LONGVIEW COMMONS

LONGVIEW BLVD & 3RD STREET

LEE'S SUMMIT, MISSOURI

TRAFFIC IMPACT STUDY

SEPTEMBER 2016

Olsson Associates Project No. 2016-2608

OLSSON ASSOCIATES

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1.0 INTRODUCTION & OBJECTIVE

This report studies traffic impacts regarding the proposed construction of the Longview Commons development located along Longview Boulevard between Fascination Drive and Kessler Drive in Lee's Summit, Missouri. The approximate location of the development is shown on the vicinity map, along with other approved site developments in the area, in **Figure 1**.

The objective of this study is to evaluate the existing traffic and roadway conditions and the traffic impacts expected from the proposed development. Additional data from seven traffic impact studies from other developments in the area that include retail, residential, church, and school land uses were utilized to account for additional traffic along the roadway network. The appropriate intersection geometrics and traffic control improvements necessary to accommodate the increased traffic on the study area roadways were identified. For the purpose of this study the Existing plus Approved, Existing plus Approved plus Phase 1, and Existing plus Approved plus Full Build scenarios were evaluated for the AM and PM peak hour periods. The City of Lee's Summit, Missouri staff was contacted regarding the scope of the project.

The study area intersections include:

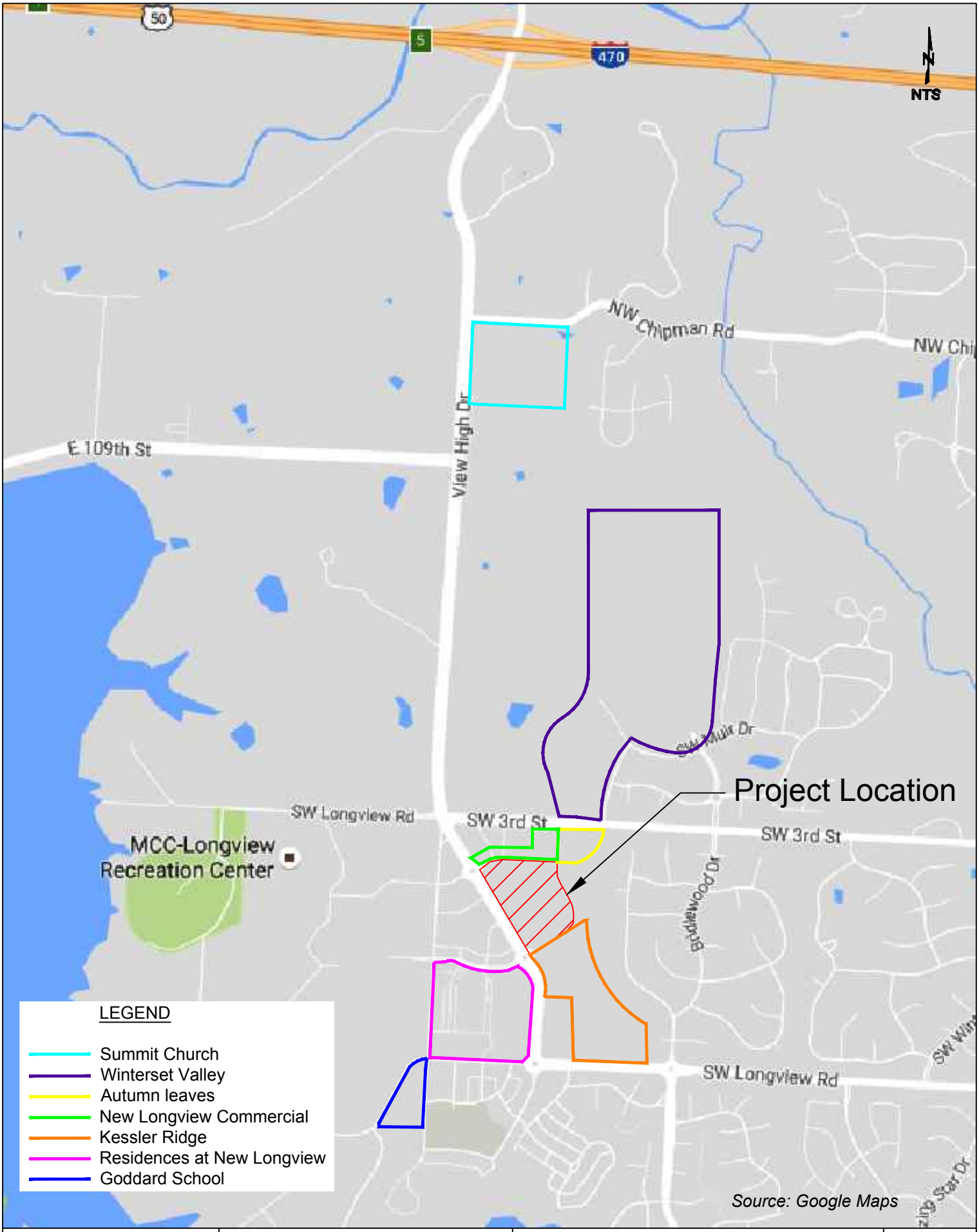
- Longview Boulevard and Longview Road/3rd Street
- Longview Boulevard and Fascination Drive
- Longview Boulevard and Kessler Drive
- Longview Boulevard and Longview Road
- 3rd Street and Kessler Drive
- 3rd Street and Bridlewood Drive

The City of Lee's Summit *Access Management Code* (most current edition) was referred to where applicable to determine the required criteria for access, additional turn lanes, and any further items reviewed within the scope of this study.

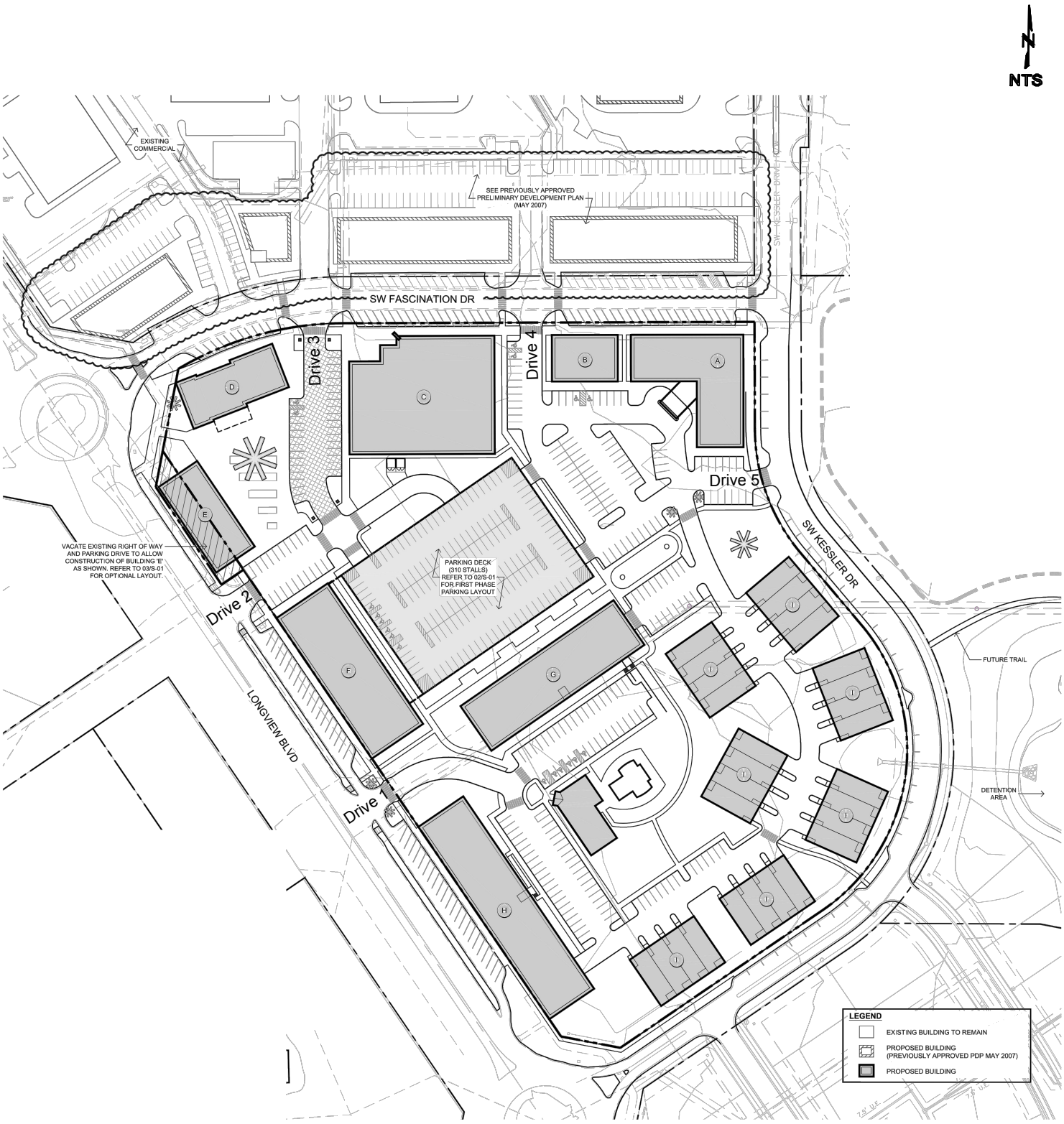
2.0 DESCRIPTION OF PROPOSED REDEVELOPMENT

The proposed multi-use development consists of 172 residential dwelling units, 32,500 square feet of medical office space, 8,000 square feet of restaurant space, 60,500 square feet of office space, and a 28,000 square foot movie theater. The development is bound by Fascination Drive to the north, Longview Boulevard to the west, and Kessler Drive to the south and east.

Access to the development area site is proposed via five access drives, two right-in/right-out access drives and three full access drives. Drives 1 and 2 are right-in/right-out access drives located along Longview Boulevard approximately 470' and 790' north of the Longview Boulevard and Kessler Drive intersection, respectively. Drives 3 and 4 are full access drives located along Fascination Drive approximately 355' and 635' east of the Longview Boulevard and Fascination Drive intersection. Drive 5 is a full access drive located along Kessler Drive approximately 225' south of the Kessler Drive and Fascination Drive intersection. The site plan for the proposed development is illustrated in **Figure 2**.



