

TRAFFIC IMPACT STUDY

REDWOOD DEVELOPMENT

INDEPENDENCE,
MISSOURI

Prepared For:
Redwood Apartment Neighborhoods

Prepared By:
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March 10, 2022



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VOLUMES

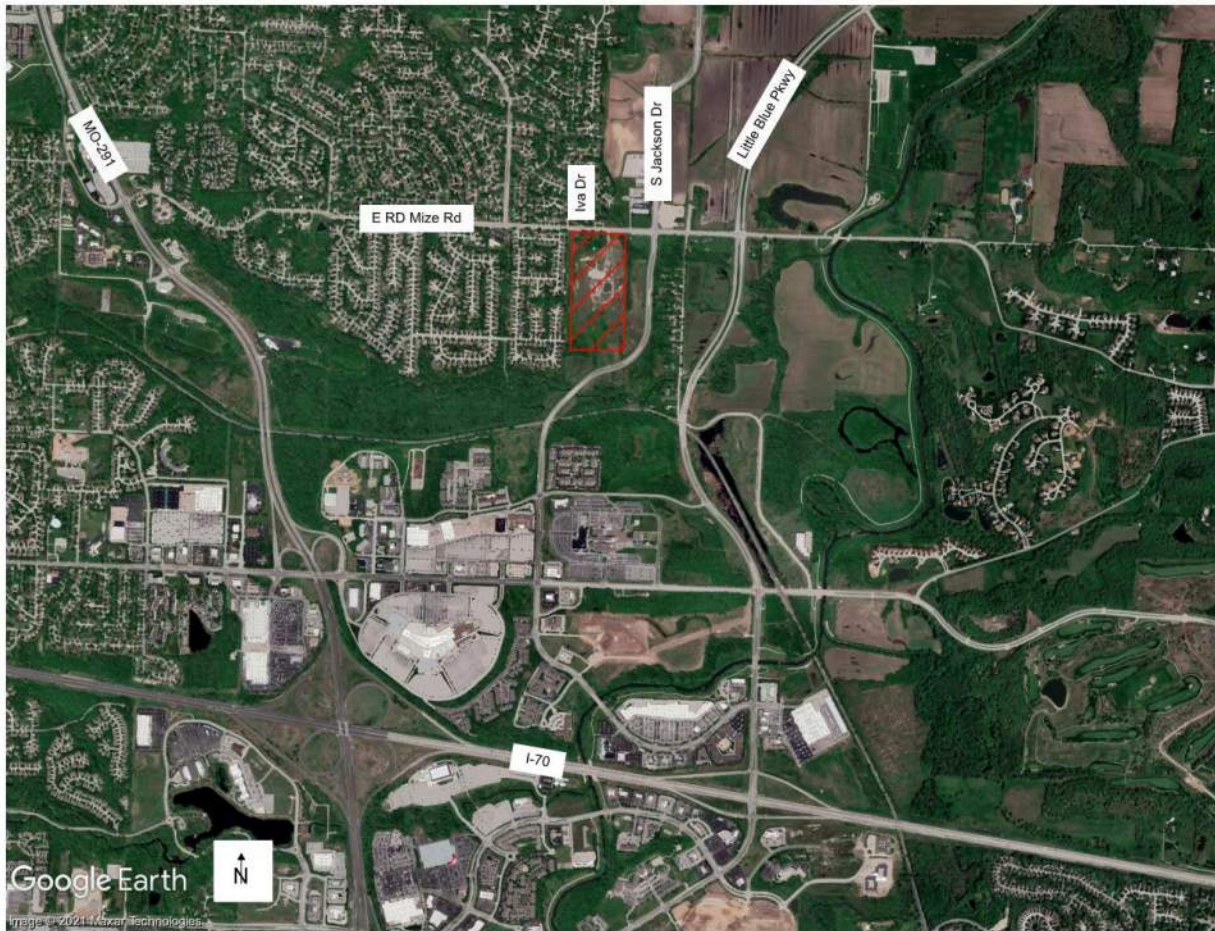
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INTRODUCTION

The proposed Redwood residential development is 182-unit, multi-family development consisting of 34 one-story buildings ranging from 4-6 units in each building. The proposed development is located in the southwest quadrant of the intersection of E RD Mize Road & S Jackson Drive in Independence, Missouri. The approximate location of the proposed development is shown in the Google Earth image below.



The existing property is vacant and is bordered to the north and west with single-family homes.

This study analyzes the traffic impacts on the surrounding roadway network for the *Existing*, *Existing + Site*, and *Future + Site* traffic-volume scenarios.

EXISTING CONDITIONS

Existing Traffic Volumes: Existing AM and PM peak-hour traffic volumes at the following intersections were via video camera during the hours of 7:00-9:00 AM and 4:00-6:00 PM on Wednesday, March 2, 2022:

- E RD Mize Road & S Jackson Drive
- E RD Mize Road & Iva Drive

The counts were processed by Miovision Technologies, Inc. and can be found in the Appendix. In general, the AM peak hour occurred from 7:15 – 8:15 AM, and the PM peak hour occurred from 4:15 – 5:15 PM. The existing AM and PM peak-hour volumes are shown on **Figure 1**.

Daily traffic counts were also recorded along E RD Mize Road, west of S Jackson Drive on Wednesday, March 2, 2022. The recorded average daily traffic (ADT) on E RD Mize Road was 4,894 vehicles per day (vpd): 2,322 vpd eastbound and 2,572 vpd westbound. These counts are also included in the Appendix.

Existing Roadway Network: Current roadway characteristics near the study area are summarized in **Table 1**.

Table 1: Existing Roadway Characteristics

Roadway	Classification	Section	Median Type	Posted Speed Limit
E RD Mize Road	Major Arterial	2-Lane	Two-Way Left-Turn Lane	35 mph
S Jackson Drive	Major Arterial	4-Lane	Median-Divided	40 mph
Iva Drive	Residential	2-Lane	Undivided	25 mph

*Classifications as listed in the City's Thoroughfare Plan

The intersection of E RD Mize Road & Iva Drive is currently stop-controlled on the minor side-street approach. The intersection of E RD Mize Road & S Jackson Drive is currently operating under traffic signal control.

PROPOSED CONDITIONS

Proposed Land Use: The proposed Redwood multi-family development includes 185 townhome units in 34 separate buildings. The site plan for the proposed development is shown on **Exhibit 1**.

Proposed Access Plan: The development will be served by two connections to E RD Mize Road. **Table 2** summarizes the access locations. Note: Distances are taken from the center of the intersection.

Table 2: Proposed Site Access

Access Name	Intersecting Roadway	Access Type	Access Location
Drive 1	E RD Mize Road	Full Access	Aligns with Iva Drive
Drive 2	E RD Mize Road	Full Access	Approx. 438' east of Iva Drive

Intersection Sight Distance: Intersection sight-distance measurements were taken in the field for the northbound approaches at the intersections of E RD Mize Road and the proposed driveways. Based on AASHTO's *A Policy on Geometric Design of Highways and Streets*, the amount of sight distance that is desirable for a 35-mph road is 390' for a left-turning vehicle (Case B1) and 335' for a right-turning vehicle (Case B2).

The results of the intersection sight distances recorded in the field are summarized below. It should be noted that if available sight distance was over the recommended value, a field measured value of ">distance" is recorded below. If the sight-distance requirements were not easily reached by simple observation, actual distances were recorded.

E RD Mize Road & Proposed Drive 1 (West Drive)

	<u>AASHTO Recommended</u>	<u>Field Measured</u>
Left-Turning Vehicle	390'	>390'
Right-Turning Vehicle	335'	>335'



E RD Mize Road & Proposed Drive 2 (East Drive)

	<u>AASHTO Recommended</u>	<u>Field Measured</u>
Left-Turning Vehicle	390'	>390'
Right-Turning Vehicle	335'	>335'



Trip Generation: The estimated trip generation for the proposed Redwood multi-family development was based upon site-specific data provided by the development team based on a trip-generation comparison study dated July 22, 2020, included in the Appendix. In addition, trip-generation estimates were calculated for comparison purposes utilizing the 11th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation Handbook* for Land Use 220-Multi-Family (Low-Rise) and Land Use 251-Senior Adult Housing (Single-Family). There will not be an age-restriction on this development, but similar sites have attracted an older demographic, and the trip generation is provided for comparison purposes only. **Table 3** depicts the trip generation for the site.

