

CITY OF WESTMORELAND COMMUNITY MOBILITY PLAN

Westmoreland, Tennessee



TDOT
Department of
Transportation

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Prepared by



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Contents

1.0	Introduction	1
	Planning Process.....	1
	Grant Overview.....	3
	Vision, Goals, and Objectives	3
2.0	Existing Conditions and Needs.....	5
	Demographics	5
	Zoning.....	5
	Safety.....	7
	Traffic Volumes and Operations.....	9
3.0	Future Conditions.....	17
	Zoning and Land Use	17
	Traffic Volumes and Operations.....	17
4.0	Recommendations.....	30
	Vehicular Recommendations	31
	Bicycle and Pedestrian Recommendations.....	36
	Funding Sources	39
5.0	Conclusion.....	41
	Appendix A – Public and Stakeholder Engagement	A1
	Appendix B – Sumner County Active Transportation Plan Recommendations.....	B1
	Appendix C – Capacity Analyses Worksheets.....	C1
	Appendix D – TDOT Count Station Data	D1
	Appendix E – Planning Level Cost Estimates.....	E1
	Appendix F – Concept Diagrams.....	F1

Tables

Table 1-1. Planning Process Timeline.....	1
Table 2-1. Employment and Wage Trends (2016 – 2020).....	5
Table 2-2. Reported Crashes (2018 – 2022).....	7
Table 2-3. Motorized Crash Summary (2018 – 2022).....	7
Table 2-4. Vehicular Level of Service for Intersections	12
Table 2-5. Existing Peak Hour Levels of Service	13
Table 3-1. Background Developments	18
Table 3-2. No-Build AM Peak Hour Levels of Service	19
Table 3-3. No-Build PM Peak Hour Levels of Service	19
Table 3-4. Build AM Peak Hour Levels of Service	26
Table 3-5. Build PM Peak Hour Levels of Service	27
Table 4-1. Vehicular Recommendations	31
Table 4-2. Bicycle and Pedestrian Recommendations.....	36
Table 4-3. Funding Sources for Implementation	39

Figures

Figure 1-1. Study Area	2
Figure 1-2. Intersection of Old Highway 31-E and SR 52 (looking north).....	4
Figure 2-1. Existing Zoning.....	6
Figure 2-3. Study Area Crashes (2018 - 2022).....	8
Figure 2-3. Intersection of Austin Peay Highway and Highway 31-E (looking south)	9
Figure 2-4. Annual Average Daily Traffic Volumes (2021)	10
Figure 2-5. Roadway Functional Classifications	11
Figure 2-6. Intersection of Highway 31-E and SR 52 (looking south).....	13
Figure 2-7. Existing Peak Hour Turning Movement Counts (AM)	14
Figure 2-8. Existing Peak Hour Turning Movement Counts (PM).....	15
Figure 2-9. Existing Level of Service (LOS).....	15
Figure 3-1. Projected 2032 Volumes (AM).....	20
Figure 3-2. Projected 2032 Volumes (PM).....	21
Figure 3-3. Projected 2052 Volumes (AM).....	22
Figure 3-4. Projected 2052 Volumes (PM).....	23
Figure 3-5. No-Build Levels of Service (2032)	24
Figure 3-6. No-Build Levels of Service (2052)	25
Figure 3-7. Future Build Levels of Service (2032).....	28
Figure 3-8. Future Build Levels of Service (2052).....	29
Figure 4-1. Vehicular Recommendations	32
Figure 4-2. Concept Diagram – Intersection of Old Highway 31-E and SR 52.....	33
Figure 4-3. Concept Diagram – Intersection of Austin Peay Highway and Highway 31-E.....	34
Figure 4-4. Concept Diagram – Intersection of Highway 31-E and SR 52	35
Figure 4-5. Bicycle and Pedestrian Recommendations.....	38

1.0 Introduction

The City of Westmoreland is located in northern Middle Tennessee, near the Tennessee border with Kentucky. Two State Routes provide regional connectivity: Highway 31-E, which runs north-south through Westmoreland’s commercial district, and SR 52, which runs east-west between the City of Portland to the west and Macon County to the east. Three intersections are the focus of this study: the intersection of Old Highway 31-E and SR 52, Highway 31-E and SR 52, and Highway 31-E and Austin Peay Highway. These intersections have experienced increasing pressure from growth and development that has negatively affected roadway operations and safety, resulting in some of the highest crash rates in the metropolitan planning region. Additionally, Highway 31-E and SR 52 provide essential freight access to commercial and industrial areas within the study area.

Planning Process

The purpose of this Community Mobility Plan is to identify transportation infrastructure recommendations to improve safety and mobility along Highway 31-E and SR 52 in the City of Westmoreland. This plan provides an overview of existing conditions within the study area and identifies recommendations and designs to address the most critical safety issues along the two corridors (Figure 1-1). Additional recommendations are included to improve access between commercial areas, the Westmoreland downtown, schools, and other community destinations for people walking, bicycling, and driving.

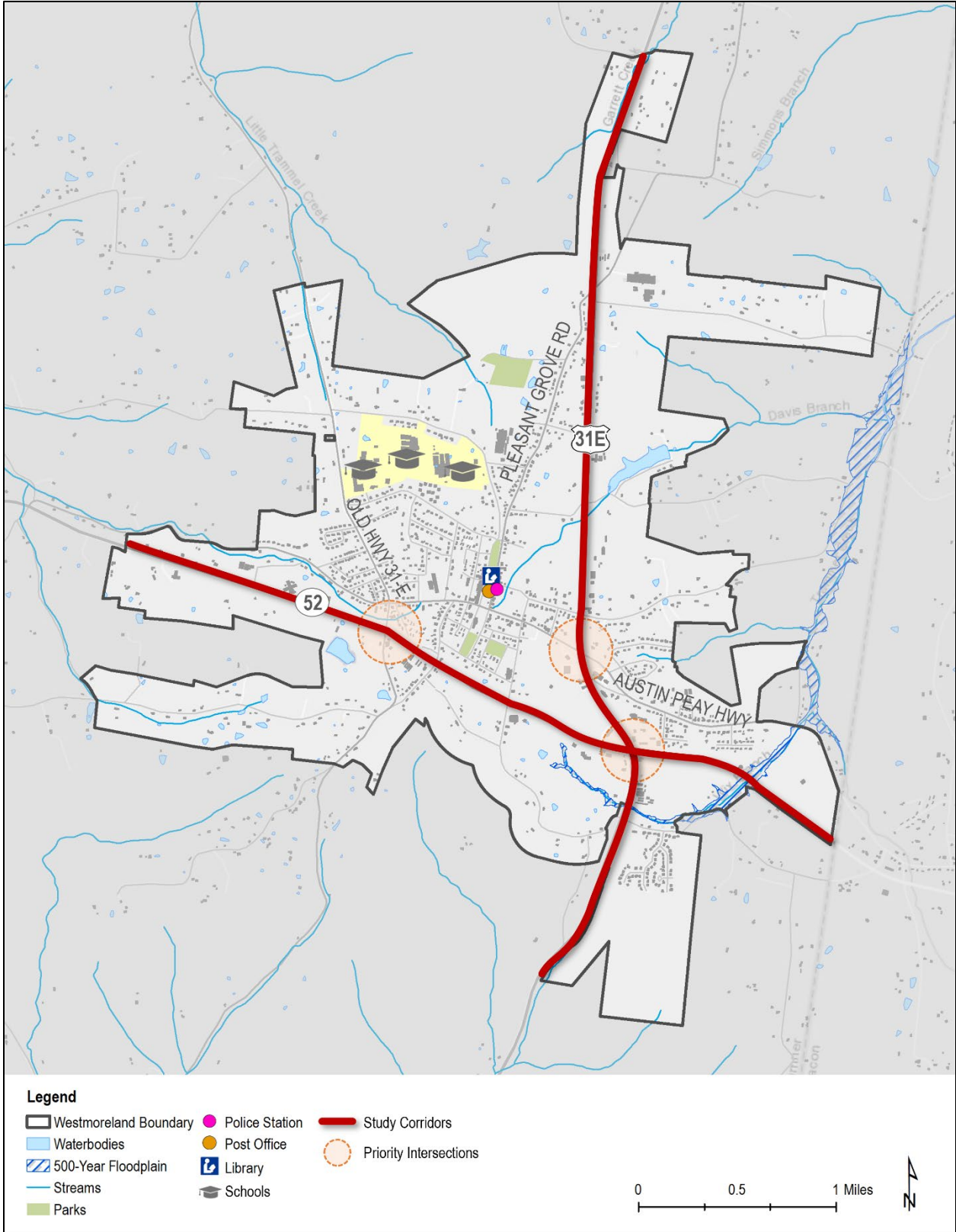
Recommended improvements were coordinated with existing and planned Tennessee Department of Transportation (TDOT) projects, the bicycle and pedestrian recommendations included in the ongoing Sumner County Active Transportation Plan, and county-wide land use planning updates being coordinated by the Greater Nashville Regional Council (GNRC). Additionally, planning level cost estimates and funding recommendations were identified to aid implementation efforts.

The planning process was completed in eleven months, as shown in Table 1-1, and included a Steering Committee of representatives from the City of Westmoreland. Meetings were held with stakeholders at various project milestones to provide critical input and direction for future planning tasks, and a project website and interactive mapping tool were utilized to gather input from the broader community. Key feedback from the virtual public engagement is summarized in Appendix A. Final improvement recommendations were presented at the City of Westmoreland City Council’s August 2023 Work Study Session.

Table 1-1. Planning Process Timeline

Task	2022				2023						
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July
Public and Stakeholder Engagement											
Existing Conditions and Needs Assessment											
Recommendations Development											
Completion of Plan Document											

Figure 1-1. Study Area



Grant Overview

The Tennessee Department of Transportation’s (TDOT) Long Range Planning Division administers the Transportation Planning Grant (TPG) program to assist both urban and rural areas across Tennessee by providing planning resources for communities to identify strategies that promote an efficient, multimodal transportation network. The TPG program is designed to help communities better align local transportation investments with regional land use planning to better meet statewide transportation objectives.

The City of Westmoreland was one of the grant recipients for the TPG’s 2022-2023 grant cycle and received funding to support the development of a Community Mobility Plan for the Highway 31-E and SR 52 corridors.

Vision, Goals, and Objectives

Based on input from stakeholders, a long-term vision was developed for the Highway 31-E and SR 52 corridors. Four goals were developed to reach that vision, with specific objectives identified that help provide local stakeholders with actionable steps to promote improved safety and mobility along the study corridors as well as throughout the City of Westmoreland.

Goal 1: Safety – Promote the safe movement of all road users.

- 1.1. Ensure safe and convenient travel options for all roadway users by minimizing conflict points through design.
- 1.2. Address Americans with Disability Act (ADA) concerns and pedestrian infrastructure deficiencies.
- 1.3. Identify funding needs for the construction and maintenance of infrastructure.

Goal 2: Access, Connectivity, and Mobility – Improve connectivity and mobility between Highway 31-E, SR 52, and downtown Westmoreland.

- 2.1. Ensure multimodal facilities are integrated into a larger city-wide network.
- 2.2. Provide access to neighborhoods, parks, businesses, recreational opportunities, schools, and other community resources by vehicle, walking, and bicycling.

Goal 3: Operational Efficiency – Ensure efficient operation of the Highway 31-E and SR 52 corridors for all users.

- 3.1. Recommend solutions to address mobility concerns involving traffic operations along the corridors.

Goal 4: Economic Development and Quality of Life – Ensure that Highway 31-E and SR 52 can accommodate the impacts of future development and meets the needs of current corridor users.

Vision Statement

Highway 31-E and SR 52 in Westmoreland are safe, accessible, and efficient corridors that connect people to the places they want to go, support access to recreation and businesses, and facilitate economic development and an increased quality of life.

- 4.1. Align corridor recommendations with current land use planning and active transportation planning efforts.
- 4.2. Incorporate previous transportation planning recommendations into the corridor-specific recommendations included in this community mobility plan.

Figure 1-2. Intersection of Old Highway 31-E and SR 52 (looking north)



2.0 Existing Conditions and Needs

The following sections detail existing conditions within the City of Westmoreland to provide an overview of transportation issues and opportunities within the study area.

Demographics

The City of Westmoreland is located within Sumner County, which has experienced a rapid 20.6% increase in population over the past decade. Westmoreland itself has grown more slowly, from a population of 2,555 in 2010 to 2,622 people in 2020, according to the Decennial Census.

According to the Census Bureau’s Longitudinal Employer-Household Dynamics survey, of the approximately 570 people who are employed in the City of Westmoreland, 5.1% live and work within the city, while 95% live elsewhere and commute in from work. An additional 1,072 people live within Westmoreland but are employed elsewhere. Key employment sectors in Westmoreland include education, service, manufacturing, and government. Residents who live in the City of Westmoreland and commute elsewhere for work primarily travel west into northern Sumner County and east into Macon County. General employment and wage trends are included in Table 2-1.

Table 2-1. Employment and Wage Trends (2016 – 2020)

	Unemployment Rate	Poverty Rate	Median Income
Westmoreland	5.4%	16.6%	\$45,030
Sumner County	3.4%	9.9%	\$69,878
Tennessee	5.3%	14.6%	\$54,833

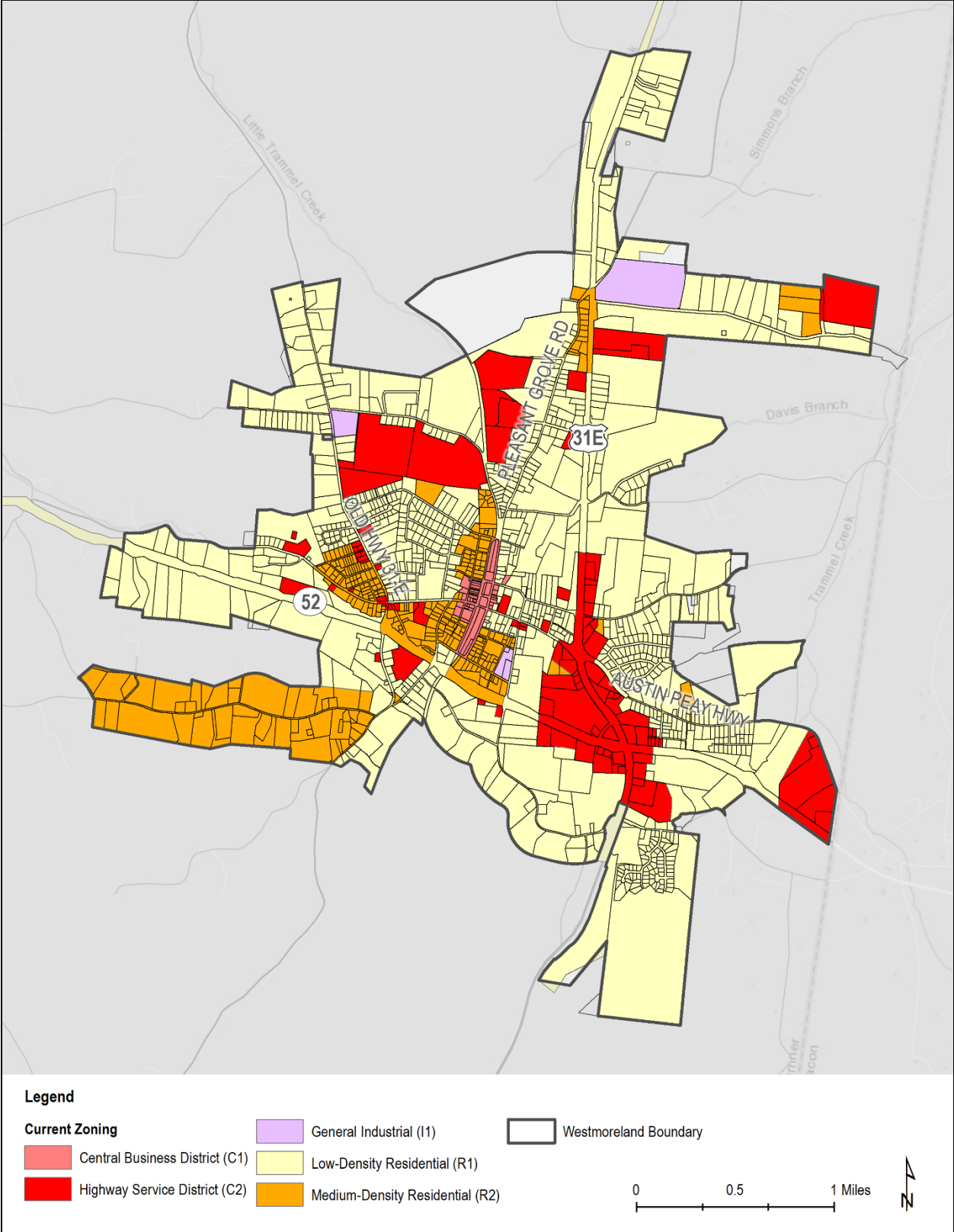
Source: U.S. Census, American Community Survey 5-Year Estimates

Zoning

Identifying the City of Westmoreland’s zoning is important for understanding the community’s current transportation needs, as each zoning category permits different types of development that attract and generate varying levels of traffic. Within the study area, over 84% of Westmoreland’s acreage is zoned for residential uses. The rest are zoned for the central business district (1%), general industrial uses (2%), and the highway services district (13%), as shown in Figure 2-1. This mix of zoning supports Westmoreland’s existing employers and residents as well as the future developments expected to occur within the City’s boundaries. These include a large residential development that will be located off Highway 31-E west of Pleasant Grove Road and north of Ball Park Road. This development is expected to include two new access points along Highway 31-E to serve more than 250 single family homes, 300 multifamily units, 20,000 square feet of retail space, a fast food restaurant, and a fuel station and convenience market. The impact of these future developments is incorporated into the operations modeling for future conditions.

To accommodate future travel in the City of Westmoreland, the Greater Nashville Regional Council’s (GNRC) 2045 Regional Transportation Plan includes an illustrative project along Highway 31-E to widen the corridor from two to four lanes from just north of Roundtree Drive to the Tennessee border with Kentucky. In addition, the Sumner County Active Transportation Plan (ATP) calls for a variety of walkway, bikeway, and trail improvements in the City of Westmoreland, including a sidepath or separated bike lane and sidewalk along SR 52 and a paved shoulder along Highway 31-E. The full list of ATP walkway and bikeway recommendations are included in Appendix B.

Figure 2-1. Existing Zoning



Safety

Crash data for the study area were evaluated for the past five years (2018 – 2022) using TDOT eTRIMS data to identify high crash locations along the Highway 31-E and SR 52 corridors that may warrant safety countermeasures and other types of safety improvements, particularly at the three primary intersections (Table 2-2).

Over the past five years, 177 crashes occurred within 250 feet of the Highway 31-E and SR 52 corridors within the City of Westmoreland. Of these, the majority of crashes (78.5%) resulted in property damage only. Of the remaining 38 incidents, 2 crashes (1.1%) resulted in a fatality, 5 crashes (2.8%) resulted in serious injuries, and 31 crashes (17.5%) resulted in minor injuries. As shown in Figure 2-4, the highest number of crashes were concentrated around the three priority intersections: Highway 31-E and SR 52, Highway 31-E and Austin Peay Highway, and Old Highway 31-E and SR 52. Of the two fatal crashes, one occurred at the intersection of Old Highway 31-E and SR 52, and the other occurred along SR 52 at the driveway access to Mike’s Foodland grocery store.

Table 2-2. Reported Crashes (2018 – 2022)

Crash Description	2018	2019	2020	2021	2022	Total
Nonmotorized	0	0	0	0	0	0
Motorized	15	42	40	40	40	177

Table 2-3 displays the motorized crash summary within the study area between 2018 – 2022, including reported crash types and associated injuries or property damage.

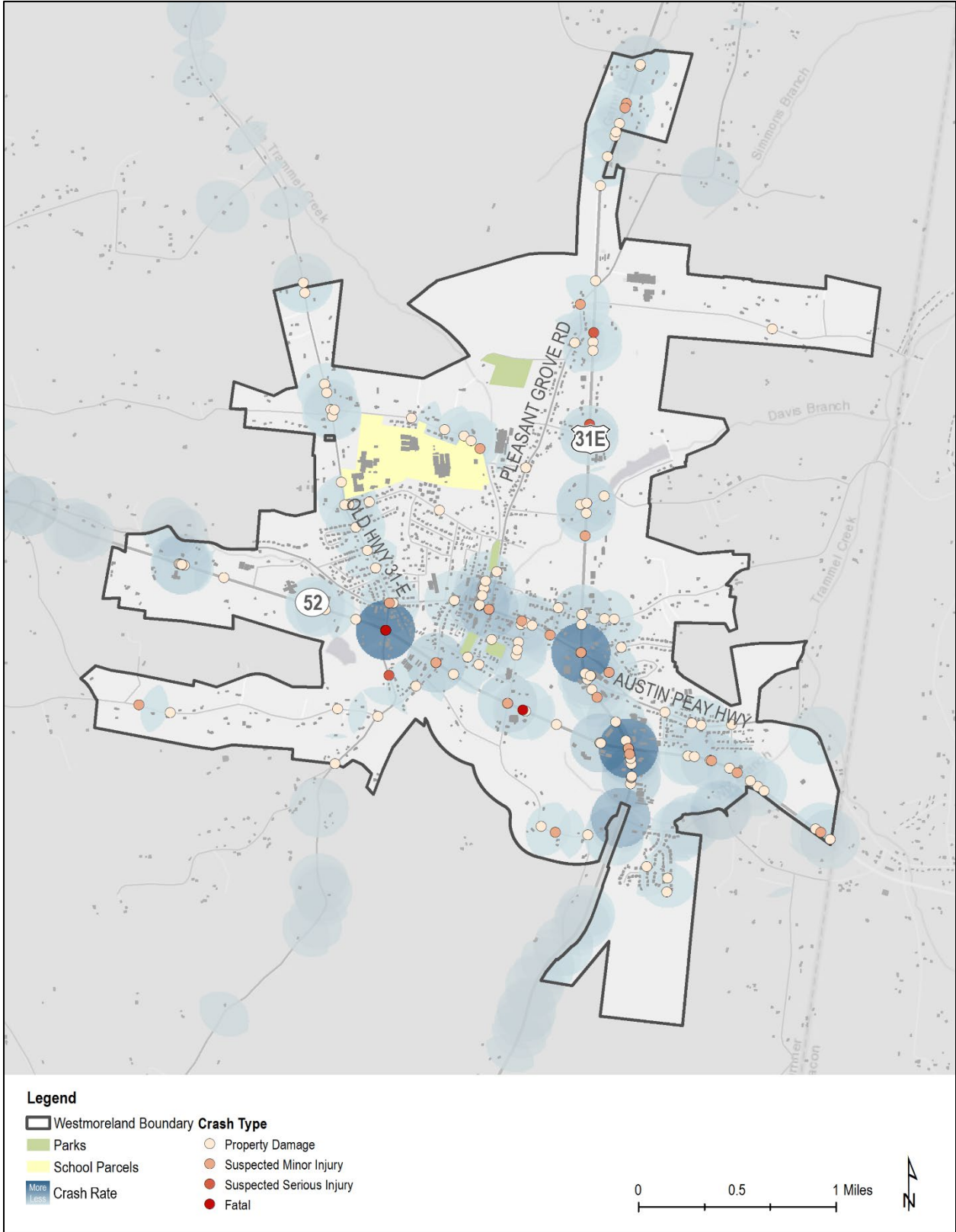
Table 2-3. Motorized Crash Summary (2018 – 2022)

Crash Type	Angle	Head-On	Single Vehicle	Rear-End	Sideswipe (Opposing Direction)	Sideswipe (Same Direction)	Unknown / Other	Total
Fatal	2	0	0	0	0	0	0	2
Serious Injury ¹	3	1	0	0	1	0	0	5
Minor Injury ¹	14	0	2	12	1	0	2	31
Property Damage (Over) ²	28	4	37	23	2	7	2	103
Property Damage (Under)	0	1	1	1	0	0	33	36
Total	47	6	40	36	4	7	37	177

¹ This represents the total # of crash events, total # of injured person(s) may be higher

² Filed crash reports per provisions of 55-12-104 T.C.A. in excess of \$400 to any person involved

Figure 2-2. Study Area Crashes (2018 - 2022)



Traffic Volumes and Operations

TDOT collects information on daily traffic volumes for major roadway corridors across the state. Reported as Annual Average Daily Traffic (AADT) volumes, this data represents the number of vehicles that travel along a particular roadway every day of the year on average. The transportation system in the City of Westmoreland is comprised of roadways with AADT volumes ranging from nearly 400 to more than 13,000 vehicles per day (Figure 2-4). The two primary arterials, Highway 31-E and SR 52, are more heavily traveled than the City’s collectors and local roadways (Figure 2-5). These arterials also experience the majority of the area’s commercial freight traffic, which varied between 3% and 10% of Westmoreland’s AADT in 2021.

Figure 2-3. Intersection of Austin Peay Highway and Highway 31-E (looking south)



Figure 2-4. Annual Average Daily Traffic Volumes (2021)

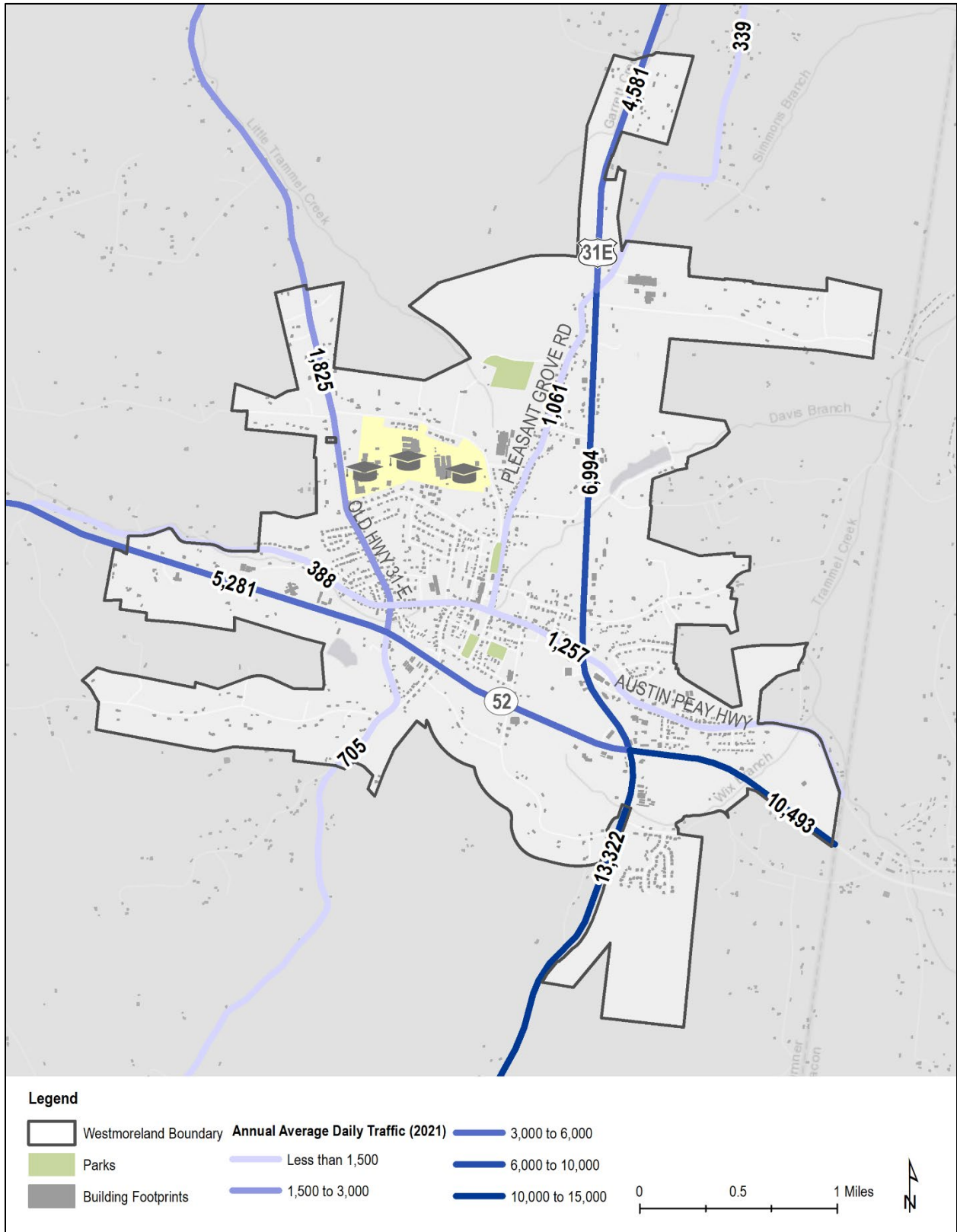
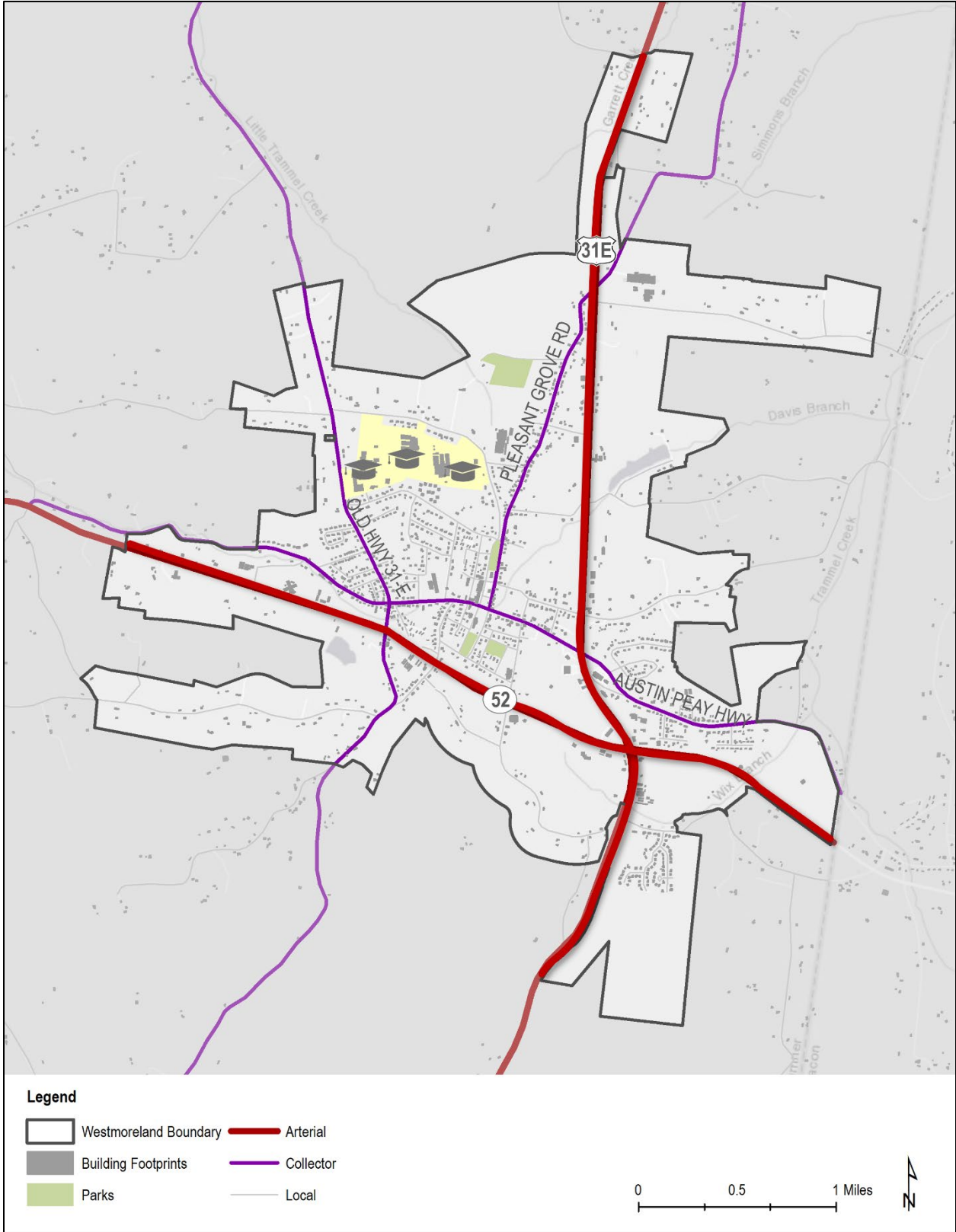


Figure 2-5. Roadway Functional Classifications



Intersection turning movement counts were collected at the three priority intersections within the study area. Specifically, counts were conducted from 7:00 – 9:00 AM and 4:00 – 6:00 PM on a typical weekday in November 2022 while local schools were in session. From the counts, it was determined that the peak hours of traffic flow occur during 7:00 – 8:00 AM and 4:00 – 5:00 PM. The existing peak hour turning movement volumes are presented in Figure 2-7 and Figure 2-8.

Capacity analyses were performed for the AM and PM peak hours to determine the current operation of the study intersection. The capacity calculations were performed according to the methods outlined in the *Highway Capacity Manual, 7th Edition*. The capacity analyses result in the determination of a Level of Service (LOS) for an intersection.

Level of Service is used as a measure of how well an intersection or roadway segment operates. LOS is used to generally describe a road’s traffic conditions and how well it moves vehicles, by comparing traffic volumes and roadway capacity. A road’s capacity is generally determined by its speed and number of lanes, and each road is assigned a letter grade between A and F, where LOS A is assigned to roads with free flow conditions and LOS F represents roads where demand exceeds capacity. For intersections, the LOS scores are associated with seconds of delay per vehicle. LOS D is typically considered as the minimum acceptable LOS for an intersection in a developed area. A description of LOS scores is presented in Table 2-4 for each critical turning movement and is measured in seconds of delay per vehicle for both signalized and unsignalized intersections.

Table 2-4. Vehicular Level of Service for Intersections

LOS Score	Description	Unsignalized Delay (Seconds per Vehicle)	Signalized Delay (Seconds per Vehicle)
A	Little or no traffic delay	≤ 10	≤ 10
B	Short traffic delay	>10 and ≤ 15	>10 and ≤ 20
C	Average traffic delay	>15 and ≤ 25	>20 and ≤ 35
D	Long traffic delay	>25 and ≤ 35	>35 and ≤ 55
E	Very long traffic delay	>35 and ≤ 50	>55 and ≤ 80
F	Extreme traffic delay	> 50	> 80

Source: *Highway Capacity Manual, 7th Edition*

The results of the capacity analyses for the existing conditions at the study intersection are presented in Table 2-5 and Figure 2-9. As shown, all critical movements operate at LOS D or better in the AM and PM peak hours. Capacity analyses worksheets are included in Appendix C.

Table 2-5. Existing Peak Hour Levels of Service

Intersection	Turning Movement	Level of Service (Average Delay in sec/veh)	
		AM Peak	PM Peak
Highway 31-E/US 231 and SR 52	Overall Intersection	C (27.3)	C (29.1)
Highway 31-E/US 231 and Austin Peay Highway	Northbound Approach	A (9.9)	B (11.1)
	Southbound Approach	A (9.5)	A (10.0)
	Eastbound Approach	A (9.8)	A (10.0)
	Westbound Approach	A (9.2)	A (9.7)
SR 52 and Old Highway 31-E	Northbound Approach	C (16.1)	C (17.6)
	Southbound Approach	C (19.0)	C (19.4)
	Eastbound Left-Turn	A (8.0)	A (7.9)
	Westbound Left-Turn	A (7.5)	A (7.8)

Figure 2-6. Intersection of Highway 31-E and SR 52 (looking south)



Figure 2-7. Existing Peak Hour Turning Movement Counts (AM)



Figure 2-8. Existing Peak Hour Turning Movement Counts (PM)



Figure 2-9. Existing Level of Service (LOS)



3.0 Future Conditions

As Westmoreland continues to grow and develop over the next 30 years, the City's transportation system will need to adapt and change to meet the needs of increased demand. To understand the impacts of future development, forecasted traffic conditions were modeled. The following sections describe the assumptions used to document known large parcel developments, likely future land use types, and future mobility needs within the study area.

Zoning and Land Use

Because the City of Westmoreland does not currently have a future land use map, future land use patterns within the study area have been extrapolated based on existing permitted zoning and known future development patterns. As described in Section 2, the Highway 31-E and SR 52 corridors are predominantly zoned for residential and commercial uses. Many of the commercially zoned parcels are currently used as both vacant and agricultural land, particularly those concentrated around the intersections of SR 52 and Highway 31-E and Highway 31-E and Austin Peay Highway. These vacant parcels will likely continue to develop into a denser conglomeration of businesses within the Highway Services District.

As Westmoreland continues to grow, analysis of increased traffic and mobility-related impacts should be conducted to ensure that the transportation system continues to function safely and efficiently. The future conditions model included additional traffic generation from the residential development currently under construction west of Highway 31-E near Pleasant Grove Road, as well as assumed background growth. These assumptions are for scenario purposes only to see how additional traffic would impact network operations. Scenario assumptions are further described below.

Traffic Volumes and Operations

In order to account for the traffic growth between now and the design years, background traffic volumes were established. For this study, the design years are 2032 and 2052, which are 10- and 30-year horizons, respectively. Historic daily traffic volumes were obtained from the eight TDOT count stations located in the vicinity of the priority intersections. Since 2018, the combined traffic at these eight TDOT count stations has increased by an average of 1.9% per year. The TDOT count station data is included in Appendix E.

A yearly growth factor was applied to the existing peak hour (7:00 – 8:00 AM and 4:00 – 5:00 PM) traffic volumes to account for background growth for the future conditions. The existing peak hour traffic volumes at the study intersections were increased by 2.0% per year between 2022 and the design years of 2032 and 2052 to account for anticipated background traffic growth within the study area. This yearly compounding growth is equivalent to an overall increase of 22% in 2032 and 81% in 2052 from the existing peak hour traffic volumes.

Additionally, the peak hour traffic volumes generated by the future Pleasant Grove Farms mixed use development were included as background traffic in the model. The vehicular trips generated by this new development were estimated in the Pleasant Grove Farms Mixed Use traffic impact study (TIS). These trips were distributed through the study area to determine the future 2032 and 2052 peak hour traffic volumes. The land use and density assumptions are included in Table 3-1.

Table 3-1. Background Developments

Name of Development	Date of Study	Location	Land Uses and Densities
Pleasant Grove Farms Mixed Use	April 2022	Northwest corner of Highway 31-E / US 231 and Pleasant Grove Road	254 Single Family Homes
			328 Multifamily Units
			20,000 s.f. of Retail
			3,800 s.f. Fast-Food Restaurant
			16 Fueling Position Fuel Center with Convenience Market

To determine the operation of the study area intersections under future no-build conditions, capacity analyses were performed for the AM and PM peak hours. The analyses for the future no-build conditions assumed no improvements were made to the study intersections, essentially leaving them “as is”, with the same lane configurations and signal timings as the existing conditions.