PROJECT NO: 016-2806	Vicinity Map	OLSSON ASSOCIATES	FIGURE
DRAWN BY: JMD		7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	1
DATE: 9/7/2016			



PROJECT NO: 016-2806	Site Plan	OLSSON ASSOCIATES	FIGURE
DRAWN BY: JMD		7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	2
DATE: 9/7/2016			

3.0 EXISTING PLUS APPROVED CONDITIONS

The City of Lee's Summit requested that this scenario consider both existing traffic volumes as well as volumes from neighboring approved developments including the following:

- Summit Church
- Winterset Valley
- Autumn Leaves
- New Longview Commercial
- Kessler Ridge
- Residences at New Longview
- Goddard School

Completing an analysis of the existing plus approved studies traffic and roadway conditions in the vicinity of the development site allows for a comparison to aid in determining the impact of the proposed development on the surrounding roadway network.

3.1 Existing Roadway Classification and Characteristics

All roadways were classified based on the Lee's Summit Road Classification map.

Longview Road/3rd Street is an east/west four-lane median-divided major arterial roadway east of Longview Boulevard with a speed limit of 40 mph. West of Longview Boulevard, Longview Road/3rd Street is an east/west two-lane undivided minor arterial roadway with a speed limit of 40 mph. Approximately 2.8 miles east of the site, 3rd Street provides access to U.S. Highway 50. Longview Road/3rd Street primarily provides access to residential roadways; access to Metropolitan Community College (MCC) – Longview Campus is also provided along Longview Road.

Longview Boulevard is a north/south four-lane divided major arterial roadway with a speed limit of 35 mph. Three roundabout intersections are provided along Longview Boulevard in the vicinity of the project area. North of Longview Road/3rd Street Longview Boulevard becomes View High Drive. Approximately 1.55 miles north of the site, View High Drive provides access to Interstate 470.

At the signalized intersection of Longview Road/3rd Street and Longview Boulevard there are dedicated left and right-turns for all approaches; the southbound approach provides dual left-turn lanes and the westbound approach provides dual right-turn lanes and has overlapped phasing with the southbound left-turns. Sidewalks are provided on the north and south sides of Longview Road/3rd Street beginning east of the intersection. Pedestrian accommodations are provided for the north and east legs of the intersection and include marked crosswalks, pedestrian indications, and push buttons.

Longview Road is an east/west four-lane divided major arterial roadway east of Longview Boulevard with a speed limit of 35 mph. West of Longview Boulevard, Longview Road is a two-lane undivided commercial or industrial collector roadway with a speed limit of 30 mph. Longview Boulevard primarily provides access to residential roadways.

Kessler Drive is a north/south two-lane undivided commercial or industrial collector roadway with no posted speed limit. At its roundabout connection with Longview Boulevard, Kessler Drive turns west and becomes a three lane divided commercial or industrial collector with a posted speed limit of 25 mph. Kessler Drive is stop-controlled at its intersection with 3rd Street. Kessler Drive provides access to residential developments as well as the MCC – Longview Campus.

Fascination Drive is an east/west two-lane undivided local roadway with no posted speed limit. Fascination Drive provides access to commercial properties as well as the MCC – Longview Campus. Fascination Drive is stop-controlled at its intersection with Kessler Drive and comes to a roundabout intersection with Longview Boulevard.

Bridlewood Drive is a north/south two-lane divided residential collector roadway with a posted speed limit of 25 mph. Bridlewood Drive is stop-controlled at its intersection with 3rd Street and comes to a roundabout intersection with Longview Road.

3.2 Data Collection

AM and PM peak hour turning movement traffic counts were utilized from TranSystems' 3rd Street and View High traffic impact study (TIS) dated July 2016 and Iteris' Residence at New Longview TIS dated January 2014. Existing traffic count data from the approved studies is provided in the **Appendix**. Due to the collection dates of the traffic count data, volumes were conservatively balanced along the corridor to account for the variation in time-of-year of the counts.

Trip generation volume characteristics expected from the approved developments are provided in the **Appendix**. The balanced existing plus approved studies peak hour volumes are illustrated in **Figure 3** and existing plus approved studies intersection geometrics and traffic control are illustrated in **Figure 4**.

3.3 Signal Warrant Analysis

The Manual on Uniform Traffic Control Devices (MUTCD – 2009 Edition) provides nine signal warrants for evaluation of signalization at intersections. Typically, traffic signal warrants are based on a complete review of traffic information including volumes, pedestrians, accidents experience, and traffic progression. The preliminary need for signalization at the study intersections were evaluated based on the Peak Hour Warrant (Warrant 3) contained in the MUTCD.

Signal warrant analysis was completed for the intersections of 3rd Street with Kessler Drive and Bridlewood Drive under Existing plus Approved conditions. Based on existing plus approved volumes the intersections of 3rd Street with Kessler Drive and Bridlewood

Drive do not meet Warrant 3 for signalization during both the AM and PM peak hour periods. Signal analysis sheets are provided in the **Appendix**.

3.4 Turn Lane Warrant Analysis

The *Access Management Code* for Lee's Summit was used to determine whether auxiliary turn lanes are warranted at the study intersections and study drives.

Right-Turn

Lee's Summit's *Access Management Code* requires that right-turn lanes be provided at all arterial roadway intersections and along collector roadway intersections where the right-turning volume on the collector street is or is projected to be at least 100 vehicles per hour.

Currently all arterial study intersections provide right-turn lanes at intersections with the exception of eastbound and westbound right-turn movements at the intersection of 3rd Street and Bridlewood Drive and westbound right-turn movements at 3rd Street and Kessler Drive. Based on the Lee's Summit *Access Management Code* criteria right-turn lanes are warranted at these locations but are not attributed to the proposed development.

Left-Turn

Lee's Summit's Access Management Code requires that left-turn lanes be provided at signalized intersections, along arterial roadways, along connector roadways which intersect with arterial or connector roadways, and median divided roadways.

Currently all arterial roadways provide left-turn lanes. Based on the *Access Management Code* of Lee's Summit a left-turn lane should be provided for the northbound movement at the intersection of 3rd Street and Kessler Drive. In review of the intersection it appears there is adequate pavement width to provide a striped left-turn lane; therefore, it is recommended to stripe a left-turn lane for the northbound movement at the intersection of 3rd Street and Kessler Drive.

3.5 Capacity Analysis

Signalized intersection capacity analysis was performed using SYNCHRO, version 9.1, based on the Highway Capacity Manual (HCM) delay methodology. Unsignalized capacity analyses were performed in accordance with Chapter 17 of the HCM using SYNCHRO. Roundabout analysis was completed using SIDRA version 6.1, based on the HCM delay methodology. For simplicity, the amount of delay is equated to a grade or Level of Service (LOS) based on thresholds of driver acceptance. A letter grade between A and F is assigned, where LOS A represents the best operation. **Table 1** represents the LOS associated with intersection control delay, in seconds per vehicle (sec/veh), for signalized and unsignalized intersections.

Table 1: Intersection Level of Service Summary

Level-of-Service Criteria		
Level of Service (LOS)	**Stop Control** Approach Delay sec/veh	**Signal Control** Control Delay sec/veh
A	≤ 10	≤ 10
B	>10 and ≤ 15	>10 and ≤ 20
C	>15 and ≤ 25	>20 and ≤ 35
D	>25 and ≤ 35	>35and ≤ 55
E	>35 and ≤ 50	>55 and ≤ 80
F	>50	>80

Capacity analysis was completed as discussed above for the signalized study intersection of Longview Road/3rd Street and Longview Boulevard. The existing signal timing data provided in the Residence at New Longview study, completed by Iteris, in January 2014, was utilized and unaltered for the signalized study intersection. **Table 2** details level of service for this intersection.

Table 2: Existing plus Approved Signalized Intersection Analysis

Intersection	AM Peak Hour*	PM Peak Hour*
Longview Rd/3rd St & Longview Blvd	B (15.1)	B (18.8)

*LOS (Delay, in seconds)

During both the AM and PM peak hour periods the overall operations for the signalized study intersection is acceptable with a LOS B. All individual movements operate at LOS D or better during both peak hour periods. The 95th-percentile queue does not exceed the storage length for any movements at the signalized study intersections. The 95th-percentile queue represents the queue length that has a 5 percent probability of being exceeded during the peak hour period.

Unsignalized capacity analysis was conducted for the all unsignalized study intersections and site access drives. Based on capacity analysis, all intersections are expected to operate acceptably during the peak hour periods with the following exceptions:

3rd Street & Kessler Drive

- During the PM peak hour period the northbound movements operate at a LOS E and the southbound left-turn movements operate at a LOS F.

3rd Street & Bridlewood Drive

- During the PM peak hour period the northbound and southbound left-turn movements are expected to operate at a LOS F.

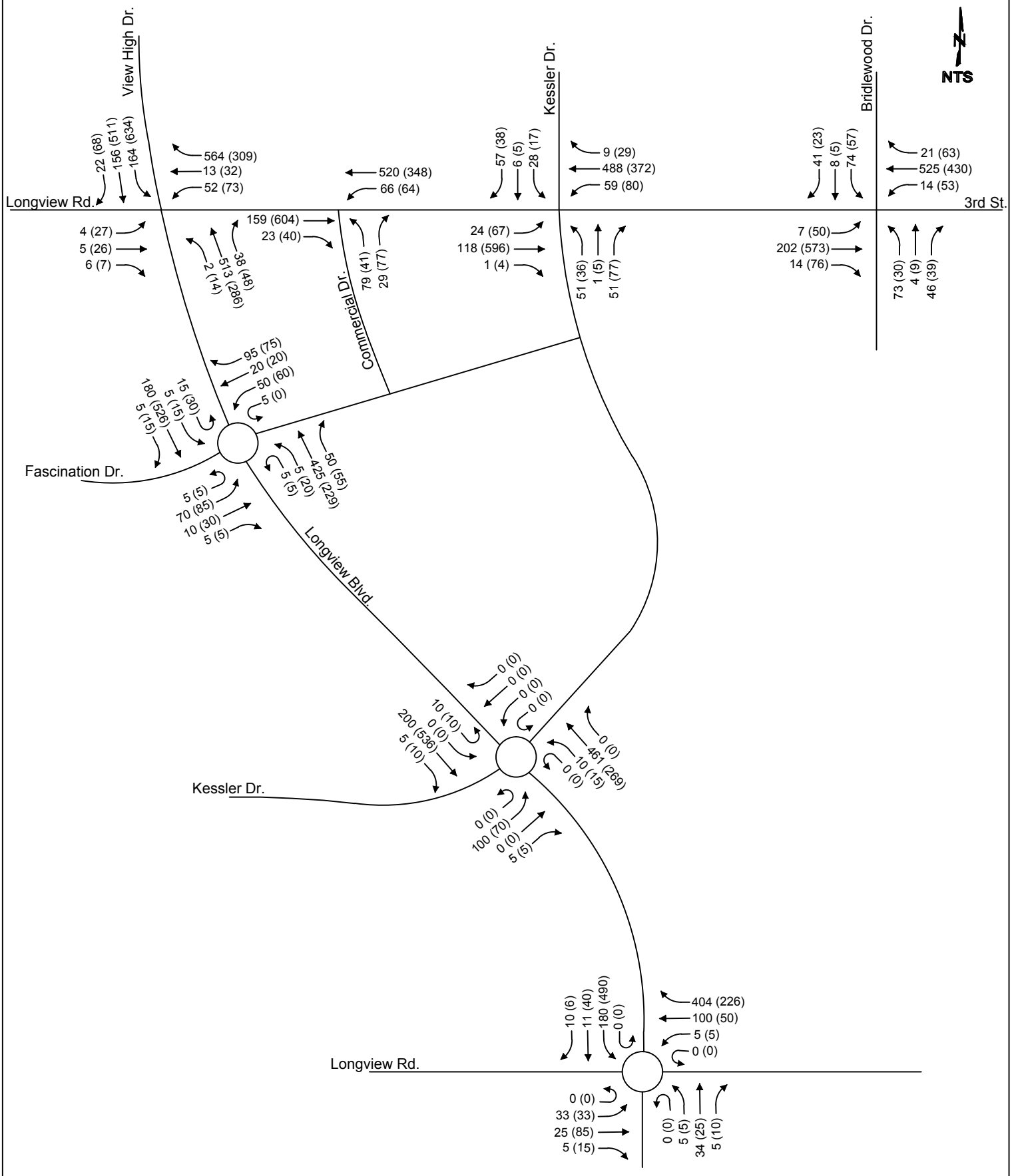
Overall, study intersections operate acceptably during the AM and PM peak hour periods with minimal exceptions. Unsignalized side street movements can be expected to operate at a lower level of service during peak hour periods as higher main-line traffic volumes are accommodated.

