

Appendix H: *Greenhouse Gas Quantification*

Minnesota Climate Calculator: Project Summary Report

Date Prepared: 3/27/2026

The results shown below were generated using the Minnesota Climate Calculator. The emissions quantified account for the full greenhouse gas impact of a potential project throughout the construction and operational phases of the project. This includes emissions from project activities that occur on-site as well as emissions that occur upstream and downstream of the project. The results are based on user inputs and assumptions; actual project emissions may vary.

Background Information

Project Name	Existing Conditions
Project Category (primary)	Subp. 19, Residential Development
Project Category (secondary)	
Location (County)	St. Louis - partial
Construction Start Date	6/1/2026
Operational Year	2026
Operational Lifetime (Years)	1

Electricity Provider	Minnesota Power
Portion of Building Electricity Consumption to be Generated On-Site via Renewables or Supplied through the Purchase of Renewable Energy Credits (RECs)	0%
Portion of Building Natural Gas Consumption to be Supplied from Renewable Sources	0%

Building Construction Project?	No
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Construction Stage	Duration (Days)
Demolition	-
Site Preparation	-
Grading	-
Building Construction	-
Architectural Coatings	-
Paving and Landscaping	-

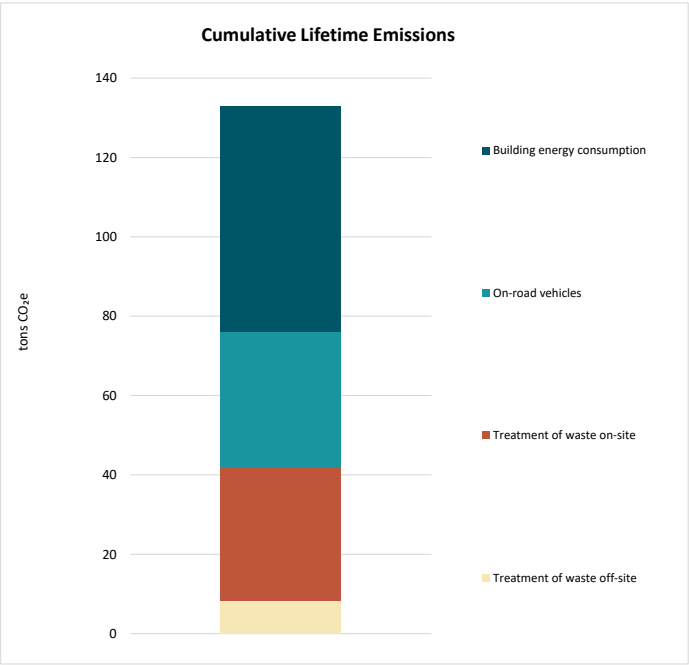
Total Project Acreage	278
Residential Building Area (sq ft)	24000
Commercial Building Area (sq ft)	0
Industrial Building Area (sq ft)	0
Institutional Building Area (sq ft)	0
Other Building Area (sq ft)	0

Summary Results

Project Lifetime	1
Unit	tons

Phase	CO ₂ e Emissions	
	Cumulative	Annualized
Construction		
Material inputs	NA	NA
Transportation of material inputs	NA	NA
Employee commuting	NA	NA
Construction equipment	NA	NA
Land use change (construction)	NA	NA
Construction waste	NA	NA
Operation		
Building energy consumption	56.92	56.92
Coal production	NA	NA
Natural gas and oil products	NA	NA
Industrial processes	NA	NA
HFC leakage	NA	NA
Land use change (operations)	NA	NA
On-road vehicles	33.90	33.90
Treatment of waste on-site	NA	NA
Treatment of wastewater on-site	NA	NA
Treatment of waste off-site	8.17	8.17
Enteric fermentation	NA	NA
Manure management	NA	NA
Total	98.99	98.99

Note: NA indicates that emissions were not quantified and/or are not applicable.



User Inputs

Note: NA indicates that emissions were not quantified and/or activity is not applicable.

Material Inputs

Material Type	Quantity	Unit	Geographical Sourcing
Aluminum	NA	Tons	Unknown
Asphalt	NA	Tons	Domestic
Brick	NA	Tons	Unknown
Concrete	NA	Tons	Domestic
Glass	NA	Tons	Unknown
Insulation (residential)	NA	Tons	Unknown
Insulation (commercial)	NA	Tons	Unknown
Steel	NA	Tons	Unknown
Wood Products	NA	Tons	Unknown

Employee Commuting

Construction Stage	Daily Average Number of Employees Commuting
Demolition	NA
Site Preparation	NA
Grading	NA
Building Construction	NA
Architectural Coatings	NA
Paving and Landscaping	NA

Transportation Mode	Percent of Employees
Single Occupancy Vehicle	NA
Carpool	NA
Motorcycle	NA
Bus	NA
Transit Rail	NA
Bike/Walk	NA

Average One-Way Commute Length (miles)	NA
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Construction Equipment	Approach: NA
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Equipment Type	Fuel Type	Number of Hours per Day by Construction Stage					
		Demolition	Site Preparation	Grading	Building Construction	Architectural Coatings	Paving and Landscaping
Air Compressors	Diesel	NA	NA	NA	NA	NA	NA
Cement and Mortar Mixers	Diesel	NA	NA	NA	NA	NA	NA
Concrete/Industrial Saws	Diesel	NA	NA	NA	NA	NA	NA
Cranes	Diesel	NA	NA	NA	NA	NA	NA
Excavators	Diesel	NA	NA	NA	NA	NA	NA
Forklifts	Diesel	NA	NA	NA	NA	NA	NA
Generator Sets	Diesel	NA	NA	NA	NA	NA	NA
Graders	Diesel	NA	NA	NA	NA	NA	NA
Pavers	Diesel	NA	NA	NA	NA	NA	NA
Paving Equipment	Diesel	NA	NA	NA	NA	NA	NA
Rollers	Diesel	NA	NA	NA	NA	NA	NA
Rubber Tired Dozers	Diesel	NA	NA	NA	NA	NA	NA
Scrapers	Diesel	NA	NA	NA	NA	NA	NA
Tractors/Loaders/Backhoes	Diesel	NA	NA	NA	NA	NA	NA
Welders	Diesel	NA	NA	NA	NA	NA	NA

Fuel Type	Total Consumption	Units
Diesel	NA	Gallons
Electricity	NA	kWh
Biodiesel 100	NA	Gallons
Biodiesel 20	NA	Gallons
Renewable Diesel	NA	Gallons

Land Use Change

Land Use Type	Acres		
	Pre-Construction	Post-Construction	Post-Operation
Wetlands: peatland, non forested	NA	NA	NA
Wetlands: peatland, forested	NA	NA	NA
Wetlands: mineral soil, non forested	NA	NA	NA
Wetlands: mineral soil, forested	NA	NA	NA
Forest	NA	NA	NA
Rivers and streams	NA	NA	NA
Brush and grassland	NA	NA	NA
Cropland	NA	NA	NA
Livestock rangeland/pastureland	NA	NA	NA
Lawn/landscaping	NA	NA	NA
Green Infrastructure: Constructed wetlands, paved	NA	NA	NA
Green Infrastructure: Constructed wetlands, vegetated	NA	NA	NA
Green Infrastructure: Constructed green roofs	NA	NA	NA
Green Infrastructure: Constructed permeable pavements	NA	NA	NA
Impervious surface	NA	NA	NA
Stormwater pond (wet sedimentation basin)	NA	NA	NA

Trees	Number
Number of mature trees removed	NA
Number of new trees planted	NA

Construction Waste

Material Type	Quantity (tons)
Aluminum	NA
Asphalt	NA
Brick	NA
Concrete	NA
Glass	NA
Insulation	NA
Steel	NA
Wood Products	NA
Mixed Waste	NA

Building Energy Consumption

Approach:	Fuel Consumption
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Building Type	Energy Intensity (Btu/sq ft/year)			
	Electricity	Natural Gas	Propane	Kerosene or Fuel Oil
Residential	NA	NA	NA	NA
Commercial	NA	NA	NA	NA
Industrial	NA	NA	NA	NA
Institutional	NA	NA	NA	NA
Other	NA	NA	NA	NA

Fuel Type	Fuel Consumption (units/year)	Unit
Electricity	108,000.00	kWh
Natural Gas	0.00	Cubic feet
Propane	0.00	Gallons
Kerosene or Fuel Oil	0.00	Gallons

Emissions from Coal Production

Coal Type	Incremental Production (tons/year)
Mixed Coal	NA
Anthracite Coal	NA
Bituminous Coal	NA
Subbituminous Coal	NA
Lignite Coal	NA
Coal Coke	NA

Emissions from Natural Gas and Oil Products

Fuel Type	Incremental Throughput	Unit
Natural Gas	NA	Cubic Feet/year
Renewable Natural Gas	NA	Cubic Feet/year
Propane	NA	Gallons/year
Gasoline	NA	Gallons/year
Distillate Fuel Oil No. 1	NA	Gallons/year
Distillate Fuel Oil No. 2	NA	Gallons/year
Distillate Fuel Oil No. 4	NA	Gallons/year
Residual Fuel Oil No. 5	NA	Gallons/year
Residual Fuel Oil No. 6	NA	Gallons/year
Liquified Petroleum Gas (LPG)	NA	Gallons/year
Kerosene	NA	Gallons/year
Kerosene Jet Fuel	NA	Gallons/year
Biodiesel 100	NA	Gallons/year
Biodiesel 20	NA	Gallons/year
Renewable Diesel	NA	Gallons/year

Natural Gas Assumptions

Percent Reduction in Leakage and Venting Emissions	NA
Leakage and Venting Emissions (kgCO ₂ e/MMBtu)	NA

Industrial Processes

Product Type	Quantity (tons/year)	Emission Factor (kgCO ₂ e/ton)
Cement	NA	NA
Lime	NA	NA
Limestone Use	NA	NA
Magnesium	NA	NA
Iron and Steel	NA	NA
Ammonia	NA	NA
Aluminum	NA	NA
Nitric Acid	NA	NA

HFC Leakage

Building Type	Percent of Building Area Utilized	Equipment Type	HFC
Residential	NA	Room A/C & Other residential A/C and heat pumps	NA
Commercial	NA	Other commercial A/C and heat pumps	NA
Industrial	NA	Other commercial A/C and heat pumps	NA
Institutional	NA	Walk-in refrigerators and freezers	NA
		Other commercial A/C and heat pumps	NA

On-Road Vehicles

Speed Bin (miles/hr)	Additional VMT (miles/year)
Fleet Average	54750
0-30	0
31-55	0
56-75	0

Treatment of Waste On-Site

Waste Treatment Practice	Quantity of Waste Treated (tons/year)
	NA
	NA
	NA

Treatment of Wastewater On-Site

Population Served by Treatment Plant	NA
Wastewater Treatment System Type	

Product Type	Production (MT/year)
	NA

Treatment of Waste Off-Site

Activity	Quantity	Waste Generation Rate	Unit
Number of single family households	10	7.00	lb/household/day
Number of employees (commercial)	0	10.53	lb/employee/day
Number of employees (industrial)	0	8.93	lb/employee/day
Number of employees (institutional)	0	3.55	lb/employee/day
Visitors per year (public venues)	0	1.72	lb/visitor

Waste Treatment Practice	Percent of Waste
Recycled	0%
Composted	0%
Landfilled	100%
Combusted	0%

Notes

General Notes	
Material inputs	
Transportation of material inputs	
Employee commuting	
Construction equipment	
Land use change (construction)	
Construction waste	
Building energy consumption	
Coal production	
Natural gas and oil products	
Industrial processes	
HFC leakage	
Land use change (operations)	
On-road vehicles	10 households x 15 miles a day x 365 days a year
Treatment of waste on-site	
Treatment of wastewater on-site	
Treatment of waste off-site	
Enteric fermentation	
Manure management	
Mitigation Measures and Quantified Reductions	
Adaptation Strategies	

Minnesota Climate Calculator: Project Summary Report

Date Prepared: 4/16/2026

The results shown below were generated using the Minnesota Climate Calculator. The emissions quantified account for the full greenhouse gas impact of a potential project throughout the construction and operational phases of the project. This includes emissions from project activities that occur on-site as well as emissions that occur upstream and downstream of the project. The results are based on user inputs and assumptions; actual project emissions may vary.

Background Information

Project Name	Updated Hermantown Industrial		
Project Category (primary)	Subp. 14, Industrial, commercial, institutional facilities		
Project Category (secondary)			
Location (County)	St. Louis - partial		
Construction Start Date	6/1/2027		
Operational Year	2030		
Operational Lifetime (Years)	50		

Electricity Provider	Minnesota Power		
Portion of Building Electricity Consumption to be Generated On-Site via Renewables or Supplied through the Purchase of Renewable Energy Credits (RECs)			0%
Portion of Building Natural Gas Consumption to be Supplied from Renewable Sources			0%

Building Construction Project?	Yes
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Construction Stage	Duration (Days)
Demolition	278
Site Preparation	167
Grading	431
Building Construction	4,309
Architectural Coatings	306
Paving and Landscaping	306

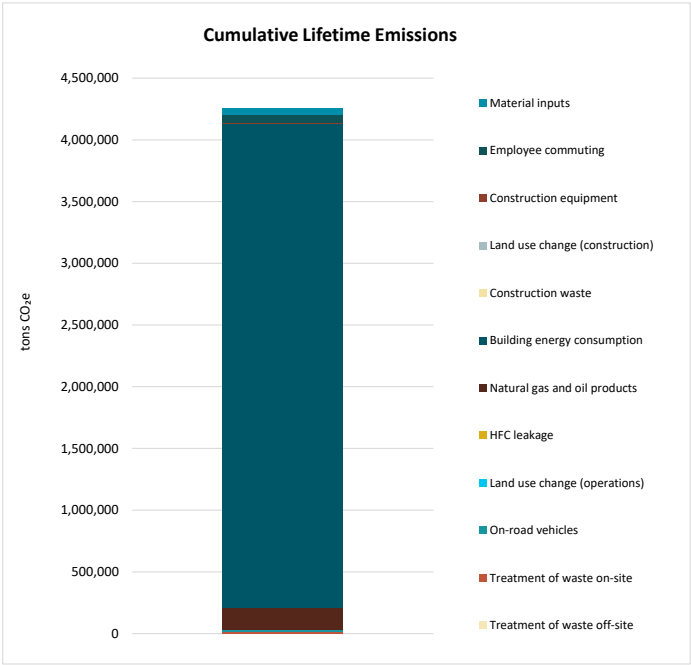
Total Project Acreage	278
Residential Building Area (sq ft)	0
Commercial Building Area (sq ft)	0
Industrial Building Area (sq ft)	1800000
Institutional Building Area (sq ft)	0
Other Building Area (sq ft)	0

Summary Results

Project Lifetime	53
Unit	tons

Phase	CO ₂ e Emissions	
	Cumulative	Annualized
Construction		
Material inputs	54,355.82	1,025.58
Transportation of material inputs	1,437.47	27.12
Employee commuting	61,179.85	1,154.34
Construction equipment	10,152.37	191.55
Land use change (construction)	66.53	1.26
Construction waste	119.16	2.25
Operation		
Building energy consumption	3,923,505.18	74,028.40
Coal production	NA	NA
Natural gas and oil products	173,102.05	3,266.08
Industrial processes	NA	NA
HFC leakage	4,331.30	81.72
Land use change (operations)	-	-
On-road vehicles	14,348.18	270.72
Treatment of waste on-site	NA	NA
Treatment of wastewater on-site	NA	NA
Treatment of waste off-site	1,456.12	27.47
Enteric fermentation	NA	NA
Manure management	NA	NA
Total	4,244,054.04	80,076.49

Note: NA indicates that emissions were not quantified and/or are not applicable.



User Inputs

Note: NA indicates that emissions were not quantified and/or activity is not applicable.

Material Inputs

Material Type	Quantity	Unit	Geographical Sourcing
Aluminum	4.00	Tons	Unknown
Asphalt	100,000.00	Tons	Domestic
Brick	0.00	Tons	Unknown
Concrete	180,000.00	Tons	Domestic
Glass	1.00	Tons	Unknown
Insulation (residential)	0.00	Tons	Unknown
Insulation (commercial)	50.00	Tons	Unknown
Steel	10,000.00	Tons	Unknown
Wood Products	0.00	Tons	Unknown

Employee Commuting

Construction Stage	Daily Average Number of Employees Commuting
Demolition	300
Site Preparation	300
Grading	900
Building Construction	1200
Architectural Coatings	0
Paving and Landscaping	200

Transportation Mode	Percent of Employees
Single Occupancy Vehicle	90%
Carpool	10%
Motorcycle	0%
Bus	0%
Transit Rail	0%
Bike/Walk	0%

Average One-Way Commute Length (miles)	13.2
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Construction Equipment	Approach: Equipment Use
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Equipment Type	Fuel Type	Number of Hours per Day by Construction Stage					
		Demolition	Site Preparation	Grading	Building Construction	Architectural Coatings	Paving and Landscaping
Air Compressors	Diesel	0	0	0	0	6	0
Cement and Mortar Mixers	Diesel	0	0	0	0	0	0
Concrete/Industrial Saws	Diesel	8	0	0	0	0	0
Cranes	Diesel	0	0	0	7	0	0
Excavators	Diesel	24	0	16	0	0	0
Forklifts	Diesel	0	0	0	24	0	0
Generator Sets	Diesel	0	0	0	8	0	0
Graders	Diesel	0	0	8	0	0	0
Pavers	Diesel	0	0	0	0	0	16
Paving Equipment	Diesel	0	0	0	0	0	16
Rollers	Diesel	0	0	0	0	0	16
Rubber Tired Dozers	Diesel	16	24	8	0	0	0
Scrapers	Diesel	0	0	16	0	0	0
Tractors/Loaders/Backhoes	Diesel	0	32	16	21	0	0
Welders	Diesel	0	0	0	8	0	0

Fuel Type	Total Consumption	Units
Diesel	NA	Gallons
Electricity	NA	kWh
Biodiesel 100	NA	Gallons
Biodiesel 20	NA	Gallons
Renewable Diesel	NA	Gallons

Land Use Change

Land Use Type	Acres		
	Pre-Construction	Post-Construction	Post-Operation
Wetlands: peatland, non forested	0.00	0.00	0.00
Wetlands: peatland, forested	0.00	0.00	0.00
Wetlands: mineral soil, non forested	58.00	26.00	26.00
Wetlands: mineral soil, forested	0.00	0.00	0.00
Forest	132.00	37.00	37.00
Rivers and streams	0.00	0.00	0.00
Brush and grassland	0.00	0.00	0.00
Cropland	0.00	0.00	0.00
Livestock rangeland/pastureland	0.00	0.00	0.00
Lawn/landscaping	77.00	74.00	74.00
Green Infrastructure: Constructed wetlands, paved	0.00	0.00	0.00
Green Infrastructure: Constructed wetlands, vegetated	0.00	0.00	0.00
Green Infrastructure: Constructed green roofs	0.00	0.00	0.00
Green Infrastructure: Constructed permeable pavements	0.00	0.00	0.00
Impervious surface	11.00	126.00	126.00
Stormwater pond (wet sedimentation basin)	0.00	15.00	15.00

Trees	Number
Number of mature trees removed	10783
Number of new trees planted	245

Construction Waste

Material Type	Quantity (tons)
Aluminum	0.00
Asphalt	0.00
Brick	0.00
Concrete	5400.00
Glass	0.03
Insulation	5.00
Steel	0.00
Wood Products	0.00
Mixed Waste	0.00

Building Energy Consumption

Approach:	Fuel Consumption
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Building Type	Energy Intensity (Btu/sq ft/year)			
	Electricity	Natural Gas	Propane	Kerosene or Fuel Oil
Residential	NA	NA	NA	NA
Commercial	NA	NA	NA	NA
Industrial	NA	NA	NA	NA
Institutional	NA	NA	NA	NA
Other	NA	NA	NA	NA

Fuel Type	Fuel Consumption (units/year)	Unit
Electricity	4,467,600,000.00	kWh
Natural Gas	0.00	Cubic feet
Propane	0.00	Gallons
Kerosene or Fuel Oil	0.00	Gallons

Emissions from Coal Production

Coal Type	Incremental Production (tons/year)
Mixed Coal	NA
Anthracite Coal	NA
Bituminous Coal	NA
Subbituminous Coal	NA
Lignite Coal	NA
Coal Coke	NA

Emissions from Natural Gas and Oil Products

Fuel Type	Incremental Throughput	Unit
Natural Gas	0.00	Cubic Feet/year
Renewable Natural Gas	0.00	Cubic Feet/year
Propane	0.00	Gallons/year
Gasoline	0.00	Gallons/year
Distillate Fuel Oil No. 1	0.00	Gallons/year
Distillate Fuel Oil No. 2	252000.00	Gallons/year
Distillate Fuel Oil No. 4	0.00	Gallons/year
Residual Fuel Oil No. 5	0.00	Gallons/year
Residual Fuel Oil No. 6	0.00	Gallons/year
Liquified Petroleum Gas (LPG)	0.00	Gallons/year
Kerosene	0.00	Gallons/year
Kerosene Jet Fuel	0.00	Gallons/year
Biodiesel 100	0.00	Gallons/year
Biodiesel 20	0.00	Gallons/year
Renewable Diesel	0.00	Gallons/year

Natural Gas Assumptions

Percent Reduction in Leakage and Venting Emissions	50%
Leakage and Venting Emissions (kgCO ₂ e/MMBtu)	2.14

Industrial Processes

Product Type	Quantity (tons/year)	Emission Factor (kgCO ₂ e/ton)
Cement	NA	NA
Lime	NA	NA
Limestone Use	NA	NA
Magnesium	NA	NA
Iron and Steel	NA	NA
Ammonia	NA	NA
Aluminum	NA	NA
Nitric Acid	NA	NA

HFC Leakage

Building Type	Percent of Building Area Utilized	Equipment Type	HFC
Residential	100%	Room A/C & Other residential A/C and heat pumps	R-454B
Commercial	100%	Other commercial A/C and heat pumps	R-454B
Industrial	100%	Other commercial A/C and heat pumps	R-407C
Institutional	100%	Walk-in refrigerators and freezers	R-404A
		Other commercial A/C and heat pumps	R-454B

On-Road Vehicles

Speed Bin (miles/hr)	Additional VMT (miles/year)
Fleet Average	975000
0-30	0
31-55	0
56-75	0

Treatment of Waste On-Site

Waste Treatment Practice	Quantity of Waste Treated (tons/year)
	NA
	NA
	NA

Treatment of Wastewater On-Site

Population Served by Treatment Plant	NA
Wastewater Treatment System Type	

Product Type	Production (MT/year)
	NA

Treatment of Waste Off-Site

Activity	Quantity	Waste Generation Rate	Unit
Number of single family households	0	7.00	lb/household/day
Number of employees (commercial)	0	10.53	lb/employee/day
Number of employees (industrial)	130	8.93	lb/employee/day
Number of employees (institutional)	0	3.55	lb/employee/day
Visitors per year (public venues)	0	1.72	lb/visitor

Waste Treatment Practice	Percent of Waste
Recycled	92%
Composted	1%
Landfilled	7%
Combusted	0%

Notes

General Notes	
Material inputs	
Transportation of material inputs	
Employee commuting	Assumes 130 full time employees, average of 30 miles per day, 250 working days in the year
Construction equipment	
Land use change (construction)	
Construction waste	
Building energy consumption	Electricity consumption ranges from 2,233,800,000 - 4,467,600,000 kWh annually. This spreadsheet attachment is showing the upper limit assumed.
Coal production	
Natural gas and oil products	Specific generator quantities included and consumptions are high level estimates for the purposes of this AUAR to study the "worst case" scenario. For the purposes of quantifying diesel for the back up generators in this AUAR, up to 4 x 2.75 MW generators are assumed per building (up to 4 buildings total).
Industrial processes	
HFC leakage	
Land use change (operations)	
On-road vehicles	
Treatment of waste on-site	
Treatment of wastewater on-site	
Treatment of waste off-site	
Enteric fermentation	
Manure management	
Mitigation Measures and Quantified Reductions	
Adaptation Strategies	

Mitigation Measures (Step 5a)

Use the filters in the table below to identify potential mitigation measures to reduce GHG emissions from the proposed project. Use the column on the far left to select measures you plan to implement. Measures marked as 'Yes' in column F are available for quantification in the Quantified Reductions tab. Click the 'Select Applicable Quantifiable Measures' button to select quantifiable mitigation measures that are deemed applicable based on entered user inputs. Select the 'Generate PDF' button once you've made your desired selections to export the list.

Select Applicable Quantifiable Measures

Select All Unhidden Measures

Reset all Selected Measures

Generate PDF

Go to Quantified Reductions

Go to Charts

Select	Emissions Source	Phase	ID	Quantifiable?	Measure Title	Measure Description
Yes	Material inputs	Construction	M-1A-01	No	Use Sustainable Building Materials	Ensure sustainable building materials comprise at least 20% of total construction materials by volume weight. Sustainable building materials have a less carbon-intensive production process compared to their non-sustainable counterparts. This strategy could include the use of Environmental Product Declarations in bid decisions to ensure the most sustainable materials are procured. This strategy is general to any building material. See 1A-2 through 1A-6 for measures specific to wood, pavement, and cement.
Yes	Material inputs	Construction	M-1A-03	No	Sustainable Pavements	Use lower-impact materials specially designed for roadway surfaces without compromising the pavement's ability to meet its engineering purposes. For example, warm-mix asphalt (WMA) production methods use temperatures that are 30 to 120 degrees Fahrenheit lower than those of traditional hot-mix asphalt. Because less energy is needed to heat the asphalt mix, less fuel is needed to produce WMA. Fuel consumption during WMA manufacturing is typically reduced by 20%. Sustainable pavements can also result in extended pavement life thereby reducing the need for energy-intensive maintenance.
Yes	Material inputs	Construction	M-1A-04	No	Purchase Cement from Manufacturers using Low-Carbon Mix Design for Calcination	Purchase cement from manufacturers that use low-carbon mix design. Using a low-carbon mix design in addition to renewable power sources and carbon capture can significantly reduce emissions from calcination. The seven most impactful low-carbon mix alternatives, listed from smallest to largest carbon footprint, are 1) granulated blast furnace slag; 2) limestone calcined clay cement; 3) fly ash; 4) Portland limestone cement; 5) biochar; 6) early-stage carbon curing; and 7) recycled concrete aggregate.
Yes	Material inputs	Construction	M-1A-05	No	Purchase Cement from Efficient Cement Manufacturers	Purchase cement from manufacturers that have implemented measures to improve their production efficiency. Efficiency measures for cement manufacturing can reduce the demand for fuel by addressing the production process itself (such as switching from inefficient wet kilns to dry ones) or through technical and mechanical improvements (such as preventive maintenance to repair kiln leaks).
Yes	Material inputs	Construction	M-1A-06	No	Purchase Cement from Manufacturers Using Alternative Fuels	Purchase cement from manufacturers that use alternative fuels in their production method. Indirect emissions from burning fossil fuels to heat the kiln can be reduced by switching to alternative fuels, including natural gas, biomass, and waste-derived fuels such as tires, sewage sludge, and municipal solid wastes.
Yes	Material inputs	Construction	M-1A-07	No	Require Environmentally Responsible Purchasing	Implement an environmentally responsible purchasing plan. Examples of environmentally responsible purchases include but are not limited to: purchasing products made from recycled materials or with sustainable packaging; purchasing post-consumer recycled paper, paper towels, and stationery; purchasing and stocking communal kitchens with reusable dishes and utensils; choosing sustainable cleaning supplies; purchasing products from restaurants, farms, or ranches that source materials or goods from locations that use soil conservation practices; and leasing equipment from manufacturers who will recycle the components at their end of life.
Yes	Material inputs	Construction	M-1A-08	No	Use Recycled Asphalt Pavement	Use recycled concrete aggregate (RCA) or recycled asphalt pavement (RAP) in place of traditional asphalt. RCA and RAP help reduce energy consumption and thus GHGs of a project by displacing the volume of new asphalt.
Yes	Transportation of material inputs	Construction	M-1B-01	No	Use Local Building Materials	Ensure locally sourced or recycled construction materials comprise at least 20% of total construction materials by volume weight. Choosing locally made and distributed products reduces the distance required to transport the products from the distribution or manufacturing center to the project, thus reducing GHG emissions associated with transportation.
Yes	Transportation of material inputs	Construction	M-1B-03	No	Limit Delivery Windows	Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours. This will avoid congested vehicle travel, which generates more emissions per mile than travel at free-flow speeds.
Yes	Transportation of material inputs	Construction	M-1B-04	No	Evaluate Efficient Delivery Options	Evaluate the feasibility of using freight locomotives and other more efficient modes of transportation to deliver construction equipment and vehicles instead of on-road haul trucks. More efficient modes of transportation will reduce delivery emissions and may reduce transportation costs.
Yes	Employee commuting	Construction	M-1C-01	No	Use Local Construction Contractors	Maximize use of local construction contractors. Contracting construction work with a local company reduces vehicle miles traveled associated with construction employee commute distances and, therefore, reduces emissions from vehicle fuel combustion. Local hire provisions may cover the entire workforce, or a percentage of the workforce based on the project size or employment type.

Yes	Construction equipment	Construction	M-1D-01	Yes	Use Renewable Diesel	Use renewable diesel in construction equipment and vehicles in lieu of similar vehicles powered by gasoline or diesel fuel. Tailpipe GHG emissions from renewable diesel are identical to tailpipe GHG emissions from conventional diesel; thus, the GHG benefits of renewable diesel come from the fact that it is produced from biomass.
Yes	Construction equipment	Construction	M-1D-02	Yes	Use Electric or Hybrid Powered Equipment	Use electric- or hybrid-powered construction equipment over conventional diesel-fueled counterparts. Replacing diesel-powered equipment with electric or hybrid-electric equipment reduces fossil fuel combustion and thus GHG emissions. However, all-electric equipment results in GHG emissions from the electricity used to charge the equipment. The indirect GHG emissions increase from electricity must be calculated in addition to the GHG emissions reduction from displaced fossil fuel combustion to estimate the total net GHG emissions reduction achieved by this measure if using all electric equipment.
Yes	Construction equipment	Construction	M-1D-03	No	Limit Heavy-Duty Diesel Vehicle Idling	Minimize idling time by requiring that equipment be shut down after five minutes when not in use. Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement. Reducing idling time will reduce emissions from fuel combustion.
Yes	Construction equipment	Construction	M-1D-04	No	Maintain All Equipment in Proper Condition	Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules should be detailed in an Air Quality Control Plan prior to commencement of construction.
Yes	Construction equipment	Construction	M-1D-05	No	Implement a Tire Inflation Program	Implement a tire inflation program on jobsites to confirm that equipment tires are correctly inflated. Check tire inflation when equipment arrives on site and every two weeks for equipment that remains on site. Check vehicles used for hauling materials off site weekly for correct tire inflation. Procedures for the tire inflation program should be documented in an Air Quality Management Plan prior to commencement of construction.
Yes	Construction equipment	Construction	M-1D-06	No	Use Conveyors Instead of Trucks	Move material onsite using electric conveyors instead of diesel trucks. While electric conveyors result in GHG emissions from the electricity used to charge the equipment, these indirect emissions are likely much less than emissions from diesel combustion. The indirect GHG emissions increase from electricity must be calculated in addition to the GHG emissions reduction from displaced fossil fuel combustion to estimate the total net GHG emissions reduction achieved by this measure.
Yes	Construction equipment	Construction	M-1D-08	No	Evaluate Potential for On-Site Electrical Service	Confirm all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane, or solar power, to power generators to the maximum extent feasible.
Yes	Construction equipment	Construction	M-1D-09	No	Use High Efficiency Lighting	Reduce electricity use in temporary construction offices by using high efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.
Yes	Construction equipment	Construction	M-1D-10	No	Develop a Water Efficiency Plan for Dust Control	Develop a plan to efficiently use water for adequate dust control since substantial amounts of energy can be consumed during the pumping or transporting of water.
Yes	Land use change	Construction	M-1E-01	Yes	Create New Open Space with Native Vegetation and Habitat	Convert previously developed areas to vegetated open spaces. By creating new vegetated areas from previously settled land, the project would sequester carbon dioxide that would not have been captured without the land conversion. Trees and other vegetation also incorporate carbon into their biomass during their growth phase (stored carbon). Prior to establishing new vegetation, conduct information gathering to assess the site history, soil type, hydrology, topography, and wildlife populations to determine appropriate native vegetation that will be well adapted to the local environment. Establish project goals, including GHG emission reduction and restoration native pollinator and/or native habitat. Other important goals may include expanding contiguous habitat and wildlife corridors for threatened or endangered species or increasing biodiversity. Create a detailed planting and management plan that describes actions for site preparation, planting, habitat enhancement, water management, and invasive species control. Maximize long-term establishment success by conducting regular monitoring. This may involve tracking plant growth, soil conditions, and wildlife movement. Utilize the monitoring data to perform regular maintenance. Adjust the management plan as needed to keep the site healthy and ensure attainment of project goal(s).
Yes	Land use change	Construction	M-1E-02	Yes	Expand Urban Tree Planting	Require tree planting in urban areas. Planting trees sequesters carbon dioxide while the trees are actively growing, thereby reducing GHGs. The amount of carbon dioxide sequestered depends on the type of tree and the duration of the active growing period. Urban trees may also provide shade, which can reduce the urban heat island effect and building cooling demands. Buildings that use less electricity for air conditioning reduce energy consumption and associated indirect GHG emission. The selection of tree type is critical to minimize the use of additional water. Trees that have high water demands that are met through GHG-intensive water (such as water transported over long distances) can impact the amount of GHG reductions achieved by this measure.
Yes	Land use change	Construction	M-1E-05	No	Wetland Restoration	Restore wetlands to improve their function and ability to sequester GHG emissions. For example, rewet drained wetlands, remove non-native plants, exclude livestock, and plant native wetland species. Because wetlands can also represent a GHG source, ensure the restored wetland and selected restoration strategies will effectively reduce GHG emissions.

