Craftsman on Elliot

Mesa, Arizona

Traffic Impact Analysis

Lee Engineering Project No. 1313.01

March 2024

Prepared for:

Martens Development Company
6710 N. Scottsdale Road, Suite 140
Scottsdale, AZ 85253

Prepared by:

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(602) 955-7206

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1.0 EXECUTIVE SUMMARY

- The subject site is planned for a mixed-use development consisting of the following:
  - 386 apartments in 4-story buildings (three buildings at 22,000 SF and one building at 19,200 SF) in the center of the subject development.
  - 16,300 SF retail.
  - 2,500 SF fast-food restaurant with a drive-through window on the southeast corner of the development.
  - 6,000 SF sit-down restaurant with an outdoor patio area on the southwest corner of the development.
  - 15,000 SF office buildings (two buildings at 7,500 SF each) on the east side of the development.

- A total of 797 parking spaces will be provided throughout the development, consisting of 573 parking spaces dedicated to the residential portion of the development, and146 parking spaces dedicated to the retail portion. It is noted that 78 parking spaces are to be shared between the residential and retail portions of the development. A separate parking study provides more details.

- The site plan proposes the following five access points into and out of the site:
  - Site driveway D1: on Hawes Road about 630 feet north of Elliot Road (aligned with the Amazon Fulfilment Center driveway) and planned as a full-movement driveway.
  - Site driveway D2: on Hawes Road about 230 feet north of Elliot Road (aligned with the Amazon Fulfilment Center driveway) and planned as a right-in/right-out driveway.
  - Site driveway D3: on Elliot Road about 700 feet west of Hawes Road and planned as a ¾ driveway. In response to this development's TIA pre-submittal, City of Mesa requested that this access point not permit left-turn out movements.
  - Site driveway D4: on 82nd Street (future roadway) about 630 feet north of Elliot Road and planned as a full-movement driveway.
  - Site driveway D5: on 82nd Street about 230 feet north of Elliot Road and planned as a full-movement driveway.

- Turning movements at the intersection of Hawes Road and Elliot Road were collected on Thursday, June 15, 2023 and documented that the study area's peak hours begin at 7:30 a.m. and 5:00 p.m.

- From 2018 to 2022, the intersection of Hawes and Elliot Roads and the site's frontage experienced 7 crashes, an excellent overall safety performance averaging 1.4 crashes per year.

- The site is expected to generate about 3,194 trips on a typical weekday, with 277 of those trips in the morning peak hour and 274 trips in the afternoon peak hour.

- All site access points are estimated to operate in an acceptable manner through the 2030 horizon year.

- The eastbound left-turn movement at site driveway D3 is expected to operate at LOS E in 2025 and 2030 during the afternoon peak hour. However, this movement is expected to operate with a maximum v/c ratio of 0.27, below capacity.

- MUTCD signal warrants 1A, 1B, and 2 were analyzed for existing and projected 2025 background conditions at the intersection of Elliot Road and Hawes Road. Volume warrants were met under background 2025 conditions for warrants 1A, 1B, and 2 at the 70% threshold.

- The following turn lanes are warranted or proposed at site driveways:
    - A northbound left-turn lane is warranted on Hawes Road approaching site driveway D1. Its total storage is recommended as 165 feet with a 60-foot gap. However, this length may need to be shortened due to the limited available distance on Hawes Road from the north end of the raised median to the south edge of site driveway D1 (114 feet)..
    - A southbound right-turn lane is not warranted approaching site driveway D2. However, since a turn lane is proposed on the site plan, it should have a storage length of 145 feet with a 60-foot gap.
    - A left-turn lane is required on eastbound Elliot Road approaching site driveway D3 to maintain safe and effective traffic operations. The left-turn lane is recommended to have a 90-foot gap and 250-feet storage length.
    - A right-turn lane is warranted on westbound Elliot Road approaching site driveway D3. The right-turn lane is recommended to have a 90-foot gap and 280-foot storage length.

- The recommended length of the northbound left-turn lane into site driveway D1 (225 feet) may need to be shortened due to the limited available distance on Hawes Road from the north end of the raised median to the south edge of site driveway D1 (114 feet).

- The roadways near the proposed site access points are on horizontal tangent alignments with little vertical profile, suggesting that roadway elements are not likely to constrain sight distance.

2.0 BACKGROUND

A development is proposed for the northwest corner of Elliot Road and Hawes Road in the City of Mesa, Arizona. The site is located west of SR 202 and north of Elliot Road. Lee Engineering was recently engaged to conduct a Traffic Impact Study (TIS) of the site for the purposes of estimating its traffic impacts on the adjacent roadway network.

The location of the site is shown in **Figure 1**; a preliminary site plan is shown in **Figure 2**.

This report is intended to provide a TIS of the subject site in compliance with the City of Mesa TIS Guidelines. Lee Engineering contacted the City of Mesa on May 4, 2023, to confirm the study requirements, inquire about the latest TIS guidelines available from the City, and set up a pre-scoping discussion if needed. Lee Engineering received consensus to collect count data at the intersection of Elliot Road and Hawes Road and was provided the latest version of the TIS guidelines.

Pre-TIA documentation was submitted to the City of Mesa for review on July 13, 2023, and approval with comments was received on August 2, 2023 (attached in **Appendix A**). This report was prepared following the methodologies for a Category I analysis (development generating fewer than 500 vehicle trips during any peak hour). Comments received on the pre-TIA document have been addressed as part of this report.

Figure 1: Vicinity Map

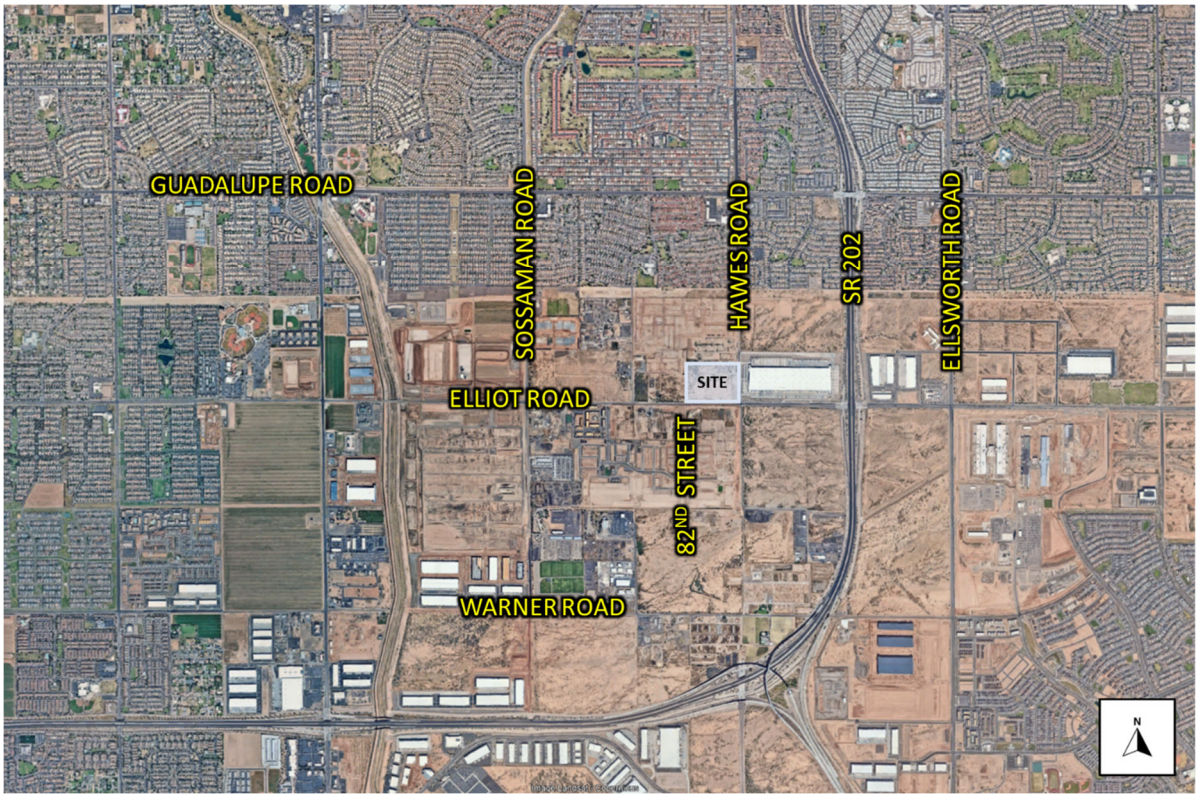
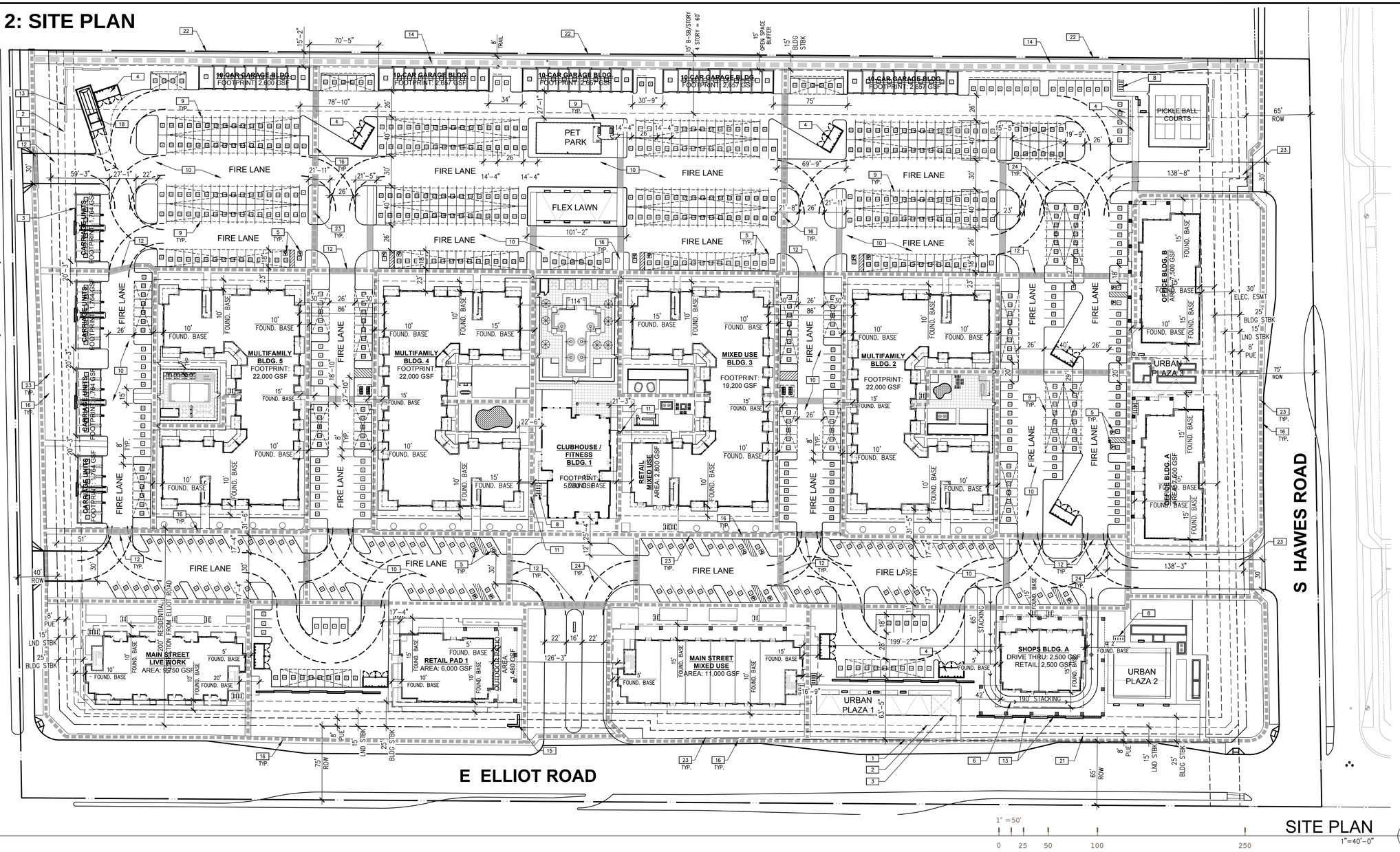


FIGURE 2: SITE PLAN



SITE PLAN
1" =50'
0 25 50 100 250
1"=40'-0"
N

SITE PLAN KEYNOTES

1. PROPERTY LINE
2. LANDSCAPE SETBACK LINE
3. 25' MAX. BUILDING SETBACK LINE
4. C.O.M. STANDARD DOUBLE BIN ENCLOSURE. SEE SITE DETAILS SHEET.
5. C.O.M. STANDARD ACCESSIBLE PARKING STALL. SEE SITE DETAILS SHEET.
6. DRIVE–THRU STACKING PER MZO SECTION 11.31.18(E)
7. RETENTION BASIN; SEE CIVIL PLANS.
8. BIKE RACKS (8 BIKE STALLS PER RACK), TYPICAL.
9. PRE–ENGINEERED PARKING SHADE STRUCTURE; TYPICAL. SEE SITE DETAILS SHEET.
10. FIRE LANE, PAINT CURB PER CITY STANDARDS.
11. SECURED–ACCESS PEDESTRIAN GATE. SEE LANDSCAPE PLANS.
12. 6" WIDE PAVERS FINISH PEDESTRIAN CROSSWALKS AT PAVEMENT, RAISE 3" ABOVE VEHICLE LANE PER MZO SECTION 11–32–4(G)
13. DECORATIVE SCREEN WALL. SEE LANDSCAPE PLANS.
14. 8'–0" STABILIZED D.G. PEDESTRIAN TRAIL PER HAWES CROSSING PAD
15. PROPOSED FUTURE MONUMENT SIGN LOCATION.
16. 6' CONCRETE SIDEWALK, TYPICAL.
17. CITY OF MESA TYPICAL PARKING STALL LAYOUT. SEE SITE DETAILS SHEET.
18. C.O.M. STANDARD CMU TRASH COMPACTOR ENCLOSURE. SEE SITE DETAILS SHEET.
19. DECORATIVE SECURITY METAL FENCE. SEE LANDSCAPE PLANS FOR FENCE DESIGN
20. SITE ACCESS DRIVEWAY TO ALIGN WITH ADJACENT PROPERTY.
21. PROPOSED FUTURE BUS PAD. OFF–SITE STREET DESIGN SHOWN FOR REFERENCE ONLY.
22. 6' H SCREENING WALL ALONG NORTH PROPERTY LINE; SEE LANDSCAPE PLANS.
23. PEDESTRIAN CIRCULATION PATH (), ON 6'–0" WIDE ADA COMPLIANT SIDEWALK.
24. FIRE TRUCK MANEUVERING CLEARANCE; 35' INSIDE RADIUS, 55' OUTSIDE RADIUS

- A RESIDENTIAL PARKING
- CA COVERED RESIDENTIAL PARKING
- G PRIVATE RESIDENTIAL GARAGE
- R RETAIL PARKING
- CR COVERED RETAIL PARKING
- M SHARED PARKING

TRASH VOLUME CALCULATION

REFERENCE CITY OF MESA STANDARD DETAIL M-62.02.2(2), M-62.02.2(3), AND M-62.02.2(4)

MULTI-FAMILY TRASH CALCULATION:

	D.U.	CY TRASH PER WEEK PER UNIT	TOTAL TRASH PER WEEK	COMPACTOR RATIO	TOTAL TRASH (CY)
TRASH	386	0.5	193	4:1	48.25
	CONTAINER TYPE	NUMBER	CAPACITY (CY)	PICKUPS PER WEEK	CAPACITY PER WEEK PER CONTAINTER
	COMPACTOR	1	25	1	25
	STANDARD BIN	5	6	1	30
	TOTAL CAPACITY PER WEEK				55
RECYCLING	D.U.	CY TRASH PER WEEK PER UNIT	TOTAL TRASH PER WEEK		TOTAL RECYCLING (CY)
	386	0.125	48.25		48.25
	CONTAINER TYPE	NUMBER	CAPACITY (CY)	PICKUPS PER WEEK	CAPACITY PER WEEK PER CONTAINTER
	STANDARD BIN	5	6	2	60

NOTE:
TRASH FROM UNITS WILL BE COLLECTED BY A PERMANENT CONCIERGE SERVICE, PROVIDED BY THE APARTMENT COMPLEX

COMMERCIAL TRASH CALCULATION:

REFERENCE TO CITY OF MESA STANDARD DETAIL M-62.02.2 (1)
EACH COMMERCIAL BUILDING REQUIRES (1) DOUBLE ENCLOSURE

DOUBLE ENCLOSURE PROVIDED: 4

DEVELOPMENT DATA

PROJECT DESCRIPTION
THE SCOPE OF THIS PROJECT IS THE MASTER PLANNING OF A MIXED USE DEVELOPMENT THAT INCLUDES 4 NEW MULTI STORY MULTIFAMILY APARTMENT BUILDINGS AND 5 COMMERCIAL USE SINGLE STORY BUILDINGS, BUILT OVER ONE PHASE.

A.P.N.	304-04-031
LOCATION	NWC ELLIOT RD. AND S. HAWES RD., MESA, AZ
GROSS SITE AREA	978,357 SF (22.46 ACRES)
NET SITE AREA	838,780 SF (19.26 ACRES)
CURRENT ZONING	MX-U (MIXED USE URBAN)
PROPOSED USE	COMMERCIAL AND MULTIFAMILY DEVELOPMENT
EXISTING USE:	VACANT LOT / AGRICULTURE
GENERAL PLAN:	MIXED USE / EMPLOYMENT

LOT USE PERCENTAGES (NET AREAS):

RESIDENTIAL	553,280 SF (12.71 AC) = 65%
COMMERCIAL	285,500 SF (6.55 AC) = 35%

MAXIMUM SETBACKS PROVIDED:

	SIDE(E)	REAR(N)	SIDE(W)	FRONT(S)
BUILDING	25'	25'	25'	25'
LANDSCAPE	15'	15'	15'	15'

URBAN PLAZA AREA:

URBAN PLAZA #1	8,300 SF
URBAN PLAZA #2	13,750 SF
URBAN PLAZA #3	2,500 SF
TOTAL URBAN PLAZA AREA:	24,550 SF

TOTAL SITE AREA:	838,780 SF
REQUIRED COVERAGE:	2.0% *(PER HAWES CROSSING PAD)*
AREA REQUIRED (2.0%) =	16,776 SF
AREA PROVIDED (2.9%) =	24,550 SF

RESIDENTIAL PROJECT DATA

VALUES ARE APPROXIMATE FOR INITIAL SITE PLANNING PURPOSES

RESIDENTIAL SITE AREA		553,280 SF (12.71 AC)
RESIDENTIAL BUILDING		
MIXED-USE APARTMENTS	(1) x	19,200 SF = 19,200 SF
APARTMENTS	(3) x	22,000 SF = 66,000 SF
CARRIAGE HOUSE	(4) x	1,600 SF = 6,400 SF
MAIN ST LIVE/WORK	(1) x	11,000 SF
MAIN ST MIXED-USE	(1) x	11,000 SF
TOTAL BUILDING AREA		**113,600 SF**
RESIDENTIAL UNITS		
MIXED-USE APARTMENTS	(1) x	(84) DU ea = 84 DU
APARTMENTS	(3) x	(88) DU ea = 264 DU
CARRIAGE HOUSE	(4) x	(2) DU ea = 8 DU
MAIN ST LIVE/WORK	(1) x	18 DU
MAIN ST MIXED-USE	(1) x	12 DU
TOTAL UNITS		**386 DU**
50% MRU CAP: 193		
DENSITY		
DENSITY ALLOWED		25 D.U. / AC
DENSITY PROVIDED		
GROSS = 386 / 22.46 =		17.19 DU/AC
NET = 386 / 19.26 =		20.04 DU/AC
BUILDINGS COVERAGE		
TOTAL BUILDINGS AREA		113,600 SF
BUILDING COVERAGE		21%
PARKING		
386 UNITS (1.6 SP/DU) =		618 SP
RESIDENTIAL (SURFACE):		94 SP
RESIDENTIAL (GARAGE):		74 SP
RESIDENTIAL (COVERED):		405 SP
SHARED (SURFACE):		78 SP
TOTAL PARKING		**651 SP**
PARKING RATIO		
651 SP / 386 DU =		1.68 SP/DU

COMMERCIAL PROJECT DATA

VALUES ARE APPROXIMATE FOR INITIAL SITE PLANNING PURPOSES

COMMERCIAL SITE AREA		285,500 SF (6.55 AC)
BUILDINGS COVERAGE		
TOTAL BUILDINGS AREA		42,050 SF
BUILDING COVERAGE		14.71%
OPEN SPACE (5%)		
REQUIRED (42,000*.05) =		2,100 SF
PROVIDED =		24,550 SF
BUILDING TYPE		
OFFICE		15,000 SF
REST - SIT DOWN		6,000 SF
REST. - PATIO		1,480 SF
REST - DRIVE THRU		2,500 SF
RETAIL		16,300 SF
TOTAL COMMERCIAL		41,280 SF
PARKING		
REQUIRED		
OFFICE	1/375 SF	40
REST. - SIT DOWN	1/75 SF	80
REST. - PATIO	1/200 SF	8
REST - DRIVE THRU	1/100 SF	25
RETAIL	1/275 SF	60
		213
DEDICATED RETAIL:		104
COVERED:		42
SHARED:		78
PROVIDED:		224
PARKING RATIO: 5.3 SP / 1,000 SF		

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THE CRAFTSMAN ON ELLIOT

8264 EAST ELLIOT ROAD
MESA, ARIZONA 85212

OVERALL SITE PLAN

REMARKS	DATE
SP/DRB SUBMITTAL #4	20240311

PA / PM:	C.BRUCE
DRAWN BY:	W.M.
JOB NO.:	PHX22-0196-00

SHEET
DR050

3.0 EXISTING TRANSPORTATION SYSTEM

Elliot Road is classified as an arterial street, according to the City of Mesa.[1] Between Hawes Road and SR 202, Google Earth aerial imagery indicates that in June 2022, Elliot Road has been reconstructed to provide two westbound lanes and one eastbound lane following the construction of the Amazon Fulfilment Center north of Elliot Road (opened on June 9, 2023). Additionally, curbs, gutter, sidewalks, and streetlighting were provided as part of these improvements and are present fronting this site.

Through the Hawes Road intersection and fronting the subject site, Elliot Road carries one lane in each direction. Elliot Road is posted with a 45-mph speed limit, and it carries about 7,900 vehicles per day through Hawes Road, according to the City of Mesa 2022 Traffic Volume Map.

The City's 2040 Transportation Plan calls for Elliot Road to be widened to a 6-lane divided roadway in the future.

Hawes Road is also classified as an arterial roadway by the City of Mesa, but it carries much less traffic in the study area: about 1,700 vehicles per day, according to the city's 2022 Traffic Volume Map. Adjacent to the Amazon Fulfilment Center and fronting the subject site, Hawes Road is an undivided roadway that carries one lane in each direction separated by a two-way left-turn lane (TWLTL). As part of the improvements on Elliot Road, Google Earth aerial imagery shows that the east side of Hawes Road adjacent to the Amazon Fulfilment Center has been reconstructed to be equipped with curbs, gutters, sidewalks, and streetlighting. Additionally, these improvements included the reconstruction of the southbound approach of Hawes Road at its intersection with Elliot Road to include a separate right-turn lane and a shared through and left-turn lane. It is posted with a 35-mph speed limit.

South of Elliot Road, Hawes Road is not continuous to the next mile-line arterial street, Warner Road. It is marked with a DEAD END sign and has no pavement markings.

The City's 2040 Transportation Plan calls for Hawes Road to be widened to a 6-lane divided roadway in the future.

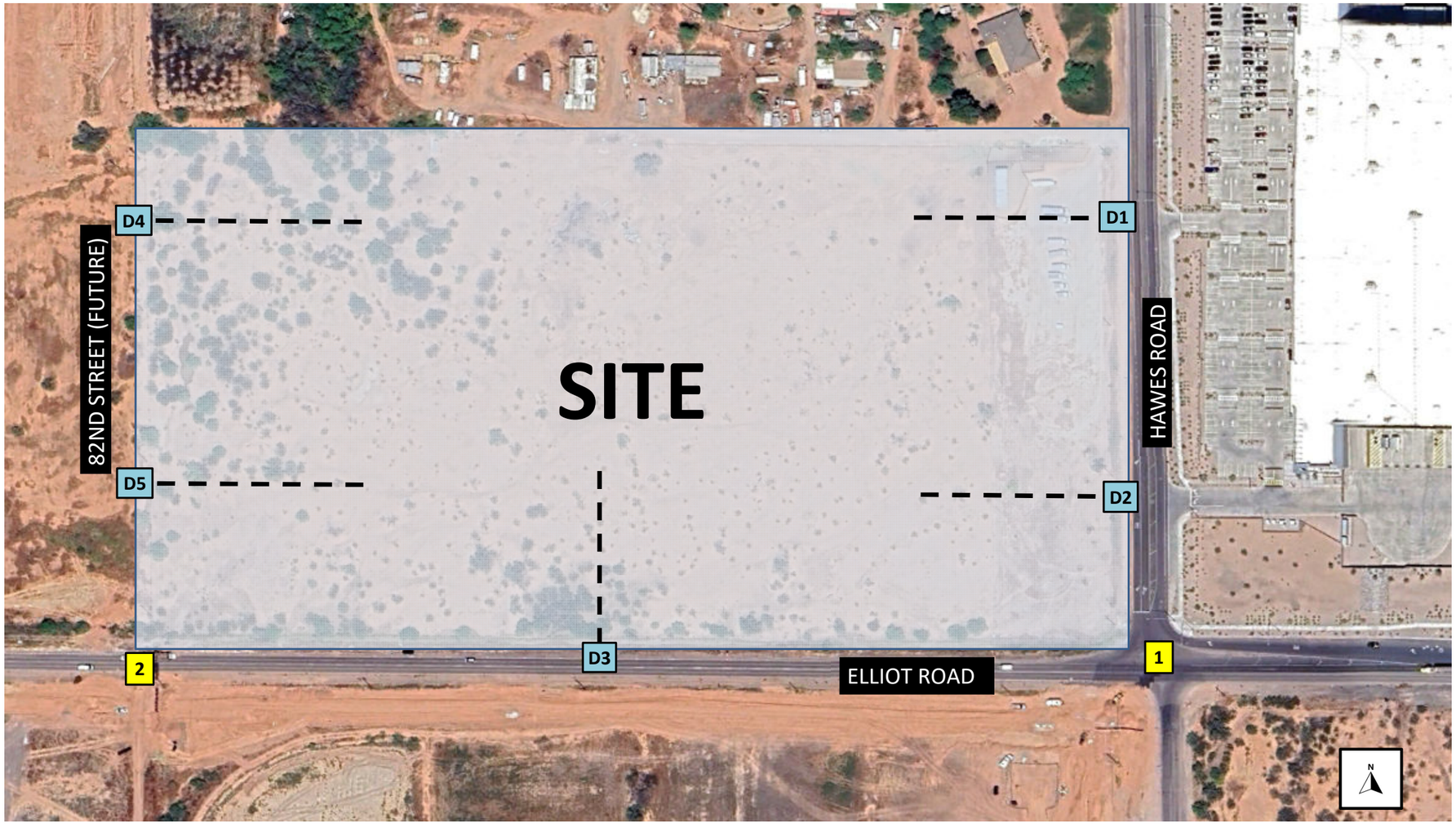
The intersection of Elliot and Hawes Roads is stop controlled on Hawes Road. At Elliot Road, there is a slight offset between the north and south legs of Hawes Road, but the offset is small enough that both legs operate sufficiently as a single intersection.

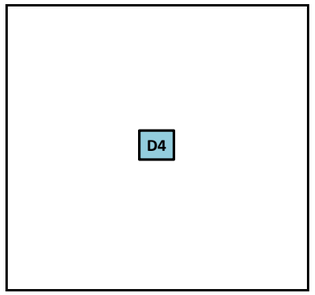
4.0 DATA COLLECTION

Turning movements at the intersection of Hawes Road and Elliot Road were collected by Field Data Services on Thursday, June 15, 2023. Turning movement counts were collected for a 24-hour period.

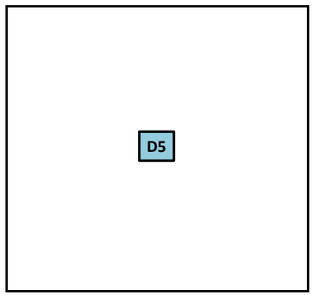
[1] City of Mesa 2040 Transportation Plan, Functional Classification Map 2.2.14, p. 68.

The results of data collection indicate the study area's peak hours begin at 7:30 a.m. and 5:00 p.m. The 2023 peak-hour volumes, existing lane configurations at the study intersections, and current traffic control are provided in **Figure 3**. Complete count data is provided in **Appendix B**.