All three of the roundabout intersections have overall operations of LOS A during the AM and PM peak hour periods. All individual movements operate at a LOS B or better during both peak hour periods.

Figure 5 illustrates existing plus approved conditions level of service. Capacity analysis sheets are included in the **Appendix**.

3.6 Existing plus Approved Studies Conditions Recommendations

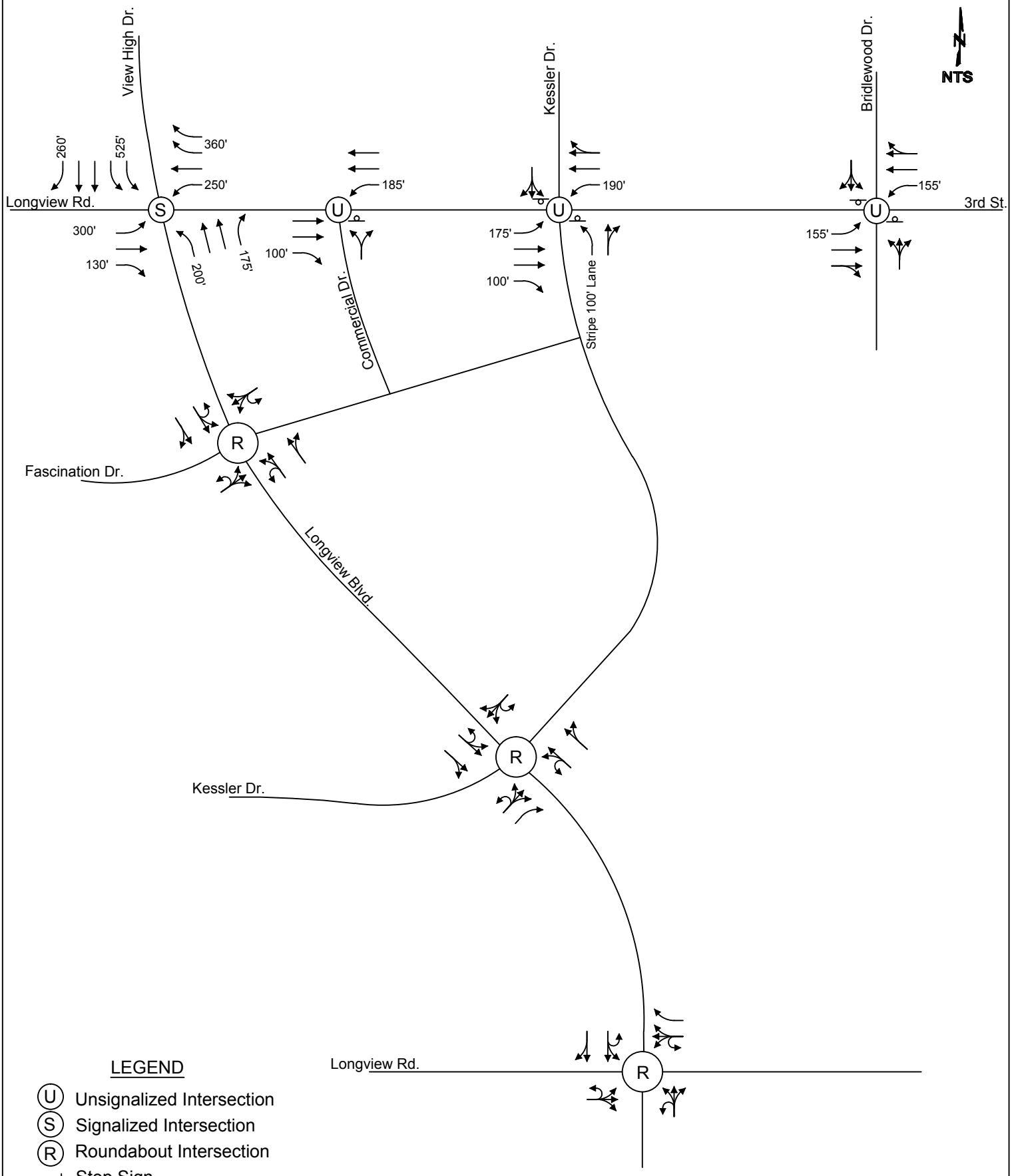
Study intersections operate at acceptable levels of service for the Existing plus Approved scenario during the AM and PM peak hour periods. It is recommended to stripe a northbound left-turn lane at the intersection of 3rd Street and Kessler Drive. No further recommendations are necessary under existing plus approved operations.



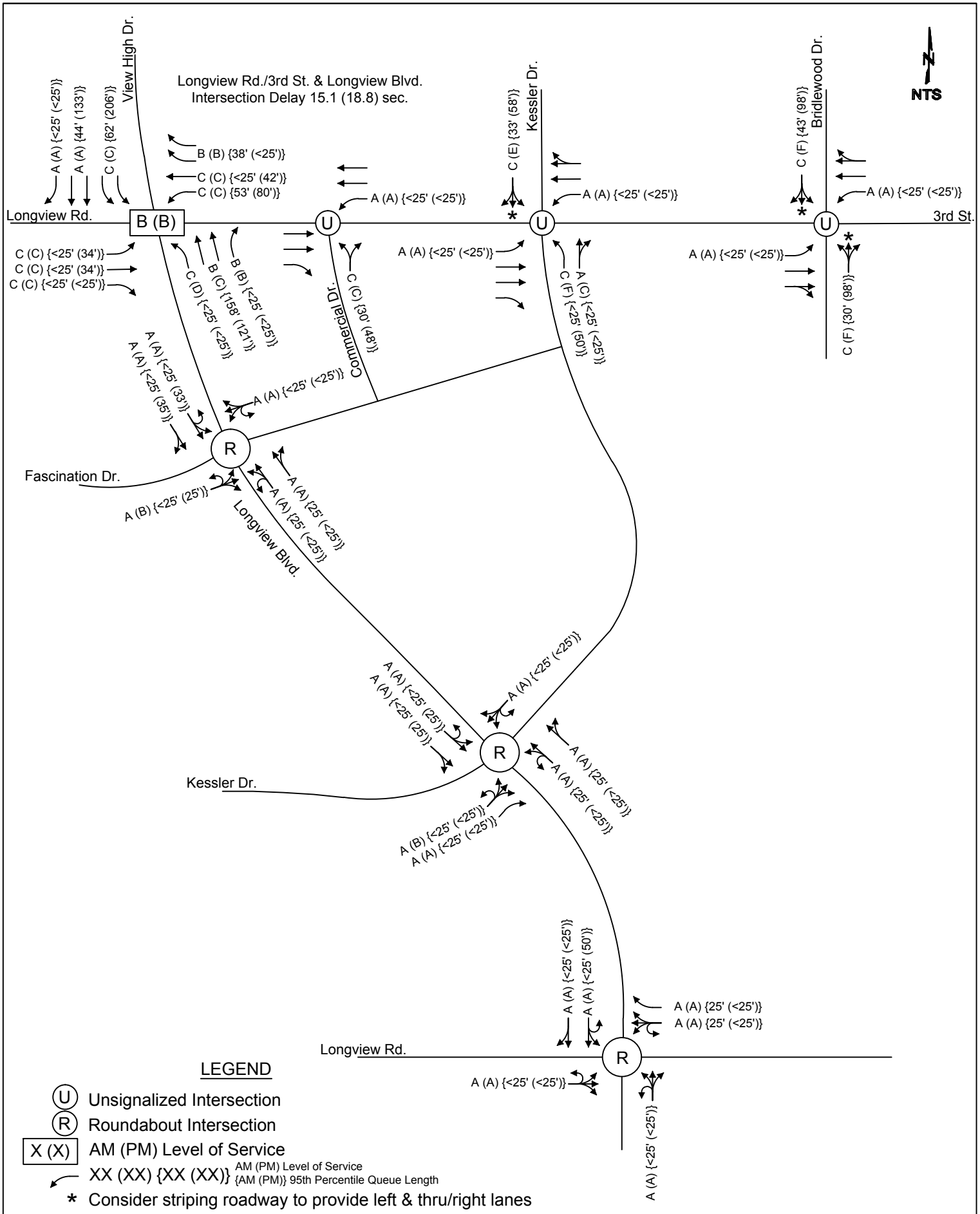
LEGEND

XX (XX) - AM (PM) Peak Hour Volumes

PROJECT NO: 016-2608	Existing plus Approved Peak Hour Volumes	OLSSON ASSOCIATES	7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	FIGURE
DRAWN BY: JRC				3
DATE: 9/7/2016				



PROJECT NO: 016-2608	Existing plus Approved Lane Configurations and Traffic Control	OLSSON ASSOCIATES	7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	FIGURE
DRAWN BY: JRC				4
DATE: 9/7/2016				



PROJECT NO: 016-2608	Existing plus Approved Level of Service	OLSSON ASSOCIATES	7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	FIGURE
DRAWN BY: JMP				5
DATE: 9/7/2016				

4.0 EXISTING PLUS APPROVED PLUS PHASE 1 CONDITIONS

The proposed initial development, phase 1, consists of a movie theater with 7 screens and a residential development consisting of 64 apartment dwelling units and 28 townhouse dwelling units. The Existing plus Approved plus Phase 1 development scenario reviews expected operations of the roadway network based on the addition of proposed phase 1 development traffic to existing traffic volumes. All five of the proposed access drives will be provided under phase 1 conditions.