No-Build Model Results, Horizon Years 2032 and 2052

As shown in Table 3-2 and Table 3-3, under future no-build conditions, the capacity analyses indicate that the operational performances of the critical movements at the study intersections are generally expected to continue to operate at the same level of service as under existing conditions or continue to operate at LOS D or better in the AM and PM peak hours with the following exceptions:

- Highway 31-E/US 231 and SR 52
 - The overall intersection is expected to deteriorate from LOS C to LOS E in the 2023 PM peak hour and from LOS C to LOS F in the 2052 AM and PM peak hour.
- SR 52 and Austin Peay Highway
 - The northbound approach is expected to deteriorate from LOS B to LOS E in the 2032 PM peak hour and LOS F in the 2052 PM peak hour.
 - The southbound approach is expected to deteriorate from LOS A to LOS E in the 2052 AM peak hour and from LOS A to LOS E in the 2052 PM peak hour.
- SR 52 and Old Highway 31 E
 - The northbound approach is expected to deteriorate from LOS C to LOS F in the 2052 AM and PM peak hour.
 - The southbound approach is expected to deteriorate from LOS C to LOS E in the 2032 AM and PM peak hour and to LOS F in the 2052 AM and PM peak hour.

Capacity analysis worksheets are included in Appendix C.

Table 3-2. No-Build AM Peak Hour Levels of Service

Intersection	Turning Movement	Level of Service (Average Delay in sec/veh)		
		2022	2032	2052
Highway 31-E/US 231 and SR 52	Overall Intersection	C (27.3)	D (53.1)	F (92.9)
Highway 31-E/US 231 and Austin Peay Highway	Northbound Approach	A (9.9)	C (15.4)	D (29.4)
	Southbound Approach	A (9.5)	C (18.0)	E (40.1)
	Eastbound Approach	A (9.8)	B (13.8)	D (25.2)
	Westbound Approach	A (9.2)	B (11.4)	B (13.6)
SR 52 and Old Highway 31 E	Northbound Approach	C (16.1)	C (22.2)	F (53.9)
	Southbound Approach	C (19.0)	E (41.3)	F (624.3)
	Eastbound Left-Turn	A (8.0)	A (8.3)	A (8.9)
	Westbound Left-Turn	A (0.0)	A (0.0)	A (0.0)

Table 3-3. No-Build PM Peak Hour Levels of Service

Intersection	Turning Movement	Level of Service (Average Delay in sec/veh)		
		2022	2032	2052
Highway 31-E/US 231 and SR 52	Overall Intersection	C (29.1)	E (62.5)	F (113.8)
Highway 31-E/US 231 and Austin Peay Highway	Northbound Approach	B (11.1)	E (36.7)	F (156.3)
	Southbound Approach	A (10.0)	C (20.5)	E (43.2)
	Eastbound Approach	A (10.0)	B (13.7)	C (18.6)
	Westbound Approach	A (9.7)	B (12.3)	B (14.5)
SR 52 and Old Highway 31 E	Northbound Approach	C (17.6)	D (26.8)	F (101.5)
	Southbound Approach	C (19.4)	E (47.7)	F (1224.3)
	Eastbound Left-Turn	A (7.9)	A (8.2)	A (8.8)
	Westbound Left-Turn	A (7.8)	A (8.1)	A (8.6)

The background peak hour traffic volumes and LOS scores for horizon years 2032 and 2052 are presented in Figure 3-1 through Figure 3-6. Capacity analyses worksheets are included in Appendix C.

Figure 3-1. Projected 2032 Volumes (AM)



Figure 3-2. Projected 2032 Volumes (PM)



Figure 3-3. Projected 2052 Volumes (AM)



Figure 3-4. Projected 2052 Volumes (PM)



Figure 3-5. No-Build Levels of Service (2032)

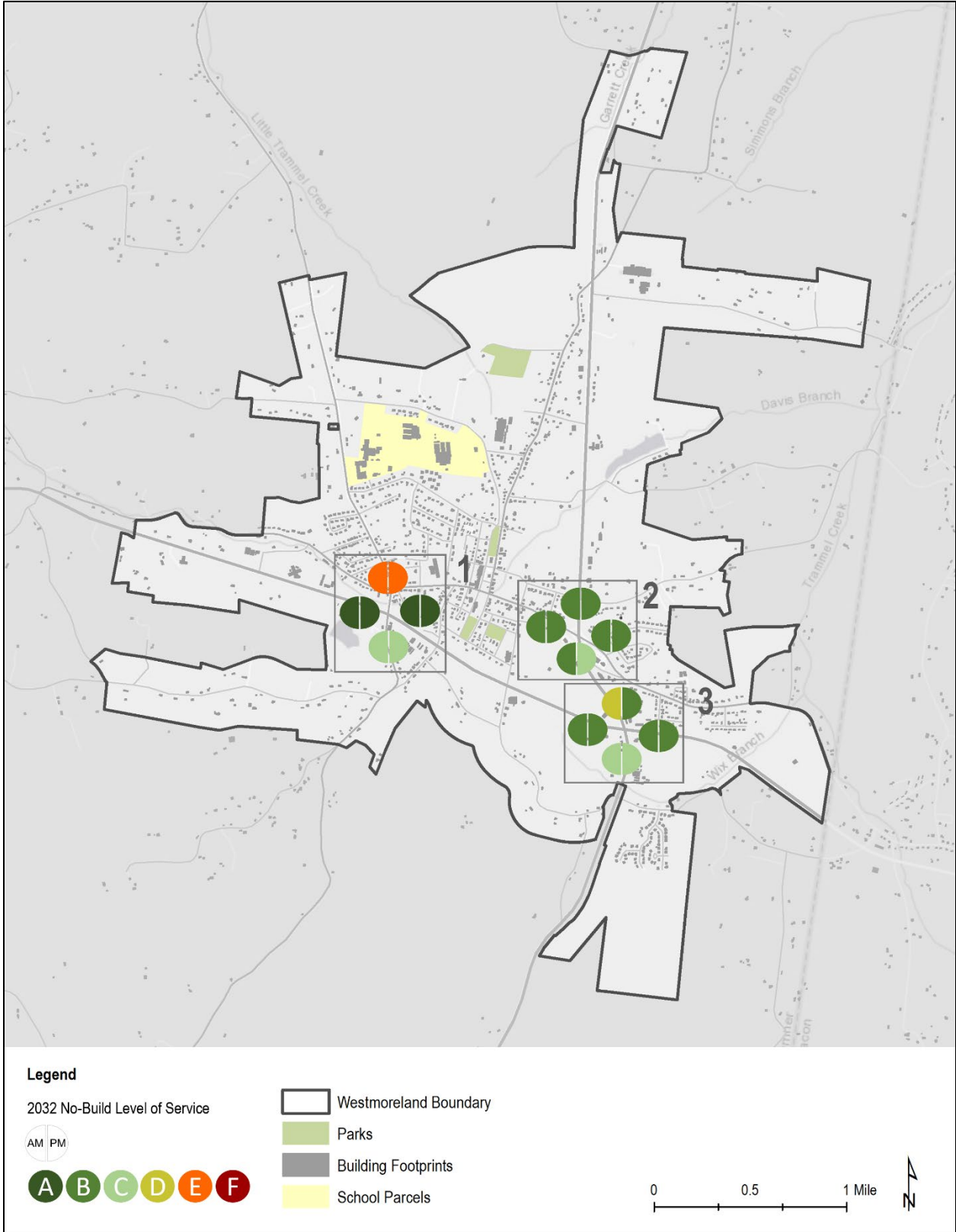
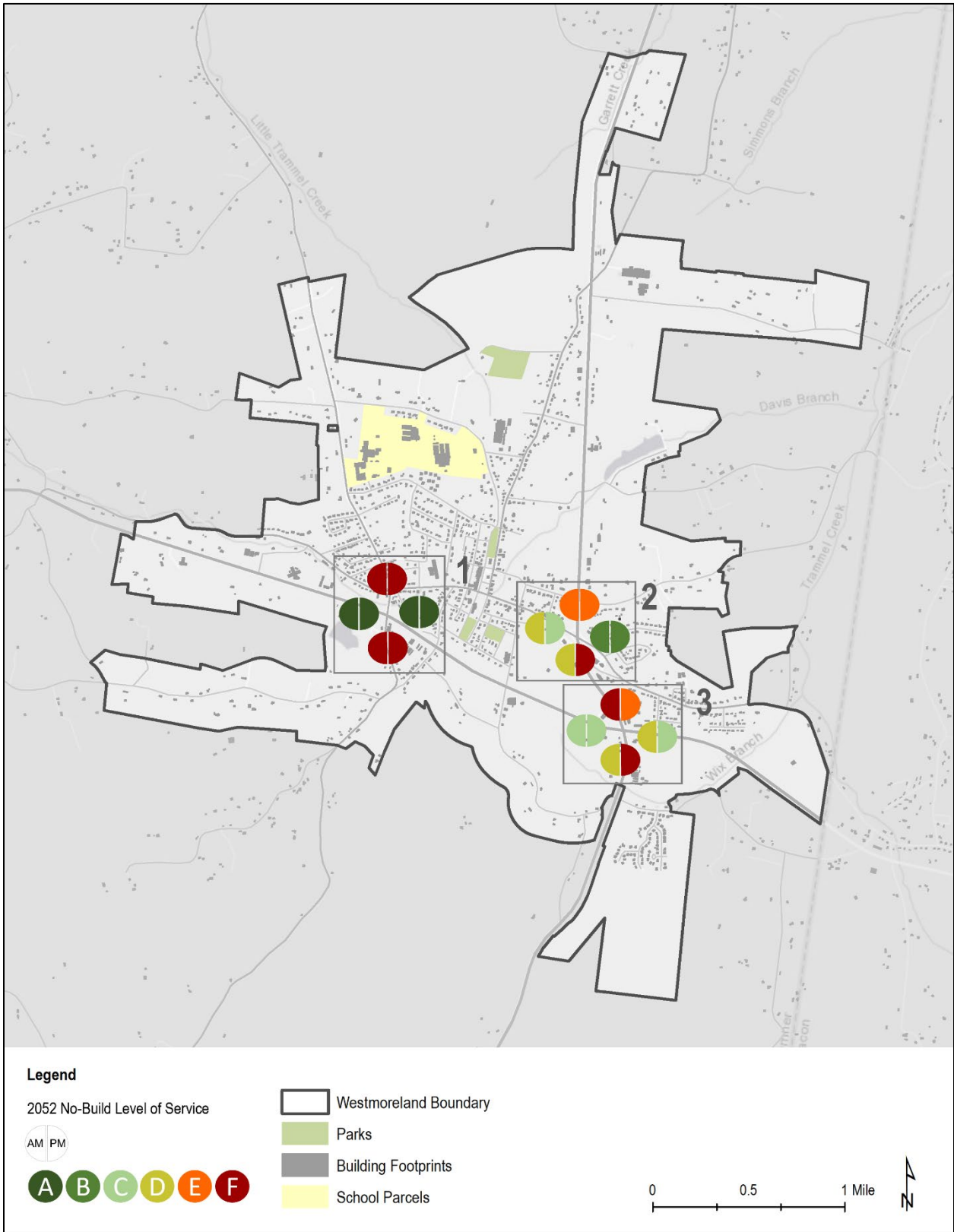


Figure 3-6. No-Build Levels of Service (2052)



Build Model Results, Horizon Years 2032 and 2052

As shown in Table 3-2 and Table 3-3, the three study intersections are expected to deteriorate in the future no-build scenarios. Additional analysis was conducted to determine potential mitigation to improve the future conditions. Based on the traffic volumes and intersection geometries, as well as input from community stakeholders and the public, the following improvements were modeled as the build scenario:

- Highway 31-E/US 231 and SR 52
 - Upgrade signal detection system and develop a new time of day signal timing plan
- Highway 31-E/US 231 and SR 52
 - Install a two-lane roundabout
- Highway 31-E/US 231 and Old Highway 31-E
 - Install left-turn lanes on the eastbound and westbound approaches by horizon year 2032 and a signal by 2052.

The results of the build scenario capacity analysis are shown in Table 3-4 and Table 3-5 for both horizon years (2032 and 2052).

Table 3-4. Build AM Peak Hour Levels of Service

Intersection	Turning Movement	Level of Service (Average Delay in sec/veh)				
		2022	No-Build		Build	
			2032	2052	2032	2052
Highway 31-E/US 231 and SR 52	Overall Intersection	C (27.3)	D (53.1)	F (92.9)	C (24.1)	D (53.5)
Highway 31-E/US 231 and Austin Peay Highway	Northbound Approach	A (9.9)	C (15.4)	D (29.4)	A (4.6)	A (5.4)
	Southbound Approach	A (9.5)	C (18.0)	E (40.1)	A (5.9)	A (7.4)
	Eastbound Approach	A (9.8)	B (13.8)	D (25.2)	A (8.2)	C (18.3)
	Westbound Approach	A (9.2)	B (11.4)	B (13.6)	A (5.0)	A (7.7)
SR 52 and Old Highway 31 E	Overall Intersection	--	--	--	--	B (16.5)
	Northbound Approach	C (16.1)	C (22.2)	F (53.9)	C (21.8)	--
	Southbound Approach	C (19.0)	E (41.3)	F (624.3)	C (39.9)	--
	Eastbound Left-Turn	A (8.0)	A (8.3)	A (8.9)	A (8.6)	--
	Westbound Left-Turn	A (0.0)	A (0.0)	A (0.0)	A (0.0)	--

Table 3-5. Build PM Peak Hour Levels of Service

Intersection	Turning Movement	Level of Service (Average Delay in sec/veh)				
		2022	No-Build		Build	
			2032	2052	2032	2052
Highway 31-E/US 231 and SR 52	Overall Intersection	C (29.1)	E (62.5)	F (113.8)	C (31.4)	D (54.2)
Highway 31-E/US 231 and Austin Peay Highway	Northbound Approach	B (11.1)	E (36.7)	F (156.3)	A (6.6)	A (9.1)
	Southbound Approach	A (10.0)	C (20.5)	E (43.2)	A (5.5)	A (7.3)
	Eastbound Approach	A (10.0)	B (13.7)	C (18.6)	A (8.6)	C (15.4)
	Westbound Approach	A (9.7)	B (12.3)	B (14.5)	A (9.6)	C (17.5)
SR 52 and Old Highway 31 E	Overall Intersection	--	--	--	--	B (12.8)
	Northbound Approach	C (17.6)	D (26.8)	F (101.5)	D (36.1)	--
	Southbound Approach	C (19.4)	E (47.7)	F (1224.3)	E (45.2)	--
	Eastbound Left-Turn	A (7.9)	A (8.2)	A (8.8)	A (8.4)	--
	Westbound Left-Turn	A (7.8)	A (8.1)	A (8.6)	A (8.1)	--

The projected peak hour traffic volumes and LOS scores for horizon years 2032 and 2052 are presented in Figure 3-7 through Figure 3-8. Capacity analyses worksheets are included in Appendix C.

Figure 3-7. Future Build Levels of Service (2032)



Figure 3-8. Future Build Levels of Service (2052)



4.0 Recommendations

As established in the existing and future conditions of this report, the intersections of Old Highway 31-E and SR 52, Highway 31-E and SR 52, and Highway 31-E and Austin Peay Highway are forecasted to experience continued pressure from commercial and residential growth in the Westmoreland area. Without careful planning and targeted capital investments to support this growth, future mobility and safety conditions will likely worsen. Additionally, because of the lack of nonmotorized facilities, significant barriers currently exist for people walking and cycling within City of Westmoreland and within the vicinity of the three priority intersections.

The recommendations included in this chapter will help address existing and future safety and operational concerns within the study area for all roadway users. The vehicular recommendations seek to address both safety and operational concerns for people driving through the three primary intersections, while the walkway and bikeway recommendations resolve network gaps and safety issues for people using active modes. The walkway and bikeway improvements build upon the recommendations included in the Sumner County Active Transportation Plan, which was completed in 2022.

The following sections describe the recommended improvements for the priority intersections in more detail. The implementation timeframes shown in each table are loosely correlated with the cost and effort required for implementation, as well as through input from the steering committee, as described below.

- **Near-term:** recommendations (0 to 3 years) could be constructed or implemented immediately and require minimal design and construction.
- **Mid-term:** recommendations (3 to 6 years) require additional traffic data collection and analysis, as well as more survey, design, and subsurface excavation during construction.
- **Long-term:** Long-term recommendations (6 years and longer) would require substantial right-of-way acquisition, additional public and stakeholder engagement, and/or are more significant financial investment.

Cost estimates were developed using TDOT's Planning Level Cost Estimating Tool, using 2021 Average Unit Prices with a 40% contingency applied for engineering and construction phases. Additional detailed information regarding each recommendation's cost estimate can be found in Appendix F.

Vehicular Recommendations

The vehicular recommendations for the intersections of Old Highway 31-E and SR 52, Highway 31-E and SR 52, and Highway 31-E and Austin Peay Highway are included in Table 4-1.

The signal detection and time of day plan recommendation (Project ID 1) applies to the existing signal at the intersection of Highway 31-E and SR 52 and maintains the current lane configuration. The recommended installation of left-turn lanes on the eastbound and westbound approaches to the intersection of Old Highway 31-E and SR 52 (Project ID 2) will improve traffic operations and provide a staging area for left-turning vehicles. By the mid-term horizon, a signal (Project ID 3) could be installed at this location as warranted by crashes and traffic volumes. The final recommendation (Project ID 4) is a two-lane roundabout at the intersection of Austin Peay Highway and Highway 31-E. This roundabout addresses both safety and operational concerns at this location and functions well in the 2032 and 2052 planning horizons.

The vehicular recommendations are shown in Figure 4-1, the concept diagrams for each intersection are shown in Figure 4-2, Figure 4-3, and Figure 4-4, and more detailed planning level cost estimates and labeled concept diagrams are included in Appendix F and Appendix G, respectively.

Table 4-1. Vehicular Recommendations

ID	Recommendation	Location	Type	Timeframe	Cost (2021 Dollars)
1	Install signal detection (e.g., radar) and establish time of day plan at existing signal	Intersection of Highway 31-E and SR 52	Signal Improvement	Near-term	\$281,000
2	Install left-turn lanes on eastbound and westbound approaches	Intersection of SR 52 and Old Highway 31-E	Capital Improvement	Long-term	\$13,100
3	Install signal if warranted	Intersection of SR 52 and Old Highway 31-E	Capital Improvement	Mid-term	\$264,000
4	Two-lane roundabout	Intersection of Austin Peay Hwy and Highway 31-E	Capital Improvement	Long-term	\$1,750,000

Figure 4-1. Vehicular Recommendations

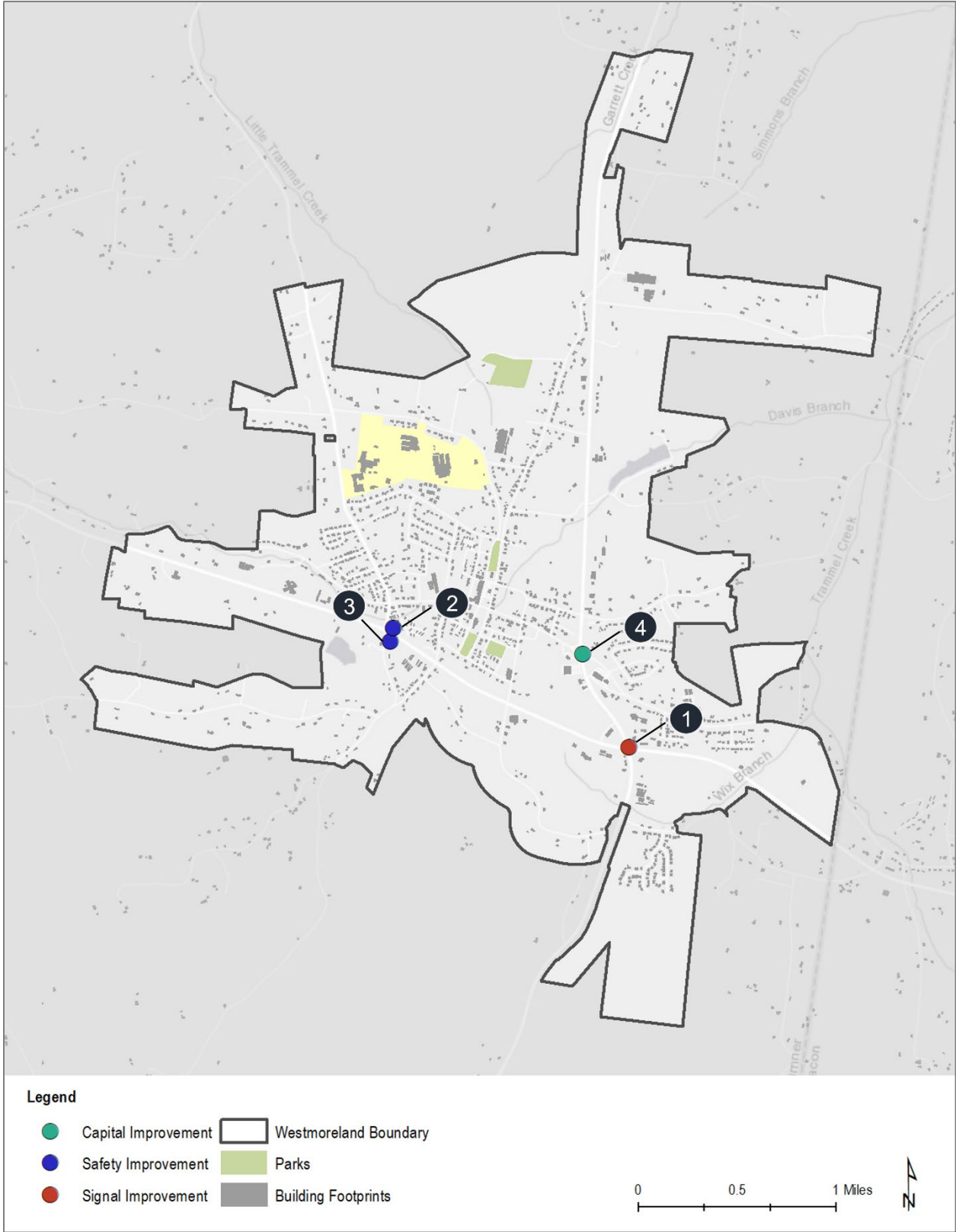
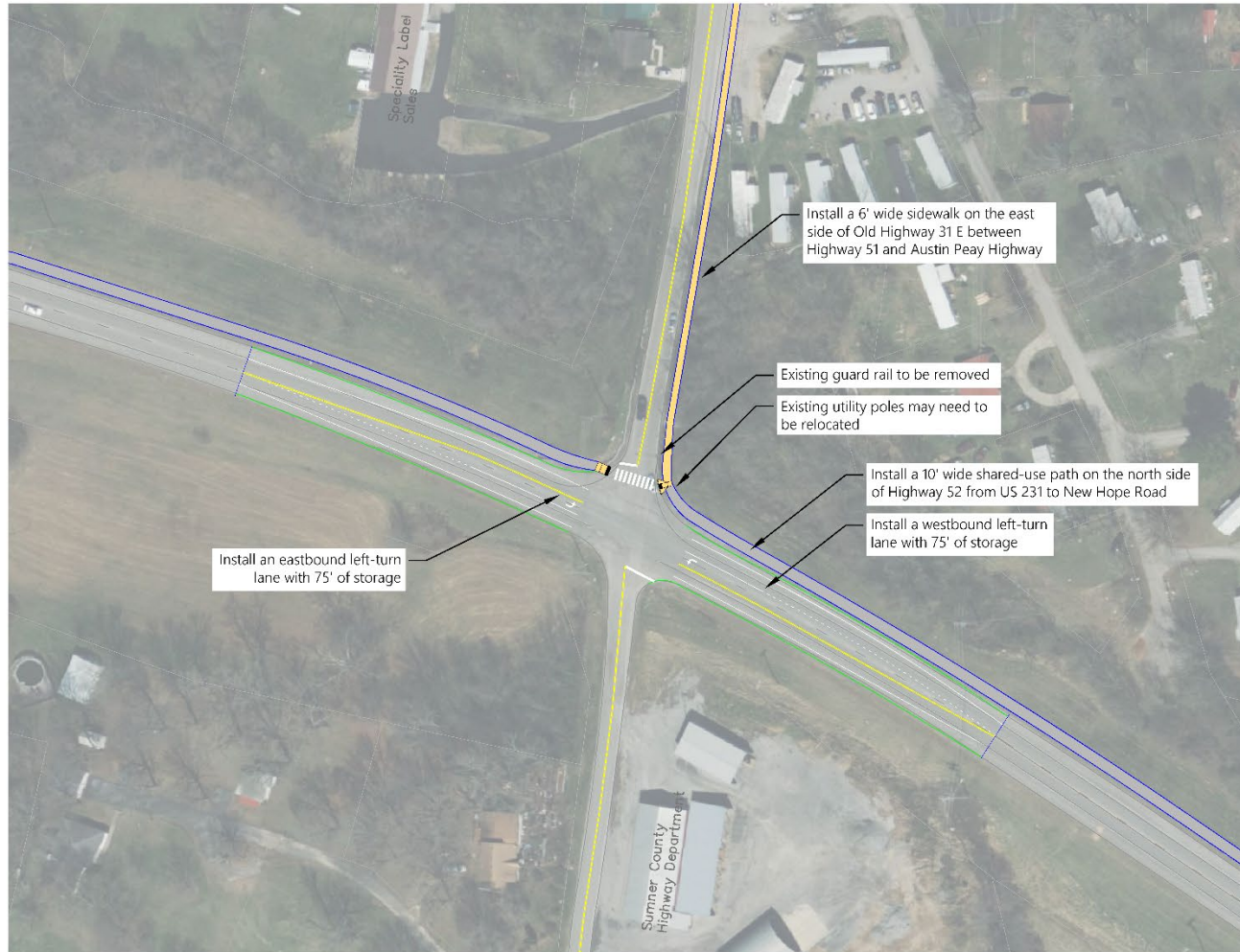


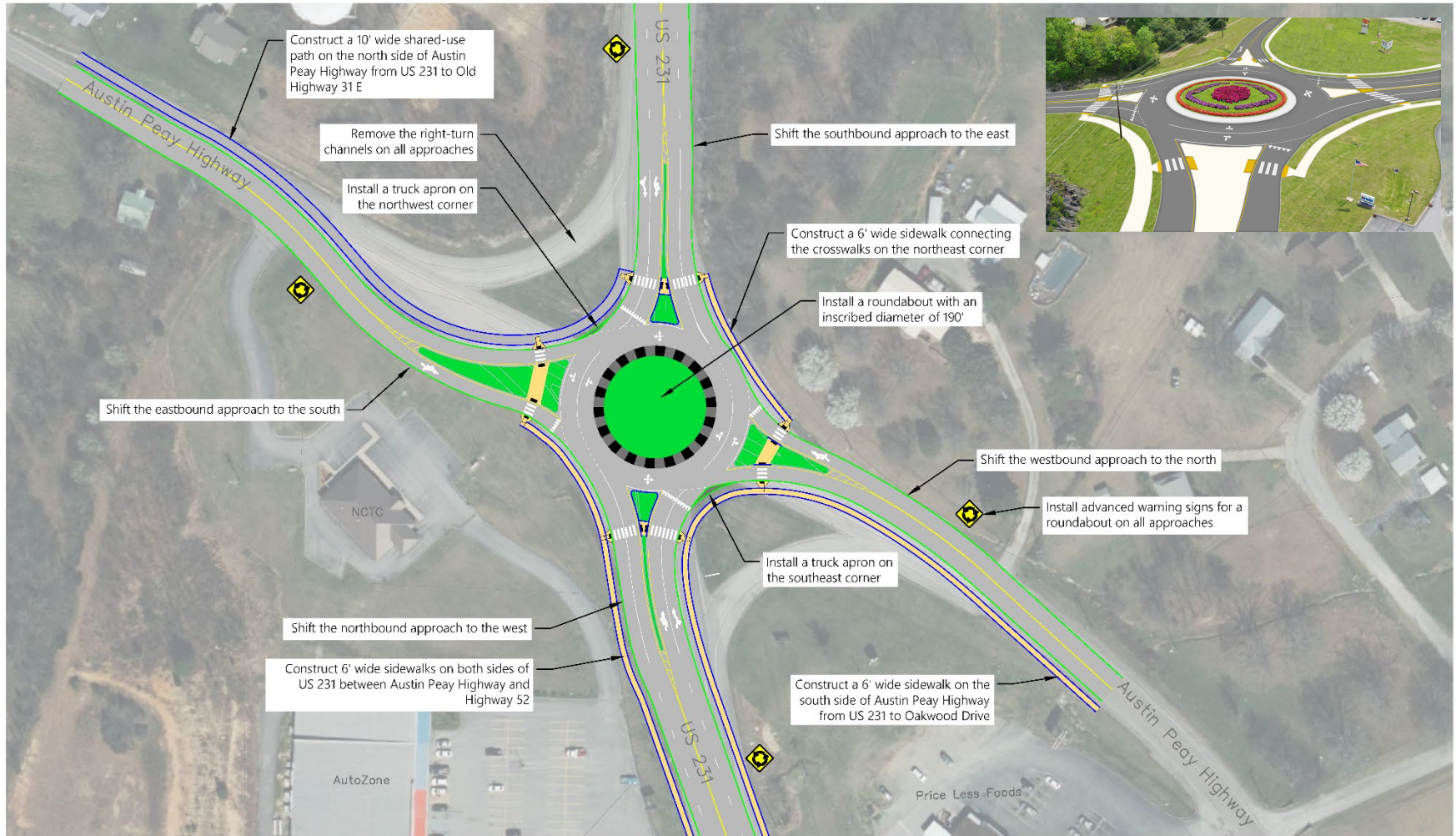
Figure 4-2. Concept Diagram – Intersection of Old Highway 31-E and SR 52



Recommended Improvements



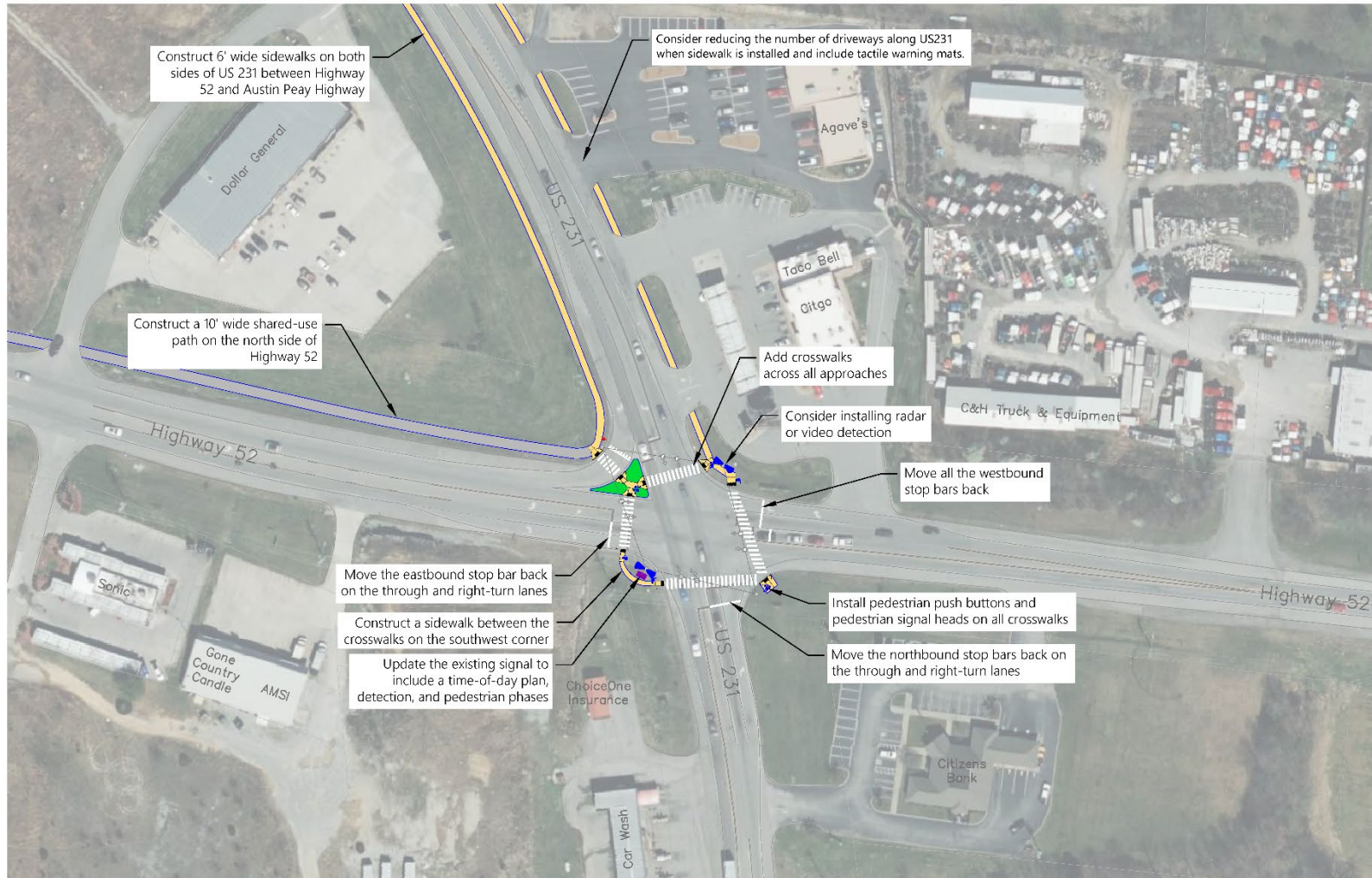
Figure 4-3. Concept Diagram – Intersection of Austin Peay Highway and Highway 31-E



Recommended Improvements



Figure 4-4. Concept Diagram – Intersection of Highway 31-E and SR 52



Recommended Improvements



Bicycle and Pedestrian Recommendations

The following bicycle and pedestrian recommendations (Table 4-2) address the lack of walking and bicycling facilities at the intersections of Old Highway 31-E and SR 52, Highway 31-E and SR 52, and Highway 31-E and Austin Peay Highway and throughout the broader Westmoreland community. These recommendations build upon those included in the Sumner County Active Transportation Plan (ATP), which identified a network of interconnected facility types to improve the safety and mobility of active modes in Westmoreland. The recommendations included in this plan further clarify the project concepts included in the ATP and identify more details regarding facility type, location, and design at the three priority intersections.

The sidepath, sidewalk, and bicycle boulevard recommendations serve to build a network of interconnected routes between downtown Westmoreland and the residential and commercial areas along Highway 31-E and SR 52 (Project IDs 5, 7, 8, 10); an additional sidewalk recommendation (Project ID 6) addresses a sidewalk gap along Old Highway 31-E and Hawkins Drive and provides a safe route to access Westmoreland’s elementary, middle, and high schools. The paved shoulder recommendation (Project ID 9) seeks to improve the safety of the existing shoulder by providing gaps in the rumble strip for cyclists. The sidepath recommendation along the east side of Park Street (Project ID 11) is a priority project from the ATP and would provide a critical connection between downtown Westmoreland, the public library, Westmoreland’s schools, and the Expo Center on Fleetwood Drive. The Signature Trail recommendation (Project ID 12) is a small segment of the broader Signature Trail proposed in the ATP that is highlighted as a priority in this plan to provide a low stress crossing of SR 52 for active modes.

The bicycle and pedestrian recommendations are shown in Figure 4-5, and more detailed planning level cost estimates and concept sheets for these recommendations are included in Appendix F and Appendix G.

Table 4-2. Bicycle and Pedestrian Recommendations

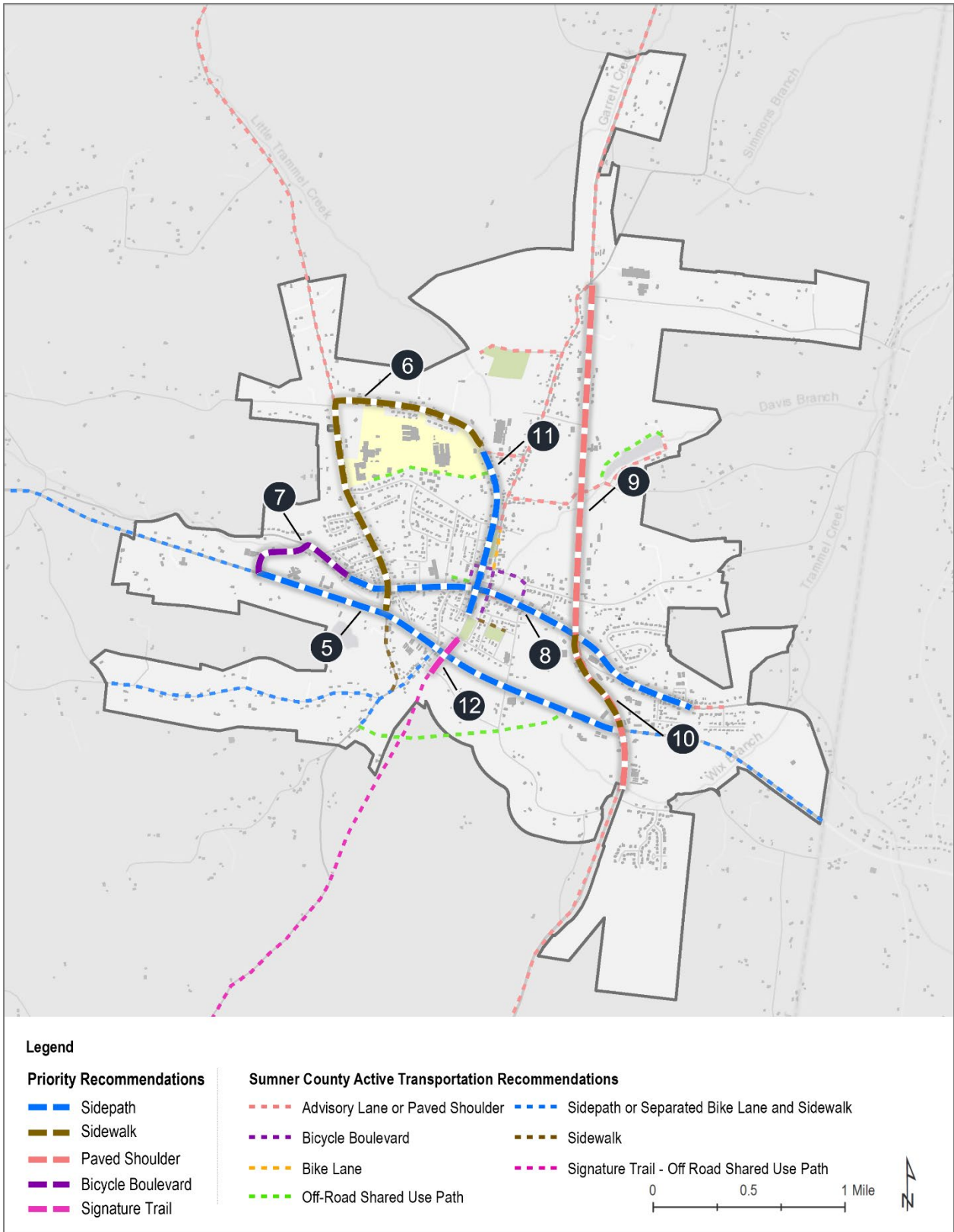
ID	Rec	From	To	Width (Ft)	Type	Time-frame	Cost (2021 Dollars)
5	Sidepath on north side of SR 52	New Hope Road	Highway 31-E/US 231	10ft	Sidepath	Long-term	\$2,299,960
6	Sidewalk on east side of Old Highway 31-E, south side of Hawkins Drive	SR 52	Fleetwood Drive	6ft	Sidewalk	Long-term	\$1,127,360
7	Bicycle boulevard on Austin Peay Highway and New Hope Road	SR 52	Borders Street	Varies	Bicycle Boulevard	Long-term (should be paired with IDs 9 and 6)	\$37,030

Table 4-2. Bicycle and Pedestrian Recommendations, continued

ID	Rec	From	To	Width (Ft)	Type	Time-frame	Cost (2021 Dollars)
8	Sidepath along Austin Peay Highway (on north side between Borders St and US 231, then on south side between US 231 and Oakwood Dr)	Borders Street	Oakwood Drive	10ft	Sidepath	Long-term	\$2,099,160
9	Paved shoulders on both sides of Highway 31-E/US 231	Westmoreland Boundary	Pleasant Grove Road	Varies	Paved Shoulder	Mid-term	\$228,540
10	Sidewalks on both sides of Highway 31-E/US 231	SR 52	Austin Peay Highway	6ft	Sidewalk	Long-term	\$589,680
11	Sidepath on east side of Park Street	Westmoreland Greenway	Hawkins Drive	10ft	Sidepath	Near-term	\$958,545
12	Signature Trail Connection under SR 52	Tunnel Road	Locust Street/ Westmoreland Greenway	10ft	Off-Road Shared Use Path	Long-term	\$235,875

Note: All sidewalk and sidepath recommendations along state routes should comply with the guidance and standards outlined in TDOT’s Multimodal Design Guidelines and the Multimodal Chapter of the Roadway Design Manual. ID 5 may require adjustments to existing guardrails present at this location.

