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MEMO

TO: City of Lee's Summit
FROM: Shannon Jeffries, PE, PTOE
 Tom Fulton, Technical Leader
RE: Kessler View Amendment (Additional Scenario Update)
DATE: July 19th, 2018
PROJECT #: 018-1363

Notes:

This memo is in response to City comments related to the Kessler View Traffic Study, submitted May 7th, 2018. This memo addresses an additional scenario requested by City staff that evaluates the addition of a proposed daycare and apartments to the previously approved preliminary development plan (PDP). Specifically, this memo will provide an evaluation of the signal warrant for the intersection of 3rd Street and Kessler Drive as well as review anticipated operations at the intersection.

Approved PDP

City staff requested that a scenario be considered that analyzed the previously approved PDP for the Kessler View area, with the addition of a proposed daycare and apartment uses. The site plan for the approved PDP can be found in **Figure 1. Table 1** provides a summary of trip generation for the approved PDP. Trip generation was conducted using the *ITE Trip Generation Manual (10th Edition)*.

TABLE 1: APPROVED PDP TRIP GENERATION

Land Use	Size	Average Weekday	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Medical Dental Office	29,000 SF	1,027	75	59	16	97	28	69
Shopping Center	24,794 SF	2,330	165	103	62	194	94	100
Movie Theater with Matinee*	7 Screens	1,540	-	-	-	103	46	57
General Office Building	58,000 SF	626	81	70	11	68	11	57
Fast-Food Restaurant with Drive-Through Window	4,000 SF	1,884	112	58	54	91	48	43
Fast-Food Restaurant without Drive-Through Window	4,500 SF	1,559	113	68	45	128	64	64
Mid-Rise Apartment*	172 DU	936	59	16	43	75	46	29
Single-Family Detached Housing	92 DU	963	70	18	52	146	91	55
High-Turnover Sit-Down Restaurant	14,893 SF	1,671	149	82	67	146	91	55
Total		12,563	824	474	350	996	488	508

*No ITE AM Trip Estimation Available

Pass-by characteristics were determined for the Fast-Food Restaurant with Drive-Through Window land use using the *ITE Trip Generation Handbook (10th Edition)*. Pass-by trips are made by traffic already on the roadway and passing the site, versus making a direct trip to the development (primary trips). According to the *ITE Trip Generation Handbook*, the pass-by trips during the AM and PM peak hour periods for the described land use varies from 25% to 71%. To be conservative, 30% pass-by trips during the AM and PM peak hour was used for this study. Trip generation data considering pass-by trips for the restaurant land uses are illustrated in **Table 2**.

TABLE 2: PASS-BY TRIPS

Land Use	Pass-by Percentage	AM Peak Hour				PM Peak Hour			
		Pass-by		Primary		Pass-by		Primary	
		Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
Fast-Food Restaurant with Drive-Through Window	30%	25	24	58	54	21	19	48	43

Trip distribution and site trips (including pass-by) are shown in **Figure 2** for the intersections along 3rd Street. Existing plus Approved PDP volumes are illustrated in **Figure 3**.

Signal Warrant Summary

Signal warrants for both the AM and PM peak hour periods were evaluated for the Existing plus Approved PDP volumes. Based on those volumes, it was determined that the criteria for signalization at 3rd Street and Kessler Drive is not expected to be met for the peak hour periods. The Existing plus Approved PDP conditions capacity analysis summary is illustrated in **Figure 4**. Detailed results may be found in the **Appendix**.

Approved PDP plus Daycare and Apartments

The proposed daycare and apartments will be located south of the existing memory care facility. The trip generation for the proposed daycare and apartments can be found in **Table 3** below. Trip generation was conducted using the *ITE Trip Generation Handbook (10th Edition)*.