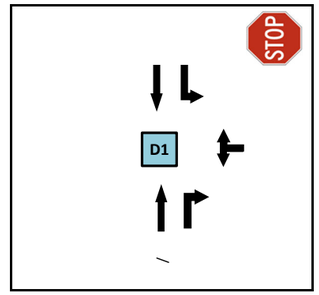




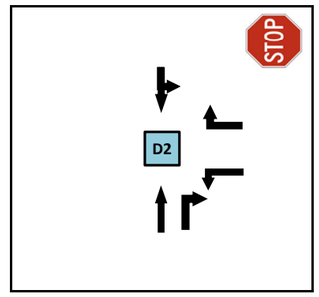
82nd Street & Site Driveway 4



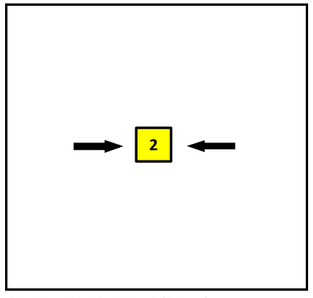
82nd Street & Site Driveway 5



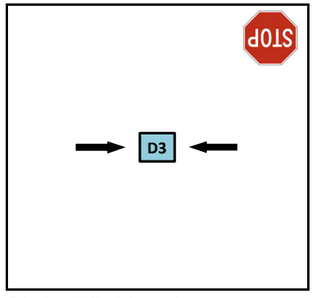
Hawes Road & Site Driveway 1



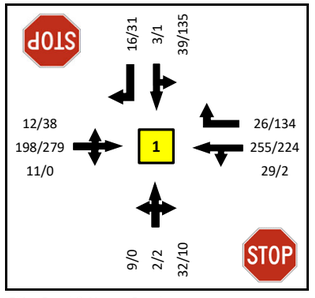
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



Elliot Road & Hawes Road

LEE ENGINEERING

2023 EXISTING PEAK HOUR VOLUME, LANE CONFIGURATIONS, AND TRAFFIC CONTROL

Legend
AM/PM

FIGURE 3

5.0 CRASH DATA

Crashes were reviewed using ADOT's Safety DataMart for the most recent 5-year period for which data is available, from 2018 to 2022. The study area included crashes that occurred at the intersection of Hawes and Elliot Roads and along the site's frontage on Hawes and Elliot Roads. During the 5 years evaluated, the study area experienced 7 crashes (averaging 1.4 crashes per year), very good safety performance. For context, an intersection typically can meet the crash warrant in the *Manual on Uniform Traffic Control Devices* (MUTCD) if it experiences at least 5 crashes per year. A summary of crashes is provided in **Appendix C**, leading to the following observations:

- One crash occurred during 2019, one in 2020, two in 2021, and three in 2022.
- No fatal crashes were reported in the study area. The majority of crashes involved property damage only, while only two crashes involved possible and serious injuries.
- The manner of collision indicated two single-vehicle crashes, and one each of angle, U-turn, side swipe opposite direction, rear-end, and head-on crashes.
- No crashes involved non-motorists.
- Two of the crashes occurred during daylight hours, and the remaining occurred after dark.

While no crash is desirable, the study area's average of 1.4 crashes per year is an acceptable safety record. Since no particular crash type is overrepresented, no clear safety countermeasures are apparent.

6.0 PROPOSED DEVELOPMENT

6.1 Development Description

The conceptual site layout plan is attached. The site is planned for a mixed-use development consisting of the following:

- 386 apartments in 4-story buildings (three buildings at 22,000 SF and one building at 19,200 SF) in the center of the subject development.
- 16,300 SF retail.
- 2,500 SF fast-food restaurant with a drive-through window on the southeast corner of the development.
- 6,000 SF sit-down restaurant with an outdoor patio area on the southwest corner of the development.
- 15,000 SF office buildings (two buildings at 7,500 SF each) on the east side of the development.

The site is on parcel number 304-04-031, according to the Maricopa County Assessor's Office, with a zoning of MX-U (Mixed Use Urban). The parcel is currently vacant with native desert vegetation.

The following land uses are adjacent to the subject parcel:

- North of site: Agricultural land
- South of site: Vacant (Proposed Hawes Crossing Development)
- East of site: Amazon Fulfilment Center

- West of site: Vacant (Proposed Hawes Crossing Development)

Passenger car parking lots are proposed to be situated throughout the subject site between the structures. A total of 573 parking spaces are dedicated for the residential portion of the development, while 146 parking spaces are dedicated for the retail portion. It is noted that 78 parking spaces are to be shared between the residential and retail portions of the development, equaling a total of 797 parking spaces provided throughout the subject development. Additionally, five 10-car garage buildings are proposed to be situated on the north side of the subject development. A parking study of the site has been provided under separate cover.

The development is assumed to open in the year 2025.

6.2 Access

The site plan proposes the following five access points into and out of the site:

- Site driveway D1: on Hawes Road about 630 feet north of Elliot Road (aligned with the Amazon Fulfilment Center driveway) and planned as a full-movement driveway.
- Site driveway D2: on Hawes Road about 230 feet north of Elliot Road (aligned with the Amazon Fulfilment Center driveway) and planned as a right-in/right-out driveway.
- Site driveway D3: on Elliot Road about 700 feet west of Hawes Road and planned as a ¾ driveway. In response to this development's TIA pre-submittal, City of Mesa requested that this access point not permit left-turn out movements.
- Site driveway D4: on 82nd Street (future roadway) about 630 feet north of Elliot Road and planned as a full-movement driveway.
- Site driveway D5: on 82nd Street about 230 feet north of Elliot Road and planned as a full-movement driveway.

6.3 Projected Traffic

6.3.1 Background Traffic Growth

Background traffic consists of two components: trips generated from the overall growth of the local and surrounding community and trips generated by specific development projects near the site.

Ambient Traffic Growth Rate

To determine ambient traffic growth of the general study area, an annual background traffic growth rate of 2.0% per year was assumed based on studies of nearby developments.

In accordance with the requirements of the City of Mesa's TIS guidelines for a Category I study for a development generating fewer than 500 peak-hour trips, analysis of the opening year (2025) and 5-year horizon after opening (2030) were conducted.

To estimate 2025 Background conditions (without site traffic), the existing 2023 traffic volumes in **Figure 3** were increased by 4.04%, or 2.0% growth for 2 years. Similarly, to estimate 2030

conditions, the **Figure 3** volumes were increased by 14.87%, or 2.0% growth for 7 years.

Other Developments Influencing Study Area Traffic Growth

The Hawes Crossing development is proposed to be located northwest of the State Route 202 (SR 202) and State Route 24 (SR 24) system interchange in Mesa, Arizona. A traffic impact study was completed for this development in November 2019. The development land uses are proposed to include single family residential, multi-family residential, commercial, office, and technology land uses on approximately 1,132 acres. The site is anticipated to generate approximately 125,486 daily trips with 5,784 trips during the morning peak hour and 10,746 trips during the afternoon peak hour.

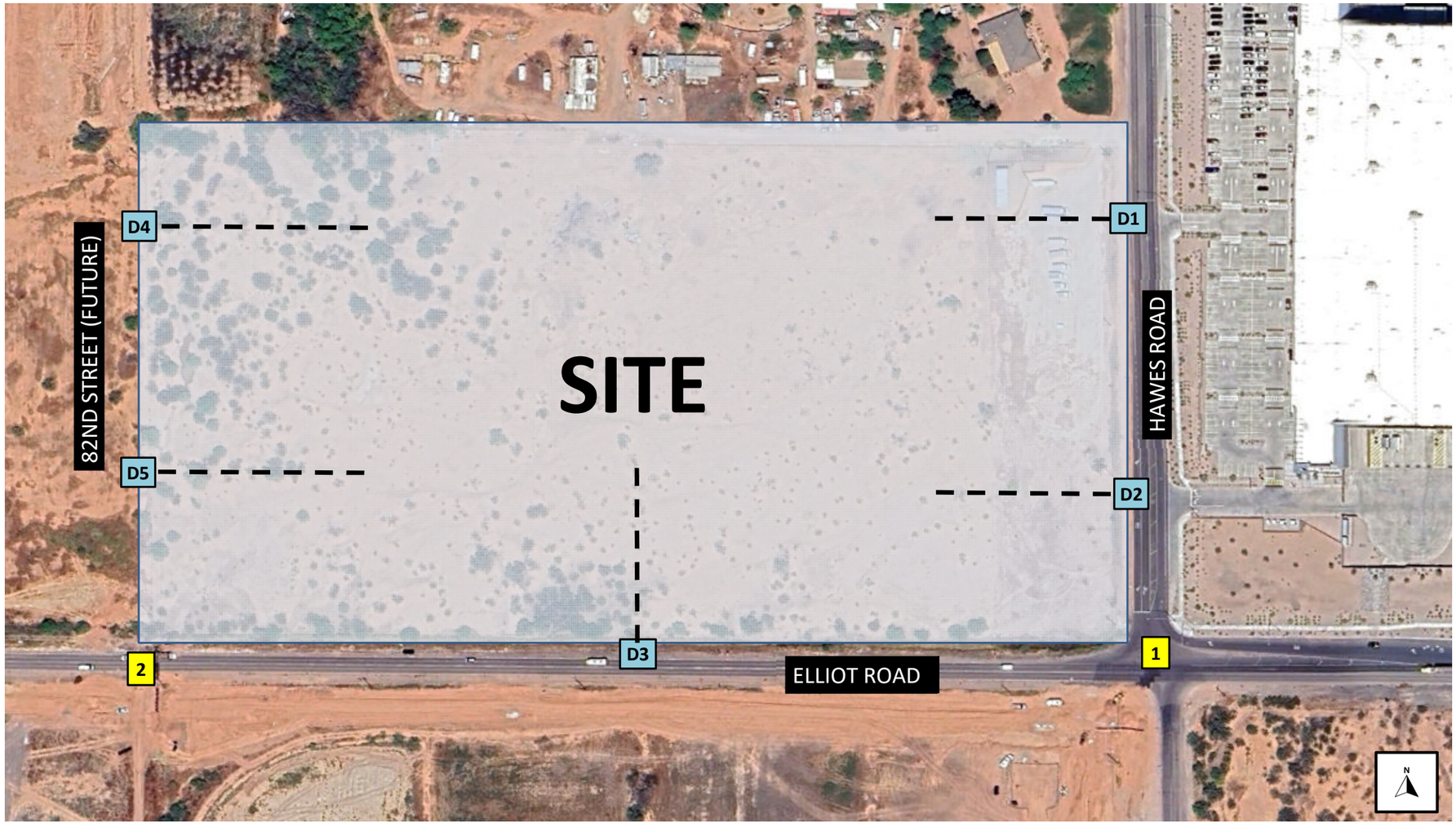
A separate traffic impact study was completed in July 2023 for the mixed-use development (part of the Hawes Crossing Development) on the northwest corner of Elliot Road and 82nd Street. The development land uses include multi-family residential, retail, and a fast-food restaurant. The site is anticipated to generate 1,962 daily trips, 218 trips during the morning peak hour, and 147 trips during the afternoon peak hour.

The morning and afternoon peak-hour site-generated traffic from the Hawes Crossing development studies were used to estimate the trip contributions for use in this report. The information provided for each report is provided in **Appendix D**. **Figure 4** shows the combined daily, morning, and afternoon peak-hour traffic volumes these adjacent developments are projected to add to the study area intersections (Elliot Road intersections with Hawes Road and 82nd Street).

It is noted that the volumes derived from the Hawes Crossing Master Traffic Impact Analysis study contain trips generated by the anticipated development on the northwest corner of Elliot Road and 82nd Street and the subject proposed Craftsman on Elliot development on the northwest corner of Elliot Road and Hawes Road. However, a volume reduction was not performed for these volumes as a conservative approach.

Figure 5 shows the 2025 Background traffic volumes (ambient traffic growth added to the traffic generated from adjacent developments)

Figure 6 shows the 2030 Background traffic volumes (ambient traffic growth added to the traffic generated from adjacent developments).



D4

82nd Street & Site Driveway 4

D1

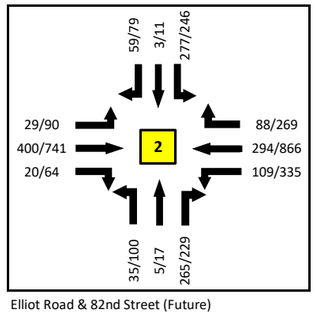
Hawes Road & Site Driveway 1

D5

82nd Street & Site Driveway 5

D2

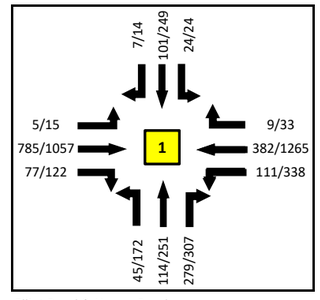
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)

D3

Elliot Road & Site Driveway 3



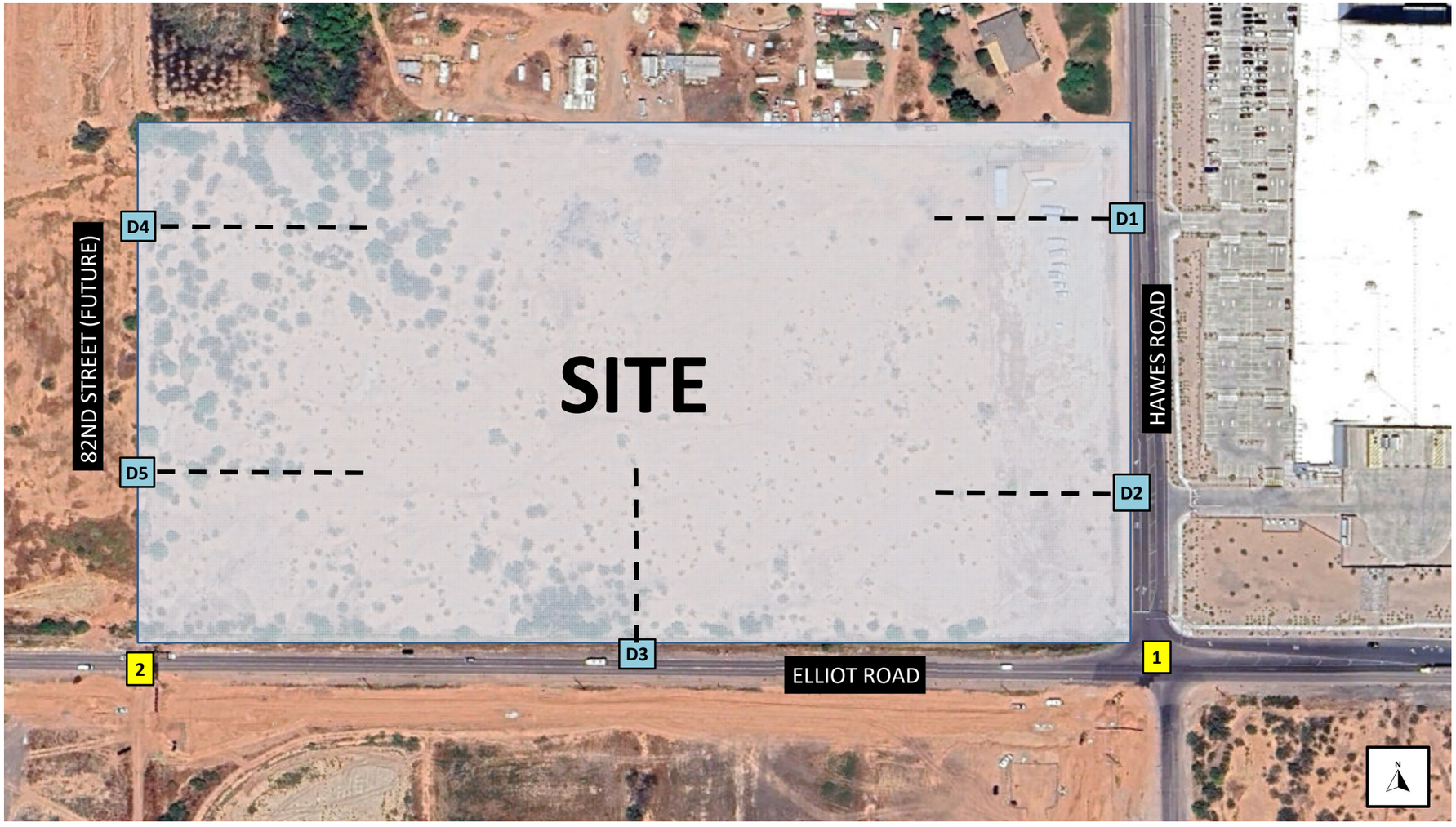
Elliot Road & Hawes Road

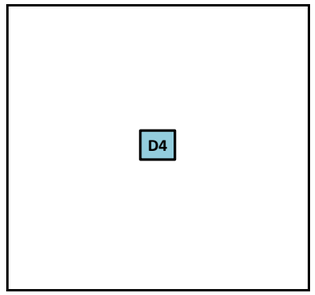
LEE ENGINEERING

Background Traffic Volumes - Site Adjacent Development Traffic

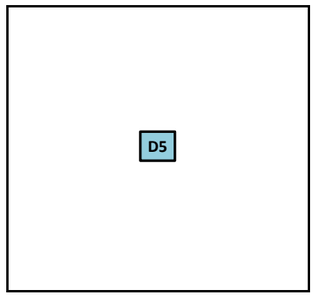
Legend
AM/PM

FIGURE 4

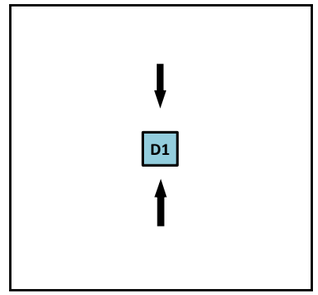




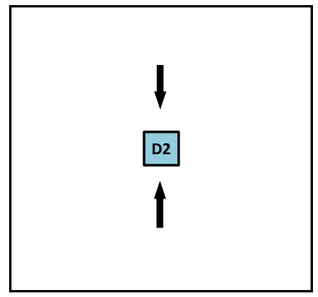
82nd Street & Site Driveway 4



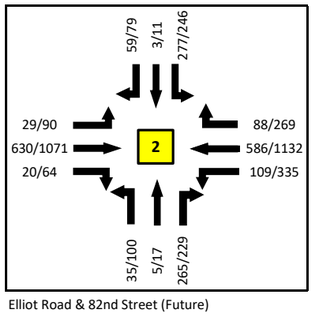
82nd Street & Site Driveway 5



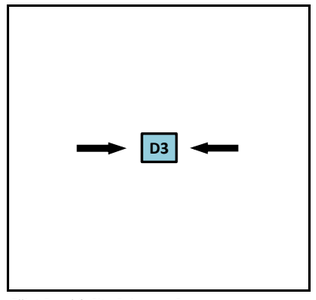
Hawes Road & Site Driveway 1



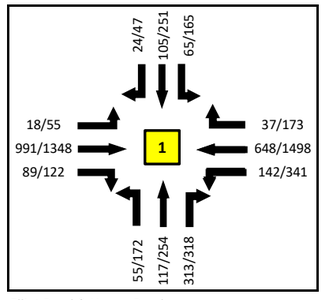
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



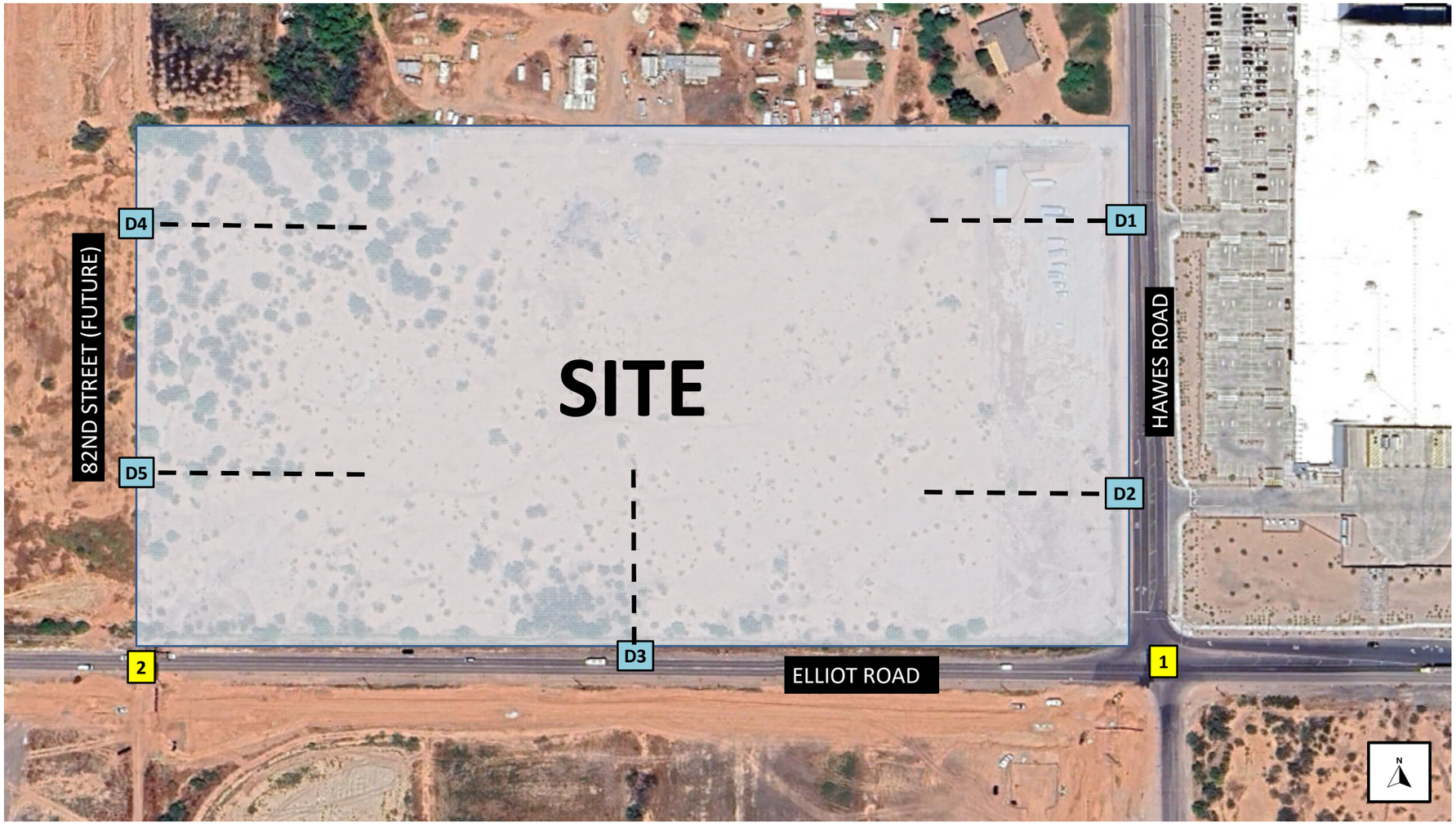
Elliot Road & Hawes Road

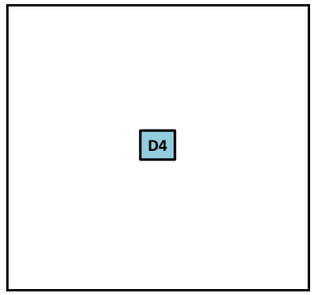
LEE ENGINEERING

2025 BACKGROUND CONDITIONS DIAGRAM

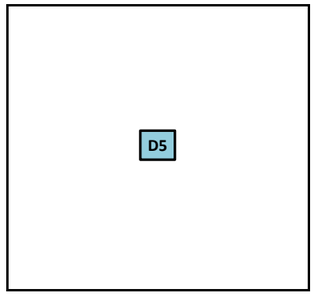
Legend
AM/PM

FIGURE 5

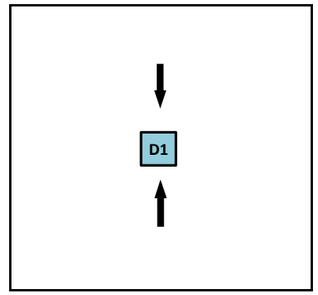




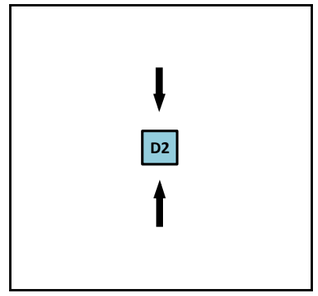
82nd Street & Site Driveway 4



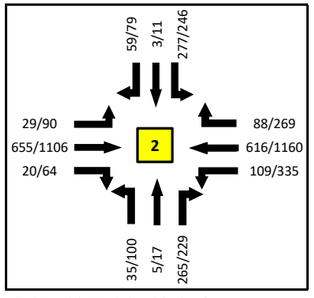
82nd Street & Site Driveway 5



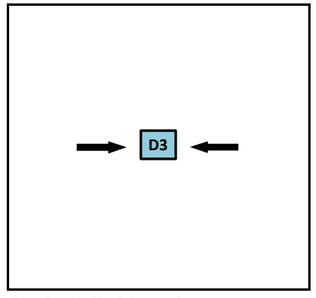
Hawes Road & Site Driveway 1



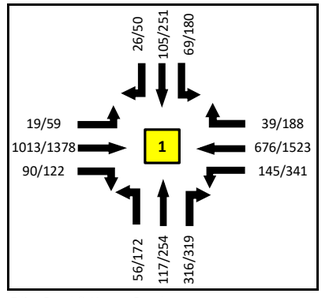
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



Elliot Road & Hawes Road

LEE ENGINEERING

2030 BACKGROUND CONDITIONS DIAGRAM

Legend
AM/PM

FIGURE 6

6.3.2 Trip Generation

The first step in estimating traffic to and from the proposed development is to calculate trip generation, which is the total vehicle trips to and from the site over a given time period. The Institute of Transportation Engineers *Trip Generation* Manual, 11th Edition, was used to estimate site traffic. Based on the site plan provided, the following ITE land use codes (LUCs) best represent the site:

- LUC 221, Multifamily Housing (Mid-Rise), 386 dwelling units
- LUC 822, Strip Retail Center (<40K), 16,300 square feet
- LUC 934, Fast-Food Restaurant with Drive-Through Window, 2,500 square feet
- LUC 932, High-Turnover (Sit-Down) Restaurant, 6,000 square feet
- LUC 712, Small Office Building, 15,000 square feet

A number of trip reduction factors can be applied to specific land uses to better estimate the total number of trips the site is expected to generate. The factors include the site's mix of land uses (internal site interaction), vehicles already on the adjacent roadway attracted to the site due to its offered convenience (pass-by trips), and availability of alternative travel modes.

6.3.3 Mode Split

It is anticipated that all site trips will be vehicle-based trips to and from the site. No credit for bus, bike, walk, or other alternative travel modes were taken.

6.3.4 Pass-by Traffic

When motorists make an intermediate stop at an adjacent land use on the way to their primary trip destination, they are said to have made a pass-by trip. Pass-by trips are not new trips added to the roadway network, as these trips divert from existing traffic streams to reach the site. The *ITE Trip Generation Handbook* publishes average pass-by rates for different land uses based on studies at similar types of developments. The following pass-by rates were used for this analysis as recommended by ITE:

- 34% during the afternoon peak period for the strip retail center.
- 62% and 56% during the morning and afternoon peak periods, respectively, for the fast-food restaurant.
- 43% during the afternoon peak period for the sit-down restaurant.

Figure 7 shows how morning and afternoon peak-hour pass-by trips were accounted for in this analysis.

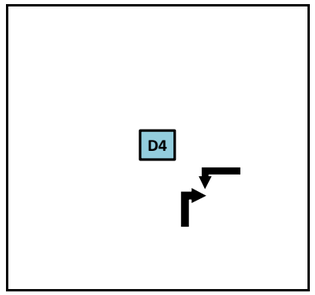
6.3.5 Internal Site Interaction

Internal trip capture is the portion of the total trips generated by a mixed-use development that begin and end on-site. An office tenant who walks over to one of the Shops & Offices restaurants for lunch would be making an internal trip. The importance of internal trip capture is that internal trips satisfy a portion of the total development's trip generation without adding any traffic volume

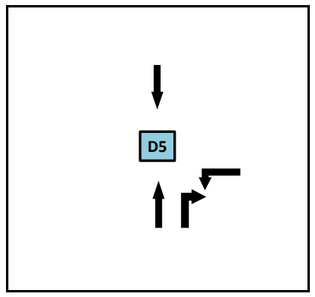
or turning movements to the external roadway network. In short, pass-by trips get assigned to site driveways and internally captured trips do not.

The internal site interaction reduction percentage was estimated using the NCHRP Report 684 spreadsheet estimator (attached in **Appendix E**). For the purposes of this analysis, the percentage has been conservatively capped at 15%.

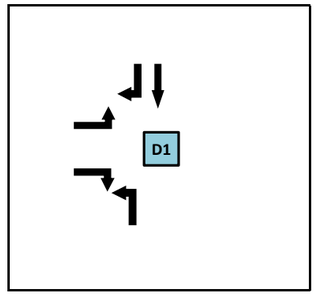
Table 1 presents the trip generation data for the site. In total, the site is expected to generate about 3,194 trips on a typical weekday, with 277 of those trips in the morning peak hour and 274 trips in the afternoon peak hour.