Figure 4-5. Bicycle and Pedestrian Recommendations



Funding Sources

Various funding opportunities are available to the City of Westmoreland to support the planning, construction, maintenance, and operation of the multimodal transportation recommendations included in this report. Table 4-4 summarizes the funding opportunities that could be utilized by the City for future transportation investments ranging from new roadways, existing infrastructure modifications, walkway and bikeway expansion, and other future activities. In addition to the grant opportunities listed in the table, some projects could be addressed through the City’s capital improvement budget or through TDOT’s roadway resurfacing projects.

Because of eligibility requirements, some of these funding sources may require partnerships with TDOT, Sumner County, and/or the Greater Nashville Regional Council to assist with applications or grant administration. In addition, some improvements could be constructed in partnership with developers, as parcels continue to develop.

Table 4-3. Funding Sources for Implementation

Grant/Program	Administering Agency	Program Focus	Eligibility	Funding Details
Local Parks and Recreation Fund (LPRF)	Tennessee Department of Environment and Conservation	Funding for the purchase of land for parks, greenways, recreational facilities, natural areas, and trail development	City or county governments	50% match required
Multimodal Access Grant (MMAG)	TDOT Multimodal Transportation Resources Division	Pedestrian, bicycle, and transit infrastructure projects on state routes, including road diets, active transportation facilities, and pedestrian-scale lighting	Projects within at-risk or distressed counties are prioritized	5% local match required; state match not to exceed \$950,000
Project Diabetes	Tennessee Department of Health	Design and construction of facilities that support healthy communities, such as greenways, fitness equipment, playgrounds, sports facilities, and walking trails; also supports educational and community health programs	All government agencies	Category A grants are funded up to \$150,000 per year for up to 3 years. Category B grants are funded up to \$15,000 per year for up to 2 years.
Recreation Trails Program (RTP)	Tennessee Department of Environment and Conservation	Funding for hard and soft-surface trails, maintenance, restoration, construction, and trailside facilities, including land acquisition	Government agencies and some non-profits; projects must be on publicly owned land	20% match required (maximum of \$200,000)

Table 4 4. Funding Sources for Implementation, continued

Grant/Program	Administering Agency	Program Focus	Eligibility	Funding Details
Safe Streets and Roads for All	United States Department of Transportation	Development of comprehensive safety action plans, including planning, design, and construction/implementation of projects or strategies identified in safety action plans	Cities, counties, and MPOs	20% match required
Surface Transportation Block Grant (STBG)	FHWA	Construction and maintenance of highways, bridges, tunnels, pedestrian and bicycle infrastructure, transit capital projects, and more	Cities with a population of at least 5,000	20% match typically required - in some cases, TDOT will provide match funding by request. For some safety-related projects, 100% federal funding is available
Transportation Alternatives Program (TAP)	TDOT Local Programs Development Office	Construction of on- and off-road bicycle and pedestrian facilities, pedestrian bridges/underpasses, bicycle and pedestrian amenities, rail-to-trail projects, scenic overlooks, and safe routes to school projects	All government agencies	20% local construction match required, plus all preliminary engineering, design, and right-of-way expenses
Transportation Planning Grant (TPG)	TDOT Long Range Planning Division Office of Community Transportation	Development of a variety of planning topics, including active transportation plans, safety plans, corridor studies (including road diet evaluations), transportation resilience and/or sustainability plans, among others	Cities and counties	10% local match required; state match not to exceed \$200,000

5.0 Conclusion

The infrastructure recommendations included in this plan seek to address the safety and operational concerns present at the intersections of Old Highway 31-E and SR 52, Highway 31-E and SR 52, and Highway 31-E and Austin Peay Highway, as well as the lack of safe and connected walkways and bikeways in the broader Westmoreland area. By investing in the transportation system at the priority intersections and throughout the City, Westmoreland will be able to create a safe, functional multimodal network that meets the needs of all roadway users now and into the future, whether they walk, bicycle, or drive in the area.

Appendix A – Public and Stakeholder Engagement

Summary of Public and Stakeholder Engagement

The public and stakeholder engagement strategy for this Community Mobility Plan included outreach to the public as well as technical coordination meetings with City of Westmoreland staff. Feedback from the public informed the development of the vision statement, plan goals, opportunities and challenges, and project recommendations.

Steering Committee Meetings

A steering committee was developed to provide feedback during each stage of the planning process, and committee members provided guidance and direction on a variety of topics, including key problem areas, recommendation concepts, the public engagement strategy, advertising, and technical analyses. The steering committee was comprised of members of the City of Westmoreland staff, including a representative from the police department and the finance department, as well as a representative from the Greater Nashville Regional Council. The steering committee met three times during the planning process.

Virtual Public Engagement

A study webpage was developed to gather feedback from the public throughout the planning process and included background information, schedule, contact information, and an interactive map and survey. The interactive mapping feature and survey allowed participants to provide feedback on their priorities for the transportation system, identify preferred improvements for the study area, as well as provide general comments about opportunities and challenges in Westmoreland more broadly. The study webpage was visited by approximately 93 unique users and the survey was completed by 16 respondents.

Key Findings

Input from the stakeholder meetings and survey helped inform the vision statement, goals, and objectives that provided the framework to develop project recommendations. Key findings from the public and stakeholder engagement included:

- Maintenance of the existing roadway network was the top transportation priority, followed by improved safety and improved traffic operations;
- Support for project concepts that would improve traffic operations and safety, including additional or lengthened turn lanes at intersections, the use of technology to manage intersections (e.g., video and sensors), and additional roadway lighting;
- Safe routes to school were the top bicycle and pedestrian priority, followed by sidewalks along the priority study corridors, and improved walking and biking connections between neighborhoods, business, parks, and other community resources;
- Support for roundabouts to improve traffic flow and safety at the priority intersections;
- Safety concerns at the signalized intersection of Highway 31-E and SR 52, as well as the intersection of Old Highway 31-E and SR 52; and,
- Desire for geometric changes at the priority intersections to improve traffic operations.

Appendix B – Sumner County Active Transportation Plan Recommendations

Recommendation	Facility	From	To	Type
Install sidepath or separated bike lane and sidewalk	SR 52	Forrest Chapel Road	Sumner County Boundary (near Clyde Wix Road)	Sidepath or Separated Bike Lane
Install sidepath or separated bike lane and sidewalk	Coleytown Road/Sumner Drive	James Brown Road	SR 52	Sidepath or Separated Bike Lane
Install sidepath or separated bike lane and sidewalk	Old Highway 31-E	Johnny Spears Road	Sumner Drive	Sidepath or Separated Bike Lane
Install sidepath or separated bike lane and sidewalk	Park Street/Hawkins Drive	Dobbs Avenue	Fleetwood Drive	Sidepath or Separated Bike Lane
Develop “Signature Rail” – Off Road Shared-Use Path	Abandoned Rail Right-of-Way	Bethpage, TN	Locust Street	Off Road Shared-Use Path
Develop Off Road Shared-Use Path	Utility Easement	Johnny Spears Road	SR 52	Off Road Shared-Use Path
Develop Off Road Shared-Use Path	New Facility	Hawkins Drive	Westmoreland Middle School	Off Road Shared-Use Path
Develop Off Road Shared-Use Path	New Facility	Eastern Terminus of Lake Road	Lake Road/Western End of Westmoreland City Lake	Off Road Shared-Use Path
Develop Off Road Shared-Use Path	New Facility	Kelly Boulevard (near water tower)	Walnut Street (south of fire department)	Off Road Shared-Use Path
Install Bike Lane	Austin Peay Highway	Walnut Street	Pleasant Grove Road	Bike Lane
Install Bike Lane	Pleasant Grove Road	Epperson Springs Road	North 1st Street	Bike Lane
Install Sidewalks	Old Highway 31-E	Coleytown Road	Henry Harris Road	Sidewalk
Install Sidewalks	Hawkins Drive	Old Highway 31-E	Fleetwood Drive	Sidewalk
Install Sidewalks	Oak Street	Jefferson Street	Harrison Street	Sidewalk

Recommendation	Facility	From	To	Type
Install Advisory Lane or Paved Shoulder	Old Highway 31-E	Henry Harris Road	KY/TN Border	Advisory Lane or Paved Shoulder
Install Advisory Lane or Paved Shoulder	Austin Peay Highway	Borders Street	Walnut Street	Advisory Lane or Paved Shoulder
Install Advisory Lane or Paved Shoulder	Austin Peay Highway	Pleasant Grove Road	Dean Street	Advisory Lane or Paved Shoulder
Install Advisory Lane or Paved Shoulder	Highway 31-E	Phillips Hollow Road	Austin Peay Highway	Advisory Lane or Paved Shoulder
Install Advisory Lane or Paved Shoulder	Fleetwood Drive	Hawkins Drive	Pleasant Grove Road	Advisory Lane or Paved Shoulder
Install Advisory Lane or Paved Shoulder	Ball Park Road	Western Terminus of Ball Park Road	Pleasant Grove Road	Advisory Lane or Paved Shoulder
Install Advisory Lane or Paved Shoulder	Lake Road	Pleasant Grove Road	Eastern Terminus of Lake Road	Advisory Lane or Paved Shoulder
Install Advisory Lane or Paved Shoulder	Pleasant Grove Road	North 1st Street	Highway 31-E	Advisory Lane or Paved Shoulder
Establish Bicycle Boulevard	Jefferson Street	Oak Street	Epperson Springs Road	Bicycle Boulevard
Establish Bicycle Boulevard	Walnut Street/ Epperson Springs Road/ Bledsoe Street	Austin Peay Highway	Austin Peay Highway	Bicycle Boulevard

Appendix C – Capacity Analyses Worksheets

Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 1 Existing AM

Report File: M:\...\Existing AM.pdf

12/6/2022

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	SB Thru	0.434	27.3	C
2	US 231/Austin Peay	All-way stop	HCM 7th Edition	NB Left	0.261	9.7	A
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	0.244	21.1	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	27.3
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.434

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵↱↲			↵↱↲			↵↱↲			↵↱↲		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	115	186	89	54	299	36	25	66	135	259	148	69
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	115	186	89	54	299	36	25	66	135	259	148	69
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	47	22	14	75	9	6	17	34	65	37	17
Total Analysis Volume [veh/h]	115	186	89	54	299	36	25	66	135	259	148	69
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	16	36	0	16	36	0	16	36	0	16	36	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	104	104	104	104	104	104	104	104	104	104	104	104
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	46	32	32	46	32	32	46	32	32	46	32	32
g / C, Green / Cycle	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.10	0.11	0.06	0.05	0.18	0.03	0.02	0.04	0.09	0.21	0.09	0.05
s, saturation flow rate [veh/h]	1142	1683	1431	1179	1683	1431	1217	1683	1431	1227	1683	1431
c, Capacity [veh/h]	465	518	440	536	518	440	568	518	440	613	518	440
d1, Uniform Delay [s]	18.75	28.02	26.58	17.14	30.31	25.57	16.67	25.94	27.52	19.35	27.33	26.19
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.27	1.94	1.03	0.38	4.64	0.36	0.15	0.51	1.80	2.13	1.39	0.76
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.25	0.36	0.20	0.10	0.58	0.08	0.04	0.13	0.31	0.42	0.29	0.16
d, Delay for Lane Group [s/veh]	20.02	29.96	27.61	17.52	34.94	25.93	16.81	26.45	29.32	21.48	28.71	26.94
Lane Group LOS	C	C	C	B	C	C	B	C	C	C	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	1.80	3.86	1.75	0.80	6.89	0.68	0.36	1.25	2.77	4.45	2.98	1.33
50th-Percentile Queue Length [ft/ln]	45.06	96.44	43.77	19.88	172.25	16.91	8.97	31.22	69.28	111.23	74.42	33.34
95th-Percentile Queue Length [veh/ln]	3.24	6.94	3.15	1.43	11.19	1.22	0.65	2.25	4.99	7.91	5.36	2.40
95th-Percentile Queue Length [ft/ln]	81.11	173.59	78.78	35.78	279.87	30.45	16.15	56.19	124.71	197.71	133.95	60.01

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.02	29.96	27.61	17.52	34.94	25.93	16.81	26.45	29.32	21.48	28.71	26.94
Movement LOS	C	C	C	B	C	C	B	C	C	C	C	C
d_A, Approach Delay [s/veh]	26.49			31.69			27.10			24.52		
Approach LOS	C			C			C			C		
d_I, Intersection Delay [s/veh]	27.32											
Intersection LOS	C											
Intersection V/C	0.434											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	577			577			577			577		
d_b, Bicycle Delay [s]	26.33			26.33			26.33			26.33		
I_b,int, Bicycle LOS Score for Intersection	2.203			2.201			1.933			2.345		
Bicycle LOS	B			B			A			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: All-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 9.7
 Level Of Service: A
 Volume to Capacity (v/c): 0.261

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇐⇐			⇐⇐			⇐⇐			⇐⇐		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	130.00	100.00	100.00	125.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	103	165	8	8	221	16	15	19	159	20	29	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	103	165	8	8	221	16	15	19	159	20	29	11
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	41	2	2	55	4	4	5	40	5	7	3
Total Analysis Volume [veh/h]	103	165	8	8	221	16	15	19	159	20	29	11
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	614	660	646	661	562	681	548	612
Degree of Utilization, x	0.22	0.21	0.19	0.19	0.03	0.26	0.04	0.07

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.86	0.78	0.69	0.68	0.08	1.04	0.11	0.21
95th-Percentile Queue Length [ft]	21.44	19.58	17.35	16.89	2.06	26.09	2.84	5.23
Approach Delay [s/veh]	9.92		9.47		9.80		9.17	
Approach LOS	A		A		A		A	
Intersection Delay [s/veh]	9.69							
Intersection LOS	A							

Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E

Control Type:	Two-way stop	Delay (sec / veh):	21.1
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.244

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	3	18	1	84	34	58	115	142	1	0	187	100
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	18	1	84	34	58	115	142	1	0	187	100
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	5	0	21	9	15	29	36	0	0	47	25
Total Analysis Volume [veh/h]	3	18	1	84	34	58	115	142	1	0	187	100
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

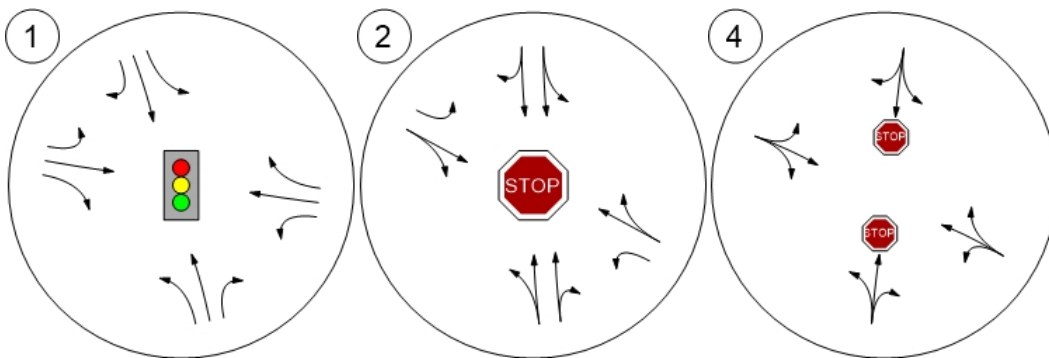
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.05	0.00	0.24	0.09	0.07	0.09	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	18.09	16.11	9.68	21.11	20.40	15.14	7.96	0.00	0.00	7.50	0.00	0.00
Movement LOS	C	C	A	C	C	C	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.20	0.20	0.20	1.95	1.95	1.95	0.20	0.20	0.20	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	5.06	5.06	5.06	48.80	48.80	48.80	5.12	5.12	5.12	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	16.09			19.00			3.55			0.00		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	6.21											
Intersection LOS	C											

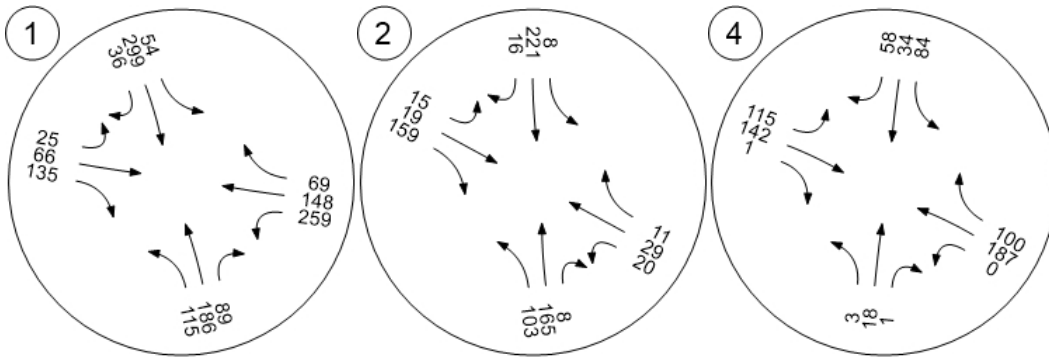
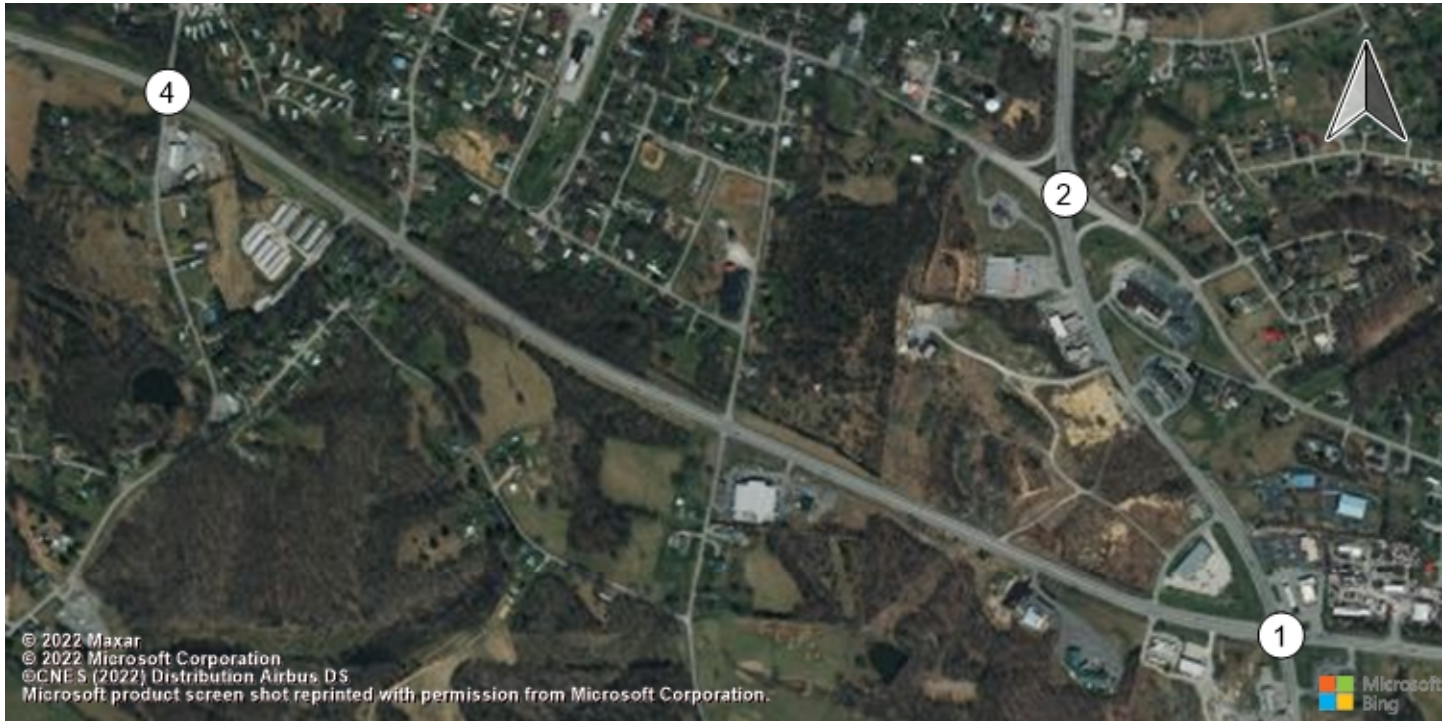
Study Intersections



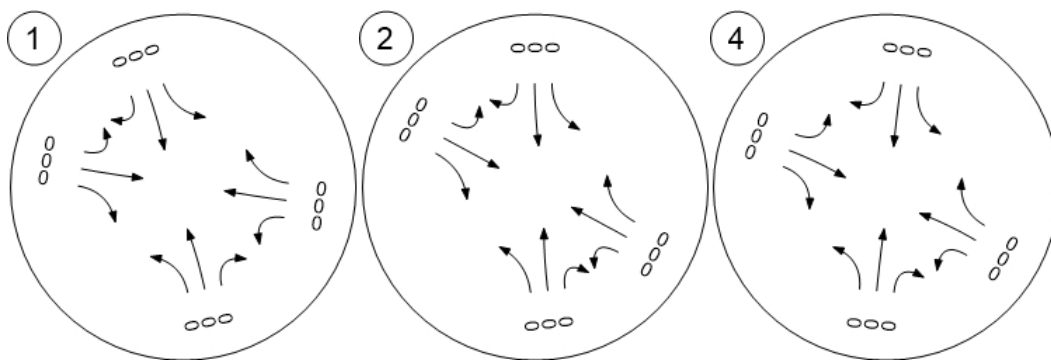
Lane Configuration and Traffic Control



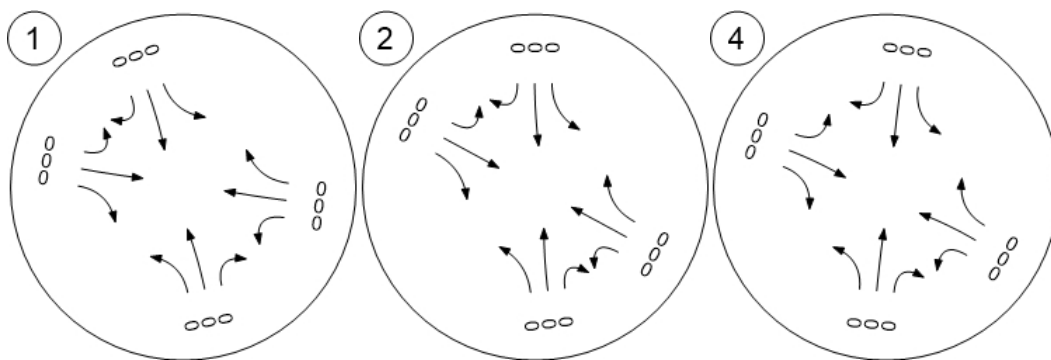
Traffic Volume - Base Volume



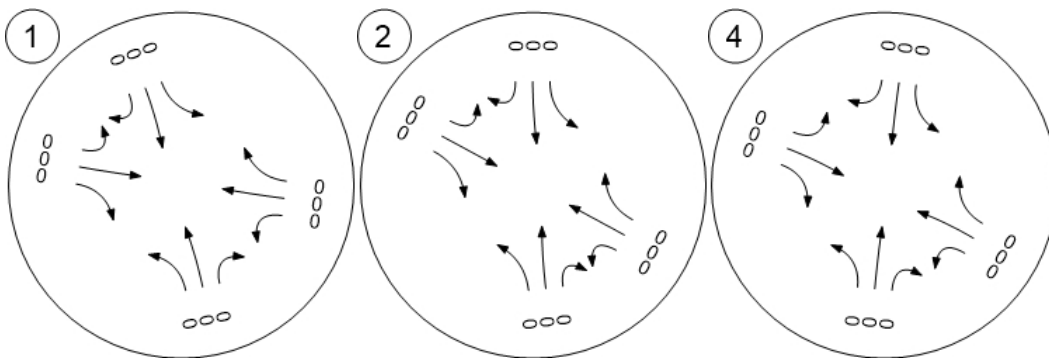
Traffic Volume - In-Process Volume



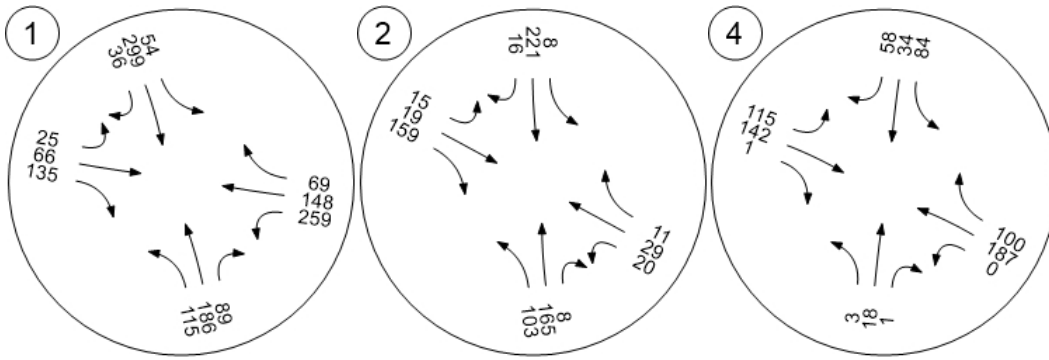
Traffic Volume - Net New Site Trips



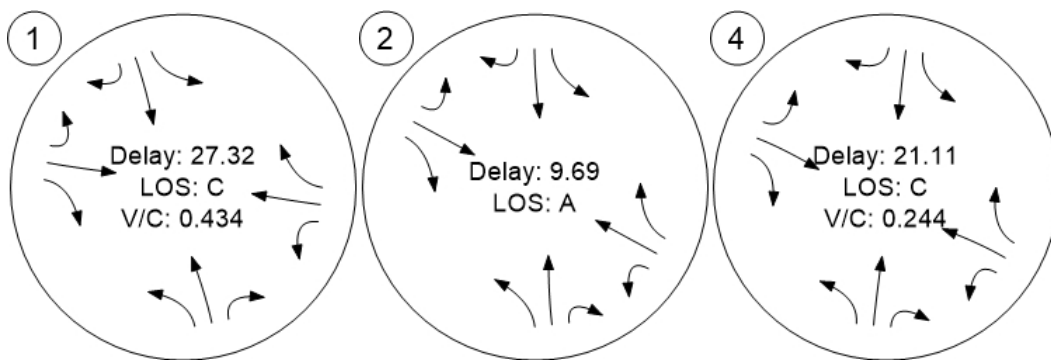
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 2 Existing PM

Report File: M:\...\Existing PM.pdf

12/6/2022

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	NB Right	0.399	29.1	C
2	US 231/Austin Peay	All-way stop	HCM 7th Edition	NB Left	0.354	10.5	B
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	0.249	22.2	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	29.1
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.399

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵↱↲			↵↱↲			↵↱↲			↵↱↲		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	170	313	266	80	205	48	67	214	104	118	114	84
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	170	313	266	80	205	48	67	214	104	118	114	84
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	78	67	20	51	12	17	54	26	30	29	21
Total Analysis Volume [veh/h]	170	313	266	80	205	48	67	214	104	118	114	84
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	16	36	0	16	36	0	16	36	0	16	36	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	104	104	104	104	104	104	104	104	104	104	104	104
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	46	32	32	46	32	32	46	32	32	46	32	32
g / C, Green / Cycle	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.14	0.19	0.19	0.08	0.12	0.03	0.05	0.13	0.07	0.10	0.07	0.06
s, saturation flow rate [veh/h]	1193	1683	1431	1010	1683	1431	1229	1683	1431	1152	1683	1431
c, Capacity [veh/h]	530	518	440	428	518	440	590	518	440	513	518	440
d1, Uniform Delay [s]	18.67	30.62	30.62	18.48	28.38	25.79	17.02	28.55	26.88	18.06	26.73	26.48
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.59	5.16	6.04	0.96	2.26	0.50	0.39	2.43	1.26	1.04	0.98	0.96
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.32	0.60	0.60	0.19	0.40	0.11	0.11	0.41	0.24	0.23	0.22	0.19
d, Delay for Lane Group [s/veh]	20.26	35.78	36.66	19.44	30.64	26.29	17.41	30.98	28.14	19.10	27.71	27.44
Lane Group LOS	C	D	D	B	C	C	B	C	C	B	C	C
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	2.75	7.32	6.33	1.23	4.32	0.91	0.99	4.55	2.07	1.83	2.23	1.65
50th-Percentile Queue Length [ft/ln]	68.75	183.09	158.28	30.71	108.01	22.78	24.72	113.63	51.84	45.84	55.84	41.13
95th-Percentile Queue Length [veh/ln]	4.95	11.76	10.46	2.21	7.73	1.64	1.78	8.04	3.73	3.30	4.02	2.96
95th-Percentile Queue Length [ft/ln]	123.75	294.05	261.45	55.28	193.23	41.00	44.50	201.04	93.32	82.51	100.52	74.03

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.26	35.78	36.66	19.44	30.64	26.29	17.41	30.98	28.14	19.10	27.71	27.44
Movement LOS	C	D	D	B	C	C	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	32.57			27.32			27.85			24.43		
Approach LOS	C			C			C			C		
d_I, Intersection Delay [s/veh]	29.13											
Intersection LOS	C											
Intersection V/C	0.399											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	577			577			577			577		
d_b, Bicycle Delay [s]	26.33			26.33			26.33			26.33		
I_b,int, Bicycle LOS Score for Intersection	2.795			2.109			2.195			2.081		
Bicycle LOS	C			B			B			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay

Control Type: All-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 10.5
 Level Of Service: B
 Volume to Capacity (v/c): 0.354

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇐⇐			⇐⇐			⇐⇐			⇐⇐		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	130.00	100.00	100.00	125.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	87	308	52	24	233	19	17	33	86	30	27	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	87	308	52	24	233	19	17	33	86	30	27	23
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	77	13	6	58	5	4	8	22	8	7	6
Total Analysis Volume [veh/h]	87	308	52	24	233	19	17	33	86	30	27	23
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	633	674	623	643	524	613	517	587
Degree of Utilization, x	0.35	0.33	0.22	0.21	0.03	0.19	0.06	0.09

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	1.59	1.45	0.84	0.81	0.10	0.71	0.18	0.28
95th-Percentile Queue Length [ft]	39.78	36.24	21.05	20.22	2.51	17.85	4.61	6.96
Approach Delay [s/veh]	11.07		9.97		9.96		9.67	
Approach LOS	B		A		A		A	
Intersection Delay [s/veh]	10.46							
Intersection LOS	B							

Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E

Control Type:	Two-way stop	Delay (sec / veh):	22.2
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.249

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	4	36	1	74	17	45	76	272	5	4	186	106
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	36	1	74	17	45	76	272	5	4	186	106
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	9	0	19	4	11	19	68	1	1	47	27
Total Analysis Volume [veh/h]	4	36	1	74	17	45	76	272	5	4	186	106
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

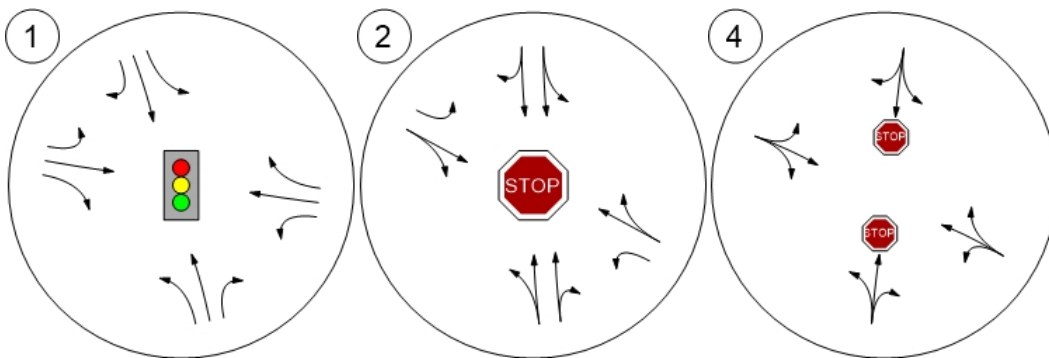
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.11	0.00	0.25	0.05	0.06	0.06	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	18.87	17.67	11.29	22.18	20.43	14.56	7.92	0.00	0.00	7.80	0.00	0.00
Movement LOS	C	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.43	0.43	0.43	1.57	1.57	1.57	0.13	0.13	0.13	0.01	0.01	0.01
95th-Percentile Queue Length [ft/ln]	10.67	10.67	10.67	39.19	39.19	39.19	3.32	3.32	3.32	0.18	0.18	0.18
d_A, Approach Delay [s/veh]	17.63			19.44			1.71			0.11		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	4.84											
Intersection LOS	C											

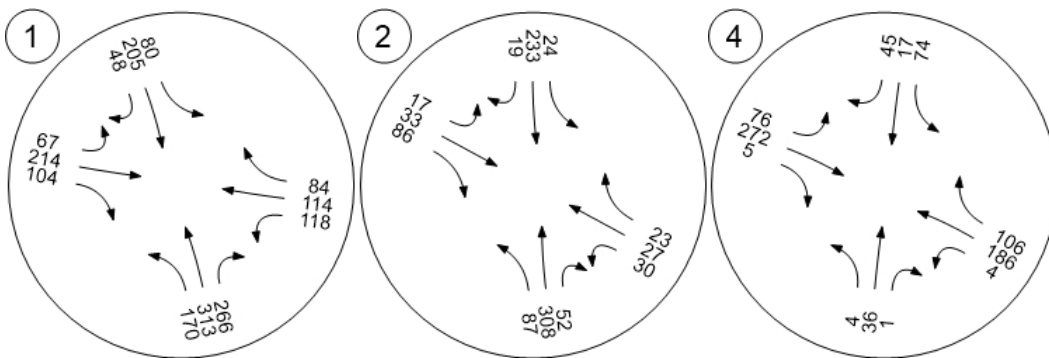
Study Intersections



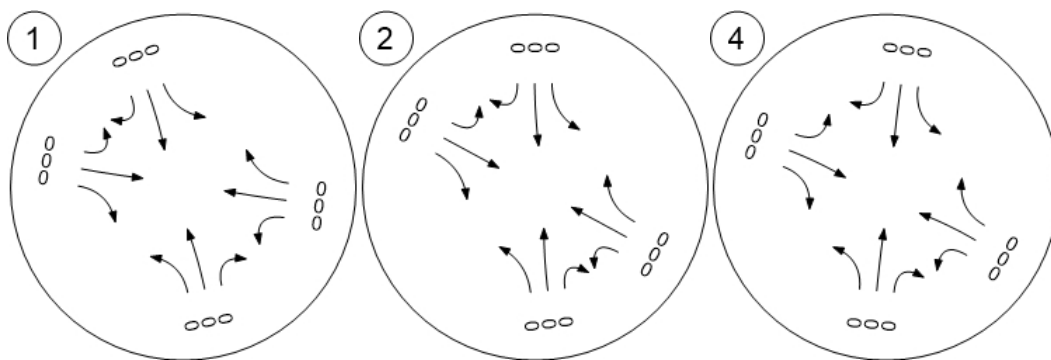
Lane Configuration and Traffic Control



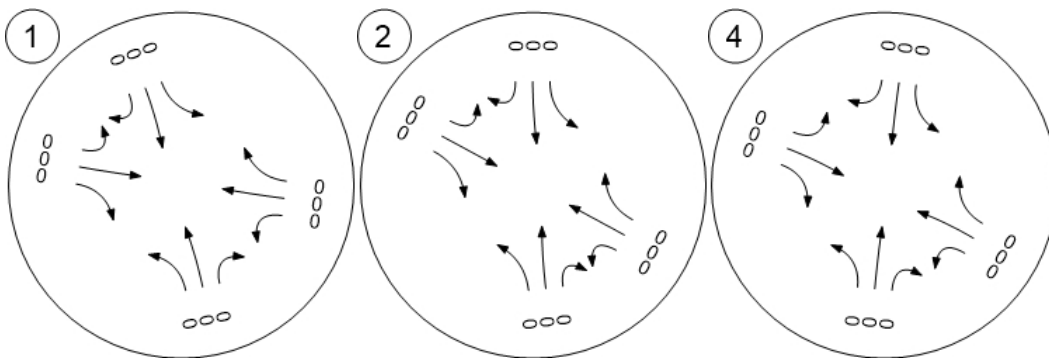
Traffic Volume - Base Volume



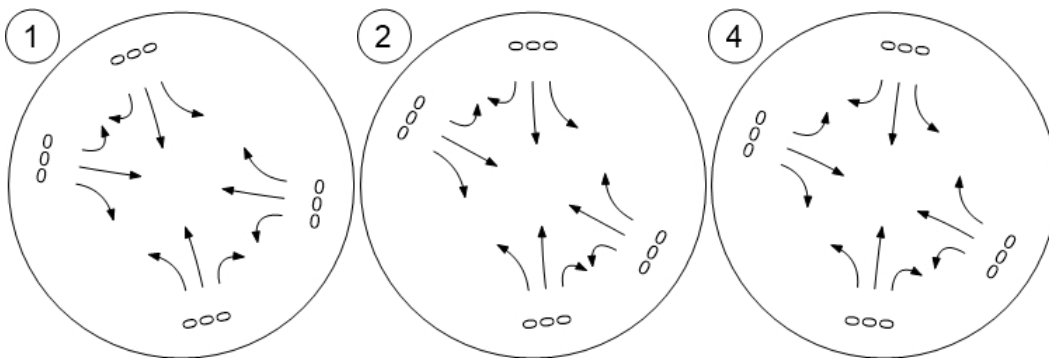
Traffic Volume - In-Process Volume



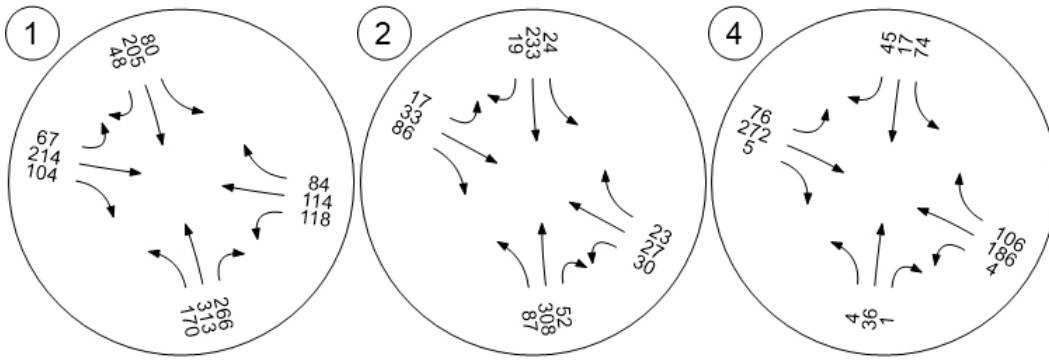
Traffic Volume - Net New Site Trips



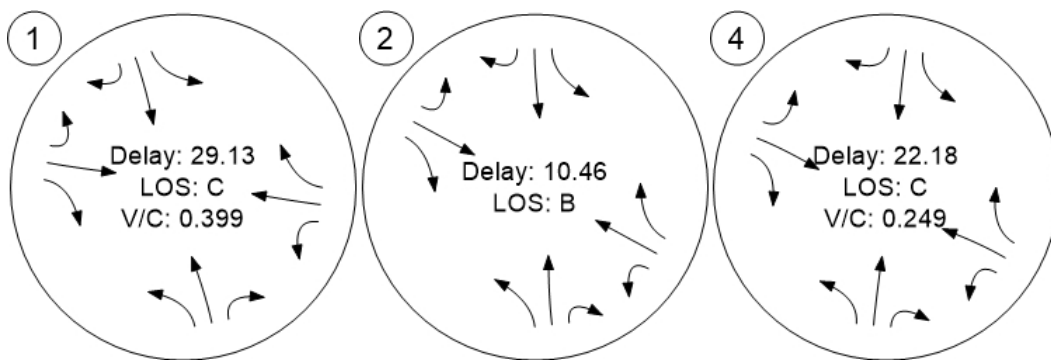
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 3 Background AM

