To: Teagun Wolf
Hubbard Engineering

Date: January 24, 2025

From: Shelly Sorensen, PE, PTOE

Job Number: 24.5721

RE: Cavasson – Retail North & M.O.B.
Traffic Impact & Mitigation Analysis

INTRODUCTION

Lōkahi, LLC (Lōkahi) has prepared an update to the April 2019 Traffic Impact Mitigation Analysis (TIMA) for Cavasson Scottsdale. See **Attachment A**.

The previously approved TIMA addresses the development of the entire approximately 134-acre project located on the southwest corner of Hayden Road and Legacy Boulevard in Scottsdale, Arizona. This included a Phase I analysis along with a Phase II (full build) analysis.

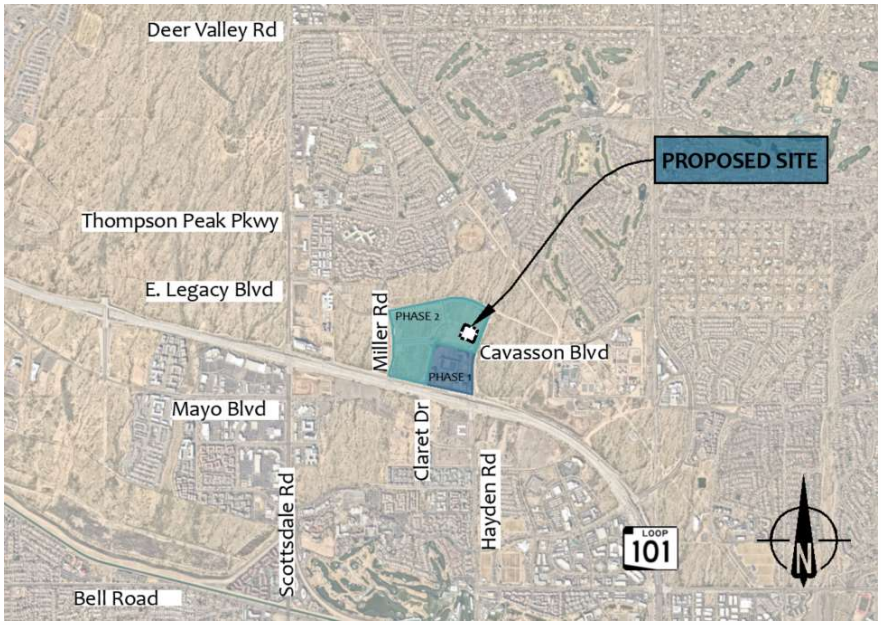

Exhibit 1 – Vicinity Map

The Cavasson Scottsdale development is bordered by Legacy Boulevard to the north, Hayden Road to the east, State Route Loop 101 (SR 101L) to the south, and Miller Road to the west. See **Exhibit 1**.

Cavasson – Retail North & M.O.B. is within the Phase II (Buildout) portion of the April 2019 TIMA study. This document serves as an update to the 2019 TIMA Study for the Cavasson Scottsdale. Cavasson– Retail North & M.O.B. site includes approximately 7.0 acres of assessor parcel number 212-31-120T and is located on the northwest corner (NWC) of Hayden Road and Cavasson Boulevard.

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2019 TIMA STUDY VS. CURRENT SITE PLAN

The Cavasson – Retail North & M.O.B. site is located in Phase II Phase II includes approximately three (3) of the four (4) quadrants of the Cavasson Scottsdale development with the following land uses:

- 265 rooms — Hotel
- 1,250 units — Multi-Family Residential (Low-Rise)
- 183,000 square feet (SF) — Retail
- 6,000 SF — Fast Food Restaurant
- 1,060,000 SF — General Office

The proposed land use for Cavasson – Retail North & M.O.B. includes the following land uses:

- 37,600 SF — Medical Office
- 12,780 SF — Retail

See **Exhibit 2** and **Attachment B** for the site plan.

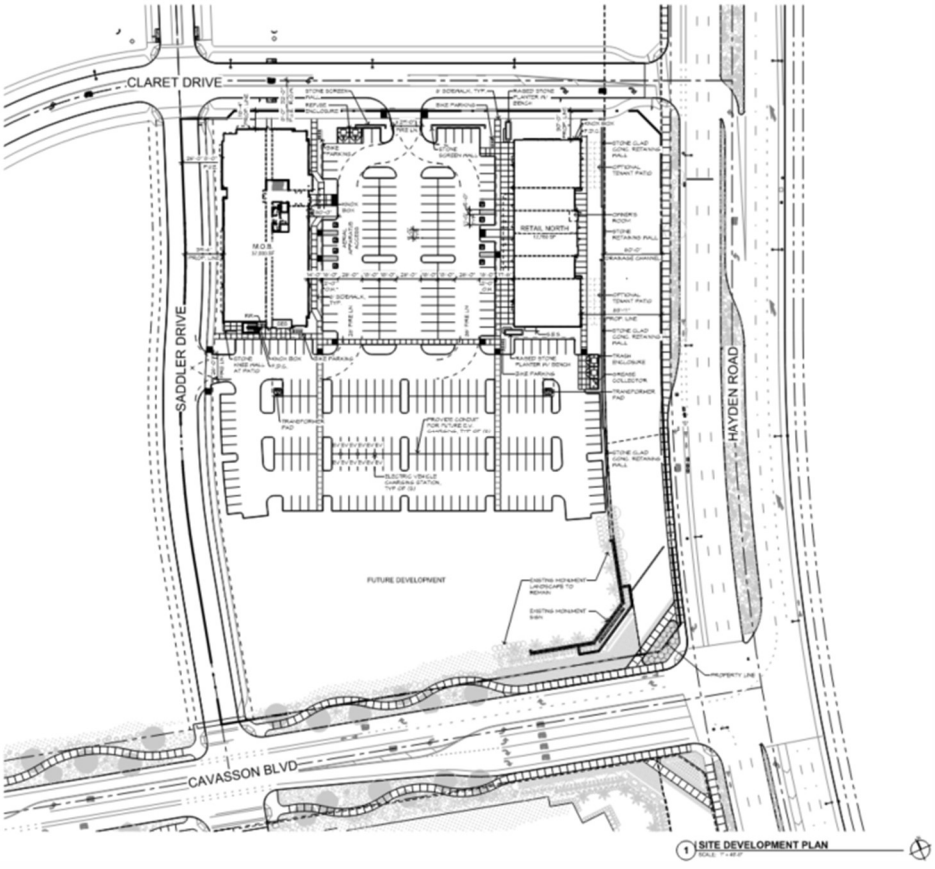

Exhibit 2 – Site Plan

TRIP GENERATION – CAVASSON – PHASE I & II

The 2019 TIMA Study provided two trip generation calculations: Phase I and Phase II (Buildout). The Phase II (Buildout) calculations included the total trip generation for Phase I and Phase II. Subtracting the Phase I trip generation calculations from the Phase II (Buildout) calculations provides the anticipated Phase II external trips. See **Table 1** for the trip generation calculations. See **Attachment A** for the detailed trip generation calculations.

Table 1 – 2019 TIMA Study Trip Generation

Phase II (Buildout) (per April 2019 Traffic Impact Study)										
Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Buildout (Phase I & Phase II)										
Hotel	310	400	Keys	3,344	196	116	80	272	139	133
Apartment	220	1,600	DU	12,048	672	155	517	704	444	260
General Office	710	1,800,000	SF	17,514	1,710	1,471	239	1,782	285	1,497
Shopping Center	820	194,000	SF	9,344	244	139	105	881	458	423
Fast Food Restaurant	930	12,000	SF	3,782	25	17	8	170	94	76
Total				**46,032**	**2,847**	**1,898**	**949**	**3,809**	**1,420**	**2,389**
Internal Capture Reductions				***-11,048***	***-285***	***-191***	***-94***	***-686***	***-255***	***-431***
Total External Trips				**34,984**	**2,562**	**1,707**	**855**	**3,123**	**1,165**	**1,958**
Phase I										
Hotel	310	135	Keys	1,128	66	39	27	92	47	45
Apartment	220	350	DU	2,636	147	34	113	154	97	57
General Office	710	740,000	SF	7,200	703	605	98	733	117	616
Shopping Center	820	11,000	SF	530	14	8	6	50	26	24
Fast Food Restaurant	930	6,000	SF	1,892	12	8	4	85	47	38
Total				**13,386**	**942**	**694**	**248**	**1,114**	**334**	***780***
Internal Capture Reductions				***-936***	***-27***	***-20***	***-7***	***-44***	***-14***	***-30***
Total External Trips				**12,450**	**915**	**674**	**241**	**1,070**	**320**	**750**
Phase II										
Hotel	310	265	Keys							
Apartment	220	1,250	DU							
General Office	710	1,060,000	SF							
Shopping Center	820	183,000	SF							
Fast Food Restaurant	930	6,000	SF							
Total External Trips				**22,534**	**1,647**	**1,033**	**614**	**2,053**	**845**	**1,208**

According to the analysis based on the original 2019 TIMA study, Phase II of the development is anticipated to generate a total of 22,534 weekday trips, with 1,647 trips occurring during the AM peak hour and 2,053 trips occurring during the PM peak hour.

TRIP GENERATION – CAVASSON – RETAIL NORTH & M.O.B.

The trip generation was calculated utilizing the Institute of Transportation Engineers (ITE) publication entitled *Trip Generation, 11th Edition*. The ITE trip generation rates and fitted curve equations are based on studies that measure trip generation characteristics for various types of land uses. The rates are expressed in terms of trips per unit of land use type. This publication is the standard for the transportation engineering profession.

The proposed Cavasson – Retail North & M.O.B. trip generation calculations are provided in **Table 2** below. Detailed trip generation calculations can be found in **Attachment C.**

Table 2 – Cavasson – Retail North & M.O.B. Trip Generation

Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Medical-Dental Office Building	720	37.6	1000 SF GFA	1,508	100	79	21	150	45	105
Strip Retail Plaza (<40k)	822	12.78	1000 SF GLA	769	30	19	11	93	47	46
			Total	2,277	130	98	32	243	92	151

The proposed development is anticipated to generate a total of 2,277 weekday trips, with 130 trips occurring during the AM peak hour and 243 trips occurring during the PM peak hour.

TRIP GENERATION – CAVASSON - PHASE II VS. RETAIL NORTH & M.O.B.

The proposed Cavasson – Retail North & M.O.B. development, comprising of approximately 7.0 acres, accounts for ~ 10% of the total daily trips for Phase II. See **Table 3**
Table 3 below.

Table 3 – Phase 2 vs. Cavasson – Retail North & M.O.B.

Phase II										
Hotel	310	265	Keys							
Apartment	220	1,250	DU							
General Office	710	1,060,000	SF							
Shopping Center	820	183,000	SF							
Fast Food Restaurant	930	6,000	SF							
			Total External Trips	22,534	1,647	1,033	614	2,053	845	1,208
Cavasson - Retail North & M.O.B.										
Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Medical-Dental Office Building	720	37.6	1000 SF GFA	1,508	100	79	21	150	45	105
Strip Retail Plaza (<40k)	822	12.78	1000 SF GLA	769	30.2	19	11.2	93	47	46
			Total	2,277	130	98	32	243	92	151
			Percent	10%	8%	9%	5%	12%	11%	13%

The 2019 TIMA Study included a total of 1,060,000 square feet and 183,000 square feet of office and retail land uses, respectively. The 37,600 square feet and 12,780 square feet of office and retail land uses proposed for Cavasson – Retail North & M.O.B. represent approximately 4% and 7%of the overall planned office and retail land uses, respectively.

FUTURE DEVELOPMENT

As shown in the site plan (**Exhibit 2**), future development is planned south of this Cavasson – Retail North & M.O.B. project. The Cavasson Scottsdale development is entitled to 163 remaining hotel keys. For the purposes of this report, it is assumed that these remaining hotel entitlements will be allocated to the future development, allowing its future traffic volumes to be considered in the right-turn lane warrant analysis.

The trip generation was calculated utilizing the Institute of Transportation Engineers (ITE) publication entitled *Trip Generation, 11th Edition*. The future development trip generation calculations are provided in **Table 4** below. Detailed trip generation calculations can be found in **Attachment C.**

Table 4 – Trip Generation Cavasson – Future Development

Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Hotel	310	163	Rooms	1,343	75	42	33	93	47	46

The future development is anticipated to generate a total of 1,343 weekday trips, with 75 trips occurring during the AM peak hour and 93 trips occurring during the PM peak hour.

SITE ACCESS DRIVEWAYS

The Cavasson – Retail North & M.O.B development proposes two site access driveways, one on Claret Drive, approximately 240 feet east of Saddler Drive, and one on Saddler Drive approximately 300 feet south of Claret Drive.

Due to the proposed location of Driveway A and Claret Drive (2), the City of Scottsdale has recommended that the access point be limited to right-in right-out only.

The future development is expected to include one site access driveway on Saddler Drive, although its exact location has not been determined at the time of this report.

FUTURE TRAFFIC VOLUMES

The 2030 Phase II (Buildout) traffic volumes were completed for the intersection of Claret Drive and Saddler Drive, the proposed site driveways (Driveway A and Driveway B), as well as the future proposed site driveway (Driveway C). See **Exhibit 3**. The location of Driveway C is shown for illustrative purposes only, the exact location has not been determined at the time of this report.

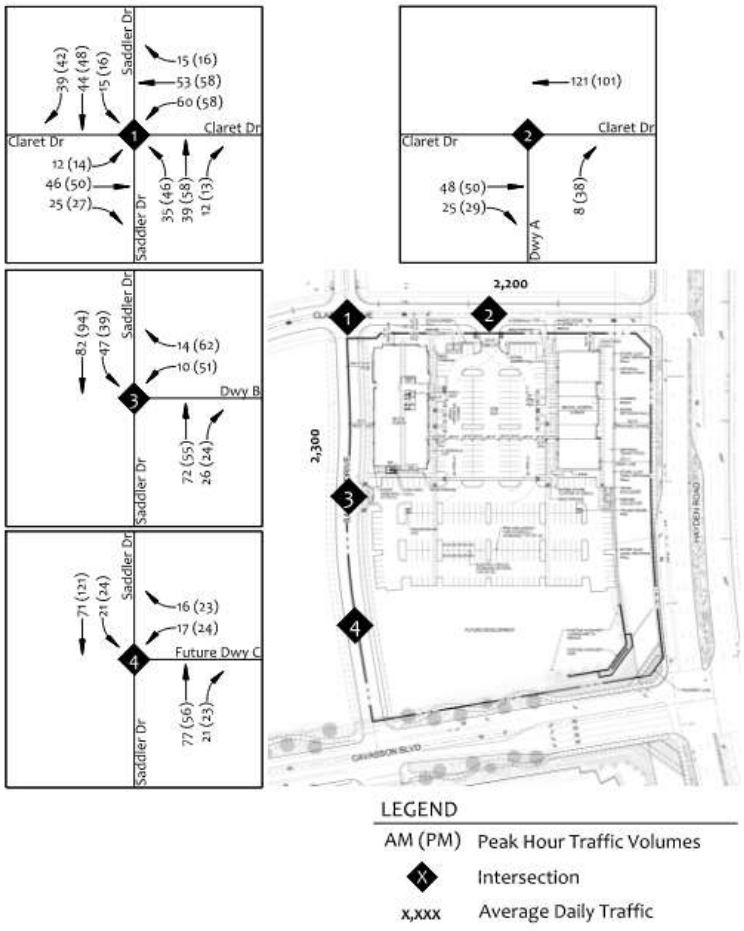

Exhibit 3 – 2030 Phase II (Buildout) Traffic Volumes

CLARET DRIVE AND SADDLER DRIVE

To account for the site-generated buildout traffic volumes from the Cavasson Scottsdale development, the traffic volumes for Claret Drive and Saddler Drive were estimated using the 2030 site-generated traffic volumes depicted in Figure 7C of the 2019 TIMA Study. Approach volumes were derived from the adjacent intersections (F, G, K, and L), with turning volumes for each approach estimated based on the trip distribution (Table 6 from the 2019 Study).

SITE ACCESS DRIVEWAYS

The trip assignment for the proposed and future site driveways was estimated based on the trip distribution for intersections F, G, K, and L, as shown in Figure 7C of the 2019 Study.

The anticipated average daily traffic volumes on Claret Drive and Saddler Drive for the 2030 Phase II (Buildout) of Cavasson Scottsdale were also estimated based on the 2019 Study and are shown in **Exhibit 3**.

RIGHT TURN LANE ANALYSIS

Turn lanes or deceleration lanes, allow vehicles exiting a roadway to slow to a reduced speed to execute a turn without impeding the main flow of traffic. The City of Scottsdale 2018 *Design Standards & Policies Manual* Section 5.3.206 deceleration lane criteria is provided below.

Deceleration lanes are required at all new driveways on major arterials and at new commercial/retail driveways on minor arterials. To determine the need for a deceleration lane on streets classified as a minor arterial or collector, use the following criteria:

1. At least 5,000 vehicle per day are expected to be using the street
2. The roadway's 85th percentile speed limit is at least 35 mph
3. At least 30 vehicles will make right-turns into the driveway during a 1-hour period

Claret Drive and Saddler Drive are considered collector streets. Using the City of Scottsdale criteria, the need for right turn deceleration lanes were evaluated, as shown in **Table 5**.

Table 5 – Right Turn Lane Analysis

On	At	ADT (vpd)	Speed Limit	Peak Hour	Right Turn Volumes		
					Direction	(vph)	Warrant
Claret Drive	Driveway A	2200	25	AM	EB	25	NO
				PM		29	
Sadler Drive	Driveway B	2300	25	AM	NB	26	NO
				PM		24	
Sadler Drive	Driveway C (Future)	2300	25	AM	NB	21	NO
				PM		23	

The results of the right-turn lane analysis indicate that none of the three criteria are met at any of the three site access driveways to warrant the installation of a right-turn lane.

SUMMARY

The proposed Cavasson – Retail North & M.O.B. site is an approximately 7.0-acre site located on the northwest corner of Hayden Road and Cavasson Boulevard in Scottsdale, Arizona, and is comprised of 37,600 square feet of medical office space and 12,780 square feet of retail space.

Trip Generation

The proposed development is anticipated to generate a total of 2,277 weekday trips, with 130 trips occurring during the AM peak hour and 243 trips occurring during the PM peak hour.

Phase II vs. Retail North & M.O.B.

The proposed Cavasson – Retail North & M.O.B. development accounts for 10% of the total trips for Phase II. The 2019 Study included a total of 1,060,000 square feet and 183,000 square feet of office and retail land uses, respectively. The 37,600 square feet and 12,780 square feet of office and retail land uses proposed for Cavasson – Retail North & M.O.B. represent 4% and 7%of the overall planned office and retail land uses, respectively.

Right Turn Lane Analysis – Site Driveways

The results of the right-turn lane analysis indicate that none of the three criteria are met at any of the three site access driveways to warrant the installation of a right-turn lane.

The traffic generated by the proposed Cavasson – Retail North & M.O.B. accounts for 10% of the total traffic from the Phase II development. The proposed land uses for Cavasson – Retail North & M.O.B. site are within the assumed land uses included in the April 2019 Traffic Impact Mitigation Analysis for Cavasson Scottsdale, which covers the entire Cavasson development. Consequently, the analysis and recommendations in the master study apply to this development.

ATTACHMENT A – CAVASSON SCOTTSDALE TRAFFIC IMPACT MITIGATION ANALYSIS

Lokahi

A

Cavasson Scottsdale

Traffic Impact Mitigation Anlaysis

Southwest Corner of Hayden Road
and Legacy Boulevard
in Scottsdale, Arizona

April 2019
Project No. 17-0310

Prepared For:

Nationwide Realty Investors
375 North Front Street, Suite 200
Columbus, Ohio 43215-2220

For Submittal to:
City of Scottsdale

Prepared By:

CivTech

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CAVASSON SCOTTSDALE
TRAFFIC IMPACT MITIGATION ANALYSIS

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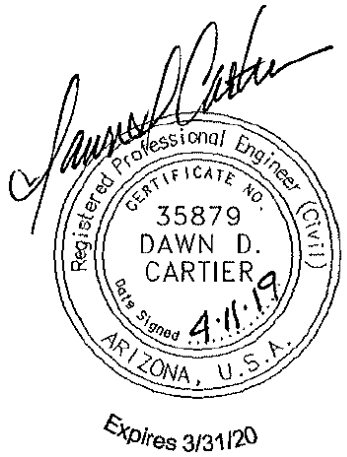

Expires 3/31/20

April 2019

CivTech Project # 17-310

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EXECUTIVE SUMMARY

The Cavasson development is a ±134-acre project located on the southwest corner of Hayden Road and Legacy Boulevard in Scottsdale, Arizona. This development is separated into two (2) phases. Phase 1 consists of a 135-key hotel, 350 multi-family residential dwelling units, 11,000 square feet of retail with 6,000 square feet of restaurant attached, and 740,000 square feet of office space. Phase 2 of Cavasson consists of multiple hotels totaling 265 keys, 1,250 multi-family dwelling units, 183,000 square feet of retail with 6,000 square feet of restaurant attached, and 1,060,000 square feet of office space. At buildout with the construction of Phase 1 and Phase 2, Cavasson will support a total of 400 hotel keys, 1,600 dwelling units of multi-family, 194,000 square feet of shopping center, 1,800,000 square feet of office and 12,000 square feet of restaurant. The vicinity of the site is provided in **Figure 1**.

CivTech, Inc. has been retained by Nationwide Realty Investors to perform the traffic impact study for the proposed development. The purpose of this assessment is to address the traffic and transportation impacts of the proposed development on the surrounding streets and intersections. The following conclusions have been documented in this study:

General

- Phase I of the Cavasson Development is anticipated to generate 12,450 daily trips to the external roadway system, with 915 occurring during the AM peak hour and 1,070 occurring during the PM peak hour, by opening year 2020. It is anticipated the Miller Road underpass will not be constructed by opening year 2020.
- Phase I project specific improvements such half street improvements and all Phase I site driveways are anticipated to be fully constructed by the developer upon opening year 2020.
- Cavasson Boulevard and Claret Drive internal to the site are also anticipated to be full constructed by opening year 2020.
- Full buildout (Phase 1 and Phase 2) of the Cavasson Development is anticipated to generate a total of 34,984 daily trips to the external roadway system, with 2,562 occurring during the AM peak hour and 3,123 occurring during the PM peak hour.
- For study purposes it is anticipated the Miller Road underpass will be constructed and provide connection to the south of the Loop 101 by study horizon year 2030.
- Both Thompson Peak Parkway and Legacy Boulevard are also planned to provide connectivity to the west ultimately offering additional roadway connections between 56th Street/Scottsdale Road by horizon year 2030.
- Legacy Boulevard is also anticipated to connect through to the east from Hayden Road to Pima Road by horizon year 2030.
- The contractor should ensure that adequate sight distance is provided at all site access points to allow safe left and right turning movements from the development. It is recommended that sight triangles be designed at all site access driveways to

provide the required sight distance shown in *Appendix 5-3B* within the *City of Scottsdale Design Standards and Policies Manual*. Excerpts from the *City of Scottsdale Design Standards and Policies Manual* and tables have been included in **Appendix K**.

- Typical sections provided for Hayden Road, Miller Road, Legacy Boulevard, Claret Drive and Cavasson Boulevard were approved by the City of Scottsdale Ordinance 4346 and Resolution 11147. Excerpts from the Ordinance and Resolution are provided in **Appendix M**.

Existing

- The results of the existing conditions analysis indicate that all existing study intersections operate with an overall acceptable level of service (LOS D or better) during the AM and PM peak hours under the existing lane configurations and stop controls with the exception of the following locations:

- The intersection of **Hayden Road and Loop 101 Westbound Ramps** operate with unacceptable delays under existing conditions during the PM peak hour. These delays are primarily due to the heavy northbound left-turn volume onto the freeway and the right-turn volume egressing from the westbound Loop 101 off ramp. It is recommended these delays be mitigated by increasing the northbound left-turn phase and additional 10-seconds. With the recommended signal timing mitigation, the overall intersection delay is expected to decrease from 124-seconds to 81-seconds for the PM peak hour. The Hayden Road/Loop 101 Ramps function as a diamond traffic interchange with both signalized ramp interchanges functioning together as one. Any signal phasing mitigation at one ramp signal directly affects the other. Therefore, the recommended signal mitigation is expected to increase the delay at the signalized eastbound ramp from 43-seconds to 46-seconds in the PM peak hour. This 3-second increase is considered very minor considering the 43-second decrease in delay at the signalized westbound ramp.

- The intersection of **Hayden Road and Loop 101 Eastbound Ramps** operate with heavy delays under existing conditions during the AM peak hour. These delays are primarily due to the southbound left-turn volume onto the freeway and the right-turn volume egressing from the eastbound Loop 101 off ramp during the AM peak hour. It is recommended the eastbound phase be extended an additional 10-seconds. With the recommended signal timing mitigation, the overall intersection delay would decrease from 72-seconds to 65-seconds in the AM peak hour. The Hayden Road/Loop 101 Ramps function as a diamond traffic interchange with both signalized ramp interchanges functioning together as one. Any signal phasing mitigation at one ramp signal directly affects the other. Therefore, the recommended signal mitigation would also decrease the delay at the signalized westbound ramp from 25-seconds to 23-seconds in the AM peak hour.

- The intersection of **Scottsdale Road and Mayo Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the northbound/southbound through volume on Scottsdale road during the PM peak hour. It is recommended that the northbound left turn phase be extended from 19-seconds to 28-seconds and the southbound left phase be extended from 11-seconds to 23-seconds. Also, adding overlaps for the northbound

and southbound right turns will decrease the delay on those approaches. By applying these changes to the existing intersections, the delay is expected to decrease from 76-seconds to 55-seconds.

- The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the westbound left-turn volume on Frank Lloyd Wright Boulevard and the conflicting northbound left-turn volume on Scottsdale Road during the PM peak hour. It is recommended that the northbound left turn phase be extended from 9-seconds to 25-seconds, the southbound left turn phase be extended from 23-seconds to 26-seconds, and the northbound through phase be extended from 35-seconds to 41-seconds. With these changes made to the existing intersection, the delay is expected to decrease from 160-seconds to 85-seconds.
- The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the PM peak northbound/southbound left-turn volume as well as the conflicting northbound/southbound right-turn volumes for those phases. It is recommended that the northbound left turn phase be extended from 10-seconds to 16-seconds, the southbound left turn phase be extended from 15-seconds to 19-seconds and the eastbound left turn phase be extended from 20-seconds to 22-seconds. With these changes made to the existing intersection, the overall delay is expected to decrease from 60-seconds to 55-seconds.

Opening Year 2020

- The results of the Synchro analysis summarized in **Table 9** indicate that all 2020 study intersections operate with an overall acceptable level of service during the AM and PM peak hours under the existing lane configurations and stop controls with the exception of the following locations:
- It should be noted the Scottsdale Road/Loop 101 Ramps functions as a diamond traffic interchange with both signalized intersections functioning together as one. Any signal phasing mitigation at one signal directly affects the other. All recommended signal mitigation herein considers the timing/delay for both signals at the diamond interchange.
- The intersection of **Scottsdale Road and the Loop 101 Ramps** is projected to experience increased heavy delay by opening year 2020 with or without the proposed Cavasson Phase I development during the study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030, scenario the recommended mitigation and reported delays herein are for the build scenario which includes the proposed Phase I development. It is recommended signalize timing be optimized as well as signal phasing. With signal timing and phasing optimization, the overall intersection delay is expected to improve 33.5-seconds in the AM, 40.0-seconds in the PM peak for the westbound ramps and 27.1-seconds in the AM, 28.2-seconds in the PM peak for the eastbound ramps with the proposed Phase I development.

*It is recommended that any and all recommended improvements for the **Scottsdale Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*

- The intersection of **Scottsdale Road and Mayo Boulevard** is projected to experience heavy delay in the PM peak by opening year 2020 with or without the proposed Cavasson Phase I development. Overall the projected intersection delay is expected to be 82.7-seconds in the PM peak hour under the total 2020 build condition. It is therefore recommended all right-turn lanes provide overlap phases as well as optimizing pedestrian signal timing in the westbound approach by opening year 2020. With these improvements, the overall delay at the intersection is projected to decrease from 82.7-seconds to 38.1-seconds in the PM peak hour with the proposed Phase I development.
- The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** is projected to experience heavy delay by opening year 2020 with or without the proposed Phase I development. Under the No-Build 2020 scenario, this intersection is expected to experience heavy delays during the PM peak hour only. Overall, the projected intersection delay is expected to be 71.7-seconds in the PM peak hour with the proposed Cavasson Phase I development. It is recommended all right-turn lanes provide overlap phases as well as a dedicated southbound right-turn lane. With the recommended mitigation the overall intersection delay is projected to improve from 71.7-seconds to 55.5-seconds with the proposed Phase I development during the PM peak hour.
- The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** is projected to experience heavy delays by opening year 2020 with or without the proposed Cavasson Phase I development. Under the No-Build 2020, scenario this intersection experiences heavy delay during the PM peak hour only. Overall, the projected 2020 Build, intersection delay is expected to be 71.7-seconds during the PM peak hour which includes the proposed Cavasson Phase I development. It is recommended signal timing be optimized and all right-turn lanes provided overlap phases. With the recommended mitigated signal timing, the overall intersection delay is projected to decrease from 71.7-seconds to 53.9-seconds with the proposed Phase I development during the PM peak hour.
- The proposed intersection of **Hayden Road and Cavasson Boulevard** is anticipated to be signalized upon completion of the Phase I development. It is recommended that right of way be provided for a future through lane east/west to provide connectivity to the east. By the opening year 2020, a single 300-foot northbound left-turn lane is warranted, as well as a single 200-foot left-turn and right-turn lanes eastbound. Additional right-of-way will be provided and striped out for the proposed future lanes required for an acceptable level of service.

Horizon Year 2030

- The results of the Synchro analysis summarized in **Table 10** indicate that all 2030 study intersections operate with an overall acceptable level of service (LOS D or better) during the AM and PM peak hours under the proposed 2020 lane configurations and stop controls with the exception of the following locations:

- The intersection of **Hayden Road and Legacy Boulevard** is projected to experience delay during both AM and PM peak hours with or without the addition of Cavasson development by horizon year 2030. It should be noted this intersection was analyzed as a four-legged intersection by horizon year 2030. It is expected Legacy Boulevard will be constructed to the east of Hayden Road and connect to Pima Road by horizon year 2030. Due to the projected heavy traffic volumes on Hayden Road by horizon year 2030 three (3) through lanes northbound and three (3) through lanes southbound are recommended as well as dual northbound left-turn lanes. To remain consistent with the four (4) lane cross section on Legacy Boulevard two (2) through lanes are recommended to be constructed in the eastbound and westbound approaches. All left-turn phases are recommended to be protected/permissive with the exception of the dual northbound left-turn lanes which will be required to be protected. With the recommended signal modifications, the intersection delay is expected to decrease to 24.0-seconds in the AM peak hour, and 22.7-seconds during the PM peak hour.

- It should be noted the Hayden Road/Loop 101 Ramps and the Scottsdale Road/Loop 101 Ramps both function as diamond traffic interchanges with both signalized intersections at each interchange functioning together as one. Any signal phasing mitigation at one signal directly affects the other. All recommended signal mitigation herein considers the timing/delay for both signals at each diamond interchange.

- The intersection of **Hayden Road and the Loop 101 Ramps** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. Under the No-Build 2030 scenario, this intersection experiences increased delay in both study peak hours. Overall, the PM peak hour at both ramps signals experiences the most delay of the two study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030 scenario, the recommended mitigation and reported delays herein are for the build scenario which includes the Cavasson development. It is recommended the cycle length for both signalized ramps be optimized to achieve optimal levels of service for the intersection by horizon year 2030. Overall the projected intersection delay is expected to be around 97.1-seconds for the westbound ramps and 72.5-seconds for the eastbound ramps during the PM peak hour with the proposed Cavasson development.

  *It is recommended that any and all recommended improvements for the **Hayden Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*

- The intersection of **Scottsdale Road and the Loop 101 Ramps** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. Under the No-Build 2030 scenario, this intersection experiences increased delay in both study peak hours. Overall, the PM peak hour at both ramps signals experiences the most delay of the two study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030 scenario, the recommended mitigation and reported delays herein are for the build scenario which includes the Cavasson development. It is recommended the cycle length for both signalized ramps be optimized to achieve optimal levels of service for each approach. Overall the projected intersection delay is expected to be 191.5-seconds for the westbound ramps and 85.2-seconds for the eastbound ramps in the PM peak hour with the Cavasson development.

  *It is recommended that any and all recommended improvements for the **Scottsdale Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*

- The intersection of **Scottsdale Road and Thompson Peak Parkway** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. It should be noted this intersection was analyzed as a four-legged intersection with the assumption that Thompson Peak Parkway will be constructed to the west of Scottsdale Road and connect to 56th Street by horizon year 2030. Under the No-Build 2030 scenario, this intersection experiences heavy delay in both study peak hours. Overall, the intersection delay is projected to be 140.3-seconds in the AM peak hour and 51.9-seconds in the PM peak hour under the 2030 No-Build scenario. With the addition of the Cavasson development, the intersection is expected to experience delays of 142.3-seconds in the AM peak hour, and 84.8-seconds in the PM peak hour. To help mitigate this intersection, it is recommended signal phasing and green times be optimized as well as add in overlap right-turn phasing. Signal progression for the north/south through movements should be optimized as well. With the recommended mitigation, the overall intersection delay will be 66.3-seconds in the AM peak hour, and 62.8-seconds during the PM peak hour.

- The intersection of **Scottsdale Road and Legacy Boulevard** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. It should be noted this intersection was analyzed as a four-legged intersection by horizon year 2030. It is expected Legacy Boulevard will be constructed to the west of Scottsdale Road and connect to 56th Street by horizon year 2030. This intersection experiences heavy delay under the 2030 No-Build condition for both study peak hours. Overall, the intersection delay under the 2030 No-Build condition is projected to be 47.2-seconds in the AM peak hour and 38.5-seconds in the PM peak hour. With the addition of the proposed Cavasson development, the intersection delay is expected to increase to 78.2-seonds in the AM peak hour, and 75.6-seconds in the PM peak hour. It is, recommended to optimize the signal timing and add in overlap phasing to all right-turn lanes. With the recommended mitigation the intersection delay is expected be 60.4-seconds in the AM peak hour, and 71.2-seconds in the PM peak hour.

- The intersection of **Scottsdale Road and Mayo Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. The heavy northbound and southbound movements conflict with the anticipated heavy eastbound movements. Signal optimization should occur with future signal progression plans for Scottsdale Road. It is therefore recommended this intersection be monitored for optimal signal timing and corridor progression due to the proximality of the existing Loop 101 traffic interchange.
- The intersection of **Scottsdale Road and Princess Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development during the PM peak hour. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.
- The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.
- The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.
- The intersection of **Pima Road and Thompson Peak Parkway** is projected to experience heavy delays by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.
- The intersection of **Miller Road and Legacy Boulevard** is projected to be signalized by study horizon year 2020. With future traffic anticipated by the Miller Road connection to the south and with additional traffic anticipated by currently unknown surrounding developments, it is recommended that dual northbound left-turn lanes be provided as well as a dedicated northbound right-turn lane by horizon year 2020.
- The proposed internal site intersection of **Claret Drive and Cavasson Boulevard** is anticipated to be a signalized as the surrounding area develops. Exclusive left-turn lanes and dedicated right-turn lanes should be provided in all approaches. Signal warrants will be evaluated with future phases of the Cavasson development.

- The proposed intersection of **Miller Road and Cavasson Boulevard** is anticipated to be signalized as the surrounding area develops. Exclusive left-turn lanes and dedicated right-turn lanes in all approaches are recommended. With the possible future connectivity to the west, it is recommended that additional right of way is provided for future through lanes eastbound and westbound. Signal warrants will be evaluated with future phases of the Cavasson development.

  The proposed intersection of **Hayden Road and Cavasson Boulevard** is anticipated to be signalized "T-intersection" upon full buildout of the Cavasson development. Dual left-turn lanes and dedicated right-turn lanes are recommended in all approaches. While dual right turn lanes may be striped in the interim condition, it is recommended that one lane provide for east/west through movements allowing connectivity to the east. By buildout year 2030, dual 300-foot northbound left-turn lanes are warranted, as well as dual 200-foot left-turn lanes and a 200-foot right-turn lane in the eastbound approach. Additional pavement provided for a second eastbound right turn lane should be converted to allow for through movements once the development east of Hayden Road is constructed.

Queue Storage

- As shown in **Table 11**, the existing storage lengths at the existing intersections are not anticipated to accommodate the additional traffic generated in 2030. Additional storage length calculations should be completed prior to traffic signal installation, a change in intersection stop control or installation of raised medians.
- It is recommended all proposed site access driveways along Legacy Boulevard, Hayden Road, Miller Road, Cavasson Boulevard and Claret Drive provide a minimum of 150-foot turn lanes at intersections regardless of intersection control so long as they are not encumbered by upstream intersections or utility conflicts. Locations with restrictions or where additional storage beyond the calculations included in this report are discussed below.
- Proposed ¾ site **Access G,** located just north of site Access M and south of Legacy Boulevard along Hayden Road, is recommended to provide a minimum 150-foot northbound left-turn lane as well as a 100-foot southbound dedicated right-turn lane. An upstream intersection restricts the ability to provide additional southbound right turn storage.
- Proposed ¾ site **Access H** located just north of the Hayden Road/Loop 101 interchange along Hayden Road is recommended to provide a minimum 100-foot northbound left-turn lane as well as a 150-foot southbound dedicated right-turn lane. The presence of a storm drain inlet conflict restricts the ability to provide additional northbound left turn queue storage.
- Proposed ¾ site **Access I**, located just north of the Loop 101 frontage road on Claret Drive is recommended to provide a 55-foot northbound right turn lane. This is restricted from further queue storage due to the proximity of the frontage road. A southbound left turn storage of 100 feet is recommended; this length is restricted by the need to provide a back to back left turn lane (northbound storage) into Access J.

- Proposed main site **Access M** (Hayden Road/Cavasson Boulevard) is planned as a signalized intersection at the opening of the proposed Cavasson Phase I development. Access M is located between Legacy Boulevard and north of Access H along Hayden Road and is planned to provide 300-feet of queue for dual northbound left-turn lanes as well as 225-feet for a dedicated southbound right-turn lane. Internally, the development should provide a minimum of 200-feet of storage for the eastbound dual left-turn and a single right-turn lane. Additional pavement will be provided and striped out for the proposed future ultimate lane alignment for connectivity to the east.
- **Access K** (Cavasson Boulevard/Claret Drive) is an internal signalized intersection with permitted phasing in all approaches. The provision of 150-foot southbound and eastbound left-turn lanes, a 300-foot westbound left-turn lane and a 200-foot northbound left-turn lane are recommended. It is also recommended that a 200-foot northbound right-turn lane, 180-foot westbound right-turn lane and 150-foot eastbound and southbound right-turn lane be provided by full build of the Cavasson development.
- **Access B** (Miller Road/Cavasson Boulevard) is a planned signalized intersection with permitted/protected phasing. A 300-foot westbound left-turn and right-turn lane, as well as a southbound 225-foot southbound left-turn lane are recommended. As the area is built out with connectivity to the south along Miller Road, it is recommended that the future queue length for the westbound and northbound left-turn lanes and northbound right-turn lane be constructed to provide a minimum storage of 150-feet.
- **Access A** and **Access C** both are recommended to provide 100-foot southbound left-turn lanes and well as 100-foot northbound dedicated right-turn lanes. The presence of back to back turn lanes and likely retaining walls from the Miller Road underpass may restrict the ability to provide more storage at these locations.
- The intersection of **Miller Road and Legacy Boulevard** is planned to be signalized upon buildout of the Cavasson development ultimately providing dual 250-foot northbound left-turn lanes as well as a dedicated northbound right-turn lane. Although the reported volumes documented within this report do not show a need for dual northbound left-turn lanes it is CivTech's understanding the planned area analyzed within this report does not include some portions of future development within the study area. As such, longer queues and dual lanes are recommended.

Sight Distance

- The developer should ensure that adequate sight distance is provided at all proposed site access points to allow safe left and right turning movements in and out of the Cavasson development. It is recommended that sight triangles be designed at all site access driveways per the requirements shown in *Appendix 5-3B* within the *City of Scottsdale Design Standards and Policies Manual*. Excerpts from the *City of Scottsdale Design Standards and Policies Manual* and tables have been included in **Appendix K**.

INTRODUCTION

The Cavasson – Scottsdale development is approximately 135 acres located on the west side of Hayden Road between the Pima Freeway (Loop 101) and Legacy Boulevard in Scottsdale, Arizona. The proposed site is a mixed-use development with land uses consisting of hotels, multi-family residential, retail, restaurants and general office buildings. There are multiple full movement access points on the surrounding roadways, and Miller Road will be extended south along the west border of the site to provide additional access. The vicinity of the site is provided in **Figure 1**.

Study Requirements

This study analyzes the traffic impact due to the proposed development on the surrounding street network. The study will be prepared in conformance with the City of Scottsdale *Design Standards and Policies Manual*, Chapter 5, Transportation Impact Studies, 2018. The specific objectives of the study are:

- To determine whether the planned street system in the vicinity of the site is adequate to accommodate the increased traffic that results from the proposed development.
- To recommend additional street improvements or traffic control devices, where necessary, to mitigate the additional site-generated traffic; and,
- Evaluate the internal site circulation and provide recommendations if necessary.

Study Area

The study area has been defined as including the following intersections:

- Scottsdale Rd. & Thompson Peak Pkwy.
- Scottsdale Rd. & Legacy Blvd.
- Scottsdale Rd. & Loop 101 WB/EB Ramps
- Scottsdale Rd. & Grayhawk Dr.
- Scottsdale Rd. & Deer Valley Rd.
- Scottsdale Rd. & Mayo Blvd.
- Scottsdale Rd. & Princess Dr.
- Scottsdale Rd. & Frank Lloyd Wright Blvd.
- Scottsdale Rd. & 17050 North
- Scottsdale Rd. & Chauncey Ln.
- Hayden Rd. & Thompson Peak Pkwy.
- Hayden Rd. & Legacy Blvd.
- Hayden Rd. & Loop 101 WB/EB Ramps
- Hayden Rd. & Princess Dr.
- Hayden Rd. & Bell Rd.
- Hayden Rd. & Mayo Blvd.
- Hayden Rd. & Grayhawk Dr.
- Hayden Rd. & Deer Valley Rd.
- Hayden Rd. & Frank Lloyd Wright Blvd.
- Pima Rd. & Thompson Peak Pkwy.

Horizon Years

This study has been conducted to conform to the *Design Standards and Policies Manual*, *Chapter 5,* Transportation Impact Studies, prepared by the City of Scottsdale in 2018. This development is planned to be built in two phases. Phase 1 is predicated to be constructed by the year 2020, and phase 2, the remainder of the site, is predicted to be completed by 2030. Therefore, the two horizon years being analyzed in this study will be 2020 and 2030.

The study intersections, site accesses, and internal collector roadway intersections will be analyzed for AM and PM peak hours to determine the recommended intersection lane configuration, intersection stop control, turn lane storage requirements, and roadway typical sections for the development.

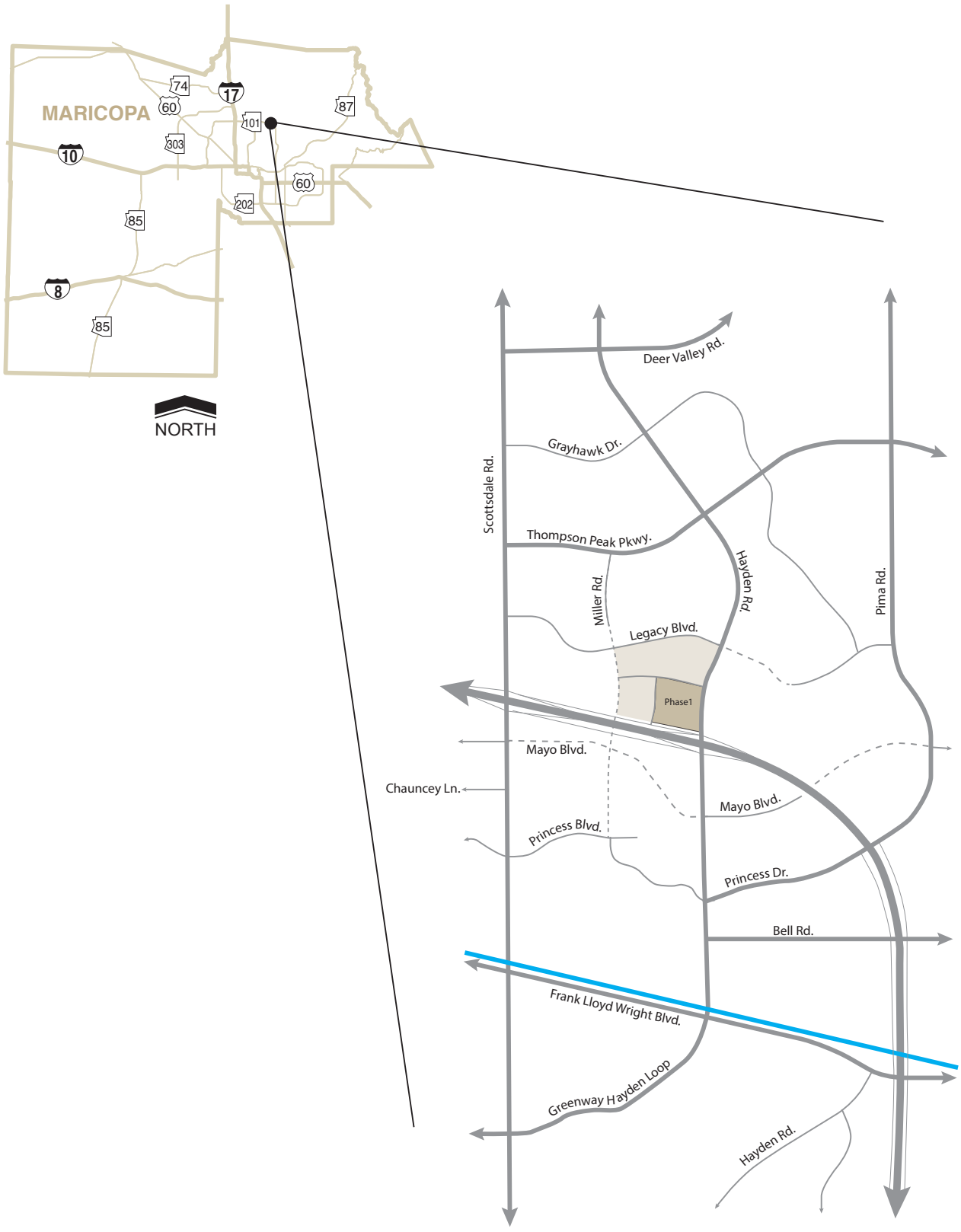


Figure 1: Vicinity Map

EXISTING CONDITIONS

Surrounding land use

The Cavasson property is currently undeveloped land, located north of the Loop 101, south of Legacy Boulevard, east of Scottsdale Road and west of Hayden Road. The land surrounding the proposed site is part of another proposed development called Crossroads East. The Crossroads East development is proposed for much of the surrounding undeveloped land and the Cavasson development is just one part of the larger project.

