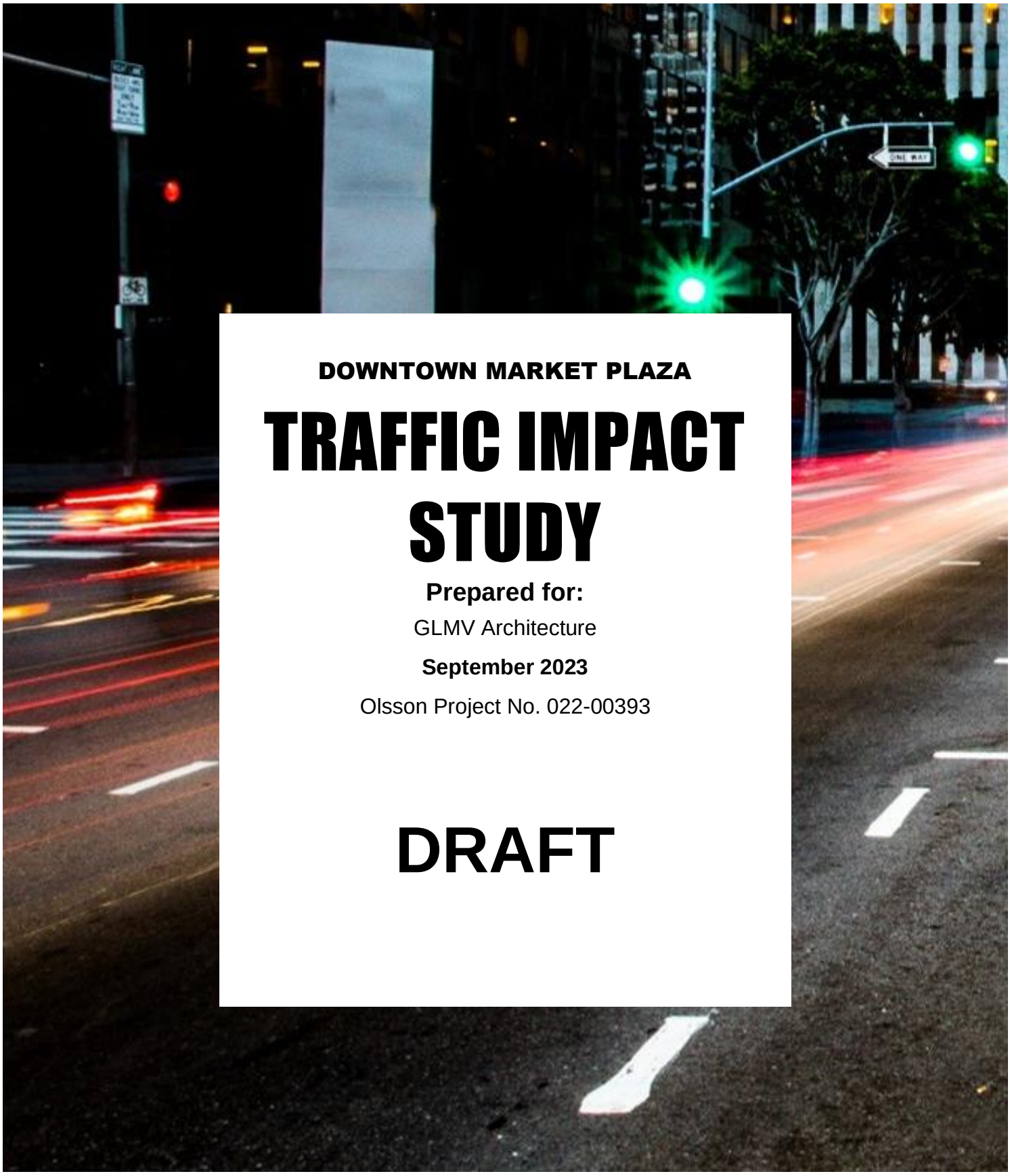

DOWNTOWN MARKET PLAZA

TRAFFIC IMPACT STUDY

Prepared for:

GLMV Architecture

September 2023

Olsson Project No. 022-00393

DRAFT

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1. INTRODUCTION

This report studies the traffic impacts of the proposed Lee's Summit Downtown Market Plaza. The proposed development is located in downtown Lee's Summit, Missouri. The boundaries of the project area are between Green Street and Johnson Street and from 2nd Street to 3rd Street and represent redevelopment of the area. The approximate location of the proposed development is shown on the Vicinity Map in **Figure 1**.

The development project is proposed to be built in two phases. The first phase will include closure of a portion of Green Street, construction of a pedestrian plaza east of City Hall, and construction of an event space. The second phase of the project will include a multi-use development encompassing residential, restaurant and hotel uses.

This report presents the potential impacts of the proposed development on the existing roadway network and, as appropriate, recommends additional turn lanes, storage bay modifications, and intersection control methods per the City of Lee's Summit *Access Management Code*, dated March 2018. The study intersections include the following:

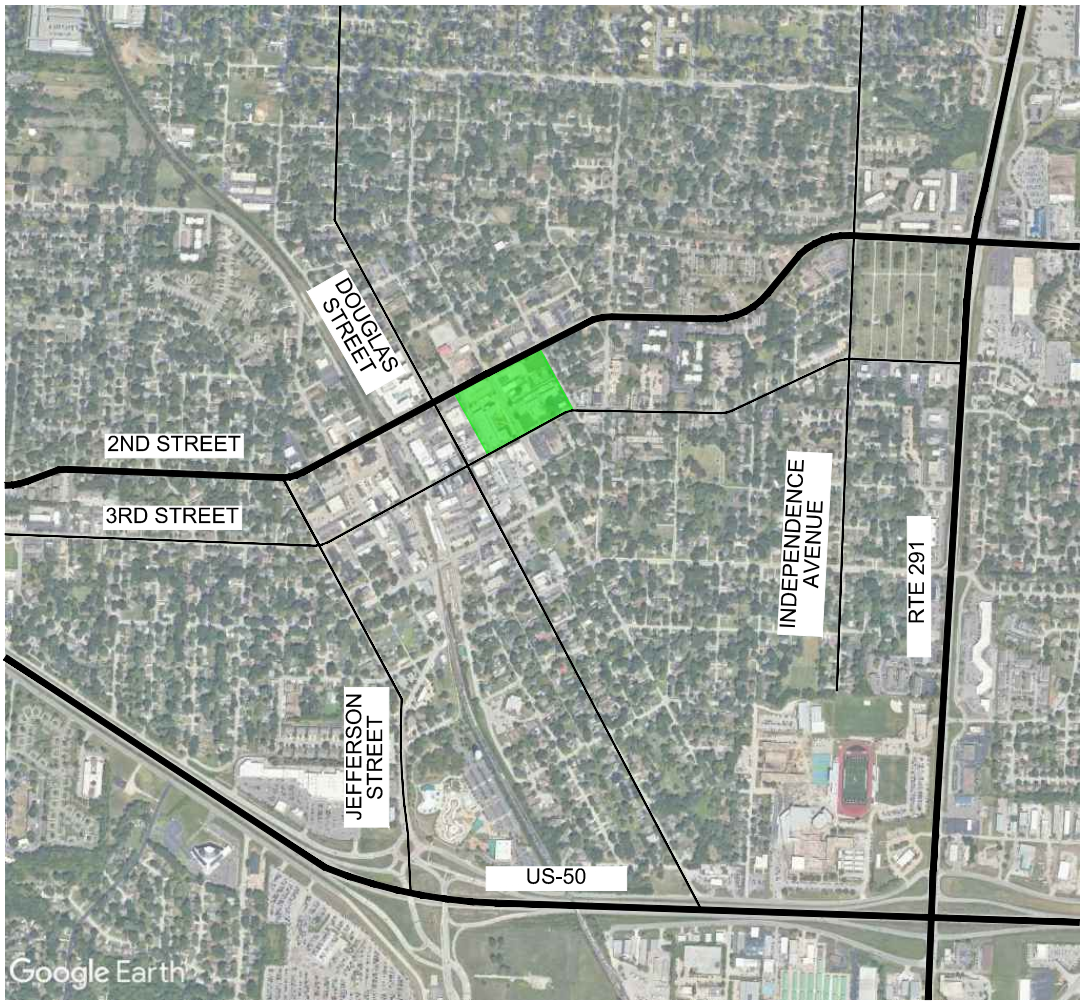
- 2nd Street and Southeast Alley (City Hall Alley)
- 2nd Street and Green Street
- 2nd Street and Johnson Street
- 2nd Street and Jefferson Street
- 2nd Street and Market Street
- 2nd Street and Main Street
- 2nd Street and Douglas Street
- 2nd Street and Independence Avenue
- 3rd Street and Southeast Alley (City Hall Alley)
- 3rd Street and Green Street
- 3rd Street and Johnson Street
- 3rd Street and Douglas Street
- Johnson Street and Cooper Street
- Green Street and City Hall Parking Garage Access
- Any proposed site driveways as appropriate

The following scenarios were analyzed considering weekday AM, PM, and weekend PM peak hour periods:

- Existing Conditions
- Existing Redistribution Conditions
- Existing Plus Phase 1 Development Conditions
- Build Year 2024 Plus Full Build Development Conditions
- Future Year 2043 Plus Full Build Development Conditions

FIGURE 1

Lee's Summit, MO
Vicinity Map



LEGEND

Lee's Summit Downtown Market Plaza

2. DATA COLLECTION

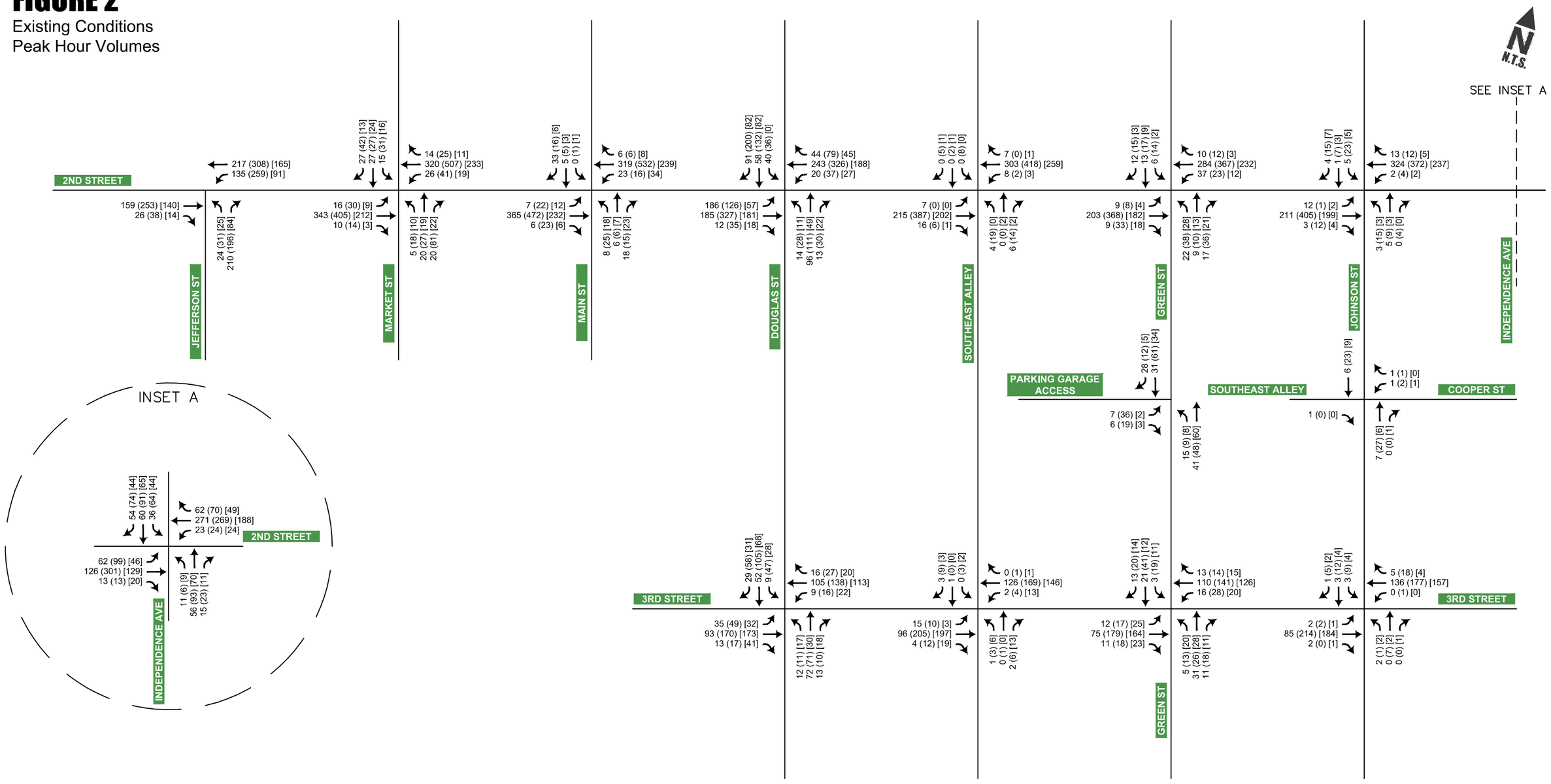
The data collection effort included acquiring peak period turning movement counts, historical average daily traffic counts, and existing intersection signal timings.

Turning movement traffic counts were collected at the study intersections on Wednesday, May 10th and Saturday, May 13th, 2023. For the intersections directly bordering the site, counts were collected for the typical weekday thirteen-hour period (6:00 AM to 7:00 PM) and for the Saturday event period (6:30-9:30 PM). The remainder of study intersections were counted during the typical weekday AM (7:00-9:00 AM) and PM (4:00-6:00 PM) peak hour periods as well as the Saturday event time period. Peak hour periods varied slightly throughout the area, however the following time frames were determined based on a review of all intersection volumes: weekday AM peak hour of 7:30-8:30 AM, weekday PM peak hour of 4:15-5:15 PM, and Saturday PM peak hour of 6:30-7:30 PM. Through volumes were balanced along the 2nd and 3rd Street corridors. Existing peak hour traffic count data is illustrated in **Figure 2**. Traffic count data is provided in **Appendix A.**

Signal timings for the intersections of 2nd Street with Market Street, Main Street, Douglas Street and Independence Avenue were provided by the City of Lee's Summit. These signal timings were used for peak hour period analysis. Signal timing data is provided in **Appendix A.**

FIGURE 2

Existing Conditions
Peak Hour Volumes



LEGEND

AM (PM) [WKND] Peak Hour Volumes

3. EXISTING CONDITIONS

Existing traffic conditions were evaluated to identify any existing deficiencies and to provide a baseline for comparison purposes.

3.1 Network Characteristics

Within the study area there are 11 roadways that were considered during analysis: 2nd Street, 3rd Street, Jefferson Street, Market Street, Main Street, Douglas Street, Southeast Alley (City Hall Alley), Green Street, Johnson Street, Cooper Street, and Independence Avenue. The maintaining jurisdiction for all roadways is the City of Lee's Summit.

Functional classification was acquired referencing the city *Thoroughfare Master Plan*. Current network characteristics were determined and are summarized in **Table 1**.

Table 1. Existing Network Summary.

Roadway	Functional Classification	Typical Section	Median Type	Posted Speed
2nd Street*	Minor Arterial	Three-Lane	TWLTL**	30 mph
3rd Street	Minor Arterial	Two-Lane	N/A	25 mph
Jefferson Street	Minor Arterial	Three-Lane	TWLTL	35 mph
Market Street	Commercial Collector	Two-Lane	N/A***	25 mph
Main Street	Local	Two-Lane	N/A	25 mph
Douglas Street	Minor Arterial	Two-Lane	N/A	25 mph
Southeast Alley	Local	One-Lane	N/A	N/A
Green Street	Local	Two-Lane	N/A	25 mph
Johnson Street	Local	Two-Lane	N/A	25 mph
Cooper Street	Local	Two-Lane	N/A	25 mph
Independence Avenue	Minor Arterial	Two-Lane	N/A	30 mph

**Two-lane section west of Jefferson Street. Three-lane section through study area, transitions to four-lane section west of Independence Avenue, speed limit increase to 35 mph.*
***TWLTL – Two-way left-turn lane*
****Section of median along south leg approach to 2nd Street only.*

3.1.1 Parking Review

A review of existing parking on street, in designated surface lots, and within the city parking garage was conducted. A map illustrating on street, surface lot, and parking garage location and number of spaces is provided in **Appendix B**. On street parking is provided along 3rd Street,

Market Street, Main Street, Douglas Street, and Green Street. Parking accommodations including striping and signing to support parking activity. Parking style along public streets is primarily parallel or angle. The locations and types of parking are detailed in **Table 2**.

Table 2. On-Street Parking Summary.

Roadway	Start	End	Type	Notes
3rd Street	Jefferson Street	Green Street	Parallel	Break at rail line
Market Street	Mid-block between 2nd and 3rd Street	4th Street	Parallel	-
Main Street	2nd Street	4th Street	Angle north of 3rd Street, Parallel to south	SW Main Street also provides parking
Douglas Street	2nd Street	4th Street	Parallel	No parking near fire station
Green Street	2nd Street	4th Street	Parallel	-

City staff provided parking count data for the downtown area. Parking data was collected in 2021. Based on the city parking survey, approximately 350 on street parking spaces are provided within the study area.

Several surface lots are located within the downtown area that support parking. Based on the city parking survey, approximately 316 surface lot parking spaces are provided within the study area.

A public parking garage is located in the southwest quadrant of 2nd Street and Green Street. Access to the parking garage is provided via Green Street and the Southwest Alley. Based on the city parking survey, 314 spaces are provided in the garage. In addition to total parking available, the city has conducted parking usage surveys for the garage. Parking usage data is provided in **Appendix B**.

3.2 Existing Warrant Analysis

Existing lane configuration and traffic control for the study network are illustrated in **Figure 3**.

3.2.1 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. Based on the data available, the Eight Hour Vehicular Volume Warrant (warrant 1), Four Hour Vehicular Volume Warrant (warrant 2), the Peak Hour

Warrant (warrant 3), and the Pedestrian Volume Warrant (warrant 4) were evaluated for following existing unsignalized study intersections:

- 2nd Street and Green Street
- 2nd Street and Johnson Street
- 3rd Street and Green Street
- 3rd Street and Johnson Street

Based on existing traffic volumes, the unsignalized study intersections do not warrant signalization under existing conditions. Signal warrant analysis sheets are provided in **Appendix B**.

3.2.2 Turn Lane Warrants

Turn lane warrant analysis was conducted for the study area roadways following agency guidelines. Operations, presented in **Section 3.3,** were reviewed to determine if additional turn lanes are recommended and to determine recommended turn bay storage length. Turn lane warrant analysis sheets are provided in **Appendix B**.