Report File: M:\...\2032 Background AM.pdf

4/12/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	SB Thru	0.665	53.1	D
2	US 231/Austin Peay	All-way stop	HCM 7th Edition	SB Left	0.600	16.1	C
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	0.451	45.3	E

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report

Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	53.1
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.665

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	115	186	89	54	299	36	25	66	135	259	148	69
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	140	345	108	102	594	102	58	80	165	316	180	106
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	35	86	27	26	149	26	15	20	41	79	45	27
Total Analysis Volume [veh/h]	140	345	108	102	594	102	58	80	165	316	180	106
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	16	36	0	16	36	0	16	36	0	16	36	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	104	104	104	104	104	104	104	104	104	104	104	104
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	46	32	32	46	32	32	46	32	32	46	32	32
g / C, Green / Cycle	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.29	0.20	0.08	0.09	0.35	0.07	0.05	0.05	0.12	0.26	0.11	0.07
s, saturation flow rate [veh/h]	488	1683	1431	1075	1683	1431	1172	1683	1431	1198	1683	1431
c, Capacity [veh/h]	316	518	440	425	518	440	537	518	440	595	518	440
d1, Uniform Delay [s]	22.64	31.35	26.96	19.16	36.00	26.84	17.16	26.17	28.17	20.28	27.91	26.92
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.46	6.64	1.32	1.33	86.84	1.23	0.41	0.63	2.43	3.38	1.84	1.29
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.44	0.67	0.25	0.24	1.15	0.23	0.11	0.15	0.37	0.53	0.35	0.24
d, Delay for Lane Group [s/veh]	27.10	37.99	28.28	20.49	122.84	28.07	17.57	26.80	30.60	23.66	29.75	28.21
Lane Group LOS	C	D	C	C	F	C	B	C	C	C	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	2.42	8.38	2.16	1.60	25.29	2.03	0.86	1.53	3.49	5.76	3.71	2.12
50th-Percentile Queue Length [ft/ln]	60.50	209.58	54.03	39.95	632.36	50.75	21.41	38.22	87.24	144.10	92.86	52.94
95th-Percentile Queue Length [veh/ln]	4.36	13.13	3.89	2.88	36.49	3.65	1.54	2.75	6.28	9.70	6.69	3.81
95th-Percentile Queue Length [ft/ln]	108.91	328.29	97.26	71.92	912.35	91.36	38.54	68.80	157.03	242.53	167.15	95.29

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.10	37.99	28.28	20.49	122.84	28.07	17.57	26.80	30.60	23.66	29.75	28.21
Movement LOS	C	D	C	C	F	C	B	C	C	C	C	C
d_A, Approach Delay [s/veh]	33.65			97.65			27.10			26.28		
Approach LOS	C			F			C			C		
d_I, Intersection Delay [s/veh]	53.10											
Intersection LOS	D											
Intersection V/C	0.665											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	577			577			577			577		
d_b, Bicycle Delay [s]	26.33			26.33			26.33			26.33		
I_b,int, Bicycle LOS Score for Intersection	2.538			2.876			2.060			2.553		
Bicycle LOS	B			C			B			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: All-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 16.1
 Level Of Service: C
 Volume to Capacity (v/c): 0.600

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↔↔			↔↔			↔↔			↔↔		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	130.00	100.00	100.00	125.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	103	165	8	8	221	16	15	19	159	20	29	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	126	371	10	18	593	56	40	23	194	24	35	23
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	32	93	3	5	148	14	10	6	49	6	9	6
Total Analysis Volume [veh/h]	126	371	10	18	593	56	40	23	194	24	35	23
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	523	544	556	568	452	526	433	477
Degree of Utilization, x	0.49	0.47	0.60	0.59	0.09	0.41	0.06	0.12

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	2.62	2.45	3.94	3.77	0.29	2.00	0.18	0.41
95th-Percentile Queue Length [ft]	65.57	61.24	98.56	94.33	7.25	50.04	4.39	10.29
Approach Delay [s/veh]	15.43		18.02		13.82		11.35	
Approach LOS	C		C		B		B	
Intersection Delay [s/veh]	16.08							
Intersection LOS	C							

Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E

Control Type:	Two-way stop	Delay (sec / veh):	45.3
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.451

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	3	18	1	84	34	58	115	142	1	0	187	100
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	22	1	102	41	71	140	201	1	0	286	122
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	6	0	26	10	18	35	50	0	0	72	31
Total Analysis Volume [veh/h]	4	22	1	102	41	71	140	201	1	0	286	122
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

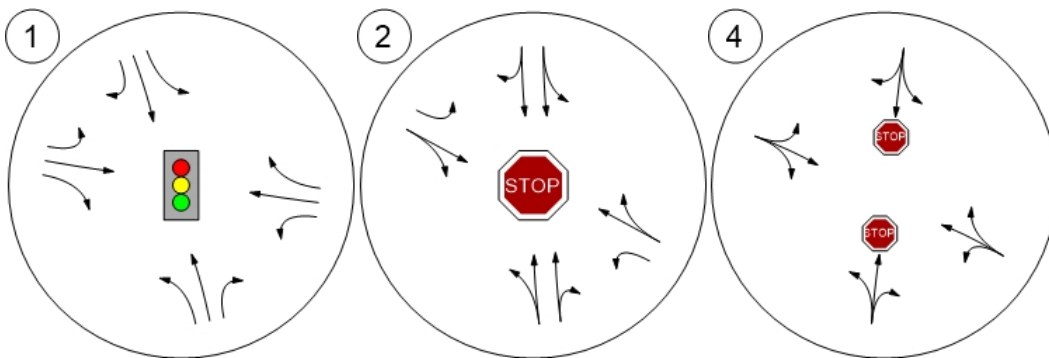
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.09	0.00	0.45	0.16	0.10	0.12	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	27.20	21.73	11.24	45.32	43.03	34.57	8.30	0.00	0.00	7.63	0.00	0.00
Movement LOS	D	C	B	E	E	D	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.38	0.38	0.38	5.01	5.01	5.01	0.25	0.25	0.25	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	9.52	9.52	9.52	125.20	125.20	125.20	6.32	6.32	6.32	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	22.15			41.31			3.40			0.00		
Approach LOS	C			E			A			A		
d_I, Intersection Delay [s/veh]	10.70											
Intersection LOS	E											

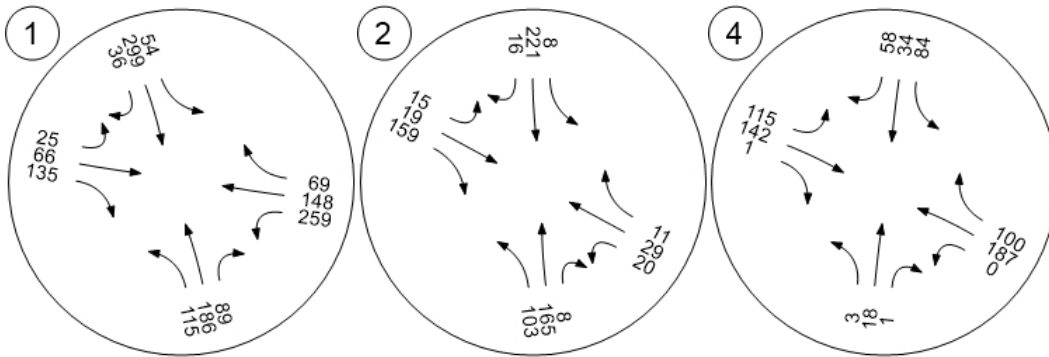
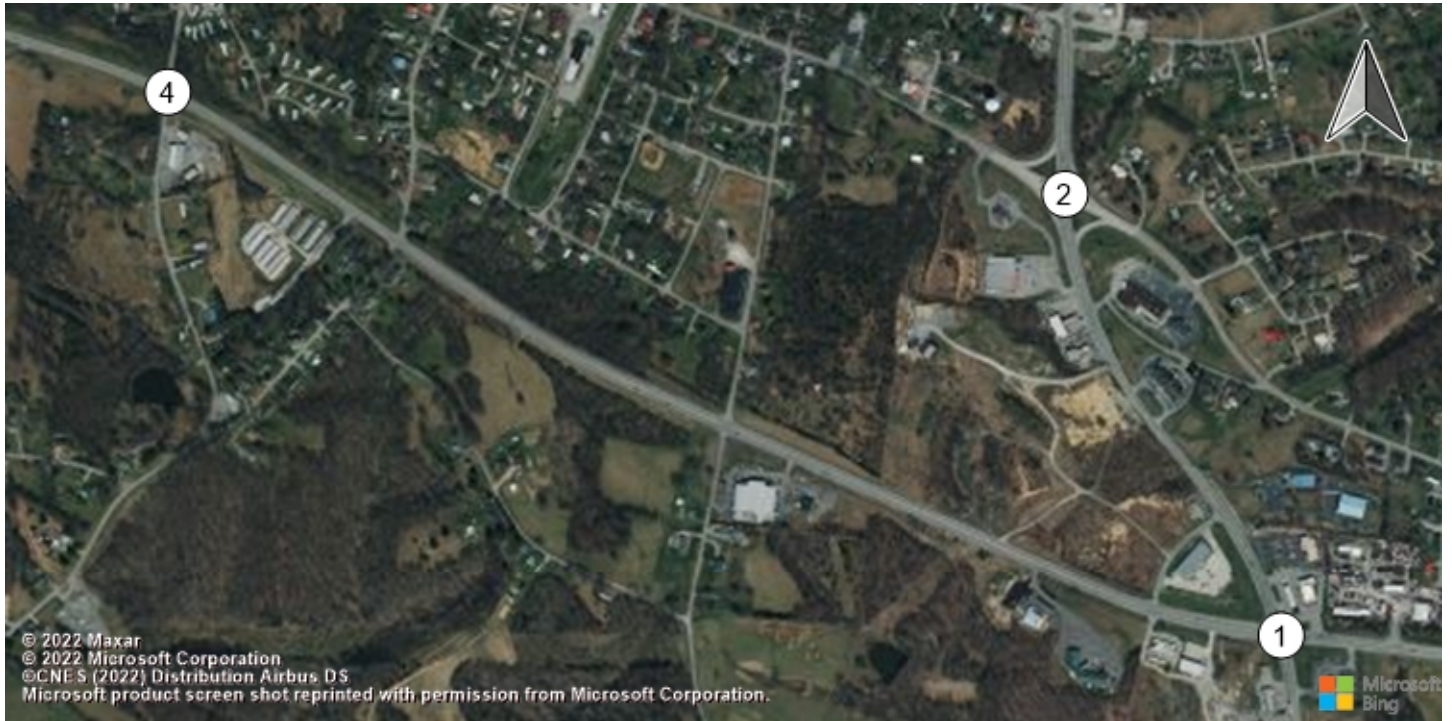
Study Intersections



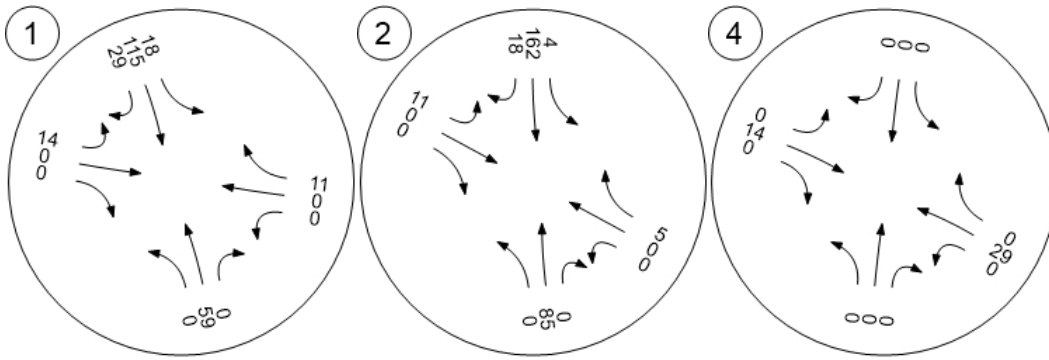
Lane Configuration and Traffic Control



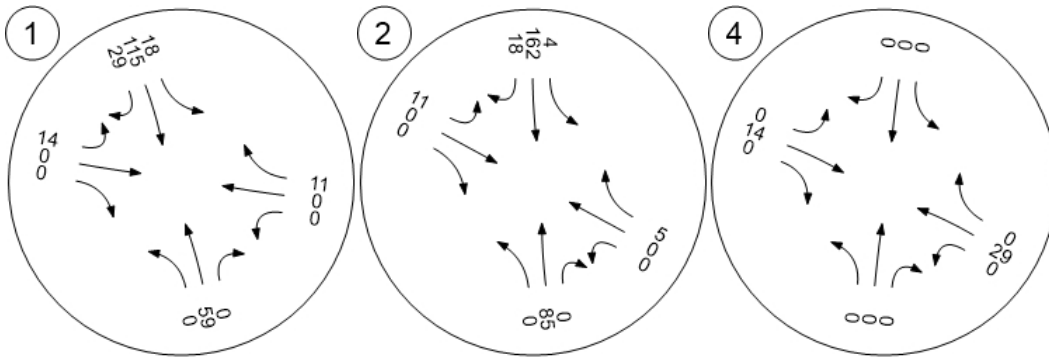
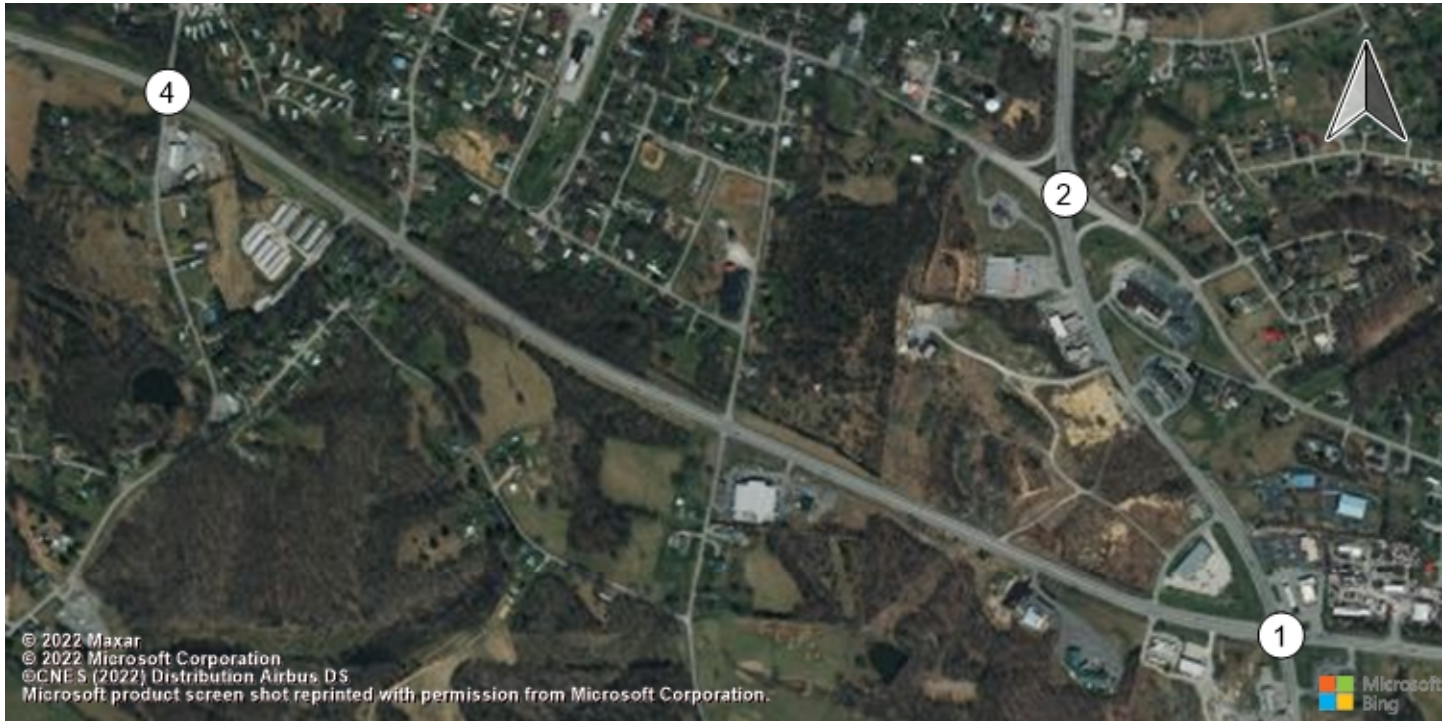
Traffic Volume - Base Volume



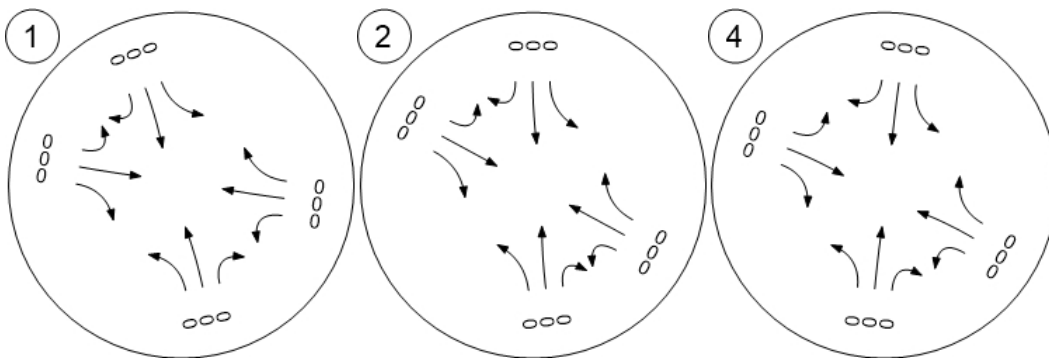
Traffic Volume - In-Process Volume



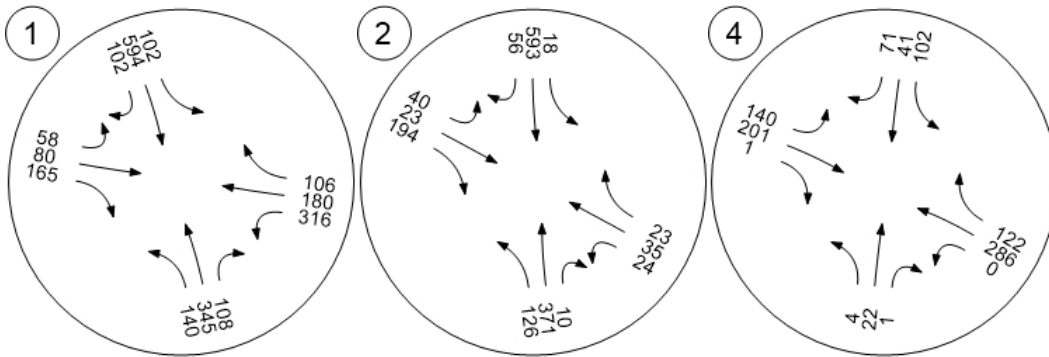
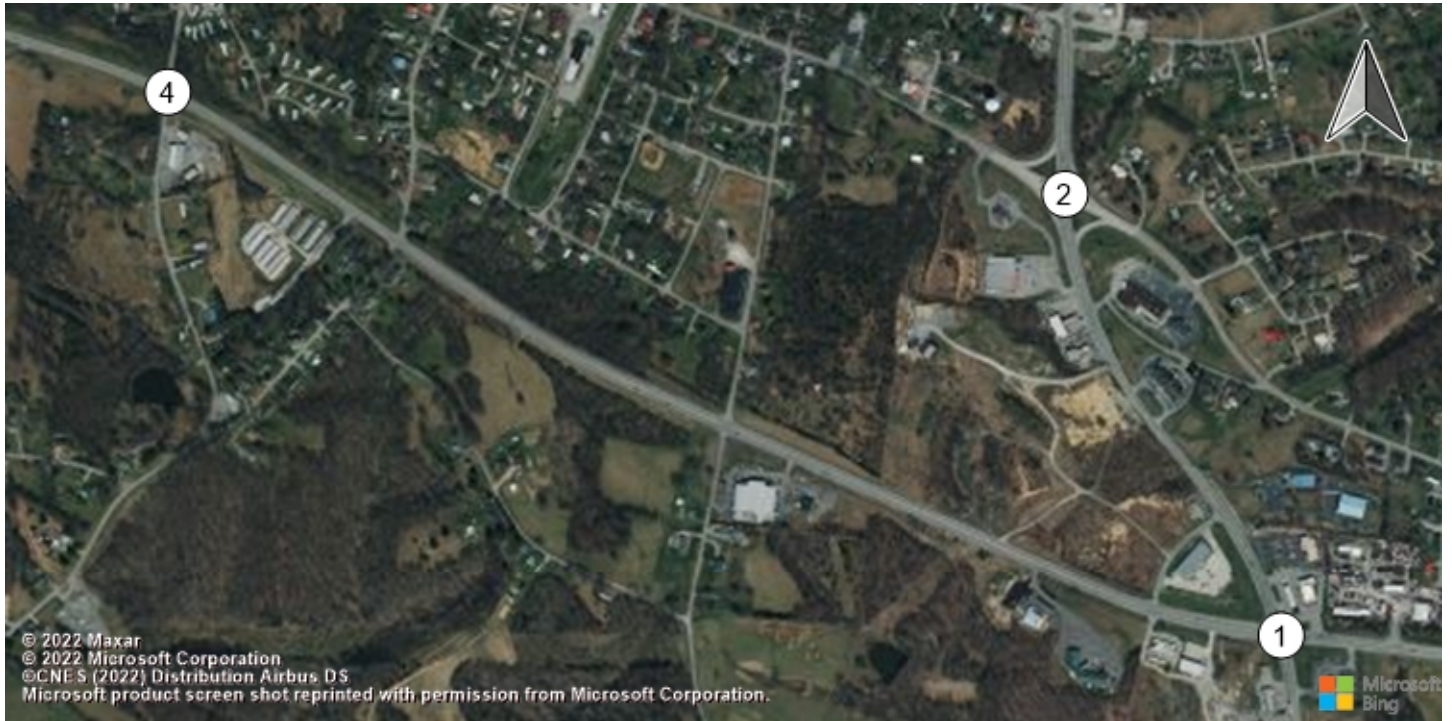
Traffic Volume - Net New Site Trips



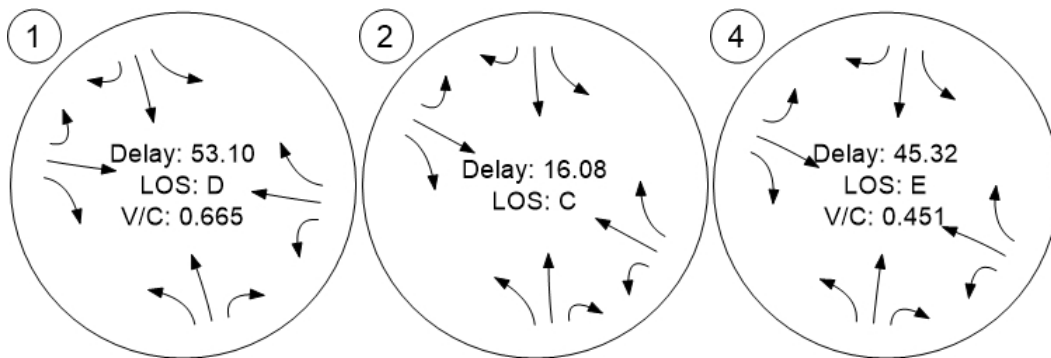
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 4 Background PM

Report File: M:\...\2032 Background PM.pdf

4/12/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	NB Thru	0.655	62.5	E
2	US 231/Austin Peay	All-way stop	HCM 7th Edition	NB Left	0.864	27.2	D
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	0.523	53.7	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	62.5
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.655

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	170	313	266	80	205	48	67	214	104	118	114	84
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	207	642	324	130	426	105	146	261	129	144	139	144
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	161	81	33	107	26	37	65	32	36	35	36
Total Analysis Volume [veh/h]	207	642	324	130	426	105	146	261	129	144	139	144
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	16	36	0	16	36	0	16	36	0	16	36	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	104	104	104	104	104	104	104	104	104	104	104	104
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	46	32	32	46	32	32	46	32	32	46	32	32
g / C, Green / Cycle	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.20	0.38	0.23	0.27	0.25	0.07	0.12	0.16	0.09	0.13	0.08	0.10
s, saturation flow rate [veh/h]	1034	1683	1431	488	1683	1431	1174	1683	1431	1110	1683	1431
c, Capacity [veh/h]	373	518	440	316	518	440	558	518	440	477	518	440
d1, Uniform Delay [s]	22.44	36.00	32.22	22.52	33.37	26.90	18.03	29.50	27.39	18.77	27.17	27.71
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.84	123.59	10.48	3.93	13.75	1.28	1.14	3.48	1.69	1.62	1.27	1.98
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.55	1.24	0.74	0.41	0.82	0.24	0.26	0.50	0.29	0.30	0.27	0.33
d, Delay for Lane Group [s/veh]	28.28	159.59	42.70	26.45	47.12	28.17	19.17	32.98	29.08	20.39	28.44	29.69
Lane Group LOS	C	F	D	C	D	C	B	C	C	C	C	C
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.75	30.58	8.45	2.22	11.74	2.10	2.30	5.79	2.63	2.31	2.78	2.98
50th-Percentile Queue Length [ft/ln]	93.73	764.49	211.27	55.40	293.52	52.39	57.53	144.69	65.82	57.69	69.40	74.55
95th-Percentile Queue Length [veh/ln]	6.75	44.98	13.22	3.99	17.36	3.77	4.14	9.73	4.74	4.15	5.00	5.37
95th-Percentile Queue Length [ft/ln]	168.71	1124.57	330.46	99.72	434.00	94.30	103.56	243.32	118.48	103.84	124.92	134.19

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	28.28	159.59	42.70	26.45	47.12	28.17	19.17	32.98	29.08	20.39	28.44	29.69
Movement LOS	C	F	D	C	D	C	B	C	C	C	C	C
d_A, Approach Delay [s/veh]	104.13			40.05			28.28			26.15		
Approach LOS	F			D			C			C		
d_I, Intersection Delay [s/veh]	62.54											
Intersection LOS	E											
Intersection V/C	0.655											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	577			577			577			577		
d_b, Bicycle Delay [s]	26.33			26.33			26.33			26.33		
I_b,int, Bicycle LOS Score for Intersection	3.495			2.650			2.444			2.264		
Bicycle LOS	C			B			B			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: All-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 27.2
 Level Of Service: D
 Volume to Capacity (v/c): 0.864

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇌⇌			⇌⇌			⇌⇌			⇌⇌		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	130.00	100.00	100.00	125.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	87	308	52	24	233	19	17	33	86	30	27	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	106	741	63	37	538	55	65	40	107	37	33	36
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	185	16	9	135	14	16	10	27	9	8	9
Total Analysis Volume [veh/h]	106	741	63	37	538	55	65	40	107	37	33	36
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	527	543	503	517	412	466	403	447
Degree of Utilization, x	0.86	0.84	0.63	0.61	0.16	0.32	0.09	0.15

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	9.33	8.65	4.25	4.04	0.56	1.34	0.30	0.54
95th-Percentile Queue Length [ft]	233.21	216.14	106.29	101.07	13.88	33.40	7.53	13.56
Approach Delay [s/veh]	36.72		20.52		13.67		12.34	
Approach LOS	E		C		B		B	
Intersection Delay [s/veh]	27.21							
Intersection LOS	D							

Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 53.7
 Level Of Service: F
 Volume to Capacity (v/c): 0.523

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	4	36	1	74	17	45	76	272	5	4	186	106
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	44	1	90	21	55	93	398	6	5	273	129
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	11	0	23	5	14	23	100	2	1	68	32
Total Analysis Volume [veh/h]	5	44	1	90	21	55	93	398	6	5	273	129
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

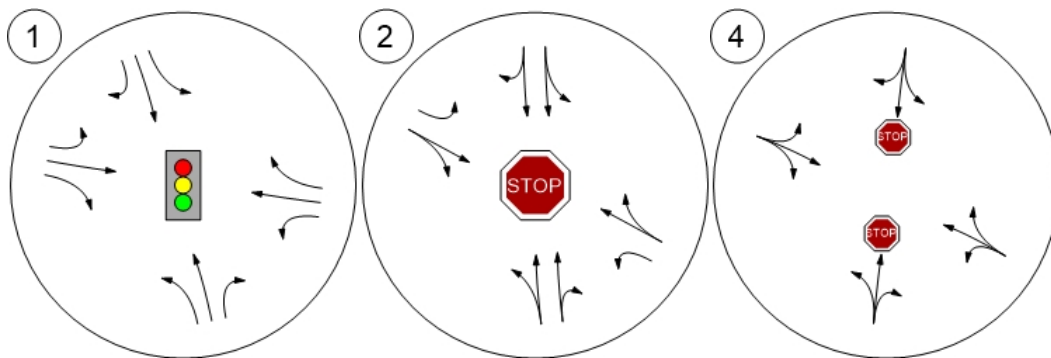
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.20	0.00	0.52	0.09	0.08	0.08	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	30.58	26.61	15.57	53.68	48.04	37.88	8.22	0.00	0.00	8.12	0.00	0.00
Movement LOS	D	D	C	F	E	E	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.87	0.87	0.87	4.50	4.50	4.50	0.16	0.16	0.16	0.01	0.01	0.01
95th-Percentile Queue Length [ft/ln]	21.85	21.85	21.85	112.55	112.55	112.55	4.10	4.10	4.10	0.22	0.22	0.22
d_A, Approach Delay [s/veh]	26.79			47.73			1.54			0.10		
Approach LOS	D			E			A			A		
d_I, Intersection Delay [s/veh]	8.99											
Intersection LOS	F											

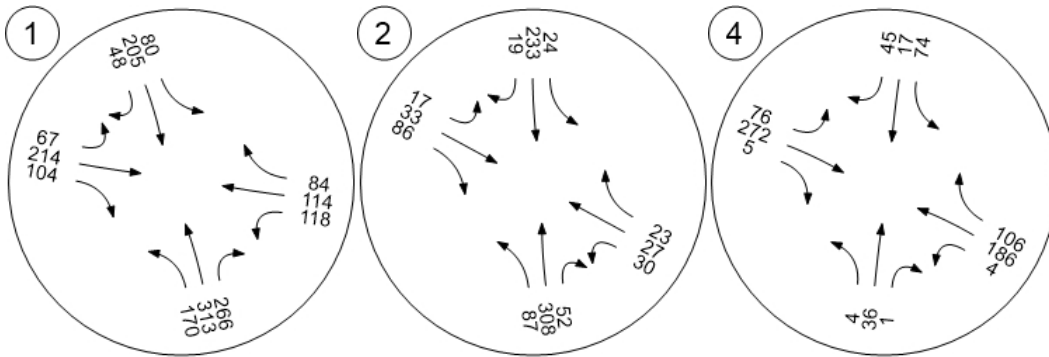
Study Intersections



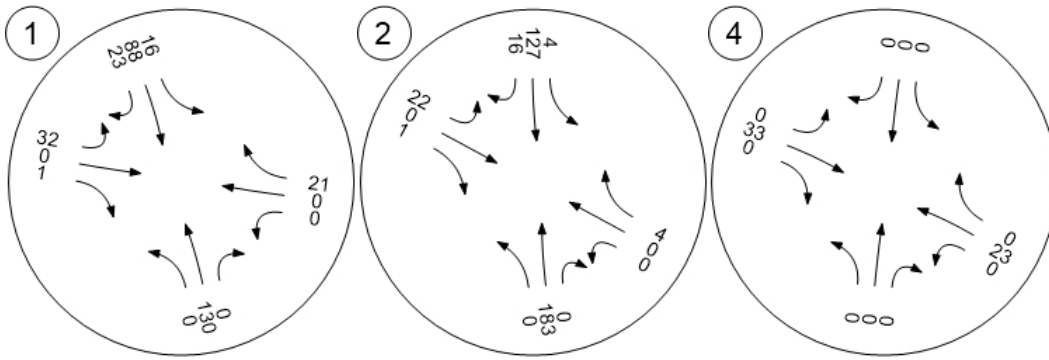
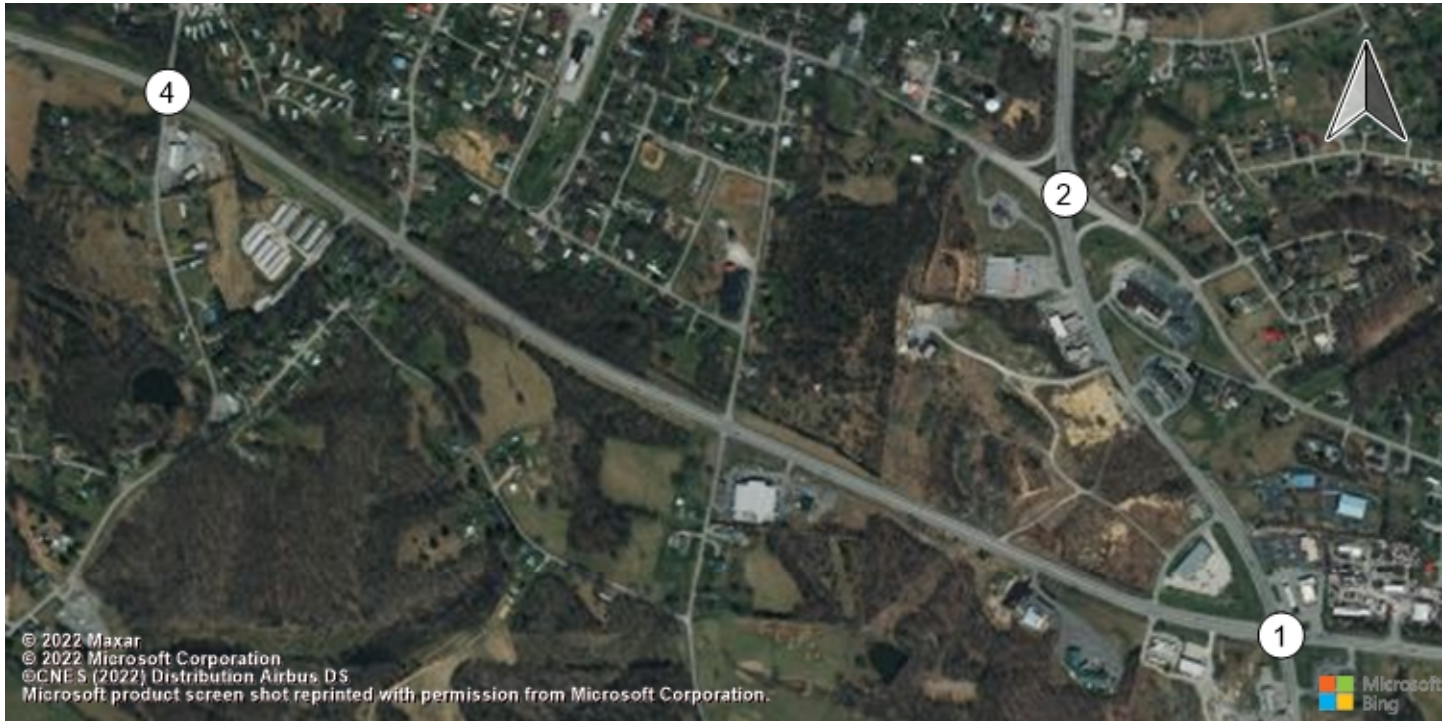
Lane Configuration and Traffic Control



