	0	5	0	0	0
10:00-11:00AM	13	251	0	0	493	16	17	0	5	0	0	0
11:00-12:00PM	17	306	0	0	532	17	19	0	5	0	0	0
12:00-1:00PM	20	366	0	0	554	18	18	0	5	0	0	0
1:00-2:00PM	20	368	0	0	528	17	16	0	4	0	0	0
2:00-3:00PM	21	402	0	0	550	18	14	0	4	0	0	0
3:00-4:00PM	29	538	0	0	728	23	19	0	5	0	0	0
4:00-5:00PM	29	527	0	0	723	23	20	0	6	0	0	0
5:00-6:00PM	33	609	0	0	867	28	18	0	6	0	0	0

75%	% of Right Turn Reduction	
Table 497-7	Table 497-8	Mainline Vols/Lane
75%	0%	156
75%	0%	382
75%	0%	326
75%	0%	232
75%	0%	264
75%	0%	323
70%	5%	386
70%	5%	388
70%	5%	423
65%	10%	567
65%	10%	556
60%	15%	642

AMERICAN STRUCTUREPOINT INC.

Defining the built environment.

2022 Signal Warrant Analysis - Input Data

Project Name:	Union Township	Project Number:	2021.00827
Intersection:	Clepper Lane & Site Access #1	Count Date:	7/29/2021
Major Street:	Clepper Lane	# of approach lanes:	1
Minor Street:	Site Access	# of approach lanes:	1

Current Intersection Condition: Unsignalized

Isolated community with population less than 10,000? NO

85th Percentile speed greater than 40 mph on major street? NO <---- 100% values used

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

	Major Street Volume (both approaches)	Minor Street Volume (highest approach)	Warrant 1, Condition A			Warrant 1, Condition B		
			Major St	Minor St	Both Met?	Major St	Minor St	Both Met?
Threshold Values			*500*	*150*		*750*	*75*	
6:00-7:00AM	549	33	YES	NO	NO	NO	NO	NO
7:00-8:00AM	955	25	YES	NO	NO	YES	NO	NO
8:00-9:00AM	868	33	YES	NO	NO	YES	NO	NO
9:00-10:00AM	690	23	YES	NO	NO	NO	NO	NO
10:00-11:00AM	773	22	YES	NO	NO	YES	NO	NO
11:00-12:00PM	872	24	YES	NO	NO	YES	NO	NO
12:00-1:00PM	958	23	YES	NO	NO	YES	NO	NO
1:00-2:00PM	933	20	YES	NO	NO	YES	NO	NO
2:00-3:00PM	991	18	YES	NO	NO	YES	NO	NO
3:00-4:00PM	1318	24	YES	NO	NO	YES	NO	NO
4:00-5:00PM	1302	26	YES	NO	NO	YES	NO	NO
5:00-6:00PM	1537	24	YES	NO	NO	YES	NO	NO
					NOT MET			**NOT MET**

2022 Signal Warrant Analysis - Input Data

Project Name:	Union Township	Project Number:	2021.00827
Intersection:	Clepper Lane & Site Access #1	Count Date:	7/29/2021
Major Street:	Clepper Lane	# of approach lanes:	1
Minor Street:	Site Access	# of approach lanes:	1

Current Intersection Condition: Unsignalized

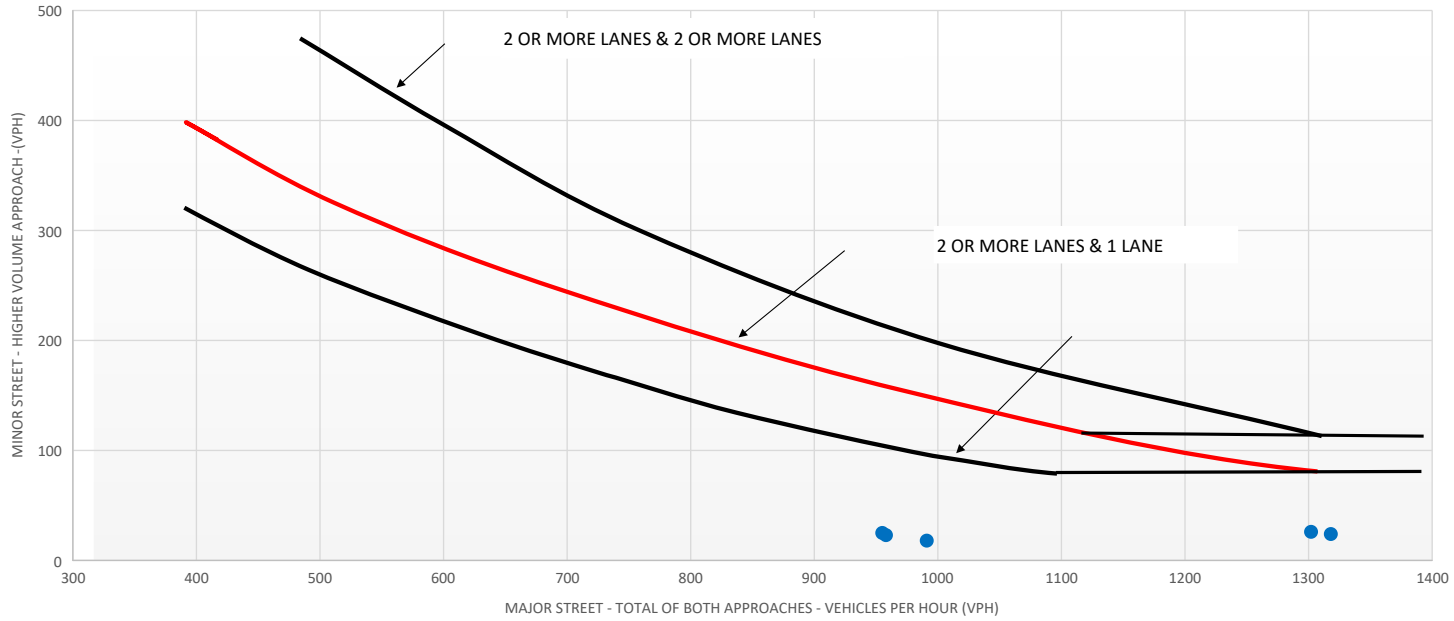
Isolated community with population less than 10,000?	NO	
85th Percentile speed greater than 40 mph on major street?	NO	<---- 100% values used

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME

	Major Street Volume (both approaches)	Minor Street Volume (highest approach)	MET?
Threshold Values	*1092*	*80*	
6:00-7:00AM	549	33	NO
7:00-8:00AM	955	25	NO
8:00-9:00AM	868	33	NO
9:00-10:00AM	690	23	NO
10:00-11:00AM	773	22	NO
11:00-12:00PM	872	24	NO
12:00-1:00PM	958	23	NO
1:00-2:00PM	933	20	NO
2:00-3:00PM	991	18	NO
3:00-4:00PM	1318	24	NO
4:00-5:00PM	1302	26	NO
5:00-6:00PM	1537	24	NO
			NOT MET

2022 Signal Warrant Analy:	Union Township	Project Number:	2021.00827
Intersection:	Union Township	Count Date:	7/29/2021
Major Street:	Clepper Lane	# of approach lanes:	1
Minor Street:	Site Access	# of approach lanes:	1

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume (100% Factor)



2022 Signal Warrant Analysis - Input Data

Project Name:	Union Township	Project Number:	2021.00827
Intersection:	Clepper Lane & Site Access #1	Count Date:	7/29/2021
Major Street:	Clepper Lane	# of approach lanes:	1
Minor Street:	Site Access	# of approach lanes:	1

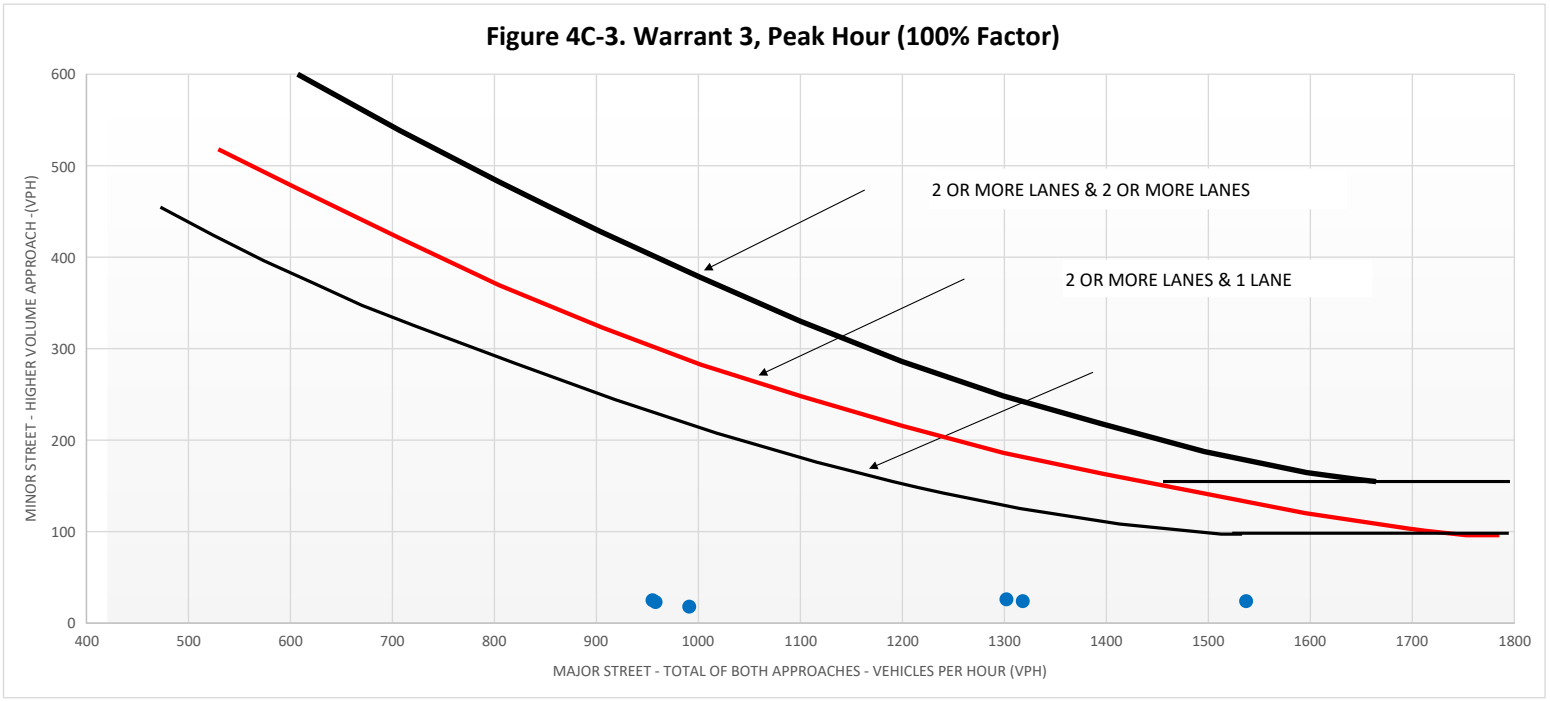
Current Intersection Condition: Unsignalized

Isolated community with population less than 10,000?	NO	
85th Percentile speed greater than 40 mph on major street?	NO	<---- 100% values used

WARRANT 3 - PEAK HOUR

	Major Street Volume (both approaches)	Minor Street Volume (highest approach)	MET?
Threshold Values	*1516*	*100*	
6:00-7:00AM	549	33	NO
7:00-8:00AM	955	25	NO
8:00-9:00AM	868	33	NO
9:00-10:00AM	690	23	NO
10:00-11:00AM	773	22	NO
11:00-12:00PM	872	24	NO
12:00-1:00PM	958	23	NO
1:00-2:00PM	933	20	NO
2:00-3:00PM	991	18	NO
3:00-4:00PM	1318	24	NO
4:00-5:00PM	1302	26	NO
5:00-6:00PM	1537	24	NO
			NOT MET

2022 Signal Warrant Analy:	Union Township	Project Number:	2021.00827
Intersection:	Union Township	Count Date:	7/29/2021
Major Street:	Clepper Lane	# of approach lanes:	1
Minor Street:	Site Access	# of approach lanes:	1



2022 Signal Warrant Analysis - Input Data

Project:	Union Township	Project Number:	2021.00827
Intersection:	Clepper Lane & Site Access #1	Count Date:	7/29/2021
Major Street:	Clepper Lane	# of approach lanes:	1
Minor Street:	Site Access	# of approach lanes:	1

Current Intersection Condition: Unsignalized

Isolated community with population less than 10,000?	NO	
85th Percentile speed greater than 40 mph on major street?	NO	<---- 100% values used

WARRANT 4 - PEDESTRIAN VOLUME

Pedestrian volumes are minimal at this location

WARRANT 5 - SCHOOL CROSSING

Not applicable

WARRANT 6 - COORDINATED SIGNAL SYSTEM

Not applicable

WARRANT 7 - CRASH EXPERIENCE

Crash data was not provided

WARRANT 8 - ROADWAY NETWORK

Not applicable

WARRANT 9 - INTERSECTION NEAR A GRADE CROSSING

Not applicable

2022 Signal Warrant Analysis - Input Data		
Warrant	Description	Warrant Met?
1A	Union Township	**NOT MET**
1B	8-hour Vehicular Volume, Condition B	**NOT MET**
2	4-hour Vehicular Volume	**NOT MET**
3	Peak Hour	**NOT MET**
4	Pedestrian Volume	N/A
5	School Crossing	N/A
6	Coordinated Signal System	N/A
7	Crash Experience	N/A
8	Roadway Network	N/A
9	Intersection Near a Grade Crossing	N/A

ATTACHMENT A

Mixed-Use Development Traffic Impact Study

ChoiceOne Engineering

Union Township, Clermont County, Ohio

Mixed-Use Development Traffic Impact Study

July 2024

W. Central Ohio/E. Indiana
440 E. Hoewisher Rd.
Sidney, OH 45365
937.497.0200 Phone

S. Ohio/N. Kentucky
8956 Glendale Milford Rd., Suite 1
Loveland, OH 45140
513.239.8554 Phone

www.CHOICEONEENGINEERING.com

Table of Contents

Traffic Impact Study

Analysis Snapshot

This document details the following items prepared for the proposed Mixed Use Development located along Bach-Buxton Road, surrounding the recently developed Provision Living at West Clermont (4299 Bach-Buxton Road) in Union Township, Clermont County, Ohio. The proposed site includes the construction of the following uses:

Villas-Phase 2

- Land Use Code 251: Senior Adult Housing – Single Family, 59 Dwelling Units

Mixed Use Commercial*

- Land Use Code 932: High-Turnover (Sit-Down) Restaurant, 2 at 4,000 square feet each
- Land Use Code 937: Coffee/Donut Shop with Drive Through Window, 2,500 square feet
- Land Use Code 971: Brewery Tap Room, 10,000 square feet

Independent Senior Living**

- Land Use Code 252: Senior Adult Housing-Multi Family, 175 Dwelling Units

***This study made assumptions of potential land uses based on input of the developer. There are no final land uses established, however the uses and sizes of the uses proposed are anticipated to be conservative.

**This Independent Senior Living development is not expected to be built until after the Villas phase 2 and the mixed-use commercial development. However, it was included in this study to ensure that Bach-Buxton Road can adequately handle the full buildout of this development. Depending on the final timing of the Independent Senior Living, a turn lane analysis with updated traffic counts may be necessary.

The proposed site plan is attached in Appendix B.

This traffic impact study includes Study Area, Existing Conditions, Traffic Counts, Proposed Access Points, Trip Generation, Directional Distribution, Growth Rate, 2025 Opening Year Build Traffic Volumes, 2035 Design Year Build Traffic Volumes, Capacity Analysis, Turn Lane Analysis, and Recommendations.

This study focused on evaluating the operation and capacity of Bach-Buxton Road, Clepper Lane, and the existing/proposed site drives. The purpose of this study is to identify the traffic-related impacts of the proposed development during typical weekday AM and PM roadway peak hours.

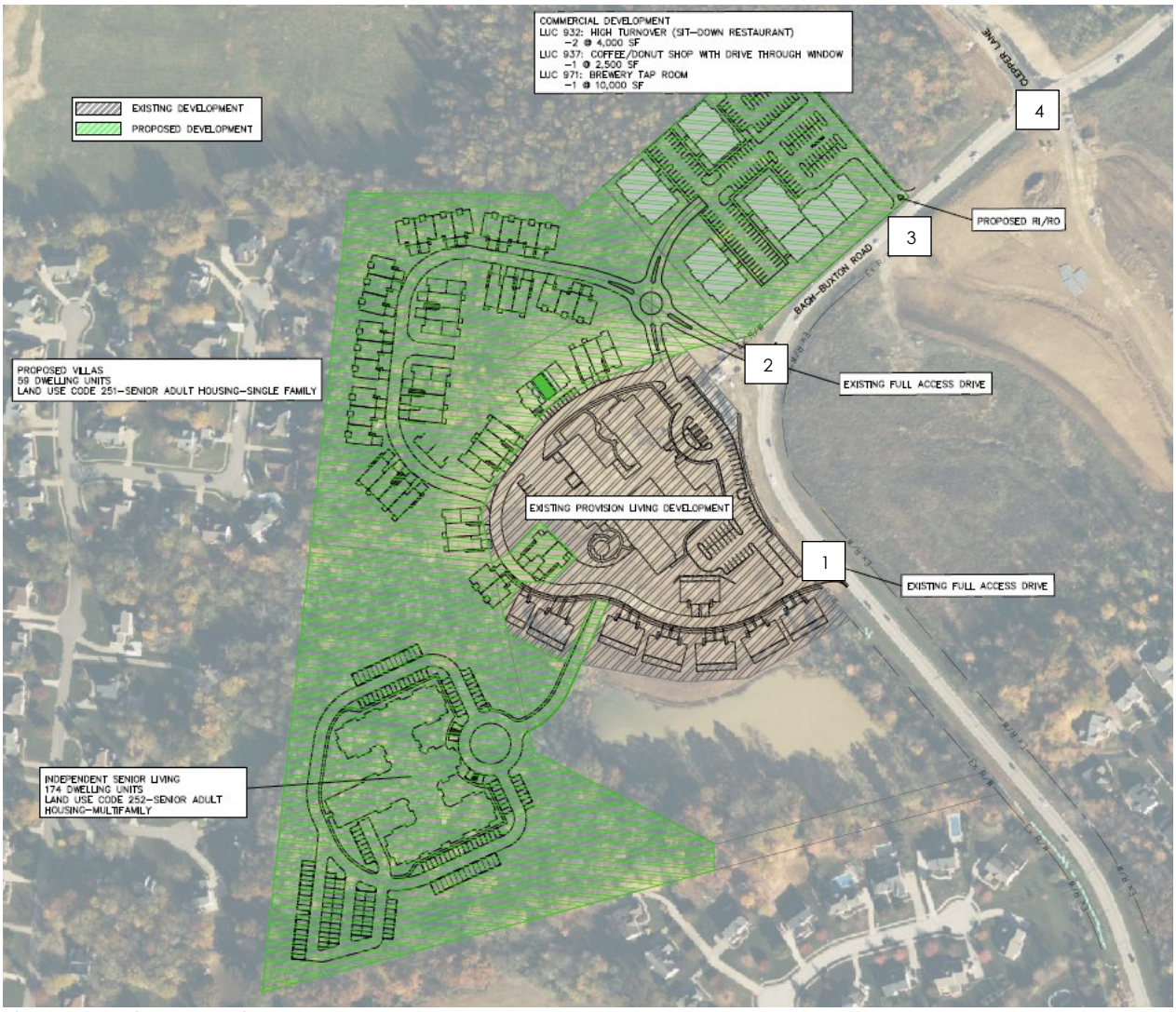


Figure 1: Project Location

Study Area

The studied intersections for the proposed development are listed below. The number notation shown below is the notation used throughout the study.

1. Bach-Buxton Road & Existing Southern Full Access Drive
2. Bach-Buxton Road & Existing Northern Full Access Drive
3. Bach-Buxton Road & Proposed Right In/Right Out Drive
4. Bach-Buxton Road & Clepper Lane

Existing Conditions

Bach-Buxton Road is currently a two-lane roadway and is classified in ODOT's Functional Classification System as a "Minor Arterial". The average daily traffic (ADT) of Bach-Buxton Road is 10,016 vehicles and the posted speed limit is 45 MPH.

Clepper Lane is currently a two-lane roadway and is classified in ODOT's Functional Classification System as a "Major Collector". The average daily traffic (ADT) of Clepper Lane is 4,306 vehicles and the posted speed limit is 35 MPH.

Traffic Counts

Peak hour turning movement count data was collected by Choice One Engineering Corporation (COEC) on Tuesday, February 20, 2024. A summary of the peak hours are in the table below and the existing traffic volumes are attached in Appendix A.

Figure 2: Peak Hours

Intersection	AM Peak	PM Peak
1-Bach-Buxton Road & Existing Southern Drive	7:00-8:00 AM	4:00-5:00 PM
2-Bach-Buxton Road & Existing Northern Drive	7:00-8:00 AM	4:45-5:45 PM
4-Bach-Buxton Road & Clepper Lane	7:00-8:00 AM	4:45-5:45 PM

Proposed Access Points

The proposed site has three (3) access points. Two of these full access points are already constructed with the existing Provision Living Site. There is one new proposed right in/right out driveway along Bach-Buxton Road approximately 360 feet south of Clepper Lane. Based on a 45 mile per hour speed limit, this proposed access point will meet the 360' minimum drive spacing. The proposed concept plan is attached in Appendix B.

Trip Generation

Trips for the proposed site were generated using the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition*. The trips are summarized in the tables below and attached in Appendix C.

Figure 3: Trip Generation Summary

Independent Senior Living

Land Use Description	ITE Code	Size	Unit	AM Peak Hour							PM Peak Hour						
				Total Trips	Primary Trips			Pass-By Trips			Total Trips	Primary Trips			Pass-By Trips		
					Total	Entering	Exiting	Total	Entering	Exiting		Total	Entering	Exiting	Total	Entering	Exiting
Senior Adult Housing - Multifamily	252	174	Dwelling Units	34	34	12	22	0	0	0	44	44	24	20	0	0	0
Directional Distributions						*34%*	*66%*		*0%*	*0%*			*56%*	*44%*		*0%*	*0%*
Totals				**34**	**34**	**12**	**22**	**0**	**0**	**0**	**44**	**44**	**24**	**20**	**0**	**0**	**0**

Villas-Phase 2

Land Use Description	ITE Code	Size	Unit	AM Peak Hour							PM Peak Hour						
				Total Trips	Primary Trips			Pass-By Trips			Total Trips	Primary Trips			Pass-By Trips		
					Total	Entering	Exiting	Total	Entering	Exiting		Total	Entering	Exiting	Total	Entering	Exiting
Senior Adult Housing - Single-Family	251	59	Dwelling Units	26	26	9	17	0	0	0	29	29	18	11	0	0	0
Directional Distributions						*33%*	*67%*		*0%*	*0%*			*61%*	*39%*	*0%*	*0%*	*0%*
Totals				**26**	**26**	**9**	**17**	**0**	**0**	**0**	**29**	**29**	**18**	**11**	**0**	**0**	**0**

Mixed Use Commercial

Land Use Description	ITE Code	Size	Unit	AM Peak Hour							PM Peak Hour						
				Total Trips	Primary Trips			Pass-By Trips			Total Trips	Primary Trips			Pass-By Trips		
					Total	Entering	Exiting	Total	Entering	Exiting		Total	Entering	Exiting	Total	Entering	Exiting
High-Turnover (Sit-Down) Restauraunt (2 @ 4,000 SF)	932	8,000	Sq. Ft. GFA	77	77	42	35	0	0	0	72	72	44	28	0	0	0
Directional Distributions						*55%*	*45%*		*0%*	*0%*			*61%*	*39%*		*0%*	*0%*
Coffee/Donut Shop With Drive Through Window	937	2,500	Sq. Ft. GFA	215	86	44	42	129	64	65	97	39	19	20	58	29	29
Directional Distributions						*51%*	*49%*	*60%*	*50%*	*50%*			*50%*	*50%*	*60%*	*50%*	*50%*
Brewery Tap Room	971	10,000	Sq. Ft. GFA	7	7	6	1	0	0	0	98	98	58	40	0	0	0
Directional Distributions						*88%*	*12%*		*0%*	*0%*			*59%*	*41%*		*0%*	*0%*
Totals				**298**	**169**	**92**	**77**	**129**	**64**	**65**	**268**	**210**	**121**	**89**	**58**	**29**	**29**

Directional Distribution

COEC analyzed the existing traffic volumes and population density to formulate the directional distribution. The directional distribution calculations are attached in Appendix C, and a synopsis is below.

Figure 4: Directional Distributions

Route	Approach/Departure Distribution
To/From the south on Bach-Buxton Road	20% / 20%
To/From the north on Bach-Buxton Road	40% / 40%
To/From the west on Clepper Lane	40% / 40%
Total	**100% / 100%**

Growth Rate

Growth rates for the study area were obtained from the Ohio-Kentucky-Indiana (OKI) Regional Demand Model. Per this data, Bach-Buxton Road south of Clepper Lane has a growth rate of 0.31% and north of Clepper Lane has a growth rate of 0.34%. Clepper Lane has a growth rate of 0.39%. The growth rate correspondence is attached in Appendix D.

2025 Opening Year Build Traffic Volumes

The 2025 Opening Year Build Traffic Volumes were calculated using the 2024 Existing Volumes increased by the annual growth rate for one year and adding in the proposed trips to each of the entering and exiting movements. The 2025 Opening Year Build Traffic Volumes are attached in Appendix C.

2035 Design Year Build Traffic Volumes

The 2035 Opening Year Build Traffic Volumes were calculated using the 2024 Existing Volumes increased by the annual growth rate for eleven years and adding in the proposed trips to each of the entering and exiting movements. The 2035 Design Year Build Traffic Volumes are attached in Appendix C.

Capacity Analysis

Utilizing the Peak Hour Volumes, capacity calculations were performed for the studied intersections. The calculations employed procedures documented in the Highway Capacity Manual (Transportation Research Board, Seventh Edition, Updated 2022). The capacity of an intersection (signalized or un-signalized) can best be described by its corresponding Level of Service (LOS). The LOS of an intersection is a qualitative measure of the various attributes of an intersection. There are six LOS ranging from "ideal" free flow conditions at LOS "A," to forced or "breakdown" conditions at LOS "F." The LOS for un-signalized intersections is based upon total delay. Total delay is defined in the Highway Capacity Manual as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position.

Capacity calculations were performed in Synchro 11 for the studied intersections analyzing the 2024 Existing Year No-Build and the 2035 Design Year No-Build and Build scenarios. The tables below show a summary of the AM and PM Peak Hour Capacity Analysis. The 2024 Existing Year Capacity is attached in Appendix E. The 2035 Design Year Capacity is attached in Appendix F.

	AM Peak						PM Peak					
	2024 Existing		2035 Design Year No Build		2035 Design Year Build		2024 Existing		2035 Design Year No Build		2035 Design Year Build	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1-Bach-Buxton Road & Existing Southern Drive												
EB	B	12	B	12	C	23	C	22	C	23	D	30
NB	A	0	A	0	A	0	A	0	A	0	A	0
SB	A	0	A	0	A	0	A	0	A	0	A	0
Overall Int.	-	-	-	-	-	-	-	-	-	-	-	-
2-Bach-Buxton Road & Existing Northern Drive												
EB	B	15	B	15	C	22	C	19	C	20	D	33
NB	A	0	A	0	A	1	A	0	A	0	A	1
SB	A	0	A	0	A	0	A	0	A	0	A	0
Overall Int.	-	-	-	-	-	-	-	-	-	-	-	-
3-Bach-Buxton Road & Proposed RI/RO												
EB	-	-	-	-	B	13	-	-	-	-	C	17
NB	-	-	-	-	A	0	-	-	-	-	A	0
SB	-	-	-	-	A	0	-	-	-	-	A	0
Overall Int.	-	-	-	-	-	-	-	-	-	-	-	-
4-Bach-Buxton Road & Clepper Lane												
EB	B	13	B	13	B	15	B	15	B	17	C	26
NB	A	6	A	3	A	7	B	12	B	12	B	16
SB	B	13	B	13	B	14	C	22	C	23	C	28
Overall Int.	B	10	B	10	B	11	B	16	B	17	C	23

Figure 5: Capacity Analysis Summary

The Clermont County Engineers office requested that the intersection of Bach-Buxton Road and the Existing Northern Drive be evaluated as a roundabout. Figure 6 below shows that this intersection will operate acceptably as a roundabout during the 2035 Design Year Build Scenarios.

	AM Peak		PM Peak	
	2035 Design Year Build		2035 Design Year Build	
	LOS	Delay	LOS	Delay
2-Bach-Buxton Road & Existing Northern Drive				
EB	A	6	A	9
NB	B	10	B	12
SB	A	7	B	11
Overall Int.	A	8	B	11

Figure 6: Capacity Analysis Summary-Roundabout

Furthermore, there were concerns over the internal roundabout shown on site & queuing into the proposed roundabout on Bach-Buxton. While there is no way to explicitly model this via Synchro, during the 2035 build PM Peak scenario, there are approximately 110 vehicles that will be entering the on-site roundabout from Bach-Buxton Road. Per the FHWA a single-lane roundabout maximum capacity is 1,800 vehicles/hour. Therefore, Choice One does not have concerns over on-site and/or off-site queuing issues.

In accordance with ODOT OATS Manual section 5.9, Operational Goals of Mainline & Intersection, when an intersection is within Metropolitan Planning Organization, the following measures of effectiveness must be met:

Figure 7: Measures of Effectiveness

Intersection LOS	D or better
Approach LOS	E or better
Control Level of Service	E or better
Volume to Capacity	All movements <1.0 with ≤ 0.93 preferred
Queue-Storage Ratio	All movements <1.0

As a result of the analysis, all intersections and approaches during all study scenarios meet the minimum measures of effectiveness as shown above.

