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Cottleville Trails Traffic Study

Cottleville, Missouri

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EXECUTIVE SUMMARY

The City of Cottleville commissioned Lochmueller Group to perform a traffic study of "Old Town" Cottleville and immediate surrounding areas with the purpose of recommending solutions to resolve existing issues, including consideration of traffic calming measures and a potential westward extension of Cottleville Trails Drive to Route N.

Old Town Cottleville, which is largely accessible along Route N between St. Charles Street and Motherhead Road, experiences a high level of pedestrian activity in addition to significant vehicular traffic. As such, concern has been raised regarding traffic and pedestrian safety. As part of this study, Lochmueller evaluated traffic and safety along the major roadways within Central Cottleville, including St. Charles Street within the Cottleville Trails subdivision.

The potential extension of Cottleville Trails Drive would serve as a western by-pass of central Cottleville and aim to relieve traffic on Route N/Motherhead Road in the Old Town area. This study evaluated traffic conditions under a range of scenarios including with and without an extension of Cottleville Trails Drive.

The following scenarios were evaluated:

- Year 2025 Baseline
- Year 2027 Baseline (2025 Baseline + full build of residential development + 2 years background growth)
- Year 2027 Forecasted (2027 Baseline + Cottleville Trails extension)
- Year 2047 Baseline (2027 Baseline + 20 years background growth)
- Year 2047 Forecasted (2047 Baseline + Cottleville Trails extension)

Based on input from the City of Cottleville, the following intersections are included in the study:

1. Route N & Dardenne Farms Dr (unsignalized)
2. Route N & Winterbrooke Ct (unsignalized)
3. Route N & Weiss Rd (signalized)
4. Route N & St. Charles St (unsignalized)
5. Route N & Motherhead Rd (signalized)
6. Gutermuth Rd & Cottleville Trails Dr (roundabout)

The following two peak hours were agreed upon to be part of the analysis:

- Weekday morning (7:00 AM to 8:00 AM)
- Weekday evening (4:30 PM to 5:30 PM)

EXISTING AND BASELINE CONDITIONS

2025 EXISTING CONDITIONS

- The study intersections generally operate acceptably under 2025 baseline conditions. However, Route N & Motherhead Road experiences peak hour congestion and motorists on eastbound St.

Charles Street experience delays trying to turn onto Route N due to conflicts imposed by vehicles, pedestrians, and even golf carts. Other study intersections generally operate at favorable levels of service.

- Overall, Route N experiences high pedestrian volumes and frequent golf cart usage, especially in Old Town. On-street parking maneuvers contribute to traffic disruptions and visibility issues, increasing the risk of rear-end and angle crashes.
- Route N between Motherhead Road and Weiss Road had the highest crash frequency in the study area, experiencing 26 crashes over a five-year period from 2019 to 2023. Although none involved pedestrians or cyclists, this corridor's crash rate was higher than statewide averages for comparable roadways.
- The majority of crashes along Route N were rear-end and angle crashes. Despite no fatalities and only a few minor injuries across the study area, the concentration of crashes within Old Town reinforces the need for operational and safety improvements, particularly given the high pedestrian levels.

2027 AND 2047 BASELINE CONDITIONS

- An annual background growth rate of 0.5% for the overall study area was used to forecast future traffic volumes based on the St. Charles TDM (as agreed to by the City of Cottleville). In addition, known residential developments were included. The additional residential development in Cottleville Trails would generate approximately 260 and 345 additional trips during the weekday AM and PM peak hours, respectively.
- By 2027, the study area would experience slightly worse delays and queue lengths as compared to the 2025 Baseline. Notably the eastbound movements at Route N & St. Charles Street would further degrade and Route N & Motherhead Road would be expected to experience a longer southbound queue in the AM peak period, largely due to the presence of St. Joseph Catholic School. The other study intersections would continue to operate favorably in 2027.
- By 2047, the overall study area would experience additional traffic delays and queue lengths. For example, the eastbound movements at Route N & St. Charles Street would be severely delayed trying to turn on Route N. Furthermore, the intersection Route N & Motherhead Road would experience longer delays as well as long queues. However, the other study intersections would continue to operate favorably with ample capacity.
- While most of the study intersections would operate favorably in the future, the intersections along Route N within the Old Town area would experience an increase in congestion and vehicle-pedestrian conflicts, which could result in more crashes. As such, improvement recommendations were developed aimed to address these conditions in order to create a better experience for motorists and pedestrians within Old Town.

RECOMMENDED IMPROVEMENTS

To improve traffic operations and safety, the following improvements are recommended:

- Cottleville Trails extension:
  - Connect Gutermuth Road to Route N to help distribute traffic and reduce congestion in Old Town Cottleville.
  - Provide one lane in each direction and a landscaped median to create a "parkway" with left-turn lanes at intersections.
- Dardenne Creek Bridge:
  - Construct a bridge with a single-lane in each direction for the Cottleville Trails Extension. This bridge should meet all applicable AASHTO guidelines.
- Route N & Dardenne Farms Drive:
  - As part of the Cottleville Trails extension, construct a roundabout with one shared thru/left-turn lane and a separate right-turn lane for the northbound (Cottleville Trails extension) and eastbound (Route N) approaches and a single lane for all other approaches.
- Gutermuth Road & Cottleville Trails Drive
  - The existing roundabout at Gutermuth Road & Cottleville Trails Drive should be restriped to eliminate the underutilized inside lane, which currently serves only northbound-to-southbound U-turn movements and does not contribute to efficient traffic flow.
- Signal Timing Improvements:
  - Signal timing improvements and a progression analysis along the Route N corridor are recommended to help improve traffic operations within the study area, particularly after the Cottleville Trails extension is in place and traffic volumes adjust.
- Traffic Calming Improvements
  - The implementation of speed cushions should be considered along St. Charles Street to help reduce vehicle speeds.
  - Should safety concerns persist within the Old Town area after the Cottleville Trails extension is in place, high-intensity activated crosswalk (HAWK) signals could be implemented at high-volume crossing locations such as at Route N & St. Charles Street.
  - Tabled intersections are recommended for consideration at Route N & St. Charles Street as well as Route N & Oak Street to slow vehicular speeds and enhance the Old Town experience.

- Improved pedestrian crosswalks, such as high-visibility and/or raised crossings, are recommended throughout the Old Town area, particularly at Route N & Motherhead Road, St. Charles Street & Main Street, and Oak Street & Main Street. Note that this would be in lieu of tabled intersections, as raised crosswalks would be redundant with tabling the entire intersection.
- A single-lane roundabout should be considered on Route N just north of Old Town to serve as a gateway into the area and a reminder for traffic to slow down.
- A multi-use path along Route N connecting Old Town to the Dardenne Greenway on the east side of Route N north of the Dardenne Creek should be considered to segregate vehicular traffic from pedestrians, bicycles, and golf carts.

2027 AND 2047 FORECASTED CONDITIONS

With the preceding recommendations, including the proposed Cottleville Trails extension, in place, the following forecasted conditions would be anticipated for the 2027 and 2047 future years:

- The Cottleville Trails Extension is expected to reduce the amount of traffic using Route N in Old Town Cottleville by approximately 50%. This reduction in traffic would provide significant relief to the intersections along Route N between Weiss Road and Motherhead Road.
- All study intersections would be expected to operate favorably overall and achieve the study's level of service target for both the 2027 and 2047 design year scenarios.

In conclusion, the extension of Cottleville Trails in combination with a suite of traffic calming treatments on St. Charles Street and on Route N in Old Town are expected to achieve the goals of this study, which include addressing traffic congestion and multimodal conflicts in the study area, particularly centered on Old Town. With the recommendations in place, traffic volumes would be significantly reduced on Route N in Old Town and the supporting calming treatments would reinforce appropriate traffic speeds while promoting safety in the Old Town area. The following report presents, in detail, the methodology and resulting analysis that support these conclusions.

INTRODUCTION

The City of Cottleville commissioned Lochmueller Group to perform a traffic study of "Old Town" Cottleville and immediate surrounding areas with the purpose of recommending solutions to resolve existing issues, including consideration of traffic calming measures and a potential westward extension of Cottleville Trails Drive to Route N. It is our understanding that Old Town Cottleville, which is largely accessible along Route N between St. Charles Street and Motherhead Road, experiences a high level of pedestrian activity in addition to significant vehicular traffic. As such, concern has been raised regarding traffic and pedestrian safety.

Figure 1 shows the study area that was evaluated. The potential extension of Cottleville Trails Drive would serve as a western by-pass of central Cottleville and aim to relieve traffic on Route N/Motherhead Road in the Old Town area. As part of this study, Lochmueller evaluated traffic and safety along the major roadways within Central Cottleville, including St. Charles Street within the Cottleville Trails subdivision.

Figure 1. Cottleville Study Area

This study evaluated potential solutions under a range of scenarios including with and without a potential extension of Cottleville Trails Drive. As discussed in the scoping meeting on January 2, 2025, the following scenarios were evaluated:

- Year 2025 Baseline
- Year 2027 Baseline (2025 Baseline + full build of residential development + 2 years background growth)
- Year 2027 Forecasted (2027 Baseline + Cottleville Trails Dr extension)
- Year 2047 Baseline (2027 Baseline + 20 years background growth)
- Year 2047 Forecasted (2047 Baseline + Cottleville Trails Dr extension)

EXISTING CONDITIONS

To identify the traffic impacts associated with potential improvements, it was first necessary to quantify roadway, traffic, and operating conditions as they currently exist.

EXISTING ROADWAY NETWORK

The study area consists of several roadways each serving a range of purposes and functions. Route N is a minor arterial which is the busiest roadway in the study area, as it provides critical connections to Mid Rivers Mall Drive, Highway K, and Route 364. Weiss Road is a minor arterial providing access to residential areas to the north. Weiss Road connects Route N to Cottleville Parkway. Gutermuth Road connects to Motherhead Road south of Old Town and also provides a connection to Route 364.

The other study roadways, including Cottleville Trails Drive, St. Charles Street, Winterbrooke Court, and Dardenne Farms Drive mostly serve local residential traffic. As such, these roadways are smaller and have a lower posted speed limit than Route N or Gutermuth Road. In addition, these roadways accommodate significant pedestrian and golf cart traffic given their residential nature and the proximity of the residences to Old Town Cottleville.

Overall, the study roadways largely serve the Cottleville community and provide necessary connections to the regional network. A detailed inventory of the existing roadway network is provided in **Appendix A – Existing Roadway Network.** The existing lane configuration and traffic control is shown in **Figure 2.**

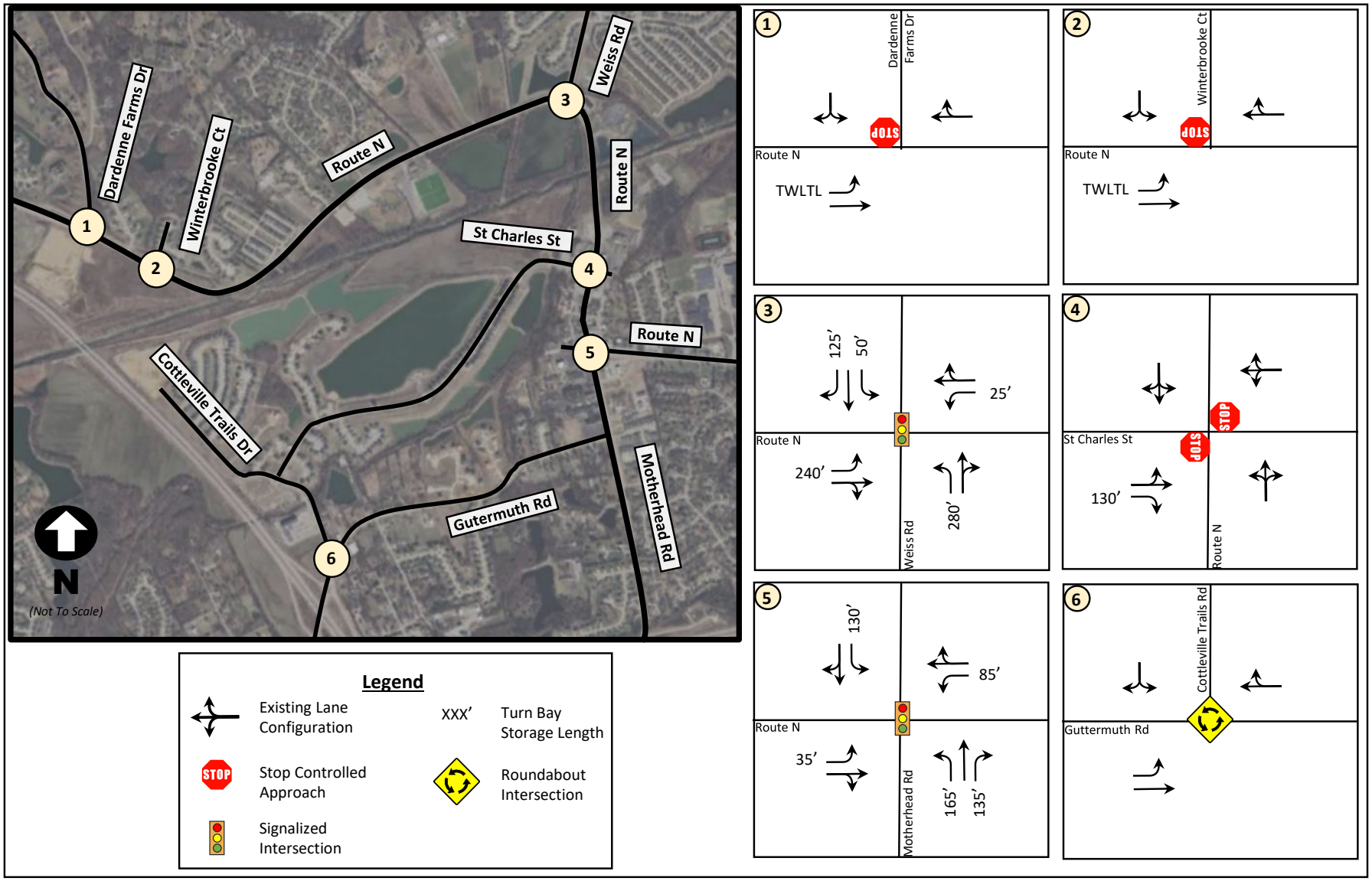


Figure 2. Existing Lane Configuration and Traffic Control

EXISTING TRAFFIC VOLUMES

Traffic counts were collected in April 2025 while school was in session and weather conditions were favorable. Based upon review of the data, it was determined that the peak hours of traffic flow along the study area roadways were from 7:00 AM to 8:00 AM for the weekday AM commuter peak hour and from 4:30 PM to 5:30 PM for the weekday PM commuter peak hour. It should be noted that the weekday AM commuter peak hour does coincide with the school arrival for Francis Howell Central High School, Saeger Middle School, and St. Joseph Catholic School.

The school dismissal peak period was investigated as well, and it was determined that the PM commuter peak hour is busier and serves as an adequate representation of peak conditions during the afternoon. Therefore, a school dismissal peak hour analysis was deemed unnecessary, and the analysis of this study was based on the AM and PM commuter peak hours. Based on input from the City of Cottleville, the following intersections were included in the study:

1. Route N & Dardenne Farms Dr (unsignalized)
2. Route N & Winterbrooke Ct (unsignalized)
3. Route N & Weiss Rd (signalized)
4. Route N & St. Charles St (unsignalized)
5. Route N & Motherhead Rd (signalized)
6. Gutermuth Rd & Cottleville Trails Dr (roundabout)

In Old Town Cottleville, Route N serves as a critical corridor with substantial traffic volumes and pedestrian activity. The 2025 baseline Average Daily Traffic (ADT) on Route N is approximately 10,000 vehicles per day. Directional patterns show heavier southbound congestion in the morning due to St. Joseph Catholic School drop-offs, while the northbound movements face delays in the afternoon, particularly at St. Charles Street.

Pedestrian counts were collected, however the pedestrian volumes have differing peak periods when compared to the vehicular peak periods. As such, supplemental observations were collected on a weekday evening to further evaluate the pedestrian and golf cart activity within Old Town. It was found that pedestrian volumes are notably high in the Old Town stretch, where marked crossings, golf cart usage, and on-street parking contribute to traffic flow interruptions, visibility issues, and crash risks. Speed limits on Route N vary from 20 to 30 mph through Old Town, with field observations confirming that congestion typically limit actual speeds during peak periods.

Due to construction, Gutermuth Road between Old Gutermuth Road & Motherhead Road was closed in the westbound direction at the time the traffic counts were collected. Further detail on the detour and its impact on the existing traffic volumes is provided in **Appendix B – Existing Traffic Volumes**. Adjustments were made to the traffic count volumes to account for the Gutermuth Road closure and approximate conditions when the roadway is fully opened to traffic. These adjustments are reflected in the 2025 Baseline Traffic Volumes shown in **Figure 3.**

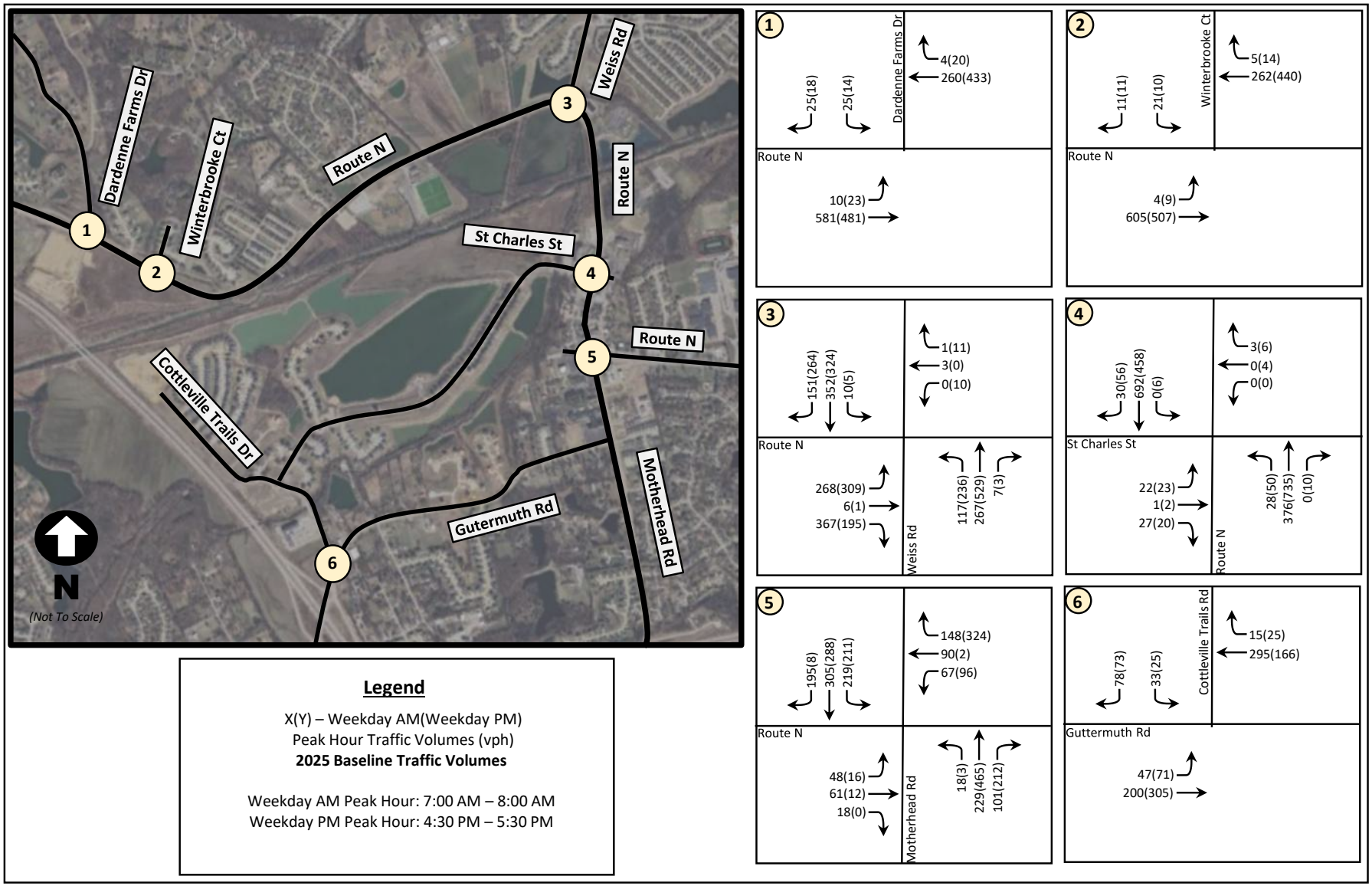


Figure 3. 2025 Baseline Traffic Volumes

ANALYSIS METHODOLOGY

TRAFFIC OPERATIONS

Traffic operating conditions at the study intersections were evaluated based upon the traffic volumes presented in **Figure 3** (which reflect Gutermuth Road opened to traffic). The analysis was completed using Synchro 11 traffic modeling software, which is based upon the methodologies outlined in the "Highway Capacity Manual" (HCM) published by the Transportation Research Board. Roundabout intersections were evaluated using Sidra, which is a traffic capacity analysis tool commonly used for roundabouts.

The perception of acceptable traffic service varies by area. More delay is usually tolerated in urban and suburban areas as compared to rural areas. Based on the character of this area, LOS D or better would be an appropriate definition of acceptable overall peak period traffic conditions at intersections. LOS E or better would be an acceptable benchmark for individual intersection approaches and movements. The measures of effectiveness were reported based on the Synchro methodology for signalized intersections and based on the HCM methodology for unsignalized intersections. Further detail on the analysis methodology is provided in **Appendix C – Analysis Methodology**.