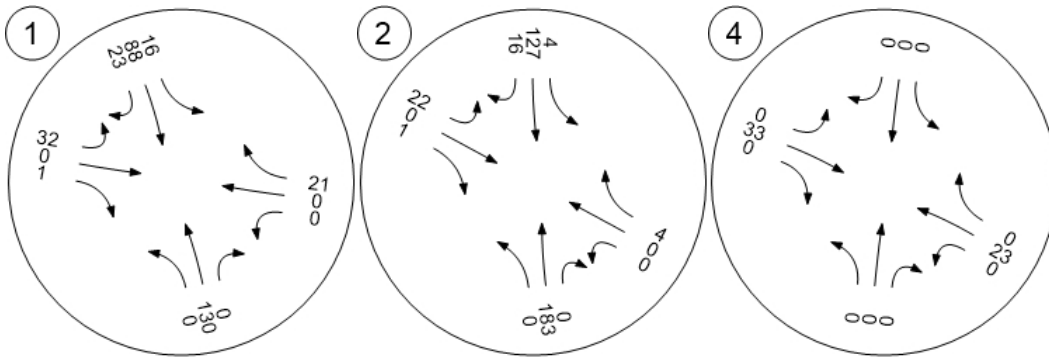
Traffic Volume - Base Volume



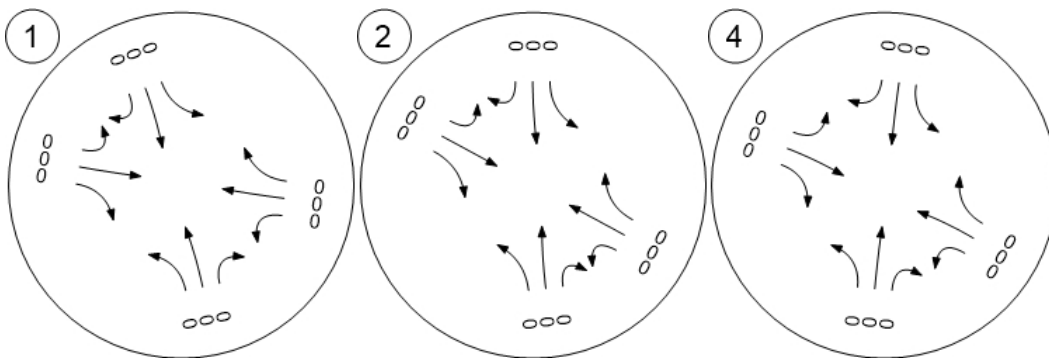
Traffic Volume - In-Process Volume



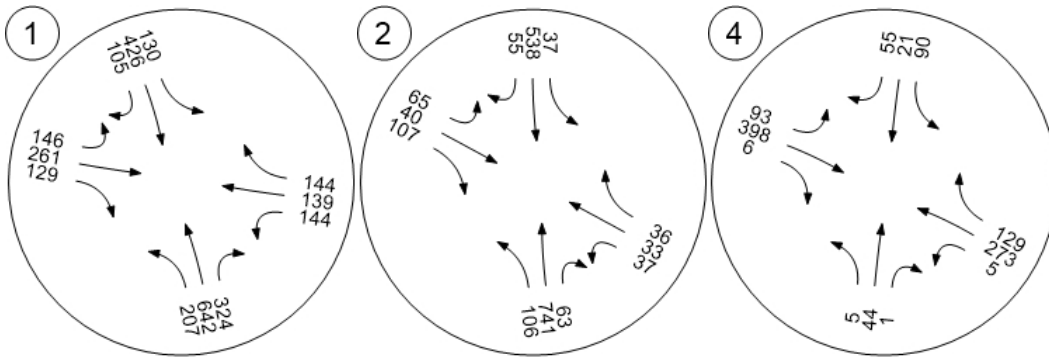
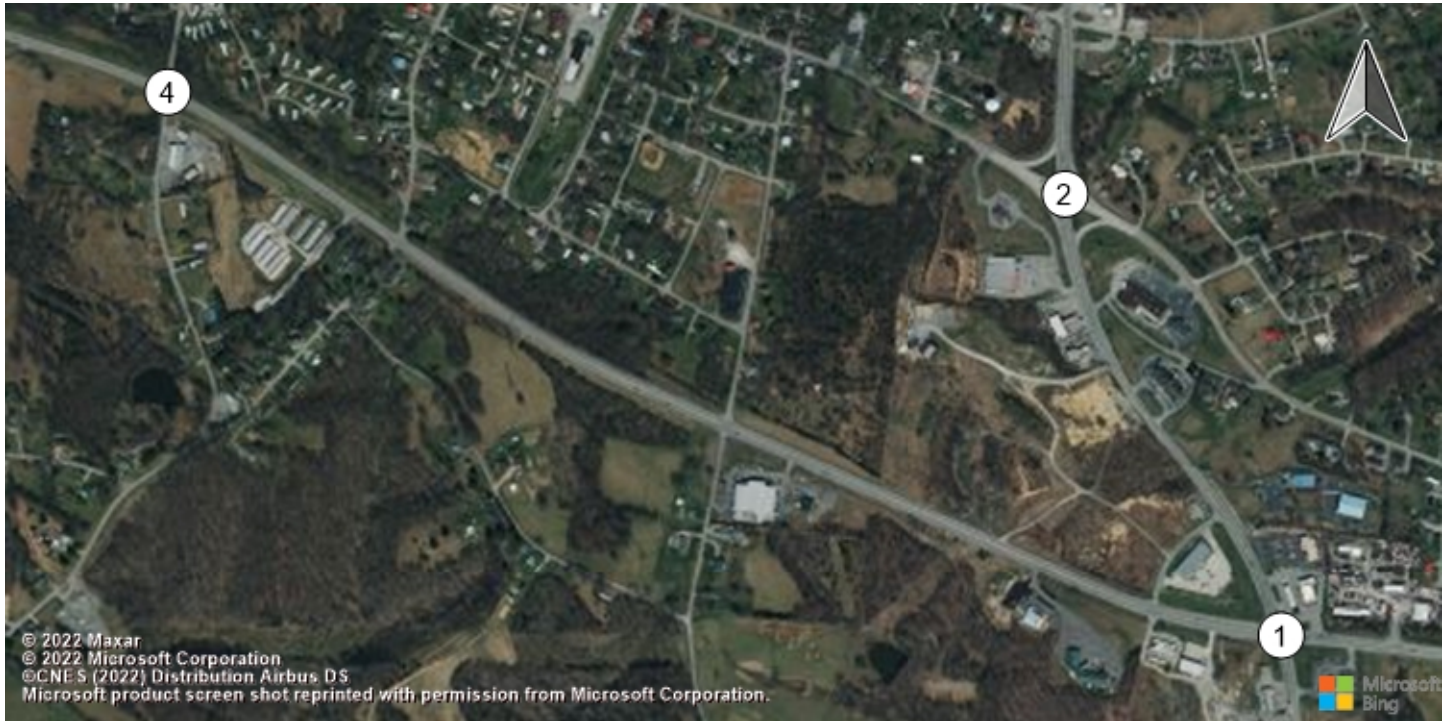
Traffic Volume - Net New Site Trips



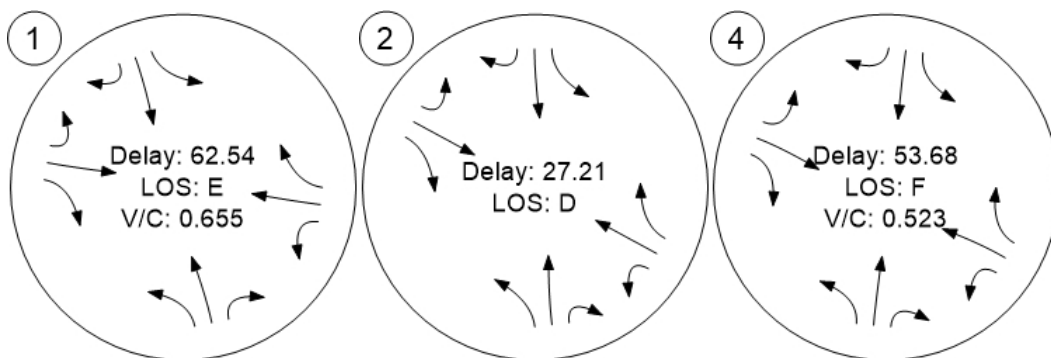
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 9 2052 Background AM

Report File: M:\...\2052 Background AM.pdf

4/12/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	SB Thru	0.872	92.9	F
2	US 231/Austin Peay	All-way stop	HCM 7th Edition	SB Left	0.859	32.1	D
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	1.606	637.2	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	92.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.872

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	115	186	89	54	299	36	25	66	135	259	148	69
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	208	455	161	134	771	123	73	119	244	469	268	147
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	114	40	34	193	31	18	30	61	117	67	37
Total Analysis Volume [veh/h]	208	455	161	134	771	123	73	119	244	469	268	147
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	16	36	0	16	36	0	16	36	0	16	36	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	104	104	104	104	104	104	104	104	104	104	104	104
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	46	32	32	46	32	32	46	32	32	46	32	32
g / C, Green / Cycle	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.43	0.27	0.11	0.13	0.46	0.09	0.07	0.07	0.17	0.42	0.16	0.10
s, saturation flow rate [veh/h]	488	1683	1431	993	1683	1431	1096	1683	1431	1126	1683	1431
c, Capacity [veh/h]	316	518	440	353	518	440	470	518	440	550	518	440
d1, Uniform Delay [s]	23.51	34.16	28.08	21.83	36.00	27.27	17.92	26.82	30.05	27.45	29.64	27.78
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.30	18.74	2.34	3.09	230.11	1.58	0.70	1.03	4.96	15.45	3.67	2.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.66	0.88	0.37	0.38	1.49	0.28	0.16	0.23	0.55	0.85	0.52	0.33
d, Delay for Lane Group [s/veh]	33.81	52.90	30.42	24.92	266.11	28.85	18.62	27.85	35.01	42.89	33.31	29.81
Lane Group LOS	C	D	C	C	F	C	B	C	D	D	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	4.07	13.37	3.39	2.24	45.90	2.50	1.10	2.34	5.64	11.13	5.98	3.05
50th-Percentile Queue Length [ft/ln]	101.63	334.22	84.78	55.92	1147.58	62.41	27.58	58.51	141.05	278.18	149.58	76.33
95th-Percentile Queue Length [veh/ln]	7.32	19.36	6.10	4.03	70.13	4.49	1.99	4.21	9.54	16.60	9.99	5.50
95th-Percentile Queue Length [ft/ln]	182.94	484.12	152.60	100.65	1753.19	112.33	49.65	105.32	238.44	414.95	249.87	137.39

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	33.81	52.90	30.42	24.92	266.11	28.85	18.62	27.85	35.01	42.89	33.31	29.81
Movement LOS	C	D	C	C	F	C	B	C	D	D	C	C
d_A, Approach Delay [s/veh]	43.69			206.29			30.31			37.81		
Approach LOS	D			F			C			D		
d_I, Intersection Delay [s/veh]	92.91											
Intersection LOS	F											
Intersection V/C	0.872											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	577			577			577			577		
d_b, Bicycle Delay [s]	26.33			26.33			26.33			26.33		
I_b,int, Bicycle LOS Score for Intersection	2.919			3.256			2.279			3.018		
Bicycle LOS	C			C			B			C		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay

Control Type: All-way stop
Analysis Method: HCM 7th Edition
Analysis Period: 15 minutes

Delay (sec / veh): 32.1
Level Of Service: D
Volume to Capacity (v/c): 0.859

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇐⇐			⇐⇐			⇐⇐			⇐⇐		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	130.00	100.00	100.00	125.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	103	165	8	8	221	16	15	19	159	20	29	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	186	469	14	22	724	65	49	34	288	36	52	30
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	117	4	6	181	16	12	9	72	9	13	8
Total Analysis Volume [veh/h]	186	469	14	22	724	65	49	34	288	36	52	30
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	447	466	473	481	400	459	376	409
Degree of Utilization, x	0.75	0.72	0.86	0.84	0.12	0.70	0.10	0.20

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	6.18	5.69	8.85	8.48	0.41	5.38	0.31	0.74
95th-Percentile Queue Length [ft]	154.49	142.19	221.22	212.07	10.36	134.48	7.87	18.47
Approach Delay [s/veh]	29.39		40.11		25.17		13.57	
Approach LOS	D		E		D		B	
Intersection Delay [s/veh]	32.06							
Intersection LOS	D							

**Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E**

Control Type:	Two-way stop	Delay (sec / veh):	637.2
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.606

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	3	18	1	84	34	58	115	142	1	0	187	100
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	33	2	152	62	105	208	285	2	0	396	181
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	8	1	38	16	26	52	71	1	0	99	45
Total Analysis Volume [veh/h]	5	33	2	152	62	105	208	285	2	0	396	181
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

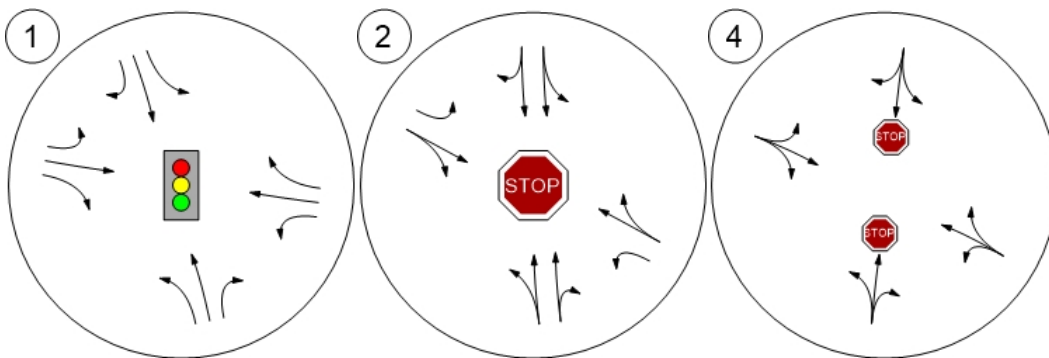
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.26	0.00	1.61	0.44	0.18	0.21	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	86.12	50.67	26.59	637.17	624.65	605.33	8.87	0.00	0.00	7.82	0.00	0.00
Movement LOS	F	F	D	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.43	1.43	1.43	26.48	26.48	26.48	0.39	0.39	0.39	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	35.86	35.86	35.86	662.01	662.01	662.01	9.80	9.80	9.80	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	53.89			624.26			3.73			0.00		
Approach LOS	F			F			A			A		
d_I, Intersection Delay [s/veh]	141.96											
Intersection LOS	F											

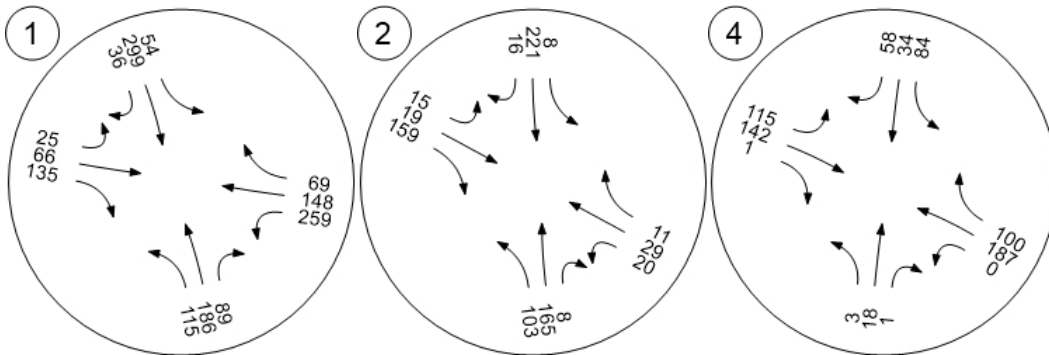
Study Intersections



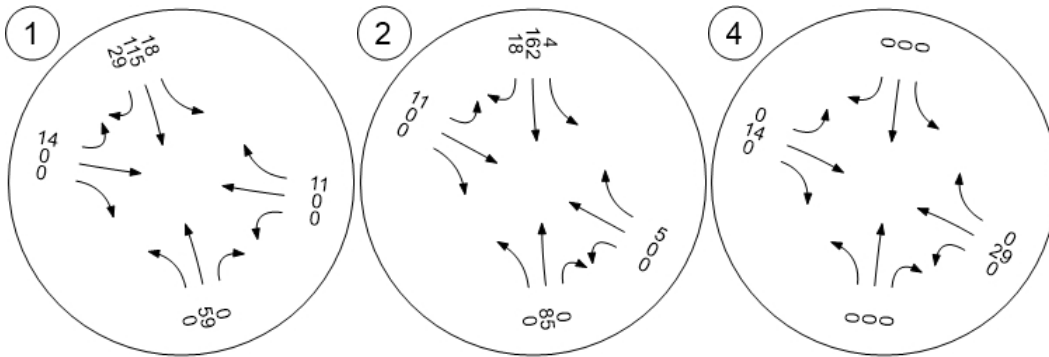
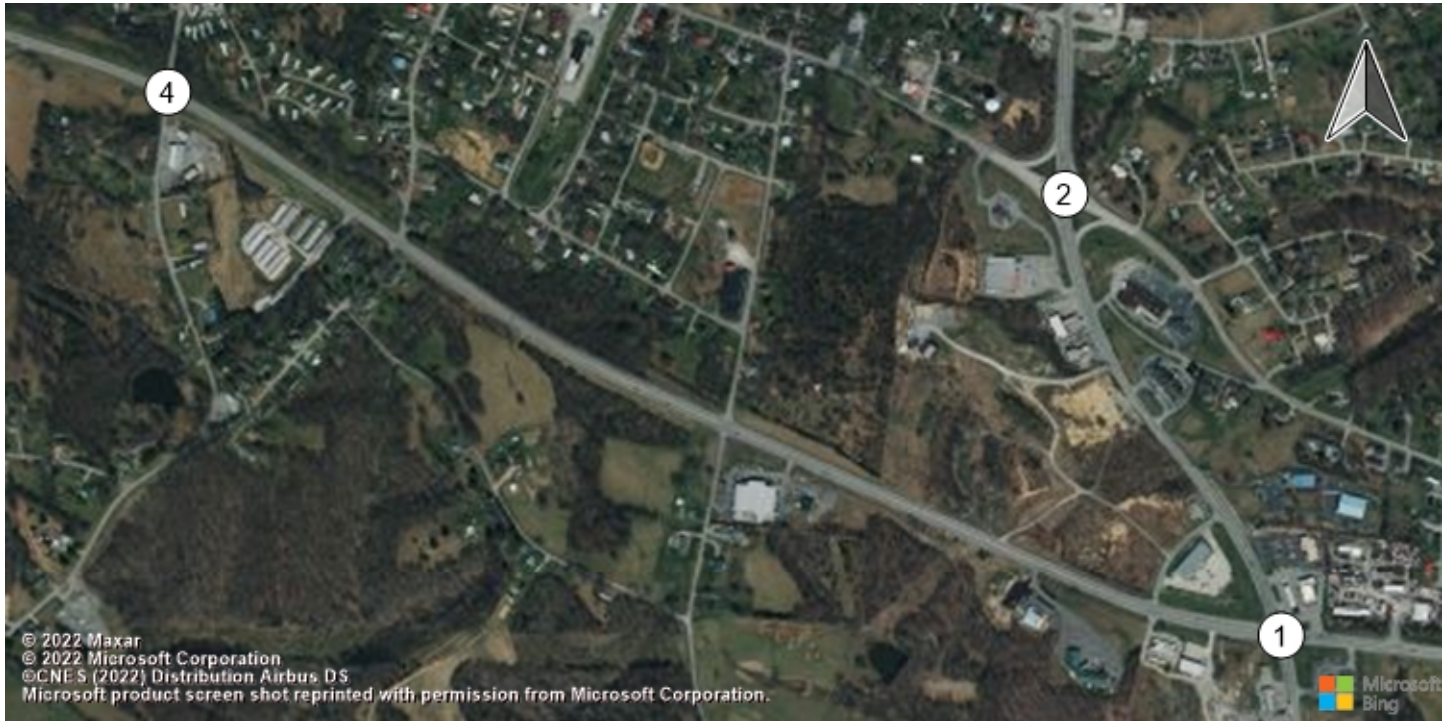
Lane Configuration and Traffic Control



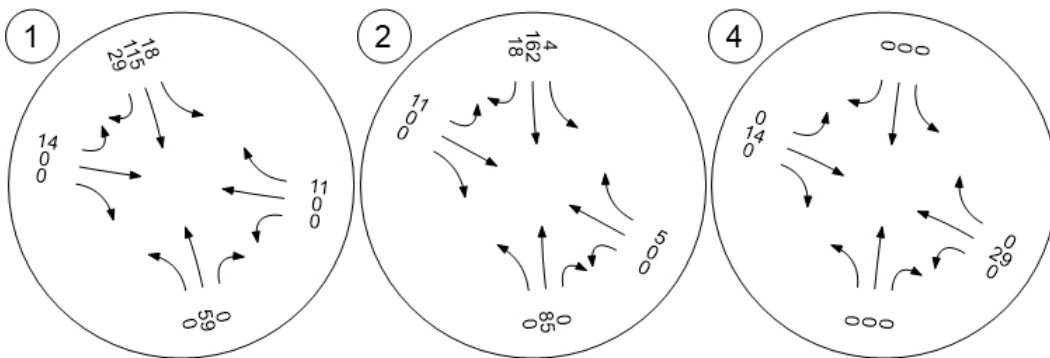
Traffic Volume - Base Volume



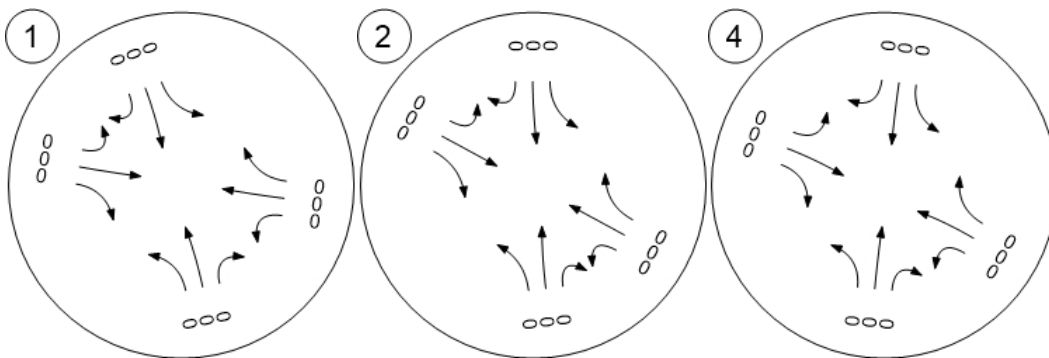
Traffic Volume - In-Process Volume



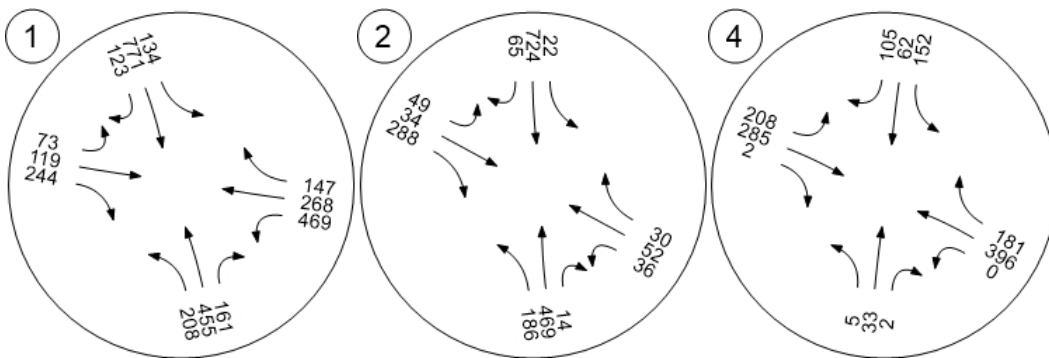
Traffic Volume - Net New Site Trips



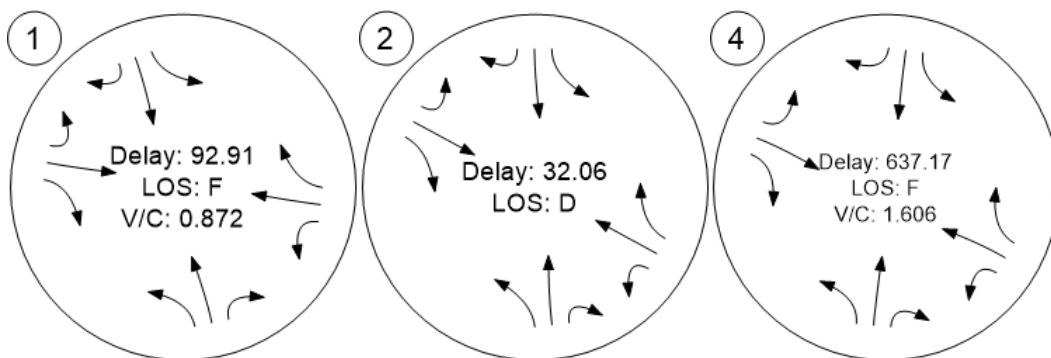
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 10 2052 Background PM

Report File: M:\...\2052 Background PM.pdf

4/12/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	NB Thru	0.890	113.8	F
2	US 231/Austin Peay	All-way stop	HCM 7th Edition	NB Left	1.278	93.4	F
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	3.054	1,255.9	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	113.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.890

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵↵↵			↵↵↵			↵↵↵			↵↵↵		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	170	313	266	80	205	48	67	214	104	118	114	84
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	308	827	481	177	547	133	185	387	190	214	206	194
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	77	207	120	44	137	33	46	97	48	54	52	49
Total Analysis Volume [veh/h]	308	827	481	177	547	133	185	387	190	214	206	194
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	16	36	0	16	36	0	16	36	0	16	36	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	104	104	104	104	104	104	104	104	104	104	104	104
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	46	32	32	46	32	32	46	32	32	46	32	32
g / C, Green / Cycle	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31	0.44	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.63	0.49	0.34	0.36	0.33	0.09	0.17	0.23	0.13	0.21	0.12	0.14
s, saturation flow rate [veh/h]	488	1683	1431	488	1683	1431	1104	1683	1431	1011	1683	1431
c, Capacity [veh/h]	316	518	440	316	518	440	503	518	440	392	518	440
d1, Uniform Delay [s]	33.30	36.00	36.00	23.10	36.00	27.48	18.90	32.37	28.74	21.77	28.40	28.83
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	44.75	277.65	70.34	7.02	55.25	1.76	2.07	9.49	3.07	5.39	2.28	3.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.98	1.60	1.09	0.56	1.06	0.30	0.37	0.75	0.43	0.55	0.40	0.44
d, Delay for Lane Group [s/veh]	78.05	313.65	106.34	30.12	91.25	29.24	20.96	41.85	31.81	27.16	30.68	32.02
Lane Group LOS	E	F	F	C	F	C	C	D	C	C	C	C
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	8.97	52.74	19.48	3.25	20.75	2.73	3.06	9.97	4.13	3.85	4.35	4.23
50th-Percentile Queue Length [ft/ln]	224.22	1318.54	487.05	81.19	518.73	68.13	76.38	249.17	103.13	96.33	108.63	105.76
95th-Percentile Queue Length [veh/ln]	13.88	81.49	28.23	5.85	29.23	4.91	5.50	15.14	7.43	6.94	7.76	7.60
95th-Percentile Queue Length [ft/ln]	347.00	2037.14	705.79	146.14	730.80	122.63	137.48	378.61	185.64	173.39	194.09	190.09

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	78.05	313.65	106.34	30.12	91.25	29.24	20.96	41.85	31.81	27.16	30.68	32.02
Movement LOS	E	F	F	C	F	C	C	D	C	C	C	C
d_A, Approach Delay [s/veh]	207.04			69.00			34.28			29.87		
Approach LOS	F			E			C			C		
d_I, Intersection Delay [s/veh]	113.84											
Intersection LOS	F											
Intersection V/C	0.890											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	577			577			577			577		
d_b, Bicycle Delay [s]	26.33			26.33			26.33			26.33		
I_b,int, Bicycle LOS Score for Intersection	4.226			2.974			2.817			2.573		
Bicycle LOS	D			C			C			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: All-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 93.4
 Level Of Service: F
 Volume to Capacity (v/c): 1.278

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇌⇌			⇌⇌			⇌⇌			⇌⇌		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	130.00	100.00	100.00	125.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	87	308	52	24	233	19	17	33	86	30	27	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	157	923	94	51	676	66	75	60	158	54	49	50
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	39	231	24	13	169	17	19	15	40	14	12	13
Total Analysis Volume [veh/h]	157	923	94	51	676	66	75	60	158	54	49	50
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	587	587	454	464	378	422	365	399
Degree of Utilization, x	1.28	1.24	0.87	0.85	0.20	0.52	0.15	0.25

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	24.82	23.46	9.13	8.68	0.73	2.88	0.51	0.96
95th-Percentile Queue Length [ft]	620.56	586.56	228.36	216.97	18.21	72.04	12.83	24.11
Approach Delay [s/veh]	156.33		43.15		18.61		14.52	
Approach LOS	F		E		C		B	
Intersection Delay [s/veh]	93.42							
Intersection LOS	F							

**Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E**

Control Type:	Two-way stop	Delay (sec / veh):	1,255.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	3.054

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	4	36	1	74	17	45	76	272	5	4	186	106
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	65	2	134	31	81	138	558	9	7	383	192
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	16	1	34	8	20	35	140	2	2	96	48
Total Analysis Volume [veh/h]	7	65	2	134	31	81	138	558	9	7	383	192
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

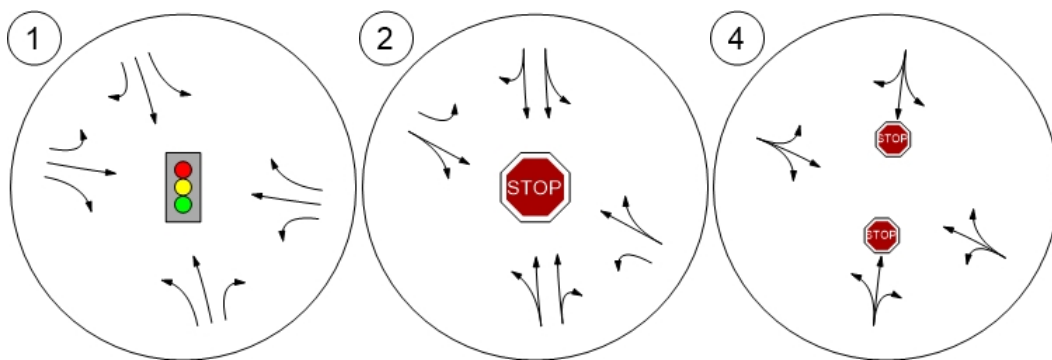
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.61	0.00	3.05	0.26	0.14	0.14	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	122.31	100.10	73.17	1255.87	1203.54	1179.95	8.77	0.00	0.00	8.59	0.00	0.00
Movement LOS	F	F	F	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.78	3.78	3.78	25.46	25.46	25.46	0.25	0.25	0.25	0.01	0.01	0.01
95th-Percentile Queue Length [ft/ln]	94.55	94.55	94.55	636.42	636.42	636.42	6.24	6.24	6.24	0.31	0.31	0.31
d_A, Approach Delay [s/veh]	101.47			1224.28			1.72			0.10		
Approach LOS	F			F			A			A		
d_I, Intersection Delay [s/veh]	192.88											
Intersection LOS	F											

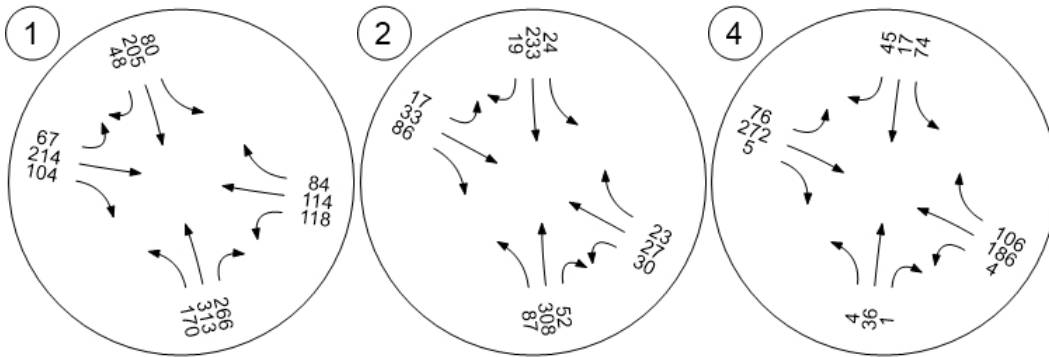
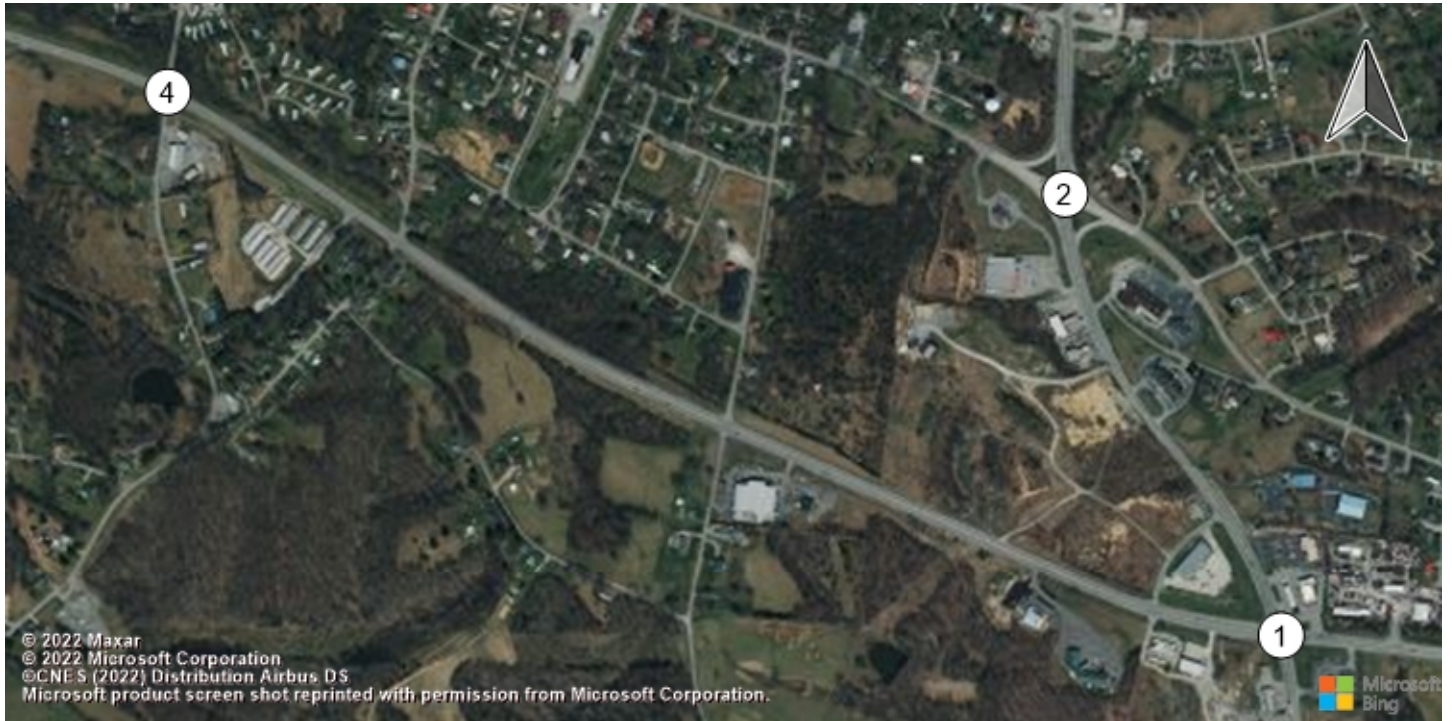
Study Intersections



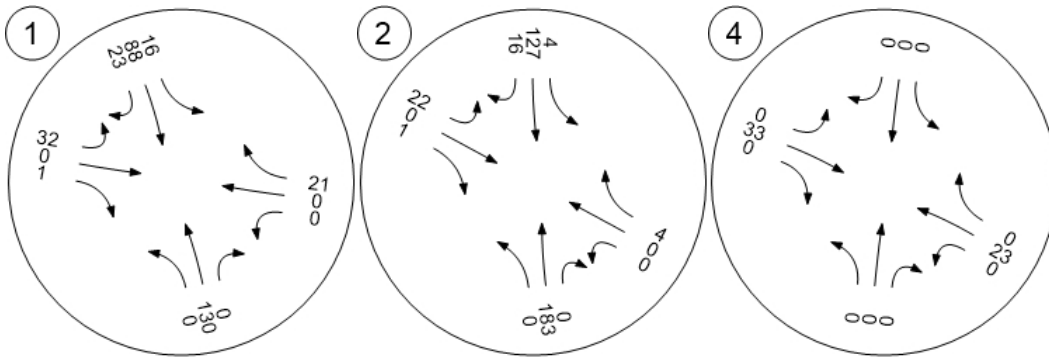
Lane Configuration and Traffic Control



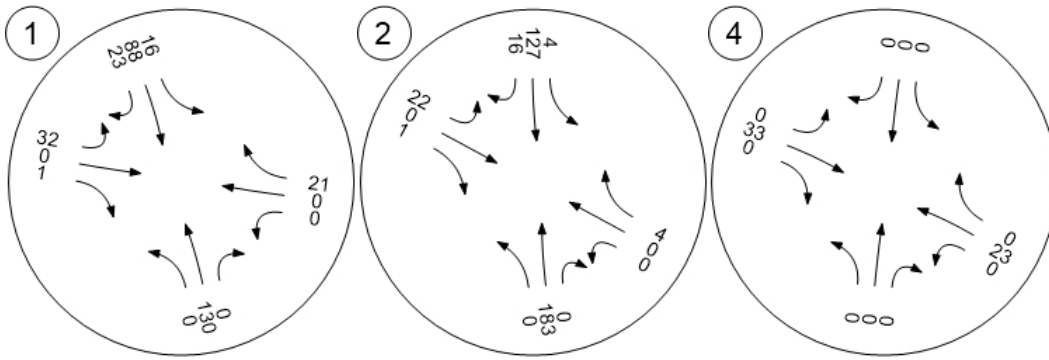
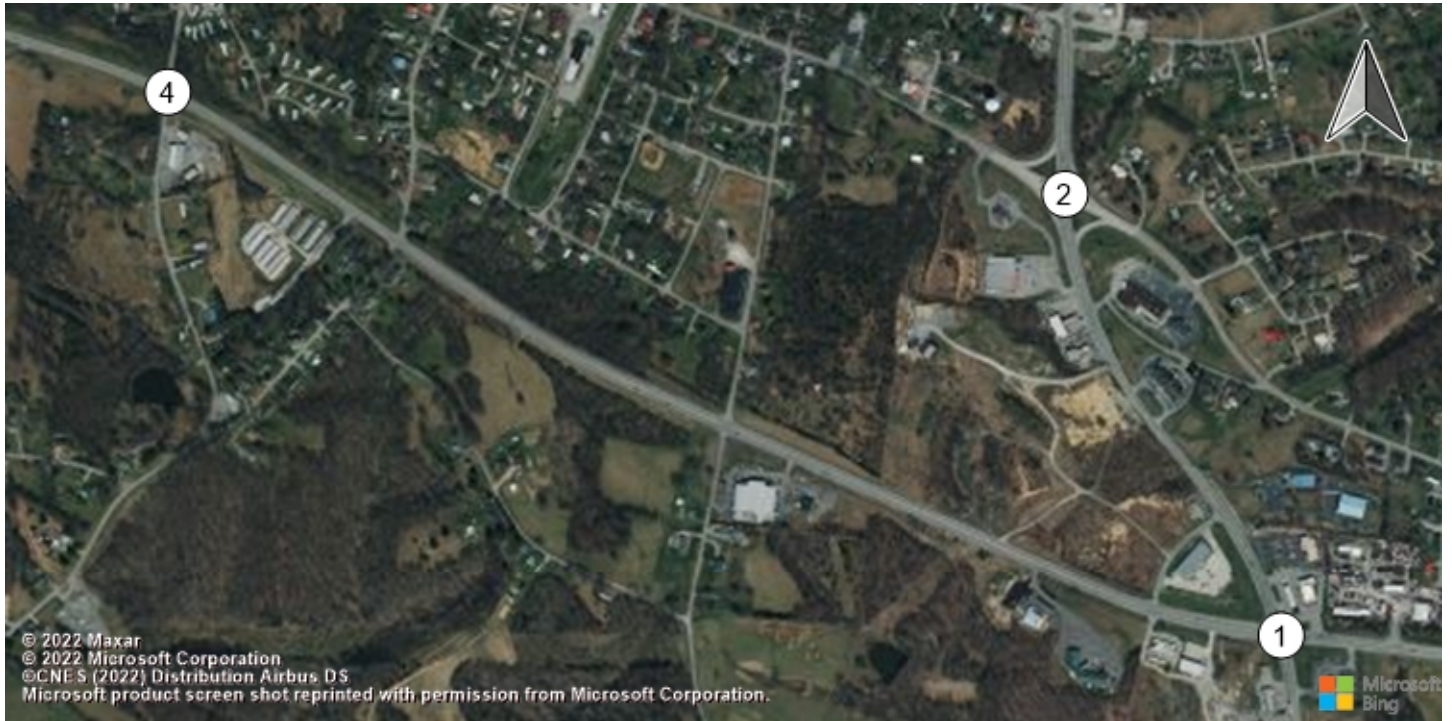
Traffic Volume - Base Volume