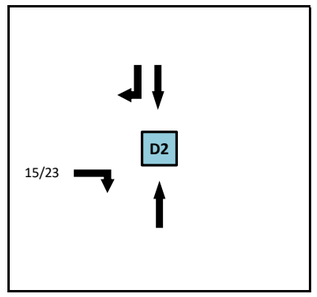
82nd Street & Site Driveway 4



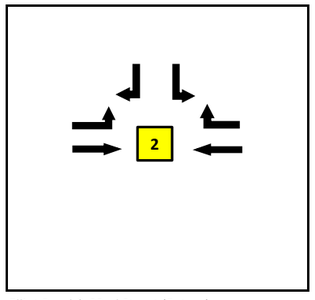
82nd Street & Site Driveway 5



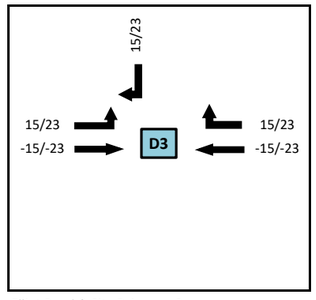
Hawes Road & Site Driveway 1



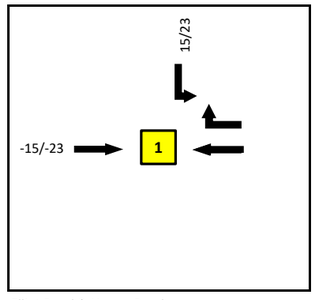
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



Elliot Road & Hawes Road

LEE ENGINEERING

PASS BY TRIPS

Legend
AM/PM

FIGURE 7

Table 1: Site Trip Generation

		Craftsman on Elliot					
Description	Land Use	Residential	Retail			Office	
	ITE Land Use Code	221	822	934	932	712	
	ITE Land Use Title	Multifamily Housing (Mid-Rise)	Strip Retail Center (<40K)	Fast-Food Restaurant with Drive-Through Window	High-Turnover (Sit-Down) Restaurant	Small Office Building	
	Land Use Variable	Dwelling Units	1000 SF GLA	1000 SF GFA	1000 SF GFA	1000 SF GFA	
	Variable Amount (X)	386	16.300	2.500	6.000	15.000	
Trip Rates	Weekday	T = 4.77(X) - 46.46	T = 42.20(X) + 229.68	T = 467.48(X)	T = 107.20X)	T = 14.39X)	
	AM Peak Hour	T = 0.44(X) - 11.61	Ln(T) = 0.66 Ln(X) + 1.84	(T) = 44.61(X)	T = 9.57(X)	T = 1.67(X)	
	PM Peak Hour	T = 0.39(X) + 0.34	Ln(T) = 0.71 Ln(X) + 2.72	(T) = 33.03(X)	T = 9.05(X)	T = 2.16(X)	
Inbound Percent	Weekday	50%	50%	50%	50%	50%	
	AM Peak Hour	23%	60%	51%	55%	82%	
	PM Peak Hour	61%	50%	52%	61%	34%	
Total Trip Ends	Weekday	1795	918	1169	643	216	4741
	AM Peak Hour Inbound	36	24	57	32	21	170
	AM Peak Hour Outbound	122	16	55	26	5	224
	PM Peak Hour Inbound	92	55	43	33	11	234
	PM Peak Hour Outbound	59	55	40	21	21	196
Internal Site Interaction Reduction Percent [1]	Daily	15%	15%	15%	15%	15%	
	AM	15%	15%	15%	15%	15%	
	PM	15%	15%	15%	15%	15%	
External Trips	Weekday	1526	780	994	547	184	4031
	AM Peak Hour Inbound	31	20	48	27	18	144
	AM Peak Hour Outbound	104	14	47	22	4	191
	PM Peak Hour Inbound	78	47	37	28	9	199
	PM Peak Hour Outbound	50	47	34	18	18	167
Pass-by Traffic [2]	AM Peak Hour Percentage	0%	0%	62%	0%	0%	
	PM Peak Hour Percentage	0%	34%	56%	43%	0%	
	AM Peak Hour Trip Ends	0	0	59	0	0	
	PM Peak Hour Trip Ends	0	32	40	20	0	
New Trip Ends	Weekday	1526	647	408	429	184	3194
	AM Peak Hour Inbound	31	20	19	27	18	115
	AM Peak Hour Outbound	104	14	18	22	4	162
	PM Peak Hour Inbound	78	31	17	18	9	153
	PM Peak Hour Outbound	50	31	14	8	18	121

1. NCHRP Report 684 Estimator. Daily site interaction estimated as the average of AM and PM values. The maximum site interaction reduction percentage has been capped at 14%.

2. Trip Generation Handbook, 3rd Ed., ITE, 2017. Daily pass-by percent is the average of the AM and PM values. The maximum pass-by trip percentage has been capped at 50%.

6.3.6 Trip Distribution and Assignment

Site-generated trips have been distributed onto the adjacent roadway network based in part on existing traffic volume collected as a result of this study and in part on engineering judgment, considering traffic patterns in the nearby and broader area. The distribution percentages assumed for this study are presented in **Figure 8**.

For simplicity, the percentages were assumed to be the same for all time periods as well as for entering and exiting traffic. As indicated on the figure, the site traffic distribution is proposed as follows in **Table 2**:

Table 2. Site Trip Distribution

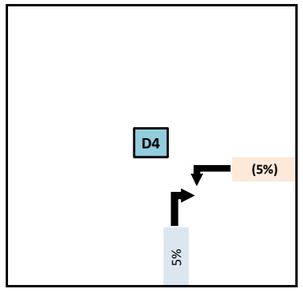
To/from north on Hawes Road	10%
To/from south on Hawes Road	10%
To/from east on Elliot Road	65%
To/from west on Elliot Road	10%
To/from south on 82nd Street	5%

Based on the trip generation values and distribution percentages above, site-generated traffic volumes are presented in **Figure 9**.

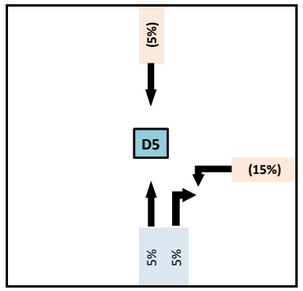
6.3.7 Total Traffic Conditions

To determine the total traffic volumes for the 2025 opening year of the proposed development, the pass-by trips and the site-related volumes were added to the background 2025 volumes. **Figure 10** presents the total traffic volume estimated for 2025.

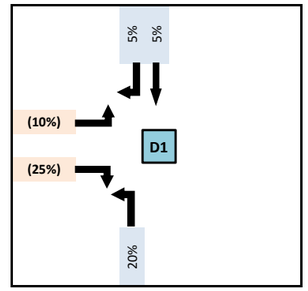
Similarly, **Figure 11** displays the 2030 total volume conditions, estimated by adding the pass-by trips and the site-related volumes to the 2030 background volumes.



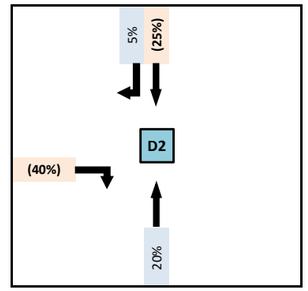
82nd Street & Site Driveway 4



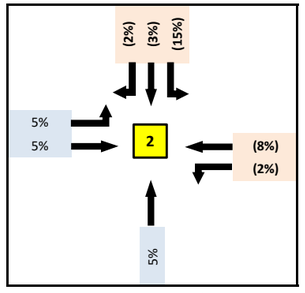
82nd Street & Site Driveway 5



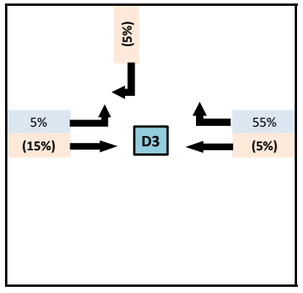
Hawes Road & Site Driveway 1



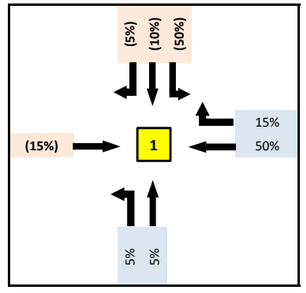
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



Elliot Road & Hawes Road

LEE ENGINEERING

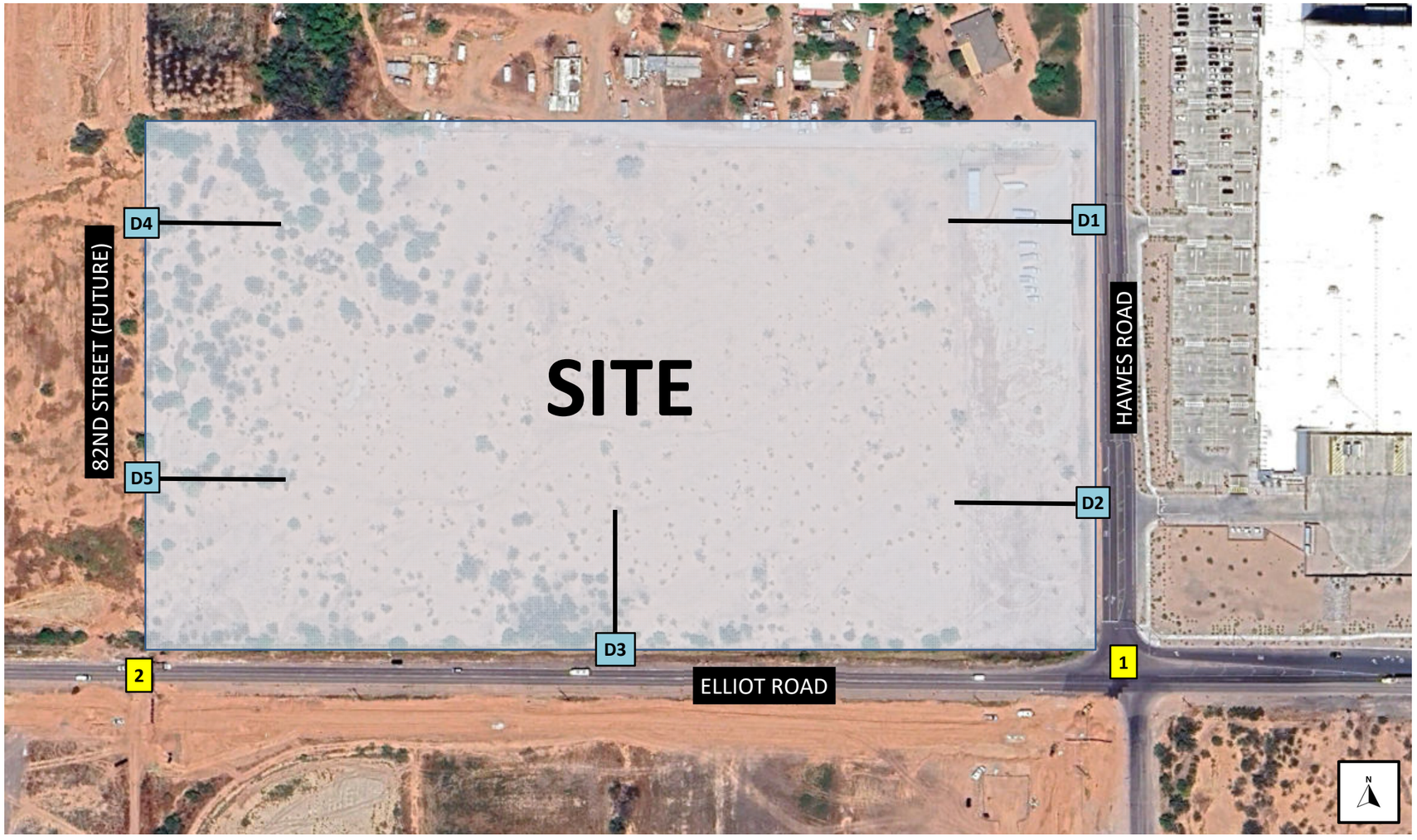
SITE TRAFFIC DISTRIBUTION

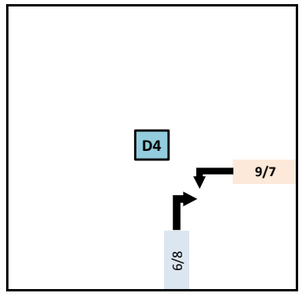
LEGEND

XX% ARRIVALS

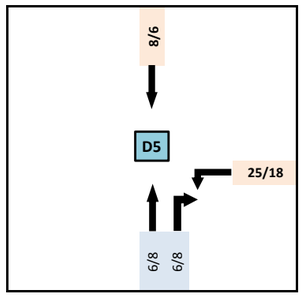
(XX%) DEPARTURES

FIGURE 8

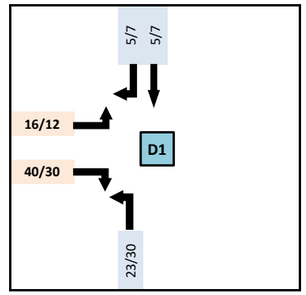




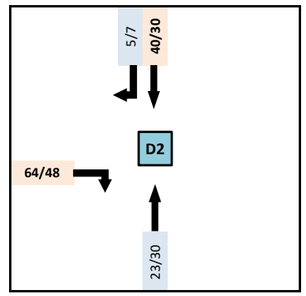
82nd Street & Site Driveway 4



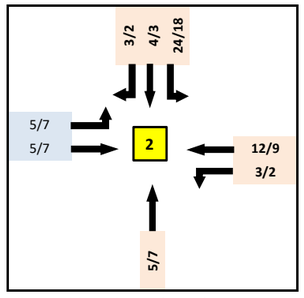
82nd Street & Site Driveway 5



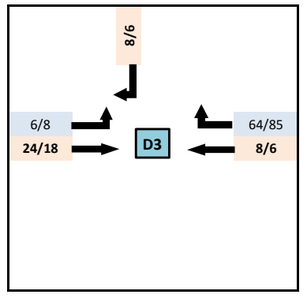
Hawes Road & Site Driveway 1



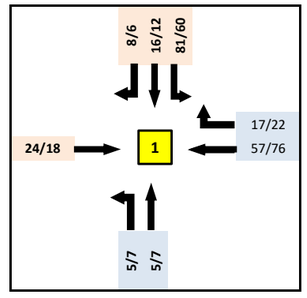
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



Elliot Road & Hawes Road

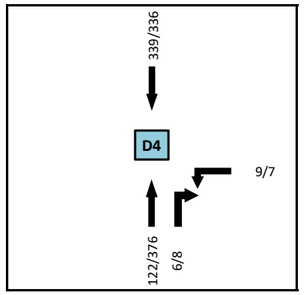
LEE ENGINEERING

SITE GENERATED TRAFFIC VOLUMES - NEW TRIPS
AM/PM PEAK HOUR VOLUMES

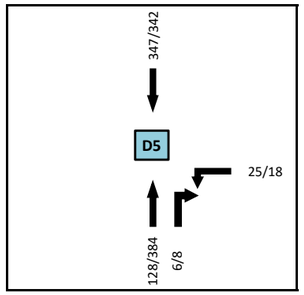
LEGEND

XX ARRIVALS
(XX) DEPARTURES

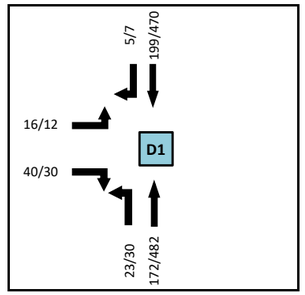
FIGURE 9



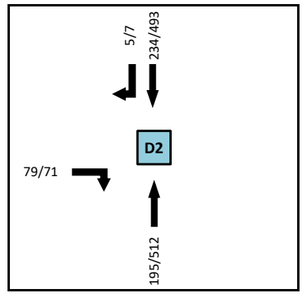
82nd Street & Site Driveway 4



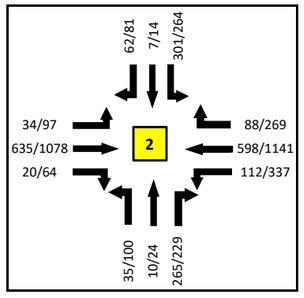
82nd Street & Site Driveway 5



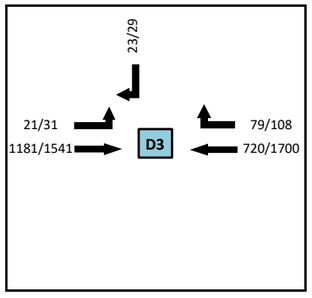
Hawes Road & Site Driveway 1



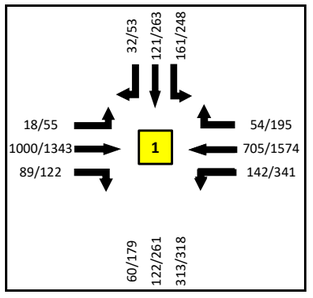
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



Elliot Road & Hawes Road

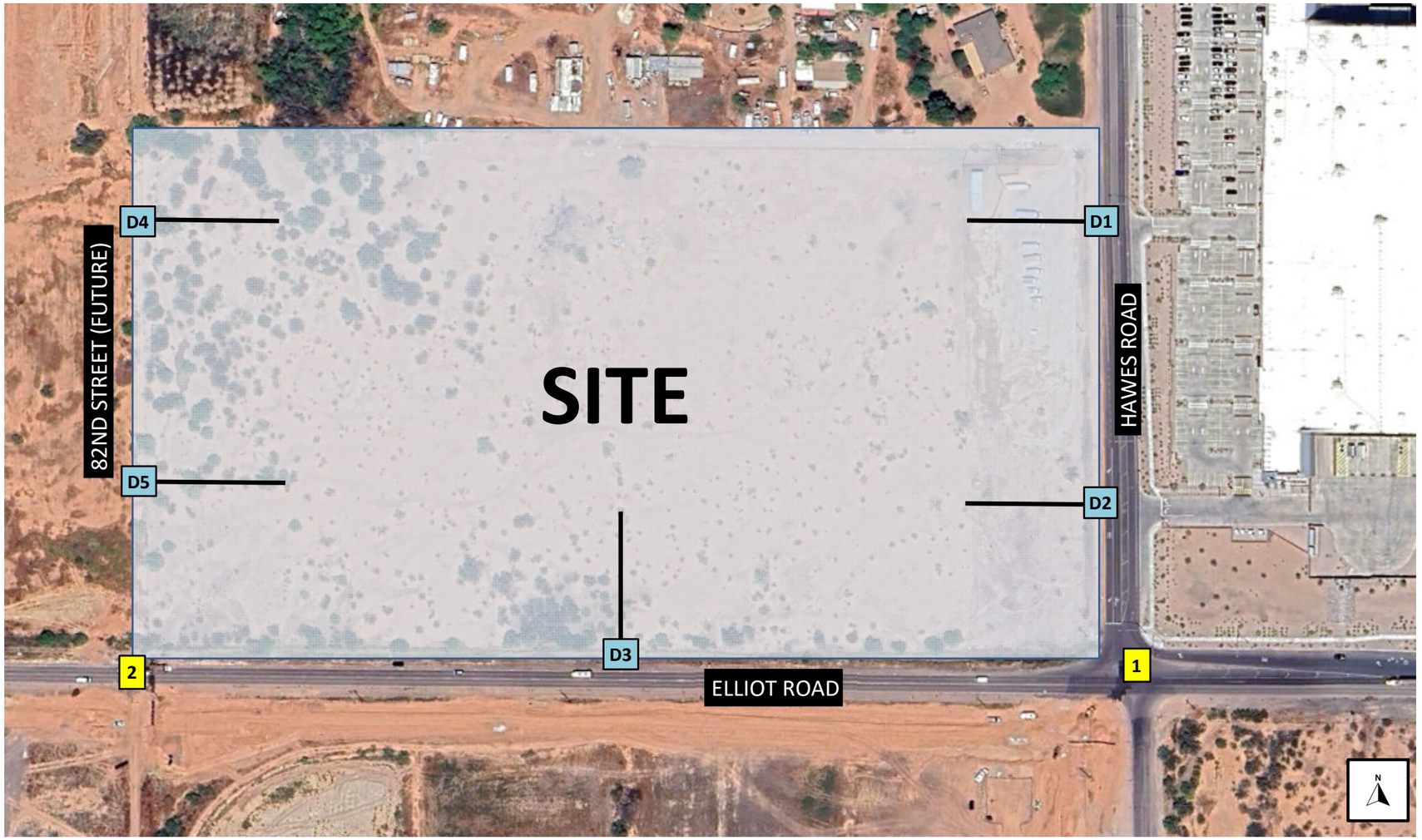
LEE ENGINEERING

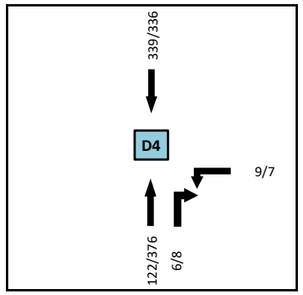
BUILD-OUT YEAR (2025) TOTAL TRAFFIC VOLUMES

Legend

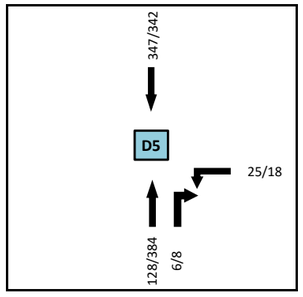
AM/PM

FIGURE 10

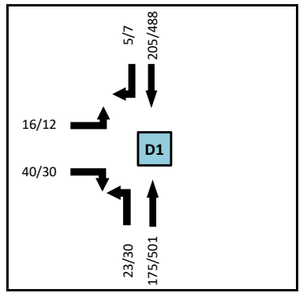




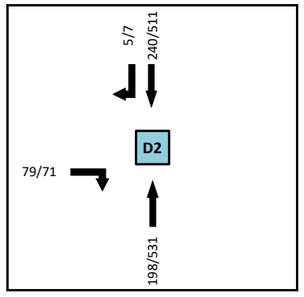
82nd Street & Site Driveway 4



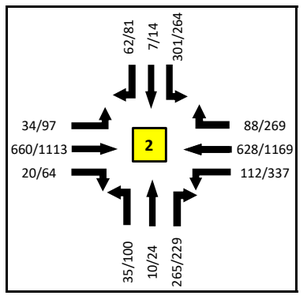
82nd Street & Site Driveway 5



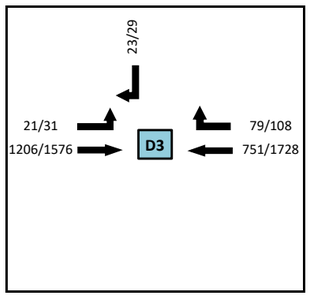
Hawes Road & Site Driveway 1



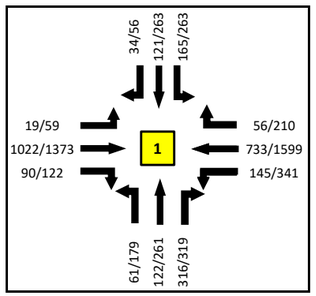
Hawes Road & Site Driveway 2



Elliot Road & 82nd Street (Future)



Elliot Road & Site Driveway 3



Elliot Road & Hawes Road

LEE ENGINEERING

HORIZON YEAR (2030) TOTAL TRAFFIC VOLUMES

Legend

AM/PM

FIGURE 11

6.4 Traffic Operational Analysis

The study-area intersections were analyzed based on the methodologies in the *Highway Capacity Manual* 6th Edition (HCM6, 2017) and evaluated using Synchro software (version 11). To provide an indication of intersection performance, signalized and unsignalized intersections are typically reported in terms of Levels of Service (LOS). Stop-controlled intersection analysis is based on the minor street approach or critical movement, whichever is applicable. The capacity criteria for signalized and unsignalized intersection analysis are presented in **Table 3**.

Table 3. Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service (LOS)	Average Control Delay (sec/veh)	
	Signalized	Unsignalized
A	≤ 10.0	≤ 10.0
B	> 10.0 and ≤ 20.0	> 10.0 and ≤ 15.0
C	> 20.0 and ≤ 35.0	> 15.0 and ≤ 25.0
D	> 35.0 and ≤ 55.0	> 25.0 and ≤ 35.0
E	> 55.0 and ≤ 80.0	> 35.0 and ≤ 50.0
F	> 80.0	> 50.0

Source: *Highway Capacity Manual 2017*, Transportation Research Board

Additional performance measures such as volume to capacity (v/c) ratios and queue lengths also provide an indication of operation. The HCM offers the following in Chapter 19:

> "For a typical major street with two lanes in each direction and an average traffic volume in the range of 15,000 to 20,000 vehicles/day (roughly equivalent to a peak hour flow rate of 1,500 to 2,000 vehicles/hour), the delay equation will predict greater than 50s of delay (LOS F) for many urban two-way-stop-controlled (TWSC) intersections that allow minor-street left-turn movements. LOS F will be predicted regardless of the volume of minor-street left-turning traffic. Even with a LOS F estimate, most low-volume minor-street approaches would not meet any of the volume or delay warrants for signalization noted in the *Manual on Uniform Traffic Control Devices*. As a result, analysts who use the HCM LOS thresholds as the sole measure to determine the design accuracy of TWSC intersections should do so with caution. In evaluating the overall performance of TWSC intersections, it is important to consider measures of effectiveness such as volume-to-capacity ratios for individual movements, average queue lengths, and 95th percentile queue lengths in addition to considering delay. By focusing on a single measure of effectiveness for the worst movement only, such as delay for the minor-street left-turn, users may make less effective traffic control decisions."

Considering the above guidance, for the purposes of this study, TWSC movements operating at LOS E or F with v/c ratios under 0.80 and acceptable queue lengths will be considered as operating at an acceptable level when the side street traffic volumes do not warrant a traffic signal.

The study-area intersections were evaluated using Synchro software to estimate the peak-hour traffic operations. The study-area intersections were evaluated for existing conditions, without site traffic, and future conditions in 2025 and 2030 both with and without site traffic.

6.4.1 Existing Conditions

Only one intersection in the study area is currently in operation. The traffic operational performance of this intersection in existing conditions is presented in **Table 4**. Complete Synchro results from this and other scenarios evaluated can be found in **Appendix F**.

Table 4. Traffic Operational Performance, Existing Conditions

	2023 Existing							
	AM Peak				PM Peak			
Intersection / Movement	LOS	Delay	V/C	Queue	LOS	Delay	V/C	Queue
Int 1. Hawes Road & Elliot Road (MSS)								
EB Approach	A	7.9		<50	A	8.2		<50
WB Thru/Left	A	7.7		<50	A	7.9		<50
NB Approach	B	11.1		<50	B	11.1		<50
SB Left/Thru	C	15.8		<50	C	21.2		<50
SB Right	A	9.8		<50	A	9.7		<50

Notes:

MSS - Minor Street Stop control, Delay shown in seconds, V/C shown if LOS E/F, Queue is the reported 95th percentile length in feet.

The results indicate that all movements in the study area under existing conditions operate at excellent LOS C or better during both morning and afternoon peak hours (maximum v/c = 0.40).

6.4.2 2025 & 2030 Background (No-Build) Conditions

It is noted that the Hawes Crossing Master Traffic Impact Analysis study provides proposed lane configurations and traffic controls for the nearby study area, which includes the intersections of Elliot Road with Hawes Road and 82nd Street (information provided in **Appendix D**).

Furthermore, review of the City of Mesa Capital Projects Explorer indicated that the subject project (CP 0982) to construct 2.5 miles of a six-lane new roadway on Elliot Road from Ellsworth Road to Sossaman Road is in the active stage and has a project start date of November 205 and an ending date of March 2027.

The lane configurations and traffic controls provided in the Master TIA were used for analysis of the opening year (2025) and horizon year (2030) conditions. The study area intersections for the 2025 and 2030 No-Build traffic scenarios were analyzed during both the morning and afternoon peak hours, and results are shown in **Table 5** and **Table 6**.

Table 5. Traffic Operational Performance, 2025 No-Build Conditions

	2025 Background							
	AM Peak				PM Peak			
Intersection / Movement	LOS	Delay	V/C	Queue	LOS	Delay	V/C	Queue
Int 1. Hawes Road & Elliot Road (S)	B	14.9			C	26.3		
EB Left	A	7.8		<50	B	15.6		<50
EB Thru	B	18.1		204	C	32.8		433
EB Right	A	1.9		<50	A	5.1		<50
WB Left	B	11.2		65	D	42.8		318
WB Thru	B	10.5		112	B	17.1		344
WB Right	A	0.1		<50	A	2.5		<50
NB Left	B	19.5		<50	C	33.3		84
NB Thru	C	28.3		56	D	46.4		142
NB Right	B	11.4		85	B	11.3		84
SB Left	C	21.2		60	D	42.7		170
SB Thru	C	26.6		51	D	40.4		135
SB Right	A	0.3		<50	A	0.7		<50
Int 2. Elliot Road & 82nd Street (S)	B	18.3			C	27.4		
EB Left	B	13.5		<50	C	20.2		62
EB Thru/Right	C	24.0		161	C	33.8		365
WB Left	B	15.3		71	D	38.2		300
WB Thru/Right	B	17.1		147	C	20.6		361
NB Left	B	15.5		<50	C	32.3		98
NB Thru/Right	B	11.1		73	B	17.2		92
SB Left	B	19.6		173	D	38.7		227
SB Thru/Right	A	6.7		<50	B	11.5		50

Notes:

S - Signal, Delay shown in seconds, V/C shown if LOS E/F, Queue is the reported 95th percentile length in feet.

The results in **Table 5** indicate that all movements at the study intersections under 2025 background conditions are expected to operate at LOS D or better during the morning and afternoon peak hours.

Table 6. Traffic Operational Performance, 2030 No-Build Conditions

	2030 Background							
	AM Peak				PM Peak			
Intersection / Movement	LOS	Delay	V/C	Queue	LOS	Delay	V/C	Queue
Int 1. Hawes Road & Elliot Road (S)	B	15.1			C	27.0		
EB Left	A	7.9		<50	B	16.9		<50
EB Thru	B	18.3		214	C	34.0		452
EB Right	A	1.9		<50	A	2.1		<50
WB Left	B	11.4		67	D	44.3		325
WB Thru	B	10.5		117	B	17.8		361
WB Right	A	0.1		<50	A	2.5		<50
NB Left	C	20.2		<50	C	33.5		83
NB Thru	C	28.9		58	D	47.3		144
NB Right	B	11.8		90	B	11.4		85
SB Left	C	22.1		66	D	44.2		185
SB Thru	C	28.6		53	D	40.1		134
SB Right	A	0.4		<50	A	0.7		<50
Int 2. Elliot Road & 82nd Street (S)	B	17.6			C	27.8		
EB Left	B	12.7		<50	C	21.3		64
EB Thru/Right	C	23.0		162	C	34.2		380
WB Left	B	14.4		68	D	39.0		302
WB Thru/Right	B	16.5		150	C	20.8		371
NB Left	B	15.0		<50	C	32.6		99
NB Thru/Right	B	10.8		72	B	17.3		92
SB Left	B	17.8		168	D	39.1		228
SB Thru/Right	A	7.8		<50	B	11.6		<50

Notes:

S - Signal, Delay shown in seconds, V/C shown if LOS E/F, Queue is the reported 95th percentile length in feet.

Results in **Table 6** indicate that all movements at the study intersections are expected to continue to operate at LOS D or better in 2030.

6.4.3 2025 & 2030 Total Traffic (Build) Conditions

The study intersections were analyzed using the morning and afternoon peak-hour volumes corresponding to the 2025 and 2030 Total traffic conditions. The volumes corresponding to each scenario were evaluated using Synchro to estimate the operational conditions of each intersection.

Table 7 and **Table 8** summarize the results of the Synchro analysis at the study intersections assuming the geometrics and traffic control for the total traffic conditions.