Bordering Cavasson and Crossroads East to the north is the Grayhawk residential subdivision and some general office and retail space. To the east of the site is an industrial park and a single-family residential community called Cliffs at Ironwood Village. South of the proposed site is TPC Scottsdale, retail and single-family/multi-family dwelling units. Southwest of the site is a large retail development and automobile sales. Directly west of the site is undeveloped land that will be a part of the Crossroads East development.

EXISTING ROADWAY NETWORK

The existing roadway network within the study area includes the following:

Scottsdale Road is a north-south, five (5) lane major arterial within the vicinity of the proposed site. Beginning to the north of Carefree Highway (SR 74) as Tom Darlington Drive, Scottsdale Road continues southbound through the City of Scottsdale, extending past the Red Mountain Freeway (Loop 202) and transitioning into Rural Road within the City of Tempe. Scottsdale Road provides access to all major east-west arterials and direct access to the Pima Freeway (Loop 101) within the vicinity of the study area. South of the Loop 101 Scottsdale Road is designated as a six (6) lane major arterial and north of the Loop 101, a five (5) lane arterial providing four (4) through lanes with a center median/two-way left-turn lane. Scottsdale Road north of the Loop 101 is currently in the design and construction phase for widening to a six-lane major arterial within the vicinity of the site. The posted speed limit on Scottsdale Road north of Thompson Peak Parkway is 50 miles per hour (mph), decreasing to 45 mph south of Thompson Peak Parkway.

Scottsdale Road also serves as the boundary line dividing the City limits between the City of Phoenix and the City of Scottsdale. The entirety of Scottsdale Road, within the vicinity of the site, is under the City of Scottsdale's control through an Intergovernmental Agreement (IGA) between both municipalities.

Hayden Road is a north-south, four (4) lane major arterial with a center raised median within the vicinity of the proposed site, per the City of Scottsdale Transportation Master Plan. Hayden Road begins north of Pinnacle Peak Road and travels southbound transitioning into the Greenway Hayden Loop south of Frank Lloyd Wright Boulevard. Hayden Road provides direct access to the Pima Freeway (Loop 101) and all major east-west arterials within the vicinity of the proposed site. The posted speed limit is 45-mph within the vicinity of the proposed site.

Pima Road is a north-south, six (6) lane major arterial with a center raised median within the vicinity of the proposed site per the City of Scottsdale Transportation Master Plan. Pima Road begins just north of Cave Creek Road and travels southbound transitioning into Princess Drive just south/west of the Pima Freeway (Loop 101) in Scottsdale, Arizona. Pima Road provides direct access to the Pima Freeway (Loop 101) and all major east-west arterials north of the Loop 101. The posted speed limit is 45-mph within the vicinity of the proposed site.

Pima Freeway (Loop 101) is a six (6) lane freeway, providing three (3) lanes and an HOV lane in each direction of travel. The function/maintenance of the Pima Freeway along with each signalized traffic interchange is under the direction and control of the Arizona Department of Transportation (ADOT). The Loop 101 within the vicinity of the study area provides regional access to the Piestewa Freeway (SR 51) to the west, north Phoenix, the City of Scottsdale to the east and the Cities of Tempe, Mesa and Chandler to the south. The posted speed limit is currently 65-mph on the freeway. Design is on-going to provide a high-occupancy vehicle (HOV) lane in each direction within the existing freeway median.

Thompson Peak Parkway is an east-west, four (4) lane minor arterial with a center raised median within the vicinity of the proposed site. Beginning to the west at Scottsdale Road, Thompson Peak Parkway continues to the east through the DC Ranch Community in Scottsdale where it begins to curve north/south transitioning into 94th Street south of Frank Lloyd Wright Boulevard. Thompson Peak Parkway provides direct access to North Scottsdale and the DC Ranch community. The posted speed limit is 45-mph within the vicinity of the study area.

Legacy Boulevard is an east-west, four (4) lane minor arterial with a center raised median within the vicinity of the proposed site, connecting Hayden Road to Scottsdale Road north of the Pima Freeway. Legacy Boulevard construction was recently completed and the roadway is open and functional for public use between Hayden Road and Scottsdale Road. Currently, Legacy Boulevard begins at Scottsdale Road and terminates at Hayden Road. It should be noted that Legacy Boulevard will serve as the northerly bordering frontage road to the proposed Cavasson development.

Mayo Boulevard is an east-west six (6) lane arterial with a center raised median within the vicinity of the proposed site. May Boulevard begins west of Tatum Boulevard continuing eastbound terminating as a parking lot east of Scottsdale Road. Serving as the primary access to the Scottsdale 101 Shopping Area May Boulevard provides a six (6) lane cross section. West of the Scottsdale 101 Shopping Area Mayo Boulevard reduces to a two (2) lane roadway providing one (1) through lane in each direction of travel. The posted speed limit on Mayo Boulevard is 45-mph within the study area.

Princess Drive is an east-west four (4) lane minor arterial, per the City of Scottsdale Transportation Master Plan, with a center raised median. Princess Drive begins to the west at the Fairmont Scottsdale Princess Resort and travels eastbound transitioning into Pima Road east of the Pima Freeway (Loop 101). Princess Drive provides direct access to the Pima Freeway (Loop 101) and all major north-south arterials. Princess Drive between the Fairmont Scottsdale Princess Resort and Hayden Road is currently a private road for resort and residential use only. The posted speed limit on Princess Drive between Hayden Road and the Loop 101 is 35-mph, 25-mph between Hayden

Road and the Fairmont Scottsdale Princess Resort and 30-mph between the Resort and Scottsdale Road within the vicinity of the study area.

Bell Road is an east-west minor four (4) lane arterial with a center raised median per the City of Scottsdale Transportation Master Plan, within the vicinity of the proposed site. Bell Road begins to the west at as Sun Valley Parkway in Surprise, Arizona and travels eastbound transitioning into Frank Lloyd Write Boulevard east of Scottsdale Road, in Scottsdale, Arizona. Bell Road provides direct access to the Bob Stump Memorial Parkway (Loop 303), Phoenix-Wickenburg Highway (US-60), Agua Fria Freeway (West Loop 101), Black Mountain Freeway (I-17), Piestewa Freeway (SR-51), and the Pima Freeway (East Loop 101). The posted speed limit on Bell Road is 40 mph within the study area.

Frank Lloyd Wright Boulevard is an east-west six (6) lane major arterial with a center raised median per the City of Scottsdale Transportation Master Plan. Frank Lloyd Wright Boulevard begins as Bell Road west of Scottsdale Road and travels southeast terminating south of Shea Boulevard as 114th Street. The posted speed limit on Frank Lloyd Wright Boulevard is 45-mph within the study area.

Grayhawk Drive is an east-west three (3) lane arterial road with one travel lane in each direction and a continuous two-way-left-turn lane. The road begins at the intersection with Scottsdale Road and travels east until terminating at Hualapai Drive. The posted speed limit is 30-mph.

Chauncey Lane is an east-west five (5) lane roadway with two travel lanes in each direction and a continuous two-way-left-turn lane along the entire segment of road. The road begins at the intersection with 68th Street and continues eastbound terminating at the roundabout just east of Scottsdale Road. The posted speed limit is 30-mph.

17050 North is an east-west two (2) lane segment of road with one lane in each direction of travel. This road serves as a driveway to surrounding businesses and the multi-family housing in the same area. There is no posted speed limit.

Deer Valley Road is an east-west two (2) lane arterial road with one travel lane in each direction. There is a two-way-left-turn-lane along portions of the road within the vicinity of the site. The road begins at the intersection with Scottsdale Road and continues east until becoming 79th Street just east of Hayden Road. The posted speed limit is 30-mph.

EXISTING INTERSECTION CONFIGURATION

The intersection of ***Hayden Road and Deer Valley Road*** operates as a signalized, four-legged intersection with permitted phasing in all approaches. The northbound and southbound approaches consist of one (1) exclusive left-turn lane, two (2) through lanes, a bike lane and a dedicated right-turn lane. The westbound and eastbound approaches consist of one (1) exclusive left-turn lane and a shared through/right-turn lane.

The intersection of ***Hayden Road and Grayhawk Drive*** operates as a signalized, four-legged intersection with permitted phasing in all approaches. The northbound and southbound approaches consist of one (1) exclusive left-turn lane, two (2) through lanes, a bike lane, and a dedicated right-turn lane. The eastbound approach consists of one (1) exclusive left-turn lane, one (1) through lane and a dedicated right-turn lane. The westbound approach consists of one (1) exclusive left-turn lane and a shared through/right-turn lane.

The intersection of ***Hayden Road and Thompson Peak Parkway*** operates as a signalized, four-legged intersection with permitted/protected left-turn phasing in all approaches. All four approaches consist of one (1) left-turn lane, two (2) through lanes, a bike lane and a dedicated right-turn lane.

The intersection of ***Hayden Road and Legacy Boulevard*** is a signalized T-intersection with permitted phasing in the northbound, southbound and eastbound approaches. The northbound approach provides one (1) exclusive left-turn lane and two (2) through lanes. The southbound approach consists of two (2) through lanes, a bike lane and a dedicated right-turn lane. The eastbound approach consists of one (1) dedicated left-turn lane, a bike lane and a dedicated right-turn lane.

The intersections of ***Hayden Road and the Loop 101 Ramps*** operate as a signalized tight urban diamond traffic interchange (TUDI). The northbound approach consists of one (1) exclusive left-turn lane, two (2) through lanes and a dedicated right-turn lane. The southbound approach consists of dual (2) left-turn lanes, two (2) through lanes and one (1) dedicated right-turn lane. The eastbound off ramp approach consists of one (1) exclusive left-turn lane, one (1) shared left/right-turn lane and one (1) dedicated right-turn lane. The westbound off ramp approach consists of one (1) exclusive left-turn lane, one (1) shared left-turn/through lane, one (1) shared through/right-turn lane and one (1) dedicated right turn lane.

The intersection of ***Hayden Road and Mayo Boulevard*** is a three-legged stop-controlled intersection with a stop sign control on the westbound approach. The northbound approach consists of two (2) through lanes, a bicycle lane and one (1) exclusive right-turn lane. The westbound approach consists of one (1) shared left/right-turn lane. The southbound approach consists of one (1) exclusive left-turn lane, two (2) through lanes and a bicycle lane.

The intersection of ***Hayden Road and Princess Drive*** operates as a four-legged signalized intersection with protected phasing in the westbound approach and permitted/protected left turns in the eastbound approach. The northbound and southbound approach consist of permitted phasing only. Both the northbound and southbound approaches consist of one (1) dedicated left turn lane, two (2) through

lanes, a bicycle lane and one (1) dedicated right turn lane. The westbound approach consists of two (2) left turn lanes and one (1) dedicated right turn lane. The eastbound approach consists of one (1) shared left-turn/through lane and one (1) dedicated right turn lane.

The intersection of ***Hayden Road and Bell Road*** operates as a four-legged signalized intersection with permitted-protected phasing in the eastbound and westbound approaches and permitted left turns in the northbound and southbound approaches. The northbound approach consists of one (1) dedicated left turn lane, two (2) through lanes, a bicycle lane and one (1) dedicated right turn lane. The westbound approach consists of one (1) dedicated left turn lane, one (1) shared left-turn/through lane and one (1) dedicated right turn lane. The southbound approach consists of one (1) dedicated left turn lane, one (1) through lane, one (1) shared through/right-turn lane and one (1) bicycle lane. The eastbound approach consists of one (1) shared left-turn/through lane and one (1) shared through/right-turn lane.

The intersection of ***Scottsdale Road and Deer Valley Road*** operates as a three-legged signalized intersection with permitted southbound left turns. The northbound approach consists of two (2) through lanes and one (1) dedicated right turn lane. The northbound approach contains a striped-out area left of the through lanes that contains extra pavement at the intersection for future use when additional lanes are needed. The westbound approach consists of one (1) left turn lane and one (1) right turn lane. Between the turn lanes, the westbound approach contains a striped-out area with extra pavement at the intersection for future use when additional lanes are needed. The southbound approach consists of one (2) dedicated left turn lane and two (2) through lanes.

The intersection of ***Scottsdale Road and Grayhawk Drive*** operates as a three-legged signalized intersection with permitted southbound left turns. The northbound approach consists of two (2) through lanes and one (1) dedicated right turn lane. The westbound approach consists of one (1) left turn lane, a bicycle lane and one (1) right turn lane. The southbound approach consists of one (1) dedicated left turn lane and two (2) through lanes. All approaches contain striped out areas with extra pavement at the intersection for future use when additional lanes are needed.

The intersection of ***Scottsdale Road and Thompson Peak Parkway*** operates as a three-legged signalized intersection with protected southbound left turns. The northbound approach consists of two (2) through lanes and a dedicated right turn lane. The northbound approach contains a striped-out area left of the through lanes that contains extra pavement at the intersection for future use when additional lanes are needed. The westbound approach consists of two (2) left turn lanes and one (1) dedicated right turn lane. Between the turn lanes, the westbound approach contains a striped area with extra pavement at the intersection for future use when additional lanes are needed. The southbound approach consists of one (1) dedicated left turn lane and two (2) through lanes.

The intersection of ***Scottsdale Road and Legacy Boulevard*** operates as a three-legged signalized intersection with protected southbound left turns. The northbound approach consists of two (2) through lanes and a dedicated right turn lane. The westbound approach consists of two (2) left turn lanes, a bicycle lane and one (1) dedicated right turn lane. The southbound approach consists of one (1) dedicated left turn lane and two (2) through lanes.

The intersections of ***Scottsdale Road and the Loop 101 Ramps*** operate as a signalized tight urban diamond traffic interchange (TUDI). The northbound approach consists of two (2) dedicated left turn lanes, three (3) through lanes and one (1) dedicated right-turn lane. The westbound approach consists of two (2) dedicated left turn lanes, one (1) shared through/right-turn lane and one (1) dedicated right-turn lane. The southbound approach consists of two (2) left turn lanes, three (3) through lanes and one (1) dedicated right turn lane. The eastbound approach consists of two (2) dedicated left turn lanes, one (1) shared through/right-turn lane and one (1) dedicated right turn lane.

The intersection of ***Scottsdale Road and Mayo Boulevard*** operates as a four-legged signalized intersection with protected phasing in all directions. The northbound, southbound and eastbound approaches each consist of two (2) left turn lanes, three (3) through lanes and one (1) dedicated right turn lane. The westbound approach consists of two (2) left-turn lanes, one (1) through lane and one (1) shared through and right turn lane. The eastbound and northbound approaches each have a bicycle lane between the through lanes and dedicated right turn lane in the same travel direction.

The intersection of ***Scottsdale Road and Chauncey Lane*** operates as a four-legged signalized intersection with permissive-protected phasing. The northbound and southbound approaches each consist of two (2) left turn lanes, three (3) through lanes, a bicycle lane and one (1) dedicated right turn lane. The eastbound and westbound approaches consist of one (1) left turn lane, two (2) through lanes, a bicycle lane and one (1) dedicated right turn lane.

The intersection of ***Scottsdale Road and Princess Drive*** operates as a four-legged signalized intersection with permissive-protected phasing in all directions. The northbound and southbound approaches each consist of one (1) dedicated left turn lane, three (3) through lanes, a bicycle lane and one (1) dedicated right turn lane. The eastbound approach consists of one (1) dedicated left turn lane, one (1) through lane, one (1) shared through/right-turn lane and one (1) bicycle lane. The westbound approach consists of one (1) dedicated left turn lane, two (2) through lanes and one (1) dedicated right turn lane.

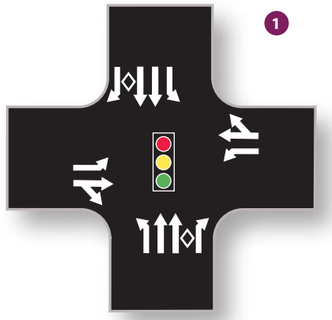
The intersection of ***Scottsdale Road and 17050 North*** operates as a four-legged signalized intersection with permissive left turns in the east and westbound approaches and permissive-protected phasing in the north and south directions. The northbound and southbound approaches each consist of one (1) dedicated left turn lane, three (3) through lanes, a bicycle lane and one (1) dedicated right turn lane. The eastbound and westbound approaches consist of one (1) shared left-turn/through/right-turn lane.

The intersection of ***Scottsdale Road and Frank Lloyd Wright Boulevard*** operates as a four-legged signalized intersection with protected phasing in all directions. The northbound approach consists of two (2) left turn lanes, three (3) through lanes and one (1) dedicated right-turn lane. The eastbound and westbound approaches consist of two (2) left turn lanes, three (3) through lanes and one (1) dedicated right turn lane. The southbound approach consists of two (2) left turn lanes, two (2) through lanes and one (1) shared through/right-turn lane.

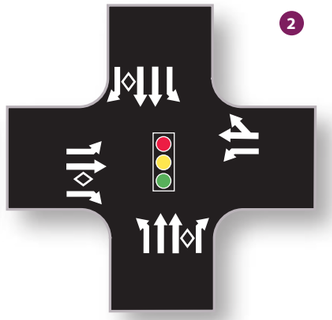
The intersection of ***Greenway Hayden Loop and Frank Lloyd Wright Boulevard*** operates as a four-legged signalized intersection with protected phasing in all directions. The northbound approach consists of one (1) dedicated left turn lane, two (2) through lanes and one (1) dedicated right-turn lane. The eastbound and westbound approaches consist of two (2) left turn lanes, three (3) through lanes and one (1) dedicated right turn lane. The southbound approach consists of two (2) left turn lanes, two (2) through lanes, a bicycle lane and one (1) dedicated right turn lane.

The intersection of ***Pima Road and Thompson Peak Parkway*** operates as a four-legged signalized intersection with protected phasing in all directions. The northbound approach consists of two (2) left turn lanes, three (3) through lanes and one (1) dedicated right-turn lane. To make northbound right turns at this intersection, there is a free flow right turn lane just south of the intersection which can be utilized to bypass the signalized intersection. Northbound right turns are permitted at the intersection. The eastbound and westbound approaches consist of two (2) left turn lanes, two (2) through lanes, a bicycle lane and one (1) dedicated right turn lane. The southbound approach consists of two (2) left turn lanes, three (3) through lanes, a bicycle lane and one (1) dedicated right turn lane.

Figures 2A and **2B** depicts the existing stop controls and lane geometries within the project study area.



Hayden Rd & Deer Valley Rd



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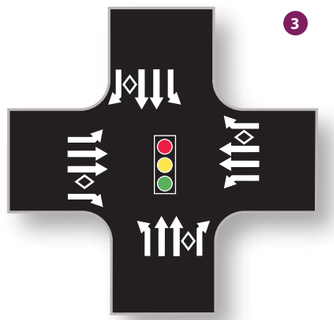
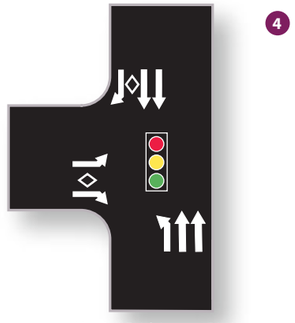
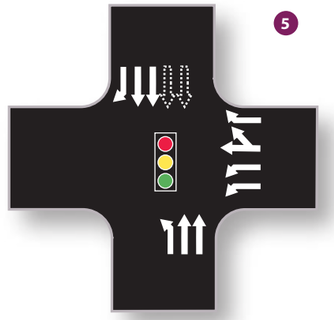


Hayden Rd & Thompson Peak Pkwy



Hayden Rd & Legacy Blvd



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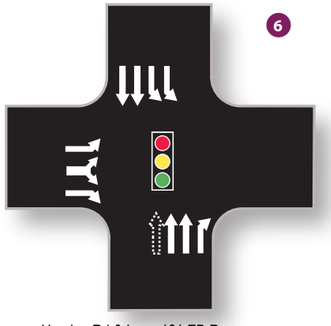

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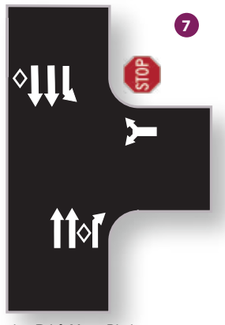
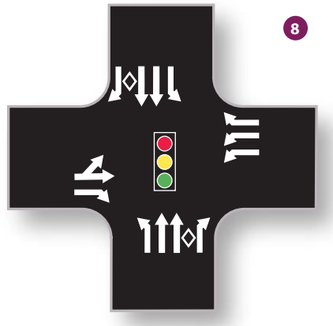
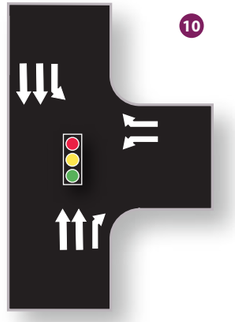


Hayden Rd & Mayo Blvd

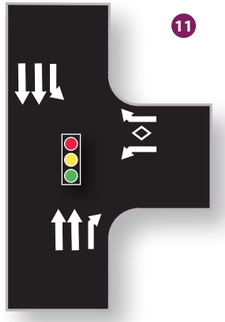


Hayden Rd & Princess Dr

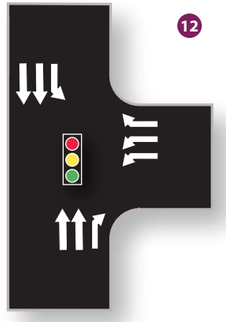
Hayden Rd & Bell Rd



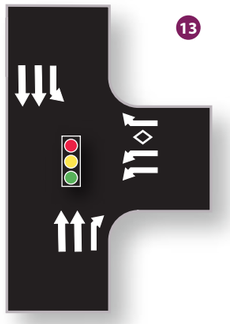
Scottsdale Rd & Deer Valley Rd



Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy



Scottsdale Rd & Legacy Blvd.

LEGEND

- Thru or Turning Movement
- Two-Way Left Turn-Lane
- Raised Median
- Bike Lane
- Becomes Left-Turn Under Bridge
- Future Roadway Connections
- Traffic Signal
- Stop Sign
- Speed Limit

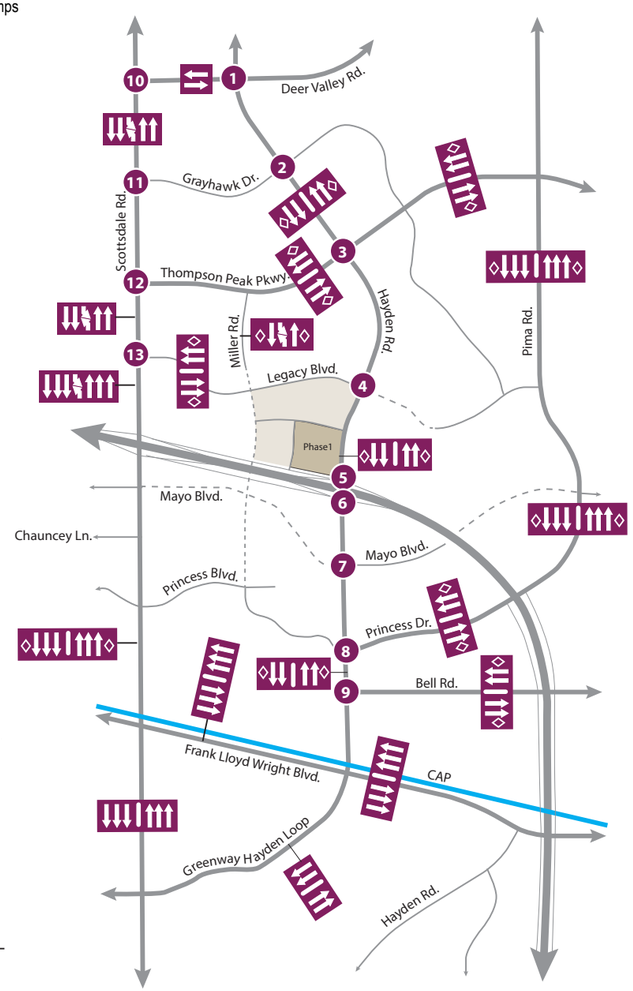
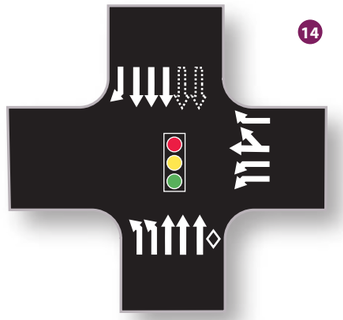
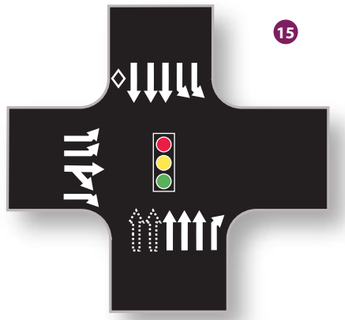


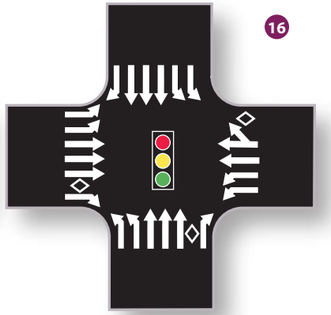
Figure 2A: Existing Lane Configurations and Traffic Controls



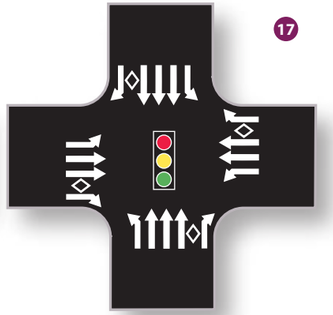
Scottsdale Rd & Loop 101 WB Ramps



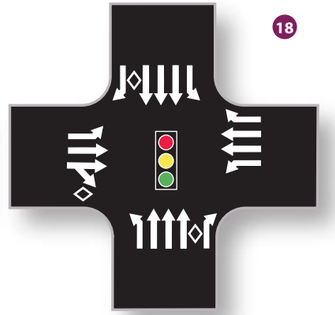
Scottsdale Rd & Loop 101 EB Ramps



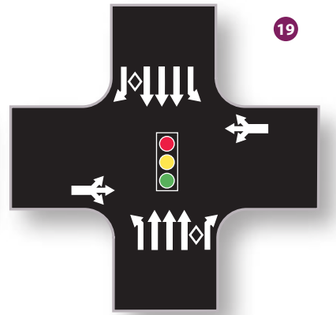
Scottsdale Rd & Mayo Blvd



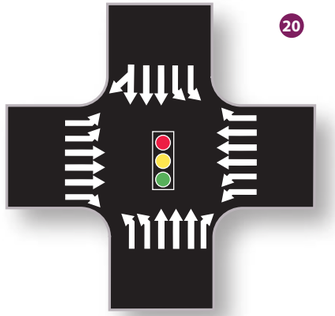
Scottsdale Rd & Chauncey Ln



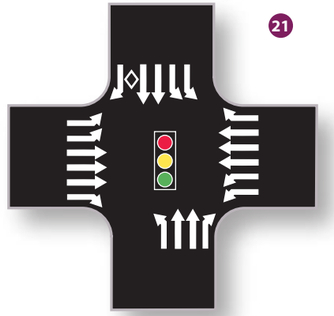
Scottsdale Rd & Princess Blvd



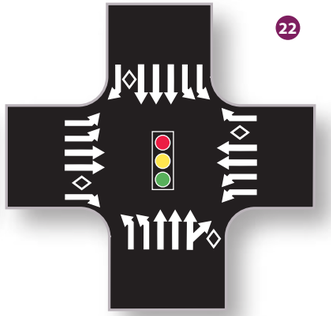
Scottsdale Rd & 17050 North



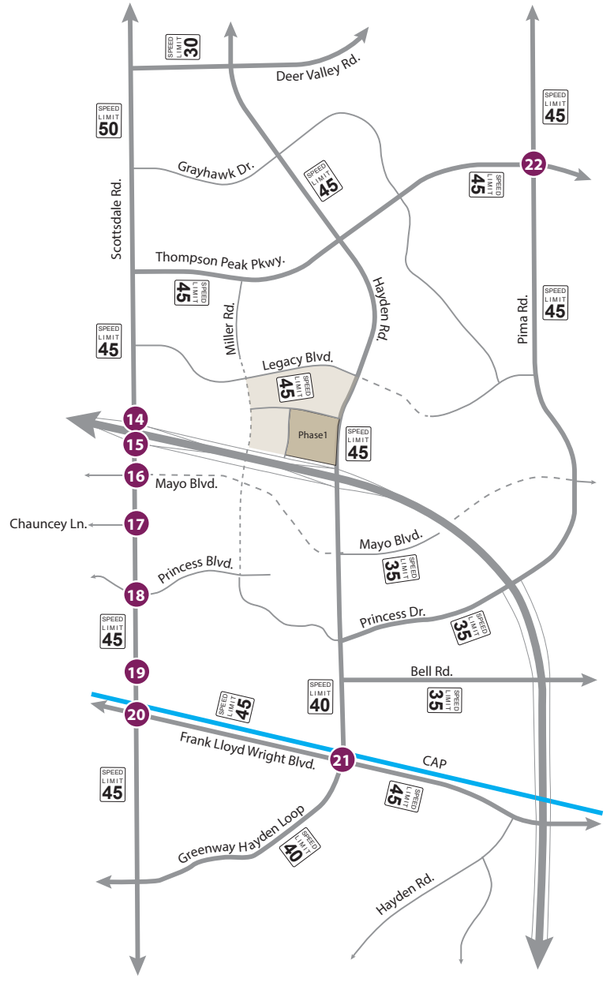
Scottsdale Rd & Frank Lloyd Wright Blvd



Greenway-Hayden & Frank Lloyd Wright Blvd



Pima Rd & Thompson Peak Pkwy



LEGEND

- Thru or Turning Movement
- Two-Way Left Turn-Lane
- Raised Median
- Bike Lane
- Becomes Left-Turn Under Bridge
- Future Roadway Connections
- Traffic Signal
- Stop Sign
- Speed Limit

NORTH

Figure 2B: Existing Lane Configurations and Traffic Controls

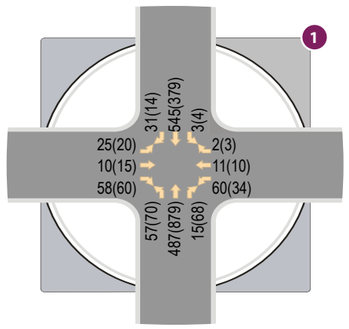
EXISTING TRAFFIC VOLUMES

CivTech contracted Field Data Services of Arizona (FDS) Inc. to conduct turning movement counts at the following intersections:

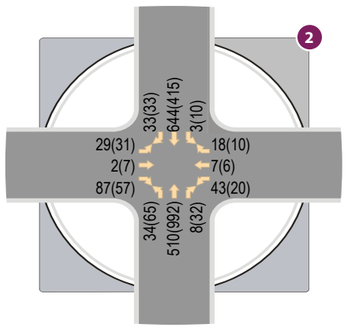
- Scottsdale Rd. & Thompson Peak Pkwy.
- Scottsdale Rd. & Legacy Blvd.
- Scottsdale Rd. & Loop 101 WB/EB Ramps
- Scottsdale Rd. & Grayhawk Dr.
- Scottsdale Rd. & Deer Valley Rd.
- Scottsdale Rd. & Mayo Blvd.
- Scottsdale Rd. & Princess Dr.
- Scottsdale Rd. & Frank Lloyd Wright Blvd.
- Scottsdale Rd. & 17050 North
- Scottsdale Rd. & Chauncey Ln.
- Hayden Rd. & Thompson Peak Pkwy.
- Hayden Rd. & Legacy Blvd.
- Hayden Rd. & Loop 101 WB/EB Ramps
- Hayden Rd. & Princess Dr.
- Hayden Rd. & Bell Rd.
- Hayden Rd. & Mayo Blvd.
- Hayden Rd. & Grayhawk Dr.
- Hayden Rd. & Deer Valley Rd.
- Greenway-Hayden Loop & Frank Lloyd Wright Blvd.
- Pima Rd. & Thompson Peak Pkwy.

These turning movement counts were conducted on Tuesday, June 19, 2018 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM.

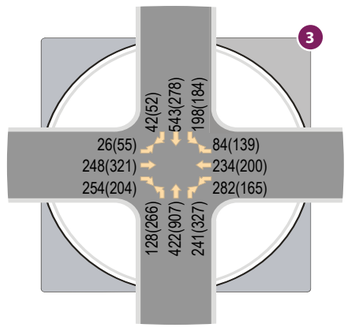
The existing traffic volume data for this study is presented in the **Appendix B** for the AM and PM peak hours. Per the City of Scottsdale requirements, a seasonal adjustment factor of 1.03 was applied to all existing intersection turning movement counts. The seasonal adjustment factor was developed by the Maricopa Association of Governments (MAG) for the region with the intent of addressing variations in peak seasonal volumes. **Figure 3A** and **3B** illustrates the existing AM and PM peak hour traffic volumes with the seasonal adjustment factor applied.



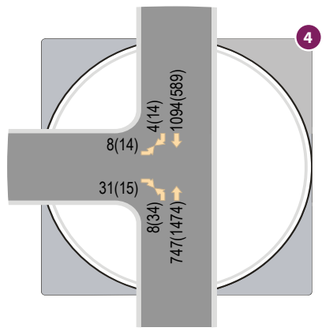
Hayden Rd & Deer Valley Rd



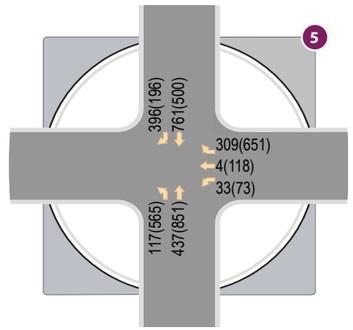
Hayden Rd & Grayhawk Dr



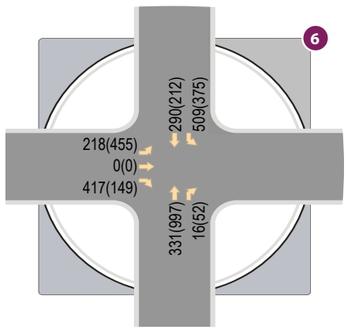
Hayden Rd & Thompson Peak Pkwy



Hayden Rd & Legacy Blvd



Hayden Rd & Loop 101 WB Ramps



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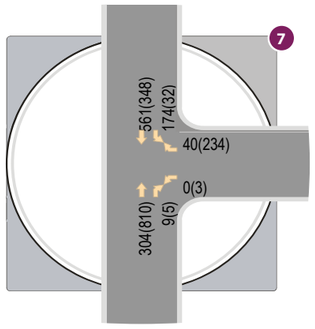
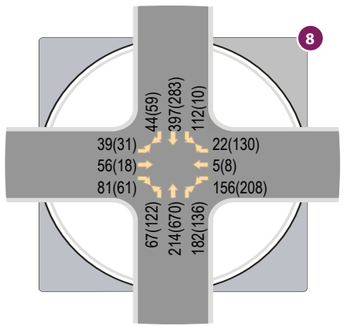
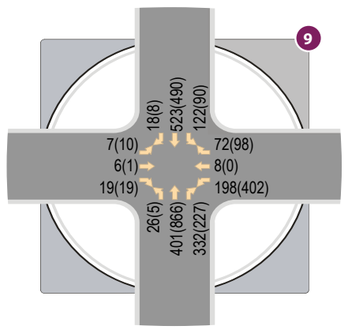


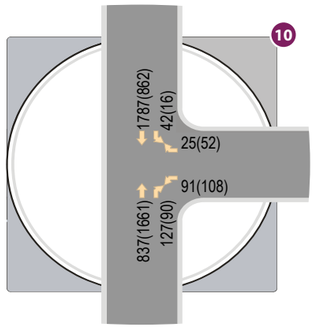
Hayden Rd & Mayo Blvd



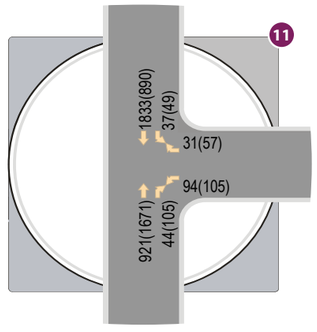
Hayden Rd & Princess Dr



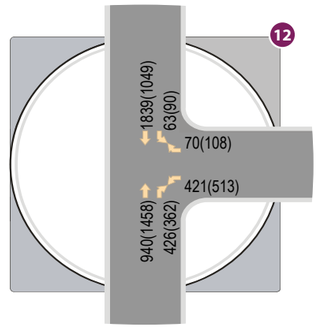
Hayden Rd & Bell Rd



Scottsdale Rd & Deer Valley Rd



Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy

LEGEND

XX(XX) - AM(PM) Peak Hour Traffic Volumes

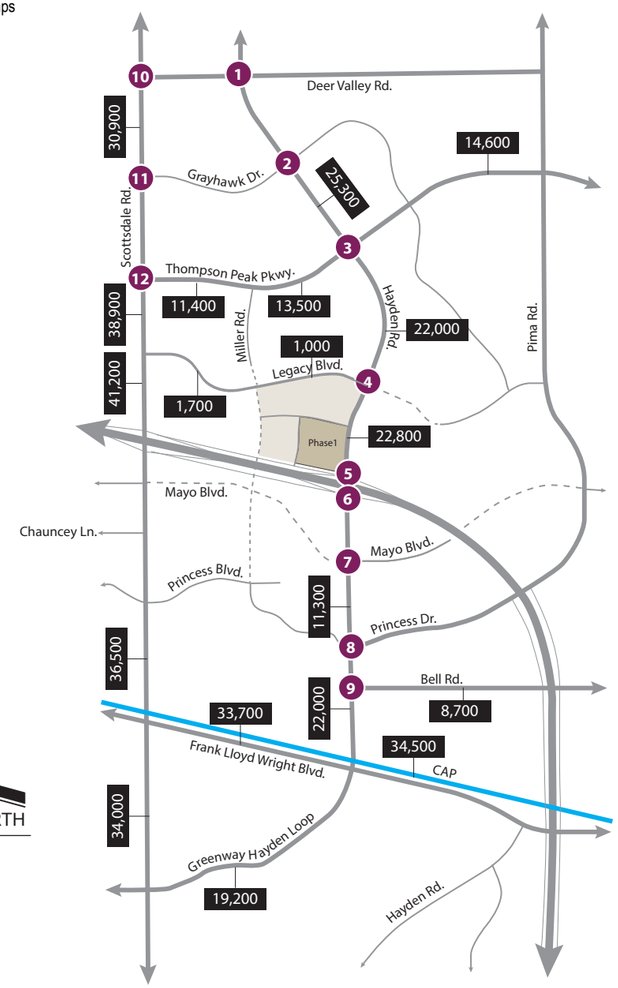
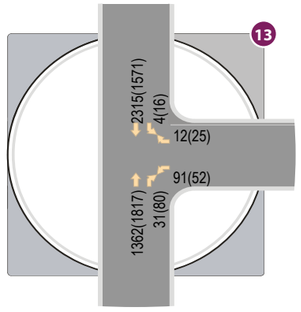
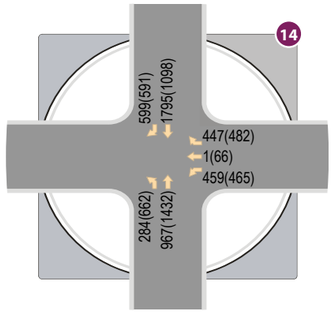


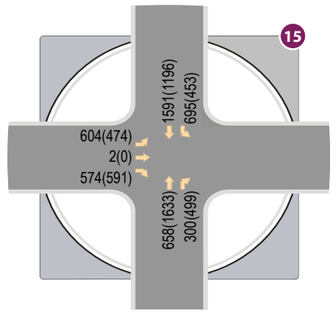
Figure 3A: Existing Traffic Volumes



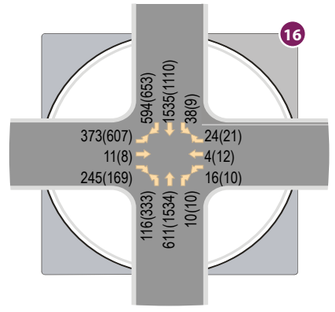
Scottsdale Rd & Legacy Blvd



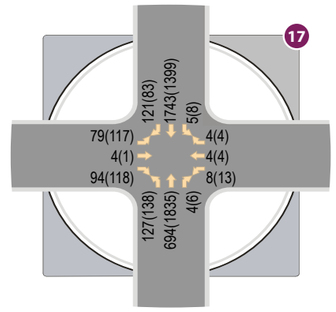
Scottsdale Rd & Loop 101 WB Ramps



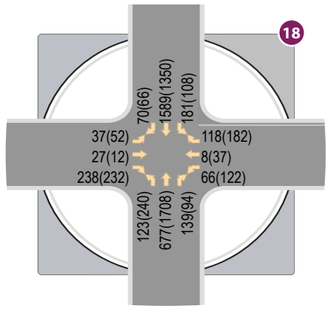
Scottsdale Rd & Loop 101 EB Ramps



Scottsdale Rd & Mayo Blvd



Scottsdale Rd & Chauncey Ln



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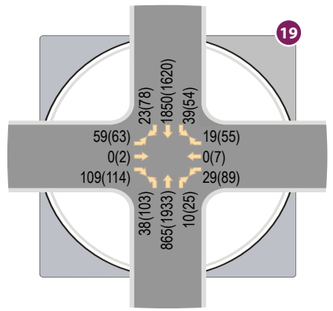
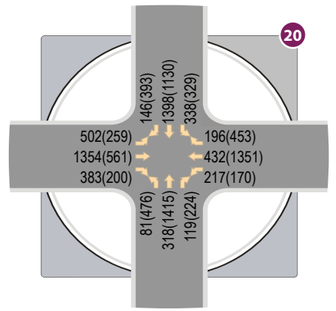
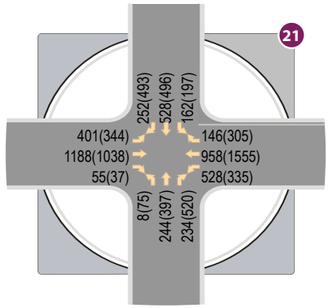


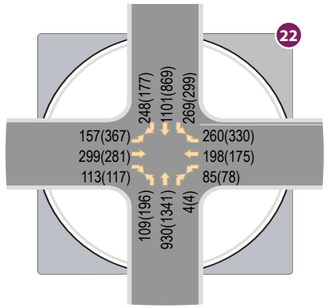
Scottsdale Rd & 17050 North



Scottsdale Rd & Frank Lloyd Wright Blvd



Greenway-Hayden & Frank Lloyd Wright Blvd



Pima Rd & Thompson Peak Pkwy

LEGEND

XX(XX) - AM(PM) Peak Hour Traffic Volumes

NORTH

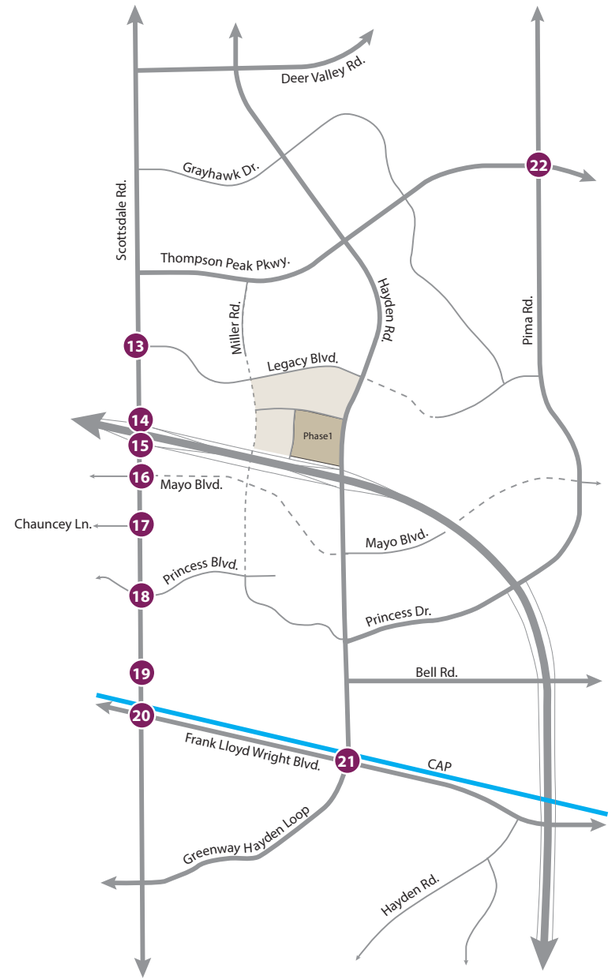


Figure 3B: Existing Traffic Volumes

EXISTING CAPACITY ANALYSIS

Peak hour capacity analyses have been conducted for the study intersections based on existing conditions and traffic volumes. All intersections have been analyzed using the methodologies presented in the *Highway Capacity Manual (HCM), Special Report 209,* Updated 2000 and using Synchro version 6 under the HCM 2000 methodology. HCM 2000 methodology was used, as opposed to HCM 6th edition methodology, because of the signal timing provided by the City of Scottsdale. The timing provided by the City does not follow NEMA phasing, and therefore could not be analyzed using the newer HCM methodology. Signal timing sheets provided by the City of Scottsdale are presented in **Appendix C**.