EXISTING CONDITIONS SUMMARY

Field observations along Route N, particularly at the intersections of Route N & Motherhead Road as well as Route N & St. Charles Street, revealed critical insight into how traffic patterns impact pedestrian activity and overall mobility in the Old Town area. The Old Town stretch of Route N, which is between St. Charles Street and Route N/Motherhead Road, has the highest level of pedestrian activity within the study area, as denoted by several marked pedestrian crossings. In addition to pedestrians, golf carts pose a significant impediment to traffic.

Operationally, this segment of Route N experiences the most congestion within the study area, although it is mostly localized to the Old Town grid area north of Motherhead Road. Specifically, the unsignalized intersection at Route N & St. Charles Street shows significant delay for eastbound traffic, highlighting its vulnerability during high-volume periods and the complications imposed by pedestrian conflicts and golf carts. Route N & Motherhead Road suffers from long queues and brief periods of congestion during peak periods, but it operates acceptably at LOS D overall in the morning peak hour and LOS B overall in the afternoon peak hour.

The other study area intersections operate favorably with minimal congestion. The Gutermuth Road & Cottleville Trails roundabout operates at LOS A, reflecting surplus capacity. Similarly, the unsignalized intersections along Route N north of Dardenne Creek operate at LOS B or better for every intersection approach. Traffic operating conditions at the study intersections are summarized in more detail in **Appendix D – Existing Conditions Analysis**.

Regarding safety, Route N between Motherhead Road and Weiss Road had the highest crash frequency in the study area, experiencing 26 crashes over a five-year period from 2019 to 2023. Although none

involved pedestrians or cyclists, this corridor's crash rate of 245 per 100,000 vehicles was approximately 4% higher than the statewide average for roads similarly classified as minor arterials.

Examining the crash history, the majority of crashes were either rear-end or angle crashes. Despite no fatalities and only a few minor injuries across the study area, the concentration of crashes along Route N in Old Town reinforces the need for operational and safety improvements, particularly given the high pedestrian volumes and golf cart activity.

On-street parking is available on Route N primarily between Chestnut Street and St. Charles Street. The impact of parking maneuvers on traffic and safety was noted. Additionally, the presence of parked cars does reduce visibility for both drivers and pedestrians, increasing the risk of collisions. However, on-street parking does provide natural friction for through traffic, helping to slow speeds and reinforce the pedestrian-oriented nature of the Old Town area.

Speed limits throughout the area vary appropriately by classification, with Route N posted at 40 mph west of Weiss Road and dropping to 20–30 mph through Old Town. Field observations indicate that congestion during the peak periods largely prevents vehicles from reaching high speeds in this segment. Gutermuth Road and Motherhead Road, as significant collector roads, have speed limits set at 35 mph. In contrast, Cottleville Trails Drive and St. Charles Street, classified as local roads, maintain a lower speed limit of 25 mph, which is appropriate given the residential land use context.

In summary, Route N through Old Town experiences a combination of busy traffic, pedestrians, and golf cart interactions, which results in some congestion, concerning conflicts, and a considerable amount of crashes (although most were minor in severity). Conditions in other portions of the study area were generally favorable. Therefore, the focus of the remainder of this study is on the potential for improvements to positively impact Route N in the Old Town area.

FUTURE CONDITIONS

An analysis of anticipated conditions in the future absent any recommended improvements was performed to quantify the impact of planned growth.

The City of Cottleville has approved the development of 355 single-family homes and 406 multi-family residential units within the study area, known as Cottleville Trails. At the time the counts were collected, 200 single-family homes were built and occupied. Therefore, traffic that would be generated by the remaining 155 single-family homes and 406 multi-family units was forecasted for inclusion in the study. These additional trips are summarized in **Appendix E – Trip Generation Methodology.** The proposed directional distribution percentages for the residential site-generated trips are presented in **Appendix F – Directional Distribution Estimate**.

In addition to known residential developments, there is the potential for additional developments within or proximate to the study area that are not presently defined. As such, a background growth rate was established to further increase traffic to account for future unknown developments. The regional growth rate for the area was based upon insight gained from historical traffic data obtained from MoDOT as well as the St. Charles County Travel Demand Model (TDM). A review of the data revealed that an annual growth rate of 0.5% would be appropriate for the study area.

Using this 0.5% growth rate as well as the residential site-generated trips for unbuilt homes in the Cottleville Trails subdivision, the 2025 Baseline Traffic Volumes were projected forward to 2027 and 2047 and summarized as 2027 and 2047 Baseline Traffic Volumes, which are included in **Appendix G – Traffic Volume Graphics**. 2027 was selected as an approximate near-term year for the implementation of improvements and 2047 was selected as a 20-year planning horizon post-implementation, as is common with transportation infrastructure projects. These baseline scenarios assume that no changes would be made to the existing roadways or traffic control within the study area.

BASELINE TRAFFIC OPERATIONAL ANALYSIS

The 2027 and 2047 Baseline Operating Conditions were evaluated using the same methodology as the 2025 Baseline Conditions and are summarized in **Appendix K – Traffic Operating Conditions**. The traffic operations analysis for study intersections along Route N shows a range of performance levels across both 2027 and 2047 scenarios. Most intersections would be expected to operate efficiently, but a few locations reflect increases in congestion.

Route N & Dardenne Farms Drive and Route N & Winterbrooke Court, which would both be side-street stop-controlled intersections under the baseline conditions, would operate acceptably through the year 2047 at LOS D or better for each approach. The signalized intersection of Route N & Weiss Road is also expected to have acceptable operating conditions at an overall LOS C during both peak hours through the year 2047. However, the eastbound approach during the PM peak hour in 2047 is expected to experience longer queues. This intersection may benefit from signal timing adjustments to help ease congestion and improve flow. Similarly, the roundabout at Gutermuth Road & Cottleville Trails Drive is expected to continue operating at LOS A overall through the year 2047.

Conditions along Route N in the Old Town area are expected to worsen over time as the Cottleville Trails subdivision continues to develop. One of the more challenging intersections is Route N & St. Charles Street. The eastbound movement is expected to operate at LOS F during both peak periods in 2027 and 2047. Opportunities for motorists to turn onto Route N would be limited by infrequent gaps in conflicting traffic as well as pedestrians crossing the street. This issue could be exacerbated by additional development in Old Town and associated increases in pedestrian levels and golf cart usage.

At Route N & Motherhead Road, traffic conditions vary depending on the time of day. During the morning peak hour, the queuing and congestion noted in the discussion of 2025 baseline conditions would worsen by 2027. By 2047, traffic demands on one or more approaches are expected to exceed the intersection's capacity, resulting in LOS F operations. Furthermore, as traffic congestion and vehicle-pedestrian conflicts increase, the risk of crashes is expected to increase as well.

Overall, while most of the study intersections would be expected to operate favorably through the year 2047 with surplus capacity, the intersections along Route N within the Old Town area would experience an increase in congestion and vehicle-pedestrian conflicts, which could result in more crashes. As such, it is recommended that improvements aimed to address these conditions in order to create a better experience for motorists and pedestrians traveling Route N within Old Town be pursued.

RECOMMENDED IMPROVEMENTS

Given the conditions along Route N in Old Town discussed in the preceding sections, recommended improvements have a two-fold emphasis. One is on reducing the volume of through traffic on Route N, and the second is on localized improvements along Route N itself to calm traffic and promote safety. These improvements are discussed below.

COTTLEVILLE TRAILS EXTENSION

The need for an alternative vehicular route to help lessen through traffic on Route in Old Town is evident. Establishing a new roadway connection across Dardenne Creek to connect Gutermuth Road with Route N would help reduce traffic in the Old Town area without overburdening the other study area roadways. This could be accomplished by extending the current Cottleville Trails Drive across Dardenne Creek to Route N in the vicinity of Dardenne Farms Drive as shown in **Figure 4**.

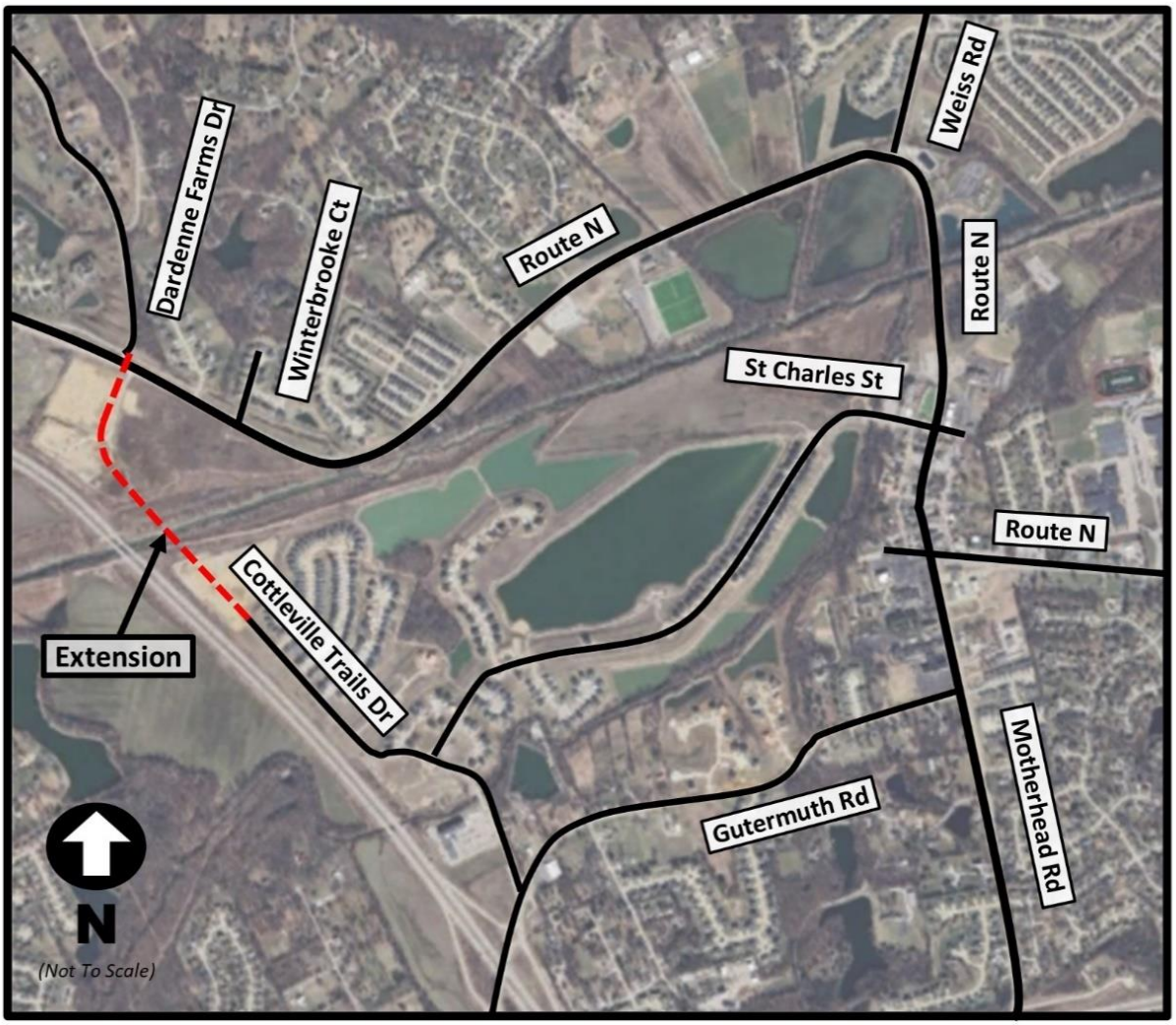


Figure 4. Cottleville Trails Extension

ANTICPATED COTTLEVILLE TRAILS EXTENSION TRAFFIC VOLUMES

To determine the impact of the Cottleville Trails Drive extension, it was first necessary to forecast traffic volume shifts due to the extension. The St. Charles County TDM provides ADT volumes of the study roadways assuming that the Cottleville Trails Drive is completed. Cottleville Trails would be expected to have an ADT of 6,087 vehicles per day (vpd). With a K factor of 0.9, a total peak hour volume of approximately 550 vehicles or 9 vehicles per minute on average would be expected. **Table 1** shows the existing ADT's compared to the forecasted ADT's for the study area roadways assuming the Cottleville Trails Drive extension is in place.

Table 1. Cottleville Trails Extension ADT Comparison

Road Segment	No Cottleville Trails Extension			Cottleville Trails Extension In Place			
	Baseline ADT (no extension)			Forecasted ADT (with extension)			
	2025	2027	2047	2025	2027	2047	2050
Route N E. of Motherhead	5,232	5,284	5,839	10,763	10,872	12,018	12,200
Route N W. of Weiss	9,782	9,880	10,916	14,998	15,149	16,746	17,000
Route N. from Cottleville Trail extension to Weiss	10,603	10,709	11,833	12,351	12,476	13,791	14,000
Cottleville Trail extension	0	0	0	6,087	6,149	6,797	6,900
Route N in Old Town (from Weiss to Motherhead)	12,200	12,322	13,615	6,176	6,238	6,896	7,000

When compared to the existing ADT's, the traffic at Route N & Motherhead Road would be expected to decrease by approximately 50% as vehicles would be able to reroute through the new extension and other nearby roads. This reduction is especially impactful during peak hours, when congestion and vehicle-pedestrian conflicts are most severe. This decrease in traffic volumes would significantly reduce the vehicle-pedestrian conflicts within the Old Town area, particularly at intersections like Route N & St. Charles Street and Route N & Motherhead Road. With fewer vehicles traversing the Old Town area, pedestrian crossings will be less exposed to turning and through movements, and the overall environment will become more conducive to walking, biking, and golf cart use.

However, traffic along Route N between Dardenne Farms Drive and Weiss Road would be expected to increase by approximately 40% as more vehicles travel around Old Town via the Cottleville Trails extension. This shift reflects the extension's role in redistributing traffic away from the congested central corridor and toward underutilized segments of Route N. Additionally, traffic calming features already in place, such as curb bump outs, narrow lanes, and stamped crosswalks, will continue to moderate speeds and enhance pedestrian safety in Old Town.

The 2027 and 2047 traffic volumes with the extension in place are provided in **Appendix G – Traffic Volume Graphics**.

RECOMMENDED LANE CONFIGURATION AND TRAFFIC CONTROL

Cottleville Trails Drive currently terminates approximately 1,000 ft south of Dardenne Creek. The existing roadway consists of a single-lane in each direction with no median. It is recommended that the extension begin at the current termination of Cottleville Trails Drive and connect north to Route N opposite Dardenne Farms Drive.

Given the forecasted ADT of 6,087 vpd, the roadway would ideally be constructed to collector standards with residential driveway access prohibited. A single traffic lane of 11 feet, exclusive of curb and gutter, should be provided in each direction with a recommended posted speed limit of 25 mph. On-street parking should be prohibited. Sidewalks should be provided on at least the east side of the roadway. In areas where both sides of the roadway are developed, sidewalks on both sides would be advisable.

Given the number and frequency of intersecting roadways, it is recommended that southbound left-turn lanes be provided to maintain the flow of traffic and avoid congestion which would disincentivize the roadway's usage. Therefore, it would be appropriate to construct the roadway to a 3-lane section. In areas where a left-turn lane is not needed, a landscaped or concrete median could fill the center lane. The friction provided by raised curbs on both sides of the single traffic lane would also provide a traffic calming effect. It is recognized that the existing Cottleville Trails Drive is currently comprised of a single lane in each direction with no center turn lane or median. However, a three-lane section is recommended once the connection to Route N is made and the traffic volumes increase.

Figure 5 and **Figure 6** show the existing and proposed configurations of the extension.

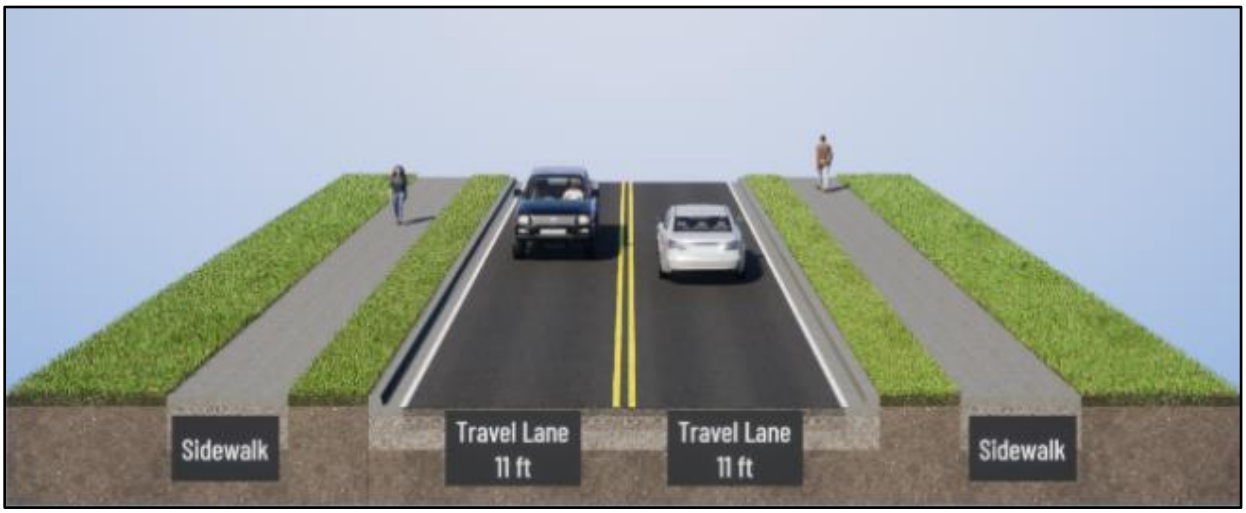


Figure 5. Existing Cottleville Trails Drive

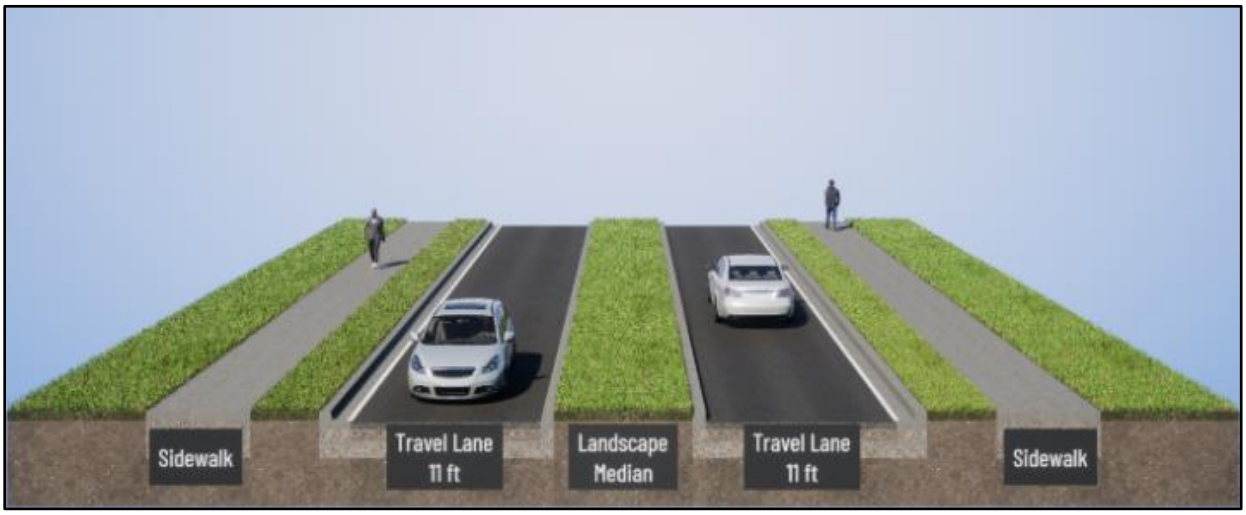


Figure 6. Proposed Cottleville Trails Drive

A bridge would be necessary across Dardenne Creek. This bridge should also be comprised of a single-lane in each direction. Further coordination would be required between the governing agencies and the Army Corps of Engineers.

A roundabout is recommended where the Cottleville Trails Drive extension would connect to Route N opposite Dardenne Farms Drive. The northbound approach of Cottleville Trails should be comprised of a shared left-turn/through lane and a right-turn lane. The southbound approach of Dardenne Farms Drive should be comprised of a single-lane. The eastbound approach of Route N should be comprised of a shared left-turn/through lane and a right-turn lane, and the westbound approach of Route N should be comprised of a single lane. Clear signage and striping should be provided for the roundabout. The recommended roundabout configuration is shown in **Figure 7**.

