

To: Chris McKenzie, PE, Engineering Services Manager
City of Plymouth

From: Matt Pacyna, PE, Principal
Transportation Collaborative & Consultants, LLC

Date: April 19, 2024

Subject: 3131 Fernbrook Lane Redevelopment Traffic Study

INTRODUCTION

TC2 completed a traffic study for the proposed redevelopment of the Plymouth Office Center at 3131 Fernbrook Lane in the City of Plymouth. The site under consideration, shown in [Figure 1](#), is generally in the northwest quadrant of the Fernbrook Lane/Harbor Lane intersection. The main objectives of the study are to identify existing traffic operations within the study area, evaluate potential impacts of the proposed redevelopment, and recommend improvements, if necessary, to ensure safe and efficient operations for all users. The following study assumptions, methodology, and findings are offered for consideration.

Figure 1 Subject Site



EXISTING CONDITIONS

Existing conditions were reviewed within the study area to establish current traffic conditions to help determine impacts associated with the proposed redevelopment. The evaluation of existing conditions included collecting traffic volumes, observing transportation characteristics, and analyzing intersection capacity, which are described in the following sections.

Traffic Volumes

Vehicular intersection turning movement counts were collected at the following locations on Tuesday March 5, 2024. The counts were generally collected from 7 to 9 a.m. and 4 to 6 p.m.; 13-hour counts (i.e., 6 a.m. to 7 p.m.) were collected along Fernbrook Lane at both Harbor Lane and 34th Avenue.

- Fernbrook Lane and 34th Avenue
- Fernbrook Lane and Harbor Lane
- Harbor Lane and 34th Avenue
- Harbor Lane and POC Northwest Access
- Harbor Lane and Currents Apartments/POC West Access
- Harbor Lane and Davani's / POC Southwest Access
- Harbor Lane and Chick-fil-A Access

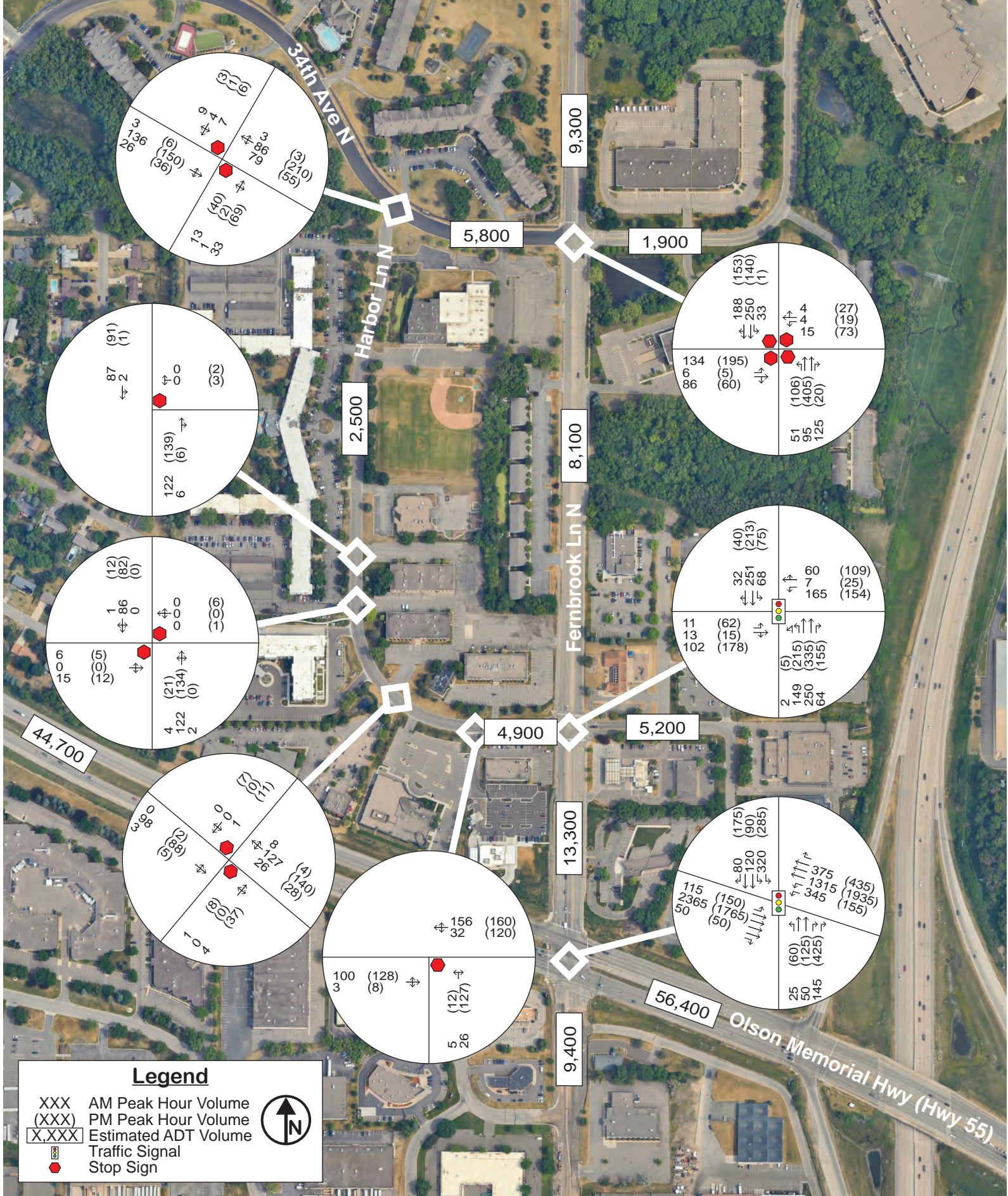
Historical traffic counts were also reviewed, which included data collected along Highway 55 and at the Fernbrook Lane / Harbor Lane intersection from October 2023 as part of the *Highway 55 Signal Retiming Project*. Based on this review, the 2024 traffic volumes and patterns are within approximately five (5) percent of the historical data in the area, which is consistent with a typical daily variation for most roadways. The a.m. and p.m. peak hours represent 7:30 to 8:30 a.m. and 4:30 to 5:30 p.m., respectively. Average daily traffic (ADT) volumes were provided by MnDOT or estimated based on the data collected.

Transportation Characteristics

Observations were conducted within the study area to identify various transportation characteristics such as roadway geometry, traffic controls, speed limits, and multimodal facilities. A general overview of key roadways within the study area is as follows:

- **Highway 55** – a 4+ lane divided principal arterial roadway with left and right turn lanes. No multimodal facilities are located along the roadway; the speed limit is 55-mph.
- **Fernbrook Lane** – a 4-lane major collector roadway with select turn lanes and a center two-way left-turn lane or raised median, depending on the segment. A multi-use trail and sidewalk are on the west and east sides of the roadway, respectively; there is a sidewalk gap along the east side of the roadway north of 34th Avenue and south of Highway 55. The speed limit is 40-mph.
- **34th Avenue** – a 2-lane minor collector roadway with left turn lanes at Fernbrook Lane. A multi-use trail is along the north side of the roadway west of Fernbrook Lane. The speed limit is 30-mph.
- **Harbor Lane** – a 2-lane local roadway with left-turn lanes at Fernbrook Lane. No multimodal facilities are located along the roadway; the speed limit is 30-mph.

The Fernbrook Lane intersections at Harbor Lane and Highway 55 are signalized; the other study intersections have side-street stop control, except the Fernbrook Lane / 34th Avenue intersection which has all-way stop control. New signal timing in the area was recently implemented and used for evaluation purposes. Existing geometrics, traffic controls, and volumes within the study area are in [Figure 2](#).



Intersection Capacity

Intersection capacity was evaluated using Synchro/SimTraffic Software (version 11), which uses methods outlined in the *Highway Capacity Manual, 6th Edition*. The software is used to develop calibrated models that simulate observed traffic operations and identify key metrics such as intersection Level of Service (LOS) and queues. These models incorporate collected traffic, pedestrian, and bicyclist volumes, traffic controls, and driver behavior factors. Level of Service (LOS) quantifies how an intersection is operating. Intersections are graded from LOS A to LOS F, which corresponds to the average delay per vehicle values shown. An overall intersection LOS A though LOS D is generally considered acceptable in the study area. LOS A indicates the best traffic operation, while LOS F indicates an intersection where demand exceeds capacity.

Level of Service	Average Delay / Vehicles	
	Stop, Yield, and Roundabout	Signalized Intersections
A	< 10 seconds	< 10 seconds
B	10 to 15 seconds	10 to 20 seconds
C	15 to 25 seconds	20 to 35 seconds
D	25 to 35 seconds	35 to 55 seconds
E	35 to 50 seconds	55 to 80 seconds
F	> 50 seconds	> 80 seconds

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, which takes into account the total number of vehicles entering the intersection and the capability of the intersection to support the volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, most delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high-levels of delay (i.e., poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

The existing intersection capacity analysis results, summarized in [Table 1](#), indicate that all study intersections currently operate at an acceptable overall LOS D or better during the typical weekday a.m. and p.m. peak hours. In addition, side-streets and/or driveways operate at LOS C or better during the peak hours, except the Fernbrook Lane approaches to Highway 55 during the peak hours. Motorists on the Fernbrook Lane approaches at Highway 55 experience on average 55 to 75 seconds of delay (i.e., LOS E), which is primarily due to MnDOT's approach to signal timing that favors Highway 55 and results in more delay for the minor approaches. The City should continue to collaborate with MnDOT to improve signal timing and local access in this area as opportunities arise.

Existing queues are generally maintained within the current turn lanes provided within the study area. Queues from Highway 55, along Fernbrook Lane, do not extend and/or impact operations at the Fernbrook Lane and Harbor Lane intersection, nor do any queues along Harbor Lane significantly impact adjacent driveways; peak queues along Harbor Lane at Fernbrook Lane extend approximately 150' to 175' during the peak periods. Queuing at most driveways along Harbor Lane range from 1 to 4 vehicles during the peak hours, or the equivalent of 75 feet or less. Thus, there are currently no significant intersection capacity issues within the study area.

TRAFFIC FORECASTS

Traffic forecasts were developed for year 2027 conditions, which represents one-year after completion of the proposed redevelopment. The traffic forecasts account for general background growth, trip generation from the proposed redevelopment, and removal of the current office buildings. The following information summarizes the traffic forecast development process.

Background Growth

To account for general background growth in the study area, an annual growth rate of one (1) percent was applied to the existing traffic volumes to develop year 2027 background traffic forecasts. Although historical ADT volumes have been stable or decreasing within the area, the higher background growth rate was used to provide a more conservative assessment. Note that the *3005 Harbor Lane Redevelopment Traffic Study* (i.e., Chick-fil-A) assumed a half (0.5) percent annual growth rate, which is also consistent with the *Plymouth 2040 Comprehensive Plan* forecasted growth rate for the area.

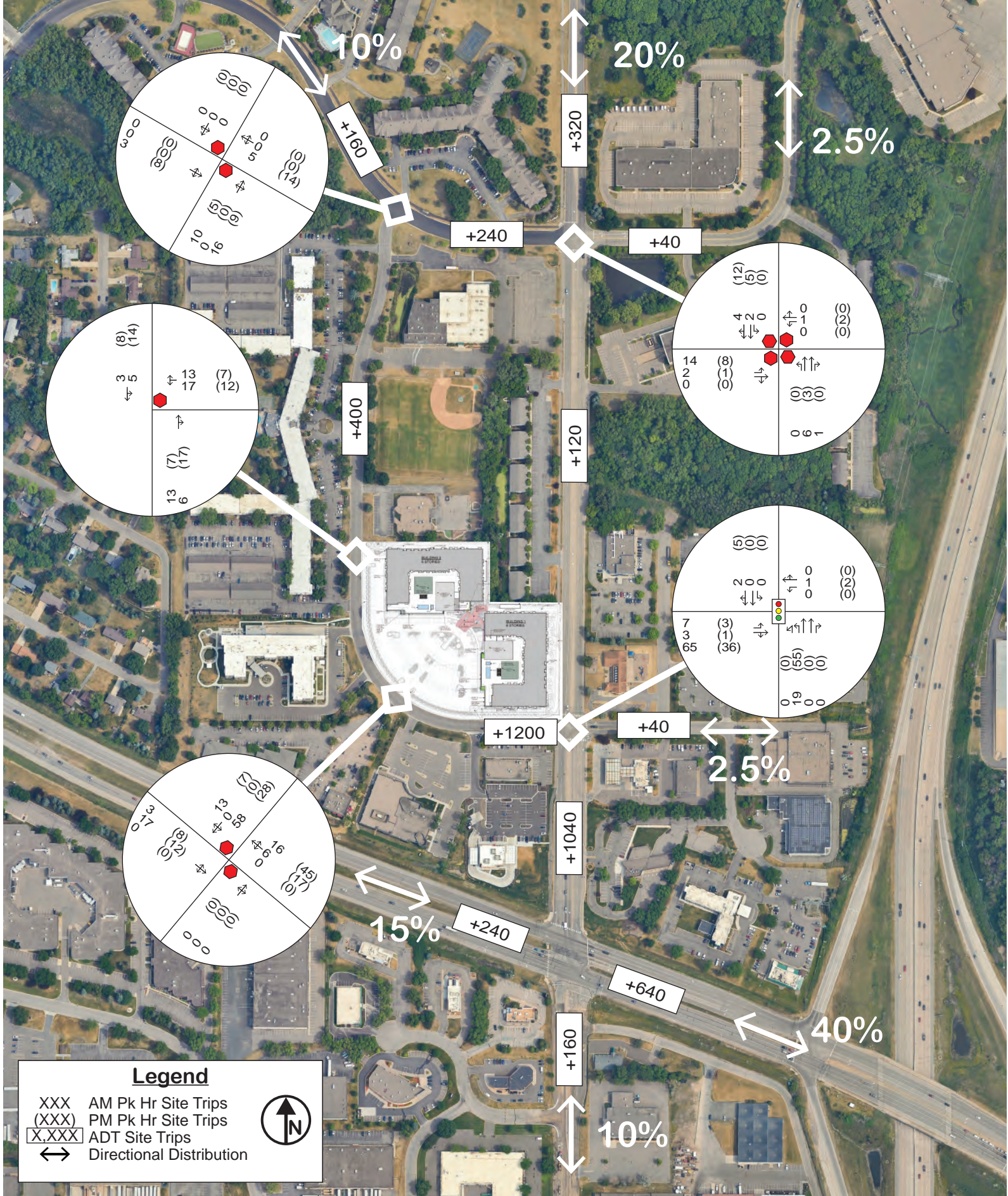
Proposed Redevelopment Trip Generation

The trip generation estimate for the proposed redevelopment was created using the *ITE Trip Generation Manual, 11th Edition* and includes trips for typical weekday a.m. and p.m. peak hours, as well as daily. The proposed redevelopment, shown in [Table 2](#), is estimated to generate 131 a.m. peak hour (30 in / 101 out), 138 p.m. peak hour (84 in / 54 out), and 1,604 daily trips. No modal reductions were applied to provide a conservative estimate. In addition, a trip generation estimate was developed for the existing Plymouth Office Center assuming full occupancy for comparison purposes. This estimate indicates the existing Plymouth Office Center has the potential to generate slightly more peak hour trips, but less overall daily trips; the in/out travel patterns are also reversed as compared to the proposed residential use. It is important to note that the existing Plymouth Office Center is generating trips at a significantly lower rate than shown in [Table 2](#).

Table 2 Trip Generation Summary

Land Use Type (ITE Code)	Size	AM Peak Hour		PM Peak Hour		Daily
		In	Out	In	Out	
Existing Plymouth Office Center Potential (if fully occupied)						
Office (710)	90,000 SF	135	18	26	126	1,060
Proposed Redevelopment						
Multifamily Housing Mid-Rise (221)	353 units	30	101	84	54	1,604
Difference (+ / -)		-105	+83	+58	-72	+544

Site generated trips were distributed throughout the study area using the directional distribution shown in [Figure 4](#), which is based on a combination of existing area travel patterns, previous area studies, and engineering judgment. The resultant year 2027 no build and build condition traffic forecasts are illustrated in [Figure 5](#) and [Figure 6](#), respectively. Note that the year 2027 no build condition includes the general background growth, while the year 2027 build condition accounts for the removal of the existing Plymouth Office Center trips in addition to the general background growth.



YEAR 2027 CONDITIONS

To understand impacts associated with the proposed redevelopment, a year 2027 no build and build condition intersection capacity analysis was conducted. [Table 3](#) provides a summary of the year 2027 no build and build condition capacity analysis.

Table 3 Year 2027 Intersection Capacity Analysis Summary

Intersection	Year 2027 Level of Service (Delay - Seconds)			
	AM Peak Hour		PM Peak Hour	
	No Build	Build	No Build	Build
Fernbrook Ln and 34 th Ave	A (7)	A (7)	A (8)	A (9)
Fernbrook Ln and Harbor Ln	B (14)	B (15)	B (17)	B (17)
Fernbrook Ln and Hwy 55	D (39)	D (43)	D (42)	D (44)
Harbor Ln and 34 th Ave	A / B (12)	A / B (12)	A / B (14)	A / B (14)
Harbor Ln and NW Site Access	A / B (10)	A / B (10)	A / B (10)	A / B (10)
Harbor Ln and Currents Access	A / B (10)	A / B (10)	A / B (10)	A / B (10)
Harbor Ln and Davani's / SW Site Access	A / B (11)	A / B (12)	A / B (11)	A / B (12)
Harbor Ln and Chick-fil-A Access	A / B (10)	A / B (10)	A / B (11)	A / B (11)

Results of the year 2027 intersection capacity analysis indicate that all study intersections and approaches are expected to continue to operate at an acceptable LOS D or better during typical weekday a.m. and p.m. peak hours under both no build and build conditions, except the Fernbrook Lane approaches to Highway 55 during the peak hours. As noted earlier, motorists on the Fernbrook Lane approaches at Highway 55 will continue to experience on average 55 to 75 seconds of delay (LOS E), which is related to MnDOT's approach to signal timing.

The level of queues on area roadways and study intersections is expected to marginally change under future year 2027 conditions. The queues are also expected to generally be maintained within the current turn lanes provided within the study area and are not expected to impact adjacent roadways or driveways. The overall change in operations from the proposed redevelopment from an intersection capacity perspective is relatively minimal and within acceptable industry standards. Thus, no additional infrastructure is needed to support the proposed redevelopment from a roadway capacity perspective.

SITE PLAN / OTHER CONSIDERATIONS

A review of the proposed site plan does not indicate any major issues. However, the following items are offered for further consideration between the City and/or project team.

- Locate signage and landscaping to avoid creating any sight distance issues.
- Extend the sidewalk along the south / west portions of the site to at least the northwest driveway and consider modifications to the Broadwell Senior Living sidewalk (west side of Harbor Lane) to improve overall multimodal access and connectivity in the area.
- Review truck maneuverability to limit potential internal circulation conflicts.
- Stripe Harbor Lane as a 3-lane facility with a center two-way left-turn lane to reduce vehicle conflicts.

CONCLUSIONS

Based on the findings of the study, the following conclusions are offered for consideration.

- 1) All study intersections and approaches currently operate at an acceptable overall LOS D or better during the typical weekday a.m. and p.m. peak hours, except the Fernbrook Lane approaches to Highway 55 during the peak hours. Motorists on the Fernbrook Lane approaches at Highway 55 experience on average 55 to 75 seconds of delay (i.e., LOS E), which is primarily due to MnDOT's approach to signal timing that favors Highway 55.
- 2) The proposed redevelopment includes 353 multifamily apartment units in two 6-story buildings; construction was assumed to be completed in the year 2026.
- 3) Traffic forecasts were developed for year 2027 no build and build conditions, which included a one (1) percent annual background growth, trip generation from the proposed redevelopment, and removal of the current office buildings.
 - a. The proposed redevelopment is estimated to generate 131 a.m. peak hour (30 in / 101 out), 138 p.m. peak hour (84 in / 54 out), and 1,604 daily trips.
 - b. The existing Plymouth Office Center has the potential to generate slightly more peak hour trips, but less overall daily trips when compared to the proposed redevelopment, however the existing Plymouth Office Center is generating trips at a significantly lower rate than its potential.
- 4) Key takeaways from the future year 2027 capacity analysis, include:
 - a. All study intersections and approaches are expected to continue to operate at an acceptable LOS D or better during typical weekday a.m. and p.m. peak hours under both no build and build conditions, except the Fernbrook Lane approaches at Highway 55 that will continue to operate at LOS E.
 - b. The overall change in operations from the proposed redevelopment from an intersection capacity perspective is relatively minimal and within acceptable industry standards; no additional infrastructure is needed to support the proposed redevelopment.
- 5) A review of the proposed site plan identified the following considerations:
 - a. Locate signage and landscaping to avoid creating any sight distance issues.
 - b. Extend the sidewalk along the south / west portions of the site to at least the northwest driveway and consider modifications to the Broadwell Senior Living sidewalk (west side of Harbor Lane) to improve overall multimodal access and connectivity in the area.
 - c. Review truck maneuverability to limit potential internal circulation conflicts.
 - d. Stripe Harbor Lane as a 3-lane facility with a center two-way left-turn lane to reduce vehicle conflicts.