TABLE 3: PROPOSED DAYCARE & APARTMENTS TRIP GENERATION

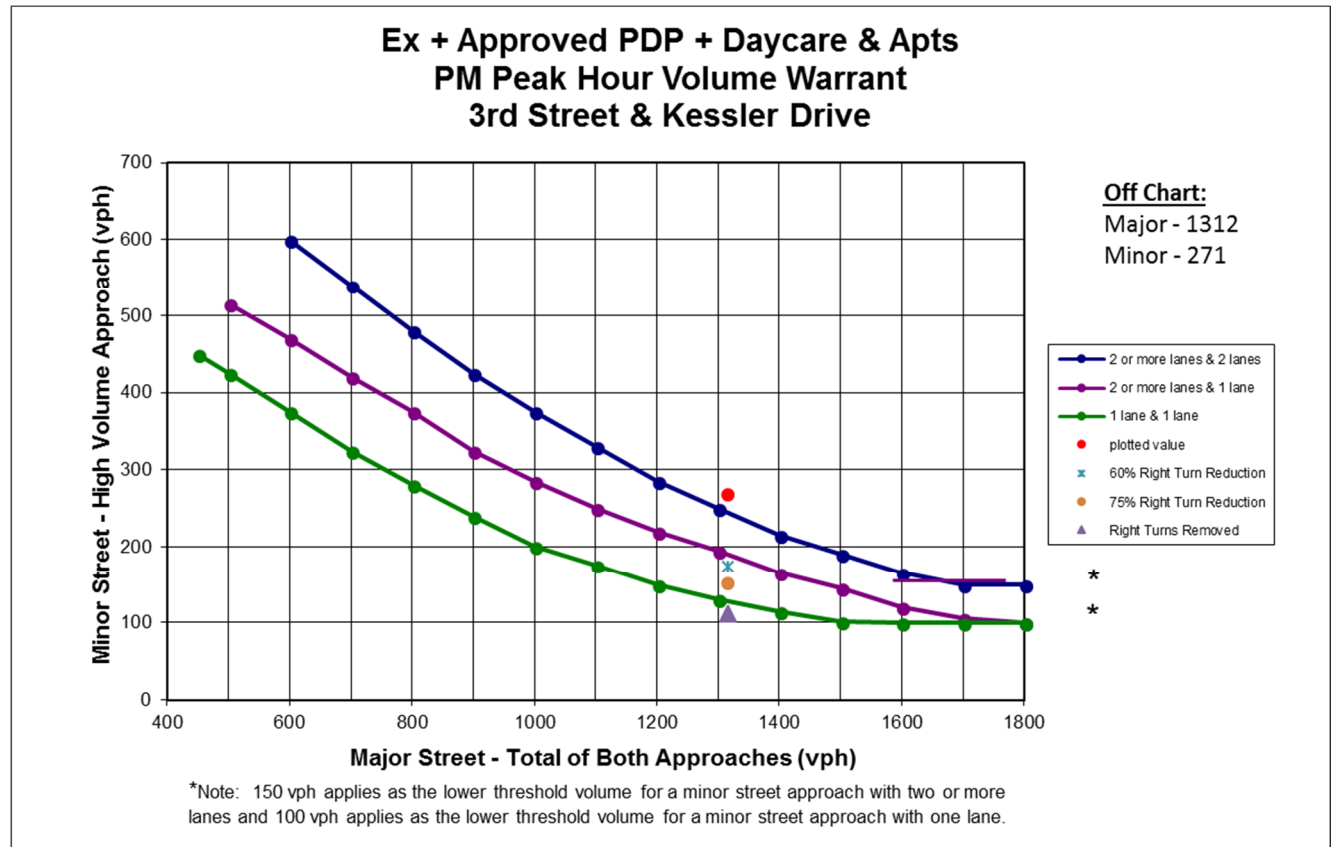
Land Use	Size	Average Weekday	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Multi-Family Housing	44 DU	292	22	6	16	29	19	10
Day Care Center	10,000 SF	477	110	59	51	112	53	59
	Total	769	132	65	67	141	72	69

Based on the location of the proposed facilities, a separate trip distribution was created for this phase of development. The proposed daycare and apartments trip distribution and site trips are shown in **Figure 5**. Existing plus Approved PDP plus Daycare and Apartments volumes are illustrated in **Figure 6**.

Signal Warrant Summary

With the addition of trips associated with the proposed daycare and apartments, the peak hour signal warrant is not expected to be met for the intersection of 3rd Street and Kessler Drive for the AM peak hour period but is expected to be met for the PM peak hour period. Similar to the Kessler View traffic study, the PM peak hour warrant is slightly above the threshold for consideration of installation of a traffic signal.

The Manual on Uniform Traffic Control Devices (MUTCD), allows for a reduction of right-turn volumes when considering an intersection with a separate (exclusive) right-turn lane. The following graph illustrates the signal warrant for the Existing plus Approved PDP plus Daycare and Apartments scenario considering a reduction in right-turn volumes. As indicated, with a 60% reduction of volumes, a signal is no longer warranted during the PM peak hour period. The northbound approach was considered with a separate right-turn lane configuration due to the high volume of right-turning vehicles. This configuration decreases potential delay for the right-turn movement by allowing the right-turn movement to occur without waiting for through traffic to clear the intersection.



Signal warrant analysis considers full development of the approved PDP. At this time, the approved PDP is unbuilt and it is anticipated that the proposed daycare and apartment uses will be constructed prior to the construction of the approved PDP. Removing volumes associated with the approved PDP, the northbound approach volumes at the intersection of 3rd Street and Kessler View would be expected to be less and the signal warrant would not be expected to be met. Due to the volume of pending (approved PDP) development considered, it is recommended to re-evaluate the signal warrant as development is expected to occur. This will provide a more accurate representation of when signalization may be warranted.

Capacity Analysis Summary

Unsignalized capacity analysis was reviewed for the intersection of 3rd Street and Kessler Drive considering the Existing plus Approved PDP plus Daycare and Apartment volumes. Queueing analysis for the intersection is based on the 95th-percentile queues. The 95th-percentile queue represents the queue length that has a 5 percent probability of being exceeded during the peak hour.

During the AM peak hour period the northbound left-turn/through movement at the intersection of 3rd Street and Kessler Drive is expected to operate at LOS F with minimal queuing. The PM peak hour period is expected to experience heavier queuing with the same LOS for the northbound left-turn/through movement. The lower individual movement levels of service and queuing can be expected along minor streets during peak hour periods while higher volume major street volumes are accommodated. This lower level of service and queuing is expected to be limited to peak hour periods of the day, specifically the PM peak. If drivers approach the intersection of 3rd Street and Kessler Drive and note queuing, which is expected to be limited to a portion of the PM peak hour period, the driver could access View High Drive to the west via Fascination Drive. This alternate route would only be expected to be utilized by drivers if longer northbound queues occur at the intersection of 3rd Street and Kessler Drive.

As with the signal warrant analysis, this operational scenario considers traffic associated with the approved PDP, which at this time is unbuilt. Considering only the traffic expected with the proposed daycare and apartment, the northbound approach volume would be less and operations would be expected to improve with a decreased 95th-percentile queue.

Summary

- Considering Existing plus Approved PDP plus Daycare and Apartment volumes, the AM peak hour warrant for signalization is not met. The PM peak hour warrant is expected to be met, slightly above the threshold of guidance for consideration of installation of a signal. Using guidance provided in the MUTCD, right-turn volumes were reduced to determine the impact to the signal warrant. A reduction of between 50-60% of the right-turn volumes at the intersection will result in the PM peak hour warrant not being met for the intersection of 3rd Street and Kessler Drive. If an exclusive right-turn lane is provided for the northbound approach, and considering the traffic volumes along 3rd Street, we feel that a 50-60% reduction in right-turn volumes is reasonable. With a reduction of right-turn volumes, the AM and PM peak hour signal warrants would not be expected to be met.
 - Evaluation of this signal warrant considered approved development which is currently not constructed. If the daycare and apartment land uses are developed prior to the approved development, the signal warrant is not expected to be met for the AM or PM peak hour periods.
- Capacity analysis for the Existing plus Approved PDP plus Daycare and Apartments indicates that as an unsignalized intersection, the northbound movement for the intersection of 3rd Street and Kessler Drive is expected to operate at a lower level of service with longer queuing, specifically during the PM peak hour period. This can be experienced by minor street approaches while major street (higher volume) traffic is accommodated.
 - This operational scenario considers traffic associated with the approved PDP. Considering only traffic expected with the proposed daycare and apartment, operations would be expected to improve with decreased delay and 95th-percentile queuing.
 - Reviewing the expected delay and queue, specifically during the PM peak hour period, for the intersection of 3rd Street and Kessler Drive indicates that with approved PDP plus daycare and apartment development, longer delay and queuing may be experienced for the northbound movement. If drivers approach the intersection of 3rd Street and Kessler Drive and note queuing or delay, an alternate route to View High Drive to the west via Fascination Drive is provided. Drivers may use this route instead to bypass expected delay,

We hope that we have provided adequate information for your request. If you have additional questions, please contact us at 913.381.1170.