The concept of level-of-service (LOS) uses qualitative measures that characterize operational conditions within the traffic stream. The individual levels-of-service are described by factors that include speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations A through F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions. **Table 1** lists the level of service criteria for signalized and unsignalized intersections, respectively.

Table 1 – Level-of-Service Criteria for Controlled Intersections

Level-of-Service	Unsignalized Control Delay (sec/veh)	Signalized Control Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10-15	> 10-20
C	> 15-25	> 20-35
D	> 25-35	> 35-55
E	> 35-50	> 55-80
F	> 50	> 80

Source: Exhibit 16-2 and Exhibit 17-2, Highway Capacity Manual 2000

Results of the existing level-of-service analyses are shown in **Table 2** for both peak hours. The analysis worksheets for the existing conditions have been included in the **Appendix D**.

Table 2 – Existing Peak Hour Levels of Service

ID	Intersection	Stop Control	Existing Peak Hour LOS		
			Approach	AM	PM
1	Hayden Road & Deer Valley Road	Signal	NB	B	B
			SB	B	B
			EB	B	B
			WB	B	B
			Overall	**B**	**B**
2	Hayden Road & Grayhawk Drive	Signal	NB	C	C
			SB	C	C
			EB	B	B
			WB	B	B
			Overall	**C**	**C**
3	Hayden Rd. & Thompson Peak Pkwy.	Signal	NB	C	C
			SB	B	C
			EB	D	**E**
			WB	D	**E**
			Overall	**C**	**D**
4	Hayden Road & Legacy Boulevard	Signal	NB	A	A
			SB	A	A
			EB	D	D
			Overall	**A**	**A**
5	Hayden Road & Loop 101 WB	Signal	NB	C	**F**
			SB	C	C
			WB	D	D
			Overall	**C**	**F**
6	Hayden Road & Loop 101 EB	Signal	NB	D	D
			SB	B	C
			EB	F	**E**
			Overall	**E**	**D**
7	Hayden Rd & Mayo Blvd	1-way Stop (WB)	SB Left	A	B
			WB Shared	A	C
8	Hayden Road & Princess Drive	Signal	NB	C	B
			SB	A	C
			EB	**E**	**F**
			WB	D	D
			Overall	**C**	**C**
9	Hayden Road & Bell Road	Signal	NB	B	B
			SB	A	B
			EB	**E**	**E**
			WB	D	D
			Overall	**B**	**C**
10	Scottsdale Road & Deer Valley Road	Signal	NB	A	A
			SB	A	A
			WB	D	**E**
			Overall	**A**	**A**
11	Scottsdale Road & Grayhawk Drive	Signal	NB	A	B
			SB	A	A
			WB	D	D
			Overall	**A**	**B**

ID	Intersection	Stop Control	Existing Peak Hour LOS		
			Approach	AM	PM
12	Scottsdale Road & Thompson Peak Parkway	Signal	NB	D	**F**
			SB	B	B
			WB	D	D
			Overall	**C**	**D**
13	Scottsdale Road & Legacy Boulevard	Signal	NB	C	C
			SB	A	A
			WB	D	**E**
			Overall	**B**	**B**
14	Scottsdale Road & Loop 101 WB	Signal	NB	C	**E**
			SB	D	C
			WB	D	D
			Overall	**D**	**D**
15	Scottsdale Road & Loop 101 EB	Signal	NB	**F**	D
			SB	C	C
			EB	D	D
			Overall	**D**	**C**
16	Scottsdale Road & Mayo Boulevard	Signal	NB	D	**E**
			SB	D	**F**
			EB	D	D
			WB	D	D
			Overall	**D**	**E**
17	Scottsdale Road & Chauncey Lane	Signal	NB	B	C
			SB	B	B
			EB	D	D
			WB	**E**	D
			Overall	**B**	**C**
18	Scottsdale Road & Princess Boulevard	Signal	NB	B	C
			SB	B	B
			EB	D	D
			WB	**E**	**E**
			Overall	**C**	**C**
19	Scottsdale Road & 17050 North	Signal	NB	A	C
			SB	B	B
			EB	**E**	D
			WB	D	**E**
			Overall	**B**	**C**
20	Scottsdale Road & Frank Lloyd Wright Boulevard	Signal	NB	D	**F**
			SB	D	D
			EB	D	D
			WB	D	**E**
			Overall	**D**	**F**
21	Hayden Road & Frank Lloyd Wright Boulevard	Signal	NB	D	**F**
			SB	**E**	**F**
			EB	D	D
			WB	D	D
			Overall	**D**	**E**

ID	Intersection	Stop Control	Existing Peak Hour LOS		
			Approach	AM	PM
22	Pima Road & Thompson Peak Parkway	Signal	NB	C	D
			SB	C	C
			WB	**E**	**E**
			EB	D	D
			Overall	**D**	**D**

All existing study intersections operate with an overall acceptable level of service (LOS C or better) during the AM and PM peak hours under the existing lane configurations and stop controls with the exception of the following locations:

The intersection of **Hayden Road and Loop 101 Westbound Ramps** operate with unacceptable delays under existing conditions during the PM peak hour. These delays are primarily due to the heavy northbound left-turn volume onto the freeway and the right-turn volume egressing from the westbound Loop 101 off ramp. It is recommended these delays be mitigated by increasing the northbound left-turn phase and additional 10-seconds. With the recommended signal timing mitigation, the overall intersection delay is expected to decrease from 124-seconds to 81-seconds for the PM peak hour. The Hayden Road/Loop 101 Ramps function as a diamond traffic interchange with both signalized ramp interchanges functioning together as one. Any signal phasing mitigation at one ramp signal directly affects the other. Therefore, the recommended signal mitigation is expected to increase the delay at the signalized eastbound ramp from 43-seconds to 46-seconds in the PM peak hour. This 3-second increase is considered very minor considering the 43-second decrease in delay at the signalized westbound ramp.

The intersection of **Hayden Road and Loop 101 Eastbound Ramps** operate with heavy delays under existing conditions during the AM peak hour. These delays are primarily due to the southbound left-turn volume onto the freeway and the right-turn volume egressing from the eastbound Loop 101 off ramp during the AM peak hour. It is recommended the eastbound phase be extended an additional 10-seconds. With the recommended signal timing mitigation, the overall intersection delay would decrease from 72-seconds to 65-seconds in the AM peak hour. The Hayden Road/Loop 101 Ramps function as a diamond traffic interchange with both signalized ramp interchanges functioning together as one. Any signal phasing mitigation at one ramp signal directly affects the other. Therefore, the recommended signal mitigation would also decrease the delay at the signalized westbound ramp from 25-seconds to 23-seconds in the AM peak hour.

The intersection of **Scottsdale Road and Mayo Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the northbound/southbound through volume on Scottsdale road during the PM peak hour. It is recommended that the northbound left turn phase be extended from 19-seconds to 28-seconds and the southbound left phase be extended from 11-seconds to 23-seconds. Also, adding overlaps for the northbound and southbound right turns will decrease the delay on those approaches. By applying these changes to the existing intersections, the delay is expected to decrease from 76-seconds to 55-seconds.

The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the westbound left-turn volume on Frank Lloyd Wright Boulevard and the conflicting northbound left-turn volume on Scottsdale Road during the PM peak hour. It is recommended that the northbound left turn phase be extended from 9-seconds to 25-seconds, the southbound left turn phase be extended from 23-seconds to 26-seconds, and the northbound through phase be extended from 35-seconds to 41-seconds. With these changes made to the existing intersection, the delay is expected to decrease from 160-seconds to 85-seconds.

The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the PM peak northbound/southbound left-turn volume as well as the conflicting northbound/southbound right-turn volumes for those phases. It is recommended that the northbound left turn phase be extended from 10-seconds to 16-seconds, the southbound left turn phase be extended from 15-seconds to 19-seconds and the eastbound left turn phase be extended from 20-seconds to 22-seconds. With these changes made to the existing intersection, the overall delay is expected to decrease from 60-seconds to 55-seconds.

FUTURE ROADWAY IMPROVEMENTS

By phase 1 opening year 2020, Miller road will be expanded from the northern subdivision, south to Legacy Boulevard. This expansion will provide site access to the Cavasson development and the surrounding Crossroads East development.

By phase 2 opening year 2030, Miller Road will be constructed south as an underpass for the Loop 101 and will terminate at Princess Boulevard, creating a new four-legged intersection.

PROPOSED DEVELOPMENT

SITE LOCATION

The Cavasson development is located within the City of Scottsdale located in the southwest corner of Hayden Road and Legacy Boulevard. The site is bound by Legacy Boulevard to the north, Loop 101 to the south, Miller Road (alignment) to the west, and Hayden Road to the east.

SITE PHASEING AND TIMING

The proposed Cavasson site is planned in two (2) phases with opening year 2020 assumed to have all of Phase I development constructed. By study horizon year 2030 it is anticipated buildout of both phases will be constructed. The following is a detailed description of each proposed phase and location:

- *Phase I* – is located in the fourth (4) quadrant of the site in the direct northwest corner of Hayden Road and Loop101. By opening year Phase I is planned to provide a total of 135 hotel rooms, 350 dwelling units of multi-family, 11,000-square feet (SF) of commercial, 6,000-SF of fast food restaurant and 740,000-SF of general office space.
- *Phase II* – encompasses the full proposed Cavasson site. Phase II is planned to provide an additional 265 hotel rooms, 1,250 dwelling units of multi-family, 183,000-SF of commercial, 6,000-SF of fast food restaurant and 1,060,000-SF of general office space.

In total the site will provide 400 hotel rooms, 1,600 dwelling units of multi-family, 194,000-SF of commercial, 6,000-SF of fast food restaurant and 1.8 million square feet of general office space.

SITE ACCESS

The conceptual layout of the proposed Cavasson site is illustrated in **Figure 4**. The site can be accessed via Miller Road alignment, Hayden Road, Legacy Boulevard and Westbound SR-101 Frontage Road.

- *Cavasson Boulevard* – is an internal east/west roadway bifurcating proposed Phases I and II, located along the half way point between SR-101 and Legacy Boulevard. Cavasson Boulevard will provide internal connectivity to the Miller Road alignment south of Legacy Boulevard and Hayden Road. Construction for Cavasson Boulevard is planned as part of the Phase I development.

- *Claret Drive* - is an internal north/south roadway, located along the half way point between the Miller Road alignment and Hayden Road. Claret Drive is planned to provide connectivity to the SR-101 Frontage Road and Cavasson Boulevard. Construction for Claret Drive is planned as part of the Phase I development.
- Access ***A*** is a proposed full unsignalized access located north of the westbound SR-101 Frontage Road along the future Miller Road alignment. Access A is planned to directly service Phase II of the proposed Cavasson development and may need to be restricted in the future if sight distance cannot be achieved after the construction of the Miller Road underpass.
- Access ***B*** is the proposed full movement signalized site access (Cavasson Boulevard and Miller Road intersection) which is located between the SR-101 Frontage Road and Legacy Boulevard. Access B is generally located north of Access A and south of Access C along the Miller Road Alignment. Access B is planned to be constructed as part of the Phase I development and will serve as one of the primary access points into the proposed Cavasson development.
- Access ***C*** is a proposed restricted ¾ unsignalized access providing left-in/right-in/right-out movements only. Access C is located south of Legacy Boulevard and north of Access B along the Miller Road Alignment. Access C is planned to be constructed as part of Phase II of the Cavasson development.
- Access ***D*** is a proposed full movement unsignalized access located east of Miller Road. Access D is planned to be constructed as part of the Phase II development.
- Access ***E*** is a proposed full movement unsignalized access located between Miller Road and Hayden Road, located generally east of Access D and west of Access F along Legacy Boulevard. Access E is planned to be constructed as part of the Phase II development.
- Access ***F*** is a proposed full movement unsignalized access located west of Hayden Road. Access F is planned to be constructed as part of the Phase II development.
- Access **G** is a proposed restricted ¾ unsignalized access providing left-in/right-in/right-out movements only. Access G is located south of Legacy Boulevard and north of Cavasson Boulevard along Hayden Road. Access G is planned to be constructed as part of the Phase II development proposed within the Cavasson development.
- Access ***H*** is a proposed restricted ¾ unsignalized access providing left-in/right-in/right-out movements only. Access H is located north of SR-101 westbound frontage road/ramps and south of Cavasson Boulevard along Hayden Road. Access H is planned to be constructed as part of the Phase I development.
- Access ***I*** is a proposed internal restricted ¾ unsignalized access providing left-in/right-in/right-out movements only to the Phase I development. Access I is located just north of SR-101 westbound Frontage Road along Claret Drive between the Miller Road alignment and Hayden Road. Access I is planned to be constructed as part of the Phase I development.

- Access ***J*** is a proposed internal full movement unsignalized access within the proposed Phase I development. Access J is located between the SR-101 Frontage Road and Cavasson Boulevard along the Claret Drive between Access I and Access K. Access J is planned to be constructed as part of the Phase I development.
- Access ***K*** is a proposed internal signalized intersection connecting both Cavasson Boulevard and Claret Drive. Access K is located directly between the Miller Road alignment and Hayden Road, generally located north of Access J along Cavasson Boulevard. Access K is planned to be constructed as part of the Phase I development.
- Access ***L*** is a proposed internal full movement unsignalized access within the proposed Phase I development. Access L is located between Claret Drive and Hayden Road along Cavasson Boulevard. Access L is planned to be constructed as part of the Phase I development proposed within the Cavasson development.
- Access **M** is a proposed signalized full movement site access (Cavasson Boulevard and Hayden Road intersection) which is located between proposed Access G and proposed Access H along the Hayden Road alignment. Access M is planned to be constructed as part of the Phase I development and will serve as one of the primary main driveways into the proposed Cavasson development.
- Access **N** is a proposed right-in/right-out internal access within the proposed Phase I development. Access N is located south of Cavasson Boulevard and north of Access J.
- Access **O** is a proposed right-in/right-out access located south of Legacy Boulevard and north of Access G. Access O is planned to be constructed as part of the Phase II development. Although Access O is shown on the site plan it was not analyzed within this report, it will be analyzed in more detail in future phased traffic reports.

Figure 4: Site Plan and Access

TRIP GENERATION

Generated trips were estimated for the proposed Crossroads East development utilizing the data given in the *Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition* report and the methodology discussed in the *ITE Trip Generation Handbook, 3rd Edition.* The *ITE Trip Generation* report contains data collected by various transportation professionals for a wide range of different land uses. The data are summarized in the report and average rates, the minimum rate for all studied locations, the maximum rate for all studied locations and equations have been established that correlate the relationship between an independent variable that describes the development size and generated trips for each categorized land use. It also provides information for daily and peak hour trips.

Internal Capture

According to data presented in the *ITE Trip Generation Handbook, 3rd Edition*, trips attracted to residential, office, or retail land uses are often shared. This means that a single trip (vehicle) to the proposed Cavasson development may visit several uses within the site during the same visit, an occurrence known as internal capture or internal interaction. This is especially true for large mixed-use developments like the Cavasson development. This has the effect of reducing the external trip generating potential of the proposed site.

CivTech calculated internal capture percentages using the ITE methodology which calculated a 7% daily internal capture, a 3% AM peak hour internal capture and 4% PM peak hour internal capture for the proposed Phase I land uses. At buildout, the internal capture was calculated to be 24% of the daily traffic, 10% for the AM peak hour and 18% in the PM peak hour. Internal capture worksheets are shown in **Appendix E**.

Pass-By and Diverted Link Trips

Based on the published ITE data, as found in *ITE Trip Generation Handbook, 3rd Edition,* it could be estimated that some portion of the traffic entering and exiting a commercial land use would come from traffic already on the external street system. The term ‘pass-by’ trips refers to traffic already traveling on a study roadway from an origin to a destination that stops into the commercial development on the way. The term ‘diverted link’ trips refers to traffic on major roadway corridors, such as Hayden Road, that are diverted into the development from their original destination.

Per the *ITE Trip Generation Handbook, 3rd Edition*, it could be estimated that 5% of the daily trips and 34% of the PM peak hour trips generated by the commercial developments could be from pass-by or diverted link trips. Thus, a daily reduction of 5% and a PM peak hour reduction of 34% could be applied to those trips generated by the commercial developments. For study purposes these reductions were not applied to the trips generated by the Cavasson development in order to provide a conservative analysis.

The methodology discussed was utilized to develop trip rates associated with each land use for the planned Cavasson Phase I densities and intensities. This was primarily conducted using fitted curve equation rates with exception of the fast food restaurant which required the use of land use average trip rates from the ITE manual were applied. **Table 3** depicts the trip generation rates applied for each land use type within the proposed Cavasson development.

Table 3 –Trip Rates and Directional Splits

Land Use	ITE Code	Size		Weekday Generated Trip Rates and Splits						
				Daily	AM Peak Hour			PM Peak Hour		
		Quantity	Units	Rate	*Enter*	*Exit*	Total	*Enter*	*Exit*	Total
Hotel	310	135	Keys	8.36	*59%*	*41%*	0.49	*51%*	*49%*	0.68
Apartment	220	350	DU	7.53	*23%*	*77%*	0.42	*63%*	*37%*	0.44
General Office	710	740,000	SF	9.73	*86%*	*14%*	0.95	*16%*	*84%*	0.99
Shopping Center	820	11,000	SF	48.16	*57%*	*43%*	1.26	*52%*	*48%*	4.54
Fast Food	930	6,000	SF	315.17	*67%*	*33%*	2.07	*55%*	*45%*	14.13

Opening Year 2020 - Phase I Trip Generation

By opening year 2020, it is anticipated that the Phase I development will be fully constructed. Utilizing the ITE guidelines for development of trip generation rates, the trips generated by the Cavasson Phase I development are summarized in **Table 4**. Detailed trip generation calculation worksheets for the Phase I Cavasson development are provided in **Appendix F**.

Table 4 – Phase I Trip Generation

Land Use	ITE Code	Size		Weekday Generated Trips						
				Daily	AM Peak Hour			PM Peak Hour		
		Quantity	Units	Total	Enter	Exit	Total	Enter	Exit	Total
Hotel	310	135	Keys	1,128	39	27	66	47	45	92
Apartment	220	350	DU	2,636	34	113	147	97	57	154
General Office	710	740,000	SF	7,200	605	98	703	117	616	733
Shopping Center	820	11,000	SF	530	8	6	14	26	24	50
Fast Food Restaurant	930	6,000	SF	1,892	8	4	12	47	38	85
Total				**13,386**	**694**	**248**	**942**	**334**	**780**	**1,114**
Internal Capture Reductions				*(936)*	*(20)*	*(7)*	*(27)*	*(14)*	*(30)*	*(44)*
Total External Trips				**12,450**	**674**	**241**	**915**	**320**	**750**	**1,070**

As shown in **Table 5**, Phase I of the Cavasson Development is anticipated to generate 12,4506 daily trips to the external roadway system, with 915 occurring during the AM peak hour and 1,070 occurring during the PM peak hour. These are the anticipated trips which will be assigned to the external street network surrounding the study area.

Horizon year 2030 - Phase II (Buildout) Trip Generation

By horizon year 2030, it is anticipated that Phase II of the Cavasson development will be fully built-out. Utilizing the trip generation equations for the proposed land uses and using ITE guidelines for development of trip generation rates, the trips generated by the Cavasson Phase II development are summarized in **Table 5**. Detailed trip generation calculation worksheets for the Cavasson development are provided in **Appendix F**.

Table 5 – Buildout Trip Generation

Land Use	ITE Code	Size		Weekday Generated Trips						
				Daily	AM Peak Hour			PM Peak Hour		
		Quantity	Units	Total	Enter	Exit	Total	Enter	Exit	Total
Hotel	310	400	Keys	3,344	116	80	196	139	133	272
Apartment	220	1,600	DU	12,048	155	517	672	444	260	704
General Office	710	1,800,000	SF	17,514	1,471	239	1,710	285	1,497	1,782
Shopping Center	820	194,000	SF	9,344	139	105	244	458	423	881
Fast Food Restaurant	930	12,000	SF	3,782	17	8	25	94	76	170
Total				**46,032**	**1,898**	**949**	**2,847**	**1,420**	**2,389**	**3,809**
Internal Capture Reductions				*(11,048)*	*(191)*	*(94)*	*(285)*	*(255)*	*(431)*	*(686)*
Total External Trips				**34,984**	**1,707**	**855**	**2,562**	**1,165**	**1,958**	**3,123**

As shown in **Table 5**, Phase I and Phase II (full build) of the Cavasson Development is anticipated to generate 34,984 daily trips to the external roadway system, with 2,562 occurring during the AM peak hour and 3,123 occurring during the PM peak hour. These are the anticipated trips which will be assigned to the external street network surrounding the study area.

TRIP DISTRIBUTION

Daily trips were distributed to the roadway network based on the Maricopa Association of Governments (MAG) estimate of total employment and population within a 10-mile radius of the site. The radius selected is based on the average trip length to this land use as discussed in the Nationwide Public Transportation Survey Urban Travel Patterns report (December 1999). It was determined that the major travel pattern for the site-generated traffic is primarily to the south and west.

By horizon year 2030, it is assumed that a portion of study area will be constructed. As the surrounding Crossroads East development builds out, the internal collector roads and adjacent arterial roads will be constructed and will be utilized to disperse site generated traffic. This includes the following improvements and extensions:

- ***64th Street***, extension from Bell Road to Jomax Road.
- ***Legacy Boulevard***, extension from Scottsdale Road to 56th Street and from Hayden Road to Pima Road.
- ***Miller Road***, underpass built at Loop 101.
- ***Deer Valley Drive (Thompson Peak Parkway),*** extension from 56th Street to Scottsdale Road.
- ***Internal Collectors***, full construction of all internal collectors to the Crossroads East development.

Table 6 displays the overall trip distribution percentages in the four (4) cardinal directions. Detailed trip distribution calculations are provided in **Appendix G**.

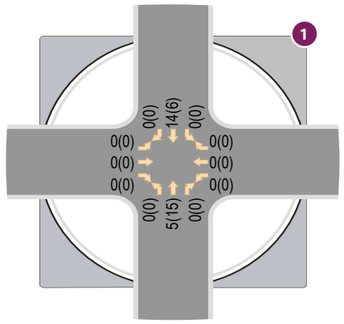
Table 6 – Trip Distribution

Direction (To/From)	Percentage
North	15%
South	30%
East	15%
West	40%
Total	**100%**

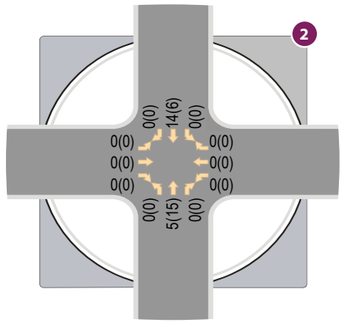
TRAFFIC ASSIGNMENT

The percentages shown in **Figure 5** were applied to the trips generated to determine the AM and PM peak hour site traffic at the intersections within the study area for each study horizon year. **Figures 6A, 6B and 6C** illustrate the opening year 2020 Phase I site generated traffic volumes. **Figures 7A, 7B and 7C** illustrate the opening year 2020 Phase II site generated traffic volumes.

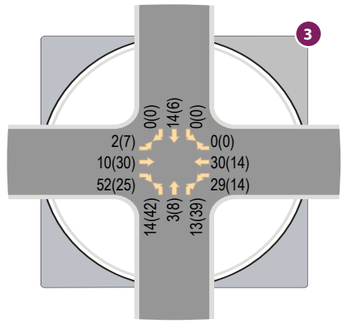
Figure 5: Trip Distribution



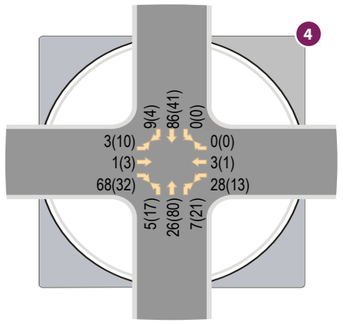
Hayden Rd & Deer Valley Rd



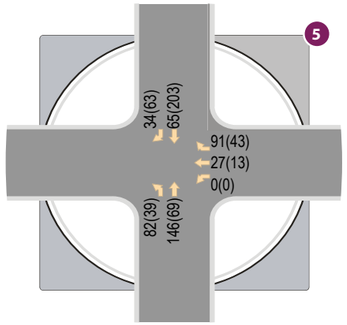
Hayden Rd & Grayhawk Dr



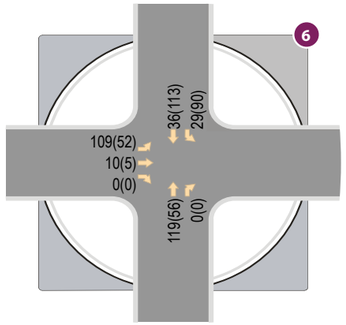
Hayden Rd & Thompson Peak Pkwy



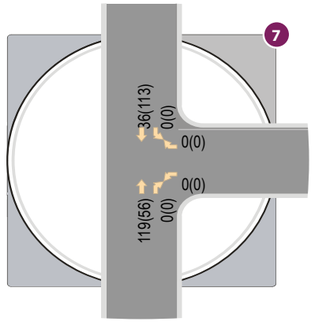
Hayden Rd & Legacy Blvd



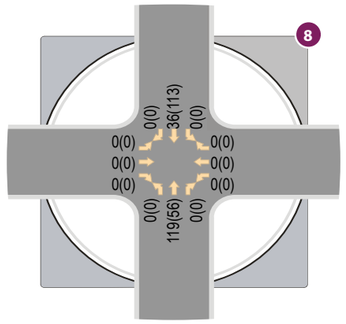
Hayden Rd & Loop 101 WB Ramps



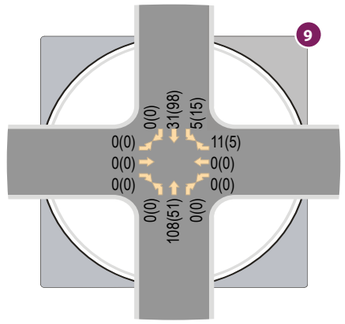
Hayden Rd & Loop 101 EB Ramps



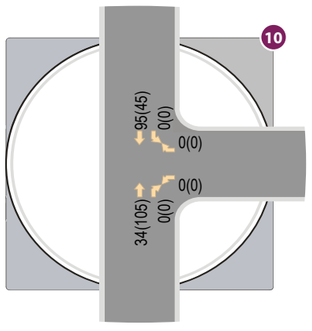
Hayden Rd & Mayo Blvd



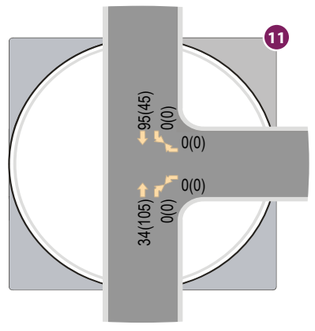
Hayden Rd & Princess Dr



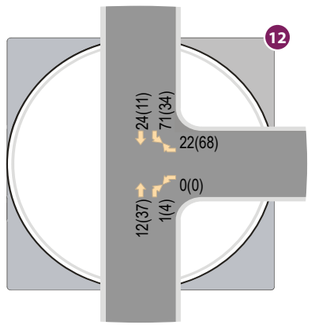
Hayden Rd & Bell Rd



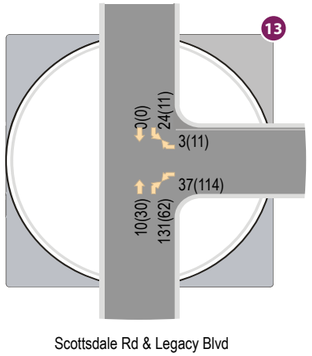
Scottsdale Rd & Deer Valley Rd



Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy



Scottsdale Rd & Legacy Blvd

LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

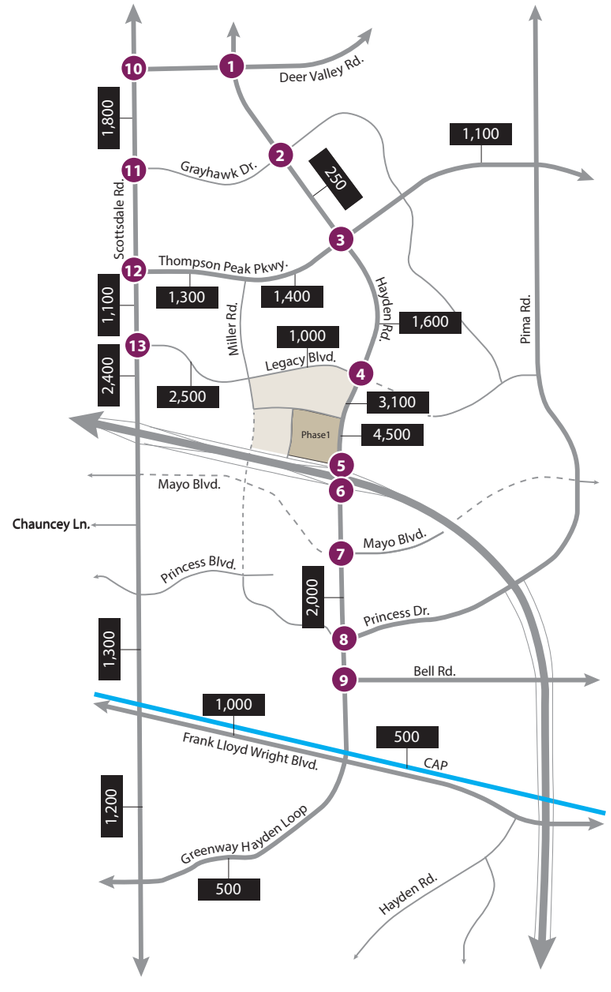
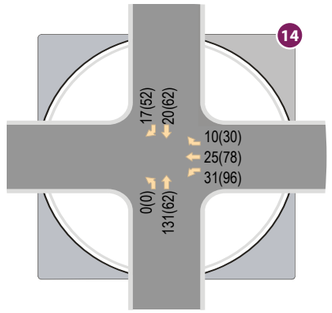
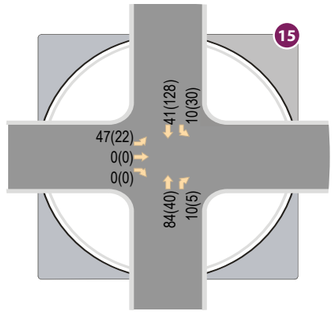


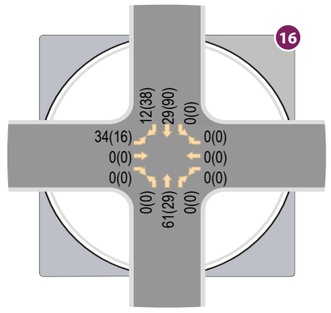
Figure 6A: 2020 Site Generated Traffic Volumes



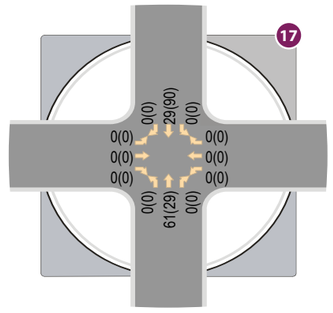
Scottsdale Rd & Loop 101 WB Ramps



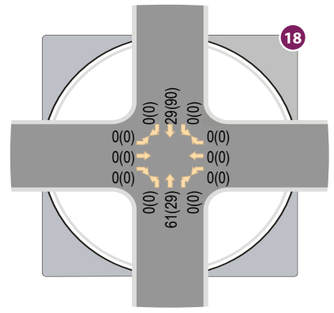
Scottsdale Rd & Loop 101 EB Ramps



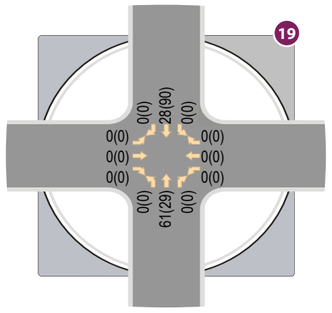
Scottsdale Rd & mayo Blvd



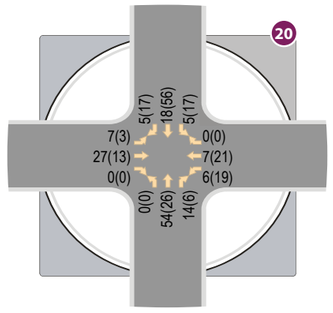
Scottsdale Rd & Chauncey Ln



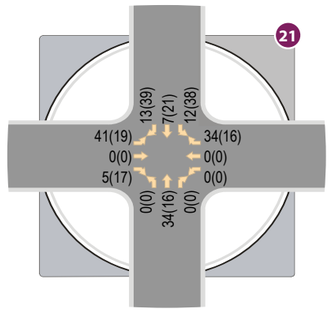
Scottsdale Rd & Peincess Blvd



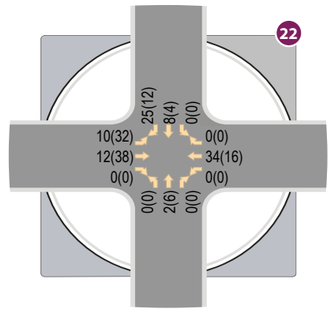
Scottsdale Rd & 17050 North



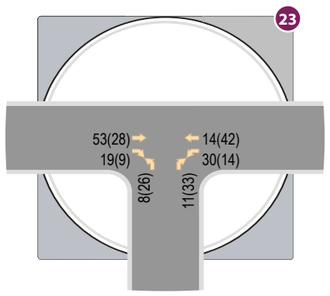
Scottsdale Rd & Frank Lloyd Wright Blvd



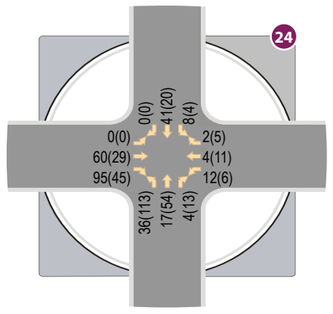
Greenway-Hayden & Frank Lloyd Wright Blvd



Pima Rd & Thompson Peak Pkwy



Miller Rd & Thompson Peak Pkwy



Miller Rd & Legacy Blvd

LEGEND

XX(XX) - AM(PM) Peak Hour Traffic Volumes

NORTH

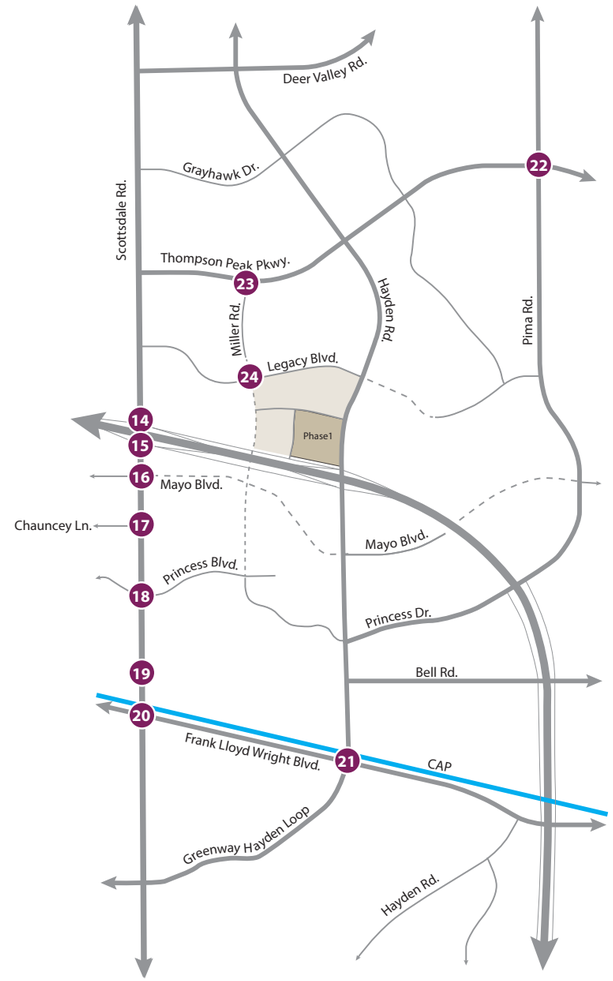
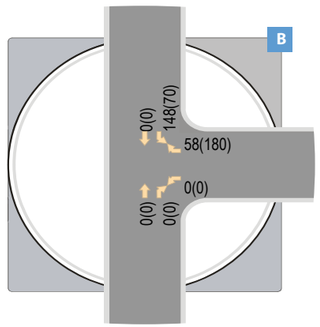
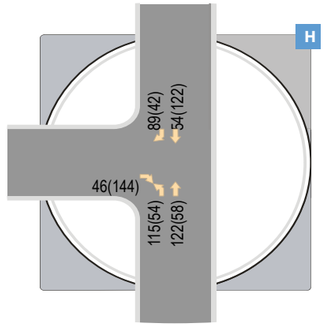


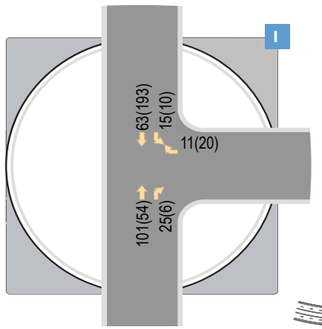
Figure 6B: 2020 Site Generated Traffic Volumes



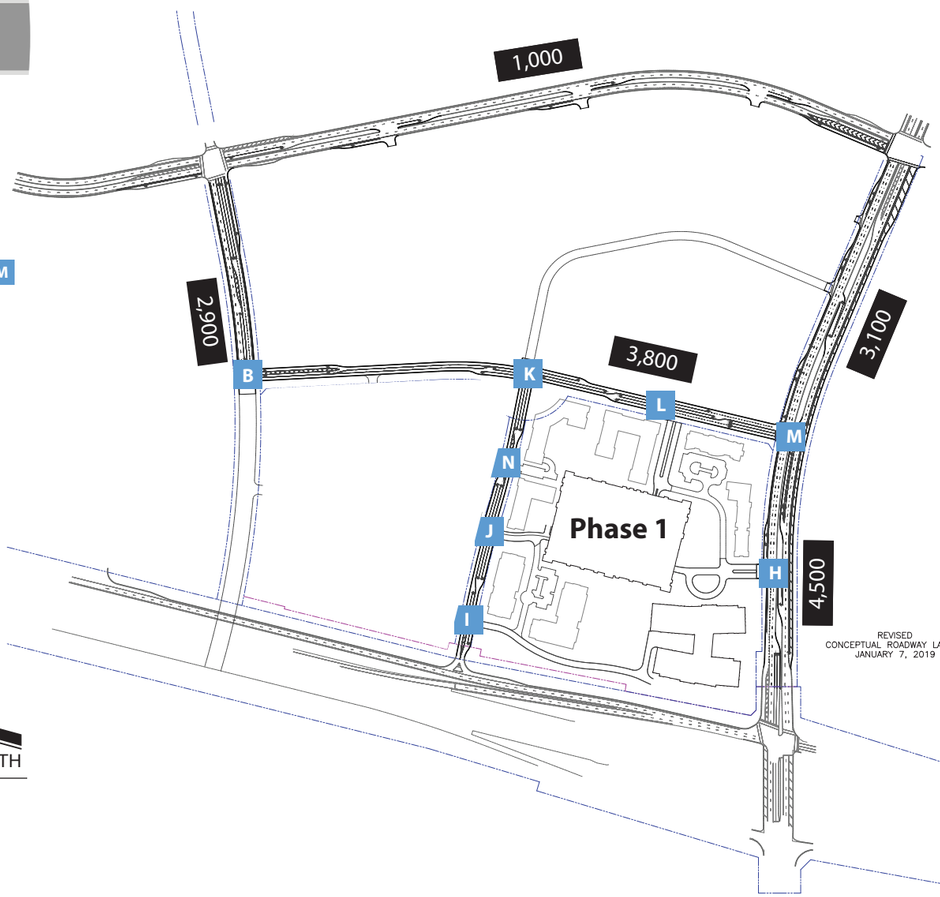
Miller Rd & Access B

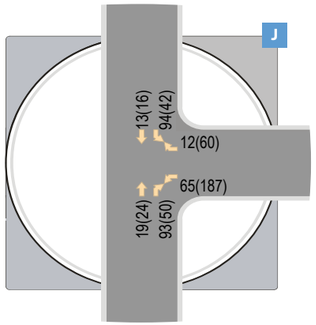


Hayden Rd & Access H

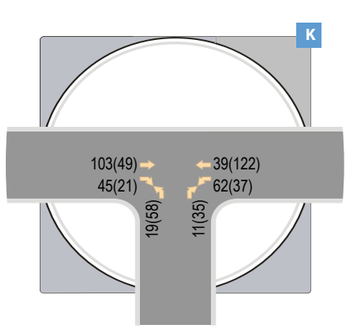


Claret Dr & Access I

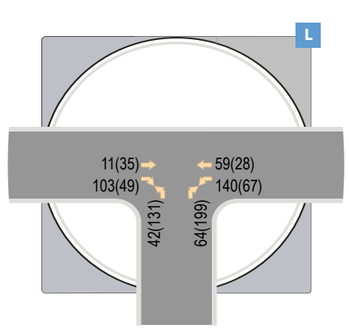




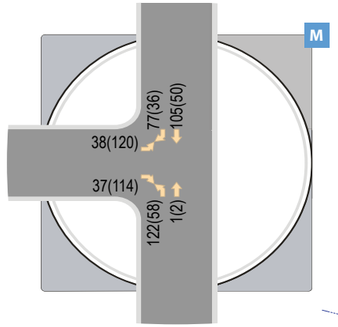
Claret Dr & Access J



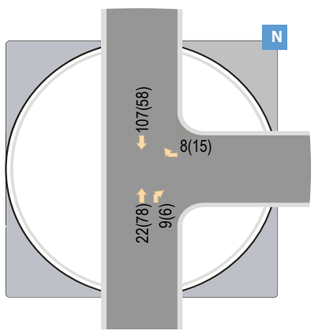
Claret Dr & Cavasson Blvd



Access L & Cavasson Blvd



Hayden Rd & Cavasson Blvd



Claret Dr. & Access N

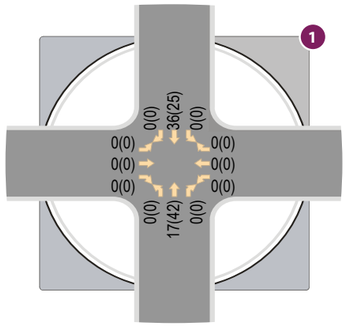
LEGEND

NORTH

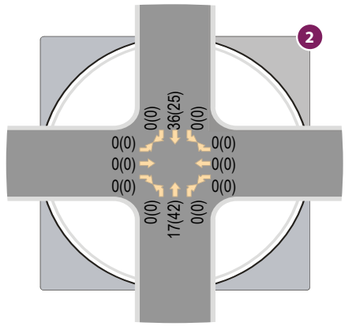
XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

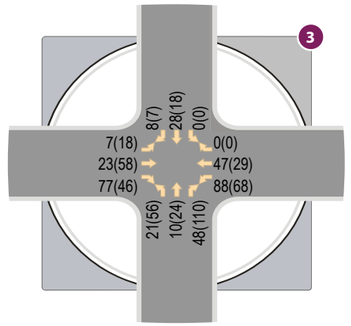
Figure 6C: 2020 Site Generated Traffic Volumes



