

Southwest Valley – Camelback Road Truck Study

FINAL PROJECT REPORT

March 2024



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Prepared for



March 2024

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1.0 INTRODUCTION

1.1 Background

This study has been conducted to address the noise and vibration impacts of heavy trucks and other vehicles in the Southwest Valley. In March 2022, member agencies brought to the Maricopa Association of Governments (MAG) their concerns about the noise and vibration caused by these vehicles as they travelled along Camelback Road and the potential remedies that may be pursued. These concerns focused primarily on the impacts occurring late at night when individual vehicles create excessive noise and vibration that becomes intrusive to the surrounding communities.

One event that led to the need for this study was the annexation of a of a two-mile section of Camelback Road into the Litchfield Park city limits. The city has had a longstanding ban on heavy trucks passing through the city except on designated truck routes that did not include Camelback Road. Responses from stakeholders to the possible enforcement of the ban on Camelback Road brought some urgency to the timing for this study.

In September 2022, MAG initiated the Southwest Valley Camelback Road Truck Study to analyze the impacts of heavy truck travel and provide information on potential remedies and their effectiveness in mitigating the intrusive impacts.

Since the start of the project, Senate Bill (SB) 1097 was passed by the Arizona State Legislature and signed into law by the governor, which prevents municipalities from applying truck bans along roadway annexations that occurred after January 1, 2020. Though this new legislation will prevent the through-truck ban implementation, this study will continue to evaluate the impacts of such a truck ban as if this bill had never been signed into law.

This final report outlines the collection and analysis of technical data related to the impacts of vehicle travel throughout the study area with a specific emphasis on Camelback Road within the jurisdiction of Litchfield Park. The primary technical data collected during this project are noise and vibration sensor readings, traffic volume and classification data, as well as truck trip generator locations and routing information. While several aspects of the study focus on the annexed segment of Camelback Road, consideration of the entire study area's street network is also considered in the data collection and analysis.

1.2 Study Area

The area for this study, also referred to in this document as the Southwest Valley, is bounded by Northern Parkway to the north, Loop 101 (Agua Fria) to the east, Interstate 10 (I-10) to the south, and Loop 303 (Estrella) to the west. The municipalities of Avondale,

Glendale, Goodyear, Litchfield Park, and Phoenix are all represented within the study area boundaries along with a substantial amount of unincorporated Maricopa County land.

The land use within the study area is largely single-family residential homes and planned communities. There are commercial developments clustered around the major I-10 interchanges. North of Camelback Road, the land uses are much more industrial with several major warehouses along Loop 303 and around Luke Air Force Base. There is also a major industrial park in the northeast corner of the study area. Additionally, there are aggregate mining operations along the Aqua Fria River. **Figure 1-1** illustrates the study area location, along with some key characteristics of the region.

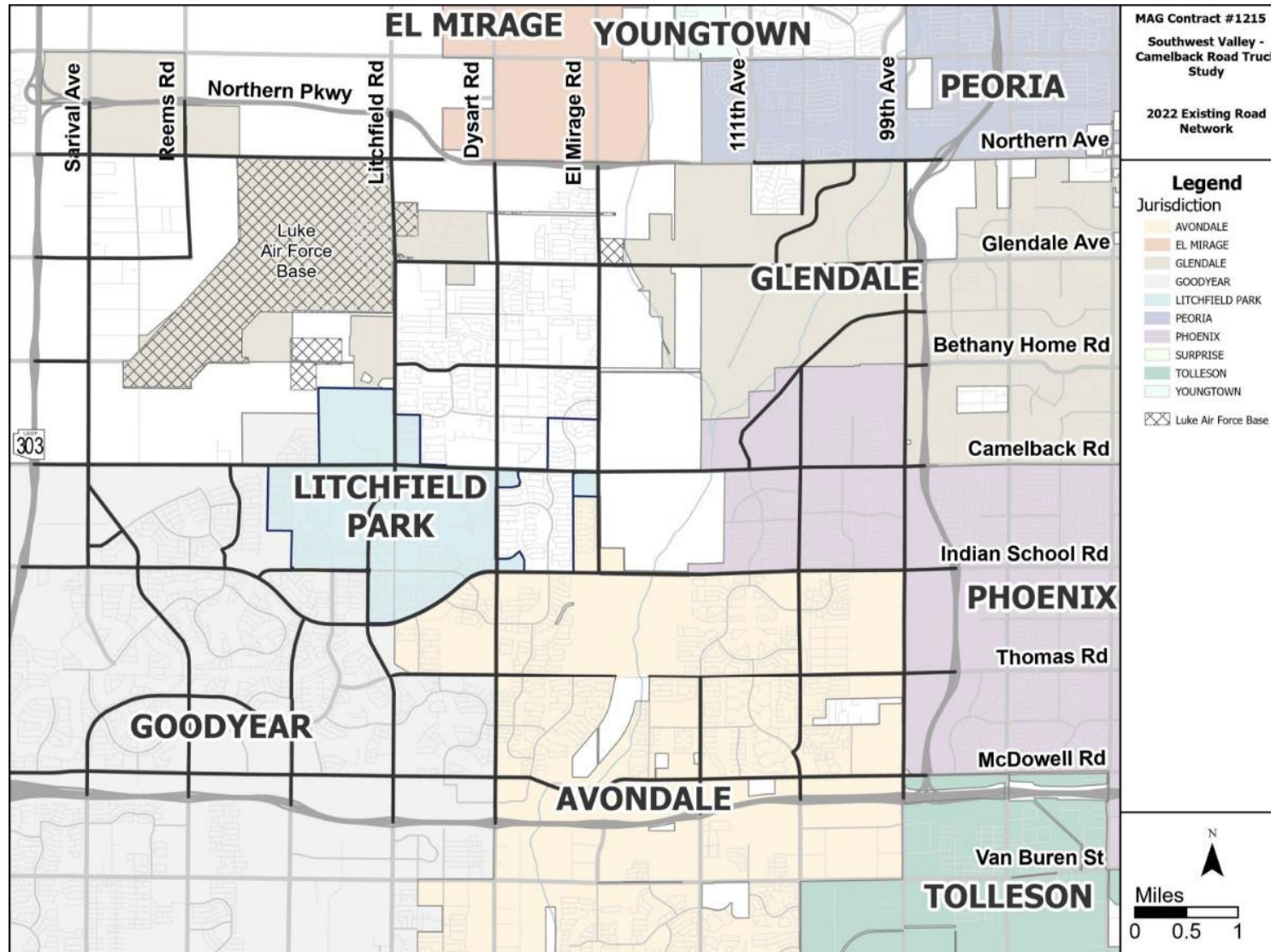
1.3 Nature of Resident Comments

Residents within Litchfield Park have written a number of complaints regarding the truck noise and vibration along Camelback Road. These complaints are documented in **Appendix B**.

The City of Litchfield Park held a public meeting on December 14, 2022, to allow members of the public to voice their perspectives regarding the truck noise and vibration along Camelback Road. The meeting was attended by approximately 80 people, of which the majority were Litchfield Park residents. Also represented at the meeting were residents from Goodyear and unincorporated Maricopa County. Additionally, there were representatives from the trucking association, a firefighter, a police officer, and members from the League of Cities.

Litchfield Park received 20 comment cards, 19 of which commented about the impacts of truck traffic along Camelback Road, particularly during late night hours. The complaints consistently drew on the theme of disruption to quality of life, enjoyment of the outdoors at residential properties, and interruption of sleep.

Figure 1-1 – Study Area Map



2.0 EXISTING CONDITIONS

Field data have been collected to capture the major travel patterns throughout the study area, especially around Camelback Road within Litchfield Park. The data were obtained through review of existing documents, interviews with key stakeholders, and field surveys.

2.1 Existing Land Uses

Figure 2-1 shows the proportions of various land use types in the existing (2022) condition and future respectively based on the updated MAG land use database. The database was updated to include the most current information on recently completed development projects. Details on the adjustments to the land uses are provided in **Appendix A**. Approximately 23 percent of the existing land uses are open space or agricultural.

Figure 2-2 maps the existing land uses within the study area. Most of the industrial and commercial land uses are in proximity of the freeways on the outskirts of the study area. Note the large amounts of agricultural land along the Loop 101 (Agua Fria) freeway and in the northwest quadrant of the study area; these areas will convert over time to more commercial, industrial, and warehousing type development, all of which will contribute to more freight activity.

Figure 2-1 – Existing Shares of Land Uses

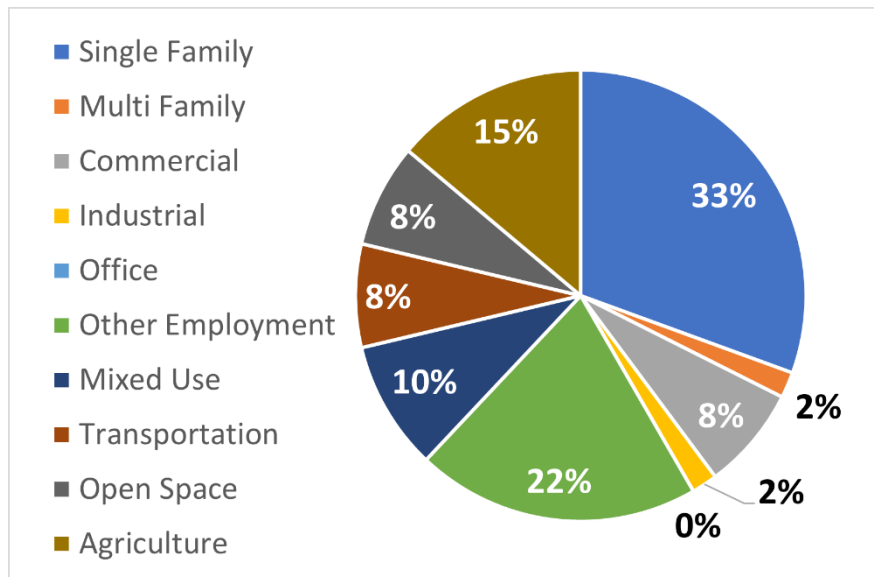
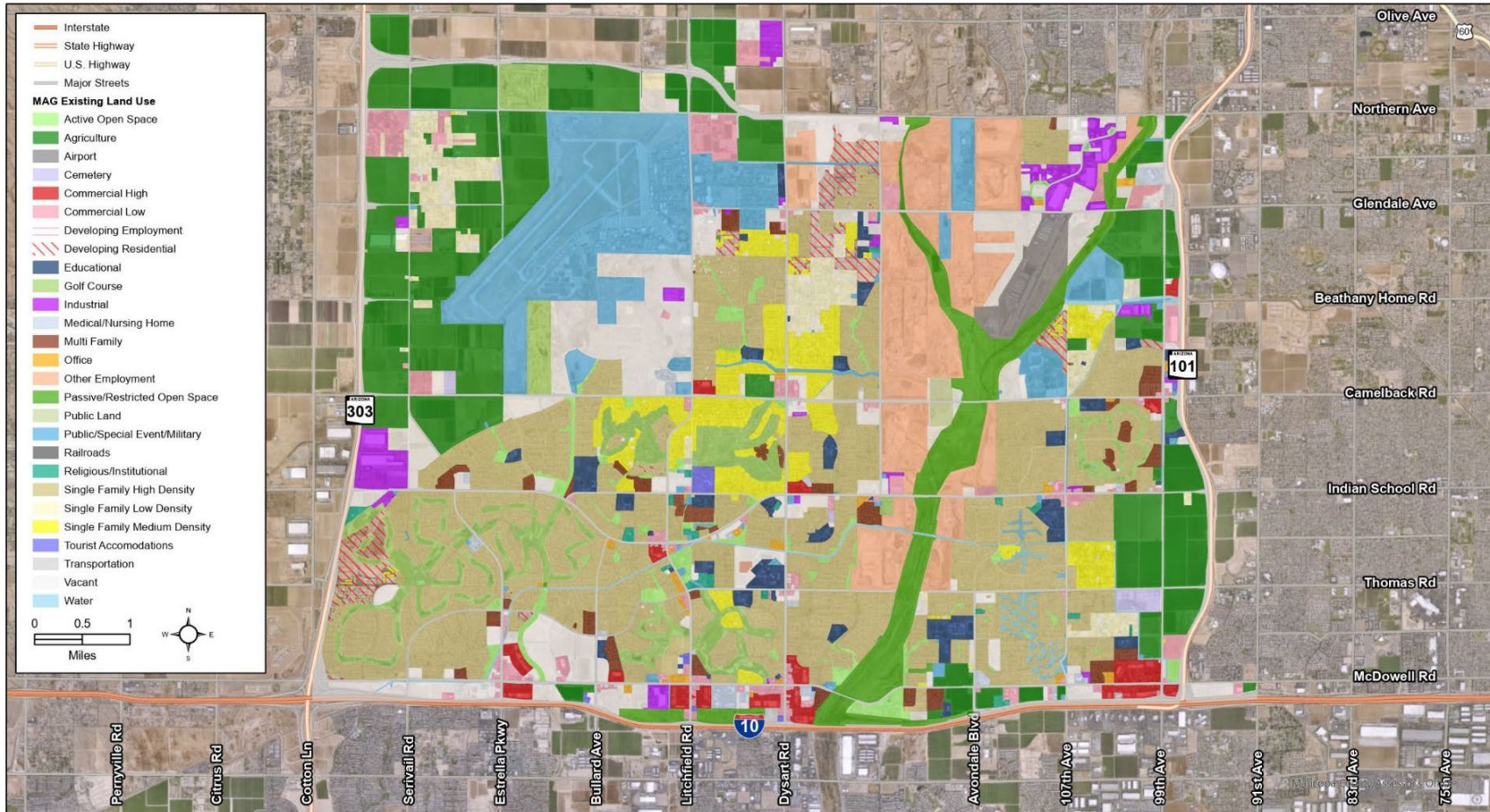


Figure 2-2 – Existing Land Use



	<p>Southwest Valley Camelback Road Truck Study</p>	<p>Maricopa County, AZ</p>
	<p>MAG - Existing Land Use</p>	

2.2 Existing Transportation Network

The existing transportation network was confirmed with aerial imagery and input from stakeholders.

Luke Air Force Base is located within the northwest corner of the study area and impacts the continuity of the arterial network. There are no east/west roads that pass through the full length of the study area between Camelback Road and Northern Parkway/Northern Avenue, which passes along the entire northern study area boundary. Likewise, there are no north/south roads that pass continuously through the study area between Sarival Avenue/Pebble Creek Parkway and Litchfield Road. The lack of continuity across this region expands the travel shed of Camelback Road and Litchfield Road making them particularly sensitive to impacts of future developments.

Additionally, the Agua Fria River flows southward between Dysart Road and 99th Avenue. Only four arterial east/west roads cross the river: Glendale Avenue, Camelback Road, Indian School Road, and McDowell Road. There are no north/south river crossings.

Figure 2-3 shows the existing number of lanes of each major arterial within the study area.