FIGURE 1

Site Plan

Kessler View
Lee's Summit, MO



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Approved PDP

Land Use	Size
Medical Dental Office	29,000 SF
Shopping Center	24,794 SF
Movie Theater with Matinee*	7 Screens
General Office Building	58,000 SF
Fast-Food Restaurant with Drive-Through Window	4,000 SF
Fast-Food Restaurant without Drive-Through Window	4,500 SF
Mid-Rise Apartment*	172 DU
Single-Family Detached Housing	92 DU
High-Turnover Sit-Down Restaurant	14,893 SF
Total	

Proposed Land Use

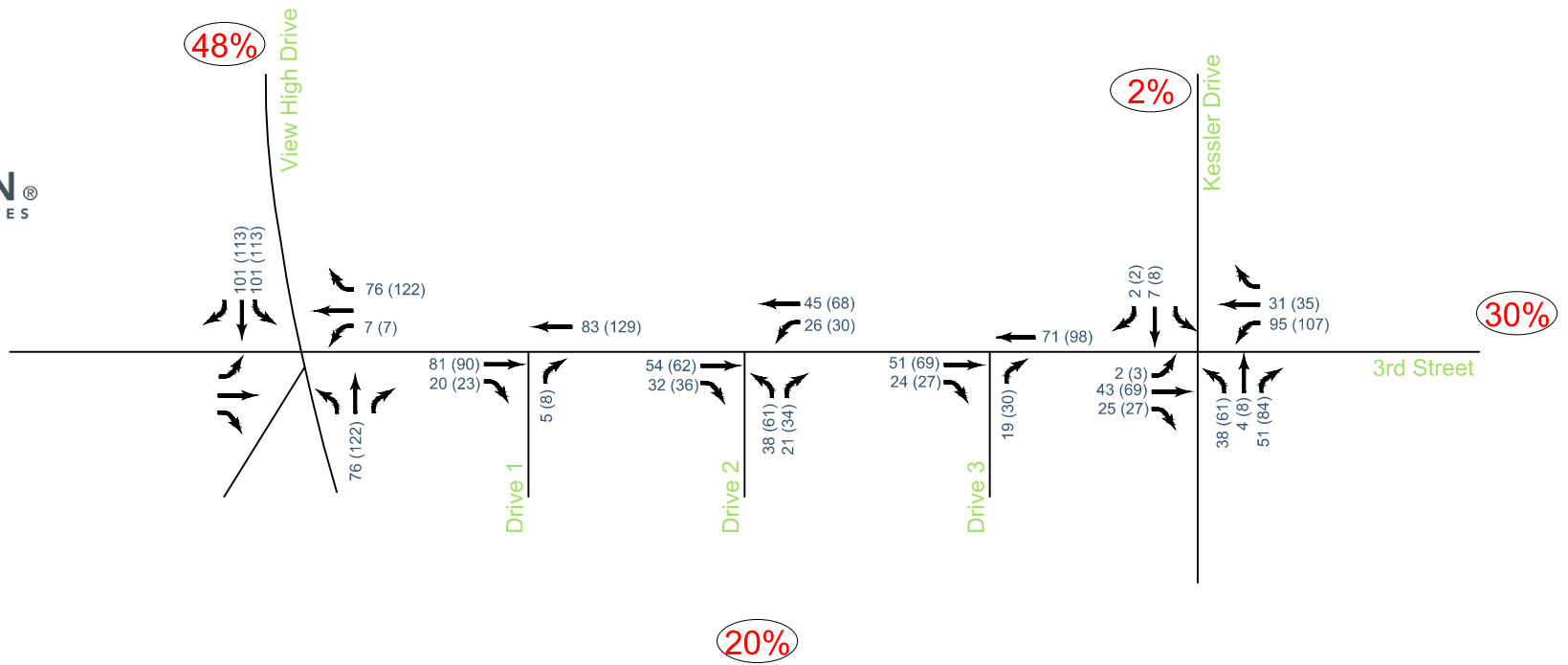
Land Use	Size
Multi-Family Housing	44 DU
Day Care Center	10,000 SF