Turn Lane Analysis

Turn Lane Analysis were completed for the free flow movements along Bach-Buxton Road using the 2035 Design Year Build Traffic Volumes. Turn lane warrants were checked against the 2-Lane Highway Left (or Right) Turn Lane Warrants figures for a >40 MPH roadway in the ODOT Access Management Manual. The following turn lanes are warranted as a result of the analysis:

- A 225 foot (including 50-foot taper) northbound left turn lane and southbound right turn lane at the intersection of Bach-Buxton Road & Existing Southern Drive (Intersection 1).
    - **These turn lanes are not currently recommended to be installed** as they are not warranted with the Villas or the Commercial Development alone. The independent senior living is anticipated to be built after the other two developments. Therefore, these turn lanes should be installed with the development of the senior living villas parcel.
- A 225 foot (including 50-foot taper) northbound left and southbound right turn lane at the intersection of Bach-Buxton Road and Existing Southern Drive (Intersection 2).
- A 225 foot (including 50-foot taper) southbound right turn lane at the intersection of Bach-Buxton Road and the proposed right in/right out driveway.

The turn lane analyses are attached in Appendix G.

Recommendations

Based on the results of the analysis, the following recommendations are made for the surrounding roadway network:

Bach-Buxton Road & Existing Southern Drive (Intersection 1)

- A 225 foot (including 50-foot taper) northbound left turn lane and southbound right turn lane. These are warranted after the development of the villas and the commercial development parcels, therefore these turn lanes should not be immediately installed and should be installed with the development of the independent senior living parcel.

Bach-Buxton Road & Existing Northern Drive (Intersection 2)

- Install a 225 foot (including 50-foot taper) northbound left turn lane.
- Install a 225 foot (including 50-foot taper) southbound right turn lane.

Bach-Buxton Road & Proposed Right In/Right Out Drive (Intersection 3)

- Install the right-in/right-out drive approximately 360 feet south of Clepper Lane.
- Install a 225 foot (including 50-foot taper) southbound right turn lane.
    - This turn lane can be installed by restriping the existing pavement to become a drop right turn lane into the proposed RI/RO.
    - This would be consistent with the IBI Bach Buxton Road & Shayler Road Conceptual Layout completed on 3/3/2023.
    - A preliminary concept has been included in Appendix B to show how this turn lane could be striped based on the IBI Conceptual Layout.

Bach-Buxton Road & Clepper Lane (Intersection 4)

- No improvements warranted or recommended.

APPENDIX

APPENDIX A

Turning Movement Counts

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & PVL South Drive
Site Code:
Start Date: 02/20/2024

Turning Movement Data

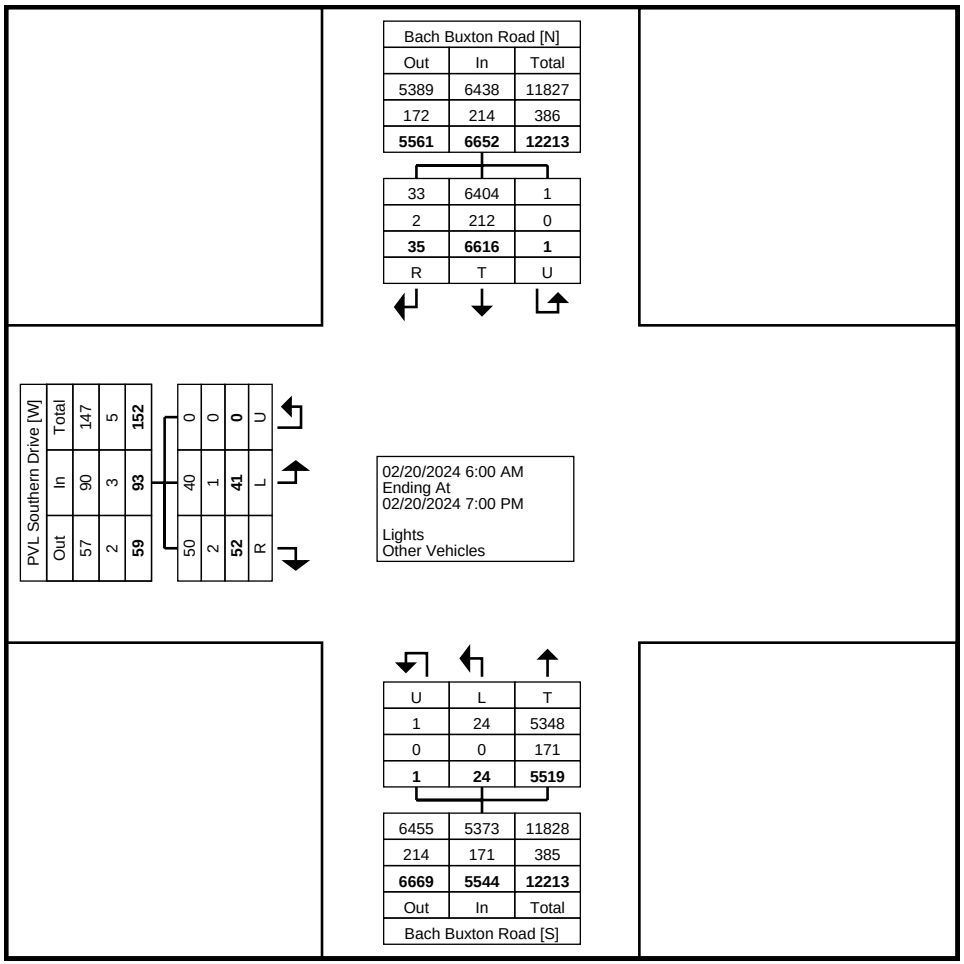
Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Southern Drive Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
6:00 AM	0	47	0	47	55	0	0	55	0	0	0	0	102
6:15 AM	0	52	0	52	82	0	0	82	0	0	0	0	134
6:30 AM	0	91	0	91	88	1	0	89	0	0	0	0	180
6:45 AM	0	112	0	112	106	1	0	107	0	0	0	0	219
Hourly Total	0	302	0	302	331	2	0	333	0	0	0	0	635
7:00 AM	0	128	0	128	154	0	0	154	0	0	0	0	282
7:15 AM	0	163	0	163	133	0	0	133	1	0	0	1	297
7:30 AM	0	132	0	132	142	0	0	142	0	0	0	0	274
7:45 AM	0	108	0	108	124	0	0	124	1	0	0	1	233
Hourly Total	0	531	0	531	553	0	0	553	2	0	0	2	1086
8:00 AM	2	79	0	81	106	0	0	106	0	0	0	0	187
8:15 AM	2	85	0	87	108	1	0	109	1	0	0	1	197
8:30 AM	1	67	0	68	93	0	0	93	1	0	0	1	162
8:45 AM	0	73	0	73	89	1	0	90	0	0	0	0	163
Hourly Total	5	304	0	309	396	2	0	398	2	0	0	2	709
9:00 AM	1	68	0	69	91	0	0	91	1	0	0	1	161
9:15 AM	0	89	0	89	94	3	0	97	1	0	0	1	187
9:30 AM	2	73	0	75	90	0	0	90	2	1	0	3	168
9:45 AM	1	89	0	90	94	0	0	94	1	1	0	2	186
Hourly Total	4	319	0	323	369	3	0	372	5	2	0	7	702
10:00 AM	1	68	0	69	96	1	0	97	3	0	0	3	169
10:15 AM	0	60	0	60	118	0	0	118	1	0	0	1	179
10:30 AM	2	84	0	86	96	3	0	99	2	0	0	2	187
10:45 AM	0	92	0	92	110	0	0	110	1	0	0	1	203
Hourly Total	3	304	0	307	420	4	0	424	7	0	0	7	738
11:00 AM	0	71	0	71	126	3	0	129	0	1	0	1	201
11:15 AM	0	101	0	101	93	2	0	95	2	1	0	3	199
11:30 AM	0	91	0	91	82	0	0	82	1	3	0	4	177
11:45 AM	1	120	0	121	103	0	1	104	1	4	0	5	230
Hourly Total	1	383	0	384	404	5	1	410	4	9	0	13	807
12:00 PM	1	125	1	127	84	0	0	84	1	3	0	4	215
12:15 PM	0	128	0	128	79	1	0	80	0	0	0	0	208
12:30 PM	0	132	0	132	113	1	0	114	0	0	0	0	246
12:45 PM	0	118	0	118	121	0	0	121	1	2	0	3	242
Hourly Total	1	503	1	505	397	2	0	399	2	5	0	7	911
1:00 PM	1	116	0	117	138	0	0	138	0	1	0	1	256
1:15 PM	0	139	0	139	93	1	0	94	1	2	0	3	236
1:30 PM	1	129	0	130	95	0	0	95	1	1	0	2	227
1:45 PM	0	122	0	122	67	0	0	67	0	0	0	0	189

Hourly Total	2	506	0	508	393	1	0	394	2	4	0	6	908
2:00 PM	1	139	0	140	97	0	0	97	3	3	0	6	243
2:15 PM	1	150	0	151	71	1	0	72	1	0	0	1	224
2:30 PM	2	153	0	155	122	0	0	122	0	2	0	2	279
2:45 PM	1	176	0	177	170	0	0	170	0	1	0	1	348
Hourly Total	5	618	0	623	460	1	0	461	4	6	0	10	1094
3:00 PM	0	151	0	151	128	0	0	128	1	1	0	2	281
3:15 PM	1	193	0	194	125	1	0	126	4	1	0	5	325
3:30 PM	2	180	0	182	131	0	0	131	2	1	0	3	316
3:45 PM	1	183	0	184	124	0	0	124	0	1	0	1	309
Hourly Total	4	707	0	711	508	1	0	509	7	4	0	11	1231
4:00 PM	1	211	0	212	131	0	0	131	4	2	0	6	349
4:15 PM	1	198	0	199	119	1	0	120	2	3	0	5	324
4:30 PM	2	195	0	197	124	0	0	124	2	1	0	3	324
4:45 PM	2	188	0	190	147	0	0	147	2	3	0	5	342
Hourly Total	6	792	0	798	521	1	0	522	10	9	0	19	1339
5:00 PM	0	209	0	209	97	0	0	97	4	1	0	5	311
5:15 PM	0	203	0	203	96	0	0	96	0	0	0	0	299
5:30 PM	2	206	0	208	84	0	0	84	2	0	0	2	294
5:45 PM	0	158	0	158	126	0	0	126	0	0	0	0	284
Hourly Total	2	776	0	778	403	0	0	403	6	1	0	7	1188
6:00 PM	1	176	0	177	118	0	0	118	0	0	0	0	295
6:15 PM	0	138	0	138	109	0	0	109	1	1	0	2	249
6:30 PM	1	137	0	138	79	0	0	79	0	0	0	0	217
6:45 PM	0	120	0	120	58	2	0	60	0	0	0	0	180
Hourly Total	2	571	0	573	364	2	0	366	1	1	0	2	941
Grand Total	35	6616	1	6652	5519	24	1	5544	52	41	0	93	12289
Approach %	0.5	99.5	0.0	-	99.5	0.4	0.0	-	55.9	44.1	0.0	-	-
Total %	0.3	53.8	0.0	54.1	44.9	0.2	0.0	45.1	0.4	0.3	0.0	0.8	-
Lights	33	6404	1	6438	5348	24	1	5373	50	40	0	90	11901
% Lights	94.3	96.8	100.0	96.8	96.9	100.0	100.0	96.9	96.2	97.6	-	96.8	96.8
Other Vehicles	2	212	0	214	171	0	0	171	2	1	0	3	388
% Other Vehicles	5.7	3.2	0.0	3.2	3.1	0.0	0.0	3.1	3.8	2.4	-	3.2	3.2

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & PVL South Drive
Site Code:
Start Date: 02/20/2024



Turning Movement Data Plot

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & PVL South Drive
Site Code:
Start Date: 02/20/2024

Turning Movement Peak Hour Data (7:00 AM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Southern Drive Eastbound				
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
7:00 AM	0	128	0	128	154	0	0	154	0	0	0	0	282
7:15 AM	0	163	0	163	133	0	0	133	1	0	0	1	297
7:30 AM	0	132	0	132	142	0	0	142	0	0	0	0	274
7:45 AM	0	108	0	108	124	0	0	124	1	0	0	1	233
Total	0	531	0	531	553	0	0	553	2	0	0	2	1086
Approach %	0.0	100.0	0.0	-	100.0	0.0	0.0	-	100.0	0.0	0.0	-	-
Total %	0.0	48.9	0.0	48.9	50.9	0.0	0.0	50.9	0.2	0.0	0.0	0.2	-
PHF	0.000	0.814	0.000	0.814	0.898	0.000	0.000	0.898	0.500	0.000	0.000	0.500	0.914
Lights	0	517	0	517	545	0	0	545	2	0	0	2	1064
% Lights	-	97.4	-	97.4	98.6	-	-	98.6	100.0	-	-	100.0	98.0
Other Vehicles	0	14	0	14	8	0	0	8	0	0	0	0	22
% Other Vehicles	-	2.6	-	2.6	1.4	-	-	1.4	0.0	-	-	0.0	2.0

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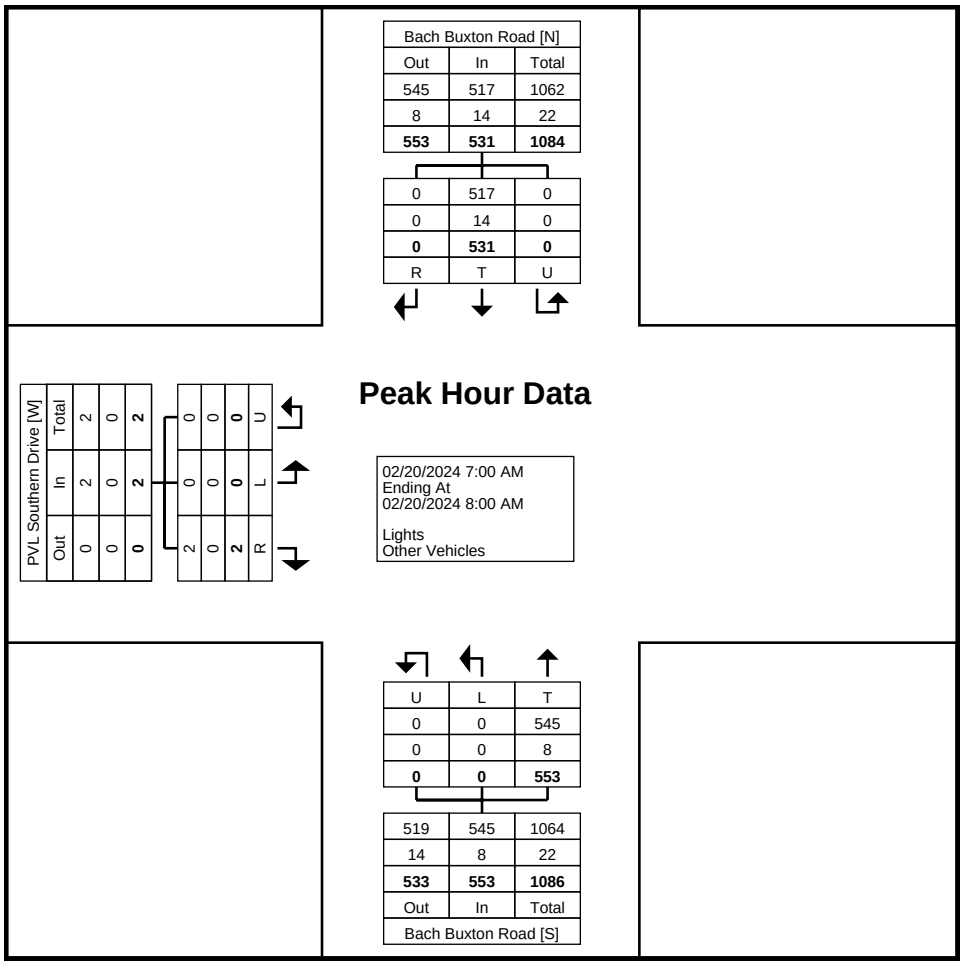
Count Name: Bach Buxton Road & PVL South Drive
Site Code:
Start Date: 02/20/2024



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

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & PVL South Drive
Site Code:
Start Date: 02/20/2024

Turning Movement Peak Hour Data (4:00 PM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Southern Drive Eastbound				
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
4:00 PM	1	211	0	212	131	0	0	131	4	2	0	6	349
4:15 PM	1	198	0	199	119	1	0	120	2	3	0	5	324
4:30 PM	2	195	0	197	124	0	0	124	2	1	0	3	324
4:45 PM	2	188	0	190	147	0	0	147	2	3	0	5	342
Total	6	792	0	798	521	1	0	522	10	9	0	19	1339
Approach %	0.8	99.2	0.0	-	99.8	0.2	0.0	-	52.6	47.4	0.0	-	-
Total %	0.4	59.1	0.0	59.6	38.9	0.1	0.0	39.0	0.7	0.7	0.0	1.4	-
PHF	0.750	0.938	0.000	0.941	0.886	0.250	0.000	0.888	0.625	0.750	0.000	0.792	0.959
Lights	6	770	0	776	513	1	0	514	10	9	0	19	1309
% Lights	100.0	97.2	-	97.2	98.5	100.0	-	98.5	100.0	100.0	-	100.0	97.8
Other Vehicles	0	22	0	22	8	0	0	8	0	0	0	0	30
% Other Vehicles	0.0	2.8	-	2.8	1.5	0.0	-	1.5	0.0	0.0	-	0.0	2.2

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Count Name: Bach Buxton Road & PVL South Drive
Site Code:
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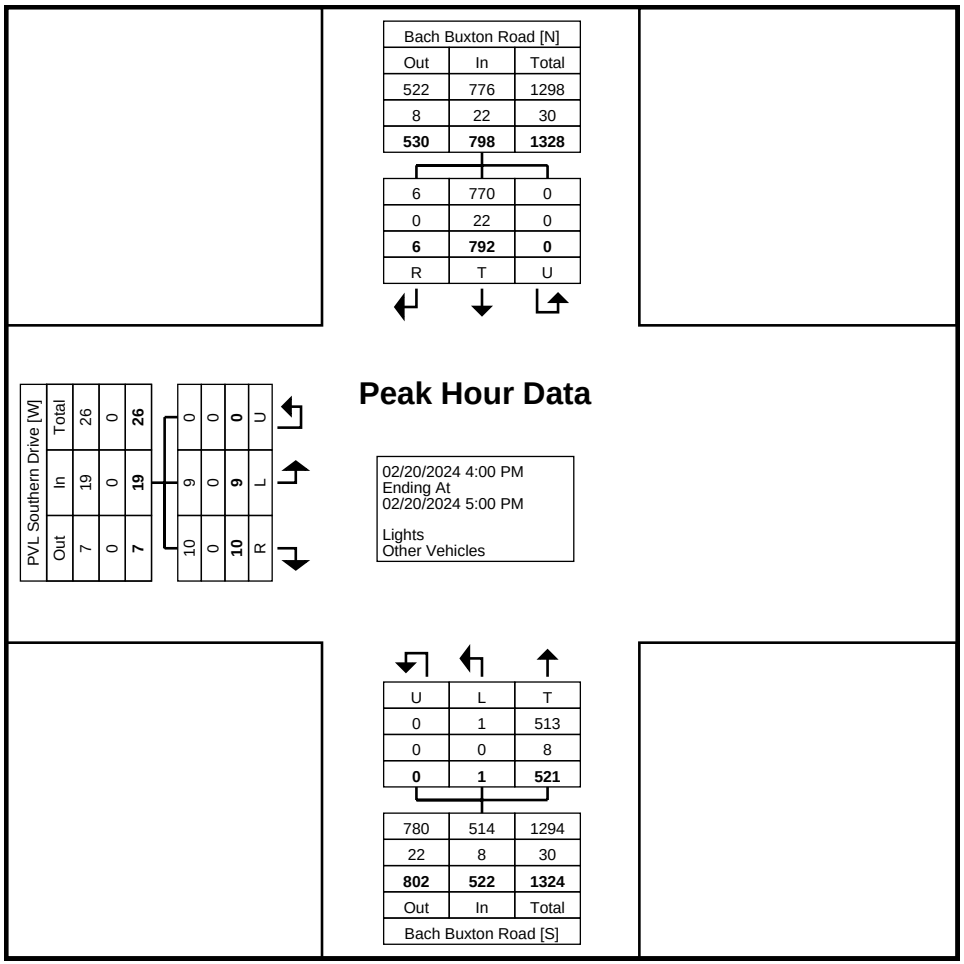

Turning Movement Peak Hour Data Plot (4:00 PM)

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024

Turning Movement Data

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Northern Drive Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
6:00 AM	1	43	0	44	59	0	0	59	0	1	0	1	104
6:15 AM	0	51	0	51	71	0	0	71	0	0	0	0	122
6:30 AM	0	88	0	88	89	0	0	89	1	0	0	1	178
6:45 AM	4	117	0	121	100	0	0	100	0	0	0	0	221
Hourly Total	5	299	0	304	319	0	0	319	1	1	0	2	625
7:00 AM	1	127	0	128	158	1	0	159	0	1	0	1	288
7:15 AM	0	168	0	168	125	0	0	125	1	1	0	2	295
7:30 AM	2	137	0	139	154	0	0	154	0	0	0	0	293
7:45 AM	1	112	0	113	142	0	0	142	0	1	0	1	256
Hourly Total	4	544	0	548	579	1	0	580	1	3	0	4	1132
8:00 AM	1	88	0	89	105	0	0	105	1	0	0	1	195
8:15 AM	0	100	0	100	106	1	0	107	0	1	0	1	208
8:30 AM	1	74	0	75	95	0	0	95	0	1	0	1	171
8:45 AM	0	70	0	70	89	0	0	89	0	0	0	0	159
Hourly Total	2	332	0	334	395	1	0	396	1	2	0	3	733
9:00 AM	5	66	0	71	91	0	0	91	0	0	0	0	162
9:15 AM	2	96	0	98	90	0	0	90	0	2	0	2	190
9:30 AM	2	72	0	74	90	0	0	90	0	0	0	0	164
9:45 AM	5	89	0	94	94	0	0	94	0	1	0	1	189
Hourly Total	14	323	0	337	365	0	0	365	0	3	0	3	705
10:00 AM	0	71	0	71	98	0	0	98	1	0	0	1	170
10:15 AM	3	61	0	64	113	0	0	113	1	0	0	1	178
10:30 AM	0	83	0	83	107	1	0	108	0	0	0	0	191
10:45 AM	0	96	0	96	103	0	0	103	0	0	0	0	199
Hourly Total	3	311	0	314	421	1	0	422	2	0	0	2	738
11:00 AM	1	67	0	68	130	0	0	130	0	0	0	0	198
11:15 AM	0	106	0	106	99	1	0	100	0	1	0	1	207
11:30 AM	2	91	0	93	87	0	0	87	0	3	0	3	183
11:45 AM	1	123	0	124	105	0	0	105	0	1	0	1	230
Hourly Total	4	387	0	391	421	1	0	422	0	5	0	5	818
12:00 PM	0	131	0	131	88	0	0	88	0	0	0	0	219
12:15 PM	1	128	0	129	88	0	0	88	0	2	0	2	219
12:30 PM	3	134	0	137	116	0	0	116	0	0	0	0	253
12:45 PM	3	127	0	130	127	0	0	127	0	1	0	1	258
Hourly Total	7	520	0	527	419	0	0	419	0	3	0	3	949
1:00 PM	1	107	0	108	128	0	0	128	0	1	0	1	237
1:15 PM	2	145	0	147	95	1	0	96	0	2	0	2	245
1:30 PM	3	126	0	129	99	0	0	99	0	5	0	5	233
1:45 PM	4	138	0	142	79	0	0	79	0	0	0	0	221

Hourly Total	10	516	0	526	401	1	0	402	0	8	0	8	936
2:00 PM	2	135	0	137	96	0	0	96	0	0	0	0	233
2:15 PM	2	148	0	150	73	1	0	74	0	1	0	1	225
2:30 PM	0	150	0	150	119	0	0	119	0	1	0	1	270
2:45 PM	2	185	0	187	181	0	0	181	1	1	0	2	370
Hourly Total	6	618	0	624	469	1	0	470	1	3	0	4	1098
3:00 PM	3	153	0	156	122	0	0	122	0	1	0	1	279
3:15 PM	1	189	0	190	123	0	0	123	0	0	0	0	313
3:30 PM	5	189	0	194	128	0	0	128	0	4	0	4	326
3:45 PM	1	187	0	188	113	0	0	113	0	1	0	1	302
Hourly Total	10	718	0	728	486	0	0	486	0	6	0	6	1220
4:00 PM	0	196	0	196	134	0	0	134	0	3	0	3	333
4:15 PM	1	203	0	204	122	0	0	122	0	0	0	0	326
4:30 PM	2	185	0	187	121	0	0	121	0	1	0	1	309
4:45 PM	1	173	0	174	152	0	0	152	0	2	0	2	328
Hourly Total	4	757	0	761	529	0	0	529	0	6	0	6	1296
5:00 PM	0	217	0	217	175	0	0	175	0	0	0	0	392
5:15 PM	0	204	0	204	179	0	0	179	0	0	0	0	383
5:30 PM	2	209	0	211	147	0	0	147	0	1	0	1	359
5:45 PM	1	160	0	161	158	0	0	158	0	0	0	0	319
Hourly Total	3	790	0	793	659	0	0	659	0	1	0	1	1453
6:00 PM	0	176	0	176	108	0	0	108	0	0	0	0	284
6:15 PM	0	144	0	144	116	0	0	116	0	0	0	0	260
6:30 PM	4	138	0	142	82	0	0	82	0	1	0	1	225
6:45 PM	1	110	0	111	55	0	0	55	1	1	0	2	168
Hourly Total	5	568	0	573	361	0	0	361	1	2	0	3	937
Grand Total	77	6683	0	6760	5824	6	0	5830	7	43	0	50	12640
Approach %	1.1	98.9	0.0	-	99.9	0.1	0.0	-	14.0	86.0	0.0	-	-
Total %	0.6	52.9	0.0	53.5	46.1	0.0	0.0	46.1	0.1	0.3	0.0	0.4	-
Lights	73	6474	0	6547	5643	5	0	5648	7	40	0	47	12242
% Lights	94.8	96.9	-	96.8	96.9	83.3	-	96.9	100.0	93.0	-	94.0	96.9
Other Vehicles	4	209	0	213	181	1	0	182	0	3	0	3	398
% Other Vehicles	5.2	3.1	-	3.2	3.1	16.7	-	3.1	0.0	7.0	-	6.0	3.1

Choice One Engineering
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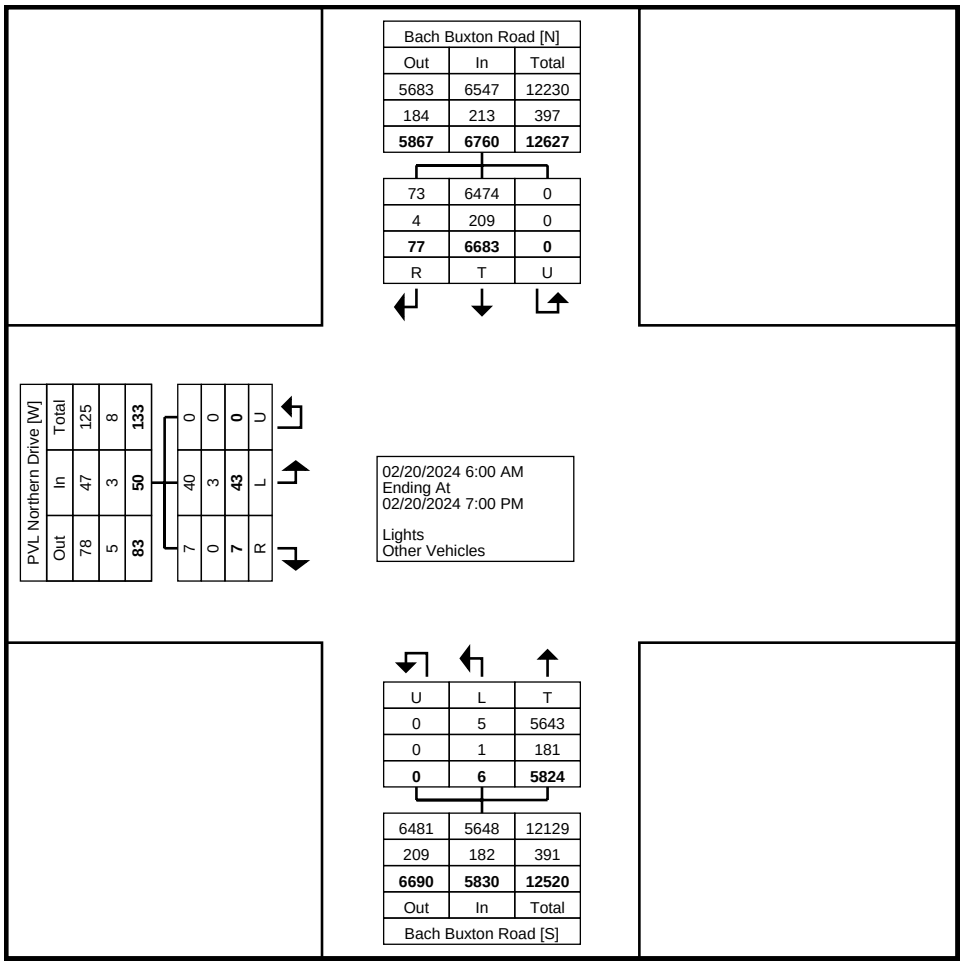
Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024



Turning Movement Data Plot

Choice One Engineering
440 E. Hoewisher Road

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Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024

Turning Movement Peak Hour Data (7:00 AM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Northern Drive Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
7:00 AM	1	127	0	128	158	1	0	159	0	1	0	1	288
7:15 AM	0	168	0	168	125	0	0	125	1	1	0	2	295
7:30 AM	2	137	0	139	154	0	0	154	0	0	0	0	293
7:45 AM	1	112	0	113	142	0	0	142	0	1	0	1	256
Total	4	544	0	548	579	1	0	580	1	3	0	4	1132
Approach %	0.7	99.3	0.0	-	99.8	0.2	0.0	-	25.0	75.0	0.0	-	-
Total %	0.4	48.1	0.0	48.4	51.1	0.1	0.0	51.2	0.1	0.3	0.0	0.4	-
PHF	0.500	0.810	0.000	0.815	0.916	0.250	0.000	0.912	0.250	0.750	0.000	0.500	0.959
Lights	4	533	0	537	570	1	0	571	1	3	0	4	1112
% Lights	100.0	98.0	-	98.0	98.4	100.0	-	98.4	100.0	100.0	-	100.0	98.2
Other Vehicles	0	11	0	11	9	0	0	9	0	0	0	0	20
% Other Vehicles	0.0	2.0	-	2.0	1.6	0.0	-	1.6	0.0	0.0	-	0.0	1.8

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Site Code:
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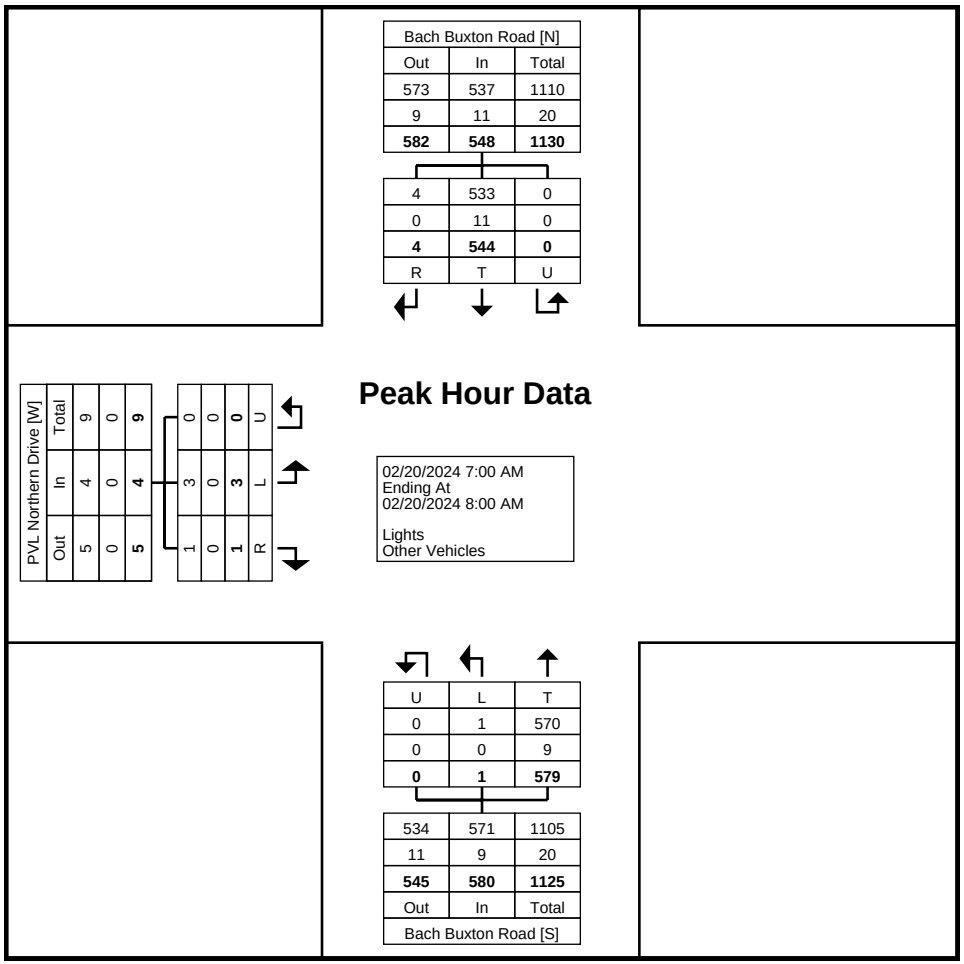

Turning Movement Peak Hour Data Plot (7:00 AM)

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024

Turning Movement Peak Hour Data (4:45 PM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Northern Drive Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
4:45 PM	1	173	0	174	152	0	0	152	0	2	0	2	328
5:00 PM	0	217	0	217	175	0	0	175	0	0	0	0	392
5:15 PM	0	204	0	204	179	0	0	179	0	0	0	0	383
5:30 PM	2	209	0	211	147	0	0	147	0	1	0	1	359
Total	3	803	0	806	653	0	0	653	0	3	0	3	1462
Approach %	0.4	99.6	0.0	-	100.0	0.0	0.0	-	0.0	100.0	0.0	-	-
Total %	0.2	54.9	0.0	55.1	44.7	0.0	0.0	44.7	0.0	0.2	0.0	0.2	-
PHF	0.375	0.925	0.000	0.929	0.912	0.000	0.000	0.912	0.000	0.375	0.000	0.375	0.932
Lights	3	796	0	799	649	0	0	649	0	3	0	3	1451
% Lights	100.0	99.1	-	99.1	99.4	-	-	99.4	-	100.0	-	100.0	99.2
Other Vehicles	0	7	0	7	4	0	0	4	0	0	0	0	11
% Other Vehicles	0.0	0.9	-	0.9	0.6	-	-	0.6	-	0.0	-	0.0	0.8

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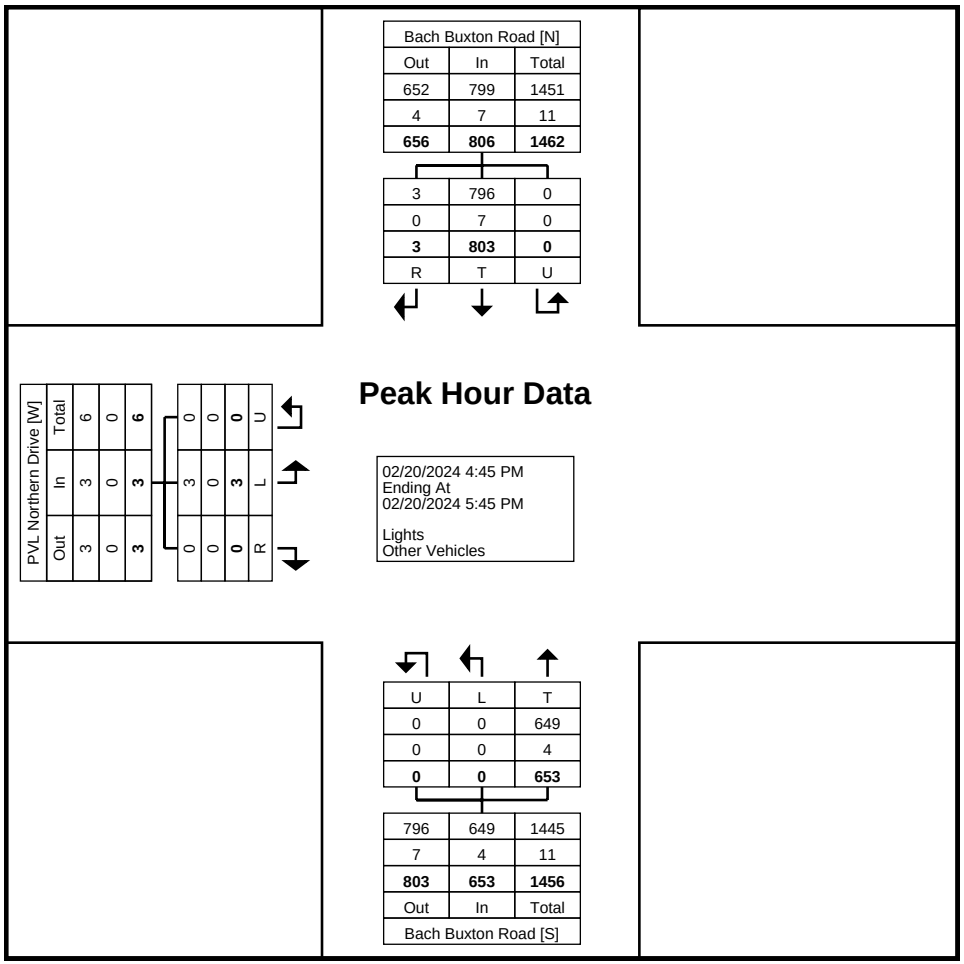
Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024



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

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & Clepper Lane
Site Code:
Start Date: 02/20/2024

Turning Movement Data

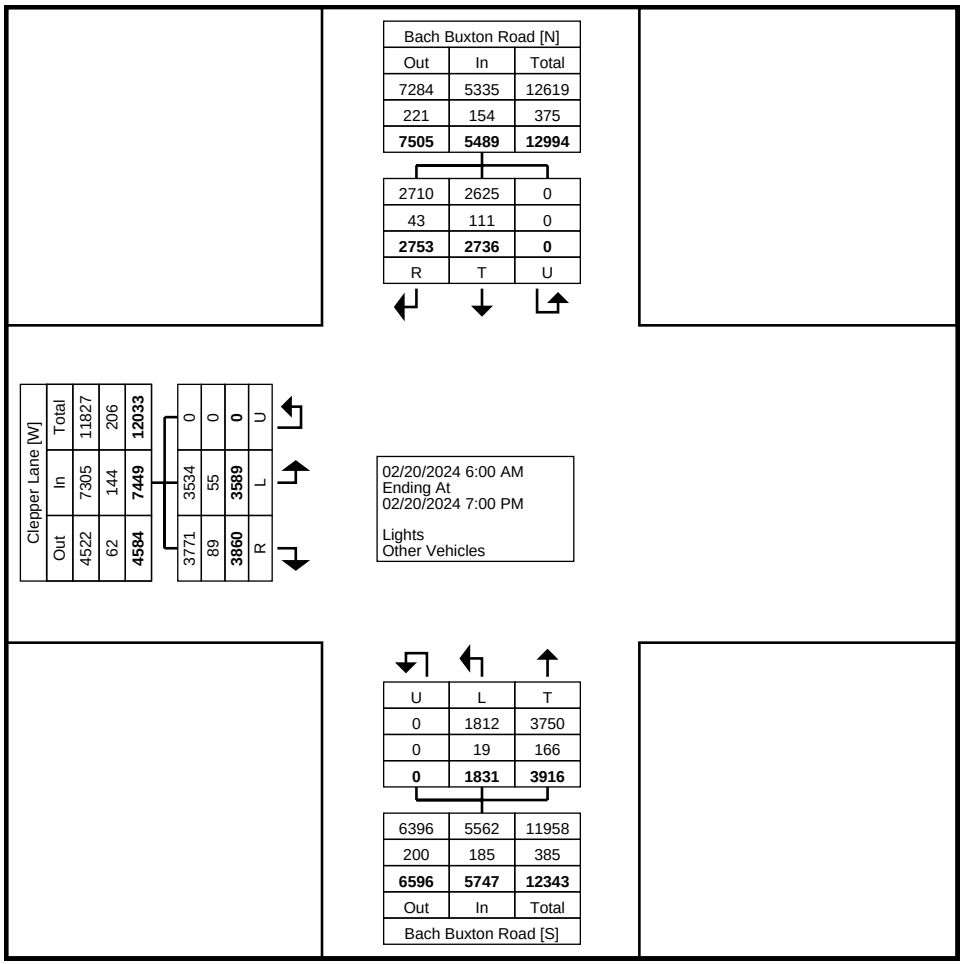
Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				Clepper Lane Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
6:00 AM	12	19	0	31	45	12	0	57	32	5	0	37	125
6:15 AM	31	13	0	44	55	22	0	77	38	12	0	50	171
6:30 AM	29	36	0	65	59	20	0	79	53	9	0	62	206
6:45 AM	30	51	0	81	76	18	0	94	62	13	0	75	250
Hourly Total	102	119	0	221	235	72	0	307	185	39	0	224	752
7:00 AM	27	56	0	83	122	45	0	167	68	20	0	88	338
7:15 AM	54	91	0	145	107	23	0	130	75	27	0	102	377
7:30 AM	52	60	0	112	117	30	0	147	63	30	0	93	352
7:45 AM	66	43	0	109	96	43	0	139	50	39	0	89	337
Hourly Total	199	250	0	449	442	141	0	583	256	116	0	372	1404
8:00 AM	46	33	0	79	82	24	0	106	51	27	0	78	263
8:15 AM	45	28	0	73	73	35	0	108	71	33	0	104	285
8:30 AM	39	33	0	72	69	28	0	97	39	28	0	67	236
8:45 AM	62	30	0	92	70	20	0	90	51	25	0	76	258
Hourly Total	192	124	0	316	294	107	0	401	212	113	0	325	1042
9:00 AM	47	26	0	73	64	24	0	88	48	44	0	92	253
9:15 AM	53	58	0	111	58	37	0	95	36	37	0	73	279
9:30 AM	47	39	0	86	61	31	0	92	37	37	0	74	252
9:45 AM	42	45	0	87	61	35	0	96	51	53	0	104	287
Hourly Total	189	168	0	357	244	127	0	371	172	171	0	343	1071
10:00 AM	49	27	0	76	62	33	0	95	18	41	0	59	230
10:15 AM	38	27	0	65	79	32	0	111	14	40	0	54	230
10:30 AM	52	47	0	99	62	40	0	102	22	51	0	73	274
10:45 AM	65	46	0	111	59	50	0	109	33	34	0	67	287
Hourly Total	204	147	0	351	262	155	0	417	87	166	0	253	1021
11:00 AM	44	34	0	78	70	56	0	126	40	54	0	94	298
11:15 AM	48	49	0	97	54	42	0	96	53	60	0	113	306
11:30 AM	56	41	0	97	47	43	0	90	54	65	0	119	306
11:45 AM	83	44	0	127	60	42	0	102	78	75	0	153	382
Hourly Total	231	168	0	399	231	183	0	414	225	254	0	479	1292
12:00 PM	71	60	0	131	55	39	0	94	69	73	0	142	367
12:15 PM	71	56	0	127	60	27	0	87	74	85	0	159	373
12:30 PM	59	49	0	108	65	47	0	112	91	76	0	167	387
12:45 PM	67	56	0	123	75	55	0	130	67	105	0	172	425
Hourly Total	268	221	0	489	255	168	0	423	301	339	0	640	1552
1:00 PM	57	45	0	102	88	48	0	136	58	99	0	157	395
1:15 PM	62	69	0	131	62	43	0	105	65	89	0	154	390
1:30 PM	57	54	0	111	71	34	0	105	78	76	0	154	370
1:45 PM	52	49	0	101	47	31	0	78	77	89	0	166	345

Hourly Total	228	217	0	445	268	156	0	424	278	353	0	631	1500
2:00 PM	60	61	0	121	67	26	0	93	78	111	0	189	403
2:15 PM	48	68	0	116	48	25	0	73	79	85	0	164	353
2:30 PM	53	68	0	121	78	39	0	117	88	90	0	178	416
2:45 PM	41	72	0	113	124	46	0	170	96	110	0	206	489
Hourly Total	202	269	0	471	317	136	0	453	341	396	0	737	1661
3:00 PM	60	64	0	124	96	27	0	123	98	102	0	200	447
3:15 PM	52	61	0	113	87	40	0	127	131	98	0	229	469
3:30 PM	45	61	0	106	116	28	0	144	127	93	0	220	470
3:45 PM	61	64	0	125	81	44	0	125	120	106	0	226	476
Hourly Total	218	250	0	468	380	139	0	519	476	399	0	875	1862
4:00 PM	57	84	0	141	91	45	0	136	115	112	0	227	504
4:15 PM	74	84	0	158	84	36	0	120	112	106	0	218	496
4:30 PM	56	67	0	123	90	26	0	116	130	120	0	250	489
4:45 PM	73	82	0	155	111	49	0	160	107	123	0	230	545
Hourly Total	260	317	0	577	376	156	0	532	464	461	0	925	2034
5:00 PM	60	70	0	130	99	40	0	139	136	110	0	246	515
5:15 PM	54	65	0	119	103	46	0	149	134	113	0	247	515
5:30 PM	56	60	0	116	79	37	0	116	149	111	0	260	492
5:45 PM	65	54	0	119	88	47	0	135	106	90	0	196	450
Hourly Total	235	249	0	484	369	170	0	539	525	424	0	949	1972
6:00 PM	79	83	0	162	73	32	0	105	93	105	0	198	465
6:15 PM	43	57	0	100	84	37	0	121	93	79	0	172	393
6:30 PM	54	54	0	108	51	25	0	76	78	99	0	177	361
6:45 PM	49	43	0	92	35	27	0	62	74	75	0	149	303
Hourly Total	225	237	0	462	243	121	0	364	338	358	0	696	1522
Grand Total	2753	2736	0	5489	3916	1831	0	5747	3860	3589	0	7449	18685
Approach %	50.2	49.8	0.0	-	68.1	31.9	0.0	-	51.8	48.2	0.0	-	-
Total %	14.7	14.6	0.0	29.4	21.0	9.8	0.0	30.8	20.7	19.2	0.0	39.9	-
Lights	2710	2625	0	5335	3750	1812	0	5562	3771	3534	0	7305	18202
% Lights	98.4	95.9	-	97.2	95.8	99.0	-	96.8	97.7	98.5	-	98.1	97.4
Other Vehicles	43	111	0	154	166	19	0	185	89	55	0	144	483
% Other Vehicles	1.6	4.1	-	2.8	4.2	1.0	-	3.2	2.3	1.5	-	1.9	2.6

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & Clepper Lane
Site Code:
Start Date: 02/20/2024



Turning Movement Data Plot

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & Clepper Lane
Site Code:
Start Date: 02/20/2024

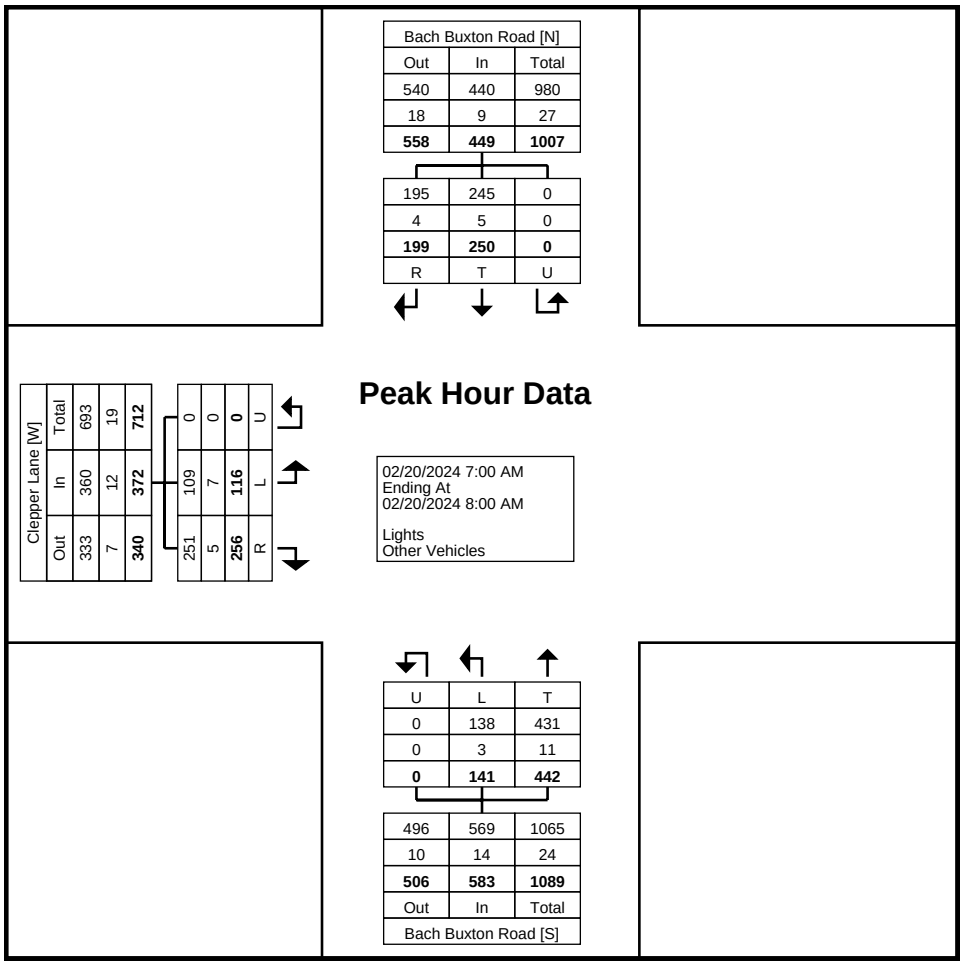
Turning Movement Peak Hour Data (7:00 AM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				Clepper Lane Eastbound				
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
7:00 AM	27	56	0	83	122	45	0	167	68	20	0	88	338
7:15 AM	54	91	0	145	107	23	0	130	75	27	0	102	377
7:30 AM	52	60	0	112	117	30	0	147	63	30	0	93	352
7:45 AM	66	43	0	109	96	43	0	139	50	39	0	89	337
Total	199	250	0	449	442	141	0	583	256	116	0	372	1404
Approach %	44.3	55.7	0.0	-	75.8	24.2	0.0	-	68.8	31.2	0.0	-	-
Total %	14.2	17.8	0.0	32.0	31.5	10.0	0.0	41.5	18.2	8.3	0.0	26.5	-
PHF	0.754	0.687	0.000	0.774	0.906	0.783	0.000	0.873	0.853	0.744	0.000	0.912	0.931
Lights	195	245	0	440	431	138	0	569	251	109	0	360	1369
% Lights	98.0	98.0	-	98.0	97.5	97.9	-	97.6	98.0	94.0	-	96.8	97.5
Other Vehicles	4	5	0	9	11	3	0	14	5	7	0	12	35
% Other Vehicles	2.0	2.0	-	2.0	2.5	2.1	-	2.4	2.0	6.0	-	3.2	2.5

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & Clepper Lane
Site Code:
Start Date: 02/20/2024



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

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & Clepper Lane
Site Code:
Start Date: 02/20/2024

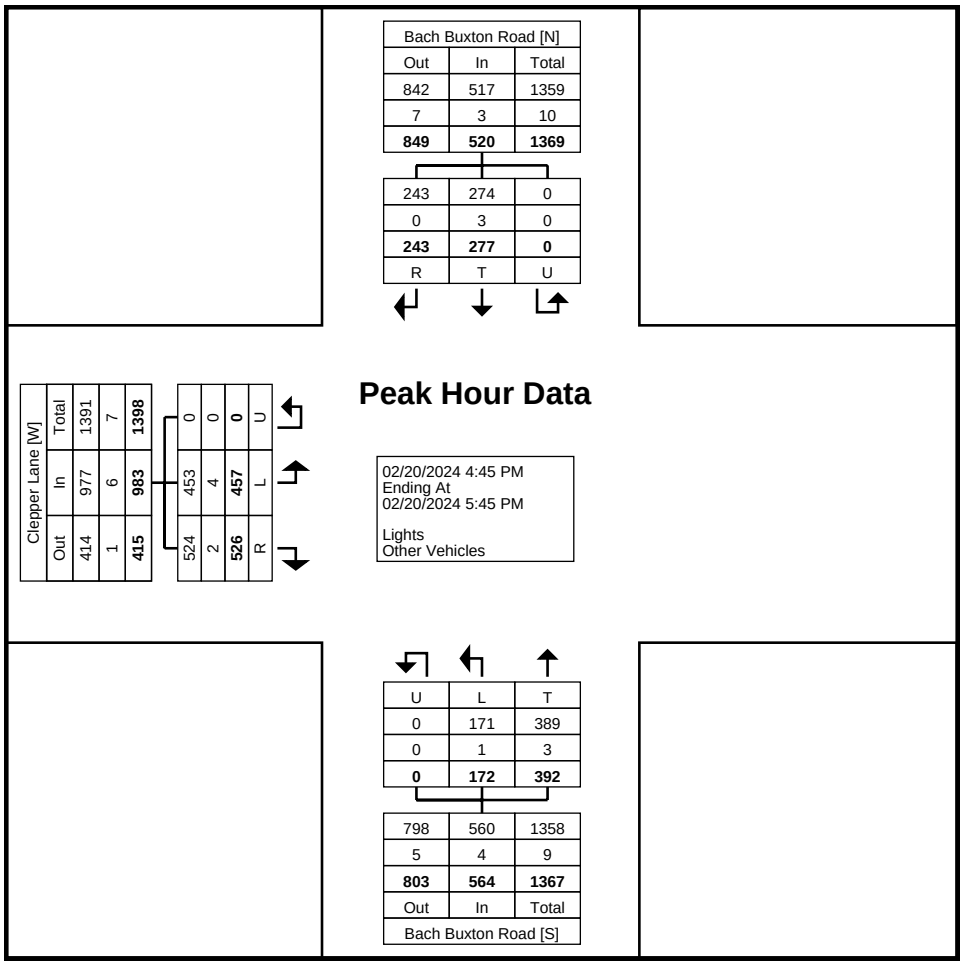
Turning Movement Peak Hour Data (4:45 PM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				Clepper Lane Eastbound				
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
4:45 PM	73	82	0	155	111	49	0	160	107	123	0	230	545
5:00 PM	60	70	0	130	99	40	0	139	136	110	0	246	515
5:15 PM	54	65	0	119	103	46	0	149	134	113	0	247	515
5:30 PM	56	60	0	116	79	37	0	116	149	111	0	260	492
Total	243	277	0	520	392	172	0	564	526	457	0	983	2067
Approach %	46.7	53.3	0.0	-	69.5	30.5	0.0	-	53.5	46.5	0.0	-	-
Total %	11.8	13.4	0.0	25.2	19.0	8.3	0.0	27.3	25.4	22.1	0.0	47.6	-
PHF	0.832	0.845	0.000	0.839	0.883	0.878	0.000	0.881	0.883	0.929	0.000	0.945	0.948
Lights	243	274	0	517	389	171	0	560	524	453	0	977	2054
% Lights	100.0	98.9	-	99.4	99.2	99.4	-	99.3	99.6	99.1	-	99.4	99.4
Other Vehicles	0	3	0	3	3	1	0	4	2	4	0	6	13
% Other Vehicles	0.0	1.1	-	0.6	0.8	0.6	-	0.7	0.4	0.9	-	0.6	0.6

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton Road & Clepper Lane
Site Code:
Start Date: 02/20/2024



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

APPENDIX B

Concept

ChoiceOne Engineering
SIDNEY, OHIO 937.497.0200
LOVELAND, OHIO 513.239.8554
www.CHOICEONEENGINEERING.com

BACH-BUXTON ROAD DEVELOPMENT
UNION TOWNSHIP, CLERMONT COUNTY, OHIO
CONCEPTUAL DEVELOPMENT PLAN

REVISIONS:

FILE NAME
CONCEPT

DRAWN BY

CHECKED BY

PROJECT No.
CLE-GOS-2309

DATE
2-29-2024

SHEET NUMBER
1 OF 1

ChoiceOne Engineering
SIDNEY, OHIO 937.497.0200
LOVELAND, OHIO 513.239.8554
www.CHOICEONEENGINEERING.com

BACH-BUXTON ROAD DEVELOPMENT
UNION TOWNSHIP, CLERMONT COUNTY, OHIO
DRIVE #3 CONCEPTUAL IMPROVEMENTS

REVISIONS:

FILE NAME: CONCEPT
DRAWN BY:
CHECKED BY:
PROJECT No.: CLE-GOS-2309
DATE: 7-12-2024
SHEET NUMBER: 1 OF 1

APPENDIX C

Build Traffic Volumes

MIXED USE DEVELOPMENT TRAFFIC IMPACT STUDY

UNION TOWNSHIP, CLERMONT COUNTY, OHIO

Independent Senior Living

Land Use Description	ITE Code	Size	Unit	AM Peak Hour							PM Peak Hour						
				Total Trips	Primary Trips			Pass-By Trips			Total Trips	Primary Trips			Pass-By Trips		
					Total	Entering	Exiting	Total	Entering	Exiting		Total	Entering	Exiting	Total	Entering	Exiting
Senior Adult Housing - Multifamily	252	174	Dwelling Units	34	34	12	22	0	0	0	44	44	24	20	0	0	0
Directional Distributions						*34%*	*66%*		*0%*	*0%*			*56%*	*44%*		*0%*	*0%*
Totals				**34**	**34**	**12**	**22**	**0**	**0**	**0**	**44**	**44**	**24**	**20**	**0**	**0**	**0**

Villas-Phase 2

Land Use Description	ITE Code	Size	Unit	AM Peak Hour							PM Peak Hour						
				Total Trips	Primary Trips			Pass-By Trips			Total Trips	Primary Trips			Pass-By Trips		
					Total	Entering	Exiting	Total	Entering	Exiting		Total	Entering	Exiting	Total	Entering	Exiting
Senior Adult Housing - Single-Family	251	59	Dwelling Units	26	26	9	17	0	0	0	29	29	18	11	0	0	0
Directional Distributions						*33%*	*67%*		*0%*	*0%*			*61%*	*39%*	*0%*	*0%*	*0%*
Totals				**26**	**26**	**9**	**17**	**0**	**0**	**0**	**29**	**29**	**18**	**11**	**0**	**0**	**0**

Mixed Use Commercial

Land Use Description	ITE Code	Size	Unit	AM Peak Hour							PM Peak Hour						
				Total Trips	Primary Trips			Pass-By Trips			Total Trips	Primary Trips			Pass-By Trips		
					Total	Entering	Exiting	Total	Entering	Exiting		Total	Entering	Exiting	Total	Entering	Exiting
High-Turnover (Sit-Down) Restauraunt (2 @ 4,000 SF)	932	8,000	Sq. Ft. GFA	77	77	42	35	0	0	0	72	72	44	28	0	0	0
Directional Distributions						*55%*	*45%*		*0%*	*0%*			*61%*	*39%*		*0%*	*0%*
Coffee/Donut Shop With Drive Through Window	937	2,500	Sq. Ft. GFA	215	86	44	42	129	64	65	97	39	19	20	58	29	29
Directional Distributions						*51%*	*49%*	*60%*	*50%*	*50%*			*50%*	*50%*	*60%*	*50%*	*50%*
Brewery Tap Room	971	10,000	Sq. Ft. GFA	7	7	6	1	0	0	0	98	98	58	40	0	0	0
Directional Distributions						*88%*	*12%*		*0%*	*0%*			*59%*	*41%*		*0%*	*0%*
Totals				**298**	**169**	**92**	**77**	**129**	**64**	**65**	**268**	**210**	**121**	**89**	**58**	**29**	**29**

TRIP ASSIGNMENT ROUTINGS-INDEPENDENT SENIOR LIVING

ORIGIN	DESTINATION	TRIP ROUTINGS O-D PERCENT	TRIP ROUTINGS ROUTE SPLIT	AFFECTED MOVEMENTS BY TRIPS	AM TRIPS	PM TRIPS
Entering Trips						
Bach-Buxton Road (South)	1	20%	100%	1NBL	2	5
Bach-Buxton Road (North)	1	40%	80%	4SBT 3SBT 2SBT 1SBR	4	8
	2		20%	4SBT 3SBT 2SBR	1	2
Clepper Lane (West)	1	40%	80%	4EBR 3SBT 2SBT 1SBR	4	8
	2		20%	4EBR 3SBT 2SBR	1	2
TOTAL ENTERING TRIPS					12	25
Exiting Trips						
1	Bach-Buxton Road (South)	20%	100%	1EBR	4	4
1	Bach-Buxton Road (North)	40%	80%	1EBL 2NBT 3NBT 4NBT	7	6
2			20%	2EBL 3NBT 4NBT	2	2
1	Clepper Lane (West)	40%	80%	1EBL 2NBT 3NBT 4NBL	7	6
2			20%	2EBL 3NBT 4NBL	2	2
TOTAL EXITING TRIPS					22	20

Intersection Legend
1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

TRIP ASSIGNMENT ROUTINGS-VILLAS PHASE 2

ORIGIN	DESTINATION	TRIP ROUTINGS O-D PERCENT	TRIP ROUTINGS ROUTE SPLIT	AFFECTED MOVEMENTS BY TRIPS	AM TRIPS	PM TRIPS
Entering Trips						
Bach-Buxton Road (South)	1	20%	70%	1NBL	1	3
	2		30%	1NBT 2NBL	1	1
Bach-Buxton Road (North)	1	40%	10%	4SBT 3SBT 2SBT 1SBR	0	1
	2		90%	4SBT 3SBT 2SBR	3	6
Clepper Lane (West)	1	40%	10%	4EBR 3SBT 2SBT 1SBR	0	1
	2		90%	4EBR 3SBT 2SBR	3	6
TOTAL ENTERING TRIPS					8	18
Exiting Trips						
1	Bach-Buxton Road (South)	20%	70%	1EBR	2	2
2			30%	2EBR 1SBT	1	1
1	Bach-Buxton Road (North)	40%	10%	1EBL 2NBT 3NBT 4NBT	1	0
2			90%	2EBL 3NBT 4NBT	6	4
1	Clepper Lane (West)	40%	10%	1EBL 2NBT 3NBT 4NBL	1	0
2			90%	2EBL 3NBT 4NBL	6	4
TOTAL EXITING TRIPS					17	11

Intersection Legend
1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

TRIP ASSIGNMENT ROUTINGS-MIXED USE COMMERCIAL

ORIGIN	DESTINATION	TRIP ROUTINGS O-D PERCENT	TRIP ROUTINGS ROUTE SPLIT	AFFECTED MOVEMENTS BY TRIPS	AM TRIPS	PM TRIPS
Entering Trips						
Bach-Buxton Road (South)	2	20%	100%	1NBT 2NBL	18	24
Bach-Buxton Road (North)	2	40%	40%	4SBT 3SBT 2SBR	15	19
	3		60%	4SBT 3SBR	22	29
Clepper Lane (West)	2	40%	40%	4EBR 3SBT 2SBR	15	19
	3		60%	4EBR 3SBR	22	29
TOTAL ENTERING TRIPS					92	120
Exiting Trips						
2	Bach-Buxton Road (South)	20%	60%	2EBR 1SBT	9	11
3			40%	3EBR 2SBT 1SBT	6	7
2	Bach-Buxton Road (North)	40%	100%	2EBL 3NBT 4NBT	31	35
2	Clepper Lane (West)	40%	100%	2EBL 3NBT 4NBL	31	35
TOTAL EXITING TRIPS					77	88
Pass-By Trips						
(Includes both entering and exiting pass-by trips from the orgin to the destination)						
Bach Buxton (South)	Bach Buxton (North)	50%	100%	-2NBT 2NBL 2EBL	32	15
Bach Buxton (North)	Bach Buxton (South)	50%	30%	-3SBT 3SBR 3EBR	10	4
			70%	-2SBT 2SBR 2EBR	22	10
PASS-BY TRIPS					64	29

Intersection Legend
1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

TRAFFIC PROJECTIONS - AM PEAK HOUR

Int. #	Movement		2024	2025	Trips-Independant Living		Trips-Villas Phase 2		Trips-Mixed Use Commercial			2025	2035	2035
		Annual Growth Rate	Existing Counts	Opening Year No-Build Volumes	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Pass-By Trips	Opening Year Build Volumes	Design Year No-Build Volumes	Design Year Build Volumes
1	EBL	0.00%	0	0		14		2				16	0	16
1	EBR	0.00%	2	2		4		2				8	2	8
1	NBL	0.00%	0	0	2		1					3	0	3
1	NBT	0.31%	553	555			1		18			574	572	591
1	SBT	0.31%	531	533				1		15		549	549	565
1	SBR	0.00%	0	0	8							8	0	8
2	EBL	0.00%	3	3		4		12		62	32	113	3	113
2	EBR	0.00%	1	1				1		9	22	33	1	33
2	NBL	0.00%	1	1			1		18		32	52	1	52
2	NBT	0.31%	579	581		14		2				597	599	615
2	SBT	0.31%	544	546	8					6		560	563	577
2	SBR	0.00%	4	4	2		6		30		22	64	4	64
3	EBR	0.00%	0	0						6	10	16	0	16
3	NBT	0.31%	582	584		18		14		62		678	602	696
3	SBT	0.31%	548	550	10		6		30			596	567	613
3	SBR	0.00%	0	0					44		10	54	0	54
4	EBL	0.39%	116	116								116	121	121
4	EBR	0.39%	265	266	5		3		37			311	276	321
4	NBL	0.31%	141	141		9		7		31		188	146	193
4	NBT	0.31%	442	443		9		7		31		490	457	504
4	SBT	0.34%	250	251	5		3		37			296	259	304
4	SBR	0.34%	199	200								200	206	206

Intersection Legend

1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

TRAFFIC PROJECTIONS - PM PEAK HOUR

Int. #	Movement		2024	2025	Trips-Independent Living		Trips-Villas Phase 2		Trips-Mixed Use Commercial			2025	2035	2035
		Annual Growth Rate	Existing Counts	Opening Year No-Build Volumes	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Pass-By Trips	Opening Year Build Volumes	Design Year No-Build Volumes	Design Year Build Volumes
1	EBL	0.00%	9	9		12						21	9	21
1	EBR	0.00%	10	10		4		2				16	10	16
1	NBL	0.00%	1	1	5		3					9	1	9
1	NBT	0.31%	521	523			1		24			548	539	564
1	SBT	0.31%	792	794				1		18		813	819	838
1	SBR	0.00%	6	6	16		2					24	6	24
2	EBL	0.00%	3	3		4		8		70	15	100	3	100
2	EBR	0.00%	0	0				1		11	10	22	0	22
2	NBL	0.00%	0	0			1		24		15	40	0	40
2	NBT	0.31%	653	655		12						667	675	687
2	SBT	0.31%	803	805	16		2			7		830	830	855
2	SBR	0.00%	3	3	4		12		38		10	67	3	67
3	EBR	0.00%	0	0						7	4	11	0	11
3	NBT	0.31%	656	658		16		8		70		752	678	772
3	SBT	0.31%	806	808	20		14		38			880	833	905
3	SBR	0.00%	0	0					58		4	62	0	62
4	EBL	0.39%	457	459								459	477	477
4	EBR	0.39%	526	528	10		7		48			593	549	614
4	NBL	0.31%	172	173		8		4		35		220	178	225
4	NBT	0.31%	392	393		8		4		35		440	405	452
4	SBT	0.34%	277	278	10		7		48			343	287	352
4	SBR	0.34%	243	244								244	252	252

Intersection Legend

1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

APPENDIX D

Growth Rate

Adam Gill

From: Liren Zhou <LZhou@oki.org>
Sent: Monday, March 4, 2024 9:46 AM
To: Adam Gill
Subject: Re: Growth Rate Request

Here is the growth estimate for the intersection of Bach Buxton Road & Clepper Ln from 2030 to 2040.

Facility	Road Segment	Estimated Traffic Growth (CAGR*)
		2030 to 2040
Bach Buxton Rd	SR 32 to Clepper Ln	0.34%
Bach Buxton Rd	Clepper Ln to Stone Oak Blvd	0.31%
Clepper LN	Bach Buxton Rd to SR 32 off Ramp	0.39%
Intersection - Bach Buxton Road @ Clepper LN		0.34%

Thanks,
Liren

APPENDIX E

2024 Capacity Analysis

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2	0	553	531	0
Future Vol, veh/h	0	2	0	553	531	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2	0	608	584	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1192	584	584	0	-	0
Stage 1	584	-	-	-	-	-
Stage 2	608	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	207	512	991	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	543	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	207	512	991	-	-	-
Mov Cap-2 Maneuver	207	-	-	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	543	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	991	-	512	-	-
HCM Lane V/C Ratio	-	-	0.004	-	-
HCM Control Delay (s)	0	-	12.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	1	1	579	544	4
Future Vol, veh/h	3	1	1	579	544	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	225	-	-	225
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	1	1	603	567	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1172	567	571	0	-	0
Stage 1	567	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	213	523	1002	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	545	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	213	523	1002	-	-	-
Mov Cap-2 Maneuver	351	-	-	-	-	-
Stage 1	567	-	-	-	-	-
Stage 2	545	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1002	-	351	523	-	-
HCM Lane V/C Ratio	0.001	-	0.009	0.002	-	-
HCM Control Delay (s)	8.6	-	15.3	11.9	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	116	265	141	442	250	199
Future Volume (veh/h)	116	265	141	442	250	199
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	125	285	152	475	269	214
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	892	409	512	1732	468	397
Arrive On Green	0.26	0.26	0.11	0.49	0.25	0.25
Sat Flow, veh/h	3456	1585	1781	3647	1870	1585
Grp Volume(v), veh/h	125	285	152	475	269	214
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1870	1585
Q Serve(g_s), s	1.0	5.8	1.9	2.8	4.5	4.1
Cycle Q Clear(g_c), s	1.0	5.8	1.9	2.8	4.5	4.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	892	409	512	1732	468	397
V/C Ratio(X)	0.14	0.70	0.30	0.27	0.57	0.54
Avail Cap(c_a), veh/h	2785	1277	997	5275	1825	1546
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.1	11.9	7.3	5.4	11.6	11.5
Incr Delay (d2), s/veh	0.1	2.1	0.3	0.1	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.1	0.5	0.6	1.6	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	10.2	14.0	7.6	5.4	12.7	12.6
LnGrp LOS	B	B	A	A	B	B
Approach Vol, veh/h	410			627	483	
Approach Delay, s/veh	12.8			6.0	12.7	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		21.7		13.6	8.4	13.4
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		52.5		28.5	13.5	34.5
Max Q Clear Time (g_c+I1), s		4.8		7.8	3.9	6.5
Green Ext Time (p_c), s		3.6		1.4	0.3	2.4

Intersection Summary		
HCM 6th Ctrl Delay		10.0
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	10	1	521	792	6
Future Vol, veh/h	9	10	1	521	792	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	10	1	543	825	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1373	828	831	0	-	0
Stage 1	828	-	-	-	-	-
Stage 2	545	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	161	371	801	-	-	-
Stage 1	429	-	-	-	-	-
Stage 2	581	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	161	371	801	-	-	-
Mov Cap-2 Maneuver	161	-	-	-	-	-
Stage 1	428	-	-	-	-	-
Stage 2	581	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	801	-	229	-	-
HCM Lane V/C Ratio	0.001	-	0.086	-	-
HCM Control Delay (s)	9.5	0	22.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	0	0	653	803	3
Future Vol, veh/h	3	0	0	653	803	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	225	-	-	225
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	0	0	702	863	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1565	863	866	0	-	0
Stage 1	863	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	123	354	777	-	-	-
Stage 1	413	-	-	-	-	-
Stage 2	491	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	123	354	777	-	-	-
Mov Cap-2 Maneuver	260	-	-	-	-	-
Stage 1	413	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	777	-	260	-	-	-
HCM Lane V/C Ratio	-	-	0.012	-	-	-
HCM Control Delay (s)	0	-	19	0	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	457	526	172	392	277	243
Future Volume (veh/h)	457	526	172	392	277	243
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	481	554	181	413	292	256
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1444	662	401	1494	429	363
Arrive On Green	0.42	0.42	0.11	0.42	0.23	0.23
Sat Flow, veh/h	3456	1585	1781	3647	1870	1585
Grp Volume(v), veh/h	481	554	181	413	292	256
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1870	1585
Q Serve(g_s), s	5.2	17.4	3.9	4.2	7.9	8.3
Cycle Q Clear(g_c), s	5.2	17.4	3.9	4.2	7.9	8.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1444	662	401	1494	429	363
V/C Ratio(X)	0.33	0.84	0.45	0.28	0.68	0.70
Avail Cap(c_a), veh/h	2265	1039	571	2839	957	811
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	14.5	13.2	10.6	19.6	19.7
Incr Delay (d2), s/veh	0.1	3.6	0.8	0.1	1.9	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	14.2	1.4	1.4	3.4	3.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.1	18.1	14.0	10.7	21.5	22.2
LnGrp LOS	B	B	B	B	C	C
Approach Vol, veh/h	1035			594	548	
Approach Delay, s/veh	14.8			11.7	21.9	
Approach LOS	B			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		27.9		27.8	10.7	17.3
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		44.5		36.5	11.5	28.5
Max Q Clear Time (g_c+I1), s		6.2		19.4	5.9	10.3
Green Ext Time (p_c), s		3.0		3.9	0.2	2.5

Intersection Summary	
HCM 6th Ctrl Delay	15.7
HCM 6th LOS	B

APPENDIX F

2035 Capacity Analysis

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2	0	572	549	0
Future Vol, veh/h	0	2	0	572	549	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2	0	629	603	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1232	603	603	0	-	0
Stage 1	603	-	-	-	-	-
Stage 2	629	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	196	499	975	-	-	-
Stage 1	546	-	-	-	-	-
Stage 2	531	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	196	499	975	-	-	-
Mov Cap-2 Maneuver	196	-	-	-	-	-
Stage 1	546	-	-	-	-	-
Stage 2	531	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	975	-	499	-	-
HCM Lane V/C Ratio	-	-	0.004	-	-
HCM Control Delay (s)	0	-	12.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

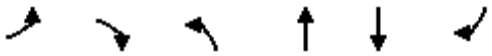
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	1	1	599	563	4
Future Vol, veh/h	3	1	1	599	563	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	1	1	624	586	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1214	588	590	0	-	0
Stage 1	588	-	-	-	-	-
Stage 2	626	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	201	509	985	-	-	-
Stage 1	555	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	201	509	985	-	-	-
Mov Cap-2 Maneuver	340	-	-	-	-	-
Stage 1	554	-	-	-	-	-
Stage 2	533	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	985	-	340	509	-	-
HCM Lane V/C Ratio	0.001	-	0.009	0.002	-	-
HCM Control Delay (s)	8.7	0	15.7	12.1	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	121	276	146	547	259	206
Future Volume (veh/h)	121	276	146	547	259	206
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	297	157	588	278	222
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	914	419	505	1733	475	403
Arrive On Green	0.26	0.26	0.11	0.49	0.25	0.25
Sat Flow, veh/h	3456	1585	1781	3647	1870	1585
Grp Volume(v), veh/h	130	297	157	588	278	222
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1870	1585
Q Serve(g_s), s	1.0	6.2	2.0	3.7	4.7	4.4
Cycle Q Clear(g_c), s	1.0	6.2	2.0	3.7	4.7	4.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	914	419	505	1733	475	403
V/C Ratio(X)	0.14	0.71	0.31	0.34	0.58	0.55
Avail Cap(c_a), veh/h	2714	1245	972	5141	1778	1507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.2	12.1	7.5	5.7	11.9	11.7
Incr Delay (d2), s/veh	0.1	2.2	0.3	0.1	1.1	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.4	0.6	0.8	1.7	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	10.3	14.3	7.8	5.8	13.0	12.9
LnGrp LOS	B	B	A	A	B	B
Approach Vol, veh/h	427			745	500	
Approach Delay, s/veh	13.1			6.2	13.0	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		22.2		14.1	8.5	13.7
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		52.5		28.5	13.5	34.5
Max Q Clear Time (g_c+I1), s		5.7		8.2	4.0	6.7
Green Ext Time (p_c), s		4.6		1.4	0.3	2.5

Intersection Summary		
HCM 6th Ctrl Delay		10.0
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	10	1	539	819	6
Future Vol, veh/h	9	10	1	539	819	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	10	1	561	853	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1419	856	859	0	-	0
Stage 1	856	-	-	-	-	-
Stage 2	563	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	151	357	782	-	-	-
Stage 1	416	-	-	-	-	-
Stage 2	570	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	151	357	782	-	-	-
Mov Cap-2 Maneuver	151	-	-	-	-	-
Stage 1	415	-	-	-	-	-
Stage 2	570	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	782	-	217	-	-
HCM Lane V/C Ratio	0.001	-	0.091	-	-
HCM Control Delay (s)	9.6	0	23.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

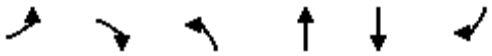
Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	0	0	675	830	3
Future Vol, veh/h	3	0	0	675	830	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	0	0	726	892	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1620	894	895	0	-	0
Stage 1	894	-	-	-	-	-
Stage 2	726	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	113	340	758	-	-	-
Stage 1	399	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	113	340	758	-	-	-
Mov Cap-2 Maneuver	250	-	-	-	-	-
Stage 1	399	-	-	-	-	-
Stage 2	479	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	758	-	250	-	-	-
HCM Lane V/C Ratio	-	-	0.013	-	-	-
HCM Control Delay (s)	0	-	19.6	0	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-	-



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	477	549	178	402	287	252
Future Volume (veh/h)	477	549	178	402	287	252
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	502	578	187	423	302	265
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1473	676	392	1494	435	369
Arrive On Green	0.43	0.43	0.11	0.42	0.23	0.23
Sat Flow, veh/h	3456	1585	1781	3647	1870	1585
Grp Volume(v), veh/h	502	578	187	423	302	265
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1870	1585
Q Serve(g_s), s	5.7	19.3	4.3	4.6	8.7	9.0
Cycle Q Clear(g_c), s	5.7	19.3	4.3	4.6	8.7	9.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1473	676	392	1494	435	369
V/C Ratio(X)	0.34	0.86	0.48	0.28	0.69	0.72
Avail Cap(c_a), veh/h	2030	931	573	2814	940	796
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.3	15.2	13.9	11.2	20.6	20.8
Incr Delay (d2), s/veh	0.1	5.9	0.9	0.1	2.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	1.1	1.6	1.6	3.7	3.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.4	21.1	14.8	11.3	22.6	23.4
LnGrp LOS	B	C	B	B	C	C
Approach Vol, veh/h	1080			610	567	
Approach Delay, s/veh	16.6			12.4	23.0	
Approach LOS	B			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		29.2		29.5	11.0	18.2
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		46.5		34.5	12.5	29.5
Max Q Clear Time (g_c+I1), s		6.6		21.3	6.3	11.0
Green Ext Time (p_c), s		3.1		3.7	0.3	2.6

Intersection Summary	
HCM 6th Ctrl Delay	17.1
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	16	8	3	590	565	8
Future Vol, veh/h	16	8	3	590	565	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	9	3	648	621	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1280	626	630	0	-	0
Stage 1	626	-	-	-	-	-
Stage 2	654	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	183	484	952	-	-	-
Stage 1	533	-	-	-	-	-
Stage 2	517	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	182	484	952	-	-	-
Mov Cap-2 Maneuver	182	-	-	-	-	-
Stage 1	530	-	-	-	-	-
Stage 2	517	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	952	-	230	-	-
HCM Lane V/C Ratio	0.003	-	0.115	-	-
HCM Control Delay (s)	8.8	0	22.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	113	33	51	615	577	64
Future Vol, veh/h	113	33	51	615	577	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	225	-	-	225
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	118	34	53	641	601	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1348	601	668	0	-	0
Stage 1	601	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	166	500	922	-	-	-
Stage 1	547	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	157	500	922	-	-	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	516	-	-	-	-	-
Stage 2	468	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.3	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	922	-	295	500	-	-
HCM Lane V/C Ratio	0.058	-	0.399	0.069	-	-
HCM Control Delay (s)	9.1	-	25.1	12.7	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.8	0.2	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	16	0	696	613	54
Future Vol, veh/h	0	16	0	696	613	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	225
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	17	0	725	639	56

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	639	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	476	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	476	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	476	-	-
HCM Lane V/C Ratio	-	0.035	-	-
HCM Control Delay (s)	-	12.8	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	121	321	193	504	304	206
Future Volume (veh/h)	121	321	193	504	304	206
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	345	208	542	327	222
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	986	452	485	1770	506	429
Arrive On Green	0.29	0.29	0.12	0.50	0.27	0.27
Sat Flow, veh/h	3456	1585	1781	3647	1870	1585
Grp Volume(v), veh/h	130	345	208	542	327	222
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1870	1585
Q Serve(g_s), s	1.2	8.3	3.1	3.8	6.4	4.9
Cycle Q Clear(g_c), s	1.2	8.3	3.1	3.8	6.4	4.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	986	452	485	1770	506	429
V/C Ratio(X)	0.13	0.76	0.43	0.31	0.65	0.52
Avail Cap(c_a), veh/h	2369	1087	851	4488	1552	1316
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	13.6	8.6	6.2	13.4	12.9
Incr Delay (d2), s/veh	0.1	2.7	0.6	0.1	1.4	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	7.2	0.9	0.9	2.4	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.1	16.3	9.2	6.3	14.8	13.8
LnGrp LOS	B	B	A	A	B	B
Approach Vol, veh/h	475			750	549	
Approach Delay, s/veh	14.9			7.1	14.4	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		25.2		16.4	9.5	15.8
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		52.5		28.5	13.5	34.5
Max Q Clear Time (g_c+I1), s		5.8		10.3	5.1	8.4
Green Ext Time (p_c), s		4.2		1.6	0.4	2.8

Intersection Summary	
HCM 6th Ctrl Delay	11.4
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	16	8	564	838	24
Future Vol, veh/h	21	16	8	564	838	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	17	8	588	873	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1490	886	898	0	-	0
Stage 1	886	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	136	343	756	-	-	-
Stage 1	403	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	134	343	756	-	-	-
Mov Cap-2 Maneuver	134	-	-	-	-	-
Stage 1	397	-	-	-	-	-
Stage 2	546	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	756	-	182	-	-
HCM Lane V/C Ratio	0.011	-	0.212	-	-
HCM Control Delay (s)	9.8	0	30	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	22	40	687	855	67
Future Vol, veh/h	100	22	40	687	855	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	225	-	-	225
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	24	43	739	919	72

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1744	919	991	0	-	0
Stage 1	919	-	-	-	-	-
Stage 2	825	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 95	329	698	-	-	-
Stage 1	389	-	-	-	-	-
Stage 2	430	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 89	329	698	-	-	-
Mov Cap-2 Maneuver	220	-	-	-	-	-
Stage 1	365	-	-	-	-	-
Stage 2	430	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	32.6	0.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	698	-	220	329	-	-
HCM Lane V/C Ratio	0.062	-	0.489	0.072	-	-
HCM Control Delay (s)	10.5	-	36.1	16.8	-	-
HCM Lane LOS	B	-	E	C	-	-
HCM 95th %tile Q(veh)	0.2	-	2.4	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	11	0	772	905	62
Future Vol, veh/h	0	11	0	772	905	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	225
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	12	0	830	973	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	973	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	306	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	306	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	306	-	-
HCM Lane V/C Ratio	-	0.039	-	-
HCM Control Delay (s)	-	17.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	477	614	225	452	352	252
Future Volume (veh/h)	477	614	225	452	352	252
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	502	646	237	476	371	265
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1523	698	370	1548	470	398
Arrive On Green	0.44	0.44	0.12	0.44	0.25	0.25
Sat Flow, veh/h	3456	1585	1781	3647	1870	1585
Grp Volume(v), veh/h	502	646	237	476	371	265
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1870	1585
Q Serve(g_s), s	6.9	28.0	6.7	6.4	13.5	10.9
Cycle Q Clear(g_c), s	6.9	28.0	6.7	6.4	13.5	10.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1523	698	370	1548	470	398
V/C Ratio(X)	0.33	0.92	0.64	0.31	0.79	0.67
Avail Cap(c_a), veh/h	1639	752	457	2271	758	643
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	19.2	17.3	13.4	25.5	24.5
Incr Delay (d2), s/veh	0.1	16.6	2.1	0.1	3.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	23.6	2.7	2.4	6.1	4.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.4	35.8	19.4	13.5	28.5	26.4
LnGrp LOS	B	D	B	B	C	C
Approach Vol, veh/h	1148			713	636	
Approach Delay, s/veh	26.0			15.5	27.6	
Approach LOS	C			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		36.2		36.6	13.4	22.8
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		46.5		34.5	12.5	29.5
Max Q Clear Time (g_c+I1), s		8.4		30.0	8.7	15.5
Green Ext Time (p_c), s		3.6		2.1	0.2	2.8

Intersection Summary	
HCM 6th Ctrl Delay	23.4
HCM 6th LOS	C

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Approach	EB	NB	SB
Entry Lanes	2	1	2
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	152	694	668
Demand Flow Rate, veh/h	155	708	681
Vehicles Circulating, veh/h	613	120	54
Vehicles Exiting, veh/h	122	648	774
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	5.8	10.0	6.8
Approach LOS	A	A	A

Lane	Left	Right	Left	Left	Right
Designated Moves	L	TR	LT	LT	R
Assumed Moves	L	TR	LT	LT	R
RT Channelized					
Lane Util	0.774	0.226	1.000	0.900	0.100
Follow-Up Headway, s	2.535	2.535	2.609	2.535	2.535
Critical Headway, s	4.544	4.544	4.976	4.544	4.544
Entry Flow, veh/h	120	35	708	613	68
Cap Entry Lane, veh/h	813	813	1221	1352	1352
Entry HV Adj Factor	0.983	0.971	0.980	0.980	0.985
Flow Entry, veh/h	118	34	694	601	67
Cap Entry, veh/h	799	790	1197	1326	1332
V/C Ratio	0.148	0.043	0.580	0.453	0.050
Control Delay, s/veh	6.0	5.0	10.0	7.2	3.1
LOS	A	A	A	A	A
95th %tile Queue, veh	1	0	4	2	0

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Approach	EB	NB	SB
Entry Lanes	2	1	2
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	132	782	991
Demand Flow Rate, veh/h	134	798	1010
Vehicles Circulating, veh/h	937	110	44
Vehicles Exiting, veh/h	117	961	864
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.0	11.5	11.2
Approach LOS	A	B	B

Lane	Left	Right	Left	Left	Right
Designated Moves	L	TR	LT	LT	R
Assumed Moves	L	TR	LT	LT	R
RT Channelized					
Lane Util	0.821	0.179	1.000	0.928	0.072
Follow-Up Headway, s	2.535	2.535	2.609	2.535	2.535
Critical Headway, s	4.544	4.544	4.976	4.544	4.544
Entry Flow, veh/h	110	24	798	937	73
Cap Entry Lane, veh/h	605	605	1233	1364	1364
Entry HV Adj Factor	0.982	1.000	0.980	0.980	0.986
Flow Entry, veh/h	108	24	782	919	72
Cap Entry, veh/h	594	605	1209	1338	1346
V/C Ratio	0.182	0.040	0.647	0.687	0.054
Control Delay, s/veh	8.3	6.4	11.5	11.8	3.1
LOS	A	A	B	B	A
95th %tile Queue, veh	1	0	5	6	0

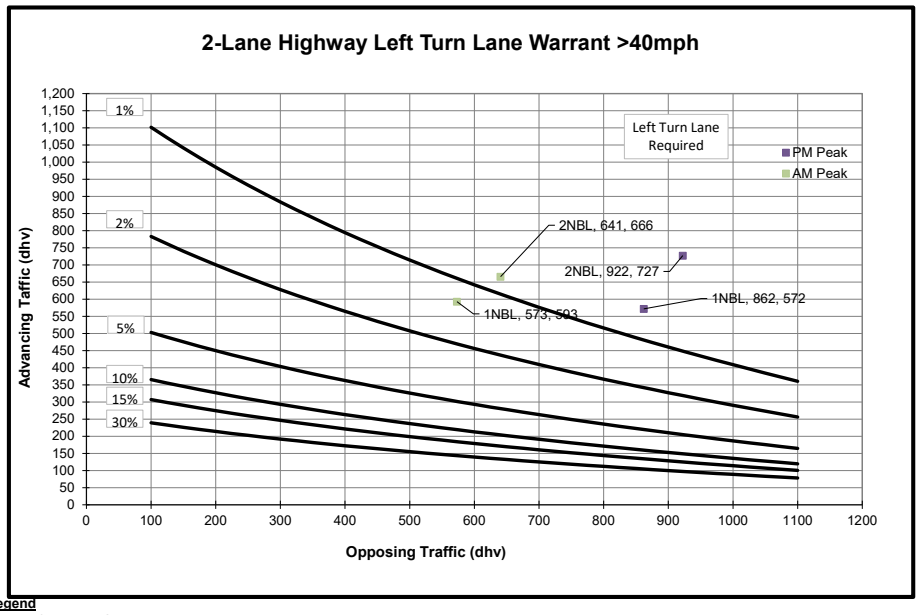
APPENDIX G

Turn Lane Analysis

Left Turn Lane Warrant
Design Year Build Volumes

PM Peak Hour				
Intersection	**Left Turning Vol**	**Advancing Vol**	**Opposing Vol**	**Left Turn %**
1NBL	8	572	862	1%
2NBL	40	727	922	6%

AM Peak Hour				
Intersection	**Left Turning Vol**	**Advancing Vol**	**Opposing Vol**	**Left Turn %**
1NBL	3	593	573	1%
2NBL	51	666	641	8%



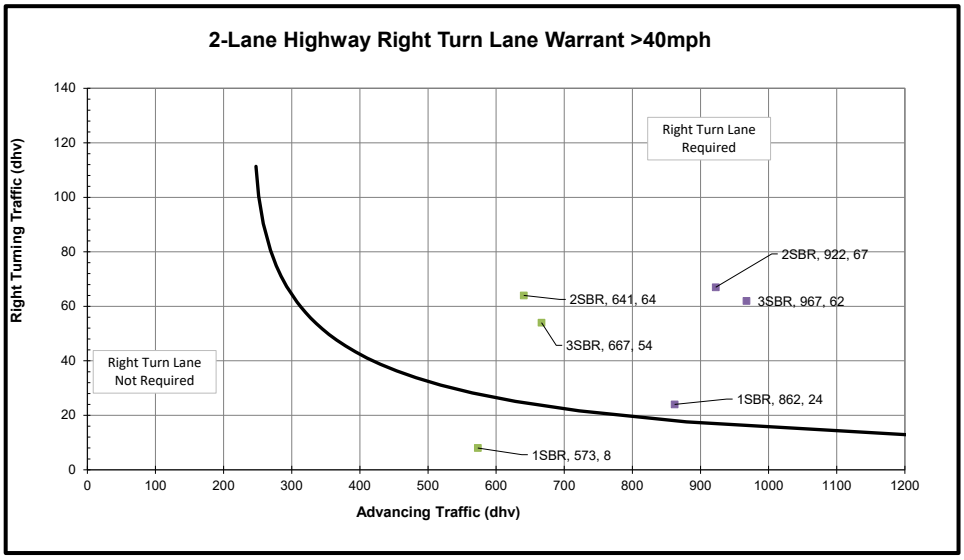
Intersection Legend

1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

Right Turn Lane Warrant
Design Year Build Volumes

PM Peak Hour		
Intersection	Right Turning Vol	Advancing Vol
1SBR	24	862
2SBR	67	922
3SBR	62	967

AM Peak Hour		
Intersection	Right Turning Vol	Advancing Vol
1SBR	8	573
2SBR	64	641
3SBR	54	667



Intersection Legend

1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

Turn Lane Lengths

Movement	Scenario	Turning Vol. (AM)	Turning Vol. (PM)	Cycles/ Hour	Veh/Hr (AM)	Veh/Hr (PM)	Avg. Veh/Hour	Storage Length (ft.)	Condition "B"	Condition "C"	Total Length (ft.)
2NBL	2035 Build	48	34	**60**	0.8	0.6	0.8	**50**	225	N/A	225
2SBR	2035 Build	65	57	**60**	1.1	1.0	1.1	**55**	225	200	225
3SBR	2035 Build	56	54	60	0.9	0.9	0.9	50	225	N/A	225

ATTACHMENT B

Traffic Volumes

ATTACHMENT B

Turning Movement Counts - Bach Buxton Road and Shayler Road

Clermont County
2381 Clermont Center Drive

Batavia, Ohio, United States 45103
(513) 732-2231 bperry@clermontcountyohio.gov

Count Name: Bach-Buxton Road & Shayler Road
Site Code: C-380-2024
Start Date: 09/04/2024

Turning Movement Data

Start Time	Bach-Buxton Southbound					Shayler Road Westbound					Bach-Buxton Northbound					Shayler Road Eastbound					
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
7:00 AM	24	107	5	0	136	18	51	14	0	83	13	127	27	0	167	25	18	13	0	56	442
7:15 AM	31	155	6	0	192	11	66	22	0	99	12	135	26	0	173	29	17	19	0	65	529
7:30 AM	41	135	11	0	187	18	54	19	0	91	8	140	38	0	186	34	24	30	0	88	552
7:45 AM	34	77	8	0	119	18	65	16	0	99	15	111	36	0	162	9	32	32	0	73	453
Hourly Total	130	474	30	0	634	65	236	71	0	372	48	513	127	0	688	97	91	94	0	282	1976
8:00 AM	37	76	7	0	120	20	56	9	0	85	5	75	14	0	94	10	48	20	0	78	377
8:15 AM	23	77	6	0	106	15	43	15	0	73	4	92	13	0	109	8	22	25	0	55	343
8:30 AM	28	60	7	0	95	14	41	8	0	63	7	84	12	0	103	11	33	35	0	79	340
8:45 AM	27	71	13	0	111	11	34	10	0	55	8	88	11	0	107	8	39	24	0	71	344
Hourly Total	115	284	33	0	432	60	174	42	0	276	24	339	50	0	413	37	142	104	0	283	1404
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	23	124	23	0	170	14	26	8	0	48	15	121	19	0	155	15	62	31	0	108	481
3:15 PM	30	142	28	0	200	17	37	3	0	57	17	113	17	0	147	17	39	21	0	77	481
3:30 PM	31	127	25	0	183	7	43	7	0	57	12	122	19	0	153	7	72	32	0	111	504
3:45 PM	25	142	24	0	191	13	42	11	0	66	8	101	10	0	119	16	48	20	0	84	460
Hourly Total	109	535	100	0	744	51	148	29	0	228	52	457	65	0	574	55	221	104	0	380	1926
4:00 PM	34	164	20	0	218	15	34	9	0	58	24	104	14	0	142	17	45	22	0	84	502
4:15 PM	40	173	30	0	243	13	33	14	0	60	19	113	6	0	138	12	51	29	0	92	533
4:30 PM	32	164	22	0	218	12	32	14	0	58	14	114	7	0	135	15	50	34	0	99	510
4:45 PM	45	140	22	0	207	17	47	17	0	81	19	108	11	0	138	12	44	27	0	83	509
Hourly Total	151	641	94	0	886	57	146	54	0	257	76	439	38	0	553	56	190	112	0	358	2054
5:00 PM	28	168	34	0	230	12	45	18	0	75	17	111	9	0	137	13	50	39	0	102	544
5:15 PM	24	158	27	0	209	8	35	17	0	60	15	109	17	0	141	13	72	23	0	108	518
5:30 PM	20	162	30	0	212	10	36	19	0	65	9	84	8	0	101	10	53	31	0	94	472
5:45 PM	23	145	21	0	189	5	54	17	0	76	3	93	8	0	104	20	50	18	0	88	457
Hourly Total	95	633	112	0	840	35	170	71	0	276	44	397	42	0	483	56	225	111	0	392	1991
Grand Total	600	2567	369	0	3536	268	874	267	0	1409	244	2145	322	0	2711	301	869	525	0	1695	9351
Approach %	17.0	72.6	10.4	0.0	-	19.0	62.0	18.9	0.0	-	9.0	79.1	11.9	0.0	-	17.8	51.3	31.0	0.0	-	-
Total %	6.4	27.5	3.9	0.0	37.8	2.9	9.3	2.9	0.0	15.1	2.6	22.9	3.4	0.0	29.0	3.2	9.3	5.6	0.0	18.1	-
All Vehicles (no classification)	600	2567	369	0	3536	268	874	267	0	1409	244	2145	322	0	2711	301	869	525	0	1695	9351
% All Vehicles (no classification)	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0

Clermont County
2381 Clermont Center Drive

Batavia, Ohio, United States 45103
(513) 732-2231 bperry@clermontcountyohio.gov

Count Name: Bach-Buxton Road & Shayler Road
Site Code: C-380-2024
Start Date: 09/04/2024

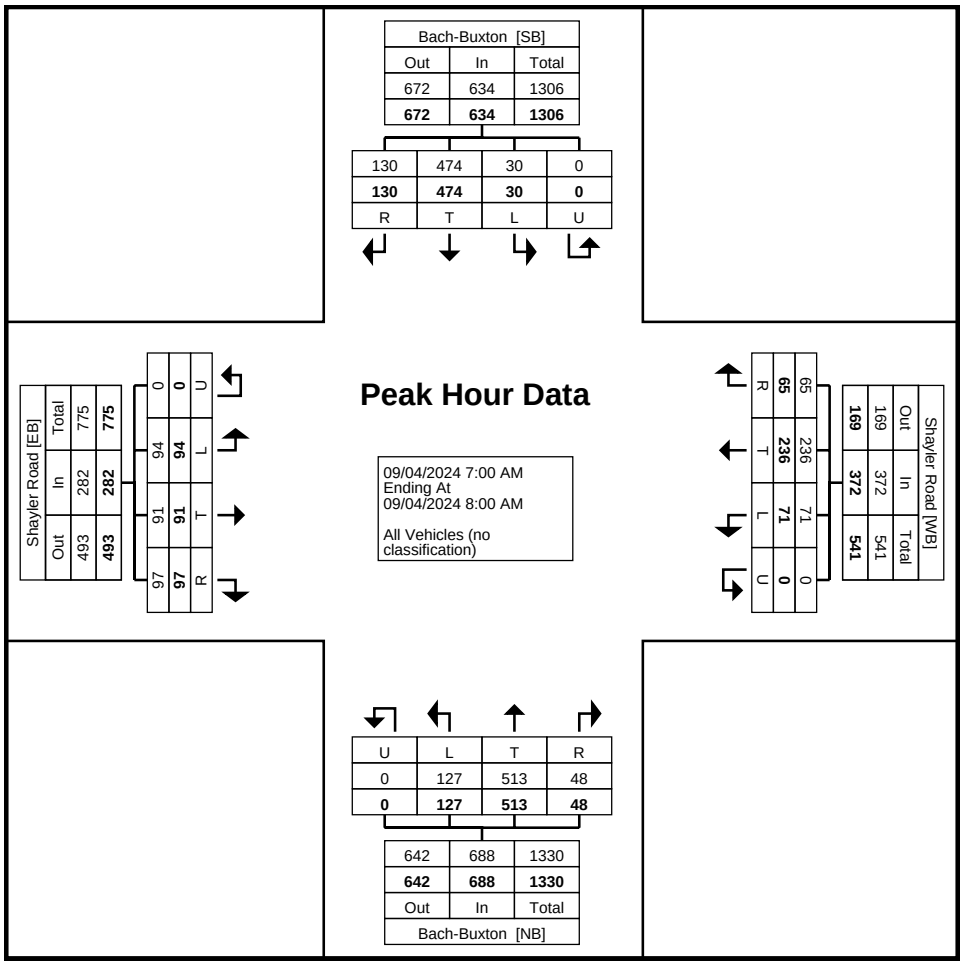
Turning Movement Peak Hour Data (7:00 AM)

Start Time	Bach-Buxton Southbound					Shayler Road Westbound					Bach-Buxton Northbound					Shayler Road Eastbound					
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
7:00 AM	24	107	5	0	136	18	51	14	0	83	13	127	27	0	167	25	18	13	0	56	442
7:15 AM	31	155	6	0	192	11	66	22	0	99	12	135	26	0	173	29	17	19	0	65	529
7:30 AM	41	135	11	0	187	18	54	19	0	91	8	140	38	0	186	34	24	30	0	88	552
7:45 AM	34	77	8	0	119	18	65	16	0	99	15	111	36	0	162	9	32	32	0	73	453
Total	130	474	30	0	634	65	236	71	0	372	48	513	127	0	688	97	91	94	0	282	1976
Approach %	20.5	74.8	4.7	0.0	-	17.5	63.4	19.1	0.0	-	7.0	74.6	18.5	0.0	-	34.4	32.3	33.3	0.0	-	-
Total %	6.6	24.0	1.5	0.0	32.1	3.3	11.9	3.6	0.0	18.8	2.4	26.0	6.4	0.0	34.8	4.9	4.6	4.8	0.0	14.3	-
PHF	0.793	0.765	0.682	0.000	0.826	0.903	0.894	0.807	0.000	0.939	0.800	0.916	0.836	0.000	0.925	0.713	0.711	0.734	0.000	0.801	0.895
All Vehicles (no classification)	130	474	30	0	634	65	236	71	0	372	48	513	127	0	688	97	91	94	0	282	1976
% All Vehicles (no classification)	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0

Clermont County
2381 Clermont Center Drive

Batavia, Ohio, United States 45103
(513) 732-2231 bperry@clermontcountyohio.gov

Count Name: Bach-Buxton Road & Shayler Road
Site Code: C-380-2024
Start Date: 09/04/2024



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

Clermont County
2381 Clermont Center Drive

Batavia, Ohio, United States 45103
(513) 732-2231 bperry@clermontcountyohio.gov

Count Name: Bach-Buxton Road & Shayler Road
Site Code: C-380-2024
Start Date: 09/04/2024

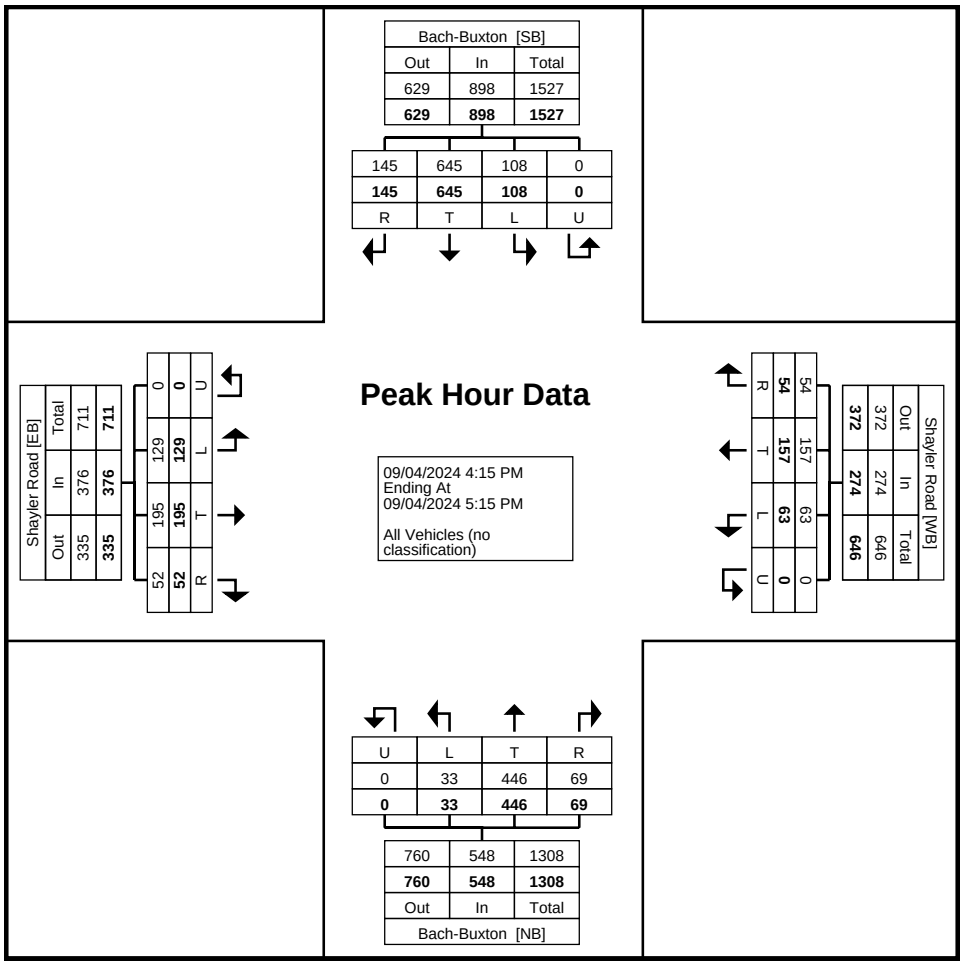
Turning Movement Peak Hour Data (4:15 PM)

Start Time	Bach-Buxton Southbound					Shayler Road Westbound					Bach-Buxton Northbound					Shayler Road Eastbound					
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
4:15 PM	40	173	30	0	243	13	33	14	0	60	19	113	6	0	138	12	51	29	0	92	533
4:30 PM	32	164	22	0	218	12	32	14	0	58	14	114	7	0	135	15	50	34	0	99	510
4:45 PM	45	140	22	0	207	17	47	17	0	81	19	108	11	0	138	12	44	27	0	83	509
5:00 PM	28	168	34	0	230	12	45	18	0	75	17	111	9	0	137	13	50	39	0	102	544
Total	145	645	108	0	898	54	157	63	0	274	69	446	33	0	548	52	195	129	0	376	2096
Approach %	16.1	71.8	12.0	0.0	-	19.7	57.3	23.0	0.0	-	12.6	81.4	6.0	0.0	-	13.8	51.9	34.3	0.0	-	-
Total %	6.9	30.8	5.2	0.0	42.8	2.6	7.5	3.0	0.0	13.1	3.3	21.3	1.6	0.0	26.1	2.5	9.3	6.2	0.0	17.9	-
PHF	0.806	0.932	0.794	0.000	0.924	0.794	0.835	0.875	0.000	0.846	0.908	0.978	0.750	0.000	0.993	0.867	0.956	0.827	0.000	0.922	0.963
All Vehicles (no classification)	145	645	108	0	898	54	157	63	0	274	69	446	33	0	548	52	195	129	0	376	2096
% All Vehicles (no classification)	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0

Clermont County
2381 Clermont Center Drive

Batavia, Ohio, United States 45103
(513) 732-2231 bperry@clermontcountyohio.gov

Count Name: Bach-Buxton Road & Shayler Road
Site Code: C-380-2024
Start Date: 09/04/2024



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

ATTACHMENT B

Turning Movement Counts - Bach Buxton Road and the Northern Driveway to Provision Living at West Clermont

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024

Turning Movement Data

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Northern Drive Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
6:00 AM	1	43	0	44	59	0	0	59	0	1	0	1	104
6:15 AM	0	51	0	51	71	0	0	71	0	0	0	0	122
6:30 AM	0	88	0	88	89	0	0	89	1	0	0	1	178
6:45 AM	4	117	0	121	100	0	0	100	0	0	0	0	221
Hourly Total	5	299	0	304	319	0	0	319	1	1	0	2	625
7:00 AM	1	127	0	128	158	1	0	159	0	1	0	1	288
7:15 AM	0	168	0	168	125	0	0	125	1	1	0	2	295
7:30 AM	2	137	0	139	154	0	0	154	0	0	0	0	293
7:45 AM	1	112	0	113	142	0	0	142	0	1	0	1	256
Hourly Total	4	544	0	548	579	1	0	580	1	3	0	4	1132
8:00 AM	1	88	0	89	105	0	0	105	1	0	0	1	195
8:15 AM	0	100	0	100	106	1	0	107	0	1	0	1	208
8:30 AM	1	74	0	75	95	0	0	95	0	1	0	1	171
8:45 AM	0	70	0	70	89	0	0	89	0	0	0	0	159
Hourly Total	2	332	0	334	395	1	0	396	1	2	0	3	733
9:00 AM	5	66	0	71	91	0	0	91	0	0	0	0	162
9:15 AM	2	96	0	98	90	0	0	90	0	2	0	2	190
9:30 AM	2	72	0	74	90	0	0	90	0	0	0	0	164
9:45 AM	5	89	0	94	94	0	0	94	0	1	0	1	189
Hourly Total	14	323	0	337	365	0	0	365	0	3	0	3	705
10:00 AM	0	71	0	71	98	0	0	98	1	0	0	1	170
10:15 AM	3	61	0	64	113	0	0	113	1	0	0	1	178
10:30 AM	0	83	0	83	107	1	0	108	0	0	0	0	191
10:45 AM	0	96	0	96	103	0	0	103	0	0	0	0	199
Hourly Total	3	311	0	314	421	1	0	422	2	0	0	2	738
11:00 AM	1	67	0	68	130	0	0	130	0	0	0	0	198
11:15 AM	0	106	0	106	99	1	0	100	0	1	0	1	207
11:30 AM	2	91	0	93	87	0	0	87	0	3	0	3	183
11:45 AM	1	123	0	124	105	0	0	105	0	1	0	1	230
Hourly Total	4	387	0	391	421	1	0	422	0	5	0	5	818
12:00 PM	0	131	0	131	88	0	0	88	0	0	0	0	219
12:15 PM	1	128	0	129	88	0	0	88	0	2	0	2	219
12:30 PM	3	134	0	137	116	0	0	116	0	0	0	0	253
12:45 PM	3	127	0	130	127	0	0	127	0	1	0	1	258
Hourly Total	7	520	0	527	419	0	0	419	0	3	0	3	949
1:00 PM	1	107	0	108	128	0	0	128	0	1	0	1	237
1:15 PM	2	145	0	147	95	1	0	96	0	2	0	2	245
1:30 PM	3	126	0	129	99	0	0	99	0	5	0	5	233
1:45 PM	4	138	0	142	79	0	0	79	0	0	0	0	221

Hourly Total	10	516	0	526	401	1	0	402	0	8	0	8	936
2:00 PM	2	135	0	137	96	0	0	96	0	0	0	0	233
2:15 PM	2	148	0	150	73	1	0	74	0	1	0	1	225
2:30 PM	0	150	0	150	119	0	0	119	0	1	0	1	270
2:45 PM	2	185	0	187	181	0	0	181	1	1	0	2	370
Hourly Total	6	618	0	624	469	1	0	470	1	3	0	4	1098
3:00 PM	3	153	0	156	122	0	0	122	0	1	0	1	279
3:15 PM	1	189	0	190	123	0	0	123	0	0	0	0	313
3:30 PM	5	189	0	194	128	0	0	128	0	4	0	4	326
3:45 PM	1	187	0	188	113	0	0	113	0	1	0	1	302
Hourly Total	10	718	0	728	486	0	0	486	0	6	0	6	1220
4:00 PM	0	196	0	196	134	0	0	134	0	3	0	3	333
4:15 PM	1	203	0	204	122	0	0	122	0	0	0	0	326
4:30 PM	2	185	0	187	121	0	0	121	0	1	0	1	309
4:45 PM	1	173	0	174	152	0	0	152	0	2	0	2	328
Hourly Total	4	757	0	761	529	0	0	529	0	6	0	6	1296
5:00 PM	0	217	0	217	175	0	0	175	0	0	0	0	392
5:15 PM	0	204	0	204	179	0	0	179	0	0	0	0	383
5:30 PM	2	209	0	211	147	0	0	147	0	1	0	1	359
5:45 PM	1	160	0	161	158	0	0	158	0	0	0	0	319
Hourly Total	3	790	0	793	659	0	0	659	0	1	0	1	1453
6:00 PM	0	176	0	176	108	0	0	108	0	0	0	0	284
6:15 PM	0	144	0	144	116	0	0	116	0	0	0	0	260
6:30 PM	4	138	0	142	82	0	0	82	0	1	0	1	225
6:45 PM	1	110	0	111	55	0	0	55	1	1	0	2	168
Hourly Total	5	568	0	573	361	0	0	361	1	2	0	3	937
Grand Total	77	6683	0	6760	5824	6	0	5830	7	43	0	50	12640
Approach %	1.1	98.9	0.0	-	99.9	0.1	0.0	-	14.0	86.0	0.0	-	-
Total %	0.6	52.9	0.0	53.5	46.1	0.0	0.0	46.1	0.1	0.3	0.0	0.4	-
Lights	73	6474	0	6547	5643	5	0	5648	7	40	0	47	12242
% Lights	94.8	96.9	-	96.8	96.9	83.3	-	96.9	100.0	93.0	-	94.0	96.9
Other Vehicles	4	209	0	213	181	1	0	182	0	3	0	3	398
% Other Vehicles	5.2	3.1	-	3.2	3.1	16.7	-	3.1	0.0	7.0	-	6.0	3.1

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024

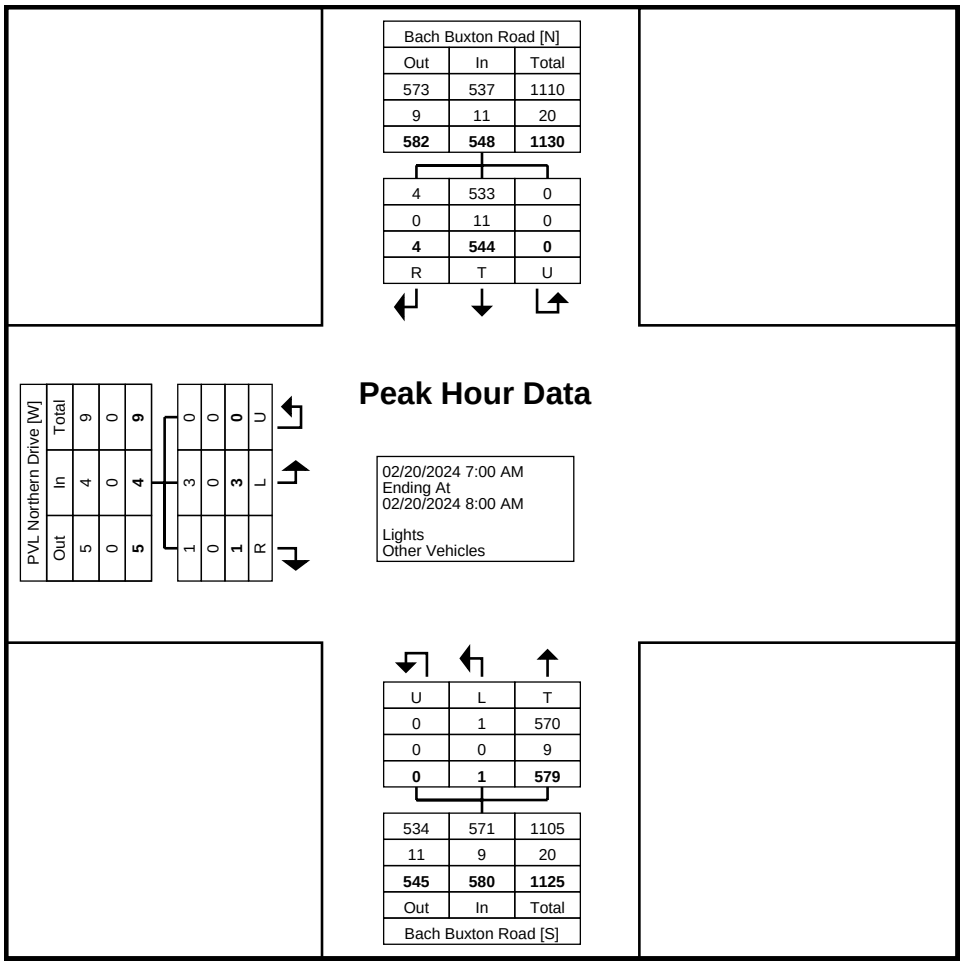
Turning Movement Peak Hour Data (7:00 AM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Northern Drive Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
7:00 AM	1	127	0	128	158	1	0	159	0	1	0	1	288
7:15 AM	0	168	0	168	125	0	0	125	1	1	0	2	295
7:30 AM	2	137	0	139	154	0	0	154	0	0	0	0	293
7:45 AM	1	112	0	113	142	0	0	142	0	1	0	1	256
Total	4	544	0	548	579	1	0	580	1	3	0	4	1132
Approach %	0.7	99.3	0.0	-	99.8	0.2	0.0	-	25.0	75.0	0.0	-	-
Total %	0.4	48.1	0.0	48.4	51.1	0.1	0.0	51.2	0.1	0.3	0.0	0.4	-
PHF	0.500	0.810	0.000	0.815	0.916	0.250	0.000	0.912	0.250	0.750	0.000	0.500	0.959
Lights	4	533	0	537	570	1	0	571	1	3	0	4	1112
% Lights	100.0	98.0	-	98.0	98.4	100.0	-	98.4	100.0	100.0	-	100.0	98.2
Other Vehicles	0	11	0	11	9	0	0	9	0	0	0	0	20
% Other Vehicles	0.0	2.0	-	2.0	1.6	0.0	-	1.6	0.0	0.0	-	0.0	1.8

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024



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

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024

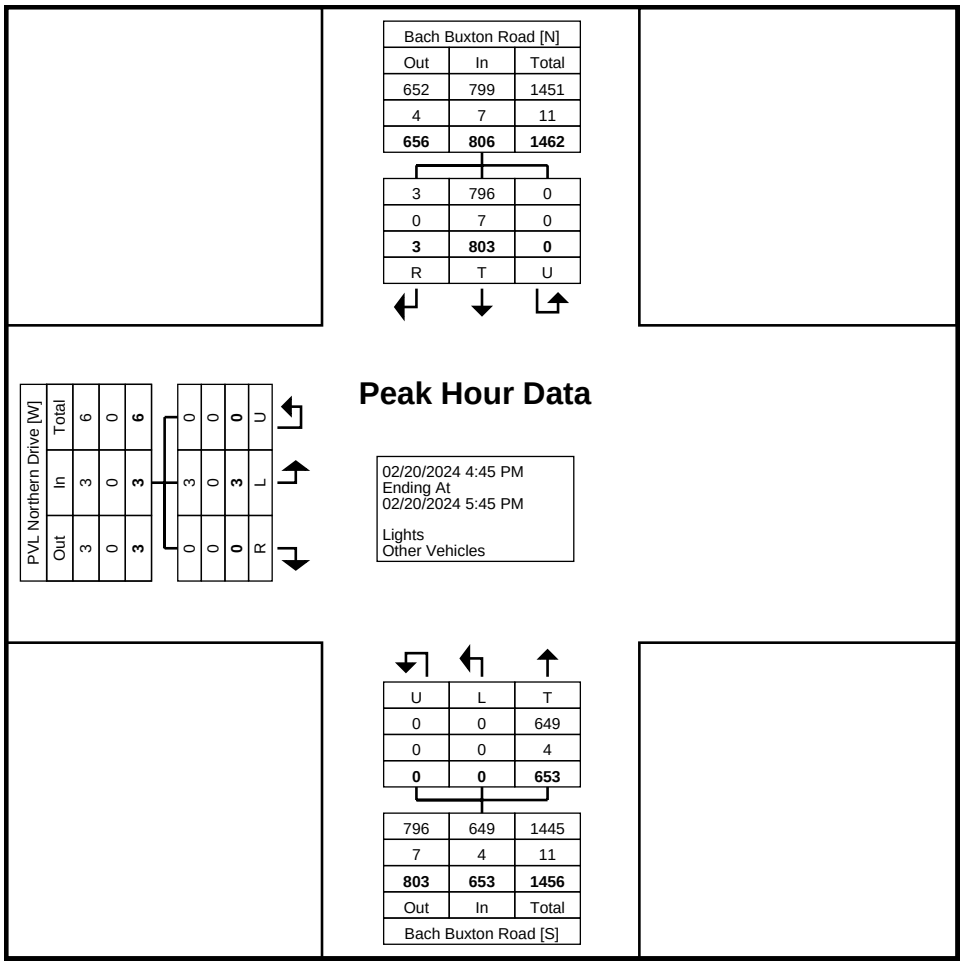
Turning Movement Peak Hour Data (4:45 PM)