4.1 Driveway Spacing

The Lee's Summit *Access Management Code* was used to determine whether the proposed driveways meet the criteria for driveway spacing and throat distance.

The proposed right-in/right-out access drives 1 and 2, are to be located approximately 660' from adjacent intersections, based on Longview Boulevard being a major arterial roadway. Although Longview Boulevard is a major arterial, Drives 1 and 2 are right-in/right-out access drives, which have a smaller required distance between intersection/access drives. Both Drives 1 and 2 are existing curb cuts located a minimum of 300' from their adjacent intersections and have been placed directly across from the drives located on the west side of Longview Boulevard. Therefore, based on roadway geometry and the fact that the drives are right-in/right-out drives, the proposed locations of Drives 1 and 2 are acceptable.

Drives 3 and 4 are proposed full access drives located along Fascination Drive. Both Drives 3 and 4 are existing curb cuts and align with existing drives located on the north side of Fascination Drive. Based on the existing roadway characteristics and geometry the spacing appears to be acceptable.

The proposed full access drive located along Kessler Drive, Drive 5, is to be spaced 300' from adjacent intersections, based on Kessler Drive being a commercial or industrial collector roadway. The approximate spacing between Fascination Drive and Drive 5 is 225', which does not meet the spacing requirement by 75'. Consideration should be given to shifting Drive 5 south to improve the alignment between Drive 5 and the parking garage entrance and to increase the distance between Drive 5 and Fascination Drive.

Based on discussions with City staff as well as the *Access Management Code* criteria, it was determined that the site drives needed to provide a throat distance of 50'. Drives 2, 3, 4, and 5 should be modified to provide a minimum of 50' of throat length.

4.2 Trip Generation and Distribution

Trip generation characteristics expected for the site are shown in **Table 3**. These characteristics are based on trip generation data included in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (9th Edition). For trip generation determination the site had classifications of Movie Theater with Matinee, Mid-Rise Apartment, and Low-Rise Residential Condominium/Townhouse as described in the trip generation manual.

The proposed phase 1 development is expected to generate 33 trips and 184 trips during the AM and PM peak hours, respectively. ITE Trip Generation Manual (9th Edition) land use sheets are provided in the **Appendix**.

Table 3: Proposed Phase 1 Development Trip Generation

Daily Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	Daily Trips	Trip Distribution Enter	Trip Distribution Exit	Daily Trips Enter	Daily Trips Exit
444/*	Movie Theater with Matinee	7	Screens	-	1,420	50%	50%	710	710
223/*	Mid-Rise Apartment	64	DU	-	200	50%	50%	100	100
231/*	Low-Rise Residential Condominium/Townhouse	28	DU	-	220	50%	50%	110	110
Total					**1,840**			**920**	**920**

*No ITE Weekday Trip Estimation Available; therefore, PM peak hour volumes for each land use were multiplied by 10 to estimate the daily volumes

AM Peak Hour Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	AM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	AM Peak Hour Trips Enter	AM Peak Hour Trips Exit
444/*	Movie Theater with Matinee	7	Screens	-	-	-	-	-	-
223/387	Mid-Rise Apartment	64	DU	Equation	14	31%	69%	5	9
231/422	Low-Rise Residential Condominium/Townhouse	28	DU	Average	19	25%	75%	5	14
Total					**33**			**10**	**23**

*No ITE AM Trip Estimation Available

PM Peak Hour Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	PM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	PM Peak Hour Trips Enter	PM Peak Hour Trips Exit
444/840	Movie Theater with Matinee	7	Screens	Average	142	40%	60%	57	85
223/388	Mid-Rise Apartment	64	DU	Equation	20	58%	42%	12	8
231/423	Low-Rise Residential Condominium/Townhouse	28	DU	Average	22	58%	42%	13	9
Total					**184**			**82**	**102**

Trip distribution was developed for the proposed site based on review of the area and the existing plus approved traffic volumes. The distributions of the proposed phase 1 development trips to the surrounding roadway are shown in **Table 4**.

Table 4: Trip Distribution

Trip Distribution	
Direction	**To/From**
East (via 3rd Street)	40%
West (via Longview Road)	5%
North (via View High Drive)	40%
South (via Longview Road)	15%
Total	**100%**

The phase 1 trips were added to existing plus approved traffic volumes for analysis of the existing plus phase 1 development scenario. The AM and PM peak hour trips for the phase 1 development, following distribution and assignment to the roadway network, are illustrated in **Figure 6**. The resulting existing plus phase 1 development peak hour traffic volumes are illustrated in **Figure 7**.

4.3 Signal Warrant Analysis

Signal warrant analysis for the existing plus approved plus phase 1 development scenario was performed using the methodologies described in **Section 3.3**.

Signal warrant analysis was completed for the intersections of 3rd Street with Kessler Drive and Bridlewood Drive under existing plus approved plus phase 1 conditions. Based on existing plus approved plus phase 1 volumes the intersections of 3rd Street with Kessler Drive and Bridlewood Drive do not meet Warrant 3 for signalization during both the AM and PM peak hour periods. Signal analysis sheets are provided in the **Appendix**.

4.4 Turn Lane Warrant Analysis

Auxiliary turn lane warrant analysis for the Existing plus Approved plus Phase 1 development scenario was performed using the methodologies described in **Section 3.4**.

Right-Turn

Based on the Lee's Summit *Access Management Code* and existing plus approved plus phase 1 volumes, auxiliary right-turn lanes are warranted for the northbound movements at the intersections of Longview Boulevard with Drives 1 and Drive 2. However, the characteristics of the Longview Boulevard roadway are such that it provides a small median on the right side of the road separating the travel lanes from diagonal parking. Therefore, it is not recommended to install right-turn lanes at the intersections of Longview Boulevard with Drive 1 and Drive 2.

A northbound right-turn lane is also warranted at the intersection of 3rd Street and Kessler Drive during the PM peak hour period. Although a right-turn lane is warranted there are a minimal amount of through volumes at the intersection and therefore, the right-turn volumes are not expected to be largely affected. Thus, it is not recommended to install a right-turn lane for the northbound movement at the intersection of 3rd Street and Kessler Drive.

Left-Turn

Based on existing plus approved plus phase 1 volumes, no auxiliary left-turn lanes are warranted for the study intersections.

4.5 Capacity Analysis

Capacity analysis was performed using the methodologies described in **Section 3.5**. **Table 5** represents the LOS and delay associated with the signalized intersections of Longview Road/3rd Street and Longview Boulevard. Signal timing data was kept

consistent with that of existing plus approved conditions to provide an accurate account of proposed phase 1 development volume conditions.

Table 5: Existing plus Approved plus Phase 1 Signalized Intersection Capacity Analysis

Intersection	AM Peak Hour*	PM Peak Hour*
Longview Rd/3rd St & Longview Blvd	B (15.1)	B (19.1)

*LOS (Delay, in seconds)

During both the AM and PM peak hour periods the overall operations for the signalized study intersection are acceptable with a LOS B. All individual movements continue to operate at LOS D or better during both peak hour periods.

Unsignalized capacity analysis was conducted for the all unsignalized study intersections and site access drives. Based on capacity analysis, all intersections are expected to operate acceptably during the peak hour periods with the following exceptions:

3rd Street & Kessler Drive

- During the PM peak hour period the northbound and southbound left-turn movements are expected to operate at a LOS F.

3rd Street & Bridlewood Drive

- During the PM peak hour period the northbound and southbound left-turn movements are expected to operate at a LOS F.

Overall, study intersections operate acceptably during the AM and PM peak hour periods with minimal exceptions. Unsignalized side street movements can be expected to operate at a lower level of service during peak hour periods as higher main-line traffic volumes are accommodated.

All three of the roundabout intersections have overall operations of LOS A during the AM and PM peak hour periods. All individual movements operate at a LOS B or better during both peak hour periods.