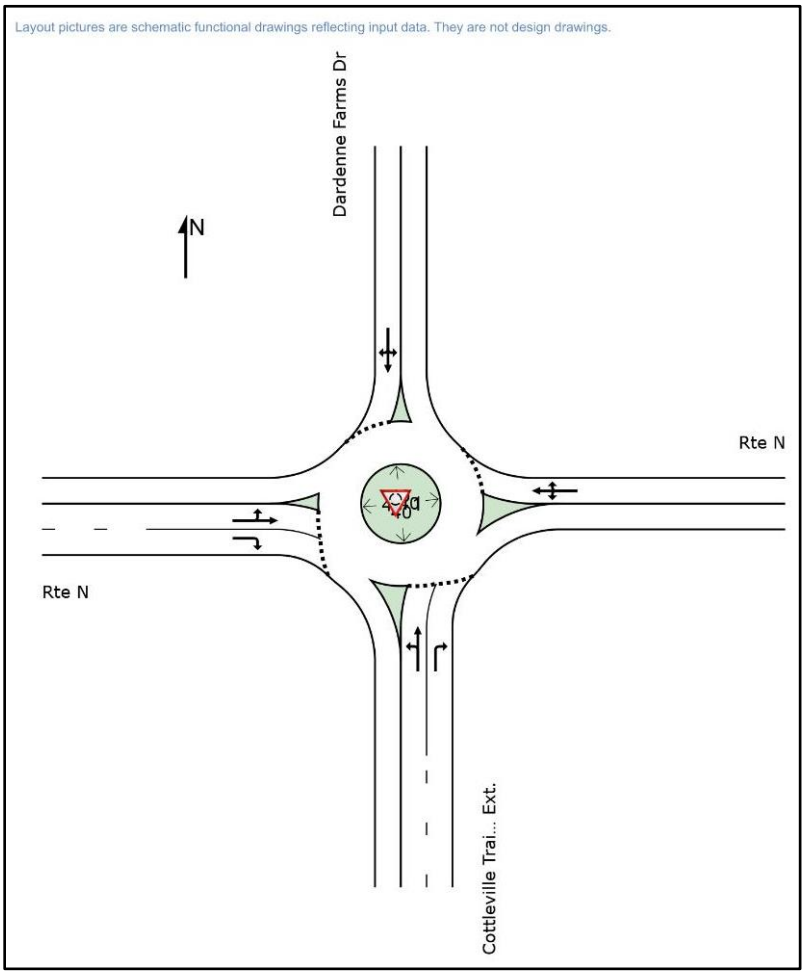


Figure 7. Recommended Roundabout at Route N & Cottleville Trails extension/Dardenne Farms Dr

At the south end of Cottleville Trails Drive, the existing roundabout at Gutermuth Road should be restriped to eliminate the underutilized inside lane, which currently serves only northbound-to-southbound U-turn movements (assuming no lane changes in the roundabout which is standard practice) and does not contribute to efficient traffic flow. The splitter islands should also either be extended or striped to clarify laneage. Simplifying the roundabout would reduce driver confusion, improve lane discipline, and better align with actual traffic patterns, especially as the roundabout experiences increased traffic as a result of the Cottleville Trails extension. These improvements are shown in **Figure 8**.

Figure 8. Recommended Roundabout at Gutermuth Road & Cottleville Trails Drive

TRAFFIC CALMING MEASURES

As a result of the proposed Cottleville Trails Drive extension, traffic volumes along Route N in Old Town Cottleville are expected to decrease significantly. While this reduction would alleviate congestion and improve pedestrian safety, it may also lead to increased vehicle speeds due to reduced traffic friction. Therefore, the following traffic calming improvements are recommended for consideration in conjunction with the extension.

Consideration was given towards either signalizing or providing an all-way stop at Route N & St. Charles Street. Since a traffic signal would not be warranted under 2047 traffic volumes, a signal is not recommended at Route N & St. Charles Street. Further detail on the signal warrant analysis is provided in **Appendix I – Signal Warrant Analysis**. Similarly, an all-way stop-controlled intersection would also not be warranted based on the anticipated traffic volumes and crash history. As such, an all-way stop-controlled intersection is not recommended at Route N & St. Charles Street. Further detail on the all-way stop control warrant analysis is provided in **Appendix J – Multiway Stop Warrant Analysis.** Overall, no changes to the existing traffic control at Route N & St. Charles Street are recommended. While no changes to the traffic control are recommended, there is potential to further calm traffic. Of note, it is prudent that vegetation does not impede with the visibility of stop signs. Care should be taken to ensure that traffic control signs are fully visible.

While only minor increases in traffic are expected on St. Charles Street, consideration of speed cushions are recommended to encourage slower speeds. An example speed cushion is shown in **Figure 9.** Potential locations for speed cushions are provided in **Figure 10.** Locations largely coincide with existing curb bump-outs. Speed cushions should be designed to not interfere with emergency vehicles.

Figure 9. Example Speed Cushion

(Source: NACTO)

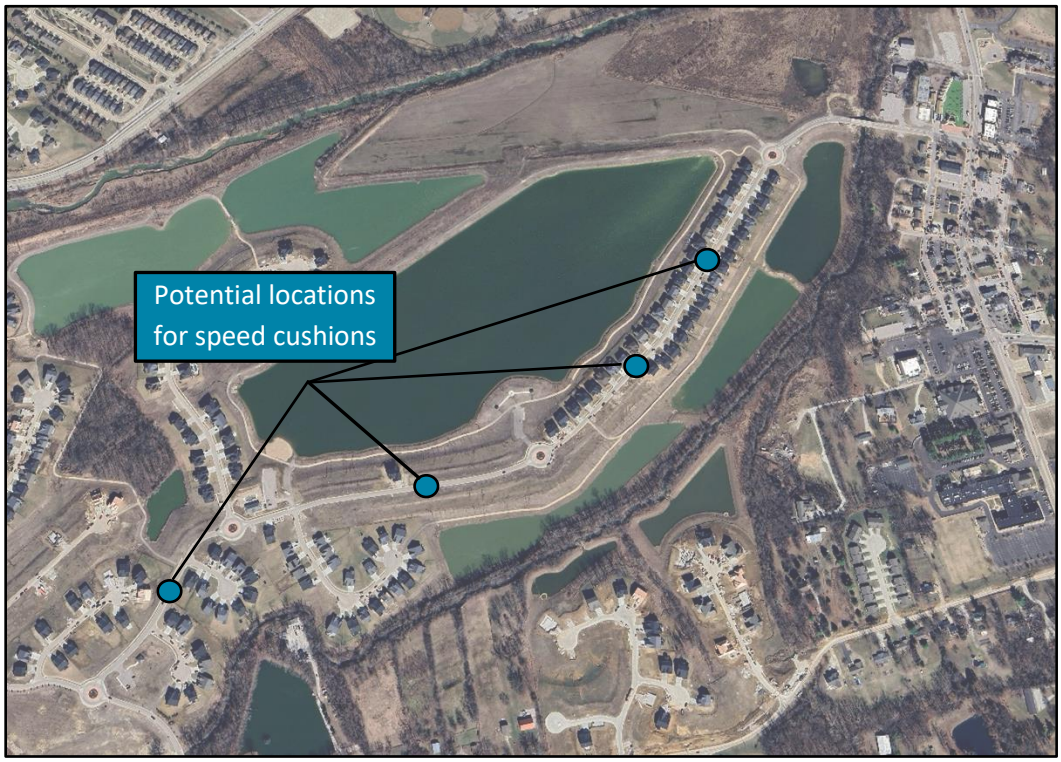


Figure 10. Potential Locations for Speed Cushions along St. Charles St

The Old Town area already has significant traffic calming measures in-place such as curb bump-outs, narrow roads, and stamped crosswalks. The narrow width of the existing roadways along Route N eliminates the need for pedestrian refuge islands as people do not cross long distances.

Should vehicle-pedestrian conflicts continue to be an issue after the Cottleville Trails extension is in place, a high-intensity activated crosswalk (HAWK) signal otherwise known as a hybrid pedestrian beacon could be considered at St. Charles Street. A HAWK provides a red signal requiring traffic to stop when a pedestrian pushes the button. This represents a higher-level of traffic intervention compared to the rapid rectangular flashing beacon (RRFB) that's currently in place, which only serves to warn approaching traffic to the presence of pedestrians. A HAWK signal could reduce pedestrian-vehicle crashes by 45% per published research.

A tabled, or raised, intersection at Route N & St. Charles Street as well as at Route N & Oak Street also merit consideration. This type of intersection would help promote slow moving traffic, while reinforcing the pedestrian-friendly nature of Old Town. Tabled intersections raise the pavement about 6 inches to curb height to encourage drivers to proceed slowly through the intersection. They also typically include a different pavement color or texture to improve visibility. An example of a tabled intersection is provided in **Figure 11.** With a tabled intersection, the existing curb-bump outs should remain, and the intersection should continue to operate under side-street stop-control.

Figure 11. Example Tabled Intersection

(Source: City of Miami, Florida)

High-visibility pedestrian crossings are also recommended throughout the Old Town area, particularly at Route N & Motherhead Road, St. Charles Street & Main Street, and Oak Street & Main Street. Improved crosswalks would help increase visibility of pedestrians and slow vehicles down. These could include raised crossing or simply crossings with high-visibility markings and/or distinct pavement textures. Note that some intersections already benefit from crosswalks with distinct pavement textures, and this feature

could be expanded to other locations, such as the intersection of Route N & Motherhead Road. Raised crossings would help increase driver awareness that they are entering a multimodal area and could reduce crashes by 45% for pedestrian crashes and 30% for vehicle crashes per published research.

In addition to the above stated recommendations, consideration should also be given to constructing a single-lane roundabout on Route N to help create a gateway into Old Town Cottleville from the north and signal to motorists to slow down upon entering the area. One potential location for this roundabout would be at Route N & Legacy Park where the roundabout could provide access to Legacy Park as well as City Hall. Alternatively, the roundabout could be located further south closer to the Food Truck Garden, in which case it could connect to a planned extension of 2nd Street on the west. In this scenario, modifications to the City Hall site are recommended to enable a new driveway connection to parking areas and the street network east of Route N.

Lastly, given the golf cart activity and overall multimodal character of Old Town Cottleville, the City should consider implementing a dedicated multi-use path to better segregate vehicular traffic from golf carts, pedestrians, and bicycles. This path should connect the existing Dardenne Greenway to the Old Town Area. Currently, Dardenne Greenway extends northward from Route N north of the Dardenne Creek bridge. Consideration should be given to extending the pathway south along the east side of Route N and connect into Old Town. Providing a dedicated multi-use path would allow golf carts, pedestrians, and bicycles to have an improved connection between nearby neighborhoods and Old Town Cottleville as shown in **Figure 12.**

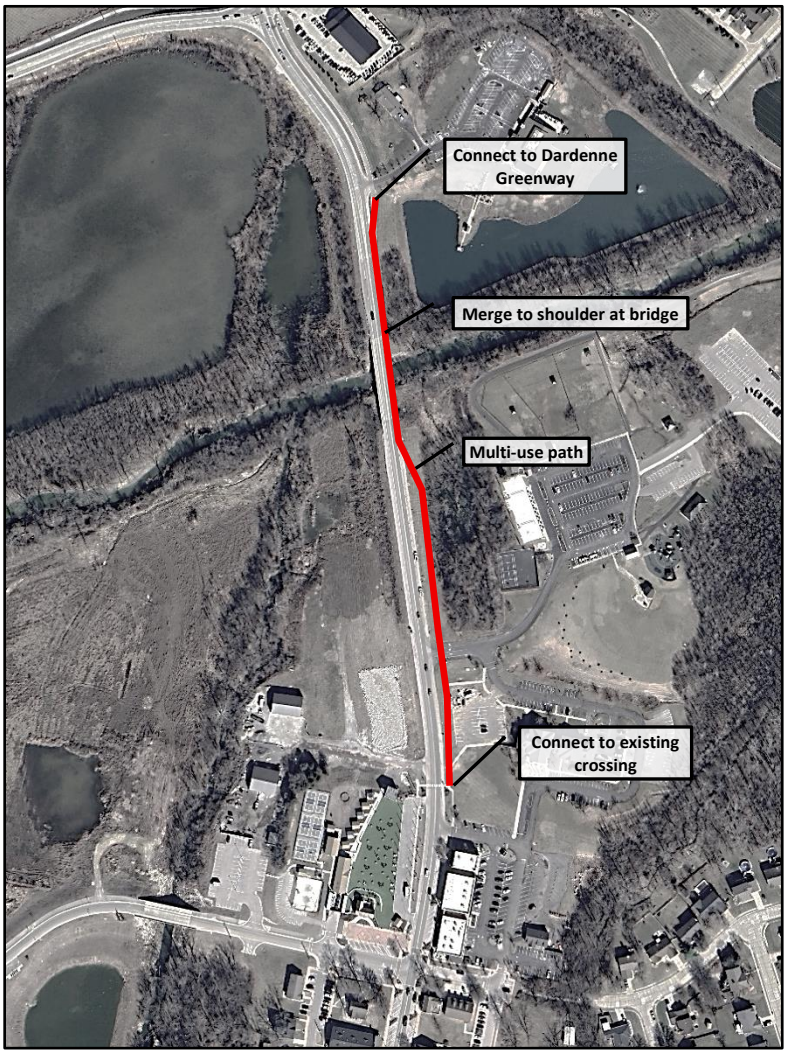


Figure 12. Potential Multi-Use Path

2027 AND 2047 FORECASTED CONDITIONS

The forecasted operating conditions associated with the recommended improvements, including the proposed Cottleville Trails extension, were evaluated using the same methodology applied to the baseline conditions. This was performed to confirm their effectiveness to achieve the goals of the study. Forecasted conditions were evaluated for the following scenarios:

- **2027 Forecasted Conditions** – Includes all developments represented in 2027 Base Conditions plus the recommended improvements and full buildout of the Cottleville Trails extension.
- **2047 Forecasted Conditions** – includes all developments represented in 2047 Base Conditions plus the recommended improvements and full buildout of the Cottleville Trails extension.

FORECASTED TRAFFIC OPERATIONAL ANALYSIS

The evaluation of the 2027 and 2047 Forecasted Operating Conditions at the study intersections was conducted using Synchro 11, with a summary provided in **Appendix K – Traffic Operating Conditions**. As shown, the Cottleville Trails extension would provide significant enhancement to the City's transportation network. By creating a new bypass route around Old Town Cottleville, the extension strategically redistributes traffic away from the most congested and pedestrian-heavy area. This shift not only alleviates pressure on critical intersections but also enhances safety for pedestrians, bicyclists, and golf cart users.

The extension would also support long-term development, improves emergency access, and preserves the character of residential neighborhoods by maintaining manageable traffic volumes and speeds. Ultimately, it enables the City to accommodate future growth while protecting the walkability and charm that defines Old Town Cottleville.

At Route N & Dardenne Farms Drive/Cottleville Trails Extension, the implementation of a roundabout would adequately accommodate the anticipated traffic volumes as a result of the Cottleville Trails extension. The AM and PM peak hours would be expected to operate at LOS B or better overall through the year 2047.

The intersection of Route N & Winterbrooke Court, which would remain a stop-controlled intersection, is expected to continue to perform acceptably with the side street movements operating at LOS E or better during the peak periods through the year 2047, despite increases in traffic this stretch of Route N due to the Cottleville Trails Extension.

The intersection of Route N & Weiss Road would be expected to operate at LOS C or better overall during both peak periods through the year 2047. These conditions are similar to the baseline operating conditions. However, it is expected that the eastbound left-turn would experience a minor increase in queuing (approximately 100 feet) as more vehicles would be expected to make these movements with the Cottleville Trails extension in place.

Route N & St. Charles Street is expected to have improved operating conditions with the Cottleville Trails extension in place. The LOS F for eastbound traffic in the baseline would improve to an acceptable LOS E or better during both peak periods through the year 2047. This improvement would be directly attributable to the significant decrease in traffic volume along Route N due to the Cottleville Trails Extension. This should also improve safety at this intersection as fewer vehicle-pedestrian conflicts would occur.

Route N & Motherhead Road would continue to be one of the more congested intersections, particularly for southbound traffic during the AM peak hour as a result of the St. Joseph's Catholic School drop off. While the southbound approach would still be expected to experience long queues during the AM peak hour as a result of the St. Joseph's School drop-off, the queue would decrease by approximately 285 ft for the year 2027 and by 250 ft for the year 2047.

The roundabout at Gutermuth Road & Cottleville Trails Drive is expected to continue to function effectively with minimal delays and short queues through the year 2047 despite the additional traffic

expected as a result of the Cottleville Trails extension. The roundabout would operate at LOS B overall or better for both peak periods.

Overall, it can be concluded that with the recommended improvements in place, the study area roadway network would operate favorably and achieve the level of service targets of this study. The Cottleville Trails extension would help to better distribute traffic within the study area by reducing traffic along Route N within the Old Town area but without overburdening or adversely impacting the other study roadways. As such, the Old Town area would be expected to have improved safety conditions, which would result in an improved experience for people accessing the City's Old Town amenities.

CONCLUSIONS

The preceding traffic study of "Old Town" Cottleville and immediate surrounding areas was completed with the purpose of recommending solutions to resolve existing issues, including consideration of traffic calming measures and a potential westward extension of Cottleville Trails Drive to Route N.

The following conclusions were reached:

- The study intersections generally operate acceptably under 2025 baseline conditions. However, Route N & Motherhead Road experiences peak hour congestion and motorists on eastbound St. Charles Street experience delays trying to turn onto Route N due to conflicts imposed by vehicles, pedestrians, and even golf carts. Other study intersections generally operate at favorable levels of service.
- Route N between Motherhead Road and Weiss Road had the highest crash frequency in the study area, experiencing 26 crashes over a five-year period from 2019 to 2023. Although none involved pedestrians or cyclists, this corridor's crash rate was higher than statewide averages for comparable roadways.
- It was concluded that while most of the study intersections would operate favorably in the future with surplus capacity, the intersections along Route N within the Old Town area would experience an increase in congestion and vehicle-pedestrian conflicts, which could result in more crashes. As such, it was recommended that improvements aim to address these conditions in order to create a better experience for motorists and pedestrians traveling Route N within Old Town.
- The following improvements are recommended:
    - Cottleville Trails extension:
        - Connect Gutermuth Road to Route N to help distribute traffic and reduce congestion in Old Town Cottleville.
        - Provide one lane in each direction and a landscaped median to create a "parkway" with left-turn lanes at intersections.
    - Dardenne Creek Bridge:
        - Construct a bridge with a single-lane in each direction for the Cottleville Trails Extension. This bridge should meet all applicable AASHTO guidelines.
    - Route N & Dardenne Farms Drive:
        - As part of the Cottleville Trails extension, construct a roundabout with one shared thru/left-turn lane and a separate right-turn lane for the northbound (Cottleville Trails extension) and eastbound (Route N) approaches and a single lane for all other approaches.

- Gutermuth Road & Cottleville Trails Drive
    - The existing roundabout at Gutermuth Road & Cottleville Trails Drive should be restriped to eliminate the underutilized inside lane, which currently serves only northbound-to-southbound U-turn movements and does not contribute to efficient traffic flow.
- Signal Timing Improvements:
    - Signal timing improvements and a progression analysis along the Route N corridor are recommended to help improve traffic operations within the study area, particularly after the Cottleville Trails extension is in place and traffic volumes adjust.
- Traffic Calming Improvements
    - The implementation of speed cushions should be considered along St. Charles Street to help reduce vehicle speeds.
    - Should safety concerns persist within the Old Town area after the Cottleville Trails extension is in place, high-intensity activated crosswalk (HAWK) signals could be implemented at high-volume crossing locations such as at Route N & St. Charles Street.
    - Tabled intersections are recommended for consideration at Route N & St. Charles Street as well as Route N & Oak Street to slow vehicular speeds and enhance the Old Town experience.
    - Improved pedestrian crosswalks, such as high-visibility and/or raised crossings, are recommended throughout the Old Town area, particularly at Route N & Motherhead Road, St. Charles Street & Main Street, and Oak Street & Main Street. Note that this would be in lieu of tabled intersections, as raised crosswalks would be redundant with tabling the entire intersection.
    - A single-lane roundabout should be considered on Route N just north of Old Town to serve as a gateway into the area and a reminder for traffic to slow down.
    - A multi-use path along Route N connecting Old Town to the Dardenne Greenway on the east side of Route N north of the Dardenne Creek should be considered to segregate vehicular traffic from pedestrians, bicycles, and golf carts.

With the recommended improvements in place, the study intersections would be expected to operate favorably overall. The previously congested Old Town area along Route N is expected to noticeably improve due to the reduction in traffic volumes as a result of the Cottleville Trails extension.

Completed by Lochmueller Group

APPENDIX

Appendix A – Existing Roadway Network

Appendix B – Existing Traffic Volumes

Appendix C – Analysis Methodology

Appendix D – Existing Conditions Analysis

Appendix E – Trip Generation Methodology

Appendix F – Directional Distribution Estimate

Appendix G – Traffic Volume Graphics

Appendix H – Turn-Lane Warrant Analysis

Appendix I – Signal Warrant Analysis

Appendix J – Multiway Stop Warrant Analysis

Appendix K – Traffic Operating Conditions

APPENDIX A – EXISTING ROADWAY NETWORK

Gutermuth Road is classified as a major collector with a posted speed limit of 35 miles per hour (mph). With an annual average daily traffic (AADT) of 4,770, this road features two lanes in each direction and is currently undergoing significant improvements. The improvement project includes reconstructing the pavement, widening the lanes, flattening hills, and straightening curves. Additionally, curb and gutter and enclosed drainage are being provided, along with a 14-foot-wide multi-use path on the south side of the road and some sidewalk connections on the north side. At the time this project was initiated, Gutermuth Road was closed in the westbound direction between Old Gutermuth Road & Motherhead Road to facilitate the improvements.

Cottleville Trails Drive is classified as a local road with a posted speed limit of 20 mph. This road features two lanes in each direction and includes a multi-use trail that runs parallel to the roadway, providing access for pedestrians and cyclists. The trail connects to Old Town Cottleville, enhancing the overall connectivity of the area.

At the roundabout intersection of Cottleville Trails Drive and Gutermuth Road, the eastbound approach includes one exclusive left turn-lane and one through lane. The westbound approach includes one shared through/right-turn lane. The southbound approach is comprised of one left-turn/right-turn lane.