Table 3: Proposed Trip Generation

Land Use	Qty	Unit	ADT (VPD)	AM Peak Hour (VPH)			PM Peak Hour (VPH)		
				TOTAL	IN	OUT	TOTAL	IN	OUT
220 – Multifamily Housing (Low-Rise)	182	DU	1,242	79	19	60	99	62	37
251 – Senior Adult Housing (Single-Family)	182	DU	986	61	20	41	71	43	28
Redwood Site-Specific Rate AM=0.33 trips/DU, PM=0.48 trips/DU	182	DU	N/A	60	14	46	87	55	32

Trip Distribution: Estimates of the expected trip distribution to and from the Redwood multi-family development were based upon the available and planned street network and existing traffic flow. The trip-distribution patterns that were utilized are as follows:

AM Peak Hour

- To the north via S Jackson Drive 10%
- To the south via S Jackson Drive 15%
- To the east via E RD Mize Road 35%
- To the west via E RD Mize Road 40%
- From the north via S Jackson Drive 10%
- From the south via S Jackson Drive 5%
- From the east via E RD Mize Road 25%
- From the west via E RD Mize Road 60%

PM Peak Hour

- To the north via S Jackson Drive 5%
- To the south via S Jackson Drive 15%
- To the east via E RD Mize Road 30%
- To the west via E RD Mize Road 50%
- From the north via S Jackson Drive 10%
- From the south via S Jackson Drive 20%
- From the east via E RD Mize Road 30%
- From the west via E RD Mize Road 40%

Existing + Site Traffic Volumes: The expected Redwood development-related traffic volumes were added to the existing volumes and were assigned to the existing and planned street system. The *Existing + Site* AM and PM peak-hour volumes are shown on **Figures 2 & 3**, respectively.

Future + Site Traffic Volumes: Historical ADT traffic volumes from the years 2002-2020 as shown on MoDOT’s Traffic Volume Maps for E RD Mize Road were analyzed to determine an appropriate growth rate for a future 20-year design volume, omitting the year 2020 due to COVID. In addition, ADT volumes from the years 2011-2020 were analyzed along S Jackson Drive. These calculated growth rates are included in the Appendix. The results indicated a generally negative growth rate for E RD Mize Road and an annual growth rate of about 5% for S Jackson Drive. There is room for future development along S Jackson Drive and to the east of the proposed site. Therefore, a 1.0% annual growth rate for 20 years was utilized for the through volumes along E RD Mize Road, and a 5.0% annual growth rate was assumed for the S Jackson through movement and turning movements to the east. As the existing northbound to eastbound right-turn movement and the westbound to southbound left-turn movement at the intersection of E RD Mize Road & S Jackson Drive are low today, these turning movement volumes were adjusted up from the growth calculations to account for future development east of S Jackson Drive. The site-generated traffic volumes from Redwood multi-family development were added to these background future traffic volumes to develop the *Future + Site* AM and PM peak-hour traffic volumes and are shown **Figures 4 & 5**, respectively.

ANALYSES

A series of intersection capacity analyses were completed at the study intersections to determine the expected levels of service, the lengths of delays, and the vehicle queues experienced by drivers. The study intersections were analyzed based upon the 6th Edition of the Transportation Research Board's (TRB) *Highway Capacity Manual*. A description of the level-of-service criteria used in these analyses is shown below:

Level of Service Definitions		
Level of Service	Signalized Intersection Average Control Delay (sec/veh)	Unsignalized Intersection Average Control Delay (sec/veh)
A	<10	<10
B	<20	<15
C	<35	<25
D	<55	<35
E	<80	<50
F	≥80	≥50

The amount of control delay is assigned a level of service based on driver acceptance with LOS "A" representing little or no delay and LOS "F" representing long delays. The queues shown on the figures represent the 95th percentile queue, or the queue that has only a 5% chance of being exceeded during the peak hour. All capacity analysis output is included in the Appendix attached to this report. It should be noted that all completed analyses utilized the Synchro 11 software package.

Existing Traffic Conditions: Figures 6 & 7 depict the results of the completed analyses for the existing AM and PM peak-hour traffic volume scenarios. As shown on the figures, all individual movements at the study intersections currently operate at LOS "C" or better with minimal queuing.

Existing + Site Traffic Conditions: As shown on Figures 8 & 9, all individual movements at the study intersections would be expected to operate at LOS "C" or better with minimal queuing with the addition of the Redwood multi-family development.

Turn Lane Warrants

Right-turn lane warrants were analyzed in conjunction with MoDOT's *Access Management Guidelines* for the proposed driveway intersections and can be found in the Appendix. As there is a two-way left-turn lane along E RD Mize Road, left-turn lanes would be provided by default into both site driveways. No right-turn lanes would be warranted for the *Existing + Site* traffic volume scenario.

Future + Site Traffic Conditions: The results of the capacity analysis for the *Future + Site* traffic volume scenario are shown on **Figures 10 & 11**. As shown on the figures, all individual movements at the study intersections would be expected to operate at LOS “C” or better during the *Future + Site* volume scenario. It should be noted that the southbound left-turn movement at the intersection of E RD Mize Road & S Jackson Drive could experience a long queue of over 300’ should the volumes develop as projected. This would exceed the 190’ of storage currently available and may require dual southbound left-turn lanes in the future.

Turn Lane Warrants

Right-turn-lane warrants were analyzed in conjunction with MoDOT’s *Access Management Guidelines* and can be found in the Appendix. No right-turn lanes would be warranted at the site driveways with future volumes.

SUMMARY & RECOMMENDATIONS

This traffic study summarizes the anticipated traffic impacts of the proposed Redwood multi-family development.

Right-turn lane warrants at the driveway intersections were analyzed in conjunction with MoDOT’s *Access Management Guidelines*, and no right-turn lanes would be warranted at either site driveway. As there is a two-way left-turn lane along E RD Mize Road, left-turn lanes will be provided at the site driveways by default.

In general, acceptable traffic operations can be expected in and around the proposed development with the addition of the Redwood multi-family development. The development traffic will have minimal impact on the traffic operations in the study area. No improvements would be required.

If traffic volumes develop as projected over the next 20-years, the southbound movement at the intersection of E RD Mize Road & S Jackson Drive could experience a queue of over 300’ during the PM peak hour, and dual southbound left-turn lanes may be needed. It should be noted that the Redwood development does not contribute to this movement, but is due to the projected future development to the east of S Jackson Drive.

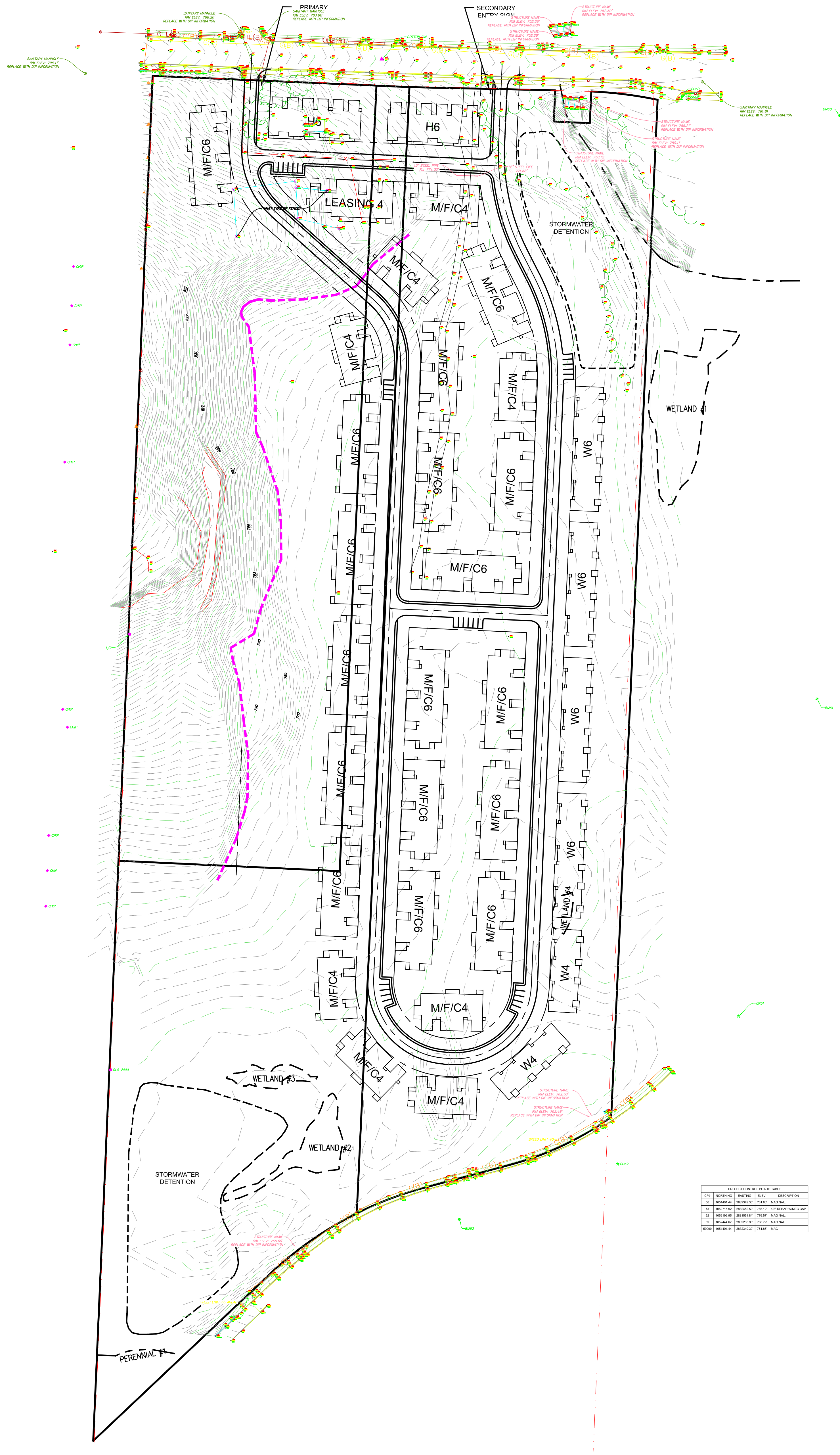
We appreciate the opportunity to serve you on this very important project. Please feel free to contact us if you should have any questions.

Respectfully submitted,
Merge Midwest Engineering, LLC



Janelle M. Clayton, P.E., PTOE
Manager / Co-Owner

EXHIBIT 1

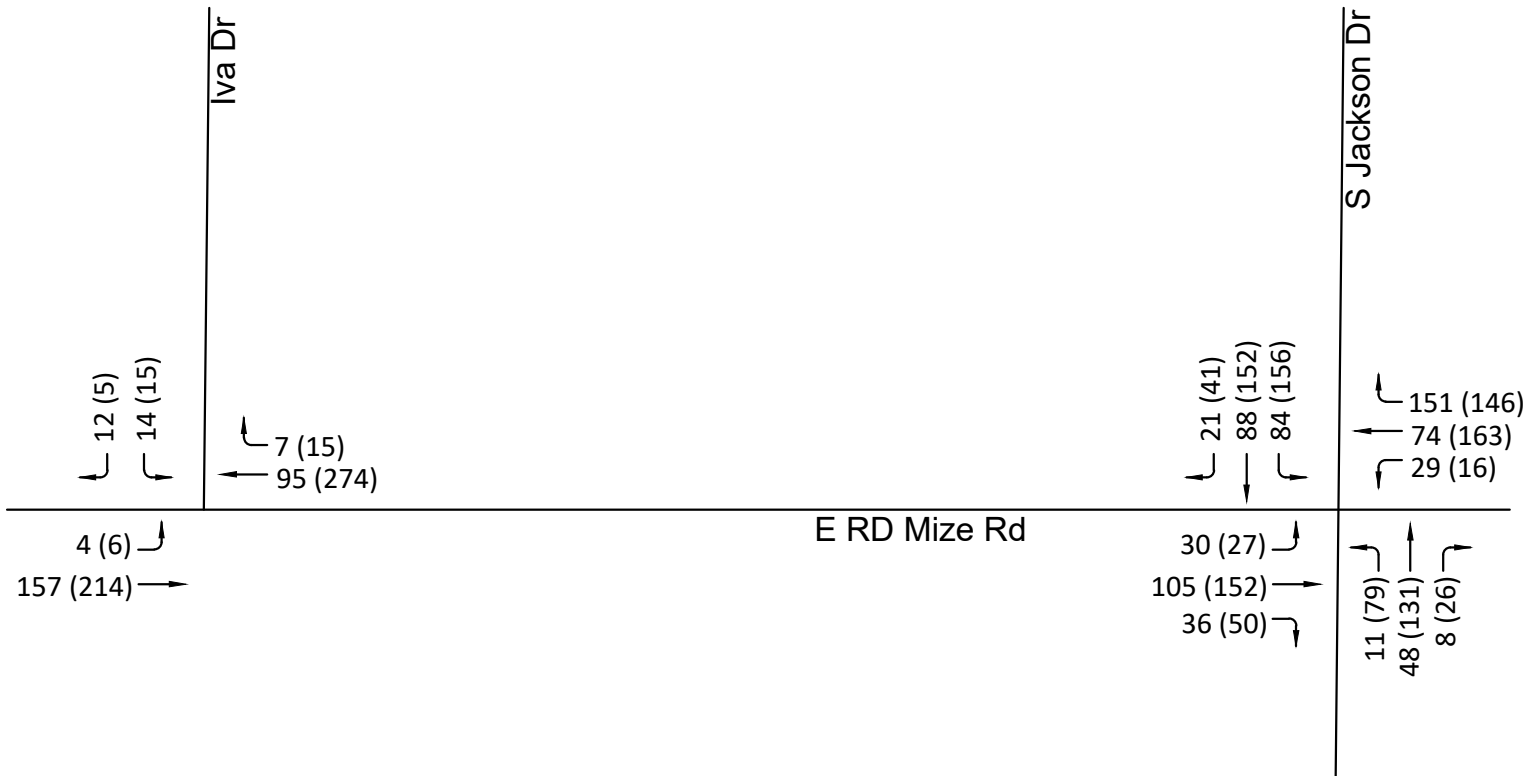


W6 = 4 x 6 = 24 Units
 W4 = 2 x 4 = 8 Units
 M/F/C6 = 17 x 6 = 102 Units
 M/F/C4 = 8 x 4 = 32 Units
 H6 = 2 x 6 = 12 Units
 Leasing 4 = 1 x 4 = 4 Units

 Total units = 182 Units

PROJECT CONTROL POINTS TABLE				
CP#	COORDINATE	ELEVATION	DESCRIPTION	
01	103441.47	2822.00	701.88	ROAD MARK
02	103273.02	2824.00	701.88	SP. REBAR IN CONC. CAP
03	103244.00	2811.00	701.88	ROAD MARK
04	103444.00	2822.00	701.88	ROAD MARK
05000	103441.47	2822.00	701.88	ROAD

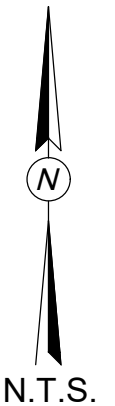
REDWOOD DEVELOPMENT
 INDEPENDENCE, MISSOURI
 CONCEPT PLAN
 1"=100'
 DATE 11-30-21
 REVISED 1-03-22
 REVISED 2-03-22
 MCCLURE



LEGEND

500 (500) — PM Peak Hour Volume (vph)

500 (500) — AM Peak Hour Volume (vph)

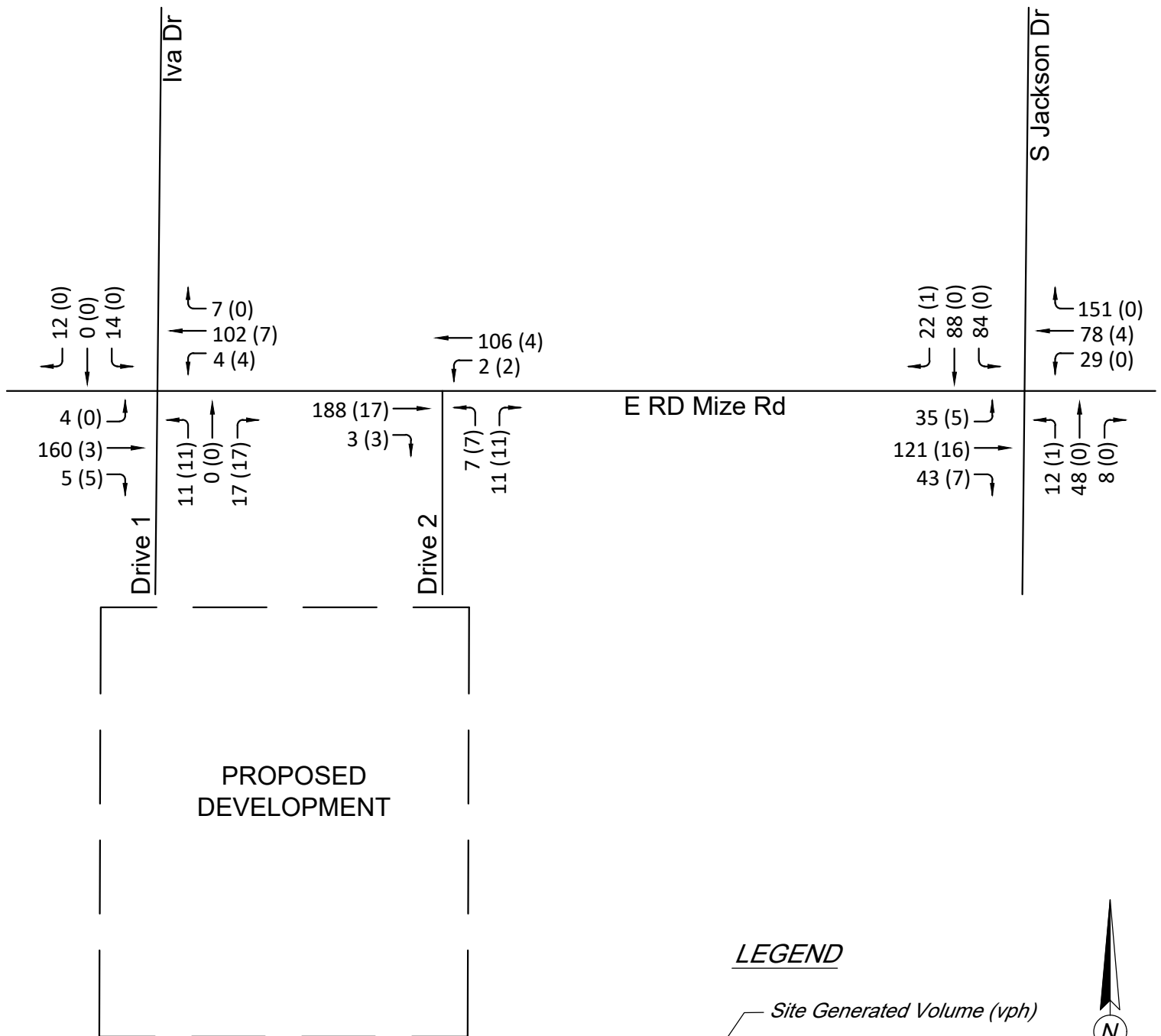


PROJECT NUMBER
22015

DATE
MARCH 2022

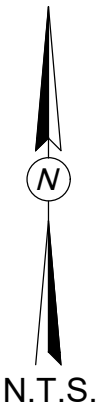
EXISTING
TRAFFIC VOLUMES
AM & PM PEAK HOUR

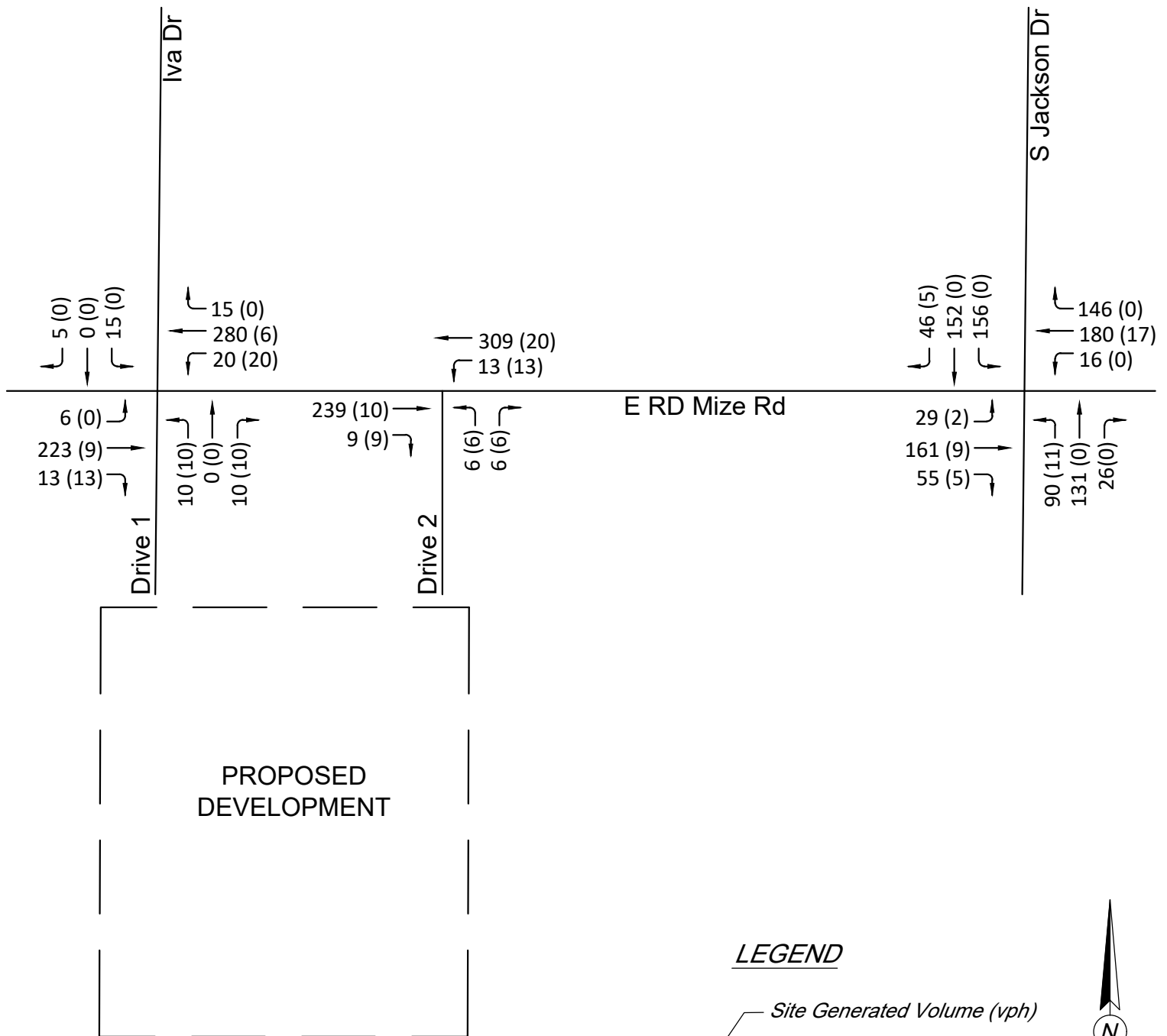
FIGURE 1



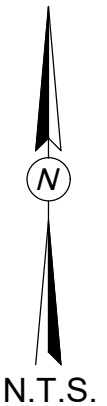
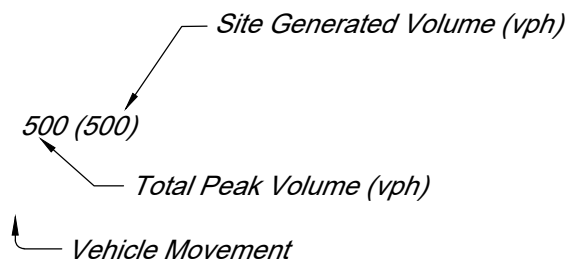
LEGEND

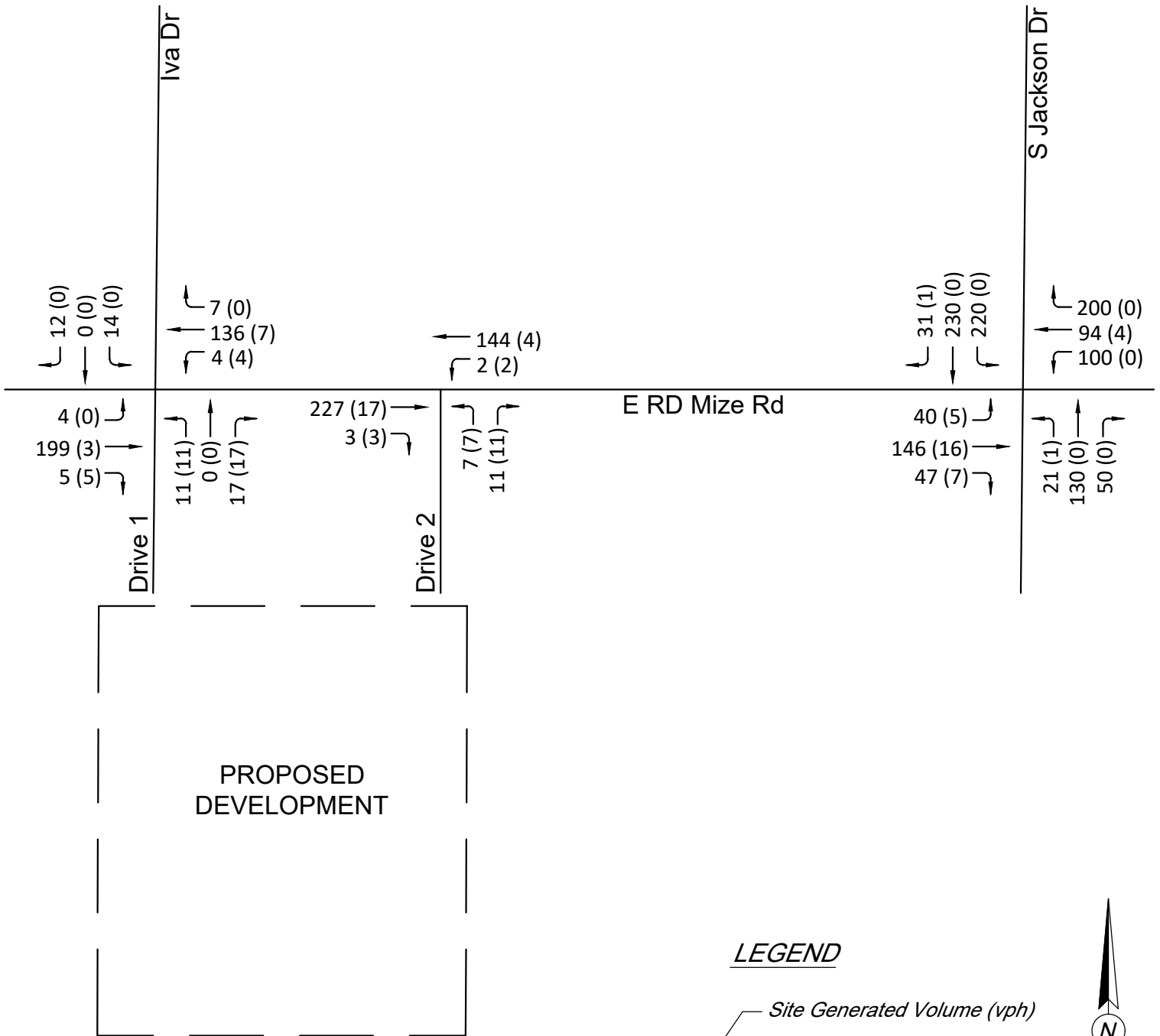
- Site Generated Volume (vph)
- 500 (500) — Total Peak Volume (vph)
- Vehicle Movement





LEGEND



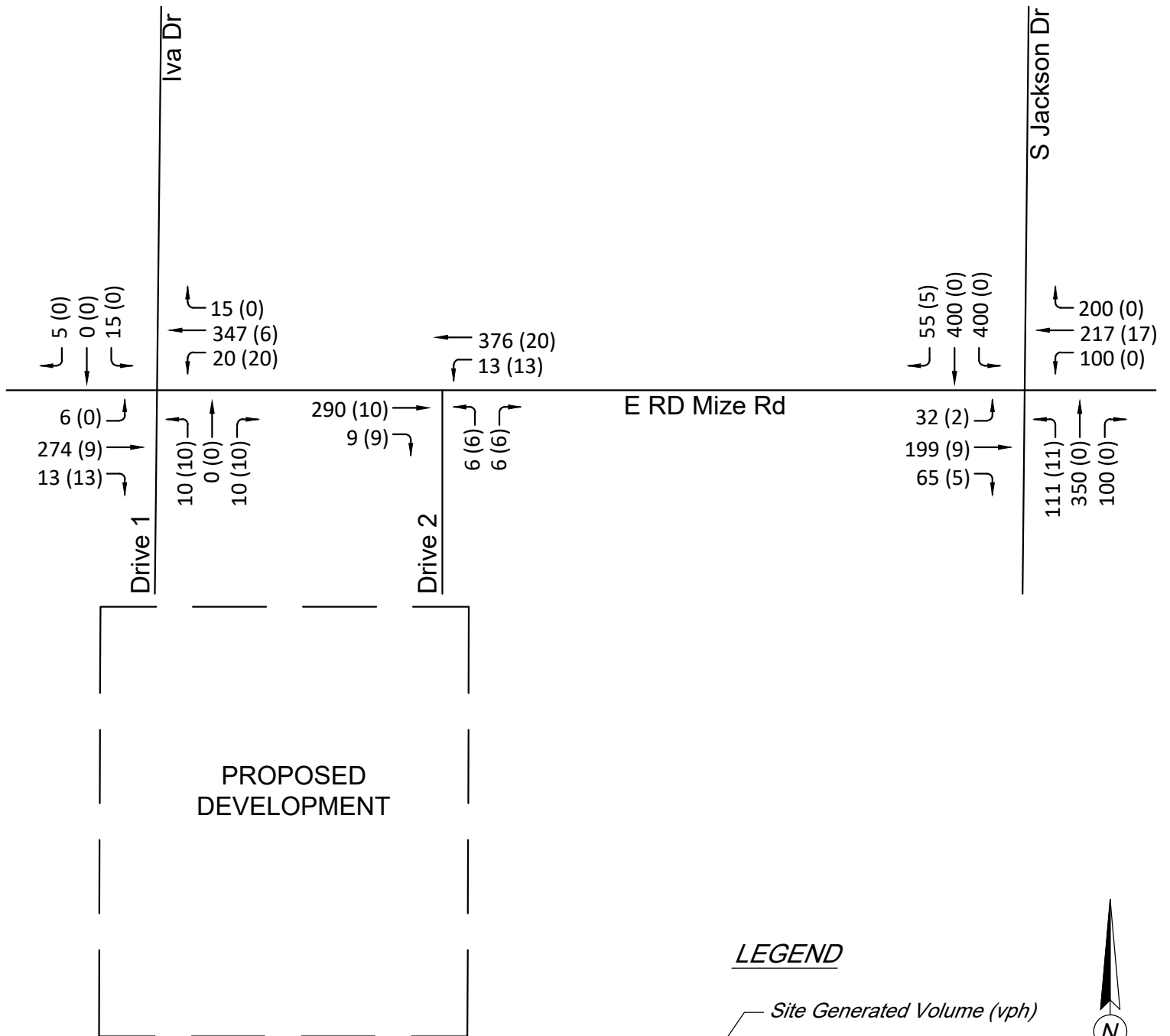


PROJECT NUMBER
22015

DATE
MARCH 2022

FUTURE + SITE
TRAFFIC VOLUMES
AM PEAK HOUR

FIGURE 4



LEGEND

- Site Generated Volume (vph)
- 500 (500) — Total Peak Volume (vph)
- Vehicle Movement



N.T.S.

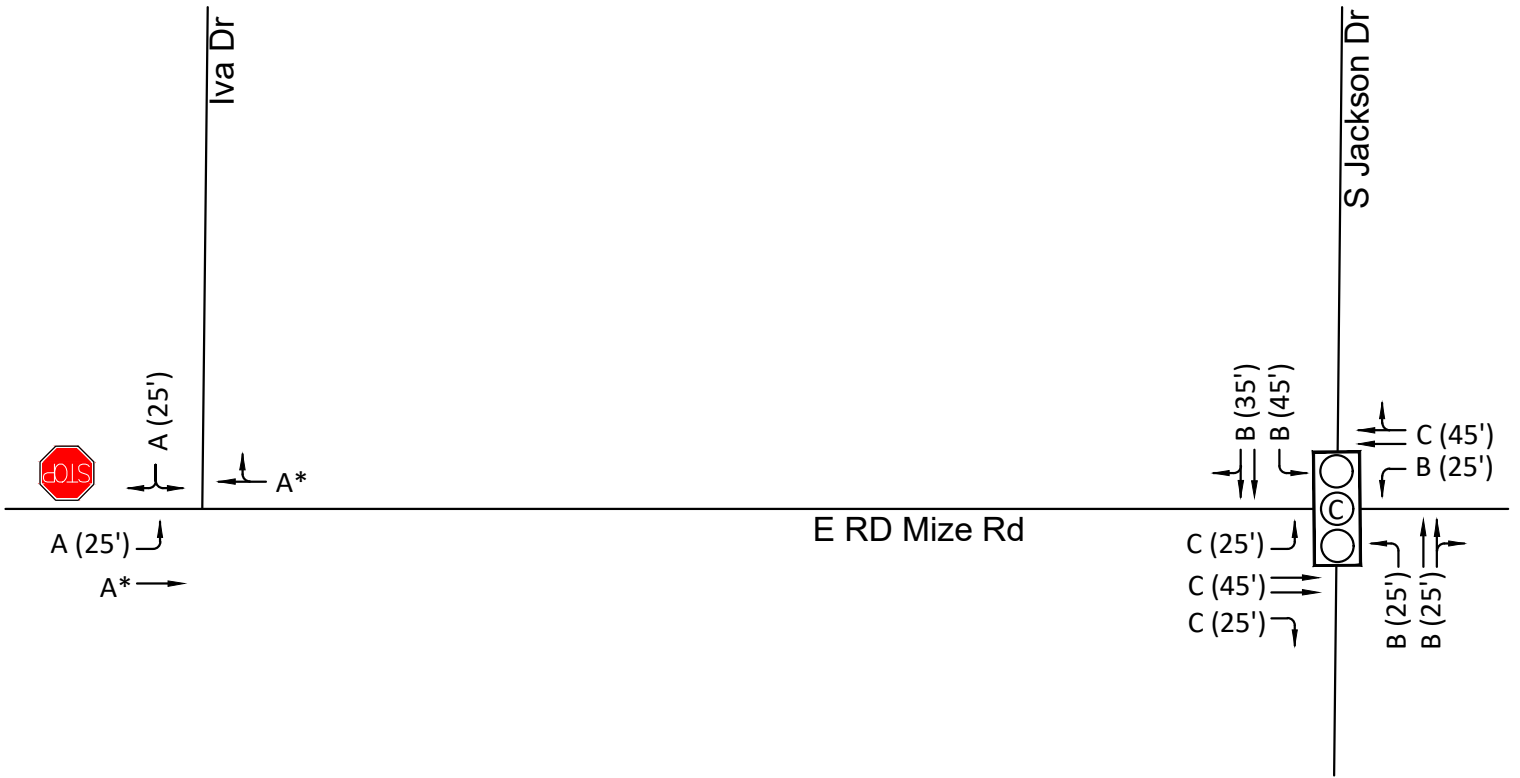


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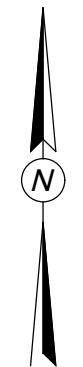
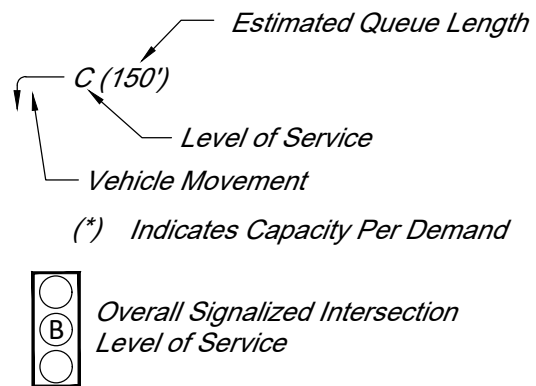
DATE
MARCH 2022

FUTURE + SITE
TRAFFIC VOLUMES
PM PEAK HOUR

FIGURE 5



LEGEND



N.T.S.

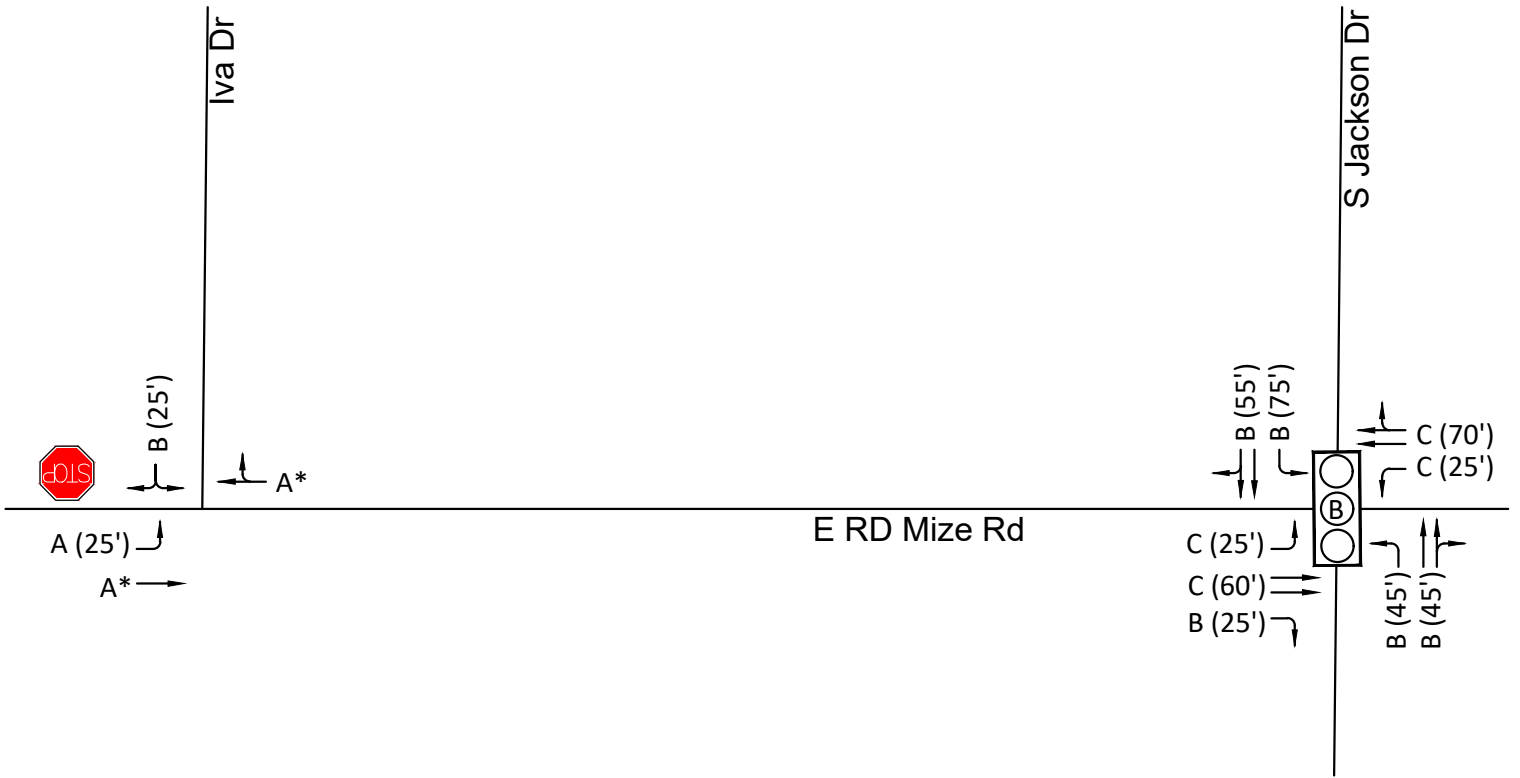


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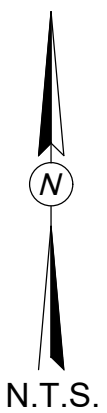
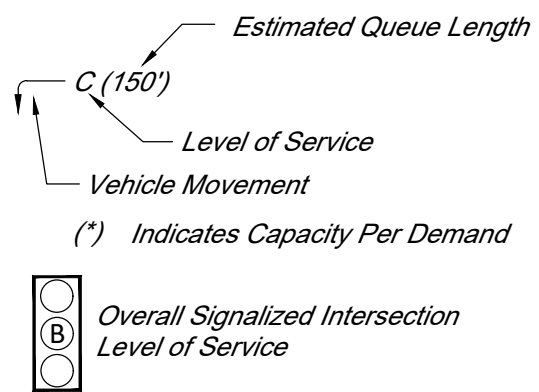
DATE
MARCH 2022

EXISTING
LEVELS OF SERVICE
AM PEAK HOUR

FIGURE 6



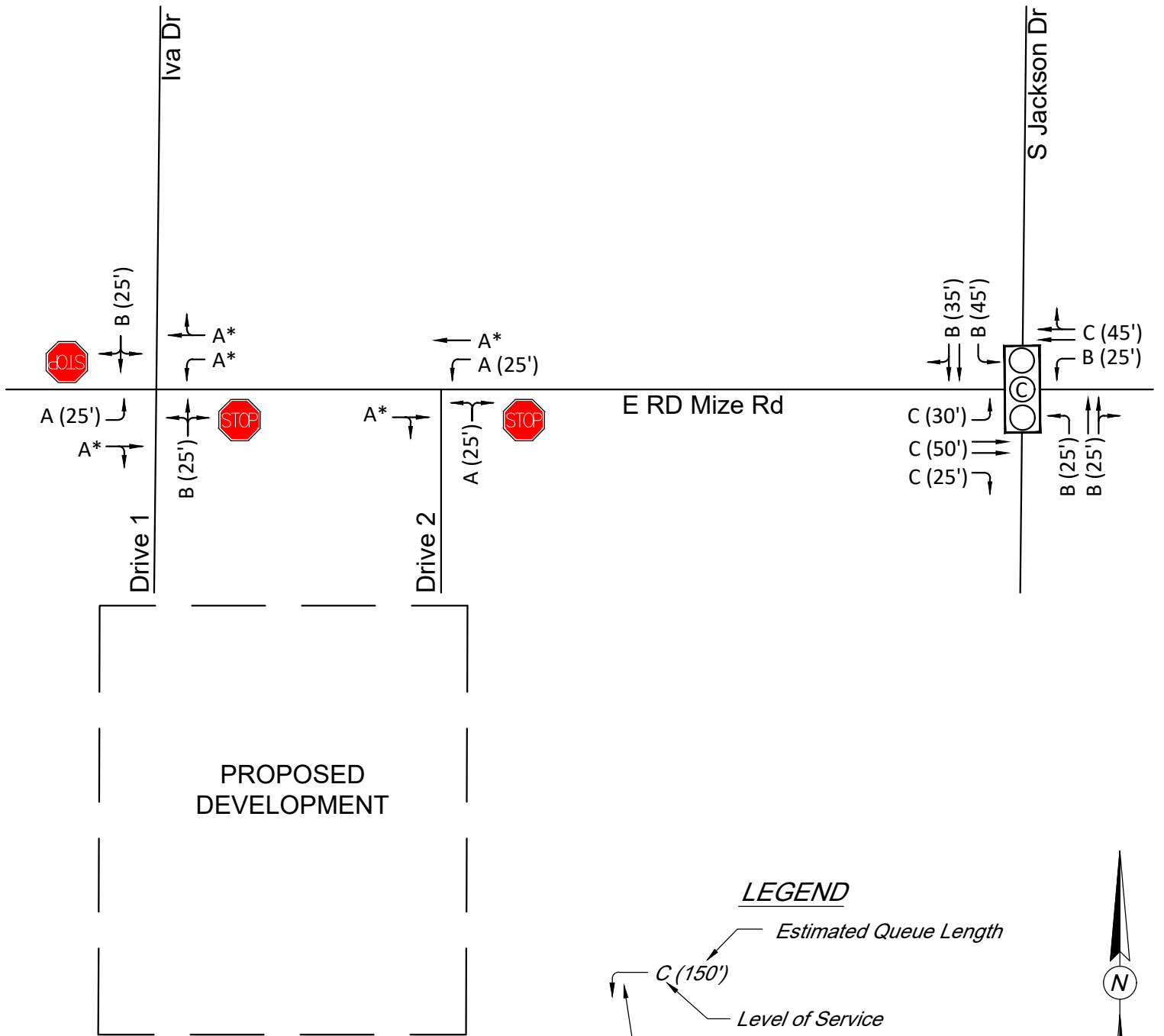
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PROJECT NUMBER
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DATE
MARCH 2022

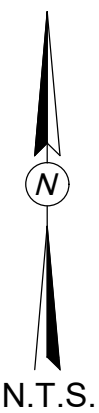
EXISTING
LEVELS OF SERVICE
PM PEAK HOUR

FIGURE 7



LEGEND

- Estimated Queue Length
- Level of Service
- Vehicle Movement
- (*) Indicates Capacity Per Demand

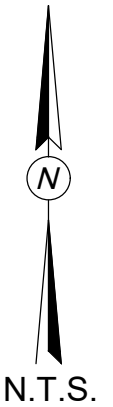
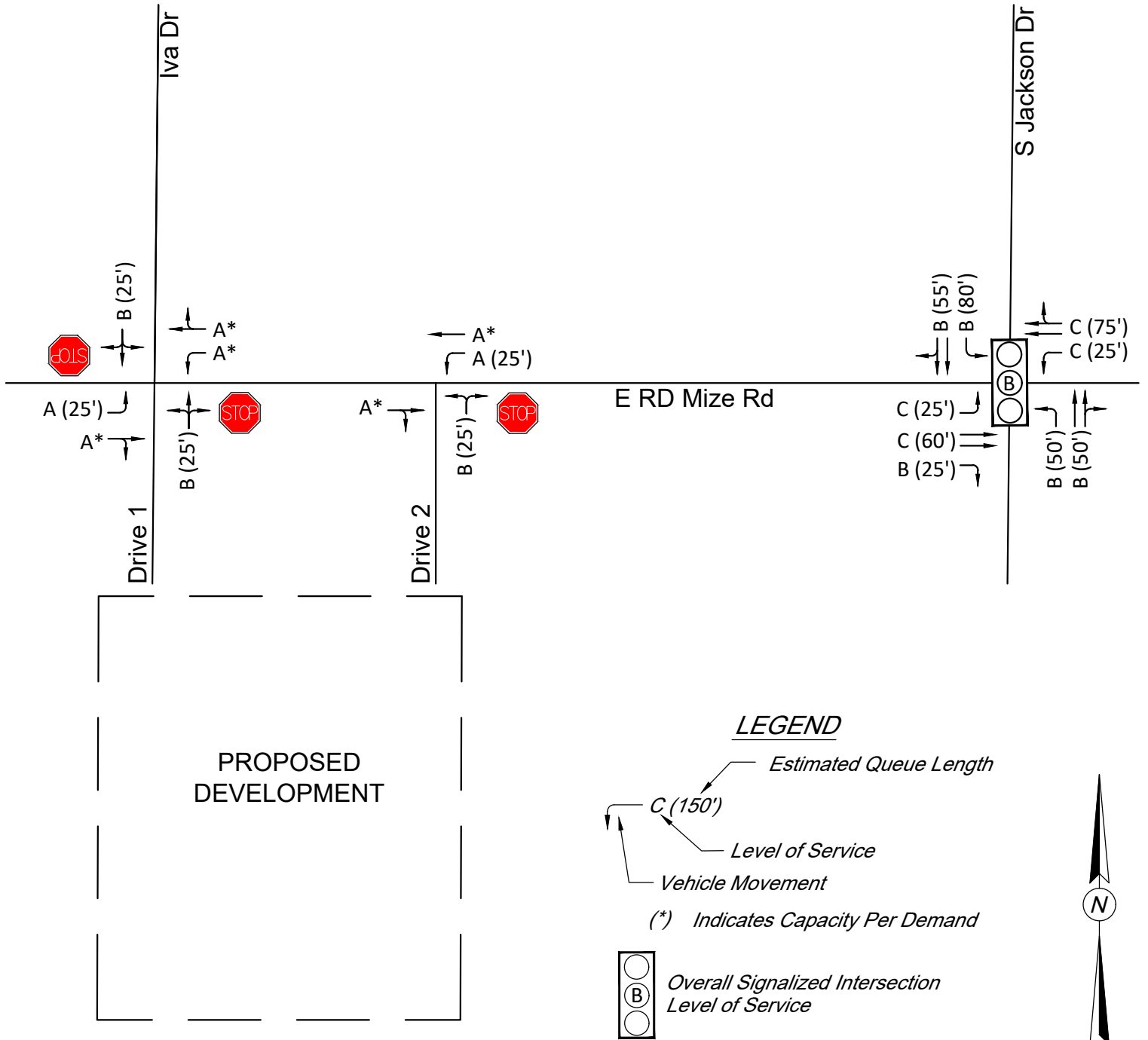


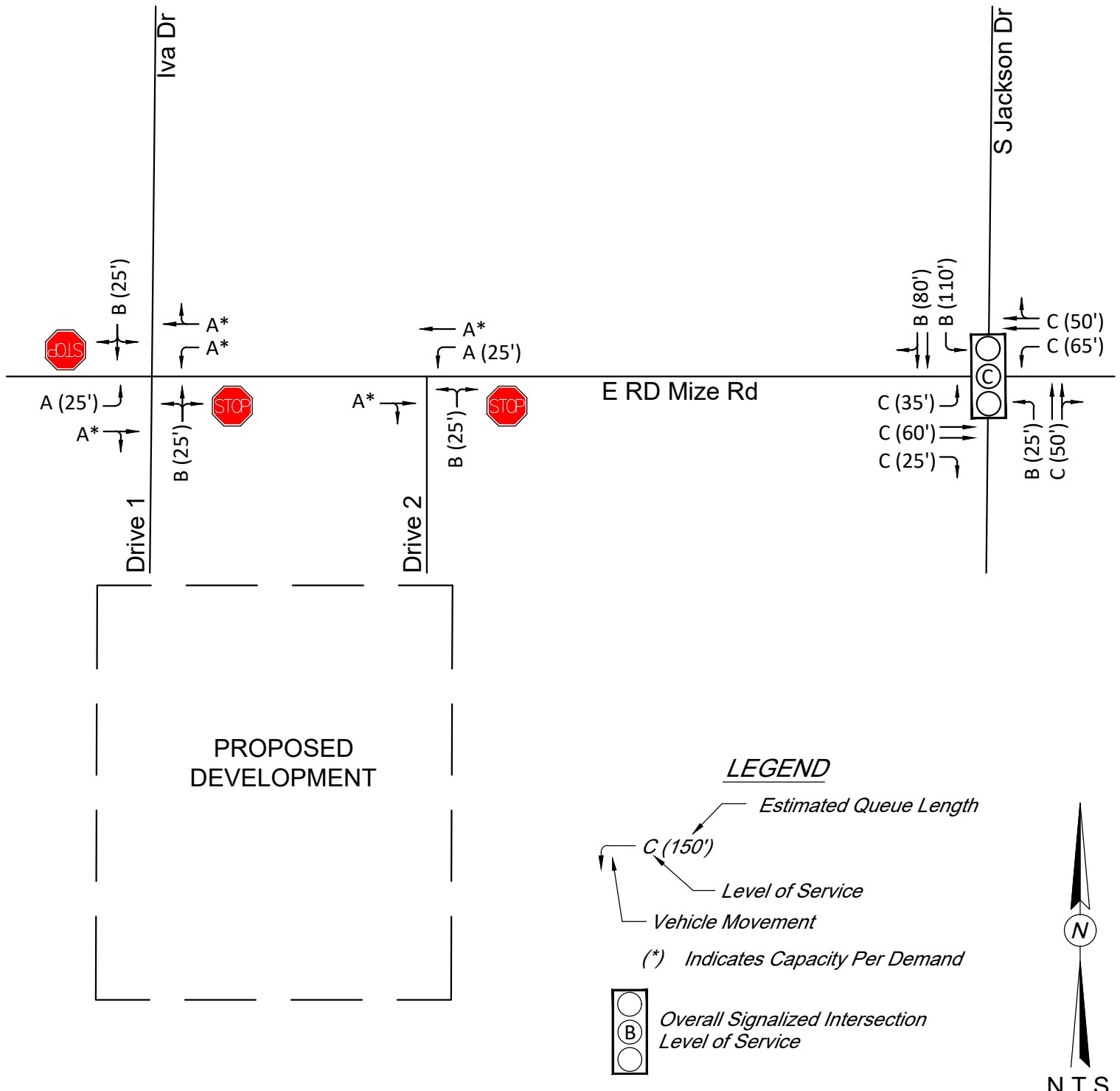
PROJECT NUMBER
22015

DATE
MARCH 2022

EXISTING + SITE
LEVELS OF SERVICE
AM PEAK HOUR

FIGURE 8





PROJECT NUMBER
22015

DATE
MARCH 2022

FUTURE + SITE
LEVELS OF SERVICE
AM PEAK HOUR

FIGURE 10