Yes	Land use change	Construction	M-1E-06	Yes	Afforestation	Plant trees on previously deforested land.
Yes	Construction waste	Construction	M-1F-02	No	Recycle Waste Paint	Recycle waste paint during construction. Recycling waste paint reduces GHG emissions from raw material sourcing and paint production. If the process of recycling waste paint is less carbon-intensive than the processes required to harvest and produce new paint, recycling results in a net reduction in GHG emissions.
Yes	Construction waste	Construction	M-1F-03	No	Recycle Demolished Construction Material	Recycle general construction waste. Recycling demolished construction material reduces GHGs by displacing new construction materials, thereby reducing the need for new raw material acquisition and manufacturing. If the process of recycling construction materials is less carbon-intensive than the processes required to harvest and produce new construction materials, recycling results in a net reduction in GHG emissions. Using local recycled construction material would also reduce emissions associated with the transportation of new construction materials, which are typically manufactured farther away from a project site. Finally, recycling avoids sending materials to landfills. Wood-based materials decompose in landfills and contribute to methane emissions.
Yes	Building energy consumption	Operation	M-2A-01	No	Require Energy Efficient Appliances	Install ENERGY STAR-certified appliances that exceed the energy efficiency of conventional appliances. By committing to more efficient appliances, the building's energy use is reduced, thereby reducing GHG emissions.
Yes	Building energy consumption	Operation	M-2A-08	No	Install Cool Roofs and/or Cool Walls	Install cool roofs and/or walls in place of dark roofs and/or conventional walls. Cool roofs have been designed to reflect more sunlight and absorb less heat than a standard roof, keeping buildings cooler in the summertime and thus reducing air-conditioning loads. Complementary to cool roofs, cool walls achieve a similar result through using more reflective paints or materials. This reduces the electricity needed to provide cooling but can potentially increase the energy needed to provide winter heating, thereby reducing associated GHG emissions depending on the project parameters (e.g., climate, level of implementation, carbon intensity of local electricity provider). However, the winter heating penalty may be small with lower levels of winter sunlight due to shorter daylight hours and more overcast skies.
Yes	Building energy consumption	Operation	M-2A-09	No	Install Green Roofs in Place of Dark Roofs	Install green roofs in place of dark roofs. Green roofs consist of a layer of vegetation on top of buildings, which provides natural insulation and climate control benefits. This reduces the electricity and natural gas needed to provide cooling and heating, thereby reducing associated GHG emissions.
Yes	Building energy consumption	Operation	M-2A-10	No	Install Cool Pavements	Install cool pavement in place of dark pavement. Cool pavement helps to lower ambient outdoor air temperatures when compared to dark-colored, heat-absorbent pavement such as asphalt. This reduces the electricity needed to provide cooling, thereby reducing associated GHG emissions, depending on the project parameters (e.g., climate, carbon intensity of local utility).
Yes	Building energy consumption	Operation	M-2A-13	No	Maximize Solar Shading	Maximize building shade during the summer months. Shading is a passive and inexpensive way to reduce summer heat loads, and thus the need for air conditioning. Examples include vegetation with seasonal variation and envelope elements that reflect natural light.
Yes	Building energy consumption	Operation	M-2A-14	No	Optimize Natural Ventilation	Maximize natural building ventilation in new construction. Façade design allows natural ventilation at night to cool the building and reduce peak daytime temperatures in summer. This in turn reduces the need for air conditioning, which reduces building electricity consumption and associated emissions.
Yes	Building energy consumption	Operation	M-2A-15	No	Obtain Third-party HVAC Commissioning and Verification of Energy Savings	Require third-party review of heating ventilation and air conditioning (HVAC) systems to ensure proper installation and construction of energy reduction features. HVAC commissioning and third-party verification of energy savings may be obtained for thermal efficiency components including HVAC systems, insulation, windows, and water heating.
Yes	Building energy consumption	Operation	M-2A-18	No	Procure Electricity from Lower Carbon Intensity Power Supply	Procure electricity with a lower carbon intensity than the primary product offered by the local provider (often an investor-owned utility). This would displace the electricity demand that would ordinarily be supplied by the local electricity provider's energy mix. Electricity provided by local electricity providers has varying carbon intensities based on the portfolio of energy sources. Procurement of electricity of a lower carbon intensity would displace the emissions that would have been produced had the electricity been supplied by the default energy mix and thus results in a reduction in GHG emissions. Green power supply options include utility green power products, community choice aggregation, shared renewables (e.g., community solar), and power purchase agreements.
Yes	Building energy consumption	Operation	M-2A-19	No	Require All-Electric Development	Install all-electric appliances and end uses. Using electric instead of natural gas-powered appliances and end uses replaces a more emissions-intensive fossil fuel source of energy with a less emissions-intensive source of energy, electricity from the grid that is increasingly transitioning to renewable sources.
Yes	Building energy consumption	Operation	M-2A-24	No	Encourage Residential Participation in Existing Demand Response Program(s)	Market and promote the local utility's manual (i.e., behavioral) demand response program(s) to encourage participation from residents in the project area. During demand response events, program users shift or conserve electricity, thereby reducing the associated indirect GHG emissions. Methods of engaging customers in demand response efforts include offering time-based rates, such as time-of-use pricing, critical peak pricing, variable peak pricing, real-time pricing, and critical peak rebates. Users are encouraged to respond to time-based rates or other forms of financial incentives with smart phone app, email, phone call, and/or text notifications.

Yes	Building energy consumption	Operation	M-2A-26	No	Provide Battery Storage	Strategically deploy battery storage. While energy storage has no direct emissions effect, when deployed strategically, energy storage can make the grid more flexible, unlocking renewable energy and reducing GHG emissions. When deployed non-strategically, owners of energy storage assets are more likely to charge their facilities during off-peak periods when power prices are lower, in order to supply power during more expensive peak hours. Off-peak generation times such as nighttime hours are more likely to be dominated by conventional power sources, which, except for nuclear and hydropower, are likely to be more emissions intensive.
Yes	Natural gas and petroleum systems	Operation	M-2C-01	Yes	Conduct Regular Maintenance	Implement a preventative maintenance schedule to replace worn-out components like gaskets, seals, and packing on valves and fittings. Regularly tighten all connections on pipelines, tanks, and equipment. Proper maintenance can avoid leaks, which in turn reduces fugitive emissions.
Yes	Natural gas and petroleum systems	Operation	M-2C-02	Yes	Ensure Proper Systemwide Management	Develop a plan to properly and efficiently maintain systemwide performance. For example, ensure proper pressure management, optimize maintenance schedules with preventative maintenance procedures, and implement procedures for proper valve operation and isolation.
Yes	HFC leakage	Operation	M-2E-01	Yes	Use Alternative Refrigerants Instead of High-GWP Refrigerants	Replace high-global warming potential (GWP) refrigerants with lower-GWP refrigerants (e.g., natural refrigerants such as carbon dioxide, ammonia, and hydrocarbons, or next generation low-GWP synthetic refrigerants like hydrofluoroolefin-1234yf) in refrigeration and air conditioning equipment. When emitted into the atmosphere, high-GWP refrigerants (e.g., hydrofluorocarbons) absorb significantly more heat than carbon dioxide on a mass basis, resulting in larger global warming effects. Shifting to lower-GWP refrigerants reduces the potency of refrigerant leaks, decreasing GHG emissions.
Yes	HFC leakage	Operation	M-2E-05	No	Reduce Service Leak Emissions	Improve refrigerant servicing technologies and practices to reduce refrigerant emissions during equipment servicing. It is estimated that recovering refrigerants can reduce emissions in servicing by up to 95 percent. Equipment should only be serviced by qualified technicians certified under Section 608 of the Clean Air Act. Implementing more widespread and thorough refrigerant recovery practices while servicing refrigeration and A/C systems must go beyond regulatory requirements.
Yes	HFC leakage	Operation	M-2E-06	No	Reduce Operational Leak Emissions	Deploy leak detection technology and preventative maintenance measures to quickly identify and resolve operational leaks, which in turn will reduce GHG emissions.
Yes	HFC leakage	Operation	M-2E-07	No	Reduce Disposal Emissions	Properly recover refrigerants prior to the disposal of refrigeration and air conditioning equipment. U.S. Environmental Protection Agency-certified refrigerant recovery equipment must be used, meaning that a least 90 percent of the refrigerant must be recovered if the compressor is operating, and at least 80 percent must be recovered otherwise.
Yes	Land use change	Operation	M-2F-01	No	Implement Management Practices to Improve the Health and Function of Natural and Working Lands	Implement management strategies aimed at improving the overall health and functionality of natural and working lands as a mechanism for increasing carbon sequestration and reducing GHG emissions. Management practices may include those that change ecosystem carbon exchange rates (e.g., cultivated land soil conservation, use of biochar) and those that involve land cover changes. If land conversion is deemed appropriate, refer to Measure M-1E-1 for recommended implementation and management strategies.
Yes	Land use change	Operation	M-2F-02	No	Wildfire Resilience and Management	Implement fuel treatments in forested areas to minimize the likelihood of severe or catastrophic wildfire behavior, thereby minimizing pyrogenic carbon emissions during a wildfire event. Fuel treatments have the short-term effect of releasing more carbon emissions as understory, ladder fuels, and forest fuel loads are burned. However, in the long term, treated stands produce fewer emissions compared to untreated stands because treated stands produce low to moderate fire severity that does not disturb the carbon stock in the overstory canopy. Untreated stands are far more likely to experience severe behavior that ignites the canopy and releases the stored carbon in the overstory.
Yes	On-road vehicles	Operation	M-2G-08	No	Limit Residential Parking Supply	Reduce the total parking supply available at a residential project or site. Limiting the amount of parking available creates scarcity and adds additional time and inconvenience to trips made by private auto, thus disincentivizing driving as a mode of travel. Reducing the convenience of driving results in a shift to other modes and decreased vehicle miles traveled and thus a reduction in GHG emissions.
Yes	On-road vehicles	Operation	M-2G-35	No	Provide Electric Vehicle Charging Infrastructure	Install onsite electric vehicle chargers at buildings with designated parking areas (e.g., commercial, educational, retail, multifamily). This will enable drivers of plug-in hybrid electric vehicles to drive a larger share of miles in electric mode, as opposed to gasoline-powered mode, thereby displacing GHG emissions from gasoline consumption with a lesser amount of indirect emissions from electricity.
Yes	On-road vehicles	Operation	M-2G-36	No	Use Cleaner-Fuel Vehicles	Use cleaner-fuel vehicles in lieu of similar vehicles powered by gasoline or diesel fuel. Cleaner-fuel vehicles may include electric vehicles, natural gas and propane vehicles, and vehicles powered by biofuels such as composite diesel (blend of renewable diesel, biodiesel, and conventional fossil diesel), ethanol, and renewable natural gas. The full GHG emissions impact of cleaner fuels depends on the emissions from the vehicle's tailpipe as well as the emissions associated with production of the fuel (sometimes termed "upstream" emissions). For example, tailpipe GHG emissions from renewable natural gas are identical to tailpipe GHG emissions from conventional natural gas; the GHG benefits of renewable natural gas come from the fact that it is produced from biomass. Similarly, battery electric vehicles have zero tailpipe emissions, but properly accounting for their GHG impacts requires quantifying the emissions associated with the electricity generation needed to charge the vehicle's batteries.

Yes	Treatment of waste off-site	Operation	M-2J-01	Yes	Institute or Extend Recycling Services	Institute or extend recycling services to reduce the volume of landfilled waste. Decomposition of certain types of landfilled waste produces methane. Increasing waste diversion from landfills therefore reduces GHG emissions. The recycling process generates some emissions, but also reduces upstream emissions from the manufacturing and production of new raw materials and goods.
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Adaptation Strategies (Step 6)

Use the checkboxes below to identify adaptation strategies relevant to selected climate trends and project characteristics. The list of adaptation strategies will filter to show strategies that align with both the climate trends and project characteristics selected. Ensure Macros are enabled for filters to work (see the User Guide tab for instructions on enabling macros). Use the column on the far left to select strategies you plan to implement as part of your proposed project. Select Generate PDF button once you've made your desired selections.

Step 1: Select Climate Trends

- ☒ Heavier, more damaging rain
- ☒ Average annual precipitation increasing
- ☒ Average annual temperature increasing
- ☒ Increasing risk of extreme heat and heatwaves
- ☒ Early thawing (cold weather warming)
- ☒ Increasing risk of drought

Reset Climate Trends

Reset Project Characteristics

Select All Unhidden Strategies

Reset all Selected Strategies

Step 2: Select Project Characteristics

- ☒ Hazardous waste
- ☒ Agriculture
- ☒ Livestock
- ☒ Critical infrastructure
- ☒ Waste management
- ☒ New or upgraded buildings
- ☒ Subsurface infrastructure
- ☒ Water management
- ☒ Construction
- ☒ Increased impervious surface
- ☒ New, expanded, or rebuilt transportation route

Generate PDF

Selection	ID	Adaptation Strategies	Additional Information
Yes	S-1A-02	Conduct ongoing and pre-event stormwater infrastructure maintenance.	Clean out the storm drains and culverts; Ensure that all maintenance equipment are readily available and working for extreme events (e.g., generators).
Yes	S-1A-10	Ensure there is adequate redundancy and/or backup energy resources available to maintain necessary operations during extreme precipitation events.	Implement renewable energy and smart grid technology to optimize energy distribution and reduce outages; Develop off-grid sources for redundant power supply; Install easy hookups for temporary power; Install backup generators; Diversify energy sources such as by installing renewable energy; Install battery storage; Incorporate multiple power supplies; Implement a microgrid with integrated energy storage systems; Join a community energy project to pool resources; Utilize a combined heat and power (CHP) system; Ensure these systems are designed to be resilient during a projected extreme flood event.
Yes	S-1A-17	When siting and orienting a facility or asset, consider flood risk from increased precipitation and extreme precipitation events.	Avoid development in erosion zones and floodplains; Select a site at higher elevation.
Yes	S-1B-01	Ensure hazardous materials are stored in temperature-controlled environments to accommodate for high temperatures and heatwaves.	Insulate storage areas; Install temperature monitoring systems with alarms to alert staff; Conduct regular inspections and maintenance of storage facilities.
Yes	S-1B-02	Consider alternative pavement surfaces and materials that are more heat-resistant to reduce heat impacts and surface temperatures.	Use light-colored asphalt pavement to reduce heat absorption and reflect radiation; Use materials for railway tracks and stations that are resistant to higher heat to prevent buckling and kinks; Install permeable surfaces especially for low-traffic areas such as roadside parking (along curbs) and parking lots.
Yes	S-1B-04	Regularly monitor the condition of roadways and conduct maintenance to address wear and tear from high temperatures and heatwaves.	Implement regular maintenance schedules to address increased wear and tear; As needed, increase the use and frequency of preventative maintenance treatments (e.g., seal coats, crack seals); Install pavement sensors for extreme heat and road failure.
Yes	S-1B-05	Retain mature trees as part of design and during construction.	Inventory trees; mark boundaries around trees to avoid compaction and damage to trunks and roots.
Yes	S-1B-06	Use cooling technologies to reduce surface temperatures during periods of high temperatures and/or heatwaves.	Use reflective coating; Use high-reflectivity hardscape; Decrease impervious surfaces and/or install permeable surfaces; Incorporate green infrastructure (e.g., green roofs); Maintain and/or expand urban tree canopy.
Yes	S-1B-08	Use building construction materials that maintain indoor temperatures and/or are resilient to increasing temperatures during high heat conditions and heatwaves.	Update building insulation for higher heat thresholds; Use reflective roofing materials; Install energy efficient windows (e.g., double-glazed windows); Install green roofs and/or green walls; Use light-colored building materials (e.g., cool roofing and siding materials); Optimize natural ventilation.
Yes	S-1B-14	Ensure there is adequate redundancy and/or backup energy resources available to maintain necessary operations during increased cooling demand and/or an extreme heat event.	Implement renewable energy and smart grid technology to optimize energy distribution and reduce outages; Develop off-grid sources for redundant power supply; Install easy hookups for temporary power; Install backup generators; Diversify energy sources such as by installing renewable energy; Install battery storage; Incorporate multiple power supplies; Implement a microgrid with integrated energy storage systems; Join a community energy project to pool resources; Utilize a combined heat and power (CHP) system.
Yes	S-1B-16	Upgrade the electrical systems to handle increased cooling demand especially from extreme heat events.	Consider renewable energy and smart grid technology to optimize energy distribution and reduce outages.
Yes	S-1B-17	Provide cooling systems for critical infrastructure or equipment sensitive to overheating during periods of high temperatures and/or heatwaves.	Install back up air conditioning units; Use battery-powered equipment which is less prone to overheating than gas-powered machinery.
Yes	S-1B-19	Increase the frequency of maintenance checks to ensure construction equipment is functioning optimally in high temperatures and during heatwaves.	Regularly check fluid levels, tire pressure, and hydraulic systems.
Yes	S-1D-08	Install water-saving technologies indoors to account for drought conditions.	Use water-efficient household appliances (e.g., low-flow toilets, showerheads, and front-loading washers); Install water meters.

Refrigerants

Use	Total SF	KSF	MTCO ₂ e/year
Data Center	1,800,000	1800	20

Assumes R-1233zd which is the basis of design (GWP = 1).
Project includes 72 total chillers, 4,000 lbs refrigerant per chiller = 288,000 lbs (130,635 kg)

$$E = \sum ((CS \times OLR) + (CS \times SLR \times (TS + L))) \times GWP_i \times KSF \times UC_1$$

Where:

E=		average annual refrigerant emissions (MT CO ₂ e/yr).
CS=	72.5748	equipment charge size (kg refrigerant/KSF). The equipment charge size is the total quantity of refrigerant installed in the refrigeration or A/C equipment. Default equipment charge sizes are based on industry data published by USEPA (2016b) (Table G-38).
OLR=	0.075	annual operational leak rate (%) (USEPA 2016b) (Table G-38).
SLR=	0.075	service leak rate (%) (USEPA 2016b) (Table G-38).
TS=	25	times serviced (number of times serviced over equipment lifetime) (USEPA 2016b) (Table G-38).
L=	25	average equipment operational lifetime (years) (USEPA 2016b) (Table G-38).
GWP=	1	global warming potential (unitless) for R-1233zd per CARB (https://ww2.arb.ca.gov/resources/documents/high-gwp-refrigerants)
KSF=		land use size (1,000 sqft). Emissions are quantified by land use subtype, with the input for the land use size.
UC ₁ =	0.001	unit conversion from kg to MT (0.001 MT/kg)
r=		refrigerant.
I=		equipment type.

Refrigerant Equipment Inventory and Operational Defaults by Land Use Subtype

Land Use Subtype	Refrigeration Ec Refrigerant	Quantity (kg per KS	Operational Leak Rate (%)	Service Leak Rate (%)	Times Serviced Over Life	Lifetime (years)
Unrefrigerated Warehouse-No Rail	Cold storage		0.075	0.075	25	25
Unrefrigerated Warehouse-Rail	Cold storage		0.075	0.075	25	25
Refrigerated Warehouse-No Rail	Cold storage		0.075	0.075	25	25
Refrigerated Warehouse-Rail	Cold storage		0.075	0.075	25	25

Global Warming Potentials

Substance	Global Warming Potential	
R-1233zd	1	https://ww2.arb.ca.gov/resources/documents/high-gwp-refrigerants
R-514a	2	https://ww2.arb.ca.gov/resources/documents/high-gwp-refrigerants https://www.epa.gov/hfcs/technology-transitions-gwp-reference-table

Appendix I:
*Transportation
Impact
Studies*

TRAFFIC IMPACT ANALYSIS

HERMANTOWN INDUSTRIAL

HERMANTOWN, MINNESOTA

REPORT CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Jacob Rojer, P.E., PTOE
License No. 56767

3-27-2026
Date

Approved _____
St. Louis County Traffic Engineer

Date

Approved _____
MnDOT Traffic Engineer

Date

Approved _____
Hermantown City Engineer

Date

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APPENDIX

- A. EXHIBITS
- B. TURNING MOVEMENT COUNTS
- C. SIMTRAFFIC ANALYSIS RESULTS
- D. TURN LANE WARRANT SHEETS

INTRODUCTION

Kimley-Horn was retained to prepare a Traffic Impact Analysis (TIA) for the proposed Hermantown Industrial development located in Hermantown, Minnesota. The site is located at the southwest corner of Morris Thomas Road & Midway Road. An aerial view of the study location and surrounding roadway network is presented in **Exhibit 1** in **Appendix A**.

As part of this study, the existing roadway network was analyzed to determine the current operations at the study intersections. In order to assess the impact of the development scenarios on the area roadway network, site-generated trips were established and added to the background traffic volumes. Background traffic volumes included the other major development projects in the vicinity. Future traffic conditions were evaluated for the potential Opening Year of the proposed development (2030) and a long-term “Design Year” (2045). Background conditions were analyzed for each study year, along with the “build” conditions of the two development scenarios. Additionally, an Existing (2025) conditions traffic analysis was conducted.

This report presents and documents data collection, summarizes the evaluation of existing and projected future traffic conditions on the surrounding roadways, and identifies recommendations to address the potential impact of site-generated traffic on the adjacent roadway network.

STUDY AREA

The development site is located at the southwest corner of Morris Thomas Road & Midway Road in Hermantown, MN. The site is largely undeveloped with the exception of an electrical substation and sparse residential and commercial buildings along the edges of the site.

EXISTING ROADWAY CHARACTERISTICS

The existing roadway network near the site includes multiple County State Aid Highways (CSAHs), a US Highway, and some minor local roads. The following provides a description of the roadways near the study area:

Midway Road (CSAH 13) is a north-south two-lane St. Louis County roadway located along the eastern boundary of the AUAR study area. The annual average daily traffic (AADT) according to the MnDOT Traffic Mapping Application is 7,111 vehicle per day south of St. Louis River Road, as of 2024. Midway Road is classified as a Minor Arterial and the posted speed limit is 55 miles per hour (mph) near the project site.

United States Highway 2 (US 2) is an east-west two-lane United States highway located northeast of the AUAR area. The MnDOT Traffic Mapping Application reports an AADT of 5,466 vpd west of St. Louis River Road, as of 2025. US Highway 2 is classified as a Principal Arterial, and the posted speed limit is 60 mph near the project site.

Morris Thomas Road (CSAH 56) is an east-west two-lane St. Louis County roadway that forms the northern boundary of the AUAR area. The MnDOT Traffic Mapping Application reports an AADT of 1,195 vehicles per day west of Midway Road, as of 2024. Morris Thomas Road is classified as a Major Collector, and the posted speed limit is 55 mph.

Saint Louis River Road (CSAH 19) east of Midway Road or **County Road 696** west of Midway Road is an east-west two-lane road located south of the AUAR area. The MnDOT Traffic Mapping Application reports an AADT of 508 vpd in 2024. Saint Louis River Road is classified as a minor collector east of Midway Road and a local road west of Midway Road, with a posted speed limit is 55 mph.

Old Highway 2 is an east-west unpaved local road located northeast of the AUAR area. The MnDOT Traffic Mapping Application reported an AADT of 760 vpd in 2019 though is likely much lower than this because the connection to US 2 has since been removed.

The existing geometry and intersection control for the intersections in the study area that will be included in this analysis are shown in **Exhibit 2**.

PLANNED ROADWAY IMPROVEMENTS

St. Louis County is currently in the planning stages of looking at concepts for future roadway improvements along Midway Road to provide grade separation from the rail lines. With the unknown nature of the potential future improvements, no background roadway modifications are assumed for this analysis. Any traffic analysis conducted after roadway improvement plans have been determined should include consideration of the planned improvements.

RAILROAD CROSSING CONDITIONS

There are two railroad crossings within the study area. The north railroad crossing is located on Midway Road, approximately 430' north of Morris Thomas Road. The south railroad crossing is located at the intersection of Midway Road & St. Louis River Road. Both railroad crossings include crossing signals with arms (the south crossing has crossing signals with arms at all four intersection approaches). The north crossing is located approximately 1,000' south of the Midway Road & US Highway 2 intersection.

A count of the trains crossing passing through each of the two railroad crossings was conducted to determine the scale of the impact that the railroad crossings pose to the traffic in the study area. The north railroad crossing saw 12 trains pass-through in the 24-hour period from 12:00 PM on April 9 to 12:00 PM on April 10. The south railroad crossing saw 9 trains pass-through during the same period. The count of the railroad crossings indicated that the flow of trains through both crossings is generally consistent throughout the day without distinct peaks or lulls. However, it should be noted that per the Minnesota Railer Viewer Application, the two crossing locations can have up to 30 trains per day.

Railroad crossings at the crossing point north of Morris Thomas Road were found to typically take 3-5 minutes. Of the 12 observed railroad crossings, the longest crossing took just under 10 minutes, and the shortest crossing took 2 minutes and 15 seconds. Overall, crossings exhibited an average duration of 4 minutes and 10 seconds and a median duration of 3 minutes and 38 seconds.

MnDOT provided railroad crossing data for June-October 2025 for the Morris Thomas Road crossing. The data showed a total of 2,732 crossings during the 5-month/152-day period. This equates to 18 crossings per day. Using the crossings timestamp data, the calculated median crossing duration was 4 minutes and 17 seconds and the 95th percentile crossing duration was 7 minutes 37 seconds.

The number of 5-minute and 10-minute railroad crossing events are shown below in **Table 1**. In the 5-month span, 649 crossings were at least 5 minutes in duration (24% of total), and 50 crossings were at least 10 minutes in duration (2% of total). The number of 10-minute crossing events annually is projected to be 120 (about one per 3 days). Only one 10-minute crossing event occurred during the AM peak hour between June and October 2025.

Table 1: Number of Railroad Crossing Events by Duration

Event Type	Crossing Count Data (June - October 2025)		Projected Annual Events
	Number of Events	Percent of Total Events	
5+ Minute Crossing	649	24%	1,558
10+ Minute Crossing	50	2%	120
Total Crossings	2,732	100%	6,557

As is typical, vehicles may experience delays of a few minutes during crossings and long queues are likely to form at these times. It was observed that queues at the north railroad crossing for vehicles traveling southbound on Midway Road reach the US Highway 2 intersection at times, causing queues to form in the westbound left-turn lane, eastbound right-turn lane, and southbound through lane. Queues from the east and westbound turning movements were not observed to block their respective through lanes at any time with adequate remaining queue storage. A future conditions queue analysis for the railroad crossing was conducted as part of this report (see the *Railroad Crossing Queue Analysis* section below).

VOLUME DEVELOPMENT

Kimley-Horn conducted a review of the study area including existing land uses in the surrounding area, the adjacent street system, current traffic volumes and operating conditions, lane configurations and traffic controls at nearby intersections, and other key roadway characteristics. This section of the report details information on the existing conditions.

EXISTING TRAFFIC VOLUMES

Turning Movement Counts (TMCs) were collected at five (5) study intersections in April 2025, with the PM peak (4:00 PM to 6:00PM) collected on Wednesday, April 9, and the AM peak (7:00 AM to 9:00 AM) collected on Thursday, April 10. The five study intersections are as follows:

- US Highway 2 & Midway Road
- Midway Road & Morris Thomas Road
- Midway Road & St. Louis River Road
- US Highway 2 & Morris Thomas Road
- US Highway 2 & St. Louis River Road

The TMC data indicates that peak hour traffic volumes occur within the study area from 7:15 to 8:15 AM and 4:15 to 5:15 PM on a typical weekday. Full turning movement count data is included in **Appendix A**. The Existing (2025) traffic volumes are shown in **Exhibit 3**.

FUTURE BACKGROUND GROWTH

To account for background growth caused by change in local and regional travel patterns and future developments, a background growth rate was utilized. Historical Annual Average Daily Traffic (AADT) data was compiled with MnDOT's ESAL worksheet and used to calculate historical growth rates along each roadway, which are adjusted for local demographic patterns. The Existing AADT for each roadway and the demographically adjusted growth rates are given in **Table 2**.

Table 2: Demographically Adjusted Growth Rates

Roadway Name	Location on Roadway	Existing AADT	Growth Rate
US Highway 2	East of Midway Road	6,200	0.5%
	West of Midway Road	3,000	0.5%
Midway Road	South of St Louis River Road	7,000	1.1%
Morris Thomas Road	West of Midway Road	1,200	0.6%
	East of US Highway 2	1,800	0.5%
St Louis River Road	East of Midway Road	1,900	0.6%
Average Growth Rate			0.6%

Based on a review of historical AADT trends, the study area roadways are generally projected to see slow growth. The average demographically adjusted growth rate was found to be about 0.6% annual growth. Population projections from the Duluth Superior Metropolitan Interstate Council show that the city of Hermantown is projected to grow from 10,128 in 2021 to 10,672 in 2050, or about 0.2% annual growth. This projection confirms that the area is generally expected to see slow growth and a 0.6% annual growth rate is likely to provide a conservative estimate regarding the level of growth.

FUTURE BACKGROUND DEVELOPMENT

There are no known background developments in the project vicinity. A 0.6% annual background growth provides a conservative estimate for all background traffic growth due to local and regional developments.

FUTURE BACKGROUND TRAFFIC PROJECTIONS

The No-Build traffic volumes for the potential Opening Year (2030) were calculated by growing the Existing (2025) traffic volumes (**Exhibit 3**) by a 0.6% annual growth rate for 5 years. The resultant Potential Opening Year (2030) No-Build traffic volumes are shown in **Exhibit 4**.

The Design Year (2045) No-Build traffic volumes were calculated by growing the Existing (2025) traffic volumes (**Exhibit 3**) by a 0.6% annual growth rate for 20 years. The resultant Design Year (2045) No-Build traffic volumes are shown in **Exhibit 5**.

PROPOSED DEVELOPMENT

The proposed Hermantown Industrial development is within the AUAR development scenario intensity. Site characteristics and estimated trip generation and distribution are described below.

DEVELOPMENT CHARACTERISTICS AND SITE ACCESS

Access to the proposed development would be located along Morris Thomas Road about 0.4 miles west of Midway Road, near the northwest corner of the development site. This access point is anticipated to serve all traffic associated with the proposed development site.

TRIP GENERATION

Site specific trip generation estimates were provided by the developer. The estimates are based on trip generation data collected at similar sites across the country.

The anticipated trip generation for the Hermantown Industrial development at full buildout is shown below in **Table 3**. The development is expected to generate 1,920 daily trips, including 290 trips during the AM peak hour (260 entering and 30 exiting) and 290 during the PM peak hour (30 entering and 260 exiting).

Table 2: Proposed Development Trip Generation

Land Use Description	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Hermantown Industrial	1,920	260	30	290	30	260	290

DIRECTIONAL DISTRIBUTION

The estimated distribution of site-generated traffic on the surrounding roadway network was developed based on a review of area demographics, roadway volumes, and origin-destination data from Replica, a publicly available dataset which utilizes Census data, land use regulations, aggregate mobile data, transaction data, and real estate transaction data to model transportation patterns. Based on the origin-destination data and consideration of the existing traffic patterns and roadway characteristics, the following global distribution was developed:

- 40% to/from southeast on US Highway 2
- 15% to/from north on Midway Road
- 15% to/from south on Midway Road
- 15% to/from east on Morris Thomas Road
- 10% to/from west on Morris Thomas Road
- 5% to/from northwest on US Highway 2

The anticipated site trip distribution for the proposed development is shown in **Exhibit 6**. The site traffic assignment, representing traffic volumes associated with the proposed development at the study intersections, is a function of the estimated trip generation (**Table 2**) as well as the directional distribution listed above. The site trip assignment for Potential Opening Year (2030) Build conditions is shown in **Exhibit 7**. Full Buildout of the development site was included in the 2030 Build conditions.

FUTURE BUILD TRAFFIC PROJECTIONS

The Build traffic volumes for the potential Opening Year (2030) were calculated by adding the total development site trips (**Exhibit 7**) to the Potential Opening Year (2030) No-Build traffic volumes (**Exhibit 4**). The Potential Opening Year (2030) Build traffic volumes are shown in **Exhibit 8**.

The Design Year (2045) Build traffic volumes were calculated by adding the total development site trips (**Exhibit 7**) to the Design Year (2045) No-Build traffic volumes (**Exhibit 5**). The Design Year (2045) Build traffic volumes are shown in **Exhibit 9**.

CAPACITY ANALYSIS

Analysis of the future background conditions was carried out to determine the baseline operating conditions for the potential Opening Year (2030) and the analyzed Design Year (2045) of the proposed development. A review of future traffic growth and planned geometric changes for the study roadways was conducted for the analysis.

ANALYSIS METHODOLOGY

Synchro/SimTraffic 12th edition capacity analysis software was used to evaluate the operating conditions at the study intersections. The capacity of an intersection quantifies its ability to accommodate traffic volumes and is expressed in terms of level of service (LOS), measured in average delay per vehicle. LOS grades range from A to F, with LOS A as the highest (best traffic flow and least delay), LOS E as saturated or at-capacity conditions, and LOS F as the lowest (oversaturated conditions).

The LOS grades shown below, which are provided in the Transportation Research Board's Highway Capacity Manual (HCM), quantify and categorize the driver's discomfort, frustration, fuel consumption, and travel times experienced as a result of intersection control and the resulting traffic queuing. A detailed description of each LOS rating can be found in **Table 4**.