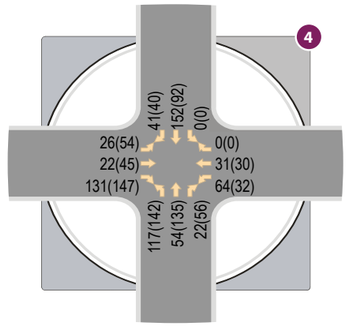
Hayden Rd & Deer Valley Rd



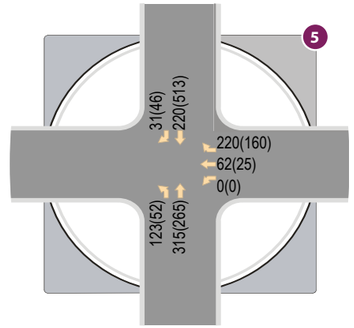
Hayden Rd & Grayhawk Dr



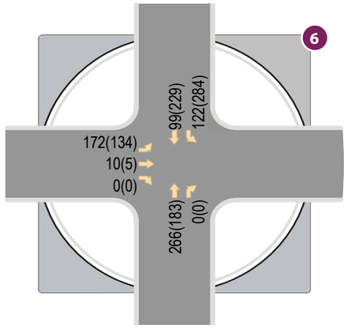
Hayden Rd & Thompson Peak Pkwy



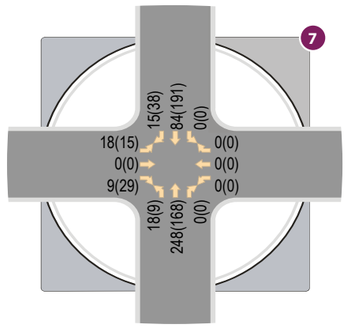
Hayden Rd & Legacy Blvd



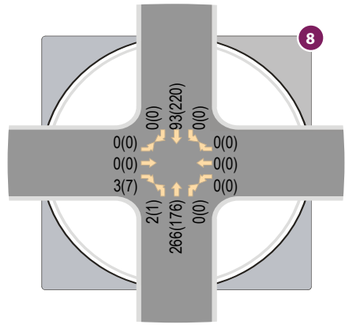
Hayden Rd & Loop 101 WB Ramps



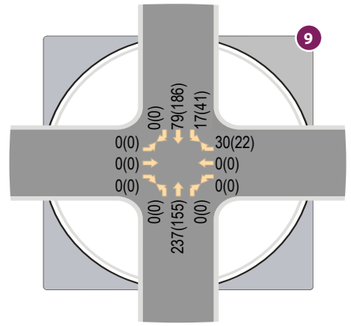
Hayden Rd & Loop 101 EB Ramps



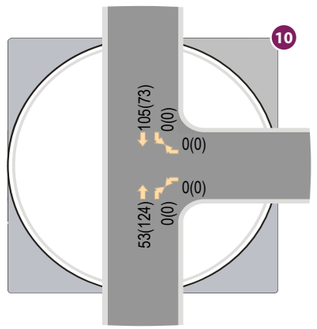
Hayden Rd & Mayo Blvd



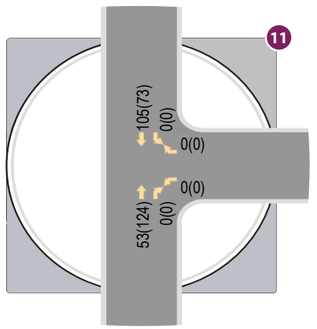
Hayden Rd & Princess Dr



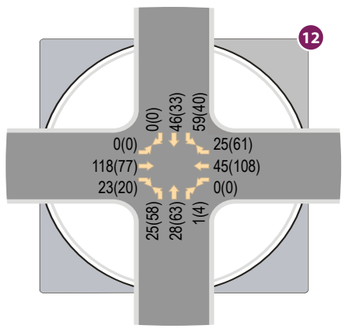
Hayden Rd & Bell Rd



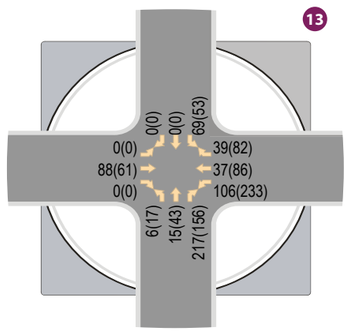
Scottsdale Rd & Deer Valley Rd



Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy



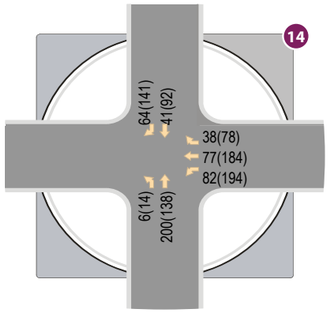
Scottsdale Rd & Legacy Blvd

LEGEND

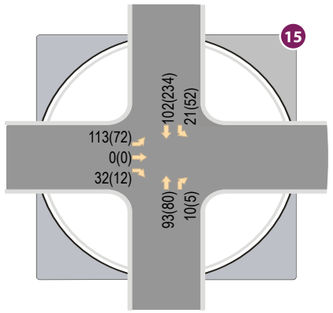
XX(XX) - AM(PM) Peak Hour Traffic Volumes

NORTH

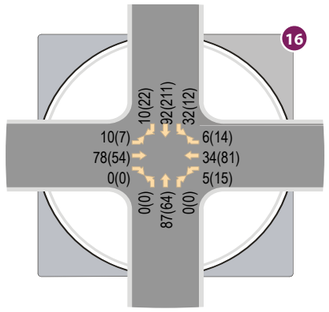
Figure 7A: 2030 Site Generated Traffic Volumes



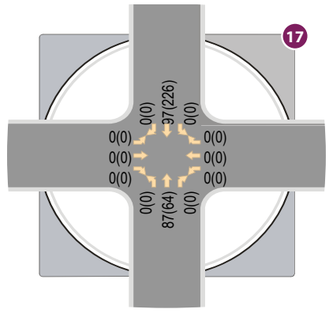
Scottsdale Rd & Loop 101 WB Ramps



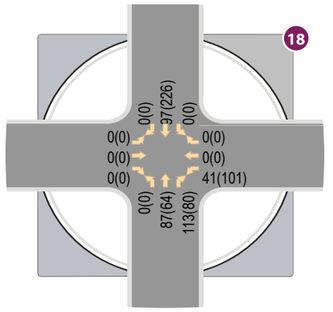
Scottsdale Rd & Loop 101 EB Ramps



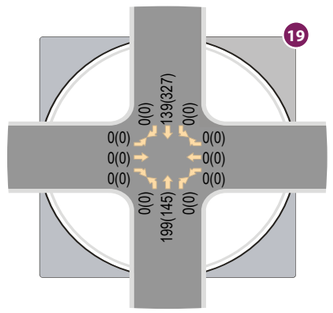
Scottsdale Rd & mayo Blvd



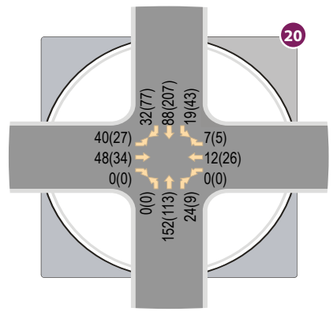
Scottsdale Rd & Chauncey Ln



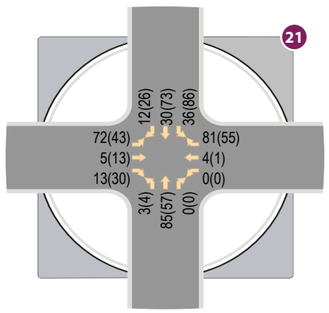
Scottsdale Rd & Peincess Blvd



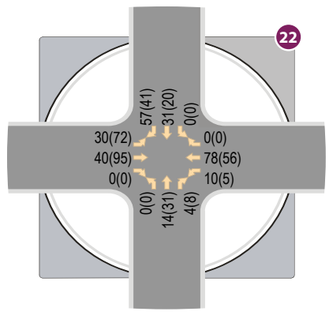
Scottsdale Rd & 17050 North



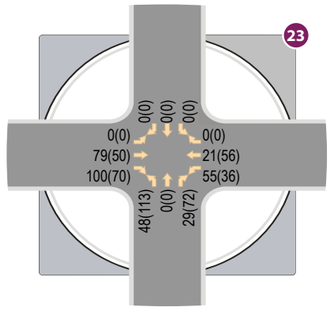
Scottsdale Rd & Frank Lloyd Wright Blvd



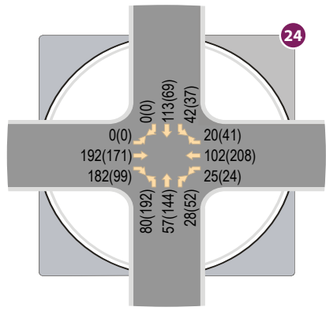
Greenway-Hayden & Frank Lloyd Wright Blvd



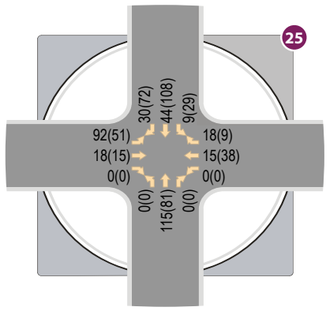
Pima Rd & Thompson Peak Pkwy



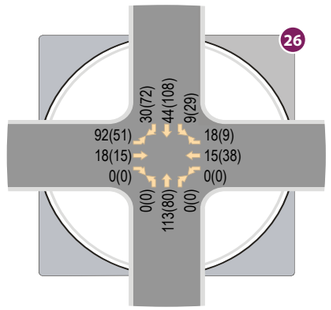
Miller Rd & Thompson Peak Pkwy



Miller Rd & Legacy Blvd



Miller Rd & Mayo Blvd



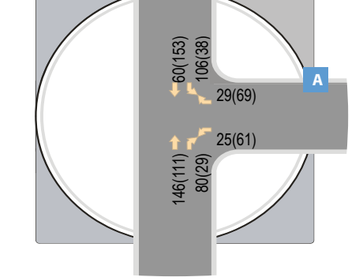
Miller Rd & Princess Dr

LEGEND

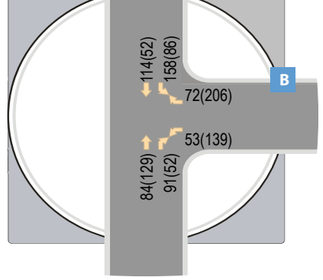
XX(XX) - AM(PM) Peak Hour Traffic Volumes

NORTH

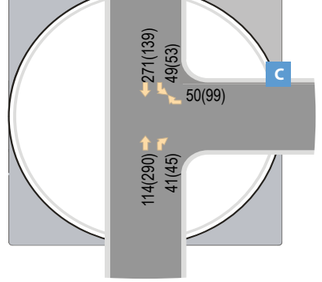
Figure 7B: 2030 Site Generated Traffic Volumes



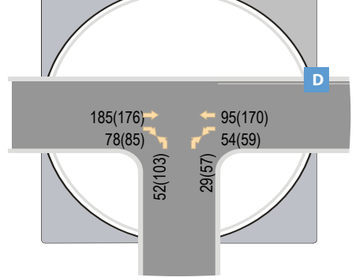
Miller Rd & Access A



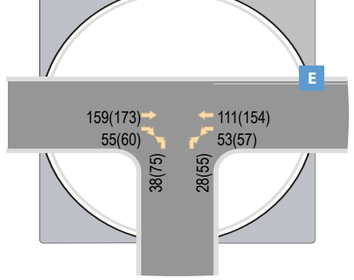
Miller Rd & Access B



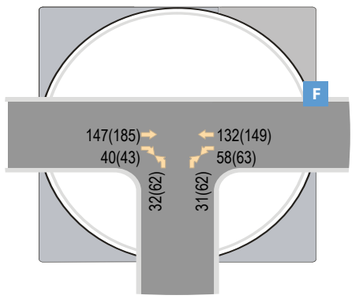
Miller Rd & Access C



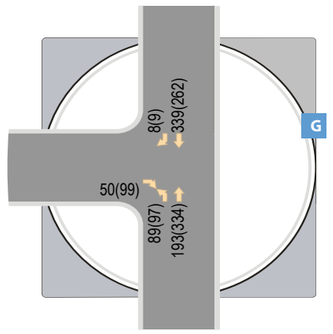
Access D & Legacy Blvd



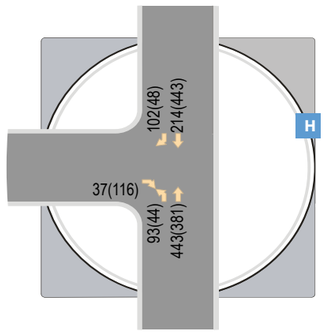
Access E & Legacy Blvd



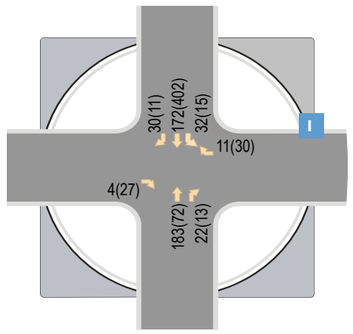
Access F & Legacy Blvd



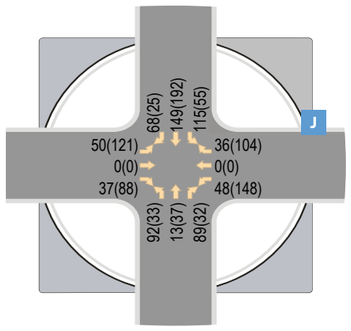
Hayden Rd & Access G



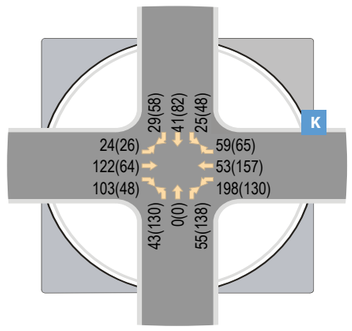
Hayden Rd & Access H



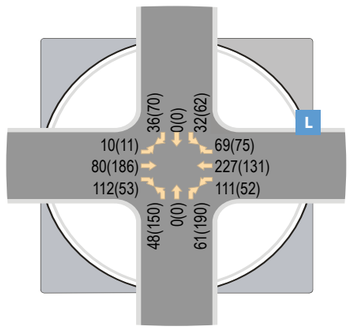
Claret Dr & Access I



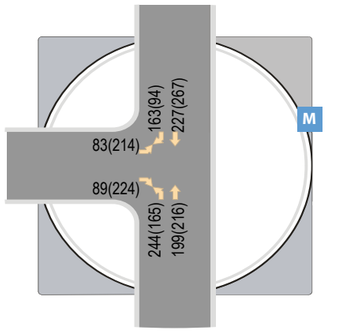
Claret Dr & Access J



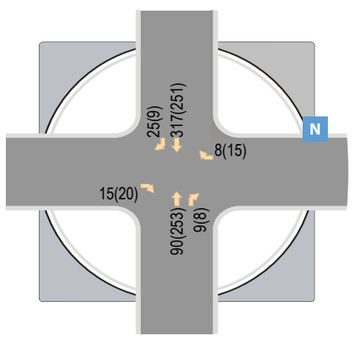
Claret Dr & Cavasson Blvd



Access L & Cavasson Blvd



Hayden Rd & Cavasson Blvd



Claret Dr. & Access N

O

Access "O" will be analyzed in more detail in future phased TIA.

LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

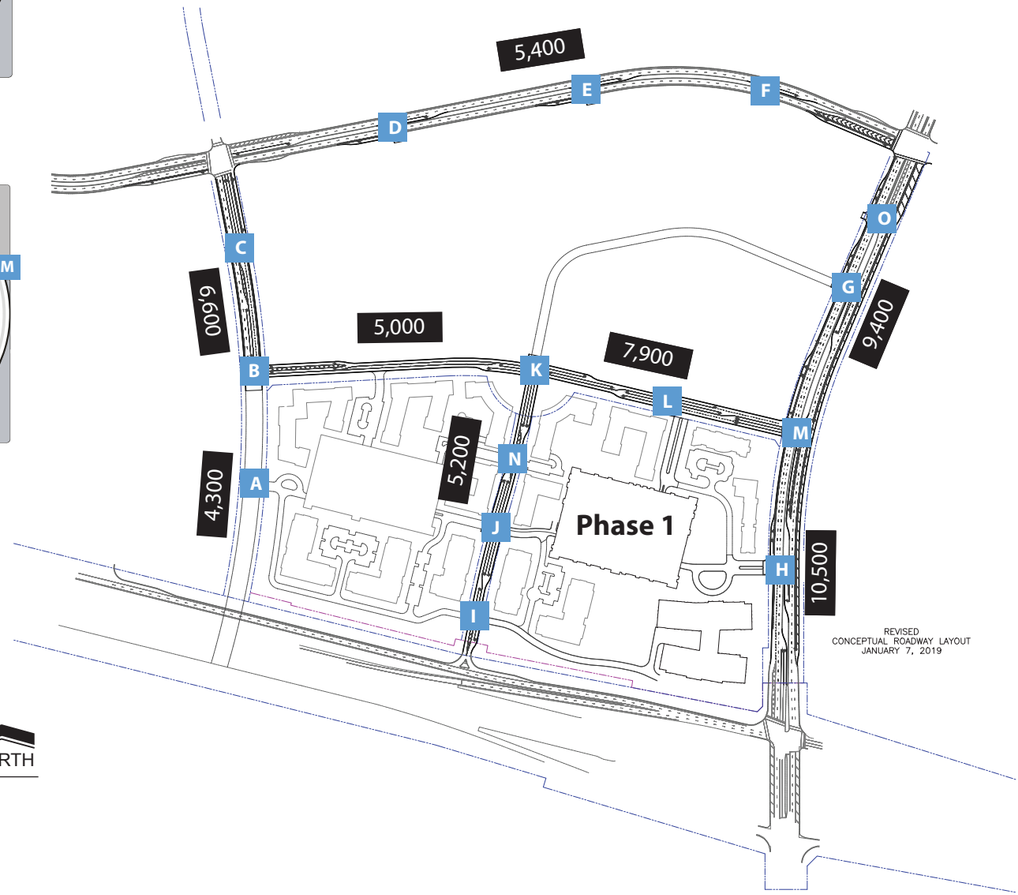


Figure 7C: 2030 Site Generated Traffic Volumes

FUTURE BACKGROUND TRAFFIC

CivTech applied a growth rate to the seasonally adjusted existing traffic counts conducted for this study to obtain the background traffic volumes along the adjacent roadway network. Historic traffic count data from the City of Scottsdale website were reviewed; the traffic counts in 2014 (11,900 ADT) and 2016 (12,400 ADT) on Thompson Peak Parkway between Scottsdale Road and Hayden Rod were compared. The comparison results in a calculated growth rate of 2% per year. Therefore, the calculated 2% per year growth rate was applied from existing traffic counts conducted in 2018 to project likely traffic in the future year 2025. A reduced 1% growth rate was applied from year 2025 to year 2030. **Table 7** below illustrates the calculated growth rate and estimated expansion factors for each study horizon year.

Table 7 – Calculated Growth Rates and Expansion Factors

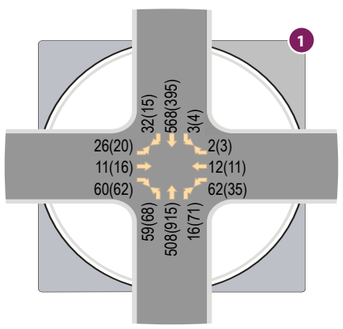
Year	Growth Rate	Expansion Factor
Seasonally Adjusted (2018)	3%	1.03
Adjusted 2018 to 2020	2%	1.042
Adjusted 2018 to 2030	2% (2018-2025) 1% (2026-2030)	1.216

To account for the likely development of the surrounding proposed Crossroads East parcels approximately 50% of the site traffic from the Crossroads East TIA was applied to the background volumes for study horizon year 2030. A copy of the Crossroads East site volumes and worksheets used to calculate the growth rate factors are included in **Appendix H**.

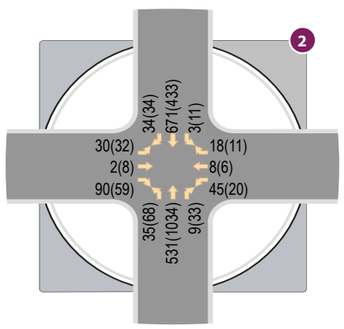
Opening year 2020 calculated background traffic volumes are presented in **Figures 8A**, **8B**, and **8C**. Horizon year 2030 calculated background traffic volumes are presented in **Figures 9A**, **9B**, and **9C**, respectively.

TOTAL TRAFFIC

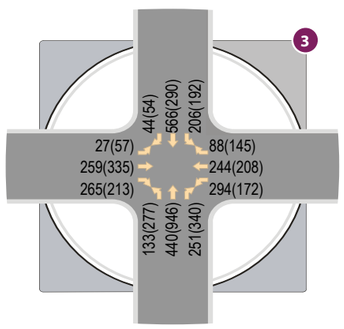
The total traffic volumes were determined for each horizon year by adding the site generated traffic volumes and the background traffic volumes. The total traffic volumes for the 2020 horizon year are illustrated in **Figures 10A**, **10B** and **10C**. The total traffic volumes for horizon year 2030 are illustrated in **Figure 11A**, **11B**, and **11C**.



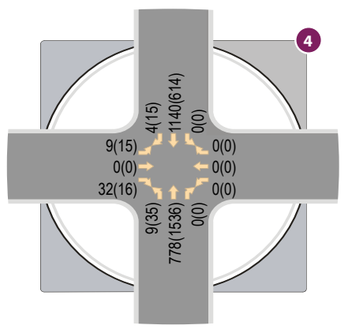
Hayden Rd & Deer Valley Rd



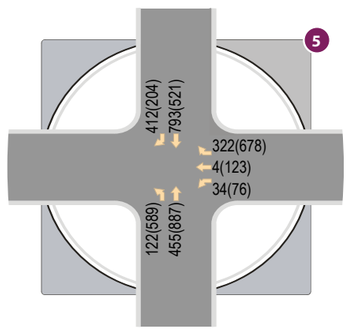
Hayden Rd & Grayhawk Dr



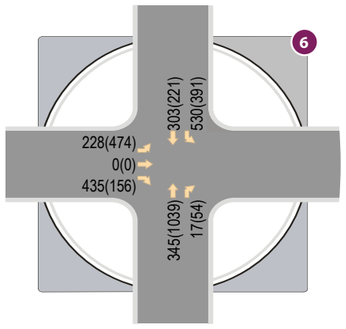
Hayden Rd & Thompson Peak Pkwy



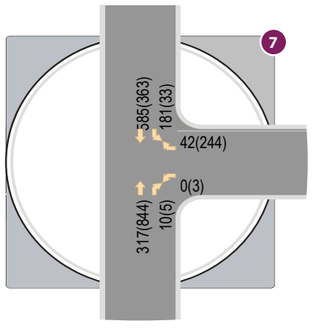
Hayden Rd & Legacy Blvd



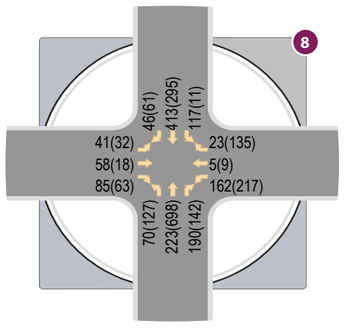
Hayden Rd & Loop 101 WB Ramps



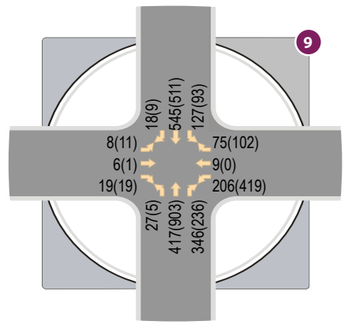
Hayden Rd & Loop 101 EB Ramps



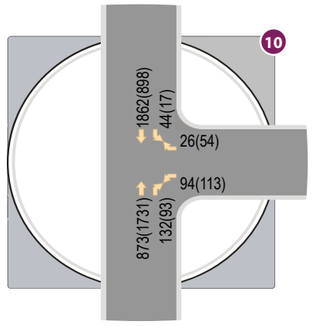
Hayden Rd & Mayo Blvd



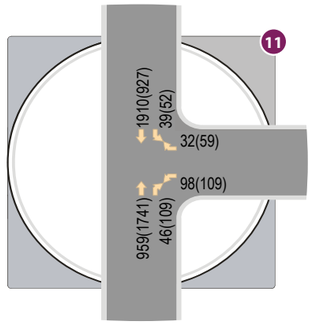
Hayden Rd & Princess Dr



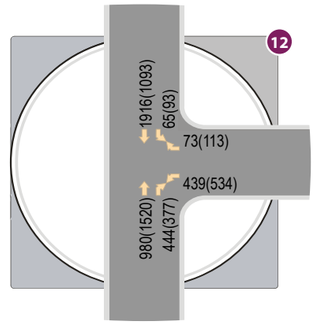
Hayden Rd & Bell Rd



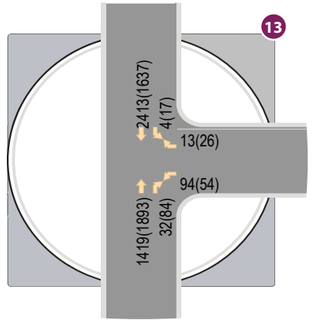
Scottsdale Rd & Deer Valley Rd



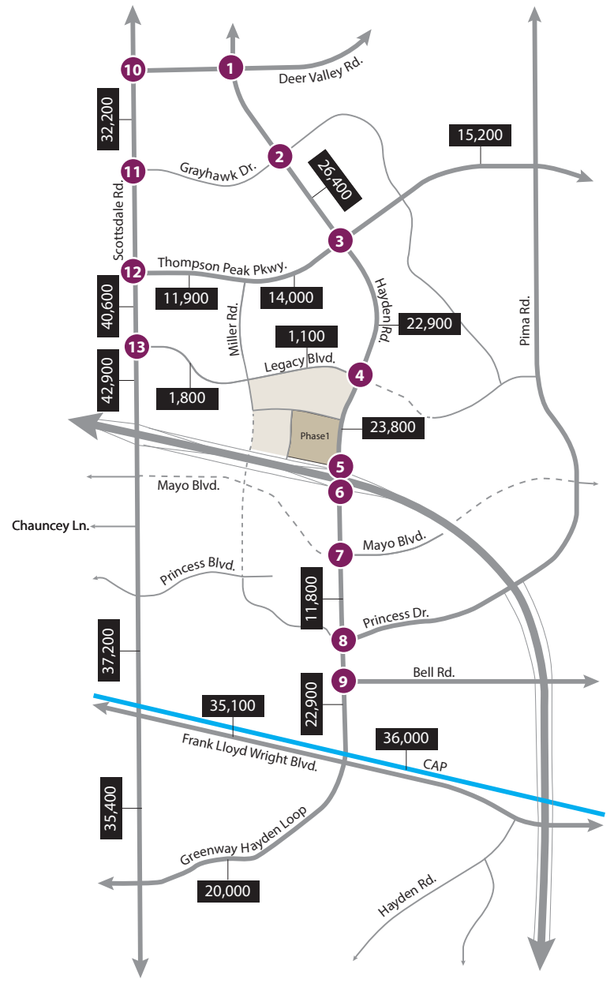
Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy



Scottsdale Rd & Legacy Blvd



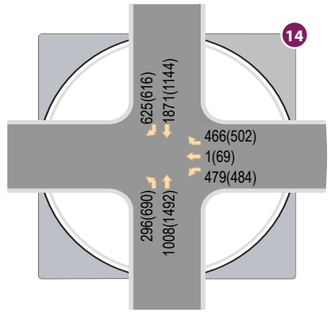
LEGEND

NORTH

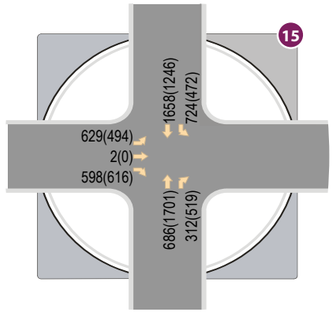
XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

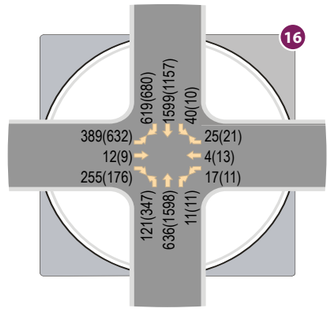
Figure 8A: 2020 Background Traffic Volumes



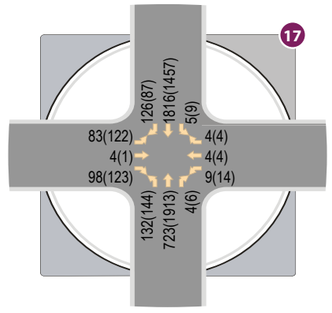
Scottsdale Rd & Loop 101 WB Ramps



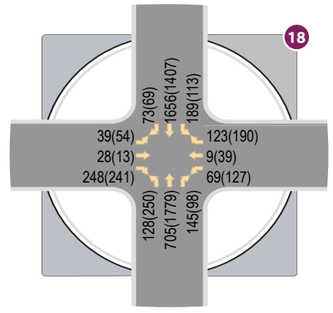
Scottsdale Rd & Loop 101 EB Ramps



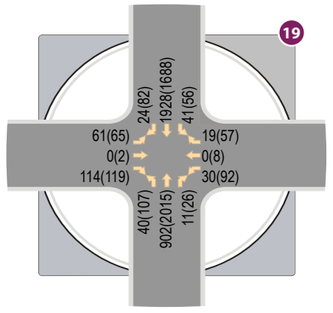
Scottsdale Rd & mayo Blvd



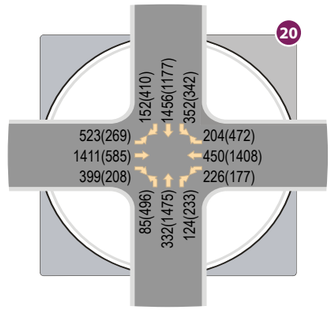
Scottsdale Rd & Chauncey Ln



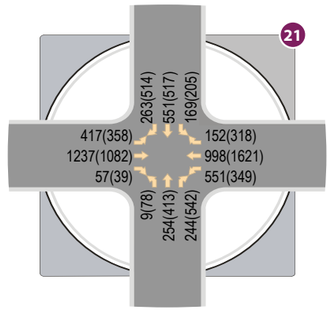
Scottsdale Rd & Peincess Blvd



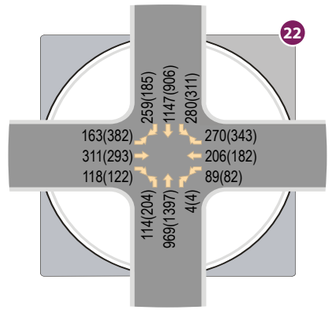
Scottsdale Rd & 17050 North



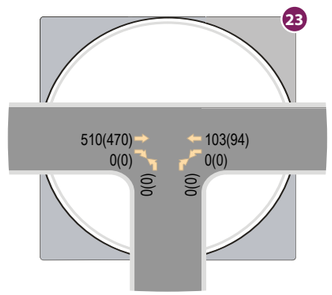
Scottsdale Rd & Frank Lloyd Wright Blvd



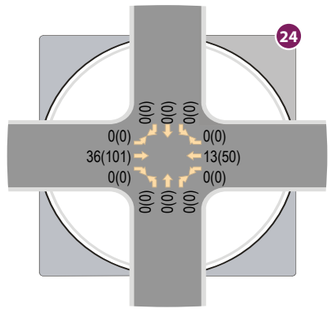
Greenway-Hayden & Frank Lloyd Wright Blvd



Pima Rd & Thompson Peak Pkwy



Miller Rd & Thompson Peak Pkwy



Miller Rd & Legacy Blvd

LEGEND

XX(XX) - AM(PM) Peak Hour Traffic Volumes

NORTH

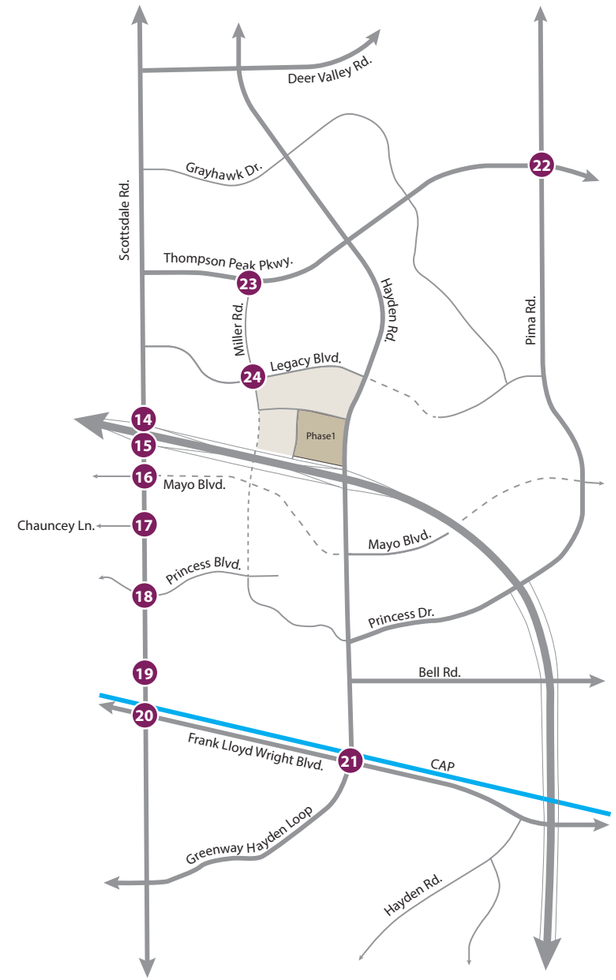
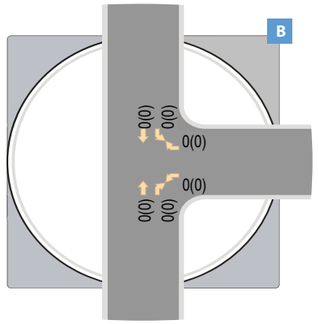
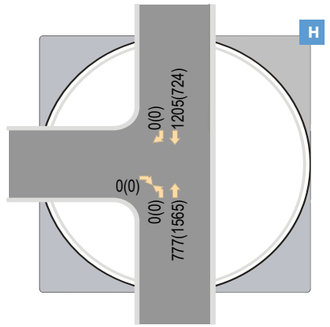


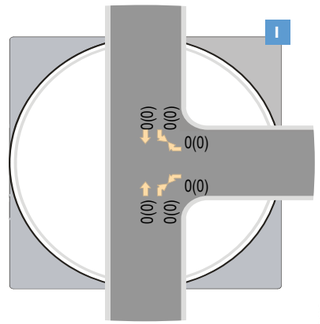
Figure 8B: 2020 Background Traffic Volumes



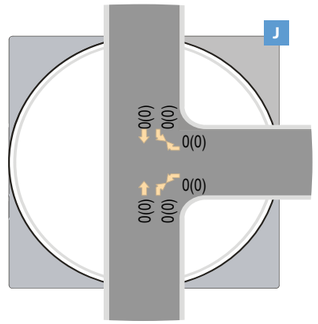
Miller Rd & Access B



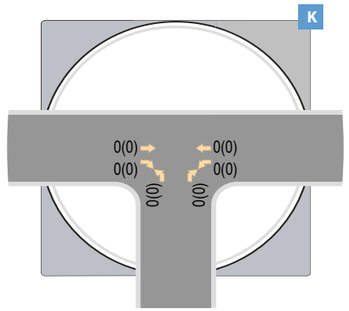
Hayden Rd & Access H



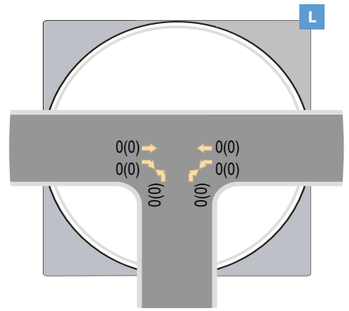
Claret Dr & Access I



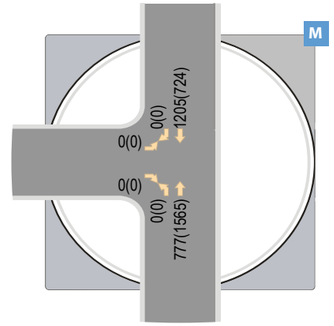
Claret Dr & Access J



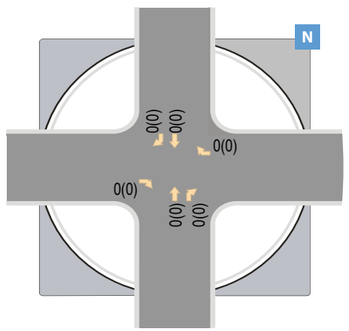
Claret Dr & Cavasson Blvd



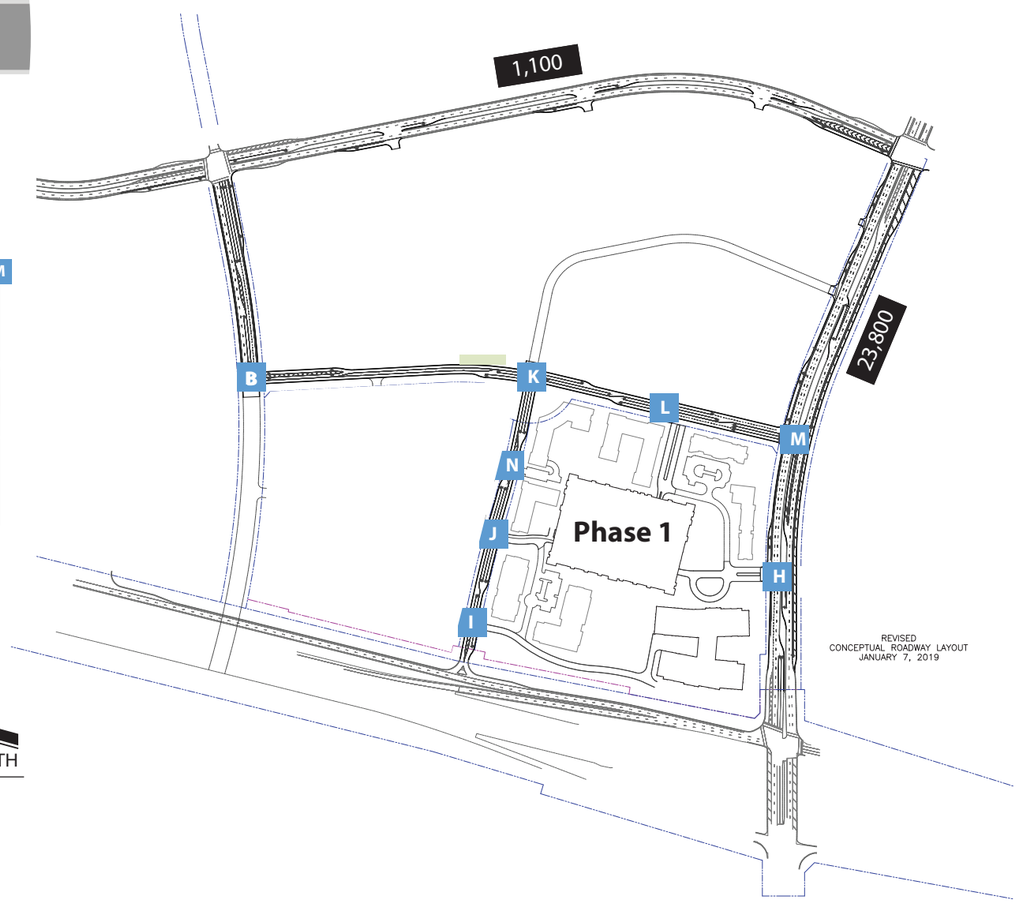
Access L & Cavasson Blvd



Hayden Rd & Cavasson Blvd



Claret Dr. & Access N



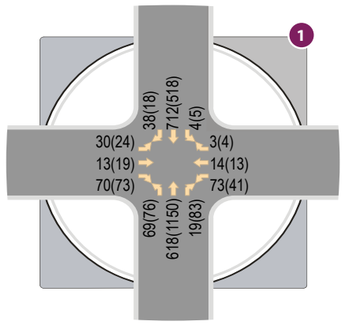
LEGEND

NORTH

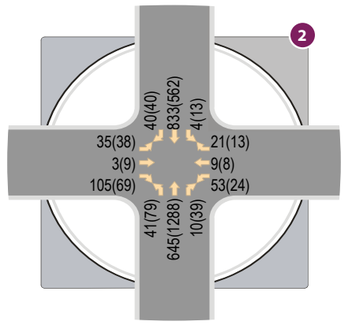
XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

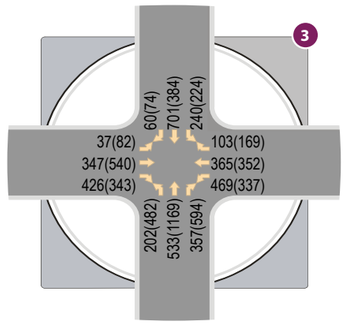
Figure 8C: 2020 Background Traffic Volumes



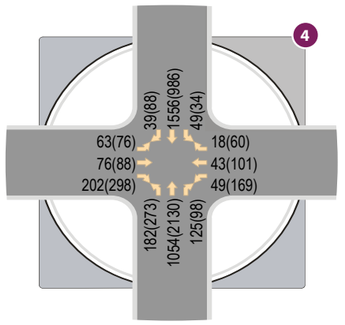
Hayden Rd & Deer Valley Rd



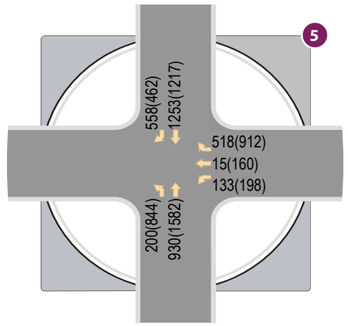
Hayden Rd & Grayhawk Dr



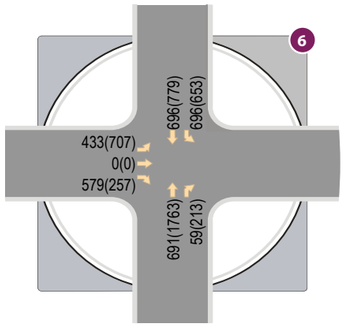
Hayden Rd & Thompson Peak Pkwy



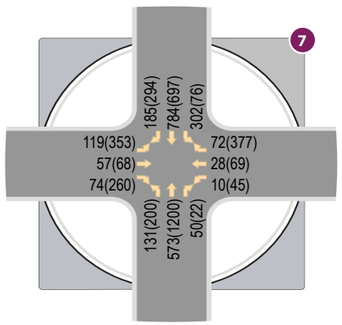
Hayden Rd & Legacy Blvd



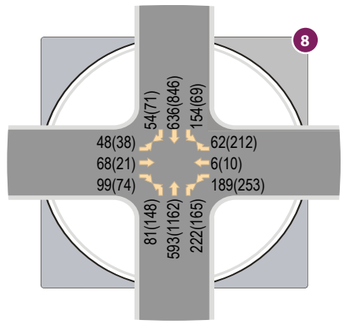
Hayden Rd & Loop 101 WB Ramps



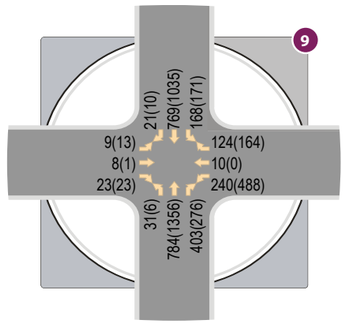
Hayden Rd & Loop 101 EB Ramps



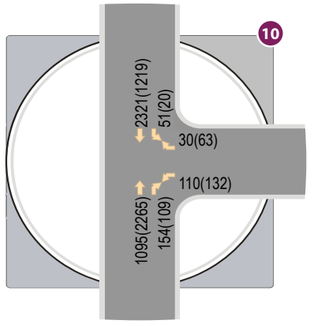
Hayden Rd & Mayo Blvd



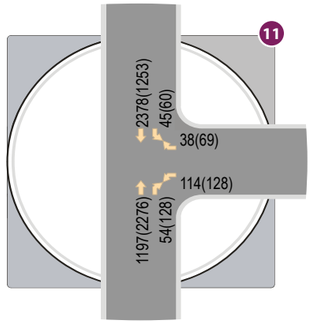
Hayden Rd & Princess Dr



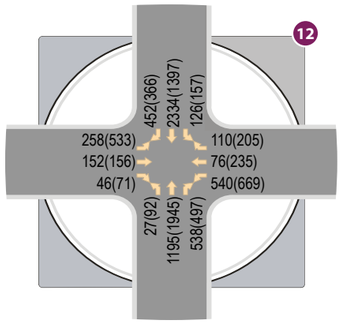
Hayden Rd & Bell Rd



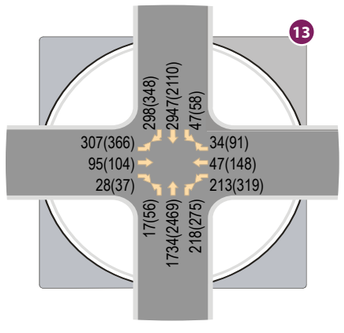
Scottsdale Rd & Deer Valley Rd



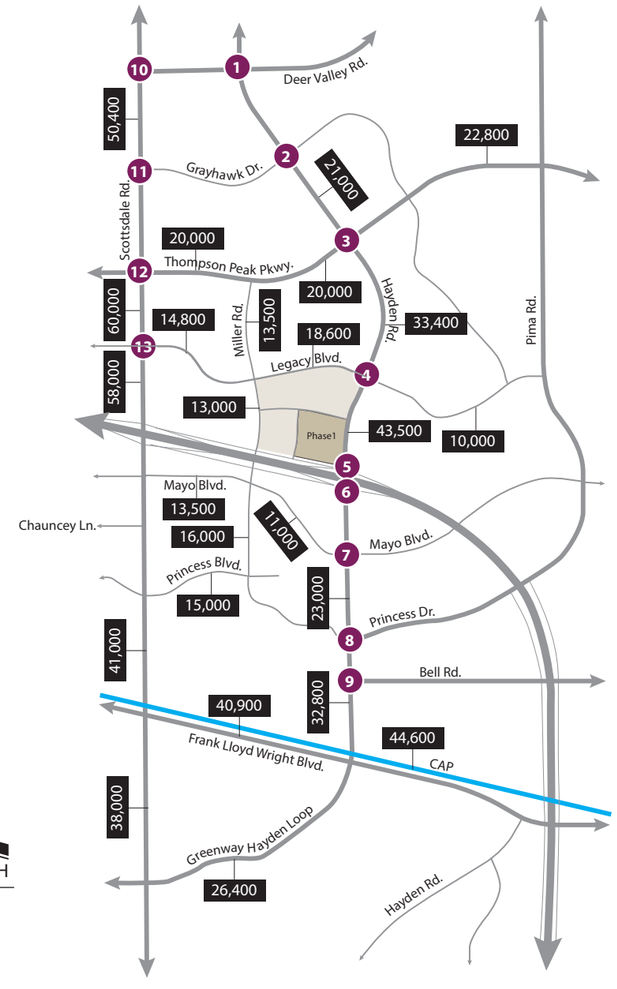
Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy



Scottsdale Rd & Legacy Blvd



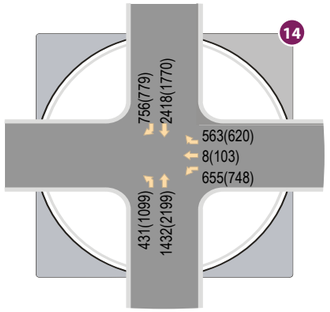
LEGEND

NORTH

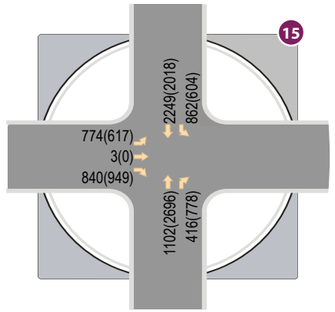
XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

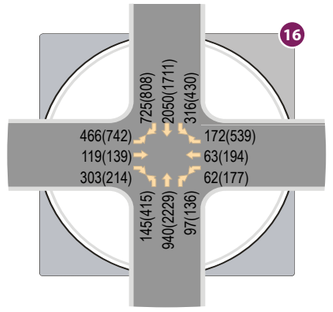
Figure 9A: 2030 Background Traffic Volumes



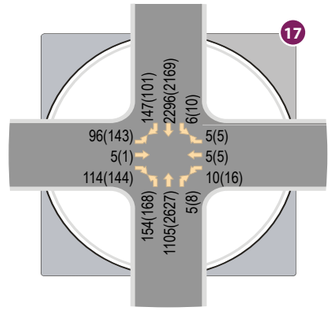
Scottsdale Rd & Loop 101 WB Ramps



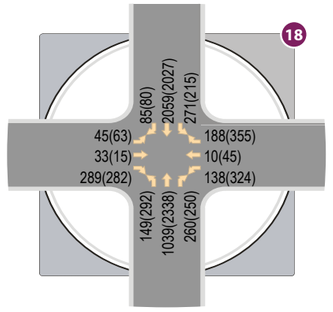
Scottsdale Rd & Loop 101 EB Ramps



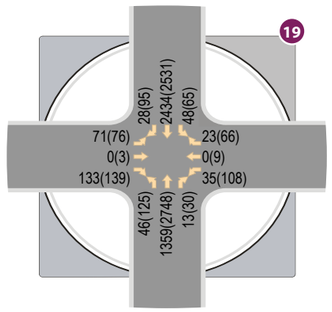
Scottsdale Rd & mayo Blvd



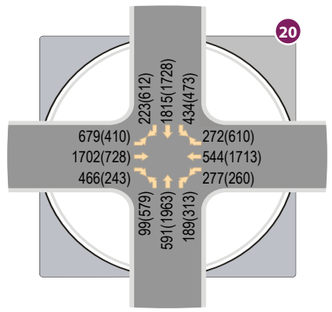
Scottsdale Rd & Chauncey Ln



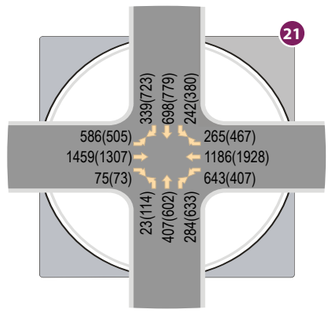
Scottsdale Rd & Peincess Blvd



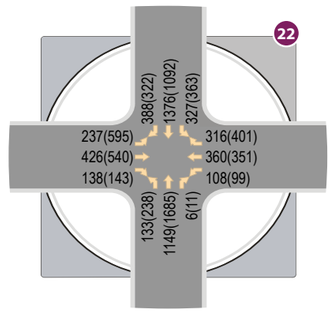
Scottsdale Rd & 17050 North



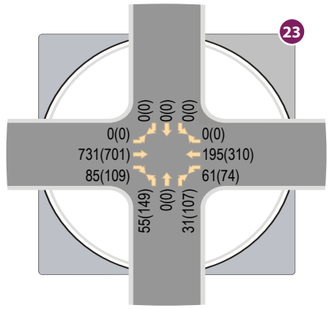
Scottsdale Rd & Frank Lloyd Wright Blvd



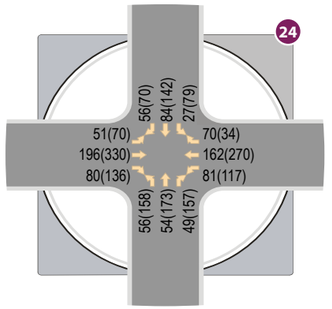
Greenway-Hayden & Frank Lloyd Wright Blvd



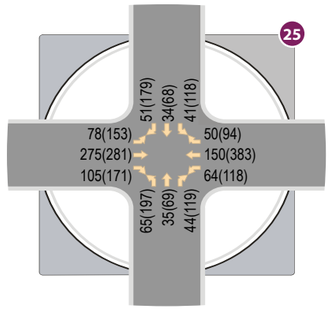
Pima Rd & Thompson Peak Pkwy



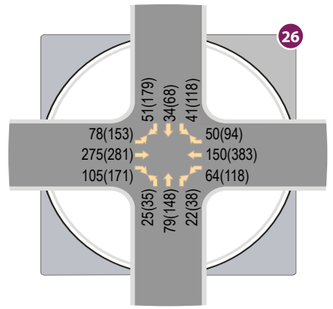
Miller Rd & Thompson Peak Pkwy



Miller Rd & Legacy Blvd



Miller Rd & Mayo Blvd



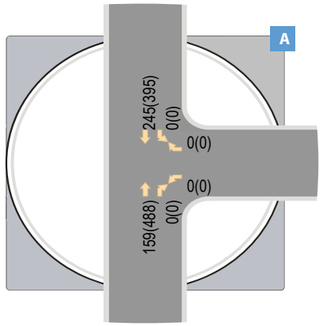
Miller Rd & Princess Dr

LEGEND

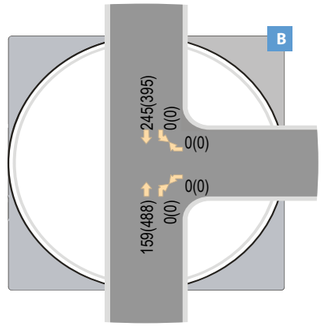
XX(XX) - AM(PM) Peak Hour Traffic Volumes

NORTH

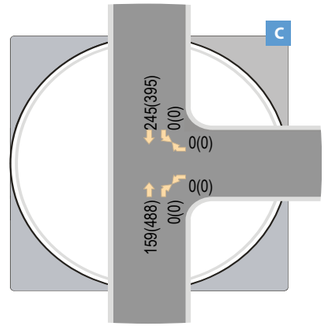
Figure 9B: 2030 Background Traffic Volumes



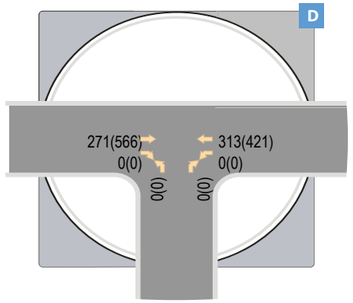
Miller Rd & Access A



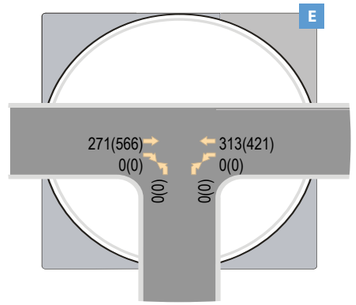
Miller Rd & Access B



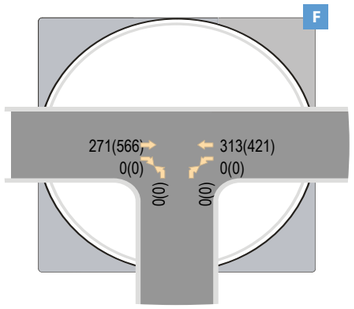
Miller Rd & Access C



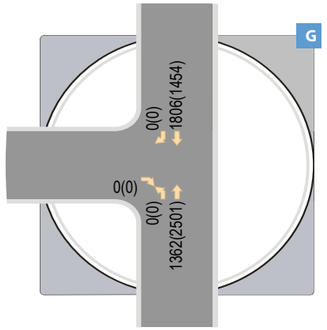
Access D & Legacy Blvd



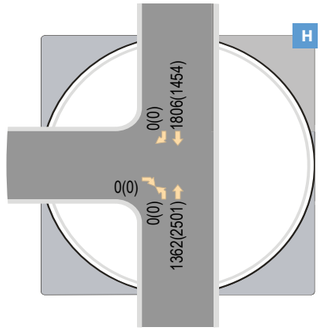
Access E & Legacy Blvd



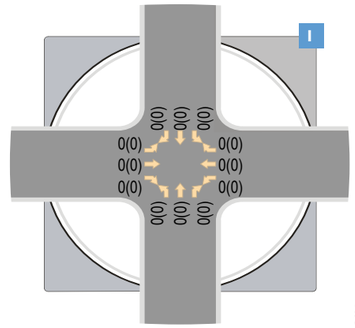
Access F & Legacy Blvd



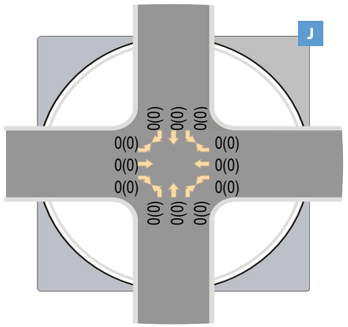
Hayden Rd & Access G



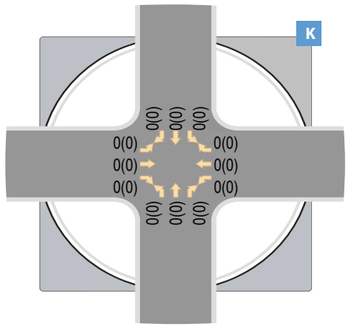
Hayden Rd & Access H



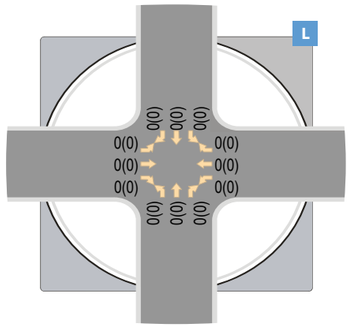
Claret Dr & Access I



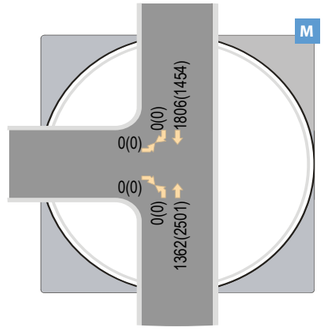
Claret Dr & Access J



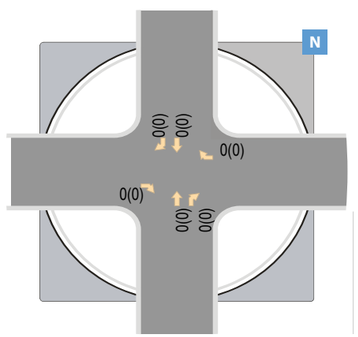
Claret Dr & Cavasson Blvd



Access L & Cavasson Blvd



Hayden Rd & Cavasson Blvd



Claret Dr. & Access N

O

Access “O” will be analyzed in more detail in future phased TIA.

LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

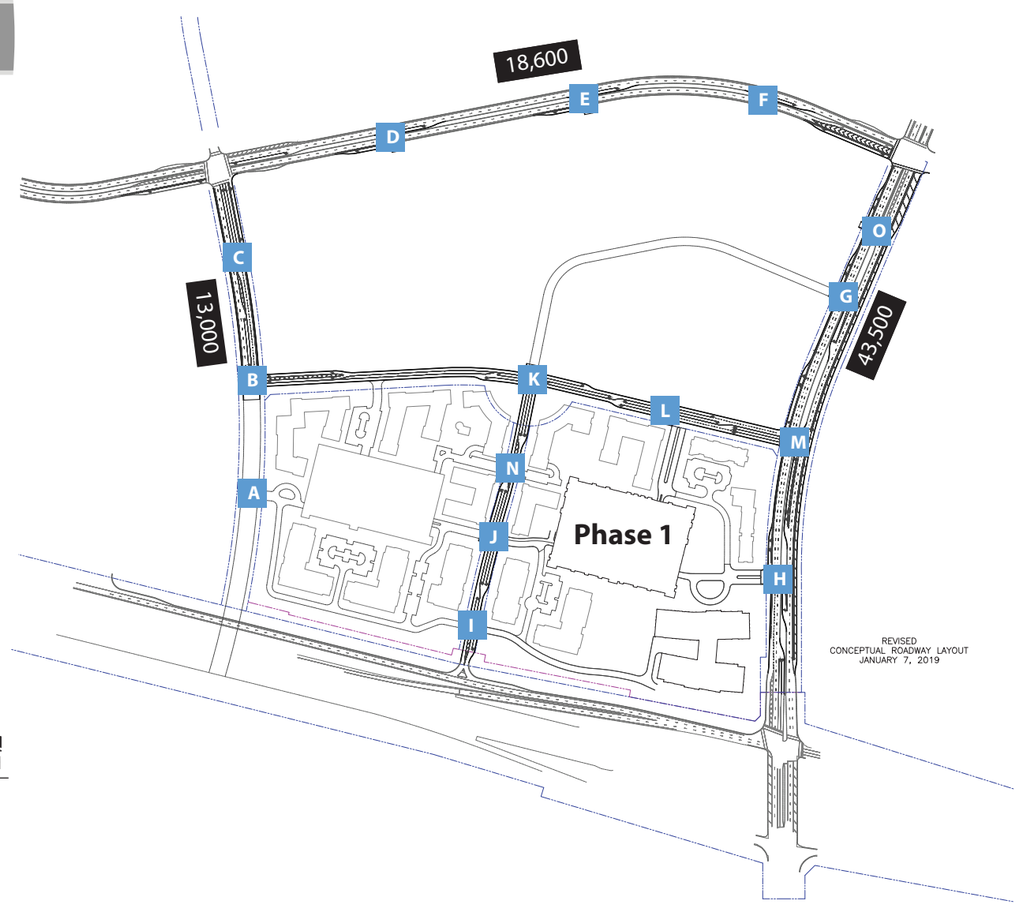
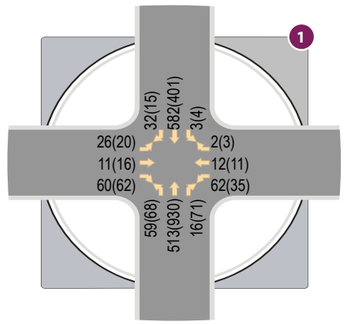
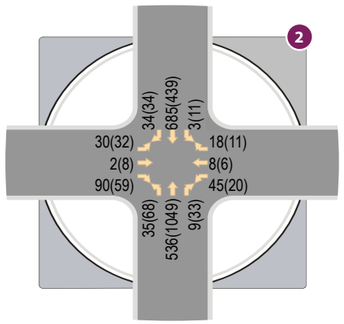


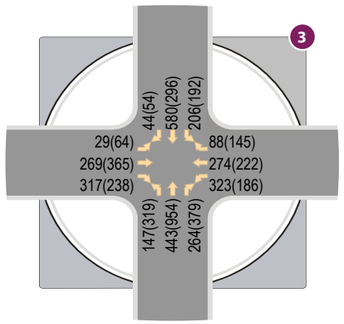
Figure 9C: 2030 Background Traffic Volumes



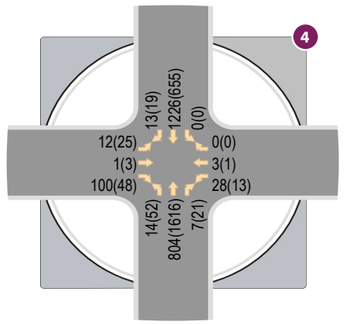
Hayden Rd & Deer Valley Rd



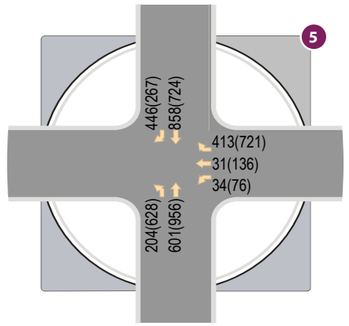
Hayden Rd & Grayhawk Dr



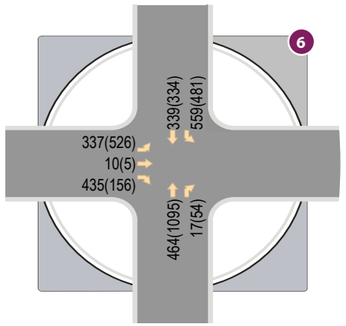
Hayden Rd & Thompson Peak Pkwy



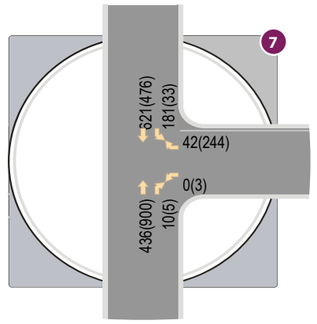
Hayden Rd & Legacy Blvd



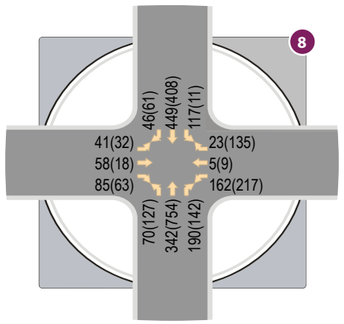
Hayden Rd & Loop 101 WB Ramps



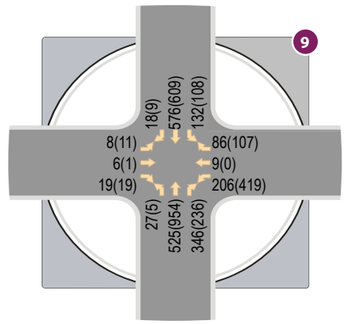
Hayden Rd & Loop 101 EB Ramps



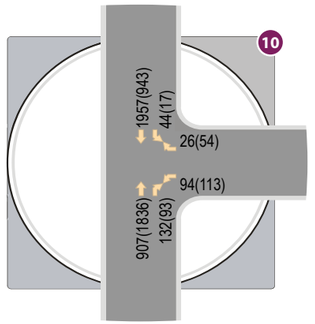
Hayden Rd & Mayo Blvd



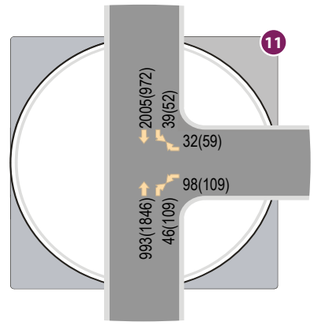
Hayden Rd & Princess Dr



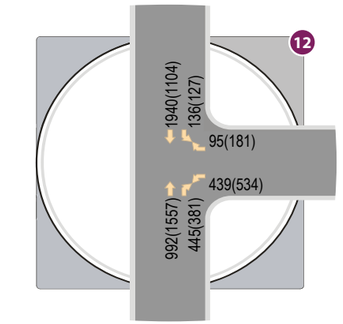
Hayden Rd & Bell Rd



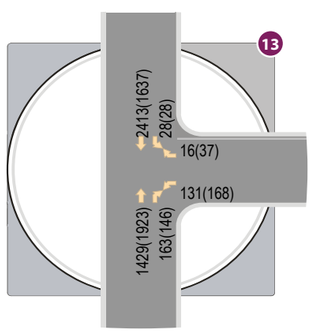
Scottsdale Rd & Deer Valley Rd



Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy



Scottsdale Rd & Legacy Blvd

LEGEND

XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

NORTH

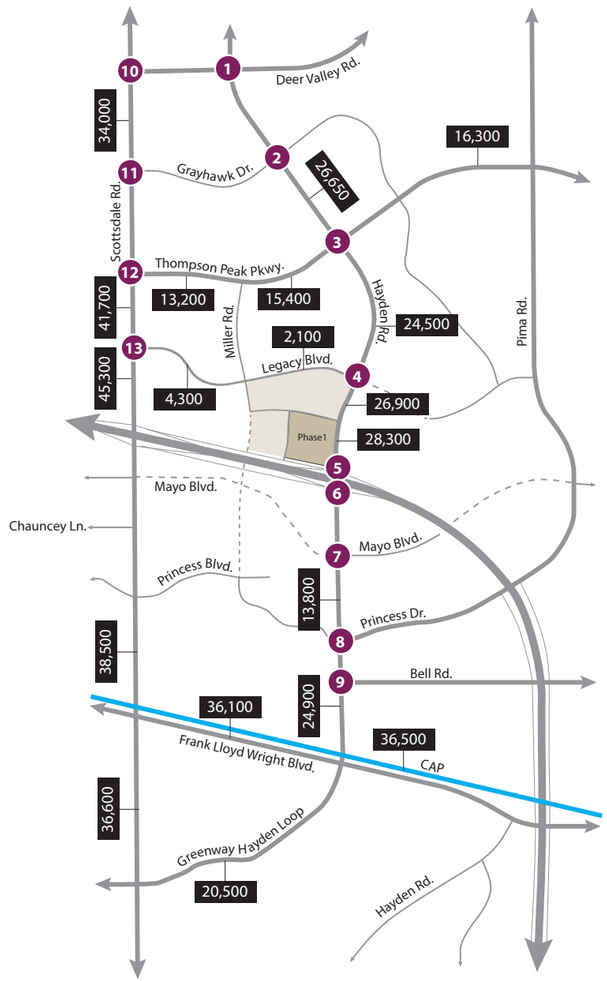
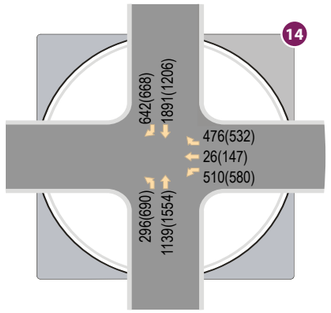
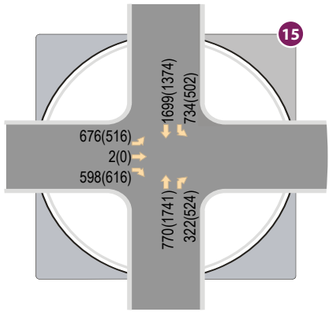


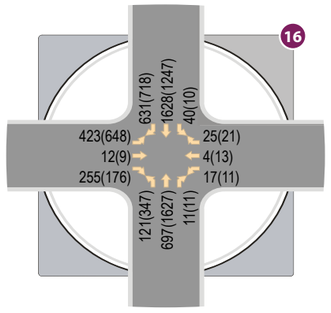
Figure 10A: 2020 Total Traffic Volumes



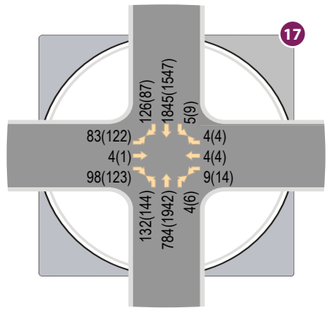
Scottsdale Rd & Loop 101 WB Ramps



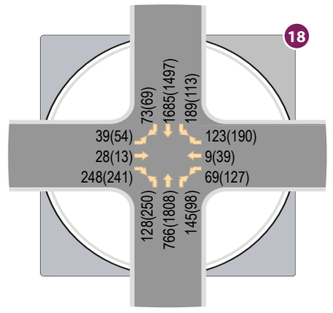
Scottsdale Rd & Loop 101 EB Ramps



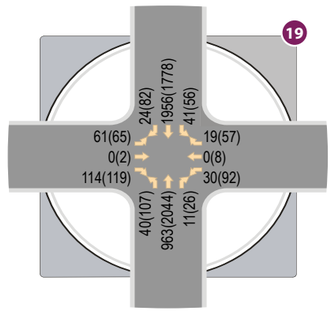
Scottsdale Rd & mayo Blvd



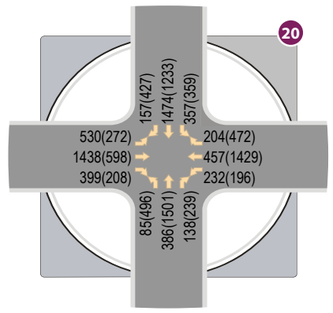
Scottsdale Rd & Chauncey Ln



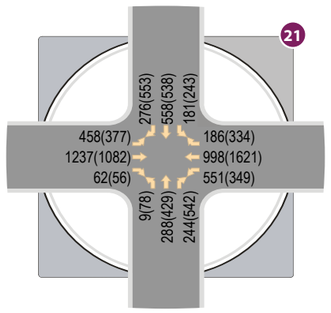
Scottsdale Rd & Peincess Blvd



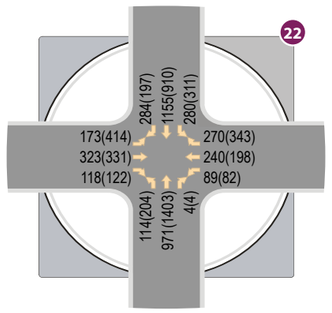
Scottsdale Rd & 17050 North



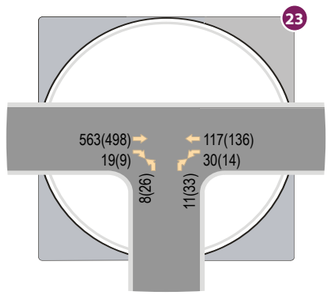
Scottsdale Rd & Frank Lloyd Wright Blvd



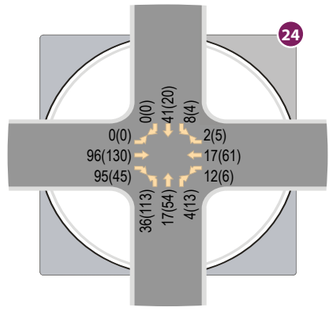
Greenway-Hayden & Frank Lloyd Wright Blvd



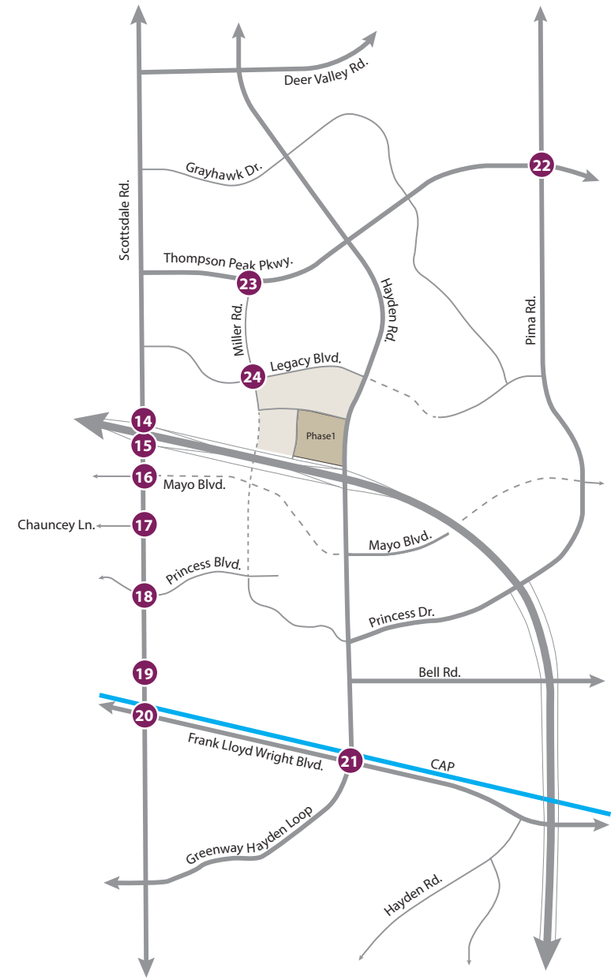
Pima Rd & Thompson Peak Pkwy



Miller Rd & Thompson Peak Pkwy



Miller Rd & Legacy Blvd

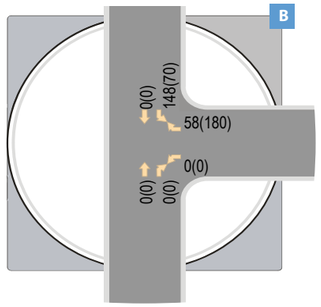


LEGEND

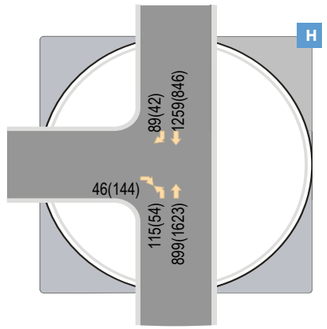
NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

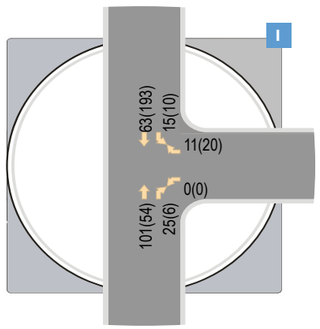
Figure 10B: 2020 Total Traffic Volumes



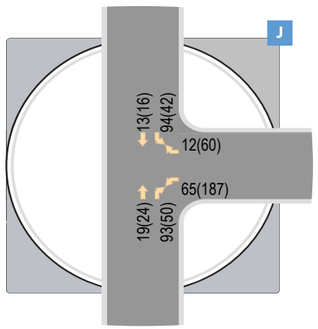
Miller Rd & Access B



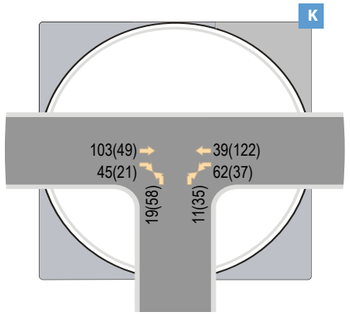
Hayden Rd & Access H



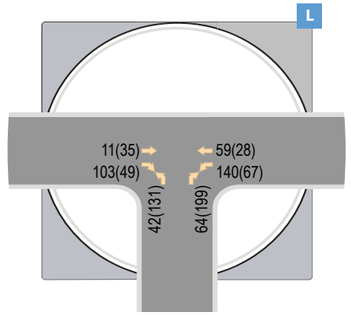
Claret Dr & Access I



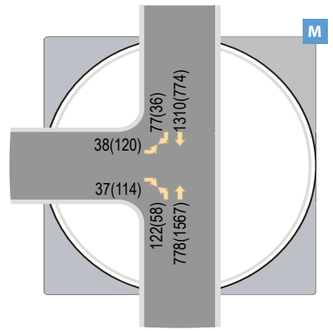
Claret Dr & Access J



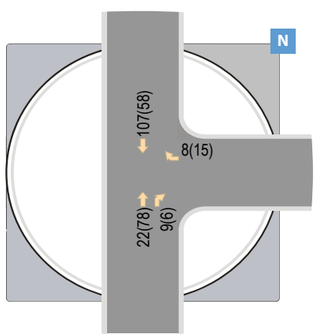
Claret Dr & Cavasson Blvd



Access L & Cavasson Blvd



Hayden Rd & Cavasson Blvd



Claret Dr. & Access N

LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

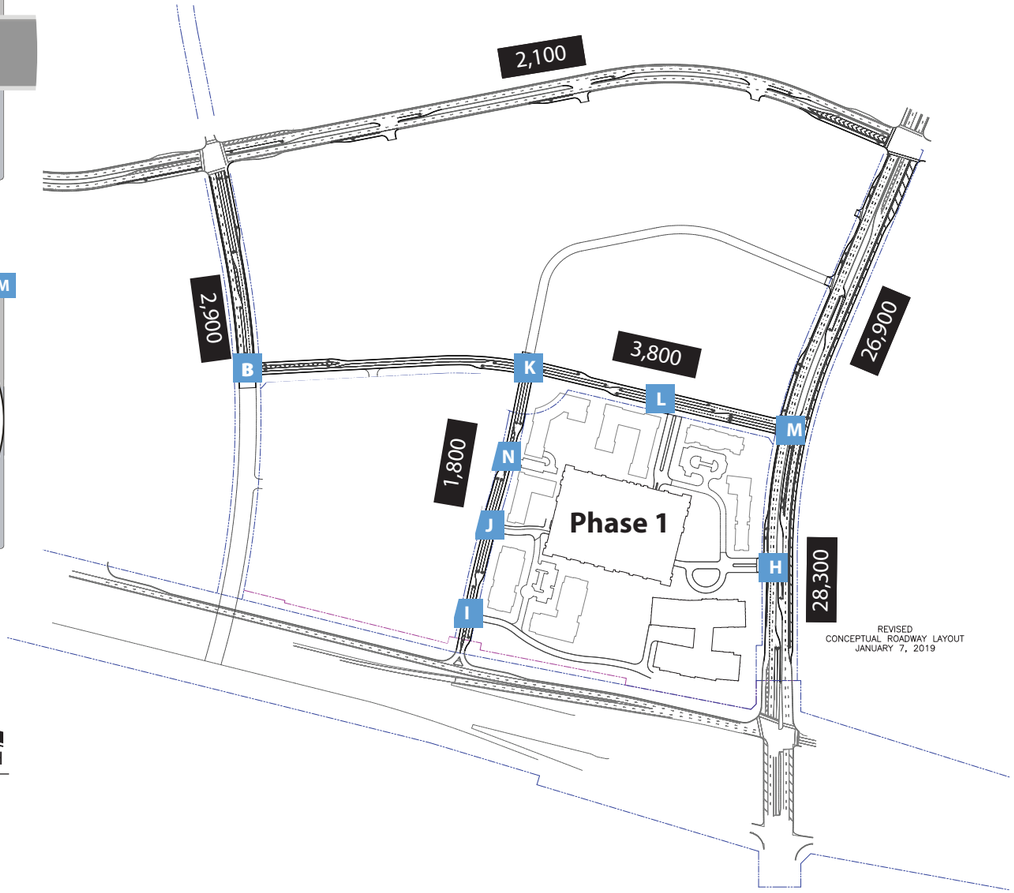
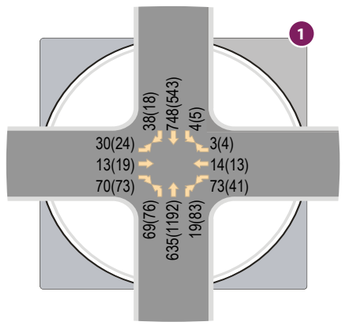
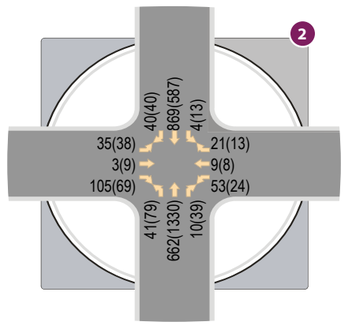


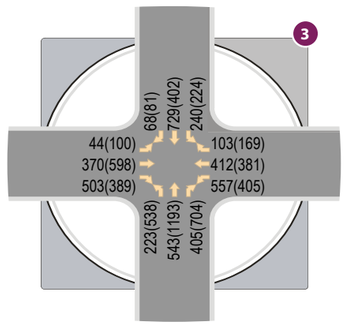
Figure 10C: 2020 Total Traffic Volumes



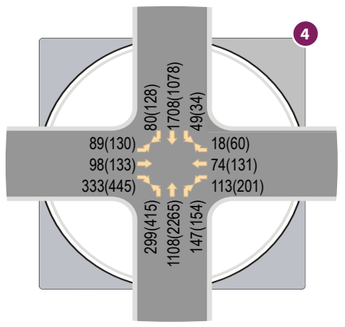
Hayden Rd & Deer Valley Rd



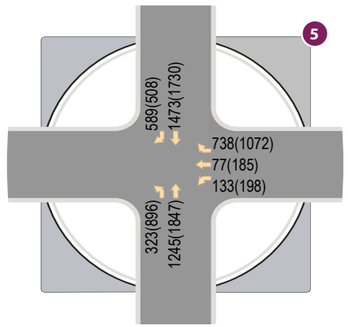
Hayden Rd & Grayhawk Dr



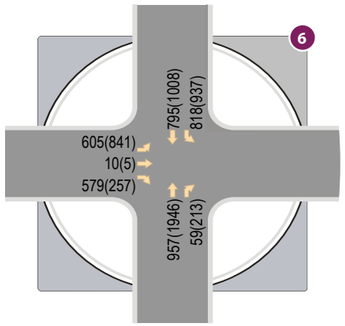
Hayden Rd & Thompson Peak Pkwy



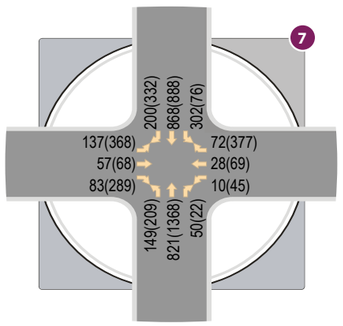
Hayden Rd & Legacy Blvd



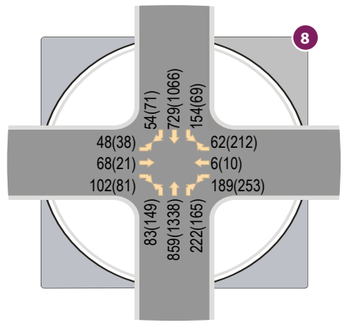
Hayden Rd & Loop 101 WB Ramps



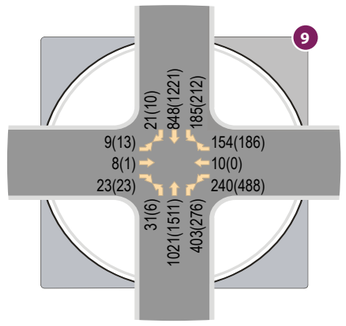
Hayden Rd & Loop 101 EB Ramps



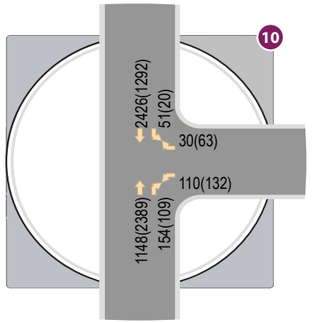
Hayden Rd & Mayo Blvd



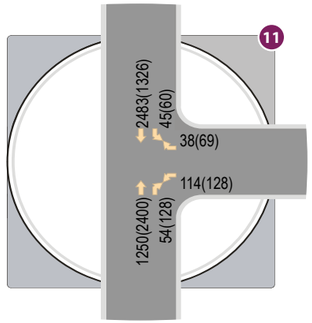
Hayden Rd & Princess Dr



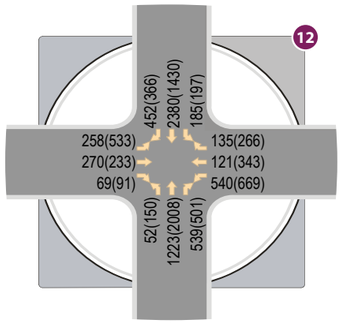
Hayden Rd & Bell Rd



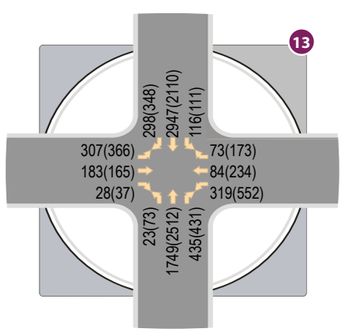
Scottsdale Rd & Deer Valley Rd



Scottsdale Rd & Grayhawk Dr



Scottsdale Rd & Thompson Peak Pkwy



Scottsdale Rd & Legacy Blvd

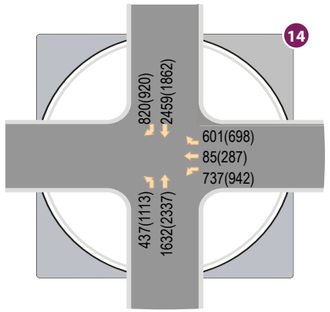
LEGEND

NORTH

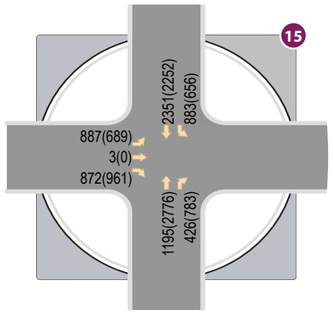
XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

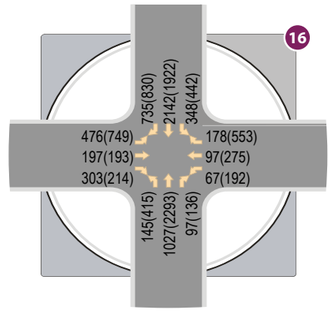
Figure 11A: 2030 Total Traffic Volumes



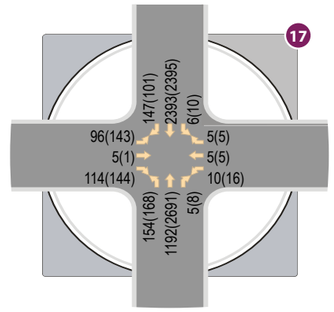
Scottsdale Rd & Loop 101 WB Ramps



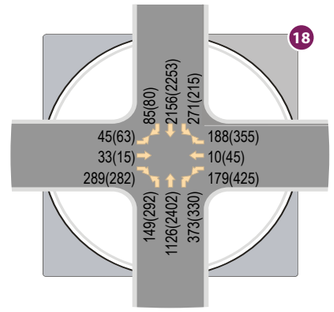
Scottsdale Rd & Loop 101 EB Ramps



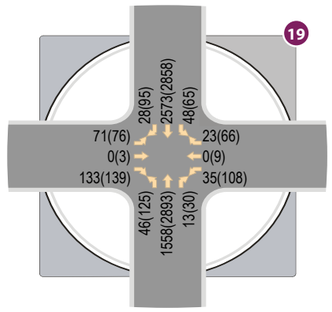
Scottsdale Rd & mayo Blvd



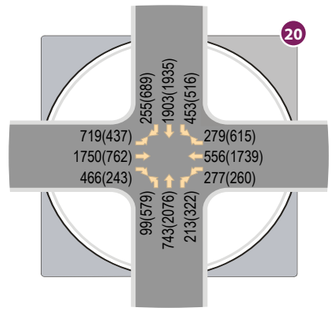
Scottsdale Rd & Chauncey Ln



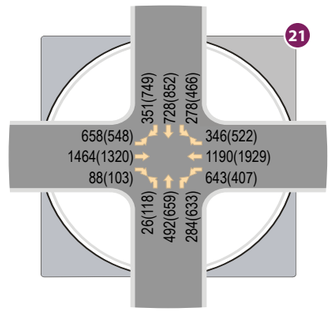
Scottsdale Rd & Peincess Blvd



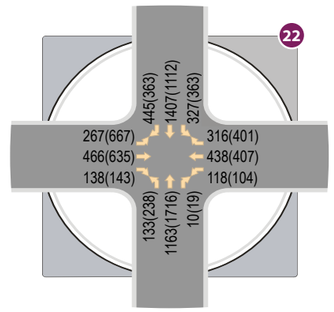
Scottsdale Rd & 17050 North



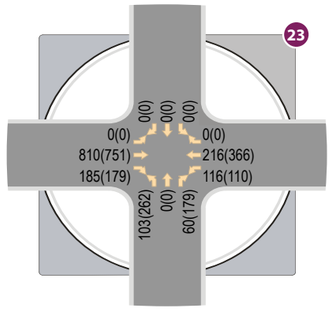
Scottsdale Rd & Frank Lloyd Wright Blvd



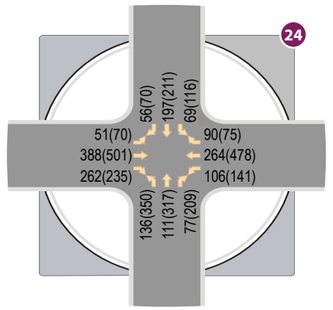
Greenway-Hayden & Frank Lloyd Wright Blvd