2.2.1 Current Policy Status

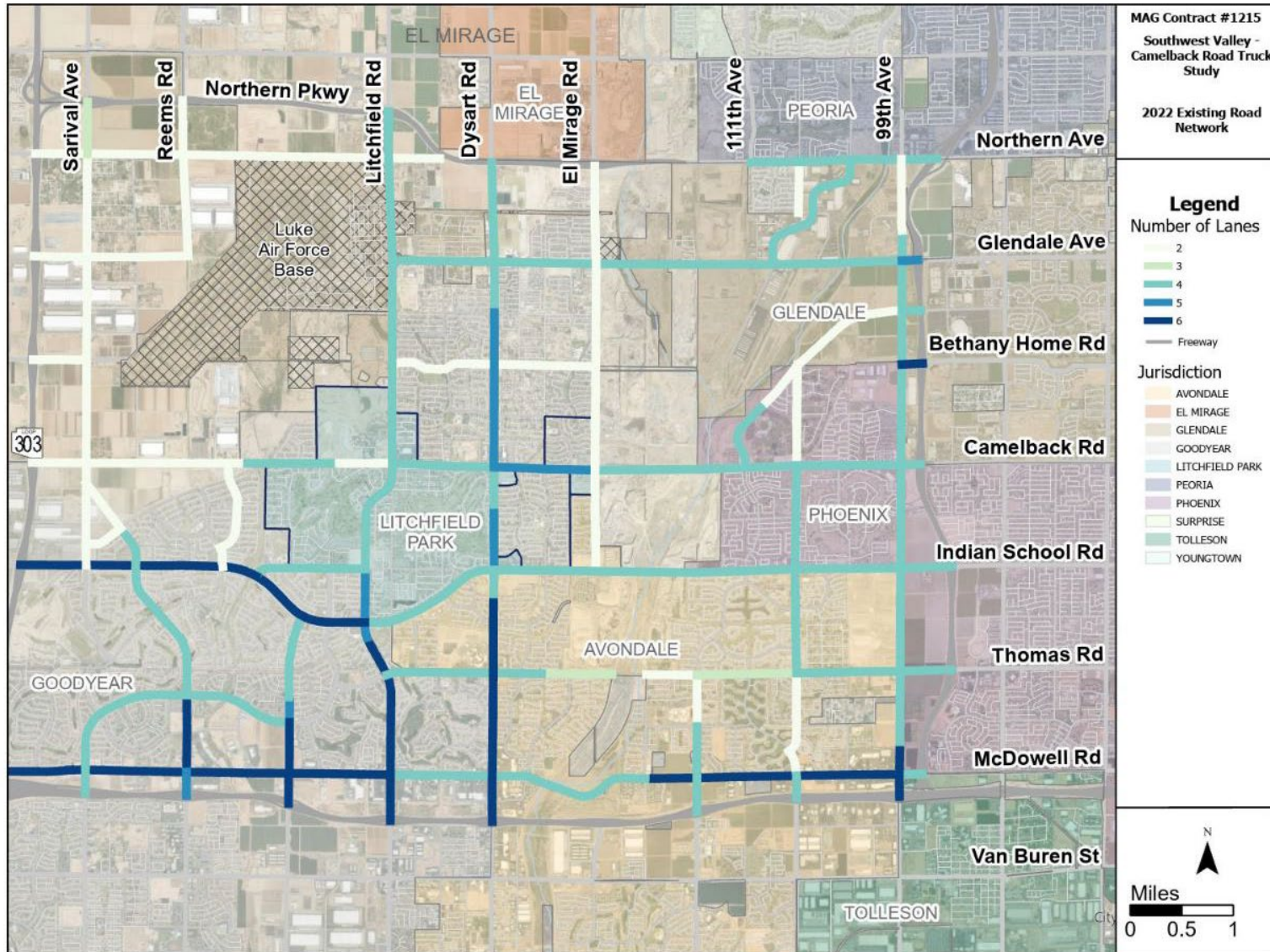
At the time this study began, the City of Litchfield Park was intending to enforce its longstanding prohibition of heavy truck trips through the city on its newly annexed section of Camelback Road. Enforcement of the truck ban on Camelback Road was suspended by City resolution while this study evaluated the impacts of the truck traffic and explore other remedies. Also during the study, SB 1097 was signed into law amending the Arizona Revised Statutes relating to vehicle size, weight and load.

Subsection G of this bill reads:

"A highway that does not have a truck restriction before being annexed by a local authority or otherwise transferred to a local authority may not be incorporated into an existing truck restriction that is passed by a local jurisdiction on or after January 1, 2020 unless the highway meets the criteria prescribed by subsection E [Safety Considerations] of this section."

Given the annexation of Camelback Road occurred after the January 1, 2020 deadline, the opportunity to enforce the truck ban on Camelback Road has been lost. However, this study has continued evaluating the impacts of a truck ban along Camelback Road despite the passing of SB 1097 to understand the effectiveness of the ban in comparison to other potential remedies.

Figure 2-3 – Existing Network Number of Lanes

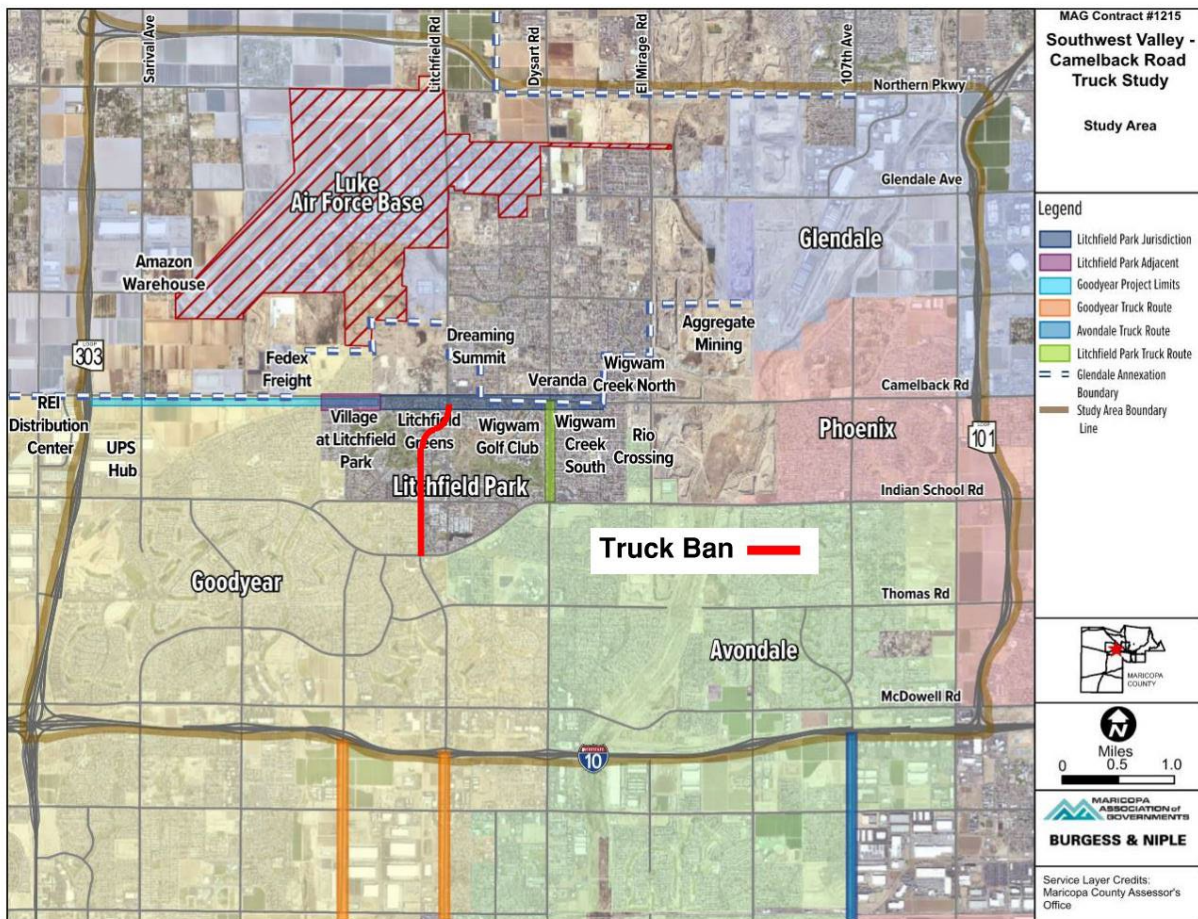


2.2.2 Existing Streets with a Ban on Through Truck Trips

The current truck ordinance in Litchfield Park bans trucks from passing through the city on all streets except Dysart Road. Prior to the annexation of Camelback Road, the only street within the transportation demand model meeting the requirements for the current ban to be enforced was Litchfield Road. Therefore, the ban was applied only to Litchfield Road in the model. This is discussed further in **Section 2.3.3**.

Figure 2-4 shows the extent of the existing truck ban. Other jurisdictions in the study area also have bans on through truck trips, but these jurisdictions are quite large, and the impact of the ban within the study area is small. For this reason, bans on truck trips in the other jurisdictions have not been programmed into the model.

Figure 2-4 – Existing Extent of Truck Ban within Litchfield Park



2.3 Existing Traffic and Freight Volume Analysis

2.3.1 Traffic Data Collection

A traffic data collection plan was developed to best capture the Camelback Road corridor around Litchfield Park as well as the connection of the arterial network to the surrounding freeways. In all, directional 24-hour traffic counts were collected at 24 locations and peak period turning movement counts were collected at five intersections.

This study uses the FHWA's vehicle classification system to define heavy trucks in the context of traffic and freight analysis. Any vehicles that fall into classes five through 13 were considered heavy trucks. **Figure 2-5** shows the FHWA's vehicle classification system.

The turning movement count locations were focused on the Camelback Road corridor within Litchfield Park as well as along Litchfield Road. These site locations best provide insights into the general routing choices of heavy trucks traveling near Litchfield Park. Traffic count locations are shown in **Figure 2-6**.

Table 2-1 shows the observed total traffic and truck volumes at each of the segment counts. **Figure 2-7** shows the total observed turning movement counts by peak period for car and truck volumes. The peak morning period hours are 6AM to 9AM and the peak afternoon period hours are from 2PM to 6PM. These hour ranges were selected as these are the same ranges the MAG model uses to define the AM and PM periods. The heaviest movement of trucks entering the proposed ban area come from the southbound right movement at Camelback Road and El Mirage Road. These trucks likely come from the mining operations north of Camelback Road.

The traffic counts are documented in **Appendix C**.

2.3.2 Regional Model Background and Calibration

This study utilized the MAG Regional Travel Demand Model (TDM) to fill in gaps in the data collected in order to describe traffic information for the entire study area and to forecast future traffic patterns. Travel demand models use land use and socioeconomic information to generate and distribute vehicles and freight trips.

Figure 2-5 – FHWA Vehicle Classification System


































Class 1 Motorcycles		Class 7 Four or more axle, single unit	
Class 2 Passenger cars		Class 8 Four or less axle, single trailer	
			
			
			
Class 3 Four tire, single unit		Class 9 5-Axle tractor semitrailer	
			
			
Class 4 Buses		Class 10 Six or more axle, single trailer	
			
			
Class 5 Two axle, six tire, single unit		Class 12 Six axle, multi-trailer	
			
			Class 13 Seven or more axle, multi-trailer
Class 6 Three axle, single unit			
			
			

Figure 2-6 – Traffic Count Locations

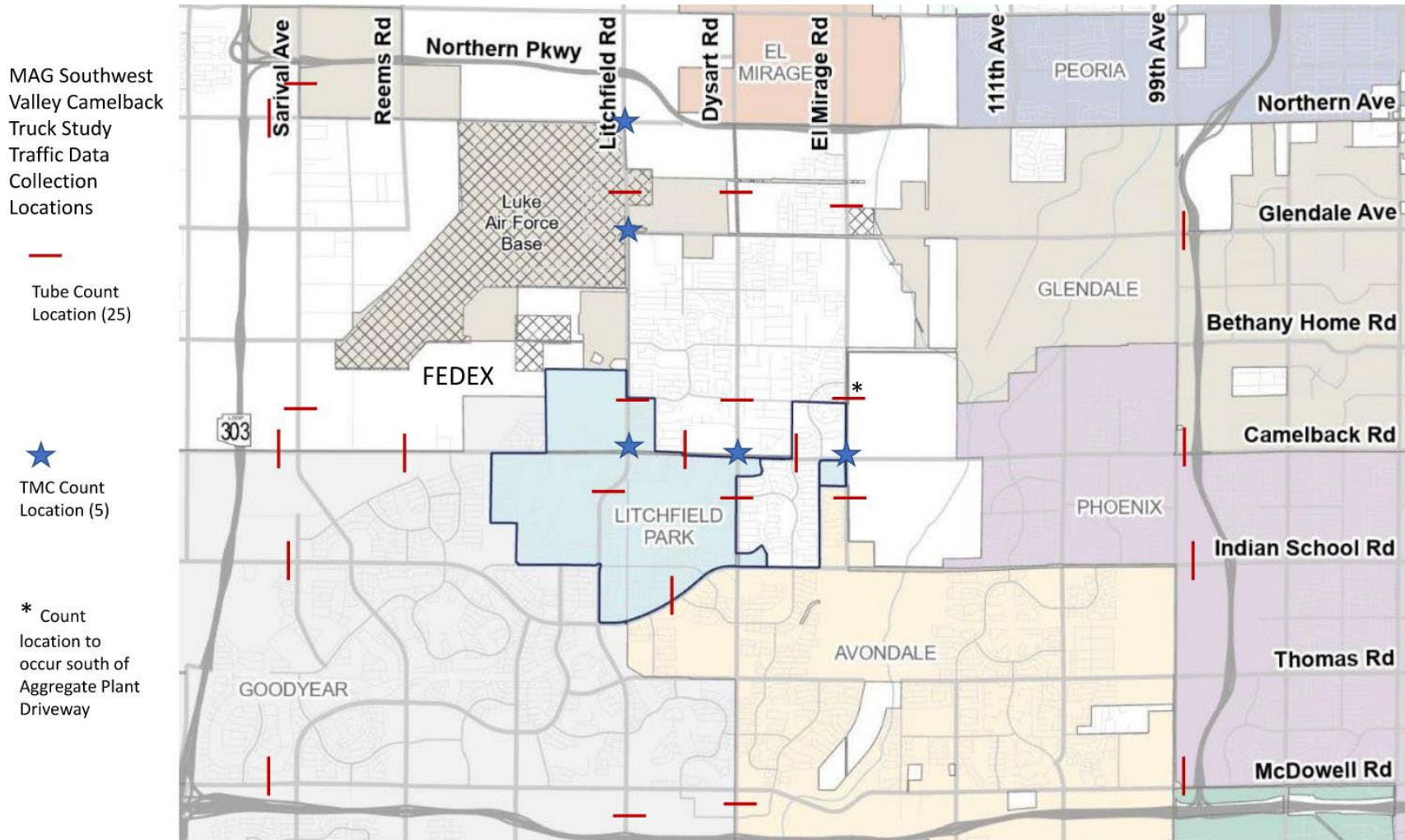
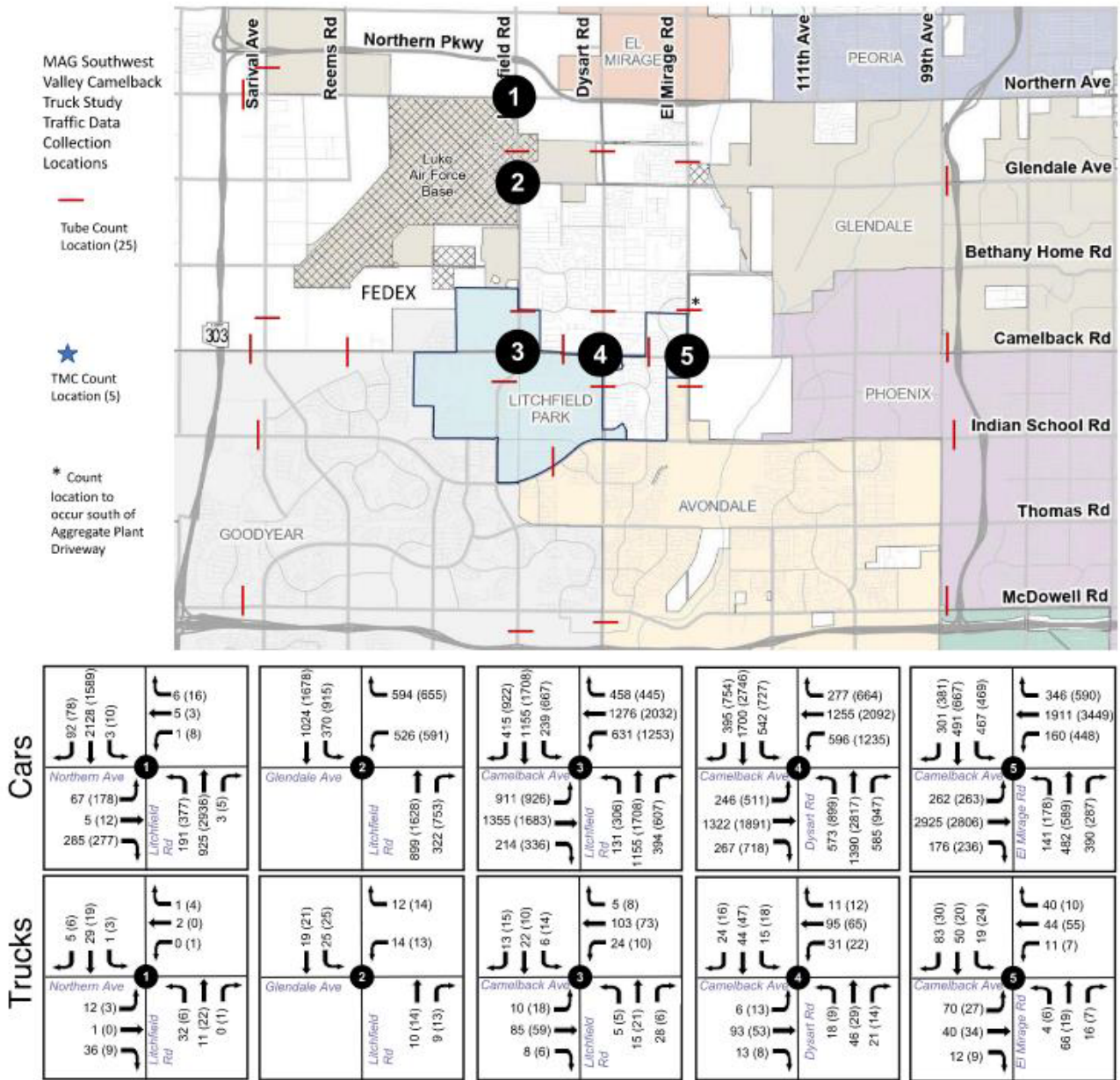