FIGURE 2

Existing + Approved Preliminary Development Plan Trip Distribution

Kessler View
Lee's Summit, MO



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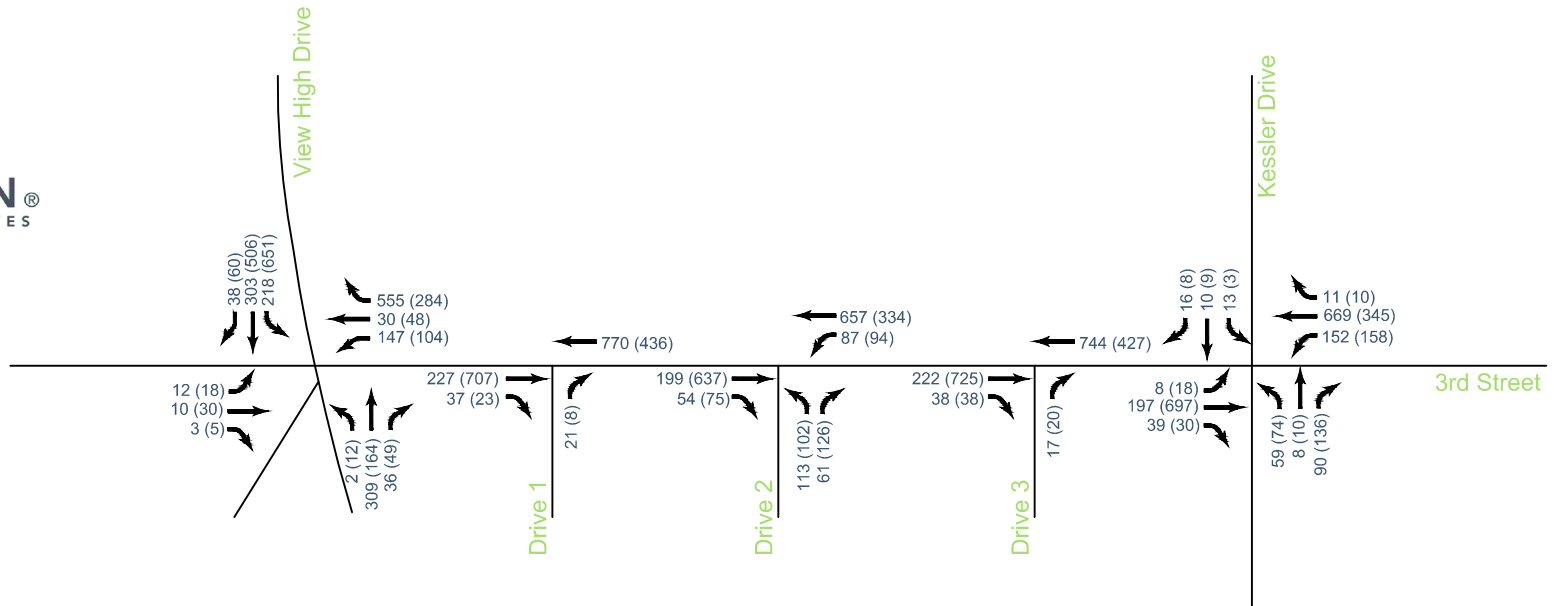
AM (PM) Peak Hour Trips

Trip Distribution Percentage

FIGURE 3

Existing + Approved Preliminary Development Plan Peak Hour Volumes

Kessler View
Lee's Summit, MO

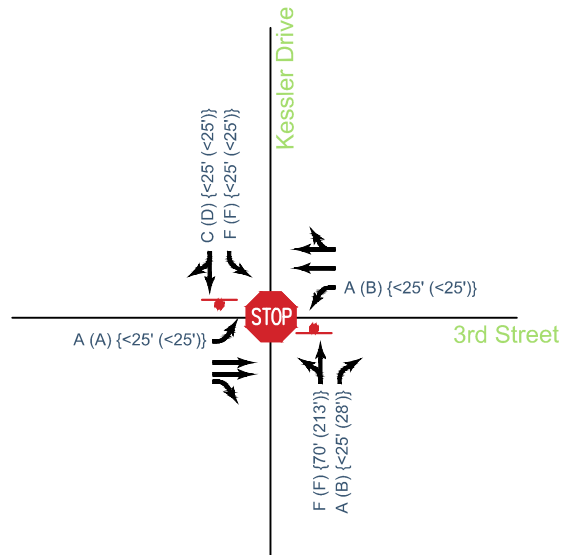


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AM (PM) Peak Hour Volume

FIGURE 4

Existing + Approved
 Preliminary Development Plan
 Level of Service
 Kessler View
 Lee's Summit, MO