Route N is classified as a minor arterial within the study area and has an AADT of 10,603. Route N serves as a significant route for local and through traffic, connecting residential neighborhoods and commercial areas. Between Mid Rivers Mall Drive and Motherhead Road, Route N runs east-west and has a posted speed limit of 35 mph. West of Cottleville Campus, this segment of Route N generally has one eastbound lane, two westbound lanes, and a two-way left-turn lane (TWLTL). East of Cottleville Campus, this segment of Route N has one eastbound lane, one westbound lane, and a TWLTL.

At Motherhead Road, Route N turns north and runs north-south to Weiss Road. This segment of Route N has a posted speed limit of 20 mph south of St. Charles Street. North of St. Charles Street, the posted speed limit gradually increases from 20 mph to 25 mph, and then to 30 mph. This segment of Route N serves “Old Town” Cottleville and Route N consists of one lane in each direction. There are several marked pedestrian crossings and sidewalks are provided on both sides of the road. On-street parking is also provided along this segment of Route N.

At Weiss Road, Route N turns west. This segment of Route N within the study area has a posted speed limit of 40 mph and is generally comprised of one eastbound lane, one westbound lane, and a TWLTL.

Motherhead Road runs north-south and is classified as a major collector with a posted speed limit of 35 mph. With an AADT of 5,232, it features two lanes in each direction. The northern section of Motherhead Road terminates at Route N.

At the signalized intersection of Route N & Motherhead Road, the northbound approach includes one exclusive left-turn lane, one through lane, and one channelized right-turn lane. The southbound, eastbound, and westbound approaches all include one exclusive left-turn lane and one shared through/right-turn lane.

St. Charles Street runs east-west and is classified as a local road with a speed limit of 25 mph. With an AADT of 1,560, it serves residential properties and local businesses, providing essential connectivity within the community. The intersection of Route N & St. Charles Street is unsignalized with the eastbound/westbound approaches being stop controlled and the northbound/southbound approaches running free flow. The eastbound approach is comprised of one shared left-turn/through lane and one right-turn lane. The westbound, northbound, and southbound approaches are comprised of a single lane. Curb bump-outs are provided at this intersection to help improve traffic calming and minimize the pedestrian crossing distance. In addition, painted brick crosswalks are also provided to improve the visibility of pedestrian crossings. Similar treatments are provided at other intersections along Route N between St. Charles Street and Motherhead Road within the Old Town area.

Per *AASHTO 2019 Guidelines for Geometric Design of Low-Volume Roads*, urban residential streets typically have a width ranging from 26 to 32 feet, accommodating two travel lanes and parking on one or both sides. St. Charles Street adheres to these standards. Parking along St. Charles Street within the Cottleville Trails neighborhood has been restricted to provide parking on the north side of the street only.

Weiss Road runs north-south and is classified as a minor arterial with a speed limit of 30 mph. With an AADT of 9,782, it serves residential properties. At the signalized intersection of Route N & Weiss Road, the northbound approach includes one exclusive left-turn lane and one shared through/right-turn lane. The southbound approach includes one exclusive left-turn lane, one through lane, and one channelized right-turn lane. The eastbound approach includes one exclusive left-turn lane and one shared channelized through/right-turn lane. The westbound approach includes one exclusive left-turn lane and one shared through/right-turn lane. The Dardenne Greenway runs along the east side of Weiss Road within the study area and continues along the north side of Route N.

Winterbrooke Court runs north-south and is classified as a local road with a speed limit of 25 mph. It primarily serves residential properties, providing access to single-family homes. The intersection of Winterbrooke Court with Route N is unsignalized. Traffic traveling along Route N travels freely whereas traffic traveling along Winterbrooke Court is required to stop. The westbound approach is comprised of a single lane, and the northbound approach is comprised of a shared through/right-turn lane. The southbound approach along Route N is comprised of a left-turn lane within a two-way left-turn lane (TWLTL) and a through lane.

Dardenne Farms Drive runs north-south and is classified as a local road, primarily serving residential properties. It features a speed limit of 30 mph and provides access to single-family homes. The intersection of Dardenne Farms Drive with Route N is unsignalized. Traffic traveling along Route N travels freely whereas traffic traveling Dardenne Farms Drive is required to stop. The westbound approach is comprised of a single lane, and the northbound approach is comprised of a shared through/right-turn lane. The southbound approach along Route N is comprised of a left-turn lane within a TWLTL and a through lane.

APPENDIX B – EXISTING TRAFFIC VOLUMES

Traffic counts were collected in April 2025 while school was in session and weather conditions were favorable; however, also while Gutermuth Road between Old Gutermuth Road & Motherhead Road was closed in the westbound direction. To ensure accuracy, adjustments were made to reflect typical two-way traffic conditions. These corrections ensured that the baseline traffic volumes accurately represented normal operating conditions despite the temporary closure.

The detour provided for westbound vehicles is shown in **Figure B1.**

Figure B1. Gutermuth Road Closure & Detour

Historical data from MoDOT and St. Charles County as well as field observations were referenced to establish 2025 Baseline traffic volumes assuming two-way traffic on Gutermuth Road. The volumes at Gutermuth Road & Cottleville Trails Drive were adjusted based on MoDOT annual average daily traffic (AADT) data. The eastbound traffic volumes were not adjusted as that direction remained open and the traffic volumes collected aligned with the MoDOT AADT values. As shown in **Figure B1,** the northbound right-turn and southbound left-turn at Route N & Motherhead Road would be expected to experience higher traffic volumes than typical due to the detour route. Additionally, the southbound through movement at Route N & Motherhead Road would be expected to experience lower traffic volumes due to the detour route. These three movements were adjusted based on historical traffic count data and AADTs.

APPENDIX C – ANALYSIS METHODOLOGY

Traffic operating conditions for signalized and unsignalized intersections were evaluated using Synchro 11, which is a macro-analytical software tool based upon "Highway Capacity Manual" (HCM) methodologies, most recently updated in 2023 by the Transportation Research Board. Roundabout intersections were evaluated using Sidra, which is a traffic capacity analysis tool commonly used for roundabouts.

The HCM quantifies transportation system performance using Levels of Service (LOS), which are measures that consider factors such as speed, delay, safety, and driver comfort and convenience. There are six levels of service ranging from LOS A ("free flow") to LOS F ("oversaturated"). LOS C is commonly used for design purposes and represents a roadway operating at approximately 70 to 80 percent of its capacity.

Levels of service criteria vary depending upon the type of roadway component being evaluated. Intersections are most commonly evaluated, since capacity is commonly dictated by the number of vehicles that can be served at critical intersections. The levels of service criteria for intersections are based on traffic delays and vary by type of control (i.e., whether it is signalized or unsignalized) as summarized in **Table C1**. Signalized intersections reflect higher delay tolerances because motorists are accustomed to longer delays at signals.

Table C1. Intersection Levels of Service Thresholds

Level of Service	Control Delay per Vehicle (sec/veh)	
	Signalized	Unsignalized/Roundabout
A	≤ 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

The perception of acceptable traffic service varies by area. More delay is usually tolerated in urban and suburban areas as compared to rural areas. Based on the character of this area, LOS D or better would be an appropriate definition of acceptable overall peak period traffic conditions at intersections. LOS E or better would be an acceptable benchmark for individual intersection approaches and movements. The measures of effectiveness were reported based on the Synchro methodology for signalized intersections and based on the HCM methodology for unsignalized intersections.

The measures of effectiveness reported include LOS, delay, queue, and volume-to-capacity ratio (v/c). The delay is reported in seconds per vehicle. The queue is reported in feet (ft) as the 95th percentile queue. The v/c ratio compares vehicle demand to capacity. A v/c ratio of 1.0 represents a road segment that is at full capacity.

APPENDIX D – EXISTING CONDITIONS ANALYSIS

2025 EXISTING OPERATING CONDITIONS ANALYSIS

Table D1. Year 2025 Baseline Traffic Operating Conditions

Intersection & Movements	LOS (Delay, sec) [Queue Length, feet] <v/c ratio>	
	AM Peak Hour	PM Peak Hour
1) Route N & Dardenne Farms Dr (unsignalized, side-street STOP controlled)		
Eastbound Left Turn	A (8.1) [<25] <0.01>	A (8.8) [<25] <0.04>
Southbound Approach	B (14.7) [<25] <0.22>	B (14.7) [<25] <0.13>
2) Route N & Winterbrooke Ct (unsignalized, side-street STOP controlled)		
Eastbound Left Turn	A (8.4) [<25] <0.02>	A (8.7) [<25] <0.01>
Southbound Approach	B (14.1) [<25] <0.12>	B (14.3) [<25] <0.10>
3) Route N & Weiss Rd (signalized)		
Overall Intersection	**C (22.3)**	**C (24.3)**
Eastbound Approach	C (23.7) [264] <0.80>	C (25.6) [341] <0.71>
Eastbound Left Turn	D (358) [264] <0.68>	D (39.5) [341] <0.71>
Eastbound Through/Right	B (17.3) [72] <0.80>	A (5.9) [<25] <0.37>
Westbound Approach	D (39.2) [<25] <0.07>	C (27.0) [25] <0.11>
Westbound Left Turn	A (0.0) [<25] <0.00>	D (53.8) [25] <0.11>
Westbound Through/Right	D (39.2) [<25] <0.07>	A (0.2) [<25] <0.04>
Northbound Approach	B (17.0) [222] <0.47>	C (22.3) [507] <0.64>
Northbound Left Turn	B (15.3) [75] <0.47>	C (20.0) [150] <0.64>
Northbound Through/Right	B (17.9) [222] <0.41>	C (23.5) [507] <0.62>
Southbound Approach	C (24.8) [350] <0.71>	C (25.7) [348] <0.66>
Southbound Left Turn	B (11.2) [<25] <0.03>	B (12.4) [<25] <0.05>
Southbound Through	C (33.0) [350] <0.71>	D (37.1) [348] <0.66>
Southbound Right Turn	A (3.6) [33] <0.25>	B (14.1) [103] <0.54>
4) Route N & St. Charles St (unsignalized, side-street STOP controlled)		
Eastbound Through/Left	F (77.1) [53] <0.48>	F (73.6) [45] <0.44>
Eastbound Right Turn	C (17.6) [<25] <0.12>	B (12.2) [<25] <0.05>
Westbound Approach	B (11.7) [<25] <0.01>	D (27.9) [<25] <0.10>
Northbound Left Turn	B (10.2) [<25] <0.05>	A (8.9) [<25] <0.06>
Southbound Left Turn	A (0.0) [<25] <0.00>	A (9.3) [<25] <0.01>
5) Route N & Motherhead Rd (signalized)		
Overall Intersection	**D (39.7)**	**B (19.5)**
Eastbound Approach	C (23.7) [63] <0.32>	C (23.7) [<25] <0.15>
Eastbound Left Turn	B (20.0) [38] <0.27>	C (20.3) [<25] <0.15>
Eastbound Through/Right	C (25.9) [63] <0.32>	C (29.2) [<25] <0.11>
Westbound Approach	E (75.3) [186] <1.04>	B (13.2) [59] <0.67>
Westbound Left Turn	B (18.8) [51] <0.20>	C (20.9) [59] <0.35>
Westbound Through/Right	F (86.0) [186] <1.04>	B (10.6) [<25] <0.67>
Northbound Approach	C (22.6) [180] <0.58>	C (23.5) [#414] <0.74>
Northbound Left Turn	B (13.2) [<25] <0.13>	B (10.3) [<25] <0.02>

Northbound Through	C (32.3) [180] <0.58>	C (32.9) [#414] <0.74>
Northbound Right Turn	A (2.2) [<25] <0.22>	A (5.8) [47] <0.36>
Southbound Approach	C (34.0) [#672] <0.91>	B (19.1) [193] <0.70>
Southbound Left Turn	B (17.4) [112] <0.59>	C (25.8) [#172] <0.70>
Southbound Through/Right	D (40.3) [#672] <0.91>	B (14.0) [193] <0.32>
6) Gutermuth Rd & Cottleville Trails Dr (roundabout)*		
Overall Intersection	**A (5.4)**	**A (5.3)**
Eastbound Approach	A (5.4) [<25] <0.18>	A (5.5) [31] <0.23>
Westbound Approach	A (4.6) [85] <0.44>	A (4.6) [57] <0.33>
Southbound Approach	A (7.6) [30] <0.23>	A (6.4) [<25] <0.13>

Delay presented in seconds per vehicle

*Roundabout intersection results from SIDRA software

- 95*th* percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles

2025 EXISTING CRASH ANALYSIS

Historical crash data was compiled from the MoDOT statewide database for the most current 5-year period. Five years of historical data is considered best practice as it captures a meaningful amount of data that occurred under similar conditions. This analysis utilized crashes between 2019 and 2023 as they are the most recent complete 5 years of data.

As shown in **Figure D1**, a total of 94 crashes occurred between 2019 and 2023 within the study area. During the time period analyzed, 42 (45%) of the crashes occurred around Old Town Cottleville, with the intersection of Route N & Weiss Road experiencing the highest frequency of crashes.

Of the reported crashes, 12 (13%) resulted in injuries (both serious and minor injuries) and 82 (87%) resulted in property damage only (PDO). There were no fatal crashes in the study area over the 5-year period. Rear-end crashes were the most prominent type of crash (29%) followed by out-of-control crashes (23%).

On Route N between Motherhead Road and Weiss Road, there were a total of 26 crashes, with three resulting in minor injury and 23 in PDO crashes. Of the crashes on this segment of Route N, 10 were rear end crashes, four were left turn right angle crashes, and three were out of control crashes. No pedestrians or cyclists were involved in any of the crashes. This segment includes a lot of pedestrian crossings and is a central corridor for Old Town Cottleville. This segment is also the segment which experiences the highest volume of crashes within the study area. **Figure D2** shows the crash dashboard for this segment of Route N between Motherhead Road and Weiss Road.

At the intersection of Route N & Motherhead Road, 15 crashes were reported between 2019 and 2023. Two of these crashes resulted in minor injuries and 13 resulted in PDO crashes. The majority of crashes at the intersection were made up of rear end crashes and head on crashes. Based upon the crash data, no crashes involved any pedestrians or cyclists at this intersection.

At the intersection of Route N & St. Charles Street, there were a total of seven crashes between 2019 and 2023. Of the seven crashes, one resulted in minor injuries and six resulted in PDO crashes. Three of these crashes are related to parking in the area. The crash data does not show any crashes involving any pedestrians or cyclists at this intersection.

At the intersection of Route N & Weiss Road, there were a total of 24 crashes between 2019 and 2023. Of these crashes, two were minor injury crashes and 12 were PDO crashes. There were seven rear end crashes, six left turn crashes, one out of control crash, and one head on crash. Based upon the crash data, there were no crashes with pedestrians or cyclists involved.

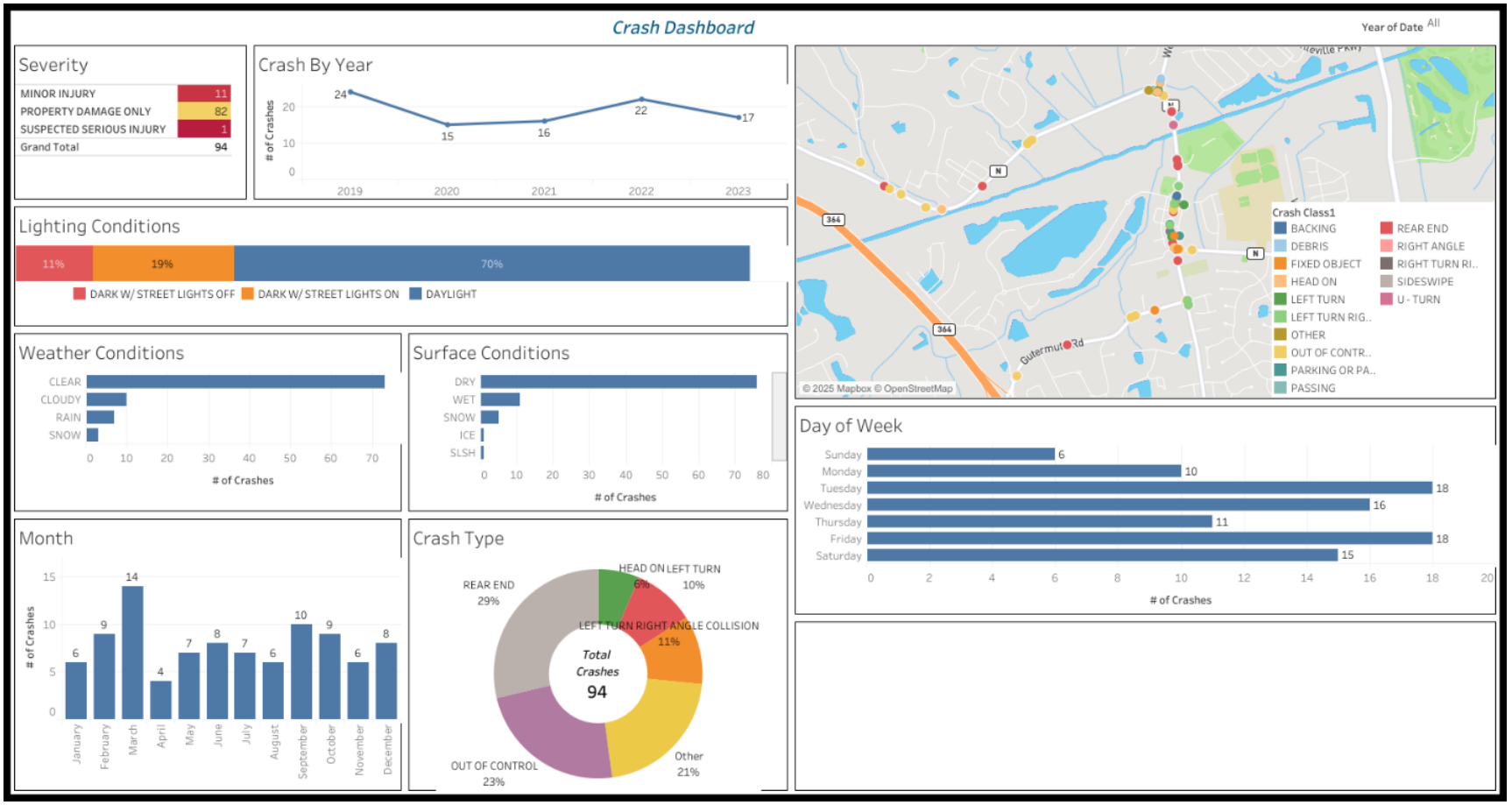


Figure D1. Study Area Crash Dashboard

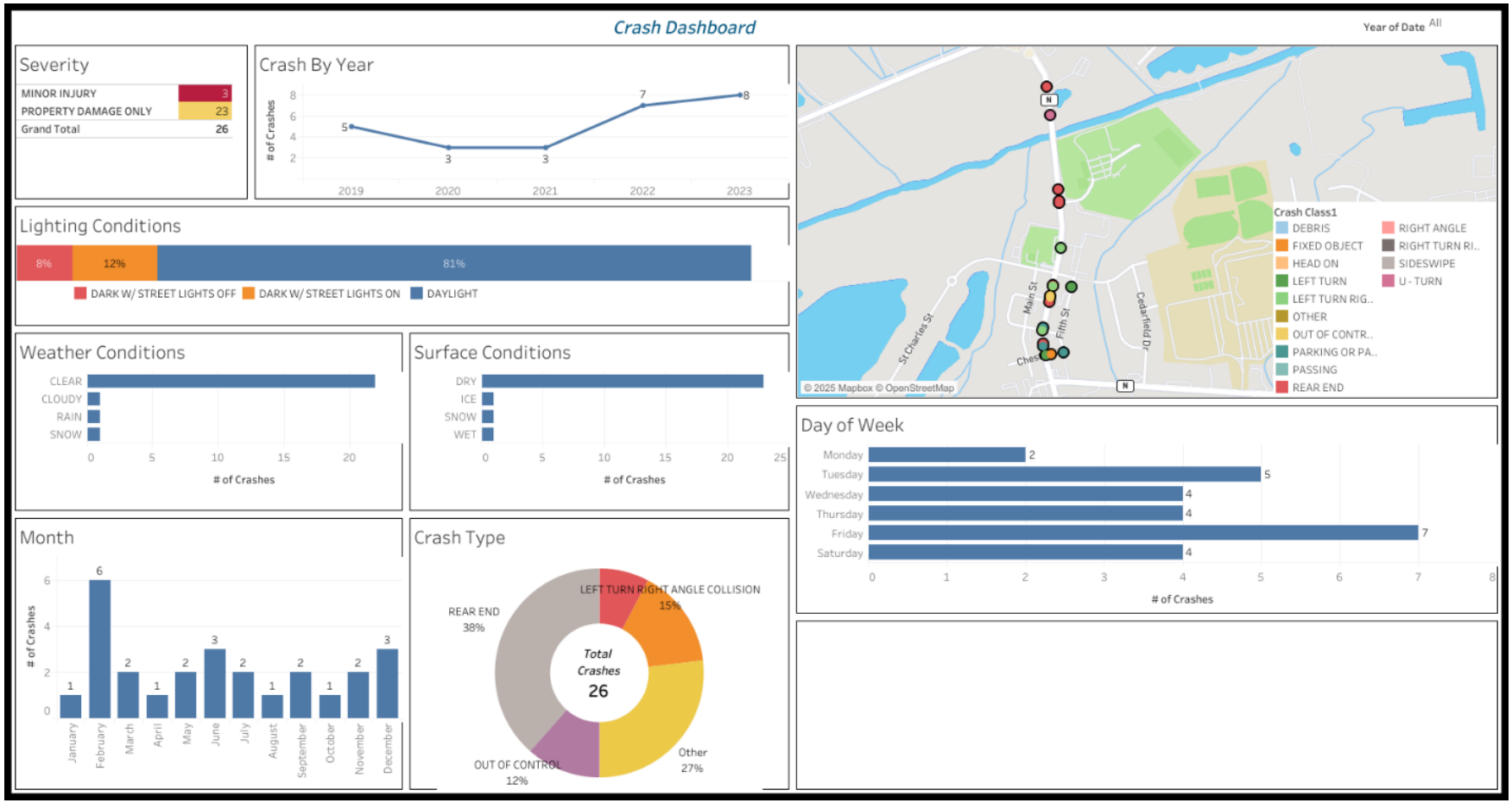


Figure D2. Route N between Motherhead Rd & Weiss Rd Crash Dashboard

As shown in **Figure D3**, the segment of Route N between Weiss Road and Dardenne Farms Drive experienced a total of 10 crashes. These crashes resulted in one minor injury crash, eight PDO crashes, and one suspected serious injury crash. Of these crashes, seven were out of control crashes, two were rear end crashes, and one was a head on crash. Based on the data, the month of March experienced the most crashes. No pedestrians or cyclists were involved in any of the crashes. A crash rate analysis was conducted and a crash rate of 94.3 per 100,000 vehicles was found for the segment Route N between Weiss Road and Dardenne Farms Drive. Compared to the statewide average for similar segments, the segment experienced approximately 60% less crashes than the statewide average number of crashes, indicating that this segment does not experience a higher-than-average crash rate.