Table 2-1 – 24 Hour. Traffic Counts

COUNT LOCATRION	DIR	24 HR. VOL	24 HR. TRUCK
Camelback Road West of 152nd Ave	WB	3,949	262
Camelback Road West of 152nd Ave	EB	5,712	355
Camelback Road West of Dysart Road	EB	10,204	294
Camelback Road West of Dysart Road	WB	11,114	403
Camelback Road West of El Mirage Road	EB	11,354	325
Camelback Road West of El Mirage Road	WB	12,847	565
Camelback Road West of Loop 101	EB	18,610	1,172
Camelback Road West of Loop 101	WB	15,762	1,230
Camelback Road West of Sarival Ave	EB	6,425	475
Camelback Road West of Sarival Ave	WB	6,088	289
Dysart Road North of Camelback Road	NB	14,870	448
Dysart Road North of Camelback Road	SB	14,217	462
Dysart Road North of Glendale Ave	NB	4,396	202
Dysart Road North of Glendale Ave	SB	9,814	245
El Mirage Road North of Glendale Ave	SB	4,673	390
El Mirage Road South of Camelback Road	SB	3,869	150
El Mirage Road South of Camelback Road	NB	3,881	163
Glendale Ave West of Loop 101	EB	11,366	991
Glendale Ave West of Loop 101	WB	11,833	1,129
Indian School Road West of Loop 101	EB	12,784	284
Indian School Road West of Loop 101	WB	13,093	542
Indian School Road West of Sarival Avenue	EB	9,769	856
Indian School Road West of Sarival Avenue	WB	10,372	893
Indian School Road West of Dysart Road	EB	10,021	220
Indian School Road West of Dysart Road	WB	9,408	225
Indian School Road Between Litchfield Road & Dysart Road	EB	8,387	378
Indian School Road Between Litchfield Road & Dysart Road	WB	8,988	538
Litchfield Road North of Camelback Road	NB	10,157	123
Litchfield Road North of Camelback Road	SB	9,560	124
Litchfield Road North of Glendale Ave	NB	7,788	175
Litchfield Road North of Glendale Ave	SB	8,137	228
Litchfield Road South of Camelback Road	SB	8,670	111
Litchfield Road South of Camelback Road	NB	8,297	129
Litchfield Road South of McDowell Road	SB	18,104	1,039
Litchfield Road South of McDowell Road	NB	17,804	472
McDowell Road West of Loop 101	EB	16,929	978
McDowell Road West of Loop 101	WB	16,000	850
McDowell Road West of Sarival	EB	5,196	125
McDowell Road West of Sarival	WB	4,354	108
Northern Ave West of Sarival Ave	EB	2,359	111
Northern Ave West of Sarival Ave	WB	1,057	50
Sarival Ave North of Camelback Road	NB	1,532	112
Sarival Ave North of Camelback Road	SB	1,164	93
Dysart Road South of McDowell Road	NB	18,783	893
Dysart Road South of McDowell Road	SB	18,519	1,142
El Mirage Road North of Camelback Road	SB	4,673	390
Camelback Road Between Dysart & El Mirage	WB	11,318	786
Camelback Road Between Dysart & El Mirage	EB	11,325	726
Camelback Road Between Pebble Creek & Litchfield	EB	5,259	649
Camelback Road Between Pebble Creek & Litchfield	WB	5,793	226
Litchfield Road Between Northern & Glendale	NB	5,782	664
Litchfield Road Between Northern & Glendale	SB	5,509	387

Figure 2-7 – Peak Periods Turning Movement Counts



Regional TDMs provide insights into big picture questions about a transportation system while accounting for the impacts of changes in land use and improvements to the network. The TDM allows the project team to assess several impacts related to the impacts of truck trips on arterial streets.

A robust collaborative effort between MAG and the project study team was conducted to update the land use information and validate the TDM. MAG met with the project study team and other jurisdictions to collect information on new and planned developments. Developments impacting truck activity were identified that had not yet been recorded in MAG's land use information.

Initially, a model calibration effort was expected, but the TDM performed so well that its findings were deemed acceptable without additional calibration. The three main components analyzed for accuracy are the street network, the socioeconomic inputs, and comparing how the traffic volume outputs matched with the updated count data. **Figure 2-8** shows the modeled and observed 24-hour volumes by location. **Figure 2-9** shows the correlation between the observed traffic counts and the modeled volumes for all vehicle types. **Figure 2-10** shows the correlation between the truck counts and the modeled truck volumes. Locations along Camelback Road are highlighted red. The correlations were very close and demonstrates the validity of the regional model.

2.3.3 Determining Local and Through Truck Volumes

Using the model, the study team was able to distinguish local and through trucks from one another. This was done by populating the local truck class trip tables only with trucks originating or ending their trips within Litchfield Park, as consistent with the city's ordinances. Loading the model with local trucks ("L") separated from external through trucks ("E") allows the model to distinguish the different flows of local and external truck trips. This made it possible to quantify the number of trucks that would be subject to a ban of through truck trips in Litchfield Park.

Figure 2-8 – Existing and Modeled 24-Hour Traffic Volumes

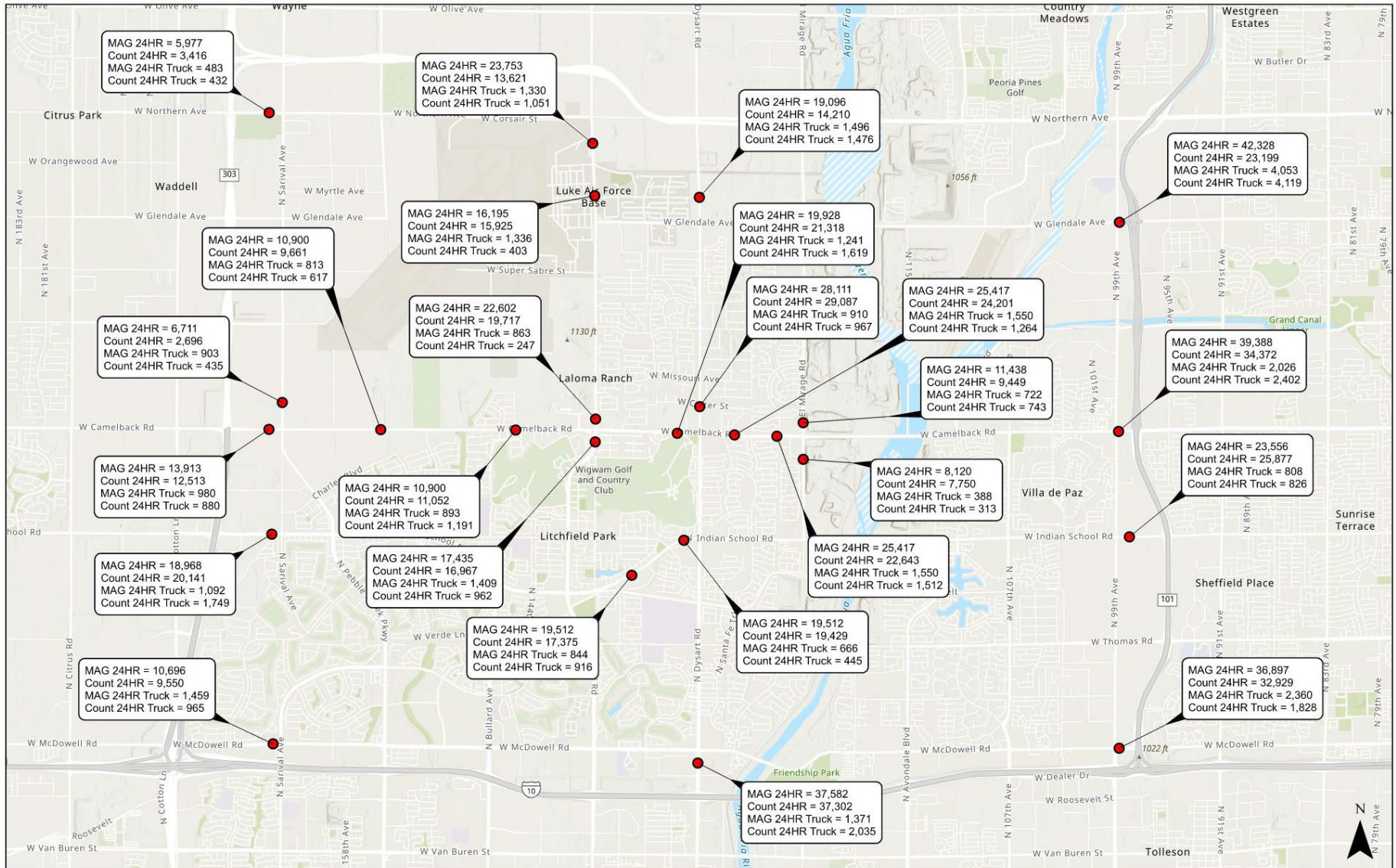


Figure 2-9 – MAG Model Validation All Vehicle Types

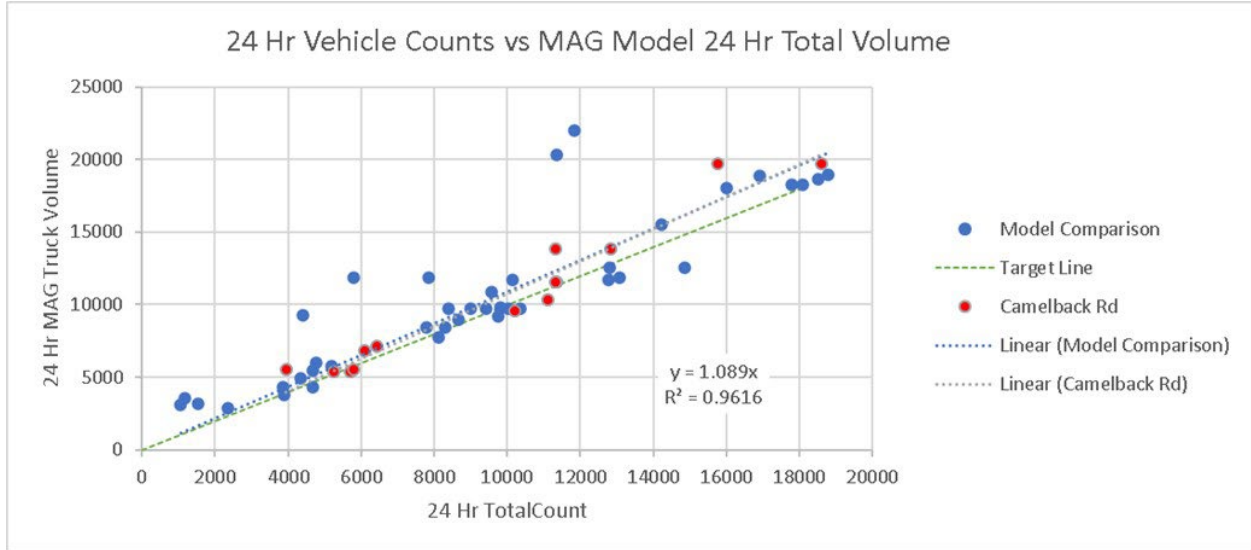
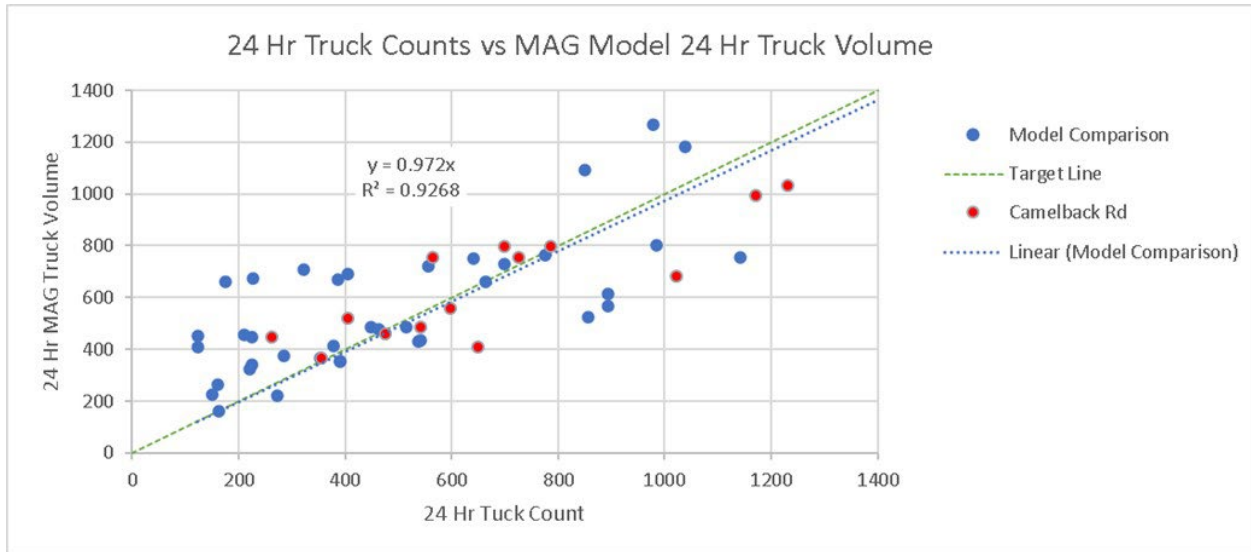


Figure 2-10 – MAG Model Validation Heavy Trucks



2.3.4 Existing Daily Traffic Volumes

Figure 2-11 shows the total daily traffic volumes on study area streets and the share of heavy trucks. The bandwidths depict the overall daily traffic volume inclusive of all vehicle types. Dysart Road and Litchfield Road are the only north-south streets that run continuously between Northern Parkway and I-10 and are near the center of the study area. Both of these streets experience relatively high traffic volumes along their entire length.

Camelback Road and Indian School Road, on the other hand, carry higher traffic volumes east of Dysart Road and lower volumes west of Dysart Road. The street with the highest traffic volumes is Glendale Avenue between Loop 101 (Agua Fria) and El Mirage Road in the northeast quadrant of the study area. The highest percentages of trucks occur on or near Northern Parkway at the northern edge of the study area.

2.3.5 Existing Daily Heavy Truck Trips

Figure 2-12 shows the daily truck volumes as well as local truck volumes determined by the travel demand model as described in Section 2.3.3. The yellow bandwidth depicts the trucks with an origin and/or destination within Litchfield Park while the blue bandwidth represents the total number of trucks. The heaviest truck traffic within the study area occurs in the northeastern corner and within proximity of the freeways especially along Northern Avenue and Glendale Avenue. Local truck trips account for between a quarter and a third of the truck traffic along Camelback Road, and much of this local truck traffic passes for miles within adjacent jurisdictions to reach Litchfield Park. A truck ban would reroute between 60-75 percent of truck traffic along Camelback Road.

Figure 2-13 shows the daily truck volumes that utilize the section of Camelback Road that has been annexed into Litchfield Park and illustrates the complete paths of these trips within the study area. Much of the Camelback Road truck traffic comes from the northeast and the designated truck route along Dysart Road.