Table 3: Level of Service Grading Descriptions

Level of Service	Description (<i>Highway Capacity Manual</i> , 7 th Edition)
A	Minimal control delay; traffic operates at primarily free-flow conditions; unimpeded movement within traffic stream.
B	Minor control delay at signalized intersections; traffic operates at a fairly unimpeded level with slightly restricted movement within traffic stream.
C	Moderate control delay; movement within traffic stream more restricted than at LOS B; formation of queues contributes to lower average travel speeds.
D	Considerable control delay that may be substantially increased by small increases in flow; average travel speeds continue to decrease.
E	High control delay; average travel speed no more than 33 percent of free flow speed.
F	Extremely high control delay; extensive queuing and high volumes create exceedingly restricted traffic flow.

The range of control delay for each rating (as detailed in the HCM) is shown in **Table 5**.

Table 4: Level of Service Grading Criteria

Level of Service ¹	Average Control Delay (s/veh) at:	
	Unsignalized Intersections	Signalized Intersections
A	0 – 10	0 – 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F ²	> 50	> 80

¹Highway Capacity Manual, 7th Edition

²All movements with a Volume to Capacity (v/c) ratio greater than 1 receive a rating of LOS F.

At side-street stop-controlled intersections, overall delay is not reported, and the worst side street delay is reported in its place. The overall delay at side-street stop-controlled intersections can misrepresent the operating conditions at the intersection since vehicles at free approaches often experience zero delay.

EXISTING (2025) CONDITIONS CAPACITY ANALYSIS

Existing (2025) conditions capacity analysis was conducted to develop an understanding of the baseline operating conditions currently present at the study intersections. Existing geometry and intersection control are shown in **Exhibit 2**, while the Existing (2025) traffic volumes are shown in **Exhibit 3**.

Capacity analysis was conducted in Synchro 12/SimTraffic. The results of Existing (2025) conditions capacity analysis are summarized below in **Table 6**.

Based on the analysis results, all movements at the study intersections currently operate at LOS C or better and all study intersections operate at an overall LOS A or B during the AM and PM peak hours.

The 95th percentile queueing results were reviewed, and all queues are maintained within their provided storage bays with no significant queueing issues anticipated. The SimTraffic analysis reports can be found in **Appendix C**.

Table 5: Existing Year (2025) Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (24.5)	B (18.1)	A (4.3)	B (13.2)	C (22.9)	B (18.2)	A (6.7)	B (12.1)
		WB	C (21.2)	A (9.7)	A (4.9)		C (20.1)	B (13.3)	A (5.4)	
		NB	B (11.6)	B (17.9)	A (4.6)		B (12.2)	B (14.9)	A (4.4)	
		SB	B (11.5)	A (8.3)	A (4.9)		B (11.8)	B (10.7)	A (4.5)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	A (5.1)	-	A (2.2)	A (5.1)	A (6.9)	-	A (3.8)	A (6.9)
		WB	-	-	-		-	-	-	
		NB	A (1.3)	A (2.7)	-		A (3.7)	A (2.4)	-	
		SB	-	A (3.3)	A (2.7)		-	A (4.8)	A (3.6)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.8)	B (10.1)	A (1.8)	B (10.1)	A (6)	A (9.6)	A (1.7)	A (9.6)
		WB	-	A (2.6)	A (2.1)		A (8.7)	A (6)	A (0.9)	
		NB	A (0)	A (0.2)	A (0)		A (1.2)	A (0.2)	A (0)	
		SB	A (0.6)	A (0.6)	A (0)		A (1.7)	A (0.6)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (6.9)	A (6.5)	-	A (6.9)	A (7.5)	A (6.4)	-	A (7.5)
		WB	-	A (1.7)	A (0.1)		-	A (3.1)	A (3)	
		NB	-	-	-		-	-	-	
		SB	A (6.6)	-	A (1.5)		A (6.1)	-	A (2.5)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.7)	A (0.1)	A (4.9)	-	A (0.4)	A (0)	A (3.7)
		WB	A (1.2)	A (0.2)	-		A (1.5)	A (0.4)	-	
		NB	A (4.9)	-	A (2.2)		A (3.7)	-	A (1.9)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS at side street stop-controlled intersections is reported as the worst movement.

POTENTIAL OPENING YEAR (2030) NO-BUILD CAPACITY ANALYSIS

A Potential Opening Year (2030) No-Build Condition analysis was completed to develop an understanding of the baseline operating conditions for the study area in the potential opening year of the proposed development. No geometric changes were assumed in the analysis. The Potential Opening Year (2030) No-Build traffic volumes are shown in **Exhibit 4**. Results of the Potential Opening Year (2030) No-Build conditions capacity analysis are provided in **Table 7**.

Under Potential Opening Year (2030) No-Build conditions, all intersections are expected to continue operating at LOS A or B and all individual movements are anticipated to operate at LOS C or better.

The 95th percentile queueing results were reviewed, and all queues are expected to remain within the provided storage bays with no significant queueing issues anticipated. The SimTraffic analysis reports are provided in **Appendix C**.

Table 6: Potential Opening Year (2030) No-Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (26.9)	C (20.7)	A (4.5)	B (14.1)	C (26.8)	C (20.6)	A (6.1)	B (13.8)
		WB	C (22.5)	B (13.2)	A (5.9)		C (25.7)	B (14.7)	A (5.6)	
		NB	B (11.6)	B (18.1)	A (4.8)		B (12.8)	B (16.8)	A (4.5)	
		SB	B (12.2)	A (8.5)	A (4.6)		B (12.9)	B (12.5)	A (4.8)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	A (5.2)	-	A (2.8)	A (5.2)	A (6.4)	-	A (3.5)	A (6.4)
		WB	-	-	-		-	-	-	
		NB	A (2)	A (2.7)	-		A (4.3)	A (2.6)	-	
		SB	-	A (3.1)	A (2.8)		-	A (5.1)	A (4)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (5.6)	B (10.5)	A (1.7)	B (10.5)	A (6.9)	B (10.9)	A (1.6)	B (10.9)
		WB	-	A (2.6)	A (1.8)		A (5.6)	A (5.7)	A (1.4)	
		NB	A (0.5)	A (0.2)	A (0)		A (2.9)	A (0.2)	A (0)	
		SB	A (1.4)	A (0.6)	A (0)		A (1.1)	A (0.6)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.3)	A (6.7)	-	A (7.3)	A (7.7)	A (6.8)	-	A (7.7)
		WB	-	A (1.8)	A (1.6)		-	A (3.4)	A (1.5)	
		NB	-	-	-		-	-	-	
		SB	A (5.1)	-	A (1.3)		A (5.1)	-	A (2.5)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.6)	A (0)	A (4.2)	-	A (0.5)	A (0)	A (5.4)
		WB	A (1.6)	A (0.1)	-		A (1)	A (0.3)	-	
		NB	A (4.2)	-	A (2.5)		A (5.4)	-	A (1.5)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS at side street stop-controlled intersections is reported as the worst movement.

POTENTIAL OPENING YEAR (2030) BUILD CONDITIONS CAPACITY ANALYSIS

The Potential Opening Year (2030) Build conditions capacity analysis was conducted to determine the traffic impacts of the proposed Build development on the operations of the adjacent roadway network in the potential opening year of the proposed development. Existing (2025) intersection control, geometry, and signal timings were assumed for the analysis. Potential Opening Year (2030) Build traffic volumes are shown in **Exhibit 8**. The results of the Potential Opening Year (2030) Build analysis are shown below in **Table 8**.

Based on the results of the Potential Opening Year (2030) Build conditions analysis, all intersections and movements are anticipated to operate at LOS C or better.

SimTraffic queueing results were reviewed and all 95th percentile queues are anticipated to remain within their respective storage bays. SimTraffic reports are included in **Appendix C**.

Table 7: Potential Opening Year (2030) Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (33.9)	C (29.7)	A (6.6)	B (19.1)	C (33)	C (22.9)	A (6.6)	B (13.7)
		WB	C (29.4)	B (11.3)	A (6)		C (25.2)	B (14.1)	A (6)	
		NB	B (15)	C (23)	A (5.7)		B (14.3)	B (17.7)	A (5.5)	
		SB	B (17.6)	B (12.8)	A (4.6)		B (13.3)	B (13)	A (4.4)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	B (10.1)	A (0.4)	A (4.7)	B (10.1)	C (16.8)	-	B (13.6)	C (16.8)
		WB	-	-	-		-	-	-	
		NB	A (5.5)	A (5.3)	-		A (4.3)	A (3.6)	-	
		SB	-	A (5.7)	A (3.3)		-	A (5.9)	A (4.1)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6)	B (10.4)	A (1.9)	B (10.4)	A (8.5)	B (11.8)	A (1.1)	B (11.8)
		WB	-	A (3)	A (1.9)		A (6.3)	A (6.2)	A (2.8)	
		NB	A (1.8)	A (0.3)	A (0)		A (1.8)	A (0.3)	A (0)	
		SB	A (1.2)	A (0.6)	A (0)		A (1.7)	A (1.2)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.9)	A (7.2)	-	A (7.9)	B (10.8)	A (9.8)	-	B (10.8)
		WB	-	A (2.7)	A (2.2)		-	A (3.5)	A (3.1)	
		NB	-	-	-		-	-	-	
		SB	A (5.6)	-	A (2.1)		A (8.1)	-	A (2.6)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.8)	A (0)	A (8.6)	-	A (0.7)	A (0)	A (7.3)
		WB	A (1.8)	A (0.5)	-		A (1.8)	A (0.5)	-	
		NB	A (8.6)	-	A (2.8)		A (7.3)	-	A (2.8)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	A (1.1)	A (0.1)	A (9.5)	-	A (1.7)	A (0)	A (6.5)
		WB	A (2.5)	A (2.8)	-		A (0.5)	A (0.5)	-	
		NB	A (9.5)	-	A (2.9)		A (6.5)	-	A (4.5)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS in side street stop-controlled intersections is reported as the worst movement.

DESIGN YEAR (2045) NO-BUILD CAPACITY ANALYSIS

The Design Year (2045) No-Build Condition analysis was completed to develop an understanding of the baseline operating conditions for the study area in the long-term without the addition of proposed development traffic. Existing (2025) intersection control, geometry and signal timings were utilized in the analysis. The Design Year (2045) No-Build Traffic Volumes are shown in **Exhibit 6**. Results of the Design Year (2045) No-Build capacity analysis are included below in **Table 9**.

All movements at the study intersections are expected to operate at LOS C or better during the AM and PM peak hours. All study intersections are anticipated to continue operating at an overall LOS A or B. Overall, the increases in delay due to background growth are minimal and operations are expected to remain acceptable through the Design Year (2045) with no modifications to the study area intersections.

The 95th percentile queueing results were reviewed and all 95th percentile queues are expected to be maintained within their provided storage bays. The SimTraffic reports are included in **Appendix C**.

Table 8: Design Year (2045) No-Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (25.6)	C (21.2)	A (4.8)	B (15)	C (28.2)	C (22.2)	A (6.7)	B (14.8)
		WB	C (24.7)	B (13.5)	A (6.3)		C (26.7)	B (15.1)	A (6)	
		NB	B (11.1)	B (19.7)	A (4.8)		B (14.6)	B (18.7)	A (4.7)	
		SB	B (14.1)	A (9.4)	A (4.1)		B (14.7)	B (12.7)	A (4.4)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	A (6.2)	-	A (3.3)	A (6.2)	A (8.7)	-	A (4.4)	A (8.7)
		WB	-	-	-		-	-	-	
		NB	A (2.5)	A (2.9)	-		A (5.4)	A (3)	-	
		SB	-	A (3.4)	A (2.8)		-	A (5.6)	A (4.1)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.6)	B (10.8)	A (2.4)	B (10.8)	A (6.5)	B (11.2)	A (2)	B (11.2)
		WB	-	A (2.2)	A (1)		A (5.4)	A (6.3)	A (2.6)	
		NB	A (0.7)	A (0.2)	A (0)		A (1)	A (0.2)	A (0)	
		SB	A (1.9)	A (0.6)	A (0)		A (1.2)	A (0.7)	A (0.1)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.7)	A (6.7)	-	A (7.7)	A (8)	A (6.6)	-	A (8)
		WB	-	A (2)	A (1.7)		-	A (3.3)	A (1.6)	
		NB	-	-	-		-	-	-	
		SB	A (5.7)	-	A (1.8)		A (5.2)	-	A (2.9)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.7)	A (0)	A (5.6)	-	A (0.5)	A (0)	A (4.4)
		WB	A (1.9)	A (0.3)	-		A (1.5)	A (0.4)	-	
		NB	A (5.6)	-	A (3)		A (4.4)	-	A (1.9)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS in side street stop-controlled intersections is reported as the worst movement.

DESIGN YEAR (2045) BUILD CONDITIONS CAPACITY ANALYSIS

Capacity analysis was conducted for the Design Year (2045) Build conditions to determine the long-term effects of the proposed development. Existing (2025) intersection control, geometry, and signal timings were used for the analysis. The Design Year (2045) Build volumes are shown in **Exhibit 9**. Capacity analysis results for the Design Year (2045) Build conditions are provided in **Table 10**.

Results of the Design Year (2045) Build conditions analysis show that with the addition of long term background growth, delays are generally anticipated to see a minor increase compared to the Potential Opening Year (2030) Build conditions. All study intersections are anticipated to operate at LOS C or better and all individual movements are anticipated to operate at LOS D or better during the AM and PM peak hours. SimTraffic queueing results were reviewed, and all 95th percentile queues are anticipated to remain within their provided storage bays and no significant queueing issues are expected. SimTraffic reports are included in **Appendix C**.

Table 9: Design Year (2045) Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	D (40.5)	C (32.1)	A (7.3)	C (22.1)	C (27.5)	C (25)	A (8)	B (15.4)
		WB	C (31.1)	B (12.3)	A (7.4)		C (26.7)	B (15.6)	A (7.1)	
		NB	B (19.8)	C (27.2)	A (5.9)		B (16.5)	B (19.1)	A (5.7)	
		SB	C (23.8)	B (15.2)	A (3.5)		B (15.6)	B (14.5)	A (4.8)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	B (10.2)	-	A (5.6)	B (10.2)	C (21.2)	-	C (15.8)	C (21.2)
		WB	-	-	-		-	-	-	
		NB	A (6.5)	A (5.9)	-		A (5.7)	A (3.9)	-	
		SB	-	A (5.7)	A (3.7)		-	A (6.6)	A (4.6)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.3)	B (11.3)	A (2.2)	B (11.3)	A (7.9)	B (12.1)	A (1.5)	B (12.1)
		WB	-	A (3.1)	A (1.5)		A (6.4)	A (6.9)	A (4.6)	
		NB	A (0.9)	A (0.4)	A (0)		A (1.2)	A (0.3)	A (0)	
		SB	A (2.4)	A (0.6)	A (0)		A (1.6)	A (1)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (8.6)	A (7.6)	-	A (8.6)	B (11)	A (9.6)	-	B (11)
		WB	-	A (3)	A (2.8)		-	A (3.6)	A (2.2)	
		NB	-	-	-		-	-	-	
		SB	A (5.5)	-	A (2.4)		A (6.9)	-	A (2.9)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.9)	A (0)	A (5.2)	-	A (0.7)	A (0)	A (7)
		WB	A (2.8)	A (0.8)	-		A (2)	A (0.5)	-	
		NB	A (5.2)	-	A (3)		A (7)	-	A (3.1)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	A (1.2)	A (0.2)	A (6)	-	A (1.6)	A (0)	A (5.8)
		WB	A (2.6)	A (2.8)	-		A (0.3)	A (0.5)	-	
		NB	A (6)	-	A (2.8)		A (5.8)	-	A (4.4)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS in side street stop-controlled intersections is reported as the worst movement.

DESIGN YEAR (2045) MITIGATED BUILD CONDITIONS CAPACITY ANALYSIS

It is anticipated that site traffic may be given designated routes to the site to avoid undesirable queueing from train crossings near the US Highway 2 & Midway Road intersection. In particular, all traffic traveling to the site from US Highway 2 south of St. Louis River Road would be instructed to turn take a left onto St. Louis River Road and then a right onto Midway Road, approaching Morris Thomas Road from the south. This would reduce the westbound left turn queueing during train events which could otherwise cause operational issues for through traffic along US Highway 2. The traffic volumes associated with this scenario are shown in **Exhibit 10**.

A capacity analysis was conducted on the Design Year (2045) Mitigated Build conditions to determine the impact of the rerouted site traffic on the roadway network with the proposed mitigation plan in place. Results are shown below in **Table 11**. All study intersections are anticipated to operate at LOS A or B and all individual movements at LOS D or better.

Table 10: Design Year (2045) Mitigated Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	D (36.8)	C (25.6)	A (5.4)	B (17.2)	C (29.4)	C (24.5)	A (9.1)	B (14.9)
		WB	C (27.5)	B (11.1)	A (6.7)		C (27)	B (16.1)	A (6.3)	
		NB	B (15)	C (22.2)	A (5.8)		B (15.2)	B (19.2)	A (6.7)	
		SB	B (16.9)	B (10.9)	A (3.9)		B (13.9)	B (13.3)	A (4.9)	
Midway Road & Morris Thomas Road	Signal	EB	C (24.2)	-	A (2.8)	A (7.7)	B (13.2)	A (1.1)	A (5.2)	B (10.2)
		WB	-	-	-		-	-	-	
		NB	A (7.5)	A (6.2)	-		B (10.5)	A (7.5)	-	
		SB	-	A (7)	A (3.9)		-	B (12.1)	A (6.3)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.6)	B (11.1)	A (2.8)	B (11.1)	A (8)	B (11.8)	A (1.4)	B (11.8)
		WB	-	A (3.5)	A (4.1)		A (6.9)	A (6.3)	A (2.8)	
		NB	A (0.8)	A (0.5)	A (0)		A (1.7)	A (0.3)	A (0)	
		SB	A (1.8)	A (0.8)	A (0)		A (1.8)	A (1.3)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.4)	A (7.2)	-	A (7.4)	B (11)	B (10.3)	-	B (11)
		WB	-	A (2.1)	A (0.5)		-	A (3.5)	A (2.5)	
		NB	-	-	-		-	-	-	
		SB	A (5.3)	-	A (2)		A (7.4)	-	A (3.2)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.9)	A (0.1)	B (10.4)	-	A (0.7)	A (0)	A (7)
		WB	A (2.8)	A (0.5)	-		A (1.5)	A (0.4)	-	
		NB	B (10.4)	-	A (3)		A (7)	-	A (3.2)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	A (1)	A (0.1)	B (14.5)	-	A (1.6)	A (0)	A (6.5)
		WB	A (2.6)	A (1.4)	-		A (0.9)	A (0.7)	-	
		NB	B (14.5)	-	A (2.6)		A (6.5)	-	A (4.5)	
		SB	-	-	-		-	-	-	

TURN LANE WARRANT ANALYSIS

The need for turn lanes in the study area were evaluated using the methodologies laid out in the National Cooperative Highway Research Program's *Report 457* on the need for major-road turn lanes at side-street stop-controlled intersections. Turn lane warrants were conducted at the proposed Industrial Access point along Morris Thomas Road as well as for the intersection of Midway Road & Morris Thomas Road. Turn Lane Warrant sheets are shown in **Appendix D**.

Under the Potential Opening Year (2030) Build conditions, northbound-left and southbound-right turn lanes are both warranted at the intersection of Midway Road & Morris Thomas Road. These lanes are recommended to be constructed along with the proposed development. The results of the turn lane warrant analysis indicated that neither an eastbound right turn lane nor a westbound left turn lane are warranted at the site access point along Morris Thomas Road. However, St. Louis County will require a left turn lane at the proposed site access point along Morris Thomas Road for due to safety concerns associated with the high number of left turns at the intersection during peak periods.

The intersection of US Highway 2 & St. Louis River Road currently has a bypass lane in place of a left turn bay for the westbound approach. The MnDOT Access Management Manual recommends bypass lanes only in instances when left turn lanes are warranted but construction of a left turn lane is impractical. MnDOT guidelines state that a bypass can be considered instead of a left turn lane when a 2-lane highway has an AADT of more than 6,500 vehicles per day and the cross street has an AADT between 100 and 400 vehicles. As of 2025, the AADT on St. Louis River Road is about 500 which exceeds these guidelines and with the development of the AUAR parcels that AADT will increase.

Because the proposed development site adds westbound left turns the US Highway 2 & St. Louis River Road intersection, a left turn lane should be installed at the intersection to conform with the latest guidance from MnDOT. NCHRP guidelines confirm that a left turn lane is warranted under the Potential Opening Year (2030) Build conditions and that a westbound left turn lane should be installed at this intersection.

RAILROAD CROSSING ANALYSIS

Railroad crossing queues were analyzed using SimTraffic to determine if the provided storage bays along US Route 2 are sufficient for the queues which will occur during railroad crossing events. Railroad crossing analysis was focused on the Existing (2025) conditions and the Potential Opening Year (2030) Build conditions because St. Louis County is exploring alternatives to remove the at-grade railroad crossing in the long term.

As discussed in the *Railroad Crossing Conditions* section above, the majority of railroad crossing events take between 3 and 5 minutes, with the longest event observed taking 10 minutes. To be conservative, analysis was conducted on 10-minute train crossing events to estimate worst case scenario queueing which could occur during under typical traffic conditions.

EXISTING (2025) RAILROAD CROSSING QUEUEING

Analysis was conducted on the Existing (2025) railroad crossing conditions to determine the baseline level of queueing that occurs as a result of 10-minute train crossing events. The analysis indicates that southbound railroad crossing queues during the AM peak generally will not have an impact on the intersection of US Highway 2 & Midway Road due to lower southbound traffic volumes. With higher northbound traffic volumes, the maximum queues for northbound are anticipated to extend 1,346' south of Morris Thomas Road.

The PM Peak hour has higher southbound traffic volumes than the AM peak hour which results in more queueing at the US Highway 2 & Midway Road intersection. The approximate maximum queues for affected movements at the intersection are 75' for eastbound right turns, 167' for westbound left turns, and 1,808' for southbound through. Northbound queues at the railroad crossing extend 1,078' south of Morris Thomas Road. These results are in line with what was observed as part of the existing conditions data collection.

BUILD (2030) RAILROAD CROSSING QUEUEING

During the AM peak hour, a 10-minute crossing event sees queues at the railroad crossing point form less quickly than the PM peak hour due to less traffic volume along Midway Road, but when queues reach the intersection of US Highway 2, queues in the turn lanes (particularly the westbound left turn lane) form quickly due to higher turning volumes. The westbound left turn movement at US Highway 2 & Midway Road is anticipated to see maximum queues of 453' during a 10-minute crossing event in the AM peak. The southbound through movement sees queues of 682' and the eastbound right turn movement sees 93' queues. The 453' westbound queue would extend back to the easternmost access to the retail parcels on the north without blocking it. However, it is recommended that traffic traveling to the site from US Highway 2 south of St. Louis River Road should be routed to turn at St. Louis River Road to avoid the US Highway 2 & Midway Road railroad crossing and reduce potential undesirable queueing in the westbound left turn lane.

During the PM peak hour, a 10-minute crossing event causes queues to form more quickly than the AM peak hour due to greater traffic flow along Midway Road, but queue storage is less of a concern for turning movements since the majority of entering site trips turning eastbound right and westbound left at the intersection occur during the AM peak hour. The westbound left turn movement is anticipated to see maximum queue lengths from a 10-minute crossing event of about 187'. The southbound through movement sees maximum queues of 2,031' and the eastbound right turn movement sees 58' queues. Queueing results for both scenarios are summarized below in **Table 12**.

Table 11: 10-Minute Train Crossing Event Queueing Results

Scenario	Maximum Queue by Movement				
	US Highway 2 & Midway Road			Midway Road & Morris Thomas Road	
	EBR	WBL	SBT	NBT	EBL/R ¹
(Available Queue Storage)	300'	450'	-	-	- / 250'
Existing (2025) Conditions – AM Peak	26'	59'	164'	1,346'	298'
Existing (2025) Conditions – PM Peak	75'	167'	1,808'	1,078'	277'
Build (2030) Conditions – AM Peak	93'	453'	682'	1,504'	432'
Build (2030) Conditions – PM Peak	58'	187'	2,031'	1,349'	1,563'
Build (2030) Conditions Mitigated – AM Peak	72'	204'	626'	1,812'	257'
Build (2030) Conditions Mitigated – PM Peak	44'	142'	1,863'	1,421'	1,169'

¹Dedicated left turn storage (250') was assumed at Midway Road & Morris Thomas Road under Build conditions.

Based on the results of the railroad queueing analysis, the existing storage is anticipated to be sufficient for all maximum queues resulting at the intersection of US Highway 2 & Morris Thomas Road during 10-minute train crossing events except for the westbound left which is at capacity. Rerouting traffic from US Highway 2 southeast of the site onto St. Louis River Road to avoid the US Highway 2 & Midway Road railroad crossing and reduce potential undesirable queueing in the westbound left turn lane.

In review of the MnDOT provided data for the railroad crossing from June through October 2025, a total of 97 railroad crossings occurred during the weekday AM peak hour (7:45 AM to 8:45 AM) when the projected queues for the turn lanes on US 2 are the longest. 97 crossings in the 5 months represents 0.9 events per weekday AM peak. While there are anticipated to be crossings almost every day during the AM peak hour, only 23 crossings exceeded 5 minutes and only 1 crossing in the 5-month time frame was 10 minutes. Therefore, the analysis condition outlined above for a 10-minute train crossing is not anticipated to be a regular occurrence.

Travel demand strategies should be implemented prior to the beginning of construction and will be included in project bid documents, agreements, and notices to sub-contractors, suppliers, and employees.

RAILROAD CROSSING OPERATIONAL ANALYSIS

An operational comparison of the existing side street stop and potential signalization at the intersection of Midway Road & Morris Thomas Road was conducted to determine which traffic control is more appropriate for the intersection. The analysis focused on the worst-case scenario crossing event (10-minutes) for the AM and PM peak hours. For the comparison, two crossing events were analyzed during the peak hours, with 20 minutes between the ending of the first event and the beginning of the second. Analysis results are given below in **Table 13**.

Table 12: Railroad Crossing Operational Analysis (10-minute Queueing Events)

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Build (2030) with Side Street Stop at Midway & Morris Thomas										
Midway Road & US Highway 2	Signal	EB	C (35)	C (32)	C (30)	D (46)	D (50)	C (30)	D (43)	D (54)
		WB	E (78)	C (25)	A (8)		E (68)	B (20)	A (7)	
		NB	E (57)	E (58)	C (32)		C (30)	C (29)	B (13)	
		SB	D (45)	D (45)	A (7)		F (89)	F (110)	F (81)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	F (199)	-	C (25.1)	F (62)	F (334)	-	F (197)	F (111)
		WB	-	-	-		-	-	-	
		NB	F (73)	F (100)	-		F (96)	F (105)	-	
		SB	-	A (3)	A (3)		-	A (3)	A (1)	
Build (2030) with Signal at Midway & Morris Thomas										
Midway Road & US Highway 2	Signal	EB	D (39)	C (32)	C (27)	D (46)	D (44)	C (30)	D (38)	E (56)
		WB	E (78)	C (27)	A (8)		E (70)	C (21)	A (8)	
		NB	E (56)	E (59)	C (35)		D (38)	D (36)	B (19)	
		SB	D (45)	D (45)	A (5)		F (93)	F (109)	E (78)	
Midway Road & Morris Thomas Road	Signal	EB	F (104)	-	A (7)	E (64)	F (192)	-	F (86)	F (85)
		WB	-	-	-		-	-	-	
		NB	F (83)	-	F (120)		F (111)	F (121)	-	
		SB	-	B (11)	A (6)		-	B (17)	A (6)	

The results of the analysis indicate 10-minute crossing events could cause very high levels of delay at the intersection of Midway Road & Morris Thomas Road, particularly in the PM peak hour. The eastbound left turn movement at this intersection sees severe delays of more than 5 minutes per vehicle due to queueing along Midway Road. With the addition of a signal at Midway Road & Morris Thomas Road, delays at the intersection are anticipated to be reduced by about 24% during the PM peak hour, with eastbound left turn delays reduced to about 3 minutes per vehicle. The overall delay at the intersection sees little change during the AM Peak hour. However, the eastbound left turn movement sees a significant reduction in delay and queueing at this time. The operations at Midway Road & US Highway 2 are relatively unaffected by the installation of a signal at Midway Road & Morris Thomas Road, changing by a few seconds or less during both peak hours.

Due to northbound queues along Midway Road south of the railroad crossing, eastbound queues at Morris Thomas Road dissipate very slowly at the side street stop controlled intersection of these two roads. Queues during the PM peak hour are anticipated to take in excess of 20 minutes to dissipate following a 10-minute train crossing event. The installation of a traffic signal at Midway Road & Morris Thomas Road would allow these queues to dissipate in about half this time (10 minutes).

Based on the anticipated operational benefit of a traffic signal at Midway Road & Morris Thomas Road, along with the potential safety benefits of having a traffic signal near the railroad crossing, it is recommended that a permanent traffic signal be installed at the intersection of Midway Road & Morris Thomas Road under Opening Year (2030) Build conditions. The traffic signal will require railroad crossing preemption to ensure safe crossing conditions as well as coordination with the traffic signal at Midway Road & US Highway 2.

CONCLUSION AND RECOMMENDATIONS

A traffic analysis was performed to quantify the impacts of the proposed development on the adjacent roadway network and study intersections. No-Build, and Build conditions were analyzed in the Potential Opening Year (2030) and the Design Year (2045). An Existing Year (2025) analysis was also conducted.

PROJECT CHARACTERISTICS

The proposed Hermantown Industrial development site is located at the southwest corner of Midway Road & Morris Thomas Road in Hermantown, MN. The proposed development is within the AUAR development scenario intensity. To determine the traffic impacts of the proposed development, the following study intersections were analyzed in the traffic analysis:

- US Highway 2 & Midway Road
- Midway Road & Morris Thomas Road
- Midway Road & St. Louis River Road
- US Highway 2 & Morris Thomas Road
- US Highway 2 & St. Louis River Road

Access to the proposed development is provided via a full-movement intersection along Morris Thomas Road, approximately 0.4 miles west of Midway Road, near the northwest corner of the development site.

BACKGROUND CONDITIONS CAPACITY ANALYSIS SUMMARY

A capacity analysis was conducted for Existing Year (2025) traffic conditions at the study intersections to determine current operating conditions of the roadway network. Based on the analysis, all intersections and individual movements are estimated to operate at LOS C or better.

A capacity analysis was conducted for the Potential Opening Year (2030) No-Build traffic conditions at the study intersections to determine baseline conditions for the 2030 analysis year. Based on the analysis, all intersections and individual movements are anticipated to continue operating at LOS C or better.

A capacity analysis was conducted for the Design Year (2045) No-Build traffic conditions at the study intersections to determine baseline conditions for the 2045 analysis year. Based on the analysis, all intersections and individual movements are anticipated to continue operating at LOS C or better.

BUILD CONDITIONS CAPACITY ANALYSIS SUMMARY

A capacity analysis was conducted for the Potential Opening Year (2030) Build traffic conditions at the study intersection. It was found that the addition of site traffic causes generally minor increases in network delays compared to the Potential Opening Year (2030) No-Build conditions. Turn lane improvements are recommended at the intersection of Morris Thomas Road & Midway Road. Additionally, a signal may be required at the intersection to alleviate queueing during railroad crossing events.

Under Design Year (2045) Build traffic conditions, it was found that with turn lane improvements and a traffic signal installed at the intersection of Midway Road & Morris Thomas Road, all study intersections would operate at LOS C or better and all individual movements would operate at LOS D or better.

MITIGATION PLAN

The following provides a summary of mitigation improvements that were identified as part of the traffic analysis for the proposed development. Based on St. Louis County's review of the proposed development's traffic impacts, the following mitigations will be required as a result of the proposed development:

1. Intersection of Morris Thomas Rd (CSAH 56) and development driveway
 - a. Construct a westbound dedicated left-turn lane on Morris Thomas Road at the driveway.
 - b. Driveway will be stop controlled.
2. Intersection of Midway Rd (CSAH 13) and Morris Thomas Rd (CSAH 56)
 - a. Construct a northbound dedicated left-turn lane on Midway Road at Morris Thomas Road.
 - b. Construct eastbound dedicated left-turn and right-turn lanes on Morris Thomas Road at Midway Road. Storage for the right-turn lane will ensure vehicles are not occluded from accessing the right-turn lane during 95% of the time.
 - c. Construct a southbound dedicated right-turn lane on Midway Road at Morris Thomas Road.
 - d. Install a permanent traffic signal.
 - e. Install conduit/cable to coordinate the signal controller with the railroad crossing controller (USDOT #251905S) and the signal controller at the US 2 signal system.
3. Railroad crossing (DOT #251905S)
 - a. Install a traffic queue cutter signal system that will face southbound Midway Road traffic and be located immediately north of Old Hwy 2
 - b. The need for railroad crossing upgrades will be coordinated with the MnDOT Rail Office (Paul DeLaRosa, paul.delarosa@state.mn.us).
4. Intersection of US 2 and Midway Road (CSAH 13)
 - a. Install conduit/cable to coordinate the signal controller with the railroad crossing controller (USDOT #251905S) and the signal controller at the Midway Road/Morris Thomas Road signal system.
5. Intersection of US 2 and St. Louis River Road
 - a. Construct a northwest bound dedicated left turn lane to accommodate additional site traffic.
6. Signal timing
 - a. Develop optimized signal timing models for both the Midway Road/Morris Thomas Road and US 2/Midway Road signal systems to accommodate non-train and train events.
7. Travel Demand Management (TDM)
 - a. A plan completed prior to the beginning of construction will be included in project bid documents, agreements, and notices to sub-contractors, suppliers, and employees. The TDM plan will direct all traffic traveling to the site from US Highway 2 southeast of St. Louis River Road to turn onto St. Louis River Road and enter from the south along Midway Road instead of turning left onto Midway Road from US Highway 2.
 - b. If the TDM plan does not prove to be effective at limiting queues at Midway Road & US Highway 2, additional mitigation such as variable message signs or other advanced warning during train event could be implemented at US Highway 2 & St. Louis River Road.