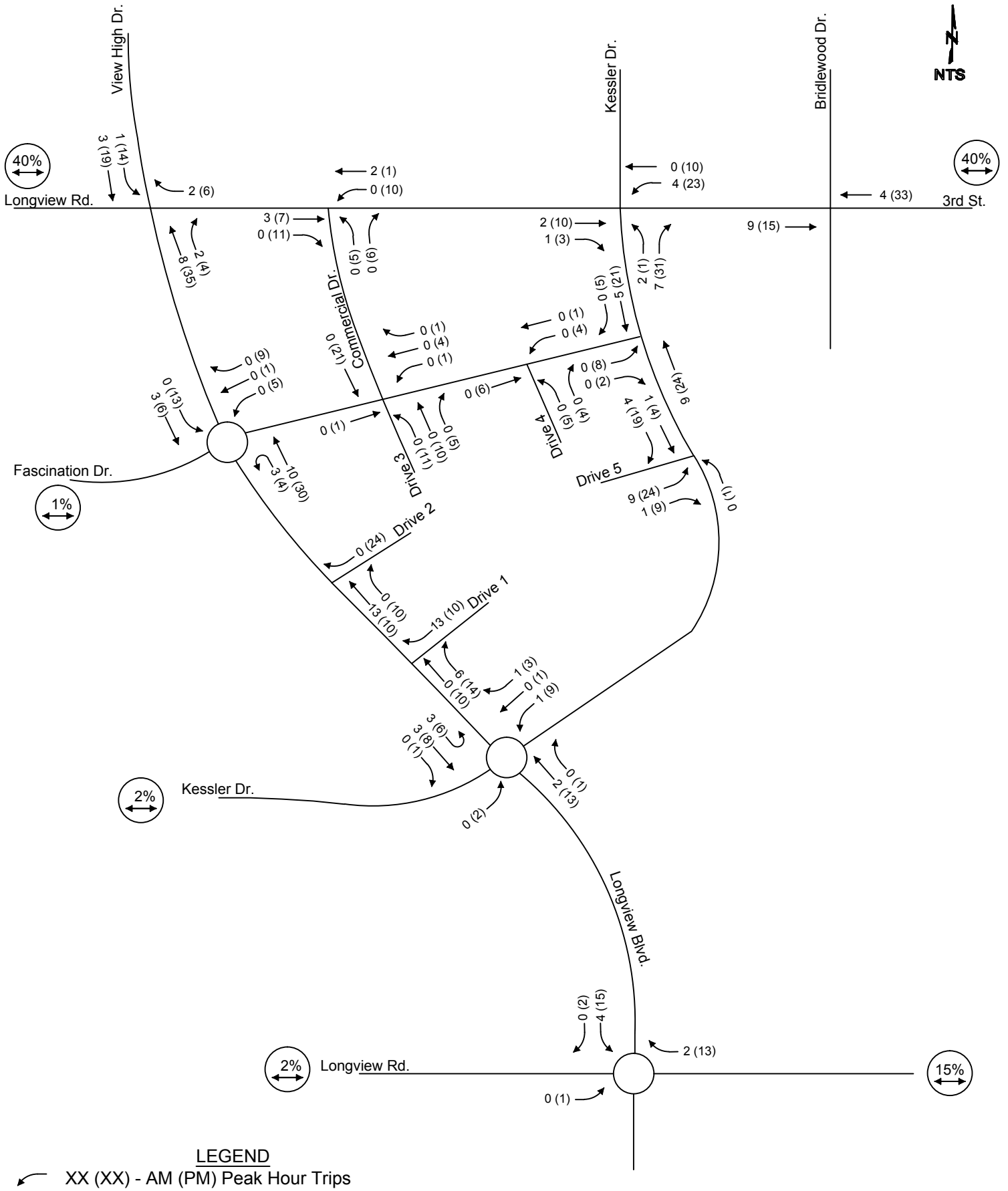
The existing plus approved plus phase 1 intersection geometrics and traffic control for the study area intersections is illustrated in **Figure 8**, and **Figure 9** illustrates level of service associated with each movement. Capacity analysis sheets are included in the **Appendix**.

4.6 Existing plus Approved plus Phase 1 Recommendations

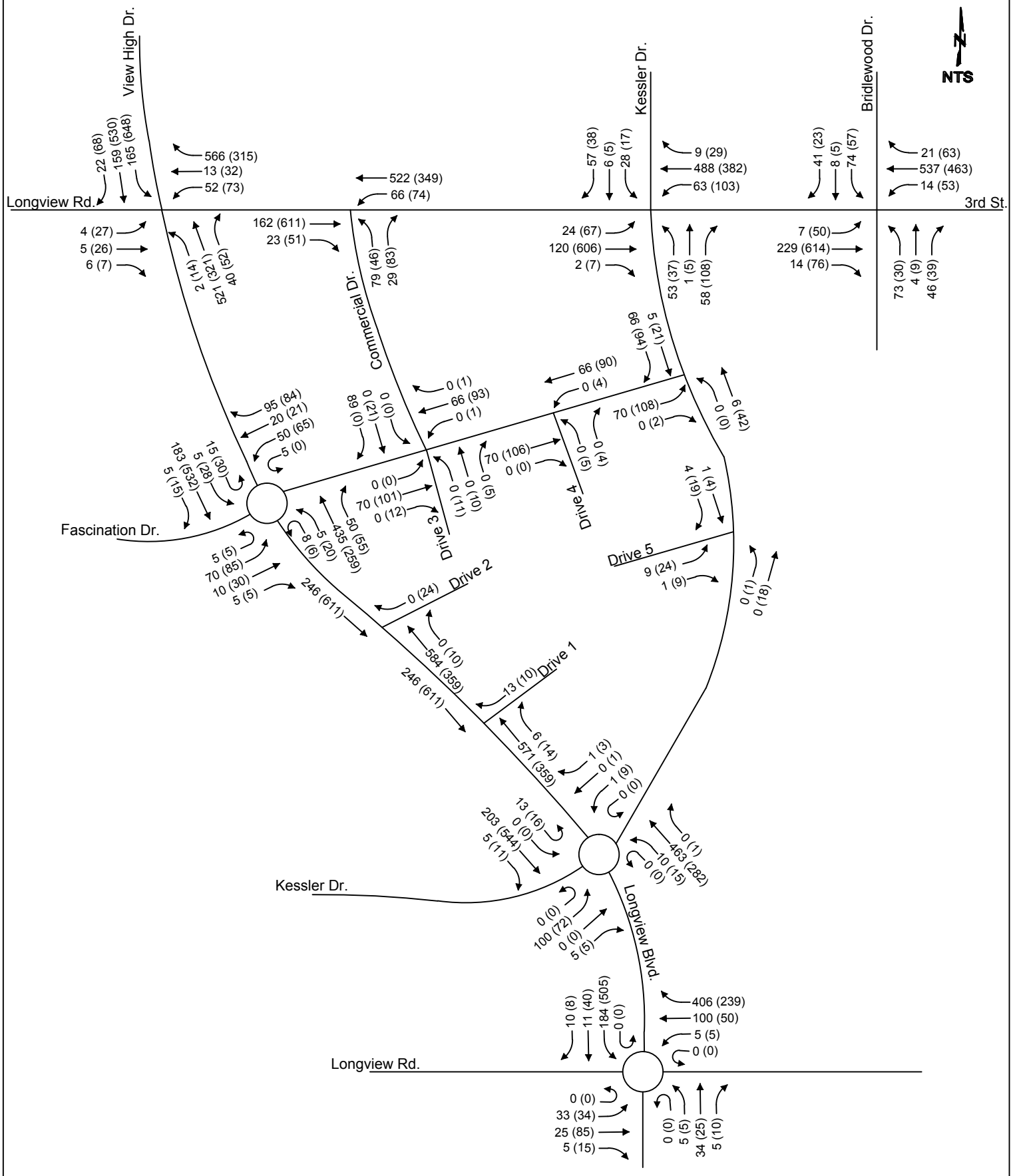
Operations at the signalized intersection of Longview Road/3rd Street and Longview Boulevard are minimally effected by the proposed Longview Commons phase 1

development. The following improvements are recommended as a result of the existing plus approved traffic along with the additional proposed phase 1 development traffic:

- Drives 2, 3, 4, and 5 should be modified to provide a minimum of 50’ of throat length.
- Consider shifting Drive 5 south to improve alignment between Drive 5 and the parking garage entrance and to increase the driveway spacing distance between Drive 5 and Fascination Drive.



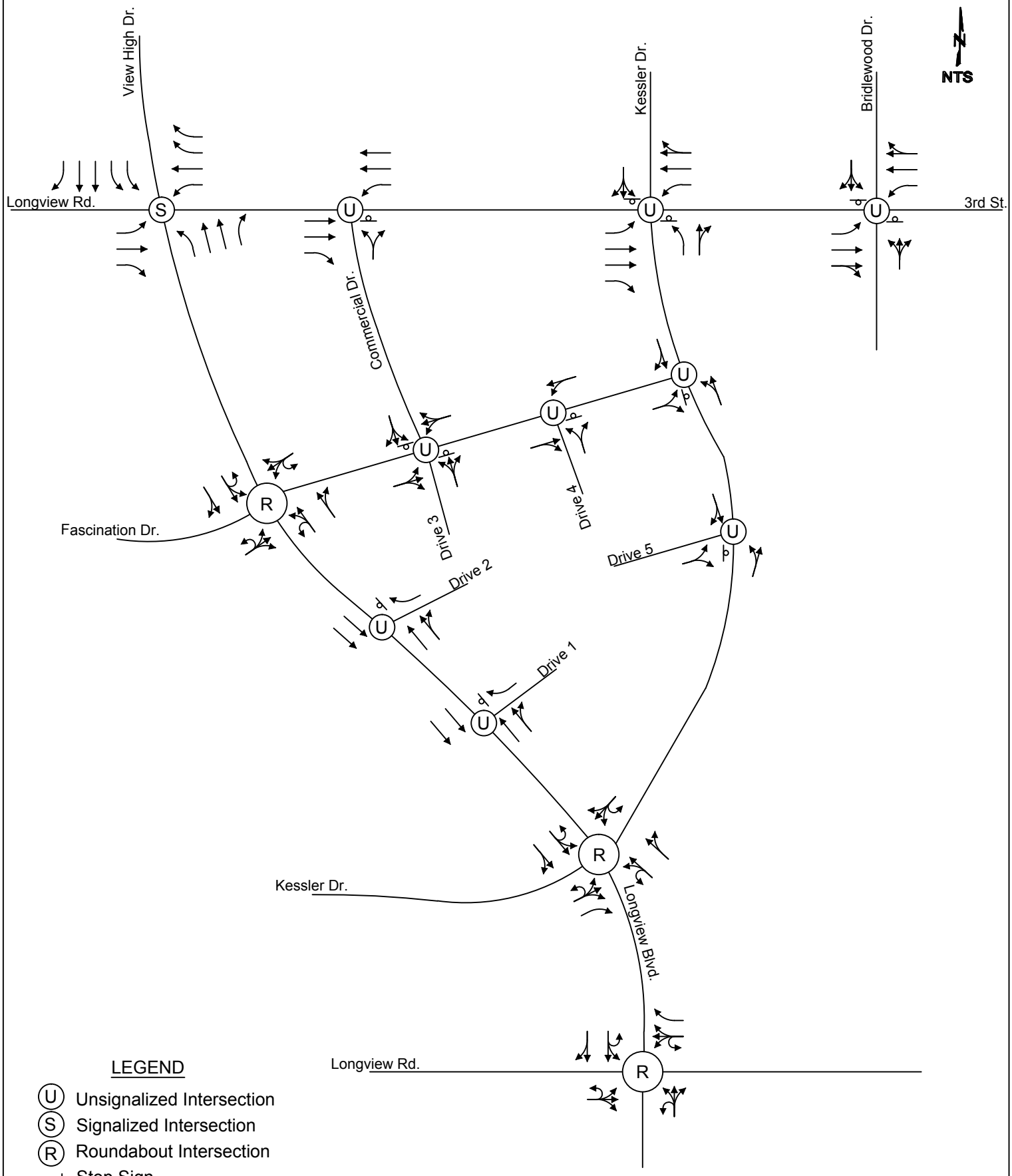
PROJECT NO: 016-2608	Phase 1 Trip Distribution	OLSSON ASSOCIATES	FIGURE
DRAWN BY: TCM		7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	6
DATE: 9/7/2016			