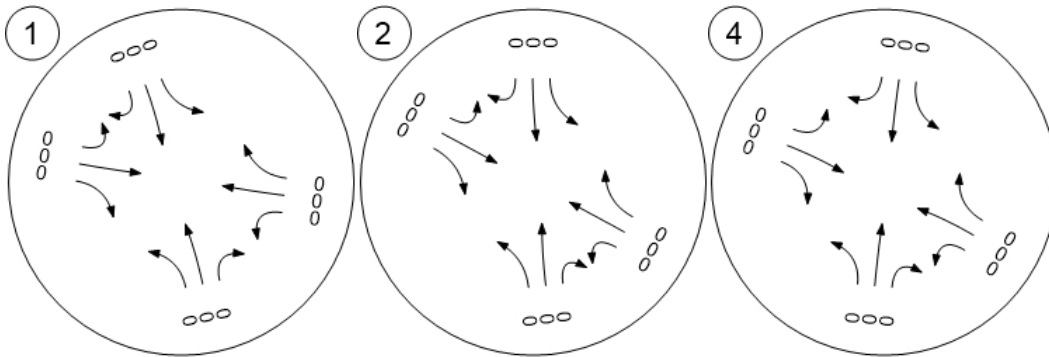
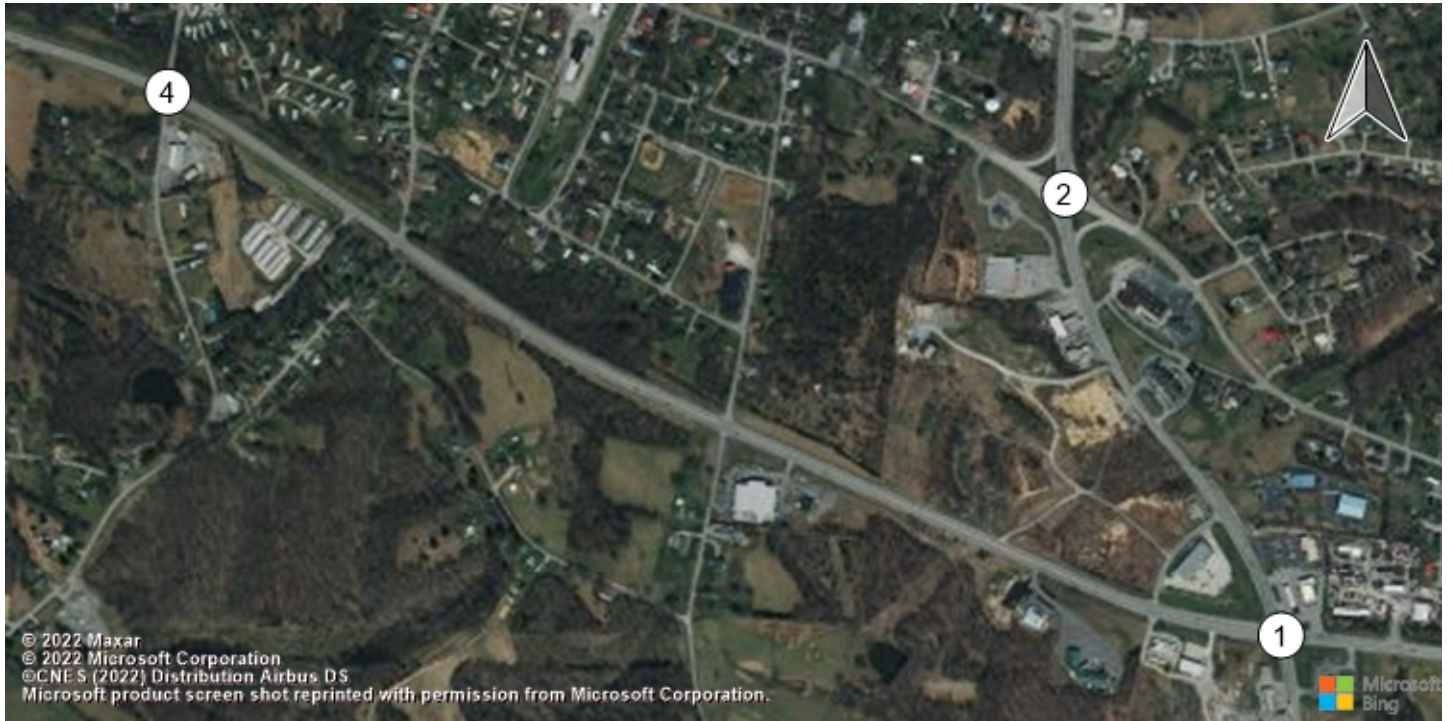
Traffic Volume - In-Process Volume



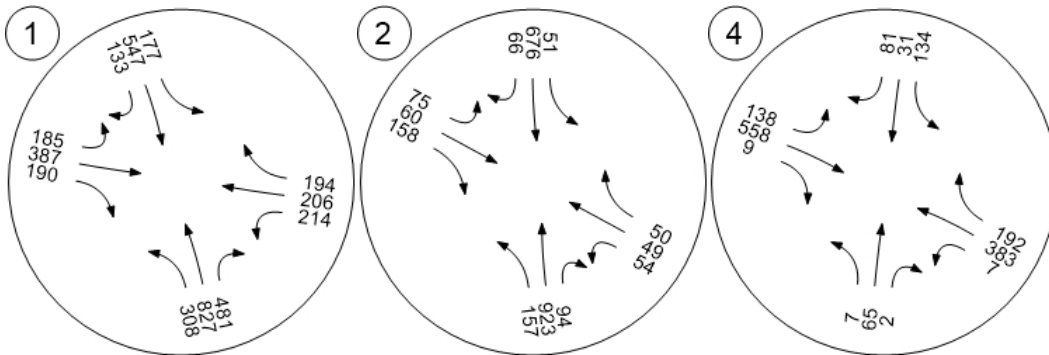
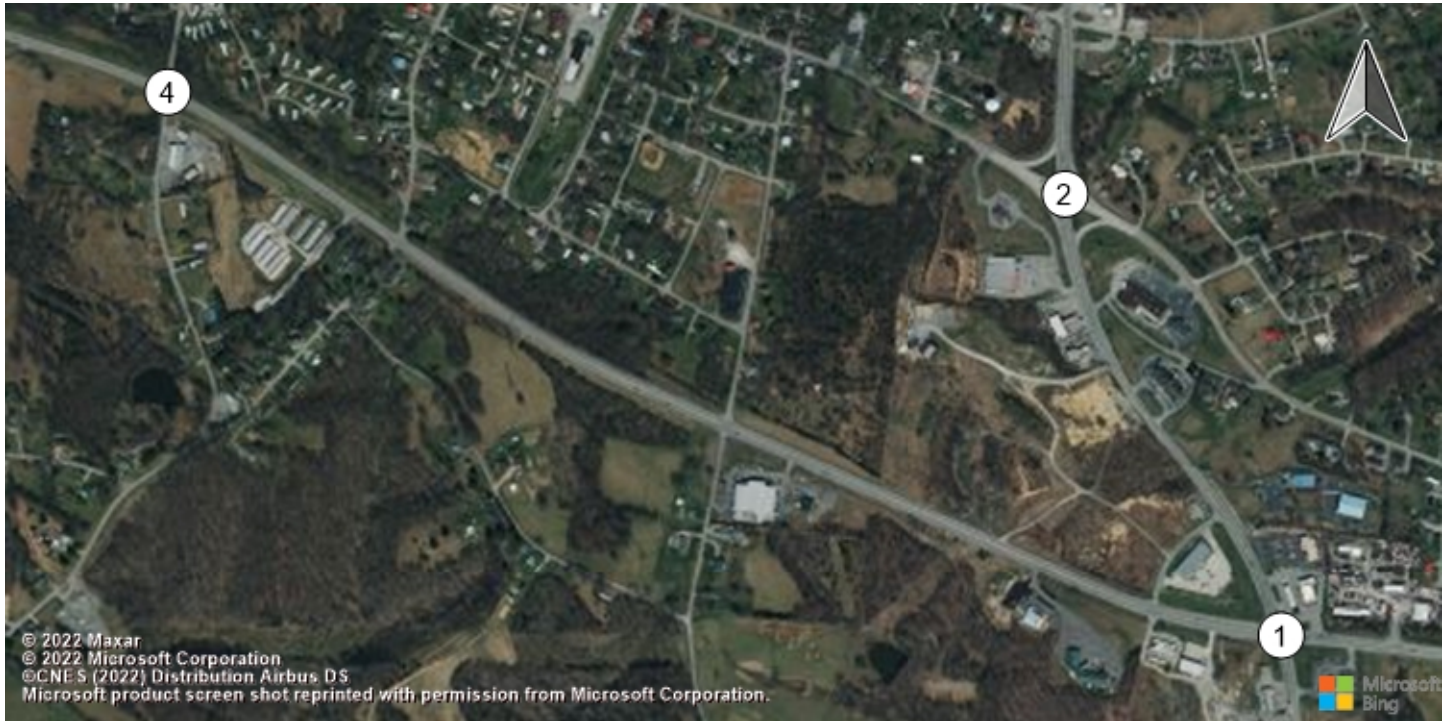
Traffic Volume - Net New Site Trips



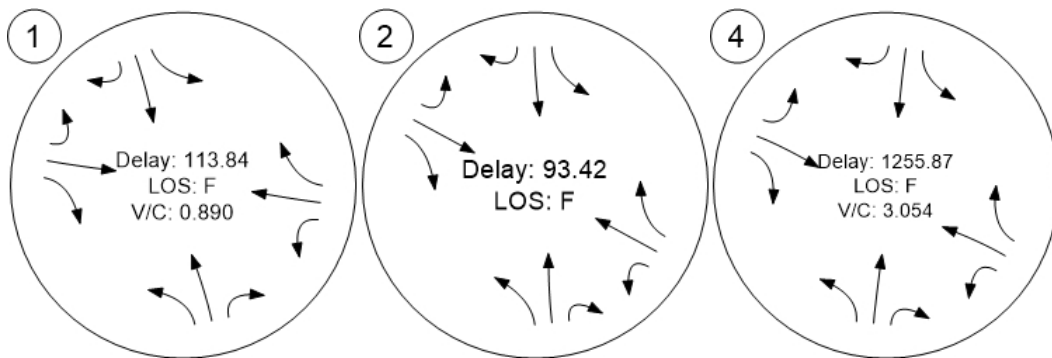
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 5 Projected AM

Report File: M:\...\2032 Projected AM.pdf

4/12/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	WB Left	0.645	24.1	C
2	US 231/Austin Peay	Roundabout	HCM 7th Edition	EB Right		5.8	A
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	0.443	43.8	E

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	24.1
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.645

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	115	186	89	54	299	36	25	66	135	259	148	69
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	140	345	108	102	594	102	58	80	165	316	180	106
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	35	86	27	26	149	26	15	20	41	79	45	27
Total Analysis Volume [veh/h]	140	345	108	102	594	102	58	80	165	316	180	106
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	9	19	0	34	44	0	7	25	0	12	30	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	90	90	90	90	90	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	54	45	45	54	45	45	28	16	16	28	21	21
g / C, Green / Cycle	0.60	0.50	0.50	0.60	0.50	0.50	0.31	0.18	0.18	0.31	0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.18	0.20	0.08	0.11	0.35	0.07	0.05	0.05	0.12	0.26	0.11	0.07
s, saturation flow rate [veh/h]	794	1683	1431	938	1683	1431	1094	1683	1431	1229	1683	1431
c, Capacity [veh/h]	412	848	721	568	842	716	363	298	254	453	392	333
d1, Uniform Delay [s]	12.85	13.94	11.99	9.43	17.36	12.09	24.07	31.97	34.43	30.58	29.65	28.60
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.50	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.23	1.45	0.44	0.15	4.93	0.42	0.20	0.48	2.80	8.61	0.84	0.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.34	0.41	0.15	0.18	0.71	0.14	0.16	0.27	0.65	0.70	0.46	0.32
d, Delay for Lane Group [s/veh]	15.09	15.39	12.43	9.58	22.29	12.51	24.27	32.45	37.23	39.19	30.49	29.14
Lane Group LOS	B	B	B	A	C	B	C	C	D	D	C	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	1.43	4.47	1.20	0.86	9.97	1.14	0.92	1.52	3.49	6.95	3.37	1.92
50th-Percentile Queue Length [ft/ln]	35.78	111.74	29.99	21.46	249.35	28.46	22.93	38.11	87.37	173.72	84.37	47.88
95th-Percentile Queue Length [veh/ln]	2.58	7.94	2.16	1.55	15.15	2.05	1.65	2.74	6.29	11.27	6.07	3.45
95th-Percentile Queue Length [ft/ln]	64.40	198.43	53.97	38.63	378.83	51.22	41.28	68.60	157.27	281.79	151.87	86.19

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	15.09	15.39	12.43	9.58	22.29	12.51	24.27	32.45	37.23	39.19	30.49	29.14
Movement LOS	B	B	B	A	C	B	C	C	D	D	C	C
d_A, Approach Delay [s/veh]	14.78			19.41			33.49			34.82		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	24.11											
Intersection LOS	C											
Intersection V/C	0.645											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	289			844			422			533		
d_b, Bicycle Delay [s]	32.94			15.02			28.01			24.20		
I_b,int, Bicycle LOS Score for Intersection	2.538			2.876			2.060			2.553		
Bicycle LOS	B			C			B			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: Roundabout
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 5.8
 Level Of Service: A

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇐⇐			⇐⇐			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	103	165	8	8	221	16	15	19	159	20	29	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	126	371	10	18	593	56	40	23	194	24	35	23
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	32	93	3	5	148	14	10	6	49	6	9	6
Total Analysis Volume [veh/h]	126	371	10	18	593	56	40	23	194	24	35	23
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Number of Conflicting Circulating Lanes	2			2			2			2		
Circulating Flow Rate [veh/h]	83			189			648			548		
Exiting Flow Rate [veh/h]	827			443			221			52		
Demand Flow Rate [veh/h]	126	371	10	18	593	56	40	23	194	24	35	23
Adjusted Demand Flow Rate [veh/h]	126	371	10	18	593	56	40	23	194	24	35	23

Lanes

Override Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Override Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1350.00	1420.00	1350.00	1420.00	1420.00	1420.00
B (coefficient)	0.00092	0.00085	0.00092	0.00085	0.00085	0.00085
HV Adjustment Factor	0.98	0.98	0.98	0.98	0.98	0.98
Entry Flow Rate [veh/h]	244	275	320	361	263	84
Capacity of Entry and Bypass Lanes [veh/h]	1252	1324	1135	1210	819	892
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1227	1298	1113	1186	803	874
X, volume / capacity	0.19	0.21	0.28	0.30	0.32	0.09

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.72	0.78	1.16	1.26	1.38	0.31
95th-Percentile Queue Length [ft]	17.98	19.47	29.08	31.47	34.61	7.74
Approach Delay [s/veh]	4.57		5.86		8.18	5.01
Approach LOS	A		A		A	A
Intersection Delay [s/veh]	5.77					
Intersection LOS	A					

**Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E**

Control Type:	Two-way stop	Delay (sec / veh):	43.8
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.443

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	3	18	1	84	34	58	115	142	1	0	187	100
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	22	1	102	41	71	140	201	1	0	286	122
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	6	0	26	10	18	35	50	0	0	72	31
Total Analysis Volume [veh/h]	4	22	1	102	41	71	140	201	1	0	286	122
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

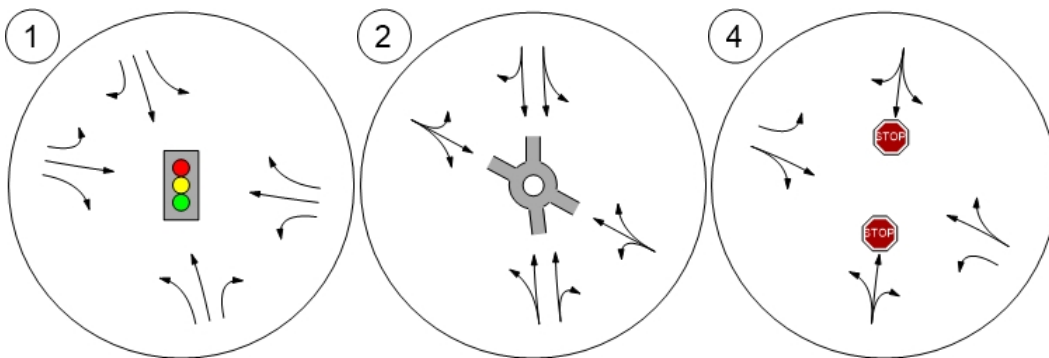
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.09	0.00	0.44	0.15	0.10	0.12	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	26.76	21.40	11.17	43.78	41.53	33.31	8.56	0.00	0.00	7.63	0.00	0.00
Movement LOS	D	C	B	E	E	D	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.37	0.37	0.37	4.87	4.87	4.87	0.41	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	9.33	9.33	9.33	121.83	121.83	121.83	10.35	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	21.82			39.87			3.50			0.00		
Approach LOS	C			E			A			A		
d_I, Intersection Delay [s/veh]	10.41											
Intersection LOS	E											

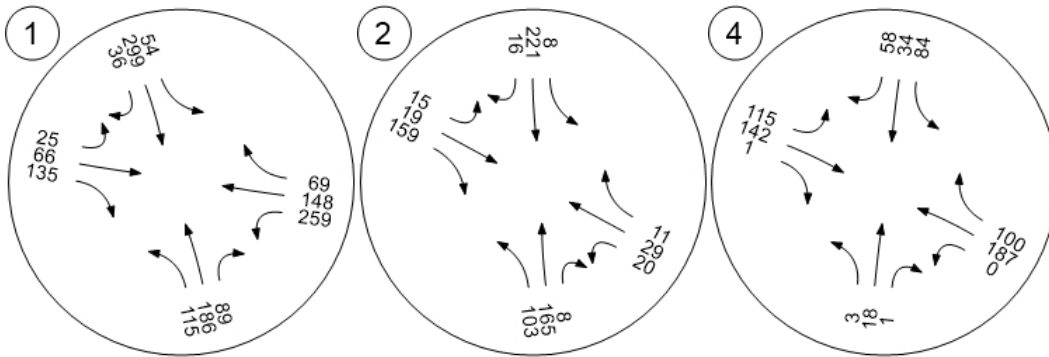
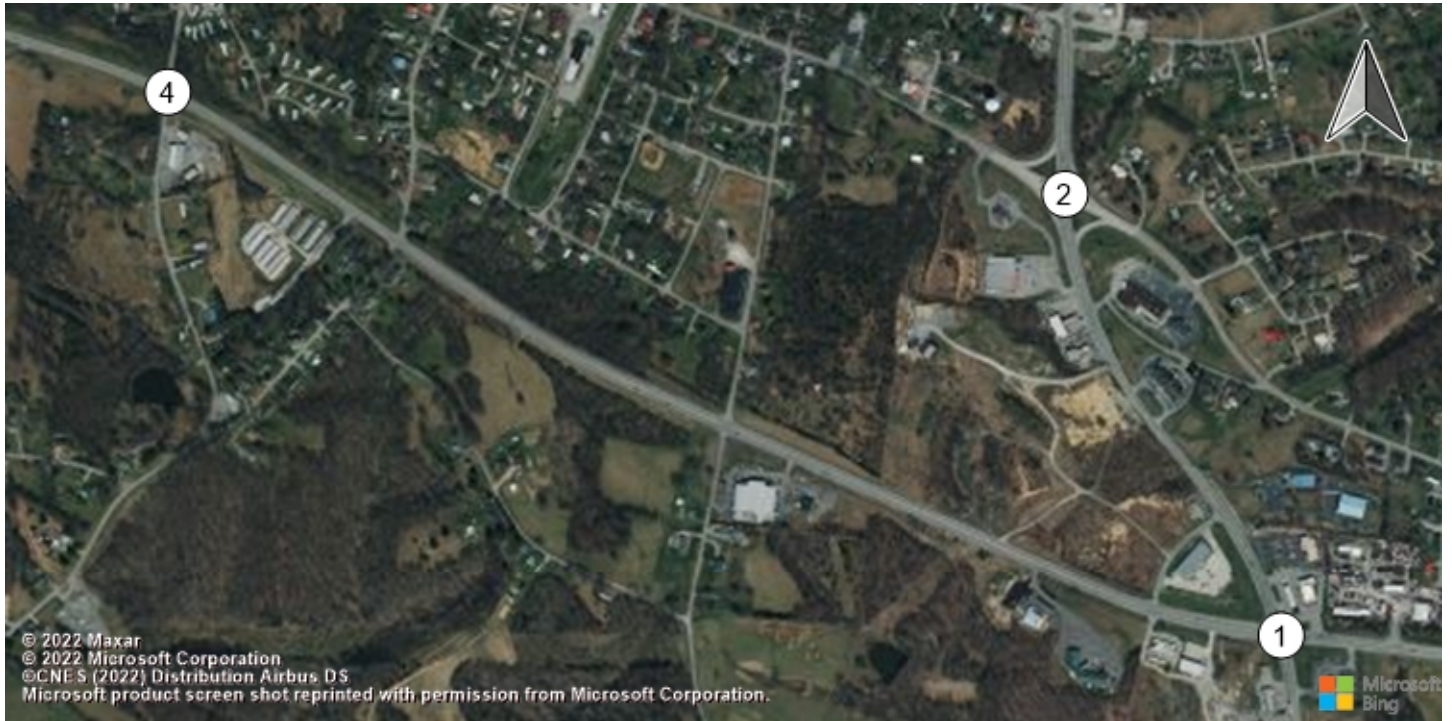
Study Intersections



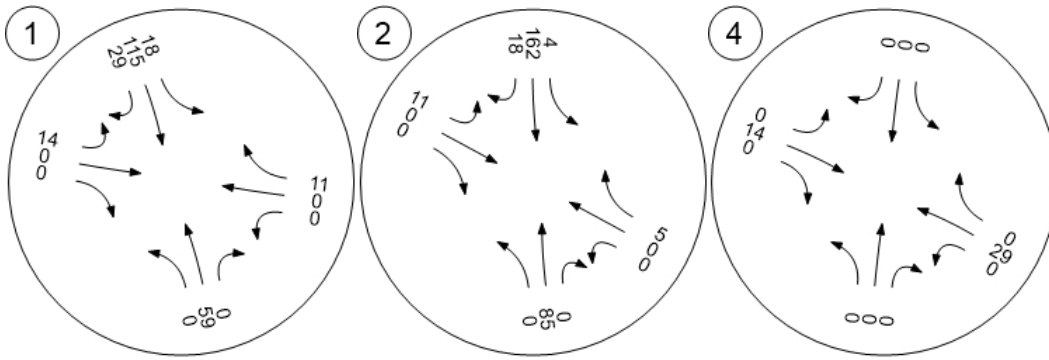
Lane Configuration and Traffic Control



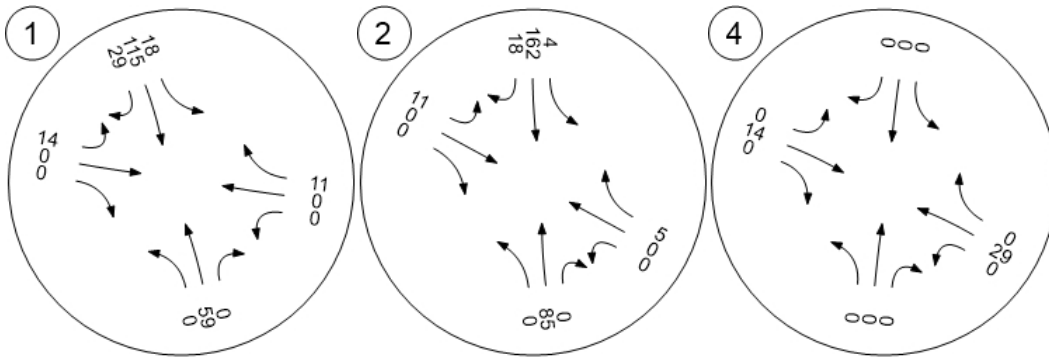
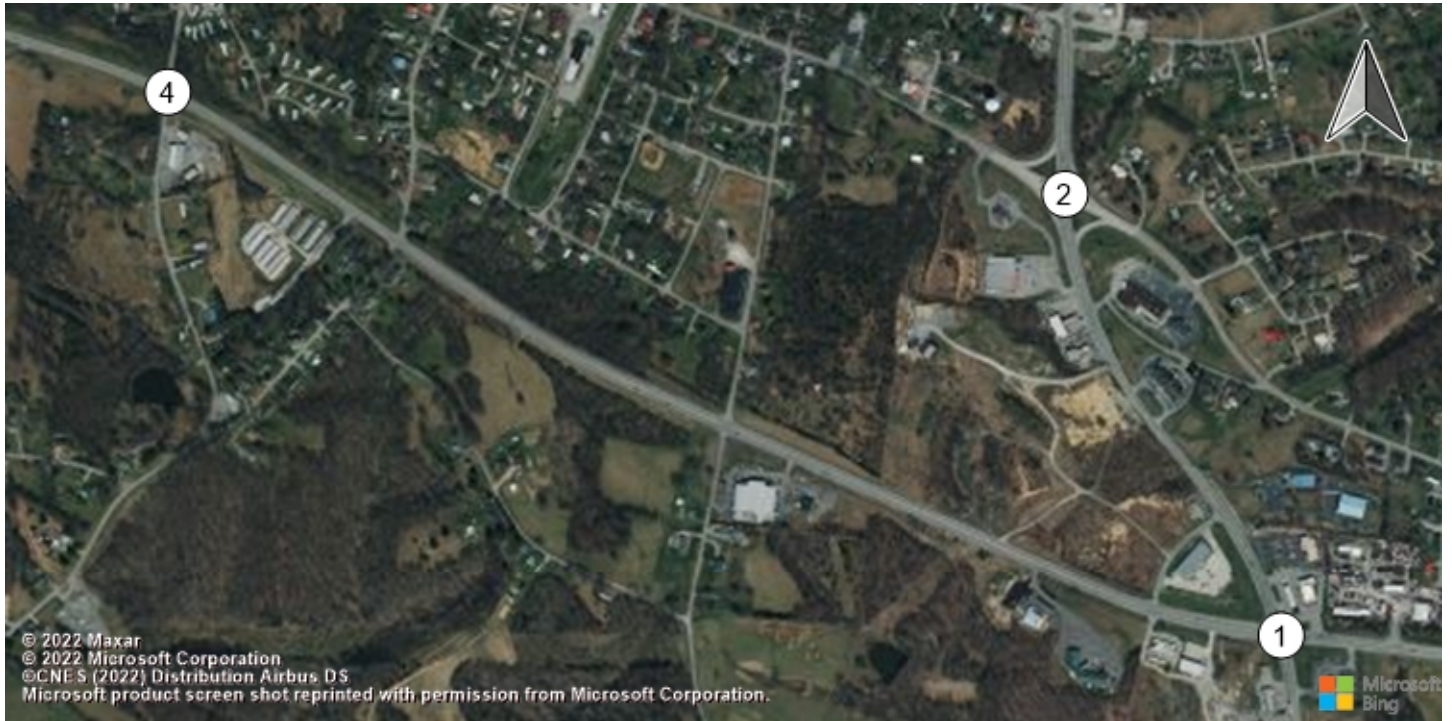
Traffic Volume - Base Volume



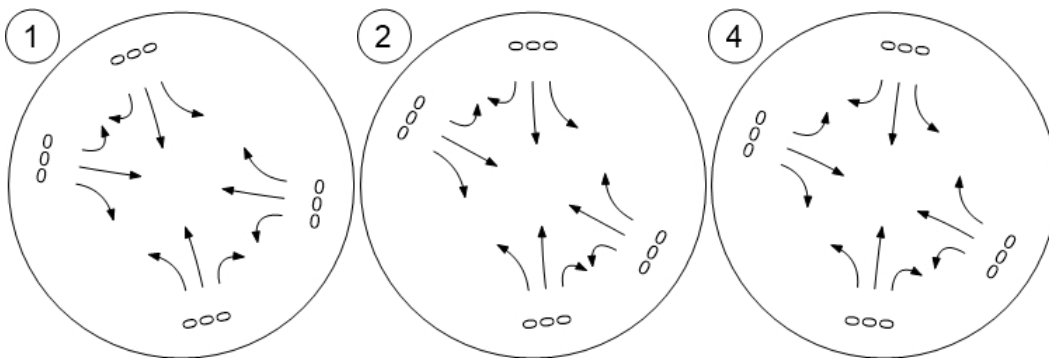
Traffic Volume - In-Process Volume



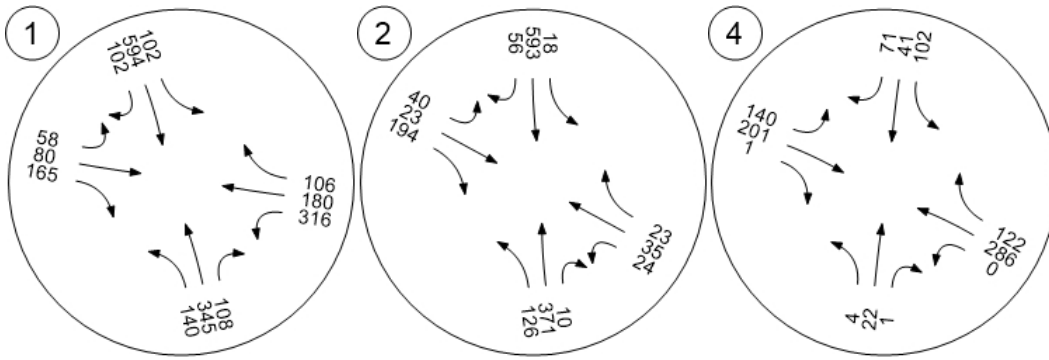
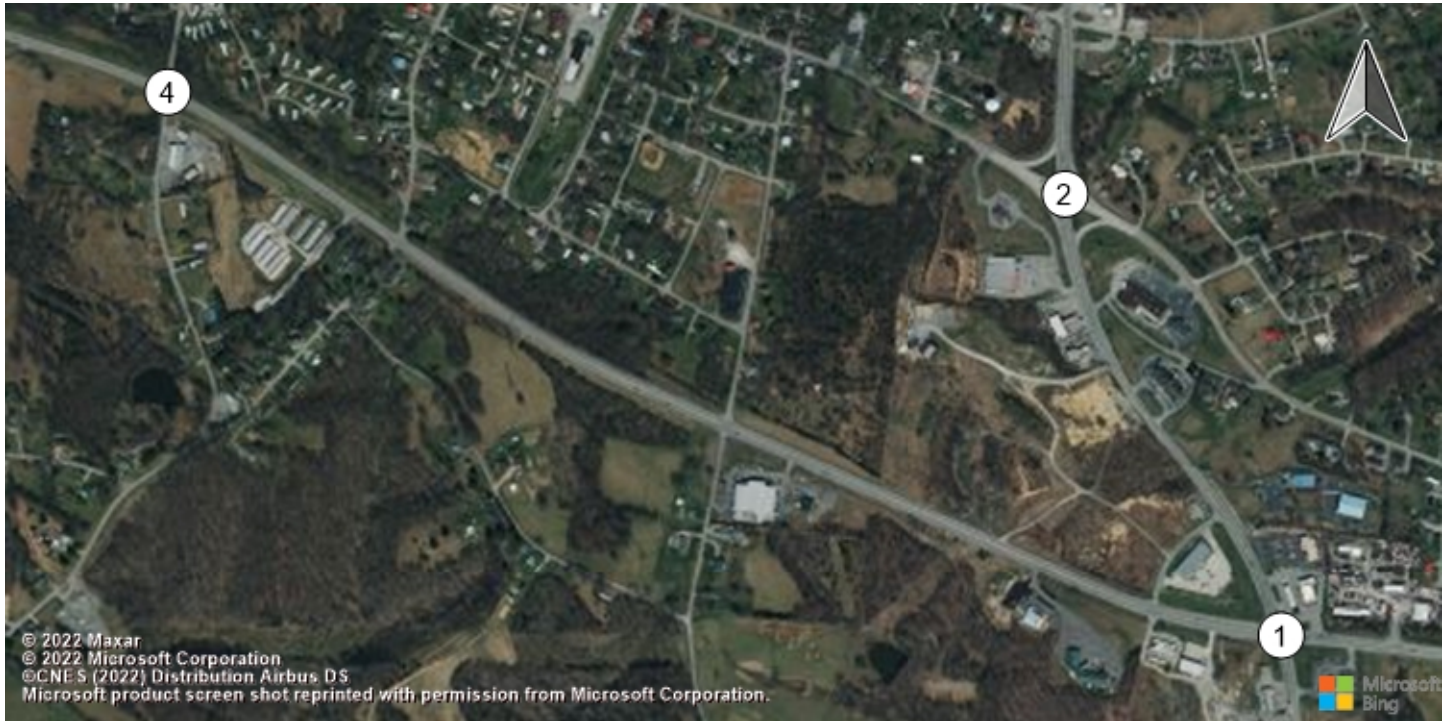
Traffic Volume - Net New Site Trips



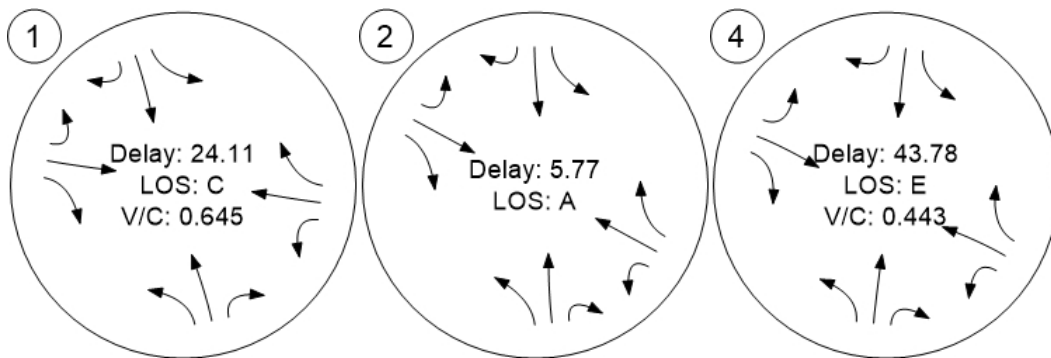
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 6 Projected PM

Report File: M:\...\2032 Projected PM.pdf

4/12/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	EB Thru	0.641	31.4	C
2	US 231/Austin Peay	Roundabout	HCM 7th Edition	WB Left		6.6	A
4	Hwy 52/Old Highway 31 E	Two-way stop	HCM 7th Edition	SB Left	0.508	50.9	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	31.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.641

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	170	313	266	80	205	48	67	214	104	118	114	84
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	207	642	324	130	426	105	146	261	129	144	139	144
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	161	81	33	107	26	37	65	32	36	35	36
Total Analysis Volume [veh/h]	207	642	324	130	426	105	146	261	129	144	139	144
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	145
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	14	59	0	12	57	0	13	63	0	11	61	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	145	145	145	145	145	145	145	145	145	145	145	145
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	93	82	82	93	79	79	44	33	33	44	31	31
g / C, Green / Cycle	0.64	0.57	0.57	0.64	0.54	0.54	0.31	0.23	0.23	0.31	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.23	0.38	0.23	0.21	0.25	0.07	0.13	0.16	0.09	0.14	0.08	0.10
s, saturation flow rate [veh/h]	891	1683	1431	626	1683	1431	1139	1683	1431	1038	1683	1431
c, Capacity [veh/h]	517	950	807	329	913	776	353	387	329	265	364	309
d1, Uniform Delay [s]	14.15	22.24	17.78	18.27	20.31	16.37	40.39	50.90	47.27	43.55	48.57	49.55
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.11	0.11	0.11	0.50	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.30	3.85	1.49	3.53	1.71	0.36	0.78	2.06	0.76	7.78	0.66	1.09
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.40	0.68	0.40	0.39	0.47	0.14	0.41	0.67	0.39	0.54	0.38	0.47
d, Delay for Lane Group [s/veh]	16.45	26.09	19.27	21.80	22.02	16.73	41.17	52.96	48.03	51.32	49.23	50.64
Lane Group LOS	B	C	B	C	C	B	D	D	D	D	D	D
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.23	16.20	6.46	2.05	9.29	1.84	4.20	8.92	4.06	4.63	4.42	4.69
50th-Percentile Queue Length [ft/ln]	80.68	405.10	161.56	51.15	232.13	45.91	104.94	222.98	101.55	115.80	110.43	117.28
95th-Percentile Queue Length [veh/ln]	5.81	22.81	10.63	3.68	14.28	3.31	7.56	13.82	7.31	8.16	7.86	8.24
95th-Percentile Queue Length [ft/ln]	145.23	570.14	265.79	92.08	357.06	82.65	188.89	345.42	182.78	204.05	196.60	206.09

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	16.45	26.09	19.27	21.80	22.02	16.73	41.17	52.96	48.03	51.32	49.23	50.64
Movement LOS	B	C	B	C	C	B	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	22.50			21.13			48.56			50.41		
Approach LOS	C			C			D			D		
d_I, Intersection Delay [s/veh]	31.43											
Intersection LOS	C											
Intersection V/C	0.641											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	731			703			786			759		
d_b, Bicycle Delay [s]	29.19			30.47			26.70			27.93		
I_b,int, Bicycle LOS Score for Intersection	3.495			2.650			2.444			2.264		
Bicycle LOS	C			B			B			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: Roundabout
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 6.6
 Level Of Service: A

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇐⇐			⇐⇐			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	87	308	52	24	233	19	17	33	86	30	27	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	106	741	63	37	538	55	65	40	107	37	33	36
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	185	16	9	135	14	16	10	27	9	8	9
Total Analysis Volume [veh/h]	106	741	63	37	538	55	65	40	107	37	33	36
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	145			180			624			930		
Exiting Flow Rate [veh/h]	696			859			198			143		
Demand Flow Rate [veh/h]	106	741	63	37	538	55	65	40	107	37	33	36
Adjusted Demand Flow Rate [veh/h]	106	741	63	37	538	55	65	40	107	37	33	36

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1380.00	1380.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00102	0.00102
HV Adjustment Factor	0.98	0.98	0.98	0.98	0.98	0.98
Entry Flow Rate [veh/h]	437	492	303	341	217	109
Capacity of Entry and Bypass Lanes [veh/h]	1245	1245	1206	1206	731	535
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1221	1221	1183	1183	716	524
X, volume / capacity	0.35	0.40	0.25	0.28	0.30	0.20

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	1.59	1.92	0.99	1.17	1.24	0.75
95th-Percentile Queue Length [ft]	39.83	48.02	24.84	29.19	30.96	18.76
Approach Delay [s/veh]	6.58		5.49		8.61	9.62
Approach LOS	A		A		A	A
Intersection Delay [s/veh]	6.62					
Intersection LOS	A					

**Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E**

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 50.9
 Level Of Service: F
 Volume to Capacity (v/c): 0.508

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			←↑			←↑		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	4	36	1	74	17	45	76	272	5	4	186	106
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190	1.2190
In-Process Volume [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	44	1	90	21	55	93	398	6	5	273	129
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	11	0	23	5	14	23	100	2	1	68	32
Total Analysis Volume [veh/h]	5	44	1	90	21	55	93	398	6	5	273	129
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

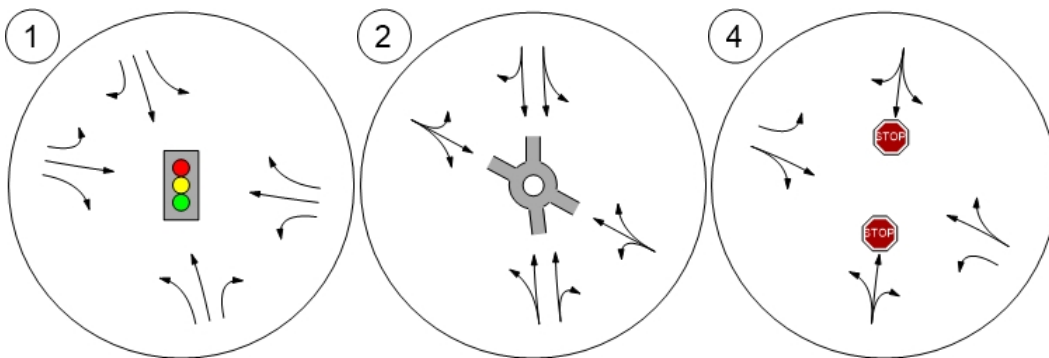
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.20	0.00	0.51	0.09	0.08	0.08	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	29.73	25.87	15.27	50.91	45.45	35.69	8.38	0.00	0.00	8.13	0.00	0.00
Movement LOS	D	D	C	F	E	E	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.85	0.85	0.85	4.32	4.32	4.32	0.26	0.00	0.00	0.01	0.00	0.00
95th-Percentile Queue Length [ft/ln]	21.15	21.15	21.15	108.03	108.03	108.03	6.54	0.00	0.00	0.33	0.00	0.00
d_A, Approach Delay [s/veh]	26.05			45.18			1.57			0.10		
Approach LOS	D			E			A			A		
d_I, Intersection Delay [s/veh]	8.59											
Intersection LOS	F											

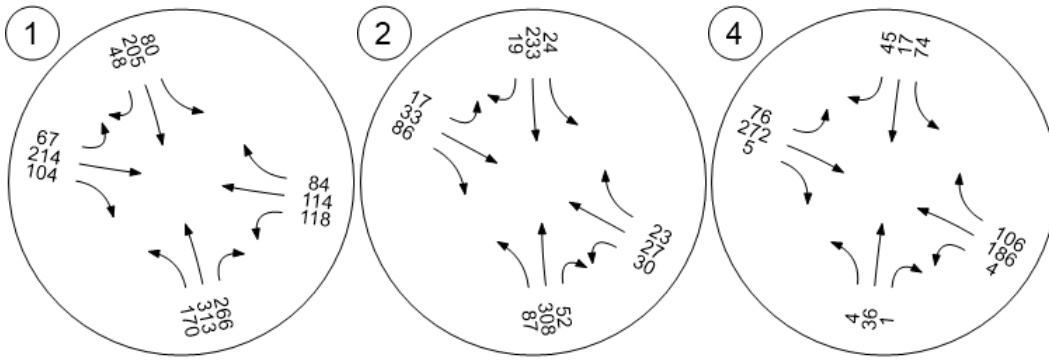
Study Intersections



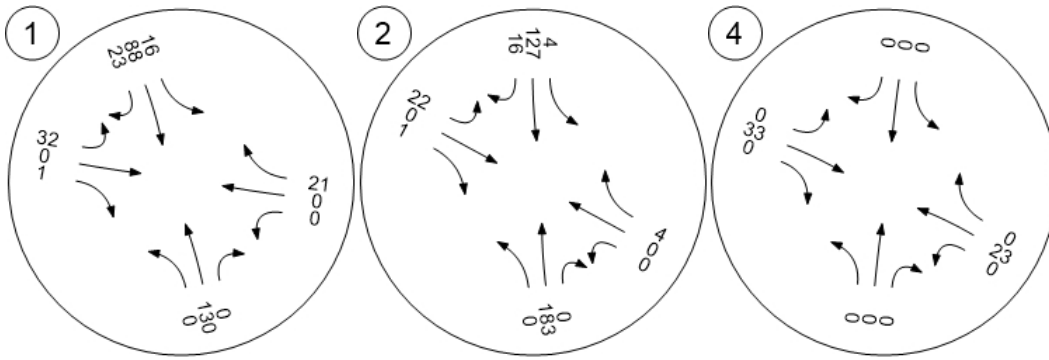
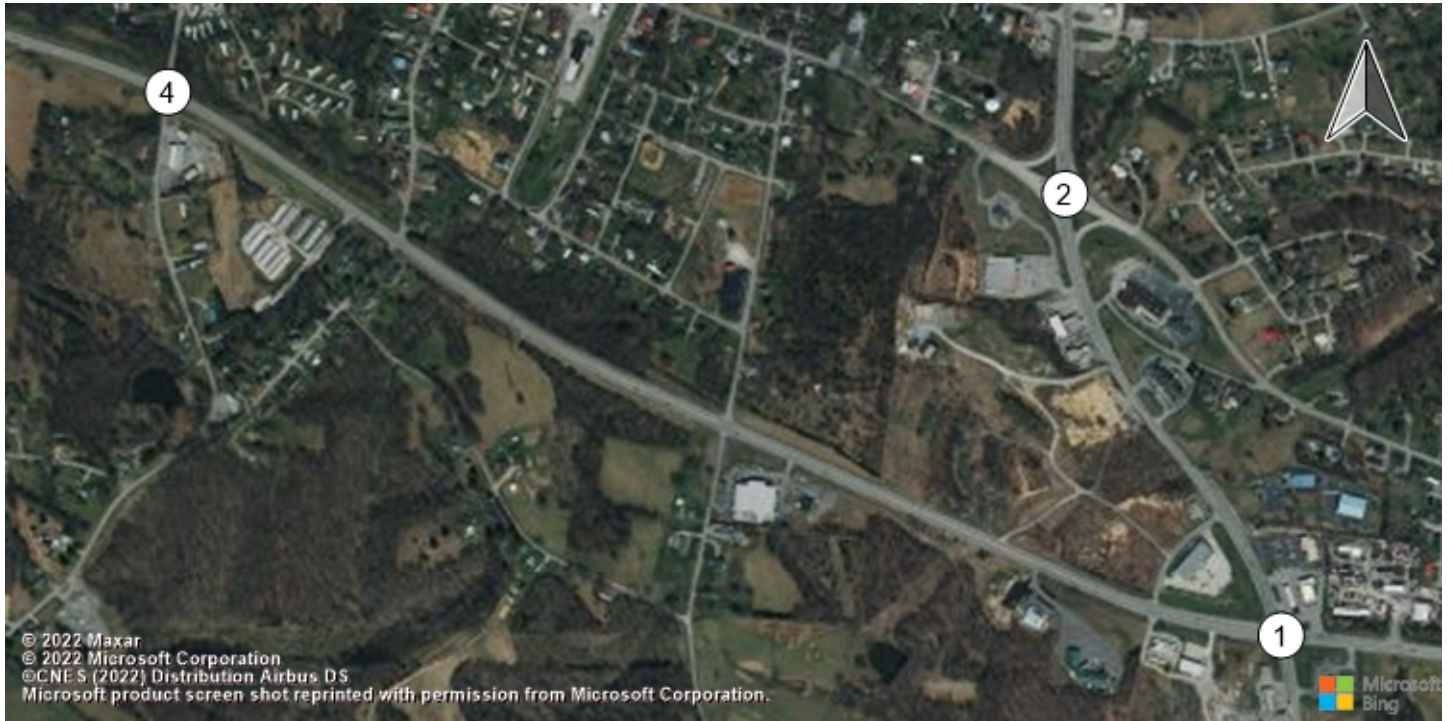
Lane Configuration and Traffic Control



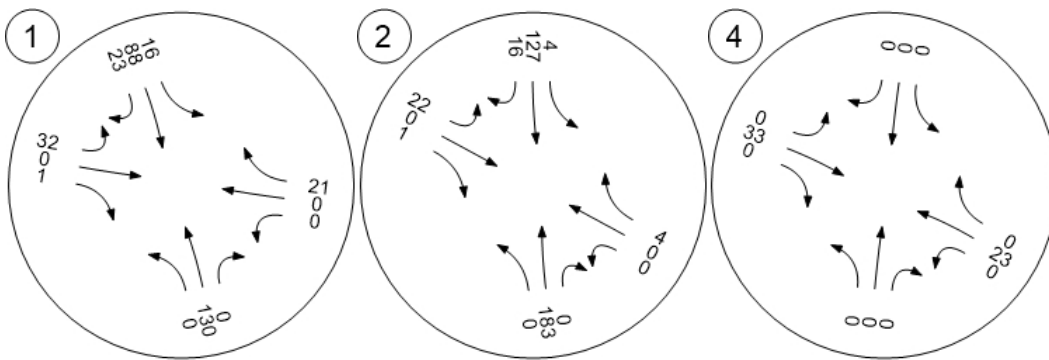
Traffic Volume - Base Volume



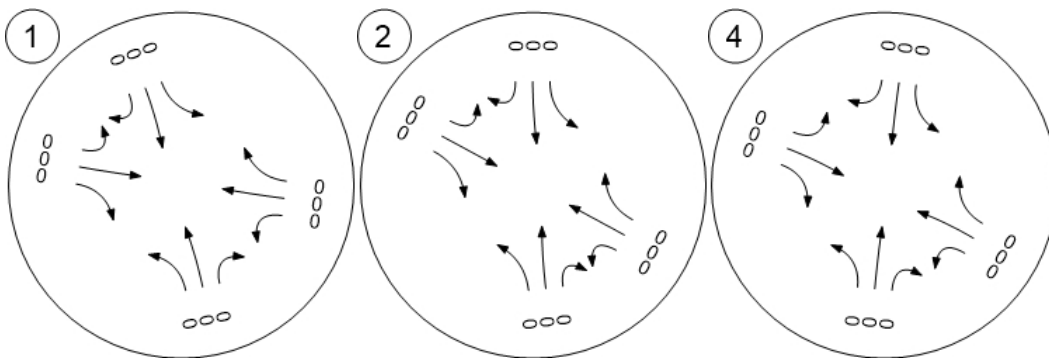
Traffic Volume - In-Process Volume



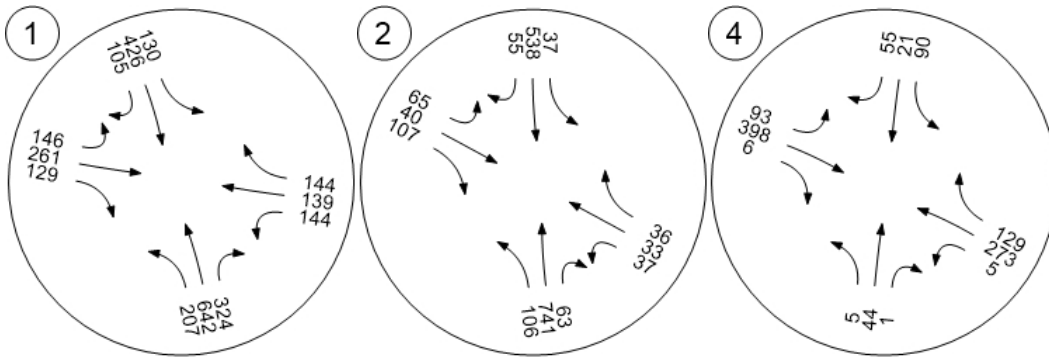
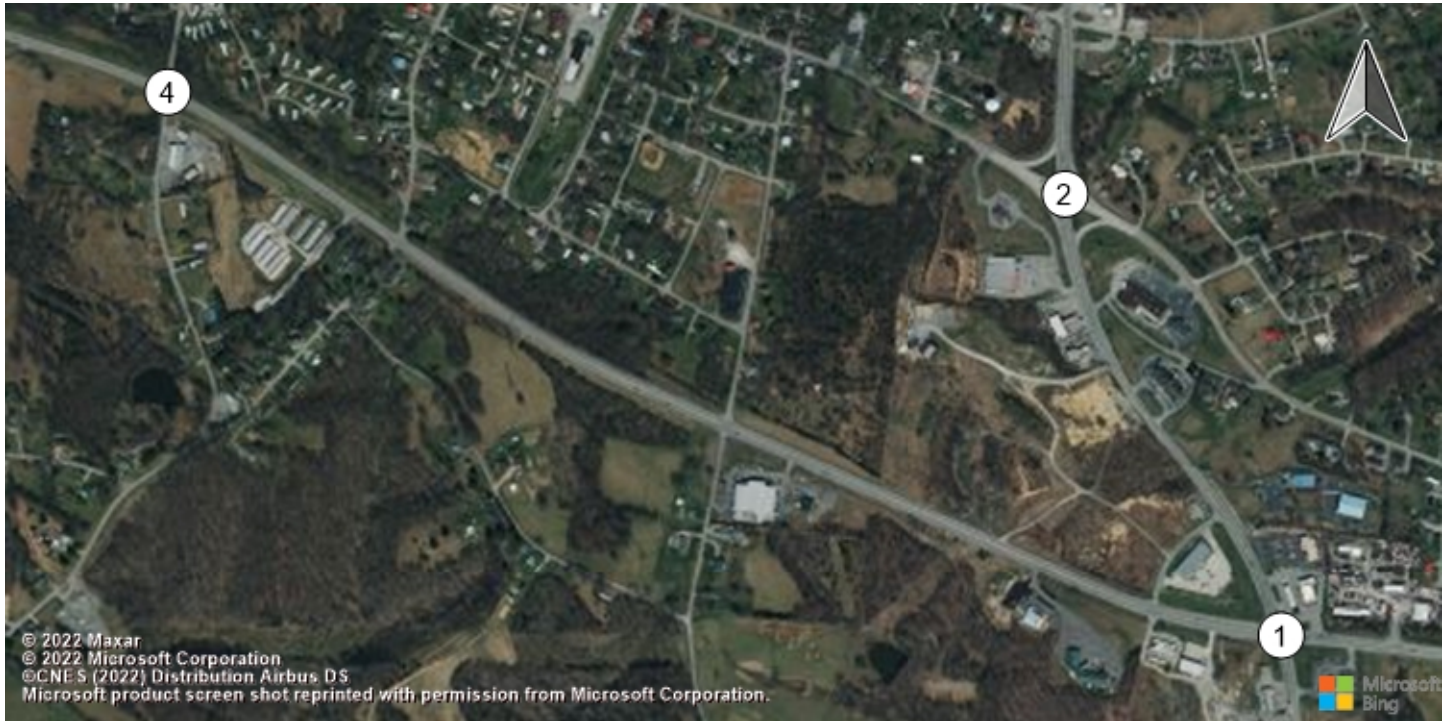
Traffic Volume - Net New Site Trips



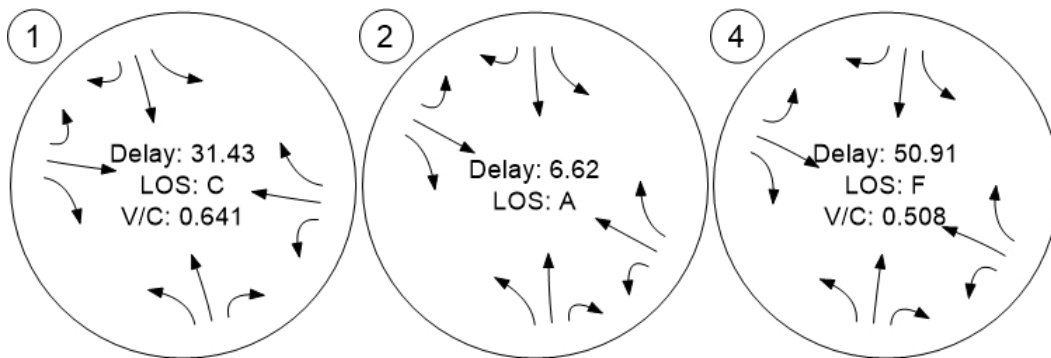
Traffic Volume - Other Volume



Traffic Volume - Future Total Volume



Traffic Conditions



Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 7 2052 Projected AM

Report File: M:\...\2052 Projected AM.pdf

4/14/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	NB Left	0.896	53.5	D
2	US 231/Austin Peay	Roundabout	HCM 7th Edition	EB Right		8.8	A
4	Hwy 52/Old Highway 31 E	Signalized	HCM 7th Edition	WB Thru	0.659	16.5	B
6	New Intersection	Signalized	HCM 7th Edition		0.000	0.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report

Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	53.5
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.896

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	115	186	89	54	299	36	25	66	135	259	148	69
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	59	0	18	115	29	14	0	0	0	0	11
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	208	455	161	134	771	123	73	119	244	469	268	147
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	114	40	34	193	31	18	30	61	117	67	37
Total Analysis Volume [veh/h]	208	455	161	134	771	123	73	119	244	469	268	147
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	12	36	0	47	71	0	9	29	0	28	48	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	140	140	140	140	140	140	140	140	140	140	140	140
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	79	67	67	79	67	67	53	25	25	53	44	44
g / C, Green / Cycle	0.56	0.48	0.48	0.56	0.48	0.48	0.38	0.18	0.18	0.38	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.30	0.27	0.11	0.16	0.46	0.09	0.08	0.07	0.17	0.37	0.16	0.10
s, saturation flow rate [veh/h]	692	1683	1431	838	1683	1431	970	1683	1431	1253	1683	1431
c, Capacity [veh/h]	218	804	683	402	805	685	328	301	255	491	529	450
d1, Uniform Delay [s]	45.76	26.18	21.52	18.90	35.12	20.82	30.93	50.83	56.95	46.46	39.15	36.68
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.30	0.50	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	50.17	2.88	0.81	0.48	22.87	0.57	0.34	0.85	33.79	30.69	0.79	0.42
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.95	0.57	0.24	0.33	0.96	0.18	0.22	0.40	0.96	0.95	0.51	0.33
d, Delay for Lane Group [s/veh]	95.94	29.06	22.33	19.38	57.99	21.40	31.27	51.67	90.74	77.15	39.94	37.10
Lane Group LOS	F	C	C	B	E	C	C	D	F	E	D	D
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	6.53	11.50	3.31	2.19	29.86	2.45	1.70	3.79	10.95	18.67	7.70	3.95
50th-Percentile Queue Length [ft/ln]	163.27	287.51	82.81	54.78	746.59	61.25	42.53	94.80	273.67	466.69	192.42	98.72
95th-Percentile Queue Length [veh/ln]	10.72	17.06	5.96	3.94	38.83	4.41	3.06	6.83	16.37	25.75	12.25	7.11
95th-Percentile Queue Length [ft/ln]	268.05	426.55	149.06	98.60	970.65	110.25	76.55	170.64	409.32	643.84	306.17	177.70

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	95.94	29.06	22.33	19.38	57.99	21.40	31.27	51.67	90.74	77.15	39.94	37.10
Movement LOS	F	C	C	B	E	C	C	D	F	E	D	D
d_A, Approach Delay [s/veh]	44.63			48.58			70.12			59.21		
Approach LOS	D			D			E			E		
d_I, Intersection Delay [s/veh]	53.47											
Intersection LOS	D											
Intersection V/C	0.896											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	429			929			329			600		
d_b, Bicycle Delay [s]	43.21			20.09			48.89			34.30		
I_b,int, Bicycle LOS Score for Intersection	2.919			3.256			2.279			3.018		
Bicycle LOS	C			C			B			C		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: Roundabout
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 8.8
 Level Of Service: A

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇐⇐			⇐⇐			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	103	165	8	8	221	16	15	19	159	20	29	11
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	85	0	4	162	18	11	0	0	0	0	5
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	186	469	14	22	724	65	49	34	288	36	52	30
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	117	4	6	181	16	12	9	72	9	13	8
Total Analysis Volume [veh/h]	186	469	14	22	724	65	49	34	288	36	52	30
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Number of Conflicting Circulating Lanes	2			2			1			1		
Circulating Flow Rate [veh/h]	107			279			798			718		
Exiting Flow Rate [veh/h]	1069			559			309			71		
Demand Flow Rate [veh/h]	186	469	14	22	724	65	49	34	288	36	52	30
Adjusted Demand Flow Rate [veh/h]	186	469	14	22	724	65	49	34	288	36	52	30

Lanes

Overwrite Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Overwrite Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1350.00	1420.00	1350.00	1420.00	1380.00	1380.00
B (coefficient)	0.00092	0.00085	0.00092	0.00085	0.00102	0.00102
HV Adjustment Factor	0.98	0.98	0.98	0.98	0.98	0.98
Entry Flow Rate [veh/h]	321	362	389	439	379	121
Capacity of Entry and Bypass Lanes [veh/h]	1224	1297	1044	1120	612	664
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1200	1272	1024	1098	600	651
X, volume / capacity	0.26	0.28	0.37	0.39	0.62	0.18

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	C	A
95th-Percentile Queue Length [veh]	1.06	1.15	1.74	1.89	4.24	0.66
95th-Percentile Queue Length [ft]	26.40	28.73	43.56	47.20	105.95	16.46
Approach Delay [s/veh]	5.35		7.39		18.34	7.66
Approach LOS	A		A		C	A
Intersection Delay [s/veh]	8.77					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E

Control Type:	Signalized	Delay (sec / veh):	16.5
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.659

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			←↑			←↑		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	3	18	1	84	34	58	115	142	1	0	187	100
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	14	0	0	29	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	33	2	152	62	105	208	285	2	0	396	181
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	8	1	38	16	26	52	71	1	0	99	45
Total Analysis Volume [veh/h]	5	33	2	152	62	105	208	285	2	0	396	181
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	0	4	0	0	8	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	10	0	0	10	0	5	10	0	5	10	0
Maximum Green [s]	0	30	0	0	30	0	10	30	0	10	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	24	0	0	24	0	9	49	0	17	57	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		Yes	No		Yes	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	L	C	L	C
C, Cycle Length [s]	51	51	51	51	51	51
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	0.00	2.00
g_i, Effective Green Time [s]	14	14	30	26	30	21
g / C, Green / Cycle	0.26	0.26	0.58	0.50	0.58	0.40
(v / s)_i Volume / Saturation Flow Rate	0.02	0.22	0.22	0.17	0.00	0.36
s, saturation flow rate [veh/h]	1656	1420	956	1681	1024	1595
c, Capacity [veh/h]	515	477	503	847	699	644
d1, Uniform Delay [s]	14.33	17.82	9.23	7.65	0.00	14.37
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.17
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.06	1.63	0.54	0.24	0.00	7.25
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.08	0.67	0.41	0.34	0.00	0.90
d, Delay for Lane Group [s/veh]	14.40	19.45	9.77	7.88	0.00	21.62
Lane Group LOS	B	B	A	A	A	C
Critical Lane Group	No	Yes	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.32	3.33	0.65	1.27	0.00	5.77
50th-Percentile Queue Length [ft/ln]	8.05	83.33	16.30	31.84	0.00	144.34
95th-Percentile Queue Length [veh/ln]	0.58	6.00	1.17	2.29	0.00	9.71
95th-Percentile Queue Length [ft/ln]	14.49	149.99	29.33	57.31	0.00	242.86

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	14.40	14.40	14.40	19.45	19.45	19.45	9.77	7.88	7.88	0.00	21.62	21.62
Movement LOS	B	B	B	B	B	B	A	A	A	A	C	C
d_A, Approach Delay [s/veh]	14.40			19.45			8.68			21.62		
Approach LOS	B			B			A			C		
d_I, Intersection Delay [s/veh]	16.46											
Intersection LOS	B											
Intersection V/C	0.659											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	778			778			1752			2063		
d_b, Bicycle Delay [s]	9.58			9.58			0.40			0.03		
I_b,int, Bicycle LOS Score for Intersection	1.626			2.086			2.376			2.512		
Bicycle LOS	A			B			B			B		

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 6: New Intersection**

Control Type:	Signalized	Delay (sec / veh):	0.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	US 231	US 231
Approach	Northbound	Southbound
Lane Configuration	↑	↑
Turning Movement	Thru	Thru
Lane Width [ft]	12.00	12.00
No. of Lanes in Entry Pocket	0	0
Entry Pocket Length [ft]	100.00	100.00
No. of Lanes in Exit Pocket	0	0
Exit Pocket Length [ft]	0.00	0.00
Speed [mph]	30.00	30.00
Grade [%]	0.00	0.00
Curb Present	No	No
Crosswalk	Yes	Yes

Volumes

Name	US 231	US 231
Base Volume Input [veh/h]	0	0
Base Volume Adjustment Factor	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00
Proportion of CAVs [%]	0.00	
Growth Factor	1.0000	1.0000
In-Process Volume [veh/h]	0	0
Site-Generated Trips [veh/h]	0	0
Diverted Trips [veh/h]	0	0
Pass-by Trips [veh/h]	0	0
Existing Site Adjustment Volume [veh/h]	0	0
Other Volume [veh/h]	0	0
Right Turn on Red Volume [veh/h]	0	0
Total Hourly Volume [veh/h]	0	0
Peak Hour Factor	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0
Total Analysis Volume [veh/h]	0	0
Presence of On-Street Parking	No	No
On-Street Parking Maneuver Rate [/h]	0	0
Local Bus Stopping Rate [/h]	0	0
v_do, Outbound Pedestrian Volume crossing	0	0
v_di, Inbound Pedestrian Volume crossing m	0	0
v_co, Outbound Pedestrian Volume crossing	0	0
v_ci, Inbound Pedestrian Volume crossing mi	0	0
v_ab, Corner Pedestrian Volume [ped/h]	0	0
Bicycle Volume [bicycles/h]	0	0

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive
Signal Group	0	0
Auxiliary Signal Groups		
Lead / Lag	-	-
Minimum Green [s]	0	0
Maximum Green [s]	0	0
Amber [s]	0.0	0.0
All red [s]	0.0	0.0
Split [s]	0	0
Vehicle Extension [s]	0.0	0.0
Walk [s]	0	0
Pedestrian Clearance [s]	0	0
Delayed Vehicle Green [s]	0.0	0.0
Rest In Walk		
I1, Start-Up Lost Time [s]	0.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0
Minimum Recall		
Maximum Recall		
Pedestrian Recall		
Detector Location [ft]	0.0	0.0
Detector Length [ft]	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group Results

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	0.00
Movement LOS		
d_A, Approach Delay [s/veh]	0.00	0.00
Approach LOS	A	A
d_I, Intersection Delay [s/veh]	0.00	
Intersection LOS	A	
Intersection V/C	0.000	

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00
d_p, Pedestrian Delay [s]	45.00	45.00
I_p,int, Pedestrian LOS Score for Intersection	1.725	1.725
Crosswalk LOS	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0
d_b, Bicycle Delay [s]	45.00	45.00
I_b,int, Bicycle LOS Score for Intersection	1.560	1.560
Bicycle LOS	A	A

Westmoreland Traffic Study

Vistro File: M:\...\Westmoreland TPG - Traffic Model.vistro

Scenario 8 2052 Projected PM

Report File: M:\...\2052 Projected PM.pdf

4/14/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 231/Hwy 52	Signalized	HCM 7th Edition	SB Left	0.881	54.2	D
2	US 231/Austin Peay	Roundabout	HCM 7th Edition	WB Left		9.8	A
4	Hwy 52/Old Highway 31 E	Signalized	HCM 7th Edition	SB Left	0.580	12.8	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 231/Hwy 52

Control Type:	Signalized	Delay (sec / veh):	54.2
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.881

Intersection Setup

Name	US 231			US 231			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵↱↲			↵↱↲			↵↱↲			↵↱↲		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Entry Pocket Length [ft]	130.00	100.00	145.00	200.00	100.00	100.00	130.00	100.00	120.00	120.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			HWY 52			HWY 52		
Base Volume Input [veh/h]	170	313	266	80	205	48	67	214	104	118	114	84
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	130	0	16	88	23	32	0	1	0	0	21
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	308	827	481	177	547	133	185	387	190	214	206	194
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	77	207	120	44	137	33	46	97	48	54	52	49
Total Analysis Volume [veh/h]	308	827	481	177	547	133	185	387	190	214	206	194
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	10	0	5	0	0
Maximum Green [s]	12	30	0	12	30	0	12	30	0	12	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	29	67	0	10	48	0	19	31	0	22	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00
g_i, Effective Green Time [s]	73	63	63	73	53	53	49	30	30	49	32	32
g / C, Green / Cycle	0.56	0.49	0.49	0.56	0.40	0.40	0.38	0.23	0.23	0.38	0.25	0.25
(v / s)_i Volume / Saturation Flow Rate	0.34	0.49	0.34	0.35	0.33	0.09	0.17	0.23	0.13	0.20	0.12	0.14
s, saturation flow rate [veh/h]	918	1683	1431	512	1683	1431	1105	1683	1431	1048	1683	1431
c, Capacity [veh/h]	398	817	695	184	680	578	401	387	329	302	413	351
d1, Uniform Delay [s]	25.50	33.43	25.90	49.13	34.18	25.44	30.99	50.07	44.47	34.52	42.17	42.81
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.25	0.45	0.14	0.50	0.11	0.15
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.63	34.42	5.60	56.71	9.77	0.93	1.90	43.58	2.07	13.14	0.93	1.85
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.77	1.01	0.69	0.96	0.80	0.23	0.46	1.00	0.58	0.71	0.50	0.55
d, Delay for Lane Group [s/veh]	39.13	67.85	31.51	105.83	43.95	26.36	32.89	93.65	46.54	47.67	43.10	44.67
Lane Group LOS	D	F	C	F	D	C	C	F	D	D	D	D
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	6.65	32.77	12.46	5.58	16.95	2.88	4.44	17.18	5.65	6.09	5.82	5.64
50th-Percentile Queue Length [ft/ln]	166.16	819.22	311.48	139.61	423.65	72.03	110.89	429.62	141.17	152.28	145.54	141.12
95th-Percentile Queue Length [veh/ln]	10.87	42.56	18.25	9.46	23.70	5.19	7.89	24.00	9.54	10.14	9.78	9.54
95th-Percentile Queue Length [ft/ln]	271.86	1064.04	456.21	236.50	592.43	129.65	197.24	599.93	238.60	253.47	244.47	238.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	39.13	67.85	31.51	105.83	43.95	26.36	32.89	93.65	46.54	47.67	43.10	44.67
Movement LOS	D	F	C	F	D	C	C	F	D	D	D	D
d_A, Approach Delay [s/veh]	51.56			54.00			67.15			45.19		
Approach LOS	D			D			E			D		
d_I, Intersection Delay [s/veh]	54.17											
Intersection LOS	D											
Intersection V/C	0.881											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	938			646			385			431		
d_b, Bicycle Delay [s]	18.31			29.78			42.40			40.02		
I_b,int, Bicycle LOS Score for Intersection	4.226			2.974			2.817			2.573		
Bicycle LOS	D			C			C			B		

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: US 231/Austin Peay**

Control Type: Roundabout
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 9.8
 Level Of Service: A

Intersection Setup

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⇐⇐			⇐⇐			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	465.00	100.00	100.00	420.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	1	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	450.00	0.00	0.00	420.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US 231			US 231			Austin Peay Highway			Austin Peay Highway		
Base Volume Input [veh/h]	87	308	52	24	233	19	17	33	86	30	27	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.9100	1.9100	1.9100	1.9100	1.9100	1.9100	1.9100	1.9100	1.9100	1.9100	1.9100	1.9100
In-Process Volume [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	183	0	4	127	16	22	0	1	0	0	4
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	166	954	99	54	699	68	76	63	166	57	52	52
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	239	25	14	175	17	19	16	42	14	13	13
Total Analysis Volume [veh/h]	166	954	99	54	699	68	76	63	166	57	52	52
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	197			281			826			1220		
Exiting Flow Rate [veh/h]	940			1104			292			220		
Demand Flow Rate [veh/h]	166	954	99	54	699	68	76	63	166	57	52	52
Adjusted Demand Flow Rate [veh/h]	166	954	99	54	699	68	76	63	166	57	52	52

Lanes

Override Calculated Critical Headway	No	No	No	No	No	No
User-Defined Critical Headway [s]	4.00	4.00	4.00	4.00	4.00	4.00
Override Calculated Follow-Up Time	No	No	No	No	No	No
User-Defined Follow-Up Time [s]	3.00	3.00	3.00	3.00	3.00	3.00
A (intercept)	1420.00	1420.00	1420.00	1420.00	1380.00	1380.00
B (coefficient)	0.00091	0.00091	0.00091	0.00091	0.00102	0.00102
HV Adjustment Factor	0.98	0.98	0.98	0.98	0.98	0.98
Entry Flow Rate [veh/h]	585	659	394	444	312	165
Capacity of Entry and Bypass Lanes [veh/h]	1188	1188	1101	1101	595	398
Pedestrian Impedance	1.00	1.00	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	1164	1164	1079	1079	583	390
X, volume / capacity	0.49	0.56	0.36	0.40	0.52	0.41

Movement, Approach, & Intersection Results

Lane LOS	A	A	A	A	C	C
95th-Percentile Queue Length [veh]	2.80	3.55	1.64	1.98	3.03	1.97
95th-Percentile Queue Length [ft]	70.06	88.72	41.00	49.50	75.81	49.36
Approach Delay [s/veh]	9.12		7.30		15.39	17.64
Approach LOS	A		A		C	C
Intersection Delay [s/veh]	9.84					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 4: Hwy 52/Old Highway 31 E

Control Type:	Signalized	Delay (sec / veh):	12.8
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.580

Intersection Setup

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			←↑			←↑		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	Old Highway 31 E			Old Highway 31 E			HWY 52			HWY 52		
Base Volume Input [veh/h]	4	36	1	74	17	45	76	272	5	4	186	106
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100	1.8100
In-Process Volume [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	33	0	0	23	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	65	2	134	31	81	138	558	9	7	383	192
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	16	1	34	8	20	35	140	2	2	96	48
Total Analysis Volume [veh/h]	7	65	2	134	31	81	138	558	9	7	383	192
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	0	4	0	0	8	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	10	0	0	10	0	5	10	0	5	10	0
Maximum Green [s]	0	30	0	0	30	0	10	30	0	10	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	17	0	0	17	0	19	54	0	9	44	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		Yes	No		Yes	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	L	C	L	C
C, Cycle Length [s]	44	44	44	44	44	44
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	0.00	2.00
g_i, Effective Green Time [s]	10	10	26	22	26	18
g / C, Green / Cycle	0.22	0.22	0.60	0.50	0.60	0.41
(v / s)_i Volume / Saturation Flow Rate	0.04	0.17	0.14	0.34	0.01	0.36
s, saturation flow rate [veh/h]	1670	1430	952	1678	838	1589
c, Capacity [veh/h]	455	440	558	834	547	656
d1, Uniform Delay [s]	13.95	15.85	6.79	8.34	4.96	11.79
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.17	1.12	0.23	0.98	0.01	3.91
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.16	0.56	0.25	0.68	0.01	0.88
d, Delay for Lane Group [s/veh]	14.12	16.96	7.02	9.32	4.97	15.70
Lane Group LOS	B	B	A	A	A	B
Critical Lane Group	No	Yes	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.53	2.05	0.23	2.39	0.01	3.91
50th-Percentile Queue Length [ft/ln]	13.24	51.37	5.80	59.80	0.26	97.69
95th-Percentile Queue Length [veh/ln]	0.95	3.70	0.42	4.31	0.02	7.03
95th-Percentile Queue Length [ft/ln]	23.83	92.46	10.44	107.64	0.48	175.85

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	14.12	14.12	14.12	16.96	16.96	16.96	7.02	9.32	9.32	4.97	15.70	15.70
Movement LOS	B	B	B	B	B	B	A	A	A	A	B	B
d_A, Approach Delay [s/veh]	14.12			16.96			8.87			15.57		
Approach LOS	B			B			A			B		
d_I, Intersection Delay [s/veh]	12.78											
Intersection LOS	B											
Intersection V/C	0.580											

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0			0.0			0.0			0.0		
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00		
d_p, Pedestrian Delay [s]	0.00			0.00			0.00			0.00		
I_p,int, Pedestrian LOS Score for Intersection	0.000			0.000			0.000			0.000		
Crosswalk LOS	F			F			F			F		
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000		
c_b, Capacity of the bicycle lane [bicycles/h]	597			597			2296			1837		
d_b, Bicycle Delay [s]	10.72			10.72			0.48			0.14		
I_b,int, Bicycle LOS Score for Intersection	1.682			1.966			2.723			2.520		
Bicycle LOS	A			A			B			B		

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Approach	No.	TOD	Speed Limit	% Left-Turns	Advancing Volume	Opposing Volumes	Results
Eastbound Highway 52 @ Old Highway 31	1	AM	45	41%	342	408	Left-turn treatment warranted.
	2	PM	45	19%	497	407	Left-turn treatment warranted.
Westbound Highway 52 @ Old Highway 31	3	AM	45	1%	408	342	Left-turn treatment NOT warranted.
	4	PM	45	1%	407	497	Left-turn treatment NOT warranted.
	5	AM					#DIV/0!
	6	PM					#DIV/0!
	7	AM					#DIV/0!
	8	PM					#DIV/0!
	9	AM					#DIV/0!
	10	PM					#DIV/0!
	11	AM					#DIV/0!
	12	PM					#DIV/0!
	13	AM					#DIV/0!
	14	PM					#DIV/0!
	15	AM					#DIV/0!
	16	PM					#DIV/0!
	17	AM					#DIV/0!
	18	PM					#DIV/0!
	19	AM					#DIV/0!
	20	PM					#DIV/0!
	21	AM					#DIV/0!
	22	PM					#DIV/0!
	23	AM					#DIV/0!
	24	PM					#DIV/0!
	25	AM					#DIV/0!
	26	PM					#DIV/0!
	27	AM					#DIV/0!
	28	PM					#DIV/0!
	29	AM					#DIV/0!
	30	PM					#DIV/0!