APPENDIX

Appendix A: Exhibits

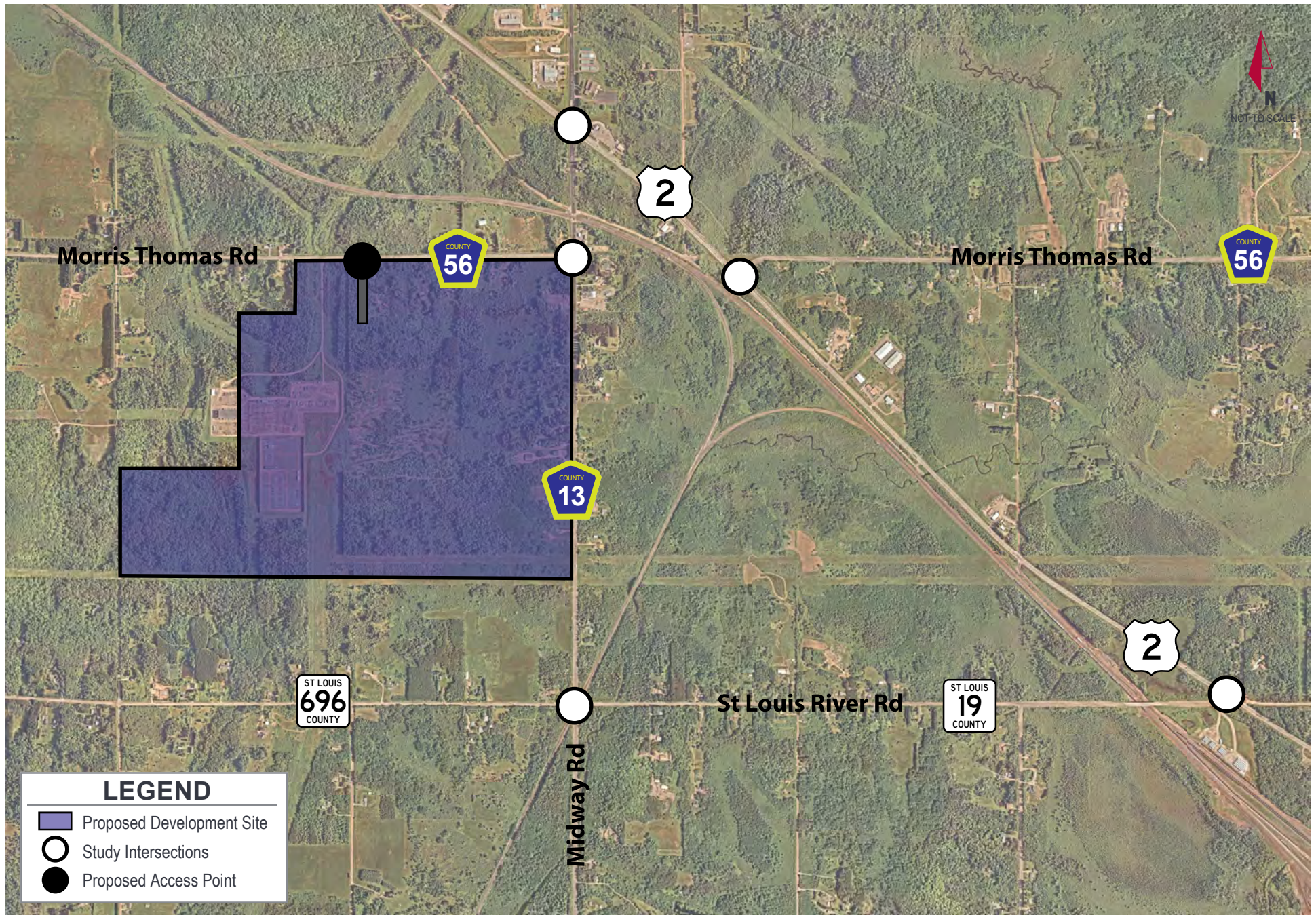
Appendix B: Turning Movement Counts

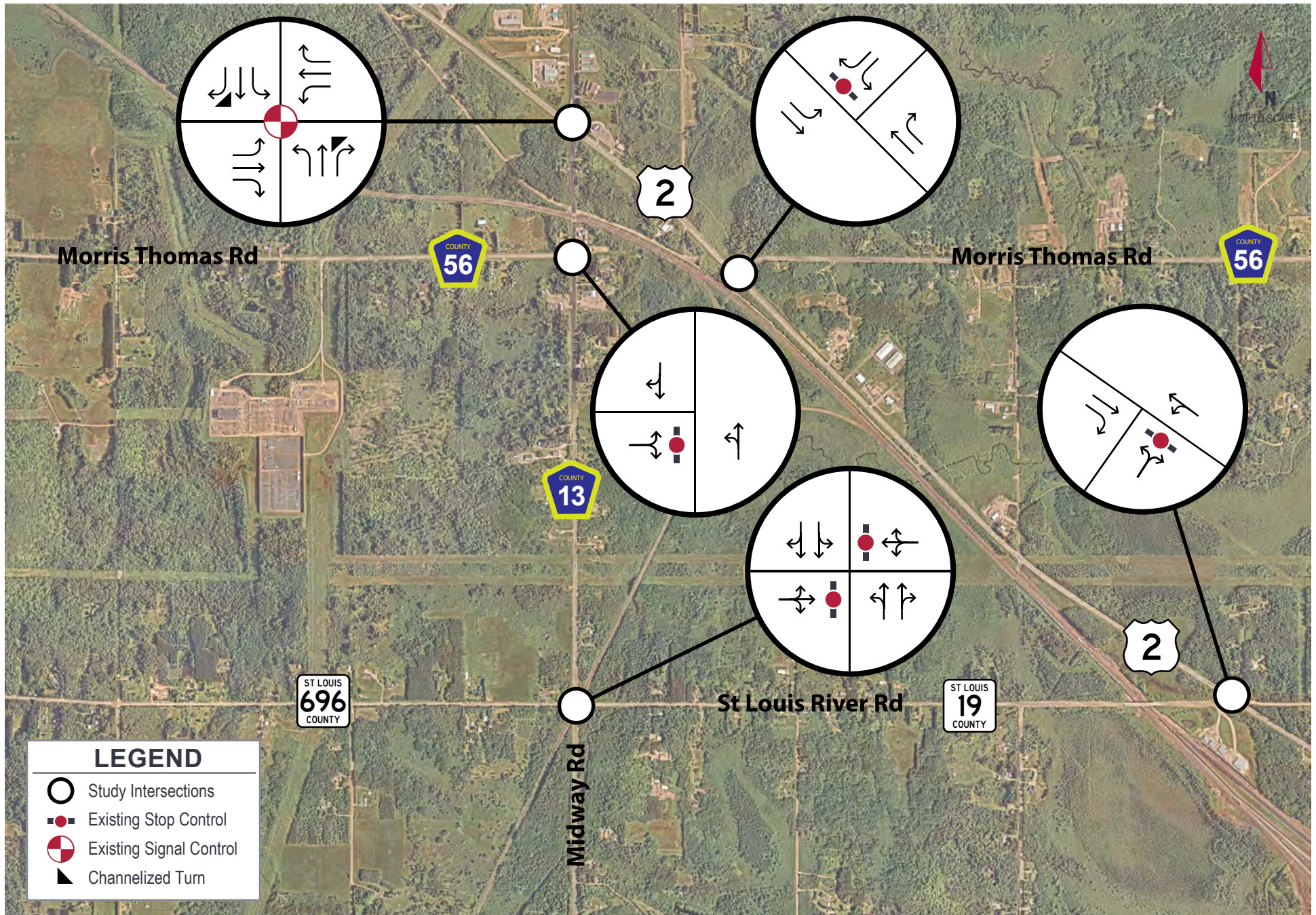
Appendix C: SimTraffic Reports

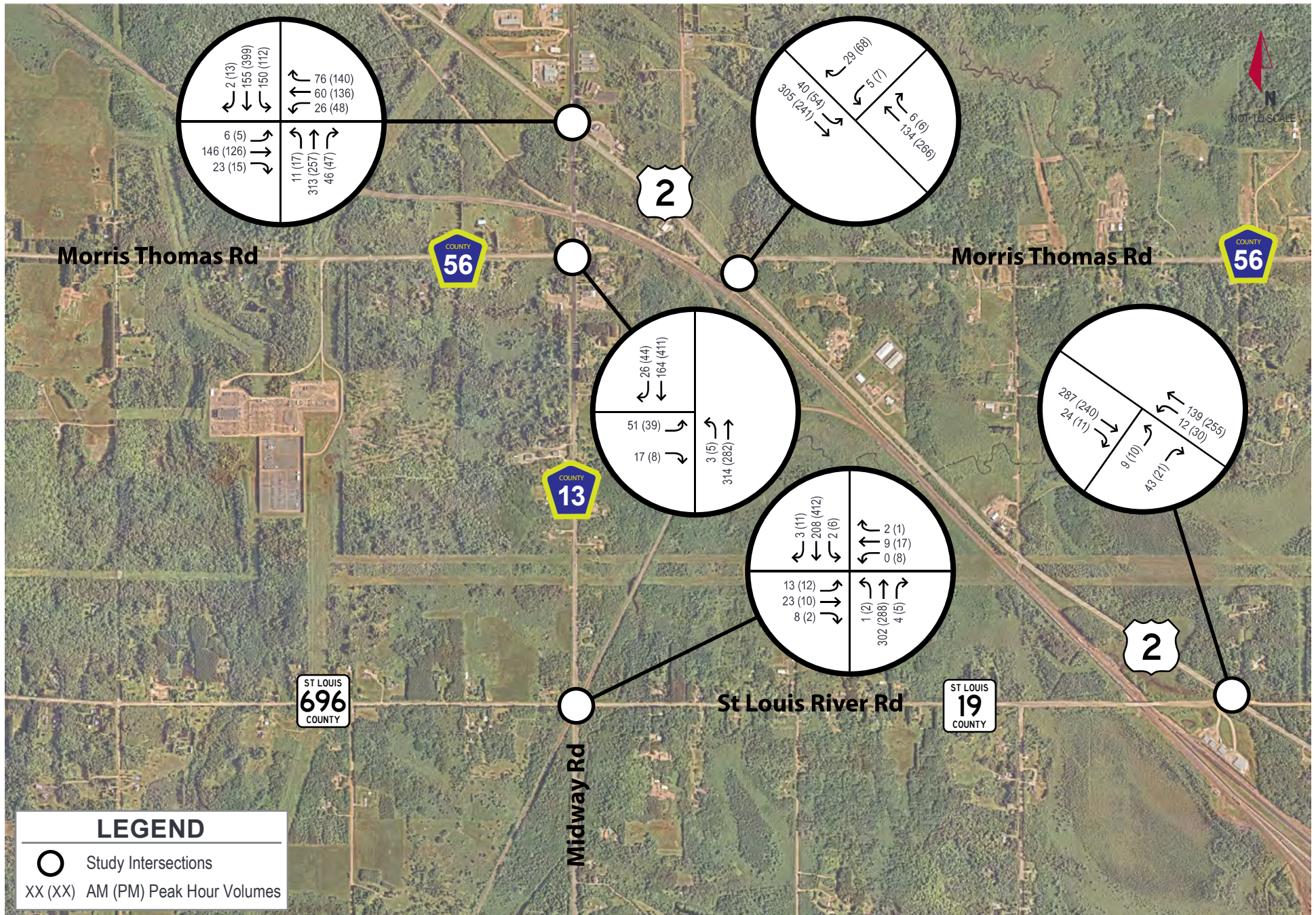
Appendix D: Turn Lane Warrant Sheets

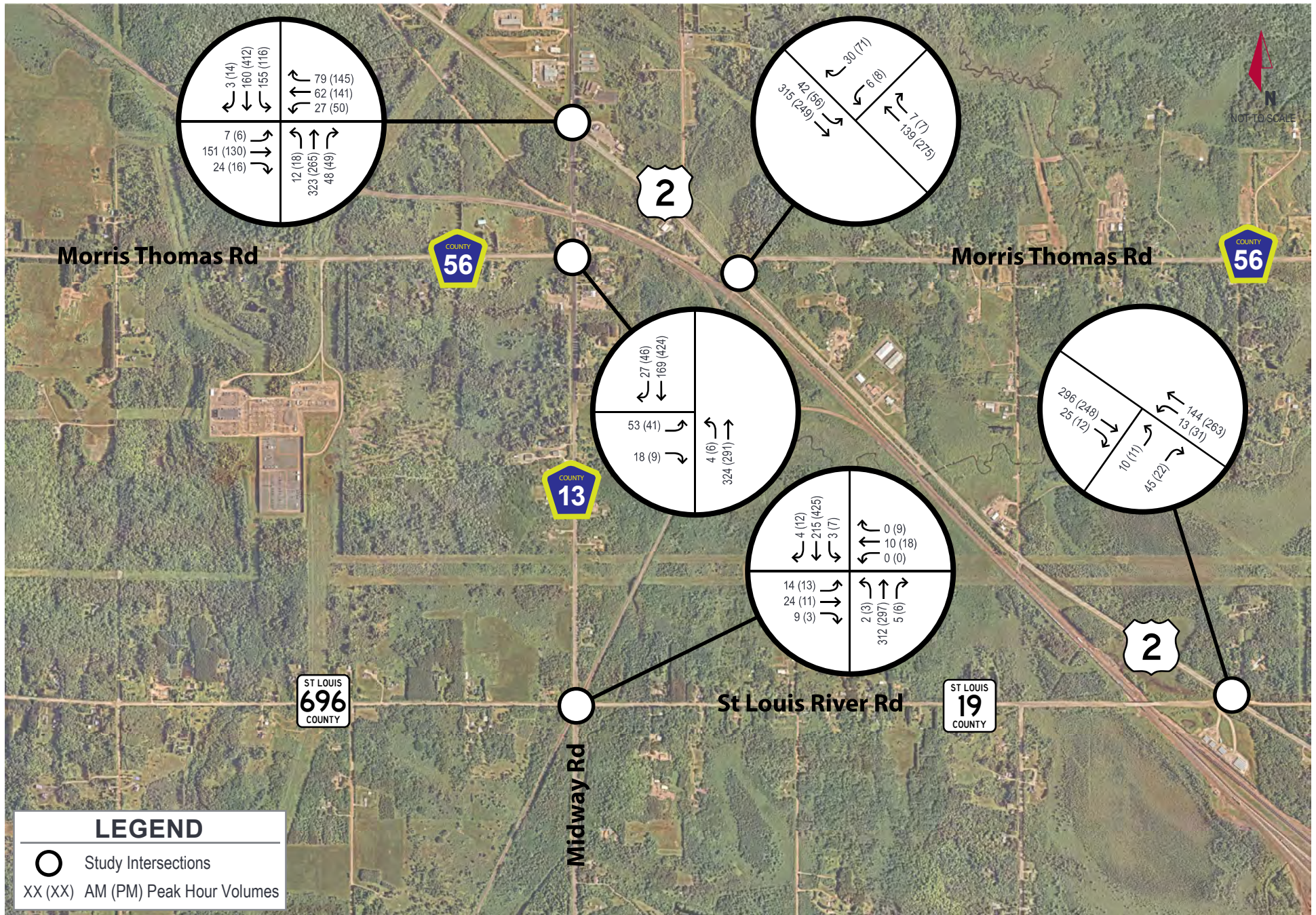
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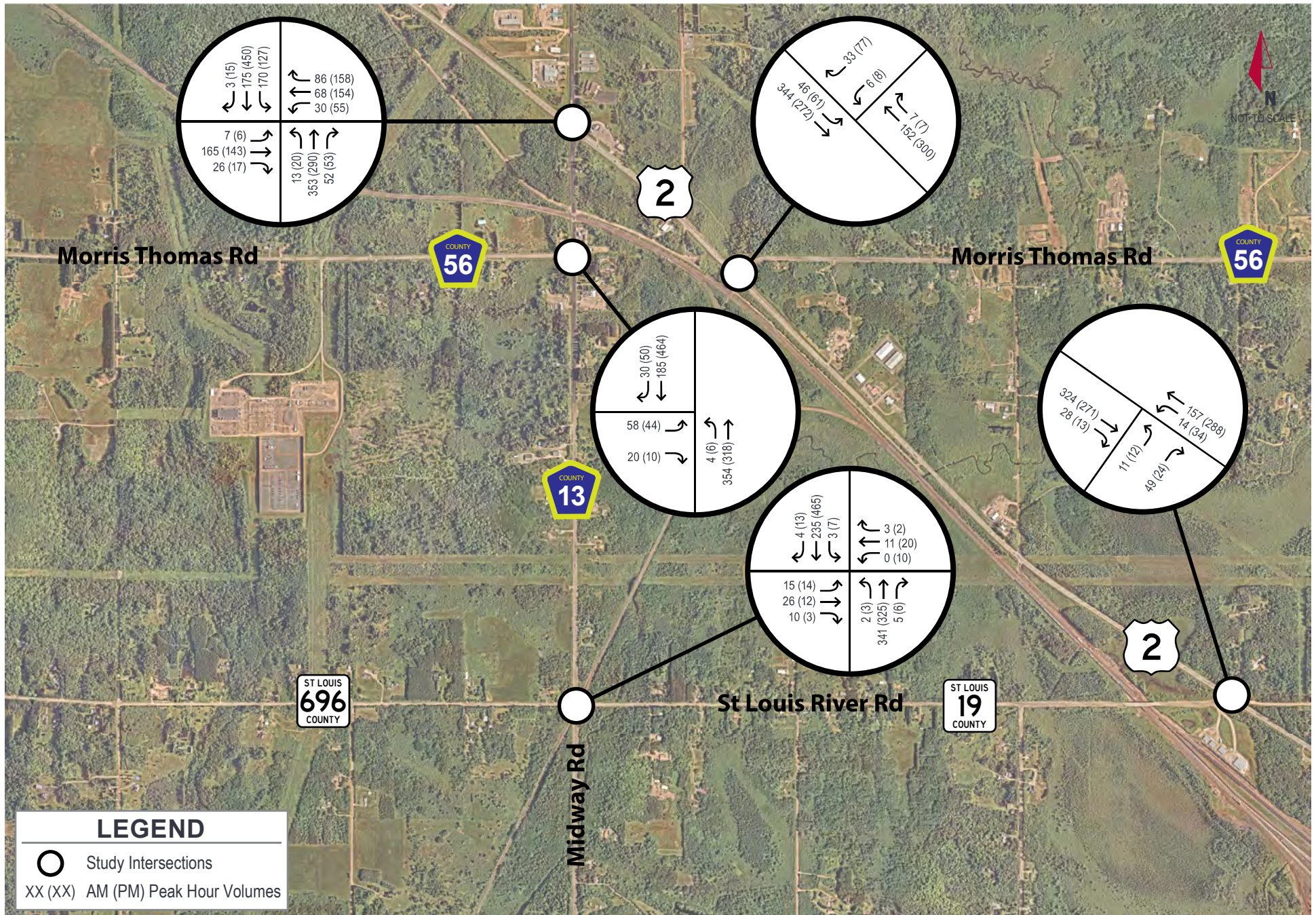
Exhibits

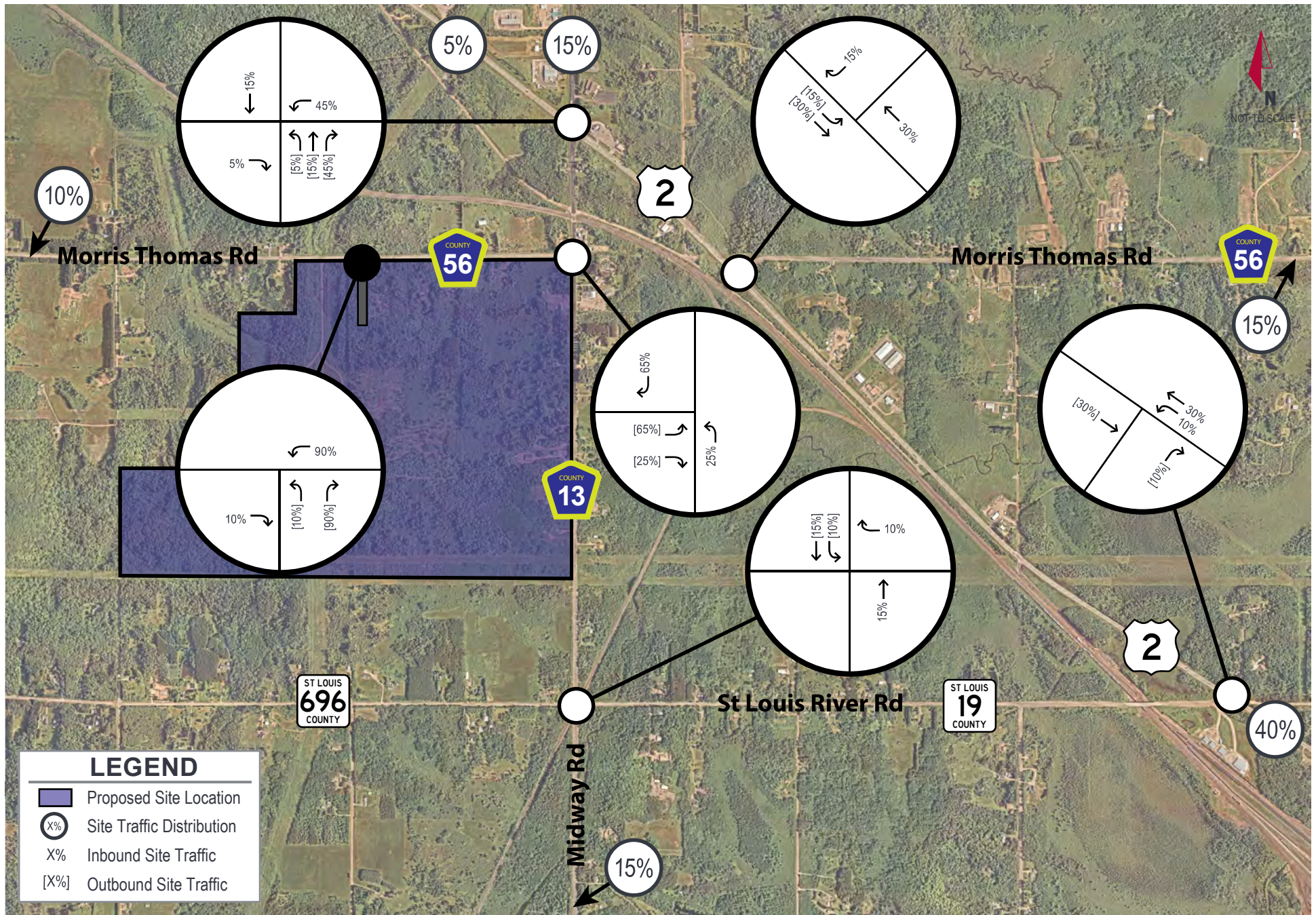


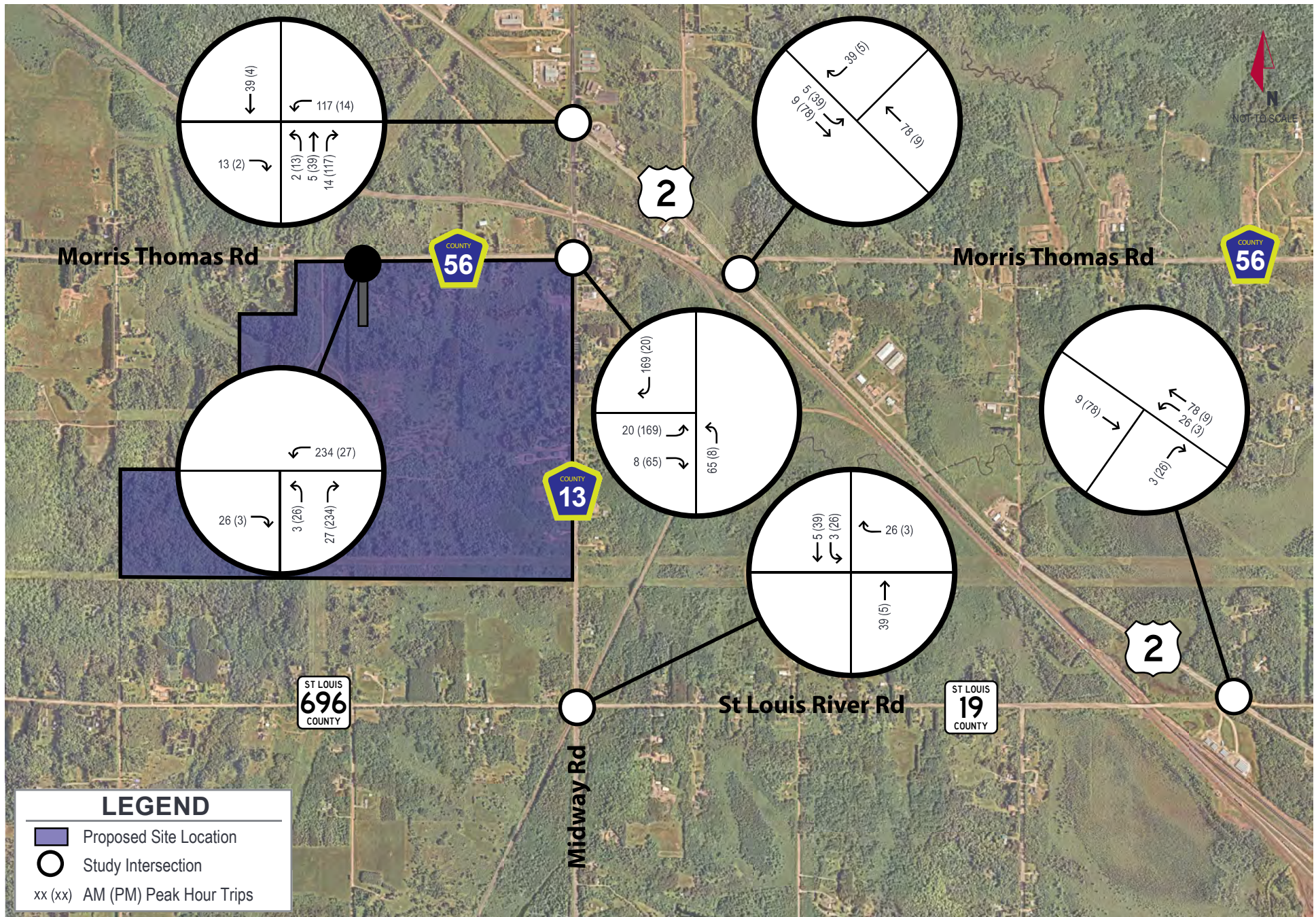


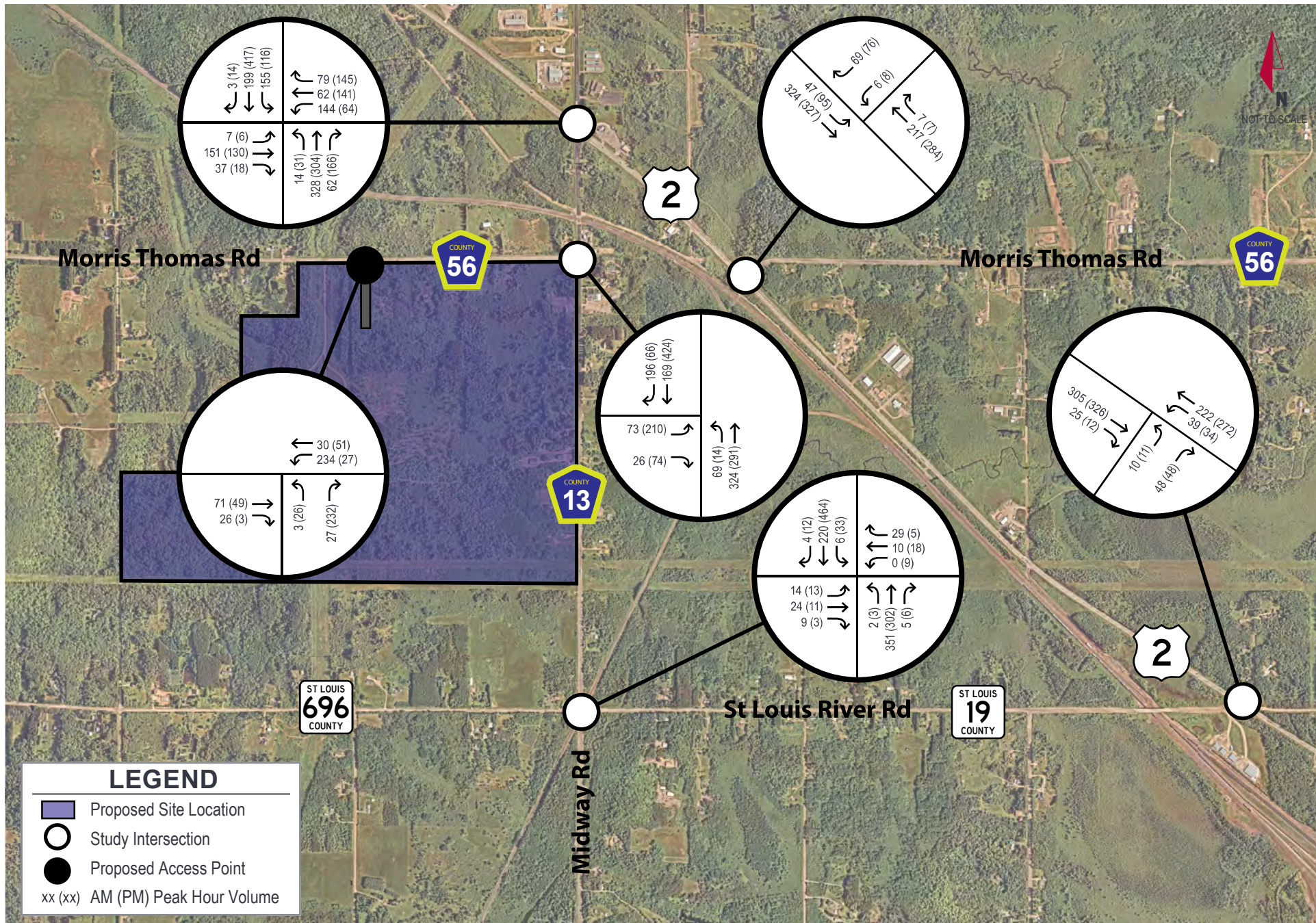


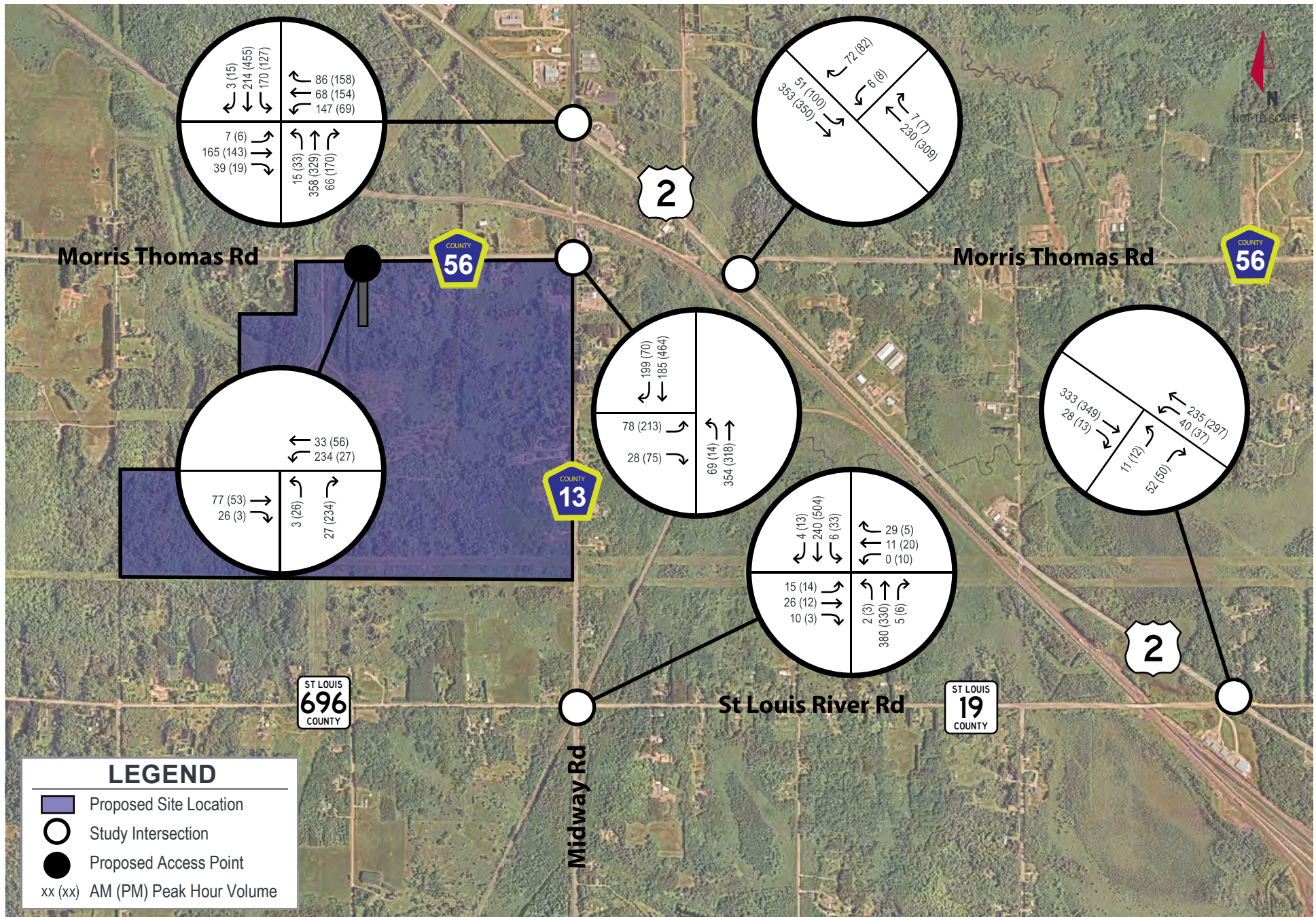












Appendix B:

Turning Movement Counts



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 1

Turning Movement Data

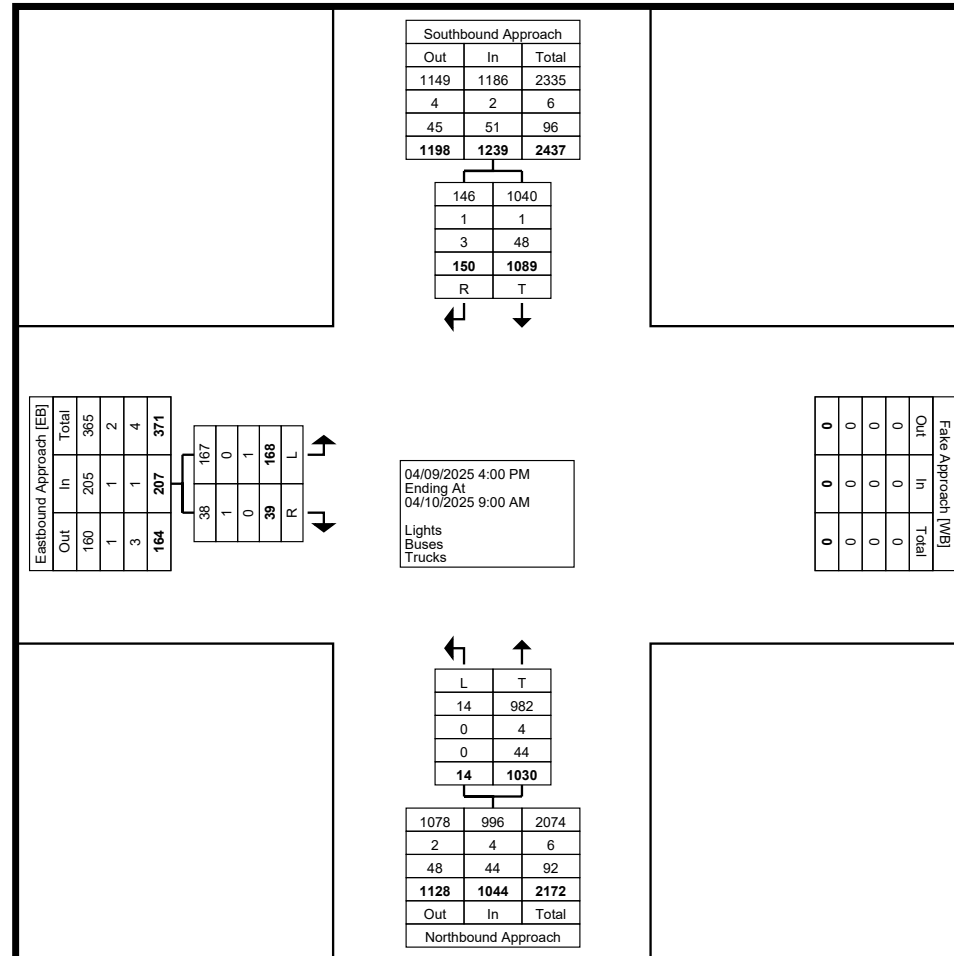
Start Time	Eastbound Approach			Northbound Approach			Southbound Approach			Int. Total
	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	
4:00 PM	13	1	14	4	56	60	109	14	123	197
4:15 PM	13	2	15	0	83	83	83	10	93	191
4:30 PM	11	2	13	1	82	83	116	12	128	224
4:45 PM	6	4	10	3	60	63	91	5	96	169
Hourly Total	43	9	52	8	281	289	399	41	440	781
5:00 PM	9	0	9	1	57	58	121	17	138	205
5:15 PM	7	1	8	0	44	44	107	21	128	180
5:30 PM	4	0	4	2	39	41	77	20	97	142
5:45 PM	2	1	3	0	56	56	65	11	76	135
Hourly Total	22	2	24	3	196	199	370	69	439	662
*** BREAK ***	-	-	-	-	-	-	-	-	-	-
7:00 AM	12	4	16	0	64	64	41	2	43	123
7:15 AM	8	2	10	0	66	66	27	6	33	109
7:30 AM	21	7	28	0	97	97	52	7	59	184
7:45 AM	16	3	19	2	94	96	55	4	59	174
Hourly Total	57	16	73	2	321	323	175	19	194	590
8:00 AM	6	5	11	1	57	58	30	9	39	108
8:15 AM	16	4	20	0	63	63	33	5	38	121
8:30 AM	15	0	15	0	57	57	38	2	40	112
8:45 AM	9	3	12	0	55	55	44	5	49	116
Hourly Total	46	12	58	1	232	233	145	21	166	457
Grand Total	168	39	207	14	1030	1044	1089	150	1239	2490
Approach %	81.2	18.8	-	1.3	98.7	-	87.9	12.1	-	-
Total %	6.7	1.6	8.3	0.6	41.4	41.9	43.7	6.0	49.8	-
Lights	167	38	205	14	982	996	1040	146	1186	2387
% Lights	99.4	97.4	99.0	100.0	95.3	95.4	95.5	97.3	95.7	95.9
Buses	0	1	1	0	4	4	1	1	2	7
% Buses	0.0	2.6	0.5	0.0	0.4	0.4	0.1	0.7	0.2	0.3
Trucks	1	0	1	0	44	44	48	3	51	96
% Trucks	0.6	0.0	0.5	0.0	4.3	4.2	4.4	2.0	4.1	3.9



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Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 2



Turning Movement Data Plot



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 3

Turning Movement Peak Hour Data (4:15 PM)

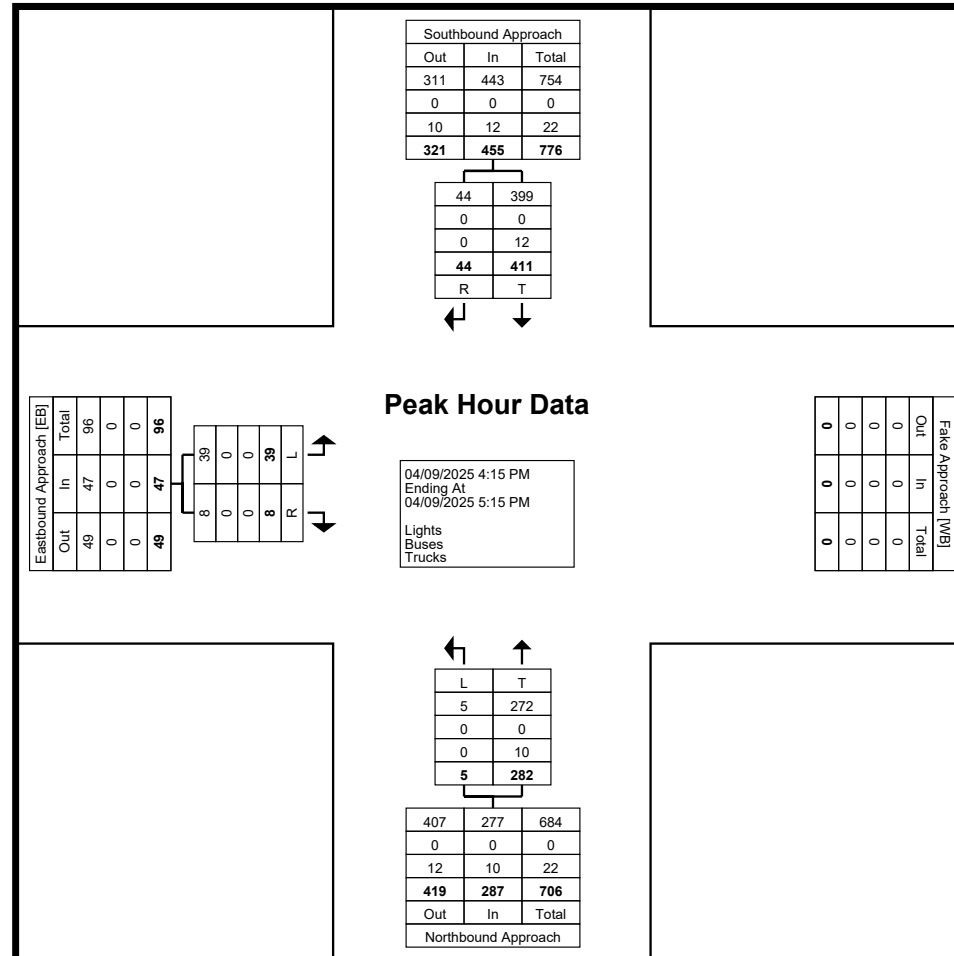
Start Time	Eastbound Approach			Northbound Approach			Southbound Approach			Int. Total
	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	
4:15 PM	13	2	15	0	83	83	83	10	93	191
4:30 PM	11	2	13	1	82	83	116	12	128	224
4:45 PM	6	4	10	3	60	63	91	5	96	169
5:00 PM	9	0	9	1	57	58	121	17	138	205
Total	39	8	47	5	282	287	411	44	455	789
Approach %	83.0	17.0	-	1.7	98.3	-	90.3	9.7	-	-
Total %	4.9	1.0	6.0	0.6	35.7	36.4	52.1	5.6	57.7	-
PHF	0.750	0.500	0.783	0.417	0.849	0.864	0.849	0.647	0.824	0.881
Lights	39	8	47	5	272	277	399	44	443	767
% Lights	100.0	100.0	100.0	100.0	96.5	96.5	97.1	100.0	97.4	97.2
Buses	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trucks	0	0	0	0	10	10	12	0	12	22
% Trucks	0.0	0.0	0.0	0.0	3.5	3.5	2.9	0.0	2.6	2.8



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



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Count Name: Midway Rd & Morris Thomas Rd
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Page No: 5

Turning Movement Peak Hour Data (7:00 AM)

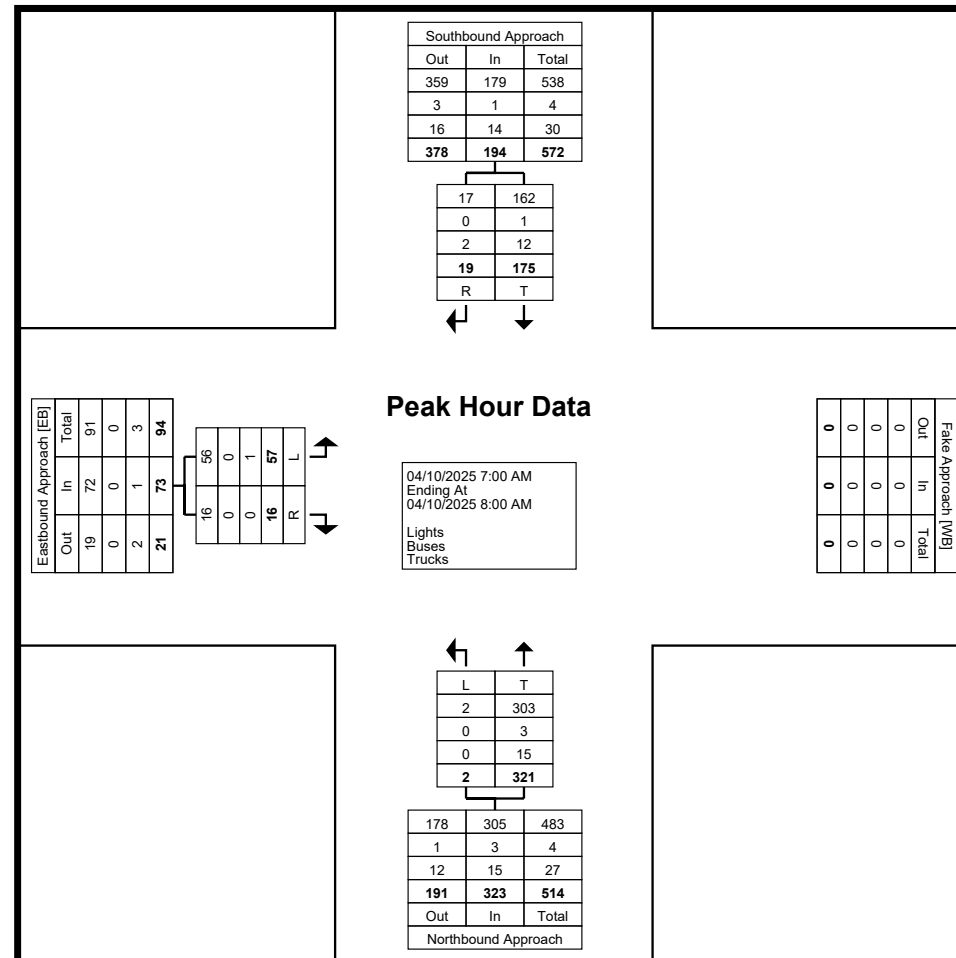
Start Time	Eastbound Approach			Northbound Approach			Southbound Approach			Int. Total
	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	
7:00 AM	12	4	16	0	64	64	41	2	43	123
7:15 AM	8	2	10	0	66	66	27	6	33	109
7:30 AM	21	7	28	0	97	97	52	7	59	184
7:45 AM	16	3	19	2	94	96	55	4	59	174
Total	57	16	73	2	321	323	175	19	194	590
Approach %	78.1	21.9	-	0.6	99.4	-	90.2	9.8	-	-
Total %	9.7	2.7	12.4	0.3	54.4	54.7	29.7	3.2	32.9	-
PHF	0.679	0.571	0.652	0.250	0.827	0.832	0.795	0.679	0.822	0.802
Lights	56	16	72	2	303	305	162	17	179	556
% Lights	98.2	100.0	98.6	100.0	94.4	94.4	92.6	89.5	92.3	94.2
Buses	0	0	0	0	3	3	1	0	1	4
% Buses	0.0	0.0	0.0	0.0	0.9	0.9	0.6	0.0	0.5	0.7
Trucks	1	0	1	0	15	15	12	2	14	30
% Trucks	1.8	0.0	1.4	0.0	4.7	4.6	6.9	10.5	7.2	5.1



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



Kimley-Horn
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Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
Page No: 1

Turning Movement Data

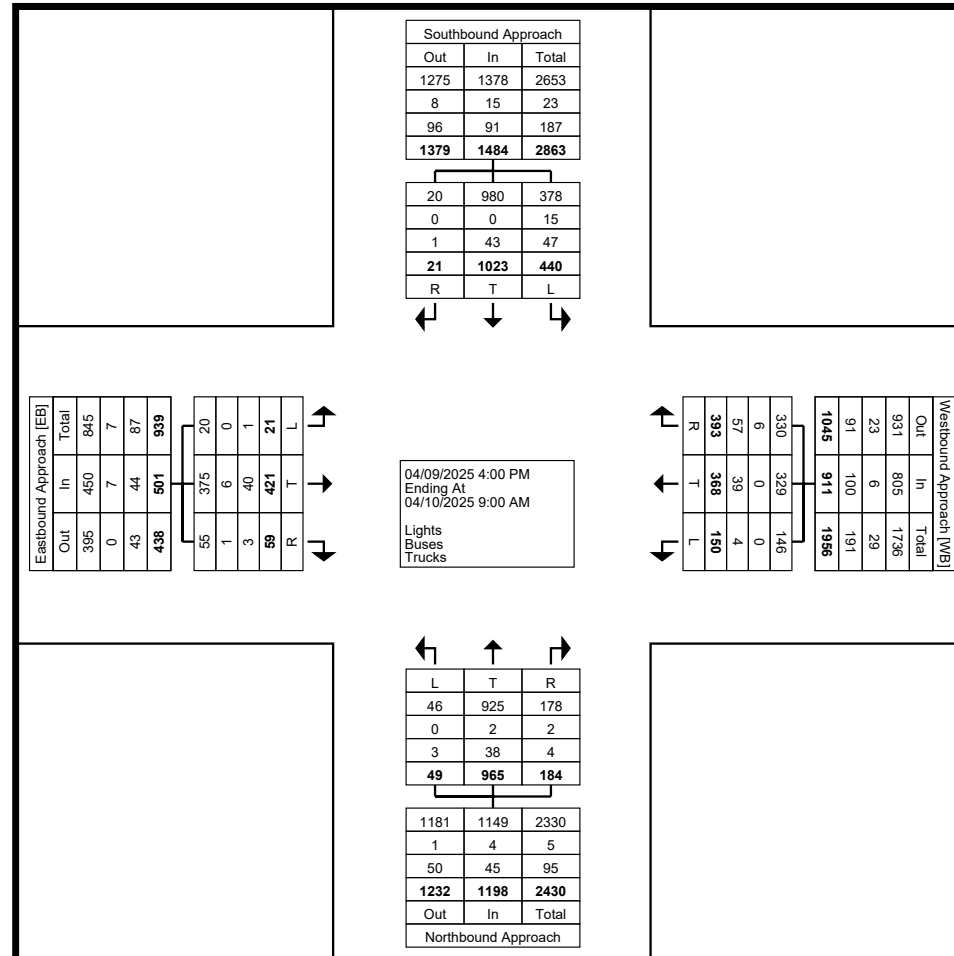
Start Time	Eastbound Approach Eastbound				Westbound Approach Westbound				Northbound Approach Northbound				Southbound Approach Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:00 PM	3	22	3	28	13	32	32	77	3	53	13	69	29	87	1	117	291
4:15 PM	0	35	5	40	9	33	25	67	3	72	19	94	28	99	2	129	330
4:30 PM	2	42	6	50	13	35	43	91	7	80	10	97	26	101	1	128	366
4:45 PM	0	27	3	30	9	43	41	93	3	52	13	68	24	93	9	126	317
Hourly Total	5	126	17	148	44	143	141	328	16	257	55	328	107	380	13	500	1304
5:00 PM	3	22	1	26	17	25	31	73	4	53	5	62	34	106	1	141	302
5:15 PM	0	18	4	22	18	24	29	71	3	38	13	54	25	115	0	140	287
5:30 PM	1	18	8	27	16	30	18	64	4	36	5	45	19	70	3	92	228
5:45 PM	1	9	0	10	10	21	13	44	3	54	5	62	17	62	0	79	195
Hourly Total	5	67	13	85	61	100	91	252	14	181	28	223	95	353	4	452	1012
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	0	20	1	21	4	11	20	35	1	49	20	70	23	34	0	57	183
7:15 AM	2	34	7	43	5	13	12	30	2	66	7	75	25	26	0	51	199
7:30 AM	2	44	7	53	7	17	22	46	2	95	18	115	54	45	0	99	313
7:45 AM	2	44	6	52	8	19	21	48	4	99	11	114	44	45	1	90	304
Hourly Total	6	142	21	169	24	60	75	159	9	309	56	374	146	150	1	297	999
8:00 AM	0	24	3	27	6	11	21	38	3	53	10	66	27	39	1	67	198
8:15 AM	3	22	2	27	1	18	25	44	2	57	19	78	17	34	0	51	200
8:30 AM	2	24	2	28	6	18	27	51	3	64	9	76	21	36	1	58	213
8:45 AM	0	16	1	17	8	18	13	39	2	44	7	53	27	31	1	59	168
Hourly Total	5	86	8	99	21	65	86	172	10	218	45	273	92	140	3	235	779
Grand Total	21	421	59	501	150	368	393	911	49	965	184	1198	440	1023	21	1484	4094
Approach %	4.2	84.0	11.8	-	16.5	40.4	43.1	-	4.1	80.6	15.4	-	29.6	68.9	1.4	-	-
Total %	0.5	10.3	1.4	12.2	3.7	9.0	9.6	22.3	1.2	23.6	4.5	29.3	10.7	25.0	0.5	36.2	-
Lights	20	375	55	450	146	329	330	805	46	925	178	1149	378	980	20	1378	3782
% Lights	95.2	89.1	93.2	89.8	97.3	89.4	84.0	88.4	93.9	95.9	96.7	95.9	85.9	95.8	95.2	92.9	92.4
Buses	0	6	1	7	0	0	6	6	0	2	2	4	15	0	0	15	32
% Buses	0.0	1.4	1.7	1.4	0.0	0.0	1.5	0.7	0.0	0.2	1.1	0.3	3.4	0.0	0.0	1.0	0.8
Trucks	1	40	3	44	4	39	57	100	3	38	4	45	47	43	1	91	280
% Trucks	4.8	9.5	5.1	8.8	2.7	10.6	14.5	11.0	6.1	3.9	2.2	3.8	10.7	4.2	4.8	6.1	6.8



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Page No: 2



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Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
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Turning Movement Peak Hour Data (4:15 PM)

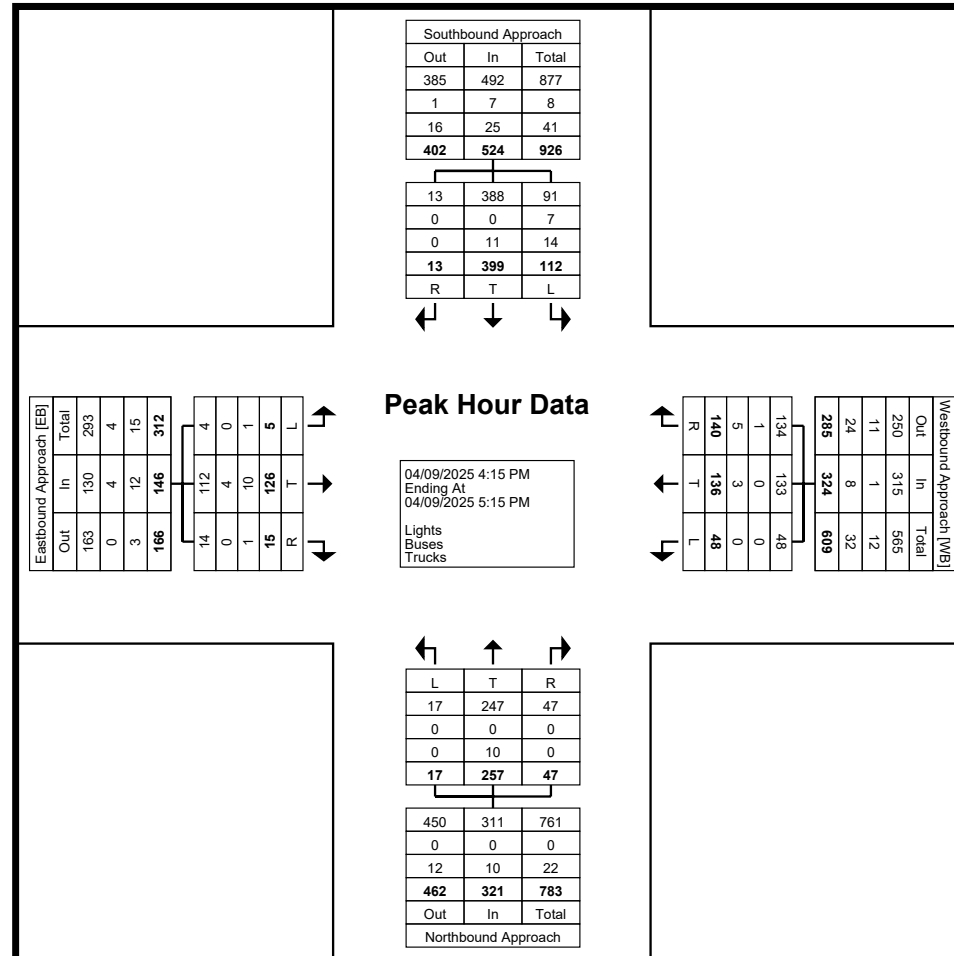
Start Time	Eastbound Approach Eastbound				Westbound Approach Westbound				Northbound Approach Northbound				Southbound Approach Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:15 PM	0	35	5	40	9	33	25	67	3	72	19	94	28	99	2	129	330
4:30 PM	2	42	6	50	13	35	43	91	7	80	10	97	26	101	1	128	366
4:45 PM	0	27	3	30	9	43	41	93	3	52	13	68	24	93	9	126	317
5:00 PM	3	22	1	26	17	25	31	73	4	53	5	62	34	106	1	141	302
Total	5	126	15	146	48	136	140	324	17	257	47	321	112	399	13	524	1315
Approach %	3.4	86.3	10.3	-	14.8	42.0	43.2	-	5.3	80.1	14.6	-	21.4	76.1	2.5	-	-
Total %	0.4	9.6	1.1	11.1	3.7	10.3	10.6	24.6	1.3	19.5	3.6	24.4	8.5	30.3	1.0	39.8	-
PHF	0.417	0.750	0.625	0.730	0.706	0.791	0.814	0.871	0.607	0.803	0.618	0.827	0.824	0.941	0.361	0.929	0.898
Lights	4	112	14	130	48	133	134	315	17	247	47	311	91	388	13	492	1248
% Lights	80.0	88.9	93.3	89.0	100.0	97.8	95.7	97.2	100.0	96.1	100.0	96.9	81.3	97.2	100.0	93.9	94.9
Buses	0	4	0	4	0	0	1	1	0	0	0	0	7	0	0	7	12
% Buses	0.0	3.2	0.0	2.7	0.0	0.0	0.7	0.3	0.0	0.0	0.0	0.0	6.3	0.0	0.0	1.3	0.9
Trucks	1	10	1	12	0	3	5	8	0	10	0	10	14	11	0	25	55
% Trucks	20.0	7.9	6.7	8.2	0.0	2.2	3.6	2.5	0.0	3.9	0.0	3.1	12.5	2.8	0.0	4.8	4.2



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Page No: 4



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



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Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
Page No: 5

Turning Movement Peak Hour Data (7:30 AM)

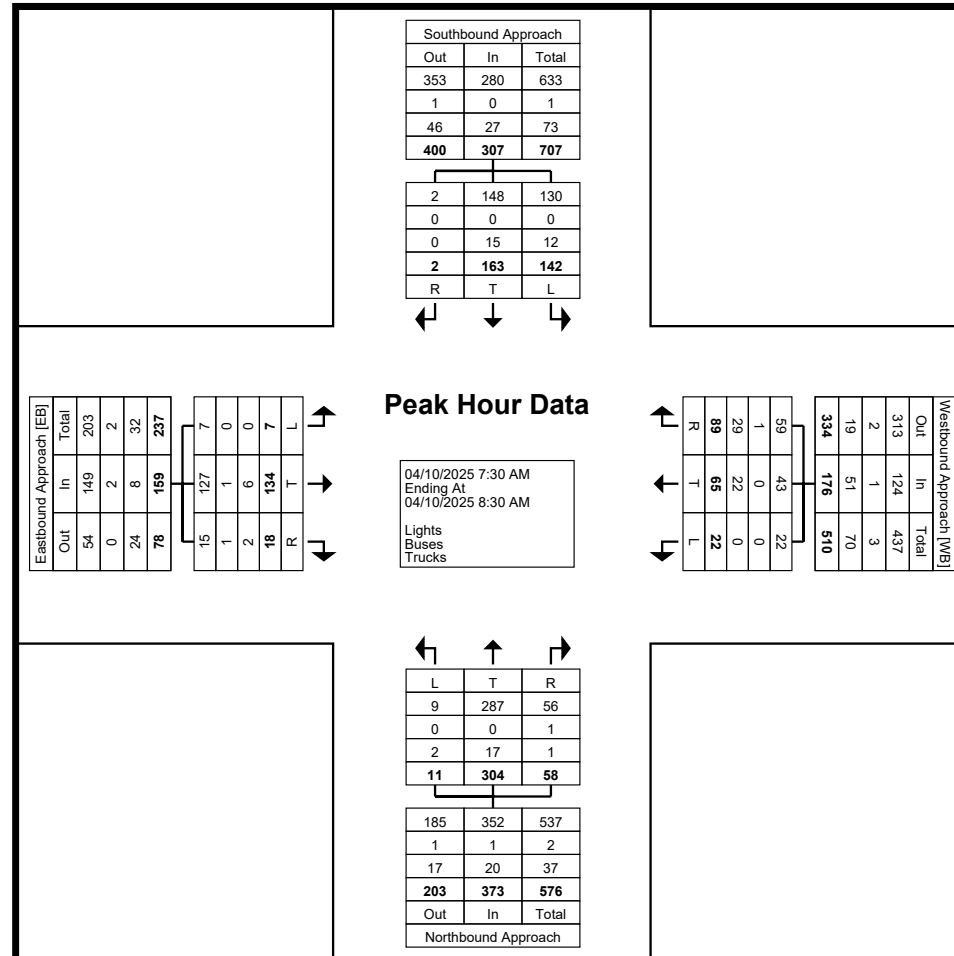
Start Time	Eastbound Approach Eastbound				Westbound Approach Westbound				Northbound Approach Northbound				Southbound Approach Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:30 AM	2	44	7	53	7	17	22	46	2	95	18	115	54	45	0	99	313
7:45 AM	2	44	6	52	8	19	21	48	4	99	11	114	44	45	1	90	304
8:00 AM	0	24	3	27	6	11	21	38	3	53	10	66	27	39	1	67	198
8:15 AM	3	22	2	27	1	18	25	44	2	57	19	78	17	34	0	51	200
Total	7	134	18	159	22	65	89	176	11	304	58	373	142	163	2	307	1015
Approach %	4.4	84.3	11.3	-	12.5	36.9	50.6	-	2.9	81.5	15.5	-	46.3	53.1	0.7	-	-
Total %	0.7	13.2	1.8	15.7	2.2	6.4	8.8	17.3	1.1	30.0	5.7	36.7	14.0	16.1	0.2	30.2	-
PHF	0.583	0.761	0.643	0.750	0.688	0.855	0.890	0.917	0.688	0.768	0.763	0.811	0.657	0.906	0.500	0.775	0.811
Lights	7	127	15	149	22	43	59	124	9	287	56	352	130	148	2	280	905
% Lights	100.0	94.8	83.3	93.7	100.0	66.2	66.3	70.5	81.8	94.4	96.6	94.4	91.5	90.8	100.0	91.2	89.2
Buses	0	1	1	2	0	0	1	1	0	0	1	1	0	0	0	0	4
% Buses	0.0	0.7	5.6	1.3	0.0	0.0	1.1	0.6	0.0	0.0	1.7	0.3	0.0	0.0	0.0	0.0	0.4
Trucks	0	6	2	8	0	22	29	51	2	17	1	20	12	15	0	27	106
% Trucks	0.0	4.5	11.1	5.0	0.0	33.8	32.6	29.0	18.2	5.6	1.7	5.4	8.5	9.2	0.0	8.8	10.4



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Page No: 6



Turning Movement Peak Hour Data Plot (7:30 AM)

Study Name Midway Rd & St. Louis River Rd

Start Date 04/09/2025

Start Time 4:00 PM

Site Code

Type Road
Classification Totals

Start Time	St. Louis River Road Eastbound			St. Louis River Road Westbound			Midway Road Northbound			Midway Road Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4:00 PM	2	1	1	1	6	0	0	62	1	0	105	3
4:15 PM	0	4	0	1	4	0	0	83	1	1	93	3
4:30 PM	5	4	0	3	5	0	1	86	3	1	90	6
4:45 PM	5	0	1	3	4	0	0	68	1	2	66	1
5:00 PM	2	2	1	1	4	1	1	51	0	2	163	1
5:15 PM	3	1	0	0	4	3	0	38	2	1	115	4
5:30 PM	3	1	1	1	2	1	1	39	0	1	76	2
5:45 PM	3	2	0	0	3	1	1	49	0	1	84	1
7:00 AM	4	5	1	0	0	0	1	56	0	1	39	2
7:15 AM	3	4	4	0	2	1	0	65	0	0	40	0
7:30 AM	3	8	3	0	3	0	0	89	2	0	61	1
7:45 AM	5	4	1	0	2	0	1	93	1	1	68	0
8:00 AM	2	7	0	0	2	1	0	55	1	1	39	2
8:15 AM	2	3	0	2	0	3	0	55	0	1	34	2
8:30 AM	2	2	0	0	0	0	0	54	1	0	32	0
8:45 AM	0	3	0	0	0	1	0	52	1	0	37	0

Study Name US Hwy 2 & Morris Thomas Rd

Start Date 04/09/2025

Start Time 4:00 PM

Site Code

Type Road
Classification Totals

	WB Morris Thomas Rd. Westbound			SB US Hwy 2 Southbound			NB US Hwy 2 Northwestbound		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4:00 PM	4		21	10	55			57	2
4:15 PM	1		13	22	62			58	1
4:30 PM	3		18	8	72			72	2
4:45 PM	3		20	16	52			82	1
5:00 PM	0		17	8	55			54	2
5:15 PM	1		16	13	45			57	1
5:30 PM	1		9	7	33			55	3
5:45 PM	2		9	4	29			37	1
7:00 AM	2		5	18	42			34	1
7:15 AM	1		9	9	61			21	2
7:30 AM	2		10	16	100			38	2
7:45 AM	1		5	6	94			43	1
8:00 AM	1		5	9	50			32	1
8:15 AM	0		1	12	44			45	0
8:30 AM	2		8	11	46			50	2
8:45 AM	0		6	5	41			29	0

Study Name US Hwy 2 & St. Louis River Rd

Start Date 04/09/2025

Start Time 4:00 PM

Site Code

Type Road
Classification Totals

Start Time	EB St. Louis River Rd. Eastbound			SB US Hwy 2 Southbound			NB US Hwy 2 Northbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4:00 PM	0		2		53	6	8	57	
4:15 PM	4		2		61	2	13	64	
4:30 PM	5		6		76	2	3	60	
4:45 PM	1		6		47	7	7	75	
5:00 PM	0		7		56	0	7	56	
5:15 PM	1		4		41	3	9	63	
5:30 PM	3		3		34	1	9	46	
5:45 PM	0		3		29	2	7	39	
7:00 AM	3		11		44	2	2	28	
7:15 AM	1		7		53	7	4	24	
7:30 AM	5		13		95	10	2	40	
7:45 AM	1		10		89	5	5	37	
8:00 AM	2		13		50	2	1	38	
8:15 AM	4		4		43	0	1	43	
8:30 AM	1		8		47	0	1	42	
8:45 AM	2		4		41	0	1	26	

Appendix C:

SimTraffic Reports

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.7	0.3	3.8	0.2	0.0	0.3	0.1	0.0	0.0	3.6	0.6	3.8
Total Del/Veh (s)	24.5	18.1	4.3	21.2	9.7	4.9	11.6	17.9	4.6	11.5	8.3	4.9

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	13.2

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.1	2.2	1.3	2.7	3.3	2.7	3.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.8	10.1	1.8	2.6	2.1		0.2	0.0	0.6	0.6	0.0	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.5	3.8	0.2
Total Del/Veh (s)	6.9	6.5	1.7	0.1	6.6	1.5	4.9

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.7	0.1	1.2	0.2	4.9	2.2	0.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	20.5

Queuing and Blocking Report
Existing (2025) - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	
Directions Served	L	T	R	L	T	R	L	T	L	T	
Maximum Queue (ft)	32	132	26	66	84	65	35	220	124	101	
Average Queue (ft)	3	44	3	17	17	15	6	99	48	36	
95th Queue (ft)	18	95	16	47	52	45	22	173	89	84	
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300		
Storage Blk Time (%)								1			
Queuing Penalty (veh)								0			

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB
Directions Served	LR
Maximum Queue (ft)	52
Average Queue (ft)	24
95th Queue (ft)	44
Link Distance (ft)	1646
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	65	37	5
Average Queue (ft)	25	8	0
95th Queue (ft)	51	29	3
Link Distance (ft)	1279	6729	299
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Existing (2025) - AM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	35	24	54
Average Queue (ft)	4	2	14
95th Queue (ft)	20	13	36
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	31	50
Average Queue (ft)	2	16
95th Queue (ft)	15	37
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.4	0.3	4.1	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.7	3.4
Total Del/Veh (s)	22.9	18.2	6.7	20.1	13.3	5.4	12.2	14.9	4.4	11.8	10.7	4.5

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	12.1

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.9	3.8	3.7	2.4	4.8	3.6	3.9

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.0	9.6	1.7	8.7	6.0	0.9	1.2	0.2	0.0	1.7	0.6	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.3	3.4	0.4
Total Del/Veh (s)	7.5	6.4	3.1	3.0	6.1	2.5	4.7

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.4	0.0	1.5	0.4	3.7	1.9	0.6

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	20.3

Queuing and Blocking Report
Existing (2025) - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	33	121	41	69	91	81	30	177	79	170
Average Queue (ft)	3	36	3	18	28	13	7	72	37	72
95th Queue (ft)	17	87	19	48	68	44	25	138	70	131
Link Distance (ft)	1621			2530			1423			1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)									0	
Queuing Penalty (veh)									0	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	59	15
Average Queue (ft)	20	1
95th Queue (ft)	44	6
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	34	47	15	46
Average Queue (ft)	14	11	1	3
95th Queue (ft)	35	31	8	21
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Existing (2025) - PM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	49	22	74
Average Queue (ft)	12	3	22
95th Queue (ft)	38	15	47
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	42	23
Average Queue (ft)	6	9
95th Queue (ft)	26	21
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.8	0.3	3.9	0.1	0.0	0.3	0.1	0.0	0.1	3.6	0.7	4.3
Total Del/Veh (s)	26.9	20.7	4.5	22.5	13.2	5.9	11.6	18.1	4.8	12.2	8.5	4.6

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	14.1

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.2	2.8	2.0	2.7	3.1	2.8	3.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.6	10.5	1.7	2.6	1.8	0.5	0.2	0.0	1.4	0.6	0.0	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	3.5	0.2
Total Del/Veh (s)	7.3	6.7	1.8	1.6	5.1	1.3	5.0

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.6	0.0	1.6	0.1	4.2	2.5	0.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	21.4

Queuing and Blocking Report
Opening Year (2030) No-Build - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	20	151	24	102	99	90	31	208	132	99
Average Queue (ft)	4	48	3	19	23	17	6	102	54	37
95th Queue (ft)	16	111	12	65	67	55	23	174	102	83
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)								0		
Queuing Penalty (veh)								0		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	55	10
Average Queue (ft)	25	0
95th Queue (ft)	42	5
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	75	33	21
Average Queue (ft)	24	9	1
95th Queue (ft)	54	31	10
Link Distance (ft)	1279	6729	289
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Opening Year (2030) No-Build - AM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	33	33	47
Average Queue (ft)	6	5	14
95th Queue (ft)	24	23	34
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	43	64
Average Queue (ft)	3	17
95th Queue (ft)	23	40
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.8	0.2	3.8	0.0	0.0	0.0	0.1	0.0	0.1	3.3	0.7	3.3
Total Del/Veh (s)	26.8	20.6	6.1	25.7	14.7	5.6	12.8	16.8	4.5	12.9	12.5	4.8

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	13.8

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.4	3.5	4.3	2.6	5.1	4.0	4.2

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.9	10.9	1.6	5.6	5.7	1.4	2.9	0.2	0.0	1.1	0.6	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	0.9

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.2	0.3	3.7	0.4
Total Del/Veh (s)	7.7	6.8	3.4	1.5	5.1	2.5	4.9

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.0	1.0	0.3	5.4	1.5	0.5

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	22.0

Queuing and Blocking Report
Opening Year (2030) No-Build - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	30	124	33	83	113	66	36	190	91	211
Average Queue (ft)	4	43	3	25	35	15	8	82	39	90
95th Queue (ft)	18	97	15	61	82	45	27	153	76	166
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)								0		
Queuing Penalty (veh)								0		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	54	43	4
Average Queue (ft)	21	2	0
95th Queue (ft)	43	19	3
Link Distance (ft)	1646	4896	1423
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	39	30	22	26
Average Queue (ft)	18	11	1	1
95th Queue (ft)	38	27	11	14
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) No-Build - PM Peak Hour

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Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	57	28	61
Average Queue (ft)	11	3	24
95th Queue (ft)	37	15	47
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	39	23
Average Queue (ft)	5	9
95th Queue (ft)	23	20
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.7	0.3	3.9	0.4	0.0	0.4	0.3	0.0	0.1	3.6	0.7	2.6
Total Del/Veh (s)	25.6	21.2	4.8	24.7	13.5	6.3	11.1	19.7	4.8	14.1	9.4	4.1

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	15.0

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.2	3.3	2.5	2.9	3.4	2.8	3.3

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.6	10.8	2.4	2.2	1.0	0.7	0.2	0.0	1.9	0.6	0.0	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	3.7	0.2
Total Del/Veh (s)	7.7	6.7	2.0	1.7	5.7	1.8	5.2

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.7	0.0	1.9	0.3	5.6	3.0	0.9

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	22.5

Queuing and Blocking Report
Design Year (2045) No-Build - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	20	134	37	84	97	86	31	249	143	120
Average Queue (ft)	3	50	3	20	23	19	6	104	59	40
95th Queue (ft)	13	106	16	56	64	55	23	191	110	91
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)								1		
Queuing Penalty (veh)								1		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	61	5
Average Queue (ft)	28	1
95th Queue (ft)	51	6
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	67	37	5	15
Average Queue (ft)	27	9	0	1
95th Queue (ft)	52	31	4	10
Link Distance (ft)	1279	6729	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	38	27	51
Average Queue (ft)	7	4	15
95th Queue (ft)	26	18	37
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	52	61
Average Queue (ft)	4	20
95th Queue (ft)	26	44
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.2	0.3	3.7	0.0	0.0	0.0	0.1	0.0	0.2	3.2	0.8	3.2
Total Del/Veh (s)	28.2	22.2	6.7	26.7	15.1	6.0	14.6	18.7	4.7	14.7	12.7	4.4

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	14.8

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.7	4.4	5.4	3.0	5.6	4.1	4.6

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.5	11.2	2.0	5.4	6.3	2.6	1.0	0.2	0.0	1.2	0.7	0.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1	0.3	3.7	0.4
Total Del/Veh (s)	8.0	6.6	3.3	1.6	5.2	2.9	4.9

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.0	1.5	0.4	4.4	1.9	0.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	23.6

Queuing and Blocking Report
Design Year (2045) No-Build - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	29	169	21	72	104	70	30	215	118	233
Average Queue (ft)	4	49	2	27	34	15	8	95	49	93
95th Queue (ft)	18	113	12	60	91	45	25	185	97	181
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)								1		0
Queuing Penalty (veh)								0		0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	52	36
Average Queue (ft)	22	2
95th Queue (ft)	44	16
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	35	35	11	33
Average Queue (ft)	17	12	1	2
95th Queue (ft)	38	28	7	13
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	59	24	60
Average Queue (ft)	13	5	22
95th Queue (ft)	40	19	40
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	42	32
Average Queue (ft)	6	11
95th Queue (ft)	27	24
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.6	0.4	3.8	0.5	0.0	0.5	0.1	0.0	0.0	3.5	0.7	3.2
Total Del/Veh (s)	38.4	34.0	8.2	73.3	22.5	20.6	18.6	28.8	6.6	22.1	16.2	4.3

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	30.9

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	53.0	43.6	14.2	11.4	7.7	5.0	14.7

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.7	10.6	2.3	3.6	1.9	1.1	0.4	0.0	1.9	0.8	0.0	1.2

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.1	3.6	0.4
Total Del/Veh (s)	8.8	8.5	3.9	3.8	7.5	3.4	6.3

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.4	1.0	7.8	3.0	1.3

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.0	0.2	0.1	0.1
Total Del/Veh (s)	2.1	0.4	5.2	4.5	13.6	3.7	4.4

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	41.8

Queuing and Blocking Report
Opening Year (2030) Build - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	34	179	46	370	569	266	40	290	164	215
Average Queue (ft)	5	75	9	198	121	50	10	136	72	73
95th Queue (ft)	21	143	30	380	641	259	31	242	135	148
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)				9	0	0		3		
Queuing Penalty (veh)				13	0	0		3		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	420	312	52
Average Queue (ft)	102	75	7
95th Queue (ft)	302	204	30
Link Distance (ft)	2226	4896	1423
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	70	57	20	42
Average Queue (ft)	24	26	1	5
95th Queue (ft)	50	51	9	24
Link Distance (ft)	1279	6729	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) Build - AM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	62	22	60
Average Queue (ft)	15	4	28
95th Queue (ft)	44	16	53
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	129	57
Average Queue (ft)	24	20
95th Queue (ft)	79	43
Link Distance (ft)	134	811
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	17	81	73
Average Queue (ft)	1	34	36
95th Queue (ft)	6	68	59
Link Distance (ft)	675	2226	861
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 16

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.2	0.3	3.9	0.0	0.0	0.0	0.0	0.0	0.1	3.3	0.8	3.3
Total Del/Veh (s)	31.8	28.3	10.5	27.4	14.7	6.6	17.4	20.4	6.2	14.5	16.2	5.0

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	16.3

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	1.1	0.0	0.0	0.0	0.0	0.0	0.3
Total Del/Veh (s)	283.6	281.9	6.4	4.9	8.0	5.2	102.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.7	11.6	1.2	7.5	8.3	3.2	1.8	0.3	0.0	2.0	1.5	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.6

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.4	0.5	3.7	0.4
Total Del/Veh (s)	13.0	11.1	3.9	2.9	8.9	3.2	8.0

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.1	0.7	5.2	0.0	3.2	1.1

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.4	0.4	0.3
Total Del/Veh (s)	3.0	0.2	1.2	1.9	13.2	10.7	7.8

Total Network Performance

Denied Del/Veh (s)	1.0
Total Del/Veh (s)	89.6

Queuing and Blocking Report
Opening Year (2030) Build - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	33	132	45	135	105	77	52	204	75	94	210
Average Queue (ft)	4	55	5	55	35	16	19	98	2	41	113
95th Queue (ft)	20	112	22	105	83	48	42	164	32	78	194
Link Distance (ft)		1621			2530			1424			1155
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)								0			
Queuing Penalty (veh)								1			

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	1990	87	9
Average Queue (ft)	1001	19	0
95th Queue (ft)	2117	57	6
Link Distance (ft)	2228	4896	1424
Upstream Blk Time (%)	3		
Queuing Penalty (veh)	12		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	35	49	20	73
Average Queue (ft)	17	18	1	16
95th Queue (ft)	37	37	10	54
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) Build - PM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	79	24	60
Average Queue (ft)	25	4	25
95th Queue (ft)	60	17	46
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	67	48
Average Queue (ft)	13	17
95th Queue (ft)	44	35
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	33	227
Average Queue (ft)	5	94
95th Queue (ft)	23	196
Link Distance (ft)	2228	936
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 13

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.8	0.3	3.8	0.3	0.0	0.3	0.1	0.0	0.1	3.5	0.7	3.3
Total Del/Veh (s)	33.3	34.2	9.1	34.2	12.5	8.8	21.8	31.4	6.5	23.7	17.2	4.5

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.7
Total Del/Veh (s)	24.0

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0		0.0	0.0	0.0	0.1	0.4	0.1
Total Del/Veh (s)	26.4		3.5	10.6	6.6	8.3	6.9	9.4

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.2	11.0	1.9	2.5	1.8	0.3	0.4	0.0	2.3	0.8	0.0	1.2

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.2	3.6	0.5
Total Del/Veh (s)	9.2	8.3	3.9	3.7	7.2	3.3	6.1

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.0	2.7	1.0	8.1	3.0	1.2

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.2	0.2	0.1
Total Del/Veh (s)	2.2	0.3	5.8	5.3	18.0	4.4	5.1

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	33.7

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - AM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	41	149	48	343	156	81	204	332	208	178	185
Average Queue (ft)	6	69	9	162	27	18	15	149	5	71	77
95th Queue (ft)	26	134	32	291	100	60	76	266	73	135	152
Link Distance (ft)		1621			2530			1423			1155
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)				0				4			
Queuing Penalty (veh)				0				6			

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	129	39	109	100	102	128
Average Queue (ft)	63	16	44	32	32	52
95th Queue (ft)	110	35	86	79	80	98
Link Distance (ft)		2220		4884	1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250		250		250	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	59	50	70
Average Queue (ft)	23	24	6
95th Queue (ft)	49	46	33
Link Distance (ft)	1278	6729	288
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - AM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	43	24	65
Average Queue (ft)	11	4	29
95th Queue (ft)	36	18	52
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	EB	WB	B16	NB
Directions Served	T	LT	T	LR
Maximum Queue (ft)	4	129	6	60
Average Queue (ft)	0	24	0	20
95th Queue (ft)	3	81	4	43
Link Distance (ft)	336	134	1476	811
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	25	100	93
Average Queue (ft)	1	41	41
95th Queue (ft)	9	81	70
Link Distance (ft)	675	2220	855
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 6

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.1	0.3	3.8	0.0	0.0	0.0	0.0	0.0	0.1	3.3	0.7	3.2
Total Del/Veh (s)	32.3	28.2	7.6	28.0	14.7	6.6	18.7	22.9	7.9	15.1	15.4	4.8

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	16.7

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	15.8	6.3	14.8	9.4	16.4	7.7	12.9

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.0	12.2	1.8	7.4	6.8	3.1	1.0	0.3	0.0	2.0	1.8	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.8

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.8	0.5	3.7	0.4
Total Del/Veh (s)	13.9	12.2	3.7	2.3	12.5	2.8	8.7

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.1	0.7	8.2	0.6	3.6	1.2

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.4	0.4	0.3
Total Del/Veh (s)	2.9	0.1	1.9	2.6	10.1	7.0	5.6

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	34.6

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - PM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	
Directions Served	L	T	R	L	T	R	L	T	R	L	T	
Maximum Queue (ft)	36	140	34	126	83	67	56	235	132	91	257	
Average Queue (ft)	4	57	4	54	31	15	20	111	5	40	106	
95th Queue (ft)	19	118	17	103	71	48	46	198	58	78	193	
Link Distance (ft)	1621			2530			1423			1155		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	325		325		350		450		200		300 300	
Storage Blk Time (%)								1		0		
Queuing Penalty (veh)								3		0		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	196	69	54	127	210	64
Average Queue (ft)	99	29	23	53	98	31
95th Queue (ft)	160	58	49	103	177	58
Link Distance (ft)	2222		4884		1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)					0	
Queuing Penalty (veh)					0	

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	43	48	11	118
Average Queue (ft)	18	16	1	18
95th Queue (ft)	40	35	9	75
Link Distance (ft)	1278	6727	299	288
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - PM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	73	38	49
Average Queue (ft)	22	6	23
95th Queue (ft)	53	25	40
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	70	55
Average Queue (ft)	12	20
95th Queue (ft)	44	41
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	48	178
Average Queue (ft)	7	79
95th Queue (ft)	30	130
Link Distance (ft)	2222	930
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 3

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.6	0.4	3.7	0.4	0.0	0.3	0.0	0.0	0.1	3.5	0.7	3.2
Total Del/Veh (s)	41.7	38.6	9.6	41.2	14.5	10.9	23.5	33.3	7.6	28.6	20.2	4.3

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.7
Total Del/Veh (s)	27.5

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0		0.0	0.0	0.0	0.0	0.4	0.1
Total Del/Veh (s)	13.6		3.2	10.3	7.9	9.7	8.2	9.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.5	11.6	2.4	3.3	2.1	1.5	0.5	0.0	2.2	0.8	0.0	1.3

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.3	3.6	0.4
Total Del/Veh (s)	10.1	8.3	4.2	2.6	9.1	3.8	6.3

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.9	0.0	2.9	1.1	10.7	2.9	1.4

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.2	0.2	0.1
Total Del/Veh (s)	2.4	0.3	6.0	5.4	14.8	4.4	5.1

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	36.8

Queuing and Blocking Report
Design Year (2045) Build - AM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	38	226	53	358	252	196	164	426	350	200	204
Average Queue (ft)	6	82	10	173	48	33	16	175	15	82	94
95th Queue (ft)	24	166	31	319	222	158	84	328	132	164	177
Link Distance (ft)		1621			2530			1423			1155
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)				3				7			0
Queuing Penalty (veh)				5				9			0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	118	43	92	120	112	134
Average Queue (ft)	48	15	41	41	40	58
95th Queue (ft)	89	34	76	96	87	100
Link Distance (ft)		2220		4884	1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250		250		250	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	58	64	15	53
Average Queue (ft)	26	28	1	5
95th Queue (ft)	51	53	8	28
Link Distance (ft)	1278	6729	299	288
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Design Year (2045) Build - AM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	55	31	80
Average Queue (ft)	13	5	31
95th Queue (ft)	40	21	60
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	101	55
Average Queue (ft)	28	20
95th Queue (ft)	79	43
Link Distance (ft)	134	811
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	17	141	98
Average Queue (ft)	1	42	40
95th Queue (ft)	7	93	70
Link Distance (ft)	675	2220	855
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 14

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.9	0.3	3.7	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.8	3.3
Total Del/Veh (s)	33.5	30.3	11.1	27.7	18.0	7.5	20.0	22.6	8.6	17.0	17.2	5.3

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	17.8

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	15.7	7.3	16.5	10.1	17.1	8.2	13.4

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	9.3	14.6	1.2	8.0	7.5	3.5	2.3	0.4	0.0	2.4	1.9	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.9

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1	0.3	3.6	0.4
Total Del/Veh (s)	14.6	12.3	3.9	3.0	12.3	3.5	9.0

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.5	0.6	7.5	0.0	3.3	1.1

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.4	0.4	0.3
Total Del/Veh (s)	3.0	0.2	1.9	2.6	9.3	7.0	5.6

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	36.0

Queuing and Blocking Report
Design Year (2045) Build - PM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	39	163	38	133	116	69	52	238	152	105	275
Average Queue (ft)	4	65	5	52	43	20	21	117	13	46	125
95th Queue (ft)	19	130	23	101	93	53	45	202	100	86	225
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)								1	0		0
Queuing Penalty (veh)								4	0		0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	227	87	78	143	215	70
Average Queue (ft)	99	32	22	60	99	29
95th Queue (ft)	172	66	54	118	183	56
Link Distance (ft)	2222		4884		1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250		250		250	
Storage Blk Time (%)	0				0	
Queuing Penalty (veh)	0				0	

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	46	39	26	82
Average Queue (ft)	17	16	1	19
95th Queue (ft)	40	33	11	58
Link Distance (ft)	1278	6727	299	288
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Design Year (2045) Build - PM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	92	32	66
Average Queue (ft)	24	5	26
95th Queue (ft)	64	20	51
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	68	50
Average Queue (ft)	16	20
95th Queue (ft)	49	40
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	55	157
Average Queue (ft)	9	77
95th Queue (ft)	36	127
Link Distance (ft)	2222	930
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 5

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	1.6	0.3	2.1	2.6	0.6	2.9	0.1	0.0	0.0	2.0	0.5	1.4
Total Del/Veh (s)	35.0	32.1	30.2	77.9	25.1	7.5	56.7	58.3	31.9	45.1	44.7	6.7

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	45.7

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	1.8	0.2	2.0	0.4	0.0	0.0	0.5
Total Del/Veh (s)	198.9	25.1	73.6	100.1	3.0	2.6	62.1

4: Midway Rd & Railroad Crossing Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	2.8	0.0	1.4
Total Del/Veh (s)	57.4	108.8	82.8

Total Network Performance

Movement	All
Denied Del/Veh (s)	2.0
Total Del/Veh (s)	130.8

Queuing and Blocking Report

10 Minute Crossing - 2030 Build AM Peak

06/27/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	32	172	93	453	202	176	170	980	350	314	682
Average Queue (ft)	4	61	14	117	33	19	10	220	30	94	134
95th Queue (ft)	20	131	62	345	163	97	71	762	191	247	458
Link Distance (ft)	3164			2724			966			2950	
Upstream Blk Time (%)								3			
Queuing Penalty (veh)								10			
Storage Bay Dist (ft)	325	325		700	450		200	300		300	
Storage Blk Time (%)				0	1				10	4	5
Queuing Penalty (veh)				0	2				8	8	10

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	292	432	300	1504	56
Average Queue (ft)	99	64	46	341	3
95th Queue (ft)	267	308	193	1181	22
Link Distance (ft)	2892		2789		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	250	250		250	
Storage Blk Time (%)	16	0		21	
Queuing Penalty (veh)	4	2		16	

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	398	990
Average Queue (ft)	178	302
95th Queue (ft)	479	980
Link Distance (ft)	392	966
Upstream Blk Time (%)	27	14
Queuing Penalty (veh)	115	60
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 236

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.6	0.2	2.5	2.5	0.5	2.7	0.5	0.0	0.0	3.3	2.1	3.6
Total Del/Veh (s)	50.3	29.7	43.4	68.0	19.6	7.3	29.6	28.8	13.2	89.1	109.8	81.2

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	1.3
Total Del/Veh (s)	53.7

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	1.7	0.4	1.5	0.3	0.0	0.0	0.5
Total Del/Veh (s)	333.6	197.1	96.4	104.5	3.1	1.1	111.5

4: Midway Rd & Railroad Crossing Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	1.8	1.0	1.4
Total Del/Veh (s)	44.5	90.2	67.6

Total Network Performance

Movement	All
Denied Del/Veh (s)	2.3
Total Del/Veh (s)	162.9

Queuing and Blocking Report

10 Minute Crossing - 2030 Build PM Peak

06/27/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	23	144	52	187	145	116	150	805	350	350	2031	140
Average Queue (ft)	6	55	7	54	51	32	16	122	18	79	525	7
95th Queue (ft)	20	117	30	140	115	85	71	448	139	259	1667	91
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								0		1		
Queuing Penalty (veh)								2		0		
Storage Bay Dist (ft)	325	325		700	450		200	300		300	300	
Storage Blk Time (%)								4	0	0	23	
Queuing Penalty (veh)								8	1	0	33	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	300	1563	200	1349	21
Average Queue (ft)	208	560	13	303	1
95th Queue (ft)	393	1484	97	1043	9
Link Distance (ft)	2892		2789		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	250	250		250	
Storage Blk Time (%)	56			23	
Queuing Penalty (veh)	43			3	

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	399	991
Average Queue (ft)	165	335
95th Queue (ft)	473	1054
Link Distance (ft)	392	966
Upstream Blk Time (%)	29	20
Queuing Penalty (veh)	156	109
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 355

Queuing and Blocking Report
10 Minute Crossing - 2030 Build Rerouted AM Peak

11/05/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	47	168	72	204	98	72	163	978	350	314	626
Average Queue (ft)	6	53	13	48	21	14	10	195	30	78	113
95th Queue (ft)	25	122	48	141	62	47	71	685	191	214	408
Link Distance (ft)	3164			2724			966			2950	
Upstream Blk Time (%)								2			
Queuing Penalty (veh)								7			
Storage Bay Dist (ft)	325	325		700	450		200	300		300	
Storage Blk Time (%)								9	0	0	5
Queuing Penalty (veh)								7	0	1	9

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	257	220	300	1812	399	280
Average Queue (ft)	79	20	74	436	48	32
95th Queue (ft)	219	116	243	1443	200	126
Link Distance (ft)	2892		2789		392	
Upstream Blk Time (%)					1	
Queuing Penalty (veh)					2	
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)	5	2		24	2	0
Queuing Penalty (veh)	2	7		38	2	0

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	400	992
Average Queue (ft)	168	310
95th Queue (ft)	471	966
Link Distance (ft)	392	966
Upstream Blk Time (%)	26	11
Queuing Penalty (veh)	112	38
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 225

Queuing and Blocking Report

10 Minute Crossing - 2030 Build Rerouted PM Peak

11/05/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	35	160	44	142	137	139	227	968	350	350	1863	136
Average Queue (ft)	7	56	6	41	48	35	22	151	41	83	468	7
95th Queue (ft)	25	128	27	112	108	90	107	579	221	263	1469	88
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								1				
Queuing Penalty (veh)								4				
Storage Bay Dist (ft)	325	325		700	450		200	300		300	300	
Storage Blk Time (%)								6	0	1	22	
Queuing Penalty (veh)								12	0	5	31	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	300	1169	299	1421	411	251
Average Queue (ft)	160	298	30	366	98	34
95th Queue (ft)	350	955	149	1125	330	170
Link Distance (ft)	2892		2789		392	
Upstream Blk Time (%)					4	
Queuing Penalty (veh)					19	
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)	31			28	6	0
Queuing Penalty (veh)	25			7	3	0

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	397	993
Average Queue (ft)	172	413
95th Queue (ft)	478	1119
Link Distance (ft)	392	966
Upstream Blk Time (%)	28	19
Queuing Penalty (veh)	155	103
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 364

Appendix D:

Turn Lane Warrant Sheets

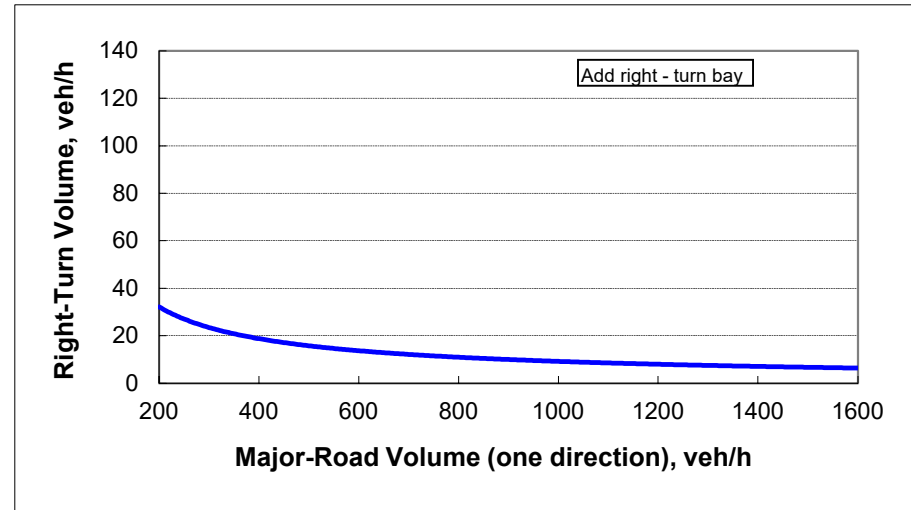
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	111
Right-turn volume, veh/h:	34

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	51
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Morris Thomas Road & Industrial Access Eastbound Right (2045 Build Conditions)

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

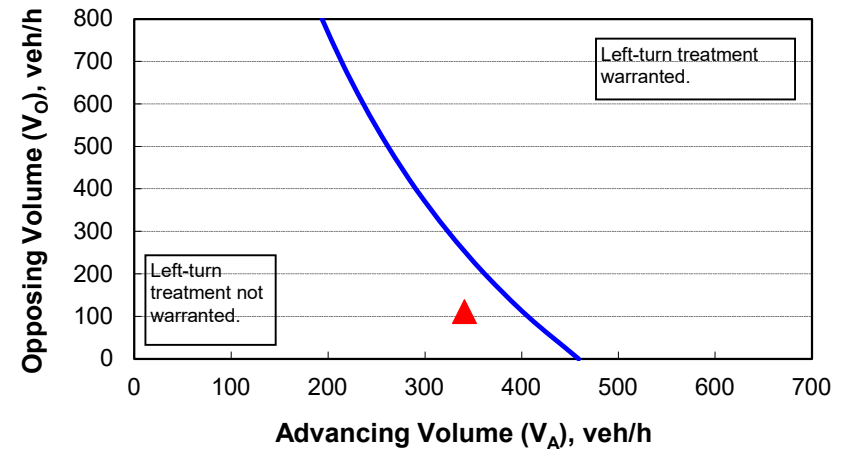
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	90%
Advancing volume (V_A), veh/h:	341
Opposing volume (V_O), veh/h:	111

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	401
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

Morris Thomas Road & Industrial Access Westbound Left (2045 Build Conditions)

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

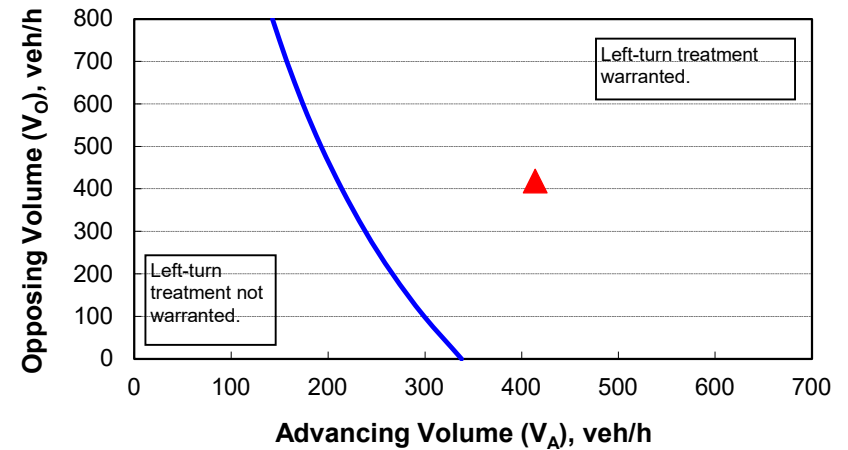
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	21%
Advancing volume (V_A), veh/h:	414
Opposing volume (V_O), veh/h:	418

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	210
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

Midway Road & Morris Thomas Road Northbound Right (2030 Build Conditions)

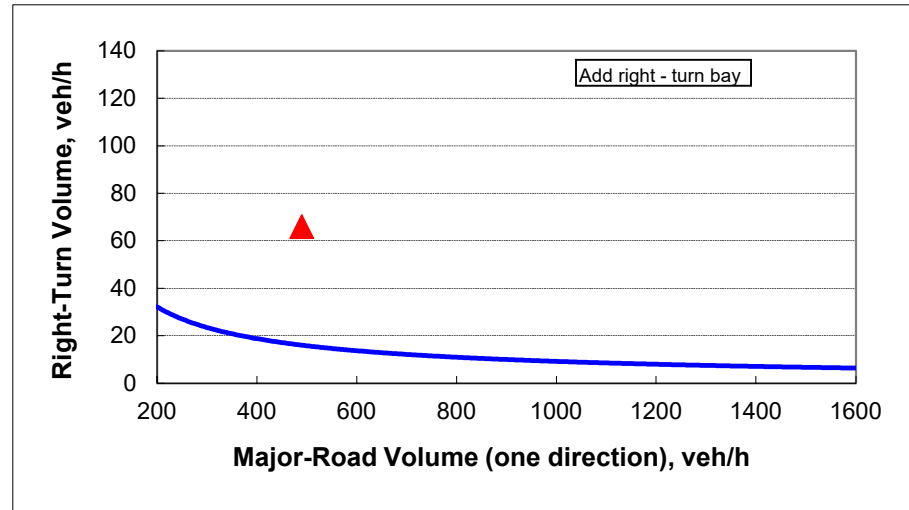
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	490
Right-turn volume, veh/h:	66

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	16
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Midway Road & Morris Thomas Road Southbound Right (2030 Build Conditions)

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

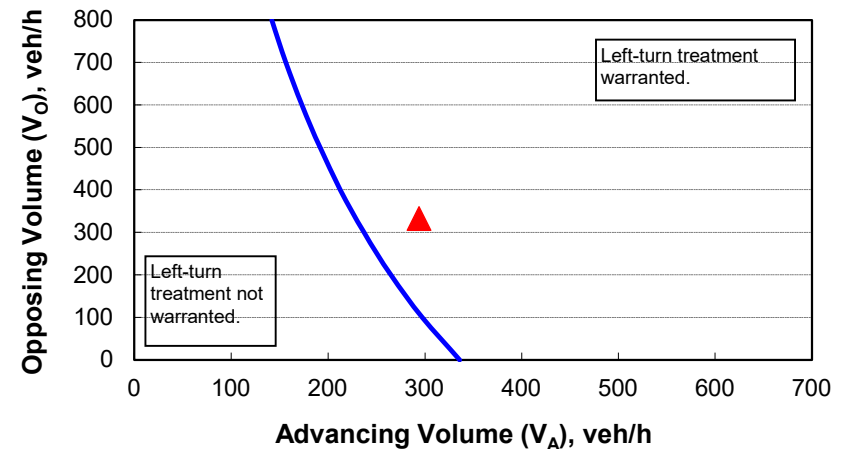
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	60
Percent of left-turns in advancing volume (V_A), %:	16%
Advancing volume (V_A), veh/h:	294
Opposing volume (V_O), veh/h:	332

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	229
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

US-2 & St Louis River Road Westbound Left (2030 Build Conditions)



TRAFFIC MEMORANDUM

To: MnDOT, St. Louis County, & City of Hermantown
From: Jacob Rojer P.E., PTOE
Date: March 27, 2026
Subject: Hermantown Industrial - Construction Conditions (2027) Traffic Analysis

INTRODUCTION

This memo analyzes the impact of Hermantown Industrial construction traffic on the surrounding roadway network and determines any mitigations necessary to support the temporarily elevated traffic levels. The Hermantown Industrial site is located at the southwest corner of Midway Road & Morris Thomas Road in Hermantown, MN. The project site location and study area is shown in **Exhibit 1**. All Exhibits are presented in **Attachment A**. A Traffic Impact Analysis (TIA) was completed for the Hermantown Industrial site which analyzed the impacts of the completed development in the short- and long-term. This memorandum includes the volume development for the construction conditions in the potential construction year of 2027. It also includes a capacity analysis for the construction conditions, and the determination of any mitigation measures necessary to facilitate access to the construction site while maintaining acceptable traffic conditions at the nearby study intersections.