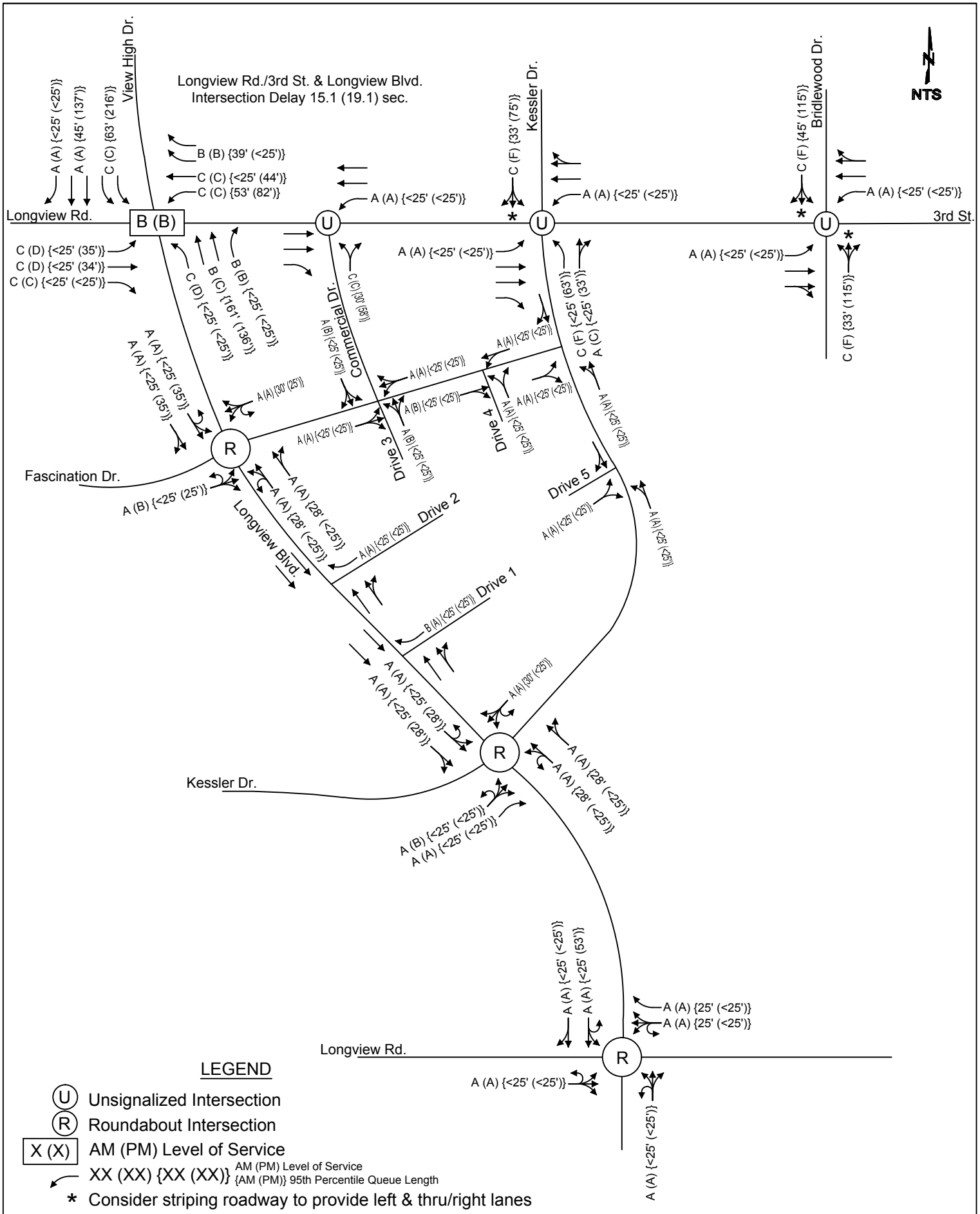
LEGEND

XX (XX) - AM (PM) Peak Hour Volumes

PROJECT NO: 016-2608	Existing plus Approved plus Phase 1 Peak Hour Volumes	OLSSON ASSOCIATES	7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	FIGURE
DRAWN BY: TCM				7
DATE: 9/7/2016				



PROJECT NO: 016-2608 DRAWN BY: TCM DATE: 9/7/2016	Existing plus Approved plus Phase 1 Lane Configurations and Traffic Control	OLSSON ASSOCIATES 7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	FIGURE 8



PROJECT NO: 016-2608	Existing plus Approved plus Phase 1 Level of Service	OLSSON ASSOCIATES	FIGURE
DRAWN BY: JMP		7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	9
DATE: 9/7/2016			

5.0 EXISTING PLUS APPROVED PLUS FULL BUILD CONDITIONS

The full build conditions consider the existing plus approved plus phase 1 development. The full build of the proposed Longview Commons development plan includes an additional 32,000 square feet of medical office space, 60,500 square feet of general office space, and an 8,000 square foot restaurant. The existing plus approved plus full build scenario reviews expected operations of the roadway network based on the addition of the proposed developments traffic to existing plus approved plus phase 1 development traffic volumes. Access drive locations are described in **Section 2.0**.

5.1 Trip Generation and Distribution

Trip generation was conducted in the same manner as discussed in **Section 4.2**. Trips from the medical office building, general office building, and restaurant were added to the existing plus approved studies plus phase 1 development volumes to represent the full build conditions.

Trip generation characteristics expected for the development are shown in Table 6. For trip generation determination the site had classifications of Medical-Dental Office Building, General Office Building, and High-Turnover (Sit-Down) Restaurant as described in the trip generation manual. Trip generation was based on the square footage for all of the land uses. The full build proposed development is expected to generate 4,849 daily trips on an average weekday and 326 trips and 515 trips during the full build scenario including the movie theater and residential development trips.

Table 6: Proposed Full Build Development Trip Generation

Daily Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	Daily Trips	Trip Distribution Enter	Trip Distribution Exit	Daily Trips Enter	Daily Trips Exit
444/*	Movie Theater with Matinee	7	Screens	PM x 10	1,420	50%	50%	710	710
223/*	Mid-Rise Apartment	64	DU	PM x 10	200	50%	50%	100	100
231/*	Low-Rise Residential Condominium/Townhouse	28	DU	PM x 10	220	50%	50%	110	110
720/1294	Medical-Dental Office Building	32,000	SF	Equation	1,094	50%	50%	547	547
710/1259	General Office Building	60,500	SF	Equation	897	50%	50%	449	448
932/1885	High-Turnover (Sit-Down) Restaurant	8,000	SF	Average	1,018	50%	50%	509	509
Total					**4,849**			**2,425**	**2,424**

Previously Analyzed Scenario

*No ITE Weekday Trip Estimation Available; therefore, PM peak hour volumes for each land use were multiplied by 10 to estimate the daily volumes

AM Peak Hour Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	AM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	AM Peak Hour Trips Enter	AM Peak Hour Trips Exit
444/*	Movie Theater with Matinee	7	Screens	-	-	-	-	-	-
223/387	Mid-Rise Apartment	64	DU	Equation	14	31%	69%	5	9
231/422	Low-Rise Residential Condominium/Townhouse	28	DU	Average	19	25%	75%	5	14
720/1295	Medical-Dental Office Building	32,000	SF	Average	77	79%	21%	61	16
710/1260	General Office Building	60,500	SF	Equation	129	88%	12%	114	15
932/1886	High-Turnover (Sit-Down) Restaurant	8,000	SF	Average	87	55%	45%	48	39
Total					**326**			**233**	**93**

Previously Analyzed Scenario

*No ITE AM Trip Estimation Available

PM Peak Hour Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	PM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	PM Peak Hour Trips Enter	PM Peak Hour Trips Exit
444/840	Movie Theater with Matinee	7	Screens	Average	142	40%	60%	57	85
223/388	Mid-Rise Apartment	64	DU	Equation	20	58%	42%	12	8
231/423	Low-Rise Residential Condominium/Townhouse	28	DU	Average	22	58%	42%	13	9
720/1296	Medical-Dental Office Building	32,000	SF	Equation	105	28%	72%	30	75
710/1261	General Office Building	60,500	SF	Equation	147	17%	83%	25	122
932/1887	High-Turnover (Sit-Down) Restaurant	8,000	SF	Average	79	60%	40%	48	31
Total					**515**			**185**	**330**

Trip distribution for the existing plus approved plus full build conditions was determined to be the same as the existing plus approved plus phase 1 development scenario distribution, discussed in **Section 4.2**.

Additional peak hour trips for the full build development, following distribution and assignment to the roadway network are illustrated in **Figure 10**. These full build development trips were added to the existing plus approved plus phase 1 development traffic volumes. The resulting existing plus approved plus full build peak hour traffic volumes are illustrated in **Figure 11**. Lane configurations and traffic control for the existing plus approved plus full build conditions are illustrated in **Figure 12**.

5.2 Signal Warrant Analysis

Signal warrant analysis for the existing plus approved plus full build development scenario was performed using the methodologies described in **Section 3.3**.

Signal warrant analysis was completed for the intersections of 3rd Street with Kessler Drive and Bridlewood Drive under existing plus approved plus full build conditions. Based on existing plus approved plus full build volumes the intersection of 3rd Street with Kessler Drive is expected to meet Warrant 3 for signalization, by 17 vehicles on the side street, during one of the peak hour periods (PM). Since only one hour was met, it is recommended to evaluate the intersection warrants after full build of both this and other developments are completed to assure the projected volumes are realized prior to installing a signal. Signal analysis sheets are provided in the **Appendix**.

5.3 Turn Lane Warrant Analysis

Auxiliary turn lane warrant analysis for the existing plus approved plus full build development scenario was performed using the methodologies described in **Section 3.4**.

Right-Turn

Based on the Lee's Summit *Access Management Code* and existing plus approved plus full build volumes, no auxiliary right-turn lanes are warranted at the study intersections, that have not been discussed in **Section 4.4**.

Left-Turn

Based on existing plus approved plus full build volumes, no auxiliary left-turn lanes are warranted for the study intersections.

5.4 Site Circulation

A layout of the site is depicted in **Figure 2**. The Longview Commons development is proposed to have access drives along Longview Boulevard, Fascination Drive, and Kessler Drive. The site plan provides parking, both angled or parallel, around the entire site. Parking is also provided internal to the site through parking lots and a two-story parking garage.

The parking garage provides four two-way accesses; two on the north side of the garage and two on the east side. Drives 2 and 3 converge at an intersection internal to the site with the two parking garage accesses on the north side. Consideration should be given to restricting the north garage entrances to one-way accesses; one access to be an entrance and the other to be an exit. Considerations should also be given to providing sufficient signing and pavement markings, furthering guidance to vehicles traveling through and around the site.

5.5 Capacity Analysis

Capacity analysis was performed using the methodologies described in **Section 3.5**. **Table 7** represents the LOS and delay associated with the signalized intersections of

Longview Road/3rd Street and Longview Boulevard. Signal timing data was kept consistent with that of existing plus approved conditions to provide an accurate account of proposed full build development volume conditions.

Table 7: Existing plus Approved plus Full Build Signalized Intersection Capacity Analysis

Intersection	AM Peak Hour*	PM Peak Hour*
Longview Rd/3rd St & Longview Blvd	B (15.1)	B (19.4)

*LOS (Delay, in seconds)

During both the AM and PM peak hour periods the overall operations for the signalized study intersection are acceptable with a LOS B. All individual movements continue to operate at LOS D or better during both peak hour periods.

Unsignalized capacity analysis was conducted for the all unsignalized study intersections and site access drives. Based on capacity analysis, all intersections are expected to operate acceptably during the peak hour periods with the following exceptions:

3rd Street & Kessler Drive

- During the AM peak hour period the southbound left-turn movement is expected to operate at a LOS E and during the PM peak hour period the northbound and southbound left-turn movements are expected to operate at a LOS F.

3rd Street & Bridlewood Drive

- During the PM peak hour period the northbound and southbound left-turn movements are expected to operate at a LOS F.

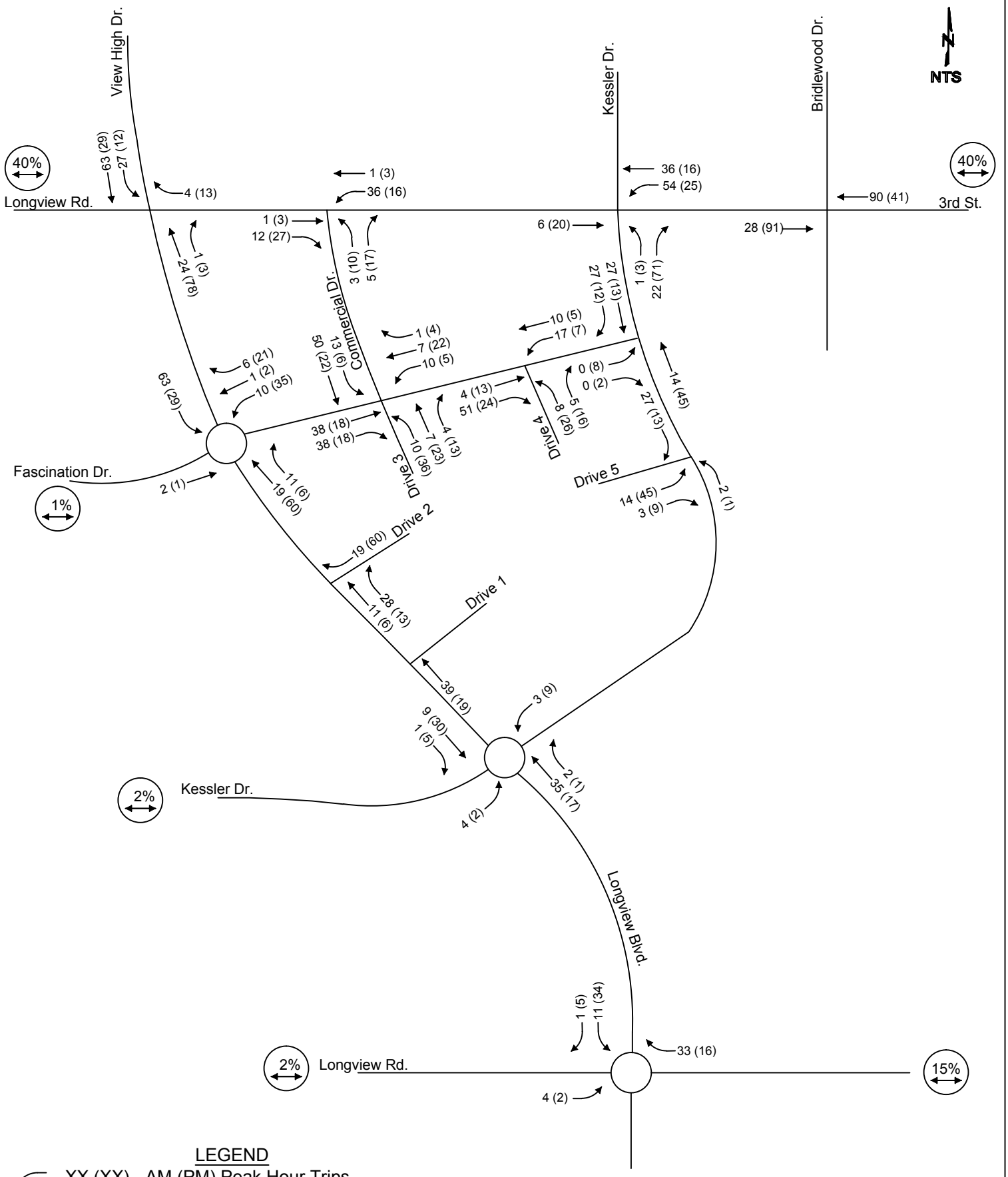
Overall, study intersections operate acceptably during the AM and PM peak hour periods with minimal exceptions. Unsignalized side street movements can be expected to operate at a lower level of service during peak hour periods as higher main-line traffic volumes are accommodated.

All three of the roundabout intersections have overall operations of LOS A during the AM and PM peak hour periods. All individual movements operate at a LOS B or better during both peak hour periods.

Figure 13 illustrates the existing plus approved plus full build development level of service and 95th-percentile queuing for the study intersections. Capacity analysis sheets are included in the **Appendix**.

5.6 Existing plus Approved plus Full Build Recommendations

Operations at the signalized study intersection are minimally effected by the addition of the full build trips to the existing plus approved plus phase 1 development volumes. The intersection of 3rd Street and Kessler Drive meets Warrant 3 (Peak Hour) for signalization during one peak hour period. Since only one peak hour period is met, it is recommended to evaluate the intersection warrant after full build of both this and other developments are completed to assure the projected volumes are realized prior to installing the signal. Consideration should be given to the site circulation options for the parking garage discussed in **Section 5.4**. No further recommendations are necessary.