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

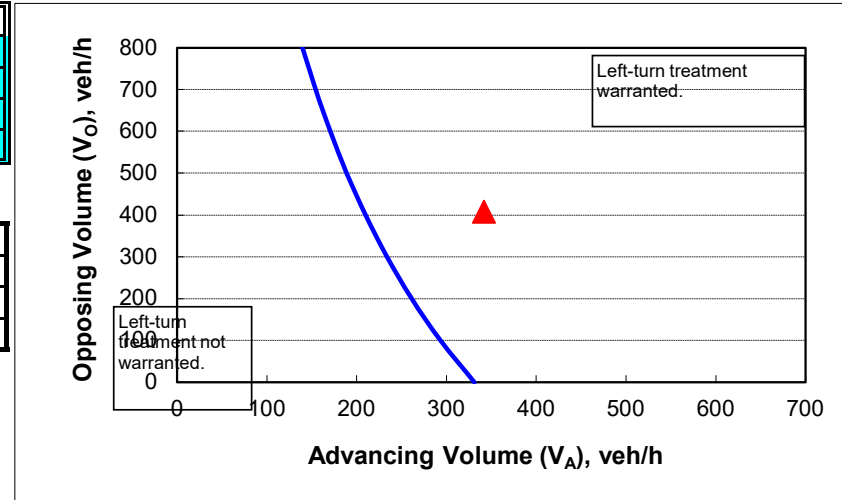
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	41%
Advancing volume (V_A), veh/h:	342
Opposing volume (V_O), veh/h:	408

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	208
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

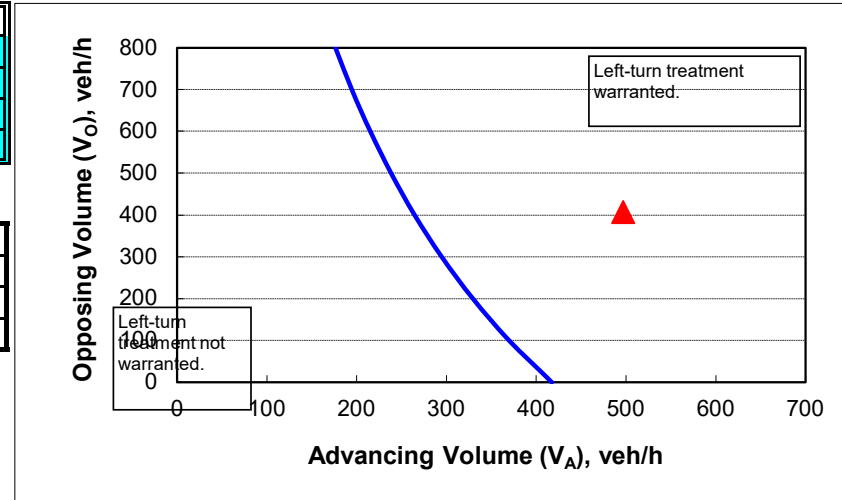
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	19%
Advancing volume (V_A), veh/h:	497
Opposing volume (V_O), veh/h:	407

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	263
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

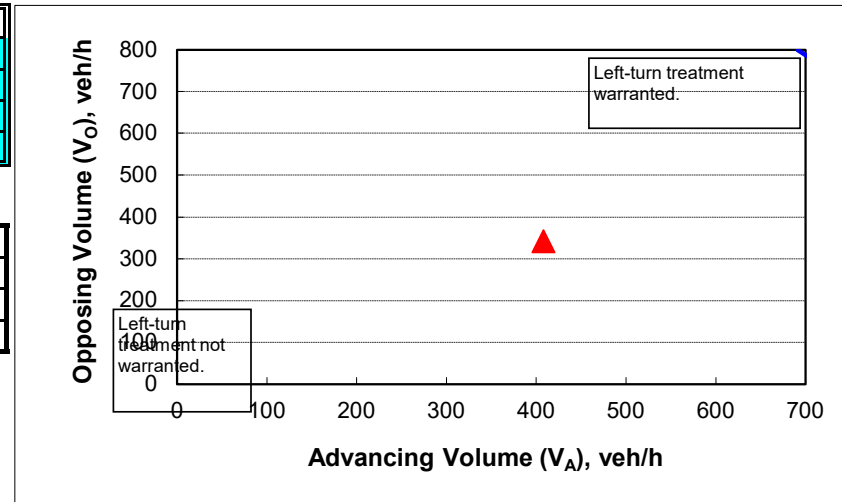
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	408
Opposing volume (V_O), veh/h:	342

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1104
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

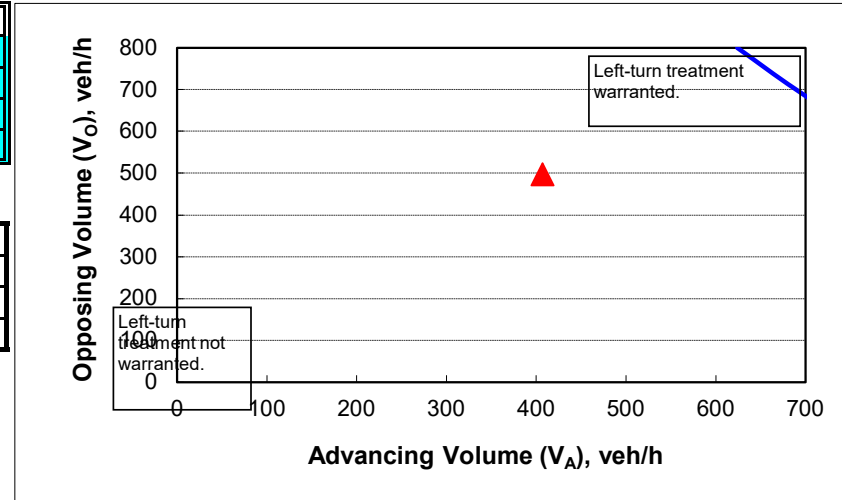
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	407
Opposing volume (V_O), veh/h:	497

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	847
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Appendix D – TDOT Count Station Data

TDOT AADT DATA

Station	90	143	213	214	38	35	36	39
Route	US 231	US 231	Hwy 52	Hwy 52	Austin Peay Hwy	Austin Peay Hwy	Old Hwy 31	Old Hwy 31
Location	US 231; South of Hwy 52	US 231; north of George Atkins Rd	Hwy 52; near the Macon Co. Line	Hwy 52; b/n James Brown Road and Old Hwy 31 E	Austin Peay Hwy; near Macon Co. Line	Austin Peay Hwy; west of New Hope Road	Old Hwy 31; north of N 1st Street	Old Hwy 31; south of Johnny Spears Rd
County	Sumner	Sumner	Sumner	Sumner	Sumner	Sumner	Sumner	Sumner
2021	13,322	6,994	10,493	5,281	1,257	388	1,825	705
2020	9,787	6,008	8,519	5,664	1,284	378	1,755	646
2019	12,163	5,800	9,821	6,244	1,371	402	1,874	650
2018	12,033	6,537	9,791	5,667	1,327	368	1,744	636
2017	11,584	6,246	9,496	5,446	987	347	1,937	597
2016	11,392	5,480	8,571	5,920	941	396	2,059	550
2015	11,036	6,067	8,776	5,510	978	393	1,692	607
2014	10,350	5,801	8,516	5,542	927	392	1,786	619
2013	10,653	5,393	8,473	5,280	886	407	1,957	556
2012	9,733	7,014	7,950	5,044	1,020	421	1,880	599
2011	10,701	6,530	8,503	5,188	970	528	1,926	612
2010	10,352	5,700	7,986	5,092	957	468	2,000	552
2009	9,994	5,718	7,366	4,638	1,035	426	1,894	594

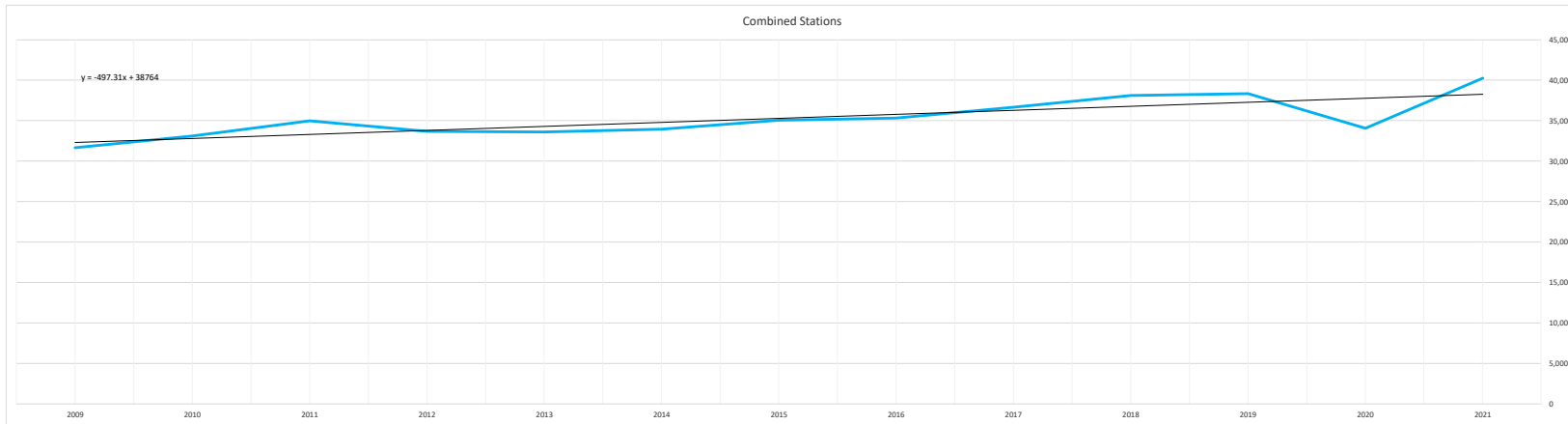
TDOT AADT Background Growth Trend Analysis

Year	US 231; South of Hwy 52		US 231; north of George Atkins Rd		Hwy 52; near the Macon Co. Line		Hwy 52; b/n James Brown Road and		Austin Peay Hwy; near Macon Co.		Austin Peay Hwy; west of New Hope		Old Hwy 31; north of N 1st Street		Old Hwy 31; south of Johnny Spears		TOTAL	
	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference
2009	9,994	--	5,718	--	7,366	--	4,638	--	1,035	--	426	--	1,894	--	594	--	31,665	--
2010	10,352	3.6%	5,700	-0.3%	7,986	8.4%	5,092	9.8%	957	-7.5%	468	9.9%	2,000	5.6%	552	-7.1%	33,107	4.6%
2011	10,701	3.4%	6,530	14.6%	8,503	6.5%	5,188	1.9%	970	1.4%	528	12.8%	1,926	-3.7%	612	10.9%	34,958	5.6%
2012	9,733	-9.0%	7,014	7.4%	7,950	-6.5%	5,044	-2.8%	1,020	5.2%	421	-20.3%	1,880	-2.4%	599	-2.1%	33,661	-3.7%
2013	10,653	9.5%	5,393	-23.1%	8,473	6.6%	5,280	4.7%	886	-13.1%	407	-3.3%	1,957	4.1%	556	-7.2%	33,605	-0.2%
2014	10,350	-2.8%	5,801	7.6%	8,516	0.5%	5,542	5.0%	927	4.6%	392	-3.7%	1,786	-8.7%	619	11.3%	33,933	1.0%
2015	11,036	6.6%	6,067	4.6%	8,776	3.1%	5,510	-0.6%	978	5.5%	393	0.3%	1,692	-5.3%	607	-1.9%	35,059	3.3%
2016	11,392	3.2%	5,480	-9.7%	8,571	-2.3%	5,920	7.4%	941	-3.8%	396	0.8%	2,059	21.7%	550	-9.4%	35,309	0.7%
2017	11,584	1.7%	6,246	14.0%	9,496	10.8%	5,446	-8.0%	987	4.9%	347	-12.4%	1,937	-5.9%	597	8.5%	36,640	3.8%
2018	12,033	3.9%	6,537	4.7%	9,791	3.1%	5,667	4.1%	1,327	34.4%	368	6.1%	1,744	-10.0%	636	6.5%	38,103	4.0%
2019	12,163	1.1%	5,800	-11.3%	9,821	0.3%	6,244	10.2%	1,371	3.3%	402	9.2%	1,874	7.5%	650	2.2%	38,325	0.6%
2020	9,787	-19.5%	6,008	3.6%	8,519	-13.3%	5,664	-9.3%	1,284	-6.3%	378	-6.0%	1,755	-6.4%	646	-0.6%	34,041	-11.2%
2021	13,322	36.1%	6,994	16.4%	10,493	23.2%	5,281	-6.8%	1,257	-2.1%	388	2.6%	1,825	4.0%	705	9.1%	40,265	18.3%

Exponential Rate	US 231; South of Hwy 52		US 231; north of George Atkins Rd		Hwy 52; near the Macon Co. Line		Hwy 52; b/n James Brown Road and		Austin Peay Hwy; near Macon Co.		Austin Peay Hwy; west of New Hope		Old Hwy 31; north of N 1st Street		Old Hwy 31; south of Johnny Spears		TOTAL	
	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference	Value	% Difference
Since 2020 Annual	36.12%		16.41%		23.17%		-6.76%		-2.10%		2.65%		3.99%		9.13%		18.28%	
Since 2019 Annual	4.66%		9.81%		3.36%		-8.03%		-4.25%		-1.76%		-1.32%		4.14%		2.50%	
Since 2018 Annual	3.45%		2.28%		2.34%		-2.32%		-1.79%		1.52%		1.52%		3.49%		1.86%	
Since 2017 Annual	3.56%		2.87%		2.53%		-0.77%		6.23%		2.83%		-1.48%		4.24%		2.39%	
Since 2016 Annual	3.18%		5.00%		4.13%		-2.26%		5.96%		-0.41%		-2.38%		5.09%		2.66%	
Since 2015 Annual	3.19%		2.40%		3.02%		-0.70%		4.27%		-0.21%		1.27%		2.53%		2.33%	
Since 2014 Annual	3.67%		2.71%		3.03%		-0.69%		4.45%		-0.15%		0.31%		1.88%		2.47%	
Since 2013 Annual	2.83%		3.30%		2.71%		0.00%		4.47%		-0.60%		-0.87%		3.01%		2.29%	
Since 2012 Annual	3.55%		-0.03%		3.13%		0.51%		2.35%		-0.90%		-0.33%		1.83%		2.01%	
Since 2011 Annual	2.21%		0.69%		2.13%		0.18%		2.63%		-3.03%		-0.54%		1.42%		1.42%	

Average of Differences	
NO. Years	Average
1	18.3%
2	3.6%
3	2.6%
4	2.9%
5	3.1%
6	2.7%
7	2.8%
8	2.6%
9	2.3%
10	1.7%

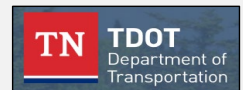
Average of Exponential Rates	
NO. Years	Average
1	18.3%
2	10.4%
3	7.5%
4	6.3%
5	5.5%
6	5.0%
7	4.6%
8	4.3%
9	4.0%
10	3.8%



Appendix E – Planning Level Cost Estimates

COST ESTIMATE SUMMARY

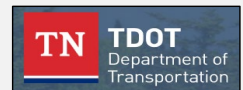
Route:	SR 52/US 231/Highway 31-E
Termini:	
Scope of Work:	Signal Modifications (Project ID 1)
Project Type of Work:	Intersection Improvements and Signals
County:	Sumner
Length:	0.10 Miles
Date:	June 22, 2023
Estimate Type:	Concept



DESCRIPTION	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Construction Items				
Removal Items	\$0	\$0	\$0	\$0
Asphalt Paving	\$0	\$0	\$0	\$0
Concrete Pavement	\$0	\$0	\$0	\$0
Drainage	\$0	\$0	\$0	\$0
Appurtenances	\$0	\$0	\$0	\$0
Structures	\$0	\$0	\$0	\$0
Fencing	\$0	\$0	\$0	\$0
Signalization & Lighting	\$0	\$0	\$0	\$0
Railroad Crossing	\$0	\$0	\$0	\$0
Earthwork	\$0	\$0	\$0	\$0
Clearing and Grubbing	\$0	\$0	\$0	\$0
Seeding & Sodding	\$0	\$0	\$0	\$0
Rip-Rap or Slope Protection	\$0	\$0	\$0	\$0
Guardrail	\$0	\$0	\$0	\$0
Signing	\$0	\$0	\$0	\$500
Pavement Markings	\$0	\$0	\$0	\$147,000
Maintenance of Traffic	\$0	\$0	\$0	\$7,000
Mobilization	5%	\$0	\$0	\$7,730
Other Items and Annual Inflation	10%	\$0	\$0	\$16,200
Const. Contingency (Structures Not Included)	30%	\$0	\$0	\$53,500
Const. Eng. & Inspec.	10%	\$0	\$0	\$23,200
Construction Estimate		\$0	\$0	\$255,000
Interchanges & Unique Intersections				
Roundabouts	\$0	\$0	\$0	\$0
Interchanges	\$0	\$0	\$0	\$0
Right-of-Way & Utilities	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Right-of-Way	\$0	\$0	\$0	\$0
Utilities	\$0	\$0	\$0	\$0
Preliminary Engineering	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Prelim. Eng.	10.0%	\$0	\$0	\$25,500
Total Project Cost (2021)	\$ -	\$ -	\$ -	\$ 281,000

COST ESTIMATE SUMMARY

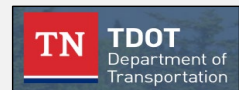
Route:	Old Highway 31-E/SR 52
Termini:	
Scope of Work:	Install Left Turn Lanes (Project ID 2)
Project Type of Work:	Turn Lanes
County:	Sumner
Length:	0.12 Miles
Date:	June 22, 2023
Estimate Type:	Concept



DESCRIPTION	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Construction Items				
Removal Items	\$0	\$0	\$0	\$0
Asphalt Paving	\$0	\$0	\$0	\$0
Concrete Pavement	\$0	\$0	\$0	\$0
Drainage	\$0	\$0	\$0	\$0
Appurtenances	\$0	\$0	\$0	\$0
Structures	\$0	\$0	\$0	\$0
Fencing	\$0	\$0	\$0	\$0
Signalization & Lighting	\$0	\$0	\$0	\$0
Railroad Crossing	\$0	\$0	\$0	\$0
Earthwork	\$0	\$0	\$0	\$0
Clearing and Grubbing	\$0	\$0	\$0	\$0
Seeding & Sodding	\$0	\$0	\$0	\$0
Rip-Rap or Slope Protection	\$0	\$0	\$0	\$0
Guardrail	\$0	\$0	\$0	\$0
Signing	\$0	\$0	\$0	\$0
Pavement Markings	\$0	\$0	\$0	\$2,900
Maintenance of Traffic	\$0	\$0	\$0	\$200
Mobilization 5%	\$0	\$0	\$0	\$155
Other Items and Annual Inflation 10%	\$0	\$0	\$0	\$326
Const. Contingency (Structures Not Included) 30%	\$0	\$0	\$0	\$1,070
Const. Eng. & Inspec. 10%	\$0	\$0	\$0	\$465
Construction Estimate	\$0	\$0	\$0	\$5,120
Interchanges & Unique Intersections				
Roundabouts	\$0	\$0	\$0	\$0
Interchanges	\$0	\$0	\$0	\$0
Right-of-Way & Utilities	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Right-of-Way	\$0	\$0	\$0	\$0
Utilities	\$0	\$0	\$0	\$7,500
Preliminary Engineering	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Prelim. Eng. 10.0%	\$0	\$0	\$0	\$512
Total Project Cost (2021)	\$ -	\$ -	\$ -	\$ 13,100

COST ESTIMATE SUMMARY

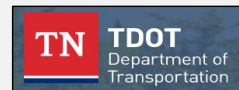
Route:	SR 52/Old Highway 31-E
Termini:	
Scope of Work:	New Signal (Project ID 3)
Project Type of Work:	Intersection Improvements and Signals
County:	Sumner
Length:	0.10 Miles
Date:	June 22, 2023
Estimate Type:	Concept



DESCRIPTION	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Construction Items				
Removal Items	\$0	\$0	\$0	\$0
Asphalt Paving	\$0	\$0	\$0	\$0
Concrete Pavement	\$0	\$0	\$0	\$0
Drainage	\$0	\$0	\$0	\$0
Appurtenances	\$0	\$0	\$0	\$0
Structures	\$0	\$0	\$0	\$0
Fencing	\$0	\$0	\$0	\$0
Signalization & Lighting	\$0	\$0	\$0	\$0
Railroad Crossing	\$0	\$0	\$0	\$0
Earthwork	\$0	\$0	\$0	\$0
Clearing and Grubbing	\$0	\$0	\$0	\$0
Seeding & Sodding	\$0	\$0	\$0	\$0
Rip-Rap or Slope Protection	\$0	\$0	\$0	\$0
Guardrail	\$0	\$0	\$0	\$0
Signing	\$0	\$0	\$0	\$500
Pavement Markings	\$0	\$0	\$0	\$134,000
Maintenance of Traffic	\$0	\$0	\$0	\$11,000
Mobilization 5%	\$0	\$0	\$0	\$7,280
Other Items and Annual Inflation 10%	\$0	\$0	\$0	\$15,300
Const. Contingency (Structures Not Included) 30%	\$0	\$0	\$0	\$50,400
Const. Eng. & Inspec. 10%	\$0	\$0	\$0	\$21,800
Construction Estimate	\$0	\$0	\$0	\$240,000
Interchanges & Unique Intersections				
Roundabouts	\$0	\$0	\$0	\$0
Interchanges	\$0	\$0	\$0	\$0
Right-of-Way & Utilities	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Right-of-Way	\$0	\$0	\$0	\$0
Utilities	\$0	\$0	\$0	\$0
Preliminary Engineering	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Prelim. Eng. 10.0%	\$0	\$0	\$0	\$24,000
Total Project Cost (2021)	\$ -	\$ -	\$ -	\$ 264,000

COST ESTIMATE SUMMARY

Route:	Austin Peay Highway/Highway 31-E
Termini:	
Scope of Work:	Roundabout at SR 53/SR 141 (Project ID 4)
Project Type of Work:	Roundabout
County:	Sumner
Length:	0.20 Miles
Date:	June 22, 2023
Estimate Type:	Concept



DESCRIPTION	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Construction Items				
Removal Items	\$0	\$0	\$0	\$112,000
Asphalt Paving	\$0	\$0	\$0	\$321,000
Concrete Pavement	\$0	\$0	\$0	\$234,000
Drainage	\$0	\$0	\$0	\$37,800
Appurtenances	\$0	\$0	\$0	\$0
Structures	\$0	\$0	\$0	\$0
Fencing	\$0	\$0	\$0	\$0
Signalization & Lighting	\$0	\$0	\$0	\$0
Railroad Crossing	\$0	\$0	\$0	\$0
Earthwork	\$0	\$0	\$0	\$117,000
Clearing and Grubbing	\$0	\$0	\$0	\$0
Seeding & Sodding	\$0	\$0	\$0	\$5,300
Rip-Rap or Slope Protection	\$0	\$0	\$0	\$0
Guardrail	\$0	\$0	\$0	\$6,900
Signing	\$0	\$0	\$0	\$11,400
Pavement Markings	\$0	\$0	\$0	\$18,700
Maintenance of Traffic	\$0	\$0	\$0	\$36,200
Mobilization 5%	\$0	\$0	\$0	\$45,000
Other Items and Annual Inflation 10%	\$0	\$0	\$0	\$94,500
Const. Contingency (Structures Not Included) 30%	\$0	\$0	\$0	\$312,000
Const. Eng. & Inspec. 10%	\$0	\$0	\$0	\$135,000
Construction Estimate	\$0	\$0	\$0	\$1,490,000
Interchanges & Unique Intersections				
Roundabouts	\$0	\$0	\$0	\$0
Interchanges	\$0	\$0	\$0	\$0
Right-of-Way & Utilities				
	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Right-of-Way	\$0	\$0	\$0	\$0
Utilities	\$0	\$0	\$0	\$113,000
Preliminary Engineering				
	LOCAL	STATE	FEDERAL	TOTAL
	0%	0%	0%	
Prelim. Eng. 10.0%	\$0	\$0	\$0	\$149,000
Total Project Cost (2021)	\$ -	\$ -	\$ -	\$ 1,750,000

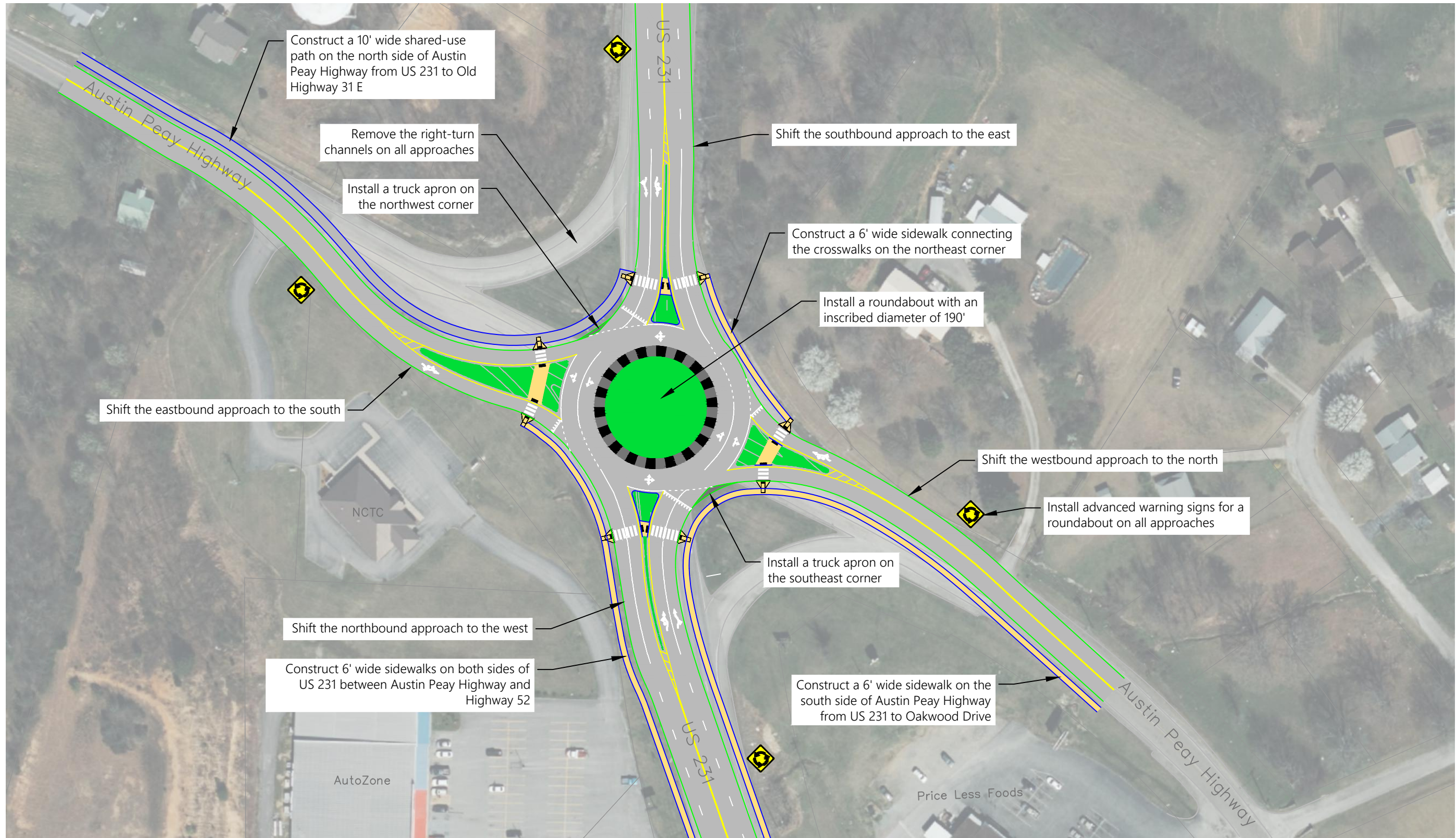
Bicycle and Pedestrian Planning Level Cost Estimates

The following cost assumptions were applied to develop planning level cost estimates for the bicycle and pedestrian recommendations:

ID	Facility	From	To	Width (ft)	Type	Time-frame	Linear Feet	Cost per foot	Cost (2021 Dollars)
5	Sidepath on north side of SR 52	New Hope Road	Highway 31-E/US 231	10ft	Sidepath	Long-term	8,846	\$260	\$2,299,960
6	Sidewalk on east side of Old Highway 31-E, south side of Hawkins Drive	SR 52	Fleetwood Drive	6ft	Sidewalk	Long-term	8,672	\$130	\$1,127,360
7	Bicycle boulevard on Austin Peay Highway and New Hope Road	SR 52	Borders Street	Varies	Bicycle Boulevard	Long-term (should be paired with IDs 9 and 6)	2,645	\$14	\$37,030
8	Sidepath along Austin Peay Highway (on north side between Borders St and US 231, then on south side between US 231 and Oakwood Dr)	Borders Street	Oakwood Drive	10ft	Sidepath	Long-term	8,232	\$255	\$2,099,160
9	Paved shoulders on both sides of Highway 31-E/US 231	Westmoreland Boundary	Pleasant Grove Road	Varies	Paved Shoulders	Mid-term	11,427	\$20	\$228,540
10	Sidewalks on both sides of Highway 31-E/US 231	SR 52	Austin Peay Highway	6ft	Sidewalk	Long-term	4,536	\$130	\$589,680
11	Sidepath on east side of Park Street	Westmoreland Greenway	Hawkins Drive	10ft	Sidepath	Near-term	3,759	\$255	\$958,545
12	Signature Trail Connection under SR 52	Tunnel Road	Locust Street/Existing Greenway	10ft	Off-Road Trail	Long-term	925	\$255	\$235,875

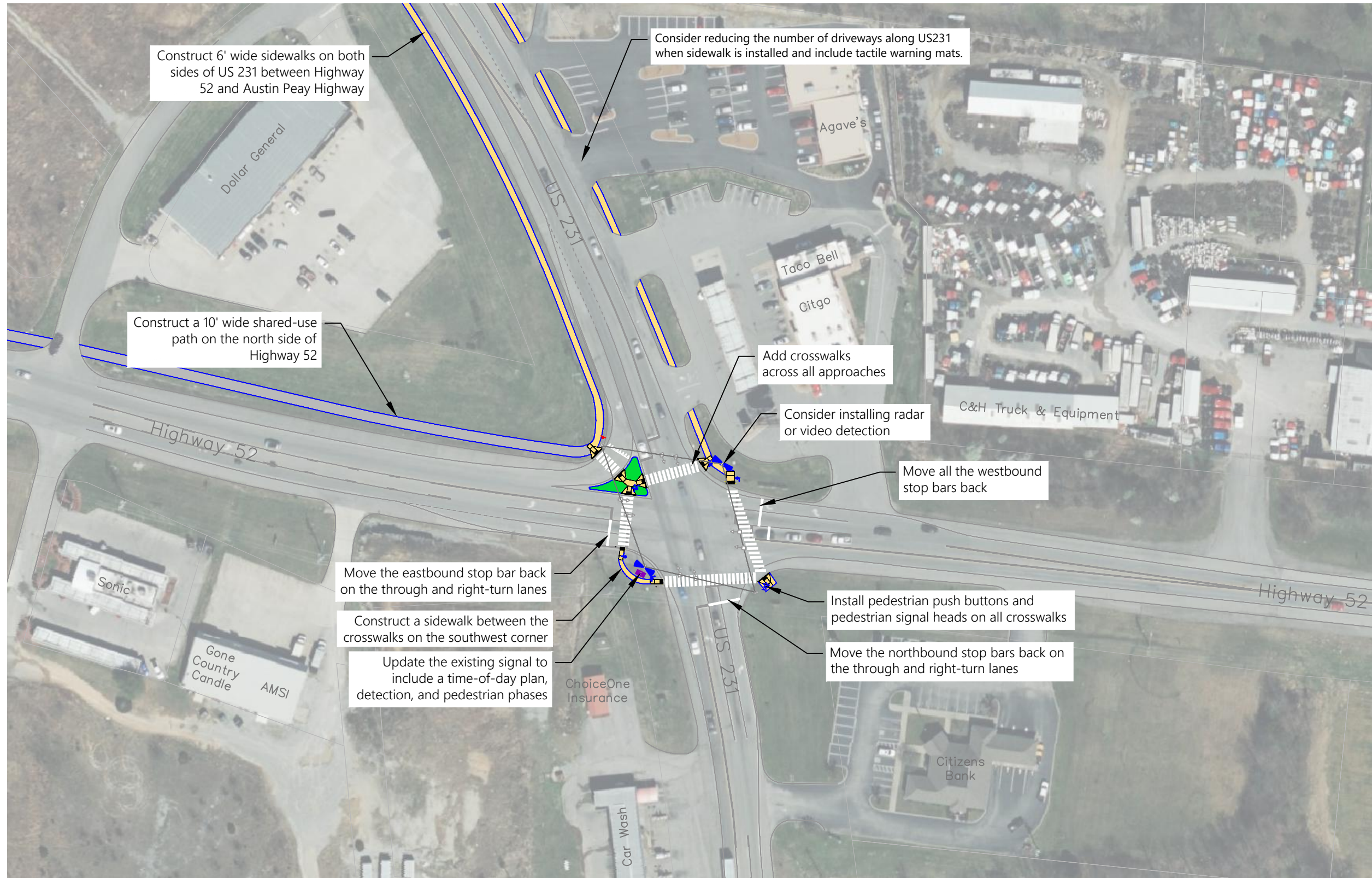
Note: All sidewalks assumed existing curb and gutter was utilized; all sidewalks and sidepaths are assumed to be constructed according to TDOT standard drawings. Cost estimate for ID 5 assumes adjustments to existing guardrail will be required.

Appendix F – Concept Diagrams



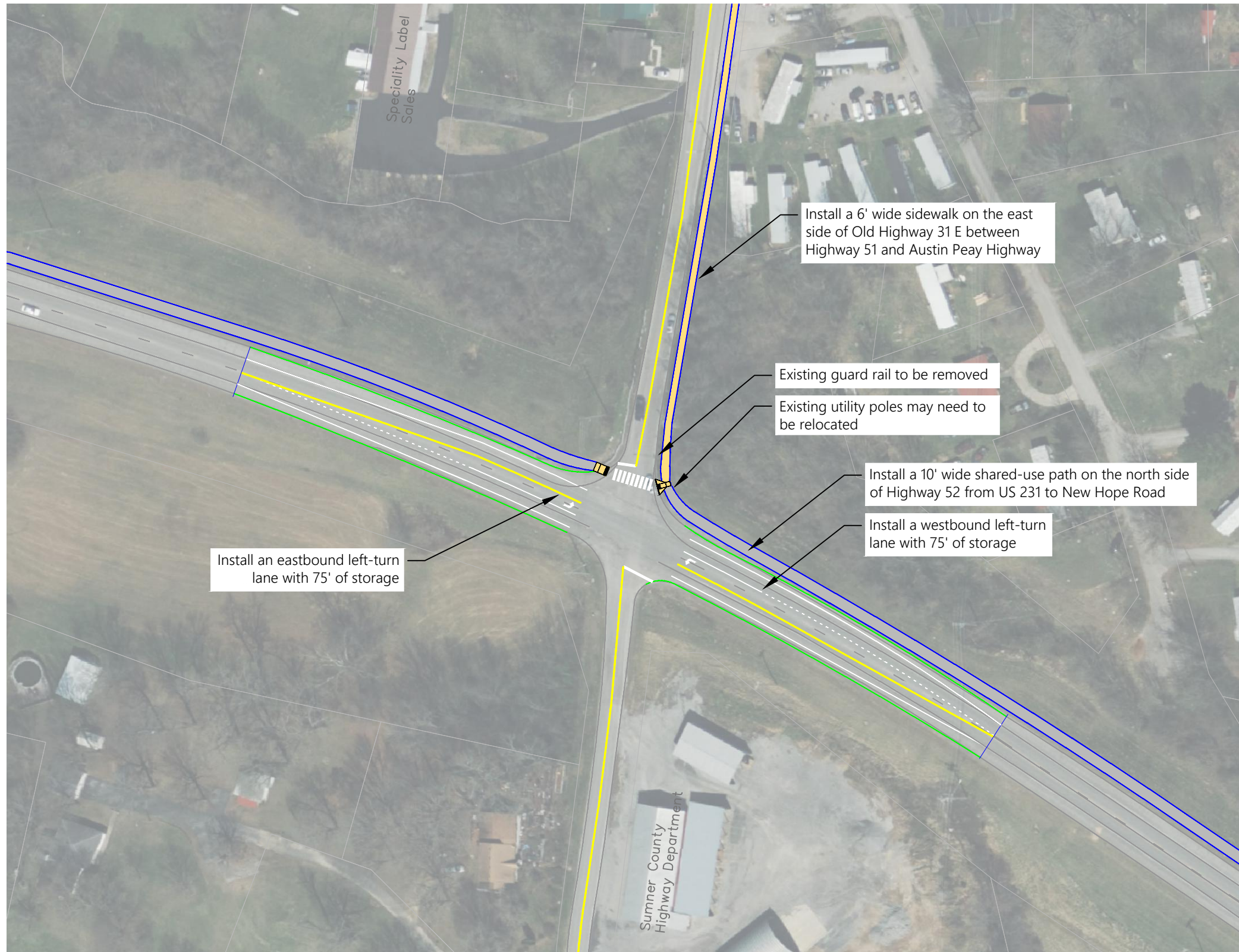
Recommended Improvements at Austin Peay Highway and US 231/Highway 31-E





Recommended Improvements at SR 52 and US 231/Highway 31-E





Recommended Improvements at SR 52 and Old Highway 31-E