All intersections studied in the Hermantown Industrial TIA were also analyzed for this memorandum. Existing geometry and intersection control is shown in **Exhibit 2**. Turning Movement Counts (TMCs) were collected at five (5) study intersections in April 2025, with the PM peak (4:00 PM to 6:00PM) collected on Wednesday, April 9, and the AM peak (7:00 AM to 9:00 AM) collected on Thursday, April 10.

VOLUME DEVELOPMENT

For the purpose of this memo, trip generation includes the construction of Phase One of the site, which includes an administrative building and one of four industrial buildings in the year 2027. Construction trip generation estimates were determined using estimates for similar sized projects. The expected construction trips generated are shown below in **Table 1**. At the peak of construction, there are expected to be 390 construction trips (330 entering, 60 exiting) during the AM peak hour and 340 construction trips (70 entering, 270 exiting) during the PM peak hour.

To determine the effects of the busiest construction period on the roadway network, the AM and PM peak periods of construction traffic were studied instead of the peak periods of adjacent street traffic. Based on the anticipated arrival patterns, the AM peak hour of street traffic is estimated to be 7:15 AM to 8:15 AM, while the PM peak hour of site traffic is estimated to coincide with the PM peak hour of adjacent street traffic at 4:15 PM to 5:15 PM. The Existing (2025) peak hour traffic volumes are shown in **Exhibit 3**.

A small percentage of truck trips are estimated to be generated throughout the day, but these trips are expected to be spread relatively throughout the workday and are generally not expected to coincide with the peak periods for passenger vehicle trips. Because there is not expected to be substantial truck trips during the peak periods, existing heavy vehicle percentages were utilized for the analysis.

Table 1: Construction Trip Generation

Trip Type	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Total	330	60	390	70	270	340

The distribution of construction site trips was determined via a review of the existing roadway characteristics, traffic patterns, and knowledge of the site characteristics. The global distribution for traffic traveling to/from the site is as follows:

- 40% to/from southeast on US Highway 2
- 15% to/from north on Midway Road
- 15% to/from south on Midway Road
- 15% to/from east on Morris Thomas Road
- 10% to/from west on Morris Thomas Road
- 5% to/from northwest on US Highway 2

For the sake of this analysis, it was assumed that all construction traffic would access the site from the primary access point located along Morris Thomas Road. The overall trip distribution for the site is shown in **Exhibit 4**, while the trip assignment for the Hermantown Technology Park Construction traffic is shown in **Exhibit 5**.

Based on an analysis of Hermantown population growth and expected traffic volume growth, an annual growth rate of 0.6% was determined to be used for background growth. Two years of background growth was applied to the Existing (2025) traffic volumes to determine No-Build (2027) traffic volumes, shown in **Exhibit 6**. The Construction Conditions (2027) traffic volumes were determined by applying trip assignment in **Exhibit 5** to No-Build (2027) traffic volumes in **Exhibit 6**. The Construction Conditions (2027) traffic volumes are shown in **Exhibit 7**.

RAILROAD CROSSING QUEUE ANALYSIS

A railroad crossing conditions analysis was conducted on the Construction Conditions (2027) to determine the necessary mitigation for 10-minute train crossing events during the peak construction conditions. Results of the analysis, along with the Existing (2025) Conditions results are given below in **Table 2**.

Table 2: 10-Minute Train Crossing Event Queueing Results

Scenario	Maximum Queue by Movement				
	US Highway 2 & Midway Road			Midway Road & Morris Thomas Road	
	EBR	WBL	SBT	NBT	EBL/R ¹
(Available Queue Storage)	300'	450'	-	-	- / 250'
Existing (2025) Conditions – AM Peak	26'	59'	164'	1,346'	298'
Existing (2025) Conditions – PM Peak	75'	167'	1,808'	1,078'	277'
Construction Conditions (2027) – AM Peak	167'	720'	1,286'	2,129'	292'
Construction Conditions (2027) – PM Peak	62'	227'	2,175'	1,517'	2,686'
Rerouted Construction (2027) – AM Peak	157'	420'	1,180'	2,627'	284'
Rerouted Construction (2027) – PM Peak	57'	209'	2,169'	1,477'	2,828'

¹Dedicated left turn storage (250') was assumed at Midway Road & Morris Thomas Road under Construction Conditions.

Based on the results of the analysis, the peak construction conditions are anticipated to cause significant increases in queueing during 10-minute crossing events compared to the existing conditions. During the AM Peak hour of the Construction Conditions (2027), the westbound left turn lane at US Highway 2 & Midway Road is anticipated to exceed its storage capacity with maximum queues of 720'. It is recommended that traffic traveling to the site from US Highway 2 south of St. Louis River Road should be routed to turn at St. Louis River Road to avoid this railroad crossing and reduce potential undesirable queueing in the westbound left turn lane.

The Rerouted Construction (2027) Traffic Volumes are shown in **Exhibit 8**. Under the rerouted construction conditions, the westbound left turn queue is reduced to 420' which is within the available storage. During the PM peak hour of the Construction Conditions (2027), the eastbound approach of Midway Road & Morris Thomas Road is anticipated to see maximum queues of approximately ½ mile. Eastbound queues do not extend to any major intersection and are not expected to cause significant issues. All other movements are generally anticipated to see acceptable levels of queueing during 10-minute crossing events and no further mitigation is required.

In review of the MnDOT provided data for the railroad crossing from June through October 2025, a total of 97 railroad crossings occurred during the weekday AM peak hour (7:45 AM to 8:45 AM) when the projected queues for the turn lanes on US 2 are the longest. 97 crossings in the 5 months represents 0.9 events per weekday AM peak. While there are anticipated to be crossings almost every day during the AM peak hour, only 23 crossings exceeded 5 minutes and only 1 crossing in the 5-month time frame was 10 minutes. Therefore, the analysis condition outlined above for a 10-minute training crossing is not anticipated to be a regular occurrence.

CONSTRUCTION CONDITIONS (2027) CAPACITY ANALYSIS

Traffic analysis was conducted for the Construction Conditions (2027) scenario as described above. Analysis was conducted using capacity analysis software SimTraffic within Synchro 12. Sim Traffic Reports are presented in **Attachment B**. The level of service is shown in **Table 3**.

Table 3: Construction Conditions (2027) Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (26.1)	C (25.4)	A (6.1)	C (26)	C (23.6)	C (20.3)	A (6.2)	B (14.2)
		WB	E (57.4)	B (15.2)	B (10.6)		C (24.2)	B (15.2)	A (5.8)	
		NB	B (19.2)	C (27.4)	A (7.4)		B (17.2)	B (19.3)	A (6.1)	
		SB	B (19.9)	B (15.8)	A (4.2)		B (14.4)	B (13.9)	A (4.8)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	F (82.1)	-	F (76.8)	F (82.1)	F (100+)	-	F (100+)	F (100+)
		WB	-	-	-		-	-	-	
		NB	C (19.6)	C (19.5)	-		A (6.1)	A (4.3)	-	
		SB	-	A (8.2)	A (5.4)		-	A (7)	A (4.2)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (7.6)	B (10.8)	A (2.3)	B (10.8)	A (8.1)	B (12)	A (1.7)	B (12)
		WB	-	A (4.3)	A (3.7)		A (9.8)	A (7)	A (2.4)	
		NB	A (0.3)	A (0.6)	A (0)		A (2.2)	A (0.4)	A (0)	
		SB	A (2.7)	A (0.7)	A (0)		A (2.3)	A (2.4)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (5.7)	A (6)	-	A (6.3)	B (12.9)	B (10.4)	-	B (12.9)
		WB	-	A (3.5)	A (2.6)		-	A (3.6)	A (3.4)	
		NB	-	-	-		-	-	-	
		SB	A (6.3)	-	A (3)		A (9.7)	-	A (2.8)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.9)	A (0.1)	A (9.6)	-	A (1.2)	A (0)	A (8.5)
		WB	A (2.9)	A (1.7)	-		A (2.3)	A (0.6)	-	
		NB	A (9.6)	-	A (2.8)		A (8.5)	A (0.7)	A (4)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	B (11.2)	A (3.1)	E (39.8)	-	C (19.7)	A (4.1)	F (81.6)
		WB	E (39.8)	D (31.8)	-		A (7)	A (7)	-	
		NB	A (8.9)	-	A (2.5)		F (71.6)	-	F (81.6)	
		SB	-	-	-		-	-	-	

Note: Worst side street delay is reported instead of overall delay at side-street stop-controlled intersections.

Based on the Construction Conditions (2027) analysis, the following individual movements are expected to operate at LOS F:

- Eastbound left at Midway Road & Morris Thomas Road (AM & PM)
- Eastbound right at Midway Road & Morris Thomas Road (AM & PM)

- Northbound left at Morris Thomas Road & Construction Access (PM)
- Northbound right Morris Thomas Road & Construction Access (PM)

The current intersection control at Midway Road & Morris Thomas Road is Side Street Stop Control. Due to this, the eastbound approach is the only approach with a stop sign. Vehicles are unable to make an eastbound left or right turn in a timely matter because of limited turning opportunities on Midway Road. In order to reduce delays at this intersection, it is recommended that this intersection be signalized. Based on the recommendation given in the Hermantown Industrial Traffic Impact Analysis, installation of a permanent traffic signal is recommended to mitigate issues related to queueing at the nearby railroad crossing along Midway Road. The delay and queueing issues at Morris Thomas Road & Construction Access are almost entirely due to the problems previously discussed at Midway Road & Morris Thomas Road. Thus, proper mitigation at Midway Road & Morris Thomas Road is expected to resolve conflict at Morris Thomas Road & Construction Access.

Analysis of 95th percentile queue lengths shows all queues remain in their respective storage bays apart from the westbound left movement at Midway Road & US Highway 2. The 95th percentile queue is expected to be at a maximum of 14 feet beyond the 350-foot storage bay in the AM peak hour. This queue is not expected to extend onto the through lane because vehicles should fit within the taper length. The extended queue is primarily due to the current signal phasing which does not have enough allotted time to allow the full westbound left queue to complete the movement in one cycle. An adjustment of the signal time is expected to be enough to provide reduced queue lengths.

MITIGATED CONSTRUCTION CONDITIONS (2027) CAPACITY ANALYSIS

In order to show the impact of mitigation strategies on the roadway network, the Mitigated Construction Conditions (2027) Capacity Analysis was conducted. The following modifications recommended in the Hermantown Industrial Traffic Impact Study were applied to the model:

- Install a permanent traffic signal at Midway Road & Morris Thomas Road. The traffic signal would require coordination with the railroad crossing and the existing signal at US Highway 2 & Midway Road
- Install northbound-left, southbound-right, and eastbound-left turn lanes at Midway Road & Morris Thomas Road
- Optimize signal timings at US Highway 2 & Midway Road and implement coordination with the proposed signal at Midway Road & Morris Thomas Road
- Install a westbound left turn lane at the development driveway/construction access
- Reroute all entering traffic from US Highway 2 that is coming from the southeast onto St. Louis River Road

Analysis was conducted using capacity analysis software SimTraffic within Synchro 12. The level of service is shown in **Table 4**.

Table 4: Construction Conditions (2027) Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (26.6)	C (22.6)	A (5)	B (19.1)	C (30.5)	C (20.2)	A (6.2)	B (14.7)
		WB	C (29.2)	B (19.7)	A (8.1)		C (24.8)	B (15.8)	A (7.3)	
		NB	B (20)	C (23.7)	A (5.9)		B (18.4)	B (19.9)	A (8.1)	
		SB	B (17.7)	B (14.5)	A (4.2)		B (14.9)	B (13.9)	A (5)	
Midway Road & Morris Thomas Road	Signal	EB	C (26.1)	-	A (3.4)	B (10.7)	B (13.8)	A (1.2)	A (5.5)	B (13.2)
		WB	-	-	-		-	-	-	
		NB	B (12.3)	A (8)	-		B (14.6)	B (10.9)	-	
		SB	-	B (10.7)	A (7.6)		-	B (18.2)	A (7.4)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.8)	B (12.3)	A (1.9)	B (12.3)	A (9.3)	C (15.1)	A (1.9)	C (15.1)
		WB	-	A (2.8)	A (6.6)		A (9.9)	A (6.7)	A (3.2)	
		NB	A (0.6)	A (1)	A (0.1)		A (2.1)	A (0.4)	A (0)	
		SB	A (6.2)	A (1.1)	A (0)		A (2.2)	A (2)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.9)	A (6.4)	-	A (7.9)	B (13.6)	B (12.3)	-	B (13.6)
		WB	-	A (2.3)	A (1.1)		-	A (3.7)	A (2.4)	
		NB	-	-	-		-	-	-	
		SB	A (6.9)	-	A (2.8)		B (12)	-	A (2.8)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (1.5)	A (0.1)	B (11.2)	-	A (1.3)	A (0)	A (9.5)
		WB	A (4.7)	A (1.2)	-		A (2.1)	A (0.3)	-	
		NB	B (11.2)	-	A (3.7)		A (9.5)	A (0.1)	A (4)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	A (1.8)	A (0.2)	B (14.8)	-	A (3.1)	A (0.1)	B (13.6)
		WB	A (5.5)	A (4)	-		A (1.4)	A (1.6)	-	
		NB	B (14.8)	-	A (3.3)		B (13.6)	-	B (10.7)	
		SB	-	-	-		-	-	-	

Results from the Construction Conditions (2027) Capacity Analysis show that all intersections are expected to operate at LOS D or better and all individual movements are expected to operate at LOS D or better. After a review of 95th percentile queue lengths, all turn lane queues are expected to remain within their respective storage bays.

CONCLUSION AND RECOMMENDATIONS

Build-out of the Hermantown Industrial Project was modeled to occur in the year 2027. A capacity analysis on the Construction Conditions (2027) on the existing roadway system was conducted. The results showed that multiple delay issues present themselves at Midway Road & Morris Thomas Road and Morris Thomas Road and Construction Access. Based on the results of this analysis and coordination with St. Louis County & MnDOT, the following mitigation measures will be required as a result of the proposed development:

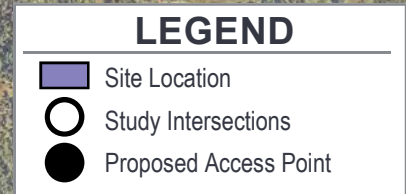
1. Intersection of Morris Thomas Rd (CSAH 56) and development driveway
 - a. Construct a westbound dedicated left-turn lane on Morris Thomas Road at the driveway.
 - b. Driveway will be stop controlled.
2. Intersection of Midway Rd (CSAH 13) and Morris Thomas Rd (CSAH 56)
 - a. Construct a northbound dedicated left-turn lane on Midway Road at Morris Thomas Road.
 - b. Construct eastbound dedicated left-turn and right-turn lanes on Morris Thomas Road at Midway Road. Storage for the right-turn lane will ensure vehicles are not occluded from accessing the right-turn lane during 95% of the time.
 - c. Construct a southbound dedicated right-turn lane on Midway Road at Morris Thomas Road.
 - d. Install a permanent traffic signal.
 - e. Install conduit/cable to coordinate the signal controller with the railroad crossing controller (USDOT #251905S) and the signal controller at the US 2 signal system.
3. Railroad crossing (DOT #251905S)
 - a. Install a traffic queue cutter signal system that will face southbound Midway Road traffic and be located immediately north of Old Hwy 2
 - b. The need for railroad crossing upgrades will be coordinated with the MnDOT Rail Office (Paul DeLaRosa, paul.delarosa@state.mn.us).
4. Intersection of US 2 and Midway Road (CSAH 13)
 - a. Install conduit/cable to coordinate the signal controller with the railroad crossing controller (USDOT #251905S) and the signal controller at the Midway Road/Morris Thomas Road signal system.
5. Intersection of US 2 and St. Louis River Road
 1. Construct a northwest bound dedicated left turn lane to accommodate additional site traffic.
6. Signal timing
 - a. Develop optimized signal timing models for both the Midway Road/Morris Thomas Road and US 2/Midway Road signal systems to accommodate non-train and train events.

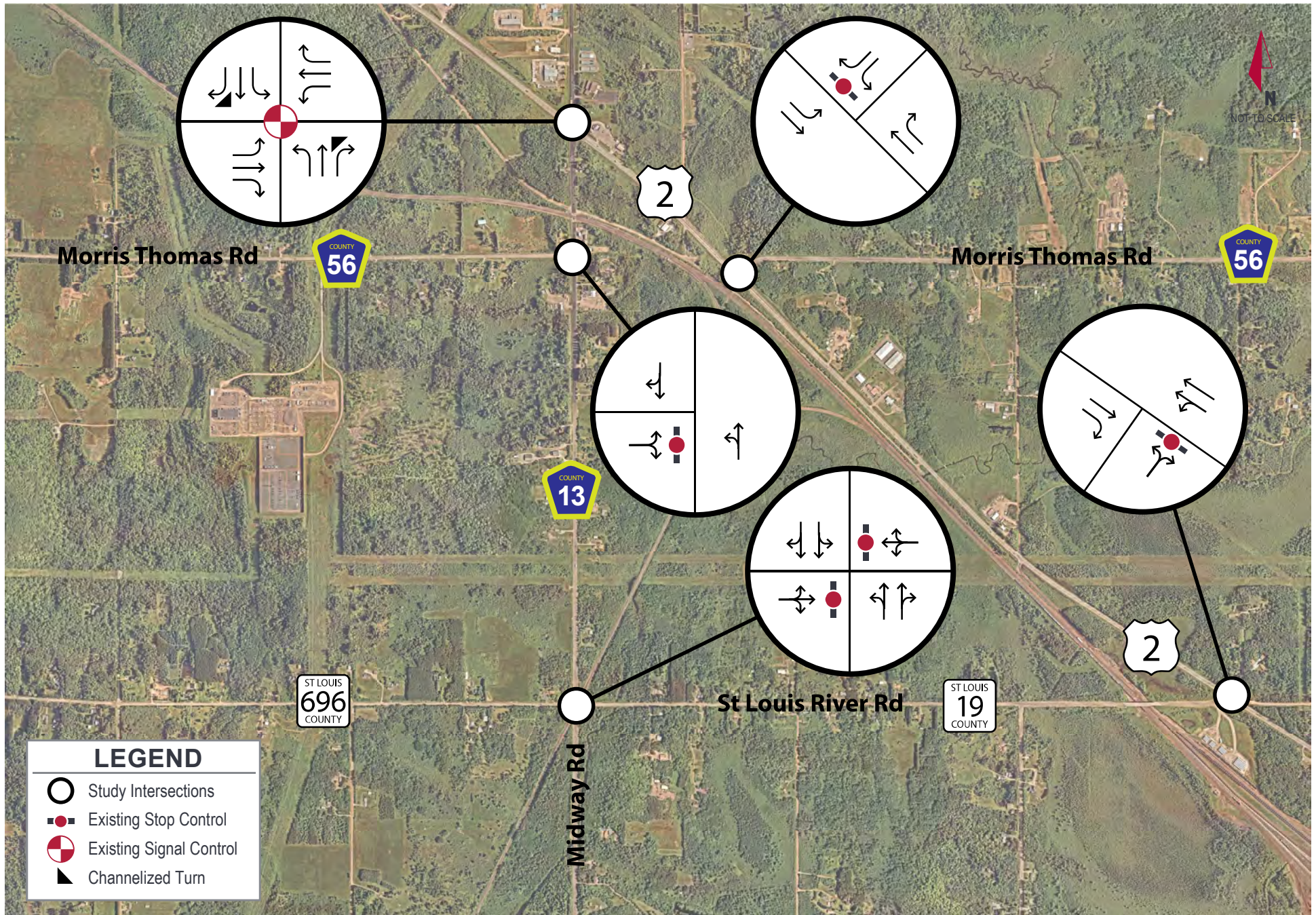
7. Travel Demand Management (TDM)

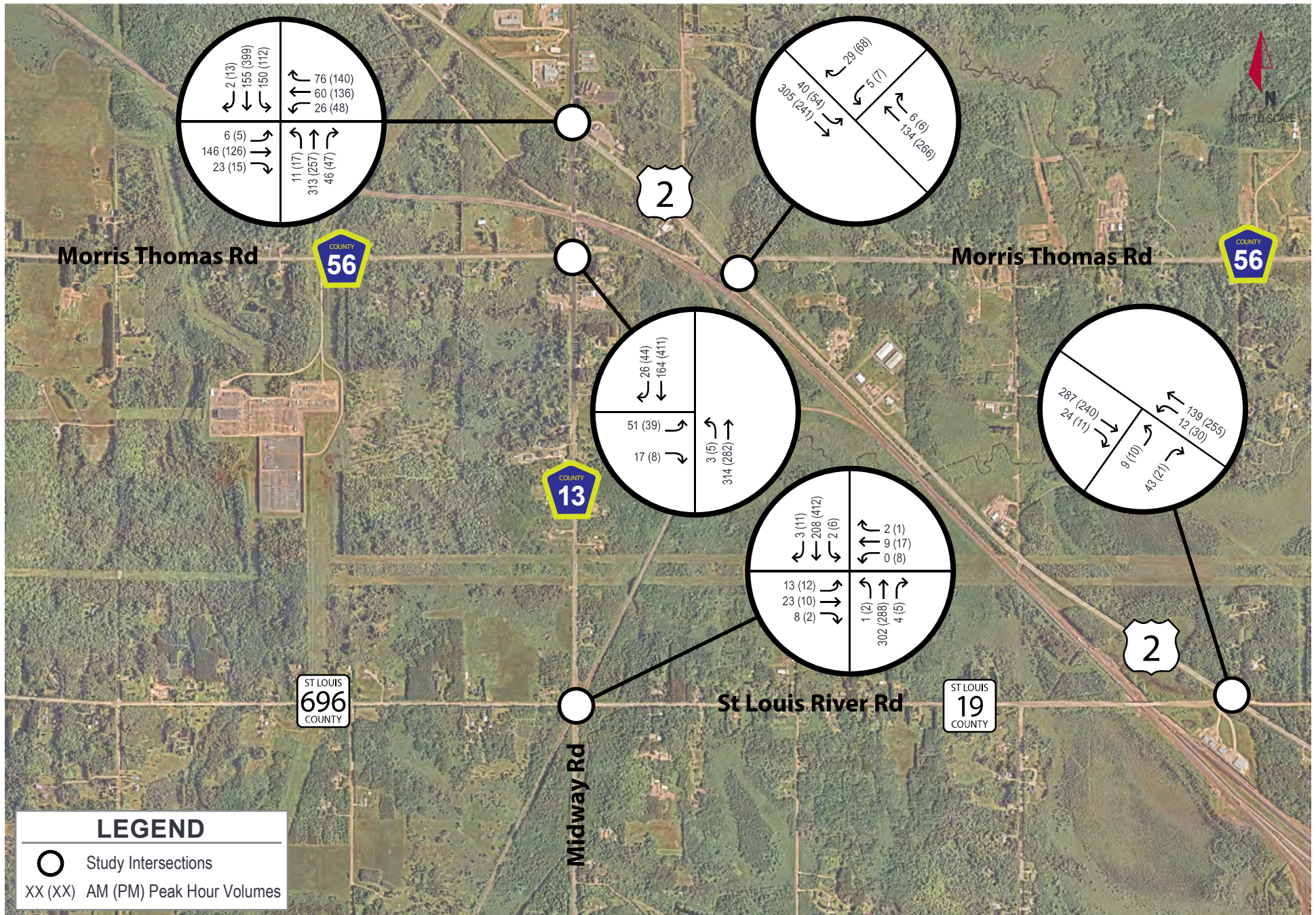
1. A plan completed prior to the beginning of construction will be included in project bid documents, agreements, and notices to sub-contractors, suppliers, and employees. The TDM plan will direct all traffic traveling to the site from US Highway 2 southeast of St. Louis River Road to turn onto St. Louis River Road and enter from the south along Midway Road instead of turning left onto Midway Road from US Highway 2.
- b. If the TDM plan does not prove to be effective at limiting queues at Midway Road & US Highway 2, additional mitigation such as variable message signs or other advanced warning during train event could be implemented at US Highway 2 & St. Louis River Road.

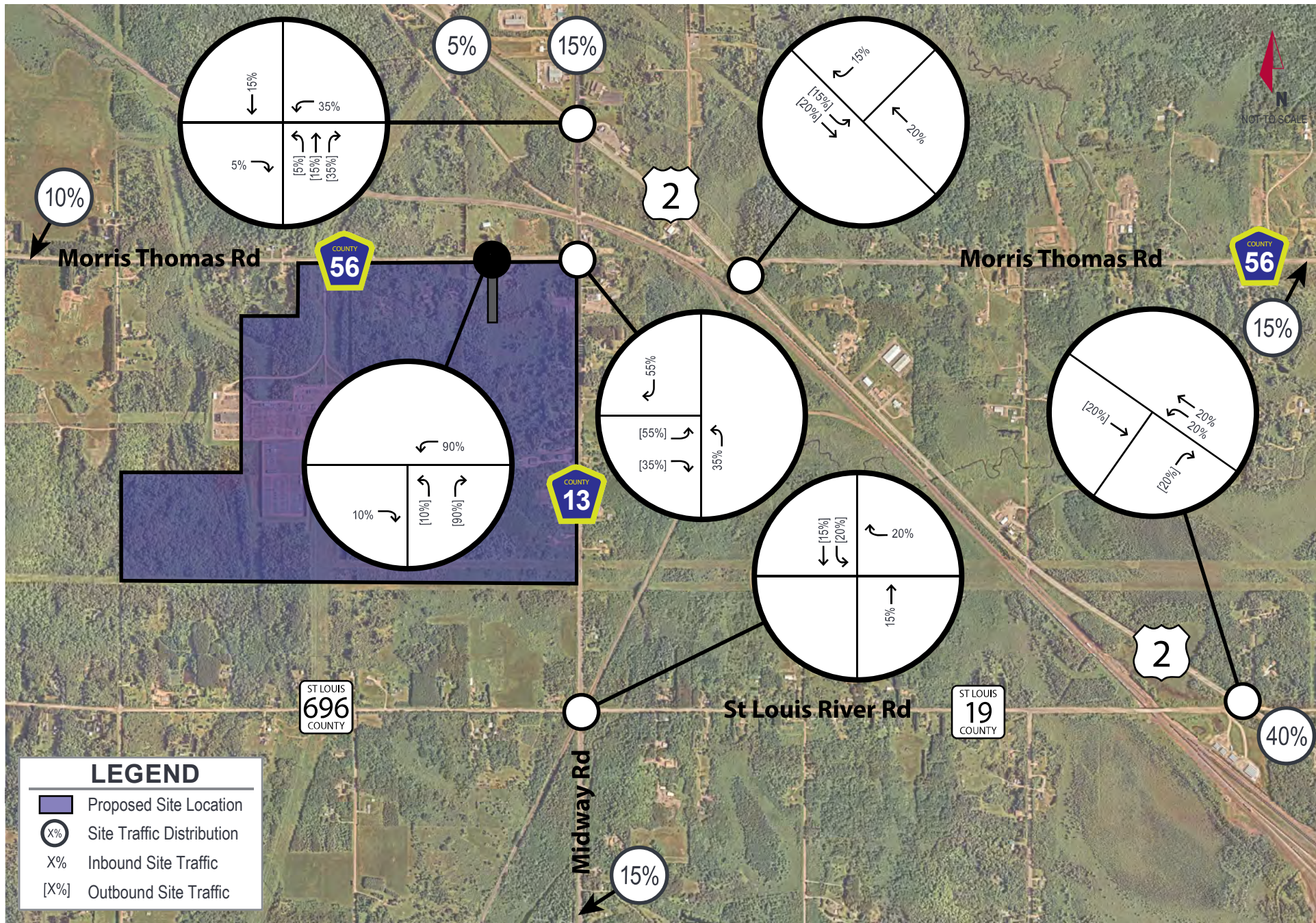
The mitigation plan is shown graphically in **Exhibit 9**. All mitigation aligns with the recommended permanent mitigation outlined in the Hermantown Industrial Site Specific TIA.

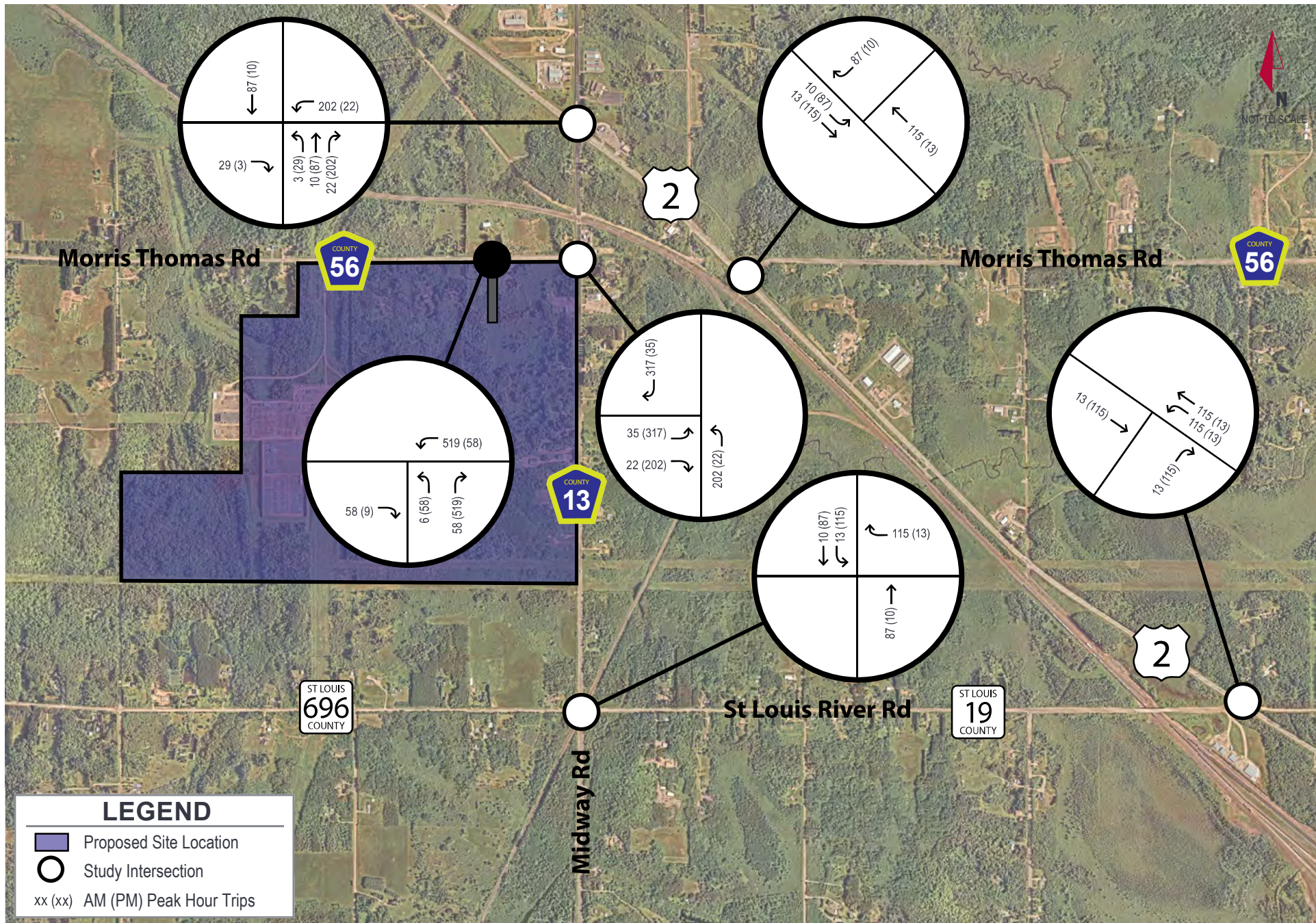
ATTACHMENT A: EXHIBITS

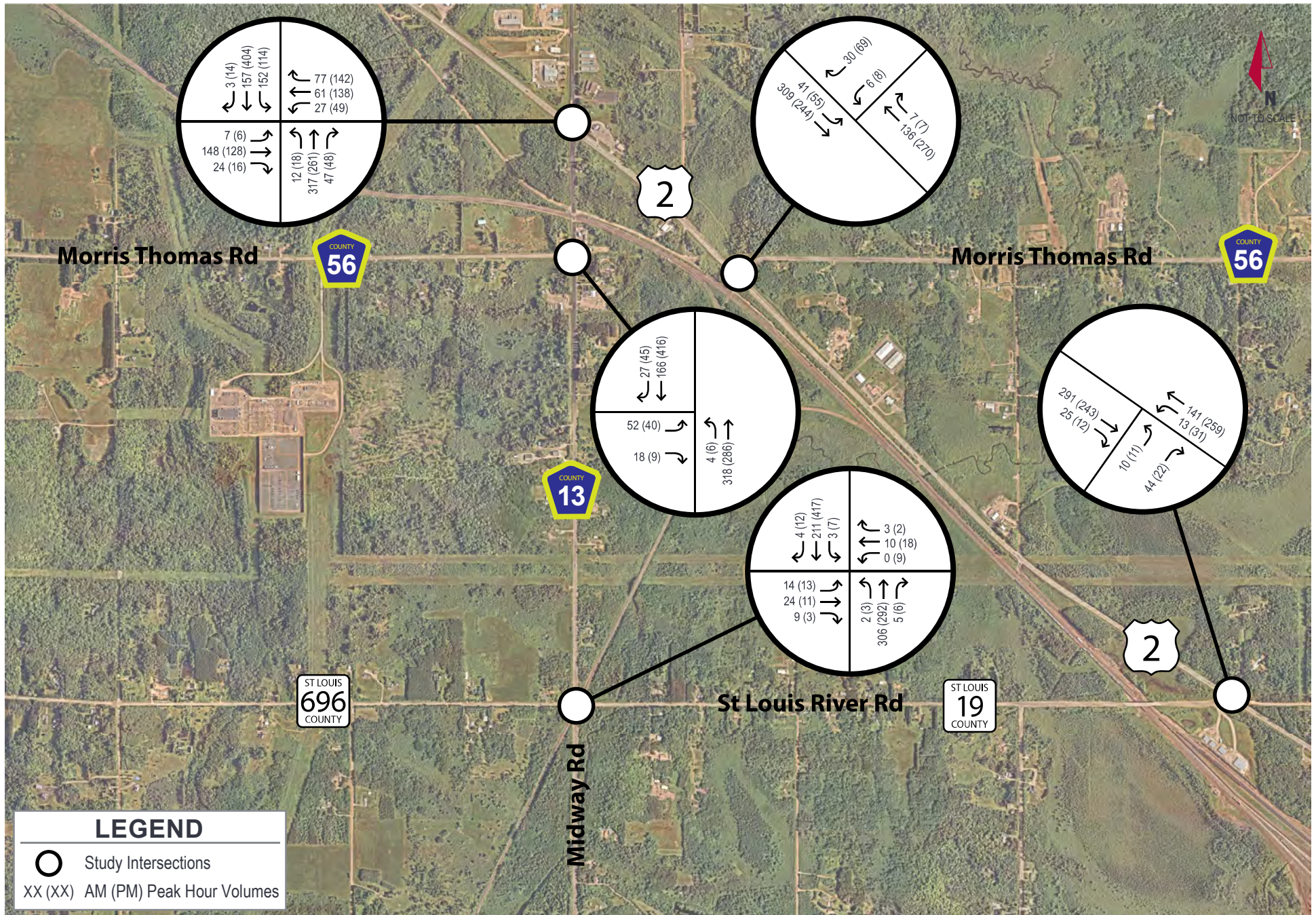


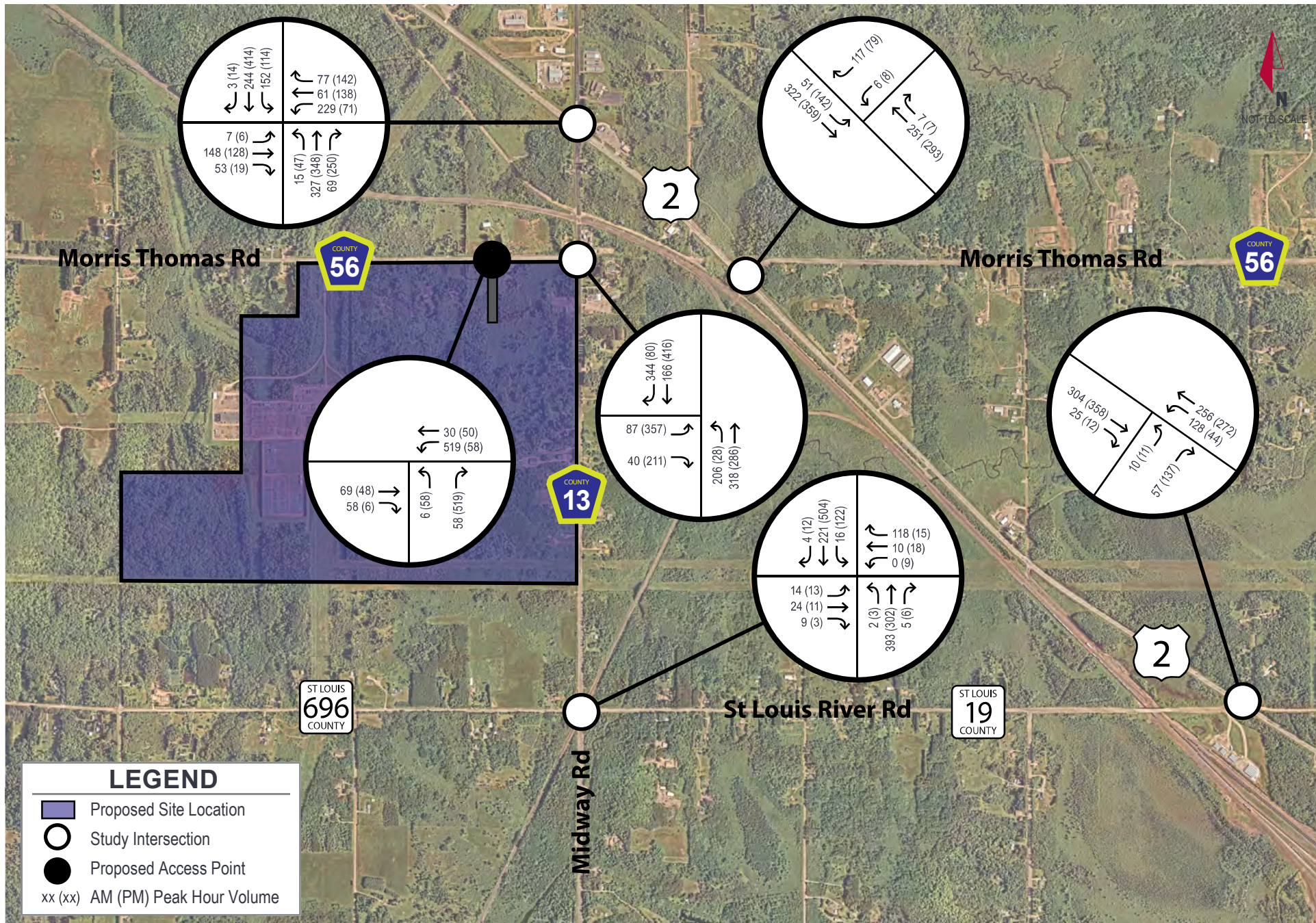


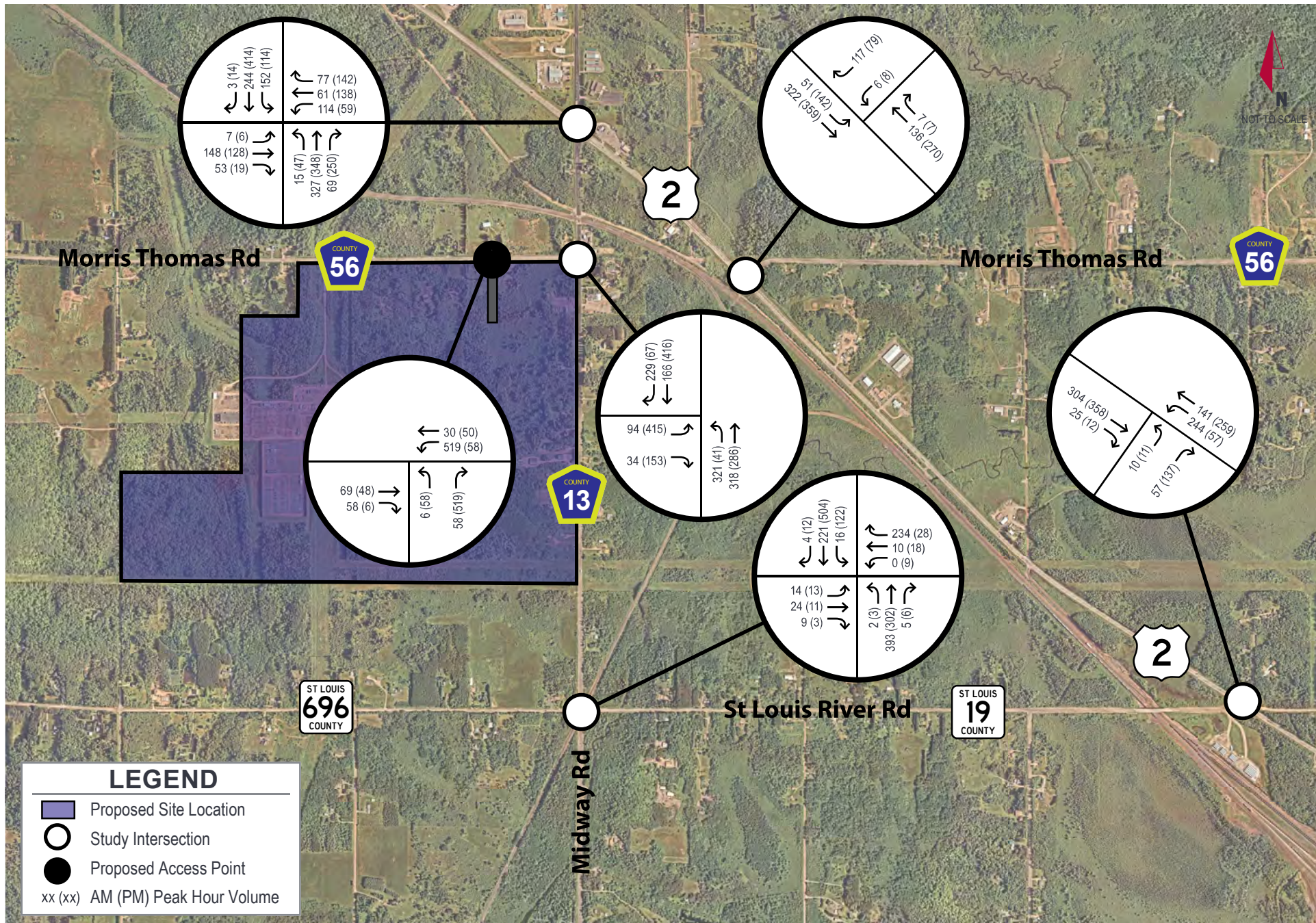


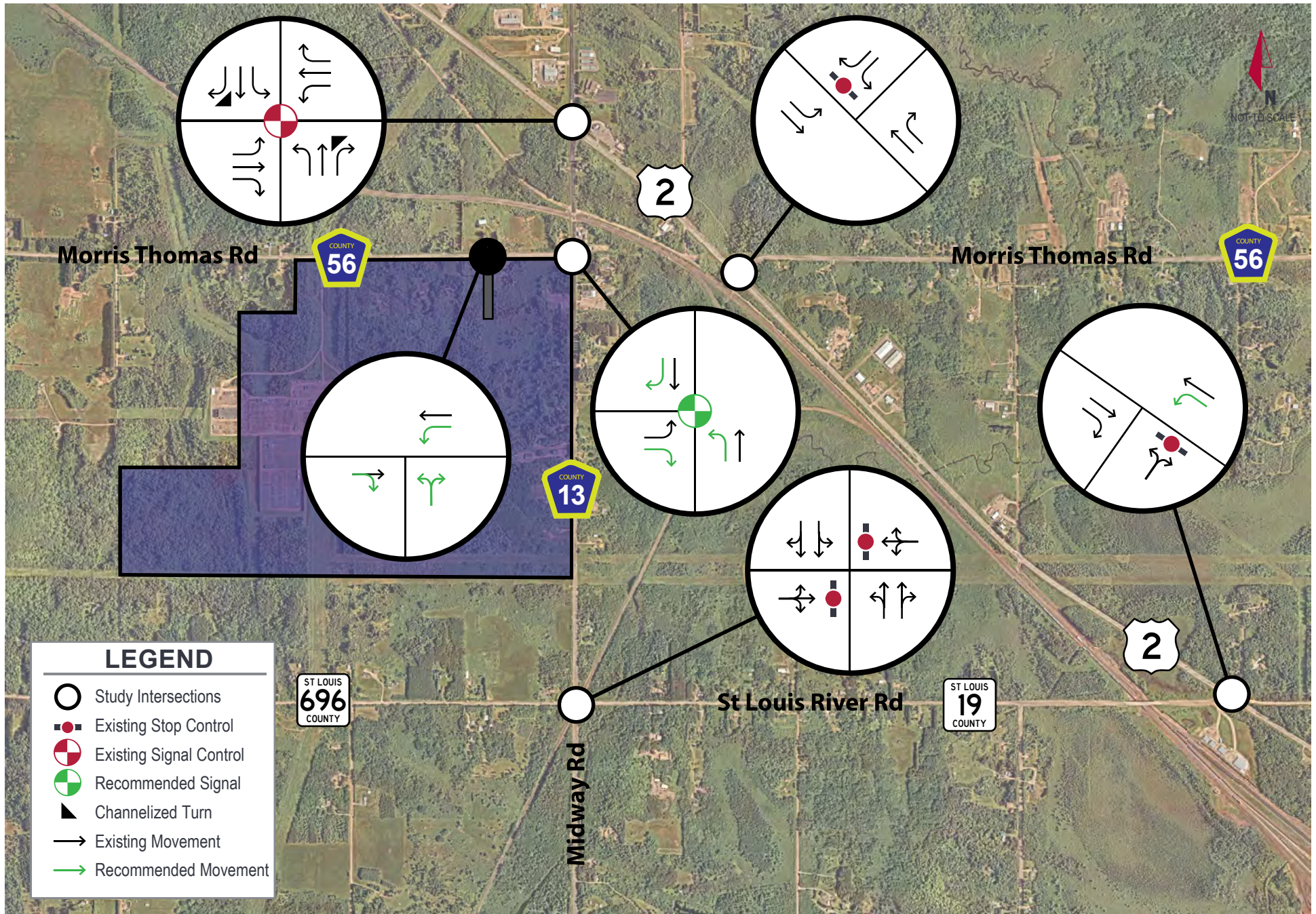












ATTACHMENT B: SIM TRAFFIC REPORTS

SimTraffic Performance Report
Construction Conditions (2027) - AM Peak Hour

07/29/2025

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.1	0.4	0.0	0.4	0.1	0.0	0.0	3.5	0.7	3.4
Total Del/Veh (s)	26.1	25.4	6.1	57.4	15.2	10.6	19.2	27.4	7.4	19.9	15.8	4.2

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	26.0

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	82.1	11.5	76.8	19.6	19.5	8.2	5.4	19.8

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.6	10.8	2.3	4.3	3.7	0.3	0.6	0.0	2.7	0.7	0.0	1.7

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.4	3.6	0.6
Total Del/Veh (s)	5.7	6.0	3.5	2.6	6.3	3.0	4.6

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.1	2.9	1.7	9.6	2.8	1.7

6: Construction Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.2	0.1	0.6	0.0	0.1	0.1	0.5
Total Del/Veh (s)	11.2	3.1	39.8	31.8	8.9	2.5	30.8

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.1
Total Del/Veh (s)	50.9

Queuing and Blocking Report
Construction Conditions (2027) - AM Peak Hour

07/29/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	26	175	50	382	471	334	47	274	196	232
Average Queue (ft)	4	68	11	186	72	36	7	128	63	78
95th Queue (ft)	19	134	33	364	365	201	29	221	135	161
Link Distance (ft)	1622	1622	1622		2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				350		450	200		300	
Storage Blk Time (%)				8	0			1		0
Queuing Penalty (veh)				11	0			1		0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	352	448	56
Average Queue (ft)	108	124	10
95th Queue (ft)	309	339	38
Link Distance (ft)	985	4896	1423
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	62	62	47
Average Queue (ft)	22	36	7
95th Queue (ft)	49	57	29
Link Distance (ft)	1279	6729	289
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Construction Conditions (2027) - AM Peak Hour

07/29/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	46	24	74
Average Queue (ft)	9	4	30
95th Queue (ft)	33	19	58
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	146	52
Average Queue (ft)	39	17
95th Queue (ft)	99	38
Link Distance (ft)	134	811
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Construction Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	82	651	53
Average Queue (ft)	33	250	23
95th Queue (ft)	67	600	52
Link Distance (ft)	604	985	749
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 13

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	3.2	0.7	3.3
Total Del/Veh (s)	23.6	20.3	6.2	24.2	15.2	5.8	17.2	19.3	6.1	14.4	13.9	4.8

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	14.2

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	26.7	0.0	17.8	0.0	0.0	0.0	0.0	8.6
Total Del/Veh (s)	191.8	89.5	178.9	6.1	4.3	7.0	4.2	75.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.1	12.0	1.7	9.8	7.0	2.4	2.2	0.4	0.0	2.3	2.4	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	2.1

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.2	3.7	0.4
Total Del/Veh (s)	12.9	10.4	3.6	3.4	9.7	2.8	7.8

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.2	0.0	2.3	0.6	8.5	0.7	4.0	1.6

6: Construction Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	39.4	42.6	32.7
Total Del/Veh (s)	19.7	4.1	7.0	7.0	71.6	81.6	64.3

Total Network Performance

Denied Del/Veh (s)	17.2
Total Del/Veh (s)	88.7

Queuing and Blocking Report
Construction Conditions (2027) - PM Peak Hour

07/29/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	26	133	45	100	97	65	49	165	42	114	236
Average Queue (ft)	3	54	6	35	33	12	19	96	1	44	97
95th Queue (ft)	16	111	23	75	74	39	41	156	30	85	176
Link Distance (ft)	1622	1622	1622		2530			1424			1155
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)				350		450	200		300	300	
Storage Blk Time (%)								0			0
Queuing Penalty (veh)								0			0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	998	69	4
Average Queue (ft)	764	10	0
95th Queue (ft)	1227	40	3
Link Distance (ft)	985	4896	1424
Upstream Blk Time (%)	14		
Queuing Penalty (veh)	83		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	35	48	21	105
Average Queue (ft)	15	14	1	29
95th Queue (ft)	36	33	8	74
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Construction Conditions (2027) - PM Peak Hour

07/29/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	69	36	65
Average Queue (ft)	25	6	23
95th Queue (ft)	55	25	44
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	66	70
Average Queue (ft)	14	28
95th Queue (ft)	45	53
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Construction Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	93	77	898
Average Queue (ft)	24	31	389
95th Queue (ft)	65	63	974
Link Distance (ft)	604	985	849
Upstream Blk Time (%)			27
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 83

SimTraffic Performance Report
Construction Conditions (2027) Rerouted - AM Peak Hour

11/04/2025

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.7	0.4	2.6	0.6	0.0	0.5	0.1	0.0	0.1	3.5	0.6	3.3
Total Del/Veh (s)	26.6	22.6	5.0	29.2	19.7	8.1	20.0	23.7	5.9	17.7	14.5	4.2

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	19.1

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	26.1	3.4	12.3	8.0	10.7	7.6	10.7

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.8	12.3	1.9	2.8	6.6	0.6	1.0	0.1	6.2	1.1	0.0	2.9

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	3.5	0.6
Total Del/Veh (s)	7.9	6.4	2.3	1.1	6.9	2.8	4.9

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	1.5	0.1	4.7	1.2	11.2	3.7	2.7

6: Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.1	0.1	0.1
Total Del/Veh (s)	1.8	0.2	5.5	4.0	14.8	3.3	4.6

Total Network Performance

Denied Del/Veh (s)	1.1
Total Del/Veh (s)	29.2

Queuing and Blocking Report
Construction Conditions (2027) Rerouted - AM Peak Hour

11/04/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	156	166	44	194	129	94	40	234	174	164
Average Queue (ft)	58	60	8	73	33	16	8	116	57	74
95th Queue (ft)	118	119	26	148	92	50	28	195	116	135
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	300		300	350		450	200		300	
Storage Blk Time (%)								1		
Queuing Penalty (veh)								1		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	122	52	169	94	123	136
Average Queue (ft)	51	15	76	25	39	51
95th Queue (ft)	103	39	135	67	90	103
Link Distance (ft)		969		4884	1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	300		300		300	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	LT	TR	LT	TR
Maximum Queue (ft)	56	102	5	6	96	9
Average Queue (ft)	24	49	0	0	5	0
95th Queue (ft)	50	81	4	5	47	6
Link Distance (ft)	1278	6729	299	299	288	288
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Queuing and Blocking Report
Construction Conditions (2027) Rerouted - AM Peak Hour

11/04/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	43	23	78
Average Queue (ft)	7	4	31
95th Queue (ft)	29	18	59
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	EB	EB	WB	NB
Directions Served	T	R	L	LR
Maximum Queue (ft)	4	15	134	81
Average Queue (ft)	0	1	55	21
95th Queue (ft)	0	8	107	52
Link Distance (ft)	568			806
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300	300	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	22	106	82
Average Queue (ft)	1	44	33
95th Queue (ft)	8	88	62
Link Distance (ft)	1188	902	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		150	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Network Summary

Network wide Queuing Penalty: 1

SimTraffic Performance Report
Construction Conditions (2027) Rerouted - PM Peak Hour

11/04/2025

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.4	0.2	2.8	0.0	0.0	0.0	0.1	0.0	0.1	3.4	0.7	3.4
Total Del/Veh (s)	30.5	20.2	6.2	24.8	15.8	7.3	18.4	19.9	8.1	14.9	13.9	5.0

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	14.7

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total Del/Veh (s)	13.8	1.2	5.5	14.6	10.9	18.2	7.4	13.2

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	9.3	15.1	1.9	9.9	6.7	3.2	2.1	0.4	0.0	2.2	2.0	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	2.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.1	0.4	3.5	0.4
Total Del/Veh (s)	13.6	12.3	3.7	2.4	12.0	2.8	9.0

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.3	0.0	2.1	0.3	9.5	0.1	4.0	1.4

6: Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.6	0.5	0.4
Total Del/Veh (s)	3.1	0.1	1.4	1.6	13.6	10.7	9.0

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	34.1

Queuing and Blocking Report
Construction Conditions (2027) Rerouted - PM Peak Hour

11/04/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	26	128	39	76	120	90	97	204	168	102	243
Average Queue (ft)	3	52	5	29	33	22	20	104	7	43	97
95th Queue (ft)	16	104	20	62	81	61	60	173	68	79	184
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	300		300	350		450	200		300	300	
Storage Blk Time (%)	0										
Queuing Penalty (veh)	2										

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	214	91	60	150	247	57
Average Queue (ft)	115	35	23	60	103	22
95th Queue (ft)	178	69	52	117	197	47
Link Distance (ft)	980		4884		1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	300	300		300		
Storage Blk Time (%)	0					0
Queuing Penalty (veh)	0					0

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	43	44	20	91
Average Queue (ft)	16	18	1	19
95th Queue (ft)	39	34	10	60
Link Distance (ft)	1278	6727	299	288
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Construction Conditions (2027) Rerouted - PM Peak Hour

11/04/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	74	33	60
Average Queue (ft)	24	6	24
95th Queue (ft)	56	24	44
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	38	67
Average Queue (ft)	14	22
95th Queue (ft)	36	47
Link Distance (ft)	805	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	4	40	312
Average Queue (ft)	0	4	112
95th Queue (ft)	3	21	238
Link Distance (ft)	1181	980	693
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 2

Queuing and Blocking Report

10 Minute Crossing - Existing (2025) - AM Peak

11/03/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	
Directions Served	L	T	R	L	T	R	L	T	R	L	T	
Maximum Queue (ft)	26	162	26	59	66	76	84	975	280	116	164	
Average Queue (ft)	4	40	4	11	17	18	5	132	15	48	39	
95th Queue (ft)	16	97	14	36	50	53	22	533	132	93	103	
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								1				
Queuing Penalty (veh)								3				
Storage Bay Dist (ft)	325	325		700	450		200	300		300		
Storage Blk Time (%)								5				
Queuing Penalty (veh)								3				

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	NB
Directions Served	LR	L	T
Maximum Queue (ft)	298	131	1346
Average Queue (ft)	76	7	239
95th Queue (ft)	228	78	940
Link Distance (ft)	2892		2801
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		250	
Storage Blk Time (%)			19
Queuing Penalty (veh)			1

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	398	941
Average Queue (ft)	160	221
95th Queue (ft)	459	736
Link Distance (ft)	392	966
Upstream Blk Time (%)	25	2
Queuing Penalty (veh)	101	5
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 113

Queuing and Blocking Report

10 Minute Crossing - Existing (2025) - PM Peak

11/03/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	30	138	75	167	142	202	212	892	350	350	1808	140
Average Queue (ft)	3	44	12	41	45	31	13	120	20	87	423	5
95th Queue (ft)	16	105	48	116	103	100	74	485	154	287	1330	74
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								0				
Queuing Penalty (veh)								1				
Storage Bay Dist (ft)	325	325		700	450		200	300		300	300	
Storage Blk Time (%)								5		0	20	
Queuing Penalty (veh)								3		2	28	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	NB
Directions Served	LR	L	T
Maximum Queue (ft)	277	25	1078
Average Queue (ft)	65	1	199
95th Queue (ft)	202	11	765
Link Distance (ft)	2892	2801	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		250	
Storage Blk Time (%)		17	
Queuing Penalty (veh)		1	

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	398	984
Average Queue (ft)	155	334
95th Queue (ft)	454	1050
Link Distance (ft)	392	966
Upstream Blk Time (%)	24	20
Queuing Penalty (veh)	84	101
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 220

SimTraffic Performance Report
10 Minute Crossing - 2027 Construction AM Peak (Signalized)

10/10/2025

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	1.9	0.3	2.2	2.6	0.7	2.8	0.0	0.0	0.2	2.0	0.5	1.9
Total Del/Veh (s)	38.2	37.8	62.3	148.4	34.4	16.7	49.1	57.7	28.5	85.2	91.8	29.0

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	1.1
Total Del/Veh (s)	74.8

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	2.1	0.2	2.0	0.6	0.0	0.0	0.7
Total Del/Veh (s)	106.5	4.2	115.6	126.7	15.3	13.5	70.4

4: Midway Rd & Railroad Crossing Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	1.7	0.2	0.9
Total Del/Veh (s)	54.9	96.6	78.1

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.9
Total Del/Veh (s)	158.1

Queuing and Blocking Report

10 Minute Crossing - 2027 Construction AM Peak (Signalized)

10/10/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	34	173	167	720	936	79	209	983	350	350	1286	70
Average Queue (ft)	5	70	33	279	121	13	12	219	26	133	298	5
95th Queue (ft)	22	145	110	686	606	44	82	724	177	339	947	73
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								2				
Queuing Penalty (veh)								8				
Storage Bay Dist (ft)	325	325		700	450		200	300		300	300	
Storage Blk Time (%)				8	0				12	5		16
Queuing Penalty (veh)				13	0				10	13		27

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	292	238	300	2129	404	300
Average Queue (ft)	87	32	102	561	79	70
95th Queue (ft)	230	159	287	1736	281	224
Link Distance (ft)	2892		2789		392	
Upstream Blk Time (%)				0	1	
Queuing Penalty (veh)				0	6	
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)	6	10		22	0	3
Queuing Penalty (veh)	3	31		50	1	6

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	398	988
Average Queue (ft)	172	376
95th Queue (ft)	473	1082
Link Distance (ft)	392	966
Upstream Blk Time (%)	26	20
Queuing Penalty (veh)	114	118
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 400

SimTraffic Performance Report
10 Minute Crossing - 2027 Construction PM Peak (Signalized)

10/10/2025

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.2	0.2	2.3	2.7	0.6	2.7	0.3	0.0	0.1	1.9	0.6	1.9
Total Del/Veh (s)	51.9	31.6	49.9	81.1	20.3	7.0	31.6	32.1	19.3	88.7	117.8	94.5

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	55.4

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	4.4	3.2	1.6	0.3	0.0	0.0	1.8
Total Del/Veh (s)	254.3	201.8	136.6	142.2	22.6	7.2	140.4

4: Midway Rd & Railroad Crossing Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	3.3	1.1	2.4
Total Del/Veh (s)	38.8	107.4	68.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	3.3
Total Del/Veh (s)	187.8

Queuing and Blocking Report
10 Minute Crossing - 2027 Construction PM Peak (Signalized)

10/10/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	31	150	62	227	182	107	233	973	350	349	2175	210
Average Queue (ft)	5	55	11	64	46	28	28	153	48	80	538	5
95th Queue (ft)	20	116	40	170	118	71	109	542	236	256	1652	73
Link Distance (ft)		3164			2724			966			2950	
Upstream Blk Time (%)								0			0	
Queuing Penalty (veh)								3			0	
Storage Bay Dist (ft)	325		325	700		450	200		300	300		300
Storage Blk Time (%)								5	2	0	24	
Queuing Penalty (veh)								16	7	0	34	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	300	2684	299	1517	411	300
Average Queue (ft)	219	1027	34	415	126	49
95th Queue (ft)	379	2686	149	1196	370	205
Link Distance (ft)		2892		2789	392	
Upstream Blk Time (%)		3			4	
Queuing Penalty (veh)		0			21	
Storage Bay Dist (ft)	250		250			250
Storage Blk Time (%)	44	1		30	7	0
Queuing Penalty (veh)	97	2		9	6	0

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	403	991
Average Queue (ft)	177	435
95th Queue (ft)	485	1130
Link Distance (ft)	392	966
Upstream Blk Time (%)	30	20
Queuing Penalty (veh)	206	112
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 512

Queuing and Blocking Report

10 Minute Crossing - 2027 Mitigated Construction AM Peak

11/03/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	26	183	157	420	247	148	130	954	280	350	1180	70
Average Queue (ft)	5	58	28	100	39	17	10	171	25	116	261	2
95th Queue (ft)	20	126	96	277	173	91	63	579	174	311	826	51
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								0				
Queuing Penalty (veh)								2				
Storage Bay Dist (ft)	325	325		700	450		200	300		300	300	
Storage Blk Time (%)					0		9		0	4	14	
Queuing Penalty (veh)					1		8		0	11	24	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	284	311	300	2627	406	300
Average Queue (ft)	93	38	125	767	61	65
95th Queue (ft)	233	183	315	2358	228	207
Link Distance (ft)	2892		2789		392	
Upstream Blk Time (%)				5	1	
Queuing Penalty (veh)				0	3	
Storage Bay Dist (ft)	250			250		
Storage Blk Time (%)	5			11	23	1
Queuing Penalty (veh)	2			34	83	2

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	401	991
Average Queue (ft)	158	354
95th Queue (ft)	462	1050
Link Distance (ft)	392	966
Upstream Blk Time (%)	26	18
Queuing Penalty (veh)	115	81
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 369

Queuing and Blocking Report

10 Minute Crossing - 2027 Mitigated Construction PM Peak

11/03/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	32	163	57	209	187	126	213	964	350	350	2169	70
Average Queue (ft)	4	55	9	55	47	28	31	165	42	85	517	2
95th Queue (ft)	18	121	35	149	126	78	126	587	223	267	1623	51
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								0				
Queuing Penalty (veh)								3				
Storage Bay Dist (ft)	325	325		700	450		200	300		300	300	
Storage Blk Time (%)							0	5	1	0	22	
Queuing Penalty (veh)							0	17	4	0	32	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	300	2684	299	1477	412	300
Average Queue (ft)	224	1100	46	412	128	47
95th Queue (ft)	378	2828	174	1200	367	194
Link Distance (ft)	2892		2789		392	
Upstream Blk Time (%)	4				5	
Queuing Penalty (veh)	0				27	
Storage Bay Dist (ft)	250			250	250	
Storage Blk Time (%)	45	1	0	28	8	
Queuing Penalty (veh)	98	3	0	13	6	

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	397	992
Average Queue (ft)	178	437
95th Queue (ft)	487	1127
Link Distance (ft)	392	966
Upstream Blk Time (%)	30	19
Queuing Penalty (veh)	207	106
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 514