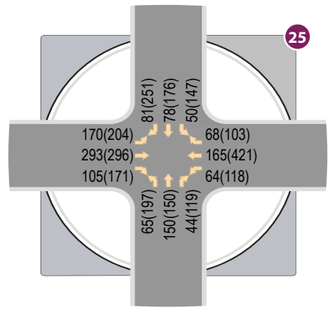
Pima Rd & Thompson Peak Pkwy



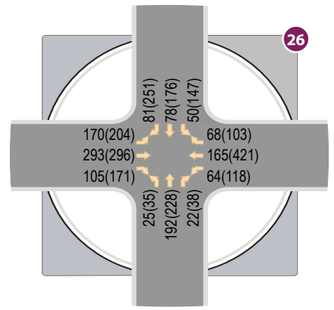
Miller Rd & Thompson Peak Pkwy



Miller Rd & Legacy Blvd



Miller Rd & Mayo Blvd



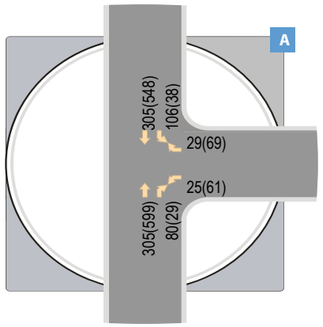
Miller Rd & Princess Dr

LEGEND

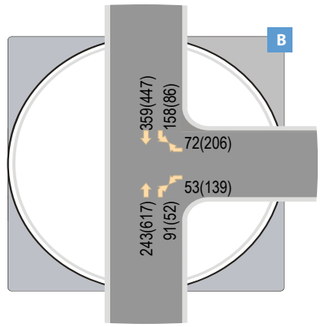
XX(XX) - AM(PM) Peak Hour Traffic Volumes

NORTH

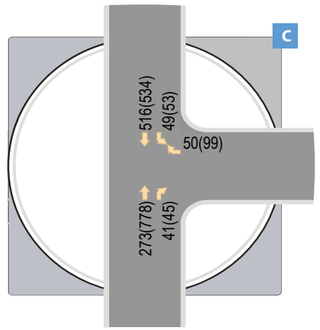
Figure 11B: 2030 Total Traffic Volumes



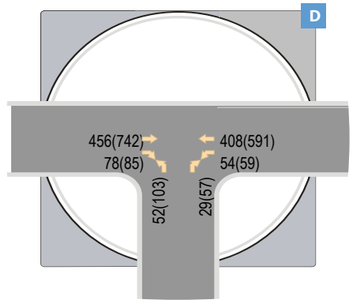
Miller Rd & Access A



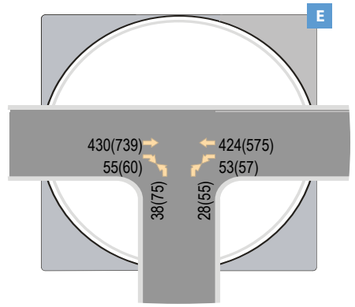
Miller Rd & Access B



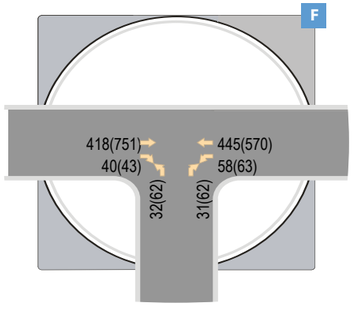
Miller Rd & Access C



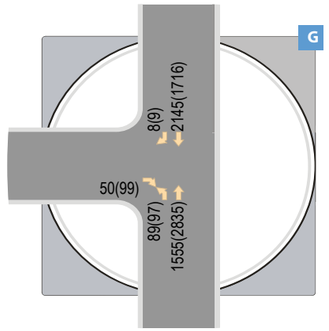
Access D & Legacy Blvd



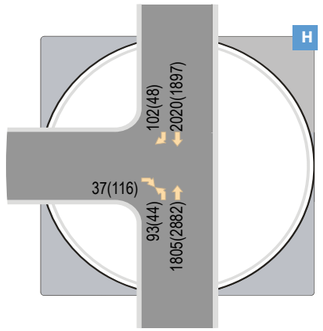
Access E & Legacy Blvd



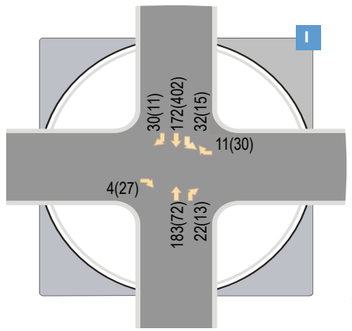
Access F & Legacy Blvd



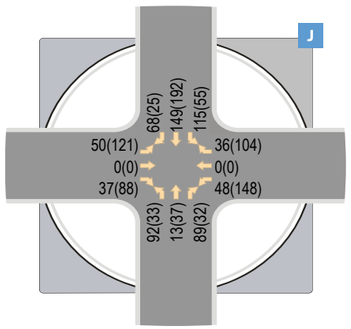
Hayden Rd & Access G



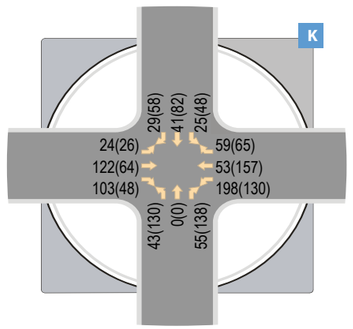
Hayden Rd & Access H



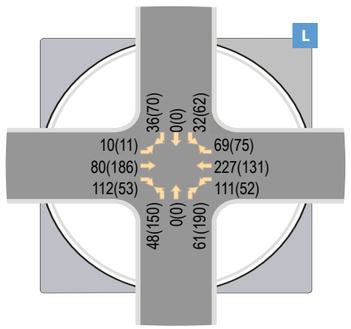
Claret Dr & Access I



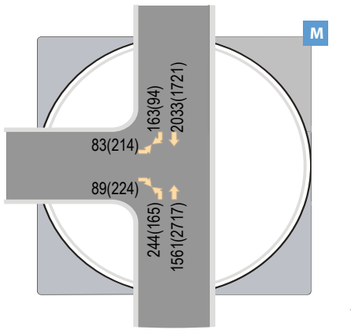
Claret Dr & Access J



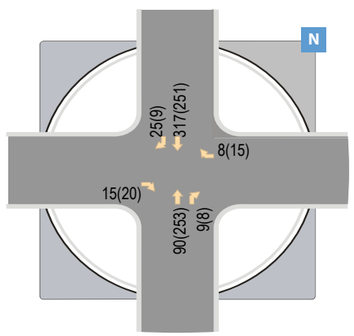
Claret Dr & Cavasson Blvd



Access L & Cavasson Blvd



Hayden Rd & Cavasson Blvd



Claret Dr. & Access N

O

Access “O” will be analyzed in more detail in future phased TIA.

LEGEND

NORTH

XX(XX) - AM(PM) Peak Hour Traffic Volumes

XX,XXX Average Daily Traffic

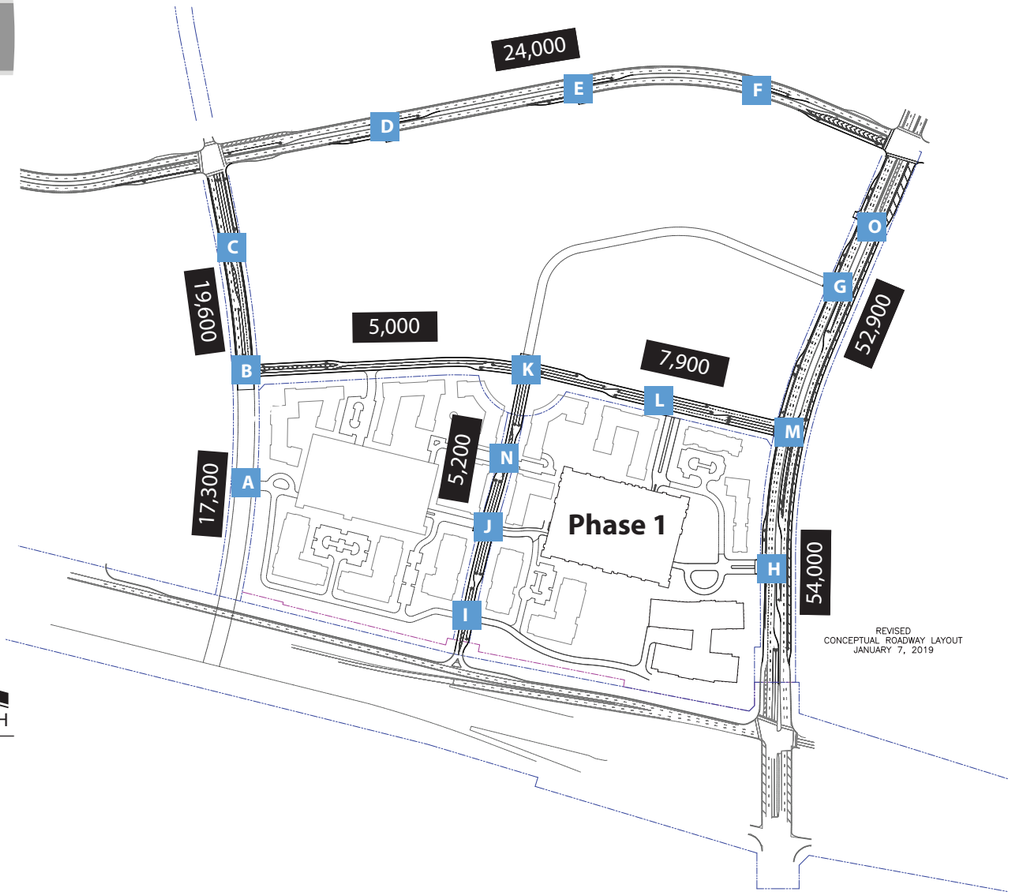


Figure 11C: 2030 Total Traffic Volumes

MILLER ROAD UNDERPASS

The Miller Road underpass of the Loop 101 is a necessary roadway connection providing additional north-south capacity to an over-saturated arterial network by horizon year 2030. The Miller Road underpass is included within the City of Scottsdale Capital Improvement Plan (CIP) to begin construction in 2020. As such, the Miller Road underpass has been analyzed to be utilized by site generated traffic from the Cavasson development and all other traffic not associated with the development by study horizon year 2030.

The total daily traffic volumes projected to use the Miller Road underpass are approximately 17,300 vehicles per day, as illustrated in **Figure 11A**. Of that traffic, CivTech estimates that approximately 13,000 vehicles per day (illustrated in **Figure 9A**), or approximately 75% are the result of background traffic. The remaining 4,300 vehicles per day (illustrated in **Figure 7A**), or 25%, are the result of the Cavasson development site generated traffic.

BIKE LANE AND MULTI-USE PATH CONSIDERATIONS

Cavasson will adhere to the City requirements for all bike lanes and multi-use paths that are depicted on the approved Scottsdale Trails System Master Plan (April 2004), Maricopa Association of Governments Regional Bike Map (2008), the Bicycle Element of the Transportation Master Plan (2018) and the Multi-Use Path Ordinance. It is also recommended that, as individual parcels come online for development, consideration be given for a multi-use path within the right-of-way along additional roadways in an effort to connect to the regional City of Scottsdale multi-use path network.

TRANSIT CONSIDERATIONS

Additional RPTA transit routes should be considered within the Cavasson development to provide access to employment areas and to assist with regional connectivity as an alternative to the automobile. It is recommended that bus stops be located along all arterial roadways within 660-feet of the major intersections. It is also recommended that bus stops be considered at all major employment and retail centers to encourage the future use of transit. Transit use could help alleviate future traffic volumes anticipated along Scottsdale Road.

INTERSECTION CAPACITY ANALYSIS

Future peak hour capacity analyses have been conducted for the study intersections. All intersections have been analyzed using the methodologies presented in the *Highway Capacity Manual (HCM), Special Report 209,* Updated 2000 and using the latest version of Synchro 10 under the HCM 2000 methodology. Levels of service criteria for signalized and unsignalized intersections are as shown earlier in **Table 1**.

Opening Year 2020

Results of the peak hour level-of-service are summarized in **Table 8** for the 2020 opening year. Worksheets for both AM and PM peak hour analyses have been included within **Appendix I** for the 2020 opening year.

Table 8 – 2020 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2020 LOS AM (PM)		
				No-Build	Build	Mitigated
1	Hayden Rd. & Deer Valley Rd.	Signal	NB	A (A)	A (A)	- (-)
			SB	A (A)	A (A)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (A)	D (D)	- (-)
			Overall	A (A)	A (A)	- (-)
2	Hayden Rd. & Grayhawk Rd.	Signal	NB	A (A)	A (A)	- (-)
			SB	A (A)	A (A)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (A)	D (D)	- (-)
			Overall	A (A)	A (A)	- (-)
3	Hayden Rd. & Thompson Peak Pkwy	Signal	NB	C (C)	C (B)	- (-)
			SB	B (C)	C (D)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (C)	D (C)	- (-)
			Overall	C (C)	D (C)	- (-)
4	Hayden Rd. & Legacy Blvd.	Signal	NB	A (A)	C (B)	- (-)
			SB	A (A)	C (C)	- (-)
			EB	C (D)	C (D)	- (-)
			WB	A (A)	D (D)	- (-)
			Overall	A (A)	C (C)	- (-)
5	Hayden Rd. & Loop 101 WB Ramps	Signal	NB	C (C)	D (**F**)	- (-)
			SB	D (D)	B (C)	- (-)
			WB	D (D)	D (**F**)	- (-)
			Overall	D (D)	C (**F**)	- (-)
6	Hayden Rd. & Loop 101 EB Ramps	Signal	NB	D (C)	C (**E**)	- (-)
			SB	B (A)	D (**F**)	- (-)
			EB	D (B)	**F** (D)	- (-)
			Overall	C (C)	**E** (**E**)	- (-)
7	Hayden Rd. & Mayo Blvd.	1-way stop (WB)	SB Left	A (B)	C (A)	- (-)
			WB Shared	A (C)	D (**F**)	- (-)

Table 8 – 2020 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2020 LOS AM (PM)		
				No-Build	Build	Mitigated
8	Hayden Rd. & Princess Dr.	Signal	NB	A (A)	A (A)	- (-)
			SB	C (A)	A (B)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	B (B)	B (B)	- (-)
9	Hayden Rd. & Bell Rd.	Signal	NB	C (B)	A (**F**)	- (-)
			SB	B (A)	A (A)	- (-)
			EB	D (D)	D (C)	- (-)
			WB	D (D)	D (**E**)	- (-)
			Overall	C (C)	B (D)	- (-)
10	Scottsdale Rd. & Deer Valley Rd.	Signal	NB	A (A)	A (C)	- (-)
			SB	A (A)	C (A)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	A (A)	B (B)	- (-)
11	Scottsdale Rd. & Grayhawk Rd.	Signal	NB	A (B)	A (B)	- (-)
			SB	A (A)	B (B)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	A (B)	B (B)	- (-)
12	Scottsdale Rd. & Thompson Peak Pkwy.	Signal	NB	A (D)	**E** (**F**)	- (-)
			SB	C (B)	**F** (D)	- (-)
			WB	D (D)	**F** (**F**)	- (-)
			Overall	C (C)	**F** (**F**)	- (-)
13	Scottsdale Rd. & Legacy Blvd.	Signal	NB	B (C)	A (**F**)	- (-)
			SB	A (A)	**F** (D)	- (-)
			WB	D (D)	**F** (**F**)	- (-)
			Overall	B (C)	**E** (**E**)	- (-)
14	Scottsdale Rd. & Loop 101 WB Ramps	Signal	NB	**F** (**F**)	**F** (**F**)	C (C)
			SB	D (D)	B (**F**)	C (D)
			WB	**E** (D)	D (**F**)	D (D)
			Overall	**E** (**F**)	D (**F**)	C (D)
15	Scottsdale Rd. & Loop 101 EB Ramps	Signal	NB	D (C)	D (**F**)	D (C)
			SB	D (**F**)	**F** (**F**)	C (C)
			EB	D (C)	**E** (**E**)	D (D)
			Overall	D (**F**)	**E** (**F**)	C (C)
16	Scottsdale Rd. & Mayo Blvd.	Signal	NB	D (**F**)	D (**F**)	C (C)
			SB	C (D)	C (D)	C (D)
			EB	D (**F**)	**F** (**F**)	D (D)
			WB	D (D)	D (**E**)	D (D)
			Overall	C (**E**)	D (**F**)	C (D)
17	Scottsdale Rd. & Chauncey Ln.	Signal	NB	A (A)	A (A)	- (-)
			SB	A (A)	A (B)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	A (A)	A (B)	- (-)

Table 8 – 2020 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2020 LOS AM (PM)		
				No-Build	Build	Mitigated
18	Scottsdale Rd. & Princess Blvd.	Signal	NB	C (A)	B (**E**)	C (B)
			SB	C (B)	**E** (D)	C (C)
			EB	D (D)	D (D)	D (D)
			WB	D (**F**)	**F** (**F**)	D (D)
			Overall	C (C)	D (**E**)	C (C)
19	Scottsdale Rd. & 17050 North	Signal	NB	B (A)	A (C)	- (-)
			SB	A (C)	A (D)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	B (C)	B (D)	- (-)
20	Scottsdale Rd. & Frank Lloyd Wright Blvd.	Signal	NB	D (**E**)	D (**F**)	D (**E**)
			SB	D (D)	**F** (**F**)	C (D)
			EB	D (**F**)	**F** (**F**)	D (D)
			WB	D (**E**)	**E** (**F**)	D (D)
			Overall	D (**E**)	**E** (**F**)	D (**E**)
21	Greenway Hayden & Frank Lloyd Blvd.	Signal	NB	D (**E**)	D (**F**)	D (D)
			SB	D (D)	D (**F**)	C (D)
			EB	D (D)	**F** (**F**)	C (D)
			WB	D (**E**)	**F** (**F**)	D (**E**)
			Overall	D (**E**)	**F** (**F**)	D (D)
22	Pima Rd. & Thompson Peak Pkwy.	Signal	NB	C (C)	D (D)	- (-)
			SB	C (D)	C (D)	- (-)
			EB	D (D)	D (**E**)	- (-)
			WB	D (D)	D (**F**)	- (-)
			Overall	C (D)	D (**E**)	- (-)
23	Miller Rd. & Thompson Peak Pkwy.	Signal	NB left	- (-)	A (B)	- (-)
			SB left	- (-)	A (A)	- (-)
			EB Left	- (-)	B (B)	- (-)
			WB Left	- (-)	B (B)	- (-)
			Overall	- (-)	B (B)	
24	Miller Rd. & Legacy Blvd.	All-way stop	NB left	- (-)	D (D)	- (-)
			SB left	- (-)	D (D)	- (-)
			EB Left	- (-)	C (C)	- (-)
			WB Left	- (-)	B (D)	- (-)
25	Miller Rd. & Union Hills Dr.	All-way stop	NB	- (-)	A (B)	- (-)
			SB	- (-)	A (B)	- (-)
			EB	- (-)	A (B)	- (-)
			WB	- (-)	A (C)	- (-)
26	Miller Rd. & Princess Dr.	All-way stop	NB	- (-)	A (A)	- (-)
			SB	- (-)	A (B)	- (-)
			EB	- (-)	A (B)	- (-)
			WB	- (-)	A (B)	- (-)
A	Miller Rd. & Access A	1-way stop (WB)	SB Left	- (-)	A (A)	- (-)
			WB Left	- (-)	C (D)	- (-)
			WB Right	- (-)	A (B)	- (-)

Table 8 – 2020 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2020 LOS AM (PM)		
				No-Build	Build	Mitigated
B	Miller Rd. & Access B	1-way stop (WB)	SB Left	- (-)	A (A)	- (-)
			WB Left	- (-)	C (C)	- (-)
			WB Right	- (-)	C (**E**)	- (-)
C	Miller Rd. & Access C	1-way stop (WB)	NB	- (-)	A (A)	- (-)
			SB	- (-)	A (A)	- (-)
			WB	- (-)	A (B)	- (-)
D	Access D & Legacy Blvd.	1-way stop (NB)	NB	- (-)	C (**F**)	- (-)
			EB	- (-)	A (A)	- (-)
			WB	- (-)	A (A)	- (-)
E	Access E & Legacy Blvd.	1-way stop (NB)	NB	- (-)	C (**F**)	- (-)
			EB	- (-)	A (A)	- (-)
			WB	- (-)	A (B)	- (-)
F	Access F & Legacy Blvd.	1-way stop (NB)	NB	**- (-)**	C (**F**)	- (-)
			EB	- (-)	A (A)	- (-)
			WB	- (-)	A (B)	- (-)
G	Hayden Rd. & Access G	1-way stop (EB)	NB	- (-)	C (C)	- (-)
			SB	- (-)	A (A)	- (-)
			EB	- (-)	B (A)	- (-)
H	Hayden Rd. & Access H	1-way stop (EB)	NB Left	- (-)	C (C)	- (-)
			EB Right	- (-)	A (A)	- (-)
I	Claret Dr. & Access I	2-way stop (EB/WB)	SB	- (-)	A (A)	- (-)
			EB	- (-)	A (B)	- (-)
			WB	- (-)	A (A)	- (-)
J	Claret Dr. & Access J	2-way stop (EB/WB)	SB	- (-)	A (A)	- (-)
			EB	- (-)	B (B)	- (-)
			WB	- (-)	B (C)	- (-)
K	Access K & Cavasson Blvd.	1-way stop (NB)	NB Left	- (-)	B (A)	- (-)
			NB Right	- (-)	B (A)	- (-)
			WB Left	- (-)	A (A)	- (-)
L	Access L & Cavasson Blvd.	2-way stop (NB/SB)	NB Left	- (-)	C (C)	- (-)
			NB Right	- (-)	A (B)	- (-)
			WB Left	- (-)	A (A)	- (-)
M	Hayden Rd. & Cavasson Blvd.	Signal	NB Left	- (-)	C (D)	- (-)
			EB left	- (-)	D (D)	- (-)
			EB Right	- (-)	D (D)	- (-)
			Overall	- (-)	B (B)	- (-)

All 2020 study intersections operate with an overall acceptable level of service (LOS D or better) during the AM and PM peak hours under the existing lane configurations and stop controls with the exception of the following locations:

It should be noted the Scottsdale Road/Loop 101 Ramps functions as a diamond traffic interchange with both signalized intersections functioning together as one. Any signal phasing mitigation at one signal directly affects the other. All recommended signal mitigation herein considers the timing/delay for both signals at the diamond interchange.

The intersection of **Scottsdale Road and the Loop 101 Ramps** is projected to experience increased heavy delay by opening year 2020 with or without the proposed

Cavasson Phase I development during the study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030, scenario the recommended mitigation and reported delays herein are for the build scenario which includes the proposed Phase I development. It is recommended signalize timing be optimized as well as signal phasing. With signal timing and phasing optimization, the overall intersection delay is expected to improve 33.5-seconds in the AM, 40.0-seconds in the PM peak for the westbound ramps and 27.1-seconds in the AM, 28.2-seconds in the PM peak for the eastbound ramps with the proposed Phase I development.

*It is recommended that any and all recommended improvements for the **Scottsdale Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*

The intersection of **Scottsdale Road and Mayo Boulevard** is projected to experience heavy delay in the PM peak by opening year 2020 with or without the proposed Cavasson Phase I development. Overall the projected intersection delay is expected to be 82.7-seconds in the PM peak hour under the total 2020 build condition. It is therefore recommended all right-turn lanes provide overlap phases as well as optimizing pedestrian signal timing in the westbound approach by opening year 2020. With these improvements, the overall delay at the intersection is projected to decrease from 82.7-seconds to 38.1-seconds in the PM peak hour with the proposed Phase I development.

The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** is projected to experience heavy delay by opening year 2020 with or without the proposed Phase I development. Under the No-Build 2020 scenario, this intersection is expected to experience heavy delays during the PM peak hour only. Overall, the projected intersection delay is expected to be 71.7-seconds in the PM peak hour with the proposed Cavasson Phase I development. It is recommended all right-turn lanes provide overlap phases as well as a dedicated southbound right-turn lane. With the recommended mitigation the overall intersection delay is projected to improve from 71.7-seconds to 55.5-seconds with the proposed Phase I development during the PM peak hour.

The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** is projected to experience heavy delays by opening year 2020 with or without the proposed Cavasson Phase I development. Under the No-Build 2020, scenario this intersection experiences heavy delay during the PM peak hour only. Overall, the projected 2020 Build, intersection delay is expected to be 71.7-seconds during the PM peak hour which includes the proposed Cavasson Phase I development. It is recommended signal timing be optimized and all right-turn lanes provided overlap phases. With the recommended mitigated signal timing, the overall intersection delay is projected to decrease from 71.7-seconds to 53.9-seconds with the proposed Phase I development during the PM peak hour.

The proposed intersection of **Hayden Road and Cavasson Boulevard** is anticipated to be signalized upon completion of the Phase I development. It is recommended that additional pavement be provided for a future through lane east/west for connectivity to the east. By opening year 2020 a single 300-foot northbound left-turn lane is warranted, as well as a single 200-foot left-turn and right-turn lanes eastbound. Additional pavement will be provided and striped out for the proposed future ultimate lanes.

Horizon Year 2030

Results of the peak hour level-of-service are summarized in **Table 9** for the 2030 horizon year. Worksheets for both AM and PM peak hour analyses have been included within **Appendix J** for the 2030 horizon year. Please note it was assumed Crossroads East would be approximately 50% built-out and all the surrounding developments within the area such as the Paradise Ridge Planning Area would be built-out as well.

Table 9 – 2030 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2030 LOS AM (PM)		
				No-Build	Build	Mitigated
1	Hayden Rd. & Deer Valley Rd.	Signal	NB	A (A)	A (A)	- (-)
			SB	A (A)	A (A)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	A (A)	A (A)	- (-)
2	Hayden Rd. & Grayhawk Rd.	Signal	NB	A (A)	A (A)	- (-)
			SB	A (A)	A (A)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	A (A)	A (A)	- (-)
3	Hayden Rd. & Thompson Peak Pkwy	Signal	NB	B (B)	C (B)	- (-)
			SB	C (D)	C (D)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	C (C)	D (C)	- (-)
			Overall	C (C)	D (C)	- (-)
4	Hayden Rd. & Legacy Blvd.	Signal	NB	C (A)	C (B)	- (-)
			SB	B (C)	C (C)	- (-)
			EB	D (C)	C (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	C (B)	C (C)	- (-)
5	Hayden Rd. & Loop 101 WB Ramps	Signal	NB	B (D)	C (**F**)	C (**F**)
			SB	B (D)	D (C)	D (C)
			WB	C (**E**)	D (**F**)	D (**F**)
			Overall	B (D)	C (**F**)	C (**F**)
6	Hayden Rd. & Loop 101 EB Ramps	Signal	NB	D (D)	D (D)	C (**E**)
			SB	B (C)	B (**E**)	B (**F**)
			EB	B (D)	C (C)	C (D)
			Overall	C (D)	C (**E**)	C (**E**)
7	Hayden Rd. & Mayo Blvd.	Signal	NB	B (B)	B (D)	- (-)
			SB	A (A)	B (A)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (**E**)	D (**F**)	- (-)
			Overall	B (C)	B (D)	- (-)
8	Hayden Rd. & Princess Dr.	Signal	NB	A (A)	A (A)	- (-)
			SB	A (A)	A (B)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	B (B)	B (B)	- (-)

Table 9 – 2030 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2030 LOS AM (PM)		
				No-Build	Build	Mitigated
9	Hayden Rd. & Bell Rd.	Signal	NB	A (C)	A (D)	- (-)
			SB	A (A)	B (B)	- (-)
			EB	D (C)	D (C)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	B (C)	B (D)	- (-)
10	Scottsdale Rd. & Deer Valley Rd.	Signal	NB	A (B)	A (B)	- (-)
			SB	B (A)	C (A)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	B (B)	B (B)	- (-)
11	Scottsdale Rd. & Grayhawk Rd.	Signal	NB	A (B)	B (B)	- (-)
			EB	A (B)	B (B)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	A (B)	B (B)	- (-)
12	Scottsdale Rd. & Thompson Peak Pkwy.	Signal	NB	D (D)	D (**E**)	B (**F**)
			SB	**F** (D)	**F** (D)	**F** (D)
			EB	D (D)	D (**E**)	D (**E**)
			WB	**F** (**F**)	**F** (**F**)	**E** (**F**)
			Overall	**F** (**D**)	**F** (**E**)	**E** (**F**)
13	Scottsdale Rd. & Legacy Blvd.	Signal	NB	B (D)	C (**F**)	A (**E**)
			SB	**E** (B)	**F** (C)	**E** (D)
			EB	**E** (D)	**E** (**E**)	**E** (D)
			WB	**E** (**F**)	**F** (D)	**F** (**F**)
			Overall	D (D)	**E** (**E**)	**E** (**E**)
14	Scottsdale Rd. & Loop 101 WB Ramps	Signal	NB	D (**E**)	**E** (**F**)	**F** (**F**)
			SB	C (D)	D (**F**)	B (**F**)
			WB	D (**F**)	D (**F**)	D (**F**)
			Overall	D (**E**)	D (**F**)	D (**F**)
15	Scottsdale Rd. & Loop 101 EB Ramps	Signal	NB	C (B)	C (**F**)	D (**F**)
			SB	C (**F**)	**E** (**F**)	**F** (**F**)
			EB	**E** (**E**)	**F** (**F**)	**E** (**F**)
			Overall	D (D)	**E** (**F**)	**E** (**F**)
16	Scottsdale Rd. & Mayo Blvd.	Signal	NB	C (**F**)	D (**F**)	D (**F**)
			SB	C (**F**)	C (C)	C (C)
			EB	D (D)	**F** (**F**)	**F** (**F**)
			WB	D (**F**)	D (**E**)	D (**E**)
			Overall	D (**F**)	D (**F**)	D (**F**)
17	Scottsdale Rd. & Chauncey Ln.	Signal	NB	B (A)	B (A)	- (-)
			SB	A (A)	A (A)	- (-)
			EB	D (D)	D (D)	- (-)
			WB	D (D)	D (D)	- (-)
			Overall	A (B)	A (B)	- (-)
18	Scottsdale Rd. & Princess Blvd.	Signal	NB	C (**E**)	C (C)	B (**F**)
			SB	D (D)	**E** (C)	B (**E**)
			EB	D (D)	D (D)	**E** (D)
			WB	D (**F**)	**F** (**F**)	D (**E**)
			Overall	D (**F**)	D (**E**)	B (**F**)

Table 9 – 2030 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2030 LOS AM (PM)		
				No-Build	Build	Mitigated
19	Scottsdale Rd. & 17050 North	Signal	NB	A (B)	A (B)	A (B)
			SB	A (B)	A (C)	A (C)
			EB	D (D)	D (**E**)	D (**E**)
			WB	D (D)	D (**F**)	D (**F**)
			Overall	A (B)	A (D)	A (D)
20	Scottsdale Rd. & Frank Lloyd Wright Blvd.	Signal	NB	D (**F**)	D (**F**)	D (**F**)
			SB	**E** (**F**)	**E** (**F**)	**E** (**F**)
			EB	**E** (**F**)	**F** (**F**)	**F** (**F**)
			WB	**E** (**F**)	**E** (**F**)	**E** (**F**)
			Overall	**F** (**F**)	**F** (**F**)	**E** (**F**)
21	Greenway Hayden & Frank Lloyd Blvd.	Signal	NB	D (**F**)	D (**F**)	D (**F**)
			SB	C (**F**)	C (**F**)	C (**F**)
			EB	**F** (**F**)	**F** (**F**)	**F** (**E**)
			WB	**F** (**F**)	**F** (**F**)	**F** (**F**)
			Overall	**F** (**F**)	**F** (**F**)	**F** (**F**)
22	Pima Rd. & Thompson Peak Pkwy.	Signal	NB	D (**E**)	D (**E**)	D (D)
			SB	C (D)	D (D)	C (C)
			EB	D (D)	D (D)	D (**F**)
			WB	D (**E**)	D (**F**)	D (**E**)
			Overall	D (D)	D (**E**)	D (**F**)
23	Miller Rd. & Thompson Peak Pkwy.	Signal	NB left	A (A)	A (B)	- (-)
			SB left	A (A)	A (A)	- (-)
			EB Left	B (B)	B (B)	- (-)
			WB Left	B (B)	B (B)	- (-)
			Overall	B (B)	B (B)	- (-)
24	Miller Rd. & Legacy Blvd.	Signal	NB	C (C)	D (D)	- (-)
			SB	C (C)	D (D)	- (-)
			EB	C (C)	B (D)	- (-)
			WB	C (B)	B (C)	- (-)
			Overall	C (C)	C (D)	- (-)
26	Miller Rd. & Princess Dr.	Roundabout	NB Left	A (A)	A (A)	- (-)
			SB Left	A (A)	A (B)	- (-)
			WB Left	A (A)	A (B)	- (-)
A	Miller Rd. & Access A	1-way stop (WB)	SB Left	- (-)	A (A)	- (-)
			WB Left	- (-)	C (D)	- (-)
B	Miller Rd. & Access B	Signal	NB	- (-)	A (A)	- (-)
			SB	- (-)	A (A)	- (-)
			WB	- (-)	C (D)	- (-)
			Overall	- (-)	A (B)	- (-)
C	Miller Rd. & Access C	1-way stop (WB)	SB Left	- (-)	A (A)	- (-)
			WB Right	- (-)	A (B)	- (-)
D	Access D & Legacy Blvd.	1-way stop (NB)	NB Left	- (-)	C (**F**)	- (-)
			NB Right	- (-)	A (A)	- (-)
			WB Left	- (-)	A (A)	- (-)

Table 9 – 2030 Peak Hour Levels of Service

ID	Intersection	Stop Control	Approach	2030 LOS AM (PM)		
				No-Build	Build	Mitigated
E	Access E & Legacy Blvd.	1-way stop (NB)	NB Left	- (-)	C (**F**)	- (-)
			NB Right	- (-)	A (B)	- (-)
			WB Left	- (-)	A (B)	- (-)
F	Access F & Legacy Blvd.	1-way stop (NB)	NB Left	- (-)	C (**F**)	- (-)
			NB Right	- (-)	B (B)	- (-)
			WB Left	- (-)	A (B)	- (-)
G	Hayden Rd. & Access G	1-way stop (EB)	NB Left	- (-)	C (C)	- (-)
			EB Left	- (-)	B (A)	- (-)
H	Hayden Rd. & Access H	1-way stop (EB)	NB Left	- (-)	C (C)	- (-)
			EB Left	- (-)	A (A)	- (-)
I	Claret Dr. & Access I	2-way stop (EB/WB)	NB Left	- (-)	A (A)	- (-)
			SB Left	- (-)	A (A)	- (-)
			EB Left	- (-)	A (B)	- (-)
			EB Shared	- (-)	A (B)	- (-)
			WB Left	- (-)	A (A)	- (-)
			WB Shared	- (-)	A (A)	- (-)
J	Claret Dr. & Access J	2-way stop (EB/WB)	NB Left	- (-)	A (A)	- (-)
			SB Left	- (-)	A (A)	- (-)
			EB Left	- (-)	B (B)	- (-)
			EB Shared	- (-)	B (B)	- (-)
			WB Left	- (-)	B (C)	- (-)
			WB Shared	- (-)	B (C)	- (-)
K	Claret Dr./Access K & Cavasson Blvd.	Signal	NB	- (-)	B (A)	- (-)
			SB	- (-)	B (A)	- (-)
			EB	- (-)	A (A)	- (-)
			WB	- (-)	A (B)	- (-)
			Overall	- (-)	A (A)	- (-)
L	Access L & Cavasson Blvd.	2-way stop (NB/SB)	NB Left	- (-)	C (C)	- (-)
			NB Right	- (-)	B (B)	- (-)
			SB Left	- (-)	C (C)	- (-)
			SB Right	- (-)	A (A)	- (-)
			EB Left	- (-)	A (A)	- (-)
			WB Left	- (-)	A (A)	- (-)
M	Hayden Rd. & Cavasson Blvd.	Signal	NB	- (-)	A (B)	- (-)
			SB	- (-)	C (C)	- (-)
			EB	- (-)	D (D)	- (-)
			Overall	- (-)	B (B)	- (-)

All 2030 study intersections operate with an overall acceptable level of service (LOS C or better) during the AM and PM peak hours under the proposed lane configurations and stop controls with the exception of the following locations:

The intersection of **Hayden Road and Legacy Boulevard** is projected to experience delay during both AM and PM peak hours with or without the addition of Cavasson development by horizon year 2030. It should be noted this intersection was analyzed as a four-legged intersection by horizon year 2030. It is expected Legacy Boulevard will

be constructed to the east of Hayden Road and connect to Pima Road by horizon year 2030. Due to the projected heavy traffic volumes on Hayden Road by horizon year 2030 three (3) through lanes northbound and three (3) through lanes southbound are recommended as well as dual northbound left-turn lanes. To remain consistent with the four (4) lane cross section on Legacy Boulevard two (2) through lanes are recommended to be constructed in the eastbound and westbound approaches. All left-turn phases are recommended to be protected/permissive with the exception of the dual northbound left-turn lanes which will be required to be protected. With the recommended signal modifications, the intersection delay is expected to decrease to 24.0-seconds in the AM peak hour, and 22.7-seconds during the PM peak hour.

It should be noted the Hayden Road/Loop 101 Ramps and the Scottsdale Road/Loop 101 Ramps both function as diamond traffic interchanges with both signalized intersections at each interchange functioning together as one. Any signal phasing mitigation at one signal directly affects the other. All recommended signal mitigation herein considers the timing/delay for both signals at each diamond interchange.

The intersection of **Hayden Road and the Loop 101 Ramps** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. Under the No-Build 2030 scenario, this intersection experiences increased delay in both study peak hours. Overall, the PM peak hour at both ramps signals experiences the most delay of the two study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030 scenario, the recommended mitigation and reported delays herein are for the build scenario which includes the Cavasson development. It is recommended the cycle length for both signalized ramps be optimized to achieve optimal levels of service for the intersection by horizon year 2030. Overall the projected intersection delay is expected to be around 97.1-seconds for the westbound ramps and 72.5-seconds for the eastbound ramps during the PM peak hour with the proposed Cavasson development.

*It is recommended that any and all recommended improvements for the **Hayden Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*

The intersection of **Scottsdale Road and the Loop 101 Ramps** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. Under the No-Build 2030 scenario, this intersection experiences increased delay in both study peak hours. Overall, the PM peak hour at both ramps signals experiences the most delay of the two study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030 scenario, the recommended mitigation and reported delays herein are for the build scenario which includes the Cavasson development. It is recommended the cycle length for both signalized ramps be optimized to achieve optimal levels of service for each approach. Overall the projected intersection delay is expected to be 191.5-seconds for the westbound ramps and 85.2-seconds for the eastbound ramps in the PM peak hour with the Cavasson development.

*It is recommended that any and all recommended improvements for the **Scottsdale Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*

The intersection of **Scottsdale Road and Thompson Peak Parkway** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. It should be noted this intersection was analyzed as a four-legged intersection with the assumption that Thompson Peak Parkway will be constructed to the west of Scottsdale Road and connect to 56th Street by horizon year 2030. Under the No-Build 2030 scenario, this intersection experiences heavy delay in both study peak hours. Overall, the intersection delay is projected to be 140.3-seconds in the AM peak hour and 51.9-seconds in the PM peak hour under the 2030 No-Build scenario. With the addition of the Cavasson development, the intersection is expected to experience delays of 142.3-seconds in the AM peak hour, and 84.8-seconds in the PM peak hour. To help mitigate this intersection, it is recommended signal phasing and green times be optimized as well as add in overlap right-turn phasing. Signal progression for the north/south through movements should be optimized as well. With the recommended mitigation, the overall intersection delay will be 66.3-seconds in the AM peak hour, and 62.8-seconds during the PM peak hour.

The intersection of **Scottsdale Road and Legacy Boulevard** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. It should be noted this intersection was analyzed as a four-legged intersection by horizon year 2030. It is expected Legacy Boulevard will be constructed to the west of Scottsdale Road and connect to 56th Street by horizon year 2030. This intersection experiences heavy delay under the 2030 No-Build condition for both study peak hours. Overall, the intersection delay under the 2030 No-Build condition is projected to be 47.2-seconds in the AM peak hour and 38.5-seconds in the PM peak hour. With the addition of the proposed Cavasson development, the intersection delay is expected to increase to 78.2-seonds in the AM peak hour, and 75.6-seconds in the PM peak hour. It is, recommended to optimize the signal timing and add in overlap phasing to all right-turn lanes. With the recommended mitigation the intersection delay is expected be 60.4-seconds in the AM peak hour, and 71.2-seconds in the PM peak hour.

The intersection of **Scottsdale Road and Mayo Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. The heavy northbound and southbound movements conflict with the anticipated heavy eastbound movements. Signal optimization should occur with future signal progression plans for Scottsdale Road. It is therefore recommended this intersection be monitored for optimal signal timing and corridor progression due to the proximality of the existing Loop 101 traffic interchange.

The intersection of **Scottsdale Road and Princess Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development during the PM peak hour. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.

The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed

Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.

The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.

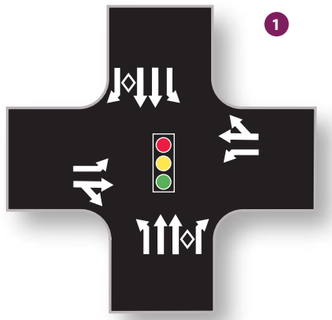
The intersection of **Pima Road and Thompson Peak Parkway** is projected to experience heavy delays by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.

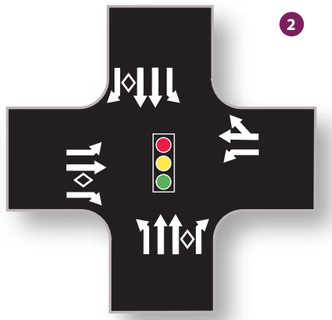
The intersection of **Miller Road and Legacy Boulevard** is projected to be signalized by study horizon year 2020. With future traffic anticipated by the Miller Road connection to the south and with additional traffic anticipated by currently unknown surrounding developments, it is recommended that dual northbound left-turn lanes be provided as well as a dedicated northbound right-turn lane by horizon year 2020.

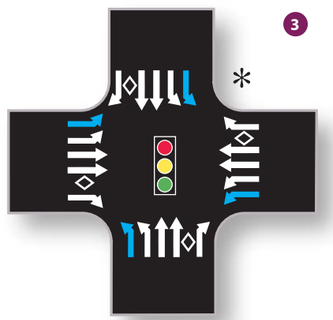
The proposed internal site intersection of **Claret Drive and Cavasson Boulevard** is anticipated to be a signalized as the surrounding area develops. Exclusive left-turn lanes and dedicated right-turn lanes should be provided in all approaches. Signal warrants will be evaluated with future phases of the Cavasson development.

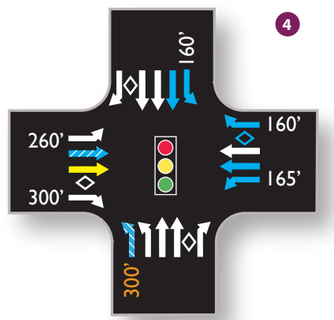
The proposed intersection of **Miller Road and Cavasson Boulevard** is anticipated to be signalized as the surrounding area develops. Exclusive left-turn lanes and dedicated right-turn lanes in all approaches are recommended. With the possible future connectivity to the west, it is recommended that additional right of way is provided for future through lanes eastbound and westbound. Signal warrants will be evaluated with future phases of the Cavasson development.

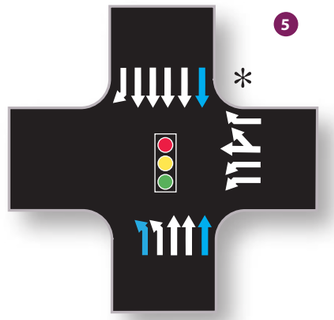
The proposed intersection of **Hayden Road and Cavasson Boulevard** is anticipated to be signalized upon completion of the Phase I development. It is recommended that right of way be provided for a future through lane east/west to provide connectivity to the east. By the opening year 2020, a single 300-foot northbound left-turn lane is warranted, as well as a single 200-foot left-turn and right-turn lanes eastbound. Additional right-of-way will be provided and striped out for the proposed future lanes required for an acceptable level of service.