Table 7. Traffic Operational Performance, 2025 Total Conditions

	2025 Total							
	AM Peak				PM Peak			
Intersection / Movement	LOS	Delay	V/C	Queue	LOS	Delay	V/C	Queue
Int 1. Hawes Road & Elliot Road (S)	B	18.1			C	28.3		
EB Left	B	10.1		<50	B	18.2		<50
EB Thru	C	22.4		243	D	35.6		445
EB Right	A	0.5		<50	A	2.9		<50
WB Left	B	14.5		78	D	45.8		354
WB Thru	B	13.3		142	B	19.7		397
WB Right	A	0.2		<50	A	2.7		<50
NB Left	B	19.7		<50	C	32.7		84
NB Thru	C	31.5		64	D	47.7		147
NB Right	B	15.8		116	B	11.3		85
SB Left	C	23.0		134	D	46.3		264
SB Thru	C	26.5		60	D	38.8		137
SB Right	A	0.3		<50	A	0.6		<50
Int 2. Elliot Road & 82nd Street (S)	B	19.8			C	29.2		
EB Left	B	14.1		<50	C	22.3		71
EB Thru/Right	C	24.8		168	D	35.0		371
WB Left	B	16.1		76	D	38.9		327
WB Thru/Right	C	20.0		158	C	23.4		385
NB Left	B	15.9		<50	C	32.5		97
NB Thru/Right	B	11.9		80	B	18.6		100
SB Left	C	20.7		195	D	39.9		245
SB Thru/Right	A	7.2		<50	B	11.5		52
Hawes Road & Site Driveway D1 (MSS)								
EB Approach	A	9.8		<50	B	11.9		<50
NB Left	A	7.7		<50	A	8.6		<50
Hawes Road & Site Driveway D2 (MSS)								
EB Approach	A	9.4		<50	B	10.5		<50
Elliot Road & Site Driveway D3 (MSS)								
SB Approach	B	12.3		<50	C	22.9		<50
EB Left	A	13.4		<50	E	42.1	0.26	<50
82nd Street & Site Driveway D4 (MSS)								
WB Approach	A	12.0		<50	C	15.1		<50
82nd Street & Site Driveway D5 (MSS)								
WB Approach	B	12.4		<50	C	15.7		<50

Notes:

S - Signal, MSS - Minor Street Stop control, Delay shown in seconds, V/C shown if LOS E/F, Queue is the reported 95th percentile length in feet.

With the addition of site-related traffic, the results in **Table 7** indicate that most movements at the study intersections are expected to operate at LOS D or better during both the morning and afternoon peak hours with an increase in delay in 2025 compared to background conditions. The eastbound left-turn movement at the site driveway D3 intersection with Elliot Road is expected to

operate at LOS E during the afternoon peak hour. However, this movement is expected to operate with a v/c ratio of 0.26, below capacity.

Table 8: Traffic Operational Performance, 2030 Total Conditions

	2030 Total							
	AM Peak				PM Peak			
Intersection / Movement	LOS	Delay	V/C	Queue	LOS	Delay	V/C	Queue
Int 1. Hawes Road & Elliot Road (S)	B	18.3			C	30.3		
EB Left	B	10.3		<50	C	20.9		<50
EB Thru	C	22.6		255	D	38.4		465
EB Right	A	0.5		<50	A	2.2		<50
WB Left	B	14.9		81	D	50.9		381
WB Thru	B	13.4		149	C	21.8		428
WB Right	A	0.2		<50	A	2.8		<50
NB Left	C	20.1		<50	C	32.6		82
NB Thru	C	31.9		64	D	49.7		150
NB Right	B	16.4		121	B	11.6		86
SB Left	C	23.7		138	D	50.3		294
SB Thru	C	26.9		60	D	37.5		134
SB Right	A	0.3		<50	A	0.6		<50
Int 2. Elliot Road & 82nd Street (S)	C	20.2			C	29.5		
EB Left	B	14.1		<50	C	23.0		73
EB Thru/Right	C	25.8		176	D	35.3		386
WB Left	B	16.2		76	D	40.4		334
WB Thru/Right	B	19.7		167	C	23.6		397
NB Left	B	15.7		<50	C	33.0		97
NB Thru/Right	B	12.4		81	B	18.7		100
SB Left	C	21.3		196	D	40.8		247
SB Thru/Right	A	8.0		<50	B	11.6		51
Hawes Road & Site Driveway D1 (MSS)								
EB Approach	A	9.9		<50	B	12.1		<50
NB Left	A	7.7		<50	A	8.6		<50
Hawes Road & Site Driveway D2 (MSS)								
EB Approach	A	9.5		<50	B	10.6		<50
Elliot Road & Site Driveway D3 (MSS)								
SB Approach	B	12.5		<50	C	23.3		<50
EB Left	A	13.7		<50	E	43.7	0.27	<50
82nd Street & Site Driveway D4 (MSS)								
WB Approach	B	12.0		<50	C	15.1		<50
82nd Street & Site Driveway D5 (MSS)								
WB Approach	B	12.4		<50	C	15.7		<50

Notes:

S - Signal, MSS - Minor Street Stop control, Delay shown in seconds, V/C shown if LOS E/F, Queue is the reported 95th percentile length in feet.

Results in **Table 8** indicate that most movements are expected to continue to operate a LOS D or better during the morning and afternoon peak periods. As in 2025, the only movement expected to operate at LOS E is the eastbound left-turn movement at site driveway D3 during the afternoon peak period. However, its v/c ratio of 0.27 indicates that it is expected to operate well below capacity.

6.5 Signal Warrant Evaluation

The intersection of Hawes Road and Elliot Road was evaluated to determine if a traffic signal would be appropriate. Traffic signals can be helpful under certain, but not all, traffic conditions. The *Manual on Uniform Traffic Control Devices* (MUTCD) contains nine traffic signal warrants outlining specific criteria that may make a traffic signal justifiable at an intersection. A signal should only be installed if one or more MUTCD warrants are met. However, satisfaction of a warrant does not require the installation of a signal. For the purposes of this analysis, only Warrants 1 and 2 were reviewed.

6.5.1 Existing Conditions

The MUTCD advises that a signal warrant study "should consider the effect of right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants."

Specifically, the MUTCD recommends that "right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict." At the subject intersection, southbound right-turning traffic from Hawes Road has a dedicated right-turn lane capable of fully accommodating right-turning traffic. Southbound right-turning traffic has clear sight distance to the left. If a traffic signal were constructed, it is virtually certain that right turns on red would be permitted. Motorists who turn right on red do not gain any operational or safety benefit from a traffic signal, so they are often excluded from consideration for the purposes of signal warrant analysis. Since the right-turn-on-red movement is clearly permissible and the right-turn volume is modest, in this study analysis a right-turn reduction of 100% was assumed for the minor-street (southbound) approach. Because of the 100% right-turn reduction, the southbound approach is assumed to consist of one lane for the purposes of this analysis. It is noted that the minor-street northbound approach consists of a single lane.

As such, the warrants were evaluated assuming one lane on the major street (Elliot Road) and one lane on the minor street (Hawes Road).

The MUTCD suggests that the warranting threshold values may be reduced to 70 percent of their normal values "when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000." The posted 45-mph speed limit on Elliot Road is above the threshold. Therefore, the 70 percent warrant thresholds were used for evaluation.

Warrant 1: Eight-Hour Vehicular Volume

The 8-hour vehicular volume warrant has two parts: Condition A, applicable where a signal may be needed due to a high volume of intersecting traffic, and Condition B, where traffic is so heavy on the major street that minor street traffic suffers excessive delay or conflict. If the amount of traffic at an intersection exceeds the thresholds in **Table 9**, a signal is warranted under Warrant 1.

Table 9: Warrant 1, Eight-Hour Vehicular Volume Threshold Values

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Table 9 indicates the first row of both conditions is the appropriate row for consideration. The relevant (70%) threshold values for Warrant 1 Condition A are 350 vph on the major street and 105 vph on the minor street approach and 525 vph/53 vph for Warrant 1 Condition B.

Table 10 shows the traffic volume at this intersection by hour and the results of the evaluation of Warrant 1.

Table 10: Results of Signal Warrant 1 Evaluation – Existing Conditions

Start time	Approach volumes						Signal Warrant 1 Evaluation					
							Condition A			Condition B		
							Threshold values		Results	Threshold values		Results
	NB	SB	EB	WB	Both major	Higher-volume minor	Major	Minor		Major	Minor	
12:00 AM	3	6	15	25	40	6	350	105	not met	525	53	not met
1:00 AM	1	-	9	10	19	1	350	105	not met	525	53	not met
2:00 AM	-	8	12	10	22	8	350	105	not met	525	53	not met
3:00 AM	1	14	30	44	74	14	350	105	not met	525	53	not met
4:00 AM	10	128	112	141	253	128	350	105	not met	525	53	not met
5:00 AM	42	35	105	191	296	42	350	105	not met	525	53	not met
6:00 AM	53	43	169	338	507	53	350	105	not met	525	53	not met
7:00 AM	43	37	201	311	512	43	350	105	not met	525	53	not met
8:00 AM	41	42	206	278	484	42	350	105	not met	525	53	not met
9:00 AM	34	20	228	249	477	34	350	105	not met	525	53	not met
10:00 AM	55	27	185	271	456	55	350	105	not met	525	53	not met
11:00 AM	45	33	254	268	522	45	350	105	not met	525	53	not met
12:00 PM	40	27	249	260	509	40	350	105	not met	525	53	not met
1:00 PM	71	33	241	289	530	71	350	105	not met	525	53	met
2:00 PM	48	34	241	244	485	48	350	105	not met	525	53	not met
3:00 PM	60	47	276	282	558	60	350	105	not met	525	53	met
4:00 PM	19	50	271	266	537	50	350	105	not met	525	53	not met
5:00 PM	12	136	317	360	677	136	350	105	met	525	53	met
6:00 PM	5	49	219	229	448	49	350	105	not met	525	53	not met
7:00 PM	11	23	154	160	314	23	350	105	not met	525	53	not met
8:00 PM	3	9	150	136	286	9	350	105	not met	525	53	not met
9:00 PM	3	20	90	79	169	20	350	105	not met	525	53	not met
10:00 PM	1	11	68	44	112	11	350	105	not met	525	53	not met
11:00 PM	10	10	32	37	69	10	350	105	not met	525	53	not met
							Hours met		**1**	**Hours met**		**3**

As shown in **Table 10**, neither Condition A nor Condition B are met. Condition A is met for one of the required eight hours of the day. Traffic on Elliot Road is sufficiently high to meet Condition A for thirteen hours, but volume on Hawes Road only exceeds 105 vph for only two hours. In Condition B, traffic volume on Elliot Road exceeds the 525-vph threshold for four hours and the volume on Hawes Road exceeds the 53-vph threshold for six hours. **Warrant 1 is not met.**

Warrant 2: Four-Hour Vehicular Volume

The four-hour warrant is intended for application at intersections where traffic during any four hours of an average day reaches a level that indicates that a signal would be beneficial. Warrant 2 is met when the plotted points representing the traffic volumes during four hours of the day lie above the relevant curve in **Figure 12**.

The bottom line in the chart applies to the subject intersection since the major approach has one lane and the minor approach has one lane.

Figure 12: Warrant 2, Four-Hour Vehicular Volume Threshold Values – Existing Conditions

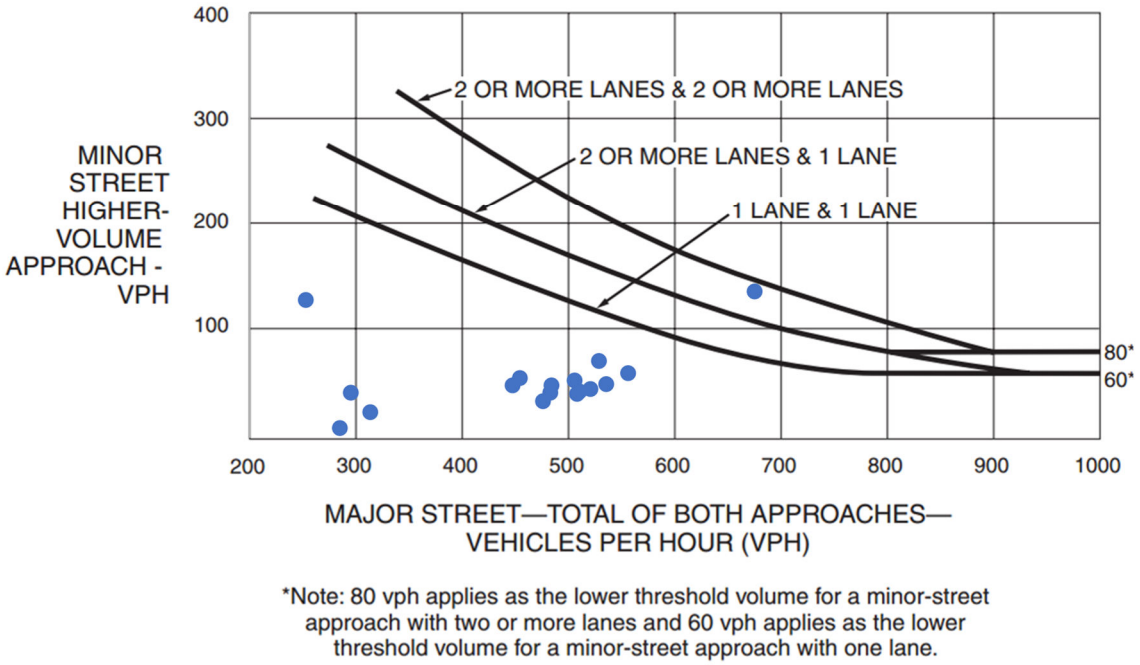


Figure 12 also displays the plotted points of all 24 hours of the day with available traffic volume. As can be seen from the figure, one plotted point lies above the relevant curve, short of the four points needed to meet this warrant, and as such, **Warrant 2 is not met.**

6.5.2 2025 Background Conditions

The subject intersection was evaluated for the 2025 background conditions without the proposed site traffic based on the criteria in the MUTCD previously described.

The morning and afternoon peak-hour volumes used in the analysis were taken from **Figure 5**. The 8th and 4th highest hours were calculated based on the hourly adjustment factors in ADOT TGP 611 and shown below (4th highest hour is 85.1% of the highest peak hour and the 8th highest hour is 74.2% of the highest peak hour). **Table 11** summarizes the results of the analysis.

Afternoon peak-hour approach volumes were converted to 4th highest hourly volumes and 8th highest hourly volumes using the adjustment factors in ADOT TGP 611. (Afternoon volumes were used because they are higher than morning peak volumes). Volumes derived from this conversion

are presented in **Table 11**. It noted that the northbound approach volumes were used for the minor approach because they are higher compared to the southbound approach volumes.

Table 11. Elliot/Hawes 4th and 8th Highest Hourly Volumes, Background 2025

Approaches	***2025 Background Peak-Hour Volume (vph)***	***Predicted 4th highest hourly volume*** (0.656/0.771 x peak-hour volume)	***Predicted 8th highest hourly volume*** (0.572/0.771 x peak-hour volume
Major (Sum of Eastbound and Westbound)	3537 vph	3006 vph	2617 vph
Minor (Northbound)	744 vph	632 vph	551 vph

The preliminary signal needs assessment results are shown in **Table 12**. It is noted that the analysis was completed based on the ultimate future lane configuration on Hawes Road and Elliot Road as previously discussed. Hence, the analysis assumed 2 or more lanes on the major street (Elliot Road) and 2 or more lanes on the minor street (Hawes Road). The preliminary results indicate that a traffic signal is warranted under 2025 background conditions without the added proposed site traffic. A traffic signal is recommended at the subject intersection and will be needed to accommodate the future significant change in traffic patterns in the study area due to the growing developments.

Table 12. Elliot Road & Hawes Road Signal Warrant Summary

Signal Warrant	***MUTCD requirement to satisfy warrant***		***Predicted 2025 volume***		***Result***
	Major Street (both approaches)	***Minor Street (higher-volume approach)***	***Major Street (both approaches)***	***Minor Street (higher-volume approach)***	
Warrant 1A	420	140	8th highest hour: 2617	8th highest hour: 551	Met
Warrant 1B	630	70	8th highest hour: 2617	8th highest hour: 551	Met
Warrant 2	Curve in MUTCD Fig. 4C-2		4th highest hour: 3006	4th highest hour: 632	Met

6.6 Turn Lane Warrants

6.6.1 Right-Turn Lanes

The Right-Turn Deceleration Lane Warrant Analysis in Mesa's TIA guidelines indicates that *"a right-turn deceleration lane will be warranted if the projected right-turn in hourly volume is greater than 60 vehicles per hour for 2-lane or 4-lane roadways and 90 vehicles per hour for 6-lane roadways."* The site driveways' right-turning volumes under 2030 Build conditions were analyzed and compared to these criteria. A summary of the results is presented in **Table 13**:

Table 13: Right-Turn Warrants Analysis Results

Location	***Number of Lanes***	***2030 Projected Peak-Hour Right-Turn Entering Volume***	***Criterion***	***Right-Turn Lane Warranted?***
Site Driveway D1	4 Lanes	7 vph	60 vph	NO
Site Driveway D2	4 Lanes	7 vph	60 vph	NO
Site Driveway D3	6 Lanes	108 vph	90 vph	YES
Site Driveway D4	2 Lanes	8 vph	60 vph	NO
Site Driveway D5	2 Lanes	8 vph	60 vph	NO

The results indicate that a westbound right-turn deceleration lane is warranted at site driveway D3 on Elliot Road since the expected right-turn volume of 108 vph exceeds the minimum right-turning volume criterion of 90 vph for a 6-lane roadway.

It is noted that a right-turn deceleration lane is also proposed as part of the subject development at site driveway D2 on Hawes Road despite not meeting the city's turn lane criterion.

6.6.2 Left-Turn Lanes

No left-turn-lane warranting criteria were found in the City of Mesa TIA Guidelines. As such, to determine if left-turn lanes are needed at the site driveways, ADOT TGP 245 was referenced. ADOT TGP 245 allows individual locations to be evaluated for left-turn lanes based on a combination of through traffic volume, turning traffic volume, speed limit, and number of through lanes.

Site Driveways D1 and D2 on Hawes Road

The warranting criteria for these driveways are shown in **Table 14** with a red box highlighting the minimum number of turn vehicles for the prevailing intersection conditions.

Table 14: ADOT TGP 245 Left Turn Lane Warrants

Peak Hour Traffic Volume on the Highway in Advancing Direction	Minimum Peak Hour Left-turn Traffic Volume			
	# of thru lanes per direction			
	1		2 (Undivided)*	
	< 45 MPH Posted Speed	≥ 45 MPH Posted Speed	< 45 MPH Posted Speed	≥ 45 MPH Posted Speed
≤ 200	30	15	-	-
201 – 300	12	12	40	30
301 – 400	12	12	30	25
401 – 500	12	12	25	18
501 – 600	12	12	15	12
601 – 1000	12	12	10	8
1000+	12	8	10	8

Referencing **Figure 11**, it is estimated that 30 vehicles will make a left-turn into site driveway D1 during the afternoon peak hour, exceeding the 15 vehicles that would warrant the turn lane. Based on this analysis, a left-turn lane is warranted at site driveway D1.

At site driveway D2, a raised median will prevent left turns, so left-turn warrants were not analyzed.

Site Driveway D3 on Elliot Road

Elliot Road is classified as an arterial roadway. The City's 2040 Transportation Plan calls for Elliot Road to be widened to a 6-lane divided roadway in the future. Hence, an eastbound left-turn lane is required at site driveway D3 to maintain safe and effective traffic operations.

Site Driveways D4 and D5 on 82nd Street

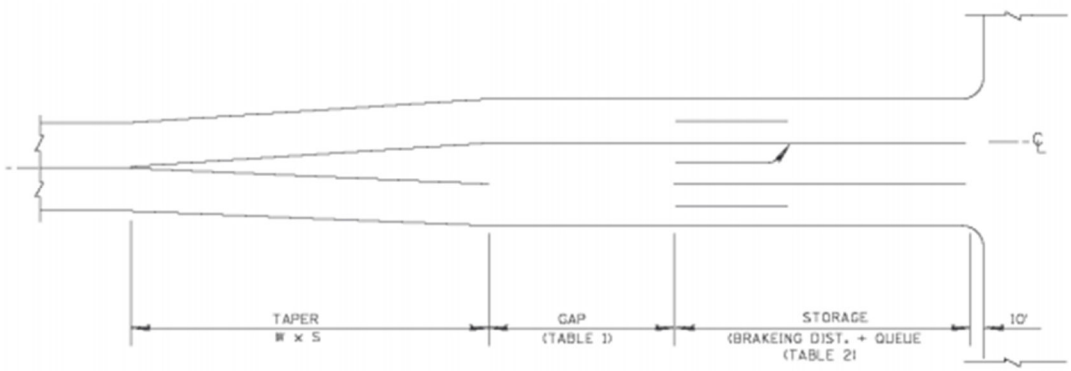
Left-turn-lane warrant analysis was not conducted at site driveways D4 and D5 since no traffic was assumed to approach the site from the north on this roadway.

6.7 Turn Lane Design

Site Driveway D1 Left-Turn Lane

ADOT TGP 430 was used for guidance on design of left-turn lanes. The ADOT-recommended design of left-turn lanes is shown in **Figure 13.**

Figure 13: ADOT TGP 430 Left-Turn Lane Design



The storage length is the combination of the braking distance and the queue length. The queue length depends on the anticipated traffic control for the intersection and the traffic volume at the turn.

$$Storage\ Length = Braking\ Distance + Queue\ Length$$

ADOT TGP 430 Table 430-1, shown in **Table 15**, was used to determine the length of the gap for the left-turn lane. Based on a 35-mph posted speed limit on Hawes Road, a gap length of 60 feet is appropriate.

Table 15: ADOT TGP 430 Right Turn Lane Gap Lengths

POSTED or DESIGN SPEED (mph)	GAP (feet)
< 40	60
40 - 50	90
> 50	140

Table 16 shows that based on a 35-mph posted speed limit on Hawes Road, a braking distance of 115 feet is desirable.

Table 16: ADOT TGP 430 Braking Distance

POSTED or DESIGN SPEED (mph)	DESIRABLE		MINIMUM		
	BRAKING SPEED (mph)	BRAKING DISTANCE (feet)	ENTERING SPEED (mph)	BRAKING SPEED (mph)	BRAKING DISTANCE (feet)
30	29	80	20	20	20
35	34	115	25	25	40
40	38	150	30	29	50
45	43	200	35	34	85
50	47	245	40	38	120
55	52	300	45	42	145
60	56	360	50	47	200
65	60	415	55	52	265
70	64	490	60	56	315
75	70	585	65	61	400

The queue length is the portion of the storage length required to temporarily store turning traffic until conditions allow the turning maneuver to be completed in a safe manner, in addition to the length required for braking. The queue length depends on the anticipated traffic control for the intersection (minor street stop-controlled) and the turning traffic volume (30 vph).

Referencing **Figure 11,** about 30 vehicles are expected to make a left turn from northbound Hawes Road into site driveway D1 during the afternoon peak hour. ADOT recommends considering the number of turning vehicles arriving in a two-minute period within the peak hour as the queue length; this amounts to 1.03 vehicles. At 25 feet per vehicle, this makes the queue length 25 feet. ADOT TGP 430 suggests a minimum queue length of 50 feet. Consequently, a queue length of 50 feet is appropriate to meet ADOT design requirements.

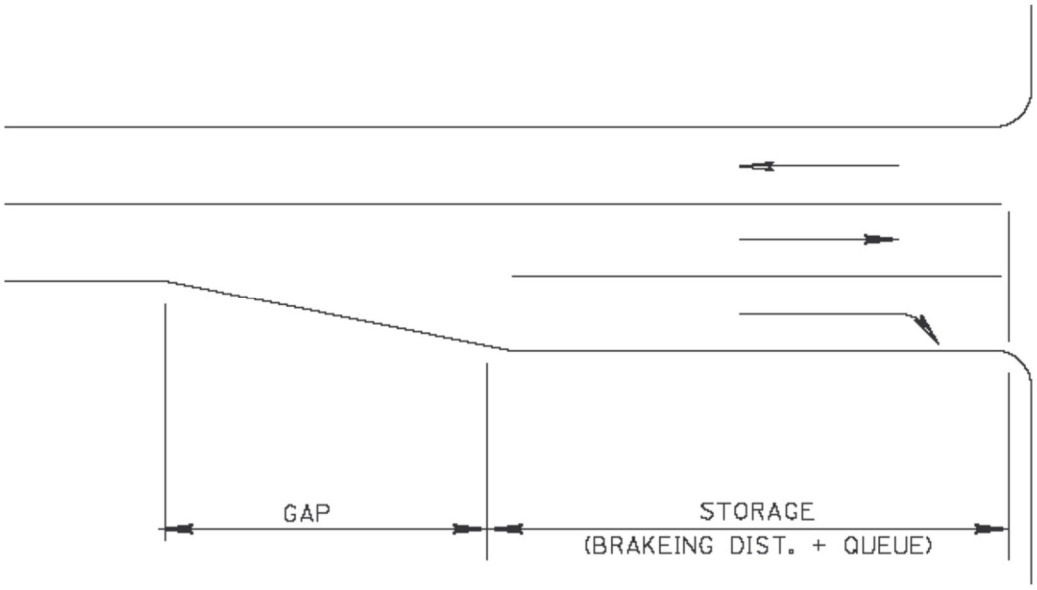
As a result, the total storage is recommended as 165 feet, calculated as the 115 feet braking distance plus the 50 feet queue length.

However, the site plan for the proposed development indicates only 114 feet is available from the north end of the raised median on Hawes Road to the south edge of site driveway D1. Hence, the recommended design of the left-turn lane (total of 225 feet) may not be able to be accommodated at this location.

Site Driveway D2 Right-Turn Lane

ADOT TGP 430 was also used for guidance on the design of right-turn lanes. A right-turn lane is not warranted at site driveway D2, but design parameters are included here since a turn lane has been proposed for construction. The ADOT-recommended design of right-turn lanes is shown in **Figure 14**, which is based on the traffic control, braking distance, volume, and other criteria.

Figure 14: ADOT TGP 430 Right-Turn Lane Design



Referencing **Table 15** and **Table 16**, based on a 35-mph posted speed limit on Hawes Road, a gap length of 60 feet is appropriate and a braking distance of 115 feet is desirable.

Referencing **Figure 11,** the afternoon right-turn peak-hour traffic volume is estimated to be 7 vehicles per hour, or (rounded) one vehicle in two minutes. At 25 feet per vehicle, this makes the queue length 25 feet. A queue length of 50 feet is appropriate to meet ADOT design requirements. ADOT also permits a reduction of 20 feet in queue length for free-flow right-turn movement such as the subject right-turn. As such, the queue length can be reduced from 50 feet to 30 feet.

As a result, the total storage is recommended as 145 feet, calculated as the 115 feet braking distance plus the 30 feet queue length.

Site Driveway D3 Left-Turn Lane

Referencing **Table 15** and **Table 16**, based on a 45-mph posted speed limit on Elliot Road, a gap length of 90 feet is appropriate and a braking distance of 200 feet is desirable.

Referencing **Figure 11,** about 31 vehicles are expected to make a left turn from the eastbound Elliot Road into site driveway D3 during the afternoon peak hour. ADOT recommends considering the number of turning vehicles arriving in a two-minute period within the peak hour as the queue length; this amounts to 1.03 vehicles. At 25 feet per vehicle, this makes the queue length 25 feet. ADOT TGP 430 suggests a minimum queue length of 50 feet. Consequently, a queue length of 50 feet is appropriate to meet ADOT design requirements.

As a result, the total storage is recommended as 250 feet, calculated as the 200 feet braking distance plus the 50 feet queue length.

Site Driveway D3 Right-Turn Lane

Referencing **Table 15** and **Table 16**, based on a 45-mph posted speed limit on Elliot Road, a gap length of 90 feet is appropriate and a braking distance of 200 feet is desirable.

Referencing **Figure 11,** the afternoon right-turn peak-hour traffic volume is estimated to be 108 vehicles per hour. ADOT recommends considering the number of vehicles arriving in a two-minute period as the queue length; this amounts to 3.6 vehicles (rounded up to 4). At 25 feet per vehicle, this makes the queue length 100 feet. ADOT also permits a reduction of 20 feet in queue length for free-flow right-turn movement such as the subject right-turn. As such, the queue length can be reduced from 100 feet to 80 feet.

As a result, the total storage is recommended as 280 feet, calculated as the 200 feet braking distance plus the 80 feet queue length.,.

6.8 Sight Distance

To provide safety for drivers exiting the subject development, AASHTO's *A Policy on Geometric Design of Highways and Streets* recommends the following minimum intersection sight distance (ISD) for left- and right-turn movements from a stopped condition for departing drivers stopped 15 feet from the edge of the traveled way. For left-turn or crossing maneuvers, the sight distance equation recommends adding time for each additional lane (12 feet of pavement width) above one lane to be crossed, including turn lanes, equal to 0.5 seconds for passenger cars and 0.7 seconds for single-unit trucks. It is noted that the posted speed limits on Elliot Road and Hawes Road are 45 mph and 35 mph, respectively. The north leg of the intersection of 82nd Street and Elliot Road is due for construction. Hence, the speed limit on this segment is assumed to be 35 mph.

Table 17 and **Table 18** show the time gap for a passenger vehicle to make a right-turn and left-turn from a stopped position, respectively.

Table 17: Time Gap, Right Turns from Minor Street

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	6.5
Single-unit truck	8.5
Combination truck	10.5

Table 18: Time Gap, Left Turns from Minor Street

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	7.5
Single-unit truck	9.5
Combination truck	11.5

The intersection sight distance is calculated as follows u:

$$ISD = 1.47 * V_{major} * t_g$$

Table 19 provides the intersection sight distance calculations for right- and left-turning maneuvers at the site driveways.

Table 19: Intersection Sight Distance Calculations Summary

Location	*Turning Maneuver*	*V_{major} (mph)*	*t_g (sec)*	*ISD (feet)*
Site Driveway D1 on Hawes Road	Right Turn	35 mph	6.5 sec	335 feet
	Left Turn		8.5 sec	440 feet
Site Driveway D2 on Hawes Road	Right Turn	35 mph	6.5 sec	335 feet
Site Driveway D3 on Elliot Road	Right Turn	45 mph	6.5 sec	430 feet
Site Driveways D4 & D5 on 82nd Street	Right Turn	35 mph	6.5 sec	335 feet
	Left Turn		7.5 sec	390 feet

All site access points should be designed to accommodate these sight distance recommendations. A review of the site reveals that the roadways near the proposed access points are on horizontal tangent alignments with little vertical profile, suggesting that roadway elements are not likely to constrain sight distance. The site developer should ensure that no fixed objects, such as landscaping or signage, are positioned in such a way as to cause sight distance to fall below the recommendations in **Table 19**.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The study has documented the following conclusions and recommendations:

- The subject site is planned for a mixed-use development consisting of the following:
  - 386 apartments in 4-story buildings (three buildings at 22,000 SF and one building at 19,200 SF) in the center of the subject development.
  - 16,300 SF retail.

- 2,500 SF fast-food restaurant with a drive-through window on the southeast corner of the development.
- 6,000 SF sit-down restaurant with an outdoor patio area on the southwest corner of the development.
- 15,000 SF office buildings (two buildings at 7,500 SF each) on the east side of the development.

- A total of 797 parking spaces will be provided throughout the development, consisting of 573 parking spaces dedicated to the residential portion of the development, and146 parking spaces dedicated to the retail portion. It is noted that 78 parking spaces are to be shared between the residential and retail portions of the development. A separate parking study provides more details.

- The site plan proposes the following five access points into and out of the site:
  - Site driveway D1: on Hawes Road about 630 feet north of Elliot Road (aligned with the Amazon Fulfilment Center driveway) and planned as a full-movement driveway.
  - Site driveway D2: on Hawes Road about 230 feet north of Elliot Road (aligned with the Amazon Fulfilment Center driveway) and planned as a right-in/right-out driveway.
  - Site driveway D3: on Elliot Road about 700 feet west of Hawes Road and planned as a ¾ driveway. In response to this development's TIA pre-submittal, City of Mesa requested that this access point not permit left-turn out movements.
  - Site driveway D4: on 82nd Street (future roadway) about 630 feet north of Elliot Road and planned as a full-movement driveway.
  - Site driveway D5: on 82nd Street about 230 feet north of Elliot Road and planned as a full-movement driveway.

- Turning movements at the intersection of Hawes Road and Elliot Road were collected on Thursday, June 15, 2023, and documented that the study area's peak hours begin at 7:30 a.m. and 5:00 p.m.

- From 2018 to 2022, the intersection of Hawes and Elliot Roads and the site's frontage experienced 7 crashes, an excellent overall safety performance averaging 1.4 crashes per year.

- The site is expected to generate about 3,194 trips on a typical weekday, with 277 of those trips in the morning peak hour and 274 trips in the afternoon peak hour.

- All site access points are estimated to operate in an acceptable manner through the 2030 horizon year.

- The eastbound left-turn movement at site driveway D3 is expected to operate at LOS E in 2025 and 2030 during the afternoon peak hour. However, this movement is expected to operate with a maximum v/c ratio of 0.27, below capacity.

- MUTCD signal warrants 1A, 1B, and 2 were analyzed for existing and projected 2025 background conditions at the intersection of Elliot Road and Hawes Road. Volume

warrants were met under background 2025 conditions for warrants 1A, 1B, and 2 at the 70% threshold.

- The following turn lanes are warranted or proposed at site driveways:
    - A northbound left-turn lane is warranted on Hawes Road approaching site driveway D1. Its total storage is recommended as 165 feet with a 60-foot gap. However, this length may need to be shortened due to the limited available distance on Hawes Road from the north end of the raised median to the south edge of site driveway D1 (114 feet).
    - A southbound right-turn lane is not warranted approaching site driveway D2. However, since a turn lane is proposed on the site plan, it should have a storage length of 145 feet with a 60-foot gap.
    - A left-turn lane is required on eastbound Elliot Road approaching site driveway D3 to maintain safe and effective traffic operations. The left-turn lane is recommended to have a 90-foot gap and 250-feet storage length.
    - A right-turn lane is warranted on westbound Elliot Road approaching site driveway D3. The right-turn lane is recommended to have a 90-foot gap and 280-foot storage length.

- The recommended length of the northbound left-turn lane into site driveway D1 (225 feet) may need to be shortened due to the limited available distance on Hawes Road from the north end of the raised median to the south edge of site driveway D1 (114 feet).

- The roadways near the proposed site access points are on horizontal tangent alignments with little vertical profile, suggesting that roadway elements are not likely to constrain sight distance.

APPENDIX A: PRE-TIA

ARIZONA
TEXAS
NEW MEXICO
OKLAHOMA

July 13, 2023

Mr. Peter Vargas
City of Mesa
55 N. Center St.
Mesa, AZ 85201

RE: Proposed Craftsman on Elliot, NWC Elliot and Hawes Roads

In our email correspondence on May 25, 2023, about the Traffic Impact Study (TIS) for the subject development, you requested that we submit our assumptions for your approval prior to beginning work. The information below describes the assumptions we plan to use in our analysis .

Project Location

The parcel proposed for development is located on the northwest corner of the intersection of Elliot and Hawes Roads, in Mesa, Arizona.

Brief Description of Project (land use, intensity, timeframe/phasing)

The conceptual site layout plan is attached. The site is planned for a mixed-use development consisting of the following:

- 352 apartments in 4-story buildings (both one- and two-bedroom units)
- 19,920 SF retail with tenants to be determined
- 16,560 SF office

Site Plan indicates other specific uses such as drive-thrus and restaurant

Based on the site layout, the following land use codes will be assumed:

- ITE Land Use Code 221, Multifamily Housing (Mid-Rise), (352 dwelling units)
- ITE Land Use Code 822, Strip Retail Center (<40K), (19,920 SF GFA)
- ITE Land Use Code 712, Small Office Building, (16,560 SF GFA)

should also include Land Use Group 900

Proposed Access (number, location, restrictions)

Access to the site is proposed from the following driveways:

- Site driveway D1: on Hawes Road about 630 feet north of Elliot Road (aligned with Amazon Fulfilment Center driveway) and planned as a full-movement driveway.
- Site driveway D2: on Hawes Road about 230 feet north of Elliot Road (aligned with Amazon Fulfilment Center driveway) and planned as a right-in/right-out driveway.
- Site driveway D3: on Elliot Road about 700 feet west of Hawes Road and planned as a full-movement driveway.

this driveway will be 3/4 - or left in. Not full-movement

- Site driveway D4: on 82nd Street (future roadway) about 630 feet north of Elliot Road and planned as a full-movement driveway.
- Site driveway D5: on 82nd Street about 230 feet north of Elliot Road and planned as a full-movement driveway.

Assumptions

Trip Generation

The trip generation for the subject site, based on the latest version of the ITE *Trip Generation* Manual (11th Edition), is shown in Table 1. The development is expected to generate 2,604 daily, 206 morning, and 240 afternoon peak-hour new trip ends, plus pass-by trips.

Table 1. Trip Generation Estimate

			Craftsman on Elliot			
Description	Land Use		Residential	Retail	Office	
	ITE Land Use Code		221	822	712	
	ITE Land Use Title		Multifamily Housing (Mid-Rise)	Strip Retail Center (<40K)	Small Office Building	
	Land Use Variable		Dwelling Units	1000 SF GLA	1000 SF GFA	
	Variable Amount (X)		352	19.920	16.560	
Trip Rates	Weekday		T = 4.77(X) - 46.46	T = 42.20(X) + 229.68	T = 14.39(X)	
	AM Peak Hour		T = 0.44(x) - 11.61	Ln(T) = 0.66 Ln(X) + 1.84	T = 1.67(X)	
	PM Peak Hour		T = 0.39(X) + 0.34	Ln(T) = 0.71 Ln(X) + 2.72	T = 2.16(X)	
Inbound Percent	Weekday		50%	50%	50%	
	AM Peak Hour		23%	60%	82%	Totals
	PM Peak Hour		61%	50%	34%	
Total Trip Ends	Weekday		1633	1070	238	2941
	AM Peak Hour Inbound		33	27	23	83
	AM Peak Hour Outbound		110	18	5	133
	PM Peak Hour Inbound		84	63	12	159
	PM Peak Hour Outbound		54	63	24	141
Internal Site Interaction Reduction Percent [1]		Daily	2%	9%	14%	6%
		AM	2%	9%	14%	5%
		PM	2%	8%	14%	7%
External Trips	Weekday		1541	1010	225	2775
	AM Peak Hour Inbound		31	25	22	78
	AM Peak Hour Outbound		106	17	5	128
	PM Peak Hour Inbound		79	59	11	149
	PM Peak Hour Outbound		50	59	22	131
Pass-by Traffic [2]	AM Peak Hour Percentage		0%	0%	0%	
	PM Peak Hour Percentage		0%	34%	0%	
	AM Peak Hour Trip Ends		0	0	0	0
	PM Peak Hour Trip Ends		0	40	0	40
New Trip Ends	Weekday [3]		1541	838	225	2604
	AM Peak Hour Inbound		31	25	22	78
	AM Peak Hour Outbound		106	17	5	128
	PM Peak Hour Inbound		79	39	11	129
	PM Peak Hour Outbound		50	39	22	111

Trip Reductions (Internal Capture, Alternative Travel Mode, and Pass-by)

- The internal site interaction percentage, estimated using the NCHRP Report 684 spreadsheet estimator, is proposed to be capped at 14%.
- No alternative travel modes are proposed to be applied or are applicable.
- The retail pass-by trip percentage, based on the ITE *Trip Generation Handbook*, 3rd Edition, is expected to be 34 percent during the afternoon peak hour. No pass-by trips are expected during the morning peak hour or for the office or residential uses.

Study Horizon Years

Per the City of Mesa's TIS guidelines, the study falls into a Category I analysis generating fewer than 500 peak-hour trips. Analysis of the opening year and a 5-year horizon after opening will be conducted. The anticipated opening year will be assumed as 2024.

Study Area Intersections

For Category I, the City of Mesa requires analysis of all roadway segments and intersections within ¼ mile and major driveways within 500 feet. Hence, the study area of this TIS will include the intersection of Elliot and Hawes Roads and all site driveways. Turning movements at Elliot and Hawes Roads were collected on Thursday, June 15, 2023, for a 24-hour period.

include 82nd St and Elliot in analysis

Trip Distribution

Vehicles are proposed to be distributed based on engineering judgment as follows:

- 70% to/from the east on Elliot Road (in the direction of the nearest SR 202 interchange)
- 15% to/from the north on Hawes Road
- 15% to/from the west on Elliot Road

Would assume some percentage from the south via Hawes and 82nd

Projected Traffic

An annual background traffic growth rate of 2 percent per year is proposed to be assumed based on studies of nearby developments.

see Hawes Crossing Master TIS

Background Development

The City of Mesa did not provide information about other planned developments near the site; as such, the TIS will assume that any other developments are accounted for as part of background traffic growth.

Hawes Crossing Master TIA

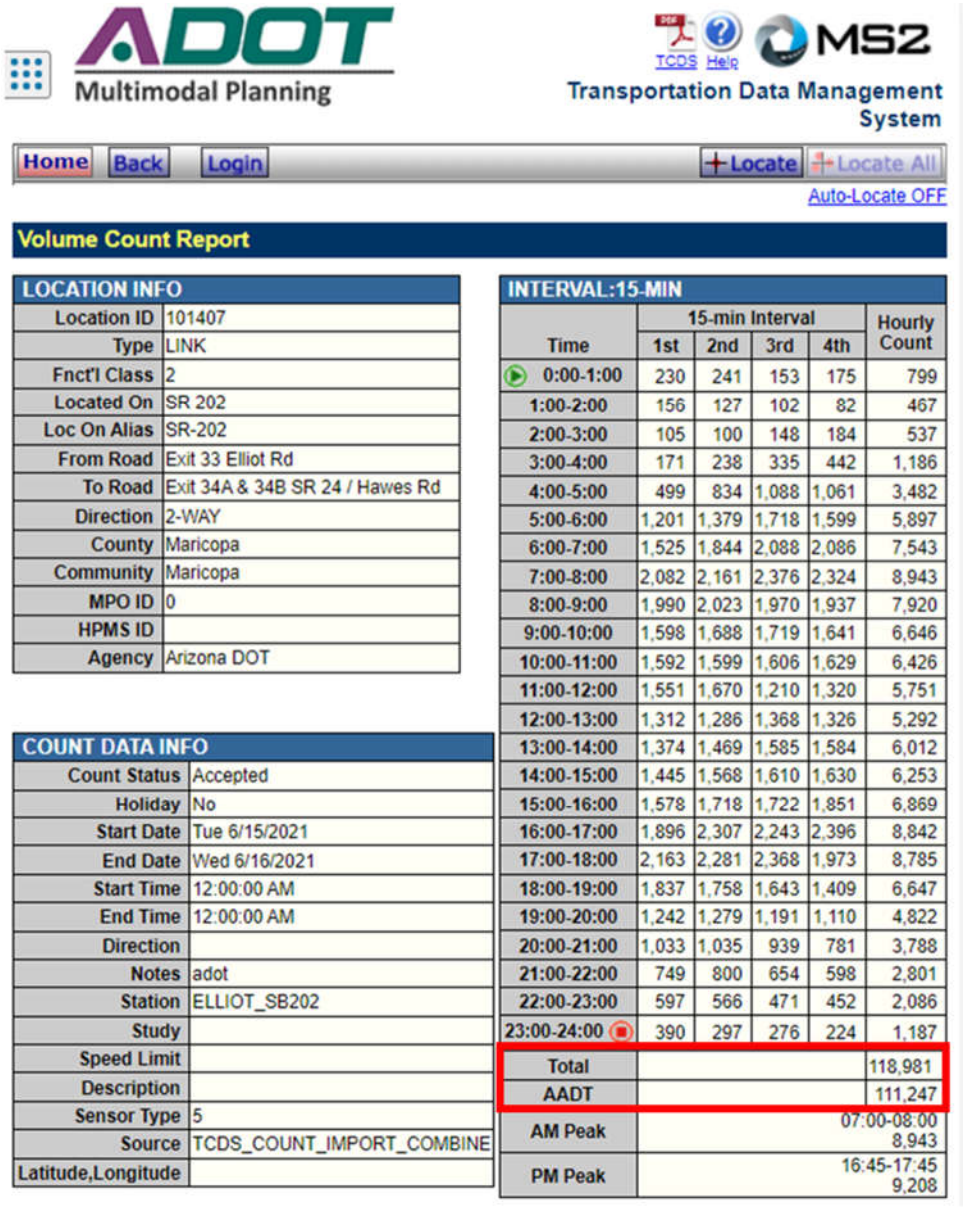
Lee Engineering has reviewed the November 2019 Hawes Crossing Master TIA, which encompasses the subject site, and will be consistent with the Master TIA where applicable.

Seasonal Adjustment

The collected traffic count data is proposed not to be seasonally adjusted. Daily volume on SR 202 south of Elliot Road (count station ID 101407) in June 2021 (this study's data collection month) was higher than the AADT, as shown in Figure 1.

This TIS shall reference the Hawes Crossing Master TIS and will need to identify if the proposed Craftsman site is changing any of the Master TIS assumptions and/or recommendations/outcomes.

Figure 1: ADOT Historical Volumes



ADOT Multimodal Planning

TCDS Help MS2 Transportation Data Management System

Home Back Login Locate Locate All

Auto-Locate OFF

Volume Count Report

LOCATION INFO	
Location ID	101407
Type	LINK
Fnct'l Class	2
Located On	SR 202
Loc On Alias	SR-202
From Road	Exit 33 Elliot Rd
To Road	Exit 34A & 34B SR 24 / Hawes Rd
Direction	2-WAY
County	Maricopa
Community	Maricopa
MPO ID	0
HPMS ID	
Agency	Arizona DOT

COUNT DATA INFO	
Count Status	Accepted
Holiday	No
Start Date	Tue 6/15/2021
End Date	Wed 6/16/2021
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	adot
Station	ELLIOT_SB202
Study	
Speed Limit	
Description	
Sensor Type	5
Source	TCDS_COUNT_IMPORT_COMBINE
Latitude,Longitude	

INTERVAL:15-MIN

Time	15-min Interval 1st	2nd	3rd	4th	Hourly Count
0:00-1:00	230	241	153	175	799
1:00-2:00	156	127	102	82	467
2:00-3:00	105	100	148	184	537
3:00-4:00	171	238	335	442	1,186
4:00-5:00	499	834	1,088	1,061	3,482
5:00-6:00	1,201	1,379	1,718	1,599	5,897
6:00-7:00	1,525	1,844	2,088	2,086	7,543
7:00-8:00	2,082	2,161	2,376	2,324	8,943
8:00-9:00	1,990	2,023	1,970	1,937	7,920
9:00-10:00	1,598	1,688	1,719	1,641	6,646
10:00-11:00	1,592	1,599	1,606	1,629	6,426
11:00-12:00	1,551	1,670	1,210	1,320	5,751
12:00-13:00	1,312	1,286	1,368	1,326	5,292
13:00-14:00	1,374	1,469	1,585	1,584	6,012
14:00-15:00	1,445	1,568	1,610	1,630	6,253
15:00-16:00	1,578	1,718	1,722	1,851	6,869
16:00-17:00	1,896	2,307	2,243	2,396	8,842
17:00-18:00	2,163	2,281	2,368	1,973	8,785
18:00-19:00	1,837	1,758	1,643	1,409	6,647
19:00-20:00	1,242	1,279	1,191	1,110	4,822
20:00-21:00	1,033	1,035	939	781	3,788
21:00-22:00	749	800	654	598	2,801
22:00-23:00	597	566	471	452	2,086
23:00-24:00	390	297	276	224	1,187
Total					118,981
AADT					111,247
AM Peak					07:00-08:00 8,943
PM Peak					16:45-17:45 9,208

Closure

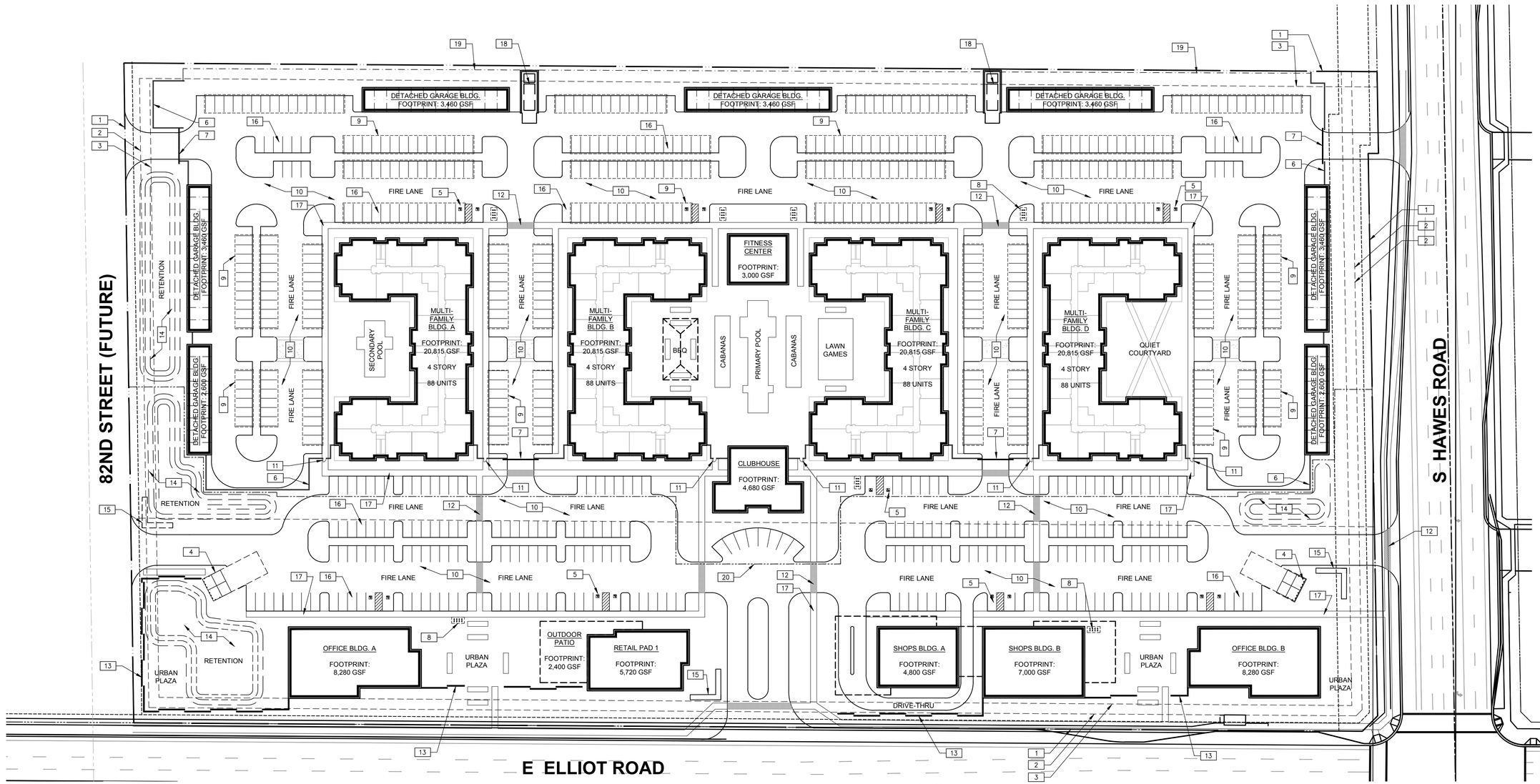
Your prompt approval of these assumptions is requested. I can be reached at rdittberner@lee-eng.com. Thank you for your attention to this study.

Respectfully submitted,

Randy Dittberner, PE, PTOE
Senior Project Manager

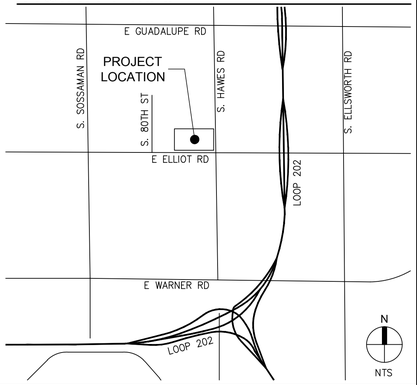
attachments

CAUTION: IF THIS SHEET IS NOT 24"x36" IT IS A REDUCED PRINT



SITE PLAN
1"=50'-0"

VICINITY MAP



SITE PLAN KEYNOTES

1. PROPERTY LINE (—— · · ——)
2. LANDSCAPE SETBACK
3. BUILDING SETBACK
4. 9' x 12' CITY OF MESA STD. CMU TRASH BIN ENCLOSURE
5. CITY OF MESA STANDARD ADA PARKING STALL
6. CMU SCREEN WALL, SEE SITE CIRCULATION & SCREENING SHEET.
7. AUTOMATIC SLIDING ACCESS GATE.
8. BICYCLE RACKS (10 BIKE STALLS PER RACK), TYPICAL.
9. PRE-ENGINEERED PARKING SHADE STRUCTURE; TYPICAL.
10. FIRE LANE; CURB PAINTING PER CITY STANDARDS.
11. SECURED-ACCESS PEDESTRIAN GATE WITH EMERGENCY EGRESS HARDWARE.
12. DECORATIVE HARDSCAPE AT PEDESTRIAN CROSSWALKS
13. PARKING SCREEN WALL. SEE SITE CIRCULATION & SCREENING SHEET.
14. RETENTION BASIN
15. PROPOSED FUTURE MONUMENT SIGN LOCATION. 30' WIDE TYP.
16. CITY OF MESA TYPICAL PARKING STALL LAYOUT.
17. 6'-0" WIDE SIDEWALK, TYPICAL THROUGHOUT SITE
18. 40' x 14' CITY OF MESA STD. CMU TRASH COMPACTOR ENLOSURE
19. IRON FENCE, PAINTED. SEE SITE CIRCULATION & SCREENING SHEET.
20. SITE AREA SEPARATION LINE BETWEEN MIXED USES (—·—·—·—)
21. PROPOSED FUTURE BUS PAD. OFF-SITE STREET DESIGN SHOWN FOR REFERENCE ONLY.

PROJECT DATA

OVERALL SITE DATA

PROJECT DESCRIPTION

THIS PROJECT IS FOR THE MASTER PLANNING OF 4 NEW MULTIFAMILY BUILDINGS AND 5 COMMERCIAL BUILDINGS BUILT OVER ONE PHASE. MASTER PLANNING FOR THE ENTIRE PROJECT IS PART OF THIS SCOPE.

APN:	304-04-031
ZONING:	MX (MIXED USE)
PAD OVERLAY:	HAWES CROSSING VILLAGE 3
SITE AREA:	18.01 AC (784,655 SF)
LOCATION:	NWC OF E. ELLIOT RD & S. HAWES RD. MESA, ARIZONA
EXISTING USE:	VACANT LOT / AGRICULTURE
GENERAL PLAN:	MIXED USE / EMPLOYMENT

AREA & USE CALCULATIONS

SEE SHEET A1.2 FOR MIXED USE, URBAN PLAZA, OPEN SPACE, LANDSCAPE, HARDSCAPE, AND BUILDING AREA CALCULATIONS.

RESIDENTIAL PROJECT DATA

RESIDENTIAL SITE DATA

VALUES ARE APPROXIMATED FOR INITIAL SITE PLANNING PURPOSES

RESIDENTIAL SITE AREA:	11.70 AC (509,650 SF)
USE PERCENTAGE:	65%
DWELLING UNITS:	352 UNITS
DENSITY:	30.09 UNITS/ACRE
PARKING RATIO REQUIRED:	
2.1 SPACES / UNIT =	739 SPACES
PARKING PROVIDED:	
SURFACE PARKING	136
COVERED PARKING	388
DETACHED GARAGE	78
VISITOR	8
TOTAL	610 SPACES
PARKING RATIO PROVIDED:	1.73 SPACES/UNIT**

*** REQUIRES APPROVAL OF S.U.P. TO REDUCE COUNT*

UNIT TABLUATIONS (TYPICAL FOR BLDG. A, B, C, & D)

UNIT	TYPE	NET AREA	COUNT	TOTAL AREA	UNIT MIX %
A1	1bd/1ba	656	40	26,240	54.5%
A2	1bd/1ba	577	8	4,616	
B1	2bd/2ba	1,102	16	17,632	36.4%
B2	2bd/2ba	1,113	8	8,904	
B3	2bd/2ba	1,127	8	9,016	
S1	0bd/1ba	475	8	3,800	9.1%
TOTALS			88	70,208	100%

AVERAGE SQFT/UNIT: 798 SF

NOTE: NET AREA IS MEASURED TO THE EXTERIOR OF FRAME WALLS. BALCONIES, PATIOS, BALCONY STORAGE ARE NOT INCLUDED.

BUILDING TABLUATIONS

	# OF UNITS PER FLOOR				
	1ST	2ND	3RD	4TH	TOTAL
BLDG. A	22	22	22	22	88
BLDG. B	22	22	22	22	88
BLDG. C	22	22	22	22	88
BLDG. D	22	22	22	22	88
TOTAL					352

COMMERCIAL PROJECT DATA

COMMERCIAL SITE DATA

VALUES ARE APPROXIMATED FOR INITIAL SITE PLANNING PURPOSES

COMMERCIAL SITE AREA:	6.31 AC (275,005 SF)
USE PERCENTAGE:	35%
COVERAGE:	13.3%
PARKING REQUIRED:	
1 SPACE / 275 SF =	133 SPACES
(SHELL COMMERCIAL PER CITY OF MESA TABLE 11-32-3.A)	
PARKING PROVIDED:	180 SPACES
REQ'D ACCESSIBLE SPACES:	6 SPACES
PROVIDED PARKING RATIO:	4.93 / 1000 SF
OVERALL SITE BICYCLE PARKING:	
REQ'D: 63	PROV'D: 70

BUILDING DATA

BUILDING TYPE	BLDG AREA (GSF)	%
SHOPS A	4,800	13.2%
SHOPS B	7,000	19.2%
RETAIL PAD 1	5,720	15.7%
OUTDOOR PATIO	2,400	6.6%
OFFICE A	8,280	22.7%
OFFICE B	8,280	22.7%
	36,480 SF	100%

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REGISTERED ARCHITECT
36166
KEVIN T. EVERNHAM
02/27/2023
ARIZONA, U.S.A.

THE CRAFTSMAN ON ELLIOT
MIXED-USE DEVELOPMENT
NWC OF E ELLIOT RD & HAWES RD
MESA, ARIZONA

SITE PLAN

DATE	REMARKS
02/27/2023	PRE-APPLICATION SUBMITTAL

PA / PM:	B.SANDSTROM
DRAWN BY:	A.S.
JOB NO.:	PHX22-0196

SHEET
A1.1

APPENDIX B: COUNT DATA

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Hawes Rd DATE: 06/15/23 LOCATION: Mesa

E-W STREET: Elliot Rd DAY: THURSDAY PROJECT# 23-1211-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0.5	0.5	1	0	1	0	0	1	1	
12:00 AM	0	0	2	1	0	1	0	5	0	2	2	0	13
12:15 AM	0	0	0	0	0	0	0	4	0	0	8	5	17
12:30 AM	0	0	0	1	0	0	1	2	0	0	5	0	9
12:45 AM	0	0	1	4	0	0	0	3	0	0	3	0	11
1:00 AM	0	0	0	0	0	1	0	1	0	0	2	1	5
1:15 AM	0	0	0	0	0	1	1	4	0	0	1	1	8
1:30 AM	0	0	0	0	0	1	0	2	0	1	1	1	6
1:45 AM	0	0	1	0	0	0	0	1	0	0	2	0	4
2:00 AM	0	0	0	3	0	0	0	2	0	0	2	0	7
2:15 AM	0	0	0	1	0	0	0	1	0	0	0	0	2
2:30 AM	0	0	0	3	0	1	1	4	0	0	2	1	12
2:45 AM	0	0	0	1	0	0	0	4	0	0	4	1	10
3:00 AM	0	0	0	2	0	0	0	3	0	0	1	1	7
3:15 AM	0	0	0	3	0	0	0	4	0	0	3	0	10
3:30 AM	0	0	0	3	0	1	0	10	1	0	16	2	33
3:45 AM	0	0	1	5	1	1	0	12	0	1	7	13	41
4:00 AM	0	0	1	2	1	2	1	18	0	1	7	6	39
4:15 AM	0	0	0	24	0	2	3	25	1	6	20	6	87
4:30 AM	0	0	5	86	2	15	2	32	3	20	16	7	188
4:45 AM	0	0	4	12	1	3	2	19	6	22	27	3	99
5:00 AM	1	0	9	14	0	4	2	18	1	16	16	7	88
5:15 AM	5	0	3	4	0	1	1	17	4	12	18	7	72
5:30 AM	3	2	11	4	1	3	1	27	0	11	31	3	97
5:45 AM	3	0	5	9	3	2	2	29	3	22	34	14	126
6:00 AM	0	0	4	10	0	3	9	38	1	20	33	36	154
6:15 AM	3	1	26	15	0	8	5	35	1	13	44	66	217
6:30 AM	1	0	10	11	0	1	3	36	1	11	47	9	130
6:45 AM	0	0	8	7	0	4	1	39	0	2	46	11	118
7:00 AM	2	0	6	8	1	1	1	37	0	3	47	8	114
7:15 AM	0	0	6	12	0	3	1	46	2	13	55	12	150
7:30 AM	1	0	14	8	0	4	0	58	0	10	78	6	179
7:45 AM	3	1	10	8	0	4	4	49	3	11	63	5	161
8:00 AM	4	1	6	9	2	6	2	36	5	2	52	8	133
8:15 AM	1	0	2	14	1	2	6	55	3	6	62	7	159
8:30 AM	2	0	10	6	1	1	4	45	0	10	50	6	135
8:45 AM	0	0	15	9	0	4	3	44	3	12	51	12	153
9:00 AM	4	3	8	10	1	6	1	55	0	10	45	9	152
9:15 AM	0	0	8	3	0	6	1	54	2	5	51	6	136
9:30 AM	1	0	2	4	0	9	5	44	0	4	35	14	118
9:45 AM	0	0	8	2	0	2	3	56	7	17	44	9	148
10:00 AM	4	0	16	7	0	5	6	36	2	12	51	11	150
10:15 AM	1	1	13	3	2	4	2	53	1	9	46	8	143
10:30 AM	4	1	10	6	2	6	0	37	3	4	44	6	123
10:45 AM	2	1	2	7	0	2	1	43	1	6	62	12	139
11:00 AM	3	0	5	5	0	3	3	53	4	14	48	6	144
11:15 AM	1	0	12	6	0	2	0	45	3	8	51	10	138
11:30 AM	1	0	10	8	0	6	4	62	4	7	50	8	160
11:45 AM	1	0	12	13	1	5	4	69	3	4	56	6	174

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: Hawes Rd DATE: 06/15/23 LOCATION: Mesa

E-W STREET: Elliot Rd DAY: THURSDAY PROJECT# 23-1211-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0.5	0.5	1	0	1	0	0	1	1	
12:00 PM	0	0	5	6	0	3	3	48	3	4	57	5	134
12:15 PM	0	0	13	8	0	2	3	65	4	17	49	4	165
12:30 PM	0	1	10	3	0	4	7	50	2	4	44	7	132
12:45 PM	2	0	9	10	0	3	2	61	1	7	53	9	157
1:00 PM	1	1	16	9	2	2	3	62	2	15	50	9	172
1:15 PM	4	2	16	5	1	3	3	63	2	13	51	10	173
1:30 PM	7	0	10	12	0	4	1	43	0	13	56	8	154
1:45 PM	6	0	8	4	0	3	4	53	5	5	51	8	147
2:00 PM	7	1	13	5	0	5	7	55	2	6	58	6	165
2:15 PM	4	0	5	12	0	1	2	53	0	3	45	4	129
2:30 PM	3	0	5	7	0	5	1	52	2	8	41	9	133
2:45 PM	5	1	4	7	3	4	3	63	1	5	48	11	155
3:00 PM	3	0	12	8	0	6	5	60	4	6	50	10	164
3:15 PM	1	0	23	11	1	8	8	60	3	5	56	11	187
3:30 PM	0	1	14	18	0	5	3	69	0	1	64	9	184
3:45 PM	2	0	4	9	0	5	6	57	1	2	51	17	154
4:00 PM	0	0	4	9	0	6	6	54	1	6	50	9	145
4:15 PM	3	0	5	14	0	6	3	69	0	1	42	19	162
4:30 PM	0	1	1	14	0	8	8	64	0	3	55	15	169
4:45 PM	1	0	4	13	0	5	8	58	0	3	46	17	155
5:00 PM	0	2	2	71	0	17	13	85	0	0	62	17	269
5:15 PM	0	0	8	28	0	3	12	70	0	0	49	23	193
5:30 PM	0	0	0	23	0	7	7	72	0	1	56	35	201
5:45 PM	0	0	0	13	1	4	6	52	0	1	57	59	193
6:00 PM	0	0	2	18	0	11	5	72	3	1	44	16	172
6:15 PM	0	0	1	11	0	9	1	49	0	1	45	19	136
6:30 PM	0	0	1	12	2	2	5	45	0	0	43	11	121
6:45 PM	0	0	1	6	0	0	2	37	0	0	42	7	95
7:00 PM	1	1	2	5	0	1	2	46	0	2	35	4	99
7:15 PM	1	0	2	4	0	3	6	32	0	4	22	9	83
7:30 PM	2	0	1	5	0	0	1	40	1	1	24	7	82
7:45 PM	1	0	0	9	0	4	4	21	1	1	39	12	92
8:00 PM	1	0	1	4	0	5	5	43	0	0	33	8	100
8:15 PM	0	0	0	2	0	1	8	24	0	0	24	9	68
8:30 PM	0	0	0	3	0	4	2	35	0	0	23	4	71
8:45 PM	1	0	0	0	0	1	2	31	0	0	28	7	70
9:00 PM	0	0	0	6	0	1	3	27	1	1	18	6	63
9:15 PM	1	1	0	5	0	1	4	18	2	0	17	8	57
9:30 PM	0	0	0	6	0	1	2	18	0	0	8	6	41
9:45 PM	1	0	0	3	0	2	2	10	3	0	10	5	36
10:00 PM	1	0	0	2	0	2	2	14	0	1	6	4	32
10:15 PM	0	0	0	4	0	1	2	15	0	0	6	3	31
10:30 PM	0	0	0	3	0	0	2	12	0	2	11	4	34
10:45 PM	0	0	0	2	0	0	0	20	1	0	6	1	30
11:00 PM	0	1	2	2	0	0	0	7	1	0	8	3	24
11:15 PM	0	0	1	2	0	2	1	9	0	0	10	1	26
11:30 PM	0	0	0	2	0	0	0	8	0	0	8	1	19
11:45 PM	0	1	5	4	0	0	0	6	0	0	5	1	22

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	110	25	476	812	30	306	271	3449	114	470	3195	857	10115

APPENDIX C: CRASH DATA

Crash Report Summary
Craftsman on Elliot TIA

Data Period: 2018 - 2022
Total Crashes: 7

No.	Incident Date	Incident Time	Incident Year	Onroad	Crossing Feature	Offset	Injury Severity	Collision Manner	Light Condition
1	11/23/19	2:42 AM	2019	Hawes Road	Elliot Road	50.00	PDO	Single Vehicle	Dark Not Lighted
2	3/23/20	8:17 AM	2020	Hawes Road	Elliot Road	0.00	PDO	Single Vehicle	Daylight
3	2/7/21	6:32 AM	2021	Hawes Road	Elliot Road	50.00	PDO	Angle	Dawn
4	9/1/21	6:11 PM	2021	Hawes Road	Elliot Road	0.00	Possible Injury	U-Turn	Dusk
5	3/29/22	6:19 PM	2022	Elliot Road	Hawes Road	0.00	PDO	SS Opp Dir	Dawn
6	9/29/22	10:55 PM	2022	Elliot Road	Hawes Road	-300.00	Serious Injury	Head On	Dark Not Lighted
7	11/5/22	12:26 PM	2022	Elliot Road	Hawes Road	-50.00	PDO	Rear End	Daylight

APPENDIX D: SURROUNDING DEVELOPMENTS TRAFFIC IMPACT STUDIES

Hawes Crossing

Master Traffic Impact Anlaysis

Northwest of Loop 202 and
State Route 24 Interchange
Mesa, Arizona

November 2019
Project No. 17-1390

Prepared For:

Mesa-Casa Grande
Land Company, LLC
19965 East Elliot Road
Mesa, Arizona 85212

For Submittal to:
City of Mesa

Prepared By:

CivTech

10605 North Hayden Road
Suite 140
Scottsdale, Arizona 85260
480-659-4250

HAWES CROSSING
MASTER TRAFFIC IMPACT ANALYSIS

Northwest of Loop 202 and State Route 24 Interchange
Mesa, Arizona

Prepared for:

Mesa-Casa Grande Land Company, LLC
19965 E. Elliot Rd.
Mesa AZ, 85212

Prepared by:

CivTech
10605 North Hayden Road
Suite 140
Scottsdale, Arizona 85260
(480) 659-4250

November 2019
CivTech Project No. 17-1390

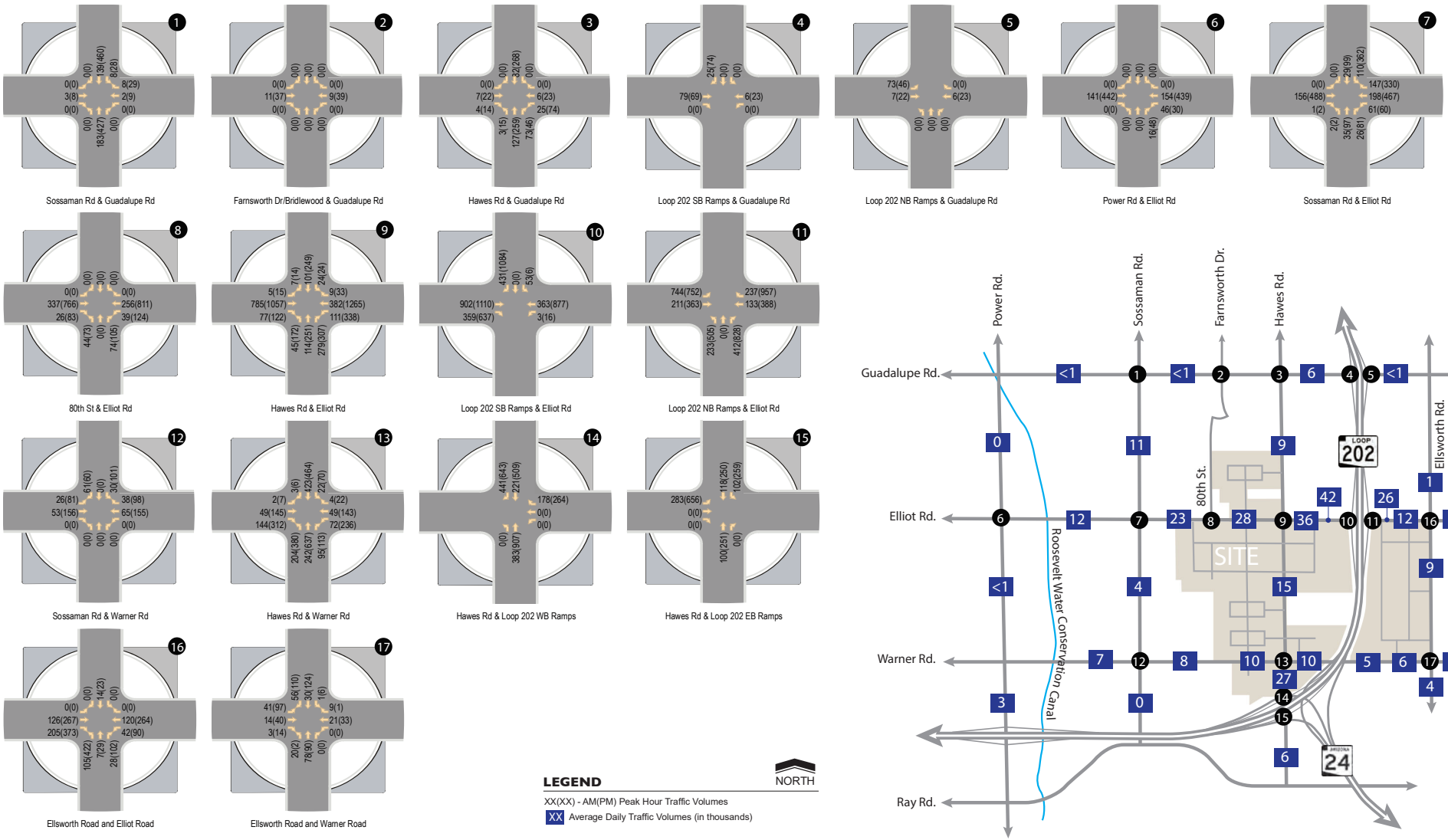


Figure 7: Site Generated Traffic Volumes A

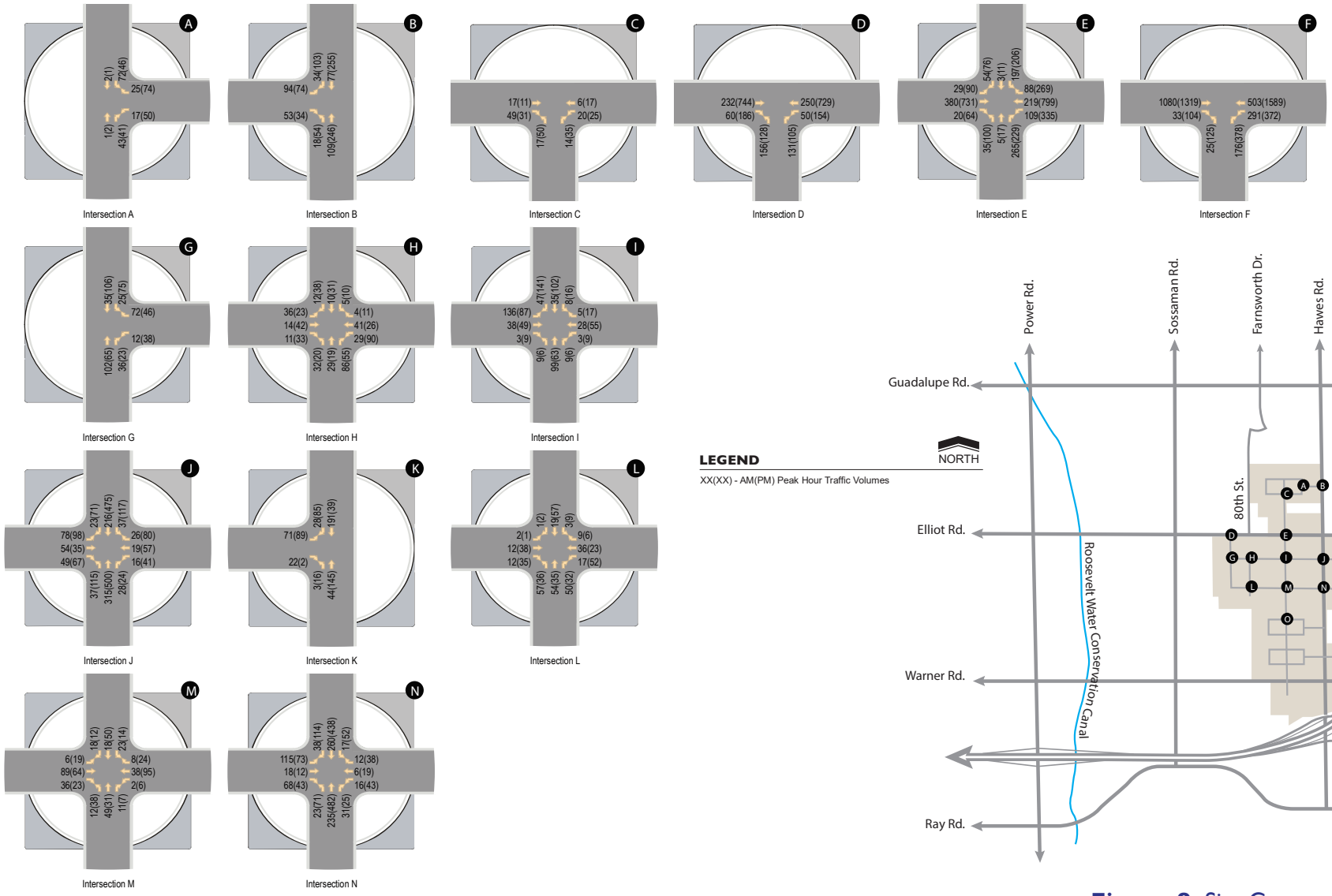


Figure 8: Site Generated Traffic Volumes B

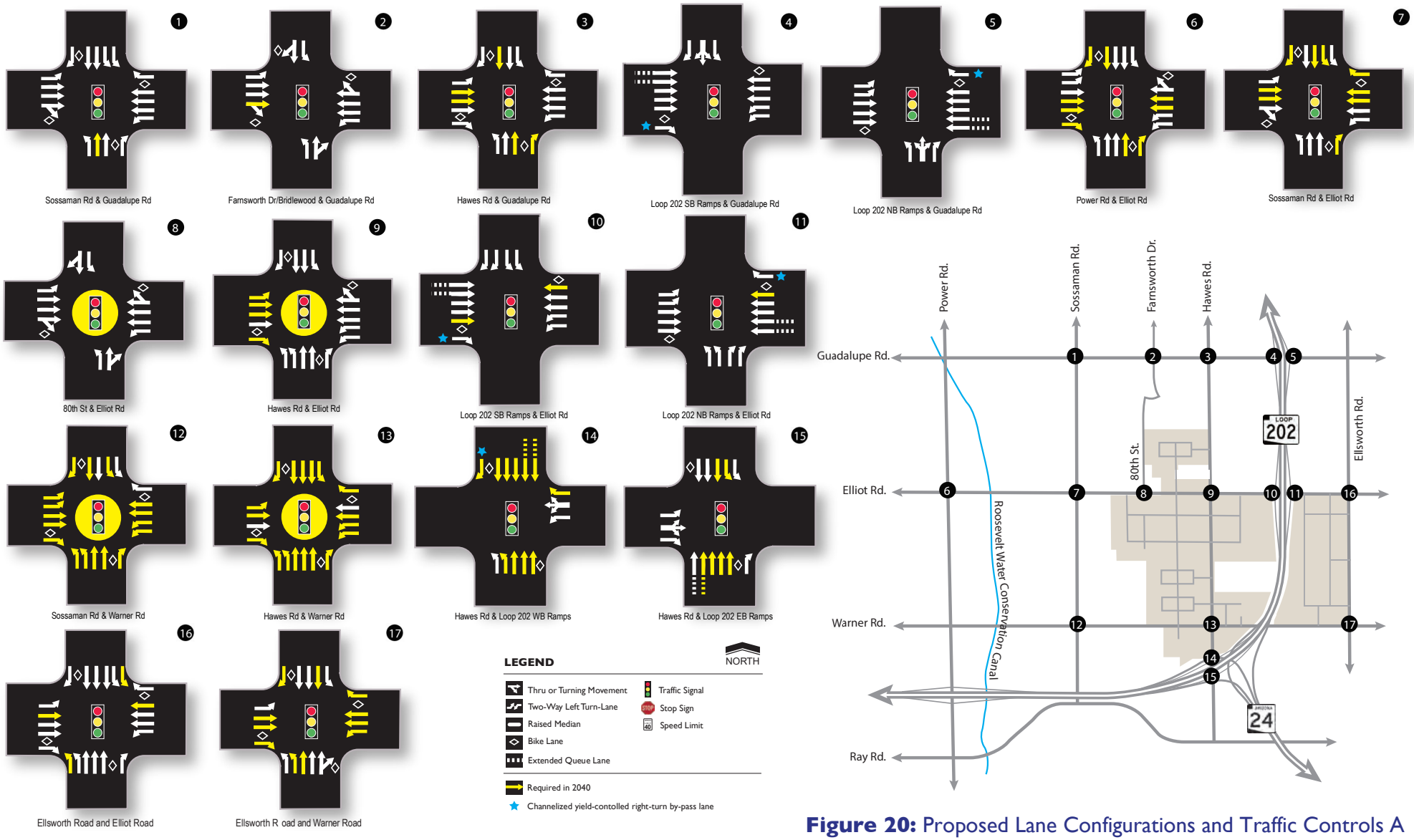
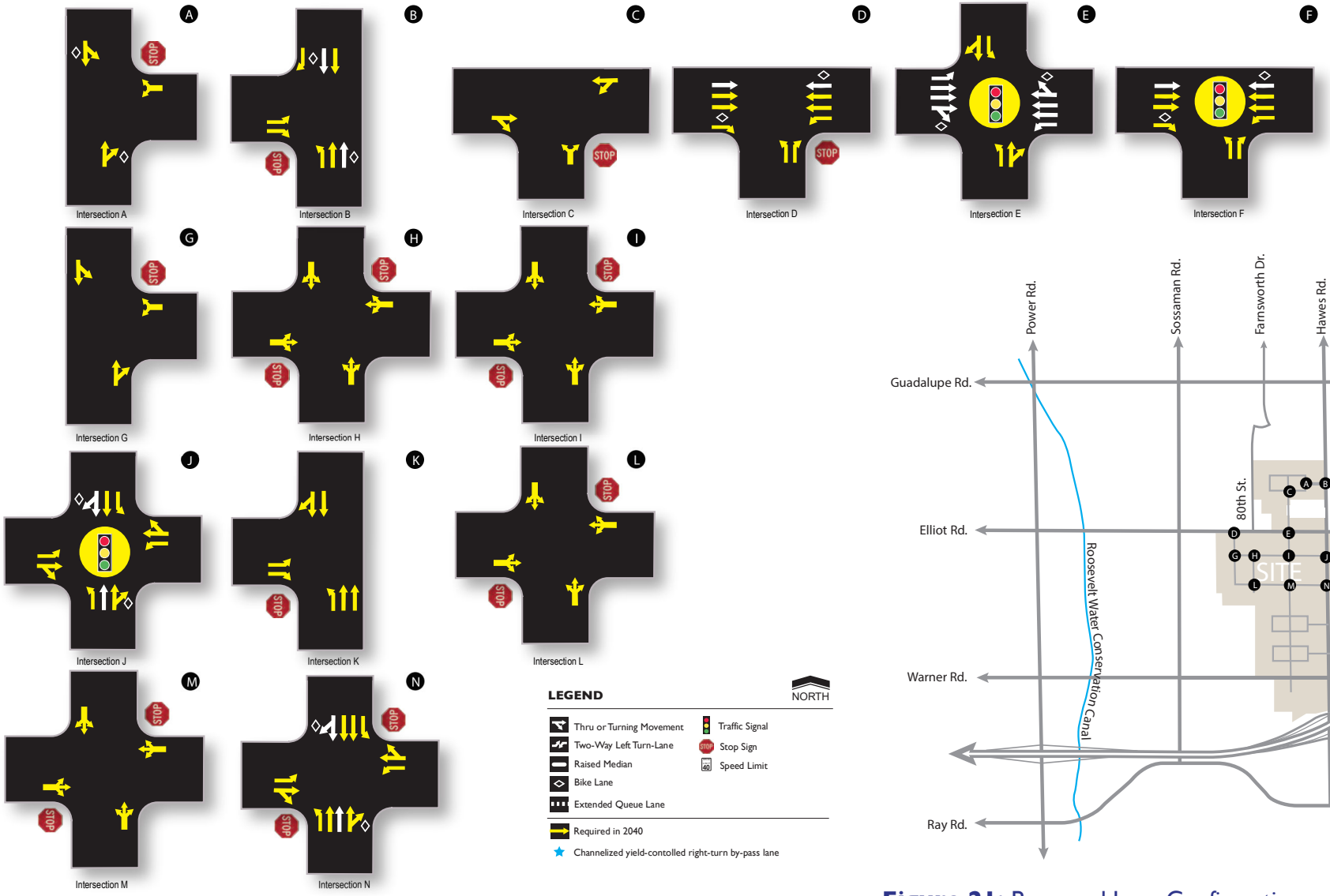


Figure 20: Proposed Lane Configurations and Traffic Controls A



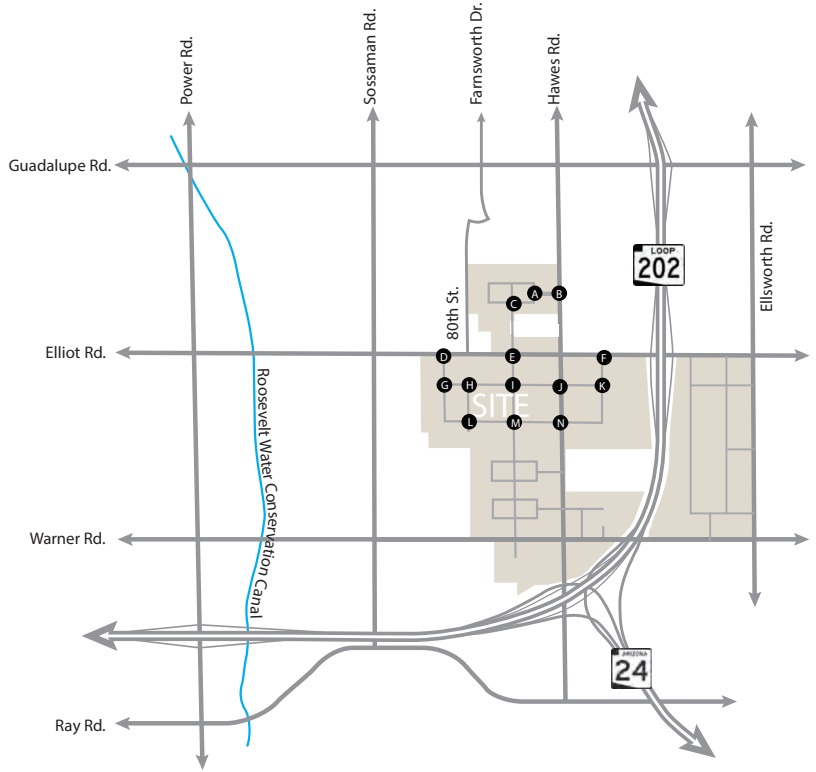
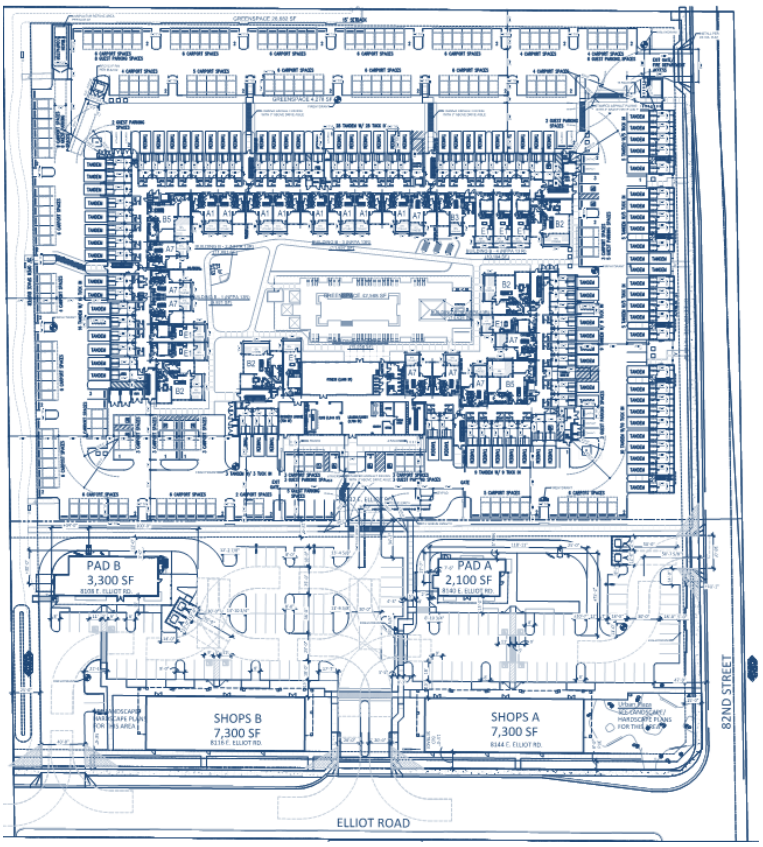


Figure 21: Proposed Lane Configurations and Traffic Controls B

Hawes Crossing

Traffic Impact Study – Category II



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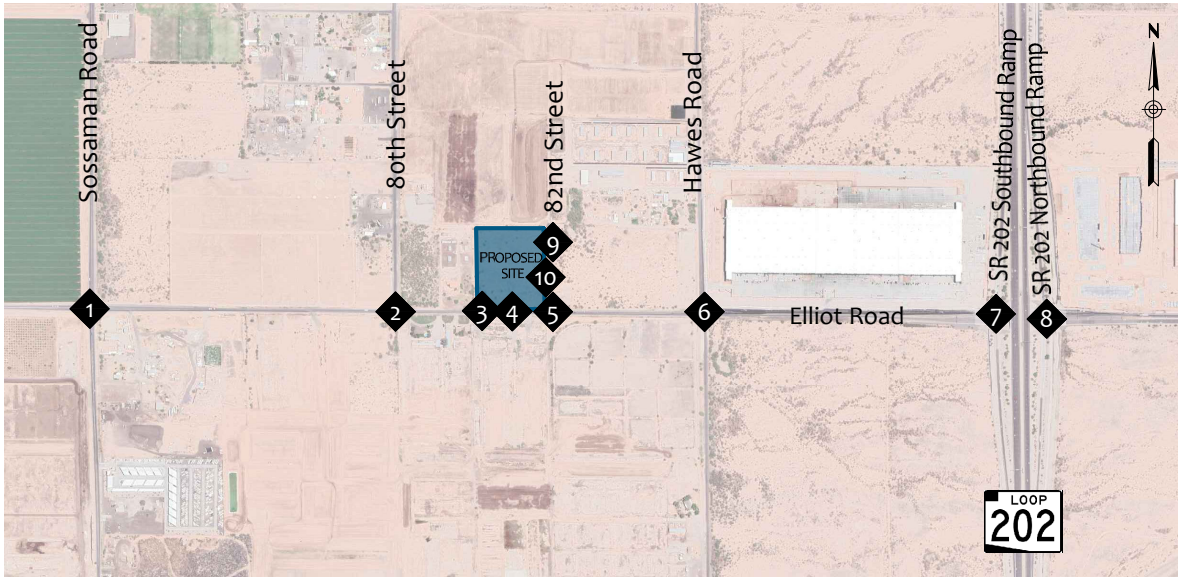
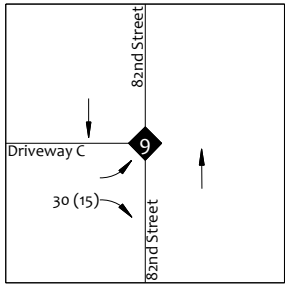
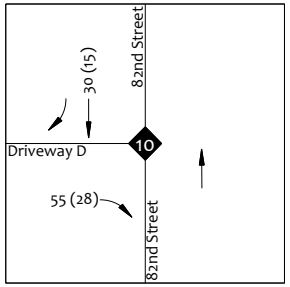
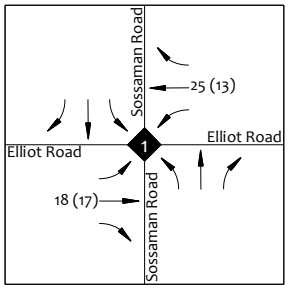
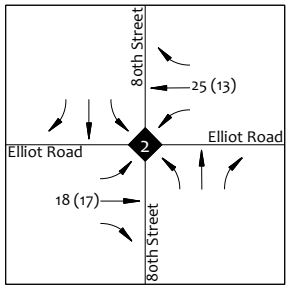
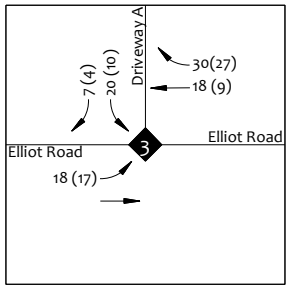


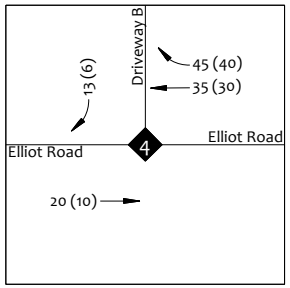


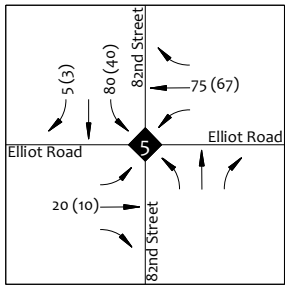


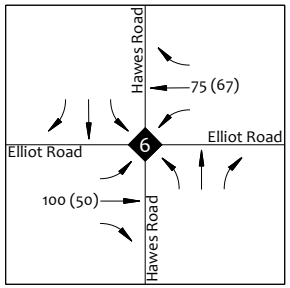








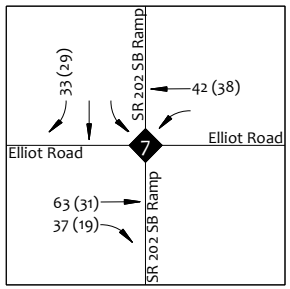




LEGEND

AM (PM) Peak Hour Traffic Volumes

Intersection



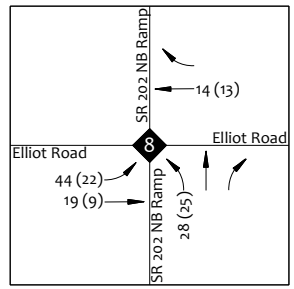


FIGURE 7 | SITE TRAFFIC VOLUMES

APPENDIX E: NCHRP REPORT 684 SPREAD SHEET ESTIMATOR

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Craftsman on Elliot	**Organization:**	Lee Eng
Project Location:	Mesa AZ	**Performed By:**	MAJ
Scenario Description:	Full site build-out	**Date:**	3/12/2024
Analysis Year:		**Checked By:**	MAJ
Analysis Period:	**AM Peak Hour**	**Date:**	3/12/2024

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	712	15	1,000 SF GFA	26	21	5
Retail	822	16	1,000 SF GFA	40	24	16
Restaurant	932,934	9	1,000 SF GFA	170	89	81
Cinema/Entertainment				0		
Residential	221	386	DU	158	36	122
Hotel				0		
All Other Land Uses[2]				0		
				394	170	224

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses[2]	1.00			1.00		

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	3	0	0	0
Retail	1		2	0	1	0
Restaurant	3	2		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	18	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	394	170	224
Internal Capture Percentage	18%	21%	16%
External Vehicle-Trips[5]	324	135	189
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	24%	80%
Retail	17%	25%
Restaurant	26%	9%
Cinema/Entertainment	N/A	N/A
Residential	8%	16%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Craftsman on Elliot	**Organization:**	Lee Eng
Project Location:	Mesa AZ	**Performed By:**	MAJ
Scenario Description:	Full site build-out	**Date:**	3/12/2024
Analysis Year:		**Checked By:**	MAJ
Analysis Period:	**PM Street Peak Hour**	**Date:**	3/12/2024

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	712	15	1,000 SF GFA	32	11	21
Retail	822	16	1,000 SF GFA	110	55	55
Restaurant	932,934	9	1,000 SF GFA	137	76	61
Cinema/Entertainment				0		
Residential	221	386	DU	151	92	59
Hotel				0		
All Other Land Uses[2]				0		
				430	234	196

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses[2]	1.00			1.00		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	1	0	0	0
Retail	1		16	0	14	0
Restaurant	2	25		0	11	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	6	11	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	430	234	196
Internal Capture Percentage	43%	40%	47%
External Vehicle-Trips[5]	244	141	103
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	45%	24%
Retail	64%	56%
Restaurant	37%	62%
Cinema/Entertainment	N/A	N/A
Residential	27%	32%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

APPENDIX F: SYNCHRO OUTPUT SHEETS

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	198	11	29	255	26	9	2	32	39	3	16
Future Vol, veh/h	12	198	11	29	255	26	9	2	32	39	3	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	300	-	-	-	-	-	240
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	215	12	32	277	28	10	2	35	42	3	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	305	0	0	227	0	0	612	616	221	607	594	277
Stage 1	-	-	-	-	-	-	247	247	-	341	341	-
Stage 2	-	-	-	-	-	-	365	369	-	266	253	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1256	-	-	1341	-	-	405	406	819	408	418	762
Stage 1	-	-	-	-	-	-	757	702	-	674	639	-
Stage 2	-	-	-	-	-	-	654	621	-	739	698	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1256	-	-	1341	-	-	381	389	819	377	401	762
Mov Cap-2 Maneuver	-	-	-	-	-	-	381	389	-	377	401	-
Stage 1	-	-	-	-	-	-	748	694	-	666	620	-
Stage 2	-	-	-	-	-	-	617	603	-	697	690	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.7	11.1	14.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	634	1256	-	-	1341	-	-	379	762
HCM Lane V/C Ratio	0.074	0.01	-	-	0.024	-	-	0.12	0.023
HCM Control Delay (s)	11.1	7.9	0	-	7.7	0	-	15.8	9.8
HCM Lane LOS	B	A	A	-	A	A	-	C	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.4	0.1

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			↰	↱		⇕			↰	↱
Traffic Vol, veh/h	38	279	0	2	224	134	0	2	10	135	1	31
Future Vol, veh/h	38	279	0	2	224	134	0	2	10	135	1	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	300	-	-	-	-	-	240
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	303	0	2	243	146	0	2	11	147	1	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	389	0	0	303	0	0	723	778	303	639	632	243
Stage 1	-	-	-	-	-	-	385	385	-	247	247	-
Stage 2	-	-	-	-	-	-	338	393	-	392	385	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1170	-	-	1258	-	-	342	328	737	389	398	796
Stage 1	-	-	-	-	-	-	638	611	-	757	702	-
Stage 2	-	-	-	-	-	-	676	606	-	633	611	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1170	-	-	1258	-	-	316	314	737	368	380	796
Mov Cap-2 Maneuver	-	-	-	-	-	-	316	314	-	368	380	-
Stage 1	-	-	-	-	-	-	611	585	-	725	701	-
Stage 2	-	-	-	-	-	-	645	605	-	595	585	-

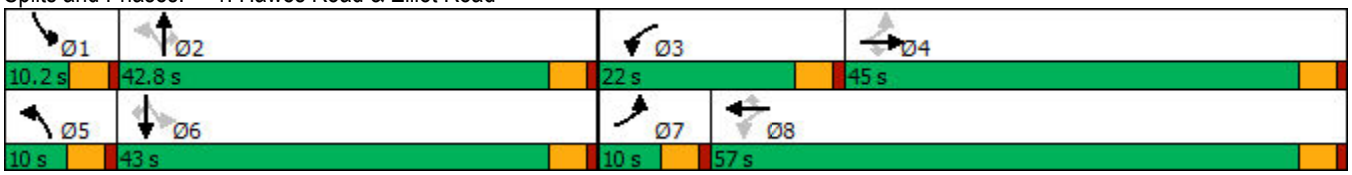
Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0	11.1	19.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	602	1170	-	-	1258	-	-	368	796
HCM Lane V/C Ratio	0.022	0.035	-	-	0.002	-	-	0.402	0.042
HCM Control Delay (s)	11.1	8.2	0	-	7.9	0	-	21.2	9.7
HCM Lane LOS	B	A	A	-	A	A	-	C	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	1.9	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	991	89	142	648	37	55	117	313	65	105	24
Future Volume (vph)	18	991	89	142	648	37	55	117	313	65	105	24
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.372			0.160			0.680			0.598		
Satd. Flow (perm)	693	5085	1583	298	5085	1583	2457	3539	1583	1114	3539	1583
Satd. Flow (RTOR)			136			95			321			136
Lane Group Flow (vph)	20	1077	97	154	704	40	60	127	340	71	114	26
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	10.0	45.0	45.0	22.0	57.0	57.0	10.0	42.8	42.8	10.2	43.0	43.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	30.2	24.3	24.3	37.4	34.3	34.3	14.6	10.5	10.5	15.9	12.8	12.8
Actuated g/C Ratio	0.46	0.37	0.37	0.57	0.53	0.53	0.22	0.16	0.16	0.24	0.20	0.20
v/c Ratio	0.05	0.57	0.14	0.43	0.26	0.05	0.09	0.22	0.65	0.21	0.16	0.06
Control Delay	7.8	18.1	1.9	11.2	10.5	0.1	19.5	28.3	11.4	21.2	26.6	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	18.1	1.9	11.2	10.5	0.1	19.5	28.3	11.4	21.2	26.6	0.3
LOS	A	B	A	B	B	A	B	C	B	C	C	A
Approach Delay		16.6			10.1			16.4			21.6	
Approach LOS		B			B			B			C	
Queue Length 50th (ft)	3	117	0	25	44	0	8	23	7	20	21	0
Queue Length 95th (ft)	14	204	15	65	112	0	26	56	85	60	51	0
Internal Link Dist (ft)		1269			960			1298			1099	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	416	3352	1089	590	4094	1293	637	2206	1107	331	2218	1043
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.32	0.09	0.26	0.17	0.03	0.09	0.06	0.31	0.21	0.05	0.02

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 65.3	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 14.9	Intersection LOS: B
Intersection Capacity Utilization 53.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Hawes Road & Elliot Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	630	20	109	586	88	35	5	265	277	3	59
Future Volume (vph)	29	630	20	109	586	88	35	5	265	277	3	59
Satd. Flow (prot)	1770	5060	0	1770	4984	0	1770	1589	0	1770	1596	0
Flt Permitted	0.362			0.233			0.713			0.244		
Satd. Flow (perm)	674	5060	0	434	4984	0	1328	1589	0	455	1596	0
Satd. Flow (RTOR)		4			24			288			64	
Lane Group Flow (vph)	32	707	0	118	733	0	38	293	0	301	67	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	10.0	31.0		19.0	40.0		10.0	37.0		33.0	60.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	21.1	16.9		26.7	23.6		15.3	9.5		29.3	24.0	
Actuated g/C Ratio	0.32	0.26		0.41	0.36		0.23	0.14		0.45	0.37	
v/c Ratio	0.10	0.54		0.34	0.41		0.11	0.62		0.60	0.11	
Control Delay	13.5	24.0		15.3	17.1		15.5	11.1		19.6	6.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.5	24.0		15.3	17.1		15.5	11.1		19.6	6.7	
LOS	B	C		B	B		B	B		B	A	
Approach Delay		23.6			16.9			11.6			17.2	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	7	88		26	63		9	2		80	1	
Queue Length 95th (ft)	26	161		71	147		29	73		173	28	
Internal Link Dist (ft)		885			1269			482			682	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	313	2167		496	2867		349	970		829	1346	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.10	0.33		0.24	0.26		0.11	0.30		0.36	0.05	

Intersection Summary

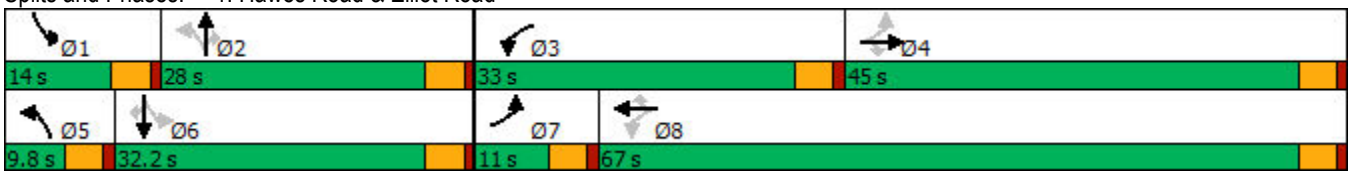
Cycle Length: 120
Actuated Cycle Length: 65.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 18.3 Intersection LOS: B
Intersection Capacity Utilization 65.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: 82nd Street & Elliot Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	1348	122	341	1498	173	172	254	318	165	251	47
Future Volume (vph)	55	1348	122	341	1498	173	172	254	318	165	251	47
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.135			0.091			0.584			0.353		
Satd. Flow (perm)	251	5085	1583	170	5085	1583	2110	3539	1583	658	3539	1583
Satd. Flow (RTOR)			136			188			346			136
Lane Group Flow (vph)	60	1465	133	371	1628	188	187	276	346	179	273	51
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	11.0	45.0	45.0	33.0	67.0	67.0	9.8	28.0	28.0	14.0	32.2	32.2
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	44.7	38.4	38.4	64.8	56.4	56.4	20.1	14.7	14.7	28.3	18.8	18.8
Actuated g/C Ratio	0.44	0.37	0.37	0.63	0.55	0.55	0.20	0.14	0.14	0.28	0.18	0.18
v/c Ratio	0.30	0.77	0.20	0.83	0.58	0.20	0.39	0.55	0.66	0.63	0.42	0.13
Control Delay	15.6	32.8	5.1	42.8	17.1	2.5	33.3	46.4	11.3	42.7	40.4	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	32.8	5.1	42.8	17.1	2.5	33.3	46.4	11.3	42.7	40.4	0.7
LOS	B	C	A	D	B	A	C	D	B	D	D	A
Approach Delay		29.9			20.2			28.4			37.2	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	14	308	0	182	258	0	50	92	0	98	87	0
Queue Length 95th (ft)	33	433	40	318	344	34	84	142	84	170	135	0
Internal Link Dist (ft)		1269			960			1298			1099	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	207	2043	717	559	3153	1053	482	825	634	287	972	533
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.72	0.19	0.66	0.52	0.18	0.39	0.33	0.55	0.62	0.28	0.10

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 102.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 26.3	Intersection LOS: C
Intersection Capacity Utilization 76.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Hawes Road & Elliot Road

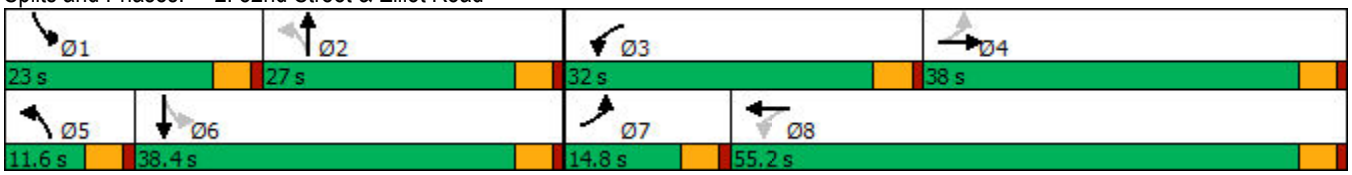


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1071	64	335	1132	269	100	17	229	246	11	79
Future Volume (vph)	90	1071	64	335	1132	269	100	17	229	246	11	79
Satd. Flow (prot)	1770	5040	0	1770	4938	0	1770	1602	0	1770	1617	0
Flt Permitted	0.137			0.109			0.694			0.274		
Satd. Flow (perm)	255	5040	0	203	4938	0	1293	1602	0	510	1617	0
Satd. Flow (RTOR)		8			57			249			86	
Lane Group Flow (vph)	98	1234	0	364	1522	0	109	267	0	267	98	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	14.8	38.0		32.0	55.2		11.6	27.0		23.0	38.4	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	39.1	31.0		56.0	46.1		17.3	10.1		31.0	19.2	
Actuated g/C Ratio	0.41	0.32		0.58	0.48		0.18	0.10		0.32	0.20	
v/c Ratio	0.43	0.76		0.81	0.64		0.41	0.68		0.71	0.25	
Control Delay	20.2	33.8		38.2	20.6		32.3	17.2		38.7	11.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.2	33.8		38.2	20.6		32.3	17.2		38.7	11.5	
LOS	C	C		D	C		C	B		D	B	
Approach Delay		32.8			24.0			21.6			31.4	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	24	246		161	247		50	11		136	6	
Queue Length 95th (ft)	62	365		300	361		98	92		227	50	
Internal Link Dist (ft)		885			1269			482			682	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	276	1805		577	2695		269	573		412	639	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.36	0.68		0.63	0.56		0.41	0.47		0.65	0.15	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 96.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 27.4 Intersection LOS: C
Intersection Capacity Utilization 84.4% ICU Level of Service E
Analysis Period (min) 15

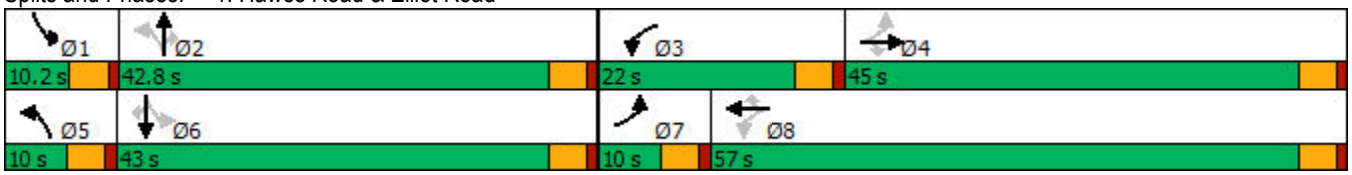
Splits and Phases: 2: 82nd Street & Elliot Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1013	90	145	676	39	56	117	316	69	105	26
Future Volume (vph)	19	1013	90	145	676	39	56	117	316	69	105	26
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.361			0.157			0.680			0.665		
Satd. Flow (perm)	672	5085	1583	292	5085	1583	2457	3539	1583	1239	3539	1583
Satd. Flow (RTOR)			136			95			320			136
Lane Group Flow (vph)	21	1101	98	158	735	42	61	127	343	75	114	28
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	10.0	45.0	45.0	22.0	57.0	57.0	10.0	42.8	42.8	10.2	43.0	43.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	31.4	25.5	25.5	38.9	35.8	35.8	15.0	10.9	10.9	15.3	11.0	11.0
Actuated g/C Ratio	0.47	0.38	0.38	0.58	0.53	0.53	0.22	0.16	0.16	0.23	0.16	0.16
v/c Ratio	0.05	0.57	0.14	0.44	0.27	0.05	0.10	0.22	0.65	0.23	0.20	0.08
Control Delay	7.9	18.3	1.9	11.4	10.5	0.1	20.2	28.9	11.8	22.1	28.6	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	18.3	1.9	11.4	10.5	0.1	20.2	28.9	11.8	22.1	28.6	0.4
LOS	A	B	A	B	B	A	C	C	B	C	C	A
Approach Delay		16.8			10.2			16.9			22.7	
Approach LOS		B			B			B			C	
Queue Length 50th (ft)	3	124	0	27	48	0	8	24	8	22	21	0
Queue Length 95th (ft)	14	214	15	67	117	1	27	58	90	66	53	0
Internal Link Dist (ft)		1269			960			1298			1099	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	409	3265	1065	579	4019	1271	633	2149	1087	330	2160	1019
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.34	0.09	0.27	0.18	0.03	0.10	0.06	0.32	0.23	0.05	0.03

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 67.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 15.1	Intersection LOS: B
Intersection Capacity Utilization 54.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Hawes Road & Elliot Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	655	20	109	616	88	35	5	265	277	3	59
Future Volume (vph)	29	655	20	109	616	88	35	5	265	277	3	59
Satd. Flow (prot)	1770	5065	0	1770	4989	0	1770	1589	0	1770	1596	0
Flt Permitted	0.349			0.235			0.713			0.320		
Satd. Flow (perm)	650	5065	0	438	4989	0	1328	1589	0	596	1596	0
Satd. Flow (RTOR)		3			22			288			64	
Lane Group Flow (vph)	32	734	0	118	766	0	38	293	0	301	67	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	10.0	32.0		19.0	41.0		23.0	39.0		30.0	46.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		3.0	4.5	
Act Effct Green (s)	21.4	17.3		26.9	23.8		16.3	9.5		29.0	15.9	
Actuated g/C Ratio	0.33	0.27		0.42	0.37		0.25	0.15		0.45	0.25	
v/c Ratio	0.10	0.54		0.33	0.41		0.10	0.61		0.56	0.15	
Control Delay	12.7	23.0		14.4	16.5		15.0	10.8		17.8	7.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	12.7	23.0		14.4	16.5		15.0	10.8		17.8	7.8	
LOS	B	C		B	B		B	B		B	A	
Approach Delay		22.6			16.2			11.3			16.0	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	6	88		25	63		9	2		76	1	
Queue Length 95th (ft)	25	162		68	150		30	72		168	30	
Internal Link Dist (ft)		885			1269			482			682	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	318	2308		510	3024		680	1031		814	1115	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.10	0.32		0.23	0.25		0.06	0.28		0.37	0.06	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 64.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 17.6 Intersection LOS: B
Intersection Capacity Utilization 65.7% ICU Level of Service C
Analysis Period (min) 15

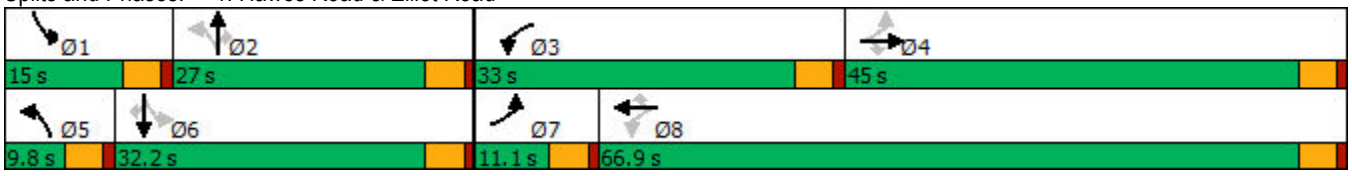
Splits and Phases: 2: 82nd Street & Elliot Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1378	122	341	1523	188	172	254	319	180	251	50
Future Volume (vph)	59	1378	122	341	1523	188	172	254	319	180	251	50
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.127			0.090			0.584			0.342		
Satd. Flow (perm)	237	5085	1583	168	5085	1583	2110	3539	1583	637	3539	1583
Satd. Flow (RTOR)			177			204			347			136
Lane Group Flow (vph)	64	1498	133	371	1655	204	187	276	347	196	273	54
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	11.1	45.0	45.0	33.0	66.9	66.9	9.8	27.0	27.0	15.0	32.2	32.2
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	45.3	38.9	38.9	65.5	57.1	57.1	20.2	14.8	14.8	29.7	19.8	19.8
Actuated g/C Ratio	0.43	0.37	0.37	0.63	0.55	0.55	0.19	0.14	0.14	0.28	0.19	0.19
v/c Ratio	0.32	0.79	0.19	0.84	0.60	0.21	0.39	0.55	0.66	0.67	0.41	0.13
Control Delay	16.9	34.0	2.1	44.3	17.8	2.5	33.5	47.3	11.4	44.2	40.1	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	34.0	2.1	44.3	17.8	2.5	33.5	47.3	11.4	44.2	40.1	0.7
LOS	B	C	A	D	B	A	C	D	B	D	D	A
Approach Delay		30.9			20.8			28.7			37.6	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	15	325	0	186	272	0	50	94	0	109	87	0
Queue Length 95th (ft)	36	452	19	#325	361	36	83	144	85	185	134	0
Internal Link Dist (ft)		1269			960			1298			1099	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	202	2010	732	550	3094	1043	476	776	618	297	955	526
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.75	0.18	0.67	0.53	0.20	0.39	0.36	0.56	0.66	0.29	0.10

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 104.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 27.0 Intersection LOS: C
Intersection Capacity Utilization 77.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

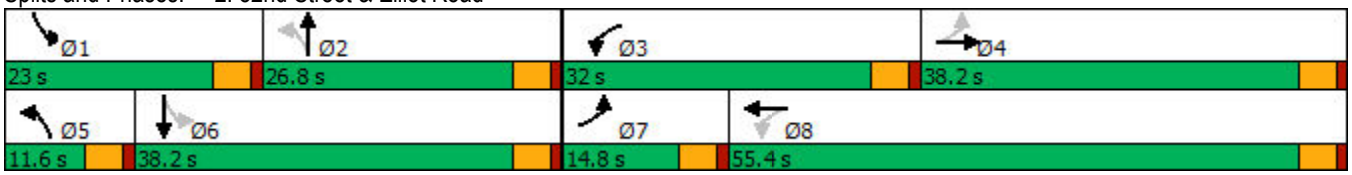
Splits and Phases: 1: Hawes Road & Elliot Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1106	64	335	1160	269	100	17	229	246	11	79
Future Volume (vph)	90	1106	64	335	1160	269	100	17	229	246	11	79
Satd. Flow (prot)	1770	5045	0	1770	4943	0	1770	1602	0	1770	1617	0
Flt Permitted	0.129			0.107			0.694			0.274		
Satd. Flow (perm)	240	5045	0	199	4943	0	1293	1602	0	510	1617	0
Satd. Flow (RTOR)		7			55			249			86	
Lane Group Flow (vph)	98	1272	0	364	1553	0	109	267	0	267	98	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	14.8	38.2		32.0	55.4		11.6	26.8		23.0	38.2	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	39.8	31.7		56.7	46.8		17.2	10.1		31.1	19.3	
Actuated g/C Ratio	0.41	0.33		0.58	0.48		0.18	0.10		0.32	0.20	
v/c Ratio	0.44	0.77		0.82	0.64		0.41	0.69		0.71	0.25	
Control Delay	21.3	34.2		39.0	20.8		32.6	17.3		39.1	11.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.3	34.2		39.0	20.8		32.6	17.3		39.1	11.6	
LOS	C	C		D	C		C	B		D	B	
Approach Delay		33.3			24.3			21.7			31.7	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	25	257		163	257		51	11		137	6	
Queue Length 95th (ft)	64	380		302	371		99	92		228	49	
Internal Link Dist (ft)		885			1269			482			682	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	270	1796		571	2677		266	566		408	629	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.36	0.71		0.64	0.58		0.41	0.47		0.65	0.16	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 97	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 27.8	Intersection LOS: C
Intersection Capacity Utilization 85.0%	ICU Level of Service E
Analysis Period (min) 15	

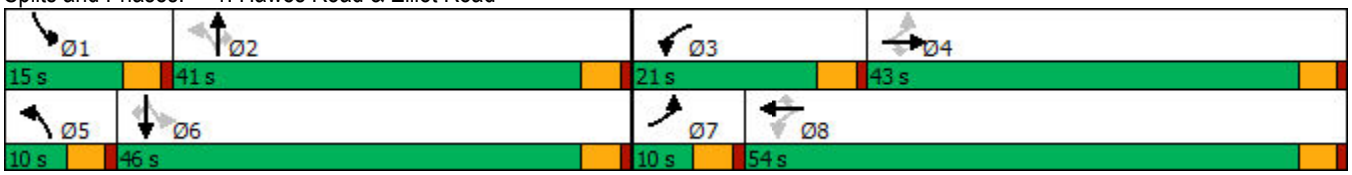
Splits and Phases: 2: 82nd Street & Elliot Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	1000	89	142	705	54	60	122	313	161	121	32
Future Volume (vph)	18	1000	89	142	705	54	60	122	313	161	121	32
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.349			0.147			0.668			0.493		
Satd. Flow (perm)	650	5085	1583	274	5085	1583	2414	3539	1583	918	3539	1583
Satd. Flow (RTOR)			177			136			288			136
Lane Group Flow (vph)	20	1087	97	154	766	59	65	133	340	175	132	35
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	10.0	43.0	43.0	21.0	54.0	54.0	10.0	41.0	41.0	15.0	46.0	46.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	32.1	26.4	26.4	40.2	36.9	36.9	17.2	11.5	11.5	26.1	18.4	18.4
Actuated g/C Ratio	0.42	0.35	0.35	0.53	0.49	0.49	0.23	0.15	0.15	0.34	0.24	0.24
v/c Ratio	0.06	0.61	0.15	0.47	0.31	0.07	0.10	0.25	0.70	0.41	0.15	0.07
Control Delay	10.1	22.4	0.5	14.5	13.3	0.2	19.7	31.5	15.8	23.0	26.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	22.4	0.5	14.5	13.3	0.2	19.7	31.5	15.8	23.0	26.5	0.3
LOS	B	C	A	B	B	A	B	C	B	C	C	A
Approach Delay		20.4			12.7			20.2			22.0	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	4	142	0	32	63	0	9	28	21	57	26	0
Queue Length 95th (ft)	16	243	0	78	142	0	28	64	116	134	60	0
Internal Link Dist (ft)		620			960			1298			150	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	360	2684	919	483	3450	1117	624	1771	935	439	2013	959
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.40	0.11	0.32	0.22	0.05	0.10	0.08	0.36	0.40	0.07	0.04

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 75.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 18.1	Intersection LOS: B
Intersection Capacity Utilization 58.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Hawes Road & Elliot Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	635	20	112	598	88	35	10	265	301	7	62
Future Volume (vph)	34	635	20	112	598	88	35	10	265	301	7	62
Satd. Flow (prot)	1770	5060	0	1770	4989	0	1770	1595	0	1770	1613	0
Flt Permitted	0.336			0.238			0.708			0.242		
Satd. Flow (perm)	626	5060	0	443	4989	0	1319	1595	0	451	1613	0
Satd. Flow (RTOR)		4			23			288			67	
Lane Group Flow (vph)	37	712	0	122	746	0	38	299	0	327	75	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	11.0	30.0		19.0	38.0		10.0	37.0		34.0	61.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	22.2	17.5		26.8	21.8		15.5	9.7		30.5	25.2	
Actuated g/C Ratio	0.33	0.26		0.40	0.32		0.23	0.14		0.45	0.37	
v/c Ratio	0.12	0.54		0.35	0.46		0.11	0.63		0.63	0.12	
Control Delay	14.1	24.8		16.1	20.0		15.9	11.9		20.7	7.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.1	24.8		16.1	20.0		15.9	11.9		20.7	7.2	
LOS	B	C		B	C		B	B		C	A	
Approach Delay		24.2			19.5			12.3			18.2	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	8	91		28	90		9	4		89	2	
Queue Length 95th (ft)	30	168		76	158		30	80		195	32	
Internal Link Dist (ft)		744			569			482			141	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	323	2028		488	2635		341	954		835	1347	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.35		0.25	0.28		0.11	0.31		0.39	0.06	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 67.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 19.8 Intersection LOS: B
Intersection Capacity Utilization 67.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: 82nd Street & Elliot Road

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	0	40	0	0	0	23	172	0	0	199	5
Future Vol, veh/h	16	0	40	0	0	0	23	172	0	0	199	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	0	43	0	0	0	25	187	0	0	216	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	363	456	111	345	458	94	221	0	0	-	-	0
Stage 1	219	219	-	237	237	-	-	-	-	-	-	-
Stage 2	144	237	-	108	221	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	568	499	921	585	498	944	1345	-	-	0	-	-
Stage 1	763	721	-	745	708	-	-	-	-	0	-	-
Stage 2	844	708	-	886	719	-	-	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	559	489	921	549	488	944	1345	-	-	-	-	-
Mov Cap-2 Maneuver	611	545	-	600	539	-	-	-	-	-	-	-
Stage 1	747	721	-	729	693	-	-	-	-	-	-	-
Stage 2	826	693	-	844	719	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.8	0	1	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1345	-	-	804	-	-	-
HCM Lane V/C Ratio	0.019	-	-	0.076	-	-	-
HCM Control Delay (s)	7.7	0.1	-	9.8	0	-	-
HCM Lane LOS	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	79	0	0	0	0	195	0	0	234	5
Future Vol, veh/h	0	0	79	0	0	0	0	195	0	0	234	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	75	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	86	0	0	0	0	212	0	0	254	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	127	-	-	106	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	900	0	0	928	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	900	-	-	928	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.4	0	0	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	900	-	-	-
HCM Lane V/C Ratio	-	-	0.095	-	-	-
HCM Control Delay (s)	-	-	9.4	0	-	-
HCM Lane LOS	-	-	A	A	-	-
HCM 95th %tile Q(veh)	-	-	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	1181	720	79	0	23
Future Vol, veh/h	21	1181	720	79	0	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	200	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	1284	783	86	0	25

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	869	0	-	0	-	392
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	3.92
Pot Cap-1 Maneuver	453	-	-	-	0	519
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	453	-	-	-	-	519
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	453	-	-	-	519
HCM Lane V/C Ratio	0.05	-	-	-	0.048
HCM Control Delay (s)	13.4	-	-	-	12.3
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	0	122	6	0	339
Future Vol, veh/h	9	0	122	6	0	339
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	0	133	7	0	368

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	505	137	0	0	140	0
Stage 1	137	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	527	911	-	-	1443	-
Stage 1	890	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	527	911	-	-	1443	-
Mov Cap-2 Maneuver	527	-	-	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	527	1443	-
HCM Lane V/C Ratio	-	-	0.019	-	-
HCM Control Delay (s)	-	-	12	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	0	128	6	0	347
Future Vol, veh/h	25	0	128	6	0	347
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	0	139	7	0	377

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	520	143	0	0	146	0
Stage 1	143	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	516	905	-	-	1436	-
Stage 1	884	-	-	-	-	-
Stage 2	694	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	516	905	-	-	1436	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	694	-	-	-	-	-

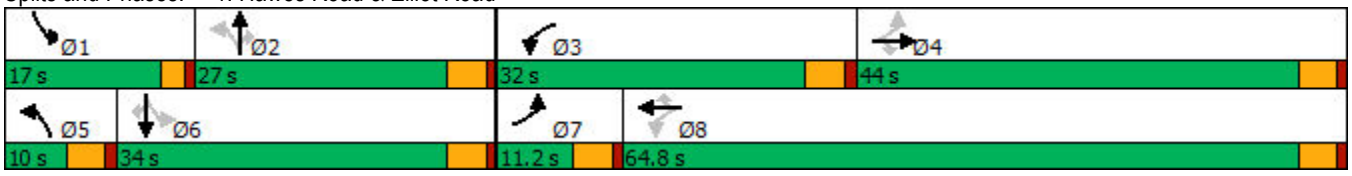
Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	516	1436	-
HCM Lane V/C Ratio	-	-	0.053	-	-
HCM Control Delay (s)	-	-	12.4	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	1343	122	341	1574	195	179	261	318	248	263	53
Future Volume (vph)	55	1343	122	341	1574	195	179	261	318	248	263	53
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.112			0.092			0.576			0.362		
Satd. Flow (perm)	209	5085	1583	171	5085	1583	2082	3539	1583	674	3539	1583
Satd. Flow (RTOR)			164			212			346			136
Lane Group Flow (vph)	60	1460	133	371	1711	212	195	284	346	270	286	58
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	11.2	44.0	44.0	32.0	64.8	64.8	10.0	27.0	27.0	17.0	34.0	34.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
Act Effct Green (s)	44.5	38.1	38.1	64.7	56.3	56.3	20.8	15.2	15.2	33.4	21.7	21.7
Actuated g/C Ratio	0.42	0.36	0.36	0.61	0.53	0.53	0.20	0.14	0.14	0.32	0.21	0.21
v/c Ratio	0.33	0.80	0.20	0.85	0.63	0.23	0.41	0.56	0.66	0.76	0.39	0.13
Control Delay	18.2	35.6	2.9	45.8	19.7	2.7	32.7	47.7	11.3	46.3	38.8	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	35.6	2.9	45.8	19.7	2.7	32.7	47.7	11.3	46.3	38.8	0.6
LOS	B	D	A	D	B	A	C	D	B	D	D	A
Approach Delay		32.3			22.4			28.9			38.5	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	15	333	0	192	304	0	53	100	0	155	92	0
Queue Length 95th (ft)	36	445	26	#354	397	38	84	147	85	#264	137	0
Internal Link Dist (ft)		620			960			1298			150	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	189	1932	703	527	2947	1006	480	765	613	360	1003	546
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.76	0.19	0.70	0.58	0.21	0.41	0.37	0.56	0.75	0.29	0.11

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 105.8		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.85		
Intersection Signal Delay: 28.3	Intersection LOS: C	
Intersection Capacity Utilization 80.4%	ICU Level of Service D	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		

Splits and Phases: 1: Hawes Road & Elliot Road

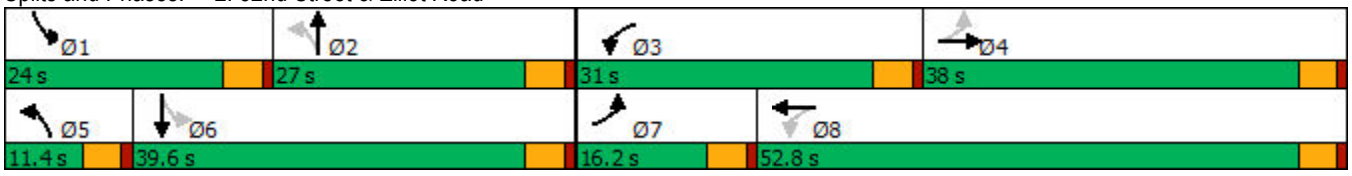


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	1078	64	337	1141	269	100	24	229	264	14	81
Future Volume (vph)	97	1078	64	337	1141	269	100	24	229	264	14	81
Satd. Flow (prot)	1770	5045	0	1770	4938	0	1770	1609	0	1770	1624	0
Flt Permitted	0.128			0.112			0.690			0.270		
Satd. Flow (perm)	238	5045	0	209	4938	0	1285	1609	0	503	1624	0
Satd. Flow (RTOR)		8			55			249			88	
Lane Group Flow (vph)	105	1242	0	366	1532	0	109	275	0	287	103	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	16.2	38.0		31.0	52.8		11.4	27.0		24.0	39.6	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	39.8	31.3		56.6	43.5		17.3	10.3		32.3	20.7	
Actuated g/C Ratio	0.41	0.32		0.58	0.44		0.18	0.10		0.33	0.21	
v/c Ratio	0.46	0.77		0.82	0.69		0.42	0.70		0.74	0.25	
Control Delay	22.3	35.0		38.9	23.4		32.5	18.6		39.9	11.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.3	35.0		38.9	23.4		32.5	18.6		39.9	11.5	
LOS	C	D		D	C		C	B		D	B	
Approach Delay		34.0			26.4			22.6			32.4	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	27	256		164	258		51	16		150	8	
Queue Length 95th (ft)	71	371		#327	385		97	100		#245	52	
Internal Link Dist (ft)		744			569			482			141	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	291	1767		551	2536		262	568		423	650	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.36	0.70		0.66	0.60		0.42	0.48		0.68	0.16	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 29.2 Intersection LOS: C
Intersection Capacity Utilization 86.0% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: 82nd Street & Elliot Road



Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	0	30	0	0	0	30	482	0	0	470	7
Future Vol, veh/h	12	0	30	0	0	0	30	482	0	0	470	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	0	33	0	0	0	33	524	0	0	511	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	843	1105	260	846	1109	262	519	0	0	-	-	0
Stage 1	515	515	-	590	590	-	-	-	-	-	-	-
Stage 2	328	590	-	256	519	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	257	209	739	256	208	737	1043	-	-	0	-	-
Stage 1	511	533	-	461	493	-	-	-	-	0	-	-
Stage 2	659	493	-	726	531	-	-	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	248	200	739	236	199	737	1043	-	-	-	-	-
Mov Cap-2 Maneuver	361	319	-	341	312	-	-	-	-	-	-	-
Stage 1	488	533	-	440	471	-	-	-	-	-	-	-
Stage 2	629	471	-	694	531	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.9	0	0.7	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1043	-	-	569	-	-	-
HCM Lane V/C Ratio	0.031	-	-	0.08	-	-	-
HCM Control Delay (s)	8.6	0.2	-	11.9	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	71	0	0	0	0	512	0	0	493	7
Future Vol, veh/h	0	0	71	0	0	0	0	512	0	0	493	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	75	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	77	0	0	0	0	557	0	0	536	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	268	-	-	279	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	730	0	0	718	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	730	-	-	718	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	0	0	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	730	-	-	-
HCM Lane V/C Ratio	-	-	0.106	-	-	-
HCM Control Delay (s)	-	-	10.5	0	-	-
HCM Lane LOS	-	-	B	A	-	-
HCM 95th %tile Q(veh)	-	-	0.4	-	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	1541	1700	108	0	29
Future Vol, veh/h	31	1541	1700	108	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	200	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	1675	1848	117	0	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1965	0	-	0	-	924
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	3.92
Pot Cap-1 Maneuver	130	-	-	-	0	233
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	130	-	-	-	-	233
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	22.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	130	-	-	-	233
HCM Lane V/C Ratio	0.259	-	-	-	0.135
HCM Control Delay (s)	42.1	-	-	-	22.9
HCM Lane LOS	E	-	-	-	C
HCM 95th %tile Q(veh)	1	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	0	376	8	0	336
Future Vol, veh/h	7	0	376	8	0	336
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	409	9	0	365

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	779	414	0	0	418	0
Stage 1	414	-	-	-	-	-
Stage 2	365	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	364	638	-	-	1141	-
Stage 1	667	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	364	638	-	-	1141	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	667	-	-	-	-	-
Stage 2	702	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	364	1141	-
HCM Lane V/C Ratio	-	-	0.021	-	-
HCM Control Delay (s)	-	-	15.1	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	0	384	8	0	342
Future Vol, veh/h	18	0	384	8	0	342
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	0	417	9	0	372

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	794	422	0	0	426	0
Stage 1	422	-	-	-	-	-
Stage 2	372	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	357	632	-	-	1133	-
Stage 1	662	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	357	632	-	-	1133	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	697	-	-	-	-	-

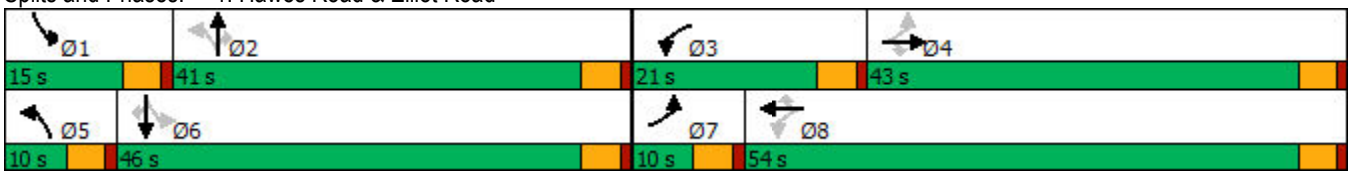
Approach	WB	NB	SB
HCM Control Delay, s	15.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	357	1133	-
HCM Lane V/C Ratio	-	-	0.055	-	-
HCM Control Delay (s)	-	-	15.7	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1022	90	145	733	56	61	122	316	165	121	34
Future Volume (vph)	19	1022	90	145	733	56	61	122	316	165	121	34
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.338			0.141			0.668			0.494		
Satd. Flow (perm)	630	5085	1583	263	5085	1583	2414	3539	1583	920	3539	1583
Satd. Flow (RTOR)			177			136			287			136
Lane Group Flow (vph)	21	1111	98	158	797	61	66	133	343	179	132	37
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	10.0	43.0	43.0	21.0	54.0	54.0	10.0	41.0	41.0	15.0	46.0	46.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	33.0	27.3	27.3	41.3	38.0	38.0	17.4	11.7	11.7	26.4	18.7	18.7
Actuated g/C Ratio	0.43	0.35	0.35	0.54	0.49	0.49	0.23	0.15	0.15	0.34	0.24	0.24
v/c Ratio	0.06	0.62	0.15	0.49	0.32	0.07	0.11	0.25	0.71	0.42	0.15	0.08
Control Delay	10.3	22.6	0.5	14.9	13.4	0.2	20.1	31.9	16.4	23.7	26.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	22.6	0.5	14.9	13.4	0.2	20.1	31.9	16.4	23.7	26.9	0.3
LOS	B	C	A	B	B	A	C	C	B	C	C	A
Approach Delay		20.7			12.8			20.6			22.4	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	4	147	0	33	66	0	10	29	23	59	26	0
Queue Length 95th (ft)	17	255	0	81	149	0	29	64	121	138	60	0
Internal Link Dist (ft)		620			960			1298			150	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	353	2635	905	475	3389	1100	619	1739	923	435	1977	944
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.42	0.11	0.33	0.24	0.06	0.11	0.08	0.37	0.41	0.07	0.04

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 77.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 59.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Hawes Road & Elliot Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	660	20	112	628	88	35	10	265	301	7	62
Future Volume (vph)	34	660	20	112	628	88	35	10	265	301	7	62
Satd. Flow (prot)	1770	5065	0	1770	4994	0	1770	1595	0	1770	1613	0
Flt Permitted	0.345			0.223			0.708			0.284		
Satd. Flow (perm)	643	5065	0	415	4994	0	1319	1595	0	529	1613	0
Satd. Flow (RTOR)		3			21			288			67	
Lane Group Flow (vph)	37	739	0	122	779	0	38	299	0	327	75	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	11.0	31.0		19.0	39.0		23.0	36.0		34.0	47.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	24.1	17.7		30.1	25.0		16.2	9.5		30.3	19.0	
Actuated g/C Ratio	0.34	0.25		0.43	0.35		0.23	0.13		0.43	0.27	
v/c Ratio	0.12	0.58		0.36	0.44		0.11	0.64		0.64	0.16	
Control Delay	14.1	25.8		16.2	19.7		15.7	12.4		21.3	8.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.1	25.8		16.2	19.7		15.7	12.4		21.3	8.0	
LOS	B	C		B	B		B	B		C	A	
Approach Delay		25.3			19.2			12.7			18.8	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	8	96		29	95		9	4		91	2	
Queue Length 95th (ft)	30	176		76	167		30	81		196	34	
Internal Link Dist (ft)		744			569			482			141	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	329	1969		469	2535		637	891		784	1030	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.38		0.26	0.31		0.06	0.34		0.42	0.07	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 70.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 20.2 Intersection LOS: C
Intersection Capacity Utilization 68.0% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: 82nd Street & Elliot Road

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	0	40	0	0	0	23	175	0	0	205	5
Future Vol, veh/h	16	0	40	0	0	0	23	175	0	0	205	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	0	43	0	0	0	25	190	0	0	223	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	371	466	114	352	468	95	228	0	0	-	-	0
Stage 1	226	226	-	240	240	-	-	-	-	-	-	-
Stage 2	145	240	-	112	228	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	561	493	917	578	491	943	1337	-	-	0	-	-
Stage 1	756	716	-	742	706	-	-	-	-	0	-	-
Stage 2	843	706	-	881	714	-	-	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	552	483	917	542	481	943	1337	-	-	-	-	-
Mov Cap-2 Maneuver	605	541	-	595	534	-	-	-	-	-	-	-
Stage 1	740	716	-	726	691	-	-	-	-	-	-	-
Stage 2	825	691	-	839	714	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.9	0	1	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1337	-	-	799	-	-	-
HCM Lane V/C Ratio	0.019	-	-	0.076	-	-	-
HCM Control Delay (s)	7.7	0.1	-	9.9	0	-	-
HCM Lane LOS	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	79	0	0	0	0	198	0	0	240	5
Future Vol, veh/h	0	0	79	0	0	0	0	198	0	0	240	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	75	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	86	0	0	0	0	215	0	0	261	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	131	-	-	108	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	894	0	0	925	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	894	-	-	925	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.5	0	0	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	894	-	-	-
HCM Lane V/C Ratio	-	-	0.096	-	-	-
HCM Control Delay (s)	-	-	9.5	0	-	-
HCM Lane LOS	-	-	A	A	-	-
HCM 95th %tile Q(veh)	-	-	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	1206	751	79	0	23
Future Vol, veh/h	21	1206	751	79	0	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	200	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	1311	816	86	0	25

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	902	0	-	0	-	408
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	3.92
Pot Cap-1 Maneuver	436	-	-	-	0	506
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	436	-	-	-	-	506
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	436	-	-	-	506
HCM Lane V/C Ratio	0.052	-	-	-	0.049
HCM Control Delay (s)	13.7	-	-	-	12.5
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	0	122	6	0	339
Future Vol, veh/h	9	0	122	6	0	339
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	0	133	7	0	368

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	505	137	0	0	140	0
Stage 1	137	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	527	911	-	-	1443	-
Stage 1	890	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	527	911	-	-	1443	-
Mov Cap-2 Maneuver	527	-	-	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	527	1443	-
HCM Lane V/C Ratio	-	-	0.019	-	-
HCM Control Delay (s)	-	-	12	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	0	128	6	0	347
Future Vol, veh/h	25	0	128	6	0	347
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	0	139	7	0	377

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	520	143	0	0	146	0
Stage 1	143	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	516	905	-	-	1436	-
Stage 1	884	-	-	-	-	-
Stage 2	694	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	516	905	-	-	1436	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	694	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	0
HCM LOS	B		

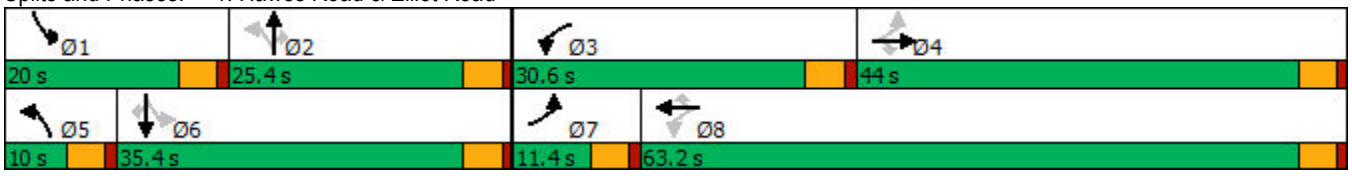
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	516	1436	-
HCM Lane V/C Ratio	-	-	0.053	-	-
HCM Control Delay (s)	-	-	12.4	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1373	122	341	1599	210	179	261	319	263	263	56
Future Volume (vph)	59	1373	122	341	1599	210	179	261	319	263	263	56
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.101			0.090			0.576			0.327		
Satd. Flow (perm)	188	5085	1583	168	5085	1583	2082	3539	1583	609	3539	1583
Satd. Flow (RTOR)			177			228			347			136
Lane Group Flow (vph)	64	1492	133	371	1738	228	195	284	347	286	286	61
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Total Split (s)	11.4	44.0	44.0	30.6	63.2	63.2	10.0	25.4	25.4	20.0	35.4	35.4
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	45.2	38.6	38.6	65.4	56.7	56.7	20.8	15.3	15.3	34.9	24.8	24.8
Actuated g/C Ratio	0.41	0.35	0.35	0.60	0.52	0.52	0.19	0.14	0.14	0.32	0.23	0.23
v/c Ratio	0.37	0.83	0.20	0.87	0.66	0.25	0.42	0.58	0.67	0.81	0.36	0.13
Control Delay	20.9	38.4	2.2	50.9	21.8	2.8	32.6	49.7	11.6	50.3	37.5	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	38.4	2.2	50.9	21.8	2.8	32.6	49.7	11.6	50.3	37.5	0.6
LOS	C	D	A	D	C	A	C	D	B	D	D	A
Approach Delay		34.9			24.6			29.6			39.7	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	18	365	0	205	334	0	54	105	0	173	94	0
Queue Length 95th (ft)	42	465	19	#381	428	41	82	150	86	#294	134	0
Internal Link Dist (ft)		620			960			1298			150	
Turn Bay Length (ft)	200		300	200		300	300		250	300		240
Base Capacity (vph)	179	1866	693	487	2762	963	465	684	586	360	1011	549
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.80	0.19	0.76	0.63	0.24	0.42	0.42	0.59	0.79	0.28	0.11

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 109.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 30.3 Intersection LOS: C
Intersection Capacity Utilization 82.2% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hawes Road & Elliot Road

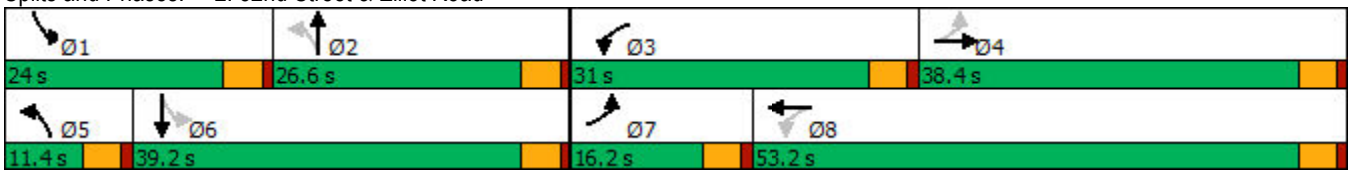


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	1113	64	337	1169	269	100	24	229	264	14	81
Future Volume (vph)	97	1113	64	337	1169	269	100	24	229	264	14	81
Satd. Flow (prot)	1770	5045	0	1770	4943	0	1770	1609	0	1770	1624	0
Flt Permitted	0.123			0.108			0.690			0.270		
Satd. Flow (perm)	229	5045	0	201	4943	0	1285	1609	0	503	1624	0
Satd. Flow (RTOR)		7			52			249			88	
Lane Group Flow (vph)	105	1280	0	366	1563	0	109	275	0	287	103	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	16.2	38.4		31.0	53.2		11.4	26.6		24.0	39.2	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	40.8	32.3		57.7	44.6		17.3	10.3		32.4	20.8	
Actuated g/C Ratio	0.41	0.33		0.58	0.45		0.17	0.10		0.33	0.21	
v/c Ratio	0.47	0.78		0.82	0.69		0.42	0.71		0.74	0.25	
Control Delay	23.0	35.3		40.4	23.6		33.0	18.7		40.8	11.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.0	35.3		40.4	23.6		33.0	18.7		40.8	11.6	
LOS	C	D		D	C		C	B		D	B	
Approach Delay		34.3			26.7			22.8			33.1	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	27	267		168	267		51	16		151	8	
Queue Length 95th (ft)	73	386		#334	397		97	100		#247	51	
Internal Link Dist (ft)		744			569			482			141	
Turn Bay Length (ft)	300			300			200			200		
Base Capacity (vph)	287	1760		543	2520		259	557		417	635	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.37	0.73		0.67	0.62		0.42	0.49		0.69	0.16	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 99.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 29.5 Intersection LOS: C
Intersection Capacity Utilization 86.6% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: 82nd Street & Elliot Road



Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	0	30	0	0	0	30	501	0	0	488	7
Future Vol, veh/h	12	0	30	0	0	0	30	501	0	0	488	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	0	33	0	0	0	33	545	0	0	530	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	873	1145	269	876	1149	273	538	0	0	-	-	0
Stage 1	534	534	-	611	611	-	-	-	-	-	-	-
Stage 2	339	611	-	265	538	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	-	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	244	198	729	243	197	725	1026	-	-	0	-	-
Stage 1	498	523	-	448	482	-	-	-	-	0	-	-
Stage 2	649	482	-	717	521	-	-	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	235	189	729	224	188	725	1026	-	-	-	-	-
Mov Cap-2 Maneuver	349	309	-	330	302	-	-	-	-	-	-	-
Stage 1	475	523	-	427	460	-	-	-	-	-	-	-
Stage 2	619	460	-	685	521	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.1	0	0.7	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1026	-	-	556	-	-	-
HCM Lane V/C Ratio	0.032	-	-	0.082	-	-	-
HCM Control Delay (s)	8.6	0.2	-	12.1	0	-	-
HCM Lane LOS	A	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	71	0	0	0	0	531	0	0	511	7
Future Vol, veh/h	0	0	71	0	0	0	0	531	0	0	511	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	75	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	77	0	0	0	0	577	0	0	555	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	278	-	-	289	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	719	0	0	708	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	719	-	-	708	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	0	0	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	719	-	-	-
HCM Lane V/C Ratio	-	-	0.107	-	-	-
HCM Control Delay (s)	-	-	10.6	0	-	-
HCM Lane LOS	-	-	B	A	-	-
HCM 95th %tile Q(veh)	-	-	0.4	-	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	1576	1728	108	0	29
Future Vol, veh/h	31	1576	1728	108	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	200	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	1713	1878	117	0	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1995	0	-	0	-	939
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	3.92
Pot Cap-1 Maneuver	126	-	-	-	0	228
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	126	-	-	-	-	228
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	23.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	126	-	-	-	228
HCM Lane V/C Ratio	0.267	-	-	-	0.138
HCM Control Delay (s)	43.7	-	-	-	23.3
HCM Lane LOS	E	-	-	-	C
HCM 95th %tile Q(veh)	1	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	0	376	8	0	336
Future Vol, veh/h	7	0	376	8	0	336
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	0	409	9	0	365

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	779	414	0	0	418	0
Stage 1	414	-	-	-	-	-
Stage 2	365	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	364	638	-	-	1141	-
Stage 1	667	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	364	638	-	-	1141	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	667	-	-	-	-	-
Stage 2	702	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	364	1141	-
HCM Lane V/C Ratio	-	-	0.021	-	-
HCM Control Delay (s)	-	-	15.1	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	0	384	8	0	342
Future Vol, veh/h	18	0	384	8	0	342
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	0	417	9	0	372

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	794	422	0	0	426	0
Stage 1	422	-	-	-	-	-
Stage 2	372	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	357	632	-	-	1133	-
Stage 1	662	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	357	632	-	-	1133	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	697	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	357	1133	-
HCM Lane V/C Ratio	-	-	0.055	-	-
HCM Control Delay (s)	-	-	15.7	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-