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AM (PM) {AM (PM)} Movement LOS & {95th-percentile Queue}



Stop-controlled Intersection



Stop Sign



Lane Geometry

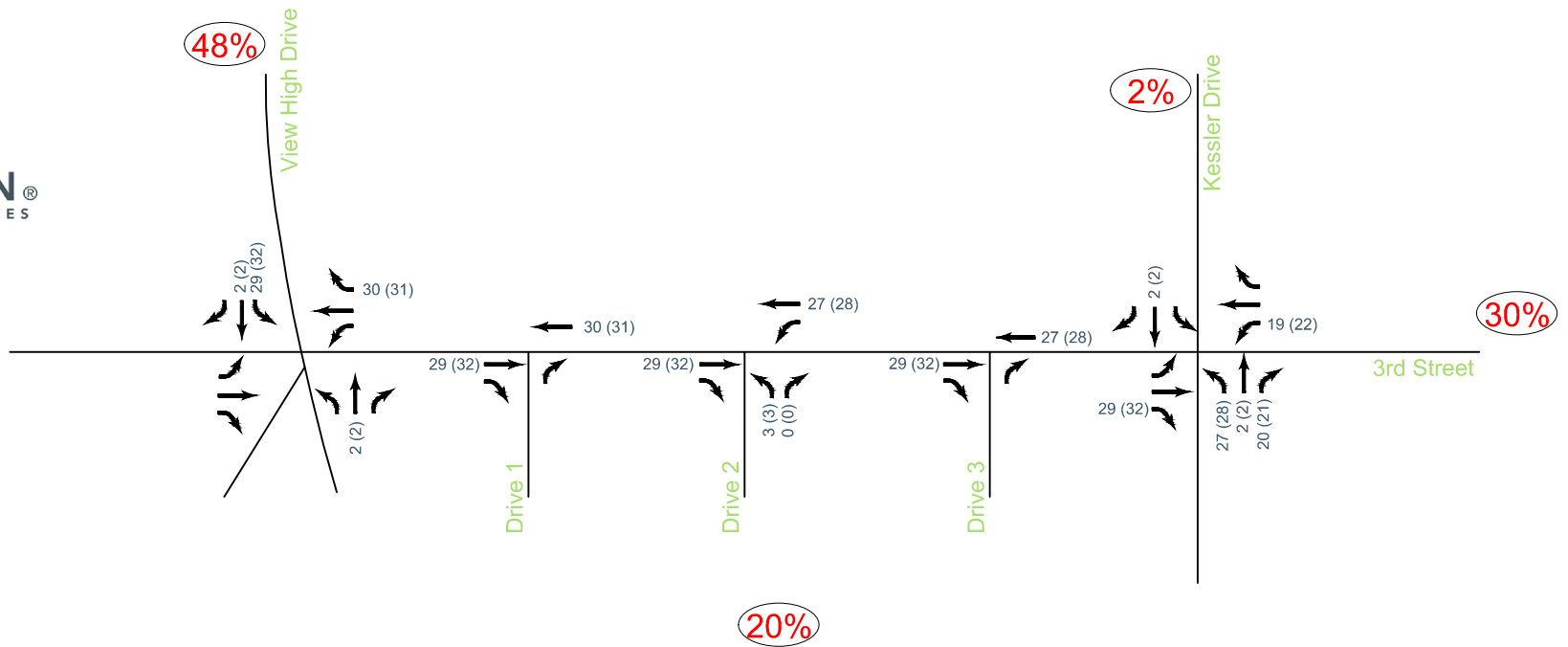
FIGURE 5

Preliminary Development Plan + Daycare & Apartments Trip Distribution

Kessler View
Lee's Summit, MO



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AM (PM) Peak Hour Trips

% Trip Distribution Percentage

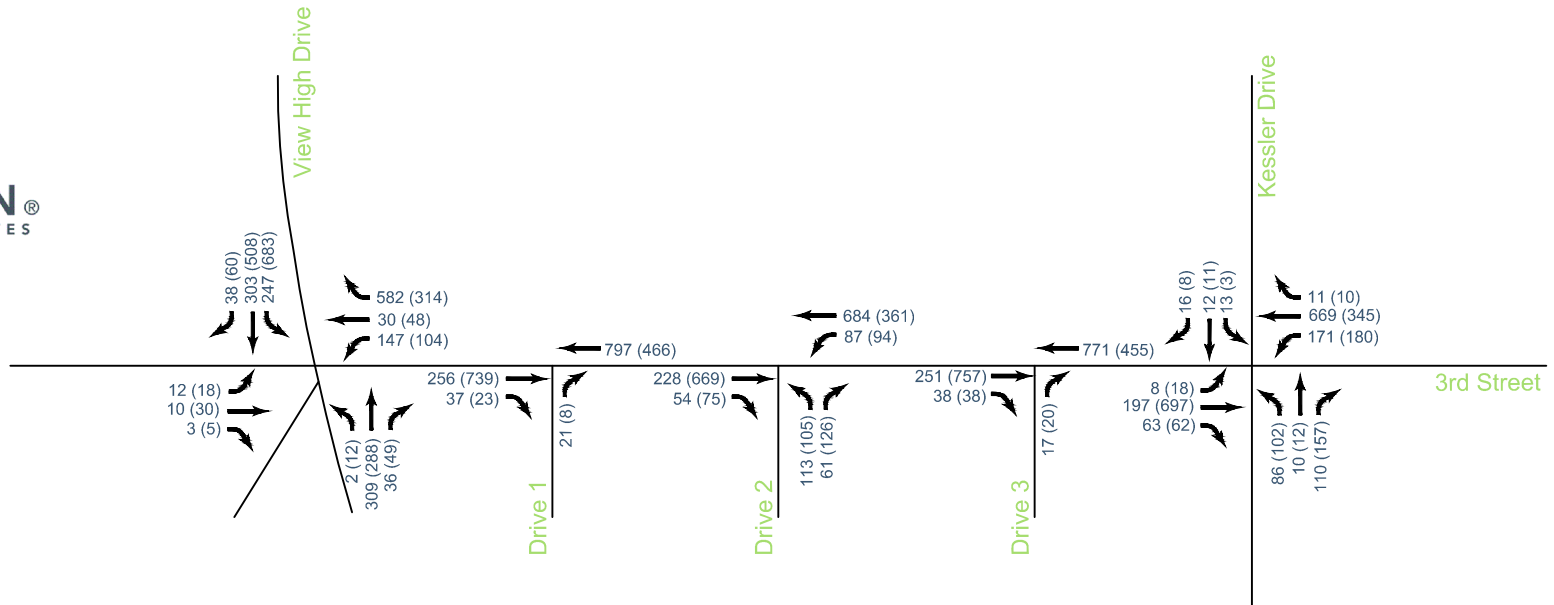
FIGURE 6

Existing + Approved
 Preliminary Development Plan