Start Time	Bach Buxton Road Southbound				Bach Buxton Road Northbound				PVL Northern Drive Eastbound				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
4:45 PM	1	173	0	174	152	0	0	152	0	2	0	2	328
5:00 PM	0	217	0	217	175	0	0	175	0	0	0	0	392
5:15 PM	0	204	0	204	179	0	0	179	0	0	0	0	383
5:30 PM	2	209	0	211	147	0	0	147	0	1	0	1	359
Total	3	803	0	806	653	0	0	653	0	3	0	3	1462
Approach %	0.4	99.6	0.0	-	100.0	0.0	0.0	-	0.0	100.0	0.0	-	-
Total %	0.2	54.9	0.0	55.1	44.7	0.0	0.0	44.7	0.0	0.2	0.0	0.2	-
PHF	0.375	0.925	0.000	0.929	0.912	0.000	0.000	0.912	0.000	0.375	0.000	0.375	0.932
Lights	3	796	0	799	649	0	0	649	0	3	0	3	1451
% Lights	100.0	99.1	-	99.1	99.4	-	-	99.4	-	100.0	-	100.0	99.2
Other Vehicles	0	7	0	7	4	0	0	4	0	0	0	0	11
% Other Vehicles	0.0	0.9	-	0.9	0.6	-	-	0.6	-	0.0	-	0.0	0.8

Choice One Engineering
440 E. Hoewisher Road

Sidney, Ohio, United States 45365
(937) 497-0200 mkg@choiceoneengineering.com

Count Name: Bach Buxton & PVL Northern Drive
Site Code:
Start Date: 02/20/2024



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

ATTACHMENT B

TIS Trip Generation - Bach Buxton Road and the Northern Driveway to Provision Living at West Clermont

TRAFFIC PROJECTIONS - AM PEAK HOUR

Int. #	Movement		2024	2025	Trips-Independant Living		Trips-Villas Phase 2		Trips-Mixed Use Commercial			2025	2035	2035
		Annual Growth Rate	Existing Counts	Opening Year No-Build Volumes	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Pass-By Trips	Opening Year Build Volumes	Design Year No-Build Volumes	Design Year Build Volumes
2	EBL	0.00%	3	3		4		12		62	32	113	3	113
2	EBR	0.00%	1	1				1		9	22	33	1	33
2	NBL	0.00%	1	1			1		18		32	52	1	52
2	NBT	0.31%	579	581		14		2				597	599	615
2	SBT	0.31%	544	546	8					6		560	563	577
2	SBR	0.00%	4	4	2		6		30		22	64	4	64

Intersection Legend

1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

TRAFFIC PROJECTIONS - PM PEAK HOUR

Int. #	Movement		2024	2025	Trips-Independent Living		Trips-Villas Phase 2		Trips-Mixed Use Commercial			2025	2035	2035
		Annual Growth Rate	Existing Counts	Opening Year No-Build Volumes	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Primary Trips IN	Primary Trips OUT	Pass-By Trips	Opening Year Build Volumes	Design Year No-Build Volumes	Design Year Build Volumes
2	EBL	0.00%	3	3		4		8		70	15	100	3	100
2	EBR	0.00%	0	0				1		11	10	22	0	22
2	NBL	0.00%	0	0			1		24		15	40	0	40
2	NBT	0.31%	653	655		12						667	675	687
2	SBT	0.31%	803	805	16		2			7		830	830	855
2	SBR	0.00%	3	3	4		12		38		10	67	3	67

Intersection Legend

1-Bach Buxton Road & Existing Southern Drive
2-Bach Buxton Road & Existing Northern Drive
3-Bach Buxton Road & Proposed RI/RO
4-Bach Buxon Road & Clepper Lane

ATTACHMENT B

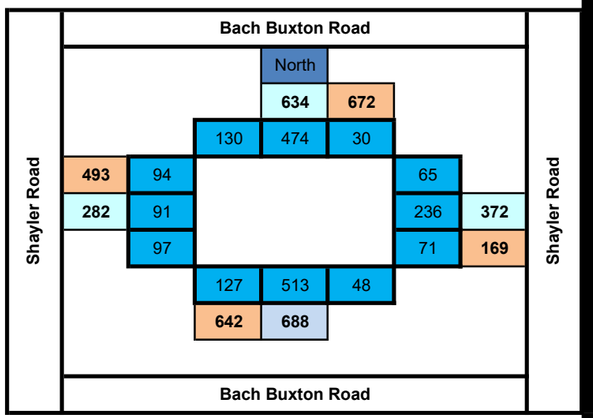
Design Hourly Traffic Volumes

Design Hourly Traffic Volumes

4/17/2025

2024 **A.M. Peak Hour - 7:00 a.m. to 8:00 a.m.**

TMC

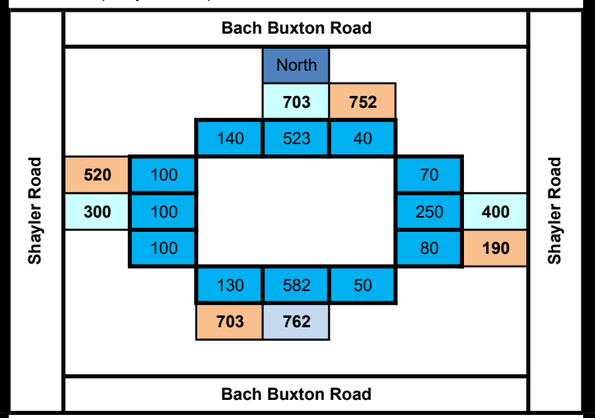


2030 **A.M. Peak Hour - 7:00 a.m. to 8:00 a.m.**

Forecasted & Rounded DHV

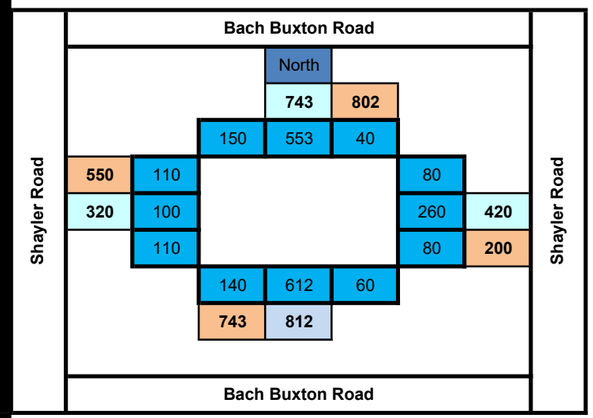
OKI CAGR (Bach Buxton Road) - 0.31%

OKI CAGR (Shayler Road) - 0.31%



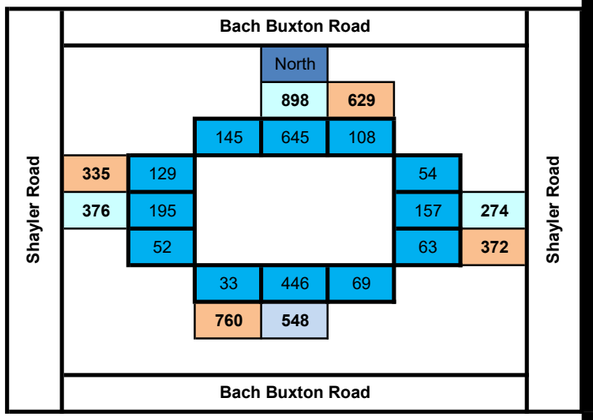
2050 **A.M. Peak Hour - 7:00 a.m. to 8:00 a.m.**

Forecasted & Rounded DHV



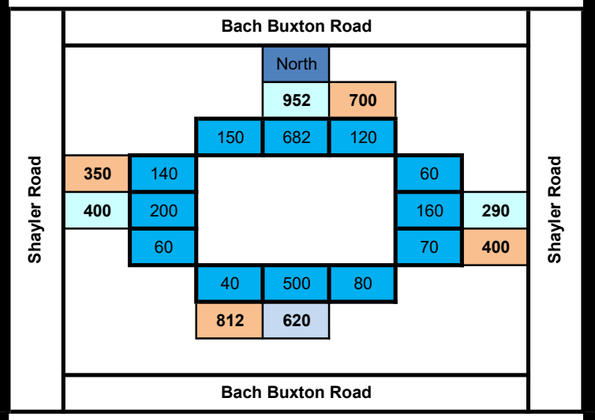
2024 **P.M. Peak Hour - 4:15 p.m. to 5:15 p.m.**

TMC



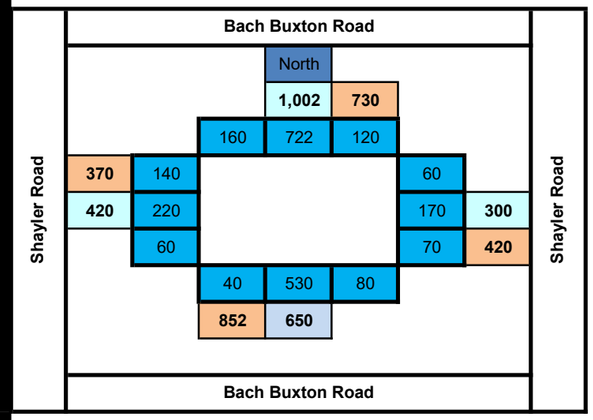
2030 **P.M. Peak Hour - 4:15 p.m. to 5:15 p.m.**

Forecasted & Rounded DHV



2050 **P.M. Peak Hour - 4:15 p.m. to 5:15 p.m.**

Forecasted & Rounded DHV

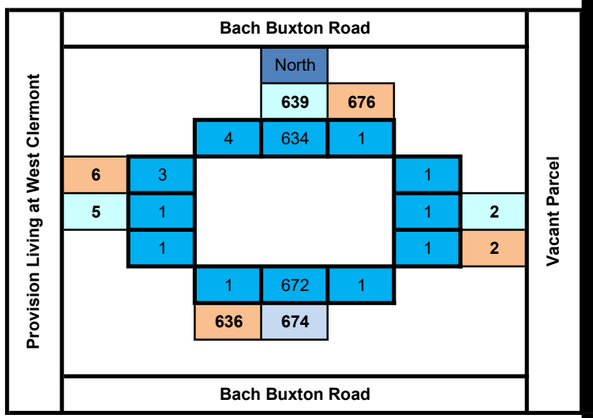


Design Hourly Traffic Volumes

4/16/2025

2024 **A.M. Peak Hour - 7:00 a.m. to 8:00 a.m.**

TMC

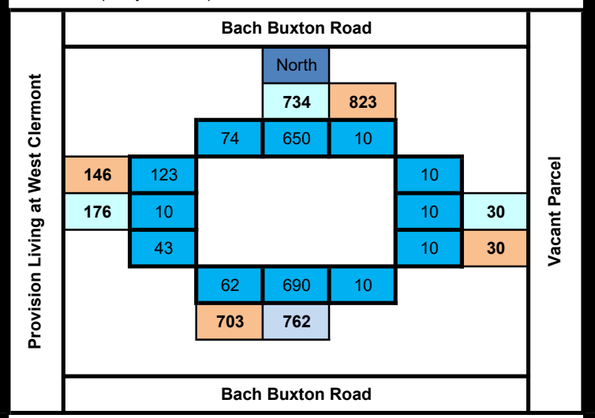


2030 **A.M. Peak Hour - 7:00 a.m. to 8:00 a.m.**

Forecasted & Rounded DHV

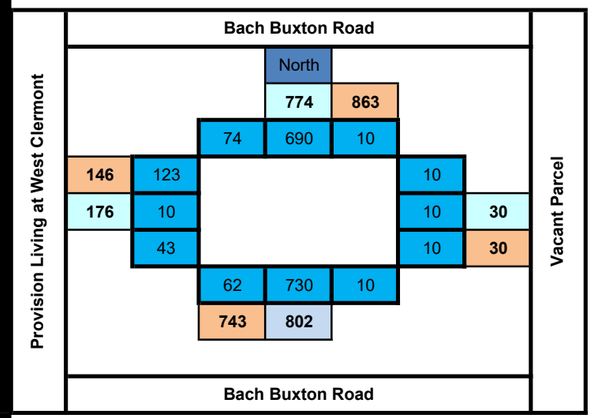
OKI CAGR (Bach Buxton Road) - 0.31%

OKI CAGR (Shayler Road) - 0.31%



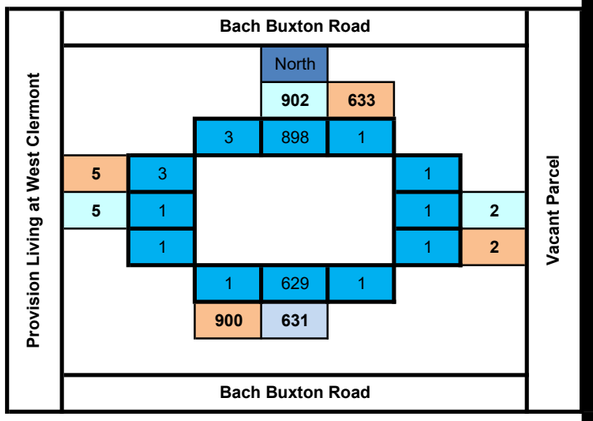
2050 **A.M. Peak Hour - 7:00 a.m. to 8:00 a.m.**

Forecasted & Rounded DHV



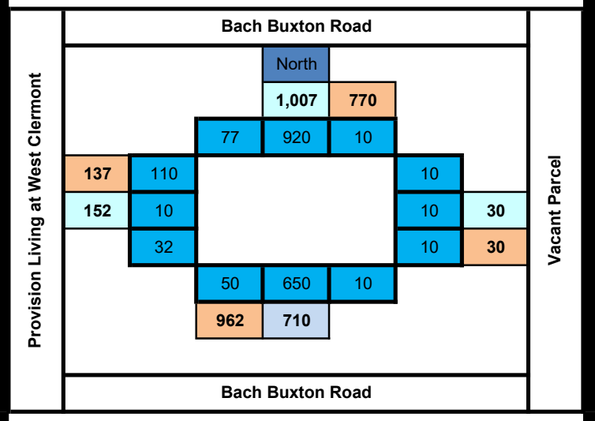
2024 **P.M. Peak Hour - 4:15 p.m. to 5:15 p.m.**

TMC



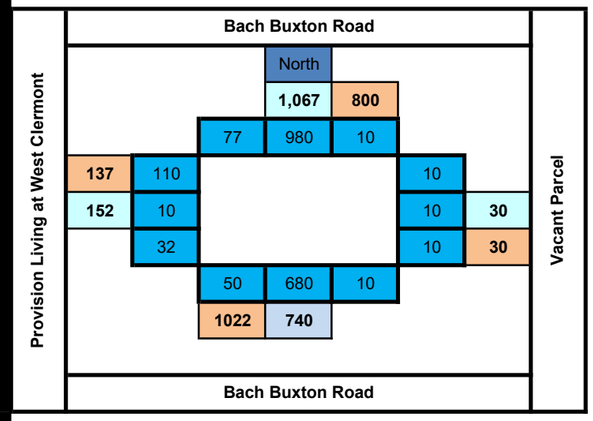
2030 **P.M. Peak Hour - 4:15 p.m. to 5:15 p.m.**

Forecasted & Rounded DHV



2050 **P.M. Peak Hour - 4:15 p.m. to 5:15 p.m.**

Forecasted & Rounded DHV



ATTACHMENT C

HCS Results

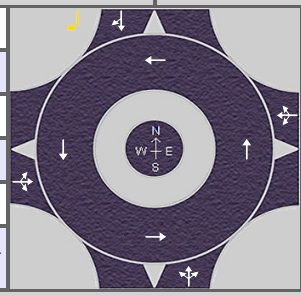
ATTACHMENT C

HCS Results - Bach Buxton Road and Shayler Road

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	2/3/2025
Analysis Year	2030
Time Analyzed	AM Peak Hour
Project Description	Bach Buxton Road and Shayl...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Shayler Road
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.90
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				TR	
Volume (V), veh/h	0	100	100	100	0	80	250	70	0	130	582	50	0		523	140
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0		4	4
Flow Rate (v_{PCE}), pc/h	0	113	113	113	0	91	283	79	0	150	673	58	0		604	162
Right-Turn Bypass	None				None				None				Yielding			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	4.9763
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	2.6087

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		339			453			881			604	162
Entry Volume, veh/h		332			444			847			581	156
Circulating Flow (v_c), pc/h	695			936			226			524		
Exiting Flow (v_{ex}), pc/h	171			433			865			808		
Capacity (c_{pce}), pc/h		679			531			1096			809	887
Capacity (c), veh/h		666			521			1054			778	853
v/c Ratio (x)		0.50			0.85			0.80			0.75	0.18

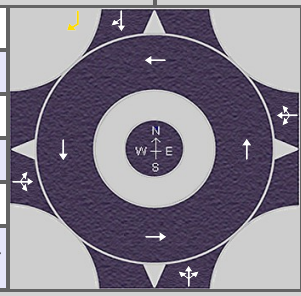
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		13.2			39.3			19.7			20.7	6.1
Lane LOS		B			E			C			C	A
95% Queue, veh		2.8			9.0			9.1			6.9	0.7
Approach Delay, s/veh	13.2			39.3			19.7			17.6		
Approach LOS	B			E			C			C		
Intersection Delay, s/veh | LOS	21.8						C					

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	2/3/2025
Analysis Year	2030
Time Analyzed	PM Peak Hour
Project Description	Bach Buxton Road and Shayl...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Shayler Road
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.96
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				TR	
Volume (V), veh/h	0	140	200	60	0	70	160	60	0	40	500	80	0		682	150
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0		4	4
Flow Rate (v_{PCE}), pc/h	0	149	213	64	0	74	170	64	0	43	542	87	0		739	163
Right-Turn Bypass	None				None				None				Yielding			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	4.9763
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	2.6087

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		426			308			672			739	163
Entry Volume, veh/h		418			302			646			711	157
Circulating Flow (v_c), pc/h	813			734			362			287		
Exiting Flow (v_{ex}), pc/h	300			213			755			877		
Capacity (c_{pce}), pc/h		602			653			954			1030	1111
Capacity (c), veh/h		590			640			917			990	1068
v/c Ratio (x)		0.71			0.47			0.70			0.72	0.15

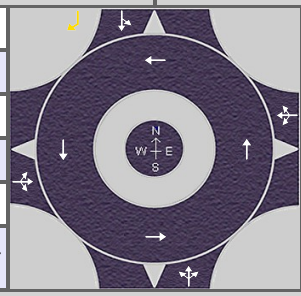
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.0			12.9			16.2			15.9	4.7
Lane LOS		C			B			C			C	A
95% Queue, veh		5.7			2.5			6.1			6.4	0.5
Approach Delay, s/veh	23.0			12.9			16.2			13.9		
Approach LOS	C			B			C			B		
Intersection Delay, s/veh | LOS	16.1						C					

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	1/14/2025
Analysis Year	2050
Time Analyzed	AM Peak Hour
Project Description	Bach Buxton Road and Shayl...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Shayler Road
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.90
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LT	
Volume (V), veh/h	0	110	100	110	0	80	260	80	0	140	612	60	0	40	553	150
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0	4	4	4
Flow Rate (v_{PCE}), pc/h	0	125	113	125	0	91	295	91	0	162	707	69	0	46	639	173
Right-Turn Bypass	None				None				None				Yielding			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	4.9763
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	2.6087

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		363			477			938			685	173
Entry Volume, veh/h		356			468			902			659	166
Circulating Flow (v_c), pc/h	776			994			284			548		
Exiting Flow (v_{ex}), pc/h	228			457			923			855		
Capacity (c_{pce}), pc/h		625			501			1033			789	866
Capacity (c), veh/h		613			491			993			759	833
v/c Ratio (x)		0.58			0.95			0.91			0.87	0.20

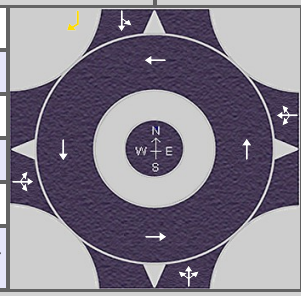
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.6			58.5			31.2			31.7	6.4
Lane LOS		C			F			D			D	A
95% Queue, veh		3.7			11.9			13.6			10.7	0.7
Approach Delay, s/veh	16.6			58.5			31.2			26.6		
Approach LOS	C			F			D			D		
Intersection Delay, s/veh | LOS	32.7						D					

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	1/14/2025
Analysis Year	2050
Time Analyzed	PM Peak Hour
Project Description	Bach Buxton Road and Shayl...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Shayler Road
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.96
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LT	
Volume (V), veh/h	0	140	220	60	0	70	170	60	0	40	530	80	0	120	722	160
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0	4	4	4
Flow Rate (v_{PCE}), pc/h	0	149	234	64	0	74	181	64	0	43	574	87	0	130	782	173
Right-Turn Bypass	None				None				None				Yielding			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	4.9763
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	2.6087

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		447			319			704			912	173
Entry Volume, veh/h		438			313			677			877	166
Circulating Flow (v_c), pc/h	986			766			513			298		
Exiting Flow (v_{ex}), pc/h	451			224			787			920		
Capacity (c_{pce}), pc/h		505			632			818			1018	1098
Capacity (c), veh/h		495			619			786			979	1056
v/c Ratio (x)		0.89			0.50			0.86			0.90	0.16

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		45.6			14.1			30.1			29.8	4.8
Lane LOS		E			B			D			D	A
95% Queue, veh		9.8			2.8			10.5			12.8	0.6
Approach Delay, s/veh	45.6			14.1			30.1			25.8		
Approach LOS	E			B			D			D		
Intersection Delay, s/veh | LOS	29.0						D					

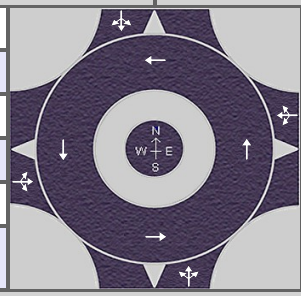
ATTACHMENT C

HCS Results - Bach Buxton Road and the northern driveway to Provision Living at West Clermont

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	2/3/2025
Analysis Year	2030
Time Analyzed	AM Peak Hour
Project Description	Bach Buxton Road Provision...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Provision Living
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.90
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	123	10	43	0	10	10	10	0	62	690	10	0	10	650	74
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0	4	4	4
Flow Rate (v_{PCE}), pc/h	0	139	11	49	0	11	11	11	0	72	797	12	0	12	751	86
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		199			33			881			849	
Entry Volume, veh/h		195			32			847			816	
Circulating Flow (v_c), pc/h	774			1008			162			94		
Exiting Flow (v_{ex}), pc/h	35			169			947			811		
Capacity (c_{pce}), pc/h		627			494			1170			1254	
Capacity (c), veh/h		614			484			1125			1206	
v/c Ratio (x)		0.32			0.07			0.75			0.68	

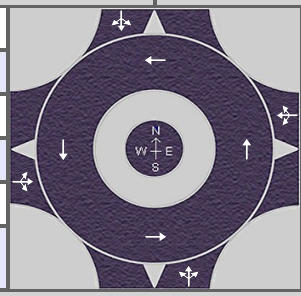
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.2			8.3			16.0			12.4	
Lane LOS		B			A			C			B	
95% Queue, veh		1.4			0.2			7.5			5.6	
Approach Delay, s/veh	10.2			8.3			16.0			12.4		
Approach LOS	B			A			C			B		
Intersection Delay, s/veh | LOS	13.7						B					

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	2/3/2025
Analysis Year	2030
Time Analyzed	PM Peak Hour
Project Description	Bach Buxton Road Provision...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Provision Living
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.96
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	110	10	32	0	10	10	10	0	50	650	10	0	10	920	77
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0	4	4	4
Flow Rate (v_{PCE}), pc/h	0	117	11	34	0	11	11	11	0	54	704	11	0	11	997	83
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		162			33			769			1091	
Entry Volume, veh/h		159			32			739			1049	
Circulating Flow (v_c), pc/h	1019			875			139			76		
Exiting Flow (v_{ex}), pc/h	33			148			832			1042		
Capacity (c_{pce}), pc/h		488			565			1198			1277	
Capacity (c), veh/h		479			554			1152			1228	
v/c Ratio (x)		0.33			0.06			0.64			0.85	

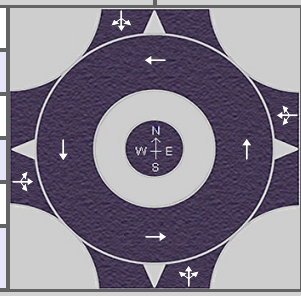
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.9			7.2			11.8			21.3	
Lane LOS		B			A			B			C	
95% Queue, veh		1.4			0.2			4.9			11.6	
Approach Delay, s/veh	12.9			7.2			11.8			21.3		
Approach LOS	B			A			B			C		
Intersection Delay, s/veh | LOS	16.9						C					

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	2/3/2025
Analysis Year	2050
Time Analyzed	AM Peak Hour
Project Description	Bach Buxton Road Provision...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Provision Living
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.90
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	123	10	43	0	10	10	10	0	62	730	10	0	10	690	74
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0	4	4	4
Flow Rate (v_{PCE}), pc/h	0	139	11	49	0	11	11	11	0	72	844	12	0	12	797	86
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		199			33			928			895	
Entry Volume, veh/h		195			32			892			861	
Circulating Flow (v_c), pc/h	820			1055			162			94		
Exiting Flow (v_{ex}), pc/h	35			169			994			857		
Capacity (c_{pce}), pc/h		598			470			1170			1254	
Capacity (c), veh/h		586			461			1125			1206	
v/c Ratio (x)		0.33			0.07			0.79			0.71	

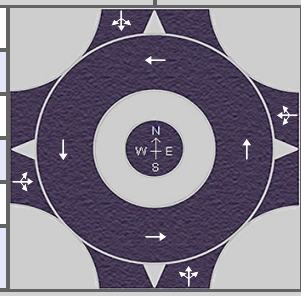
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.8			8.7			18.2			13.6	
Lane LOS		B			A			C			B	
95% Queue, veh		1.5			0.2			8.8			6.5	
Approach Delay, s/veh	10.8			8.7			18.2			13.6		
Approach LOS	B			A			C			B		
Intersection Delay, s/veh | LOS	15.3						C					

HCS7 Roundabouts Report

General Information

Analyst	Justin Maderia
Agency or Co.	Arcadis
Date Performed	2/3/2025
Analysis Year	2050
Time Analyzed	PM Peak Hour
Project Description	Bach Buxton Road Provision...