There were no reported crashes on the roadway segment of St. Charles Street between Cottleville Trails Drive and Route N between 2019 and 2023.

At the intersection of Route N & Dardenne Farms Drive, there was one PDO crash between 2019 and 2023. Similarly, at the intersection of Route N & Winterbrooke Court, there was one PDO crash between the 5-year period. Both crashes were classified as out of control crashes. The data does not show any involvement of pedestrians or cyclists.

As seen in **Figure D4**, the roadway segment of Gutermuth Road between Cottleville Trails Drive and Motherhead Road experienced nine crashes, one minor injury and eight PDO crashes. Three of these crashes were out of control crashes, three were left turn right angle collision crashes, and one was a rear end crash. The data does not show any pedestrians or cyclists involved in any crashes in this study segment. A crash rate analysis was conducted and a crash rate of 188.7 per 100,000 vehicles was found for the segment Gutermuth Road between Cottleville Trails Drive and Motherhead Road. Compared to the statewide average for similar segments, the segment experienced approximately 13% less crashes than the statewide average number of crashes, indicating that this segment does not experience a higher-than-average crash rate.

At the intersection of Gutermuth Road & Cottleville Trails Drive, one crash was reported between 2019 and 2023. The crash type was an out-of-control crash and resulted in a PDO crash. Crash data does not show any crashes involving any pedestrians or cyclists at this roundabout.

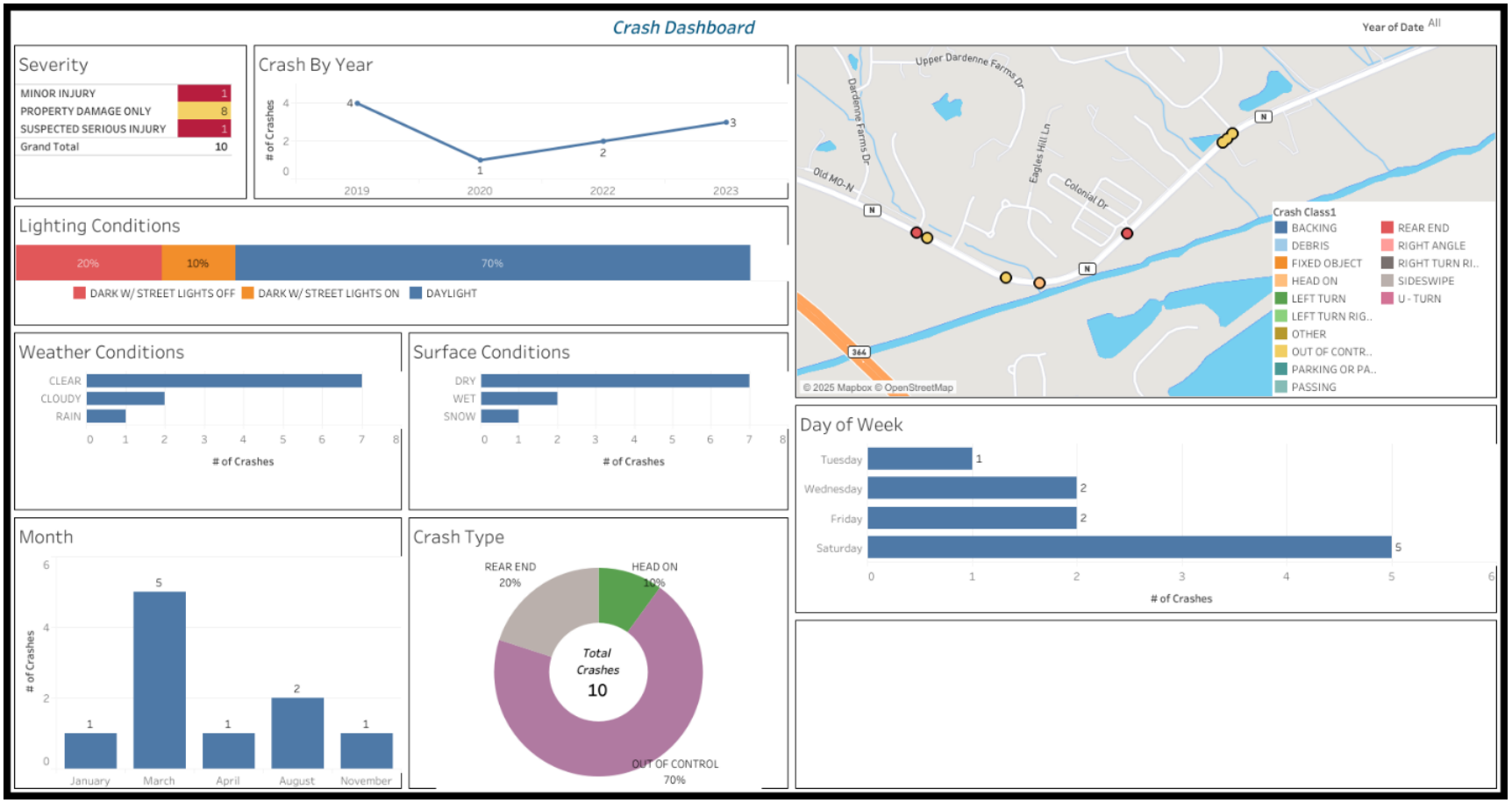


Figure D3. Route N between Weiss Rd & Dardenne Farms Dr Crash Dashboard

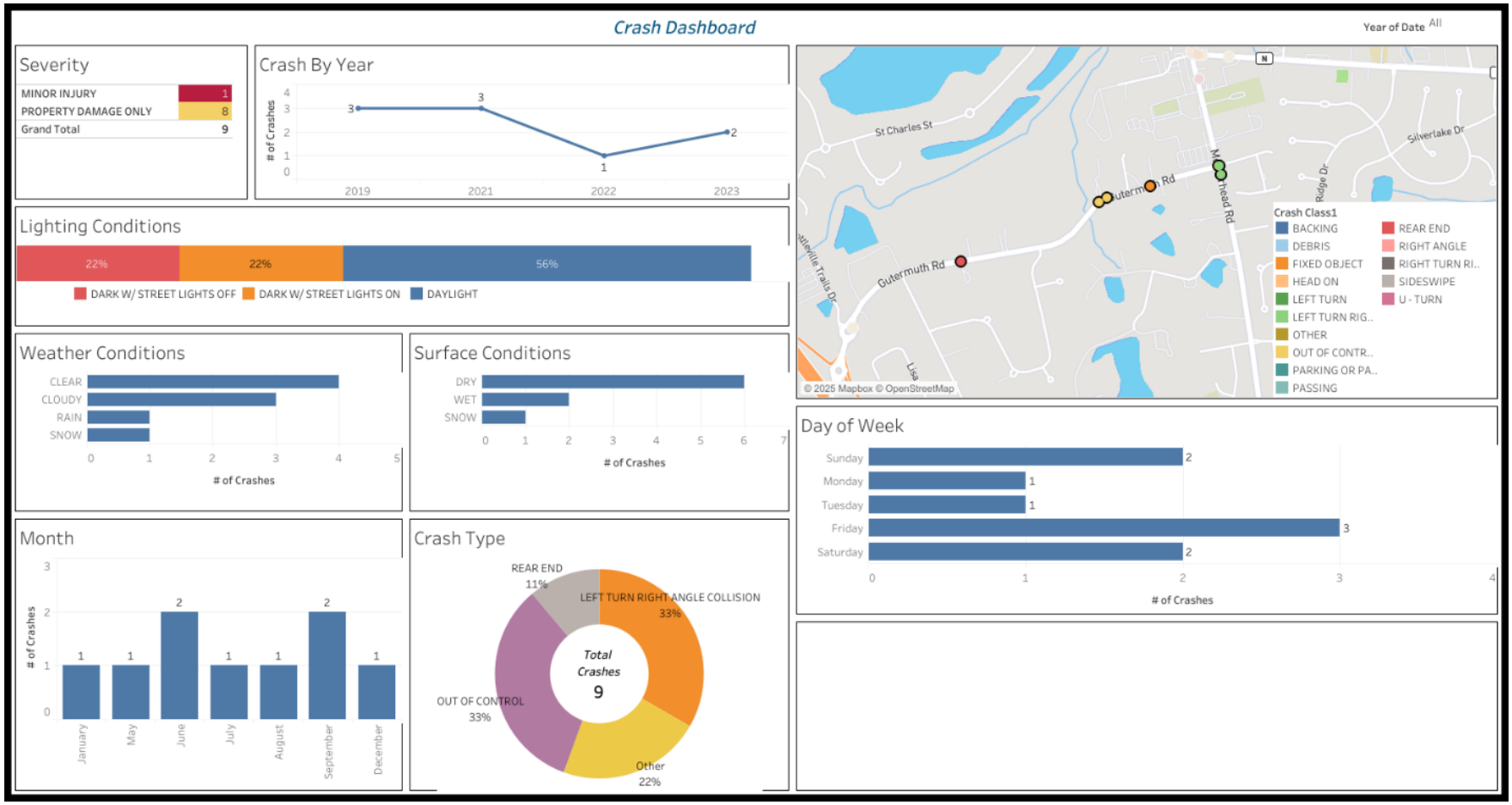


Figure D4. Gutermuth Rd between Cottleville Trails Dr & Motherhead Rd Crash Dashboard

Table D2 provides a summary of crash severity by intersection and segment. As previously stated, a total of 94 crashes occurred between 2019 and 2023. Of the reported crashes, there were 12 crashes that resulted in injuries (both serious and minor injuries), 82 property damage only crashes, and zero fatal crashes within the 5-year period. There was a total of 49 crashes that occurred at intersections and 45 that occurred in segments. The intersection of Route N & Weiss Road experienced the highest volume of crashes over this 5-year period when compared to the other study intersections and the segment of Route N between Motherhead Road & Weiss Road experienced the highest volume of crashes over this 5-year period when compared to the other study segments.

Table D2. Crash Classification by Severity

Location	2019		2020		2021		2022		2023		Grand Total
	Injury	PDO	Injury	PDO	Injury	PDO	Injury	PDO	Injury	PDO	
Intersection	**2**	**10**	**-**	**11**	**3**	**7**	**1**	**11**	**-**	**4**	**49**
Route N & Dardenne Farms Dr (U)	-	-	-	-	-	-	-	1	-	-	1
Route N & Winterbrooke Ct (U)	-	1	-	-	-	-	-	-	-	-	1
Route N & Weiss Rd (S)	1	5	-	5	1	4	1	5	-	2	24
Route N & St. Charles St (U)	-	1	-	2	1	1	-	1	-	1	7
Route N & Motherhead Rd (S)	1	3	-	4	1	2	-	3	-	1	15
Gutermuth Rd & Cottleville Trails Dr (R)	-	-	-	-	-	-	-	1	-	-	1
Segment	**1**	**11**	**-**	**4**	**1**	**5**	**1**	**9**	**3**	**10**	**45**
Gutermuth Rd between Cottleville Trails Dr & Motherhead Rd	-	3	-	-	1	2	-	1	-	2	9
Route N between Motherhead Rd & Weiss Rd	-	5	-	3	-	3	-	7	3	5	26
Route N between Weiss Rd & Dardenne Farms Dr	1	3	-	1	-	-	1	1	-	3	10
St. Charles Rd between Cottleville Trails Dr & Route N	-	-	-	-	-	-	-	-	-	-	-
Grand Total	**3**	**21**	**-**	**15**	**4**	**12**	**2**	**20**	**3**	**14**	**94**

(S) = Signalized Intersection

(U) = Unsignalized Intersection

(R) = Roundabout

APPENDIX E – TRIP GENERATION METHODOLOGY

It is our understanding that the City of Cottleville has approved the development of 355 single-family homes and 406 multi-family residential units within the study area, known as Cottleville Trails. A preliminary site plan provided by others for this development is shown in **Figure E1.** At the time the counts were collected, 200 single-family homes were built and occupied. Therefore, it is necessary to include the additional traffic anticipated from the remaining 155 single-family homes and 406 multi-family units in the baseline conditions of this study.

The site-generated traffic volumes for the remainder of the residential development were estimated using data provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition utilizing dwelling units as the determining variable. Land Use 210: Single-Family Detached Housing as well as Lane Use 220: Multi-Family Housing (Low-Rise) was used.

The forecasted trips that would be generated by the additional residential units are summarized in **Table E1.** Respectively upon completion, the residential units would generate a total of approximately 260 and 345 trips during the weekday morning and evening peak hours. These site generated trips were added to the 2027 and 2047 Baseline conditions to represent a full-build of the study area.

Table E1. Proposed Trip Generation

Land Use	Size	Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
LUC 210: Single-Family Detached Housing	155 DUs	28	83	111	95	55	150
LUC 220: Multi-Family Housing (Low-Rise)	406 DUs	36	113	149	123	72	195
	Total	**64**	**196**	**260**	**218**	**127**	**345**

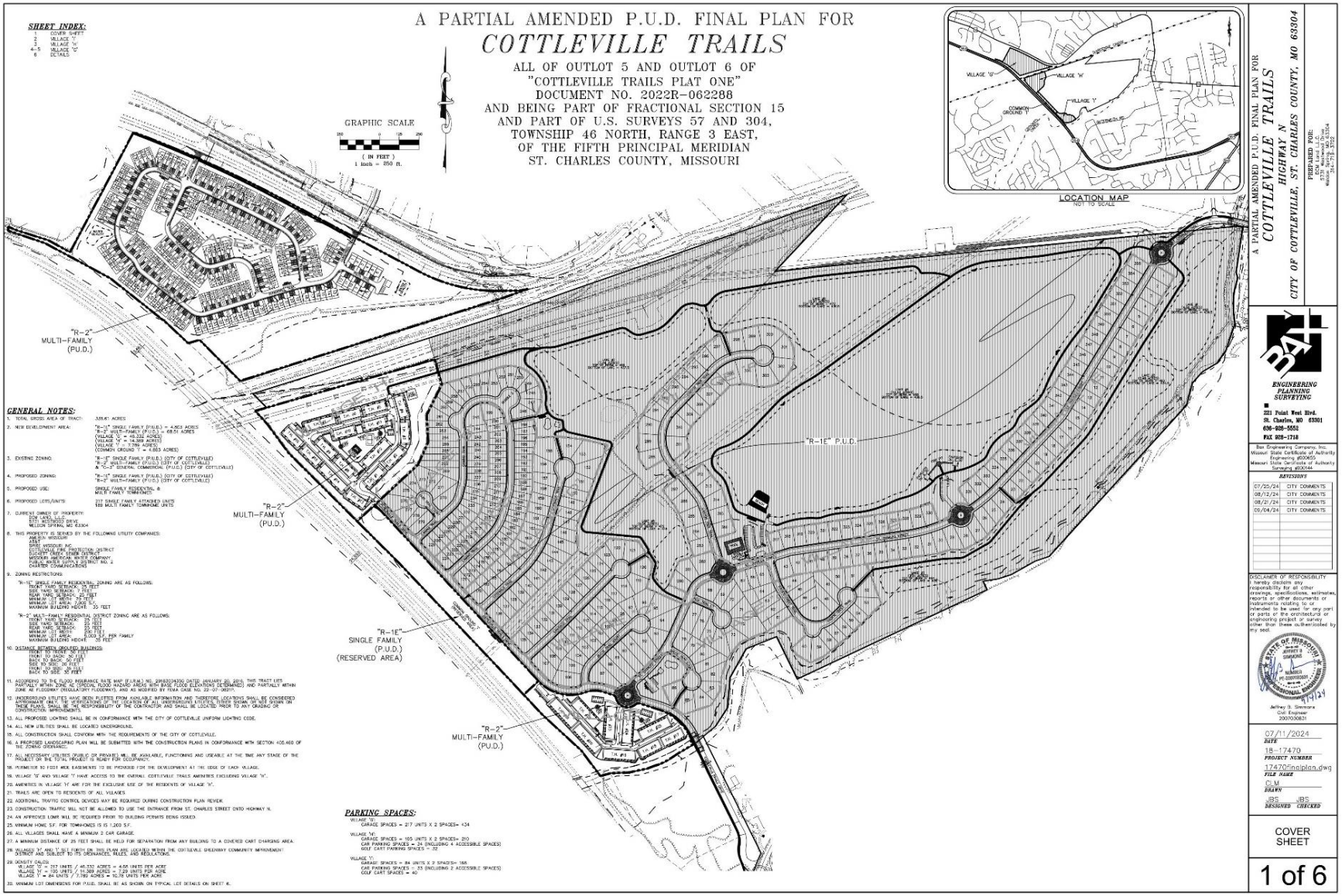


Figure E1. Cottleville Trails Preliminary Site Plan (Provided by Others)

APPENDIX F – DIRECTIONAL DISTRIBUTION ESTIMATE

The new trips from the Cottleville Trails subdivision were assigned to the study area roadways in accordance with an anticipated directional distribution that reflects prevailing traffic patterns. The northern multi-family portion of the residential development will be located north of the Dardenne Creek along Route N with access via Dardenne Farms Drive and Winterbrooke Court. The southern residential development will be accessible via Gutermuth Road & Cottleville Trails Drive as well as via Route N & St. Charles Street. The proposed extension of Cottleville Trails Drive would connect the two sections of the development.

It is anticipated that the directional distribution for the northern residential development would be different than the directional distribution for the southern residential developments given the different locations and access. The proposed directional distribution percentages for the residential site-generated trips are presented in **Table F1**.