 + Daycare & Apartments
 Peak Hour Volumes

Kessler View
 Lee's Summit, MO



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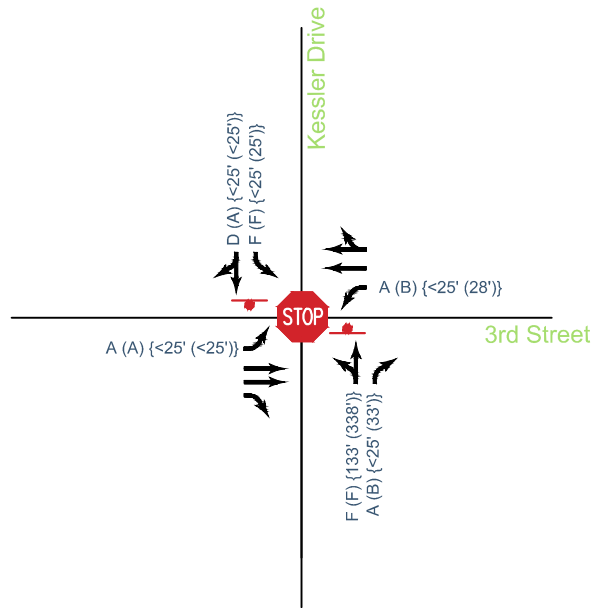
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AM (PM) Peak Hour Volume

FIGURE 7

Existing + Approved
Preliminary Development Plan
+ Daycare & Apartments
Level of Service

Kessler View
Lee's Summit, MO



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AM (PM) {AM (PM)} Movement LOS & {95th-percentile Queue}



Stop-controlled Intersection



Stop Sign



Lane Geometry