Left-Turn Lanes

The following left-turn lanes are warranted under existing conditions:

- Southbound on Market Street at 2nd Street (signalized, arterial/collector required)
- Northbound on Market Street at 2nd Street (signalized, arterial/collector required)
- Northbound Main Street at 2nd Street (signalized, meets PM peak hour only)
- Southbound Douglas Street at 2nd Street (signalized, arterial/arterial required)
- Northbound Douglas Street at 2nd Street (signalized, arterial/arterial required)
- Northbound Green Street at 2nd Street (meets all three peak hours)
- Southbound Johnson Street at 2nd Street (meets PM peak hour only)
- Southbound Independence Avenue at 2nd Street (signalized, meets all three peak hours)
- Northbound Independence Avenue at 2nd Street (signalized, volumes do not meet)
- Westbound 3rd Street at Green Street (meets PM and weekend peak hours)
- Northbound Green Street at 3rd Street (meets weekend peak hour only)
- Eastbound 3rd Street at Green Street (meets weekend peak hour only)
- Southbound Douglas Street at 3rd Street (arterial/arterial required)
- Westbound 3rd Street at Douglas Street (arterial/arterial required)
- Northbound Douglas Street at 3rd Street (arterial/arterial required)
- Eastbound 3rd Street at Douglas Street (arterial/arterial required)

Right-Turn Lanes

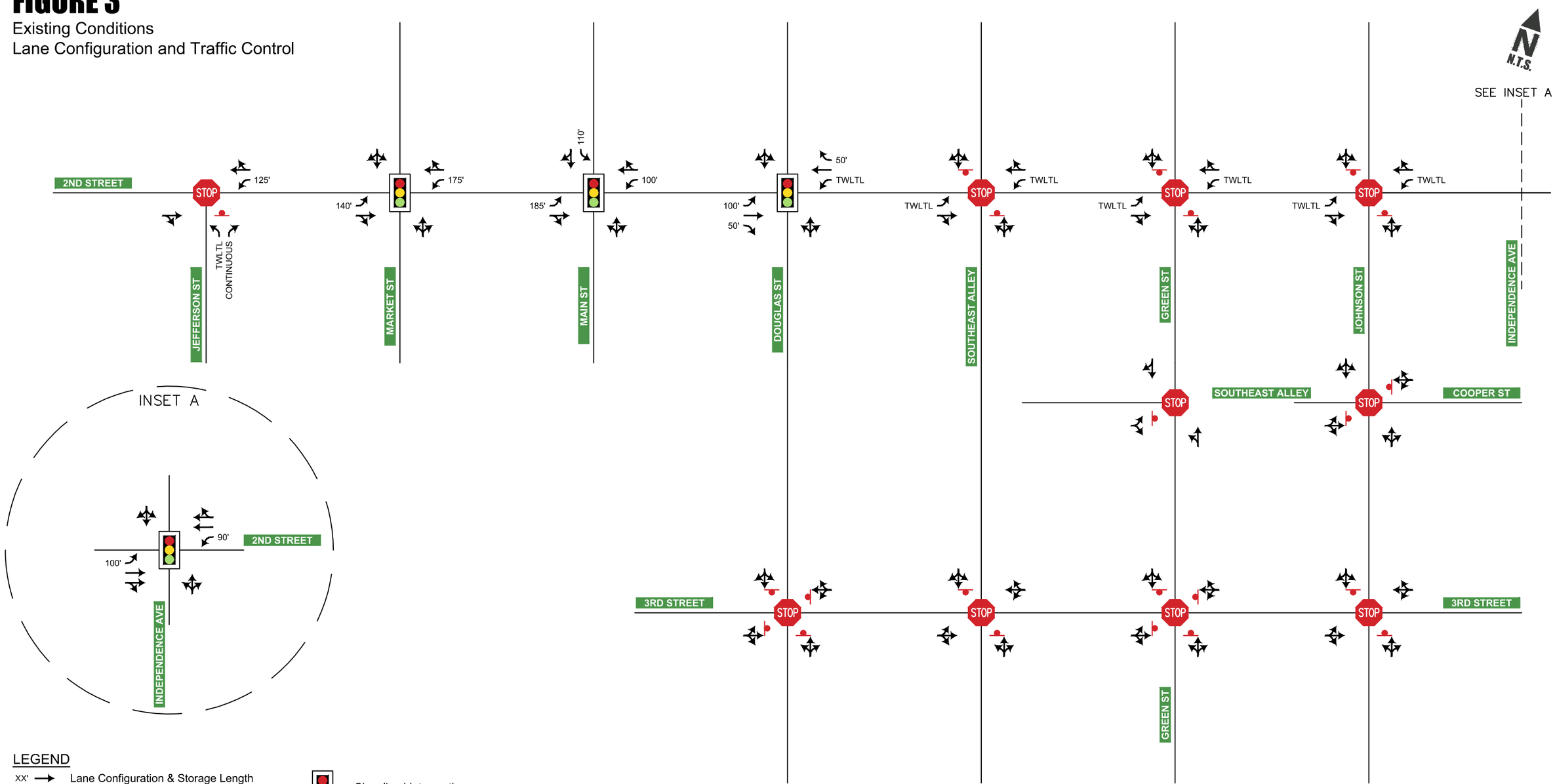
The following right-turn lanes are warranted under existing conditions:

- Southbound Douglas Street at 2nd Street (meets all three peak hours)
- Southbound Independence Avenue at 2nd Street (meets PM peak hour only)
- Westbound 2nd Street at Independence Avenue (meets AM and PM peak hours)

The ability to add dedicated turn lanes is limited at several intersections in the downtown area, restricted by right-of-way and existing building setback. Capacity analysis will be reviewed in **Section 3.3** to identify areas with operational deficiencies. Recommendations for turn lanes will be based on feasibility, constructability and benefit of improvement. Other considerations when determining if turn lanes should be installed should include pedestrian activity and the impact of additional lanes to pedestrian crossing distances. Within the downtown core, maintaining a shorter pedestrian crossing distance may be preferred to providing vehicular turn lane capacity.

FIGURE 3

Existing Conditions
Lane Configuration and Traffic Control



3.3 Existing Capacity Analysis

Capacity analysis was performed for the study intersections using the existing lane configurations and traffic control. Analysis was conducted using Synchro, Version 11, based on the *Highway Capacity Manual* (HCM) delay methodologies. 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 3** shows the delays associated with each LOS grade for signalized and unsignalized intersections, respectively. Queuing analysis was conducted referencing the 95th percentile queue length. This represents the queue length that has a 5 percent probability of being exceeded during the peak hour period.

Table 3. Intersection Level of Service 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 (6th Edition)		

Analysis was conducted referencing the existing peak hour factors as obtained from data collection. Heavy vehicle percentages were based on existing conditions. The City of Lee's Summit *Level of Service Policy* was referenced to determine acceptable operations for the purposes of this study. The policy outlines that a LOS C is desired, but LOS D may be deemed acceptable for signalized intersections. A LOS C is desired for stop-controlled intersections, however a LOS D or E may be deemed acceptable due to extenuating circumstances.

The signalized intersections of 2nd Street with Market Street, Main Street, Douglas Street, and Independence Avenue are operating at an overall LOS B or better during the AM, PM, and weekend peak hour periods. Individual signalized movements are operating at a LOS C or better with acceptable 95th percentile queue lengths during all peak hour periods.

Unsignalized movements are operating at LOS C or better during all three peak hour periods with the exception of the northbound left turn movement at the intersection of 2nd Street and Jefferson Street which is operating at a LOS D during the PM peak hour period. The 95th-percentile queue is contained within the dedicated left-turn lane for this movement.

Several intersection movements meet turn lane warrants under existing conditions, thus a further analysis of the necessity and practicality of improvements was conducted. A combination of warranting condition, existing LOS and queue length, and constructability was considered. A summary of factors for turn lane warrants and recommendations are summarized in

Table 4. One of the factors included is the warranting criteria from the City of Lee's Summit. Referencing city requirements, turn lanes may be warranted based on traffic control elements such as signalization, peak hour turning volumes of the three study hours, and roadway classification (arterial vs. arterial streets), which are summarized below.

Table 4. Existing Conditions Turn Lane Warrant Review.

Intersection		Movement	Criteria	Operations	Recommended?
Left-Turn Lanes	2nd and Market	Southbound	Signalized	LOS A-B	NO
		Northbound	Signalized	LOS A-B	NO
	2nd and Main	Northbound	Signalized	LOS A-B	NO
	2nd and Douglas	Southbound	Signalized	LOS A-B	NO
		Northbound	Signalized	All LOS B	NO
	2nd and Green	Northbound	Volumes (3/3)	LOS B-C	NO
	2nd and Johnson	Southbound	Volumes (1/3)	LOS B-C	NO
	2nd and Independence	Southbound	Signalized	LOS A-B	NO
		Northbound	Signalized	LOS A-B	NO
	3rd and Green	Westbound	Volumes (2/3)	LOS A	NO
		Northbound	Volumes (1/3)	LOS A	NO
		Eastbound	Volumes (1/3)	LOS A	NO
	3rd and Douglas	Southbound	Classification	LOS A-B	NO
		Westbound	Classification	LOS A-B	NO
		Northbound	Classification	LOS A	NO
		Eastbound	Classification	LOS A-B	NO
Right-Turn Lanes	2nd and Douglas	Southbound	Volumes (3/3)	LOS A-B	NO
	2nd and Independence	Southbound	Volumes (1/3)	LOS A-B	NO
		Westbound	Volumes (2/3)	LOS B-C	NO

Under existing conditions, a higher southbound right-turn volume was noted at the intersection of 2nd Street and Douglas Street, with a PM peak hour volume of 200 vehicles. The southbound approach for this intersection is currently a shared lane (southbound left/through/right from shared lane). Reviewing operations, during the PM peak hour period the reported 95th-percentile queue is approximately 150 feet. Providing a dedicated southbound right-turn lane would be expected to improve operations at this intersection. However, reviewing existing geometrics it is preferred to maintain through lane alignment along Douglas Street at 2nd Street. Existing building setback and right-of-way may be limited in the northwest quadrant of the intersection limiting the feasibility of turn lane construction, thus for the purposes of this study a dedicated right turn lane is not presented.

Based on observational information provided by City staff, the intersection of 2nd Street and Green Street was reviewed in further detail referencing traffic count video to determine if a northbound left turn lane should be provided at the intersection. Operational information provided was that the northbound movement can experience delay and longer queuing during PM peak hour periods. To review this condition, video data collected for the northbound left-turn movement was reviewed during PM peak hour conditions. A heavy concentration of northbound vehicles was observed between 5:00-5:10 PM, consistent with typical work schedules. During this time period, delay was observed in one case to be over 75 seconds with a queue of approximately 5-7 vehicles. However, once a gap in traffic was available the queue quickly dissipated. Outside of this peak 10-minute time period, queues and delay were observed to be consistently low. Also considered in determination of if a turn lane should be provided was the pedestrian environment. To support walkability, a shorter crossing distance at intersections is preferred for pedestrians; a turn lane would increase the crossing distance. Due to the short time period of higher traffic volumes, the lack of queueing and acceptable operations at other times of the day, and considering the pedestrian environment, a northbound left turn lane is not recommended at the intersection.

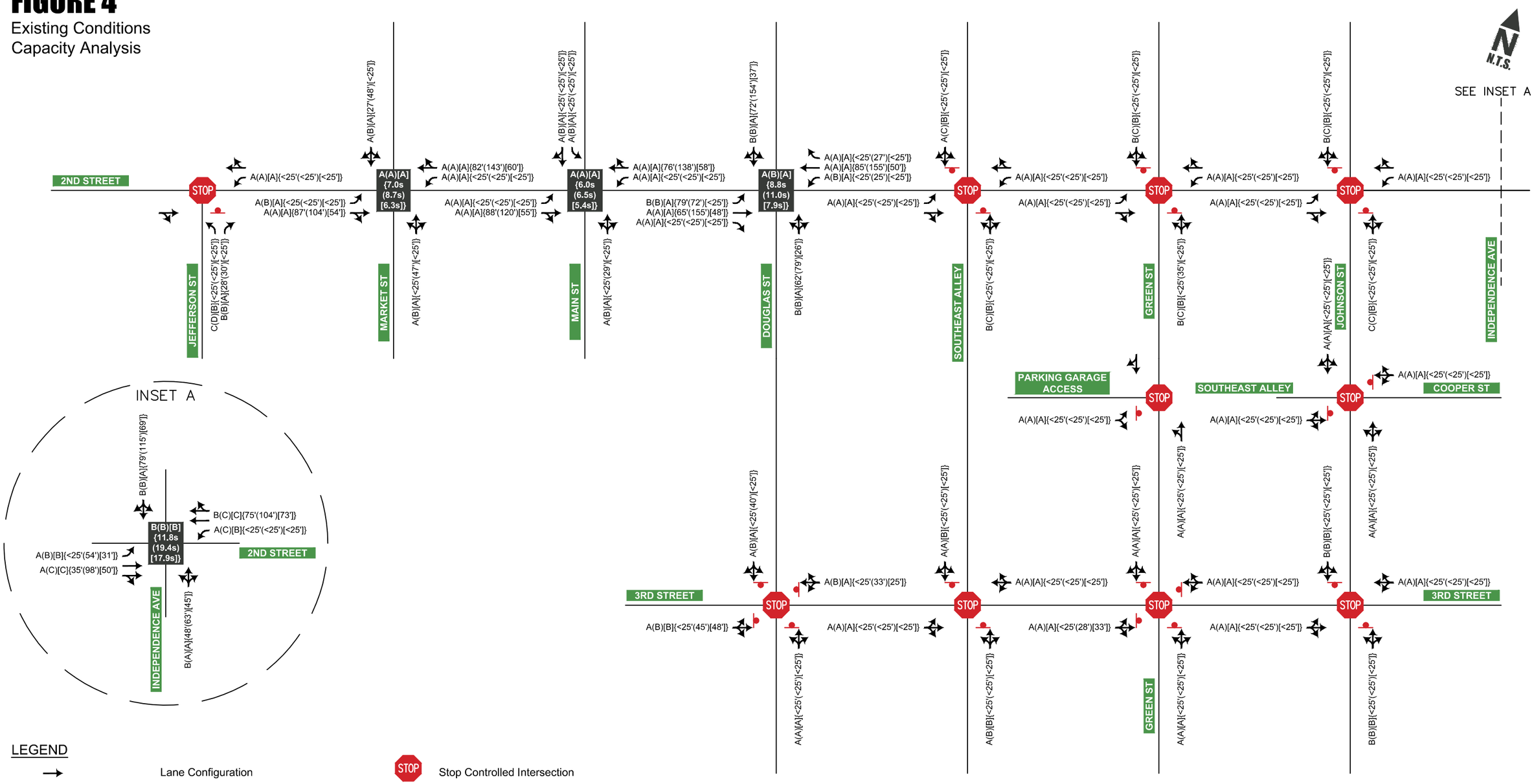
The intersection of 2nd Street and Green Street was also reviewed to determine existing pedestrian accommodations and if further improvements to support pedestrian movements across 2nd Street are recommended. Currently, pedestrian accommodations along the west leg of the intersection include crosswalk markings and signage. A school zone with reduced speed limit signage and flashers is present along 2nd Street in advance of the intersection. School crossing ahead signage is also present along 2nd Street in advance of the school flashers. Reviewing video data of the intersection, an adult (anticipated to be associated with the adjacent school) was present during before and after school periods to assist with younger pedestrians crossing the road. Reviewing operations of the current crossing, the pedestrian accommodations at the intersection are appropriate. Additional intersection treatments including installation of a rectangular rapid flashing beacon (RRFB) or high-intensity activated crosswalk

(HAWK) signal were considered for this location. Reviewing video data for the intersection and considering operations, the current measures in place to support pedestrian activity appear adequate; additional treatment is not recommended at this time. As presented in **Section 3.2.1**, a signal is not warranted based on current pedestrian or vehicular traffic volumes.

Reviewing warranting characteristics, operations and feasibility of construction, several movements do not need additional capacity, have acceptable operations or present construction challenges. With this consideration, no improvements are recommended under existing conditions. The Existing capacity analysis summary is illustrated in **Figure 4**. Detailed results are provided in **Appendix B.**

FIGURE 4

Existing Conditions
Capacity Analysis


2ND STREET
JEFFERSON ST
MARKET ST
MAIN ST
DOUGLAS ST
SOUTHEAST ALLEY
GREEN ST
JOHNSON ST
INDEPENDENCE AVE
PARKING GARAGE ACCESS
SOUTHEAST ALLEY
COOPER ST
3RD STREET
STOP
N.T.S.
SEE INSET A
A(A)[A]{7.0s (8.7s) [6.3s]}
A(A)[A]{6.0s (6.5s) [5.4s]}
B(B)[A]{8.8s (11.0s) [7.9s]}
A(A)[A]{<25'(<25')[<25']}
A(B)[A]{<25(<25')[<25']}
A(A)[A]{87'(104')[54']}
A(A)[A]{82'(143')[60']}
A(A)[A]{<25'(<25')[<25']}
A(A)[A]{88'(120')[55']}
A(A)[A]{76'(138')[58']}
A(A)[A]{<25'(<25')[<25']}
B(B)[A]{79'(72')[<25']}
A(A)[A]{65'(155')[48']}
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A(A)[A]{85'(155')[50']}
A(B)[A]{<25'(25')[<25']}
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4. EXISTING REDISTRIBUTION CONDITIONS

With the redevelopment project, the closure of Green Street is proposed to support construction of planned development including a pedestrian plaza area directly east of the City Hall building. Green Street is proposed to be closed between 3rd Street and 2nd Street. The current four-leg, all-way stop controlled intersection of 3rd Street and Green Street will transition to a T-intersection. The south leg of Green Street at 2nd Street will service the city parking garage only. Modifications to intersection traffic control conditions will be reviewed in **Section 4.2**.

4.1 Existing Redistribution Considerations

To represent the closure of Green Street, existing vehicular traffic volumes were redistributed to the surrounding intersections. All trips to/from the garage to the south were redistributed north to 2nd Street. The primary bypass route that was utilized for existing trips along Green Street was Douglas Street. It is noted that with the closure of Green Street, some existing users may find alternative routes outside of the downtown area. It is anticipated that the volume redistribution presented is a conservative representation. The existing redistribution conditions peak hour volumes are shown in **Figure 5**. Detailed volume redistribution spreadsheets are provided in **Appendix C**.

With redistribution of traffic associated with the closure of Green Street, the current operations of Southeast Alley (the north/south road segment west of city hall) were evaluated. Currently, limited building setback for buildings in the northwest and northeast quadrants of the intersection limit visibility for southbound traffic approaching 3rd Street. Visibility of pedestrians along the sidewalk is also limited; pedestrians cannot be viewed in advance until a vehicle has entered the crossing area. The current alley configuration was reviewed as additional pedestrian traffic is expected along 3rd Street with proposed redevelopment and the alley could operate as an ingress/egress route to the parking garage. Considering expected increases in pedestrian traffic and southbound sight distance, re-assigning the alley to support northbound traffic only from 3rd Street to the east/west alley south of the fire station (Southeast Alley) was reviewed.

Supporting northbound traffic only will alleviate sight distance concerns for southbound traffic accessing 3rd Street, will limit the use of the alley for southbound traffic displaced from the closure of Green Street, and will improve pedestrian conditions at the current alley access at 3rd Street. Several businesses have parking along this segment of the alley and use the alley for receipt of supplies and trash service. The loading dock for the City of Lee's Summit City Hall building is also located along this alley. Turning templates were reviewed at the alley access with 3rd Street to determine if a change to circulation can be supported. Vehicular turning templates for the westbound right and eastbound left turning movements from 3rd Street, as well as the northbound left and right turning movements to 2nd Street were conducted and are provided in **Appendix C**. As illustrated on the turning templates, larger trucks may encroach the

adjacent lane when accessing the alley. This is an existing condition for exiting traffic currently using the alley and is expected to be present at other alley locations within the downtown area. The impact of vehicular encroachment would be expected to be minimal. The revised circulation plan would support the entry of traffic from 3rd Street at the alley location. Users can then circulate north along the alley, exiting at 2nd Street. A section of two-way access will be maintained along Southeast Alley from 2nd Street to the parking garage access to support fire department operations and access to/from the parking garage.

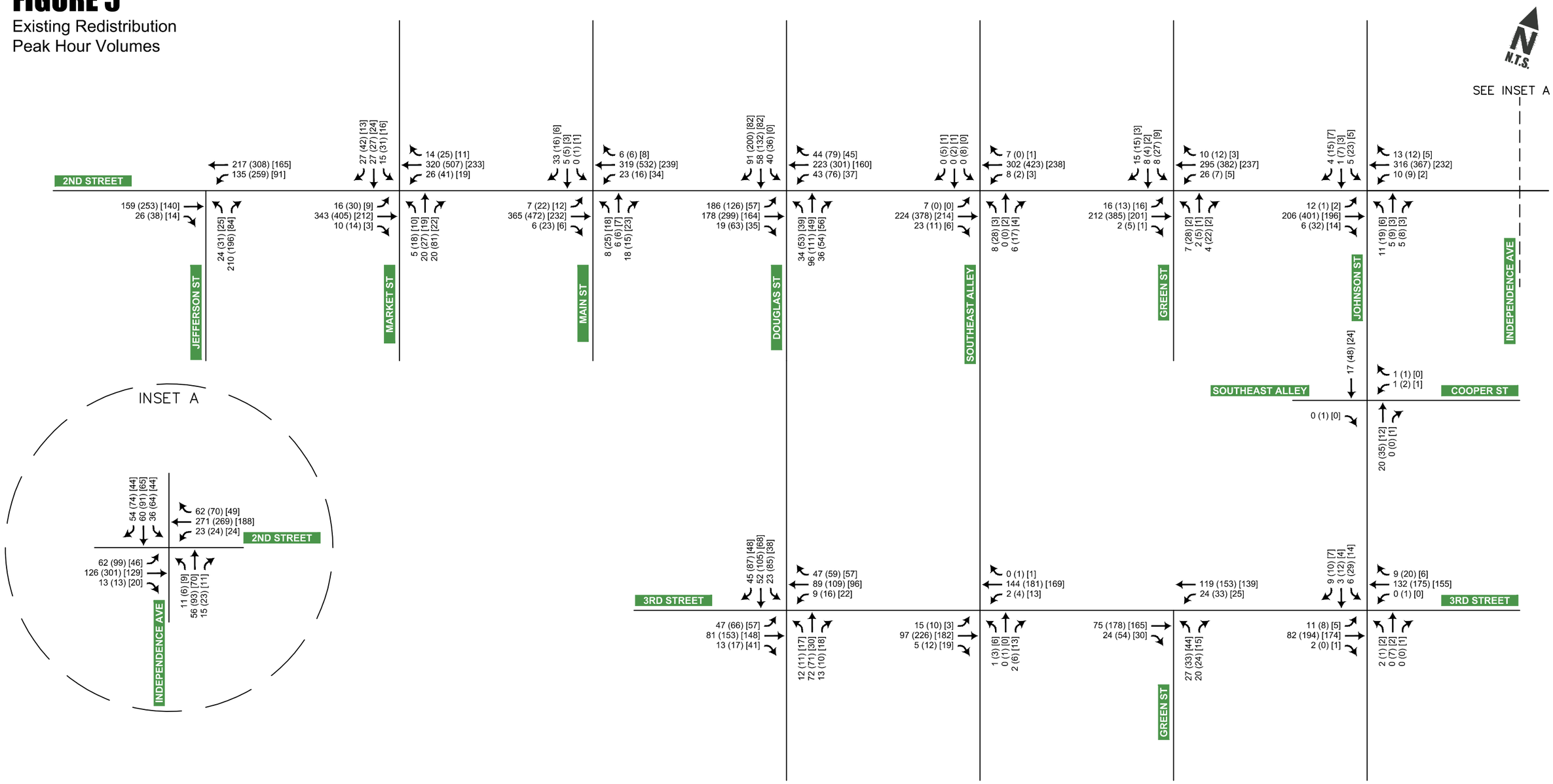
It is recommended to modify the circulation of Southeast Alley to support northbound traffic only. It is anticipated that city staff will need to present the potential configuration of the alley to adjacent businesses. If the proposed circulation change of the alley is supported, one-way (R6-1) and do not enter (R5-1) signage should be provided at several locations along the alley. To further support the one-way configuration, arrow pavement markings along the alley should be provided to reinforce the northbound only circulation. During high attendance events, consideration should be given to providing staff or barriers at the garage drive (northwest corner of City Hall) to direct traffic north.

If modifying the traffic configuration of the alley is not desired, operations would be expected to remain similar to existing conditions. During high attendance events, staff or barriers should be provided at the parking garage drive (northwest corner of City Hall) to direct traffic north and discourage event traffic from using the alley to exit the site to the south. This will assist in reducing potential conflicts at the intersection of the alley with 3rd Street.

With the closure of Green Street, a dedicated loading zone in front of City Hall will be removed. The development team should coordinate with the City of Lee's Summit to determine if another location on site would be suitable to replace the loading zone. The location of the loading zone should consider future transit routes in the city. Potential locations for the loading zone are along 2nd Street east of Green Street (south side of road). The possible usage of a planned gated access location along 2nd Street (proposed with Phase 1 development) should be considered.

FIGURE 5

Existing Redistribution
Peak Hour Volumes



LEGEND

AM (PM) [WKND] Peak Hour Volumes

4.2 Existing Redistribution Warrant Analysis

Turn lane and signal warrants were reviewed for Existing Redistribution conditions following the methodologies stated in **Section 3.2**. Existing Redistribution lane configuration and traffic control for the study network are illustrated in **Figure 6**. Detailed warrant analysis is provided in **Appendix C.**

4.2.1 Signal Warrants

Due to the redistribution of volumes from Green Street and Southeast Alley, trip distribution patterns are expected to change. The percent increase or decrease of approach peak hour volumes were calculated and a factor was extrapolated to use over the entire count period. Warrants 1, 2 and 3 were reviewed for the following intersections, consistent with the existing conditions.

- 2nd Street and Green Street
- 2nd Street and Johnson Street
- 3rd Street and Green Street
- 3rd Street and Johnson Street

No intersections are expected to warrant signalization under Existing Redistribution Conditions.

Existing pedestrian travel patterns are not expected to significantly change with the closure of Green Street. While pedestrian traffic may increase within the plaza area, pedestrians are expected to utilize the city parking garage for access. Outside of the city hall block, pedestrians would be expected to follow similar travel patterns to existing. Pedestrian volumes were not revised for redistribution conditions, thus Warrant 4 was not reviewed.

4.2.2 Intersection Stop Control

The following intersections were reviewed to determine if the redistribution of volumes warrants a change in stop control. The current intersection control type is noted.

- 2nd Street and Green Street (north/south stop control)
- 2nd Street and Johnson Street (north/south stop control)
- 3rd Street and Green Street (all-way stop control)

Multi-way stop control may be justified if traffic conditions meet any of the applicable criteria described in the MUTCD. Based on the data available, the minimum volume guidance was reviewed. This guidance indicates that multi-way stop control may be an effective solution to an intersection with a major street volume of 300 vehicles per hour (total of both approaches) for any 8 hours of a single day, and 200 units (vehicles, pedestrians, cyclists) per hour for the same 8 hours.

The intersection of 2nd Street and Green Street is recommended to remain under its current configuration as a four-leg intersection with stop control for the minor legs (Green Street). The south leg of the intersection will provide access to the city parking garage only and will terminate north of City Hall.

With closure of the north leg of Green Street at 3rd Street, the intersection was reviewed to determine if a change in traffic control would be appropriate. Redistributed volumes at the intersection are not expected to meet warrants for all way stop control; it is noted that existing vehicular volumes do not support the current all-way stop control. Reviewing the intersection, existing building set back in the southwest quadrant of the intersection limits visibility along 3rd Street when approaching northbound along Green Street. Additionally, the future presence of a pedestrian plaza and event space north of this intersection, and the availability of street and surface lot parking within this area, is expected to result in an increase in pedestrian volumes. Considering sight distance limitations, the configuration of the pedestrian pathway and amenities that are proposed to replace the north leg of Green Street, and the likelihood of pedestrian volumes increasing, all way stop controlled is recommended to remain at the intersection.

The intersection of 2nd Street and Johnson Street is recommended to remain under its current configuration as a four-leg intersection with stop control for the minor legs (Johnson Street).

4.2.3 Turn Lane Warrants

Due to the reconfiguration of Green Street and Southeast Alley, several vehicular turning movements will no longer exist. The following is a summary of turn lane warrants that are met with the redistribution of traffic. Movements that were previously warranted under existing conditions are not included. Detailed turn lane warrant analysis sheets are provided in **Appendix C.**

4.2.3.1 Left-Turn Lanes

Based on Existing Redistribution volumes, the following left-turn lanes are warranted:

- Northbound on Southeast Alley at 2nd Street (meets PM peak hour only)
- Southbound on Green Street at 2nd Street (meets PM peak hour only)
- Southbound on Johnson Street at 3rd Street (meets PM peak hour only)
- Westbound on 3rd Street at Green Street (increased warrant, meets all hours)
- Northbound on Green Street at 3rd Street (increased warrant, meets all hours)

4.2.3.2 Right-Turn Lanes

Based on Existing Redistribution conditions, the following right-turn lanes are warranted based Lee's Summit standards and peak hour volumes:

- Southbound on Douglas Street at 3rd Street (meets PM peak hour only)

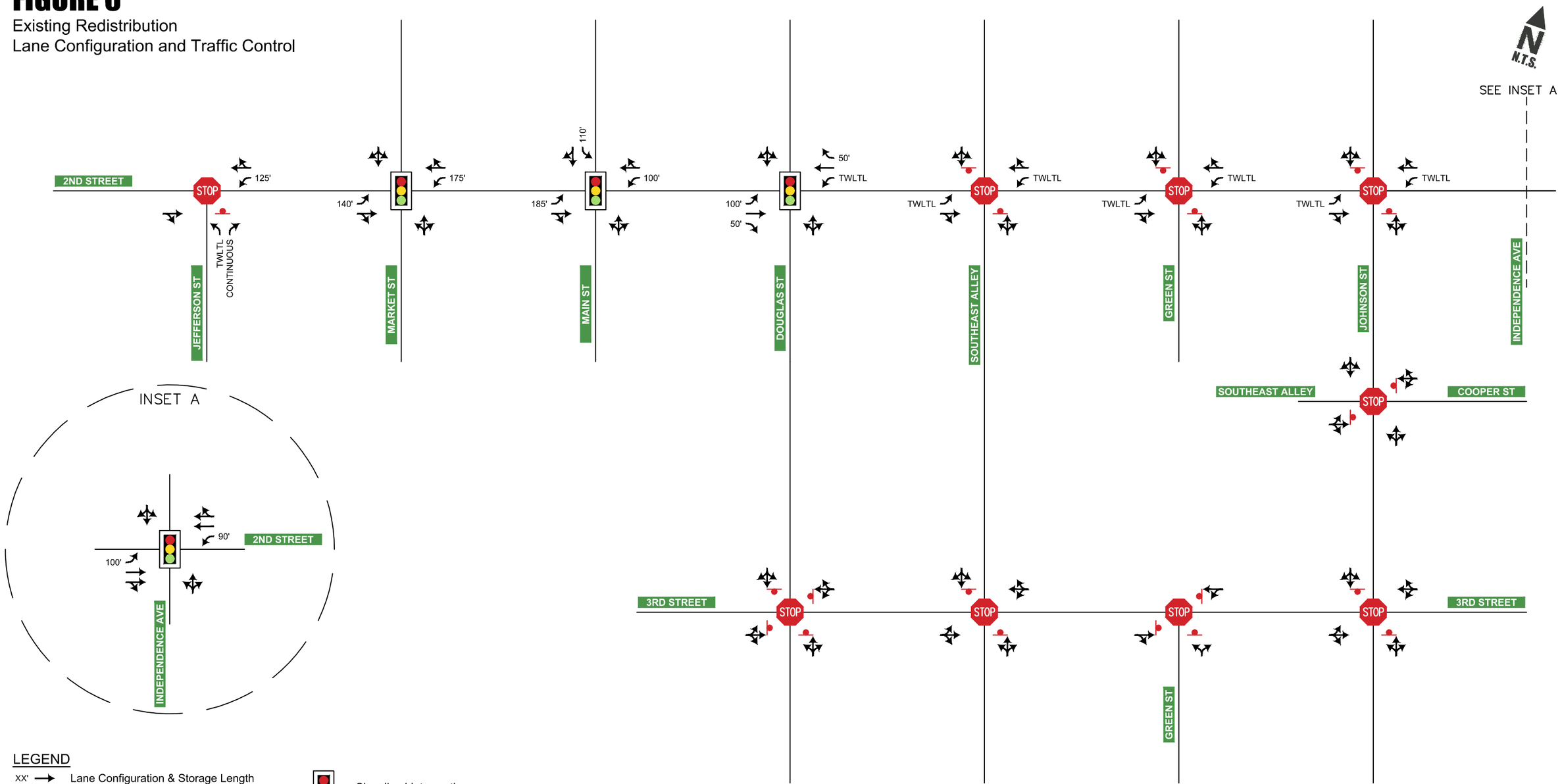
Several movements are on the threshold of meeting warranting volumes, listed below:

- Northbound on Douglas at 2nd Street (threshold for PM and Weekend)
- Eastbound on 3rd Street at Green Street (threshold for PM only)
- Westbound on 3rd Street at Douglas Street (threshold for PM and Weekend)

Capacity analysis will be reviewed in **Section 4.3** to identify areas with operational deficiencies. Recommendations for turn lanes will be based on feasibility, constructability and benefit of improvement.

FIGURE 6

Existing Redistribution
Lane Configuration and Traffic Control



4.3 Existing Redistribution Capacity Analysis

Capacity analysis was performed for Existing Redistribution conditions using the methodologies described in **Section 3.3**. The peak hour factors observed under existing conditions were used for existing redistribution conditions at all existing study intersections. Truck percentages were not updated from existing conditions.

The signalized intersections of 2nd Street with Market Street, Main Street, Douglas Street, and Independence Avenue are expected to operate at an overall LOS B or better during all three peak hour periods. Individual signalized movements are expected to operate at a LOS C or better with acceptable 95th-percentile queue lengths during all three peak hour periods.

Unsignalized movements are expected to operate similar to existing conditions at LOS C or better with acceptable 95th percentile queue lengths during all three peak hour periods with the exception of the northbound left turn movement at the intersection of 2nd Street and Jefferson Street which is operating at a LOS D during the PM peak hour period. The 95th-percentile queue is contained within the dedicated left-turn lane for this movement.

A further analysis of the necessity and practicality of improvements was conducted as outlined in **Section 3.3**. Movements with unchanged volumes from the previous scenario were removed. A summary of factors for turn lane warrants and recommendations are summarized in **Table 5**.

Table 5. Existing Redistribution Turn Lane Warrant Review.

	Intersection	Movement	Criteria	Operations	Recommended?
Left-Turn Lanes	2nd and Douglas	Northbound	Signalized	LOS A-B	NO
	2nd and SE Alley	Northbound	Volumes (1/3)	LOS B-C	NO
	2nd and Green	Southbound	Volumes (1/3)	LOS B-C	NO
	3rd and Green	Westbound	Volumes (3/3)	LOS A	NO
		Northbound	Volumes (3/3)	LOS A	NO
	3rd and Douglas	Southbound	Classification	LOS A-B	NO
		Eastbound	Classification	LOS A-B	NO
Right-Turn Lanes	2nd and Douglas	Northbound	Threshold (2/3)	LOS A-B	NO
	3rd and Green	Eastbound	Threshold (1/3)	LOS A	NO
	3rd and Douglas	Southbound	Volumes (1/3)	LOS A-B	NO
		Westbound	Threshold (2/3)	LOS A-B	NO

Redistributed volumes at the intersection of 2nd Street and Douglas Street are expected to be similar to existing volumes for the southbound movements. Operations of the southbound movement are similar to the existing condition. As presented in **Section 3.3**, a southbound right turn lane should be provided if through lane alignment can be maintained.

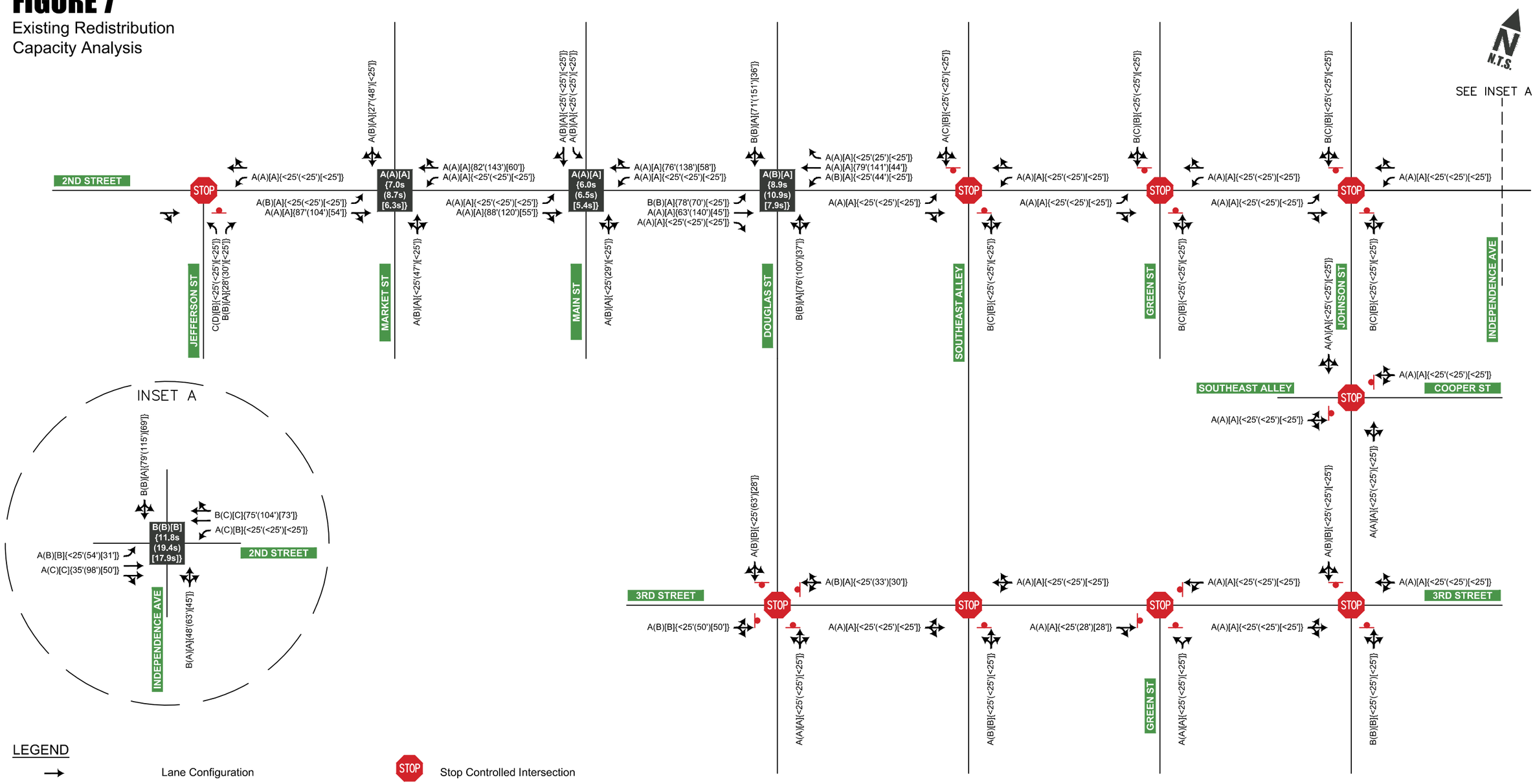
As presented in **Section 3.3**, City staff presented observational data of queuing at the intersection of 2nd Street and Green Street under existing conditions and requested review of a northbound left turn lane. With the removal of Green Street between 2nd Street and 3rd Street, northbound volumes at the intersection of 2nd Street and Green Street would be expected to decrease under typical operations as only garage traffic will be serviced. While short periods of delay may be experienced during workday departure periods, due to the short time period of higher traffic volumes, the lack of expected queueing and acceptable operations at other times of the day, and considering the pedestrian environment, a northbound left turn lane is not recommended at the intersection.

The intersection of 2nd Street and Green Street was also reviewed to determine if additional pedestrian treatment is recommended with the closure of Green Street. The closure of Green Street is not expected to significantly impact pedestrian or vehicular volumes through the intersection, thus additional treatment is not recommended.

Reviewing warranting characteristics, operations and feasibility of construction, several movements do not need additional capacity, have acceptable operations or present construction challenges. With this consideration, no improvements are recommended under existing redistribution conditions. The Existing Redistribution capacity analysis summary is illustrated in **Figure 7**. Detailed results are provided in **Appendix C.**

FIGURE 7

Existing Redistribution
Capacity Analysis


N.T.S.
SEE INSET A
2ND STREET
JEFFERSON ST
MARKET ST
MAIN ST
DOUGLAS ST
SOUTHEAST ALLEY
GREEN ST
JOHNSON ST
INDEPENDENCE AVE
COOPER ST
3RD STREET
STOP
A(A)[A] {7.0s (8.7s) [6.3s]}
A(A)[A] {6.0s (6.5s) [5.4s]}
A(B)[A] {8.9s (10.9s) [7.9s]}
C(D)[B]{<25'(<25')[<25']}
B(B)[A]{28'(30')[<25']}
A(A)[A]{<25'(<25')[<25']}
A(B)[A]{<25(<25')[<25']}
A(A)[A]{87'(104')[54']}
A(B)[A]{27'(48')[<25']}
A(A)[A]{82'(143')[60']}
A(A)[A]{<25'(<25')[<25']}
A(A)[A]{<25'(<25')[<25']}
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A(B)[A]{<25'(<25')[<25']}
A(A)[A]{<25'(29')[<25']}
A(A)[A]{76'(138')[58']}
A(A)[A]{<25'(<25')[<25']}
B(B)[A]{78'(70')[<25']}
A(A)[A]{63'(140')[45']}
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B(B)[A]{76'(100')[37']}
A(A)[A]{<25'(25')[<25']}
A(A)[A]{79'(141')[44']}
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A(C)[B]{<25'(<25')[<25']}
B(C)[B]{<25'(<25')[<25']}
A(A)[A]{<25'(<25')[<25']}
A(A)[A]{<25'(<25')[<25']}
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5. EXISTING PLUS PHASE 1 DEVELOPMENT CONDITIONS

This project represents redevelopment of existing land uses within the area. As presented in **Section 1.0**, the development site is proposed to be constructed in two phases. The first phase of development is an event space, located east of the existing city hall parking garage, replacing several existing buildings located in the southeast quadrant of 2nd Street and Green Street. An internal private road network will provide access to phase 1 development as well as to limited parking. The event space is expected to be utilized for the city farmer's market as well as special events throughout the year. Phase 2 will represent development of the remainder of the site encompassing the area bound by Green Street, 2nd Street, Johnson Street and 3rd Street. The site plan is presented in **Figure 8,** with planned phasing shown. Phase 1 is considered under existing year conditions and represents the farmers market and event space land uses. Phase 2 is considered under build year 2024 conditions and is presented in **Section 6**.

The existing Lee's Summit farmer's market is located in the northeast quadrant of 2nd Street and Douglas Street. Vendors utilize an existing parking lot for the market space with attendees parking along the public street network. The farmer's market is held on Wednesday and Saturday mornings between April and November. With phase 1 development the farmer's market is proposed to be relocated to the new event space. Up to fifty vendors are expected to be supported within the space. Based on conversations with agency staff, Wednesday morning farmer's market conditions were reviewed for the purposes of this study.

The event space is also expected to support special events throughout the year. Based on conversations with city staff, weekly evening events with smaller attendance are planned as well as weekend events that may have larger attendance. Both scenarios (smaller weeknight event and larger weekend event) are presented in this study.

5.1 Phase 1 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. Two methodologies were utilized to generate trips. Trip generation was discussed with city staff due to the unique uses of the site. The Institute of Transportation Engineers (ITE) provides methods for estimating traffic volumes of common land uses in the *Trip Generation Manual (11th Edition)*. The ITE manual was referenced to develop trips for the farmers market. The land use that most resembles the proposed site is Land Use Code 858 (Farmers Market).

An applicable land use in the ITE manual is not available to represent the event space uses. Based on conversations with city staff, projected attendance was used to generate trips. An attendance of 225 people was considered for a typical weeknight event and attendance of 1,000 people was considered for a weekend event. Assumptions to generate vehicular trips

associated with an event included assuming 2.0 riders per vehicle, 20% of traffic arrives prior to the peak hour of the event, and entering/exiting distribution rates that match other typical events (Land Use Code 462 Baseball Stadium was referenced). While active user trips may occur (pedestrian, bicycling, etc), to present a conservative analysis alternative modes of traffic to vehicular were not considered. The event space trip generation (farmers market or weekday/weekend event) was assumed to include all site amenities, such as playground, street vendors, or other attractions as these amenities would be expected to be subsidiary uses to the main trip generator of a market or event.

There is not expected to be overlap between the farmers market and an event during a typical weekday, therefore farmers market is the only trip generator during the AM peak hour period. A smaller capacity event is the only trip generator during the PM peak hour period. Higher capacity event conditions were considered during the weekend PM peak hour period.

Based on the *ITE Trip Generation Manual* and assumptions, trip generation characteristics were developed for Phase 1 of the proposed site. Trip generation characteristics expected for the site are shown in **Table 6**. Detailed trip generation information is provided in **Appendix D**.

Table 6. Phase 1 Development Trip Generation.

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekend PM Peak Hour		
	Total	Enter	Total	Total	Total	Exit	Total	Total	Exit
Farmers Market	887	461	426	-	-	-	-	-	-
Event	-	-	-	113	104	9	400	368	32
TOTAL	**887**	**461**	**426**	**113**	**104**	**9**	**400**	**368**	**32**

Trips associated with existing development located on the property and on network trips associated with the existing farmers market were not removed from existing count data. Thus, the operations presented in this report are expected to present a conservative representation of potential conditions.

Trips were distributed through the study network based on the existing gravity, anticipated land use, and review of the surrounding area. Directional trip distribution percentages expected for the site are illustrated in **Table 7**.

Table 7. Trip Distribution.

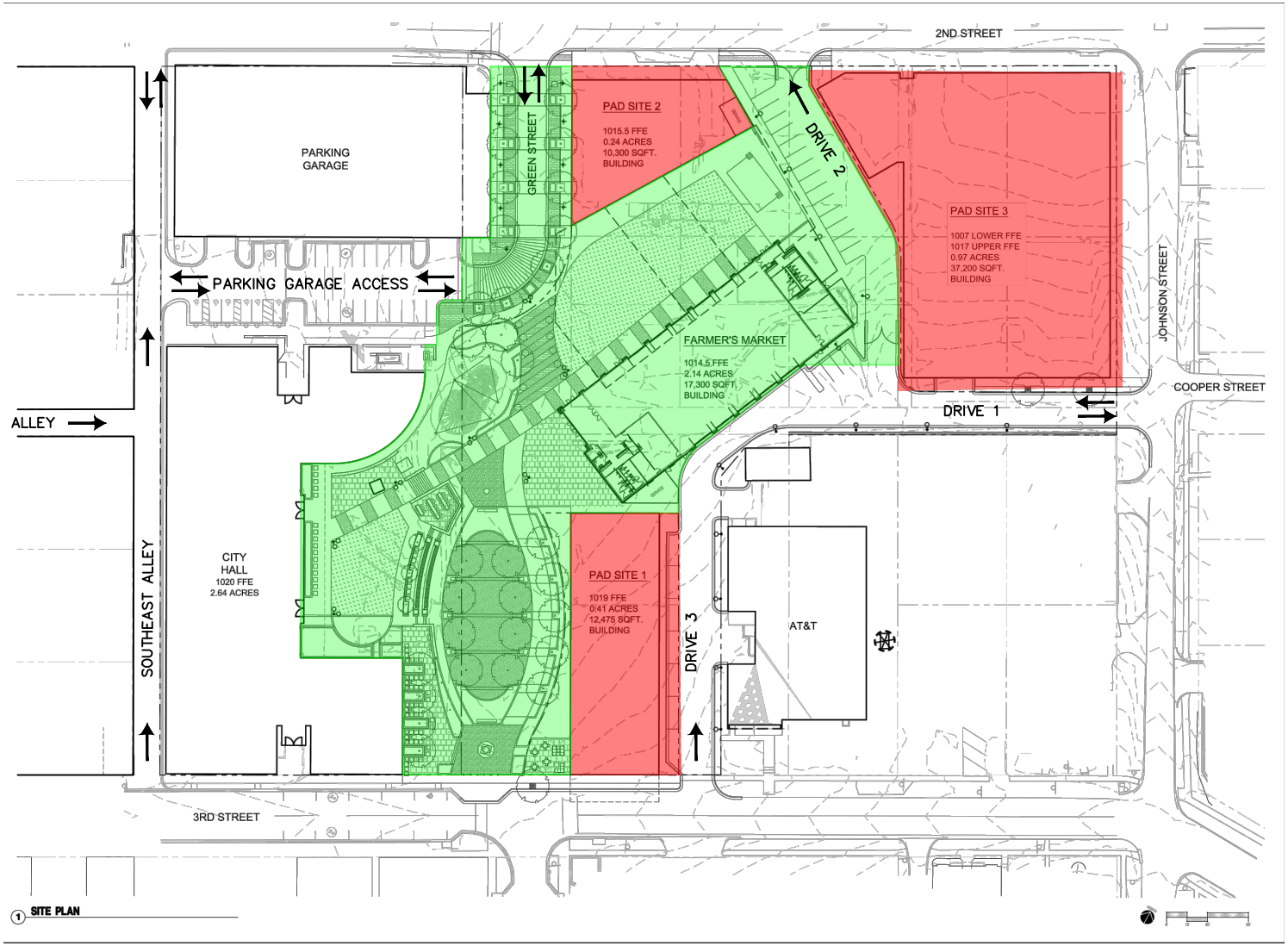
Direction	Trip Distribution
2nd Street (West)	11%
2nd Street (East)	15%
3rd Street (West)	15%
3rd Street (East)	10%
Jefferson Street (South)	10%
Market Street (North)	1%
Market Street (South)	2%
Main Street (North)	1%
Main Street (South)	2%
Douglas Street (North)	16%
Douglas Street (South)	5%
Green Street (North)	1%
Green Street (South)	4%
Johnson Street (North)	1%
Johnson Street (South)	1%
Independence Avenue (North)	4%
Independence Avenue (South)	1%
TOTAL	**100%**

Trip generation and distribution was provided to agency staff for review. The expected trip distribution volumes for the proposed development are shown in **Figure 9**. The resulting existing plus development volumes are illustrated in **Figure 10**.

The site is not expected to consist of a high volume of truck traffic. A delivery or single-unit truck is expected to be a typical heavy vehicle to service the site. A significant impact to adjacent roadway truck percentages is not expected with the proposed development.

FIGURE 8

Lee's Summit, MO
Site Plan

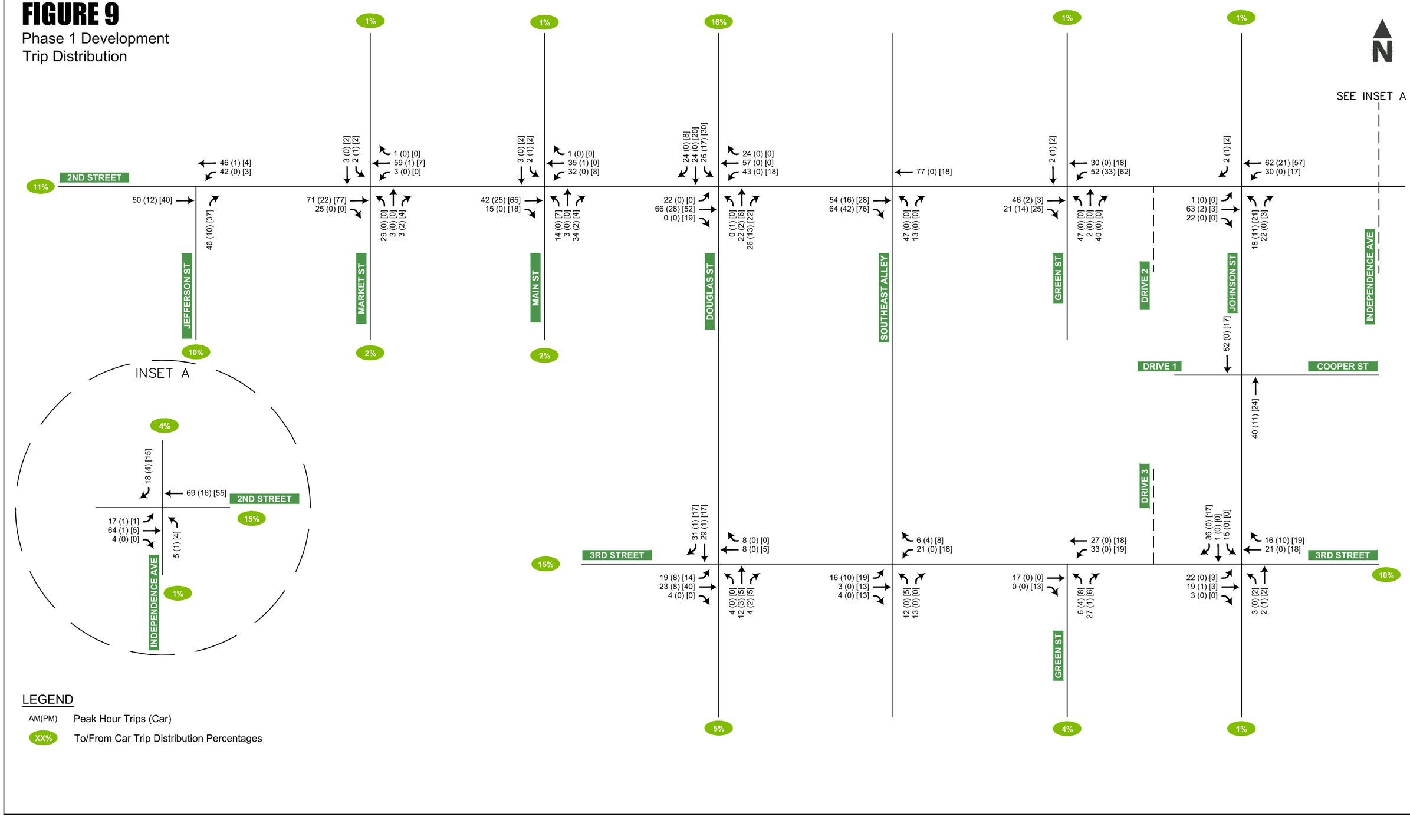


LEGEND

- Phase 1
- Phase 2
- Traffic Circulation

FIGURE 9

Phase 1 Development
Trip Distribution



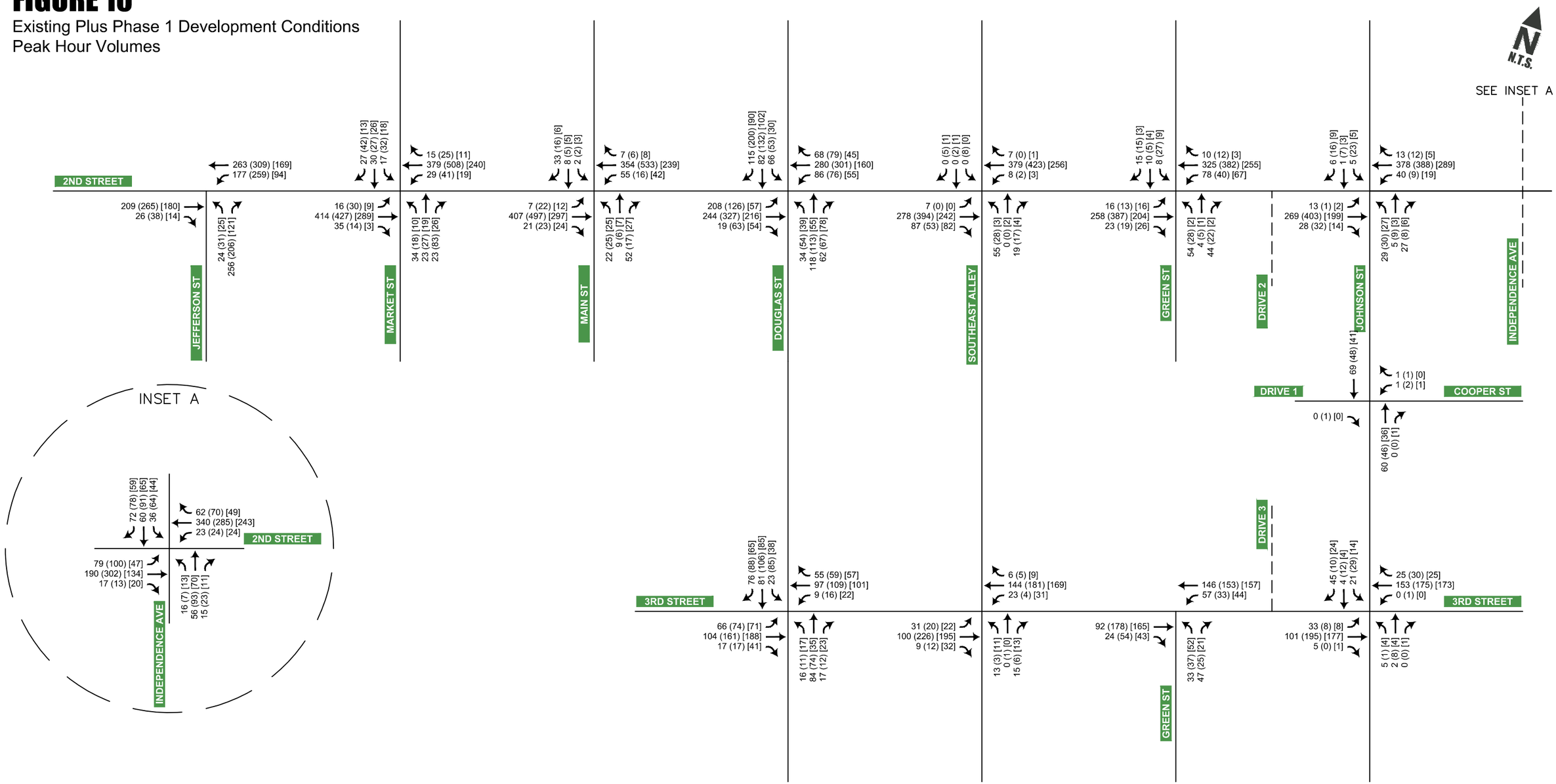
LEGEND

AM(PM) Peak Hour Trips (Car)

XX% To/From Car Trip Distribution Percentages

FIGURE 10

Existing Plus Phase 1 Development Conditions
Peak Hour Volumes



LEGEND

AM (PM) [WKND] Peak Hour Volumes

5.2 Parking Conditions

Section 3.1.1 presented existing parking characteristics in the downtown area. The city hall parking garage is expected to service the farmers market and event space. Dependent upon event attendance, when the parking garage is full drivers are expected to start utilizing on street and surface parking lots.

The city provided data from a survey of parking garage usage which was referenced to determine a projected number of available stalls during each analysis period. Based on discussion with city staff, the available parking garage stalls were further reduced by 84 stalls to represent potential stall usage by approved developments.

Reviewing phase 1 trip generation, both the weekday AM farmers market and weekend PM event could generate more vehicular trips than parking that is available in the garage. To represent trip generation to the area, it was assumed that for both land uses the parking garage would be filled first, with any remaining trips utilizing on street and surface parking lots. Ample on street and public surface lots are expected to be available within ¼ mile of the site that should adequately serve typical operations for all analysis periods. Adequate parking in the city hall garage is expected to service a weekday PM event, thus all expected trips were distributed to the garage. Parking garage assumptions and a map of public parking areas is provided in **Appendix D**.

5.3 Access Characteristics

As shown on the site plan presented in **Figure 8**, the proposed development is located in the downtown block east of City Hall bordered by 2nd Street, Johnson Street, 3rd Street, and Green Street. Three new access points are proposed to service phase 1 development: one full access drive along Johnson Street (Drive 1), one gated one-way access along 2nd Street (Drive 2), and a limited access along 3rd Street (Drive 3). Several existing driveways are proposed to be improved, removed, or used in place.

Figure 8 illustrates configuration of drives and alleys within the study area, as summarized below. Detailed discussion of street and driveway configuration is provided further in this section.

- Drive 1 – Two-way from Johnson Street west to Drive 2
- Drive 2 – One-way northbound from Drive 1 to 2nd Street
- Drive 3 – One-way northbound from 3rd Street to Drive 1
- Southeast Alley (alley west of city hall)
    - One-way northbound from 3rd Street to fire station
    - Two-way from fire station to 2nd Street
- Alley south of fire station – Remain one-way eastbound

As presented previously, modifications to the existing road geometrics will occur with phase 1 development. Green Street will be closed between 3rd Street and 2nd Street. The south leg of the intersection of 2nd Street and Green Street will remain, providing access to the city hall parking garage. Southeast Alley is recommended to support northbound traffic only from 3rd Street to south of the fire station. Both streets will continue to provide two-way access between 2nd Street and the garage. Redistribution of trips was presented in **Section 4.0**.

Currently, an east/west alley is located south of 2nd Street providing access between Green Street and Johnson Street. At Johnson Street, the alley is offset from Cooper Street by approximately 20 feet (south of Cooper Street, measured center to center). With redevelopment of the site, the alley is proposed to be removed; however, the existing curb cut with Johnson Drive is proposed to remain (referred to as Drive 1 for the purposes of this report). The Drive 1 access point is expected to service both phase 1 and 2 development and will service two-way traffic. Considering expected traffic conditions, it is recommended to align the west leg of the intersection (Drive 1) 20 feet to the north to eliminate the offset condition.

The City of Lee's Summit *Access Management Code* provides guidance for acceptable access spacing of new streets and driveways. Connections where there is no median provided (no restrictions to access) should provide a minimum separation of 400 feet along minor arterials. Connections at local roadways should be spaced at appropriate distances to accommodate throat length queuing.

The City of Lee's Summit *Unified Development Ordinance* further outlines expectations for design within the downtown core area. In general, the number of curb cuts and the size of access is to be minimized, and access spacing is to be provided as is reasonable.

Drive 2 is located along 2nd Street approximately 185 feet east of Green Street. Drive 2 is proposed to be gated at all times except for events (farmers market vendor drop off/pick up and event support services) and will service exiting (northbound) traffic only. The drive is not proposed to service daily, public traffic. Reviewing potential locations for access, several closely spaced driveways are located along the north side of 2nd Street. The presence of these existing drives hinders location of the drive to prevent offset intersections. If the drive can be adjusted to align with one of the existing drives along the north side of 2nd Street, that would be a preferred condition. However, considering that the drive will have limited usage (gated) and service northbound traffic only, the offset location is acceptable. Drive 2 will consolidate two existing full access drives currently located along 2nd Street within this block.

Drive 3 is proposed along 3rd Street to provide access to phase 1 and 2 development. Drive 3 is proposed to be located approximately 125 feet east of Green Street and 330 feet west of Johnson Street, aligning with an existing access to the south. Although minimum recommended spacing of 400 feet is not met, the removal of the north leg of Green Street and the access

alignment with an existing drive is a preferred location. Drive 3 is proposed as one-way northbound only to provide access to the frontage of pad site 1. The internal loop road connection where Drives 1 and 3 meet will be signed and marked appropriately to restrict two-way access traveling westbound.

Site access should be designed to meet City of Lee's Summit standards.

5.4 Site Circulation and Connectivity

Site circulation and connectivity was reviewed for the site considering phase 1 conditions. The site will be serviced by an internal drive that intersects Johnson Drive (Drive 1) and 3rd Street (Drive 3). A one-way drive (northbound) will intersect the internal drive and provide limited access to 2nd Street. Drive 2 will be gated, with access restricted during non-event periods. Existing access points associated with phase 2 development are expected to remain in place and will be considered during the phase 2 study.

Drive 1 will serve two-way traffic between Johnson Street and Drive 3 and will be the primary access to the east of the site, with limited on street parking proposed along the north side of the road. Under phase 1 development, Drive 1 will provide access to farmer's market vendors/event staff parking along Drive 2. Under phase 1 development the road is expected to service a low volume of traffic. The proposed drive width and direction of travel will be further reviewed under phase 2. Due to the one-way configuration of Drive 3 and the gated condition for Drive 2, adequate turn around should be provided for drivers that enter Drive 1 when Drive 2 is gated. A three-point turn using Drive 2 (prior to the gate) or parking spaces may be required internal to the site.

Drive 2 access will be restricted to egress only for vendors or service providers associated with the events (including farmers market). During an event, access to the drive will be provided internally to the site from Drive 1 or Drive 3. It is anticipated that this gate location will be monitored by staff to restrict access to vehicles only associated with an event. Vendors will be able to access the drive, park to unload/load, and will then exit northbound. At 2nd Street, northbound left and right turn movements will be allowed. Based on discussions with city staff, it is anticipated that the existing farmers market lot (northeast quadrant of 2nd Street and Douglas Street) will serve as parking for vendors during an event. Allowing northbound egress to both the west and east supports this planned circulation. Signage is recommended to be provided along 2nd Street at the drive location to note that it is gated and one way (exit) only.

During non-farmers market periods, the parking will be accessed via Drive 1 or Drive 3, with the gate to 2nd Street closed. This parking area is proposed to be available for limited public parking during non-event periods. If parking is allowed, adequate turn around space should be provided

and access to 2nd Street restricted. Parking management should be in place to ensure public parking is cleared from the space before event periods.

Drive 3 will serve one-way traffic northbound between 3rd Street and Drive 1. At the intersection with Drive 1 traffic can continue east along Drive 1 or continue north along Drive 2 (when the drive is open). Under phase 1 conditions the drive is expected to service a low volume of traffic. The proposed drive width and direction of travel will be further reviewed under phase 2.

Two-way access will be provided to/from the city hall garage at Green Street and at Southeast Alley, consistent with existing conditions. As presented in **Section 4.0**, Southeast Alley is recommended to be restricted to one-way only northbound traffic between 3rd Street and the parking garage access. During high attendance events, consideration should be given to providing staff or barriers at the garage drive (northwest corner of City Hall) to direct traffic north.

Traffic flow interior to the site is illustrated in **Figure 8.**

5.5 Existing Plus Phase 1 Development Warrant Analysis

Turn lane and signal warrants were reviewed for Existing Plus Phase 1 Development conditions following the methodologies stated in **Section 3.2**. Existing Plus Phase 1 Development lane configuration and traffic control for the study network are illustrated in **Figure 11**. Detailed warrant analysis is provided in **Appendix D.**

5.5.1 Signal Warrants

Due to the peak characteristics of the farmers market and event space land uses, warrant 3 was the only signal warrant reviewed for the study intersections outlined in **Section 3.2**. No intersections are expected to warrant signalization under Existing Plus Phase 1 Development Conditions. Intersection traffic control (stop control) is recommended to remain in place considering expected phase 1 operations.

The development of phase 1 (farmers market, event space and pedestrian plaza) may lead to an increase of pedestrian traffic in the study area. Reviewing the site, the majority of surface lot parking and ample on street parking is located in the downtown core south of 2nd Street. With the relocation of the farmers market to the event space it is anticipated that farmers market attendees will park in the parking garage, then transition to on street or surface lot parking when the garage is full. Thus, the intersection of 2nd Street and Green Street is not expected to experience a significant increase of pedestrian traffic volumes. Consistent with existing conditions, warrant 4 (pedestrian activity) is not expected to be met at the intersection of 2nd Street and Green Street. It is anticipated that pedestrian crossing patterns may change with a reduction in pedestrian traffic north/south across 2nd Street as attendees utilize parking available closer to the site.

5.5.2 Intersection Stop Control

The following intersections were reviewed to determine if the addition of phase 1 development volumes warrants a change in stop control. The current intersection control type is noted.

- 2nd Street and Green Street (north/south stop control)
- 2nd Street and Johnson Street (north/south stop control)
- 3rd Street and Green Street (all-way stop control)

The intersection of 2nd Street and Green Street is proposed to remain under its current configuration as a four-leg intersection with stop control for the minor legs (Green Street).

Due to existing building set back in the vicinity of the intersection which limits visibility along 3rd Street and the expected increase of pedestrian traffic, the intersection of Green Street and 3rd Street is recommended to remain under all-way stop control.

The intersection of 2nd Street and Johnson Street is recommended to remain under its current configuration as a four-leg intersection with stop control for the minor legs (Johnson Street).

5.5.3 Turn Lane Warrants

The following is a summary of new or increased warrants the previous existing conditions scenario. Detailed turn lane warrant analysis sheets are provided in **Appendix D.**

5.5.3.1 Left-Turn Lanes

Based on Existing Plus Phase 1 Development volumes, the following left-turn lanes are warranted:

- Northbound on Southeast Alley at 2nd Street (increased warrant, AM and PM)
- Northbound on Johnson Street at 2nd Street (meets all hours)
- Southbound on Johnson Street at 3rd Street (increased warrant, AM and PM)
- Eastbound on 3rd Street at Johnson Street (meets AM peak hour only)
- Westbound on 3rd Street at Southeast Alley (meets AM and weekend)
- Eastbound on 3rd Street at Southeast Alley (meets all hours)

5.5.3.2 Right-Turn Lanes

Based on Existing Plus Phase 1 Development conditions, the following right-turn lanes are warranted based Lee's Summit standards and peak hour volumes:

- Northbound on Douglas Street at 2nd Street (meets all hours)
- Eastbound on 2nd Street at Southeast Alley (meets AM and weekend)
- Southbound on Independence Avenue and 2nd Street (meets AM and PM)
- Southbound on Douglas Street at 3rd Street (increased warrant, meets all hours)

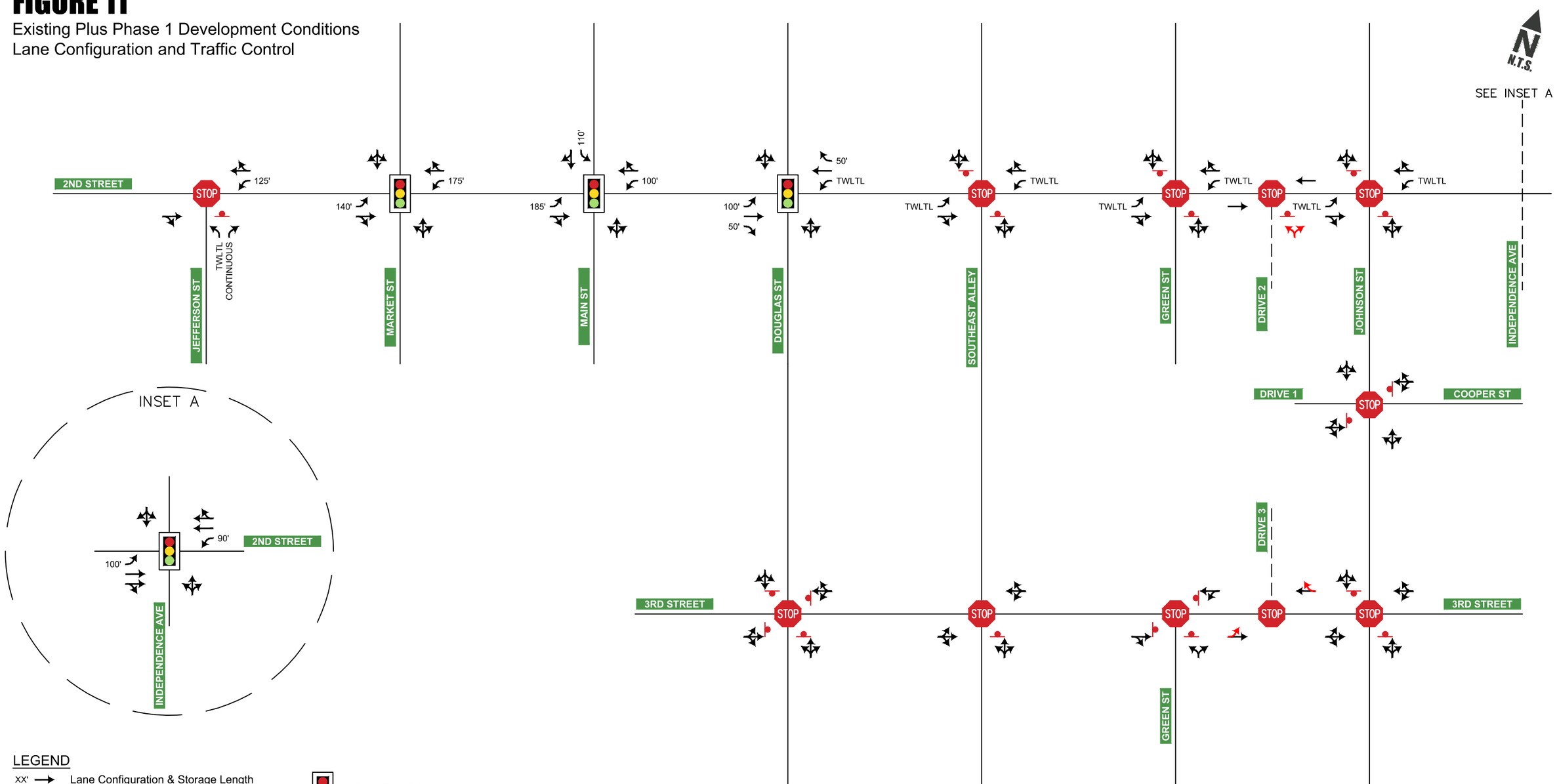
Several movements are on the threshold of meeting warranting volumes, listed below:

- Eastbound on 3rd Street at Green Street (threshold for PM only)
- Westbound on 3rd Street at Douglas Street (threshold for all hours)

Capacity analysis will be reviewed in **Section 5.6** to identify areas with operational deficiencies. Recommendations for turn lanes will be based on feasibility, constructability and benefit of improvement.

FIGURE 11

Existing Plus Phase 1 Development Conditions
Lane Configuration and Traffic Control



5.6 Existing Plus Phase 1 Development Capacity Analysis

Capacity analysis was performed for Existing Plus Phase 1 Development conditions using the methodologies described in **Section 3.3**. The peak hour factors observed under previous scenarios were used for Existing Plus Phase 1 Development conditions at all existing study intersections. Truck percentages were not updated from previous scenarios.

The signalized intersections of 2nd Street with Market Street, Main Street, Douglas Street, and Independence Avenue are expected to operate similar to Existing Redistribution conditions at an overall LOS B or better during all three peak hour periods. Individual signalized movements are expected to operate at a LOS C or better with acceptable 95th-percentile queue lengths during all three peak hour periods.

Unsignalized movements are expected to operate similar to Existing Redistribution conditions at LOS C or better with acceptable 95th percentile queue lengths during all three peak hour periods with the following exceptions:

- Similar to Existing Redistribution conditions, the northbound left turn movement at the intersection of 2nd Street and Jefferson Street is expected to operate at a LOS D during the PM peak hour period. The 95th-percentile queue is contained within the dedicated left-turn lane for this movement.
- The southbound shared left/through/right turn movement at the intersection of 2nd Street and Green Street is expected to operate at a LOS D during the PM peak hour period. Queue lengths are expected to be one vehicle. It is anticipated that the lower level of service is associated with higher east/west traffic volumes that can be expected during an event scenario.

A further analysis of the necessity and practicality of improvements was conducted as outlined in **Section 3.3**. Movements with unchanged volumes from the previous scenario were removed. A summary of factors for turn lane warrants and recommendations are summarized in **Table 8**.

Table 8. Existing Plus Phase 1 Turn Lane Warrant Review.

Intersection		Movement	Criteria	Operations	Recommended?
Left-Turn Lanes	2nd and SE Alley	Northbound	Volumes (2/3)	LOS B-C	NO
	2nd and Johnson	Northbound	Volumes (3/3)	LOS B-C	NO
	3rd and Johnson	Southbound	Volumes (2/3)	LOS B	NO
		Eastbound	Volumes (1/3)	LOS A	NO
	2nd and Green	Southbound	Volumes (1/3)	LOS C-D	NO
	3rd and SE Alley	Westbound	Volumes (2/3)	LOS A	NO
		Eastbound	Volumes (3/3)	LOS A	NO
Right-Turn Lanes	2nd and Douglas	Northbound	Volumes (3/3)	LOS A-B	NO
	2nd and SE Alley	Eastbound	Volumes (2/3)	LOS A	NO
	3rd and Green	Eastbound	Threshold (1/2)	LOS A	NO
	2nd and Indep.	Southbound	Volumes (2/3)	LOS A-B	NO
	3rd and Douglas	Southbound	Volumes (3/3)	LOS A-B	NO
		Westbound	Threshold (3/3)	LOS A-B	NO

Considering phase 1 development, volumes at the intersection of 2nd Street and Douglas Street are expected to be similar to existing/redistribution volumes for the southbound movements. Operations of the southbound movement are similar to the previous conditions.

Under event conditions, heavier traffic may be expected to exit the parking garage through the intersection of 2nd Street and Green Street. During event release times, longer vehicular queuing and delay may be experienced. While providing a dedicated northbound left turn lane at the drive may slightly improve operations, as discussed in previous sections the presence of a turn lane would result in a wider drive width (three-lane section versus two-lane section) increasing the crossing distance for pedestrians. Considering the limited time periods in which queuing and delay may be experienced (high attendance events) and maintenance of the pedestrian environment, a northbound left turn lane is not recommended for the drive intersection 2nd Street and Green Street.

The intersection of 2nd Street and Green Street was also reviewed to determine if additional pedestrian treatment is recommended with phase 1 development. While traffic volumes at the intersection may increase during an event condition, a significant increase in pedestrian movements across 2nd Street are not expected, thus additional pedestrian treatment is not recommended.

Reviewing warranting characteristics, operations and feasibility of construction, several movements do not need additional capacity, have acceptable operations or present construction challenges. With this consideration, no improvements are recommended under Existing Plus Phase 1 Development conditions. The Existing Plus Phase 1 Development capacity analysis summary is illustrated in **Figure 12**. Detailed results are provided in **Appendix D.**

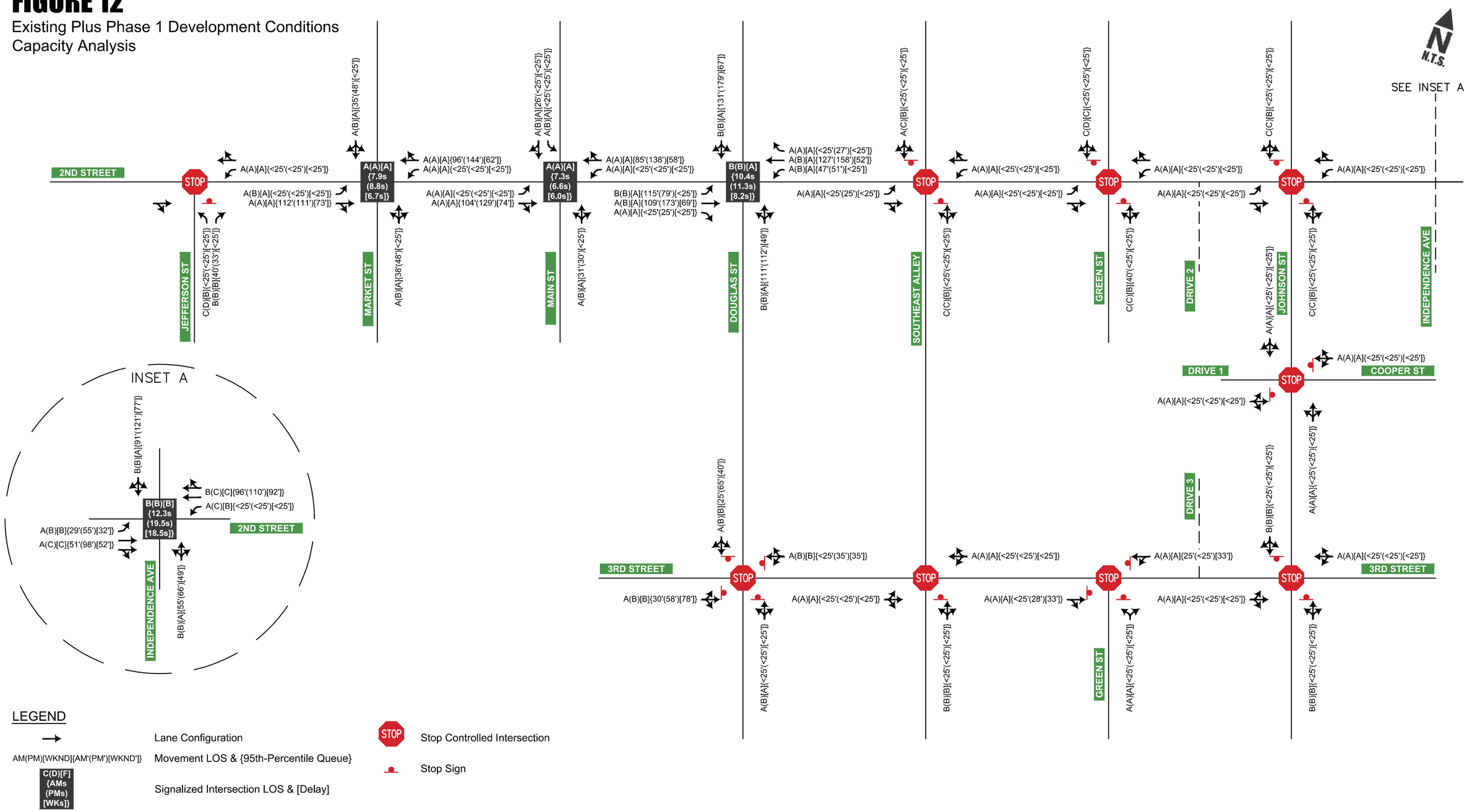
5.7 Event Conditions

As presented in **Section 5.6**, the study area network is expected to operate acceptably during event conditions. Adequate parking within the downtown core is anticipated to be available for a typical farmers market, weekday event, or weekend event considering the expected attendance. Dependent upon event conditions, some event types (i.e., concert or event with a designated start time) may result in heavier loading the hour prior to an event. While higher delay and queuing may be expected before and after events, it is expected to be limited to higher attendance events. With the relocation of the farmers market and development of different event types, it is recommended to observe conditions and provide additional wayfinding or traffic control support as needed to support traffic operations. The following options can be considered when developing an approach to accommodate event traffic:

- Event signage designating preferred traffic routes.
- Wayfinding signage to parking areas.
- Presence of staff to direct traffic into (before event) or out of (after event) high volume drives (parking garage).
- Consider installation of a system to monitor available parking in the garage. Use of dynamic signage or notification services (apps) to notify attendees when the parking garage is full.
    - Monitoring of the parking garage will be important during high attendance events to prevent drivers entering and ‘circling’ the garage.
- City staff noted that under existing conditions garage users (as pedestrians) utilize vehicular access openings rather than doorways to enter/exit the garage after parking. Consider installation of wayfinding signage or painted pedestrian paths to direct pedestrians to preferred garage access locations.
- A one-way circulation plan can be considered for the road network accessing the garage if congestion occurs. Traffic can be designated to enter at one location (Southeast Alley) and exit at an alternate location (Green Street). This may assist in improved circulation and traffic control during higher occupancy events. Appropriate staff and/or signage to support the circulation plan should be provided.

FIGURE 12

Existing Plus Phase 1 Development Conditions
Capacity Analysis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MAIN ST
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GREEN ST
DRIVE 2
JOHNSON ST
INDEPENDENCE AVE
DRIVE 1
COOPER ST
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6. BUILD YEAR 2024 PLUS FULL BUILD DEVELOPMENT CONDITIONS

This scenario considers the addition of Phase 2 development traffic to the study area network. Development was considered for the build year 2024 to identify any potential geometric improvements that could be attributed to the additional traffic associated with Phase 2 of the proposed development. The build year considers 1 year of background traffic growth, applied to all movements at the intersection of 2nd Street and Douglas Street. Growth trips were then applied through adjacent intersections along 2nd Street and Douglas Street. Traffic was also grown along 3rd Street and at the intersection of 2nd Street and Independence Avenue. A 1.0 percentage growth rate was used for the study area. Growth rate was reviewed and approved by city staff.

Phase 2 development is proposed to consist of hotel, restaurant, coffee shop, and apartment land uses. **Figure 8** illustrates the proposed site plan.

This analysis considers phase 1 traffic volumes. As phase 1 traffic is associated with events (farmers market on Wednesday mornings from April to October and other special evening events) the analysis presented is expected to be a conservative representation of potential conditions. During periods when phase 2 traffic is present without phase 1, operations would be expected to improve.

6.1 Phase 2 Trip Generation and Distribution

Trip generation was conducted following typical ITE methodology presented in **Section 5.1**. A detailed summary of Phase 2 daily and peak hour trip generation by land use type is shown in **Table 9**. Detailed trip generation and calculations are provided in **Appendix E**.

Table 9. Phase 2 Development Trip Generation.

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekend PM Peak Hour		
	Total	Enter	Total	Total	Total	Exit	Total	Total	Exit
Multifamily Housing	72	17	55	74	45	29	74	38	36
Hotel	33	18	15	31	16	15	58	32	26
High-Turnover Restaurant	48	26	22	45	27	18	56	29	27
Coffee/Donut Shop	186	95	91	65	33	32	113	55	58
TOTAL	**339**	**156**	**183**	**215**	**121**	**94**	**301**	**154**	**147**

When a site supports multiple uses, internal capture can be considered. Internal capture represents the portion of trips generated within a site that begin and end within the development; the trips stay within the site and do not access the external road network. **Table 10** summarizes total trip generation considering internal capture. Internal capture rates are not available for weekend trips, thus an average of AM and PM values were utilized to calculate weekend reductions. Pass-by trips (trips already on the road network that may access a land use) were not considered for phase 2 development. Pass-by trips and internal capture were not considered with phase 1 development, thus the study is anticipated to represent conservative analysis. This approach was presented to the reviewing agency and approved. Internal capture worksheets are provided in **Appendix E**.

Table 10. Phase 2 Development Trip Generation, with Internal Capture.

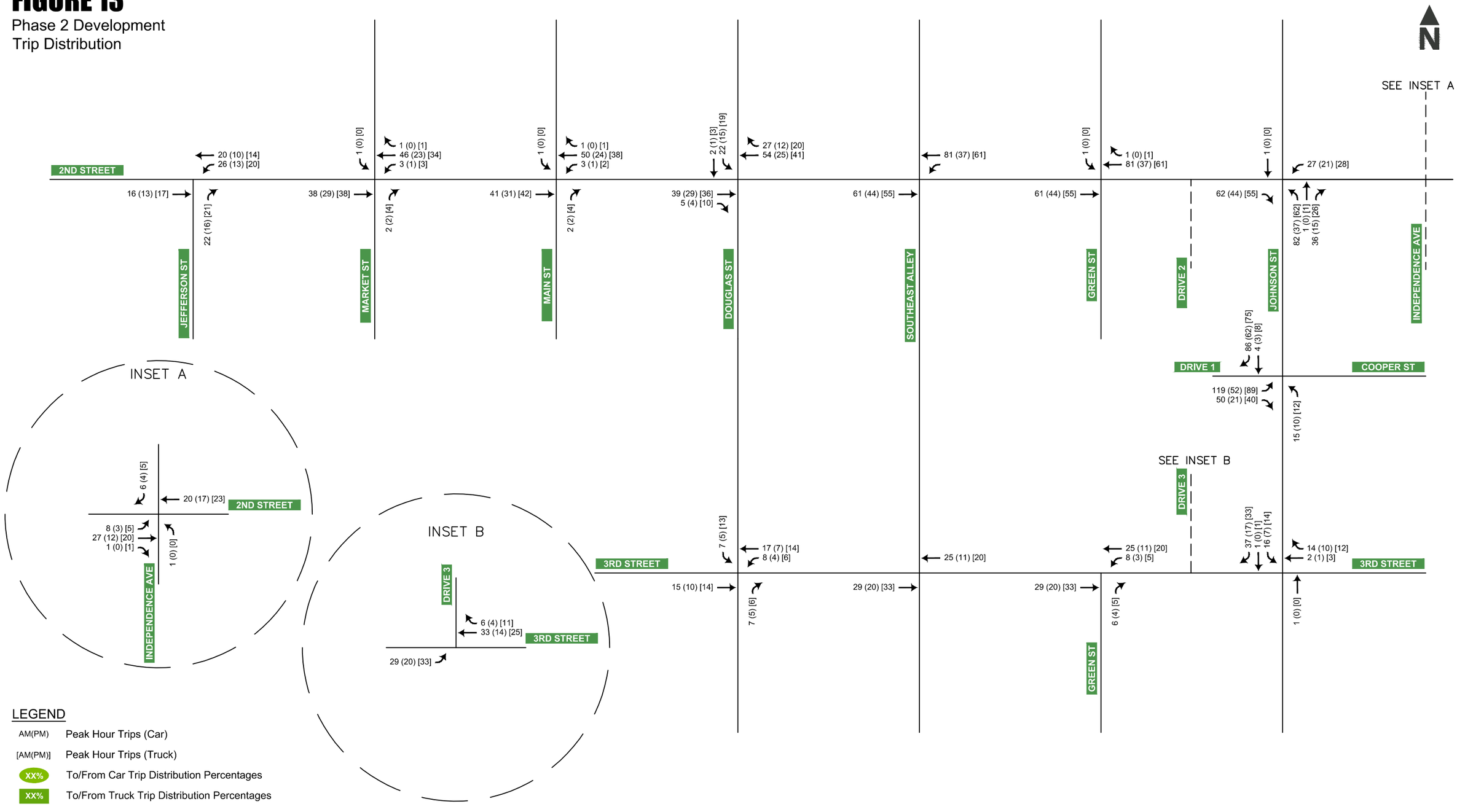
Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekend PM Peak Hour		
	Total	Enter	Total	Total	Total	Exit	Total	Total	Exit
Multifamily Housing	60	16	44	60	38	22	61	34	27
Hotel	31	17	14	23	11	12	53	29	24
High-Turnover Restaurant	45	23	22	37	23	14	51	26	25
Coffee/Donut Shop	175	86	89	53	28	25	100	47	53
TOTAL	**311**	**142**	**169**	**173**	**100**	**73**	**265**	**136**	**129**

Expected trips were distributed to the public road network following the trip distribution presented in **Section 5.1**. The expected trip distribution volumes for Phase 2 development are shown in **Figure 13**. The resulting Build Year 2024 Plus Full Build Development volumes are illustrated in **Figure 14**.

The site is not expected to consist of a high volume of truck traffic. A delivery or single-unit truck is expected to be a typical heavy vehicle to service the site. A significant impact to adjacent roadway truck percentages is not expected with the proposed development.

FIGURE 13

Phase 2 Development
Trip Distribution

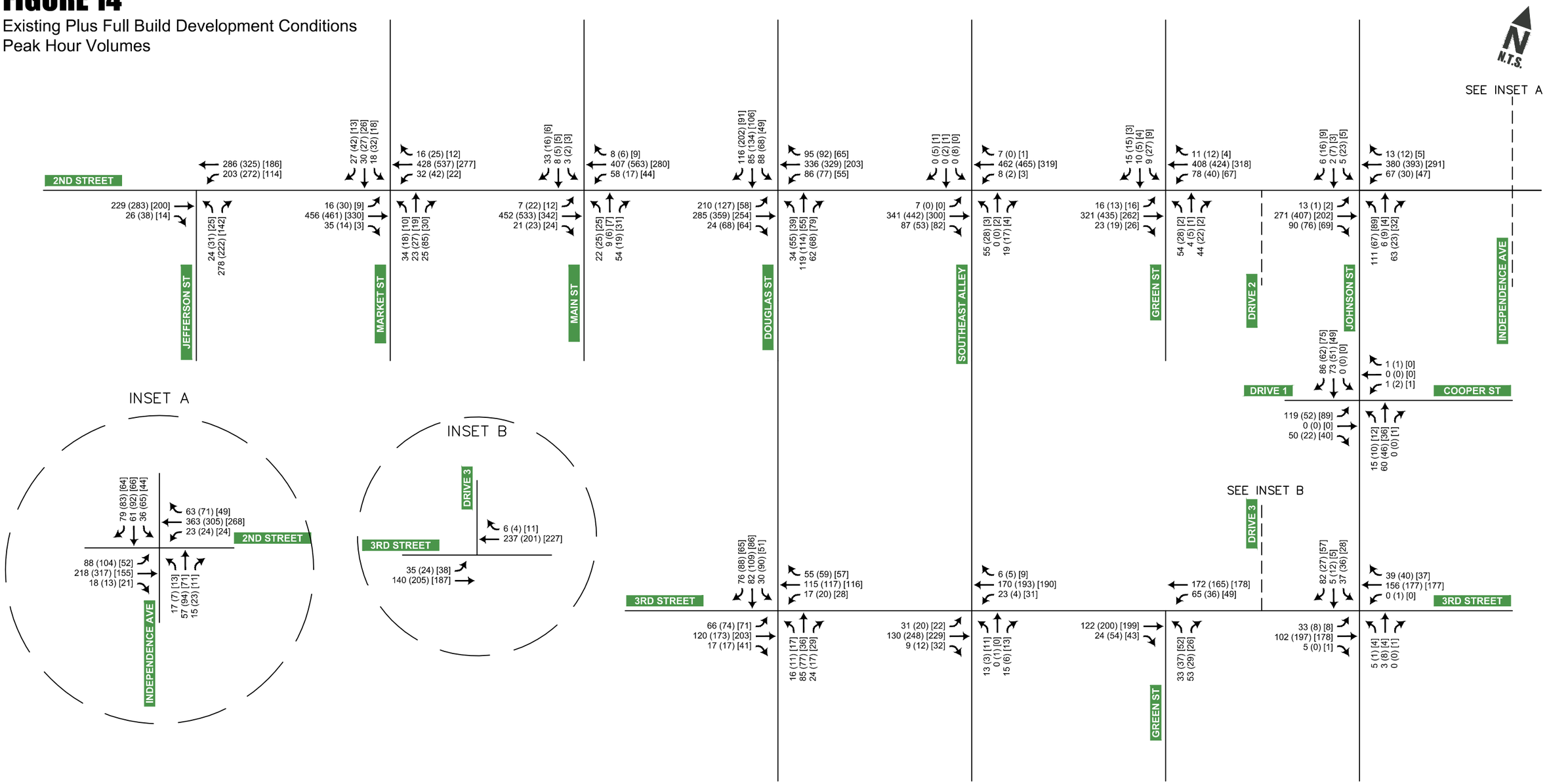


LEGEND

AM(PM)	Peak Hour Trips (Car)
[AM(PM)]	Peak Hour Trips (Truck)
XX%	To/From Car Trip Distribution Percentages
XX%	To/From Truck Trip Distribution Percentages

FIGURE 14

Existing Plus Full Build Development Conditions
Peak Hour Volumes



LEGEND

AM (PM) [WKND] Peak Hour Volumes

6.2 Access Characteristics

Access characteristics and site circulation were reconsidered under Phase 2 development conditions. Site characteristics are outlined in **Sections 5.3** and **5.4**. **Figure 8** illustrates the proposed site plan. Changes to drive/alley circulation are not proposed with phase 2 development, the following summarizes proposed lane configuration.

- Drive 1 – Two-way from Johnson Street west to Drive 2
- Drive 2 – One-way northbound from Drive 1 to 2nd Street
- Drive 3 – One-way northbound from 3rd Street to Drive 1
- Southeast Alley (alley west of city hall)
    - One-way northbound from 3rd Street to fire station
    - Two-way from fire station to 2nd Street
- Alley south of fire station – Remain one-way eastbound

Drive geometrics were reviewed in accordance with the City of Lee's Summit *Access Management Code, Section 18*. Drive 1 was reviewed following criteria for a medium volume driveway. Drives 2 and 3 were reviewed following criteria for a low volume driveway.

With phase 2 development, Drive 1 is proposed to remain as a two-way access between Johnson Drive and Drive 2. Under phase 1, Drive 1 was recommended to align with Cooper Street which is consistent with recommendations in the city access management policy. Drive 1 will provide access to limited parking along the drive as well as to a parking garage located on site. Access to the parking garage is proposed approximately 125 feet west of Johnson Street. Reviewing expected operations of the drive, eastbound queuing is not expected to extend past the garage access thus adequate throat length is provided. A drive width of 22 feet is proposed, which is less than the minimum width guidance provided in the city access management policy. Considering the downtown location, pedestrian environment and two-way travel, a narrower drive is supported. Drive width and curb radius should support expected largest design vehicle. Building set back should support adequate sight distance of the pedestrian and vehicular environment.

Drive 2 is proposed to remain as one-way northbound access between Drive 1 and 2nd Street. The access to Drive 2 from Drive 1 is expected to remain gated with limited use during non-event periods. If parking is allowed along Drive 2 outside of event periods, adequate turn around space should be provided and access to 2nd Street restricted. Parking management should be in place to ensure public parking is cleared from the space before event periods. A drive width of 20 feet is proposed, which is expected to be adequate for one-lane travel. Approximately 20 feet of throat length is proposed along Drive 2 between 2nd Street and the first parking stall. This does not meet the city recommended minimum throat length. Parking configuration should be

evaluated to confirm that drivers can enter and exit parking stalls when traveling in the northbound direction along Drive 2.

Drive 3 is proposed as a one-way northbound access between 3rd Street and Drive 1. The northbound circulation of the access is expected to best service both valet and regular parking hotel guests (located on pad site 1). Should redevelopment occur in the southeast quadrant of the property, two-way access along Drive 3 should be reviewed. A drive width of 22 feet is proposed for Drive 3, which is expected to be adequate for one-lane travel. Approximately 15 feet of throat length is proposed along Drive 3 between 2nd Street and the first parking stall. Traffic will not be exiting this drive location, so a reduced throat length may be acceptable. However, parking should be reviewed to confirm that vehicles accessing parking stalls can maneuver without blocking the pedestrian network (sidewalk) or extending onto 3rd Street. On-site parking management should manage vehicular traffic accessing the site to maintain through access along Drive 3 (do not allow parked cars to block traffic).

At all drive locations, drive width and curb radius should support expected largest design vehicle. Building set back should support adequate sight distance at the access location of the vehicular and pedestrian approaches.

Phase 2 development is expected to further increase pedestrian activity in the redeveloped areas, specifically within the pedestrian plaza south of 2nd Street. Pedestrian accommodations (sidewalk, ramps, crosswalk markings) and connectivity to the site should be provided along the public roadways adjacent to the site.

6.3 Build Year 2024 Plus Full Build Development Warrant Analysis

Turn lane and signal warrants were reviewed for Build Year 2024 Plus Full Build Development volumes with the methodologies presented in **Section 3.2**. Build Year 2024 Plus Full Build Development lane configuration and traffic control for the study network are illustrated in **Figure 15**. Detailed warrant analysis is provided in **Appendix E.**

6.3.1 Signal Warrants

No intersections are expected to warrant signalization under Build Year 2024 Plus Full Build Development conditions. An increase of pedestrian activity across 2nd Street at Green Street that would warrant additional traffic control is not expected.

6.3.2 Intersection Stop Control

The following intersections were reviewed to determine if the addition of phase 2 development volumes warrants a change in stop control. The current intersection control type is noted.

- 2nd Street and Green Street (north/south stop control)
- 2nd Street and Johnson Street (north/south stop control)

- 3rd Street and Green Street (all-way stop control)
- 3rd Street and Johnson Street (north/south stop control)

The intersection of 2nd Street and Green Street is proposed to remain under its current configuration as a four-leg intersection with stop control for the minor legs (Green Street).

Due to existing building set back in the vicinity of the intersection which limits visibility along 3rd Street and the expected increase of pedestrian traffic, the intersection of Green Street and 3rd Street is recommended to remain under all-way stop control.

The intersection of 2nd Street and Johnson Street is recommended to remain under its current configuration as a four-leg intersection with stop control for the minor legs (Johnson Street).

Reviewing expected traffic volumes, the intersection of 3rd Street and Johnson Street is recommended to remain two-way stop controlled north/south. However, reviewing the site plan it appears that on street parking is proposed along the south side of 3rd Street, west of Johnson Street. On street parking would be expected to impact sight distance at the intersection. When designing parking, intersection sight distance should be reviewed and parking not allowed adjacent to the intersection if sight distance is impacted.

6.3.3 Turn Lane Warrants

The following is a summary of new or increased warrants the previous Existing plus Phase 1 Development conditions scenario. Detailed turn lane warrant analysis sheets are provided in **Appendix E.**

6.3.3.1 Left-Turn Lanes

Based on Build Year 2024 Plus Full Build Development conditions, the following left-turn lanes are warranted based Lee's Summit standards and peak hour volumes:

- Southbound on Johnson Street at 3rd Street (increased warrant, meets all hours)
- Eastbound on 3rd Street at Drive 3 (meets all hours)

6.3.3.2 Right-Turn Lanes

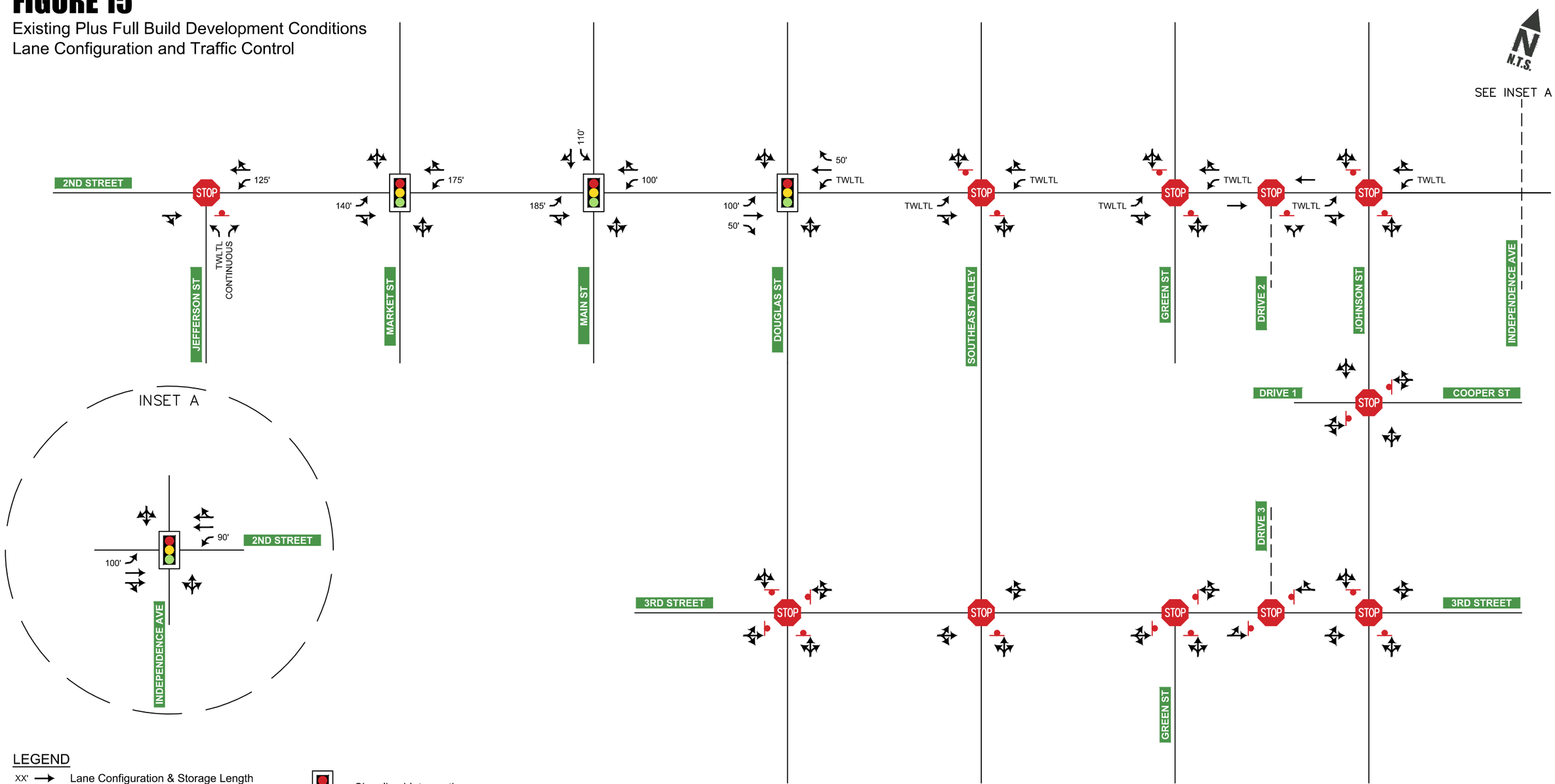
Based on Build Year 2024 Plus Full Build Development conditions, the following right-turn lanes are warranted based Lee's Summit standards and peak hour volumes:

- Eastbound on 2nd Street at Douglas Street (meets all hours)
- Eastbound on 2nd Street at Southeast Alley (meets AM and weekend)

Capacity analysis will be reviewed in **Section 6.4** to identify areas with operational deficiencies. Recommendations for turn lanes will be based on feasibility, constructability and benefit of improvement.

FIGURE 15

Existing Plus Full Build Development Conditions
Lane Configuration and Traffic Control



6.4 Build Year 2024 Plus Full Build Development Capacity Analysis

Capacity analysis was performed for Build Year 2024 Plus Full Build Development conditions using the methodologies described in **Section 3.3**. The peak hour factors observed under previous scenarios were used for Build Year 2024 Plus Full Build Development conditions at all existing study intersections, except for the intersections of Johnson Street with Cooper Street/Drive 1 and 3rd Street with Drive 3 which were updated to 0.92 to account for new traffic patterns. Truck percentages were not updated from previous scenarios.

The signalized intersections of 2nd Street with Market Street, Main Street, Douglas Street, and Independence Avenue are expected to operate similar to Existing Plus Phase 1 Development conditions at an overall LOS B or better during all three peak hour periods. Individual signalized movements are expected to operate at a LOS C or better with acceptable 95th-percentile queue lengths during all three peak hour periods.

Unsignalized movements are expected to operate similar to Existing Plus Phase 1 Development conditions at LOS C or better with acceptable 95th percentile queue lengths during all three peak hour periods with the following exceptions:

- The northbound left turn movement at the intersection of 2nd Street and Jefferson Street is expected to operate at a LOS E during the PM peak hour period. The 95th-percentile queue is contained within the dedicated left-turn lane for this movement.
- The southbound shared left/through/right turn movement at the intersection of 2nd Street and Green Street is expected to operate at a LOS D during the PM peak hour period. The northbound shared left/through/right turn movement is also expected to operate at a LOS D during the AM and PM peak hour periods. Queue lengths are expected to be two vehicles. It is anticipated that the lower level of service is associated with higher east/west traffic volumes that can be expected during an event scenario. Considering expected queuing and preservation of the pedestrian environment, additional turn lanes are not recommended at this intersection.
- The northbound shared left/through/right turn movement at the intersection of 2nd Street and Johnson Street is expected to operate at a LOS E during the AM and PM peak hour periods. Queue lengths are expected to be between three and five vehicles. It is anticipated that the lower level of service is associated with higher east/west traffic volumes that can be expected during an event scenario.

A further analysis of the necessity and practicality of improvements was conducted as outlined in **Section 3.3**. Movements with unchanged volumes from the previous scenario were removed. A summary of factors for turn lane warrants and recommendations are summarized in **Table 11**.

Table 11. Build Year 2024 Plus Phases 1 and 2 Turn Lane Warrant Review.

Intersection		Movement	Criteria	Operations	Recommended?
Left-Turn Lanes	2nd and Douglas	Southbound	Signalized	LOS A-B	NO
	2nd and Johnson	Northbound	Volumes (3/3)	LOS C-E	NO
	3rd and Johnson	Southbound	Volumes (3/3)	LOS B	NO
	3rd and Green	Westbound	Volumes (3/3)	LOS A	NO
	3rd and Douglas	Westbound	Arterial	LOS A-B	NO
		Southbound	Arterial	LOS B	NO
	3rd and Drive 3	Eastbound	Volumes (3/3)	LOS A	NO
Right-Turn Lanes	2nd and Douglas	Northbound	Volumes (3/3)	LOS A-B	NO
	2nd and Johnson	Southbound	Volumes (3/3)	LOS B-C	NO
		Eastbound	Volumes (3/3)	LOS A	NO
	2nd and Independence	Southbound	Volumes (3/3)	LOS A-B	NO
		Westbound	Volumes (2/3)	LOS B-C	NO

Considering phase 2 development, volumes at the intersection of 2nd Street and Douglas Street are expected to be similar to existing/redistribution volumes for the southbound movements. The southbound 95th-percentile queue length is expected to increase through the progression of analysis scenarios. As presented previously, a southbound right turn lane would be expected to improve operations if it could be provided while maintaining north/south through lane alignment.

Phase 2 development is primarily expected to utilize Drives 1 and 3 for access to the site, thus significant impact to side street volumes at the intersection of 2nd Street and Green Street is not expected. Additionally, phase 2 development is not expected to result in a significant increase in pedestrian volumes. Additional pedestrian accommodations are not recommended.

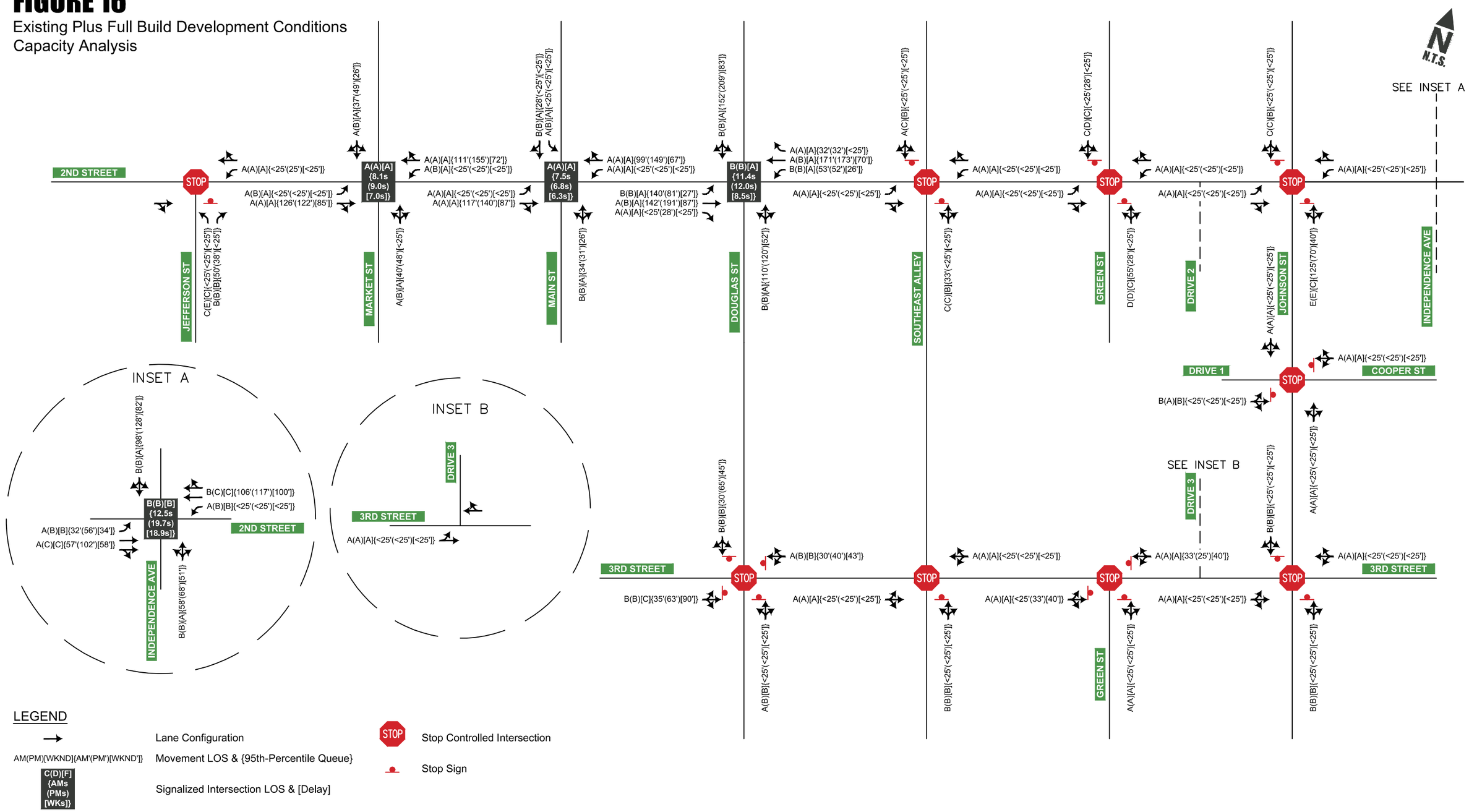
Further consideration was given to the northbound movement at 2nd Street and Johnson Street due to the expected queuing of the movement. The impact to intersection operations with a northbound left turn lane was considered. Capacity analysis indicates that while queuing would minimally decrease with the addition of a northbound left turn lane, the expected LOS would remain at an E for both AM and PM peak hour periods. Reviewing the existing geometrics and characteristics of the intersection, providing a northbound left turn lane would result in poor through movement alignment across 2nd Street. Additionally, there is existing single-family residential development located in the southeast quadrant of the intersection that limits opportunities for road widening. Right-of-way should be retained along the west side of Johnson Street to support the construction of a northbound left turn lane if other redevelopment around

the intersection occurs. Alternative routes are available to drivers if queuing or delay is not acceptable to a user.

Reviewing warranting characteristics, operations and feasibility of construction, several movements do not need additional capacity, have acceptable operations or present construction challenges. With this consideration, no geometric improvements are recommended under Build Year 2024 Plus Full Build Development conditions. The Build Year 2024 Plus Full Build Development capacity analysis summary is illustrated in **Figure 16**. Detailed results are provided in **Appendix E.**

FIGURE 16

Existing Plus Full Build Development Conditions
Capacity Analysis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2ND STREET
JEFFERSON ST
MARKET ST
MAIN ST
DOUGLAS ST
SOUTHEAST ALLEY
GREEN ST
DRIVE 2
JOHNSON ST
INDEPENDENCE AVE
DRIVE 1
COOPER ST
3RD STREET
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7. FUTURE YEAR 2043 PLUS FULL BUILD DEVELOPMENT CONDITIONS

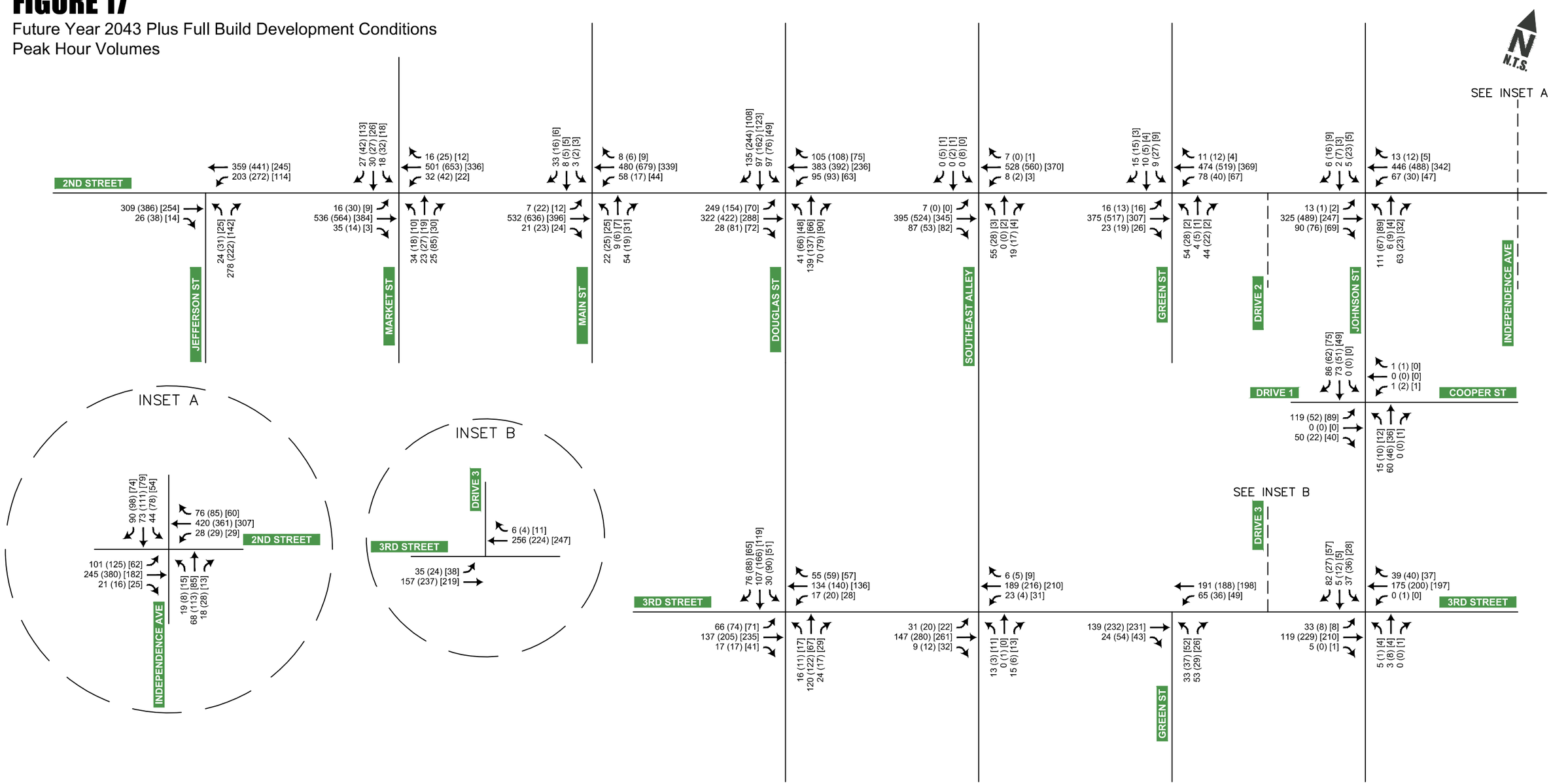
This scenario considers operations of the future roadway network considering background traffic growth with the addition of proposed development volumes. Traffic growth was applied as presented in **Section 6.0**. Background traffic growth volumes were added to existing redistribution plus phases 1 and 2 volumes to obtain future year 2043 plus full build development volumes.

As presented in **Section 6.0**, this analysis considers phase 1 and 2 traffic volumes. During future year periods when phase 2 traffic is present without phase 1, operations would be expected to improve.

Figure 17 illustrates the expected Future Year 2043 Plus Full Build Development volumes. Additional information for the calculation of future year background traffic volumes is provided in **Appendix F**.

FIGURE 17

Future Year 2043 Plus Full Build Development Conditions
Peak Hour Volumes



7.1 Future Year 2043 Plus Full Build Development Warrant Analysis

Turn lane and signal warrants were reviewed for Future Year 2043 Plus Full Build Development volumes with the methodologies presented in **Section 3.2**. Future Year 2043 Plus Full Build Development lane configuration and traffic control for the study network are illustrated in **Figure 18**. Detailed warrant analysis is presented in **Appendix F.**

7.1.1 Signal Warrants

No intersections are expected to warrant signalization under Future Year 2043 Plus Full Build Development conditions. The intersection of 2nd Street and Johnson Street is expected to be on the threshold of meeting Warrant 1 during the AM peak hour period only. Future volumes should be incrementally monitored along 2nd Street to determine if expected growth is actualized. Existing stop control at study unsignalized intersections is expected to be adequate as presented in **Section 6.3.2**.

7.1.2 Turn Lane Warrants

The following is a summary of new or increased warrants the previous Build Year plus Phases 1 and 2 Development conditions scenario. Detailed turn lane warrant analysis sheets are provided in **Appendix F.**

7.1.2.1 Left-Turn Lanes

Based on Future Year 2043 Plus Full Build Development conditions, no additional left-turn lanes are warranted based Lee's Summit standards and peak hour volumes.

7.1.2.2 Right-Turn Lanes

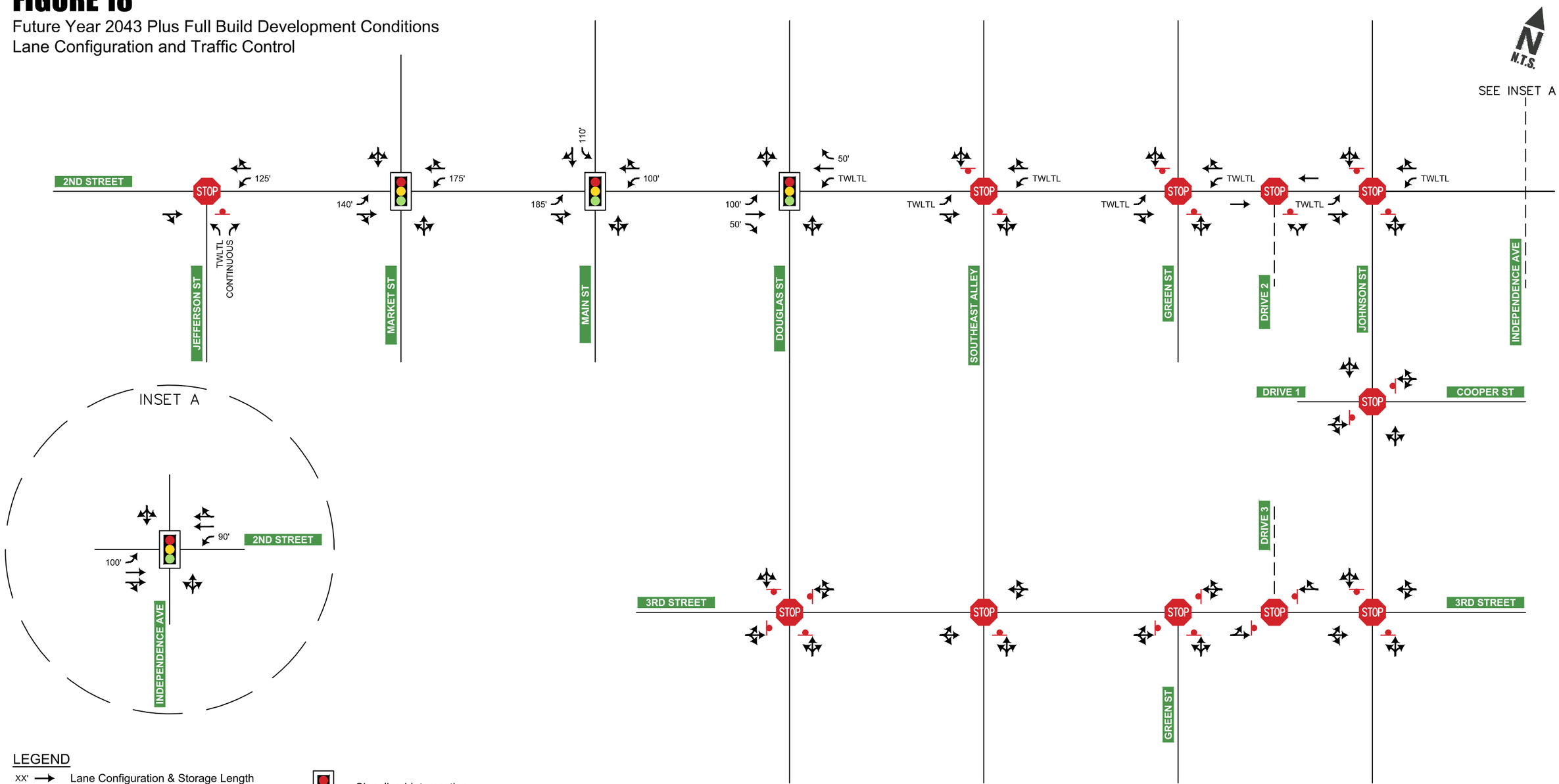
Based on Future Year 2043 Plus Full Build Development conditions, the following right-turn lane is warranted based Lee's Summit standards and peak hour volumes:

- Westbound on 2nd Street at Independence Avenue (increased, meets all hours)

Capacity analysis will be reviewed in **Section 7.2** to identify areas with operational deficiencies. Recommendations for turn lanes will be based on feasibility, constructability and benefit of improvement.

FIGURE 18

Future Year 2043 Plus Full Build Development Conditions
Lane Configuration and Traffic Control



7.2 Future Year 2043 Plus Full Build Development Capacity Analysis

Capacity analysis was performed for Future Year 2043 Plus Full Build Development conditions using the methodologies described in **Section 3.3**. The peak hour factors observed under previous scenarios were used for Future Year 2043 Plus Full Build Development conditions at all existing study intersections. Truck percentages were not updated from previous scenarios.

The signalized intersections of 2nd Street with Market Street, Main Street, Douglas Street, and Independence Avenue are expected to operate similar to Build Year 2024 Plus Full Build Development conditions at an overall LOS C or better during all three peak hour periods. Individual signalized movements are expected to operate at a LOS C or better with acceptable 95th-percentile queue lengths during all three peak hour periods with the exception of the intersection of 2nd Street and Douglas Street. The following movement are noted to operate with longer vehicular queuing under future year conditions.

- The eastbound left turn movement at the intersection of 2nd Street and Douglas Street is expected to operate at a LOS C with a 95th-percentile queue length of 231 feet during the AM peak hour period.
- The southbound shared left/through/right turn movement is expected to operate at a LOS B with a 95th percentile queue length of 288 feet during the PM peak hour. While the queue length extends to the mid-block, the LOS and delay remains low. As presented previously, a southbound right turn lane would be expected to improve operations but may not be feasible for construction due to existing building setback and/or available right-of-way.

Unsignalized movements are expected to operate similar to Build Year 2024 Plus Full Build Development conditions at LOS C or better with acceptable 95th percentile queue lengths during all three peak hour periods with the following exceptions:

- The northbound left turn movement at the intersection of 2nd Street and Jefferson Street is expected to operate at a LOS D and F with acceptable queuing during the AM and PM peak hour period, respectively. The 95th-percentile queue is contained within the dedicated left-turn lane for this movement. The intersection is not expected to meet signal warrants.
- The southbound shared left/through/right turn movement at the intersection of 2nd Street and Green Street is expected to operate at a LOS D and E with acceptable queuing during the AM and PM peak hour period, respectively. The northbound shared left/through/right turn movement is also expected to operate at a LOS E during the AM and PM peak hour periods. Northbound queue lengths are expected to be approximately three vehicles.

- The northbound shared left/through/right turn movement at the intersection of 2nd Street and Johnson Street is expected to operate at a LOS F during the AM and PM peak hour periods. Queue lengths are expected to be up to seven vehicles. The southbound shared left/through/right turn movement is also expected to operate at a LOS E with acceptable queues during the PM peak hour period. The intersection is expected to start approaching the threshold for warranting consideration of a signal and should be monitored under future year conditions.
- The northbound shared left/through/right turn movement at the intersection of 2nd Street and SE Alley is expected to operate at a LOS D with acceptable queue lengths during both AM and PM peak hour periods. The southbound shared left/through/right turn movement is expected to operate at a LOS D with acceptable queue lengths during the PM peak hour period.

A further analysis of the necessity and practicality of improvements was conducted as outlined in **Section 3.3**. Movements with unchanged volumes from the previous scenario were removed. A summary of factors for turn lane warrants and recommendations are summarized in **Table 12.**

Table 12. Future Year 2043 Plus Full Build Turn Lane Warrant Review.

	Intersection	Movement	Criteria	Operations	Recommended?
Left-Turn Lanes	2nd and Douglas	Southbound	Signalized	LOS A-C	NO
		Northbound	Signalized	LOS A-B	NO
	2nd and Independence	Southbound	Signalized	LOS B	NO
		Northbound	Signalized	LOS A-B	NO
Right-Turn Lanes	2nd and Douglas	Southbound	Volumes (3/3)	LOS A-C	NO
		Northbound	Volumes (3/3)	LOS A-B	NO
	2nd and Independence	Southbound	Volumes (3/3)	LOS B	NO
		Westbound	Volumes (3/3)	LOS B-C	NO

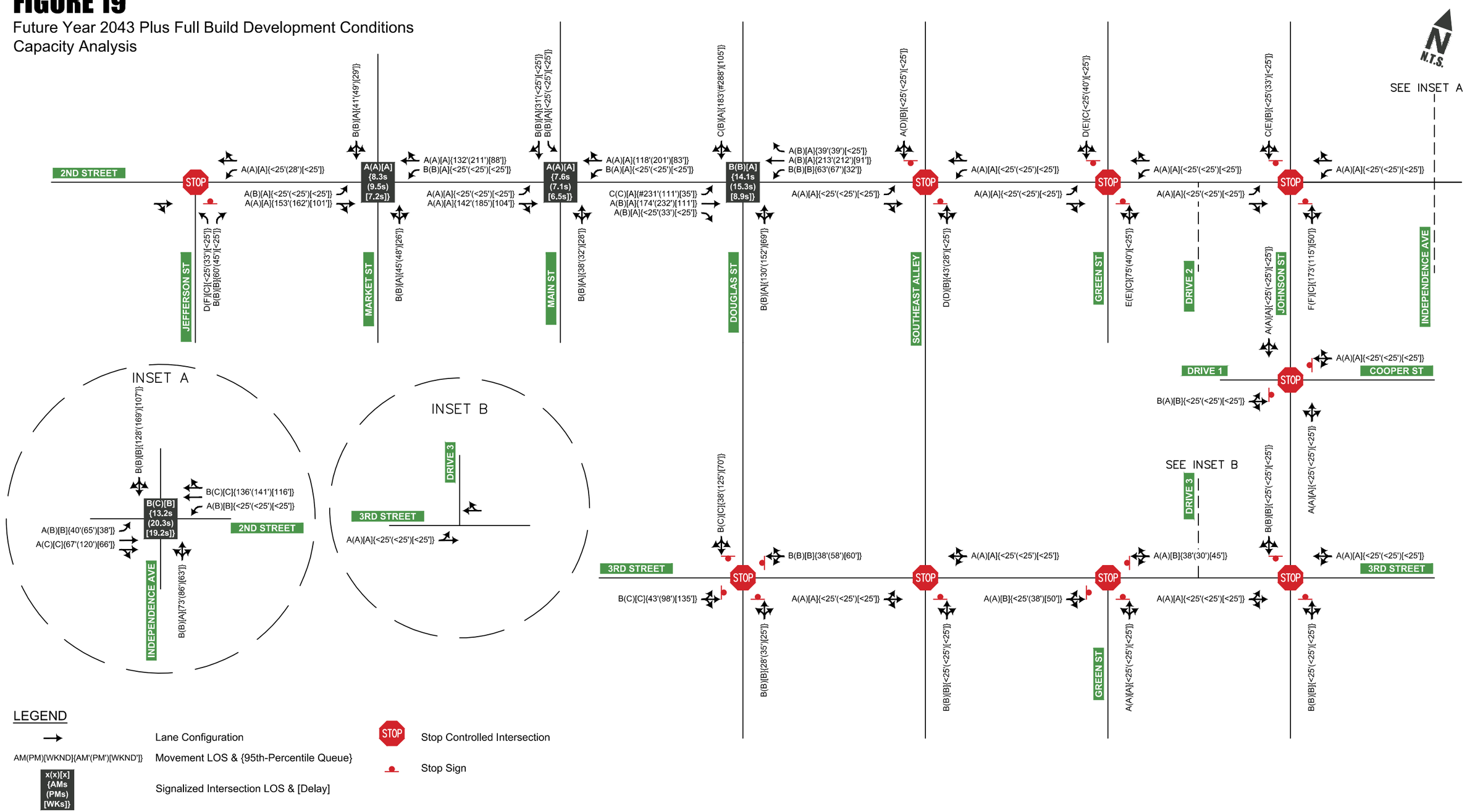
Delay is expected for side street movements along 2nd Street with influence of background growth combined with an event scenario. However, signal warrants are not expected to meet at Green Street or Johnson Street. No additional turn lanes are expected to alleviate delays of side street movements due to lack of gaps from through traffic. Future volumes should be monitored along 2nd Street to determine if adequate gaps are being provided in mainline traffic.

Reviewing warranting characteristics, operations and feasibility of construction, several movements do not need additional capacity, have acceptable operations or present construction challenges. With this consideration, no improvements are recommended under Future Year 2043 Plus Full Build Development conditions.

The Future Year 2043 Plus Full Build Development capacity analysis summary is illustrated in **Figure 19**. Detailed results are provided in **Appendix F.**

FIGURE 19

Future Year 2043 Plus Full Build Development Conditions
Capacity Analysis



8. SUMMARY

This report summarizes analysis conducted for the Lee's Summit Downtown Market Plaza redevelopment project located in Lee's Summit, Missouri. The project represents redevelopment of the area bordered by Green Street, 2nd Street, Johnson Street, and 3rd Street. Redevelopment was considered to occur in two phases.

8.1 Conclusions

The general findings for this traffic impact study include the following:

1. To support the proposed project, Green Street will be removed between 3rd Street and 2nd Street. Full access is proposed to remain to and from the parking garage at Green Street and at Southeast Alley.
2. Limited data is available for the proposed phase 1 site uses (farmers market and event). Expected attendance and vendors were considered, as well as ITE land uses, to conduct trip generation for phase 1 of the site. ITE land uses and internal capture rates were utilized to conduct trip generation for phase 2 of the site. City staff were involved in the development of trip generation assumptions.
3. Three access drives are proposed with this site; one existing access will be used. Drive 1 is an existing full access (two-way) curb cut (alley) along the west side of Johnson Drive. Drive 2 is a restricted access out only (one-way northbound) drive that is to be used during events only. This access is located on the south of 2nd Street east of Green Street. Drive 3 is a new access on the north side of 3rd Street (one-way northbound), east of Green Street.
4. To support the proposed project, the following traffic circulation in the vicinity of the project area is recommended:
    - Drive 1 – Two-way from Johnson Street west to Drive 2
    - Drive 2 – One-way northbound from Drive 1 to 2nd Street
    - Drive 3 – One-way northbound from 3rd Street to Drive 1
    - Southeast Alley (alley west of city hall)
        - One-way northbound from 3rd Street to fire station (Recommendation addresses existing sight distance limitations. If reconfiguration is not supported, operations of the alley would be expected to be similar to existing conditions.)
        - Two-way from fire station to 2nd Street
    - Alley south of fire station – Remain one-way eastbound
5. No study intersections currently meet or are expected to meet signal warrants based on analysis conducted. Existing intersection traffic control is expected to be adequate.

6. Pedestrian activity at the intersection of 2nd Street and Green Street was reviewed. Considering existing pedestrian control (signage, marking and presence of staff during school crossing periods) changes to control are not recommended. With the relocation of the farmers market, pedestrian activity through the area is expected to migrate with more pedestrian activity south of 2nd Street, associated with opportunities for on street and surface lot parking located within the downtown core.
7. Considering Lee's Summit criteria, several turn lane warrants are met under various analysis periods within the study area. Reviewing operations, the majority of the movements warranting additional turn lanes are expected to operate at acceptable levels of service with minimal queuing throughout the study periods. In addition to operations, other factors that influenced consideration of the recommendation of turn lanes included feasibility of construction associated with limited right-of-way and/or existing building setback. Due to the current development of the downtown area, there are limited opportunities for turn lane improvements. Other considerations when determining if turn lanes should be installed should include pedestrian activity and the impact of additional lanes to pedestrian crossing distances.
8. Based on the analysis conducted for this study, both phases of the proposed development are expected to have minimal impact on the existing operations of the system. Capacity analysis results are similar for the study area from existing to redistribution to full build development conditions.
9. This study is expected to be a conservative representation of potential operations. Phase 1 represents event conditions, with a farmers market (Wednesday and Saturday operations, April through October) and PM events of varying capacity. With phase 2 development in place, operations would be expected to improve when the farmers market or an event is not occurring.

8.2 Recommendations

Proposed drives and recommended improvements should be constructed following agency guidelines. Sight distance should be provided at new intersections.

Based on review and analysis of the proposed development, the following improvements are recommended:

8.2.1 Existing Conditions

1. A southbound right-turn lane at the intersection of 2nd Street and Douglas Street would be expected to improve operations. Construction of this turn lane may be limited by existing right-of-way limitations and/or building setback.

8.2.2 Existing Redistribution Conditions

1. With the closure of Green Street, existing traffic control (stop control) at both 2nd Street and 3rd Street is recommended to remain.
2. There are no traffic control improvements recommended at the intersections of 2nd Street and 3rd Street with Johnson Street associated with the redistribution of traffic.
3. The Southeast Alley is recommended to be closed to southbound traffic between the fire station/parking garage entrances and 3rd Street (resulting in one-way northbound circulation).
    - Appropriate do not enter and one-way signage as well as pavement markings should be installed along the alley. If the alley is not reconfigured to service northbound traffic only, consideration should be given to providing staff or barriers at the garage drive (northwest corner of City Hall) to direct traffic north.

8.2.3 Existing Plus Phase 1 Development Conditions

1. Realign the existing alleyway (proposed Drive 1) on the west leg of the intersection of Johnson Street and Cooper Street 20 feet to the north to align the intersection.
2. Provide signage at Drive 2 to indicate one-way directional flow (exit only) and gate closure.
3. Provide signage at Drive 3 to indicate one-way direction flow northbound.
4. All drives should be constructed to meet agency requirements.
5. To support one-way directional flow, adequate opportunity for vehicular turn around internal to the site should be provided.
6. Parking internal to the site along Drive 2 and Drive 3 should support the recommended directional flow. Adequate drive throat should be provided to ensure parking maneuvers do not impact the pedestrian or public street network.
7. Dependent upon event occupancy, consider event traffic control measures such as enhanced signing, garage monitoring, or circulation plans to improve traffic operations.

8.2.4 Build Year 2024 Plus Full Build Development Conditions

1. Retain right-of-way along the west side of Johnson Street to support potential construction of a northbound left turn lane at the intersection of 2nd Street and Johnson Street.
2. On street parking along the south side of 3rd Street, west of Johnson Street, should not impact available intersection sight distance.
3. Building set back should support adequate sight distance at the access location of the vehicular and pedestrian approaches.
4. Pedestrian accommodations (sidewalk, ramps, crosswalk markings) and connectivity to the site should be provided along the public roadways adjacent to the site.

8.2.5 Future Year 2043 Plus Full Build Development Conditions

1. Monitor volumes at intersections along 2nd Street (Green Street and Johnson Street) for signal warrant evaluation. Signalization at either intersection is not recommended until volumes (pedestrian or vehicular) warrant a signal.
2. Future vehicular and pedestrian volumes should be monitored throughout project vicinity to determine if additional traffic control measures are needed (for example, signalization, RRFB, parking restrictions, etc.)

(SIGNED AND DATED SEAL)

DOWNTOWN MARKET PLAZA

Lee's Summit, MO

September 2023

Olsson Project No. 022-00393