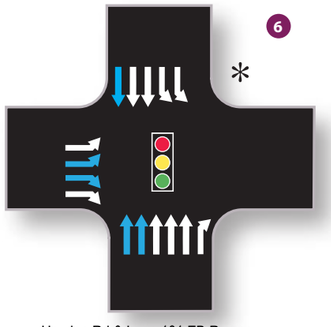


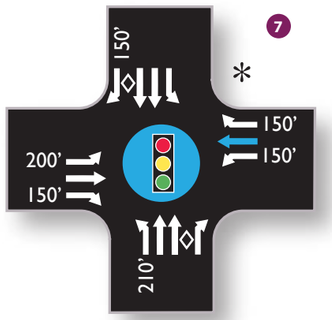


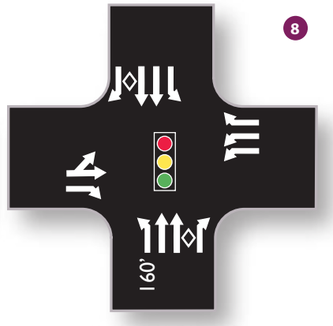


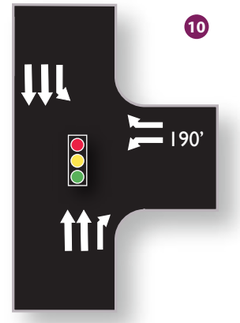


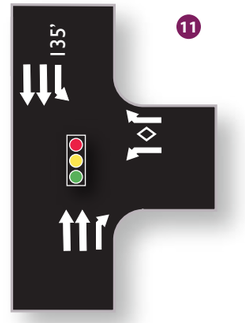


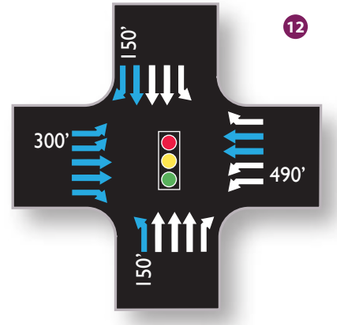


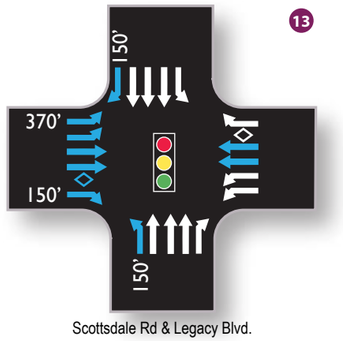


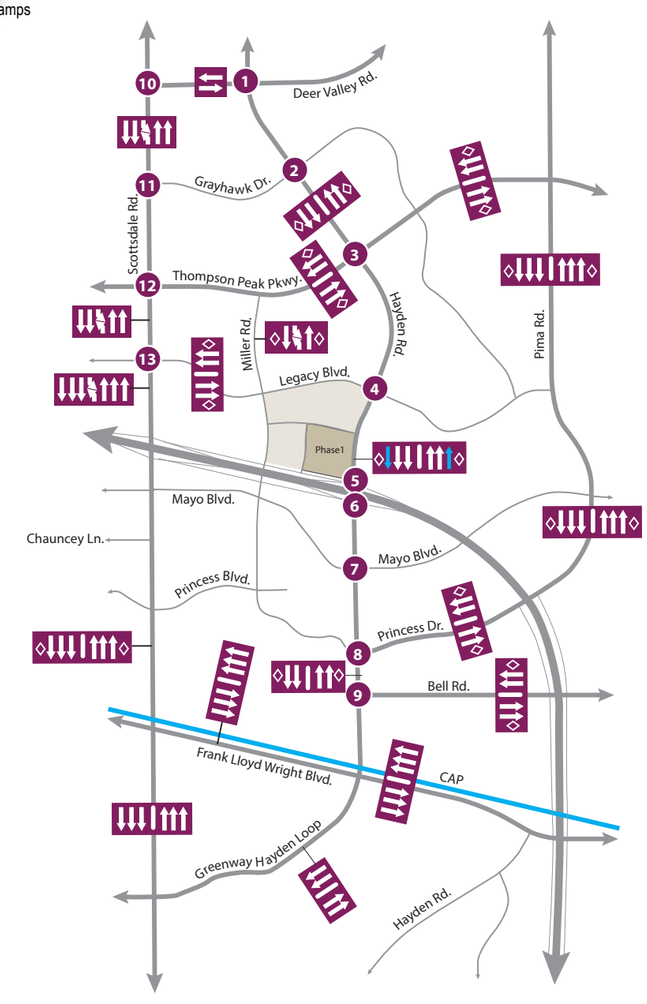










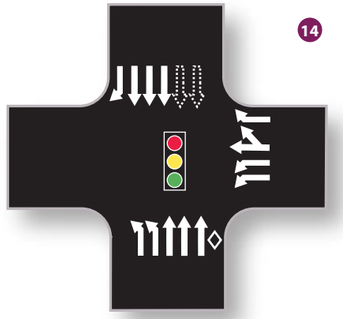


LEGEND

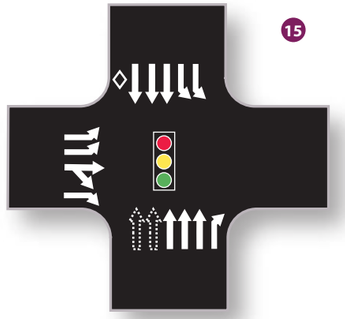
- Thru or Turning Movement
- Two-Way Left Turn-Lane
- Raised Median
- Bike Lane
- Traffic Signal
- Stop Sign
- Speed Limit
- NORTH
- Improvements by 2020
- Improvements by 2030
- Developers Responsibility
- Signal Warrants will be Analyzed in Future Phases
- XXX Total Queue by Developer
- XXX Total Extended Queue by Others

* Signal Timing Modification

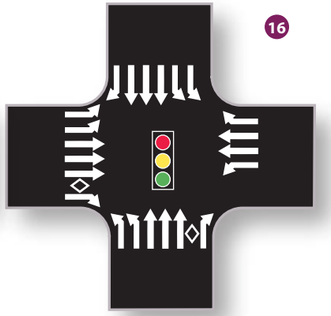
Figure 12A: Proposed Lane Configurations and Traffic Controls



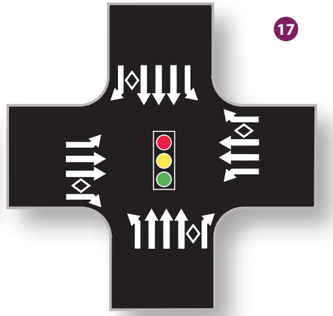
Scottsdale Rd & Loop 101 WB Ramps



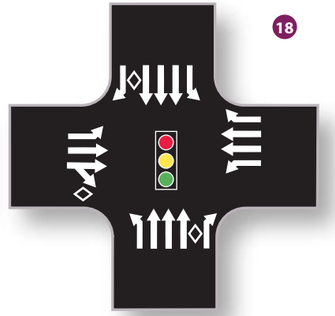
Scottsdale Rd & Loop 101 EB Ramps



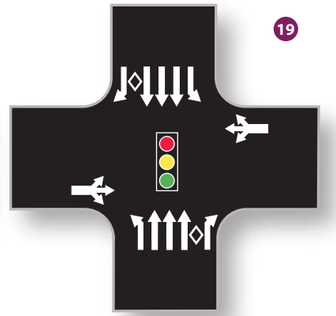
Scottsdale Rd & Mayo Blvd



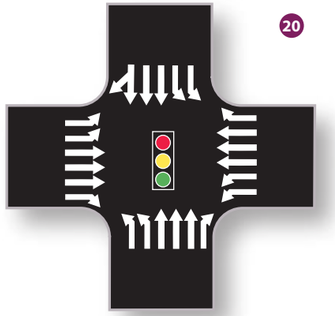
Scottsdale Rd & Chauncey Ln



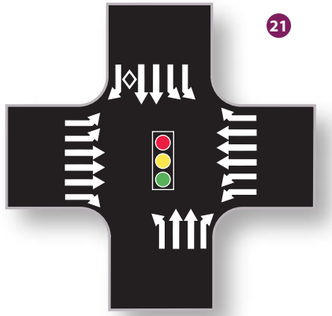
Scottsdale Rd & Princess Blvd



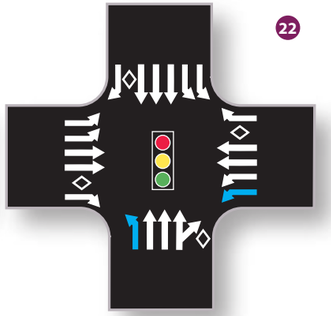
Scottsdale Rd & 17050 North



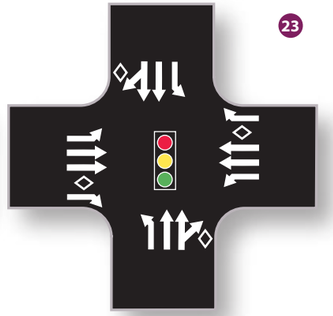
Scottsdale Rd & Frank Lloyd Wright Blvd



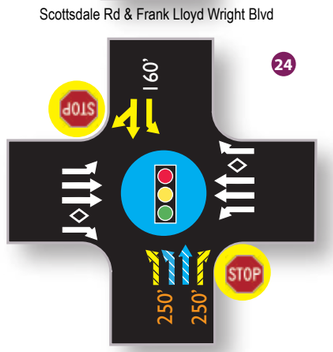
Greenway-Hayden & Frank Lloyd Wright Blvd



Pima Rd & Thompson Peak Pkwy

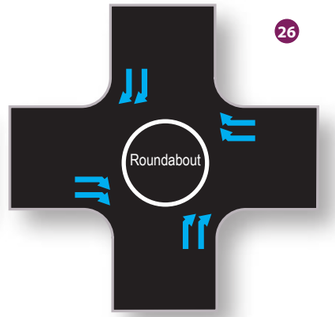


Miller Rd & Thompson Peak Pkwy



Miller Rd & Legacy Blvd

Miller Rd & Mayo Blvd.

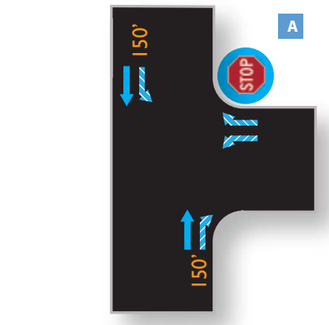


Miller Rd & Princess Dr

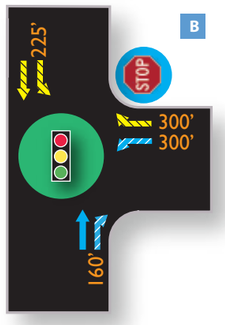
LEGEND

- Thru or Turning Movement
- Two-Way Left Turn-Lane
- Raised Median
- Bike Lane
- Traffic Signal
- Stop Sign
- Speed Limit
- NORTH
- Improvements by 2020
- Improvements by 2030
- Developers Responsibility
- Signal Warrants will be Analyzed in Future Phases
- XXX Total Queue by Developer
- XXX Total Extended Queue by Others

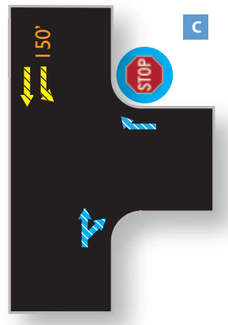
Figure 12B: Proposed Lane Configurations and Traffic Controls



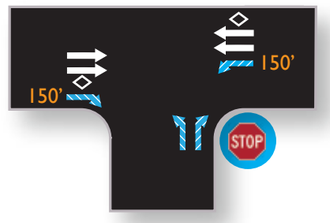
Miller Rd & Access A



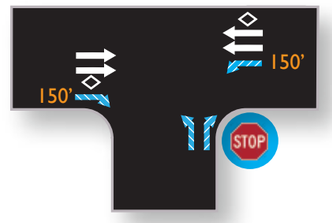
Miller Rd & Access B



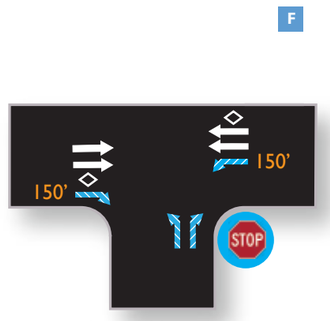
Miller Rd & Access C



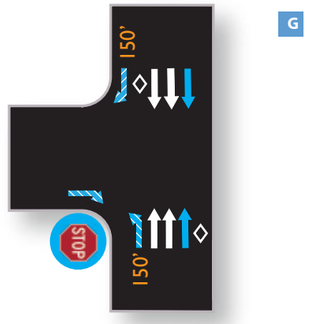
Access D & Legacy Blvd



Access E & Legacy Blvd

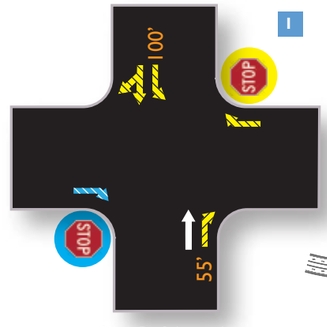


Access F & Legacy Blvd

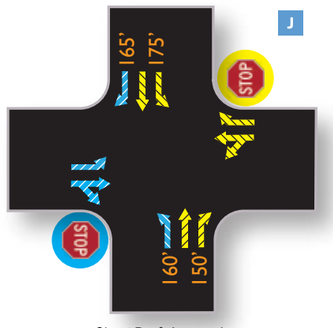


Hayden Rd & Access G

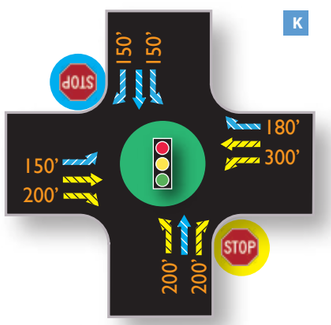
Hayden Rd & Access H



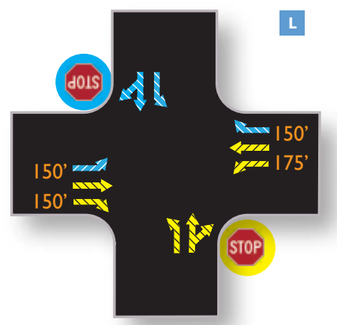
Claret Dr. & Access I



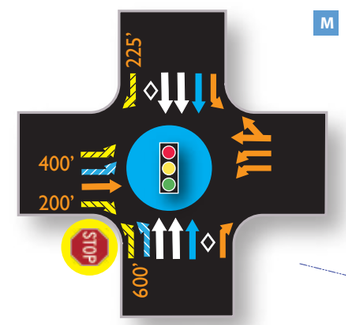
Claret Dr. & Access J



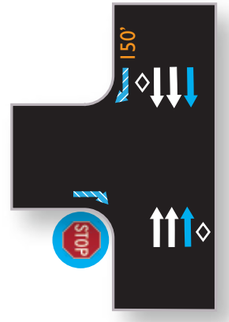
Claret Dr. & Cavasson Blvd.



Access L & Cavasson Blvd.



Hayden Rd & Cavasson Blvd.



* • Access "O" will be analyzed in more detail in future phased TIA.

LEGEND

- Thru or Turning Movement
- Two-Way Left Turn-Lane
- Raised Median
- Bike Lane
- Traffic Signal
- Stop Sign
- Speed Limit
- NORTH
- Improvements by 2020
- Improvements by 2030
- Developers Responsibility
- Signal Warrants will be Analyzed in Future Phases
- Future Lane Improvements when State Lane to the East is Developed
- XXX Total Queue by Developer
- XXX Total Extended Queue by Others

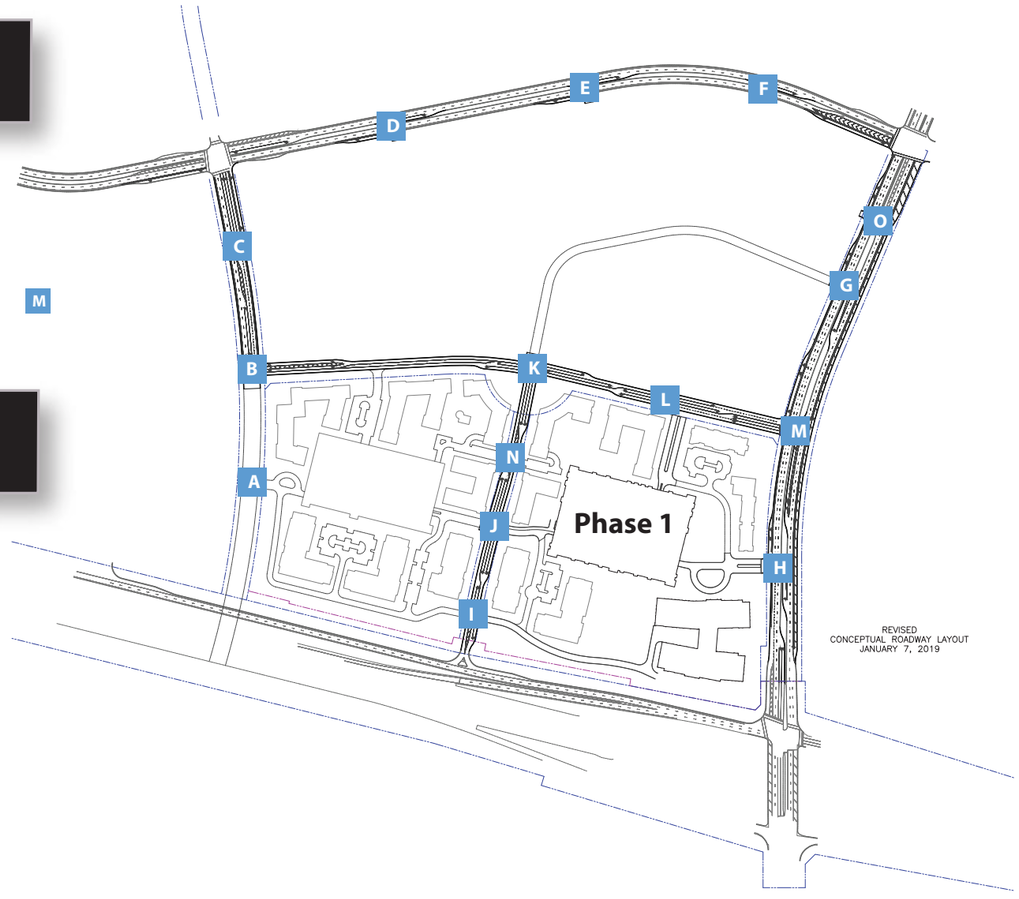


Figure 12C: Proposed Lane Configurations and Traffic Controls

QUEUING ANALYSIS

The site access points were analyzed to determine the storage needed to accommodate the expected traffic volumes for the horizon year 2030 at the left and right turn lanes.

LEFT TURN STORAGE ANALYSIS

Left-turn lanes are required at all street intersections on major collectors and arterials per the City of Scottsdale Design Standards and Policy Manual (DS&PM). Dual left turn lanes should be considered at intersections in which the peak hour turning volume exceeds 300 vehicles, the opposing volume exceeds 1,000 vehicles per hour or the delay of the left-turns exceeds 45 seconds.

A queuing analysis for left turns was performed for all intersection turn lanes under stop or signal control within the study area. The intersections were analyzed to determine the left turn storage needed to accommodate the expected traffic volumes for the horizon year 2030. The formulas used for the calculations are stated below. The resulting left turn lane storage requirements for the 2030 horizon year are summarized in **Table 10**.

Two (2) methods were utilized to calculate the likely queue storage needed at the intersections for the 2030 horizon year. Synchro analysis software provided values for the 50th and 95th percentile queue storage. The 95th percentile has been reported herein. AASHTO also provides the following guidance:

For signalized intersections, the storage length is determined by the following formula:

Storage Length = [2 x (veh/hr)/(cycles/hr)] x 25 feet

For unsignalized intersections, the storage length is determined by the following formula:

Storage Length = [(veh/hr)/(30 periods/hr)] x 25 feet

Typically, intersections that are within ADOT right-of-way are required to perform the queue storage calculations in accordance with the methodology provided by ADOT's Policy, Guidelines and Procedures Manual. ADOT requires a turn lane gap to be included within the queue storage calculation based upon the design speed of the roadway. Therefore, the queue storage calculations performed at the interchange intersections were prepared per ADOT criteria.

Queue storage length recommendations at all study intersections herein are based on the 2030 projected traffic volumes.

RIGHT TURN AUXILIARY LANES

Right turn auxiliary lanes are required at all street intersections on major arterials per the City of Scottsdale DS&PM.

DECELERATION LANES

Per the City of Scottsdale standards, right turn deceleration lanes are generally deemed warranted at a driveway when the following three conditions are satisfied:

- *At least 5,000 vehicles per day are expected to use the adjacent street;*
- *The 85th percentile traffic speed on the adjacent street is 35 MPH or higher, or 45 MPH or higher for a one (1) lane per direction roadway;*
- *At least 30 vehicles will make right turns into a driveway during a peak hour.*

In general, the deceleration lanes are a minimum length of 100-feet with a standard length of 150-feet. Modifications of the design standard are allowed on a case-by-case analysis. Right turn deceleration lane queue lengths have been calculated and are shown in **Table 10** for the 2030 horizon year.

Table 10 – Build-Out Turn Lane Length

ID	Intersection	Control	Movement/ Approach	2030 Queue Length (ft)				
				Existing	AASHTO/ ADOT	(4)Synchro	Minimum Rec. Q	Proposed Developer Q
1	Hayden Rd. & Deer Valley Rd.	Signal	NB Left	205’	100'	67’	(5) 205’	-‘
			SB Left	140’	25'	<25’	(5) 140’	-‘
			EB Left	25’	50'	31’	(5) 25’	-‘
			WB Left	100’	100'	62’	(5) 100’	-‘
			NB Right	100’	125'	42’	(5) 100’	-‘
			SB Right	180’	50'	16’	(5) 180’	-‘
2	Hayden Rd. & Grayhawk Dr.	Signal	NB Left	140’	100'	88’	(5) 140’	-‘
			SB Left	170’	25'	25’	(5) 170’	-‘
			EB Left	100’	50'	37’	(5) 100’	-‘
			WB Left	40’	75'	46’	(5) 40’	-‘
			NB Right	145’	50'	<25’	(5) 145’	-‘
			SB Right	115’	75'	<25’	(5) 115’	-‘
			EB Right	100’	150'	62’	(5) 100’	-‘
3	Hayden Rd. & Thompson Peak Pkwy.	Signal	NB Left	175’	(2) 350'	(2) 307’	(2), (5) 350’	-‘
			SB Left	210’	(2) 175'	(2) 176’	(2), (5) 210’	-‘
			EB Left	335’	(2) 75'	(2) 77’	(2), (5) 335’	-‘
			WB Left	225’	(2) 350'	(2) 344’	(2), (5) 225’	-‘
			NB Right	215’	900'	642’	350’	-‘
			SB Right	200’	125'	<25’	(5) 200’	-‘
			EB Right	300’	650'	534	350’	-‘
			WB Right	190’	225'	155’	(5) 225’	-‘
4	Hayden Rd. & Legacy Blvd.	Signal	NB Left	255’	(2) 275'	(2) 143’	(2), (5) 255’	(2) 300’
			SB Left	-‘	75’	28’	160’	160’
			EB Left	260’	175’	58’	(5) 260’	(5) 260’
			WB Left	-‘	275’	163’	165’	165’
			NB Right	-’	200'	58’	160’	160’
			SB Right	160‘	175’	75’	(5) 160’	160’
			EB Right	260’	575’	220	(5) 260’	300’
			WB Right	-‘	75’	30’	150’	150’

Table 10 – Build-Out Turn Lane Length (Continued…..)

ID	Intersection	Control	Movement/ Approach	2030 Queue Length (ft)				
				Existing	AASHTO/ ADOT	[4]Synchro	Minimum Rec Q	Proposed Developer Q
5	Hayden Rd. & Loop 101 WB Ramp	Signal	NB Left	[2] 275’	[2],[7]575’	[2] 421’	[2] [5] 275’	-‘
			WB Left	[2] 495’	[2], [7] 125’	[2] 164’	[2], [5] 495’	-‘
			SB Right	235’	[7] 750’	522’	525’	-‘
			WB Right	[2] 495’	[2], [7] 675’	[2] 276’	[2], [5] 495’	-‘
6	Hayden Rd. & Loop 101 EB Ramp	Signal	SB Left	[2] 275’	[2], [7] 600’	[2] 558’	[2] [5] 275’	-‘
			EB Left	[2] 430’	[2], [7] 550’	[2] 406’	[2], [5] 430’	-‘
			NB Right	260’	[7] 275’	50’	260’	-‘
			EB Right	[2] 430’	[2], [7] 375’	[2] 176’	[2], [5] 430’	-‘
7	Hayden Rd. & Mayo Blvd.	Signal	NB Left	-‘	275’	207’	210’	-‘
			SB Left	370’	400’	233’	[5] 370’	-‘
			EB Left	-‘	475’	210’	210’	-‘
			WB Left	-‘	75’	25’	150’	-‘
			NB Right	150’	75’	<25’	[5] 150’	-‘
			SB Right	-‘	425’	<25’	150’	-‘
			EB Right	-‘	375’	34’	150’	-‘
			WB Right	-‘	475’	31’	150’	-‘
8	Hayden Rd. & Princess Dr.	Signal	NB Left	150’	200'	156’	150’	-‘
			SB Left	250’	200'	106’	[5] 250’	-‘
			WB Left	150’	175'	147’	[5] 280’	-‘
			NB Right	235’	300'	42’	[5] 235’	-‘
			SB Right	255’	100'	<25’	[5] 255’	-‘
			EB Right	175’	150'	52’	[5] 175’	-‘
			WB Right	150’	275’	71’	[5] 150’	-‘
9	Hayden Rd. & Bell Rd.	Signal	NB Left	290’	50'	<25’	[5] 290’	-‘
			SB Left	140’	275'	386’	275’	-‘
			WB Left	[2] 140’	[2] 325'	[2] 276’	[2] 560’	-‘
			NB Right	300’	525'	46’	[5] 300’	-‘
			WB Right	140’	250’	63’	[5] 140’	-‘
10	Scottsdale Rd. & Deer Valley Rd.	Signal	SB Left	145’	75'	33’	[5] 145’	-‘
			WB Left	150’	175'	192’	195’	-‘
			NB Right	95’	200’	<25’	[5] 95’	-‘
			WB Right	155’	100’	90’	[5] 155’	-‘
11	Scottsdale Rd. & Grayhawk Dr.	Signal	SB Left	120’	100’	135’	150’	-‘
			WB Left	175’	175’	173’	[5] 175’	-‘
			NB Right	150’	175’	<25’	[5] 150’	-‘
			WB Right	175’	100’	96’	[5] 175’	-‘
12	Scottsdale Rd. & Thompson Peak Pkwy.	Signal	NB Left	-‘	200’	<25’	150’	-‘
			SB Left	200’	250’	115’	[5] 200’	-‘
			EB Left	-‘	[2] 350’	159’	[2] 320’	-‘
			WB Left	[2] 130’	[2] 425’	242’	[2], [5] 130’	-‘
			NB Right	520’	675’	425’	[5] 520’	-‘
			SB Right	-‘	575’	48’	150’	-‘
			EB Right	-‘	125’	-	150’	-‘
			WB Right	225’	350’	<25’	[5] 225’	-‘

Table 10 – Build-Out Turn Lane Length (Continued…..)

ID	Intersection	Control	Movement/ Approach	2030 Queue Length (ft)				
				Existing	AASHTO/ ADOT	[4]Synchro	Minimum Rec Q	Proposed Developer Q
13	Scottsdale Rd. & Legacy Blvd.	Signal	NB Left	-‘	100’	<25’	150’	-‘
			SB Left	195’	150’	44’	[5] 195’	-‘
			EB Left	-‘	[2] 250’	181’	[2] 185’	-‘
			WB Left	[2] 310’	[2] 350’	215’	[2], [5] 310’	-‘
			NB Right	145’	550’	258’	260’	-‘
			SB Right	-‘	450’	39’	150’	-‘
			EB Right	-‘	50’	-	150’	-‘
			WB Right	130’	225’	-	[5] 130’	-‘
14	Scottsdale Rd. & Loop 101 WB Ramp	Signal	NB Left	[2]245’	[2], [7] 700’	[2] 573’	[2] 575’	-‘
			WB Left	[2]310’	[2], [7] 600’	[2] 534’	[2] 535’	-‘
			SB Right	400’	[7] 1,150’	1,164’	1,165’	-‘
			WB Right	[2]320’	[2], [7] 450’	[2] 182’	[2], [5] 320’	-‘
15	Scottsdale Rd. & Loop 101 EB Ramp	Signal	SB Left	[2]270’	[2], [7] 575’	[2] 595’	[2] 595’	-‘
			EB Left	[2]205’	[2], [7] 575’	[2] 544’	[2] 545’	-‘
			NB Right	135’	[7] 1,000’	327’	330’	-‘
			EB Right	[2]215’	[2], [7] 625’	[2] 390’	[2] 390’	-‘
16	Scottsdale Rd. & Mayo Blvd.	Signal	NB Left	[2] 240’	[2] 275’	106’	[2], [5] 240’	-‘
			SB Left	[2] 165’	[2] 300’	139’	[2], [5] 165’	-‘
			EB Left	[2] 325’	[2] 475’	354’	[2], [5] 325’	-‘
			WB Left	[2] 160’	[2] 125’	53’	[2], [5] 160’	-‘
			NB Right	155’	175’	96’	[5] 155’	-‘
			SB Right	240’	1050’	429’	[5] 240’	-‘
			EB Right	335’	400’	102’	[5] 335’	-‘
			WB Right	-‘	700’	106’	150‘	-‘
17	Scottsdale Rd. & Chauncey Ln.	Signal	NB Left	195’	225’	187’	[5] 195’	-‘
			SB Left	170’	25’	<25’	[5] 170’	-‘
			EB Left	160’	200’	142’	[5] 160’	-‘
			WB Left	160’	25’	26’	[5] 160’	-‘
			NB Right	125’	25’	<25’	[5] 125’	-‘
			SB Right	160’	200’	39’	[5] 160’	-‘
			EB Right	180’	200’	55’	[5] 180’	-‘
			WB Right	105’	25’	<25’	[5] 105’	-‘
18	Scottsdale Rd. & Princess Blvd.	Signal	NB Left	250’	375’	246’	[5] 250’	-‘
			SB Left	235’	350’	126’	[5] 235’	-‘
			EB Left	205’	100’	76’	[5] 205’	-‘
			WB Left	165’	550’	676’	350’	-‘
			NB Right	250’	475’	210’	[5] 250’	-‘
			SB Right	250’	125’	34’	[5] 250’	-‘
			WB Right	85’	450’	217’	220’	-‘
19	Scottsdale Rd. & 17050 North	Signal	NB Left	190’	175'	54’	[5] 190’	-‘
			SB Left	200’	100'	<25’	[5] 200’	-‘
			NB Right	135’	50'	<25’	[5] 135’	-‘
			SB Right	240’	125'	<25’	[5] 240’	-‘
20	Scottsdale Rd. & Frank Lloyd Wright Blvd.	Signal	NB Left	[2] 300’	[2] 375’	[2] 379’	[2], [5] 300’	-‘
			SB Left	[2] 565’	[2] 325’	[2] 720’	[2],[5] 565’	-‘
			EB Left	[2] 245’	[2] 450’	[2] 455’	[2], [5] 245’	-‘
			WB Left	[2] 270’	[2] 175’	[2] 143’	[2], [5] 270’	-‘
			NB Right	145’	425’	246’	[5] 145’	-‘
			EB Right	235’	600’	389’	[5] 235’	-‘
			WB Right	315’	775’	223’	[5] 315’	-‘

Table 10 – Build-Out Turn Lane Length (Continued…..)

ID	Intersection	Control	Movement/ Approach	2030 Queue Length (ft)				
				Existing	AASHTO/ ADOT	[4]Synchro	Minimum Rec Q	Proposed Developer Q
21	Greenway Hayden & Frank Lloyd Wright Blvd	Signal	NB Left	190’	150'	112’	[5] 190’	-‘
			SB Left	[2] 180’	[2] 300'	[2] 248’	[2] 250’	-‘
			EB Left	[2] 190’	[2] 425'	[2] 298’	[2] 300’	-‘
			WB Left	[2] 275’	[2] 425'	[2] 381’	[2] 350’	-‘
			NB Right	100’	800'	772’	[5] 100’	-‘
			SB Right	175’	950'	937’	[5] 175’	-‘
			EB Right	155’	150'	<25’	[5] 155’	-‘
			WB Right	165’	675	424’	350’	-‘
22	Pima Rd. & Thompson Peak Pkwy.	Signal	NB Left	[2] 250’	[2] 150’	[2] 90’	[2], [5] 250’	-‘
			SB Left	[2] 230’	[2] 250’	[2] 223’	[2], [5] 230’	-‘
			EB Left	[2] 215’	[2] 425’	[2] 547’	[2], [5] 215’	-‘
			WB Left	[2] 260’	[2] 75’	[2] 82’	[2], [5] 260’	-‘
			SB Right	345’	575’	293’	[5] 345’	-‘
			EB Right	230’	200’	84’	[5] 230’	-‘
			WB Right	180’	525’	343’	350’	-‘
23	Miller Rd. & Thompson Peak Pkwy.	Signal	NB Left	135’	350’	301’	300’	-‘
			SB Left	120’	150’	-‘	[5] 120’	-‘
			EB Left	150’	-‘	-‘	[5] 150’	-‘
			WB Left	165’	-‘	105’	[5] 165’	-‘
			EB Right	120’	-‘	<25’	[5] 120’	-‘
			WB Right	100’	-‘	-‘	[5] 100’	-‘
24	Miller Rd. & Legacy Blvd.	Signal	NB Left	-	[2] 450’	[2] 138’	[2] 150’	[2] 250’
			SB Left	-	150’	68’	[1] 150’	160’
			EB Left	250’	100’	110’	[5] 250’	[5] 250’
			WB Left	260’	200’	70’	[5] 260’	[5] 260’
			NB Right	-	275’	78’	[1] 150’	250’
			SB Right	-	100’	45’	[1] 150’	[1] 150’
			EB Right	250’	350’	110’	[5] 250’	[5] 250’
			WB Right	260’	125’	48’	[5] 260’	[5] 260’
25	Miller Rd. & Union Hills Dr.	All way stop	NB Left	-‘	175’	-‘	175’	-‘
			SB Left	-‘	125’	-‘	[1] 150’	-‘
			EB Left	-‘	175’	-‘	175’	-‘
			WB Left	-‘	100’	-‘	[1] 150’	-‘
			SB Right	-‘	225’	-‘	225’	-‘
A	Miller Rd. & Access A	1-way stop (WB)	SB Left	-‘	100’	-‘	[1] 150’	-‘
			NB Right	-‘	75’	-‘	[1] 150’	-‘
B	Miller Rd. & Cavasson Blvd.	Signal	SB Left	-‘	150’	<25‘	[1] 150’	225’
			WB Left	-‘	100’	33‘	[1] 150’	300’
			NB Right	-‘	100’	<25‘	[1] 150’	[1] 150’
			WB Right	-‘	175’	80‘	175’	300’
C	Miller Rd. & Access C	1-way stop (WB)	SB Left	-‘	50’	-‘	[1] 150’	-‘
			NB Right	-‘	50’	-‘	[1] 150’	-‘
			WB Right	-‘	100’	-‘	[1] 150’	-‘
D	Access D & Legacy Blvd.	1-way stop (NB)	WB Left	-‘	50’	-‘	[1] 150’	[1] 150’
			EB Right	-‘	75’	-‘	[1] 150’	[1] 150’
E	Access E & Legacy Blvd.	1-way stop (NB)	WB Left	-‘	50’	-‘	[1] 150’	[1] 150’
			EB Right	-‘	50’	-‘	[1] 150’	[1] 150’
F	Access F & Legacy Blvd.	1-way stop (NB)	WB Left	-‘	75’	-‘	[1] 150’	[1] 150‘
			EB Right	-‘	50’		[1] 150’	[1] 150‘
G	Hayden Rd. & Access G	1-way stop (EB)	NB Left	-‘	100’	-‘	[1] 150’	[1] 150‘
			SB Right	-‘	50’	-‘	[1] 150’	[1] 150‘

Table 10 – Build-Out Turn Lane Length (Continued…..)

ID	Intersection	Control	Movement/ Approach	2030 Queue Length (ft)				
				Existing	AASHTO/ ADOT	[4]Synchro	Minimum Rec Q	Proposed Developer Q
H	Hayden Rd. & Access H	1-way stop (EB)	NB Left	-‘	100’	-‘	[1] 150’	[1], [8] 150‘
			SB Right	-‘	100’	-‘	[1] 150’	[1] 150‘
I	Claret Dr. & Access I	2-way stop (EB/WB)	SB Left	-‘	50’	-‘	[8] 100’	[8] 100‘
			NB Right	-‘	25’	-‘	[8] 55’	[8] 55’
J	Claret Dr. & Access J	2-way stop (EB/WB)	NB Left	-‘	100’	-‘	[1] 150’	160‘
			SB Left	-‘	100’	-‘	[1] 150’	175‘
			NB Right	-‘	100’	-‘	[1] 150’	[1] 150’
			SB Right	-‘	75’	-‘	[1] 150’	165‘
K	Access K & Cavasson Blvd.	Signal	NB Left	-‘	125’	70‘	[1] 150’	200’
			SB Left	-‘	50’	<25‘	[1] 150’	[1] 150’
			EB Left	-‘	25’	<25’	[1] 150’	[1] 150’
			WB Left	-‘	175’	38‘	[1] 150’	300’
			NB Right	-‘		28’	[1] 150’	200’
			SB Right	-‘		<25’	[1] 150’	[1] 150’
			EB Right	-‘		48’	[1] 150’	[1] 150’
			WB Right	-‘		<25’	[1] 150’	180’
L	Access L & Cavasson Blvd.	2-way stop (NB/SB)	EB Left	-‘	25’	-‘	[1] 150’	[1] 150‘
			WB Left	-‘	100’	-‘	[1] 150’	175‘
			EB Right	-‘	100’	-‘	[1] 150’	[1] 150‘
			WB Right	-‘	75’	-‘	[1] 150’	[1] 150‘
M	Hayden Rd. & Cavasson Blvd.	Signal	NB Left	-‘	325’	83’	[1] 150’	[2] 350’
			EB Left	-‘	275’	90’	[1] 150’	[2] 200’
			SB Right	-‘	225’	55’	[1] 150’	225’
			EB Right	-‘	300’	105’	[1] 150’	200’

(1) COS recommends 150’ of storage regardless of intersection control; a minimum of 100’ may be provided if 150’ of storage is not available.
(2) Dual turn lanes, queue reported is for each lane.
(3) Calculated per ADOT minimum/desired queue storage.
(4) Recommended Synchro 50th Percentile dual queue storage lengths.
(5) Existing queue storage recommended to remain.
(6) Recommended maximum length of 350’.
(7) ADOT calculated queue length. Reported value does not include breaking distance or 2/3 Gap/taper.
(8) Turn lane length restricted by presence of upstream intersection or utility conflict.

Storage lengths provided in **Table 10** are based on turn volumes for the 2030 study horizon year. Additional storage length calculations should be completed prior to a change in intersection stop control. Turn queue storage length calculations can be found in the **Appendix K**.

It is recommended all proposed site access driveways along Legacy Boulevard, Hayden Road, Miller Road, Cavasson Boulevard and Claret Drive provide a minimum of 150-foot turn lanes at intersections regardless of intersection control so long as they are not encumbered by upstream intersections or utility conflicts. Locations with restrictions or where additional storage beyond the calculations included in this report are discussed below.

Proposed ¾ site **Access G,** located just north of site Access M and south of Legacy Boulevard along Hayden Road, is recommended to provide a minimum 150-foot northbound left-turn lane as well as a 100-foot southbound dedicated right-turn lane. An

upstream intersection restricts the ability to provide additional southbound right turn storage.

Proposed ¾ site **Access H** located just north of the Hayden Road/Loop 101 interchange along Hayden Road is recommended to provide a minimum 100-foot northbound left-turn lane as well as a 150-foot southbound dedicated right-turn lane. The presence of a storm drain inlet conflict restricts the ability to provide additional northbound left turn queue storage.

Proposed ¾ site **Access I**, located just north of the Loop 101 frontage road on Claret Drive is recommended to provide a 55-foot northbound right turn lane. This is restricted from further queue storage due to the proximity of the frontage road. A southbound left turn storage of 100 feet is recommended; this length is restricted by the need to provide a back to back left turn lane (northbound storage) into Access J.

Proposed main site **Access M** (Hayden Road/Cavasson Boulevard) is planned as a signalized intersection at the opening of the proposed Cavasson Phase I development. Access M is located between Legacy Boulevard and north of Access H along Hayden Road and is planned to provide 300-feet of queue for dual northbound left-turn lanes as well as 225-feet for a dedicated southbound right-turn lane. Internally, the development should provide a minimum of 200-feet of storage for the eastbound dual left-turn and a single right-turn lane. Additional pavement will be provided and striped out for the proposed future ultimate lane alignment for connectivity to the east.

Access K (Cavasson Boulevard/Claret Drive) is an internal signalized intersection with permitted phasing in all approaches. The provision of 150-foot southbound and eastbound left-turn lanes, a 300-foot westbound left-turn lane and a 200-foot northbound left-turn lane are recommended. It is also recommended that a 200-foot northbound right-turn lane, 180-foot westbound right-turn lane and 150-foot eastbound and southbound right-turn lane be provided by full build of the Cavasson development.

Access B (Miller Road/Cavasson Boulevard) is a planned signalized intersection with permitted/protected phasing. A 300-foot westbound left-turn and right-turn lane, as well as a southbound 225-foot southbound left-turn lane are recommended. As the area is built out with connectivity to the south along Miller Road, it is recommended that the future queue length for the westbound and northbound left-turn lanes and northbound right-turn lane be constructed to provide a minimum storage of 150-feet.

Access A and **Access C** both are recommended to provide 100-foot southbound left-turn lanes and well as 100-foot northbound dedicated right-turn lanes. The presence of back to back turn lanes and likely retaining walls from the Miller Road underpass may restrict the ability to provide more storage at these locations.

The intersection of **Miller Road and Legacy Boulevard** is planned to be signalized upon buildout of the Cavasson development ultimately providing dual 250-foot northbound left-turn lanes as well as a dedicated northbound right-turn lane. Although the reported volumes documented within this report do not show a need for dual northbound left-turn lanes it is CivTech's understanding the planned area analyzed within this report does not include some portions of future development within the study area. As such, longer queues and dual lanes are recommended.

INTERNAL CIRCULATIONS AND ROADWAY CROSS SECTIONS

Cavasson will adhere to the City requirements for all bike lanes and multi-use paths that are depicted on the approved *Scottsdale Trails System Master Plan* and the Multi-use path ordinance. It is also recommended that, as individual parcels come online for the development, consideration should be given for a multi-use path within the right-of-way along additional roadways in an effort to connect to the regional City of Scottsdale multi-use path network. The proposed bike and pedestrian paths for the Cavasson development is illustrated in **Figure 13**.

The proposed roadway cross sections are presented in **Figure 14**.

SIGHT DISTANCE ANALYSIS

Adequate sight distance must be provided at the intersections to allow safe turning movements into and out of the development. A sight triangle is the area encompassed by the line of sight from a stopped vehicle on the minor roadway to the approaching vehicle on the major roadway: there must be sufficient unobstructed sight distance along both approaches of a street or driveway intersection and across their included corners to allow operators of vehicles to see each other in time to prevent a collision. There must also be sufficient sight distance along the major street to allow a driver intending to turn left into the site to see an oncoming vehicle in the opposing direction.

Sight distance is largely based on the design speed of the roadway. Per the *City of Scottsdale Design Standards and Policies Manual, dated 2018* intersection sight distance should adhere to *Appendix 5-3B. Sight Distance tables in Appendix 5-3B* presents the required sight distance for varying roadway widths and design speeds for passenger cars, single unit trucks and combination trucks. Typically, the posted speed limit is less than the design speed of a roadway. The current posted speed limit on Hayden Road and Legacy Boulevard is 45 miles per hour (mph). For design purposes a minimum design speed of 50 mph should be used.

The contractor should ensure that adequate sight distance is provided at all site access points to allow safe left and right turning movements from the development. Fixed objects within the safety triangle cannot be taller than 2.5-feet measured from the adjacent roadway surface (edge of pavement); vegetation should be trimmed to 2.5-feet tall measured form the adjacent roadway surface. Trees placed within the sight triangle shall have canopies no lower than eight (8) feet. It is recommended that sight triangles be designed at all site access driveways to provide the required sight distance shown in *Appendix 5-3B* within the *City of Scottsdale Design Standards and Policies Manual*. Excerpts from the *City of Scottsdale Design Standards and Policies Manual* and tables have been included in **Appendix L**.

