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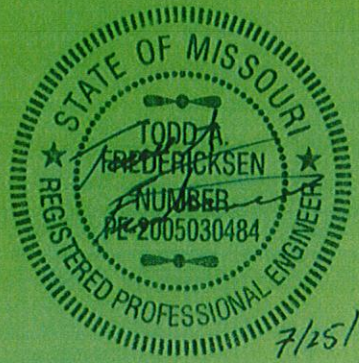
Development Services

Traffic Impact Study

WOODSIDE RIDGE

PRYOR ROAD AND O'BRIEN ROAD
LEE'S SUMMIT, MO

July 2018



Prepared for:
Summit Custom Homes

Prepared by:
Olsson Associates
7301 W. 133rd Street, Suite 200
Overland Park, KS 66213
TEL 913.381.1170
www.olssonassociates.com

Olsson Associates Project No. 018-1140

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1.0 INTRODUCTION AND OBJECTIVE

This report studies traffic impacts associated with proposed residential development along the west side of Pryor Road between Chipman Road and 3rd Street in Lee's Summit, Missouri. The objective of this study is to evaluate operations at study intersections for the scenarios detailed below. The report will review roadway conditions and consider potential impacts of the proposed development regarding turn lanes, storage bays, and intersection control methods. Study intersections include:

- Pryor Road and Chipman Road
- Pryor Road and Ashurst Drive (currently a driveway for The Meadows at John Knox Village)
- Pryor Road and O'Brien Road
- Pryor Road and Shamrock Avenue
- Pryor Road and 3rd Street

The two scenarios that were analyzed as a part of this study are as follows:

- Existing Conditions
- Existing Conditions Plus Development Conditions

The approximate location of the proposed development is shown on the vicinity map in **Figure 1**.

City of Lee's Summit staff provided guidance on study intersections and analysis periods to review. City staff indicated that there are no approved projects near the project area to consider in this traffic study.

FIGURE 1

Vicinity Map

Woodside Ridge
Lee's Summit, MO

LEGEND

Site Location

2.0 DATA COLLECTION

The data collection effort included acquiring AM and PM peak hour turning movement counts and documentation of current roadway geometrics. Intersection turning movement counts were conducted during the AM and PM peak hour periods on Tuesday, May 22nd, 2018 at the following intersections:

- Pryor Road and Chipman Road
- Pryor Road and O'Brien Road
- Pryor Road and Shamrock Avenue
- Pryor Road and 3rd Street

Existing north/south through traffic was assigned to the study intersection of Pryor Road and Ashurst Drive (currently a right-in/right-out drive providing access to the information center for The Meadows at John Knox Village) using count data from the adjacent intersections of Pryor Road with Chipman Road and Pryor Road with O'Brien Road. Based on conversations with City staff, the information center generates little to no traffic.

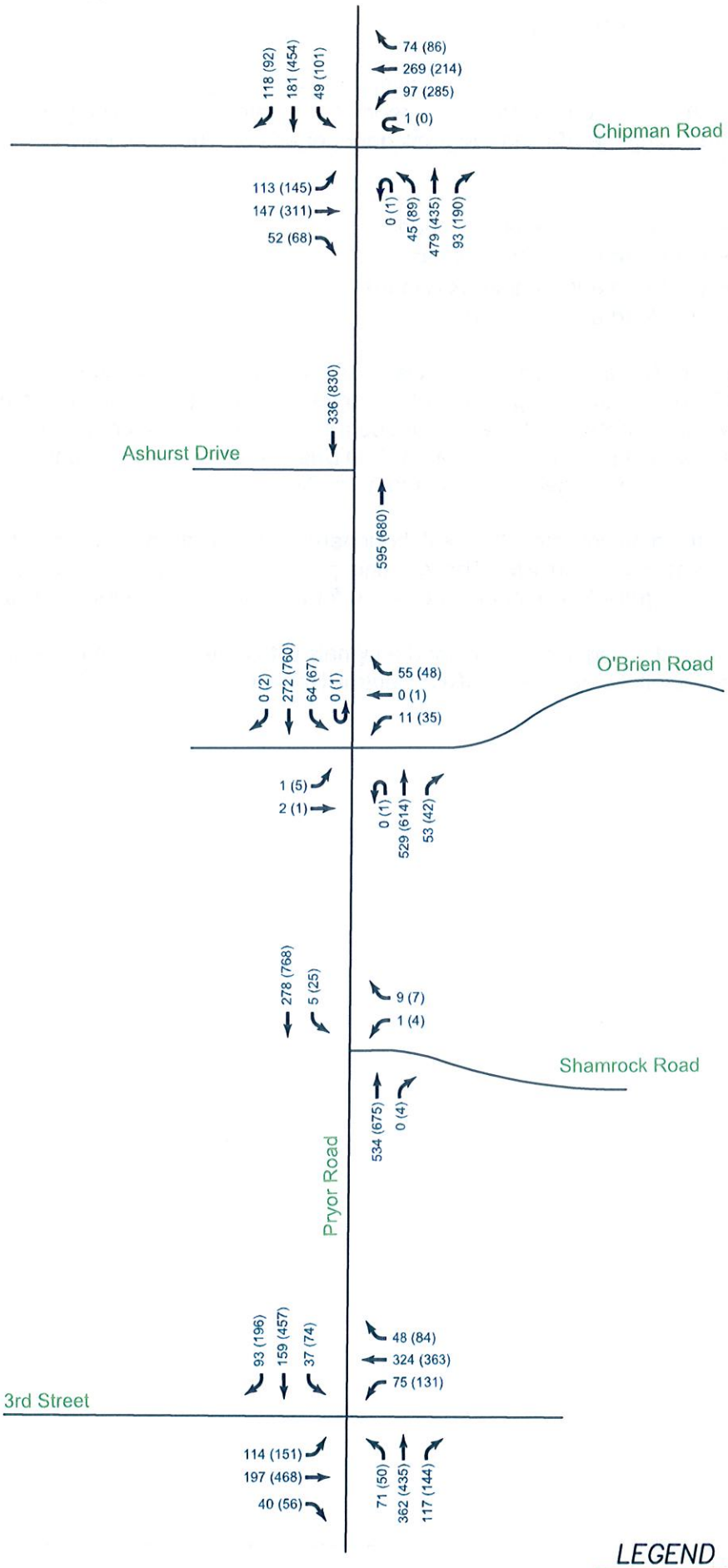
Based on the data collected, the peak hour periods for the study area were determined to be 7:00-8:00 AM and 5:00-6:00 PM. The existing peak hour volumes at the study intersections are illustrated in **Figure 2**. Count data collected for this study can be found in **Appendix A**.

Existing signal timing information for the signals within the study area was obtained using the Mid America Regional Council's (MARC) Central Traffic Control System (TransSuite).

FIGURE 2

Existing
Peak Hour Volumes

Woodside Ridge
Lee's Summit, MO



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AM (PM) *Peak Hour Volume*

3.0 EXISTING CONDITIONS

To provide a baseline for comparative purposes for the proposed development scenario, traffic control operations were reviewed for the study intersections. This analysis considers existing conditions and does not include the consideration of any proposed development.

3.1 Network Characteristics

Six roadways within the study area were considered during analysis: Pryor Road, Chipman Road, Ashurst Drive, O'Brien Road, Shamrock Road, and 3rd Street. Current network characteristics are summarized in **Table 1** below. The functional classification for each roadway was acquired from the City of Lee's Summit, Missouri Existing Functional Classification Map. The intersections of Pryor Road with Chipman Road, O'Brien Road, and 3rd Street are signalized. The intersections of Pryor Road with Ashurst Drive and Shamrock Road operate under two-way stop control for east/west movements.

TABLE 1: EXISTING NETWORK SUMMARY

Roadway	Functional Classification	Section	Median Type	Posted Speed
Pryor Road	Major Arterial	4-Lane	Raised	35 mph
Chipman Road	Major Arterial	4-Lane	Raised east of Pryor Road, no treatment west of Pryor Road	35 mph
Ashurst Drive	Local	2-Lane	Raised at Pryor Road	25 mph
O'Brien Road	Residential Collector	2-Lane	n/a	25 mph
Shamrock Road	Local	2-Lane	n/a	25 mph
3rd Street	Major Arterial	4-Lane	No treatment*	35 east of Pryor Road, 40 mph west of Pryor Road

*A median is proposed to be provided along 3rd Street east of Pryor Road with a current design project.

3.2 Existing Warrant Analysis

Existing Signal Warrants: A traffic signal may be justified if traffic conditions meet any of the applicable nine signal warrants described in the 2009 Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD provides criteria for conducting an engineering study to determine whether a traffic signal is appropriate at any intersection.

For this study, Warrants 2 and 3 were reviewed under existing conditions to determine if alternative control measures are warranted for the currently unsignalized intersection of Pryor Road and Shamrock Avenue. All other study intersections are currently signalized or have limited use (Ashurst Drive). Based on data collected, neither the Four-Hour Vehicular Volume Warrant (Warrant 2) nor the Peak Hour Warrant (Warrant 3) meet the necessary criteria to warrant a traffic signal at the intersection of Pryor Road and Shamrock Avenue.

Existing Turn Lane Warrants: The City of Lee's Summit *Access Management Code*, dated March 2018, was used to determine if any additional turn lanes may be required. The code provides direction on when turn lanes should be provided based on intersection control, roadway classification and/or traffic volumes.

Based on information provided in the Lee's Summit *Access Management Code*, a left-turn lane is required for each approach at signalized intersections. Currently, there is no eastbound left-turn lane provided at the intersection of Pryor Road and O'Brien Road. Peak hour traffic volumes for the eastbound movement are low, thus capacity analysis was also reviewed for existing conditions to determine if a dedicated left-turn lane is recommended based on existing conditions.

Dual left-turn lanes are recommended by the Lee's Summit *Access Management Code* to be planned for all approaches of an arterial/arterial intersection, which would include the intersections of Pryor Road with Chipman Road and Pryor Road with 3rd Street. Neither of these intersections currently provide dual left-turn lanes, while all approaches provide a single left-turn lane. The left-turn lanes currently provided at these intersections do not meet the minimum recommended left-turn lane storage distance of 250 feet for arterial/arterial intersections, set forth in the Lee's Summit *Access Management Code*, with the exception of the southbound and westbound movements at Pryor Road and Chipman Road and the southbound approach at Pryor Road and 3rd Street. Capacity analysis was also reviewed for existing conditions to determine if providing additional storage and/or dual left-turn lanes is recommended based on existing operations.

Recommendation of a right-turn lane is based on roadway classification and minimum traffic volumes outlined in the *Access Management Code*. Based on this information, a right-turn lane is required for the following movements based on existing conditions:

- Pryor Road and 3rd Street
  - Eastbound and northbound movements
- Pryor Road and O'Brien Road
  - Northbound movement
- Pryor Road and Chipman Road
  - Southbound, northbound and eastbound movements

Capacity analysis was also reviewed for the existing conditions to determine if providing a right-turn lane is recommended at any of these locations based on existing operations.

Existing conditions lane configurations and traffic control for the study network are illustrated in **Figure 3**. Signal and turn lane warrant analysis sheets can be found in **Appendix B**.

3.3 Existing Capacity Analysis

Capacity analysis was performed for the study intersections utilizing the existing lane configurations and traffic control. Analysis was conducted using Synchro, Version 10, based on the Highway Capacity Manual (HCM) delay methodologies. In order to utilize the latest methodology, HCM 6th Edition, U-turn movements at the signalized intersections were coded as left-turn movements during analysis. Due to the low volume of U-turn movements at study intersections, considering U-turn movements as a left-turn movement is expected to have minimal impact on results of capacity analysis. For simplicity, the amount of control delay is equated to a grade or Level of Service (LOS) based on thresholds of driver acceptance. The amount of delay is assigned a letter grade A through F, LOS A representing little or no delay and LOS F representing very high delay. **Table 2** shows the delays associated with each LOS grade for signalized and unsignalized intersections, respectively.

TABLE 2: INTERSECTION LOS CRITERIA

Level-of-Service	Average Control Delay (seconds)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

Highway Capacity Manual (HCM 6th Edition)

The signalized study intersections of Pryor Road and Chipman Road, Pryor Road and O'Brien Road, and Pryor Road and 3rd Street are operating at LOS C or better overall during both the AM and PM peak hour periods. All individual movements at these intersections are operating at a LOS C or better with acceptable queues during the AM and PM peak hour periods. The individual movements at the unsignalized study intersections of Pryor Road and Ashurst Drive and Pryor Road and Shamrock Drive are operating at a LOS C or better with acceptable queues during the AM and PM peak hour periods.

The existing capacity analysis summary is illustrated in **Figure 4**. Detailed results may be found in **Appendix B**.

Existing operations were also reviewed to determine if turn lane improvements, based on direction provided in the *Access Management Code,* should be provided. Level of service as well as 95th-percentile queue length were considered. The 95th-percentile queue represents the queue length that has a 5 percent probability of being exceeded during the peak hour.

Based on the results of the operational analysis, study intersections are operating at acceptable levels of service with the current intersection configurations. Existing through movement queues for some approaches were found to extend beyond the provided turn lane storage during a portion of peak hour periods at the intersections of Pryor Road with Chipman Road and 3rd Street; however, the delays associated with these movements are still believed to be acceptable with no individual movement operating worse than a LOS C. Existing queuing for turning movements is contained within the provided storage length. Although existing turn lanes or storage lengths may not meet direction provided in the *Access Management Code*, intersections are operating at an acceptable level of service. These turn lanes are likely to provide some operational benefits; however, it is believed that these improvements are not necessary at this time due to the acceptable operations under current conditions. A summary of this review is described below:

- Pryor Road and 3rd Street
  - Northbound right-turn lane
    - Current movement operations are acceptable (LOS C during the AM and PM peak hours) with current lane configurations
  - Eastbound right-turn lane
    - Current movement operations are acceptable (LOS C during the AM and PM peak hours) with current lane configurations
  - Additional left-turn storage/dual left-turn lanes
    - Current left-turn operations are acceptable (LOS C or better during both peak hours)
    - Existing left-turn 95th-percentile queues are contained within storage lanes
- Pryor Road and O'Brien Road

    - Northbound right-turn lane
        - Current movement operations are acceptable (LOS B during the AM and PM peak hours) with current lane configurations
    - Eastbound left-turn lane
        - Current movement operations are acceptable (LOS C during the AM and PM peak hours) with current lane configurations
- Pryor Road and Chipman Road
    - Southbound right-turn lane
        - Current movement operations are acceptable (LOS B during the AM peak hour and LOS C during the PM peak hour) with current lane configurations
        - Existing utilities in the northwest quadrant impact the feasibility of a right-turn lane installation
    - Northbound right-turn lane
        - Current movement operations are acceptable (LOS B during the AM peak hour and LOS C during the PM peak hour) with current lane configurations
        - Existing utilities in the southeast quadrant impact the feasibility of a right-turn lane installation
    - Eastbound right-turn lane
        - Current movement operations are acceptable (LOS C during the AM and PM peak hours) with current lane configurations
        - Existing utilities in the southwest quadrant impact the feasibility of a right-turn lane installation
    - Additional left-turn storage/dual left-turn lanes
        - Current left-turn operations are acceptable (LOS C or better during both peak hours)
        - Existing left-turn 95th-percentile queues are contained within storage lanes

FIGURE 3

Existing
Lane Configuration and
Traffic Control

Woodside Ridge
Lee's Summit, MO

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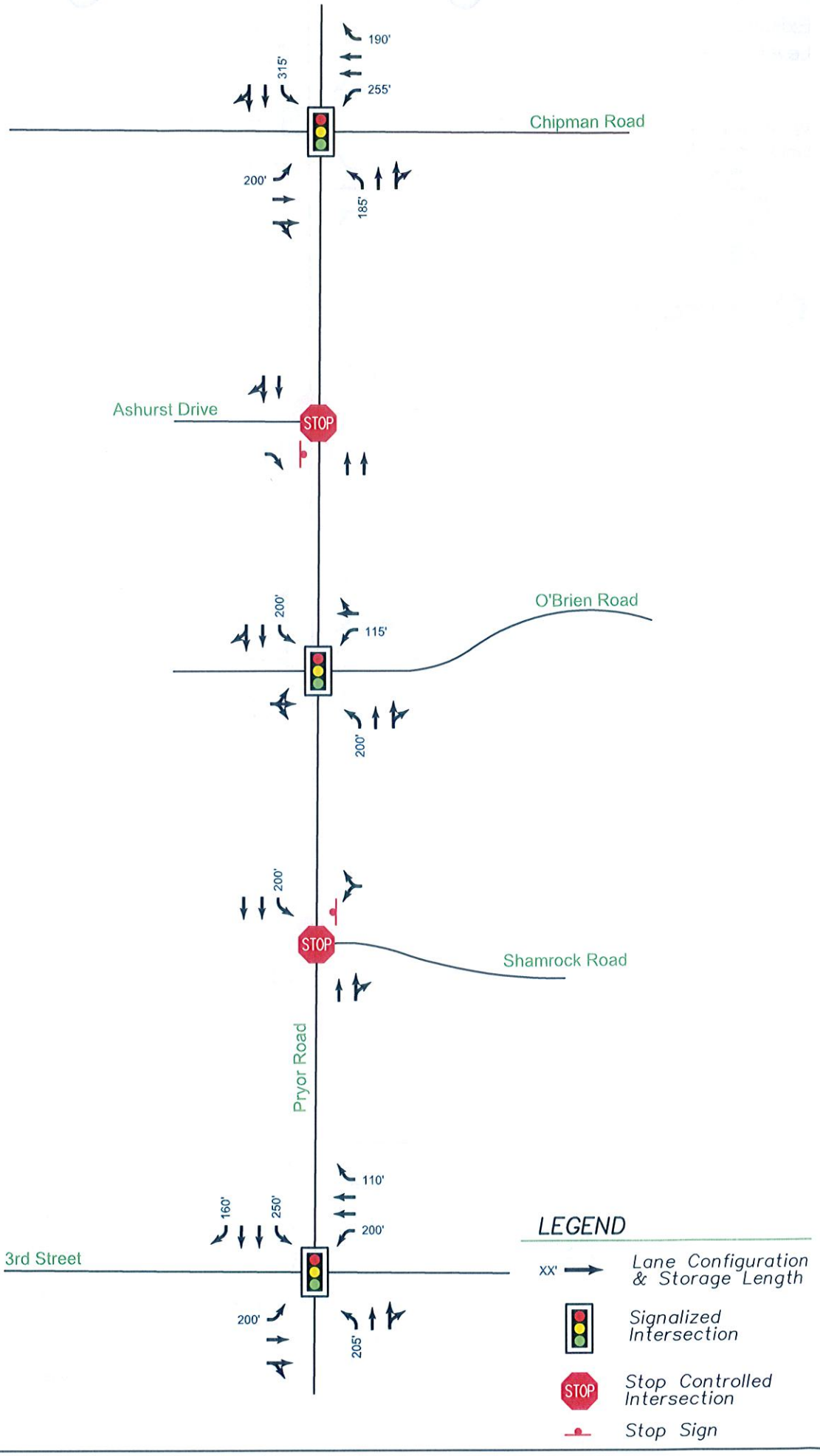

FIGURE 4

Existing Level of Service

Woodside Ridge
Lee's Summit, MO

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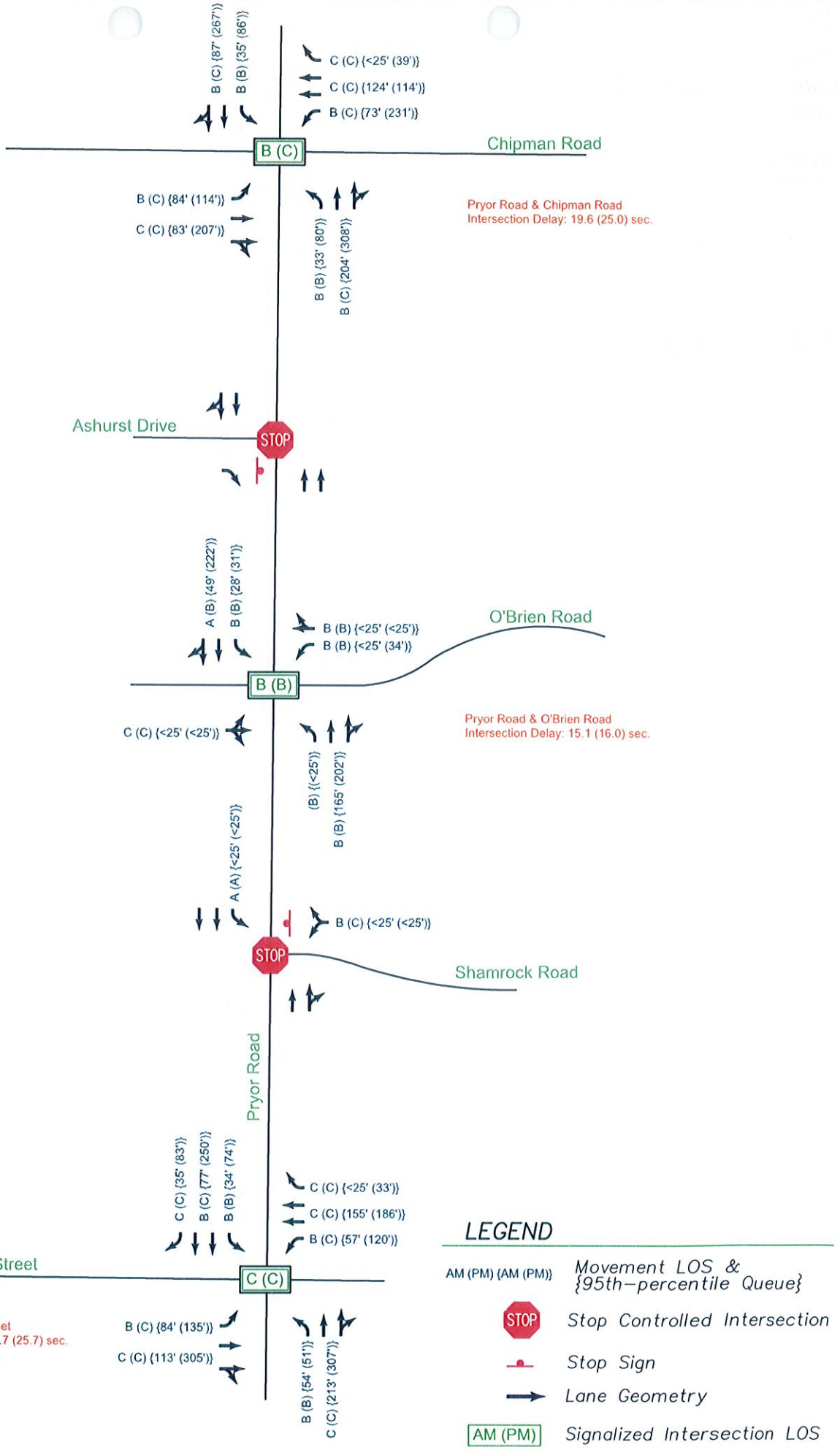


4.0 SITE CHARACTERISTICS

This scenario considers the proposed residential development located west of Pryor Road. The proposed development consists of 206 single-family residential units. The site plan associated with this proposed development is illustrated in **Figure 5**.

Proposed Access

Access to the development is proposed along the extension of Ashurst Drive, O'Brien Road, and Shamrock Road.

The proposed roadway extensions will provide connections to existing residential development located west of the site. The existing right-in/right-out access at Pryor Road, utilized by The Meadows at John Knox Village, is proposed to extend west and connect with existing residential development along Ashurst Drive. O'Brien Road, which currently terminates approximately 365 feet west of Pryor Road, will extend west to provide connections with Killarney Street and Ambersham Drive, providing access to existing residential development. Shamrock Road, which currently has no access west of Pryor Road, will extend west to connect with Joshua Drive, providing access to existing residential development. As part of a future City project, improvements are planned for the intersection of Pryor Road and Shamrock Road including a proposed northbound left-turn lane and eastbound left-turn lane at this location. These planned City improvements were considered complete under the evaluation of existing plus development conditions. The proposed roadway connections are shown to align with the existing road network and are consistent with requirements provided in the *Access Management Code.*

Roadway Spacing and Thoroughfare Master Plan

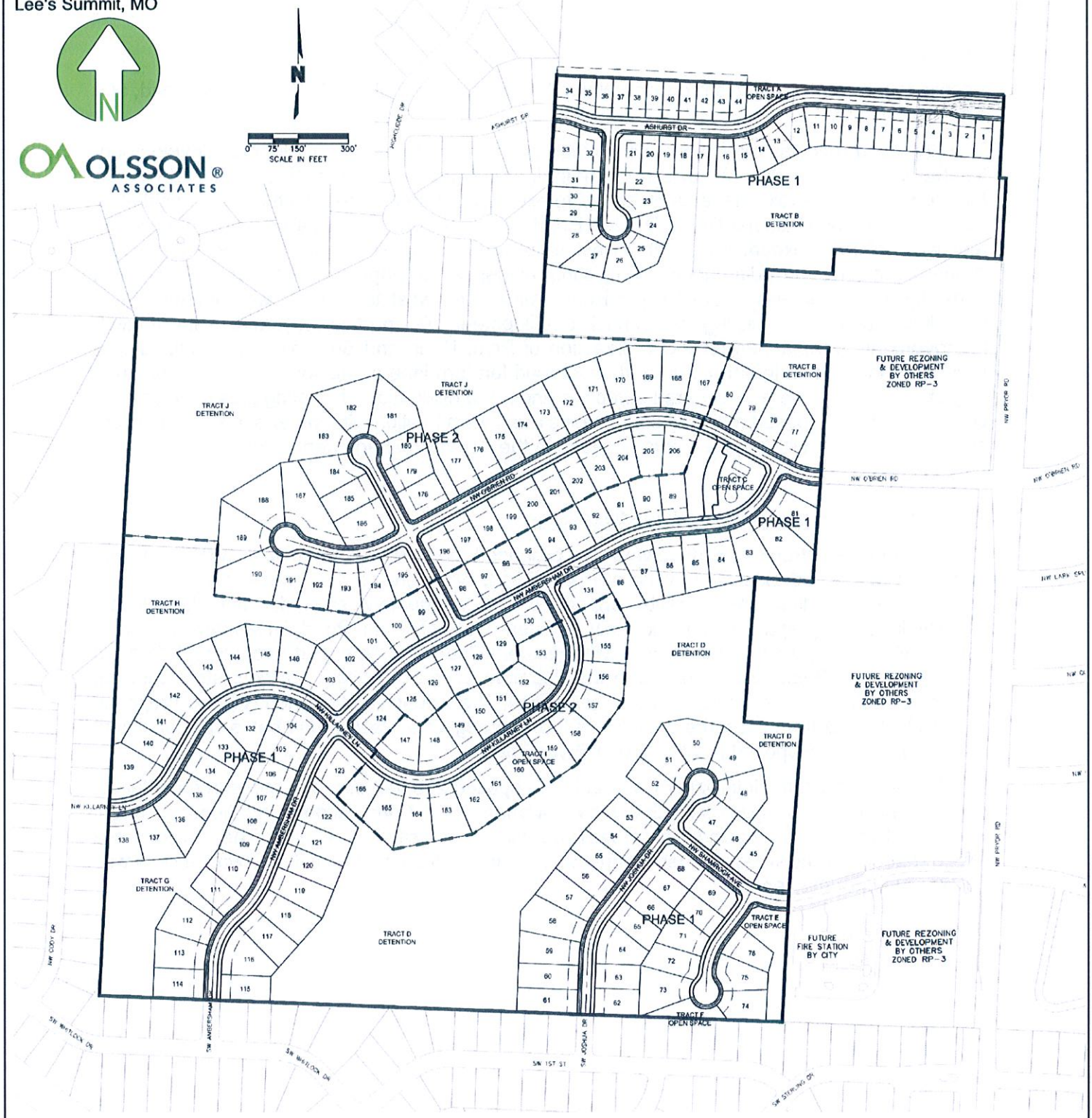
Residential cross-streets and driveways are proposed along the Ashurst Drive, O'Brien Road, and Shamrock Road extensions west of Pryor Road. According to the proposed site plan, the proposed intersecting cross-streets appear to be adequately spaced, with the closest intersections being spaced approximately 675 feet west of Pryor Road, measured center-to-center, which complies with the *Access Management Code* recommended throat length from an arterial such as Pryor Road. The three development access locations are consistent with the locations depicted in the *Thoroughfare Master Plan*. The extension of O'Brien Road is proposed to slightly deviate from the route depicted in the *Thoroughfare Master Plan* but is still consistent with respect to its proposed location along Pryor Road.

Within the site itself, the internal cross-streets are spaced 295 feet or more, measured center-to-center, which also complies with the *Access Management Code* recommendations for throat length and connection spacing along roadways without a restrictive median. The provided site plan did not detail individual residential driveway locations; thus, residential driveway access was not reviewed for this report.

FIGURE 5

Site Plan

Woodside Ridge
Lee's Summit, MO



4.1 Proposed Development Trip Generation and Distribution

To determine the impact of potential site traffic on the roadway network, expected trips associated with the proposed site were generated and applied to the study network. The Institute of Transportation Engineers (ITE) provides methods for estimating traffic volumes of common land uses in the Trip Generation Manual (10th Edition). The land use that most resembles that which is planned for this site is Land Use Code 210 (Single-Family Detached Housing).

Based on the *ITE Trip Generation Manual*, trip generation characteristics were developed for the proposed site. Trip generation characteristics expected for the site are shown in **Table 3**. Detailed ITE trip generation information can be found in **Appendix C.**

Table 3: Proposed Development Trip Generation

Land Use	Size	Average Weekday	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Single-Family Detached Housing	206 DU	2,022	152	38	114	204	129	75

Trips were distributed based on the anticipated land use, discussions with City staff, as well as a review of existing traffic behavior within the study area. **Table 4** illustrates general trip distribution for the site.

Table 4: Proposed Development Trip Distribution

Route	Percent Distribution
Pryor Road (north)	45%
Pryor Road (south)	10%
Chipman Road (east)	15%
Chipman Road (west)	5%
3rd Street (west)	10%
3rd Street (east)	10%
O'Brien Road (east)	5%

The proposed development will provide access to existing residential roadways; thus, it is expected that the new roadways will provide a more optimal route for some of the existing homes in the area. After reviewing the surrounding existing residential development, approximately 35 homes northwest of the proposed site currently utilize Highcliffe Drive as their main access, and 60 homes located southwest of the proposed site primarily utilize Sterling Drive. To account for the possibility of existing development using the proposed roadways, a portion of the estimated existing trips were redistributed to the proposed roadway extensions. Additional information regarding the redistribution of trips is provided in **Appendix C.** The trip distribution for the proposed development, as well as the redistributed existing trips, are shown in **Figure 6**. Existing plus development volumes are illustrated in **Figure 7.**

FIGURE 6

Proposed Development Trip Distribution

Woodside Ridge
Lee's Summit, MO

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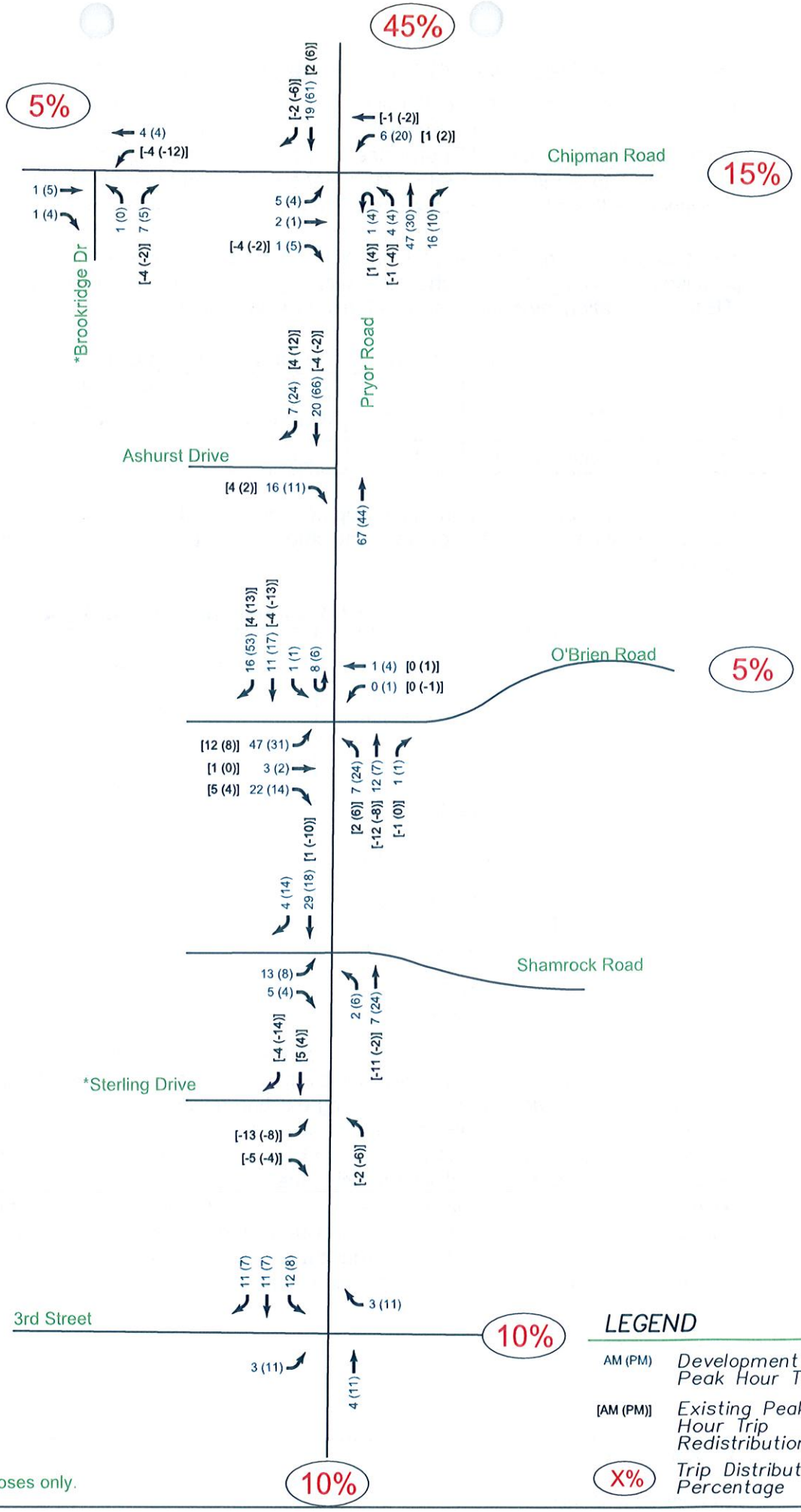

*Not a study intersection.
Illustrated for redistribution purposes only.

LEGEND

AM (PM)	Development Peak Hour Trips
[AM (PM)]	Existing Peak Hour Trip Redistribution
X%	Trip Distribution Percentage

FIGURE 7

Existing + Development
Peak Hour Volumes

Woodside Ridge
Lee's Summit, MO

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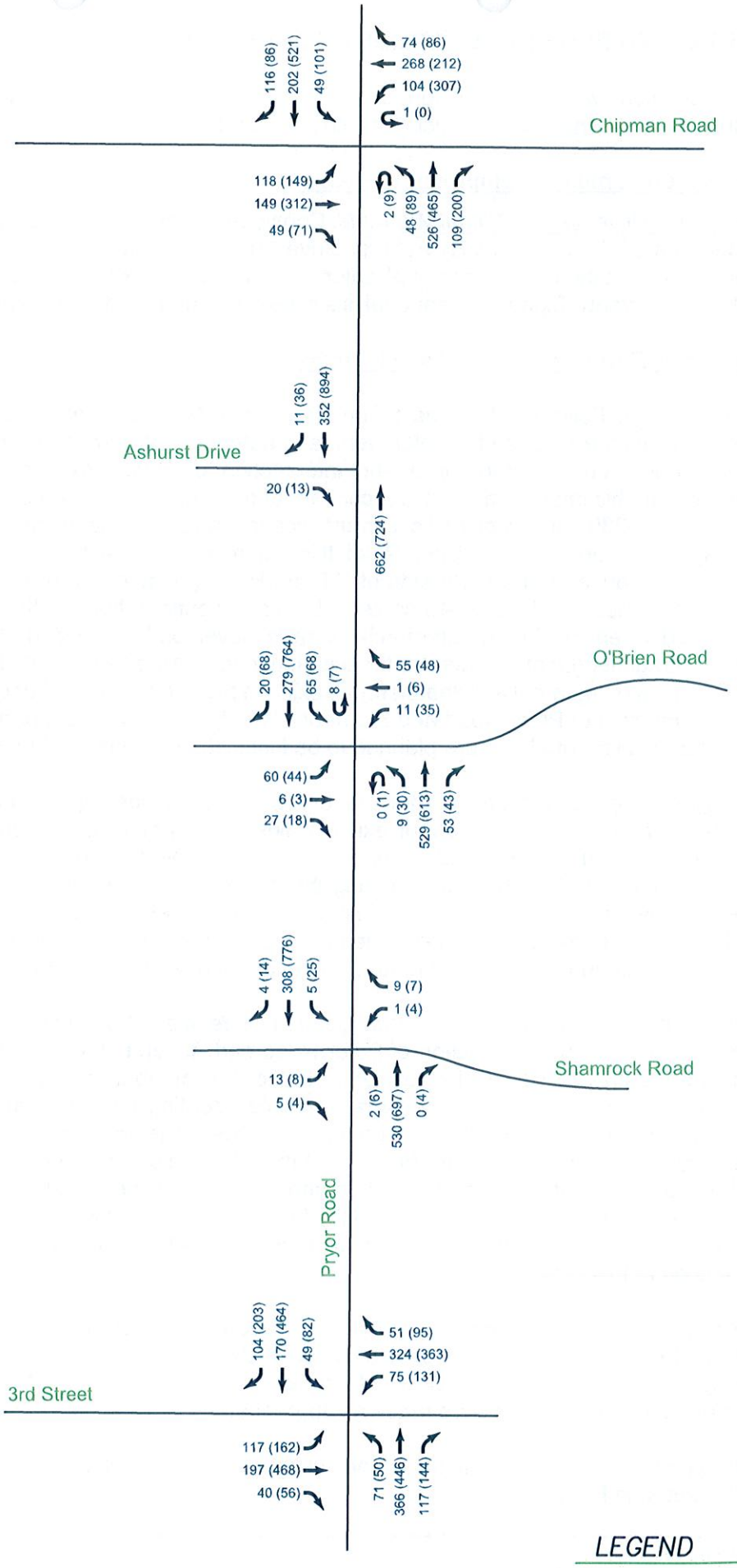

LEGEND

AM (PM) Peak Hour Volume

5.0 EXISTING PLUS DEVELOPMENT CONDITIONS

Traffic conditions were reviewed to identify any potential geometric improvements that could be attributed to additional traffic associated with proposed development.

5.1 Existing plus Development Warrants

Existing plus Development Signal Warrants: Considering Existing plus development volumes, the intersections of Pryor Road with Ashurst Drive and Pryor Road with Shamrock Road are not expected to meet the criteria for signalization during either peak hour period based on Warrant 3 (peak hour warrant). Signal warrant analysis sheets can be found in **Appendix C**.

Existing plus Development Turn Lane Warrants:

Left Turn Lane: Following the Lee's Summit *Access Management Code* and based on trips associated with the proposed development, an eastbound left-turn lane with 150 feet of storage plus taper is recommended for at the intersection of Pryor Road and O'Brien Road. To accommodate this improvement, it is recommended to shift the existing community garden drive approximately 230 feet west of its current location and be located across from the existing driveway on the north side of O'Brien Road. It is also recommended to restrict left-turn movements at the existing drive on the north side of O'Brien Road (located approximately 215 feet west of Pryor Road, measured center-to-center). Ultimate configuration of these drives should be reevaluated when the future commercial area is developed. If needed, it is believed that the desired storage length of 150 feet for the eastbound left-turn lane may be shortened since heavy eastbound queueing is not anticipated under existing plus development conditions. Improvements to the intersection of Pryor Road and Shamrock Road, which include a northbound left-turn lane and eastbound left-turn lane, are planned to be installed as part of a future City project.

Right Turn Lane: Based on right-turn lane standards provided in the Lee's Summit *Access Management Code* and a review of existing plus development peak hour turning volumes, a southbound right-turn lane with 200 feet of storage plus taper is recommended at the intersection of Pryor Road and O'Brien Road. Meeting the minimum volume threshold for this southbound right-turn movement is expected to be limited to the PM peak hour period. The minimum volume threshold for a southbound right-turn lane is not met at the intersection of Pryor Road and Shamrock Road; thus, a right-turn lane is not recommended for this movement.

Following the Lee's Summit *Access Management Code*, a southbound right-turn lane is expected to be warranted at the intersection of Pryor Road and Ashurst Drive. Considering development traffic and redistribution of existing residential traffic, the southbound right-turn volume is expected to be slightly over the minimum volume threshold. Meeting the minimum volume threshold is expected to be limited to the PM peak hour period. Due to the presence of a signalized crosswalk located approximately 200 feet to the north of the intersection, the length of a southbound right-turn lane and taper at Ashurst Drive would need to be shortened. A shortened right-turn lane is not an optimal design and would not yield the full benefit that is typically provided with a right-turn lane. For these reasons, it is not recommended to install a southbound right-turn lane at this intersection at this time.

As discussed with the existing conditions scenario, several existing intersection lane configurations do not meet standards provided in the *Access Management Code*. Existing plus development operations were reviewed for these movements (described in the next section) and turn lane recommendations were made as appropriate.

Existing plus development conditions lane configurations and traffic control for the study network are illustrated in **Figure 8**.

5.2 Existing plus Development Capacity Analysis

Capacity analysis was performed for under existing plus development conditions using the methodologies described above. With the addition of an eastbound left-turn lane at Pryor Road and O'Brien Road, this intersection was analyzed with protected-permissive phasing for this approach. The eastbound left-turn lane and northbound left-turn lane at the intersection of Pryor Road and Shamrock Road, which are planned City projects, were analyzed with storage lengths of 150 feet and 200 feet, respectively, to be consistent with the *Access Management Code*.