Site Information

Intersection	Bach Buxton and Shayler
E/W Street Name	Provision Living
N/S Street Name	Bach Buxton Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.96
Jurisdiction	Clermont County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	110	10	32	0	10	10	10	0	50	680	10	0	10	980	77
Percent Heavy Vehicles, %	0	2	2	2	0	2	2	2	0	4	4	4	0	4	4	4
Flow Rate (v_{PCE}), pc/h	0	117	11	34	0	11	11	11	0	54	737	11	0	11	1062	83
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		162			33			802			1156	
Entry Volume, veh/h		159			32			771			1112	
Circulating Flow (v_c), pc/h	1084			908			139			76		
Exiting Flow (v_{ex}), pc/h	33			148			865			1107		
Capacity (c_{pce}), pc/h		457			547			1198			1277	
Capacity (c), veh/h		448			536			1152			1228	
v/c Ratio (x)		0.35			0.06			0.67			0.91	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		14.2			7.5			12.6			26.7	
Lane LOS		B			A			B			D	
95% Queue, veh		1.6			0.2			5.5			14.4	
Approach Delay, s/veh	14.2			7.5			12.6			26.7		
Approach LOS	B			A			B			D		
Intersection Delay, s/veh | LOS	20.2						C					

ATTACHMENT D

Highway Capacity Software (HCS) Files

Roundabout Critical Design Parameters

Bach Buxton Road North Roundabout

PID 90740

Design Parameters	East Leg	West Leg	North Leg	South Leg
Inscribed Circle Diameter, FT	140			
Entry Width, FT	17.0	17.7	18.0	17.8
Entry Angle PHI ϕ, DEG	28	16	20	27
Exit Width, FT	17.8	16.3	18.4	17.0
Circulatory Roadway Width, FT	18	18	18	18

Fastest Path Speed	East Leg		West Leg		North Leg		South Leg	
R_1, Radius/Speed, FT/MPH	147.9	23.7	108.2	21.0	167.2	24.8	164.0	24.7
R_2, Radius/Speed, FT/MPH	80.7	17.4	60.6	15.6	59.5	15.5	169.8	22.8
R_3, Radius/Speed, FT/MPH (MIN)	NA	31.8	377.2	34.0	NA	28.9	395.4	34.6
R_4, Radius/Speed, FT/MPH	57.0	15.3	57.0	15.3	57.0	15.3	57.0	15.3
R_5, Radius/Speed, FT/MPH	51.2	15.7	107.7	21.0	90.6	19.6	52.8	15.9
R_5, Bypass Radius/Speed, FT/MPH	NA		NA		NA		NA	

Minimum Sight Parameters	East Leg		West Leg		North Leg		South Leg	
Approach Design Speed, MPH	25		25		45		45	
Approach Stopping Sight Distance, FT/MPH	152	25	152	25	360	45	360	45
Circulatory Stopping Sight Distance, FT/MPH	79	15.3	79	15.3	79	15.3	79	15.3
Exit (Crosswalk) Stopping Sight Distance, FT/MPH	141	23.7	119	21	151	24.8	149	24.7
Intersection Sight Distance, FT/MPH (MIN)	115	15.6	128	17.4	151	20.5	114	15.5

General	
Design Vehicle(s)	WB-50
Truck Apron Width, FT	12'

Designer: Matt Burger

Date: 05/05/2025

CTY-RTE-SECTION

MODEL: Roundabout Checks-1 - Bach Buxton Roundabout LAYOUT [Sheet] PAPERSIZE: 17x11 (in.) DATE: 5/7/2025 TIME: 8:25:10 AM USER: MBurger
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HORIZONTAL SCALE IN FEET
0 20 40 80

BACH BUXTON ROUNDABOUT LAYOUT

DESIGN AGENCY
ARCADIS
7575 HUNTINGTON PARK DR, STE 130
COLUMBUS, OHIO 43235
(614) 985-9100
www.arcadis.com

DESIGNER
MJB

REVIEWER
BKM 05-05-25

PROJECT ID
90740

SHEET	TOTAL
P.0	0

MODEL: Roundabout Checks-1 - North Roundabout Checks [Sheet] PAPERSIZE: 17x11 (in.) DATE: 5/7/2025 TIME: 7:53:18 AM USER: MBurger
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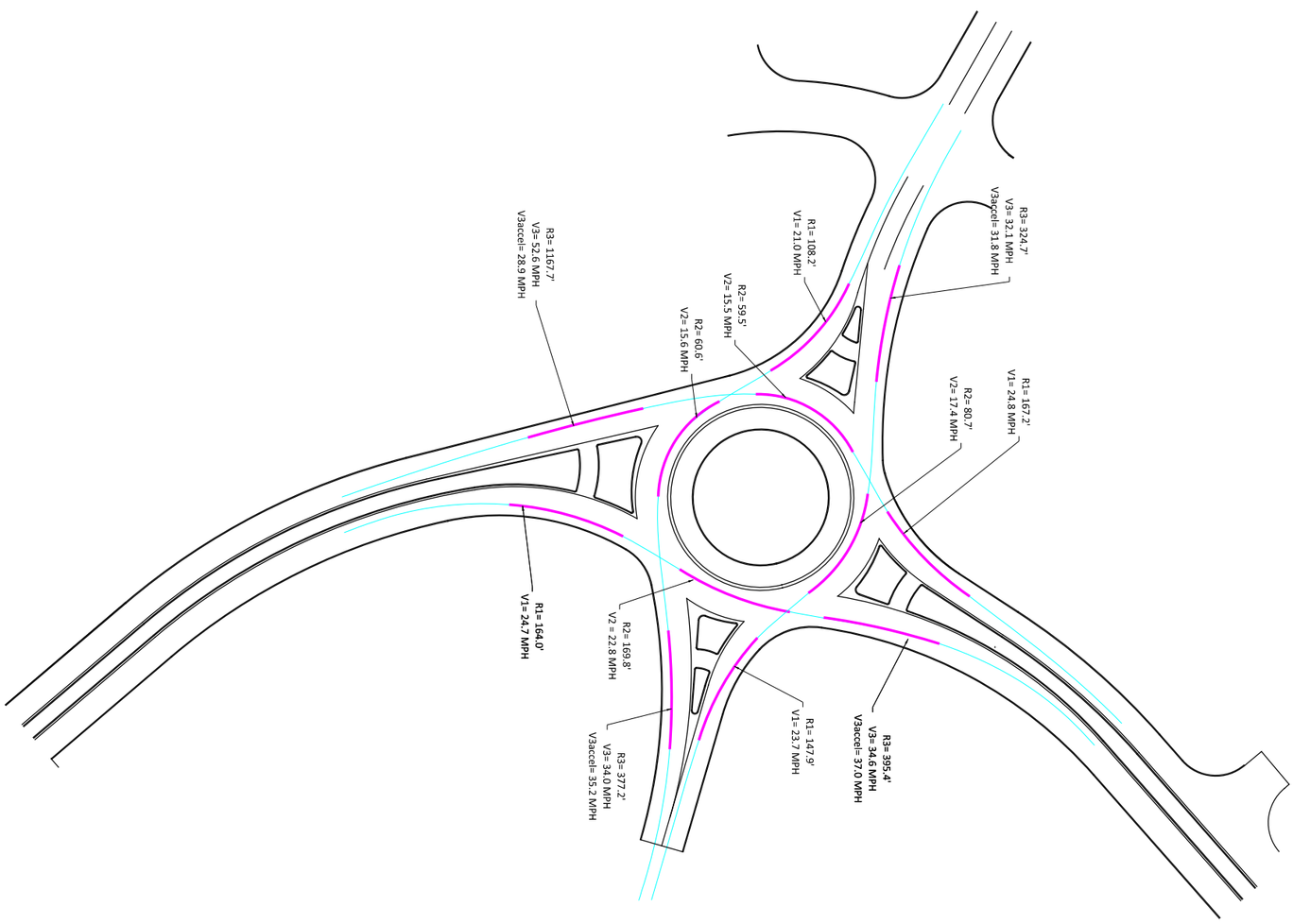

ARCADIS
7575 HUNTINGTON PARK DR, STE 130
COLUMBUS, OHIO 43235
(614) 985-4100
www.arcadis.com

DESIGN AGENCY

DESIGNER MJB

REVIEWER BKM 05-05-25

PROJECT ID 90740

SHEET P.0 | TOTAL 0

BACH BUXTON
ROUNDABOUT FASTEST PATHS

HORIZONTAL SCALE IN FEET

0 40
20 80

CTY-RTE-SECTION

MODEL: Roundabout Checks-1 - North Roundabout Checks (R4) [Sheet] PAPERSIZE: 17x11 (in.) DATE: 5/7/2025 TIME: 8:00:02 AM USER: MBurger
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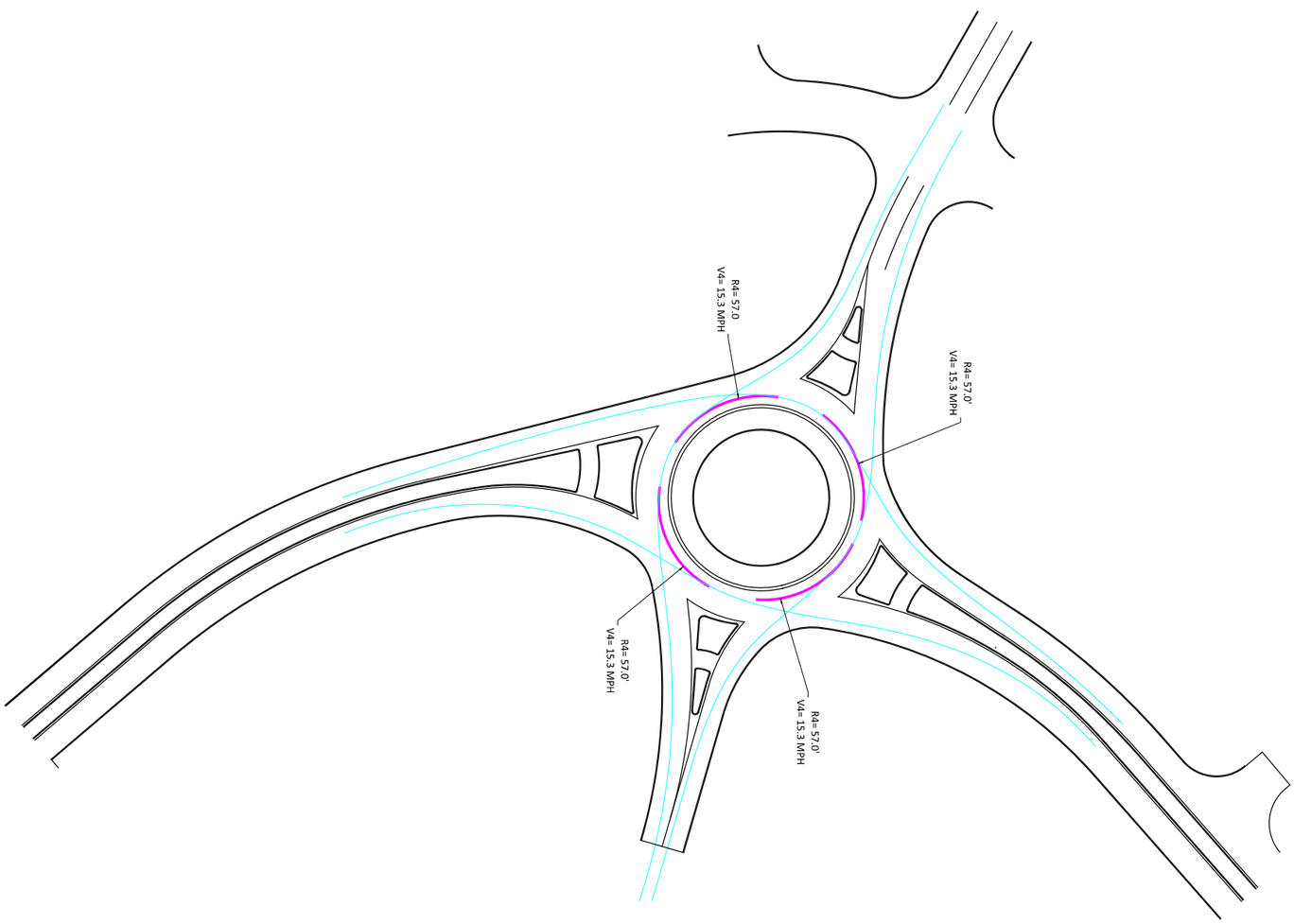

SHEET P.0 | TOTAL 0

PROJECT ID 90740

REVIEWER BKM 05-02-25

DESIGNER MJB

ARCADIS
7575 HUNTINGTON PARK DR, STE 130
COLUMBUS, OHIO 43235
(614) 985-9100
www.arcadis.com

DESIGN AGENCY

BACH BUXTON
ROUNDABOUT CONCEPT

HORIZONTAL SCALE IN FEET

0 40
20 80

CTY-RTE-SECTION

MODEL: Roundabout Checks-1 - North Roundabout Checks (R5) [Sheet] PAPERSIZE: 17x11 (in.) DATE: 5/7/2025 TIME: 8:04:11 AM USER: MBurger
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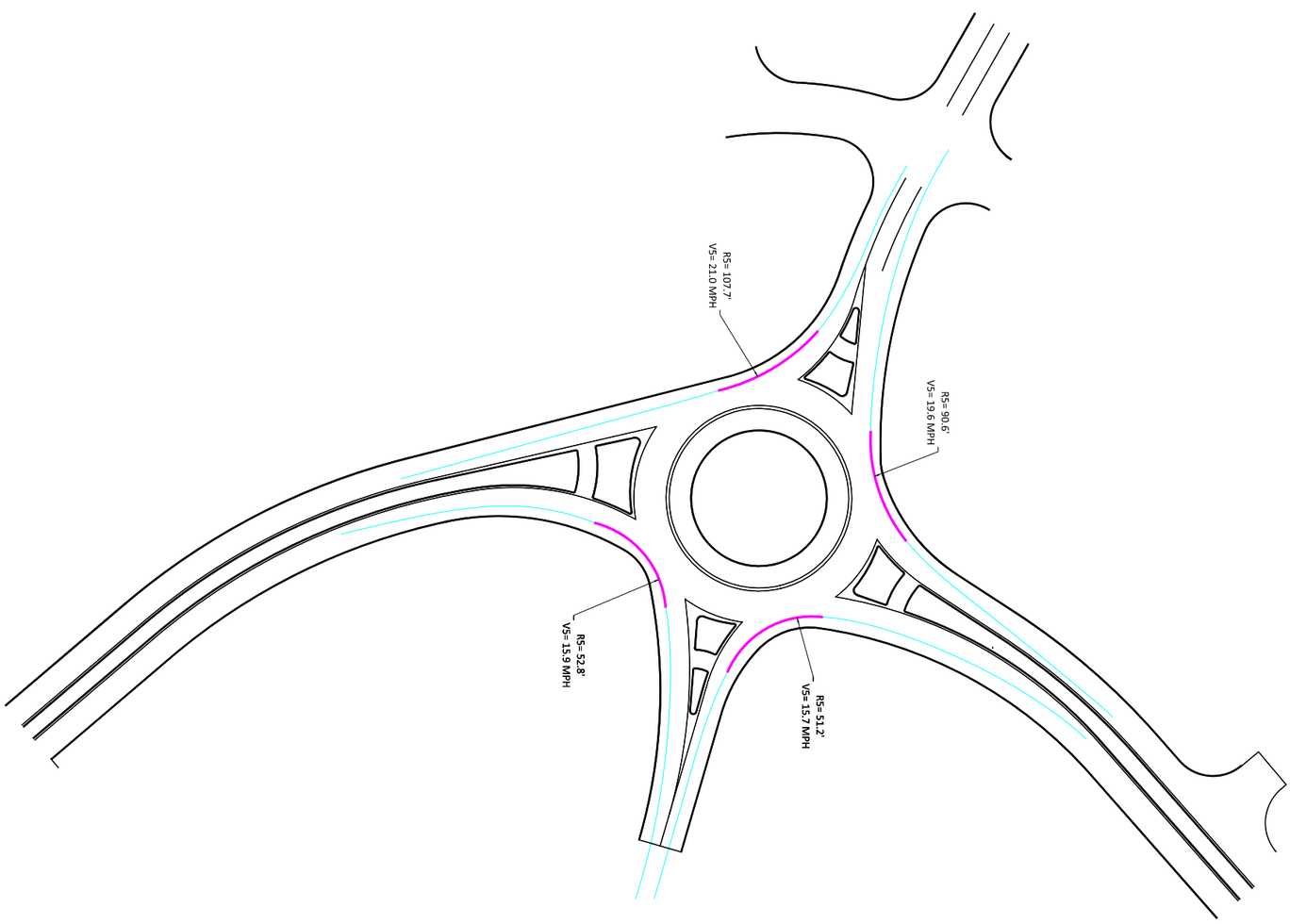

SHEET	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
P.0 / TOTAL 0	90740	BKM 05-02-25	MJB	ARCADIS 7575 HUNTINGTON PARK DR, STE 130 COLUMBUS, OHIO 43235 (614) 985-9100 www.arcadis.com

BACH BUXTON
ROUNDABOUT FASTEST PATHS

HORIZONTAL
SCALE IN FEET
0 40
20 80

MODEL: Truck Turns-1 - Through Path (Secondary) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 5/6/2025 TIME: 12:10:56 PM USER: MBurger
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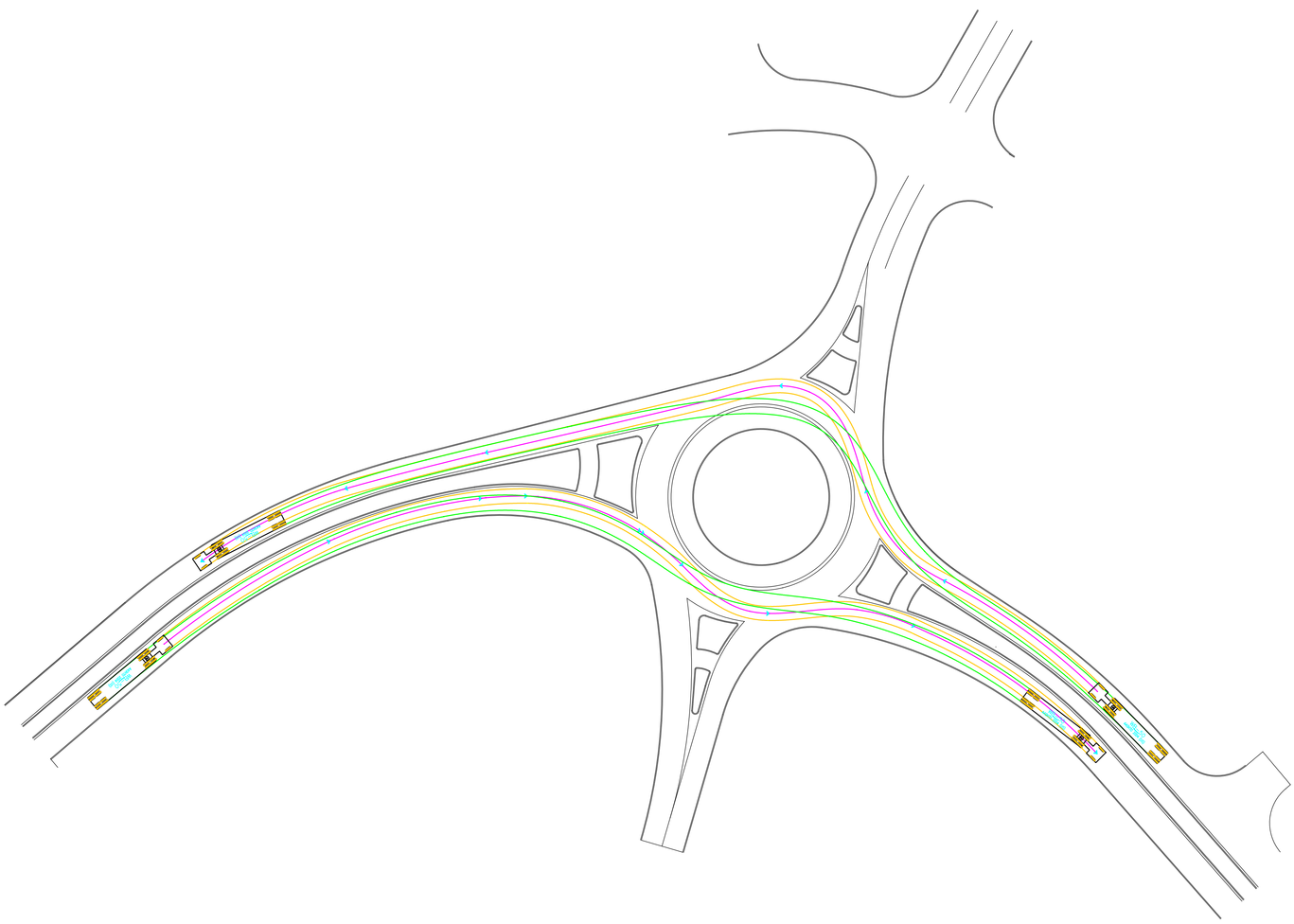

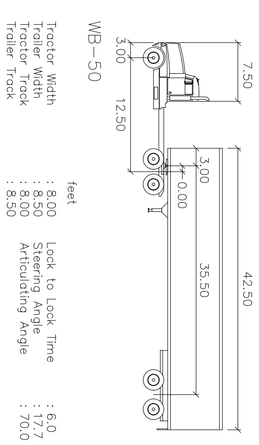

SHEET	TOTAL	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
P.0	0	0	BKM 05-06-25	MJB	ARCADIS 7575 HUNTINGTON PARK DR, STE 130 COLUMBUS, OHIO 43235 (614) 985-9100 www.arcadis.com

BACH BUXTON
ROUNDABOUT (WB-50)

HORIZONTAL
SCALE IN FEET
0 40
20 80

MODEL: Truck Turns-1 - Through Path (Secondary) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 5/6/2025 TIME: 12:08:44 PM USER: MBurger
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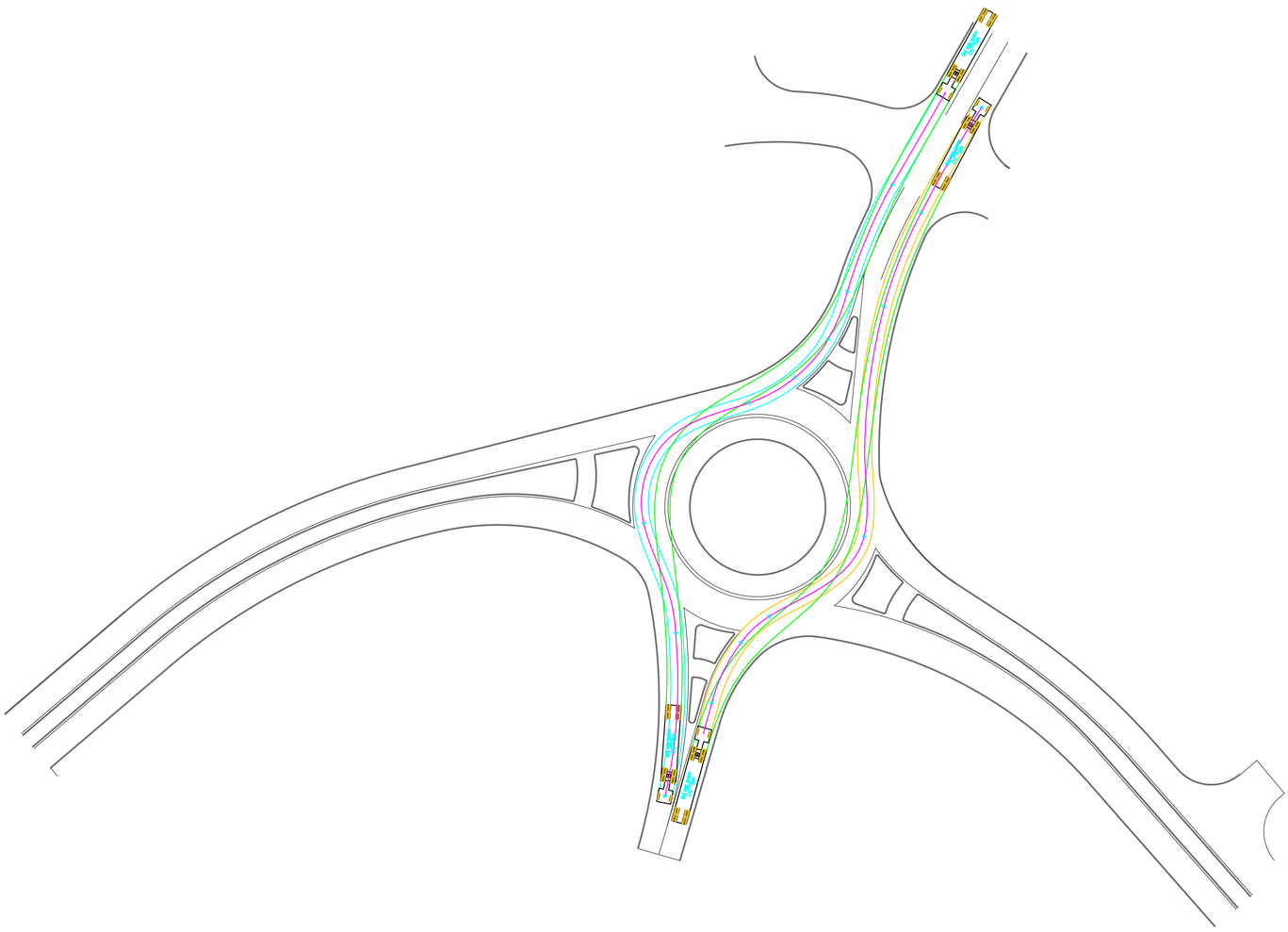

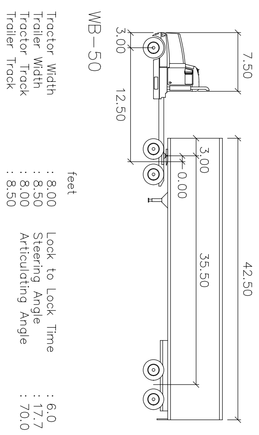

	feet
Tractor Width	: 8.00
Trailer Width	: 8.50
Tractor Track	: 8.00
Trailer Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 17.7
Articulating Angle	: 70.0

SHEET	TOTAL
P.0	0

PROJECT ID: 0

REVIEWER: BKM 05-06-25

DESIGNER: MJB

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(614) 985-9100
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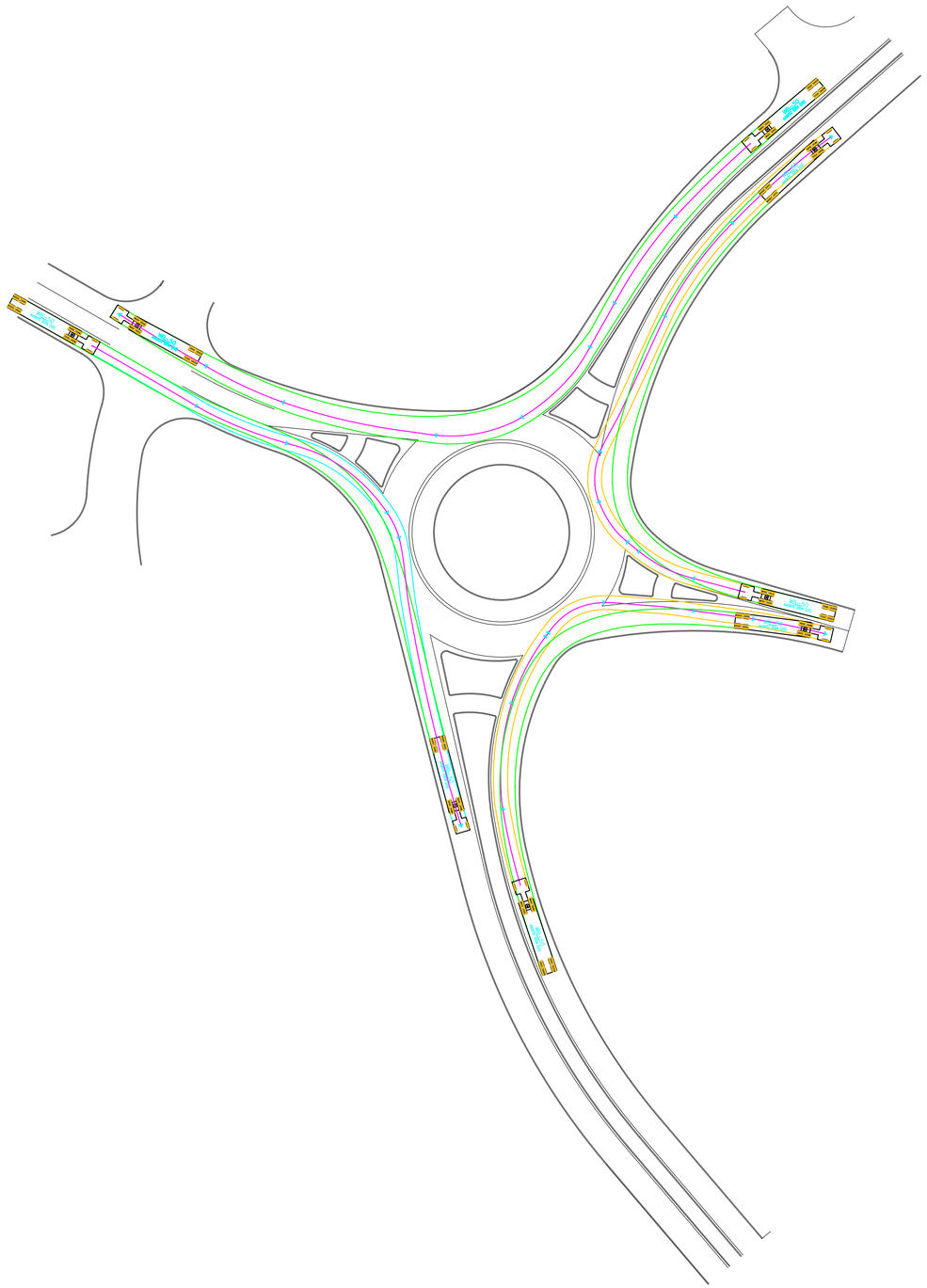
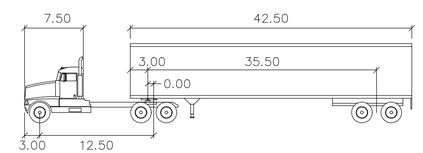
DESIGN AGENCY

BACH BUXTON
ROUNDABOUT (WB-50)

HORIZONTAL
SCALE IN FEET

0 40
20 80





WB-50

feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

HORIZONTAL
SCALE IN FEET
0 20 40 80

BACH BUXTON
ROUNDABOUT (WB-50)

DESIGN AGENCY
ARCADIS
7575 HUNTINGTON PARK DR, STE 130
COLUMBUS, OHIO 43235
(614) 985-4700
www.arcadis.com