Table F1. Directional Distribution Percentages for Cottleville Trails Subdivision Unrealized Trips

To/From	Percentage
Northern Residential Development along Route N	**100%**
Route N to/from west	65%
Route N to/from east (towards Weiss Rd)	35%
Southern Residential Development along Gutermuth Road	**100%**
Route N to/from north	15%
Route N to/from east (towards Mid Rivers Mall Dr)	15%
Gutermuth Road to/from west	70%

APPENDIX G – TRAFFIC VOLUME GRAPHICS

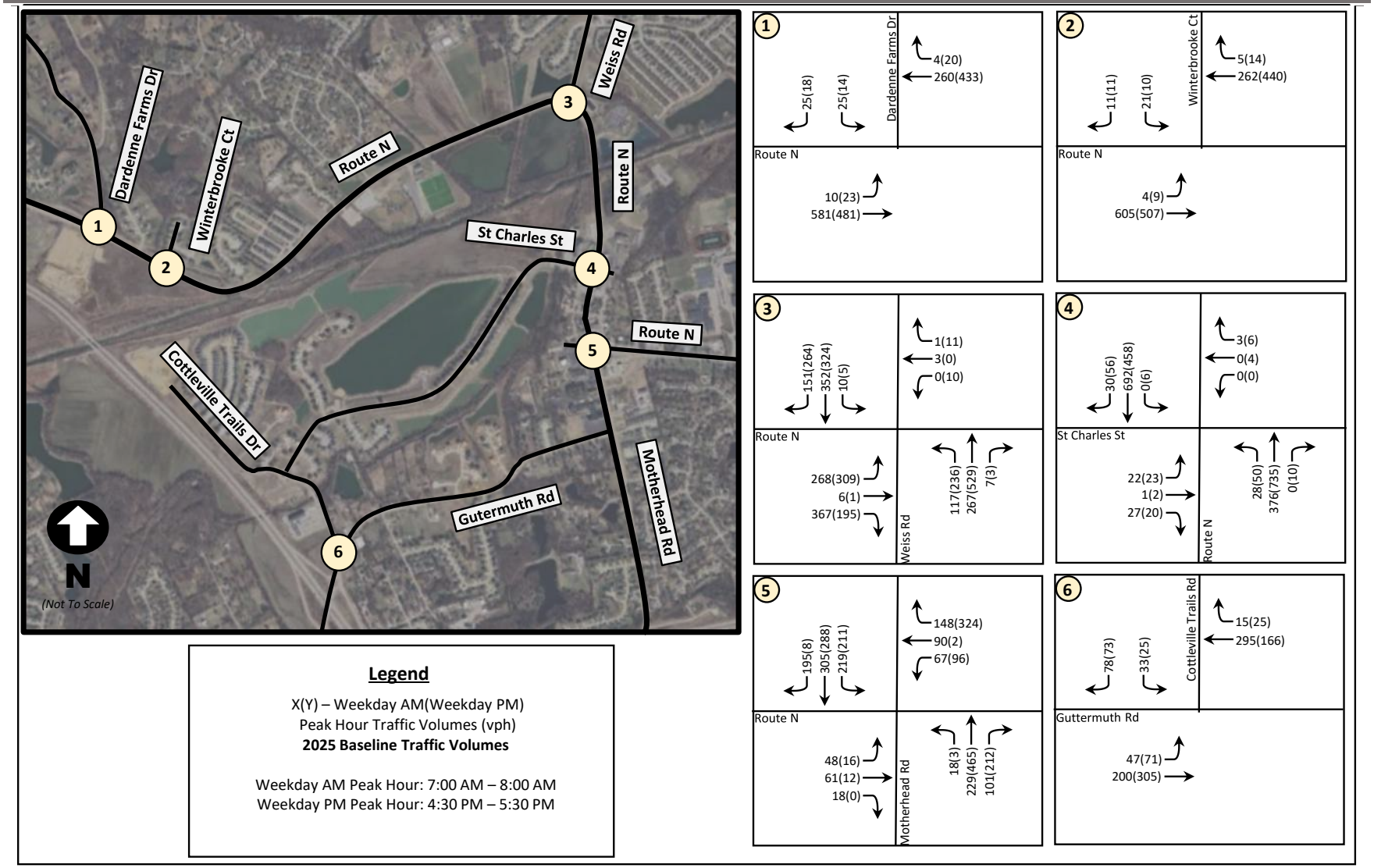


Figure G1. 2025 Baseline Traffic Volumes

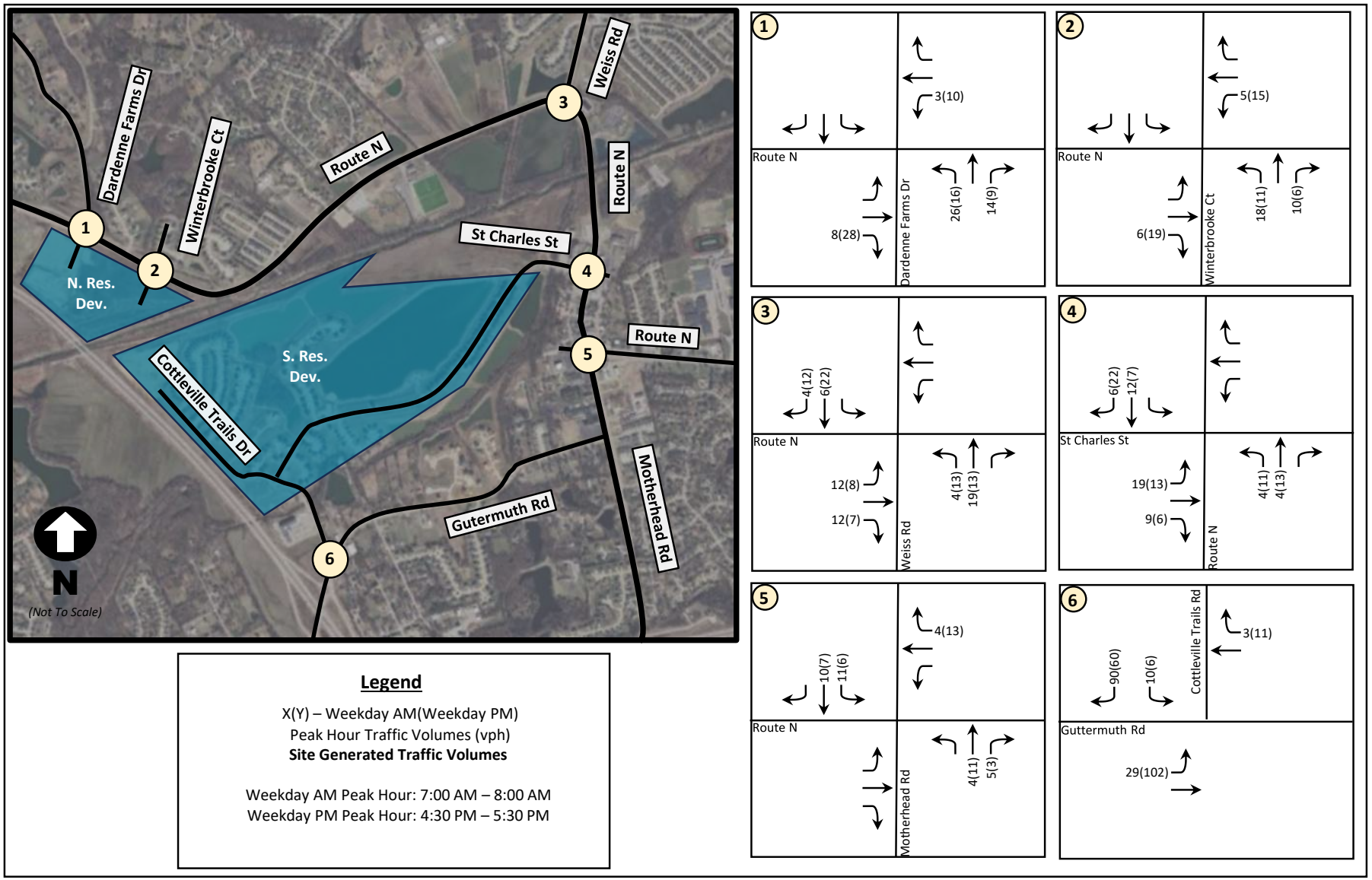


Figure G2. Site Generated Traffic Volumes – Cottleville Trails Subdivision Unbuild Homes