Results of the capacity analysis indicate similar operations to existing conditions. The overall signalized study intersections and their associated individual movements are expected to operate at LOS C or better overall during both the AM and PM peak hour periods. The individual movements at the unsignalized intersections are expected to continue operating at a LOS C or better during the AM and PM peak hour periods with the following exception:

Pryor Road and Shamrock Road

- Delay for the stop-controlled side street movements are expected to increase, resulting in an expected LOS D for the westbound movement and LOS F for the eastbound left-turn movement during the PM peak hour period. The queues associated with these movements are expected to be one vehicle or less.
    - Minor street approaches with movements operating at a lower level of service during peak hour periods are not uncommon at an unsignalized intersection, as the higher volumes on the main road are accommodated. For this intersection, lower levels of service are expected to be limited to the PM peak period and would only affect approximately 8 eastbound left-turning vehicles and 11 westbound vehicles during the PM peak hour.

The existing plus development capacity analysis summary is illustrated in **Figure 9**. Detailed results may be found in **Appendix C**.

As discussed previously, several existing intersection lane configurations do not meet standards provided in the *Access Management Code*. Operations at these intersections were subsequently reviewed under existing plus development conditions. It was determined that these movements are minimally impacted by the proposed development traffic.

- Pryor Road and Chipman Road
    - Northbound right-turn lane
        - The 95th-percentile queue length for this movement is expected to operate similar to existing conditions. The queue is expected to increase by approximately one vehicle during both the AM and PM peak hour periods. Considering that operations are not expected to be substantially impacted by the proposed development, a northbound right-turn lane is not recommended based on existing plus development conditions.

- Pryor Road and Chipman Road
    - Southbound right-turn lane
        - The 95th-percentile queue length for this movement is expected to operate similar to existing conditions. The queue is expected to increase by less than one vehicle during the AM peak hour and less than two vehicles during the PM peak hour periods. Considering that operations are not expected to be substantially impacted by the proposed development, a southbound right-turn lane is not recommended based on existing plus development conditions.

- Pryor Road and Chipman Road
  - Eastbound right-turn lane
    - The 95th-percentile queue length for this movement is expected to operate similar to existing conditions. The queue is expected to increase by less than one vehicle during both peak hour periods. Considering that operations are not expected to be substantially impacted by the proposed development, an eastbound right-turn lane is not recommended based on existing plus development conditions.

- Pryor Road and O'Brien Road
  - Northbound right-turn lane
    - The 95th-percentile queue length for this movement is expected to operate similar to existing conditions. The queue is expected to increase by less than two vehicles during both peak hour periods. Considering that operations are not expected to be substantially impacted by the proposed development, a northbound right-turn lane is not recommended based on existing plus development conditions.

- Pryor Road and 3rd Street
  - Northbound right-turn lane
    - The 95th-percentile queue length for this movement is expected to operate similar to existing conditions. The queue is expected to increase by less than one vehicle during both peak hour periods. Considering that operations are not expected to be substantially impacted by the proposed development, a northbound right-turn lane is not recommended based on existing plus development conditions.

- Pryor Road and 3rd Street
  - Eastbound right-turn lane
    - The 95th-percentile queue length for this movement is expected to be similar to existing conditions. The queue is expected to increase by less than one vehicle during both peak hour periods. Considering that operations are not expected to be substantially impacted by the proposed development, an eastbound right-turn lane is not recommended based on existing plus development conditions.

- Pryor Road and Chipman Road; Pryor Road and 3rd Street
  - Additional left-turn storage and/or dual- lanes
    - The existing left-turn lane storage provided at these intersections are expected to continue operating acceptably. The 95th-percentile queue for the westbound left-turn movement at Pryor Road and Chipman Road is expected to slightly exceed the 250 feet of provided storage; however, this is expected to be contained within the existing taper and be limited to a portion of the PM peak hour period. Dual left-turn lanes are not believed to be a necessity at this time.

Without the required turn lanes above, the study intersections are expected to operate at acceptable levels of service under existing plus development conditions.

FIGURE 8

Existing + Development Lane Configuration and Traffic Control

Woodside Ridge
Lee's Summit, MO

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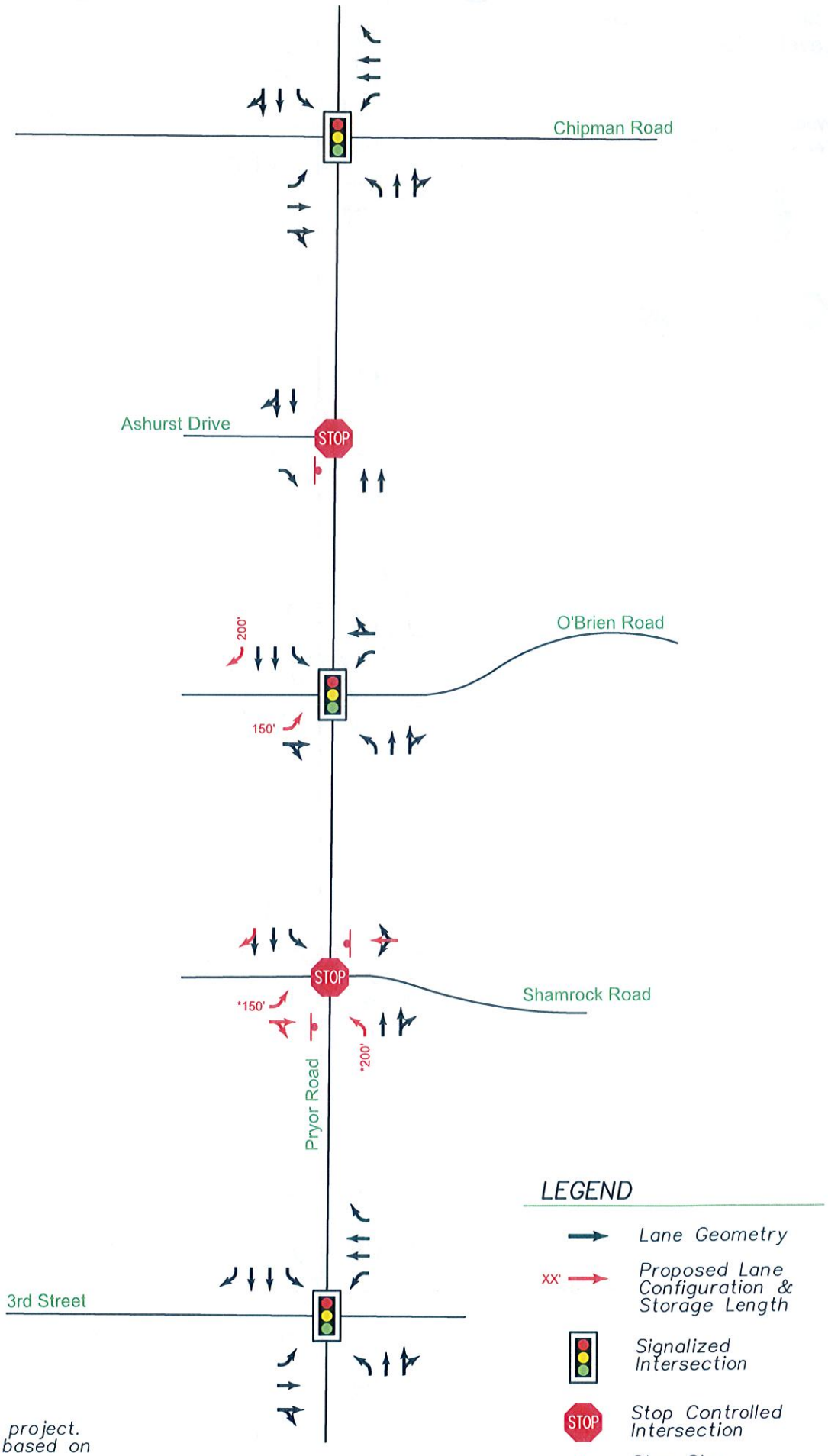
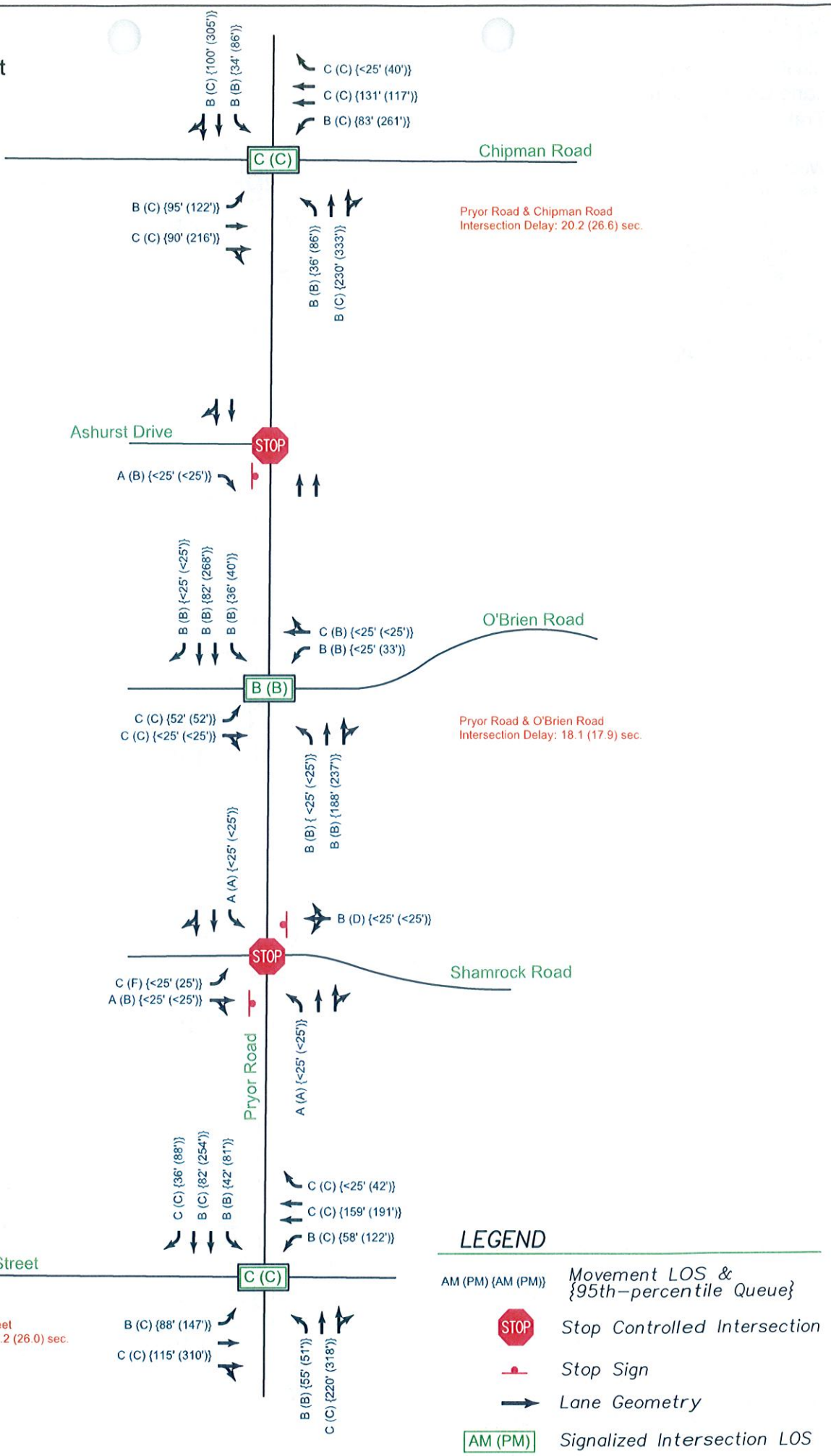


*Planned City improvement project. Storage lengths assumed based on minimum AMC standards.

FIGURE 9

Existing + Development
Level of Service

Woodside Ridge
Lee's Summit, MO



6.0 Conclusions and Recommendations

The purpose of this study was to summarize the traffic impacts regarding the proposed residential development located on the west side of Pryor Road between Chipman Road and 3rd Street in Lee's Summit, Missouri. Based on this evaluation, the following conclusions and recommendations are made for the study area.

6.1 Conclusions

The general findings of this traffic impact study can be summarized by two main points:

1. In general, traffic operations after development of the proposed site are expected to be acceptable and be similar to existing conditions.

2. The existing lane configuration of several study intersections does not meet turn lane recommendations provided in the City of Lee's Summit *Access Management Code.* Traffic operations before and after development were reviewed to determine if improvements should be recommended to meet turn lane standards outlined in the code. Based on this review, additional turn lanes at the study intersections are likely to provide some operational benefits; however, it is believed that certain improvements are not a necessity at this time due to the acceptable operations under both existing and existing plus development conditions.

3. Under development conditions, a southbound right-turn lane is expected to be warranted at the intersection of Pryor Road and Ashurst Drive based on standards provided in the *Access Management Code*. However, this improvement is not recommended at this time based on the following:
    a. If constructed, this turn lane would have to be shortened from the recommended minimum storage length due to the presence of a signalized crosswalk to the north and would not yield the full benefit that is typically provided with a right-turn lane.
    b. Southbound right-turn volume is expected to be slightly above the minimum threshold, per the *Access Management Code*, and is expected to be limited to the PM peak hour period only.

4. The City of Lee's Summit has a planned improvement project that includes a northbound left-turn lane and eastbound left-turn lane at the intersection of Pryor Road and Shamrock Road. These planned improvements were considered during the existing plus development scenario of this report.

6.2 Recommendations

Given the review of information, list of conclusions and intersection specific capacity analysis, the following items are recommended for the study area:

1. It is recommended to install a southbound right-turn lane with 200 feet of storage plus taper at the intersection of Pryor Road and O'Brien Road. Considering the expected traffic volumes and current roadway classification, this recommendation is consistent with standards provided in the *Access Management Code.*

2. It is recommended to install an eastbound left-turn lane with 150 feet of storage plus taper at the intersection of Pryor Road and O'Brien Road. This recommendation is consistent with standards provided in the *Access Management Code.*
    a. To accommodate the eastbound left-turn lane, the following improvements along O'Brien Road are recommended at this time. Ultimate driveway configuration at this location should be reevaluated when the commercial area develops.

i. It is recommended to shift the existing community garden drive approximately 230 feet west of its current location and align with the existing drive on the north side of O'Brien Road.
ii. It is also recommended to restrict left-turn movements at the existing drive on the north side of O'Brien Road (located approximately 215 feet west of Pryor Road, measured center-to-center). If 150 feet of storage plus taper is not required, the recommended storage may be shortened to accommodate the existing drive location since heavy eastbound queueing is not anticipated under existing plus development conditions.