Figure 2-11 – Daily Traffic and Heavy Truck Share

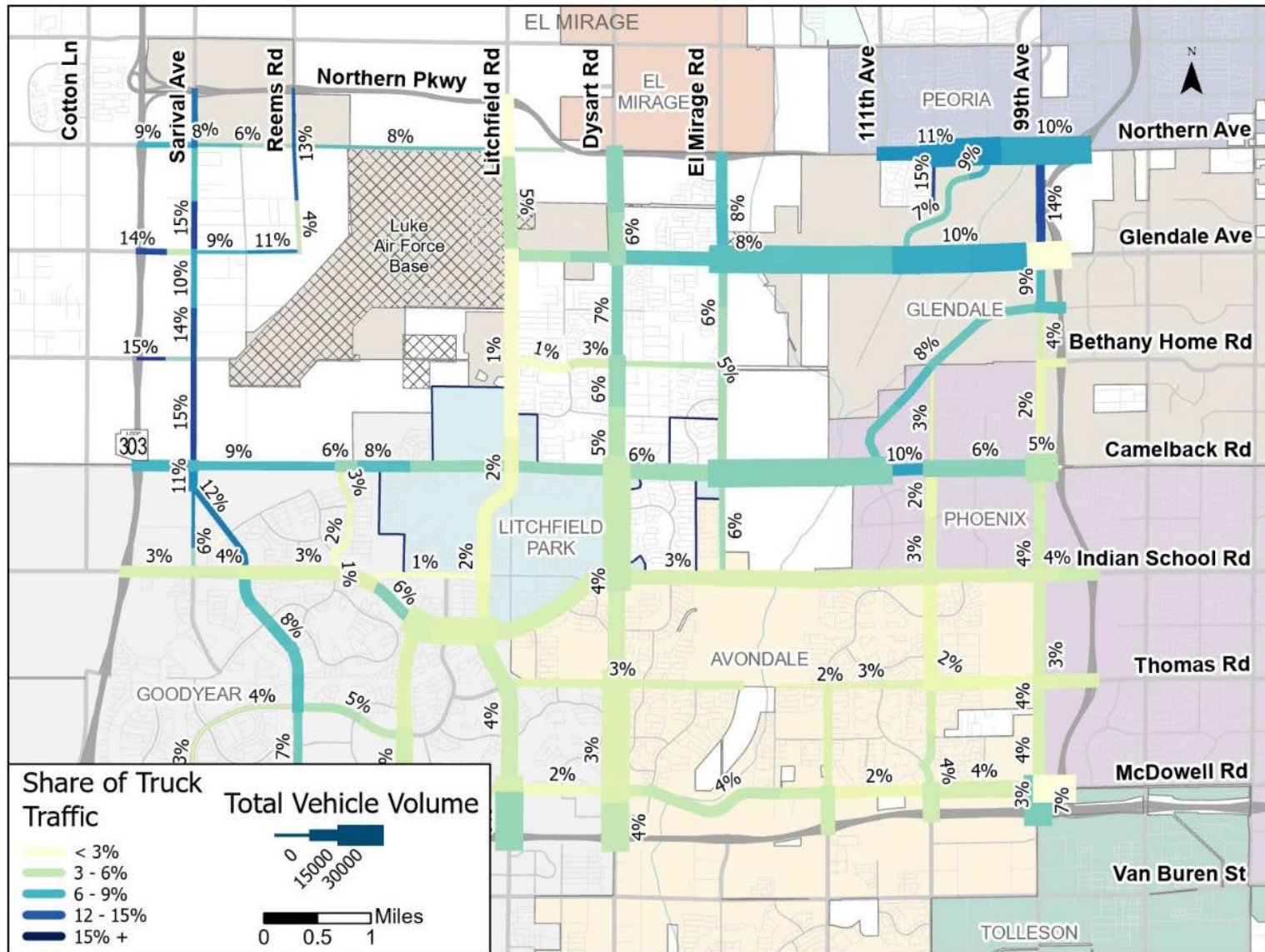


Figure 2-12 – Daily Truck Trips 2022

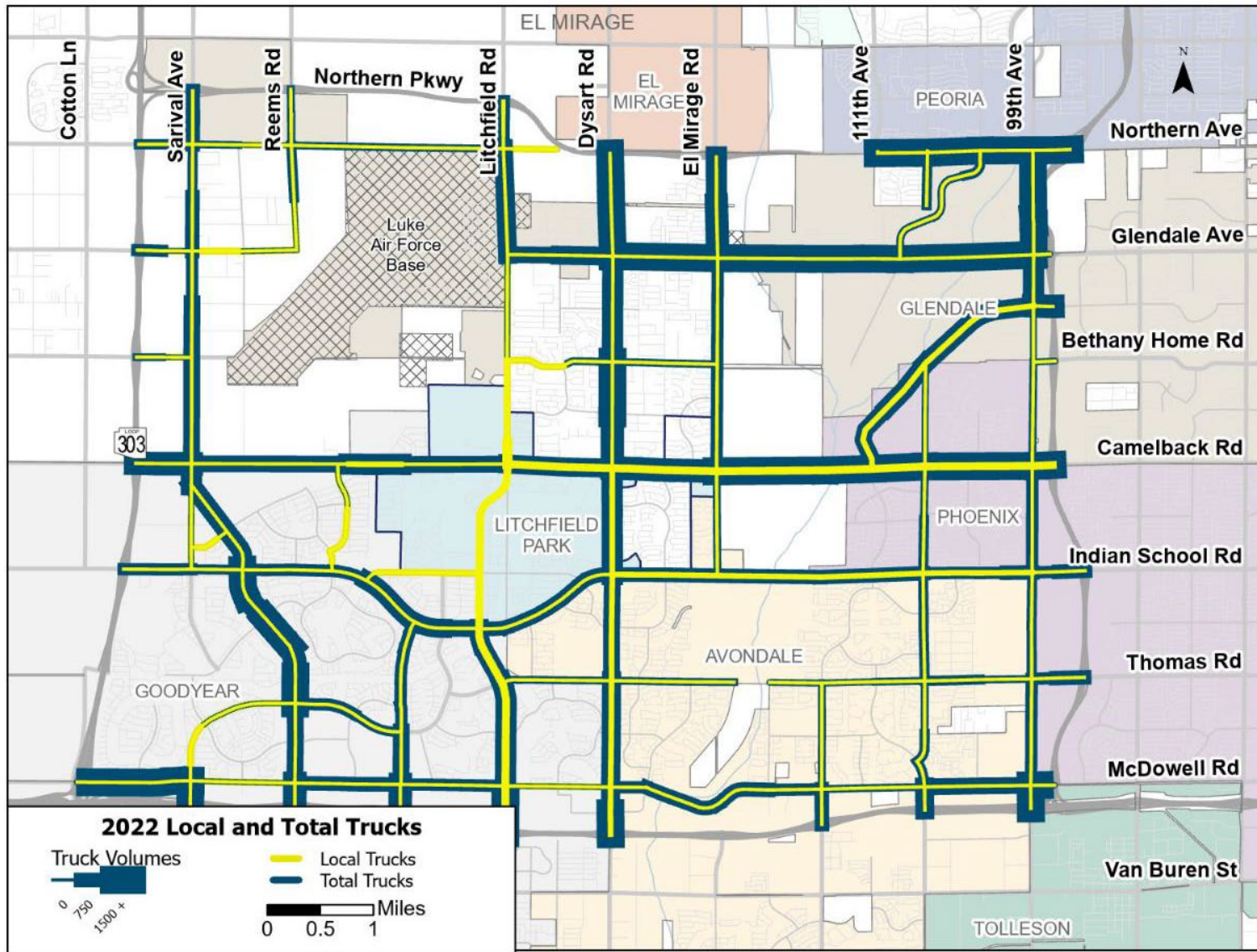
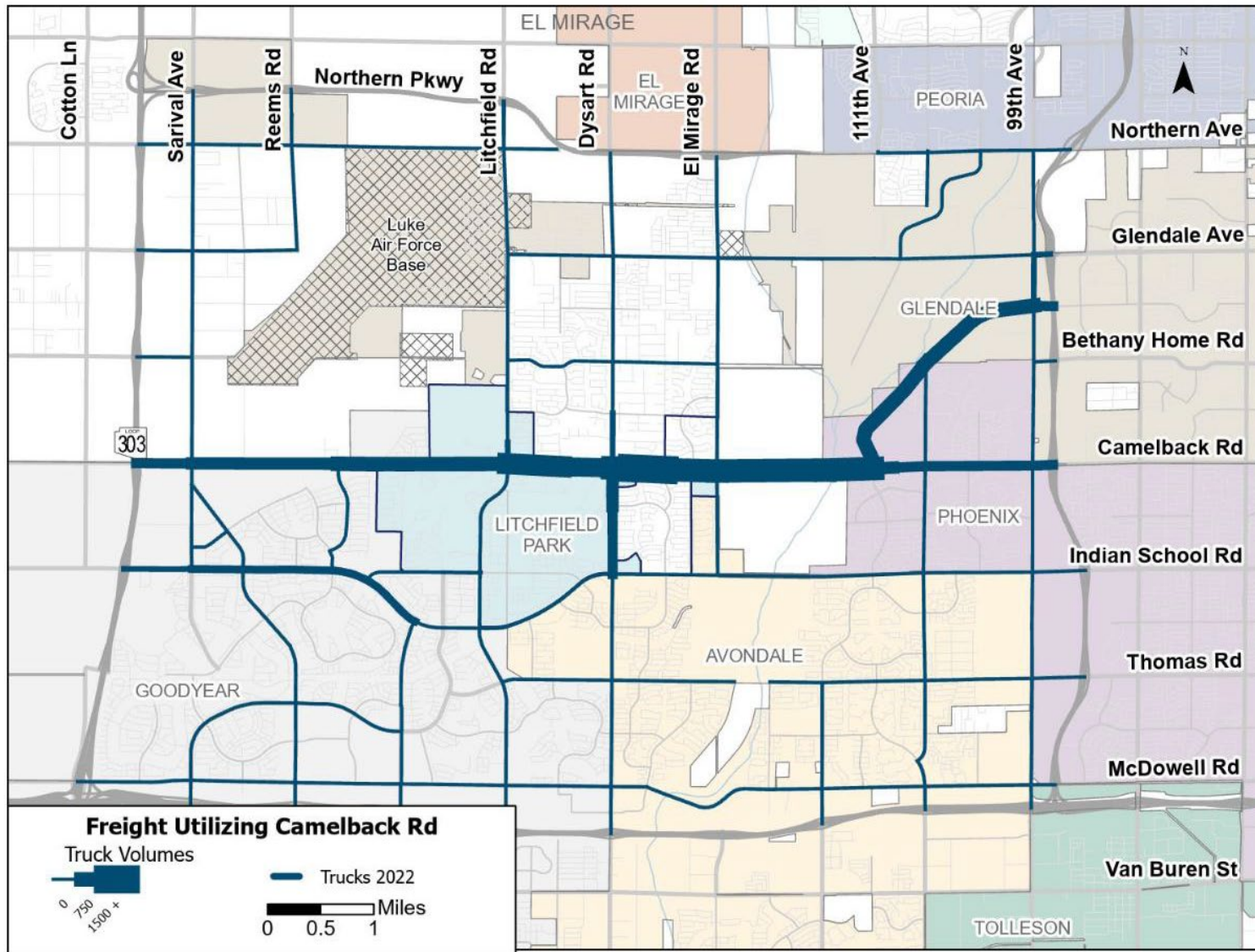


Figure 2-13 – Daily Truck Traffic Utilizing Camelback Road in Litchfield Park



2.4 Noise Fundamentals, Data Collection, and Analysis

This section summarizes noise data collection occurring November 16-19, 2022. The number and type of data points collected are shown on **Table 2-2**. Data are discussed below by measurement type. See **Figure 2-14** for the location of noise and vibration measurements. The purpose of the measurements was to collect noise and vibration levels and concurrent traffic counts to use for validation of traffic noise models developed for the project, and longer noise and vibration measurements to aid in identifying existing conditions.

Planned measurement locations were selected in consultation with City of Litchfield Park and MAG staff. Some measurement locations were adjusted during data collection to accommodate for activities that would interfere with measured results. Each measurement comprises data points for each record made during the measurement period. For example, each of the twenty-four short-term measurements comprises approximately 30, one-minute measurement records. This approach facilitates post-processing of collected data and removal of corrupted data without losing good data captured during the overall measurement.

Table 2-2 – Number and Type of Data Points

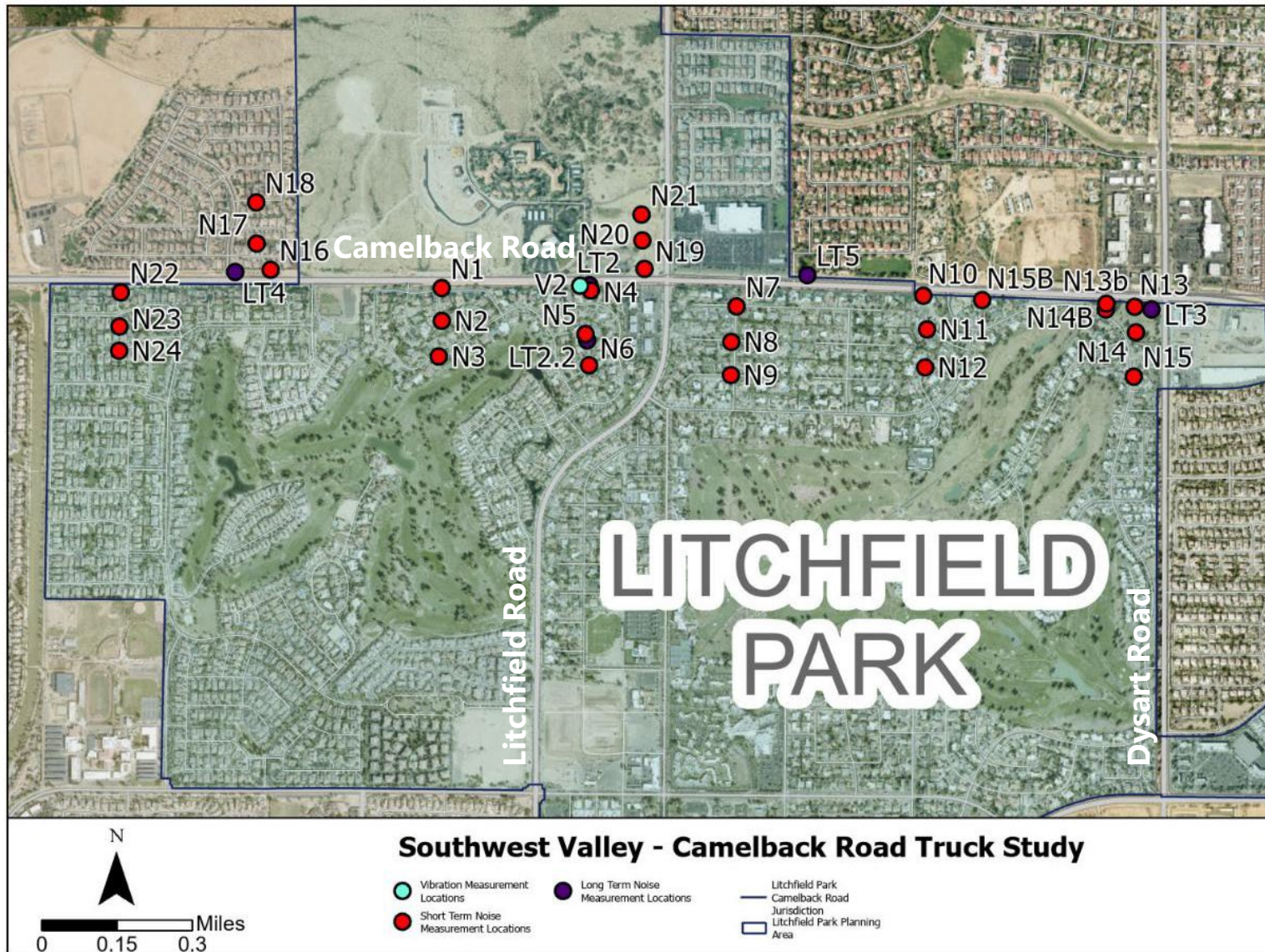
MEASUREMENT TYPE	# DATA POINTS
Long-term noise	126,838
Short-term noise	850
Privacy barrier reduction	94
Noise Data Points	127,782
Vibration Data Points	157,834
Total Data Points	285,616

2.4.1 Noise Fundamentals

This section provides a brief overview of the fundamentals of noise to help the reader better understand the technical information found in the next sections.