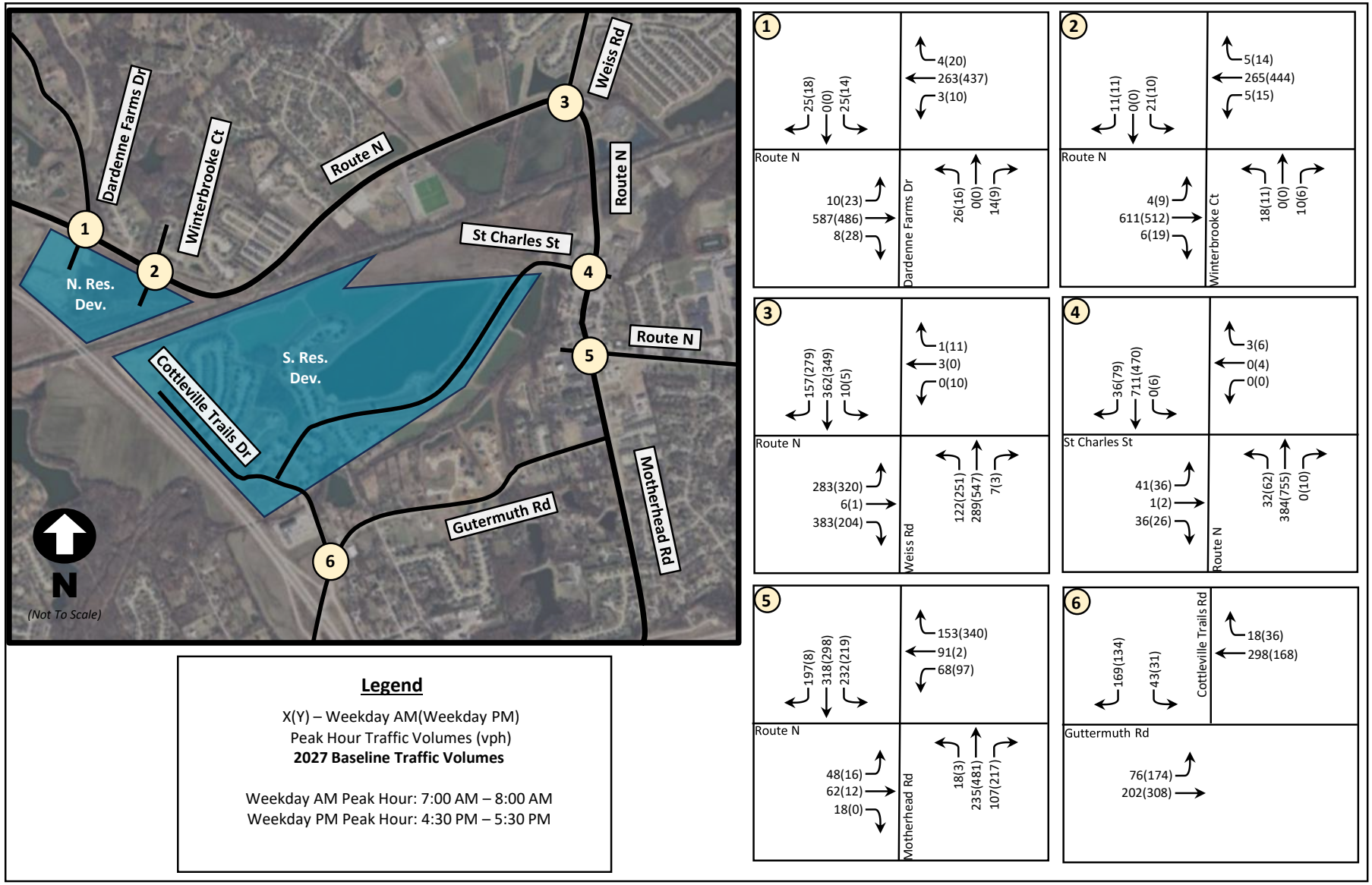


Figure G3. 2027 Baseline Traffic Volumes

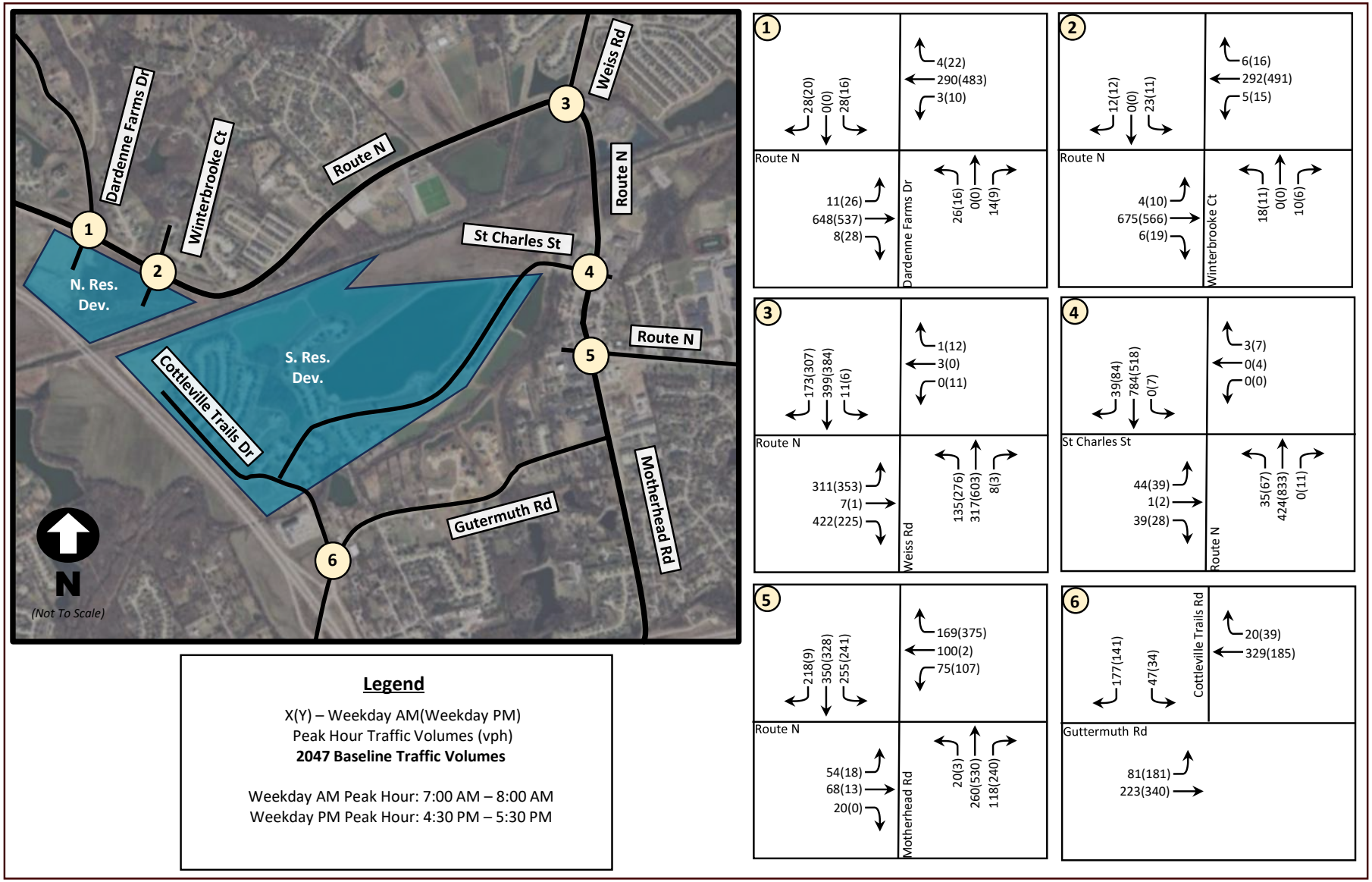


Figure G4. 2047 Baseline Traffic Volumes

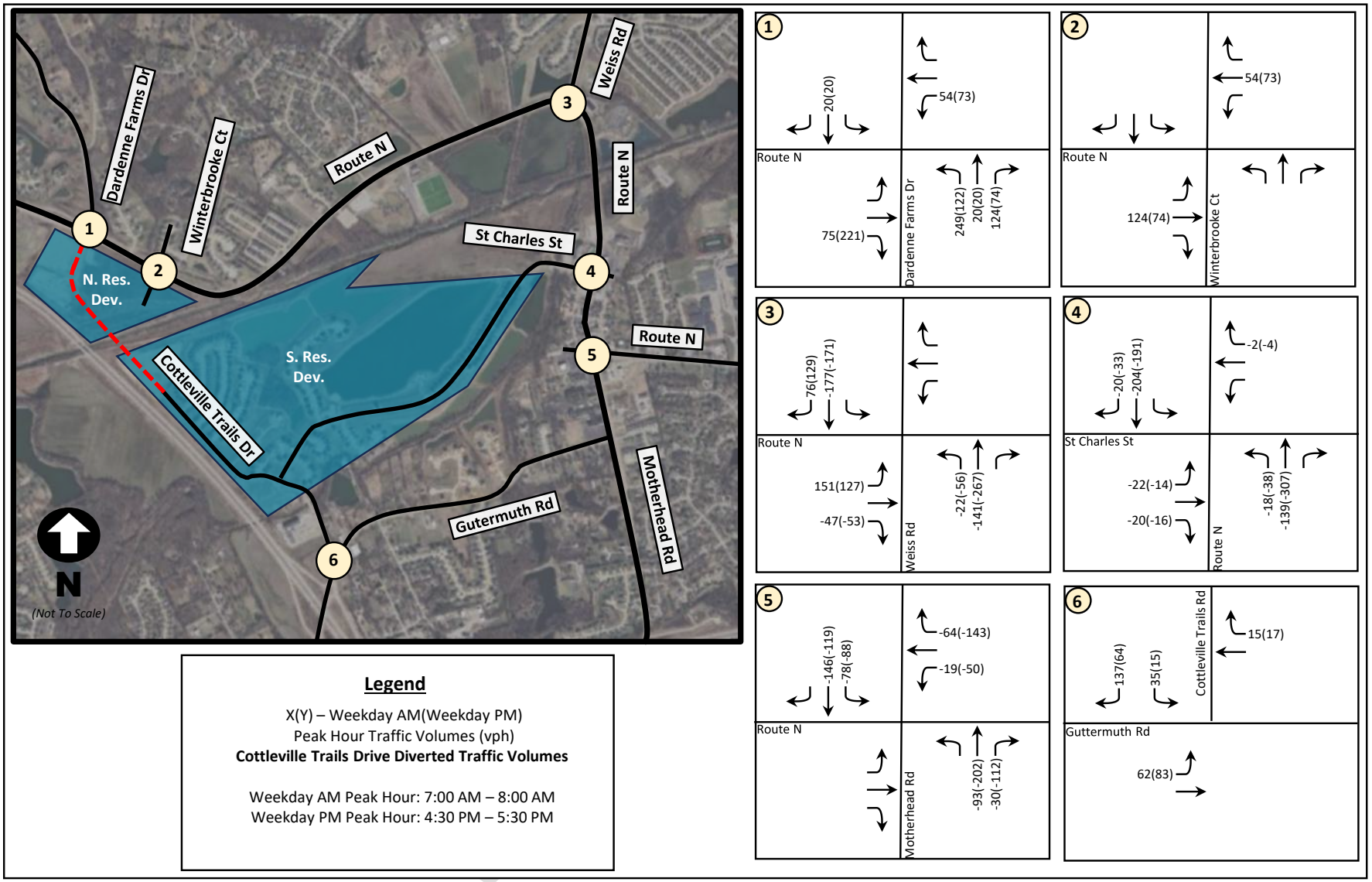


Figure G5. Cottleville Trails Drive Diverted Traffic Volumes

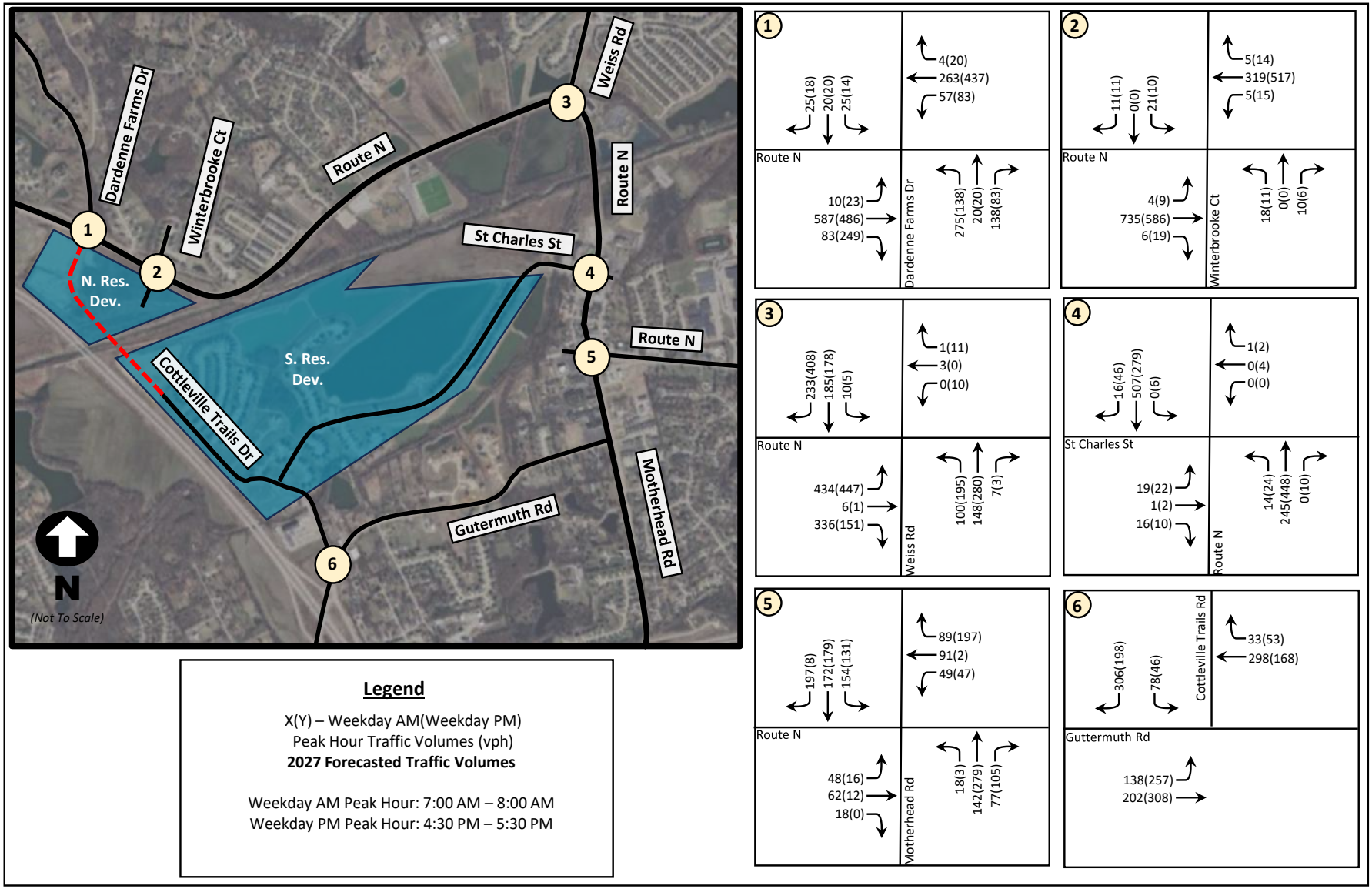


Figure G6. 2027 Forecasted Traffic Volumes – With Cottleville Trails extension

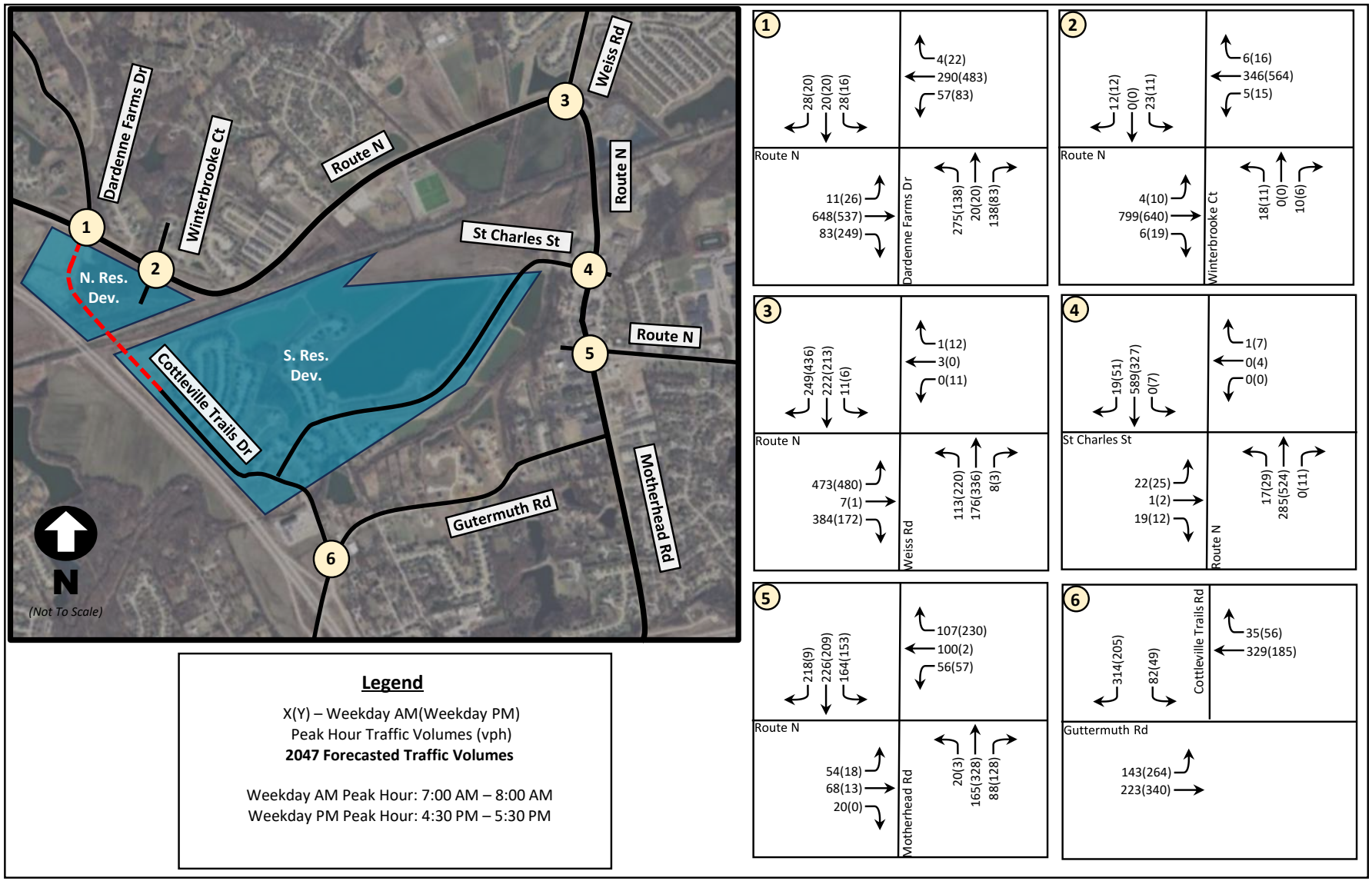
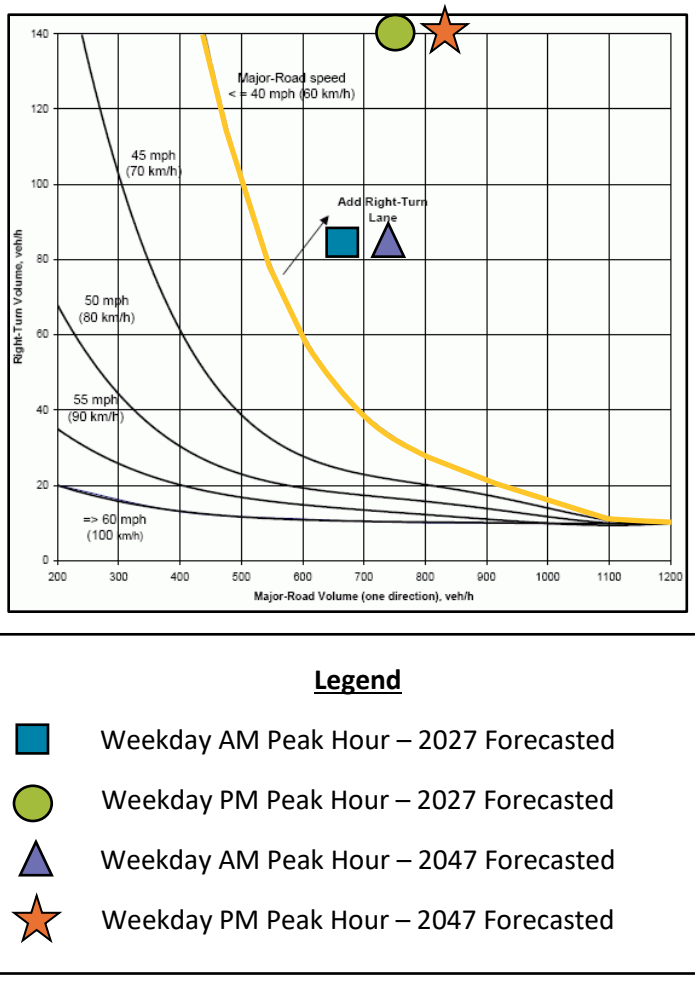


Figure G7. 2047 Forecasted Traffic Volumes – With Cottleville Trails extension

APPENDIX H – TURN-LANE WARRANT ANALYSIS

Various study intersections were analyzed for the addition of a dedicated right-turn lane using Chapter 940.9 of the MoDOT EPG. The speed limit along Route N from Dardenne Farms Drive to Weiss Road is 40 mph, therefore, Figure 940.9.8, "Right Turn Lane Guidelines for Two-Lane Roadways" from MoDOT's EPG was utilized for analysis. The eastbound right-turn lane warrant analysis for Route N & Dardenne Farms Drive is shown in **Table H1** and **Figure H1.** As shown, an eastbound right-turn lane is warranted under both 2027 and 2047 forecasted years. Therefore, it is recommended that right-of-way be provided for a future eastbound right-turn lane at this intersection.



Legend

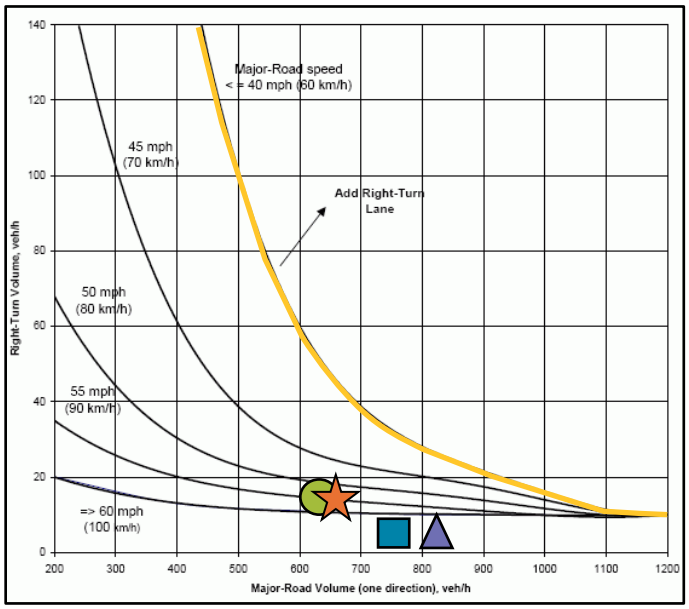
- Weekday AM Peak Hour – 2027 Forecasted
- Weekday PM Peak Hour – 2027 Forecasted
- Weekday AM Peak Hour – 2047 Forecasted
- Weekday PM Peak Hour – 2047 Forecasted

Figure H1. Right-Turn Lane Warrant for Eastbound Route N & Dardenne Farms Dr

Table H1. Right-Turn Lane Warrant for Eastbound Route N & Dardenne Farms Dr

Route N & Dardenne Farms Dr	Right-Turn Volume	Major Road Volumes	Meets Right-Turn Lane Warrant?
2027 Forecasted AM	83	680	**Yes**
2027 Forecasted PM	249	758	**Yes**
2047 Forecasted AM	83	742	**Yes**
2047 Forecasted PM	249	812	**Yes**

The eastbound right-turn lane warrant analysis for Route N & Winterbrooke Court is shown in **Table H2** and **Figure H2.** As shown, an eastbound right-turn lane is not warranted even under the 2047 traffic volumes. Therefore, an eastbound right-turn lane is not recommended at this location.



Legend

- Weekday AM Peak Hour – 2027 Forecasted
- Weekday PM Peak Hour – 2027 Forecasted
- Weekday AM Peak Hour – 2047 Forecasted
- Weekday PM Peak Hour – 2047 Forecasted

Figure H2. Right-Turn Lane Warrant for Eastbound Route N & Winterbrooke Ct

Table H2. Right-Turn Lane Warrant for Eastbound Route N & Winterbrooke Ct

Route N & Winterbrooke Ct	Right-Turn Volume	Major Road Volumes	Meets Right-Turn Lane Warrant?
2027 Forecasted AM	6	745	**No**
2027 Forecasted PM	19	614	**No**
2047 Forecasted AM	6	809	**No**
2047 Forecasted PM	19	669	**No**

The southbound right-turn lane warrant analysis for Route N & St. Charles Street is shown in **Table H3** and **Figure H3.** It should be noted that this segment of Route N has a posted speed limit of 20 mph south of St. Charles Street. North of St. Charles Street, the posted speed limit gradually increases from 20 mph to 25 mph, and then to 30 mph. As shown, a southbound right-turn lane is not warranted even under the 2047 traffic volumes. Therefore, a southbound right-turn lane is not recommended at this location.

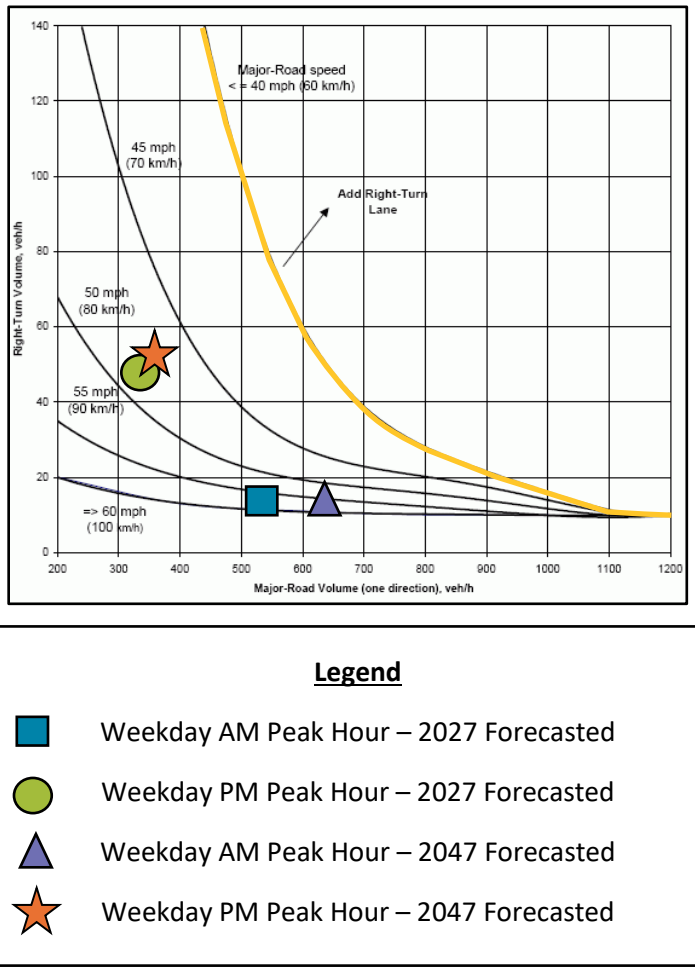


Figure H3. Right-Turn Lane Warrant for Southbound Route N & St. Charles St

Table H3. Right-Turn Lane Warrant for Southbound Route N & St. Charles St

Route N & St. Charles St	Right-Turn Volume	Major Road Volumes	Meets Right-Turn Lane Warrant?
2027 Forecasted AM	16	523	**No**
2027 Forecasted PM	46	331	**No**
2047 Forecasted AM	19	608	**No**
2047 Forecasted PM	51	385	**No**

APPENDIX I – SIGNAL WARRANT ANALYSIS

A signal warrant analysis was completed for three study intersections where signal consideration was merited. Procedures consistent with the Manual on Uniform Traffic Control Devices (MUTCD) 11th Edition, were used to complete the traffic signal warrant analysis. In accordance with Section 902.3.1 of MoDOT's EPG, no right-turns for the side-street approaches were included in the calculation where right-turn lanes would be provided.

Warrant 3: Peak Hour was considered for these locations based on available data. Given the anticipated speed limit along Route N from Dardenne Farms Drive to Weiss Road is 40 mph, Figure 4C-3 was utilized. The results of the traffic signal warrant analysis for Route N & Dardenne Farms Drive can be found in **Table I1** and **Figure I1**. As shown, a signal is warranted during the 2027 and 2047 Weekday AM and PM peak periods.

Table I1. Forecasted Route N & Dardenne Farms Drive Traffic Signal Warrant 3 Results

Peak Period	Minor Street Volume Higher Volume Approach	Major Street Volume Total of Both Approaches	Symbol	Warrant Met?
2027 Weekday AM	295	1,004		**Yes**
2027 Weekday PM	158	1,298		**Yes**
2047 Weekday AM	295	1,093		**Yes**
2047 Weekday PM	158	1,400		**Yes**

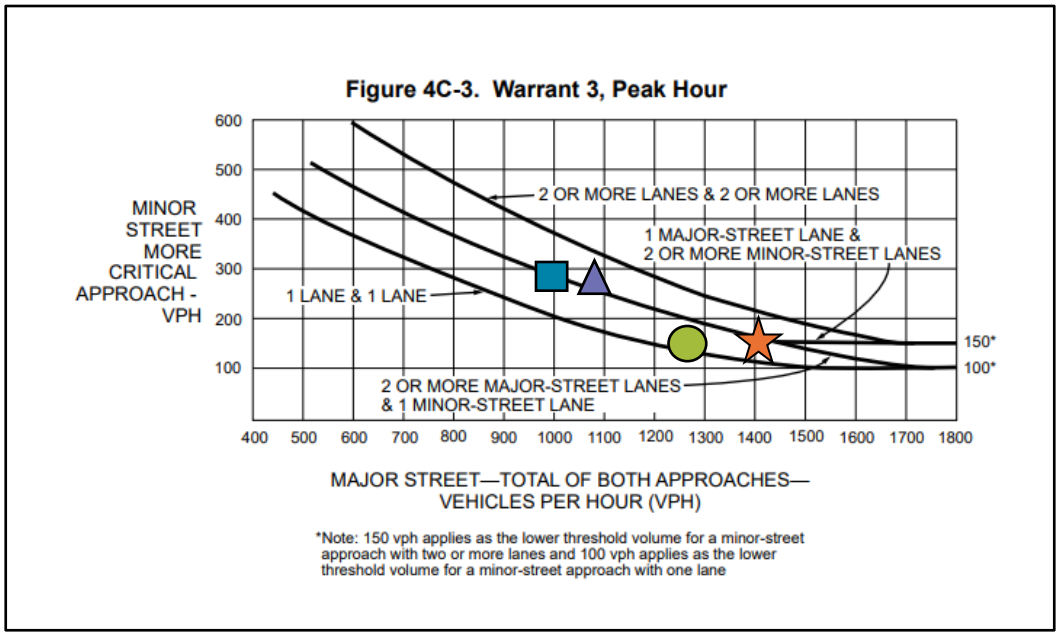


Figure I1. Forecasted Route N & Dardenne Farms Drive Traffic Signal Warrant 3 Results

The results of the traffic signal warrant analysis for Route N & Winterbrooke Court can be found in **Table I2** and **Figure I2**. As shown, a signal is not warranted even under 2047 traffic volumes. Therefore, a signal is not recommended at this location.

Table I2. Forecasted Route N & Winterbrooke Court Traffic Signal Warrant 3 Results

Peak Period	Minor Street Volume Higher Volume Approach	Major Street Volume Total of Both Approaches	Symbol	Warrant Met?
2027 Weekday AM	32	1,074		**No**
2027 Weekday PM	21	1,160		**No**
2047 Weekday AM	35	1,166		**No**
2047 Weekday PM	23	1,264		**No**

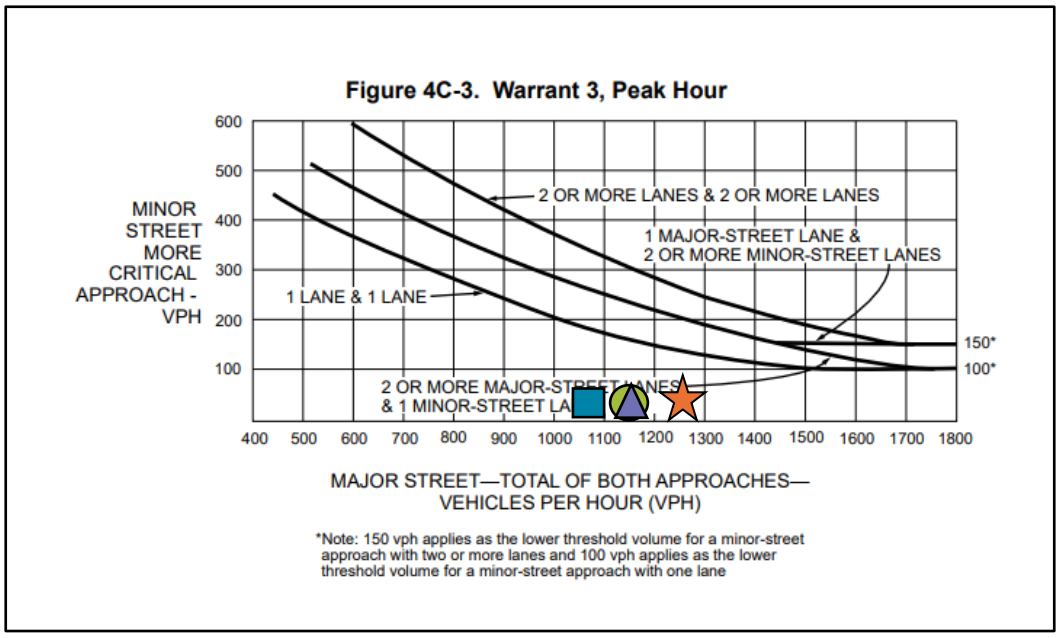


Figure I2. Forecasted Route N & Winterbrooke Court Traffic Signal Warrant 3 Results

The results of the traffic signal warrant analysis for Route N & St. Charles Street can be found in **Table I3** and **Figure I3**. It should be noted that this segment of Route N has a posted speed limit of 20 mph south of St. Charles Street. North of St. Charles Street, the posted speed limit gradually increases from 20 mph to 25 mph, and then to 30 mph. As shown, a signal is not warranted even under 2047 traffic volumes. Therefore, a signal is not recommended at this location.

Table I3. Forecasted Route N & St. Charles Street Traffic Signal Warrant 3 Results

Peak Period	Minor Street Volume Higher Volume Approach	Major Street Volume Total of Both Approaches	Symbol	Warrant Met?
2027 Weekday AM	20	782	■	**No**
2027 Weekday PM	24	813	●	**No**
2047 Weekday AM	23	910	▲	**No**
2047 Weekday PM	27	949	★	**No**

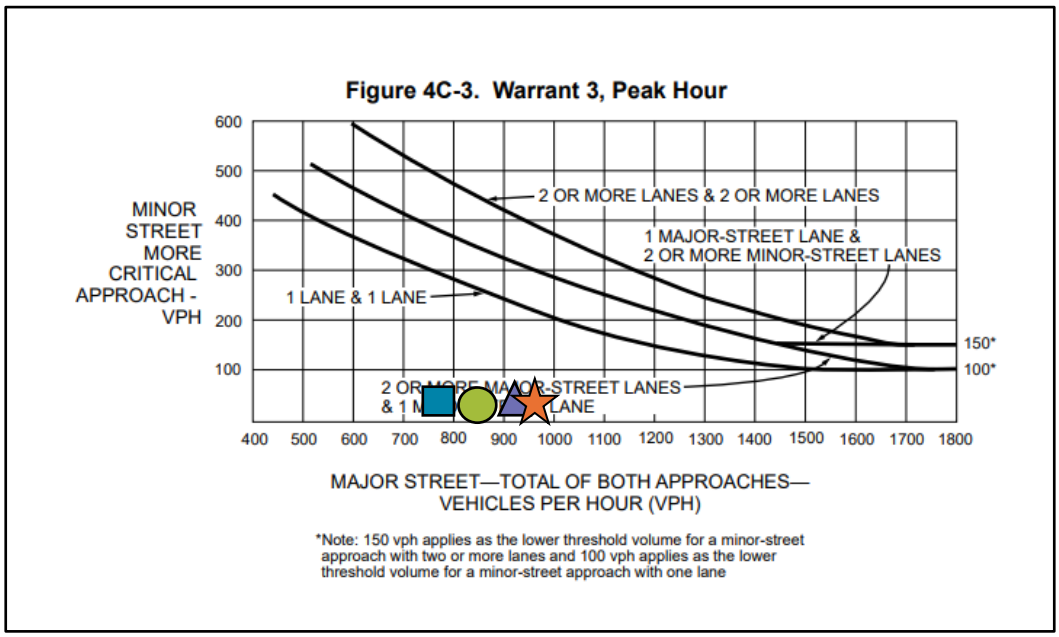


Figure I3. Forecasted Route N & St. Charles Street Traffic Signal Warrant 3 Results

APPENDIX J – MULTIWAY STOP WARRANT ANALYSIS

A multiway stop warrant analysis was completed for Route N & St. Charles Street. Procedures consistent with the Manual on Uniform Traffic Control Devices (MUTCD) 11th Edition, were used to complete the multiway stop warrant analysis. Section 903.5.4.3, "Multiway Stop Applications," of MoDOT's EPG, was utilized for analysis:

Support

- Multiway stop control enhances safety at intersections under specific traffic conditions.
- Key safety concerns include expectations of stopping behavior among pedestrians, bicyclists, and drivers.
- Best used when traffic volumes on intersecting roads are roughly equal.
- Restrictions from EPG 903.5.4.1 apply to multiway stop installations.