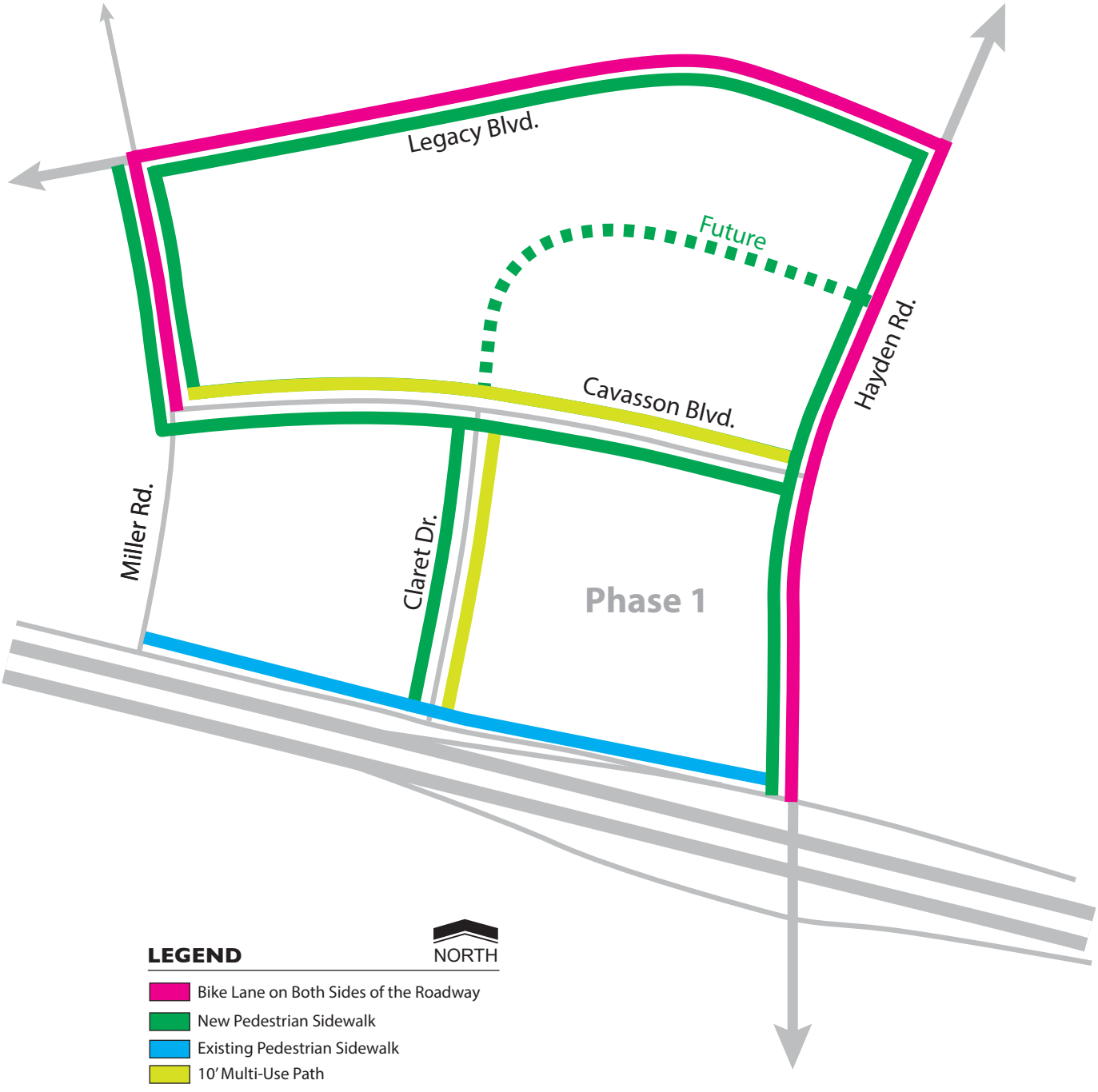
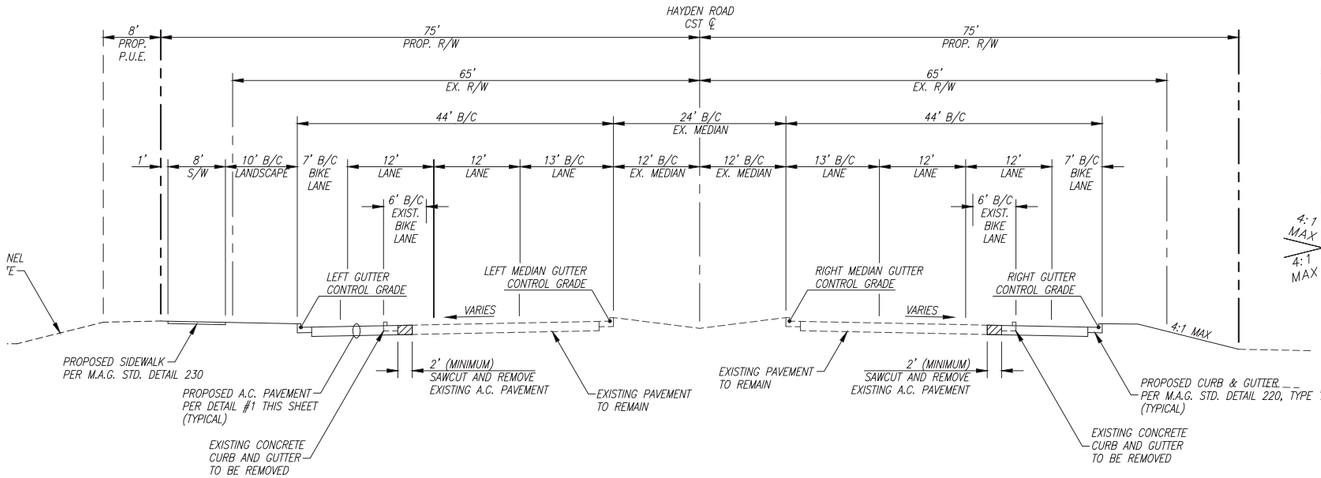


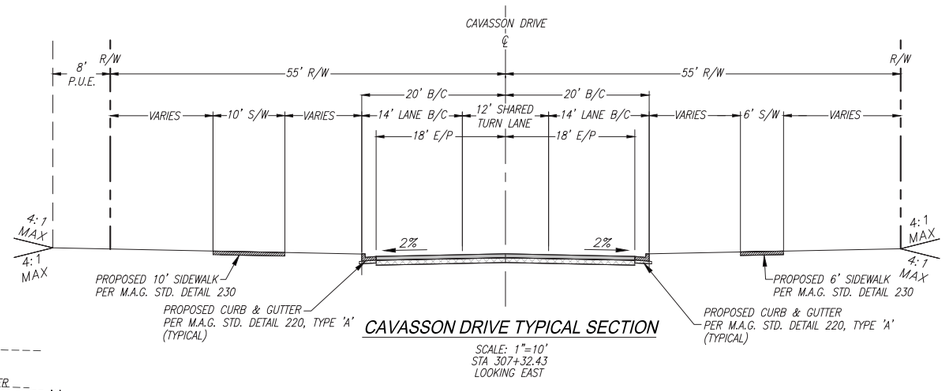
Figure 13: Pedestrian and Bike Routes



TYPICAL SECTION #1 (CROWN)

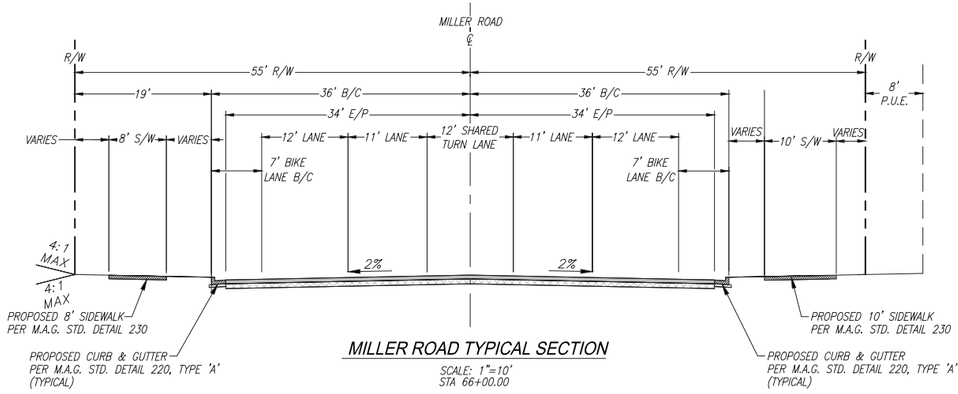
SCALE: 1"=10'

STA 87+66.15± TO STA 90+93.00±
STA 104+42.00± TO STA 111+61.39±



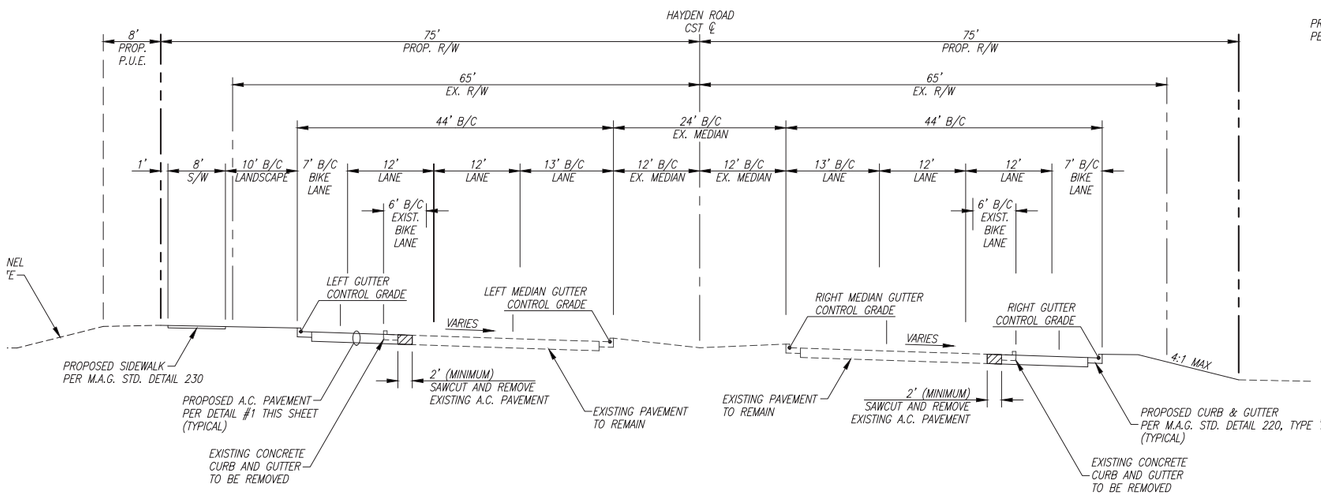
CAVASSON DRIVE TYPICAL SECTION

SCALE: 1"=10'
STA 307+32.43
LOOKING EAST



MILLER ROAD TYPICAL SECTION

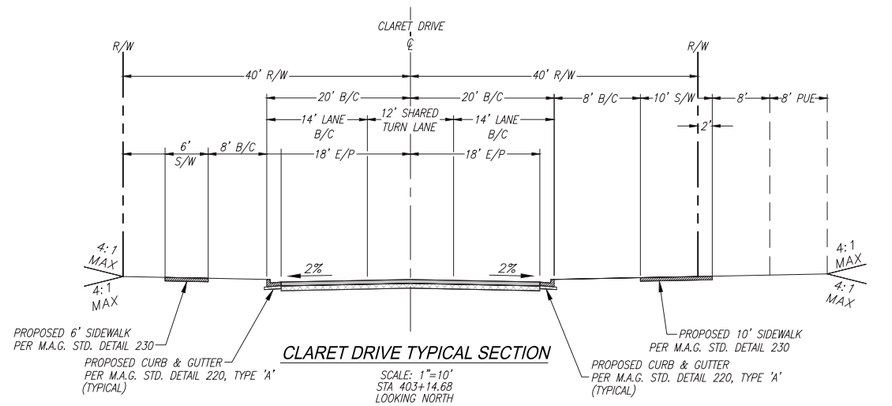
SCALE: 1"=10'
STA 66+00.00



TYPICAL SECTION #2 (SUPERELEVATION)

SCALE: 1"=10'

STA 90+93.00± TO STA 104+42.00±



CLARET DRIVE TYPICAL SECTION

SCALE: 1"=10'
STA 403+14.68
LOOKING NORTH

Figure 14: Typical Cross Sections

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions have been documented in this study:

General

- Phase I of the Cavasson Development is anticipated to generate 12,450 daily trips to the external roadway system, with 915 occurring during the AM peak hour and 1,070 occurring during the PM peak hour, by opening year 2020. It is anticipated the Miller Road underpass will not be constructed by opening year 2020.
- Phase I project specific improvements such half street improvements and all Phase I site driveways are anticipated to be fully constructed by the developer upon opening year 2020.
- Cavasson Boulevard and Claret Drive internal to the site are also anticipated to be full constructed by opening year 2020.
- Full buildout (Phase 1 and Phase 2) of the Cavasson Development is anticipated to generate a total of 34,984 daily trips to the external roadway system, with 2,562 occurring during the AM peak hour and 3,123 occurring during the PM peak hour.
- For study purposes it is anticipated the Miller Road underpass will be constructed and provide connection to the south of the Loop 101 by study horizon year 2030.
- Both Thompson Peak Parkway and Legacy Boulevard are also planned to provide connectivity to the west ultimately offering additional roadway connections between 56th Street/Scottsdale Road by horizon year 2030.
- Legacy Boulevard is also anticipated to connect through to the east from Hayden Road to Pima Road by horizon year 2030.
- The contractor should ensure that adequate sight distance is provided at all site access points to allow safe left and right turning movements from the development. It is recommended that sight triangles be designed at all site access driveways to provide the required sight distance shown in *Appendix 5-3B* within the *City of Scottsdale Design Standards and Policies Manual*. Excerpts from the *City of Scottsdale Design Standards and Policies Manual* and tables have been included in **Appendix K**.
- Typical sections provided for Hayden Road, Miller Road, Legacy Boulevard, Claret Drive and Cavasson Boulevard were approved by the City of Scottsdale Ordinance 4346 and Resolution 11147. Excerpts from the Ordinance and Resolution are provided in **Appendix M**.

Existing

- The results of the existing conditions analysis indicate that all existing study intersections operate with an overall acceptable level of service (LOS D or better) during the AM and PM peak hours under the existing lane configurations and stop controls with the exception of the following locations:

- The intersection of **Hayden Road and Loop 101 Westbound Ramps** operate with unacceptable delays under existing conditions during the PM peak hour. These delays are primarily due to the heavy northbound left-turn volume onto the freeway and the right-turn volume egressing from the westbound Loop 101 off ramp. It is recommended these delays be mitigated by increasing the northbound left-turn phase and additional 10-seconds. With the recommended signal timing mitigation, the overall intersection delay is expected to decrease from 124-seconds to 81-seconds for the PM peak hour. The Hayden Road/Loop 101 Ramps function as a diamond traffic interchange with both signalized ramp interchanges functioning together as one. Any signal phasing mitigation at one ramp signal directly affects the other. Therefore, the recommended signal mitigation is expected to increase the delay at the signalized eastbound ramp from 43-seconds to 46-seconds in the PM peak hour. This 3-second increase is considered very minor considering the 43-second decrease in delay at the signalized westbound ramp.
- The intersection of **Hayden Road and Loop 101 Eastbound Ramps** operate with heavy delays under existing conditions during the AM peak hour. These delays are primarily due to the southbound left-turn volume onto the freeway and the right-turn volume egressing from the eastbound Loop 101 off ramp during the AM peak hour. It is recommended the eastbound phase be extended an additional 10-seconds. With the recommended signal timing mitigation, the overall intersection delay would decrease from 72-seconds to 65-seconds in the AM peak hour. The Hayden Road/Loop 101 Ramps function as a diamond traffic interchange with both signalized ramp interchanges functioning together as one. Any signal phasing mitigation at one ramp signal directly affects the other. Therefore, the recommended signal mitigation would also decrease the delay at the signalized westbound ramp from 25-seconds to 23-seconds in the AM peak hour.
- The intersection of **Scottsdale Road and Mayo Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the northbound/southbound through volume on Scottsdale road during the PM peak hour. It is recommended that the northbound left turn phase be extended from 19-seconds to 28-seconds and the southbound left phase be extended from 11-seconds to 23-seconds. Also, adding overlaps for the northbound and southbound right turns will decrease the delay on those approaches. By applying these changes to the existing intersections, the delay is expected to decrease from 76-seconds to 55-seconds.
- The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the westbound left-turn volume on Frank Lloyd Wright Boulevard and the conflicting northbound left-turn volume on Scottsdale Road during the PM peak hour. It is recommended that the northbound left turn phase be extended from 9-seconds to 25-seconds, the southbound left turn phase be extended from 23-seconds to 26-seconds, and the northbound through phase be extended from 35-seconds to 41-seconds. With these changes made to the existing intersection, the delay is expected to decrease from 160-seconds to 85-seconds.

- The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** operates with heavy delays under existing conditions during the PM peak hour. These delays are primarily due to the PM peak northbound/southbound left-turn volume as well as the conflicting northbound/southbound right-turn volumes for those phases. It is recommended that the northbound left turn phase be extended from 10-seconds to 16-seconds, the southbound left turn phase be extended from 15-seconds to 19-seconds and the eastbound left turn phase be extended from 20-seconds to 22-seconds. With these changes made to the existing intersection, the overall delay is expected to decrease from 60-seconds to 55-seconds.

Opening Year 2020

- The results of the Synchro analysis summarized in **Table 9** indicate that all 2020 study intersections operate with an overall acceptable level of service during the AM and PM peak hours under the existing lane configurations and stop controls with the exception of the following locations:
- It should be noted the Scottsdale Road/Loop 101 Ramps functions as a diamond traffic interchange with both signalized intersections functioning together as one. Any signal phasing mitigation at one signal directly affects the other. All recommended signal mitigation herein considers the timing/delay for both signals at the diamond interchange.
- The intersection of **Scottsdale Road and the Loop 101 Ramps** is projected to experience increased heavy delay by opening year 2020 with or without the proposed Cavasson Phase I development during the study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030, scenario the recommended mitigation and reported delays herein are for the build scenario which includes the proposed Phase I development. It is recommended signalize timing be optimized as well as signal phasing. With signal timing and phasing optimization, the overall intersection delay is expected to improve 33.5-seconds in the AM, 40.0-seconds in the PM peak for the westbound ramps and 27.1-seconds in the AM, 28.2-seconds in the PM peak for the eastbound ramps with the proposed Phase I development.

  *It is recommended that any and all recommended improvements for the **Scottsdale Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*
- The intersection of **Scottsdale Road and Mayo Boulevard** is projected to experience heavy delay in the PM peak by opening year 2020 with or without the proposed Cavasson Phase I development. Overall the projected intersection delay is expected to be 82.7-seconds in the PM peak hour under the total 2020 build condition. It is therefore recommended all right-turn lanes provide overlap phases as well as optimizing pedestrian signal timing in the westbound approach by opening year 2020. With these improvements, the overall delay at the intersection is projected to decrease from 82.7-seconds to 38.1-seconds in the PM peak hour with the proposed Phase I development.

- The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** is projected to experience heavy delay by opening year 2020 with or without the proposed Phase I development. Under the No-Build 2020 scenario, this intersection is expected to experience heavy delays during the PM peak hour only. Overall, the projected intersection delay is expected to be 71.7-seconds in the PM peak hour with the proposed Cavasson Phase I development. It is recommended all right-turn lanes provide overlap phases as well as a dedicated southbound right-turn lane. With the recommended mitigation the overall intersection delay is projected to improve from 71.7-seconds to 55.5-seconds with the proposed Phase I development during the PM peak hour.
- The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** is projected to experience heavy delays by opening year 2020 with or without the proposed Cavasson Phase I development. Under the No-Build 2020, scenario this intersection experiences heavy delay during the PM peak hour only. Overall, the projected 2020 Build, intersection delay is expected to be 71.7-seconds during the PM peak hour which includes the proposed Cavasson Phase I development. It is recommended signal timing be optimized and all right-turn lanes provided overlap phases. With the recommended mitigated signal timing, the overall intersection delay is projected to decrease from 71.7-seconds to 53.9-seconds with the proposed Phase I development during the PM peak hour.
- The proposed intersection of **Hayden Road and Cavasson Boulevard** is anticipated to be signalized upon completion of the Phase I development. It is recommended that right of way be provided for a future through lane east/west to provide connectivity to the east. By the opening year 2020, a single 300-foot northbound left-turn lane is warranted, as well as a single 200-foot left-turn and right-turn lanes eastbound. Additional right-of-way will be provided and striped out for the proposed future lanes required for an acceptable level of service.

- *Horizon Year 2030*

- The results of the Synchro analysis summarized in **Table 10** indicate that all 2030 study intersections operate with an overall acceptable level of service (LOS D or better) during the AM and PM peak hours under the proposed 2020 lane configurations and stop controls with the exception of the following locations:

- The intersection of **Hayden Road and Legacy Boulevard** is projected to experience delay during both AM and PM peak hours with or without the addition of Cavasson development by horizon year 2030. It should be noted this intersection was analyzed as a four-legged intersection by horizon year 2030. It is expected Legacy Boulevard will be constructed to the east of Hayden Road and connect to Pima Road by horizon year 2030. Due to the projected heavy traffic volumes on Hayden Road by horizon year 2030 three (3) through lanes northbound and three (3) through lanes southbound are recommended as well as dual northbound left-turn lanes. To remain consistent with the four (4) lane cross section on Legacy Boulevard two (2) through lanes are recommended to be constructed in the eastbound and westbound approaches. All left-turn phases are recommended to be protected/permissive with the exception of the dual northbound left-turn lanes which

will be required to be protected. With the recommended signal modifications, the intersection delay is expected to decrease to 24.0-seconds in the AM peak hour, and 22.7-seconds during the PM peak hour.

- It should be noted the Hayden Road/Loop 101 Ramps and the Scottsdale Road/Loop 101 Ramps both function as diamond traffic interchanges with both signalized intersections at each interchange functioning together as one. Any signal phasing mitigation at one signal directly affects the other. All recommended signal mitigation herein considers the timing/delay for both signals at each diamond interchange.
- The intersection of **Hayden Road and the Loop 101 Ramps** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. Under the No-Build 2030 scenario, this intersection experiences increased delay in both study peak hours. Overall, the PM peak hour at both ramps signals experiences the most delay of the two study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030 scenario, the recommended mitigation and reported delays herein are for the build scenario which includes the Cavasson development. It is recommended the cycle length for both signalized ramps be optimized to achieve optimal levels of service for the intersection by horizon year 2030. Overall the projected intersection delay is expected to be around 97.1-seconds for the westbound ramps and 72.5-seconds for the eastbound ramps during the PM peak hour with the proposed Cavasson development.

  *It is recommended that any and all recommended improvements for the **Hayden Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*
- The intersection of **Scottsdale Road and the Loop 101 Ramps** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. Under the No-Build 2030 scenario, this intersection experiences increased delay in both study peak hours. Overall, the PM peak hour at both ramps signals experiences the most delay of the two study peak hours. Although the signalized interchange experiences increased delay in the No-Build 2030 scenario, the recommended mitigation and reported delays herein are for the build scenario which includes the Cavasson development. It is recommended the cycle length for both signalized ramps be optimized to achieve optimal levels of service for each approach. Overall the projected intersection delay is expected to be 191.5-seconds for the westbound ramps and 85.2-seconds for the eastbound ramps in the PM peak hour with the Cavasson development.

  *It is recommended that any and all recommended improvements for the **Scottsdale Road/Loop 101 Traffic Interchange** be evaluated by ADOT as part of their Loop 101 improvements.*
- The intersection of **Scottsdale Road and Thompson Peak Parkway** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. It should be noted this intersection was analyzed as a four-legged intersection with the assumption that

Thompson Peak Parkway will be constructed to the west of Scottsdale Road and connect to 56th Street by horizon year 2030. Under the No-Build 2030 scenario, this intersection experiences heavy delay in both study peak hours. Overall, the intersection delay is projected to be 140.3-seconds in the AM peak hour and 51.9-seconds in the PM peak hour under the 2030 No-Build scenario. With the addition of the Cavasson development, the intersection is expected to experience delays of 142.3-seconds in the AM peak hour, and 84.8-seconds in the PM peak hour. To help mitigate this intersection, it is recommended signal phasing and green times be optimized as well as add in overlap right-turn phasing. Signal progression for the north/south through movements should be optimized as well. With the recommended mitigation, the overall intersection delay will be 66.3-seconds in the AM peak hour, and 62.8-seconds during the PM peak hour.

- The intersection of **Scottsdale Road and Legacy Boulevard** is projected to experience heavy delay by study horizon year 2030 with or without the proposed Cavasson development during both study peak hours. It should be noted this intersection was analyzed as a four-legged intersection by horizon year 2030. It is expected Legacy Boulevard will be constructed to the west of Scottsdale Road and connect to 56th Street by horizon year 2030. This intersection experiences heavy delay under the 2030 No-Build condition for both study peak hours. Overall, the intersection delay under the 2030 No-Build condition is projected to be 47.2-seconds in the AM peak hour and 38.5-seconds in the PM peak hour. With the addition of the proposed Cavasson development, the intersection delay is expected to increase to 78.2-seonds in the AM peak hour, and 75.6-seconds in the PM peak hour. It is, recommended to optimize the signal timing and add in overlap phasing to all right-turn lanes. With the recommended mitigation the intersection delay is expected be 60.4-seconds in the AM peak hour, and 71.2-seconds in the PM peak hour.
- The intersection of **Scottsdale Road and Mayo Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. The heavy northbound and southbound movements conflict with the anticipated heavy eastbound movements. Signal optimization should occur with future signal progression plans for Scottsdale Road. It is therefore recommended this intersection be monitored for optimal signal timing and corridor progression due to the proximality of the existing Loop 101 traffic interchange.
- The intersection of **Scottsdale Road and Princess Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development during the PM peak hour. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.
- The intersection of **Scottsdale Road and Frank Lloyd Wright Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is

therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.

- The intersection of **Hayden Road and Frank Lloyd Wright Boulevard** is projected to experience increased delay by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.
- The intersection of **Pima Road and Thompson Peak Parkway** is projected to experience heavy delays by study horizon year 2030 with or without the proposed Cavasson development. Even with signal optimization this intersection is expected to experience heavy delays during future study peak hours. It is therefore recommended this signal be monitored in the future for optimal signal timing and corridor progression.
- The intersection of **Miller Road and Legacy Boulevard** is projected to be signalized by study horizon year 2020. With future traffic anticipated by the Miller Road connection to the south and with additional traffic anticipated by currently unknown surrounding developments, it is recommended that dual northbound left-turn lanes be provided as well as a dedicated northbound right-turn lane by horizon year 2020.
- The proposed internal site intersection of **Claret Drive and Cavasson Boulevard** is anticipated to be a signalized as the surrounding area develops. Exclusive left-turn lanes and dedicated right-turn lanes should be provided in all approaches. Signal warrants will be evaluated with future phases of the Cavasson development.
- The proposed intersection of **Miller Road and Cavasson Boulevard** is anticipated to be signalized as the surrounding area develops. Exclusive left-turn lanes and dedicated right-turn lanes in all approaches are recommended. With the possible future connectivity to the west, it is recommended that additional right of way is provided for future through lanes eastbound and westbound. Signal warrants will be evaluated with future phases of the Cavasson development.
- The proposed intersection of **Hayden Road and Cavasson Boulevard** is anticipated to be signalized upon completion of the Phase I development. It is recommended that right of way be provided for a future through lane east/west to provide connectivity to the east. By the opening year 2020, a single 300-foot northbound left-turn lane is warranted, as well as a single 200-foot left-turn and right-turn lanes eastbound. Additional right-of-way will be provided and striped out for the proposed future lanes required for an acceptable level of service.

Queue Storage

- As shown in **Table 11**, the existing storage lengths at the existing intersections are not anticipated to accommodate the additional traffic generated in 2030. Additional storage length calculations should be completed prior to traffic signal installation, a change in intersection stop control or installation of raised medians.
- It is recommended all proposed site access driveways along Legacy Boulevard, Hayden Road, Miller Road, Cavasson Boulevard and Claret Drive provide a

minimum of 150-foot turn lanes at intersections regardless of intersection control so long as they are not encumbered by upstream intersections or utility conflicts. Locations with restrictions or where additional storage beyond the calculations included in this report are discussed below.

- Proposed ¾ site **Access G,** located just north of site Access M and south of Legacy Boulevard along Hayden Road, is recommended to provide a minimum 150-foot northbound left-turn lane as well as a 100-foot southbound dedicated right-turn lane. An upstream intersection restricts the ability to provide additional southbound right turn storage.
- Proposed ¾ site **Access H** located just north of the Hayden Road/Loop 101 interchange along Hayden Road is recommended to provide a minimum 100-foot northbound left-turn lane as well as a 150-foot southbound dedicated right-turn lane. The presence of a storm drain inlet conflict restricts the ability to provide additional northbound left turn queue storage.
- Proposed ¾ site **Access I**, located just north of the Loop 101 frontage road on Claret Drive is recommended to provide a 55-foot northbound right turn lane. This is restricted from further queue storage due to the proximity of the frontage road. A southbound left turn storage of 100 feet is recommended; this length is restricted by the need to provide a back to back left turn lane (northbound storage) into Access J.
- Proposed main site **Access M** (Hayden Road/Cavasson Boulevard) is planned as a signalized intersection at the opening of the proposed Cavasson Phase I development. Access M is located between Legacy Boulevard and north of Access H along Hayden Road and is planned to provide 300-feet of queue for dual northbound left-turn lanes as well as 225-feet for a dedicated southbound right-turn lane. Internally, the development should provide a minimum of 200-feet of storage for the eastbound dual left-turn and a single right-turn lane. Additional pavement will be provided and striped out for the proposed future ultimate lane alignment for connectivity to the east.
- **Access K** (Cavasson Boulevard/Claret Drive) is an internal signalized intersection with permitted phasing in all approaches. The provision of 150-foot southbound and eastbound left-turn lanes, a 300-foot westbound left-turn lane and a 200-foot northbound left-turn lane are recommended. It is also recommended that a 200-foot northbound right-turn lane, 180-foot westbound right-turn lane and 150-foot eastbound and southbound right-turn lane be provided by full build of the Cavasson development.
- **Access B** (Miller Road/Cavasson Boulevard) is a planned signalized intersection with permitted/protected phasing. A 300-foot westbound left-turn and right-turn lane, as well as a southbound 225-foot southbound left-turn lane are recommended. As the area is built out with connectivity to the south along Miller Road, it is recommended that the future queue length for the westbound and northbound left-turn lanes and northbound right-turn lane be constructed to provide a minimum storage of 150-feet.
- **Access A** and **Access C** both are recommended to provide 100-foot southbound left-turn lanes and well as 100-foot northbound dedicated right-turn lanes. The

presence of back to back turn lanes and likely retaining walls from the Miller Road underpass may restrict the ability to provide more storage at these locations.

- The intersection of **Miller Road and Legacy Boulevard** is planned to be signalized upon buildout of the Cavasson development ultimately providing dual 250-foot northbound left-turn lanes as well as a dedicated northbound right-turn lane. Although the reported volumes documented within this report do not show a need for dual northbound left-turn lanes it is CivTech's understanding the planned area analyzed within this report does not include some portions of future development within the study area. As such, longer queues and dual lanes are recommended.

Sight Distance

- The developer should ensure that adequate sight distance is provided at all proposed site access points to allow safe left and right turning movements in and out of the Cavasson development. It is recommended that sight triangles be designed at all site access driveways per the requirements shown in *Appendix 5-3B* within the *City of Scottsdale Design Standards and Policies Manual*. Excerpts from the *City of Scottsdale Design Standards and Policies Manual* and tables have been included in **Appendix K**.

LIST OF REFERENCES

A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, Washington, D.C., 2004.

ADOT Traffic Engineering Policies, Guidelines, and Procedures, Arizona Department of Transportation, January 2000.

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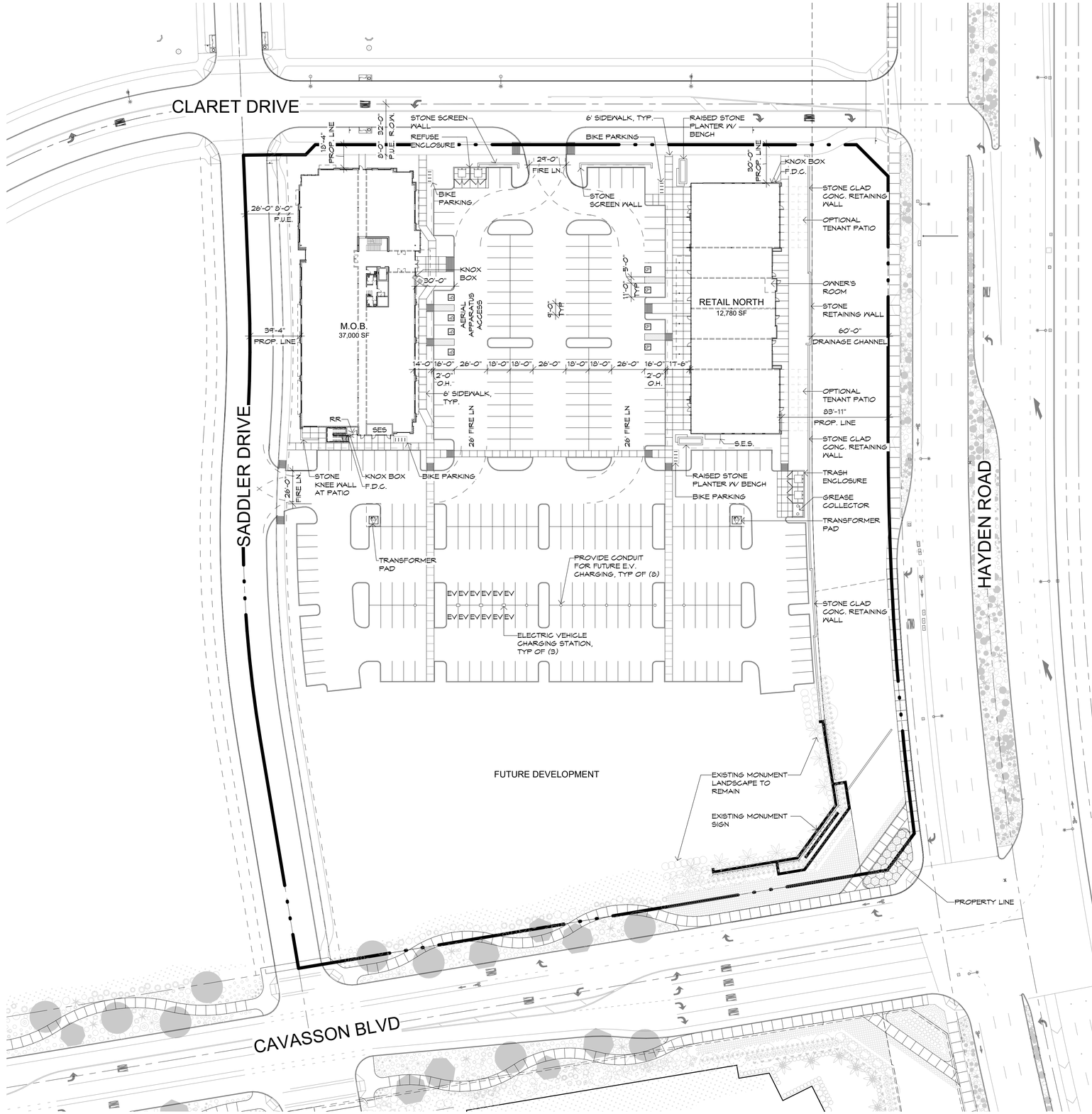
Crossroads East TIA, CivTech, Scottsdale, AZ, June 2011

ATTACHMENT B – SITE PLAN



1 **SITE DEVELOPMENT PLAN**
SCALE: 1" = 40'-0"

SITE DATA

APN:
212-31-120T

ADDRESS:
T.B.D.

SITE AREAS

GROSS LOT AREA	307,152 SF (7.0 AC) PROPOSED
NET LOT AREA	257,547 SF (5.9 AC) PROPOSED

EXISTING ZONING
PCP

ADJACENT SITES ZONING
PCD

BUILDING AREAS

	TOTAL AREA	TOTAL FOOTPRINT
M.O.B.:	37,600 GSF	18,800 SQFT
RETAIL:	12,780 GSF	12,780 SQFT

LOT COVERAGE
160,500 SF OPEN SPACE PROVIDED (**52.2%**) > **76,788 SF** REQUIRED (**25%**)

BUILDING HEIGHT

ALLOWABLE:	84'	
PROVIDED:	MOB: 32' / 2-STORIES	RETAIL: 23' / 1-STORY

BUILDING SETBACKS

FRONT:	25'
REAR:	15'
STREET SIDE:	15'

LANDSCAPE SETBACKS

REQUIRED:	25' FRONT; 20' REAR; 15' SIDE REQUIRED
PROVIDED:	AS DIMENSIONED ON LANDSCAPE PLANS

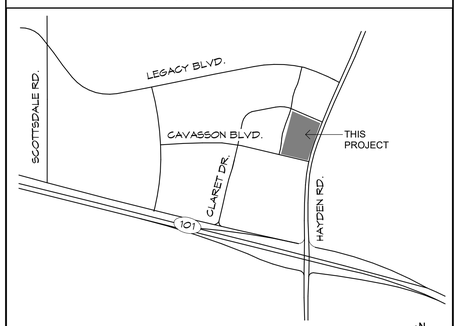
PARKING

TOTAL PARKING:	(XX) SPACES REQUIRED, (290) PROVIDED
ADA PARKING:	(7) SPACES REQUIRED, (8) PROVIDED
E.V. PARKING*:	4% (12) REQUIRED, (12) PROVIDED
E.V. READY PARKING:	10% (29) REQUIRED, (30) PROVIDED

BIKE PARKING
1 BIKE SPACE / 10 VEHICLE SPACES = (29) REQUIRED, (32) PROVIDED

REFUSE
ENCLOSURES PROVIDED PER CITY OF SCOTTSDALE DETAILS.

VICINITY MAP



Butler Design Group Inc.
architects & planners
5013 East Washington St. #100
Phoenix, Arizona 85034
Phone 602-957-1800

PRELIMINARY NOT FOR CONSTRUCTION

Nationwide®

CAVASSON

Retail North & M.O.B.
Scottsdale, Arizona

Current Submittal: 100% PROGRESS SET
DATE
Revisions:

Project No.:	15148.400
Issue Date:	08/29/2024
Drawn By:	--
Project Manager:	--

Title:
SITE DEVELOPMENT PLAN

DR24

ATTACHMENT C – TRIP GENERATION

Proposed Development

Trip Generation Calculations (11th Edition)

720

Land Use	ITE Code	Qty	Unit	Weekday			AM Peak Hour			PM Peak Hour			Weekday			AM Peak Hour			PM Peak Hour			
				Rate	% In	% Out	Rate	% In	% Out	Rate	% In	% Out	Total	In	Out	Total	In	Out	Total	In	Out	
Medical-Dental Office Building	720	37.60	1000 SF GFA	36.00	50%	50%	3.10	79%	21%	3.93	30%	70%	1,354	677	677	117	92	25	148	44	104	Average
Medical-Dental Office Building	720	37.60	1000 SF GFA	14.52	50%	50%	0.87	79%	21%	0.62	30%	70%	546	273	273	33	26	7	23	7	16	Minimum
Medical-Dental Office Building	720	37.60	1000 SF GFA	100.75	50%	50%	14.3	79%	21%	8.86	30%	70%	3,788	1,894	1,894	538	425	113	333	100	233	Maximum
Land Use	ITE Code	Qty	Unit	Weekday			AM Peak Hour			PM Peak Hour			Weekday			AM Peak Hour			PM Peak Hour			
				Equation	% In	% Out	Equation	% In	% Out	Equation	% In	% Out	Total	In	Out	Total	In	Out	Total	In	Out	
Medical-Dental Office Building	720	37.60	1000 SF GFA	T=42.97(X)-108.01	50%	50%	Ln(T)=0.90Ln(X)+1.34	79%	21%	T=4.07(X)-3.17	30%	70%	**1,508**	**754**	**754**	**100**	**79**	**21**	**150**	**45**	**105**	Equation

Medical-Dental Office Building	Standard Deviation	13.38		1.49		1.86
	Number of Studies	18		24		30
	Average Size	15		25		23
	R^2	0.92		0.80		0.77

822

Land Use	ITE Code	Qty	Unit	Weekday			AM Peak Hour			PM Peak Hour			Weekday			AM Peak Hour			PM Peak Hour			
				Rate	% In	% Out	Rate	% In	% Out	Rate	% In	% Out	Total	In	Out	Total	In	Out	Total	In	Out	
Strip Retail Plaza (<40k)	822	12.78	1000 SF GLA	54.45	50%	50%	2.36	60%	40%	6.59	50%	50%	696	347	349	**30**	**19**	**11**	84	42	42	Average
Strip Retail Plaza (<40k)	822	12.78	1000 SF GLA	47.86	50%	50%	1.60	60%	40%	2.81	50%	50%	612	305	307	20	13	7	36	17	19	Minimum
Strip Retail Plaza (<40k)	822	12.78	1000 SF GLA	65.07	50%	50%	3.73	60%	40%	15.20	50%	50%	832	415	417	48	29	19	194	97	97	Maximum
Land Use	ITE Code	Qty	Unit	Weekday			AM Peak Hour			PM Peak Hour			Weekday			AM Peak Hour			PM Peak Hour			
				Equation	% In	% Out	Equation	% In	% Out	Equation	% In	% Out	Total	In	Out	Total	In	Out	Total	In	Out	
Strip Retail Plaza (<40k)	822	12.78	1000 SF GLA	T=42.20(X)+229.68	50%	50%	Ln(T)=0.66Ln(X)+1.84	60%	40%	Ln(T)=0.71Ln(X)+2.72	50%	50%	**769**	**384**	**385**	34	21	13	**93**	**47**	**46**	Equation

Strip Retail Plaza (<40k)	Standard Deviation	7.81		0.94		2.94
	Number of Studies	4		5		25
	Average Size	19		18		21
	R^2	0.96		0.57		0.56

Future Development

Trip Generation Calculations (11th Edition)

310

Land Use	ITE Code	Qty	Unit	Weekday			AM Peak Hour			PM Peak Hour			Weekday			AM Peak Hour			PM Peak Hour			
				Rate	% In	% Out	Rate	% In	% Out	Rate	% In	% Out	Total	In	Out	Total	In	Out	Total	In	Out	
Hotel	310	163	Rooms	7.99	50%	50%	0.46	56%	44%	0.59	51%	49%	1,303	652	651	75	42	33	97	49	48	Average
Hotel	310	163	Rooms	5.31	50%	50%	0.20	56%	44%	0.26	51%	49%	866	433	433	33	19	14	43	21	22	Minimum
Hotel	310	163	Rooms	9.53	50%	50%	0.84	56%	44%	1.06	51%	49%	1,554	777	777	137	77	60	173	88	85	Maximum
Land Use	ITE Code	Qty	Unit	Weekday			AM Peak Hour			PM Peak Hour			Weekday			AM Peak Hour			PM Peak Hour			
				Equation	% In	% Out	Equation	% In	% Out	Equation	% In	% Out	Total	In	Out	Total	In	Out	Total	In	Out	
Hotel	310	163	Rooms	T=10.84(X)-423.51	50%	50%	T=0.50(X)-7.45	56%	44%	T=0.74(X)-27.89	51%	49%	1,343	672	671	75	42	33	93	47	46	Equation

Hotel	Standard Deviation	1.92		0.14		0.22		
	Number of Studies	7		28		31		
	Average Size	148		182		186		
	R^2	0.85		0.84		0.78		

ATTACHMENT D – SYNCHRO REPORTS

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	46	25	60	53	15	35	39	12	15	44	39
Future Vol, veh/h	12	46	25	60	53	15	35	39	12	15	44	39
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	0	-	-	0	-	-	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	58	31	75	66	19	44	49	15	19	55	49

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	85	0	0	89	0	0	347	338	73	338	344	76
Stage 1	-	-	-	-	-	-	103	103	-	226	226	-
Stage 2	-	-	-	-	-	-	244	235	-	112	119	-
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	1512	-	-	1507	-	-	608	583	989	616	578	986
Stage 1	-	-	-	-	-	-	903	810	-	777	717	-
Stage 2	-	-	-	-	-	-	760	710	-	893	797	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1512	-	-	1507	-	-	491	549	989	523	544	986
Mov Cap-2 Maneuver	-	-	-	-	-	-	491	549	-	523	544	-
Stage 1	-	-	-	-	-	-	894	802	-	738	681	-
Stage 2	-	-	-	-	-	-	631	675	-	818	789	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	1.07	3.52	12.16	11.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	491	613	1512	-	-	1507	-	-	523	689
HCM Lane V/C Ratio	0.089	0.104	0.01	-	-	0.05	-	-	0.036	0.151
HCM Control Delay (s/veh)	13	11.6	7.4	-	-	7.5	-	-	12.1	11.1
HCM Lane LOS	B	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.3	0.3	0	-	-	0.2	-	-	0.1	0.5

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	50	27	58	58	16	46	58	13	16	48	42
Future Vol, veh/h	14	50	27	58	58	16	46	58	13	16	48	42
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	0	-	-	0	-	-	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	63	34	73	73	20	58	73	16	20	60	53

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	93	0	0	96	0	0	362	352	79	361	359	83
Stage 1	-	-	-	-	-	-	114	114	-	228	228	-
Stage 2	-	-	-	-	-	-	248	238	-	134	131	-
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	1502	-	-	1497	-	-	594	573	981	594	568	977
Stage 1	-	-	-	-	-	-	890	801	-	775	716	-
Stage 2	-	-	-	-	-	-	756	709	-	870	788	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1502	-	-	1497	-	-	472	539	981	480	534	977
Mov Cap-2 Maneuver	-	-	-	-	-	-	472	539	-	480	534	-
Stage 1	-	-	-	-	-	-	880	792	-	738	681	-
Stage 2	-	-	-	-	-	-	621	674	-	768	778	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	1.14	3.31	12.79	11.59
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	472	587	1502	-	-	1497	-	-	480	677
HCM Lane V/C Ratio	0.122	0.151	0.012	-	-	0.048	-	-	0.042	0.166
HCM Control Delay (s/veh)	13.7	12.2	7.4	-	-	7.5	-	-	12.8	11.4
HCM Lane LOS	B	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.4	0.5	0	-	-	0.2	-	-	0.1	0.6