DESIGNER
MJB

REVIEWER
BKM 05-06-25

PROJECT ID
0

SHEET P.0 | TOTAL 0

CTY-RTE-SECTION

MODEL: Truck Turns-1 - Through Path (Secondary) (Sheet) PAPERSIZE: 34x22 (in.) DATE: 5/6/2025 TIME: 12:10:11 PM USER: MBurger
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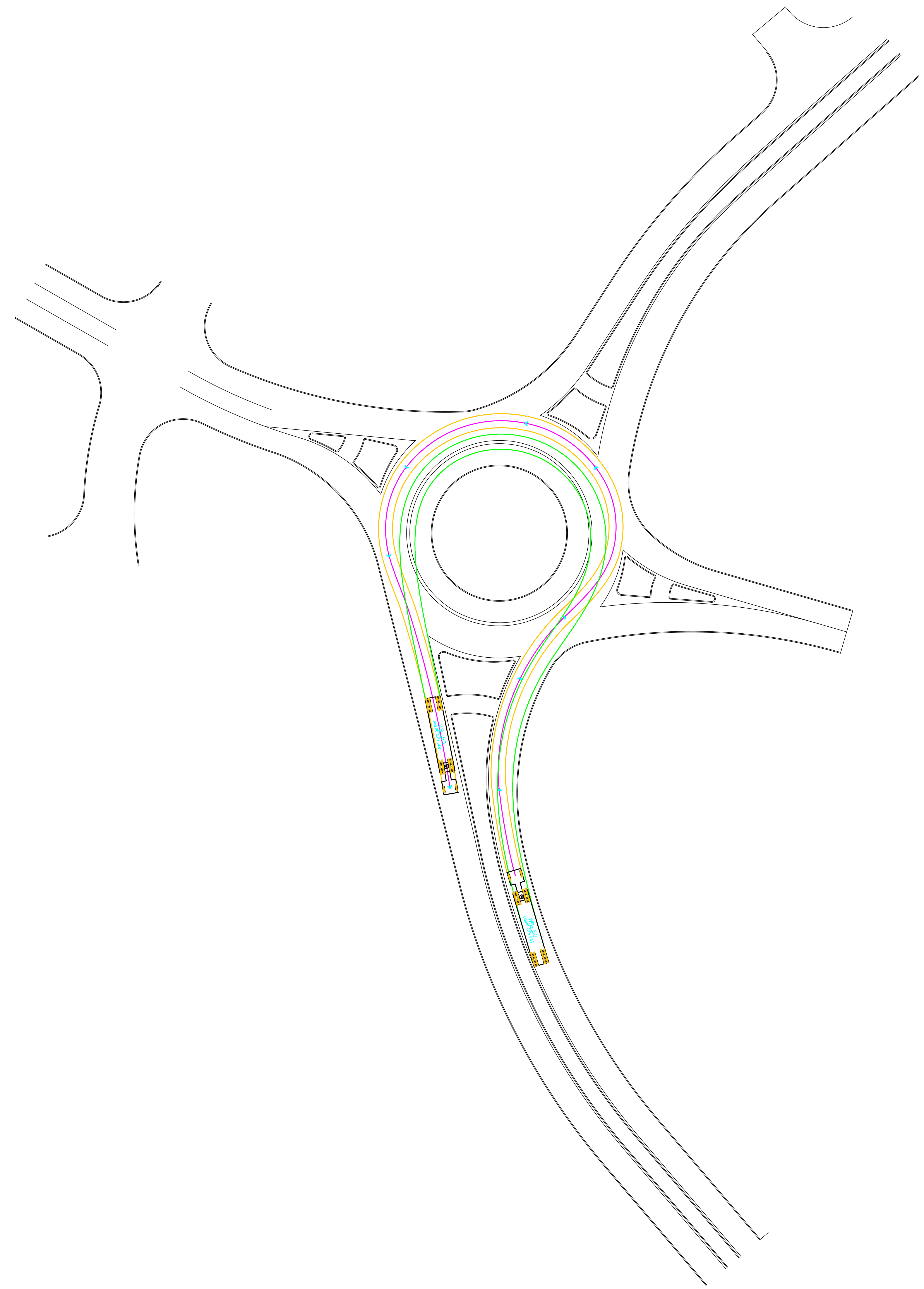
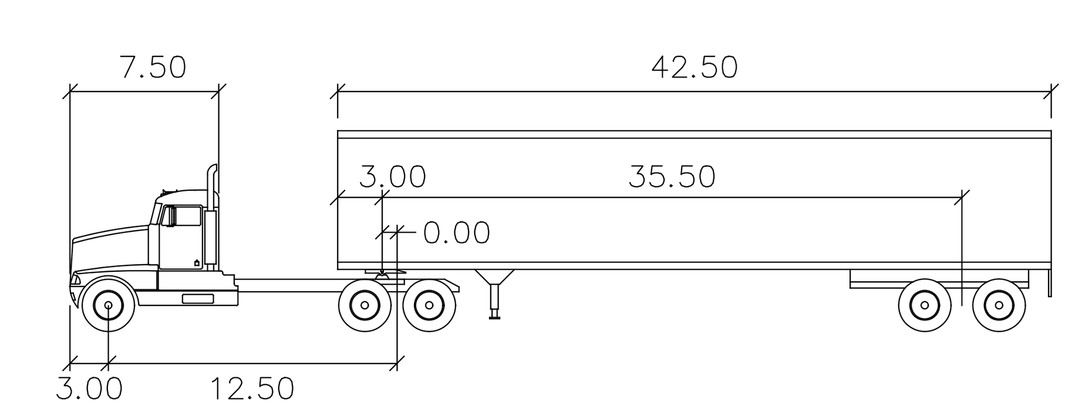
BACH BUXTON ROUNDABOUT (WB-50)





WB−50

feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

HORIZONTAL SCALE IN FEET

0 20 40 80

CTY-RTE-SECTION

MODEL: Truck Turns-1 - Through Path (Secondary) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 5/6/2025 TIME: 12:09:53 PM USER: MBurger

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DESIGN AGENCY

ARCADIS

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(614) 985-9100
www.arcadis.com

DESIGNER: MJB

REVIEWER: BKM 05-06-25

PROJECT ID: 0

SHEET: P.0 TOTAL: 0

Roundabout Critical Design Parameters

Bach Buxton Road South Roundabout

PID 90740

Design Parameters	East Leg	West Leg	North Leg	South Leg
Inscribed Circle Diameter, FT	140			
Entry Width, FT	17.3	17.5	17.0	18.0
Entry Angle PHI ϕ, DEG	22	22	23	24
Exit Width, FT	16.1	16.0	17.5	16.1
Circulatory Roadway Width, FT	18	18	18	18

Fastest Path Speed	East Leg		West Leg		North Leg		South Leg	
R_1, Radius/Speed, FT/MPH	141.6	23.3	155.0	24.1	155.6	24.2	152.7	24.0
R_2, Radius/Speed, FT/MPH	112.6	19.6	57.0	15.3	116.8	19.9	66.3	16.1
R_3, Radius/Speed, FT/MPH (MIN)	NA	33.0	NA	34.4	NA	32.5	NA	32.6
R_4, Radius/Speed, FT/MPH	57.0	15.3	57.0	15.3	57.0	15.3	57.0	15.3
R_5, Radius/Speed, FT/MPH	86.8	19.3	90.1	19.6	NA		155.0	24.1
R_5, Bypass Radius/Speed, FT/MPH	NA		NA		115.0	21.5	NA	

Minimum Sight Parameters	East Leg		West Leg		North Leg		South Leg	
Approach Design Speed, MPH	45		45		45		45	
Approach Stopping Sight Distance, FT/MPH	360	45	360	45	360	45	360	45
Circulatory Stopping Sight Distance, FT/MPH	79	15.3	79	15.3	79	15.3	79	15.3
Exit (Crosswalk) Stopping Sight Distance, FT/MPH	138	23.3	145	24.1	145	24.2	143	24.0
Intersection Sight Distance, FT/MPH (MIN)	112	15.3	144	19.6	118	16.1	146	19.9

General	
Design Vehicle(s)	WB-50
Truck Apron Width, FT	12

Designer: Matt Burger

Date: 02/28/2025

CTY-RTE-SECTION

MODEL: Roundabout Checks-1 - Shayler Rd. Roundabout [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 3:07:02 PM USER: TBreininger
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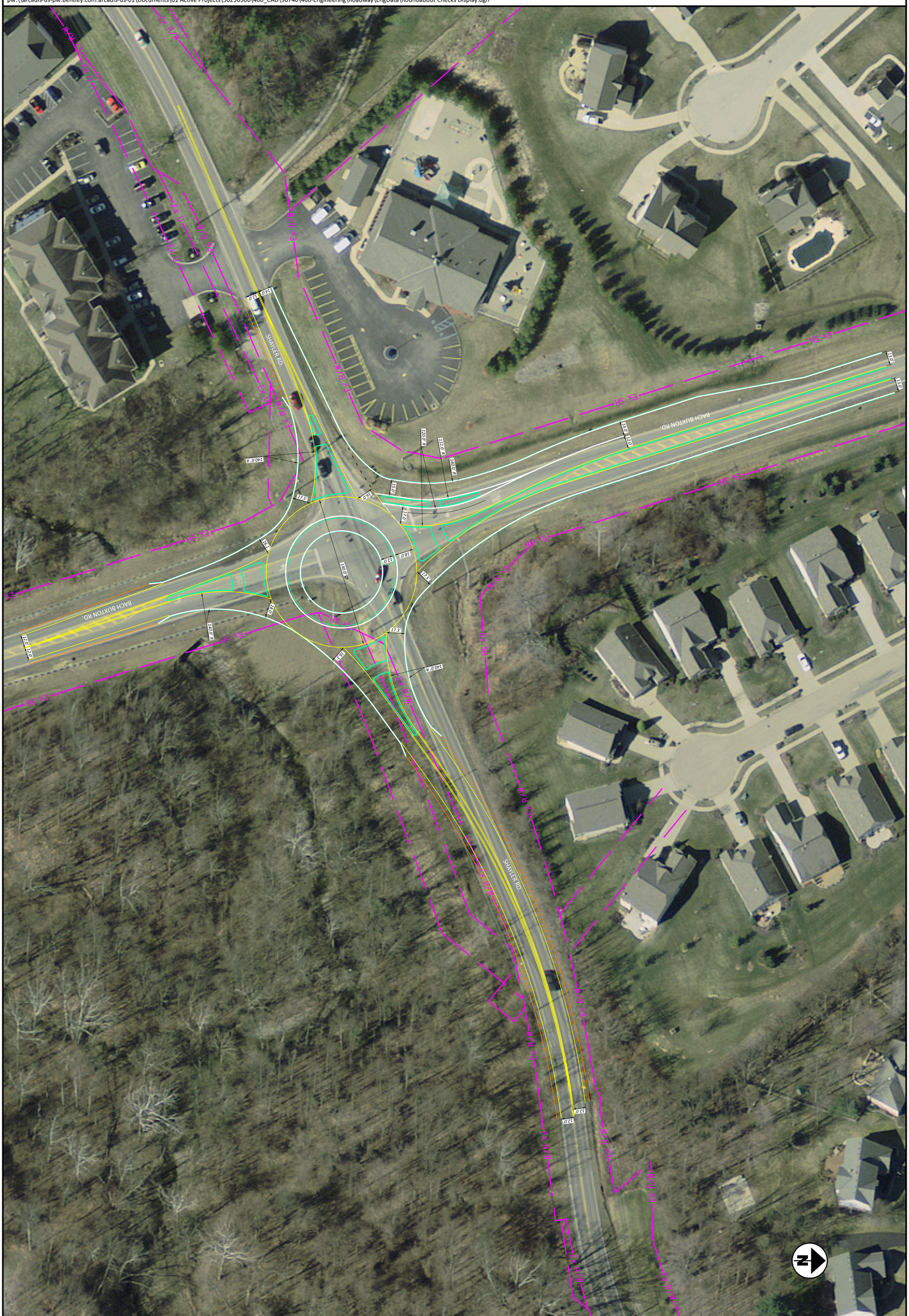
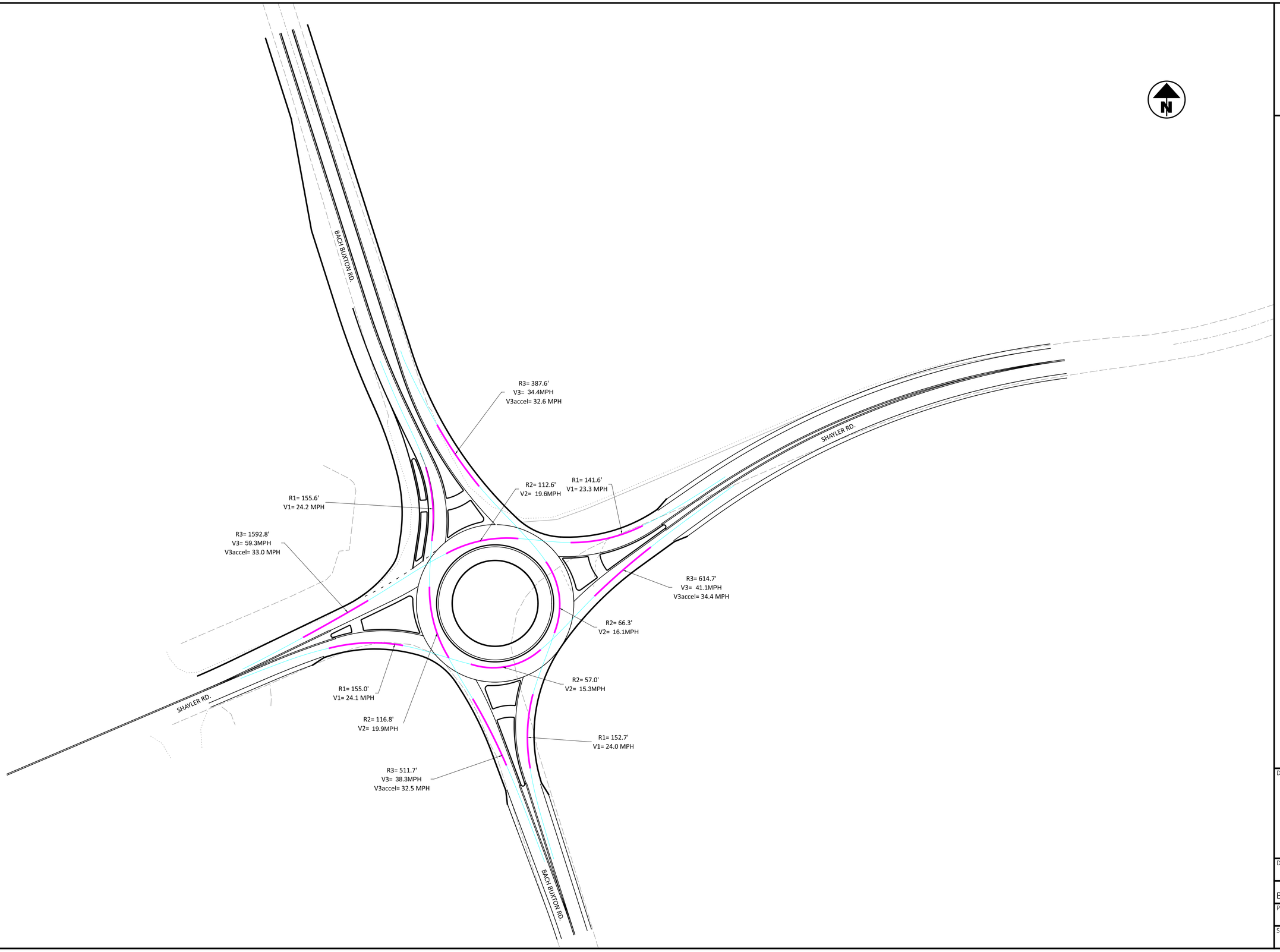


SHEET	TOTAL	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
P.0	0	90740	BKM 02-28-25	MJB	ARCADIS 7575 HUNTINGTON PARK DR, STE 130 COLUMBUS, OHIO 43235 (614) 985-9100 www.arcadis.com

BACH BUXTON & SHAYLER RD.
ROUNDABOUT LAYOUT

HORIZONTAL SCALE IN FEET
0 40
20 80



HORIZONTAL SCALE IN FEET
0 20 40 80

BACH BUXTON & SHAYLER RD. ROUNDABOUT FASTEST PATHS

CTY-RTE-SECTION

MODEL: Roundabout Checks-1 - South Roundabout Checks [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 12:01:12 PM USER: TBreininger
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DESIGN AGENCY
ARCADIS
7575 HUNTINGTON PARK DR, STE 130
COLUMBUS, OHIO 43235
(614) 825-4500
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DESIGNER
MJB

REVIEWER
BKM 02-28-25

PROJECT ID
90740

SHEET P.0 TOTAL 0

CTY-RTE-SECTION

MODEL: Roundabout Checks-1 - South Roundabout Checks (R4) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 2:20:00 PM USER: TBreininger
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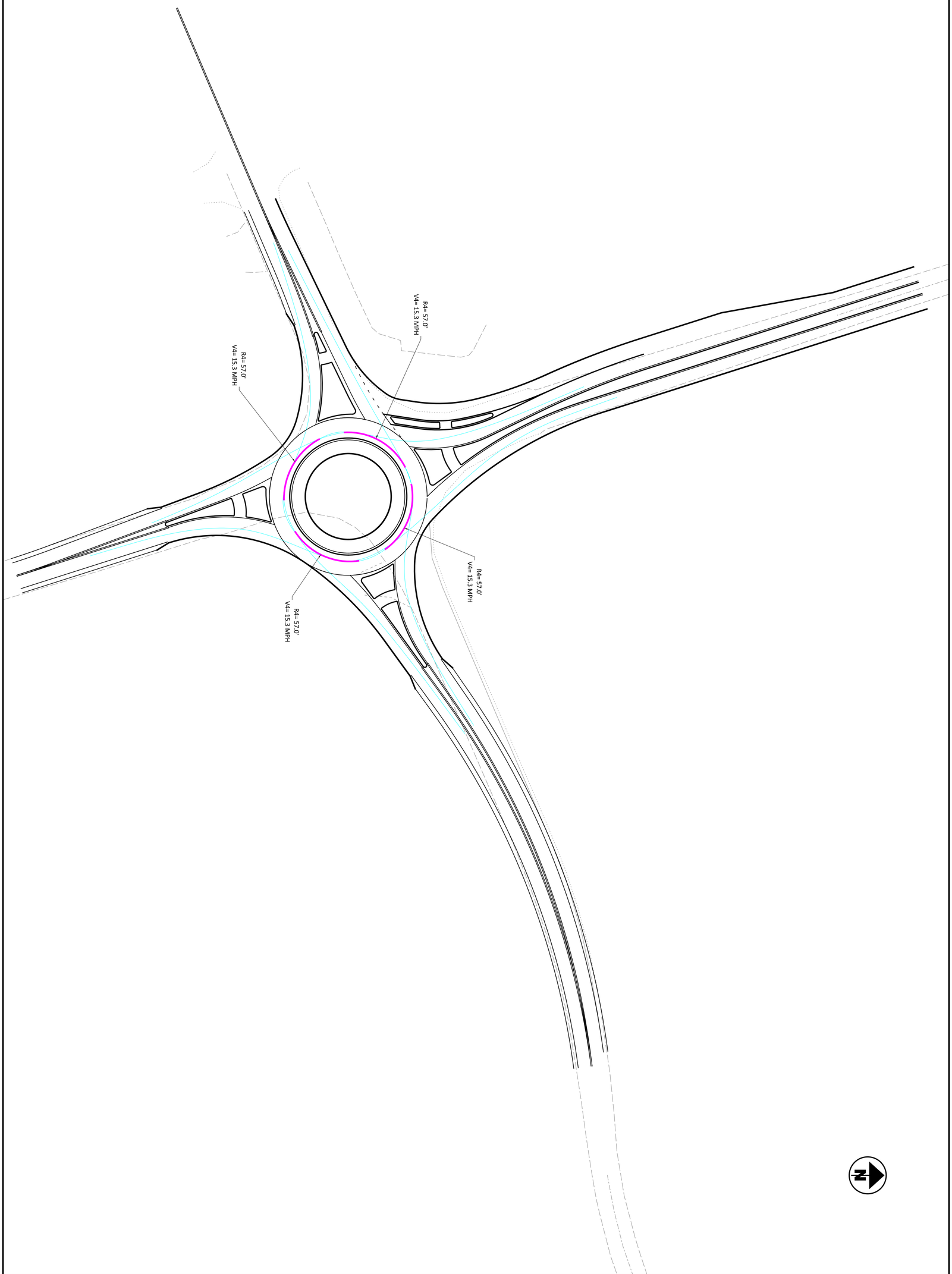

SHEET	TOTAL
P.0	0

PROJECT ID: 90740

REVIEWER: BKM 02-28-25

DESIGNER: MJB

DESIGN AGENCY
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(614) 985-9100
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BACH BUXTON AND SHAYLER RD.
ROUNDABOUT FASTEST PATHS

HORIZONTAL SCALE IN FEET
0 40
20 80

CTY-RTE-SECTION

MODEL: Roundabout Checks-1 - South Roundabout Checks (R5) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 11:58:38 AM USER: TBreininger
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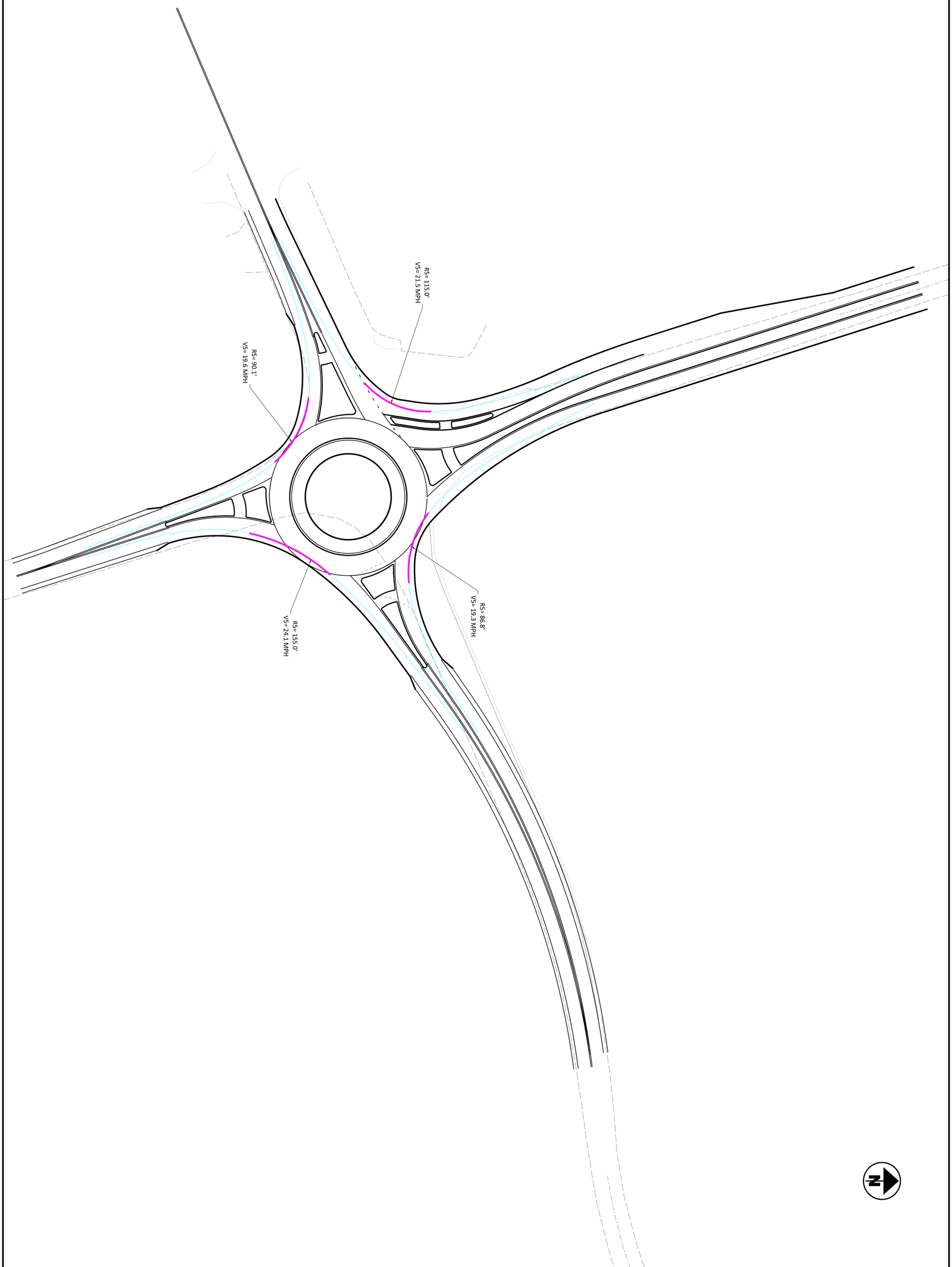

SHEET P.0 / TOTAL 0	PROJECT ID 90740	REVIEWER BKM 02-28-25	DESIGNER MJB	ARCADIS 7575 HUNTINGTON PARK DR, STE 130 COLUMBUS, OHIO 43235 (614) 985-9100 www.arcadis.com	DESIGN AGENCY

BACH BUXTON & SHAYLER RD.
ROUNDABOUT FASTEST PATHS

HORIZONTAL SCALE IN FEET
0 40
20 80

MODEL: Truck Turns-1 - Through Path (Shayler) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 1:52:03 AM USER: TBreininger
pw:\\arcadis-us-pw.bentley.com:arcadis-us-01\Documents\01 Active Projects\30236306\400_CAD\90740\400-Engineering\Roadway\EngData\Roundabout Concept Visuals.dgn

Tractor Width	: 8.00 feet
Trailer Width	: 8.50
Tractor Track	: 8.00
Trailer Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 17.7
Articulating Angle	: 70.0

BACH BUXTON & SHAYLER RD.
ROUNDABOUT (WB-50)

HORIZONTAL SCALE IN FEET
0 40
20 80

SHEET P.0 / TOTAL 0	PROJECT ID 0	REVIEWER BKM 02-28-25	DESIGNER MJB	DESIGN AGENCY ARCADIS 7575 HUNTINGTON PARK DR, STE 130 COLUMBUS, OHIO 43235 (614) 985-9100 www.arcadis.com

CTY-RTE-SECTION

MODEL: Truck Turns-1 - Through Path (Shayler Secondary) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 1:49:19 AM USER: TBreininger
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Tractor Width : 8.00
Trailer Width : 8.50
Tractor Track : 8.00
Trailer Track : 8.50

feet

Lock to Lock Time : 6.0
Steering Angle : 17.7
Articulating Angle : 70.0

SHEET	TOTAL	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
P.0	0	0	BKM 02-28-25	MJB	ARCADIS 7575 HUNTINGTON PARK DR, STE 136 COLUMBUS, OHIO 43235 (614) 985-9100 www.arcadis.com

BACH BUXTON & SHAYLER RD.
ROUNDABOUT (WB-50)

HORIZONTAL SCALE IN FEET

0 40
20 80

CTY-RTE-SECTION

MODEL: Truck Turns-1 - Right Turns (Shayler) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 1:40:06 AM USER: TBreininger
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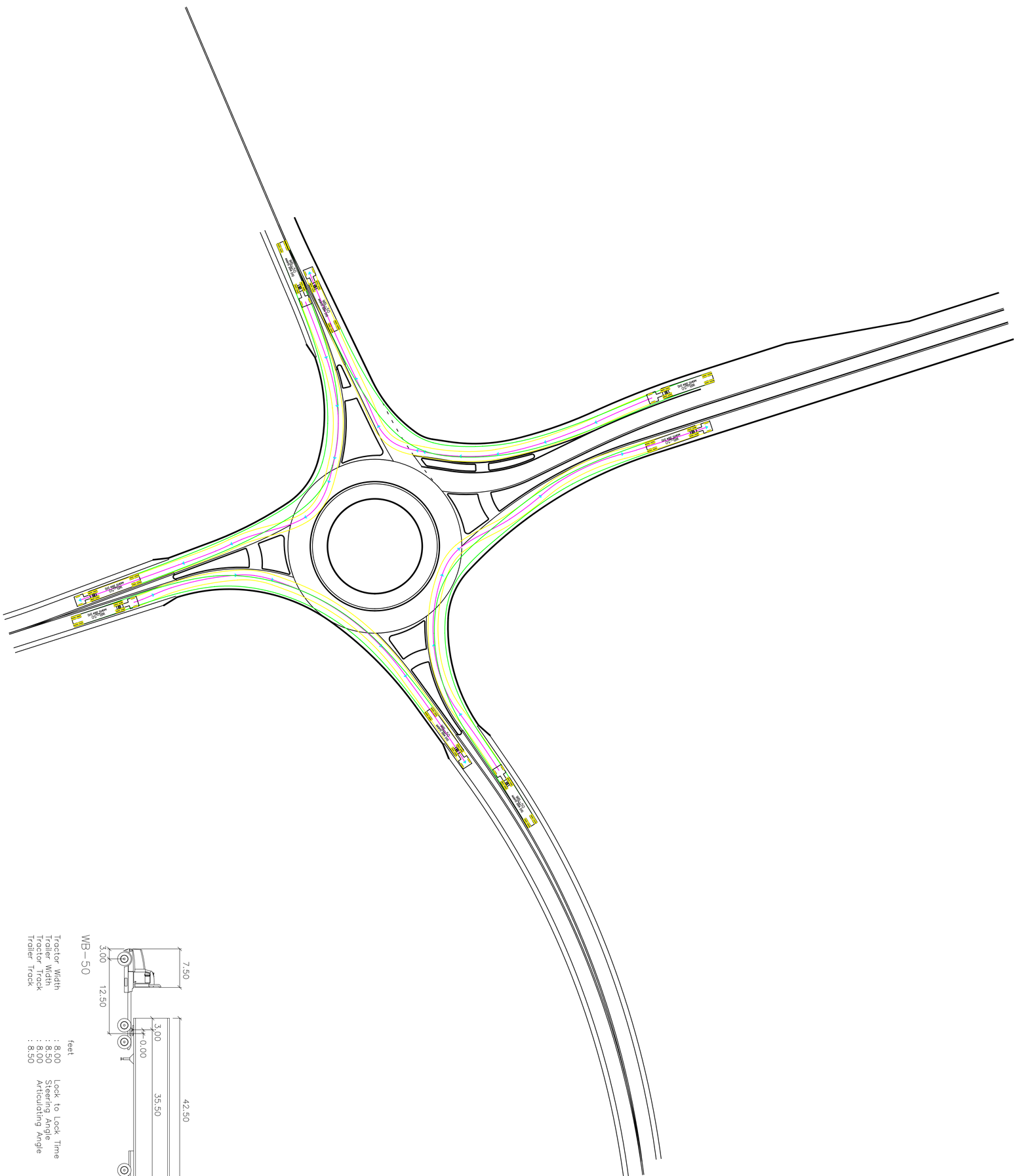

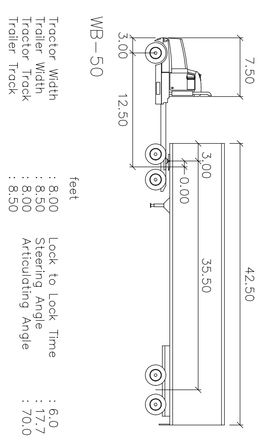

	feet
Tractor Width	: 8.00
Trailer Width	: 8.50
Tractor Track	: 8.00
Trailer Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 17.7
Articulating Angle	: 70.0

SHEET	PROJECT ID	REVIEWER	DESIGNER
P.0 / TOTAL 0	0	BKM 02-28-25	MJB

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COLUMBUS, OHIO 43235
(614) 985-9100
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DESIGN AGENCY

BACH BUXTON & SHAYLER RD.
ROUNDABOUT (WB-50)

HORIZONTAL SCALE IN FEET
0 40
20 80

MODEL: Truck Turns-1 - UTurn (Shayler) [Sheet] PAPERSIZE: 34x22 (in.) DATE: 2/28/2025 TIME: 1:53:27 AM USER: TBreininger
pw:\\arcadis-us-pw.bentley.com:arcadis-us-01\Documents\01 Active Projects\30236306\400_CAD\90740\400-Engineering\Roadway\EngData\Roundabout Concept Visuals.dgn

	feet
Tractor Width	8.00
Trailer Width	8.50
Tractor Track	8.50
Trailer Track	8.50
Lock to Lock Time	6.0
Steering Angle	17.7
Articulating Angle	70.0

SHEET	TOTAL
P.0	0

PROJECT ID: 0

REVIEWER: BKM 02-28-25

DESIGNER: MJB

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BACH BUXTON & SHAYLER RD.
ROUNDABOUT (WB-50)

HORIZONTAL
SCALE IN FEET

0 40
20 80