Guidance

- Installation should be based on an engineering study.
- Criteria for installation:
    A. Interim Measure: Used when traffic signals are justified but not yet installed.
        - **Traffic Signal is not warranted at Route N & St. Charles Street**
    B. Crash History: Five or more correctable crashes in 12 months (e.g., turn and angle collisions).
        - **There have been zero correctable crashes in the past 12 months at Route N & St. Charles Street**
    C. Minimum Volumes:
        - Major street: ≥ 300 vehicles/hour (any 8 hours of average day).
            - **Route N has more than 300 vehicles/hour during the peak hours**
        - Minor street: ≥ 200 units/hour (vehicles, pedestrians, bicycles) with ≥ 30 seconds delay per vehicle during peak hour.
            - **St. Charles Street has less than 200 units/hour during the peak hour**
        - If major street speed > 40 mph, volume thresholds reduced to 70%.
    D. Partial Criteria: If Criteria B, C.1, and C.2 are met at 80% of minimum values (C.3 excluded).

Option

- Additional considerations for installation:
    A. Left-turn conflict control.
    B. Vehicle/pedestrian conflict control near high pedestrian areas.
    C. Poor visibility at intersection requiring all-way stop.
    D. Residential neighborhood collector streets with similar design and traffic characteristics.

Based on the anticipated traffic volumes and crash history, an all-way stop-controlled intersection would not be warranted. As such, an all-way stop-controlled intersection is not recommended at Route N & St. Charles Street.

APPENDIX K – TRAFFIC OPERATING CONDITIONS

Table K1. Baseline Operating Conditions

Intersection & Movements	LOS (Delay, sec) [95th % Queue, ft] <v/c>			
	2027 Baseline		2047 Baseline	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1) Route N & Dardenne Farms Dr (unsignalized, side-street STOP controlled)				
Eastbound Left Turn	A (8.1) [<25] <0.01>	A (8.8) [<25] <0.04>	A (8.2) [<25] <0.01>	A (9.0) [<25] <0.04>
Westbound Left Turn	A (9.3) [<25] <0.00>	A (8.6) [<25] <0.01>	A (9.5) [<25] <0.00>	A (8.7) [<25] <0.01>
Northbound Approach	D (27.6) [<25] <0.22>	D (26.1) [<25] <0.14>	D (33.8) [25] <0.26>	D (31.6) [<25] <0.17>
Southbound Approach	D (25.4) [40] <0.37>	C (23.1) [<25] <0.22>	D (33.8) [60] <0.48>	D (29.1) [30] <0.30>
2) Route N & Winterbrooke Ct (unsignalized, side-street STOP controlled)				
Eastbound Left Turn	A (8.4) [<25] <0.02>	A (8.7) [<25] <0.01>	A (8.5) [<25] <0.02>	A (8.9) [<25] <0.01>
Westbound Left Turn	A (9.4) [<25] <0.01>	A (8.6) [<25] <0.02>	A (9.8) [<25] <0.01>	A (8.8) [<25] <0.02>
Northbound Approach	D (28.0) [<25] <0.16>	C (24.5) [<25] <0.09>	D (33.8) [<25] <0.20>	D (28.9) [<25] <0.11>
Southbound Approach	C (23.0) [<25] <0.22>	C (22.0) [<25] <0.17>	D (28.2) [28] <0.28>	D (26.4) [<25] <0.22>
3) Route N & Weiss Rd (signalized)				
Overall Intersection	**C (23.7)**	**C (25.5)**	**C (29.6)**	**C (29.3)**
Eastbound Approach	C (25.8) [259] <0.84>	C (27.2) [357] <0.73>	C (33.1) [323] <0.90>	C (30.9) [#410] <0.80>
Eastbound Left Turn	D (35.8) [259] <0.66>	D (42.2) [357] <0.73>	D (39.6) [323] <0.69>	D (48.7) [#410] <0.80>
Eastbound Through/Right	C (20.9) [104] <0.84>	A (6.0) [<25] <0.38>	C (29.6) [228] <0.90>	A (5.9) [<25] <0.40>
Westbound Approach	D (40.8) [<25] <0.07>	C (27.8) [25] <0.12>	D (45.3) [<25] <0.08>	C (30.0) [27] <0.15>
Westbound Left Turn	A (0.0) [<25] <0.00>	E (55.5) [25] <0.12>	A (0.0) [<25] <0.00>	E (58.1) [27] <0.15>
Westbound Through/Right	D (40.8) [<25] <0.07>	A (0.2) [<25] <0.04>	D (45.2) [<25] <0.08>	A (0.2) [<25] <0.05>
Northbound Approach	B (17.9) [241] <0.49>	C (23.1) [532] <0.70>	C (21.8) [268] <0.60>	C (27.2) [631] <0.79>
Northbound Left Turn	B (16.1) [78] <0.49>	C (21.9) [160] <0.70>	C (21.3) [86] <0.60>	C (29.0) [182] <0.79>
Northbound Through/Right	B (18.8) [241] <0.44>	C (23.8) [532] <0.63>	C (22.0) [268] <0.50>	C (26.1) [631] <0.68>
Southbound Approach	C (25.7) [363] <0.72>	C (27.2) [381] <0.68>	C (31.6) [423] <0.78>	C (30.7) [434] <0.74>
Southbound Left Turn	B (11.6) [<25] <0.03>	B (12.2) [<25] <0.05>	B (12.9) [<25] <0.04>	B (12.7) [<25] <0.07>
Southbound Through	C (34.3) [363] <0.72>	D (38.4) [381] <0.68>	D (42.0) [423] <0.78>	D (42.5) [434] <0.74>

Southbound Right Turn	A (4.1) [38] <0.26>	B (15.6) [122] <0.56>	A (5.3) [51] <0.28>	B (18.7) [158] <0.61>
4) Route N & St. Charles St *(unsignalized, side-street STOP controlled)*				
Eastbound Through/Left	F (177.3) [130] <0.96>	F (142.6) [95] <0.78>	F (336.9) [178] <1.33>	F (280.5) [133] <1.13>
Eastbound Right Turn	C (18.9) [<25] <0.17>	B (12.6) [<25] <0.06>	C (21.5) [<25] <0.21>	B (13.3) [<25] <0.07>
Westbound Approach	B (11.8) [<25] <0.02>	D (31.6) [<25] <0.11>	B (12.3) [<25] <0.02>	E (38.1) [<25] <0.15>
Northbound Left Turn	B (10.5) [<25] <0.06>	A (9.1) [<25] <0.07>	B (11.0) [<25] <0.07>	A (9.4) [<25] <0.09>
Southbound Left Turn	A (0.0) [<25] <0.00>	A (9.4) [<25] <0.01>	A (0.0) [<25] <0.00>	A (9.8) [<25] <0.02>
5) Route N & Motherhead Rd (signalized)				
Overall Intersection	**D (40.4)**	**C (20.6)**	**E (71.2)**	**C (23.9)**
Eastbound Approach	C (21.2) [61] <0.28>	C (23.7) [<25] <0.15>	C (21.6) [66] <0.31>	C (23.5) [<25] <0.17>
Eastbound Left Turn	B (18.2) [35] <0.28>	C (20.3) [<25] <0.15>	B (18.7) [38] <0.31>	C (20.3) [<25] <0.17>
Eastbound Through/Right	C (23.0) [61] <0.28>	C (29.2) [<25] <0.11>	C (23.3) [66] <0.29>	C (29.0) [<25] <0.12>
Westbound Approach	D (43.7) [158] <0.90>	B (13.3) [59] <0.68>	D (53.2) [186] <0.96>	B (13.4) [64] <0.70>
Westbound Left Turn	B (16.4) [49] <0.18>	C (20.9) [59] <0.35>	B (16.6) [53] <0.19>	C (21.2) [64] <0.38>
Westbound Through/Right	D (48.8) [158] <0.90>	B (10.7) [<25] <0.68>	E (60.0) [186] <0.96>	B (10.8) [<25] <0.70>
Northbound Approach	C (23.2) [181] <0.62>	C (24.6) [#432] <0.77>	C (26.4) [201] <0.72>	C (30.4) [#490] <0.87>
Northbound Left Turn	B (14.4) [<25] <0.13>	B (10.3) [<25] <0.02>	B (14.6) [<25] <0.14>	B (10.7) [<25] <0.02>
Northbound Through	C (33.2) [181] <0.62>	C (34.4) [#432] <0.77>	D (37.8) [201] <0.72>	D (42.5) [#490] <0.87>
Northbound Right Turn	A (2.6) [<25] <0.24>	A (6.1) [50] <0.37>	A (3.3) [<25] <0.28>	A (7.6) [63] <0.41>
Southbound Approach	D (50.3) [#721] <1.00>	C (21.1) [199] <0.75>	F (109.1) [#812] <1.21>	C (24.3) [#245] <0.81>
Southbound Left Turn	C (27.3) [129] <0.73>	C (30.3) [#189] <0.75>	D (44.4) [#177] <0.89>	D (36.3) [#218] <0.81>
Southbound Through/Right	E (59.2) [#721] <1.00>	B (14.1) [199] <0.33>	F (134.1) [#812] <1.21>	B (15.2) [#245] <0.36>
6) Gutermuth Rd & Cottleville Trails Dr (roundabout)*				
Overall Intersection	**A (6.2)**	**A (6.3)**	**A (6.6)**	**A (6.4)**
Eastbound Approach	A (6.0) [26] <0.18>	A (6.6) [32] <0.23>	A (6.0) [30] <0.20>	A (6.5) [37] <0.26>
Westbound Approach	A (5.0) [94] <0.47>	A (5.9) [81] <0.41>	A (5.1) [113] <0.53>	A (6.1) [93] <0.46>
Southbound Approach	A (8.3) [74] <0.45>	A (6.3) [28] <0.21>	A (9.4) [91] <0.50>	A (6.5) [31] <0.23>

Delay presented in seconds per vehicle

*Roundabout intersection results from SIDRA software

- 95*th* percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles

Table K2. Forecasted Operating Conditions

Intersection & Movements	LOS (Delay, sec) [95th % Queue, ft] <v/c>			
	2027 Forecasted		2047 Forecasted	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1) Route N & Dardenne Farms Dr (roundabout)*				
Overall Intersection	**B (10.1)**	**A (8.7)**	**B (11.3)**	**A (9.6)**
Eastbound Approach	A (6.6) [153] <0.65>	A (6.4) [85] <0.47>	A (6.9) [197] <0.72>	A (6.5) [103] <0.53>
Westbound Approach	A (9.2) [105] <0.51>	B (10.0) [233] <0.73>	A (9.8) [124] <0.56>	B (12.0) [318] <0.80>
Northbound Approach	C (16.9) [131] <0.48>	B (11.6) [41] <0.20>	C (21.1) [178] <0.54>	B (12.4) [45] <0.22>
Southbound Approach	B (11.5) [32] <0.22>	B (12.6) [27] <0.17>	B (12.0) [38] <0.25>	B (13.6) [35] <0.22>
2) Route N & Winterbrooke Ct (unsignalized, side-street STOP controlled)				
Eastbound Left Turn	A (8.5) [<25] <0.02>	A (8.8) [<25] <0.01>	A (8.6) [<25] <0.02>	A (9.0) [<25] <0.02>
Westbound Left Turn	B (9.7) [<25] <0.01>	A (8.9) [<25] <0.02>	B (10.0) [<25] <0.01>	A (9.1) [<25] <0.02>
Northbound Approach	D (31.3) [<25] <0.18>	D (28.7) [<25] <0.11>	E (37.7) [<25] <0.22>	D (34.3) [<25] <0.13>
Southbound Approach	D (25.7) [<25] <0.24>	D (25.5) [<25] <0.20>	D (31.2) [30] <0.30>	D (30.8) [25] <0.26>
3) Route N & Weiss Rd (signalized)				
Overall Intersection	**B (19.1)**	**C (21.5)**	**C (23.0)**	**C (24.3)**
Eastbound Approach	B (18.1) [355] <0.80>	C (23.9) [390] <0.77>	C (22.7) [427] <0.84>	C (26.7) [460] <0.81>
Eastbound Left Turn	C (32.4) [355] <0.80>	C (31.4) [390] <0.77>	D (37.4) [427] <0.84>	D (35.9) [460] <0.81>
Eastbound Through/Right	A (4.6) [<25] <0.60>	A (3.8) [<25] <0.25>	A (9.6) [53] <0.70>	A (3.9) [<25] <0.28>
Westbound Approach	D (38.3) [<25] <0.08>	C (25.0) [25] <0.11>	D (40.8) [<25] <0.08>	C (27.7) [27] <0.14>
Westbound Left Turn	A (0.0) [<25] <0.00>	D (49.9) [25] <0.11>	A (0.0) [<25] <0.00>	D (53.6) [27] <0.14>
Westbound Through/Right	D (38.2) [<25] <0.08>	A (0.2) [<25] <0.03>	D (40.8) [<25] <0.08>	A (0.2) [<25] <0.04>
Northbound Approach	B (19.8) [145] <0.37>	C (25.7) [307] <0.55>	C (22.5) [170] <0.45>	C (28.8) [377] <0.65>
Northbound Left Turn	B (19.2) [79] <0.37>	C (24.7) [167] <0.55>	C (20.9) [87] <0.45>	C (29.1) [190] <0.65>
Northbound Through/Right	C (20.3) [145] <0.28>	C (26.6) [307] <0.41>	C (23.6) [170] <0.35>	C (28.5) [377] <0.49>
Southbound Approach	C (20.4) [193] <0.53>	B (15.9) [204] <0.68>	C (23.7) [230] <0.61>	B (18.5) [244] <0.72>
Southbound Left Turn	B (16.5) [<25] <0.03>	B (19.0) [<25] <0.04>	B (16.2) [<25] <0.03>	B (19.5) [<25] <0.06>
Southbound Through	D (35.2) [193] <0.53>	D (36.2) [204] <0.46>	D (37.8) [230] <0.61>	D (38.0) [244] <0.52>
Southbound Right Turn	A (6.9) [63] <0.45>	A (8.1) [<25] <0.68>	A (9.5) [91] <0.48>	B (10.1) [36] <0.72>
4) Route N & St. Charles St *(unsignalized, side-street STOP controlled)*				

Eastbound Through/Left	D (27.1) [<25] <0.19>	C (22.2) [<25] <0.15>	E (38.1) [28] <0.29>	D (30.2) [<25] <0.23>
Eastbound Right Turn	B (13.3) [<25] <0.05>	B (10.3) [<25] <0.02>	B (14.8) [<25] <0.07>	B (10.7) [<25] <0.02>
Westbound Approach	B (10.2) [<25] <0.00>	B (13.2) [<25] <0.02>	B (10.6) [<25] <0.00>	C (17.3) [<25] <0.06>
Northbound Left Turn	A (9.0) [<25] <0.02>	A (8.1) [<25] <0.02>	A (9.5) [<25] <0.03>	A (8.3) [<25] <0.03>
Southbound Left Turn	A (0.0) [<25] <0.00>	A (0.0) [<25] <0.00>	A (0.0) [<25] <0.00>	A (8.6) [<25] <0.01>
5) Route N & Motherhead Rd (signalized)				
Overall Intersection	**C (24.2)**	**B (13.1)**	**C (33.9)**	**B (14.0)**
Eastbound Approach	C (21.7) [58] <0.35>	C (22.6) [<25] <0.15>	C (20.6) [63] <0.31>	C (23.0) [<25] <0.17>
Eastbound Left Turn	B (18.1) [33] <0.26>	C (20.1) [<25] <0.15>	B (17.5) [36] <0.28>	C (20.7) [<25] <0.17>
Eastbound Through/Right	C (23.7) [58] <0.35>	C (26.8) [<25] <0.09>	C (22.4) [63] <0.31>	C (27.0) [<25] <0.11>
Westbound Approach	D (42.9) [106] <0.86>	B (11.8) [34] <0.53>	E (56.0) [128] <0.95>	B (12.1) [39] <0.57>
Westbound Left Turn	B (16.4) [36] <0.15>	B (18.4) [34] <0.18>	B (15.6) [40] <0.16>	B (19.0) [39] <0.22>
Westbound Through/Right	D (47.6) [106] <0.86>	A (9.9) [<25] <0.53>	E (63.2) [128] <0.95>	B (10.1) [<25] <0.57>
Northbound Approach	B (13.4) [95] <0.30>	B (13.5) [181] <0.38>	B (15.1) [109] <0.40>	B (15.1) [216] <0.49>
Northbound Left Turn	B (11.4) [<25] <0.11>	A (9.7) [<25] <0.02>	B (11.9) [<25] <0.12>	A (9.7) [<25] <0.02>
Northbound Through	C (20.5) [95] <0.30>	B (19.2) [181] <0.38>	C (23.1) [109] <0.40>	C (21.4) [216] <0.49>
Northbound Right Turn	A (0.4) [<25] <0.15>	A (0.4) [<25] <0.16>	A (0.6) [<25] <0.18>	A (1.4) [<25] <0.20>
Southbound Approach	C (20.8) [#439] <0.72>	B (11.8) [120] <0.27>	C (34.7) [#565] <0.92>	B (12.6) [139] <0.37>
Southbound Left Turn	B (13.3) [76] <0.36>	B (10.7) [67] <0.27>	B (15.9) [80] <0.44>	B (12.2) [77] <0.37>
Southbound Through/Right	C (23.2) [#439] <0.72>	B (12.6) [120] <0.20>	D (40.3) [#565] <0.92>	B (12.9) [139] <0.24>
6) Gutermuth Rd & Cottleville Trails Dr (roundabout)*				
Overall Intersection	**B (10.4)**	**A (7.2)**	**B (13.1)**	**A (7.5)**
Eastbound Approach	A (7.1) [29] <0.19>	A (7.3) [36] <0.25>	A (7.0) [33] <0.22>	A (7.2) [39] <0.26>
Westbound Approach	A (5.9) [126] <0.57>	A (7.5) [118] <0.53>	A (6.2) [151] <0.63>	A (8.3) [145] <0.57>
Southbound Approach	C (16.7) [317] <0.84>	A (6.5) [47] <0.32>	C (24.1) [443] <0.92>	A (6.7) [52] <0.34>

Delay presented in seconds per vehicle

*Roundabout intersection results from SIDRA software

- 95*th* percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles

Table K3. Route N & Dardenne Farms Dr Forecasted Operating Conditions (Signalized)

Intersection & Movements	LOS (Delay, sec) [95th % Queue, ft] <v/c>			
	2027 Forecasted		2047 Forecasted	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1) Route N & Dardenne Farms Dr (signalized)				
Overall Intersection	**C (34.2)**	**C (26.6)**	**D (37.8)**	**C (27.8)**
Eastbound Approach	D (40.6) [579] <0.91>	C (25.0) [424] <0.74>	D (45.8) [674] <0.95>	C (25.5) [486] <0.76>
Eastbound Left Turn	B (12.3) [<25] <0.03>	B (13.7) [<25] <0.14>	B (12.1) [<25] <0.03>	B (13.8) [<25] <0.17>
Eastbound Through	D (45.9) [579] <0.91>	C (33.5) [424] <0.74>	D (51.4) [674] <0.95>	C (33.8) [486] <0.76>
Eastbound Right Turn	A (0.3) [<25] <0.11>	B (10.4) [109] <0.39>	A (0.3) [<25] <0.11>	A (9.8) [109] <0.37>
Westbound Approach	B (19.2) [218] <0.37>	C (31.2) [410] <0.77>	B (19.8) [241] <0.39>	C (32.3) [473] <0.80>
Westbound Left Turn	B (16.8) [44] <0.31>	B (16.0) [58] <0.31>	B (19.2) [44] <0.38>	B (15.9) [59] <0.33>
Westbound Through/Right	B (19.7) [218] <0.37>	C (33.5) [410] <0.77>	B (19.9) [241] <0.39>	C (34.6) [473] <0.80>
Northbound Approach	C (29.2) [316] <0.69>	B (18.2) [138] <0.29>	C (32.1) [316] <0.71>	C (20.2) [150] <0.31>
Northbound Left Turn	D (41.3) [316] <0.69>	C (25.3) [138] <0.29>	D (45.7) [316] <0.71>	C (28.2) [150] <0.31>
Northbound Through/Right	A (8.2) [68] <0.26>	A (8.6) [52] <0.16>	A (8.5) [68] <0.26>	A (9.4) [56] <0.17>
Southbound Approach	E (58.2) [157] <0.65>	C (32.1) [88] <0.24>	E (60.0) [#175] <0.65>	D (35.9) [102] <0.28>

Delay presented in seconds per vehicle

- 95*th* percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycle