APPENDIX C – TRAFFIC STUDY

DRAFT Memorandum

SRF No. 13146.00

To: Steve Lillehaug, PE, PTOE, Public Works Director/City Engineer
City of Shakopee

From: Brent Clark, PE, Senior Engineer
Matt Pacyna, PE, Principal

Date: December 18, 2019

Subject: Summerland Place Development EAW Transportation Analysis

Introduction

SRF has completed a traffic study for the proposed Summerland Place Development in the City of Shakopee. The development is generally bounded by Eagle Creek Boulevard/US 169 to the north, County Road 83 (CR 83) to the east, CR 16 to the south, and Balinese Street to the west (Figure 1: Project Location). The main objectives of the study are to evaluate the existing operations within the study area, identify any transportation impacts associated with the proposed development and transportation network changes, and recommend improvements to address any issues, if necessary. The following information provides the assumptions, analysis, and study recommendations offered for consideration.

Previous Area Studies

Development and transportation within the project area have been discussed and evaluated over the past few years. The following studies have been conducted since 2018 that have reviewed various intersections and/or roadway segments within the study area.

1) *Canterbury Commons Areawide Transportation Assessment* - July 2018
2) *Canterbury Commons Areawide Transportation Assessment, Southwest Area Addendum* - February 2019

The *Canterbury Commons Areawide Transportation Assessment* provided a comprehensive review of the area north of Mn Highway 169, as well as segments along CR 83 that overlap with the *Summerland Place Development EAW Transportation Analysis*. The goal of the previous study was to understand how the overall transportation system is expected to function as area improvements and development (i.e. the Canterbury Commons development) occurs. The assessment evaluated year 2025 and 2040 conditions, and identified several improvements, most of which have been incorporated into the City of Shakopee and Scott County capital improvement plans. The *Southwest Area Addendum* was a refinement to the original *Canterbury Commons Areawide Transportation Assessment* due to updated land use assumptions in the southwest area of the proposed development. Thus, information from each of these studies was leveraged to aide in the development of the *Summerland Place Development EAW Transportation Analysis*.

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Project Location

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Figure 1

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Existing Conditions

Existing conditions were reviewed to establish a baseline condition to compare and determine any future impacts. The evaluation of existing conditions includes various data collection efforts including traffic volumes, roadway characteristics, and an intersection capacity analysis, which are summarized in the following sections.

Traffic Volumes

Weekday a.m. and p.m. peak period vehicular turning movement and pedestrian/bicyclist counts were collected at the following external study intersections on Wednesday, October 9, 2019:

- Eagle Creek Boulevard/Tyrone Drive
- Eagle Creek Boulevard/County Road 83
- County Road 16/County Road 83
- County Road 16/Sarazin Street
- County Road 16/Britany Drive
- County Road 16/England Way
- County Road 16/Independence Drive
- County Road 16/Philipp Drive

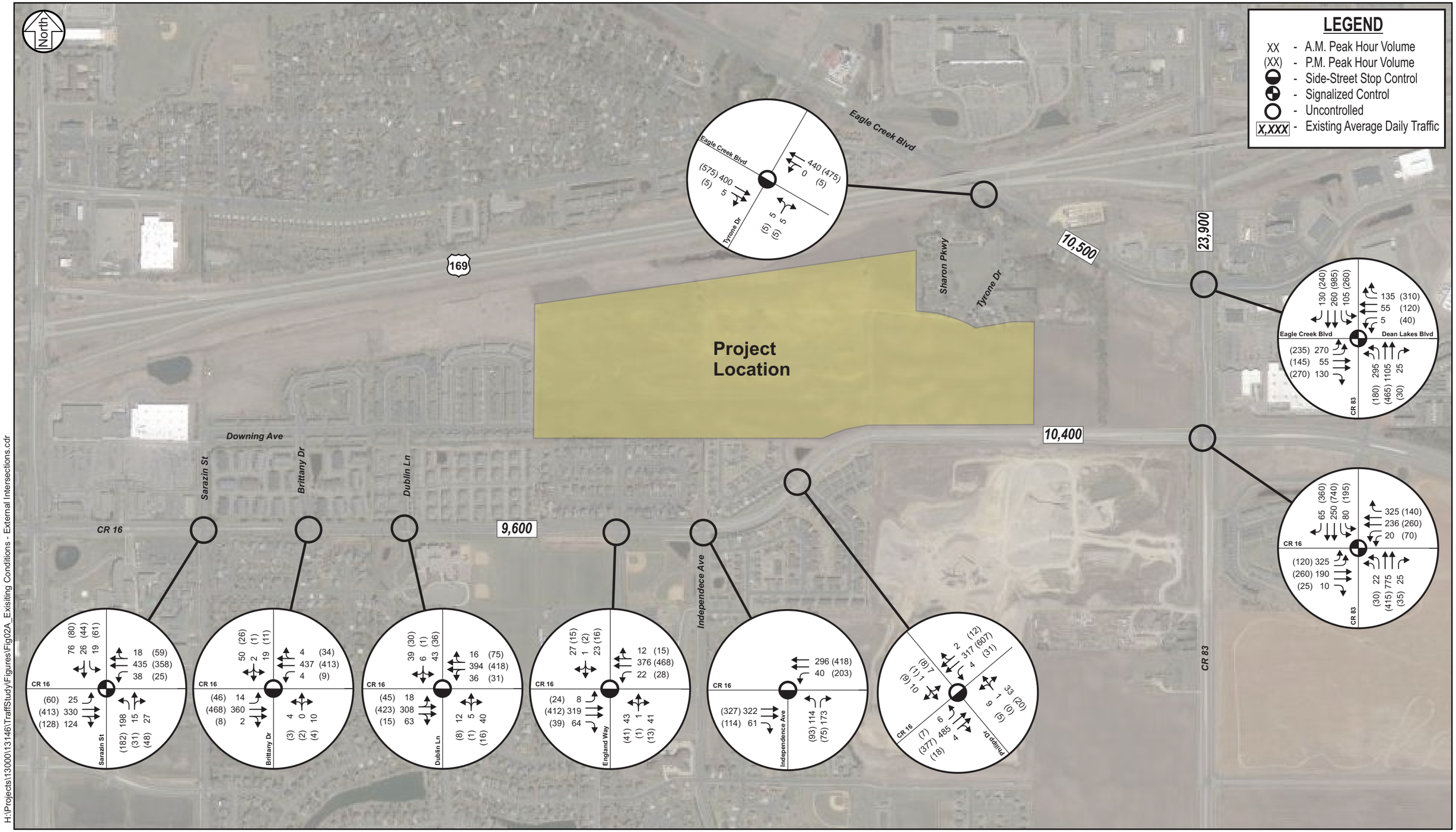
In addition, short-duration (i.e. 15 minute) counts were collected at the following internal neighborhood study intersections the week of October 7, 2019 during typical weekday peak hour conditions (i.e. a Tuesday, Wednesday, or Thursday). These short-duration counts were modified to reflect peak hour volumes based on the peak hour turning movement counts at the external study intersections.

- Downing Avenue/Sarazin Street
- Downing Avenue/Britany Drive
- Downing Avenue/Dublin Lane
- Britany Drive/Mockingbird Avenue
- Dublin Lane/Dublin Trail
- England Way/King Avenue (North)
- England Way/King Avenue (South)
- Philipp Drive/Philipp Way
- Tyrone Drive/Sharon Parkway (North)
- Tyrone Drive/Sharon Parkway (South)

Note that average daily traffic volumes within the area were provided by MnDOT and/or estimated based on the data collected as part of this study.

Roadway Characteristics

A field assessment was completed to identify various roadway characteristics within the transportation system study area, such as functional classification, general configuration, and posted speed limits. A summary of these roadway characteristics is shown in Table 1. In addition to the general roadway characteristics, there are varying types of traffic controls within the transportation system study area. The CR 83/Eagle Creek Blvd, CR 83/CR 16, and CR 16/Sarazin Street intersections are signalized, while the remaining study intersections are either unsignalized with side-street stop control or uncontrolled. Existing geometrics, traffic controls, and volumes are shown in Figure 2A and 2B. Figure 2A represents the external study intersections, while Figure 2B represents the internal neighborhood study intersections.



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Existing Conditions - External Intersections

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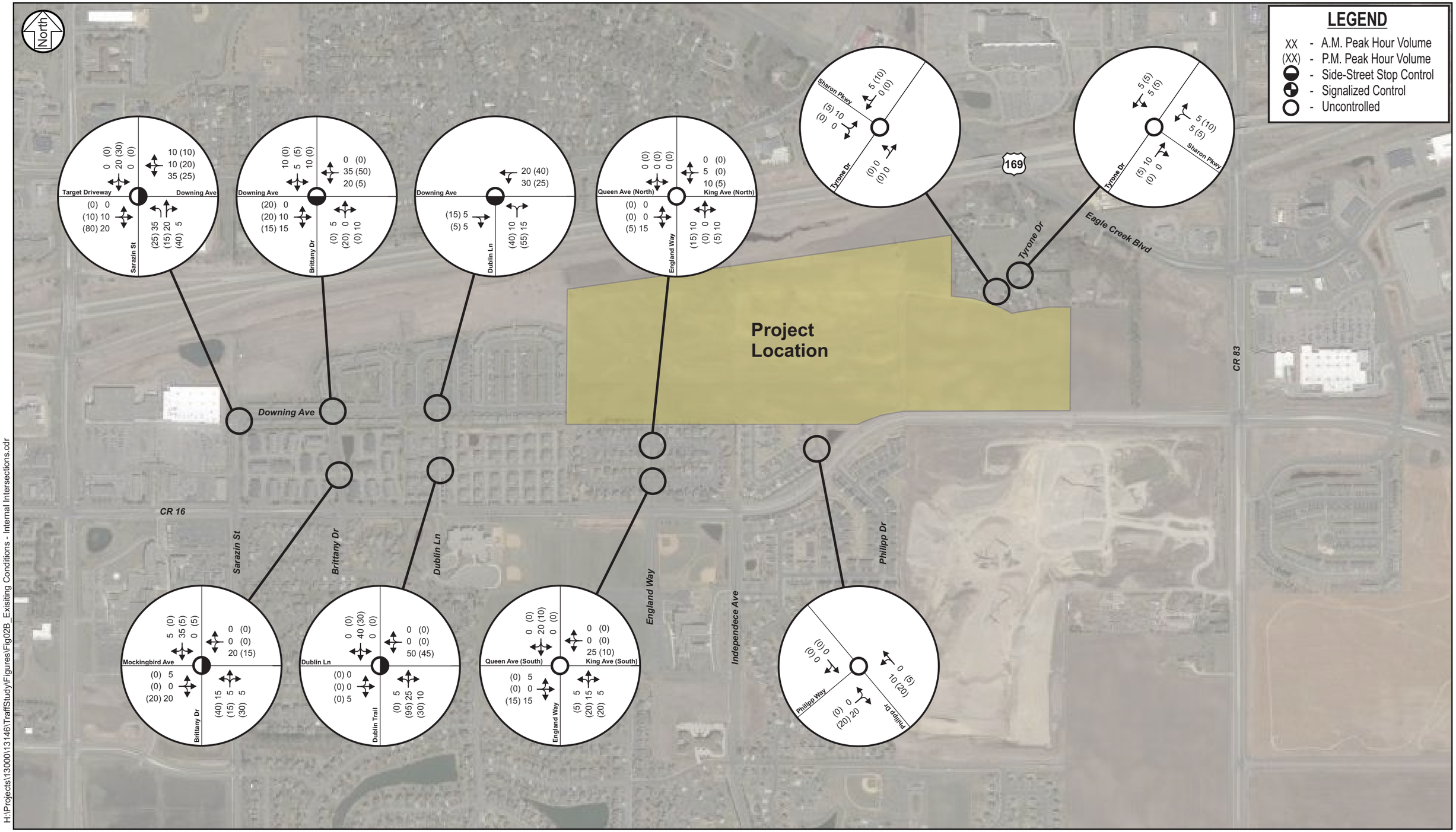
Figure 2A



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Existing Conditions - Internal Intersections

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Figure 2B

Table 1. Existing Roadway Characteristics

Roadway [4]	Functional Classification	General Configuration	Posted Speed Limit (mph)
County Road 83	A Minor Arterial	4-Lane Divided	45
Eagle Creek Boulevard	Collector	4-Lane Undivided	50/35 [1]
County Road 16	A-Minor Arterial	4-Lane Divided	45/40/25 [2][3]
Sarazin Street	Local Road	3-Lane	30
Independence Drive	Collector	2-Lane Undivided	35/25 [3]

(1) Speed limit change occurs at the Holiday gas station full access, with a posted speed limit of 35 mph east of the access.
(2) Speed limit change occurs at the Independence Drive, with a posted speed limit of 45 mph east of Independence Drive.
(3) School Zones are present throughout the corridor and have a speed limit of 25 mph when children are present.
(4) Al other study roadways are local 2-lane undivided roadways with a speed limit of 30 mph.

Intersection Capacity Analysis

An intersection capacity analysis was conducted to determine how traffic is currently operating at the study intersections during typical weekday a.m. and p.m. peak hour conditions. All intersections were analyzed using Synchro/SimTraffic software. Capacity analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are graded from LOS A through LOS F. The LOS results are based on average delay per vehicle results from SimTraffic, which correspond to the delay threshold values shown in Table 2. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. Overall intersection LOS A through D is generally considered acceptable by drivers in the Twin Cities Metropolitan Area.

Table 2. Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
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

For side-street stop-controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these volumes.

Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high-levels of delay (poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing intersection capacity analysis, shown in Table 3, indicate that all study intersections currently operate at an acceptable overall LOS D or better during the weekday a.m. and p.m. peak hours.

Table 3. Existing Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
External Intersections				
Eagle Creek Boulevard/Tyrone Drive (1)	A/A	7 sec.	A/A	7 sec.
CR 83/Eagle Creek Boulevard/Dean Lakes Blvd	D	41 sec.	C	26 sec.
CR 83/CR 16	D	36 sec.	C	26 sec.
CR 16/Sarazin Street	A	10 sec.	B	13 sec.
CR 16/Britany Drive (1)	A/A	6 sec.	A/A	7 sec.
CR 16/Dublin Lane (1)	A/A	9 sec.	A/A	9 sec.
CR 16/England Way (1)	A/A	6 sec.	A/A	9 sec.
CR 16/Independence Drive (1)	A/A	6 sec.	A/B	15 sec.
CR 16/Philipp Drive (1)	A/A	5 sec.	A/A	6 sec.
Internal Neighborhood Intersections				
Downing Avenue/Sarazin Street (1)	A/A	5 sec.	A/A	5 sec.
Downing Avenue/Britany Drive (1)	A/A	4 sec.	A/A	6 sec.
Downing Avenue/Dublin Lane (1)	A/A	3 sec.	A/A	3 sec.
Britany Drive/Mockingbird Avenue (1)	A/A	4 sec.	A/A	5 sec.
Dublin Lane/Dublin Trail (1)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (North) (2)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (South) (2)	A/A	5 sec.	A/A	4 sec.
Philipp Drive/Philipp Way (2)	A/A	2 sec.	A/A	2 sec.
Tyrone Drive/Sharon Parkway (North) (2)	A/A	3 sec.	A/A	3 sec.
Tyrone Drive/Sharon Parkway (South) (2)	A/A	4 sec.	A/A	4 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an uncontrolled intersection.

The following information summarizes the operational and/or queuing issues identified as part of the existing intersection capacity analysis:

- During the a.m. peak hour at the CR 83/Eagle Creek Boulevard intersection, there is heavy northbound thru and eastbound left-turn movements that are destined eastbound on US 169. Due to the short distance along CR 83 between Eagle Creek/Deans Lake Boulevard and US 169 (approximately 750 feet), many vehicles (approximately 70 percent) will begin positioning themselves in the outside lane to access the northbound right-turn lane at the CR 83/US 169 intersection. This results in a 95th percentile queue of approximately 300 feet for the eastbound left-turn movement, and a northbound thru queue that extends to the CR 83/CR 16 intersection one or two times during the a.m. peak hour.
    - In order to avoid these queues, approximately 35 vehicles were observed positioning themselves in the inner travel lane and make a late aggressive merge into the northbound right-turn lane at the CR 83/US 169 South Ramp intersection.
    - This issue was previously identified in the *Canterbury Commons Areawide Transportation Assessment*.

There are no other existing significant transportation issues within the study area from an intersection capacity perspective.

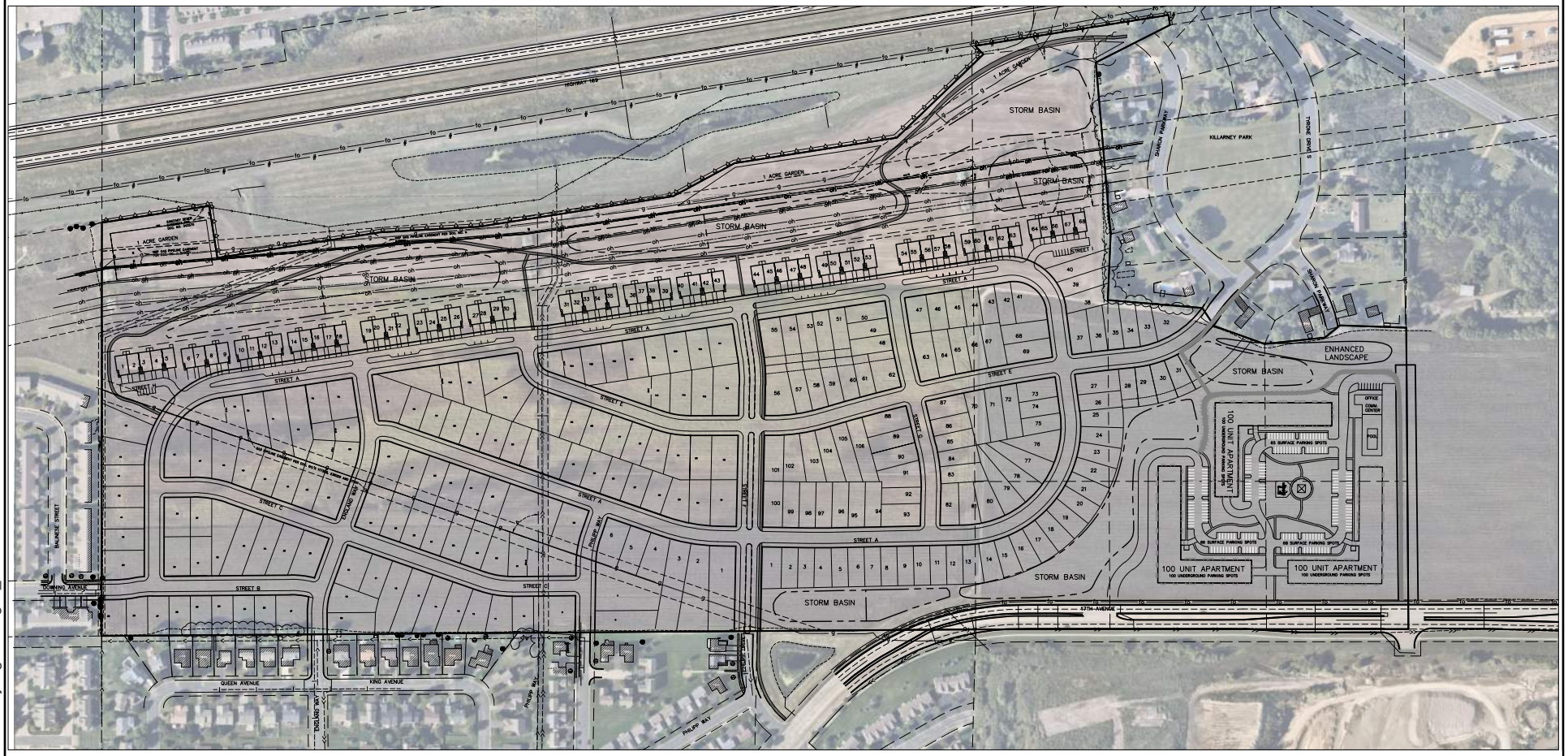
Proposed Development

The proposed development is generally bounded by Eagle Creek Boulevard/US 169 to the north, CR 83 to the east, CR 16 to the south, and Balinese Street to the west. The proposed development consists of a total of 590 residential units; which includes 222-units of single-family housing, 68-units of townhomes, and a 300-unit apartment building. A preliminary site plan for the proposed development is illustrated in Figure 3, which was used as the basis for the traffic analysis.

Several access locations are provided to the single-family and townhome components of the development, including Tyrone Drive, Philipp Drive, England Way, and Downing Avenue. Two full access locations along CR 16 are planned for the apartment building. The development is anticipated to be constructed in phases, with full build out anticipated by the end of year 2024.

Traffic Forecasts

Traffic forecasts were developed for the study area to help determine short- and long-term transportation infrastructure needs within the study area. The forecasts were developed using a combination of general area historical growth trends, trip generation estimates based on the proposed development, and data within the Scott County Regional Travel Demand Model. The following sections outline the proposed development within the study area, as well as overall traffic forecast development process and assumptions.



SITE DATA:

GROSS AREA: ±114.3 ACRES
EASEMENT ON NORTH END OF PROJECT AREA: ±21.6 ACRES
NET AREA: ±92.7 ACRES

50' VILLA LOTS: 106
65' SINGLE FAMILY LOTS: 115
ROW TOWNHOME UNITS: 68
HIGH DENSITY UNITS: 300

TOTAL UNITS: 589
NET DENSITY: 6.35 UNITS/ACRE

North

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Site Plan

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Figure 3

Proposed Development Trip Generation

To account for traffic impacts associated with the proposed development, a trip generation estimate was developed for the a.m. and p.m. peak hours and a daily basis. These estimates, shown in Table 4, were developed using the *ITE Trip Generation Manual, 10th Edition*. Note that no multi-use or pass-by reductions were applied due to the type of land use planned within the proposed development, which is solely residential.

Table 4. Proposed Development Trip Generation Estimate

Land Use Type *(ITE Code)*	Size	A.M. Peak Hour		P.M. Peak Hour		Daily Trips
		In	Out	In	Out	
Single-Family Housing (210)	222 DU	41	123	138	81	2,096
Low-rise Multi-family (220)	68 DU	7	24	24	14	498
Mid-rise Multi-family (221)	300 DU	28	80	81	51	1,632
	Total Site Trips	**76**	**227**	**243**	**146**	**4,226**

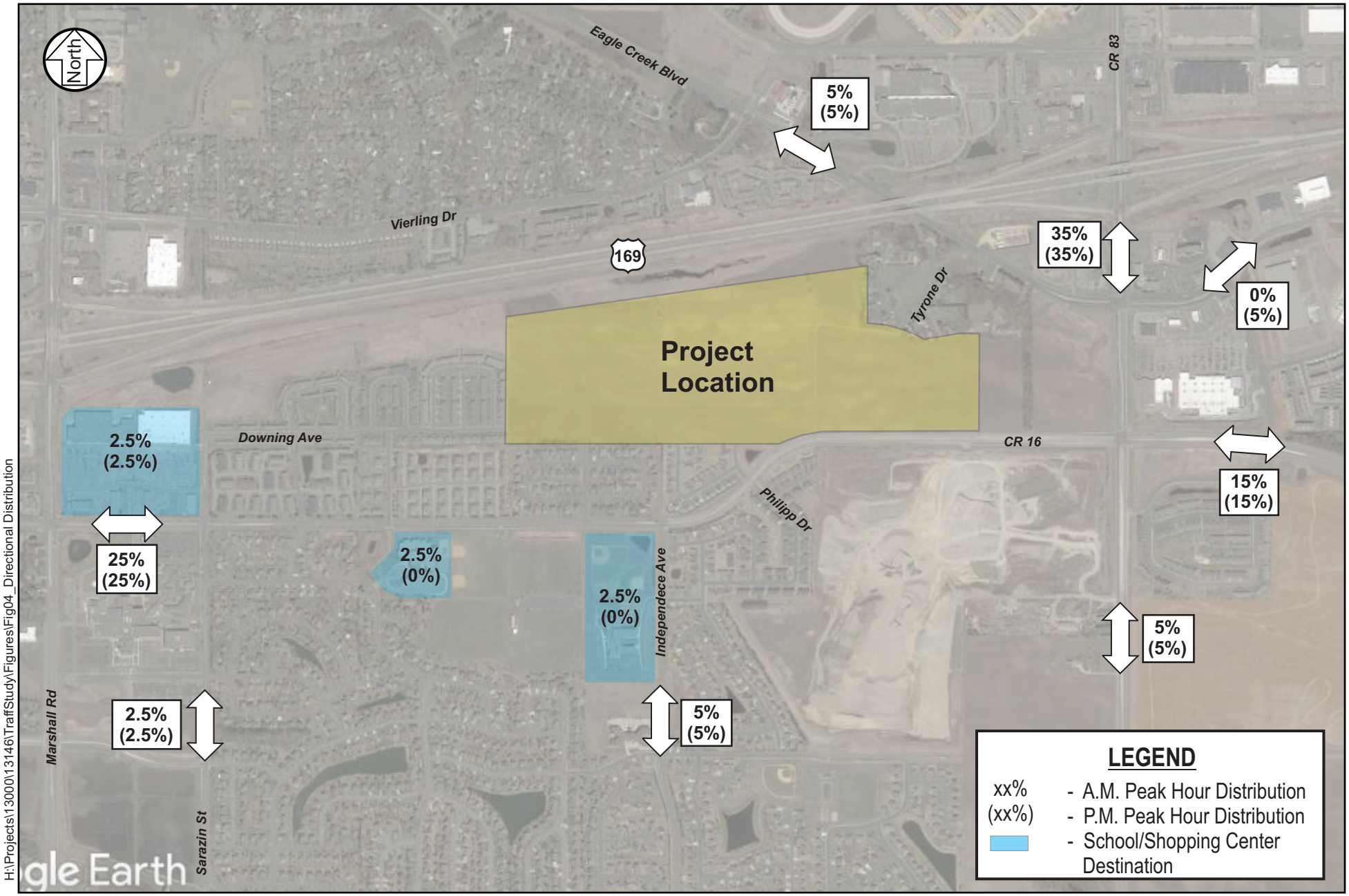
Results of the trip generation estimate indicate that the proposed development is expected to generate approximately 303 a.m. peak hour, 389 p.m. peak hour, and 4,226 daily trips. The trips generated were distributed throughout the area based on the directional distribution shown in Figure 4, which was developed based on information provided by the Scott County Regional Demand model, existing travel patterns, and engineering judgement.

Adjacent Development

In addition to the proposed development, there are known adjacent developments planned in the area. The Canterbury Commons development, which is currently under construction, is generally bounded by CR 83 to the east, 12th Avenue/Vierling Drive/Eagle Creek Boulevard to south, existing development to the west, and Barenscheer Boulevard to the north. The project consists of residential, office, retail, hotel, and entertainment. The development is further outlined in the *Canterbury Commons Areawide Transportation Assessment* and the *Canterbury Commons Areawide Transportation Assessment: SW Area Addendum*. For the purpose of this study, the Canterbury Commons development was assumed to be fully completed by 2025. Therefore, trip generation/routing estimates for the adjacent development from the previous studies was utilized.

Scott County Regional Travel Demand Model

The *Scott County Regional Travel Demand Model* was reviewed to understand how the proposed development land use compares to previous socio-economic (i.e. employment and households) assumptions within the area, as well as to identify general background growth within the study area. The following information provides an overview of the model review process.



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Directional Distribution

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Figure 4

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First, a review of the employment and household data within the regional model's traffic analysis zone (TAZ) 45 and 46 was completed. The two TAZ's encompass the entire proposed development area along with additional area, as illustrated below. The regional model assumes the base (i.e. year 2014) level of trip generation within TAZ 45 and 46 to be approximately 1,620 daily trips, with a future year 2040 trip generation of approximately 10,860 daily trips. Thus, the expected growth within TAZ 45 and 46 was estimated to be approximately 9,240 daily trips in the regional model.

Comparing the trip generation identified earlier in this analysis, the proposed development is expected to generate approximately 4,226 daily trips, which is slightly less than half of the daily trips previously assumed within the regional model. A breakdown of the number of daily trips by trip type for the socio-economic data trip growth (year 2040 minus existing) and the proposed development is shown in Table 5. Additional development may occur east of the Summerland development, which may account for more daily trips, especially retail and non-retail trips. However, the Summerland development is considered within guidance based on the regional travel demand model.

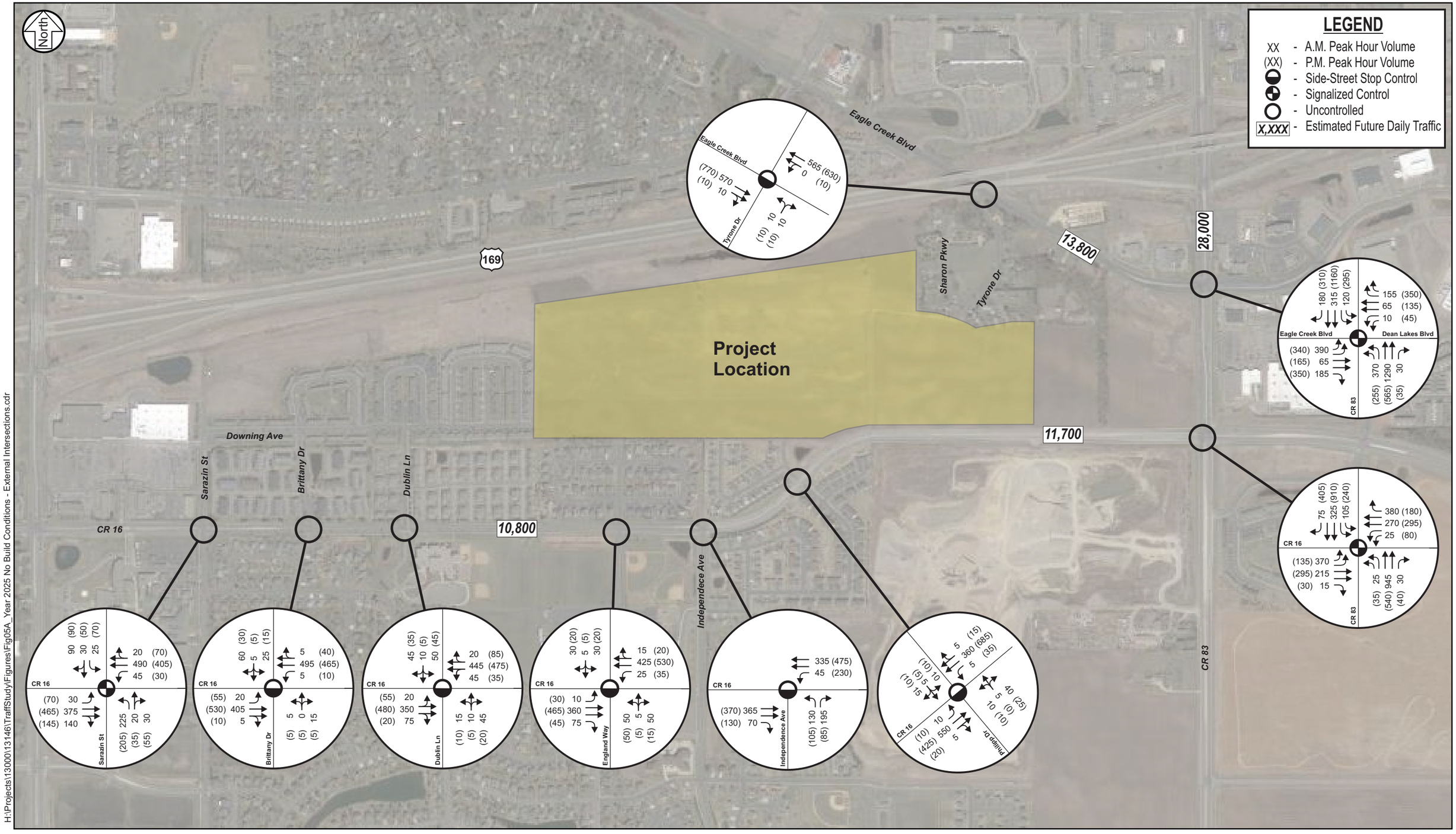
Table 5. Daily Trips Comparison

Trip Type	TAZ 45 & 46 Daily Trip Growth	Summerland Development Daily Trips
Household	6,325	4,226
Retail	2,690	0
Non-Retail	225	0
Total	**9,240**	**4,226**

Second, the socio-economic data from TAZ 45 and 46 was removed from the regional model, along with TAZ 60 (Canterbury) and TAZ 52 (Amazon) to understand the general background growth expected on area roadways on an annual basis. This approach identified that traffic volume growth on area roadway is expected to range from one-half (0.5) percent to two (2) percent annually. Therefore, for purposes of this assessment, a two (2) percent annual background growth rate was applied to the existing peak hour volumes to develop year 2025 no build traffic volumes. To develop year 2040 no build traffic volumes, a one-half (0.5) percent annual background growth rate was applied to the year 2025 no build traffic volumes. This approach is consistent with the growth rate assumed for the *Canterbury Commons Areawide Transportation Assessment*.

Traffic Forecast Summary

Based on the traffic forecast approach described within this assessment, peak hour traffic volumes were developed for both year 2025 and year 2040 no build and build conditions, which are illustrated in Figures 5A thru 8B. The no build conditions include general background growth and known adjacent developments. The build conditions include the traffic volumes generated under no build conditions, as well as trips generated by the proposed development.



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Year 2025 No Build Conditions - External Intersections

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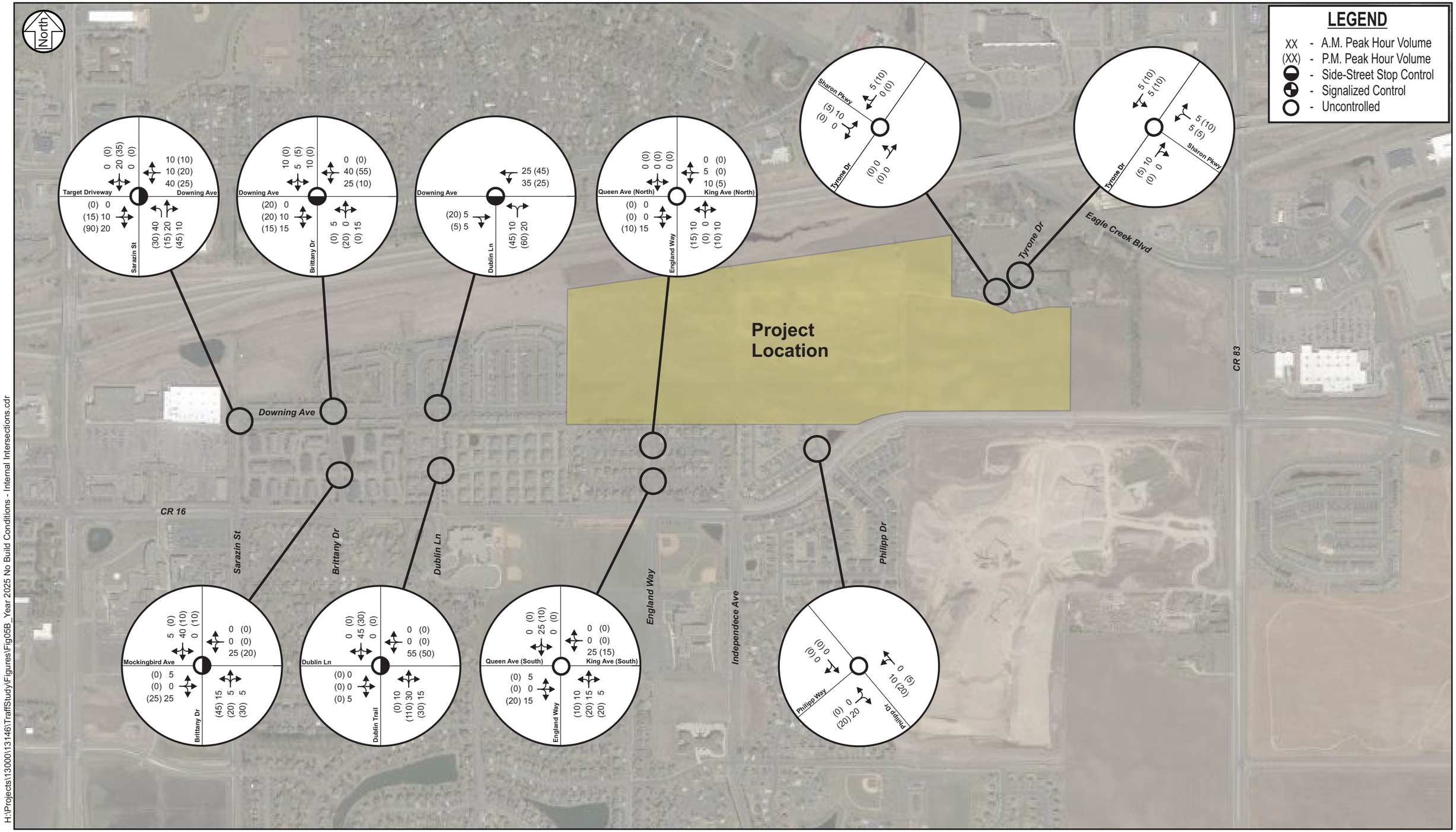
Figure 5A



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Year 2025 No Build Conditions - Internal Intersections

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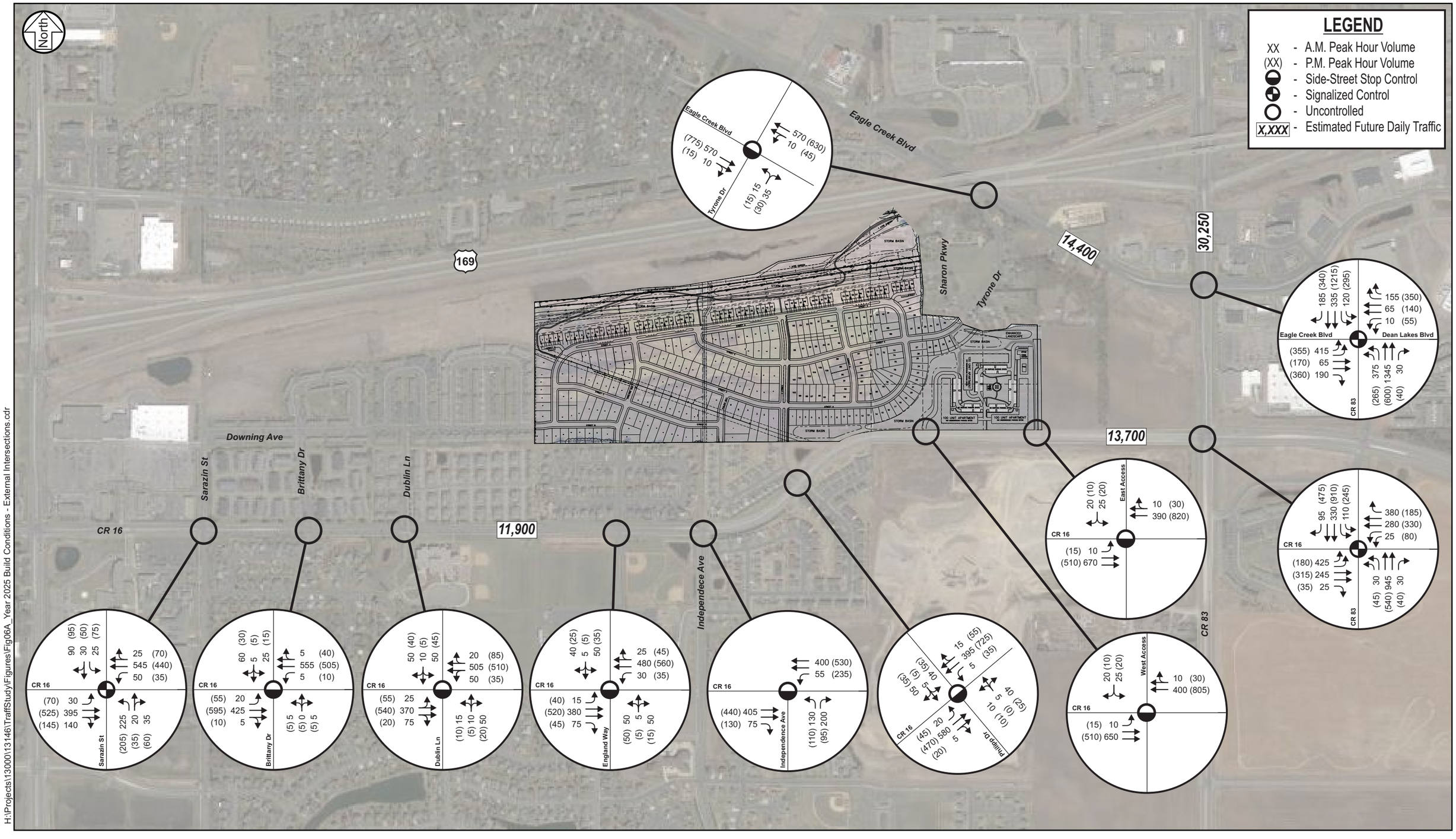
Figure 5B



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Year 2025 Build Conditions - External Intersections

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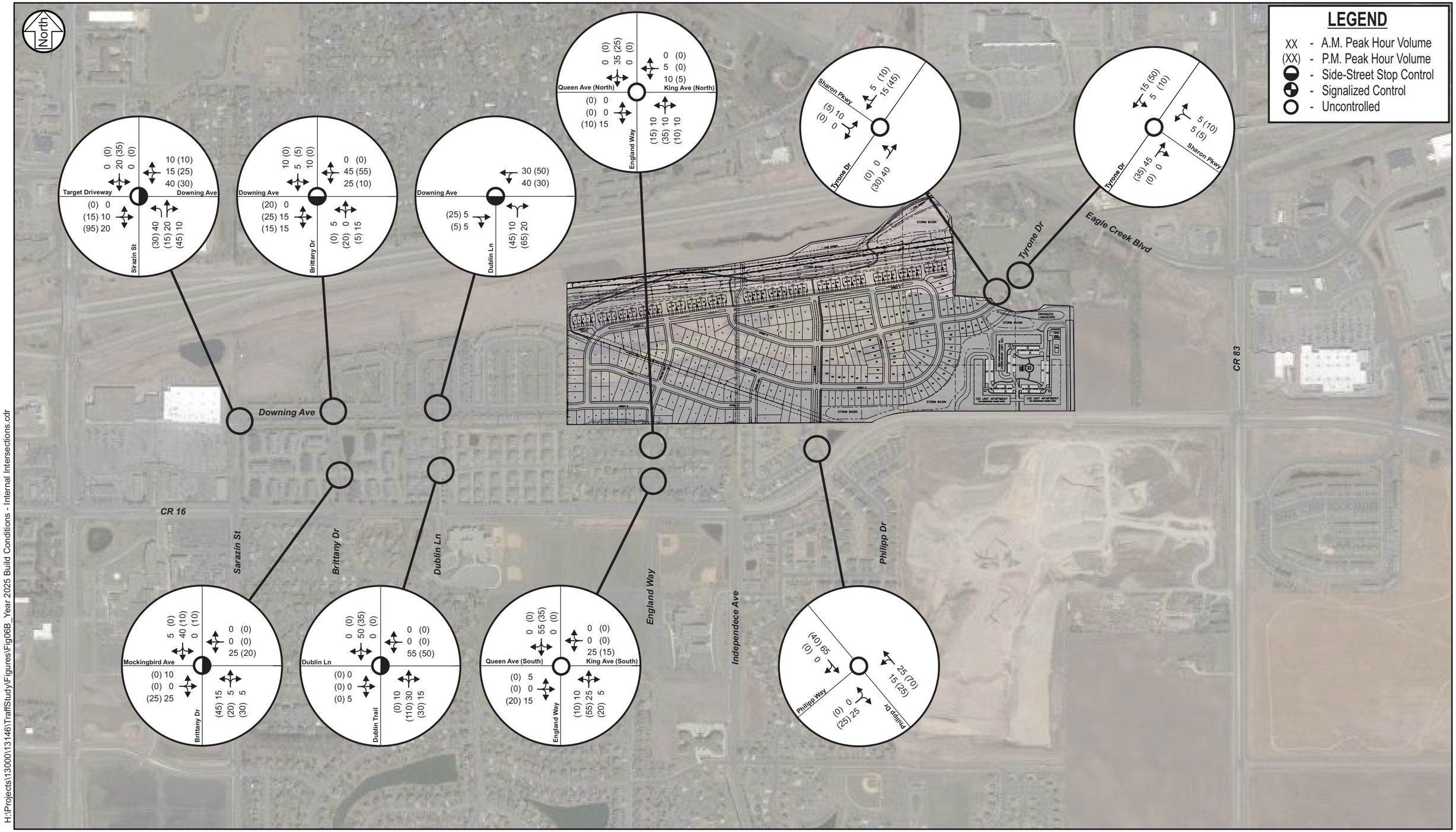
Figure 6A



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Year 2025 Build Conditions - Internal Intersections

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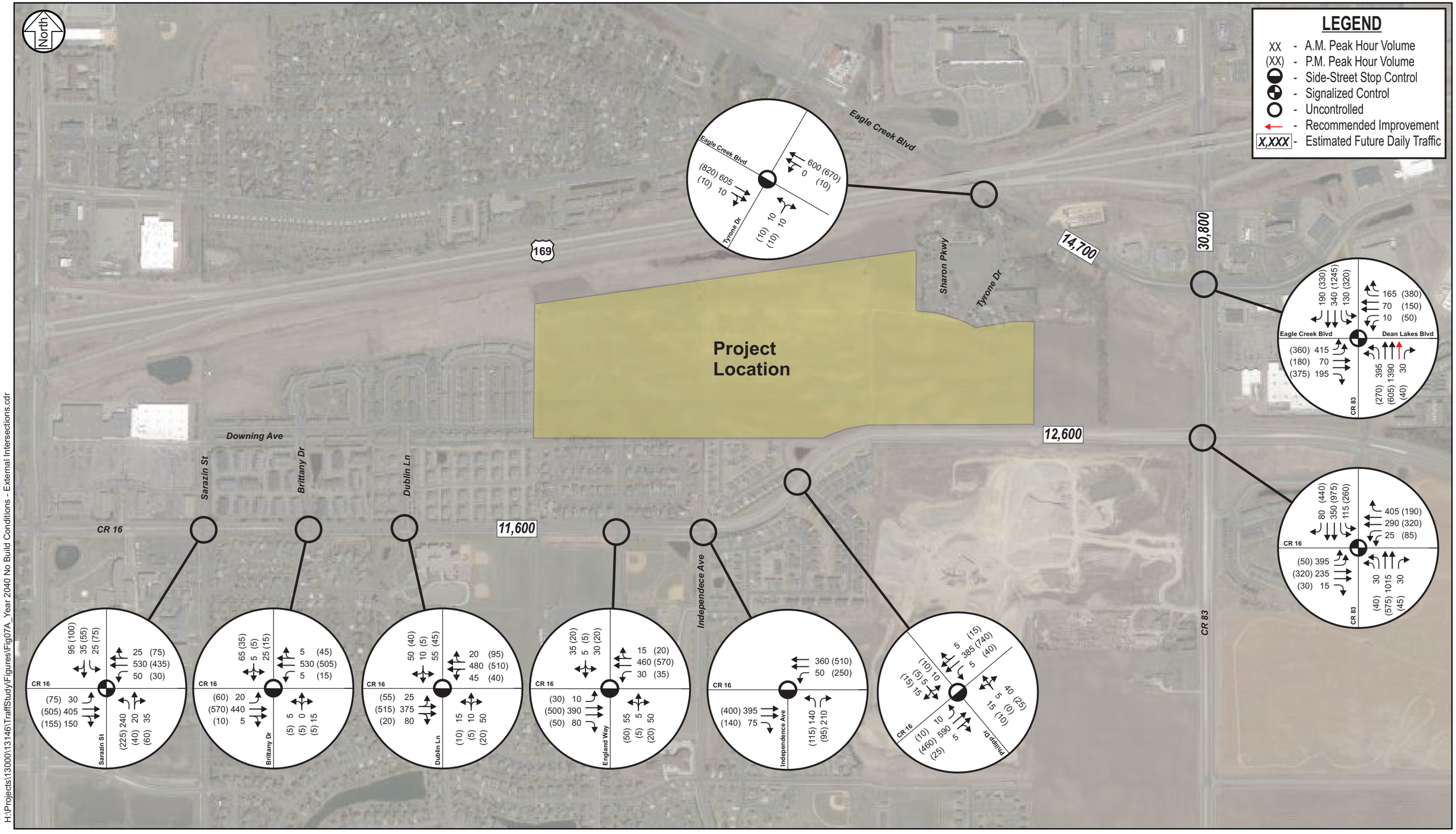
Figure 6B



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Year 2040 No Build Conditions - External Intersections

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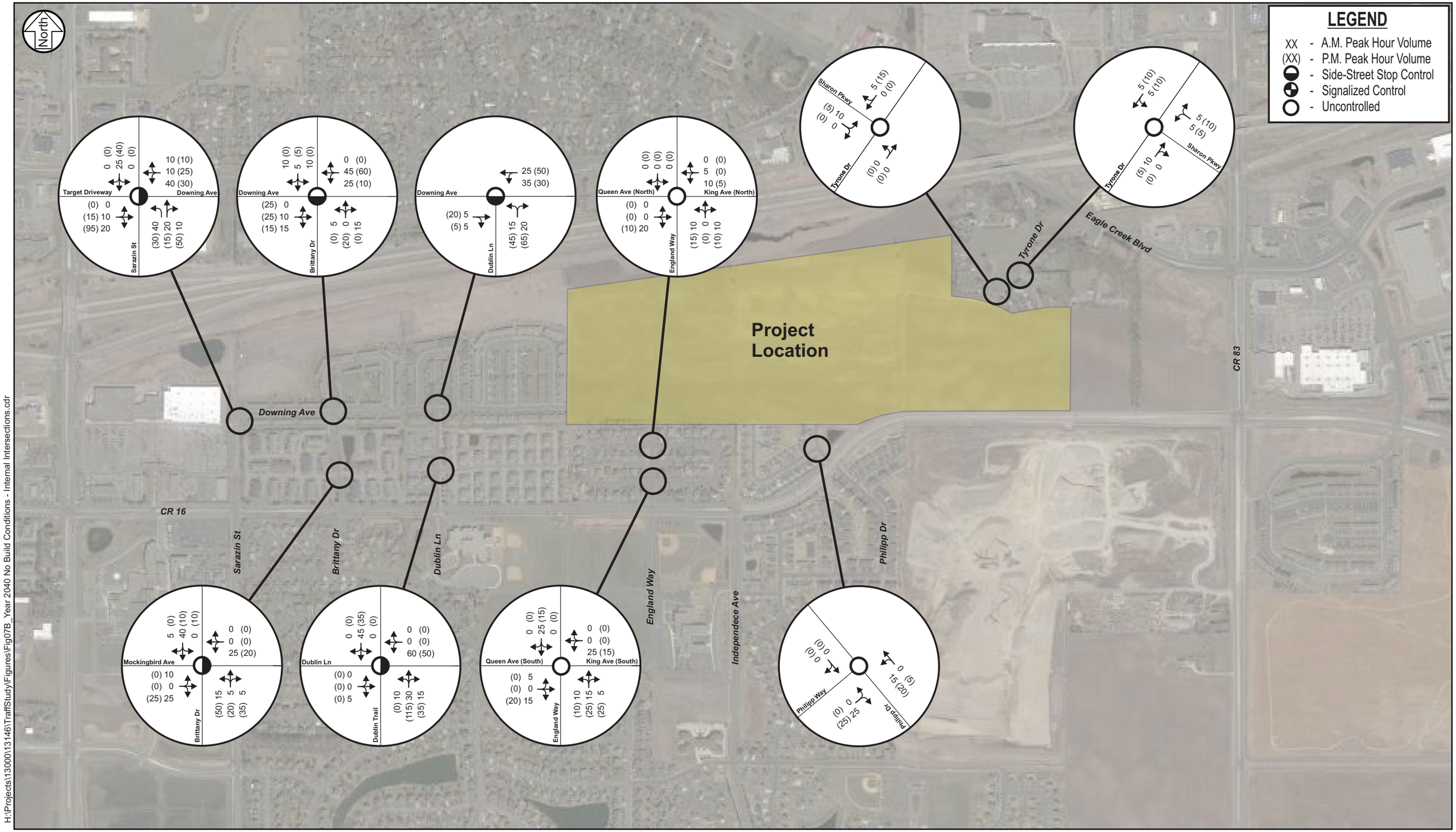
Figure 7A



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Year 2040 No Build Conditions - Internal Intersections

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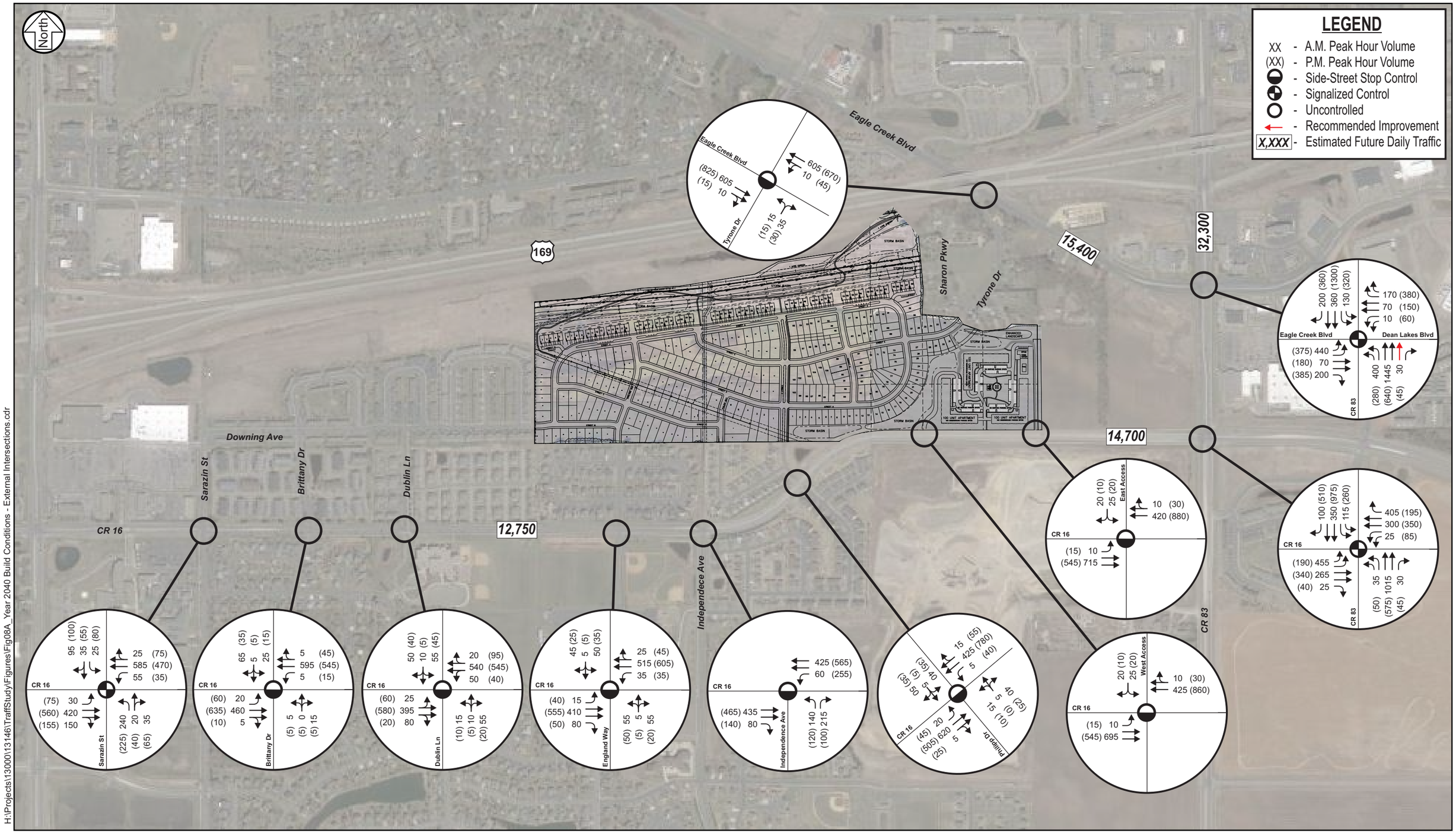
Figure 7B



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Year 2040 Build Conditions - External Intersections

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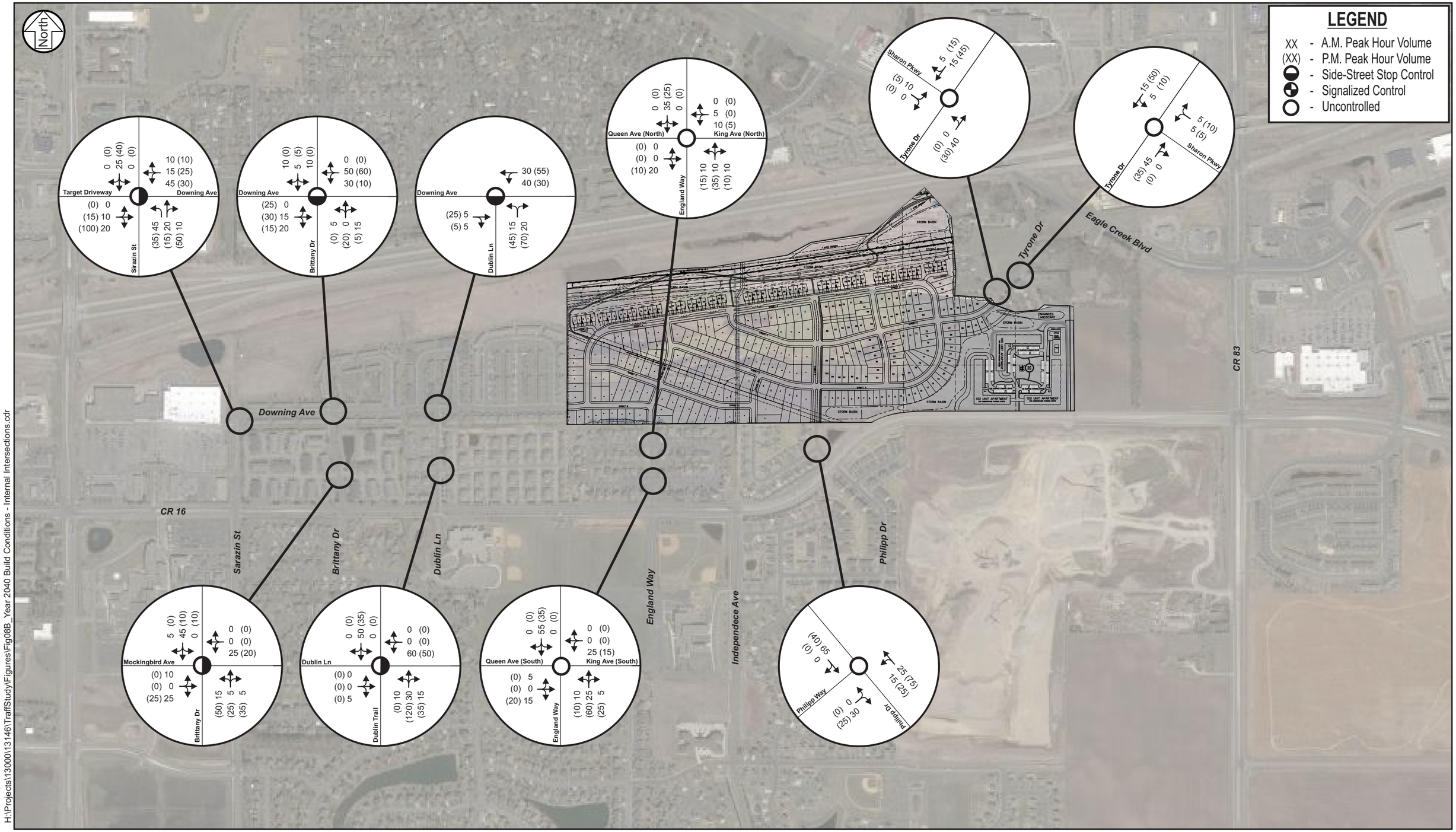
Figure 8A



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Year 2040 Build Conditions - Internal Intersections

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Figure 8B

Year 2025 Conditions

To help determine impacts associated with the proposed development, year 2025 no build and build conditions were reviewed.

Year 2025 No Build Conditions

To determine how the study intersections will accommodate the year 2025 no build traffic forecasts, an intersection capacity analysis was completed using Synchro/SimTraffic software. Results of the intersection capacity analysis shown in Table 6 indicate that all study intersections are expected to operate at an overall LOS D or better during the weekday a.m. and p.m. peak hours, except the CR 83/Eagle Creek Boulevard intersection which is expected to operate at LOS E during the a.m. peak hour. Northbound queues from the CR 83/Eagle Creek Boulevard intersection will begin to impact operations at the CR 83/CR 16 intersection.

Table 6. 2025 No Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
External Intersections				
Eagle Creek Boulevard/Tyrone Drive (1)	A/A	8 sec.	A/A	7 sec.
CR 83/Eagle Creek Boulevard/Dean Lakes Boulevard	E	64 sec.	C	31 sec.
CR 83/CR 16	D	50 sec.	C	24 sec.
CR 16/Sarazin Street	B	11 sec.	B	14 sec.
CR 16/Britany Drive (1)	A/A	6 sec.	A/A	7 sec.
CR 16/Dublin Lane (1)	A/A	9 sec.	A/B	11 sec.
CR 16/England Way (1)	A/A	8 sec.	A/B	11 sec.
CR 16/Independence Drive (1)	A/A	7 sec.	A/C	18 sec.
CR 16/Philipp Drive (1)	A/A	5 sec.	A/A	7 sec.
Internal Neighborhood Intersections				
Downing Avenue/Sarazin Street (1)	A/A	5 sec.	A/A	5 sec.
Downing Avenue/Britany Drive (1)	A/A	4 sec.	A/A	6 sec.
Downing Avenue/Dublin Lane (1)	A/A	3 sec.	A/A	3 sec.
Britany Drive/Mockingbird Avenue (1)	A/A	4 sec.	A/A	5 sec.
Dublin Lane/Dublin Trail (1)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (North) (2)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (South) (2)	A/A	5 sec.	A/A	5 sec.
Philipp Drive/Philipp Way (2)	A/A	2 sec.	A/A	2 sec.
Tyrone Drive/Sharon Parkway (North) (2)	A/A	3 sec.	A/A	3 sec.
Tyrone Drive/Sharon Parkway (South) (2)	A/A	4 sec.	A/A	4 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.
(2) Indicates an uncontrolled intersection.

The following information summarizes the operational and/or queuing issues that warrant consideration as development occurs.

- During the a.m. peak hour at the CR 83/Eagle Creek Boulevard intersection, the eastbound left-turn movement is expected to extend beyond the available storage approximately 60 percent of the peak hour, and the eastbound approach is expected to have a 95th percentile queue of approximately 800 feet. The northbound thru movement is expected to extend to the CR 16 intersection up to five (5) percent of the a.m. peak hour, impacting queues and operations at the CR 83/CR 16 intersection.
    - As queues and delays continue to degrade, the aggressive maneuvers identified under existing conditions at the CR 83/US 169 South Ramp intersection are expected to increase.
- During the a.m. peak hour at the CR 83/CR 16 intersection, the northbound thru and westbound right-turn movements are expected to have a 95th percentile queue of approximately 600 feet and 500 feet, respectively. These queues are directly related to the northbound queues at the Eagle Creek Boulevard intersection extending into the CR 16 intersection.

To address the lane utilization issues, geometric improvements should be considered. Specific geometric improvements will be discussed further in the 2025 build conditions. However, the year 2025 no build analysis indicates the need and approximate timeframe of when capacity improvements are expected to be needed along the corridor.

Year 2025 Build Conditions

To determine how the study intersections will accommodate the year 2025 build traffic forecasts, an intersection capacity analysis was completed using Synchro/SimTraffic software. Results of the year 2025 build intersection capacity analysis, shown in Table 7, indicates that the operational issues identified under the year 2025 no build condition are expected to degrade as development occurs. Given the level of adjacent development planned, construction of the proposed development is expected to accelerate the need for capacity improvements along the CR 83 corridor.

The following information summarizes the operational and/or queuing issues that warrant consideration as development occurs.

- During the a.m. peak hour at the CR 83/Eagle Creek Boulevard intersection, the eastbound left-turn movement is expected to extend beyond the available storage approximately 70 percent of the peak hour, and the eastbound approach is expected to have a 95th percentile queue of approximately 850 feet. The northbound-thru movement is expected to extend to the CR 16 intersection up to five (5) percent of the a.m. peak hour, impacting queues and operations at the CR 83/CR 16 intersection.
    - As queues and delays continue to degrade, the aggressive maneuvers identified under existing conditions at the CR 83/US 169 South Ramp intersection are expected to increase.

- During the a.m. peak hour at the CR 83/CR 16 intersection, the northbound thru and westbound right-turn movements are expected to have a 95th percentile queue of approximately 1,100 feet and 700 feet, respectively. These queues are directly related to the northbound queues at the Eagle Creek Boulevard intersection extending into the CR 16 intersection.
- The northbound left-turn movement at the CR 16/Independence Drive intersection is expected to operate near the LOS E/LOS F range during the p.m. peak hour.

Table 7. 2025 Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
External Intersections				
Eagle Creek Boulevard/Tyrone Drive (1)	A/A	5 sec.	A/A	8 sec.
CR 83/Eagle Creek Boulevard/Dean Lakes Boulevard	E	71 sec.	C	33 sec.
CR 83/CR 16	F	81 sec.	C	25 sec.
CR 16/Sarazin Street	B	12 sec.	B	15 sec.
CR 16/Britany Drive (1)	A/A	7 sec.	A/A	9 sec.
CR 16/Dublin Lane (1)	A/B	11 sec.	A/B	12 sec.
CR 16/England Way (1)	A/A	9 sec.	A/B	12 sec.
CR 16/Independence Drive (1)	A/A	7 sec.	A/D	30 sec.
CR 16/Philipp Drive (1)	A/A	8 sec.	A/B	12 sec.
CR 16/West Apartment Access	A/A	9 sec.	A/B	15 sec.
CR 16/East Apartment Access	A/A	8 sec.	A/B	14 sec.
Internal Neighborhood Intersections				
Downing Avenue/Sarazin Street (1)	A/A	5 sec.	A/A	5 sec.
Downing Avenue/Britany Drive (1)	A/A	4 sec.	A/A	6 sec.
Downing Avenue/Dublin Lane (1)	A/A	3 sec.	A/A	4 sec.
Britany Drive/Mockingbird Avenue (1)	A/A	4 sec.	A/A	5 sec.
Dublin Lane/Dublin Trail (1)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (North) (2)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (South) (2)	A/A	5 sec.	A/A	5 sec.
Philipp Drive/Philipp Way (2)	A/A	3 sec.	A/A	3 sec.
Tyrone Drive/Sharon Parkway (North) (2)	A/A	3 sec.	A/A	3 sec.
Tyrone Drive/Sharon Parkway (South) (2)	A/A	4 sec.	A/A	4 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an uncontrolled intersection.

Potential Improvements

To address future capacity and/or queuing issues identified, the following improvements are offered:

1) CR 83/Eagle Creek Boulevard Intersection
    a. Construct an advanced turn-lane from the US 169 South Ramp intersection through the CR 83/Eagle Creek Boulevard intersection. The advanced turn-lane is provided by extending the inside northbound right-turn lane at the US 169 South Ramp intersection to Eagle Creek Boulevard and constructing an additional northbound thru lane at Eagle Creek Boulevard that feeds into the extended northbound right-turn lane. *Note that this improvement was previously identified in the Canterbury Commons Areawide Transportation Assessment.* This improvement will be assumed to be completed under the year 2040 intersection capacity analysis.
2) CR 16/Independence Drive
    a. Monitor the CR 16/Independence Drive intersection to determine if/when a traffic signal should be considered.

Year 2025 Build Conditions with Improvements

To illustrate how the recommended improvement along CR 83 are expected to operate under year 2025 build conditions, an additional intersection capacity analysis was conducted. For comparison purposes, results of the traffic operations analysis for the existing, 2025 no build, and 2025 build conditions with no improvements are also shown. Note that only the a.m. peak hour operations are shown as that is the only time there is a capacity/queuing issue.

Results of the analysis, shown in Table 8, indicates that with the recommended improvements, the CR 83 intersections are expected to operate at an overall LOS C during the a.m. peak hour. The northbound queues are also expected to be significantly improved. The traffic operations during the p.m. peak hour are expected to remain similar to previous conditions, thus are not shown in the table.

Table 8. A.M. Peak Hour Intersection Capacity Analysis Comparison

Intersection	LOS (Delay)			
	Existing	2025 No Build	2025 Build	
			No Improvements	Recommend Improvement
CR 83/Eagle Creek Blvd	D (41 sec)	E (64 sec)	E (71 sec)	C (26 sec)
CR 83/CR 16	D (36 sec)	D (50 sec)	F (81 sec)	C (34 sec)
	Northbound 95th Percentile Queue (ft)			
CR 83/CR 16	325	600	1,100	325

Trip Proportional Share

Intersection improvements were identified in this report that are expected to be needed by year 2025 or before. Therefore, to identify the number of trips the proposed Summerland development contributes to the transportation system along CR 83 under year 2025 build conditions, a trip proportional share analysis was conducted. As mentioned previously, the eastbound left-turn and northbound thru movements at the CR 83/Eagle Creek Boulevard intersection during the a.m. peak hour cause operational and queuing issues that impact the adjacent CR 83/CR 16 intersection. Since these movements conflict with each other, additional trips to either movement impact the overall operations of both the CR 83/Eagle Creek Boulevard and CR 83/CR 16 intersections.

Therefore, a trip proportional share, which is shown in Table 9, was developed by taking the expected a.m. peak hour site trips for the eastbound left-turn and northbound thru movements at the CR 83/ Eagle Creek Boulevard intersection, divided by the total number of eastbound left-turn and northbound thru vehicles under the year 2025 build condition. It should be noted that only a.m. peak hour trips at the CR 83/Eagle Creek Boulevard intersection were utilized, as the issue identified only occurs during the a.m. peak hour. The resultant proportional share of trips that the proposed Summerland development contributes to the transportation system is approximately 4.5 percent of the total trips making these movements.

Table 9. Summerland Development Trip Proportional Share (2025 Build)

Intersection	Summerland A.M. Site Trips (EBL/NBT)	Total 2025 Build A.M. Trips (EBL/NBT)	Proportional Share
CR 83/Eagle Creek Blvd	79	1756	4.5%

Year 2040 Conditions

To help determine impacts associated with the proposed development, year 2040 no build and build conditions were reviewed. It should be noted that the CR 83 right-turn lane extension improvement identified under the 2025 conditions was assumed to be completed and is included in the year 2040 intersection capacity analysis.

Year 2040 No Build Conditions

To determine how the study intersections will accommodate the year 2040 no build traffic forecasts, an intersection capacity analysis was completed using Synchro/SimTraffic software. Results of the year 2040 build intersection capacity analysis, shown in Table 10, indicate that all study intersections are expected to operate at an overall LOS D or better during the peak hours. The northbound left-turn movement at the CR 16/Independence Drive intersection, however, is expected to operate near the LOS E/LOS F range during the p.m. peak hour.

Table 10. 2040 No Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
External Intersections				
Eagle Creek Boulevard/Tyrone Drive (1)	A/A	6 sec.	A/A	9 sec.
CR 83/Eagle Creek Boulevard/Dean Lakes Boulevard	C	27 sec.	C	31 sec.
CR 83/CR 16	D	44 sec.	C	23 sec.
CR 16/Sarazin Street	B	12 sec.	B	15 sec.
CR 16/Britany Drive (1)	A/A	6 sec.	A/A	9 sec.
CR 16/Dublin Lane (1)	A/A	10 sec.	A/B	12 sec.
CR 16/England Way (1)	A/A	8 sec.	A/B	12 sec.
CR 16/Independence Drive (1)	A/A	8 sec.	A/D	26 sec.
CR 16/Philipp Drive (1)	A/A	6 sec.	A/A	10 sec.
Internal Neighborhood Intersections				
Downing Avenue/Sarazin Street (1)	A/A	5 sec.	A/A	5 sec.
Downing Avenue/Britany Drive (1)	A/A	4 sec.	A/A	6 sec.
Downing Avenue/Dublin Lane (1)	A/A	3 sec.	A/A	4 sec.
Britany Drive/Mockingbird Avenue (1)	A/A	4 sec.	A/A	5 sec.
Dublin Lane/Dublin Trail (1)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (North) (2)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (South) (2)	A/A	5 sec.	A/A	5 sec.
Philipp Drive/Philipp Way (2)	A/A	2 sec.	A/A	2 sec.
Tyrone Drive/Sharon Parkway (North) (2)	A/A	3 sec.	A/A	3 sec.
Tyrone Drive/Sharon Parkway (South) (2)	A/A	4 sec.	A/A	4 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an uncontrolled intersection.

Year 2040 Build Conditions

To determine how the study intersections will accommodate the year 2040 build traffic forecasts, an intersection capacity analysis was completed using Synchro/SimTraffic software. Results of the year 2040 build intersection capacity analysis, shown in Table 11, indicate that all study intersections are expected to operate at an overall LOS D or better during the peak hours.

During the p.m. peak hour at the CR 16/Independence Drive intersection, the northbound approach is expected to operate at a LOS F (53 seconds) and have a northbound left-turn delay of approximately 1.5 minutes. To address this issue, consider constructing a traffic signal to improve the p.m. peak hour delays and reduce challenging maneuvers. A traffic signal would also provide another safe crossing along CR 16. With implementation of a traffic signal, this intersection is expected to operate at LOS A during the p.m. peak hour.

Table 11. 2040 Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
External Intersections				
Eagle Creek Boulevard/Tyrone Drive (1)	A/A	6 sec.	A/A	9 sec.
CR 83/Eagle Creek Boulevard/Dean Lakes Boulevard	C	28 sec.	C	35 sec.
CR 83/CR 16	D	44 sec.	C	25 sec.
CR 16/Sarazin Street	B	12 sec.	B	16 sec.
CR 16/Britany Drive (1)	A/A	7 sec.	A/A	9 sec.
CR 16/Dublin Lane (1)	A/B	11 sec.	A/B	12 sec.
CR 16/England Way (1)	A/A	9 sec.	A/B	14 sec.
CR 16/Independence Drive (1)	A/A	10 sec.	A/F	53 sec.
CR 16/Philipp Drive (1)	A/A	8 sec.	A/B	14 sec.
CR 16/West Apartment Access	A/A	9 sec.	A/B	12 sec.
CR 16/East Apartment Access	A/A	9 sec.	A/C	19 sec.
Internal Neighborhood Intersections				
Downing Avenue/Sarazin Street (1)	A/A	5 sec.	A/A	5 sec.
Downing Avenue/Britany Drive (1)	A/A	4 sec.	A/A	6 sec.
Downing Avenue/Dublin Lane (1)	A/A	3 sec.	A/A	4 sec.
Britany Drive/Mockingbird Avenue (1)	A/A	4 sec.	A/A	5 sec.
Dublin Lane/Dublin Trail (1)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (North) (2)	A/A	5 sec.	A/A	5 sec.
England Way/King Ave/Queen Avenue (South) (2)	A/A	5 sec.	A/A	5 sec.
Philipp Drive/Philipp Way (2)	A/A	3 sec.	A/A	3 sec.
Tyrone Drive/Sharon Parkway (North) (2)	A/A	3 sec.	A/A	3 sec.
Tyrone Drive/Sharon Parkway (South) (2)	A/A	5 sec.	A/A	4 sec.

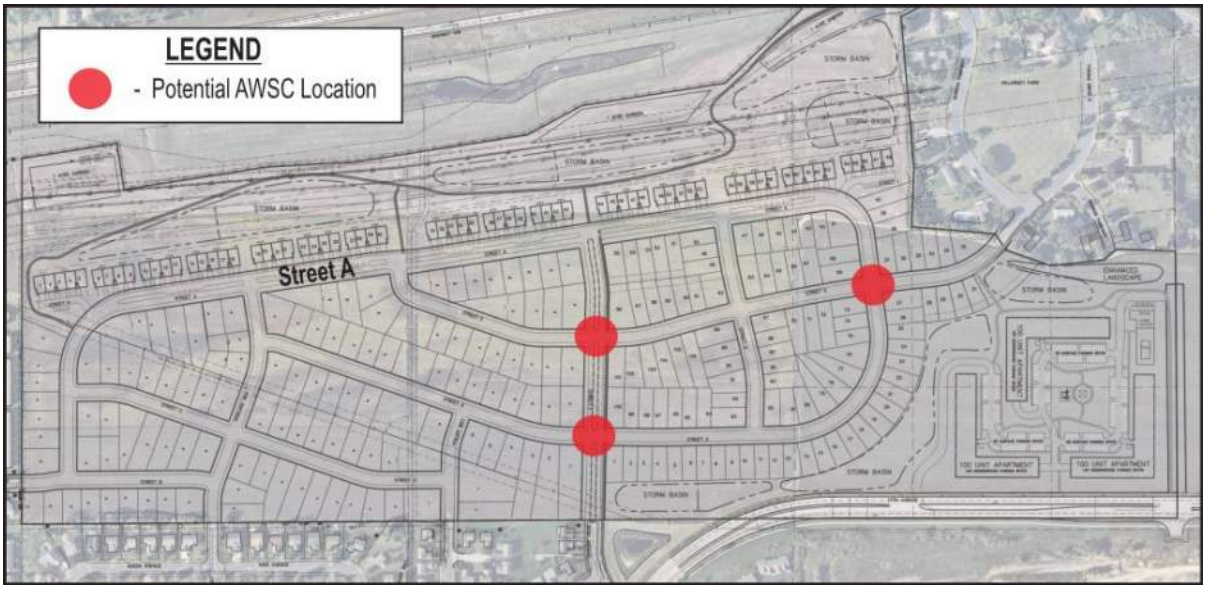
(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an uncontrolled intersection.

Site Plan Review

A review of the proposed site plan was completed to identify any issues and recommend potential improvements with regard to internal roadways, access, traffic controls, and circulation. The following information should be considered.

In general, all roadways within the proposed development are expected to function adequately as two-lane facilities. The median parking area on Street A is uncommon and should be redesigned to provide a more traditional on-street parking configuration. Internal intersections are also expected to operate adequately with side-street stop control. As development occurs, internal intersections should be reviewed to determine if a higher-level of traffic control (i.e. an all-way stop) should be considered, specifically at the intersection locations identified below.



From an access perspective, access to the single-family and townhome components are provided off existing roadways. The two proposed access locations to the apartment building, located along CR 16, do not fall within Scott County access spacing guidelines, which state that full access to local streets along A-Minor arterials should have 1/4-mile (1,320 feet) access spacing. The two proposed access locations are only spaced approximately 950 feet apart, while the western proposed access location is spaced approximately 1,100 feet from Philipp Drive. Although these access locations do not meet the 1/4-mile guidance, there are currently left-turn lanes provided along the corridor at these access locations. These access locations appear to be located along the corridor to provide evenly spaced intersections, meet access spacing guidelines from CR 83, and avoid the curve east of Independence Drive. Therefore, the external access as proposed is reasonable although special consideration should be made to limit any sight distance impacts from future landscaping and signing at all external and internal intersections within the study area.

Although not shown, pedestrian and bicycle facilities should be provided on at least one-side of each roadway, if not both sides. If only one side is provided, consider providing on the north-side of the roadway to maximize sun exposure.

Summary and Conclusions

The following information provides a summary of the analysis performed as part of the Summerland Place Development EAW Transportation Analysis and the identified conclusions for consideration:

- All study intersections currently operate at an overall LOS D or better during the a.m. and p.m. peak hours. Lane utilization and queuing issues were identified at the CR 83/Eagle Creek Boulevard intersection, particularly in the northbound direction during the a.m. peak hour.
- The current development proposal consists of a total of 590 residential units; which includes 222-units of single-family housing, 68-units of townhomes, and a 300-unit apartment building. Several existing access locations are provided to the single-family and townhome components. Two full-access locations along CR 16 are planned for the apartment building.
- Traffic forecasts were developed for the study area to help determine short- and long-term transportation infrastructure needs within the study area. The forecasts were developed using a combination of general area historical growth trends, trip generation estimates based on the proposed development, and data within the Scott County Regional Travel Demand Model.
- The proposed development is expected to generate approximately 303 a.m. peak hour, 389 p.m. peak hour, and 4,226 daily site trips.
- Results of the year 2025 no build condition intersection capacity analysis indicates that the lane utilization and queueing issues identified under existing conditions is expected to degrade. The CR 83/Eagle Creek Blvd intersection is expected to operate at a LOS E, and northbound queues from the intersection are expected to impact operations at the CR 83/CR 16 intersection.
- Results of the year 2025 build condition intersection capacity analysis indicate that operational issues identified under the year 2025 no build condition are expected to degrade as development occurs. In addition to the issues identified under the year 2025 no build condition, the northbound left-turn movement at the CR 16/Independence Drive intersection is expected to operate near the LOS E/LOS F range during the p.m. peak hour.
- To address the future capacity and/or queuing issues identified, the following improvements are offered;
    - CR 83/Eagle Creek Boulevard Intersection
        - Construct an advanced turn-lane from the US 169 South Ramp intersection through the CR 83/Eagle Creek Boulevard intersection. The advanced turn-lane is provided by extending the inside northbound right-turn lane at the US 169 South Ramp intersection to Eagle Creek Boulevard and constructing an additional northbound thru lane at Eagle Creek Boulevard that feeds into the extended northbound right-turn lane.

  - CR 16/Independence Drive
    - Monitor the CR 16/Independence Drive intersection to determine if/when a traffic signal should be considered.

- To identify the number of trips the proposed Summerland development contributes to the transportation system issue along CR 83 under year 2025 build conditions, a trip proportional share analysis was conducted. The resultant proportional share of trips that the proposed Summerland development contributes to the transportation system is approximately 4.5 percent.
- Results of the year 2040 no build condition intersection capacity analysis indicates that all study intersections are expected to operate at an overall LOS D or better during peak hours. The northbound left-turn movement at the CR 16/Independence Drive intersection, however, is expected to operate in the LOS E/F range during the p.m. peak hour.
- Results of the year 2040 build condition intersection capacity analysis indicate that operational issues identified at the CR 16/Independence Drive intersection under the year 2025 build and year 2040 no build condition are expected to degrade under 2040 conditions. The northbound approach is expected to operate at a LOS F and have a northbound left-turn delay of approximately 1.5 minutes.
- To address this issue, consider constructing a traffic signal to improve the p.m. peak hour delays and reduce challenging maneuvers.
- A review of the proposed site plan was completed to identify any issues and recommend potential improvements regarding internal roadways, access, traffic controls, and circulation. The following improvements are offered for consideration and are found in the site plan review section.