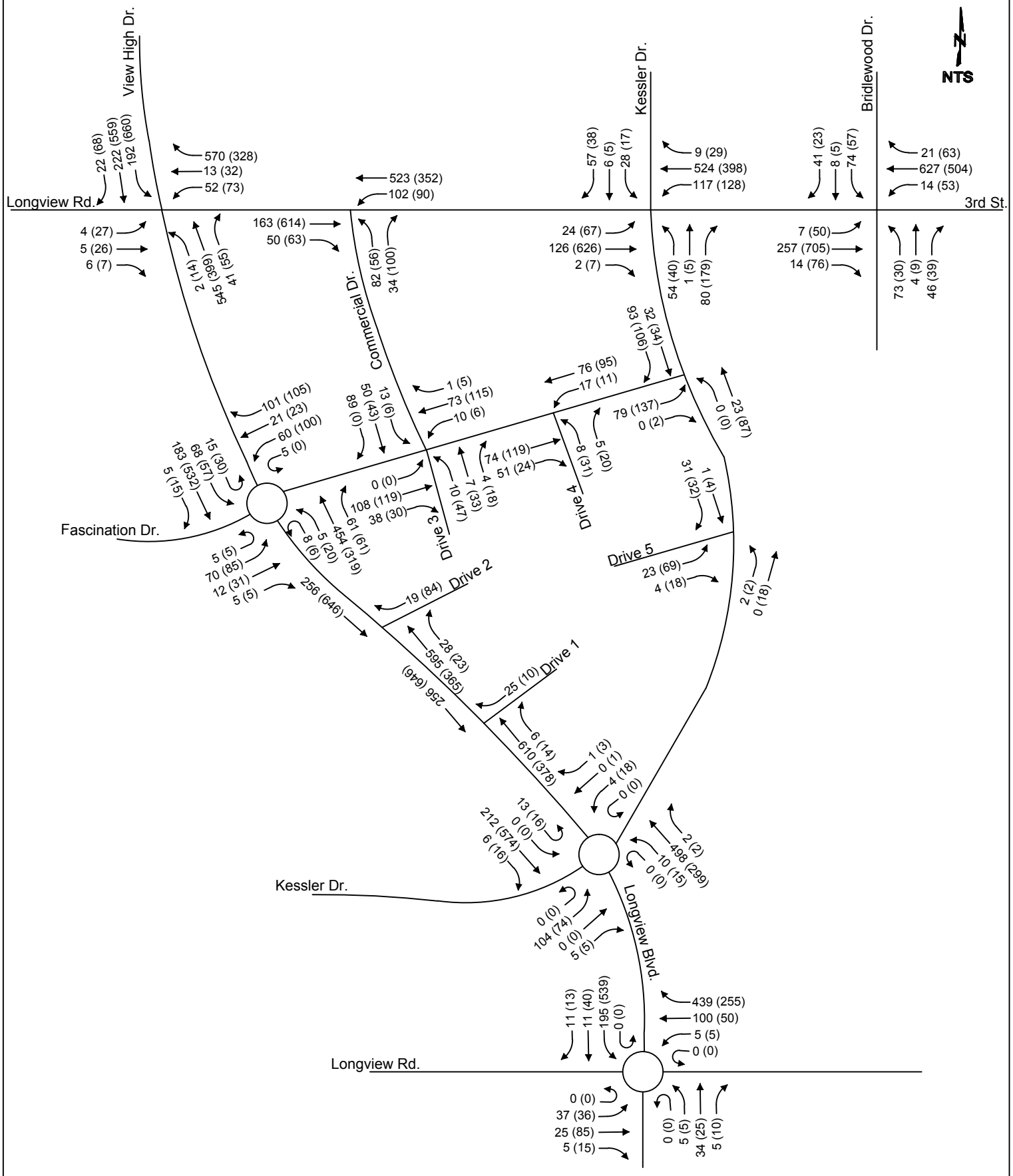


LEGEND

XX (XX) - AM (PM) Peak Hour Trips

XX% Trip Distribution Percentage

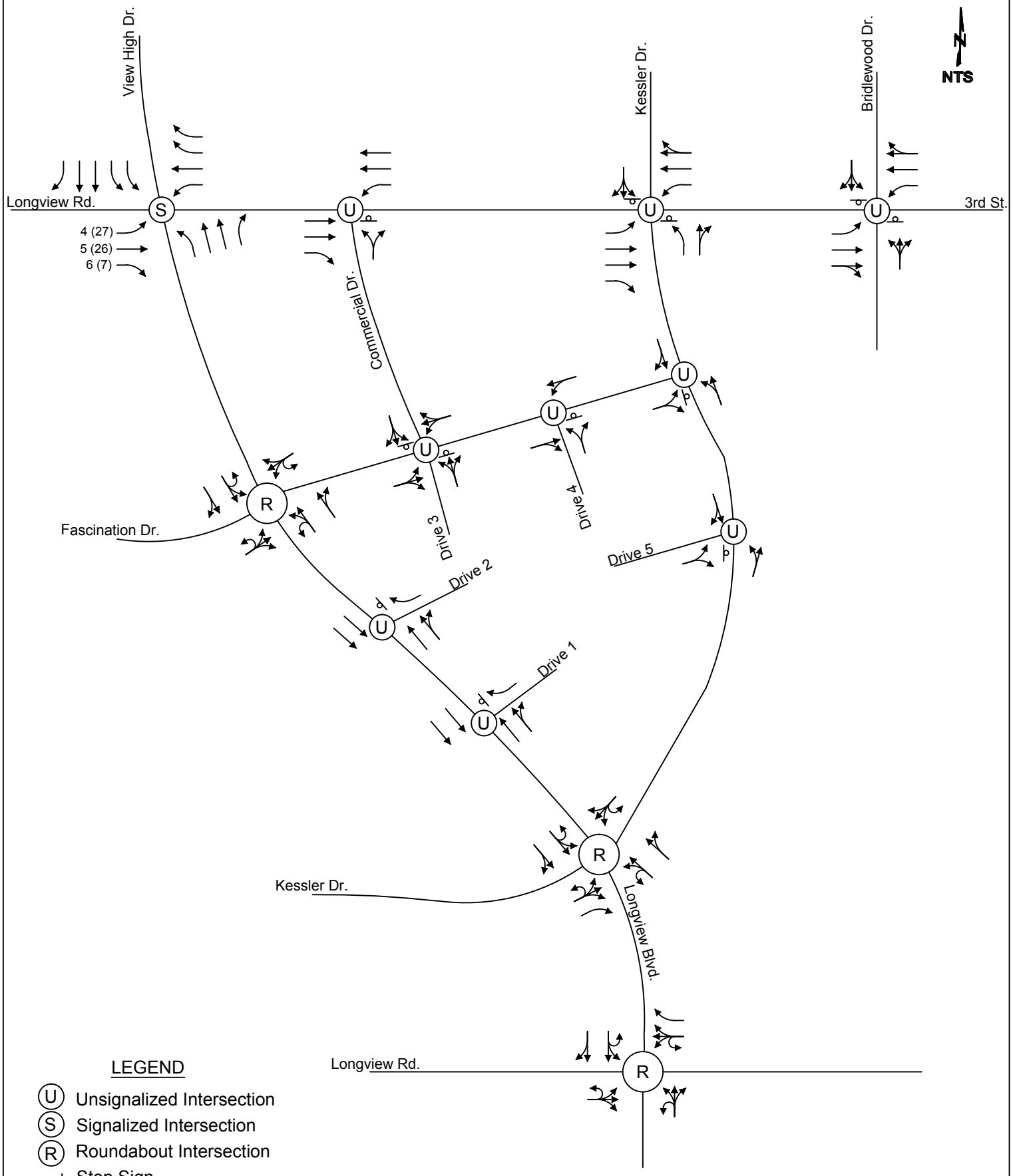
PROJECT NO: 016-2608	Full Build Trip Distribution	OLSSON ASSOCIATES	7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	FIGURE 10
DRAWN BY: TCM				
DATE: 9/7/2016				



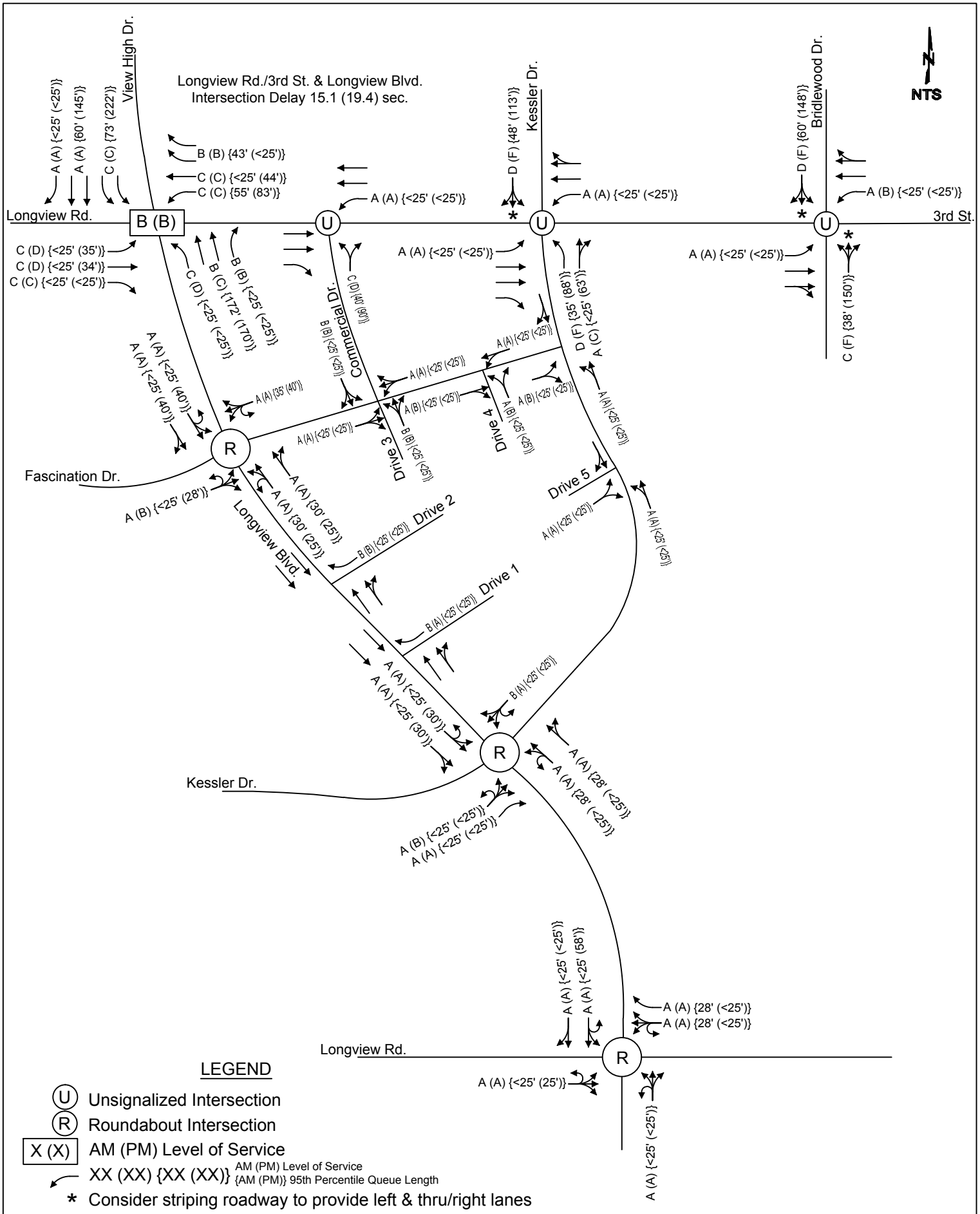
LEGEND

XX (XX) - AM (PM) Peak Hour Volumes

PROJECT NO: 016-2608	Existing plus Approved plus Full Build Peak Hour Volumes	OLSSON ASSOCIATES	FIGURE
DRAWN BY: TCM		7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	11
DATE: 9/7/2016			



PROJECT NO: 016-2608	Existing plus Approved plus Full Build Lane Configurations and Traffic Control	OLSSON ASSOCIATES	FIGURE
DRAWN BY: TCM		7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	12
DATE: 9/7/2016			



PROJECT NO: 016-2608	Existing plus Approved plus Full Build Level of Service	OLSSON ASSOCIATES	FIGURE
DRAWN BY: TCM		7301 West 133rd Street Suite 200 Overland Park, KS 66213-4750 TEL 913.381.1170 FAX 913.381.1174	13
DATE: 9/7/2016			

6.0 RECOMMENDATIONS & CONCLUSIONS

This report considered the impact of the proposed construction of the Longview Commons development located along Longview Boulevard between Fascination Drive and Kessler Drive in Lee's Summit, Missouri. The study determined the impacts that the proposed developments will have on traffic operations. Based on the results of the capacity analysis and Lee's Summit access management criteria, the following conclusions and recommendations are made for the study area:

Existing plus Approved Conditions

Study intersections operate at acceptable levels of service for the Existing plus Approved scenario during the AM and PM peak hour periods. It is recommended to stripe a northbound left-turn lane at the intersection of 3rd Street and Kessler Drive. No further recommendations are necessary under existing plus approved operations.

Existing plus Approved plus Phase 1 Conditions

Operations at the signalized intersection of Longview Road/3rd Street and Longview Boulevard are minimally effected by the proposed Longview Commons phase 1 development. The following improvements are recommended as a result of the existing plus approved traffic along with the additional proposed phase 1 development traffic:

- Drives 2, 3, 4, and 5 should be modified to provide a minimum of 50' of throat length.
- Consider shifting Drive 5 south to improve alignment between Drive 5 and the parking garage entrance and to increase the driveway spacing distance between Drive 5 and Fascination Drive.

Existing plus Approved plus Full Build Conditions

Operations at the signalized study intersection are minimally effected by the addition of the full build trips to the existing plus approved plus phase 1 development volumes. The intersection of 3rd Street and Kessler Drive meets Warrant 3 (Peak Hour) for signalization during one peak hour period. Since only one peak hour period is met, it is recommended to evaluate the intersection warrant after full build of both this and other developments are completed to assure the projected volumes are realized prior to installing the signal. Consideration should be given to the site circulation options for the parking garage discussed in **Section 5.4**. No further recommendations are necessary.

We appreciate the opportunity to be of service to you on this project. If you should have any questions or need any additional information, please feel free to contact us.

Respectfully Submitted,

Olsson Associates

X

Todd Fredericksen, PE, PTOE

X

Tom Fulton, Senior Project Manager

APPENDIX