Noise is defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, commercial businesses, and highway vehicles. Steady-state highway traffic noise is predominantly a composite of noises from engine exhaust, drive train, and tire-roadway interaction.

Figure 2-14 – Noise and Vibration Data Collection Locations



The magnitude of sound (and noise) is described by the logarithm of the ratio of the sound pressure to a reference sound pressure of twenty micro-Pascals ($20\mu\text{Pa}$). Since the range of sound pressure ratios varies over orders of magnitude, a base-10 logarithmic scale is used to express sound levels in dimensionless units of decibels (dB). The commonly accepted limits of human hearing to detect magnitudes of sound are between the threshold of hearing at 0 decibels and the threshold of pain at 140 decibels.

Sound frequencies are represented in units of Hertz (Hz), which correspond to the number of vibrations per second of a given tone. A cumulative 'sound level' (L_{eq}) is equivalent to ten times the base-10 logarithm of the ratio of the sum of the sound pressures of all frequencies to the reference sound pressure. To simplify the mathematical process of determining sound levels, sound frequencies are grouped into ranges, or 'bands', each typically representing either one 'octave' or '1/3 octave' of the sound frequency spectrum. Since the cumulative sound level is a representation of the total sound pressure (energy), cumulative sound levels are then calculated by adding all the sound pressure levels of each band and multiplying the logarithm of the ratio of the result and the reference sound pressure level (e.g., $20\mu\text{Pa}$) by ten.

The commonly accepted limits of human hearing to detect sound frequencies are between 20 Hz and 20,000 Hz, and human hearing is most sensitive to the frequencies between 1,000 Hz – 6,000 Hz. Although people are generally not as sensitive to lower-frequency sounds as they are to higher frequencies, most people lose the ability to hear high-frequency sounds as they age. To accommodate varying receptor sensitivities, frequency sound levels are commonly adjusted, or 'filtered', before being logarithmically added and reported as a single 'sound level' magnitude of that filtering scale.

The A-weighted decibel filtering scale applies numerical adjustments to sound frequencies to emphasize the frequencies at which human hearing is sensitive, and to minimize the frequencies to which human hearing is not as sensitive. The A-weighted scale is used in highway traffic noise studies because it best represents human hearing. Several examples of noise levels, expressed in dB(A), are listed in **Table 2-3**.

As discussed above, the decibel scale is logarithmic rather than linear. The result is that adding two identical noise sources together does not result in a doubling of noise. Instead, a doubling of noise requires ten identical sources. **Table 2-3** shows how changes in sound level affect acoustic energy and how the change in sound level is perceived by someone with average hearing. Note that most of the table expresses changes as sound level decreases, however, the concept applies to increases in noise level as illustrated in the last row of the table where a 10 dB increase is shown to be perceived as twice as loud.

Table 2-3 – Relative Change in Loudness of Mid-Range Sounds (FHWA)

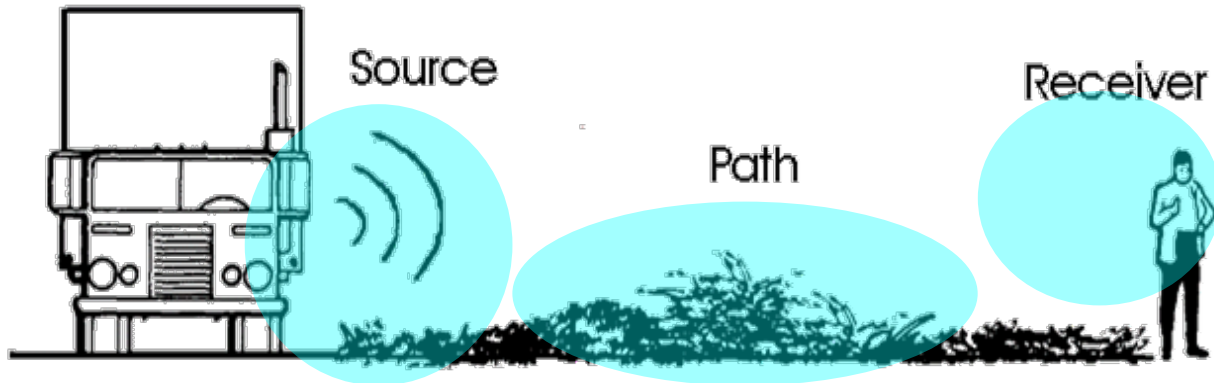
SOUND LEVEL CHANGE	ACOUSTIC ENERGY LOSS	RELATIVE LOUDNESS CHANGE
0 dB	0	Reference
-3 dB	50%	Barely perceptible change
-5 dB	70%	Readily perceptible change
-10 dB	90%	Half as loud as original
-20 dB	99%	¼ as loud as original
-30 dB	99.9%	1/8 as loud as original
+10 dB	900% increase	Twice as loud as original

The source, path, receiver relationship is a fundamental component to understanding noise. **Figure 2-15** illustrates this concept showing how noise emanates from the source, in this case a truck, and makes its way to the receiver across a path. Each of these locations presents an opportunity to reduce noise by applying noise mitigation strategies to reduce the amount of noise made by the truck, such as placing something in the path such as a privacy wall to alter the sound path to the receiver or reduce the amount of noise heard at the receiver by some means such as hearing protection. For most roadway projects, the typical approach is to use a structural barrier in the path and then look at other options.

Various metrics are used to identify potential noise impacts. The most common metric used in the United States is from the Federal Highway Administration (FHWA) noise standards found in Title 23 Code of Federal Regulations Part 772 (23 CFR 772). The standard identifies noise levels that approach or exceed 67 dB(A)_{Leq(h)} at exterior areas of residences as an impact. The FHWA standard is based on a one-hour energy average of noise levels and does not capture individual loud events that may cause annoyance or other concerns such as sleep disturbance. In 2009, the World Health Organization (WHO) released *Night Noise Guidelines for Europe*, which identified noise levels that may affect human health. As shown on **Table 2-4**, the threshold for moderate annoyance in outdoor living areas is 50 dB(A)_{Leq(16h)}. In a 2018 update to the Night Study, WHO provided additional guidance on health effects from transportation noise by mode. L_{den} is a 24-

hour measurement that applies a 5 dB penalty to measurement from 7 PM to 11 PM and a 10 dB penalty from 11 PM to 7 AM. L_{night} is the sound level measured from 11 PM to 7 AM.

Figure 2-15 – Source, Path, Receiver Relationship (FHWA)



The road traffic noise recommendations were to limit noise levels to the following average noise levels:

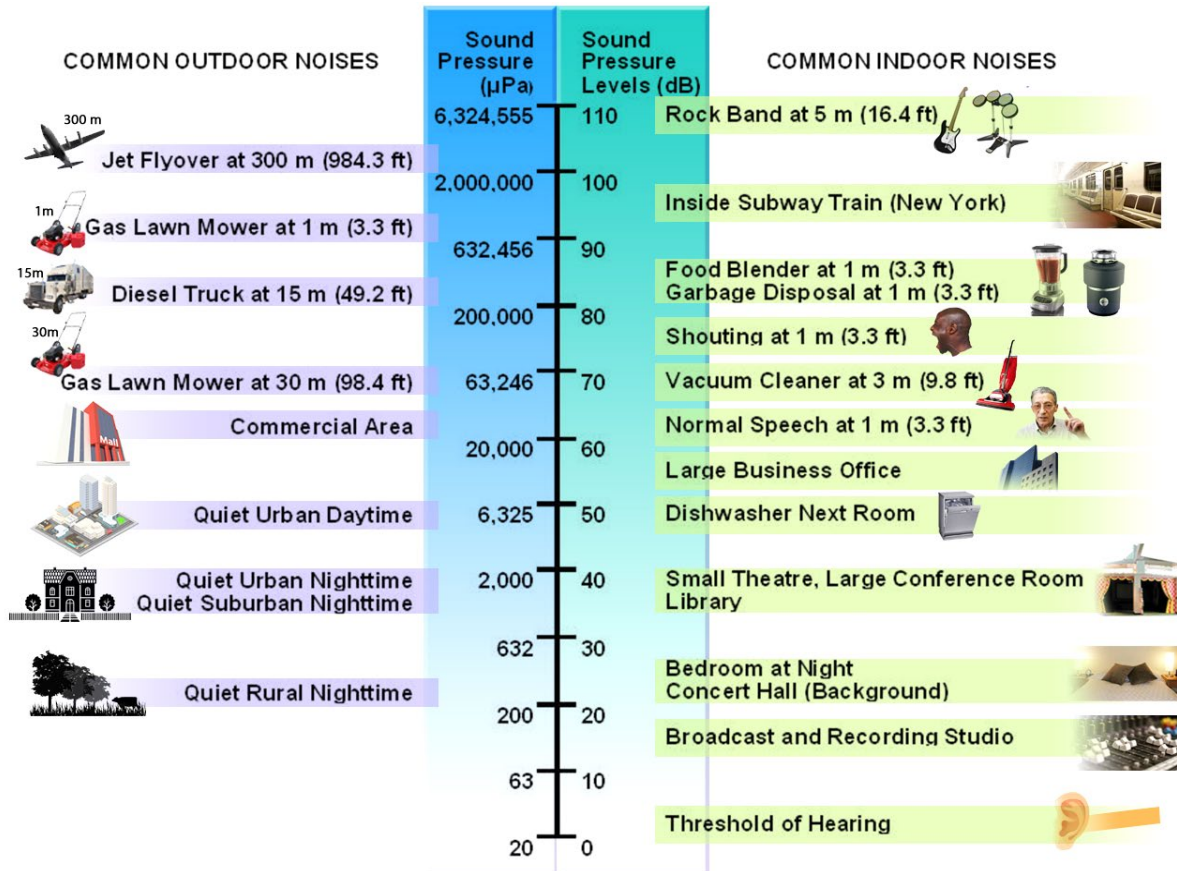
- Average noise exposure recommendation $< 53 \text{ dB } L_{\text{den}}$;
- Average exposure recommendation targeted to reducing adverse health effects from road noise;
- Night exposure recommendation $< 45 \text{ dB } L_{\text{night}}$; and
- Night exposure recommendation targeted to reduce adverse effects on sleep.

The report also identified potential health impacts:

- Likely 5 percent relevant risk of ischemic heart disease (IHD) with exposure level of $59.3 \text{ dB } L_{\text{den}}$;
- Risk increases by 1.08 for each increase of 10 dB;
- Potential increase in relevant risk of hypertension; and
- Risk that 10 percent of the population are highly annoyed with noise level exposure of $53.3 \text{ dB } L_{\text{den}}$.

Figure 2-16 illustrates common noise levels and give readers a frame of reference. This is known as a noise thermometer. The examples in this figure are typical indoor and outdoor noise sources such as appliances and vehicles.

Figure 2-16 – Noise Thermometer (Source FHWA)



2.4.2 Noise Data Collection

The noise data collection effort included short-term and long-term measurements. The data collection protocol was in general conformity with best practices for collection of noise measurements for a roadway project. The standard approach for this type of measurement, was established by the Federal Highway Administration as published in the Noise Measurement Handbook - Final Report (FHWA-HEP-18-065) released June 1, 2018, and the Noise Measurement Field Guide – Final Report (FHWA-HEP-18-066) released June 1, 2018.

There are varying standards regarding thresholds for impacts from highway noise, as discussed in Section 2.4.1 above. Noise Fundamentals. This analysis uses the 64 dB(A)_{Leq(h)} impact criterion for identifying noise impacts in residential areas requiring mitigation found in the Arizona DOT (ADOT) Noise Abatement Policy. The ADOT Noise Abatement Policy documents ADOT’s implementation of Federal requirements in Title 23 Code of

Federal Regulations Part 772: Procedures for Abatement of Highway Traffic Noise and Construction Noise, which requires each state to develop an approved policy conforming with the regulation. The sound level descriptor used is an A-weighted, one-hour equivalent noise level notated as $dB_{A, Leq(h)}$.

2.4.2.1 Short Term Noise Collection

Short-term validation measurements occurred Nov. 17-18 with measurements collected at twenty-seven locations typically with three simultaneous measurements at varying distances from the roadway. The measurement plan originally called for twenty-four measurements, but three additional measurements were collected to aid in estimating the reduction provided by the privacy wall between Litchfield Road and Camelback Park. Short-term measurements had a duration of at least 30 minutes and are labeled as N1-N24. Measurements grouped together, for example N22, N23, and N24 were collected simultaneously.

For most measurements, an observer was located near each noise meter. The observer was responsible for collecting meteorological data, preparing a site sketch, taking photographs of the equipment setup, and noting non-traffic related significant noise sources. Traffic data were collected manually during each measurement noting the vehicle classification. The vehicles visually observed during data collection were classified into a smaller number of vehicle types that matched aggregations of the FHWA vehicle types identified earlier in Figure 2-5 as closely as possible. These are shown in **Table 2-5**. Data collection west of Litchfield Road. was completed on Nov. 17 and locations east of Litchfield Road. were completed on Nov. 18.

Table 2-5 - Vehicle Classification for Noise Analysis

VEHICLE	DESCRIPTION
Automobiles	All vehicles with two axles and four tires -- primarily designed to carry nine or fewer people (passenger cars, vans) or cargo (vans, light trucks) -- generally with gross vehicle weight less than 4,500 kg (9,900 lb) (FHWA Classes 2 and 3)
Medium trucks	All cargo vehicles with two axles and six tires -- generally with gross vehicle weight between 4,500 kg (9,900 lb) and 12,000 kg (26,400 lb) (FHWA Class 5)
Heavy trucks	All cargo vehicles with three or more axles -- generally with gross vehicle weight more than 12,000 kg (26,400 lb) (FHWA Classes 6 through 13)
Buses	All vehicles designed to carry more than nine passengers (FHWA Class 4)
Motorcycles	All vehicles with two or three tires and an open-air driver/passenger compartment (FHWA Class 1)

2.4.2.2 Long Term Noise Collection

Collection of the long-term noise measurements began the evening of November 16 and was completed the afternoon of November 19. Long-term measurement locations are designated as LT2-LT5. Long-term measurement sound levels are shown on **Table 2-6**. Data is organized by site and date and further organized to look at the average noise level for the duration of the measurement and for only the overnight hours of 10:00 PM to 7:00 AM. The noise level of the loudest rolling hour, and the noise level for the quietest rolling hour are reported for each measurement.

As with the short-term measurements, the long-term data collection began at the west end of the study area with setups at locations LT2 and LT4. Standard setup was a noise meter and video camera used to record traffic. An observer was on site during overnight hours to note unusual events and vehicle activity at site LT2.

Meters were programmed to record data every 5 seconds. The output from each meter was evaluated to identify contributions from non-traffic noise sources and were removed from the dataset. Examples of removed data are aircraft activity from Luke Air Force Base and landscaping activities in the neighborhoods. Measurements at site LT2.2 were most affected by non-traffic noise sources since that location had indirect exposure to traffic on Camelback Road.

Figure 2-17 shows the time history of overnight measurements for November 16-19 in 5-second samples at measurement site LT2., and overnight measurements for measurement site LT2.2. Measurements at LT2.2 show a low ambient noise environment interrupted by occasional loud, short-duration events.

2.4.3 Development of the Traffic Noise Model

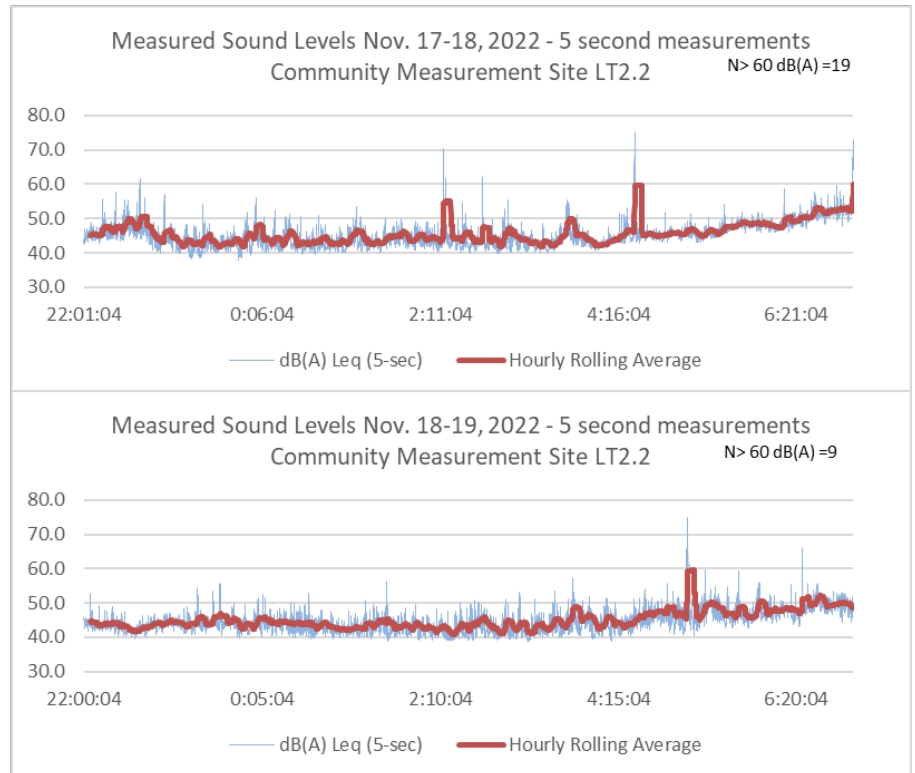
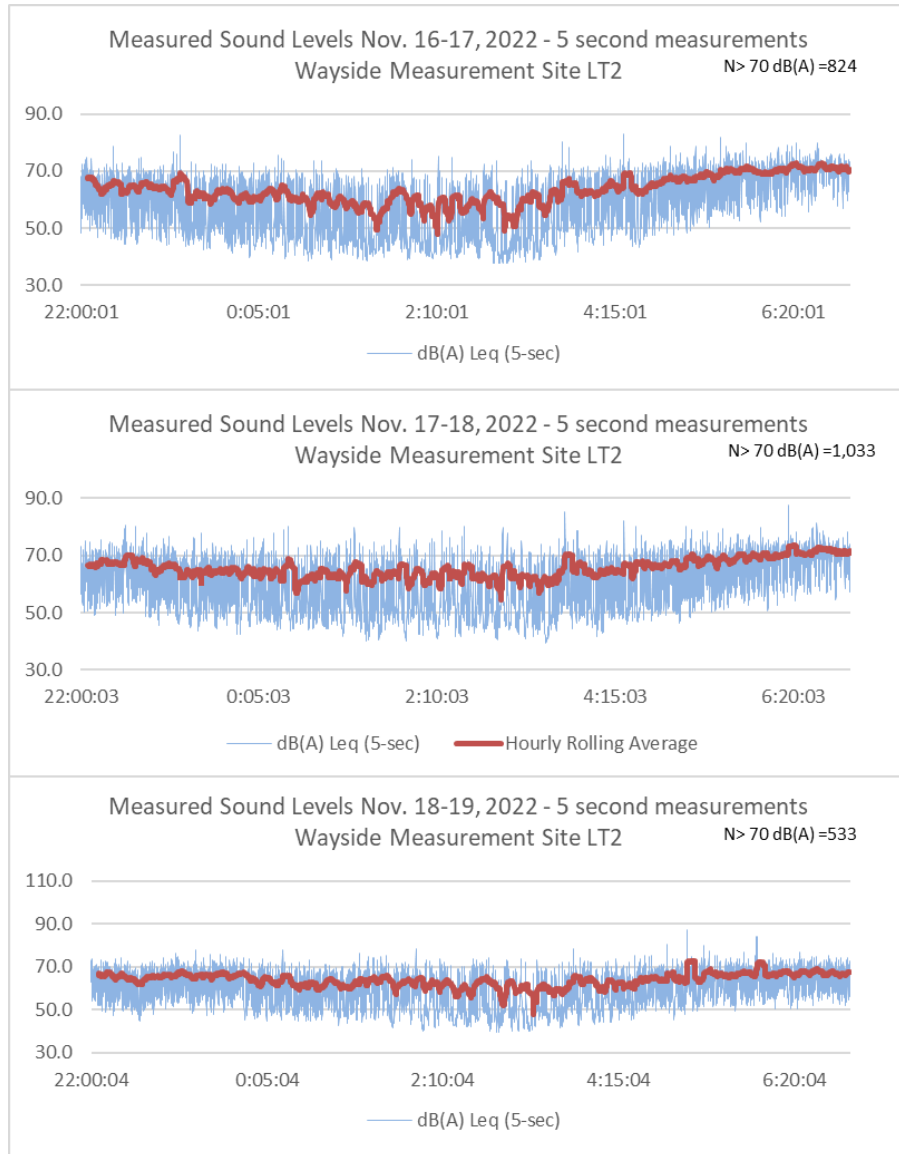
The primary noise analysis software used for the study was the FHWA Traffic Noise Model version 3.1 (TNM 3.1). Some scenarios assessing noise remedies utilized the FHWA Traffic Noise Model version 2.5 (TNM 2.5). The TNM can calculate several metrics with the most common being the one-hour equivalent noise level, which requires conversion of daily traffic volumes to one-hour volumes for model inputs. These one-hour volumes typically represent the loudest noise hour with sound levels reported in an A-weighted energy designated as $dB_{A_{Leq(h)}}$. The TNM can also calculate L_{dn} and L_{den} noise levels, which are the Day-Night and Day-Evening-Night noise levels respectively. The L_{dn} and L_{den} are a 24-hour sound level descriptor that applies penalties to nighttime (L_{dn}), or evening and nighttime (L_{den}) noise calculations to account for greater sensitivity to noise in the evening and nighttime hours. Additional technical information about the FHWA TNM is available at [Traffic Noise Model - Noise - Environment - FHWA \(dot.gov\)](https://www.fhwa.gov/traffic-noise-model-noise-environment).

Table 2-6 – Long Term Noise Collection

SITE	DATE	MEASUREMENT TIME	OVERALL AVERAGE NOISE LEVEL*	NOISE LEVEL LOUDEST ROLLING HOUR*		NOISE LEVEL QUIETEST ROLLING HOUR*	
				Sound Level (dBA)	Time	Sound Level (dBA)	Time
LT2	11/16-17/2022		67	79	17:30-18:30	48	1:10-2:10
LT2	11/16-17/2022	2200-0700	63	73	5:40-6:40	48	1:10-2:10
LT2	11/17-18/2022		68	74	6:40-7:40	55	1:54-2:54
LT2	11/17-18/2022	2200-0700	66	74	5:21-6:21	55	1:54-2:54
LT2	11/18-19/2022		67	77	9:00-10:00	48	2:14-3:14
LT2	11/18-19/2022	2200-0700	64	73	4:07-5:07	48	2:14-3:14
LT2.2	11/17-18/2022		45	55	12:00-13:00	35	13:45-14:45
LT2.2	11/17-18/2022	2200-0700	46	53	6:00-7:00	42	22:53-23:53
LT2.2	11/18-19/2022		45	54	11:33-12:33	38	16:00-17:00
LT2.2	11/18-19/2022	2200-0700	45	52	5:36-6:36	40	1:20-2:20
LT3	11/18-19/2022		64	75	17:30-18:30	54	2:25-3:25
LT3	11/18-19/2022	2200-0700	61	72	5:30-6:30	54	2:25-3:25
LT4	11/16-17/2022		70	80	7:45-8:45	39	1:09-2:09
LT4	11/16-17/2022	2200-0700	66	76	5:49-6:49	39	1:09-2:09
LT5	11/17-18/2022		72	77	6:47-7:47	57	1:55-2:55
LT5	11/17-18/2022	2200-0700	69	77	5:49-6:49	57	1:55-2:55

* Rounded A-weighted hourly equivalent levels (dB(A)_{Leq})

Figure 2-17 – Long Term Noise Measurements



The FHWA TNM predicts noise levels at selected locations based on traffic data, roadway design, topographic features, and the relationship of the analysis site (receiver) to nearby roadways. Traffic composition (volume/mix/speed) for the 2022 existing and 2040 scenarios was derived from traffic data collected by the study team. The worst hour volumes were derived starting with Average Daily Traffic (ADT) forecast volumes assigning vehicle classifications based on the vehicle mix observed in the field by the study team. Vehicles with two axles and four wheels are classified as autos, two axles and six wheels are classified as medium trucks, and three or more axles are classified as heavy trucks. The model also includes categories for buses and motorcycles.

2.4.4 Noise Model Validation

The purpose of these measurements is to collect noise levels and contributing traffic volume, mix, and speed for use in validating computer-generated noise models of the study area. Short term measurement results are documented in **Table 2-7**. This process helps to confirm the accuracy of model inputs depicting area topography. Most locations validated to within the accepted tolerance of +/- 3 dB. Sites that did not validate had periods with significant interference from non-transportation noise sources. In some cases, such as with N7-N9, measurements were relocated due to landscape maintenance activity after multiple attempts to collect data at the original sites. The model calculates a one-hour equivalent noise level, which requires normalizing traffic counted during the measurement to one-hour volumes for model inputs. Sound levels are reported in an A-weighted energy designated as $dB_{A_{Leq(h)}}$. This is a standard reporting metric for traffic noise studies. Separate model calculations were performed for each measurement setup since the traffic varies for each setup. See Section 2.4.3 above for additional information about the FHWA TNM.

The 2022 existing roadways were traced in a geographic information system (GIS) with the centerline of each direction of travel modeled. Elevation data were collected along with laser imaging, detection, and ranging (LiDAR) data, which captured the elevation of the tops of walls and houses. To determine the heights of houses and existing walls, the ground elevation was subtracted from the LiDAR elevation. The spatial, elevation, and height data were used as inputs into TNM 3.1 to model the 2022 existing conditions and predict conditions based on future changes to traffic in the area.

Table 2-7 – SHORT TERM MEASUREMENTS

Setup	Site ID	Sound Level (dBA _{leq})	Duration (mins)	Sample Length
1	N22	67.3	48	1-minute
1	N23	66.7	36	1-minute
1	N24	68.4	37	1-minute
2	N4	60.7	39	1-minute
2	N5	52.5	36	1-minute
2	N6	55.9	37	1-minute
3	N19	67.4	37	1-minute
3	N20	62.4	36	1-minute
3	N21	61.8	37	1-minute
4	N16	64.2	37	1-minute
4	N17	54.0	36	1-minute
4	N18	56.3	36	1-minute
5	N1	58.2	40	1-minute
5	N2	52.2	31	1-minute
5	N3	46.2	36	1-minute
6	N10	60.6	36	1-minute
6	N11	52.2	35	1-minute
6	N12	48.9	31	1-minute
7	N13	62.1	33	1-minute
7	N14	56.6	31	1-minute
7	N15	55.4	31	1-minute
9	N7	49.9	32	1-minute
9	N8	50.9	31	1-minute
9	N9	49.8	31	1-minute

2.5 Vibration Fundamentals, Data Collection, and Analysis

2.5.1 Vibration Fundamentals

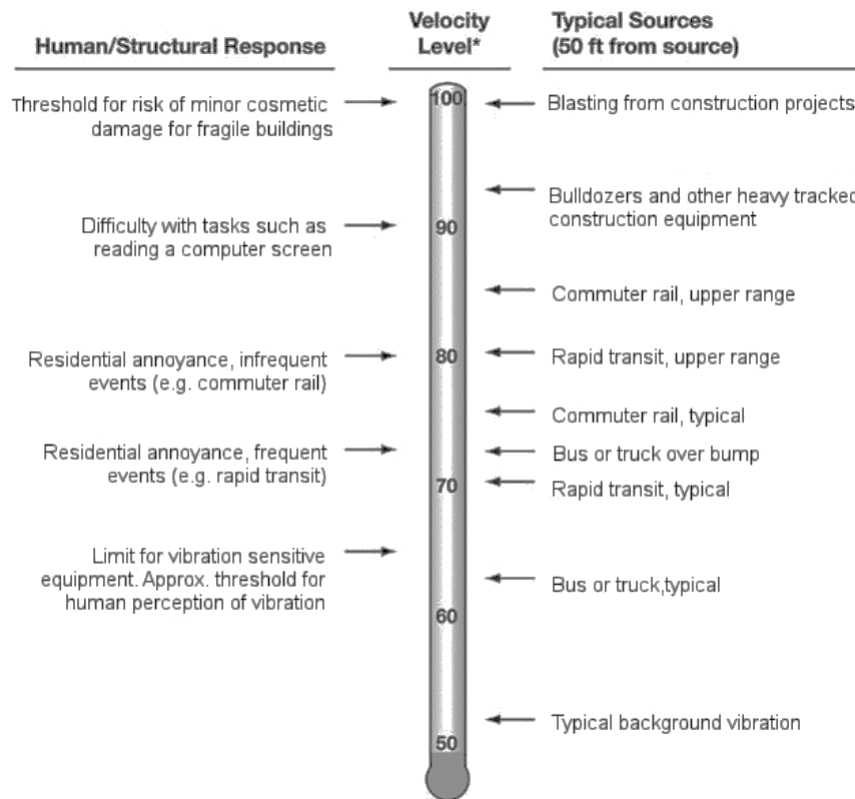
It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. The most common transportation related ground-borne vibration sources are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operating heavy earth-moving equipment. Ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is not a common environmental problem.

Typical outdoor sources of vibration waves that propagate through the ground and create perceptible ground-borne vibration in nearby buildings include construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from rubber-tired traffic is rarely perceptible. Building damage due to vibration is also rare for typical transportation projects; but in extreme cases, such as during blasting or piledriving during construction, vibration could cause damage to buildings.

Vibration travels from the source through the road pavement or transit structure and excites the adjacent ground, creating vibration waves that propagate through soil layers and rock strata to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the building structure. The vibration of the building structure and room surfaces can radiate a low-frequency rumble called ground-borne noise.

Soil and subsurface conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Vibration propagates more easily in stiff clay soils. Shallow rock may concentrate the vibration energy close to the surface, resulting in ground-borne vibration problems at large distances from the track. Factors such as soil layers and depth to water table can have substantial effects on the propagation of ground-borne vibration (FTA, 2018). **Figure 2-18** is a vibration thermometer illustrating the effects of vibrations.

Figure 2-18 – Typical Levels of Ground Borne Vibration (FTA, 2013)

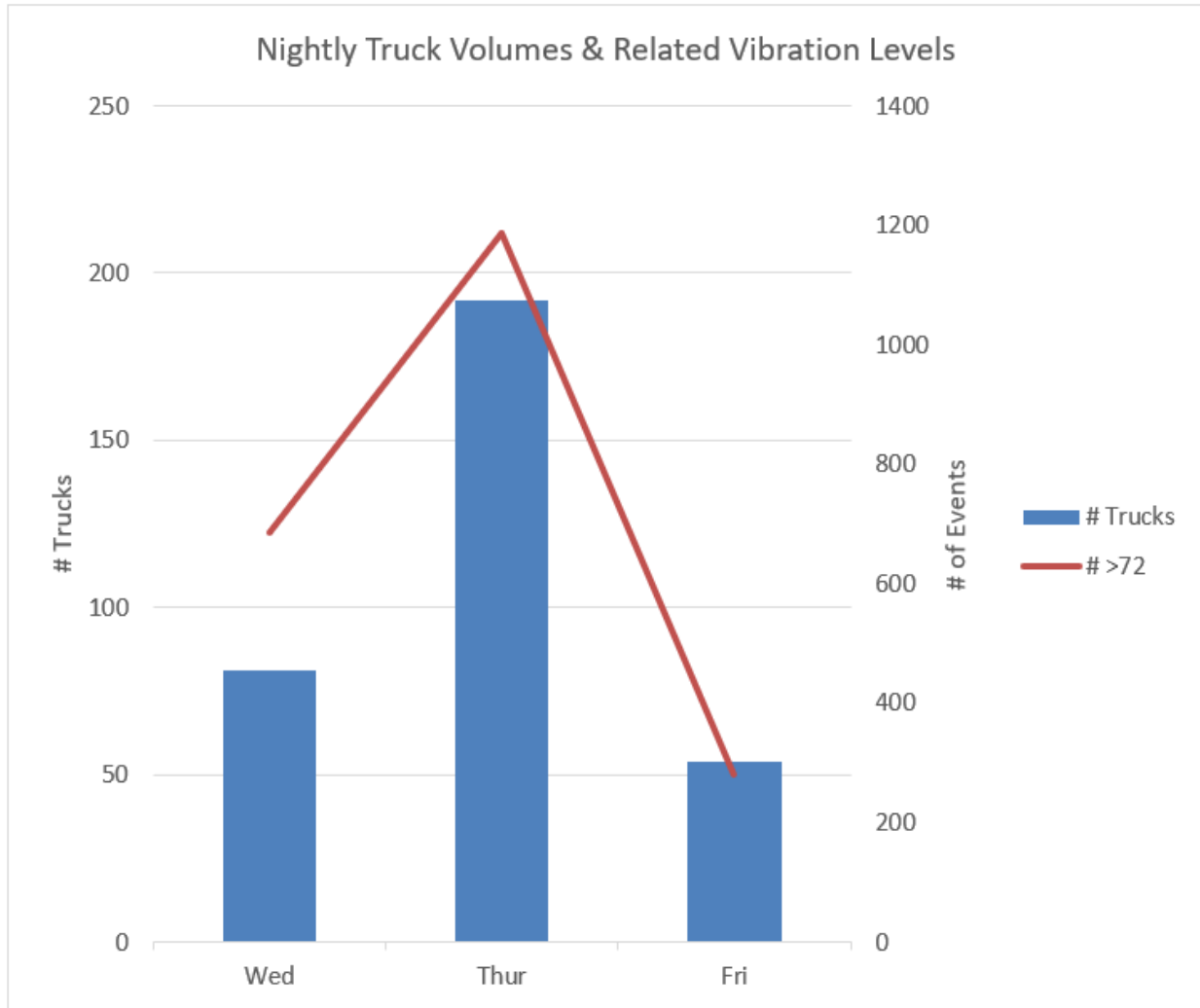


2.5.2 Vibration Data Collection

Collection of the vibration measurements began the evening of November 16 and was completed the afternoon of November 19. Vibration monitors were installed in proximity to long-term noise meters. The initial vibration data analysis showed that heavy trucks are most often the cause of vibration events. **Figure 2-19** shows a comparison of heavy truck volumes and vibration events exceeding 72 VdB at the vibration meter with one second samples. The event curve matches well for Thursday and Friday nights (Nov. 17 and 18). While the curve fit is not as good on Wednesday night (Nov. 16).

Equipment malfunction resulted in only obtaining usable data at one location. Fortunately, this location was adjacent to LT2 which was used to collect evening and night vibration data. This site was adjacent to Camelback Road and was identified by Litchfield Park staff as a location of importance because of complaints about noise and vibration from nearby residents. There is an increase in grade to about 1.75 percent starting at the intersection with N. Litchfield Road, peaking approximately 750 feet west of N. Litchfield Road intersection with Camelback Road. An observer remained overnight at this site to assess traffic patterns and vehicle types on Camelback Road.

Figure 2-19 – Nightly Truck Volume and Vibration Levels



The annoyance threshold used for vibration on this project is from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018), Table 6-3, Category 2 applies to this project since the focus is on residential property. The impact criterion for frequent events is 72 VdB (vibration decibels). This is an annoyance criterion describing a level where people are likely to be annoyed by vibration and ground borne noise.

With the initial focus on an event-based analysis for vibration, the next step was to use this data to estimate the number of vehicles expected to cause an event in each of the traffic forecast scenarios. Heavy trucks were considered most likely to create vibration events, so the analysis focused on them. Video recordings were used to count heavy truck volumes for the nights of Nov. 16-18. Unfortunately, the video was incomplete for the night of November 17 (Friday) so the counts were limited to the first two nights. Events were identified using measurements at the vibration meter, which was ~50' from the roadway. Further analysis would be necessary during this study to identify those events with the potential to cause a nuisance to residents by accounting for the decrease in vibration from the meter to adjacent residences.

2.6 Analysis of Existing Conditions

2.6.1 Correlation of Traffic with Noise and Vibration Data

Correlation of the traffic forecast with noise and vibration data was needed to forecast noise and vibration events by comparing traffic volume, vehicle mix, and the number of events that occurred between the hours of 22:00 and 07:00 with traffic volumes from the traffic model. Video observations were available for the nights of November 16 and 17. The noise team used the videos to determine vehicle classifications, volumes, and speeds. The team also noted the time stamp of the vehicle pass-by for comparison to the noise measurement time history data. This allowed for identification of the vehicle class and associated sound level.

Vibration data were converted to 5-second samples to align with the noise data collection sample length and for use in the correlation analysis. Using this information, the team was able to calculate the percentage of each vehicle class causing an event – defined as a five second sound level greater than or equal to 72 dB(A) or vibration level greater than or equal to 72 VdB at the reference meter. The number of events varied widely when comparing each night. **Table 2-8** shows the observed percentage of events by vehicle type for each night.

Table 2-8 – Observed Events by Vehicle Type*

VEHICLE TYPE	NOV 16, 2023 (WED) OBSERVED EVENTS	NOV 16, 2023 (WED) OBSERVED VEHICLES	PERCENT OF VEHICLES CAUSING EVENTS	NOV 17, 2023 (THUR) OBSERVED EVENTS	NOV 17, 2023 (THUR) OBSERVED VEHICLES	PERCENT OF VEHICLES CAUSING EVENTS
Autos	84	3,582	2.3%	246	4,270	5.8%
Medium Truck	11	64	17.2%	30	108	27.8%
Heavy Truck	68	109	62.4%	195	398	49.0%

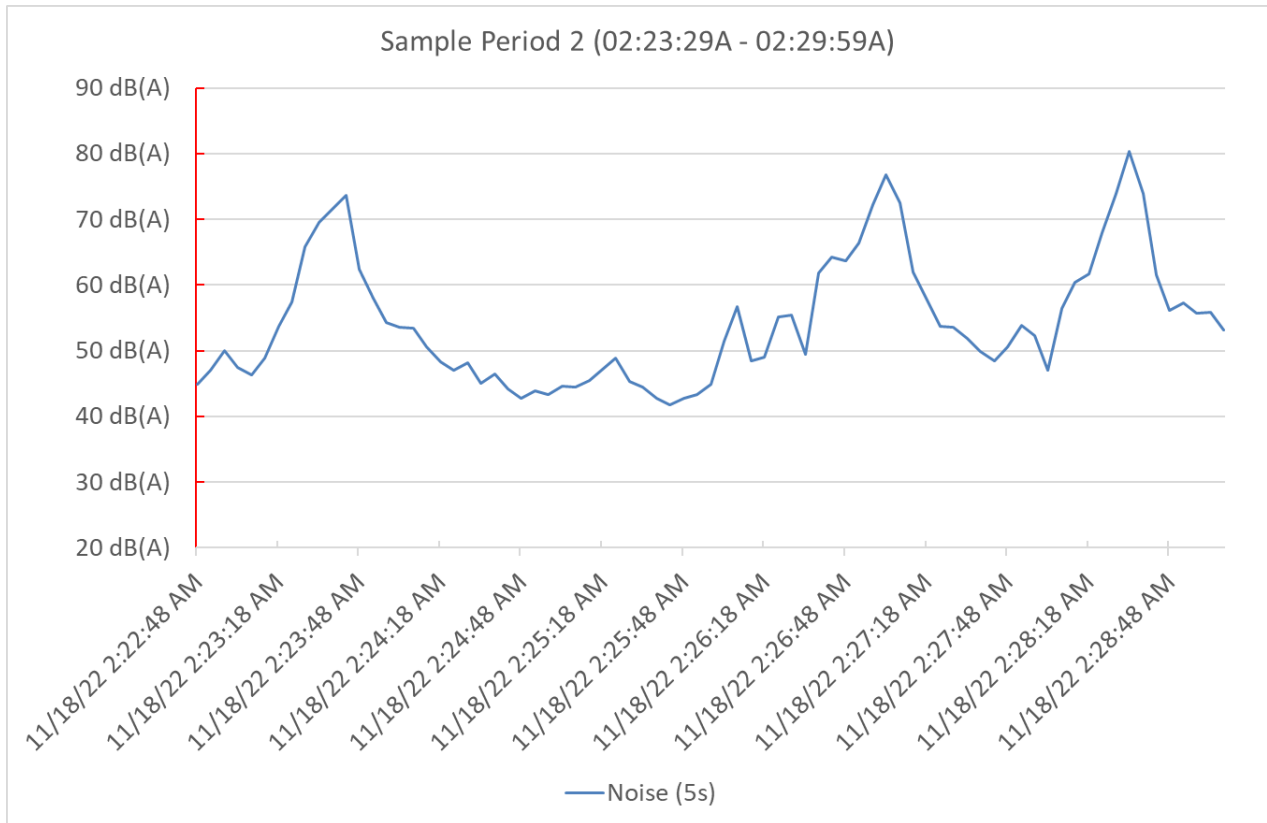
*Between the hours of 22:00 and 7:00

2.6.2 Potential Nuisance Events

The long-term average noise level analysis showed that overall noise levels are not the source of noise complaints. Rather, the culprit was singular events that were sufficiently loud to be a nuisance. Resolving this issue led to a change in approach to identifying severe events and categorizing them based on severity. This approach is similar to the assessment of construction noise, which also focuses on peak events for some types of equipment. The revised approach was also supported because of the small percentage of noise events that approached or exceeded 80 dB(A) as shown in Figure 2-17 above.

Closer examination of the loudest events revealed that complaints were likely due to interruptions caused by intermittent loud events disrupting the relatively quiet nighttime environment. **Figure 2-20** illustrates a short sequence of three events that occurred during the early morning hours on November 18. The first event initiates a disturbance and just when the listener is recovering from the event there are two new disturbances.

At this point in the analysis, a decision was made to shift the approach to focus on estimating the number of events with sufficient impact to community residents to be considered "potential nuisance events," or PNEs. For this study, an event in which a vehicle generates noise and/or vibration of sufficient magnitude that it has the potential to create a sudden and noticeable disturbance at the nearest residential homes is considered a potential nuisance event.

Figure 2-20 – Loud Events


The initial approach to defining a potential nuisance event (PNE) based on the noise or vibration level at the meter was determined to overpredict such events because it relied on the level at the reference meter rather than at the residences, which were farther away and generally behind a 5 to 6 foot privacy wall. The TNM 3.1 model was used to calculate the decrease in sound level from site LT2 to the front wall of the residence located immediately south of site LT2 and designated as receiver 4.026 in the noise model. This analysis excluded noise reductions from the privacy wall. Based on the model results, a reduction of 4.0 dB was applied to the sound level of each event measured at LT2 to estimate the sound level at the front of the residence. The noise event threshold was also adjusted to limit consideration to events calculated to be 75 dB(A) or more at the closest wall of the residence represented by receiver 4.026. The event threshold for vibration remained at 72 VdB.

The decrease due to the additional distance from the vibration meter to the face of the house was derived by using the doubling of distance formula. The drop-off rate from the center of the roadway to the meter had been calculated as 6 VdB. The additional distance to the front wall of the residence resulted in a further decrease of 4.4 VdB.

Figure 2-22 – Potential Nuisance Events by Vehicle Type (Percent/Quantity)

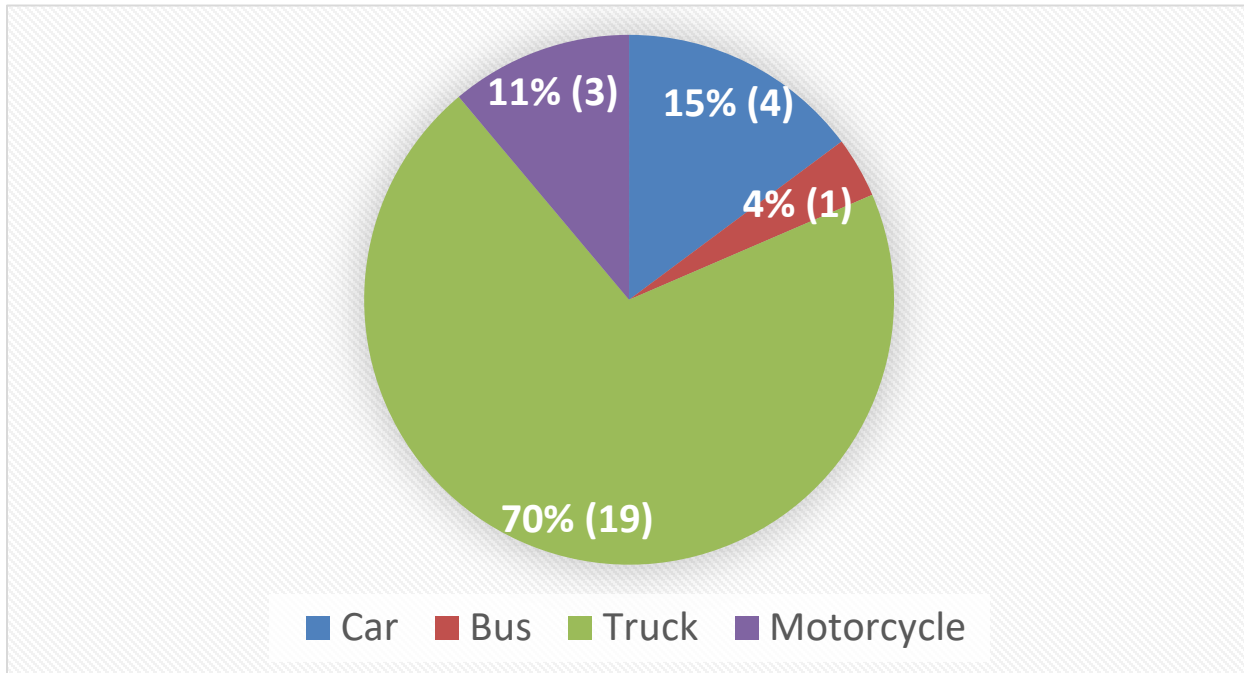


Table 2-9 shows the number of PNEs observed the nights of November 16 and 17 and estimates projected events by calculating the percentage of each vehicle class causing a potential nuisance event and multiplying the predicted traffic volumes for each scenario by the calculated percentage. This correlation provides a forecast range of 2022 events based on observation. Caution is necessary when using this data because observed volumes each night do not necessarily correspond to forecast volumes. The correlations indicate the potential for nuisance events to continue absent application of remedies to decrease the number of nuisance events.

Table 2-9 – Observed and Estimated Potential Nuisance Events

DESCRIPTION	AUTO & MED. TRUCK	HEAVY TRUCK	BUS	MOTOR-CYCLE	TOTAL
Volume 11/16	3,646	109	4	6	3,765
Volume 11/17	4,378	398	16	6	4,798
Volume Total	8,024	507	20	12	8,563
Events Observed 11/16	1	4	0	2	7
Events Observed 11/17	3	15	1	1	20
Total Events Observed	4	19	1	3	27
Average Percent of Volumes	0.05%	3.75%	5.0%	25.0%	0.32%
Estimated Events Total	4	19	1	3	27

2.6.3 Existing Conditions Summary

The data collection efforts of this study established the existing baseline conditions within the study area regarding the surrounding land uses, transportation network configuration, traffic patterns, vehicle class distribution, noise levels, and vibration levels. The traffic data collection effort was also used to validate the MAG travel demand model.

The noise and vibration analysis of the existing conditions found that trucks are the greatest contributors of potential nuisance events. The material hauling trucks were noted to cause the most noise events especially along the westbound direction due to an uphill incline along Camelback Road west of Litchfield Road.

This analysis has identified 27 PNEs observed during the data collection period. Not all of these events would have been noticed by the residents nearby. In fact, it is very likely that none of these events actually disturbed anyone on the nights observed.

This study did not, and could not, identify any specific events that caused a meaningful disturbance to the residents. What this study did accomplish is to identify a small number of events that had the greatest potential to cause disturbance to the residents.

The 27 PNEs all had the following characteristics:

- They all propagated to the nearest residential homes energy levels of noise and/or vibration that exceeded 75 dBA for noise;
- One event exceeded 72 Vdb for vibration; and
- They all occurred during late-night and early morning hours when ambient noise and vibration were at very low levels.

While these characteristics are found in only about 0.32 percent of the vehicles observed, they are not likely, in and of themselves, sufficient for their impacts to rise to the level of meaningful disturbance to the nearby residents. If the noise or vibration energy level alone was enough to cause meaningful disturbances, there would be many more complaints during the daytime when traffic levels and the number of events is much higher. As a result, the ambient noise level has a lot to do with the perceived disturbance of any event.

As pointed out earlier in this report, the best candidates for true nuisance events are those that have the highest change in energy levels between the preceding ambient condition and the sudden surge in energy caused by the event. To put this another way, if two events have precisely the same noise level, the event that occurred when the ambient noise level was lowest would be the one more likely to cause a nuisance event. This is most significant at night when there is an expectation of quiet and when residents are trying to sleep. Even a relatively high ambient level may go unnoticed if it is relatively steady, but when large increases occur and awaken residents, the high ambient and subsequent potential nuisance events may inhibit returning to sleep.

Table 2-10 shows the ambient noise levels prior to the five loudest PNEs and compares that to the noise levels of the events themselves. This table shows that the increase in noise level due to the events ranges from a low of 9.8 dBA to a high of 21.9 dBA. This is equivalent to an increase in noise by factors ranging from approximately two to four times the ambient levels, meaning a person with average hearing would perceive the sound level during the event as two to four times as loud as the period before the PNE. For purposes of this report, ambient noise levels are defined as the 30 second A-weighted average energy level preceding the peak noise level. None of the five highest noise events coincided with the highest vibration event. Also, note that the loudest event had one of the smallest noise increases. The second-loudest event had a maximum energy level 2 dB(A) lower than the loudest event, but had nearly double the noise increase over the ambient level, making the second-loudest event more likely to be an actual nuisance event than the loudest.

Table 2-10 – Analysis of Five Highest Noise Events in Ambient Conditions

EVENT	AMBIENT NOISE PRIOR 30 SECONDS dBA	EVENT NOISE dBA	INCREASE IN NOISE		EVENT VIBRATION VdB
			dBA	Factor	
1	69.4	83.5	12.1 dB(A)	>2x	67.4
2	59.6	81.5	21.9 dB(A)	>4x	64.5
3	69.1	78.9	9.8 dB(A)	~2x	63.4
4	58.6	78.5	19.9 dB(A)	~4x	63.3
5	63.9	78.3	14.4 dB(A)	>2x	62.8

The 27 potential nuisance events are shown as a group in **Table 2-11**. Of this group, 19 events were generated by heavy trucks. A heavy truck was also responsible for the single loudest event; however, the remaining four of the five loudest events were caused by automobiles (events 2 and 4) and motorcycles (events 3 and 5).

Table 2-11 – Observed Potential Nuisance Events

Event		Noise					Vibration					Details		
Video Reference Day/Time	Video #	Max Noise dB(A)	dB(A) Distance Reduction	Max dB(A) at Nearest House	dB(A) Threshold	dB(A) Above Threshold	Vibration Level (VdB):	VdB Distance Reduction	VdB at Nearest House	VdB Threshold	VdB Above Threshold	Vehicle Class	Note	Direction
11/18/22 6:16	439	87.5	-4.0	83.5	75.0	8.5	71.8	-4.4	67.4	72.0		HT	Material	WB
11/18/22 3:39	407	85.5	-4.0	81.5	75.0	6.5	65.9	-4.4	61.5	72.0		A	Reflectors	EB
11/17/22 4:21	126	82.9	-4.0	78.9	75.0	3.9	57.5	-4.4	53.1	72.0		MC		EB
11/16/22 23:09	64	82.5	-4.0	78.5	75.0	3.5	62.9	-4.4	58.5	72.0		A	Exhaust	EB
11/18/22 4:21	416	82.3	-4.0	78.3	75.0	3.3	63.8	-4.4	59.4	72.0		MC		WB
11/17/22 5:28	140	82.0	-4.0	78.0	75.0	3.0	77.6	-4.4	73.2	72.0		HT	Semi	EB
11/18/22 6:36	443	81.4	-4.0	77.4	75.0	2.4	74.2	-4.4	69.8	72.0		HT	Material	EB
11/17/22 22:31	346	80.6	-4.0	76.6	75.0	1.6	55.8	-4.4	51.4	72.0		A	Exhaust	EB
11/17/22 22:38	347	80.4	-4.0	76.4	75.0	1.4	71.9	-4.4	67.5	72.0		HT	Material	EB
11/18/22 2:29	393	80.4	-4.0	76.4	75.0	1.4	71.2	-4.4	66.8	72.0		HT	Material	WB
11/18/22 5:05	425	80.2	-4.0	76.2	75.0	1.2	67.7	-4.4	63.3	72.0		HT	Material	WB
11/17/22 3:37	117	80.1	-4.0	76.1	75.0	1.1	63.0	-4.4	58.6	72.0		MC		WB
11/18/22 0:25	369	80.1	-4.0	76.1	75.0	1.1	71.2	-4.4	66.8	72.0		HT	Material	WB
11/18/22 1:43	384	80.0	-4.0	76.0	75.0	1.0	72.2	-4.4	67.8	72.0		HT	Material	WB
11/17/22 6:36	153	79.9	-4.0	75.9	75.0	0.9	78.3	-4.4	73.9	72.0	1.9	HT	Material	WB
11/18/22 6:34	442	79.9	-4.0	75.9	75.0	0.9	72.6	-4.4	68.2	72.0		HT	Semi	WB
11/17/22 6:21	150	79.8	-4.0	75.8	75.0	0.8	72.3	-4.4	67.9	72.0		HT	Material	EB
11/18/22 1:12	378	79.8	-4.0	75.8	75.0	0.8	71.2	-4.4	66.8	72.0		HT	Material	EB
11/18/22 2:56	399	79.8	-4.0	75.8	75.0	0.8	70.8	-4.4	66.4	72.0		HT	Material	WB
11/18/22 5:57	435	79.8	-4.0	75.8	75.0	0.8	71.6	-4.4	67.2	72.0		HT	Material	WB
11/17/22 5:47	143	79.7	-4.0	75.7	75.0	0.7	72.5	-4.4	68.1	72.0		HT	Material	WB
11/18/22 5:04	425	79.6	-4.0	75.6	75.0	0.6	72.1	-4.4	67.7	72.0		HT	Material	WB
11/18/22 6:33	442	79.6	-4.0	75.6	75.0	0.6	70.5	-4.4	66.1	72.0		B	Bus (x2)	WB
11/18/22 5:30	430	79.5	-4.0	75.5	75.0	0.5	62.0	-4.4	57.6	72.0		A	Utility	EB
11/17/22 22:30	346	79.3	-4.0	75.3	75.0	0.3	74.9	-4.4	70.5	72.0		HT	Material	EB
11/18/22 5:08	425	79.3	-4.0	75.3	75.0	0.3	69.2	-4.4	64.8	72.0		HT	Material	WB
11/18/22 0:22	368	79.2	-4.0	75.2	75.0	0.2	69.9	-4.4	65.5	72.0		HT	Semi	WB

3.0 FUTURE CONDITIONS

3.1 Forecasts of Future Land Use

The year 2040 was selected as the future horizon year for this study.

MAG’s TDM incorporates known future improvements into the transportation network as well as expected changes in land use and developments to forecast future traffic volumes. Future year TDMs allow the project team to account for the many interrelated factors that impact travel demand. The project team will develop multiple versions of the future year model to study various future scenarios.

MAG provided land use assumptions about future developments including 2040 estimates of population and employment in their land use database. Further adjustments were made to these land use projections as shown in **Appendix A** to incorporate known developments that had not been included in the MAG database up to that point.

Figure 3-1 shows the 2040 shares of land uses, note that agricultural land uses will disappear by 2040 while being replaced primarily by employment centers. **Figure 3-2** maps the 2040 land uses within the study area. There are large portions of land in the northwest quadrant of the study area introducing industrial and warehousing type land uses.

Figure 3-1 – 2040 Shares of Land Uses

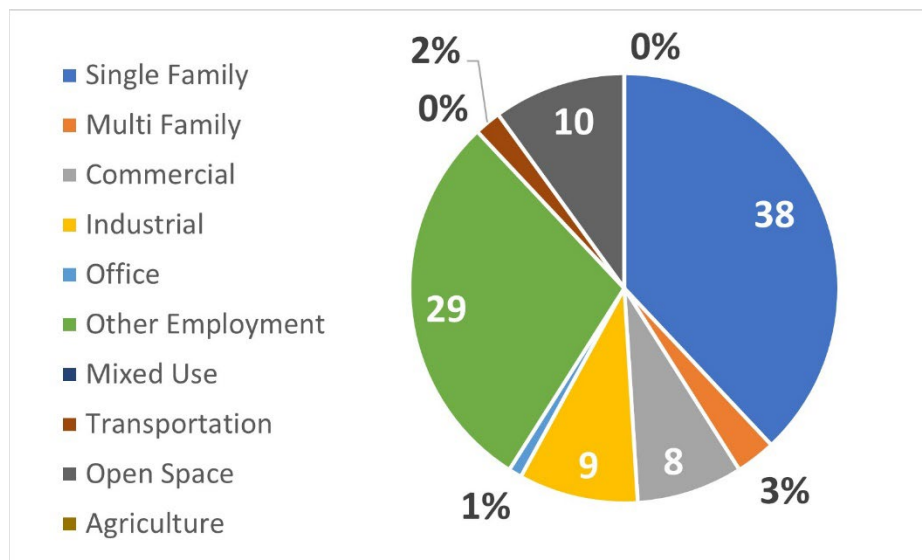
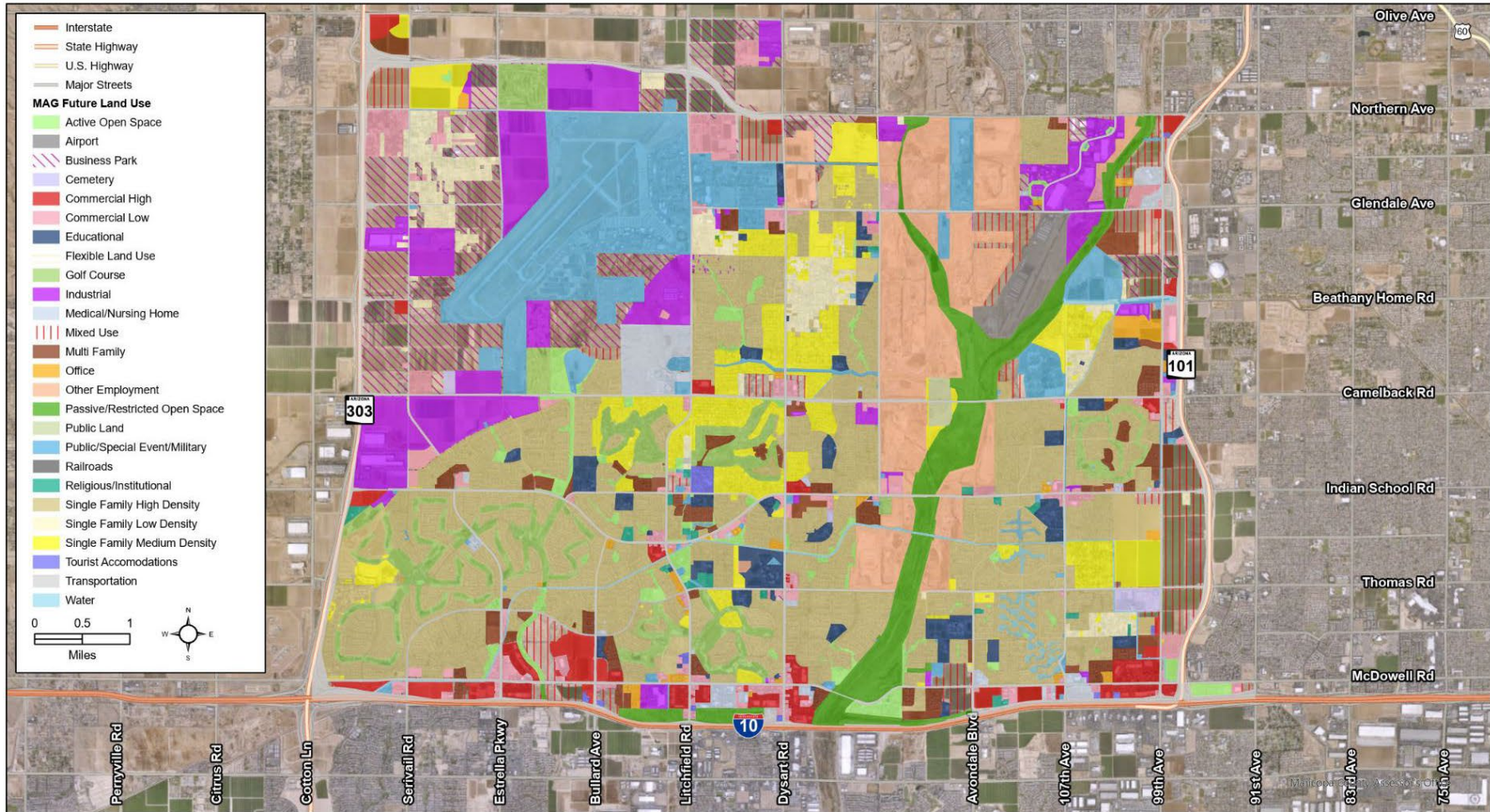



Figure 3-2 – 2040 Baseline Condition Land Use



	Southwest Valley Camelback Road Truck Study	Maricopa County, AZ
	MAG - Future Land Use	

3.2 Future Roadway Assumptions

The 2040 Baseline condition scenario was developed assuming the network would change in accordance with the Capital Improvement Plans (CIPs) of the surrounding municipalities. The 2040 network assumptions are depicted in **Figure 3-3**, which shows the number of lanes of each major roadway within the study area.

Camelback Road outside of Litchfield Park will be widened to six lanes (three lanes in each direction) from the Loop 303 (Estrella) to the Litchfield Park city limits. Within Litchfield Park, Camelback Road will be widened as needed to achieve a four-lane cross-section (two lanes in each direction). There are no known plans to increase the overall connectivity of the network by adding bridges across the Agua Fria River, and Sarival Avenue, Litchfield Park Road, Dysart Road, and 99th Avenue will continue to be the only north/south roads to cross the entirety of the study area.

The Capital Improvement Plans (CIPs) of the municipalities within the study area were reviewed for capacity expanding projects for inclusion in the MAG model. The projects are listed below by city. These improvements will be applied to the future year models.

Avondale will implement the following improvements:

- 107th Avenue, add a northbound dedicated right turn lane at I-10 interchange;
- 107th Avenue, from McDowell Road to 700 feet southward widen to three lanes both directions;
- McDowell Road, widen to three lanes in both directions from 107th Avenue for 2000 ft west;
- Avondale Boulevard, add a southbound lane from McDowell Road to Encanto Boulevard; and
- 107th Avenue, widen to two lanes in both directions from Broadway Road to Roeser Road.

Goodyear will implement the following improvements:

- Citrus Road, I-10 to Thomas Road widen to four lanes;
- Sarival Ave, Jefferson Street to Yuma Road widen to four lanes;
- Estrella Parkway/Pebble Creek Parkway Traffic Interchange at I-10, add a lane in both directions under the overpass;
- Yuma Road, Canyon Trails to Sarival widen to three eastbound through lanes; and
- Camelback Road, SR 303 to 152nd Avenue widen to three lanes in both directions.

Maricopa County will implement the following improvements:

- Olive Avenue, widen to four lanes with center turn lane from Loop 303 (Estrella) to Reems Road; and

- Olive Avenue, widen to four lanes with center turn lane from Reems Road to Litchfield Road.

Glendale, Litchfield Park, and Phoenix will have no capacity expanding projects within the study area.

Figure 3-3 also shows the year 2040 baseline roadway system, color coded by number of lanes.

3.3 Future Baseline Traffic Volumes

3.3.1 Total Daily Traffic

The 2040 conditions incorporated changes in land use, network improvements, and updated truck ban policies into the regional model as necessary for scenario analysis. Overall, the future year model has greater travel demand capacity due to several roadway widenings and increased trip generation due to increases in population and employment.

Figure 3-4 summarizes the changes in overall vehicle activity between 2022 and 2040.

Table 3-1 – Change in Daily Total Traffic (Vehicle Miles Traveled)

AREA	DAILY TRAFFIC			
	2022	2040	Change	Percent Change
Study Area VMT	1,619,625	2,553,693	934,068	57.8%
Litchfield Park VMT ¹	200,485	270,408	69,923	25.9%
Camelback Road VMT ²	75,323	120,946	45,623	60.6%

¹ Traffic in Litchfield Park includes traffic on streets within Litchfield Park and streets along the boundary of Litchfield Park, including portions of Indian School, Camelback and Dysart roads.

² Traffic using the portion of Camelback Road that has been annexed into the Litchfield Park city limits.

Figure 3-3 – 2040 Network Configuration

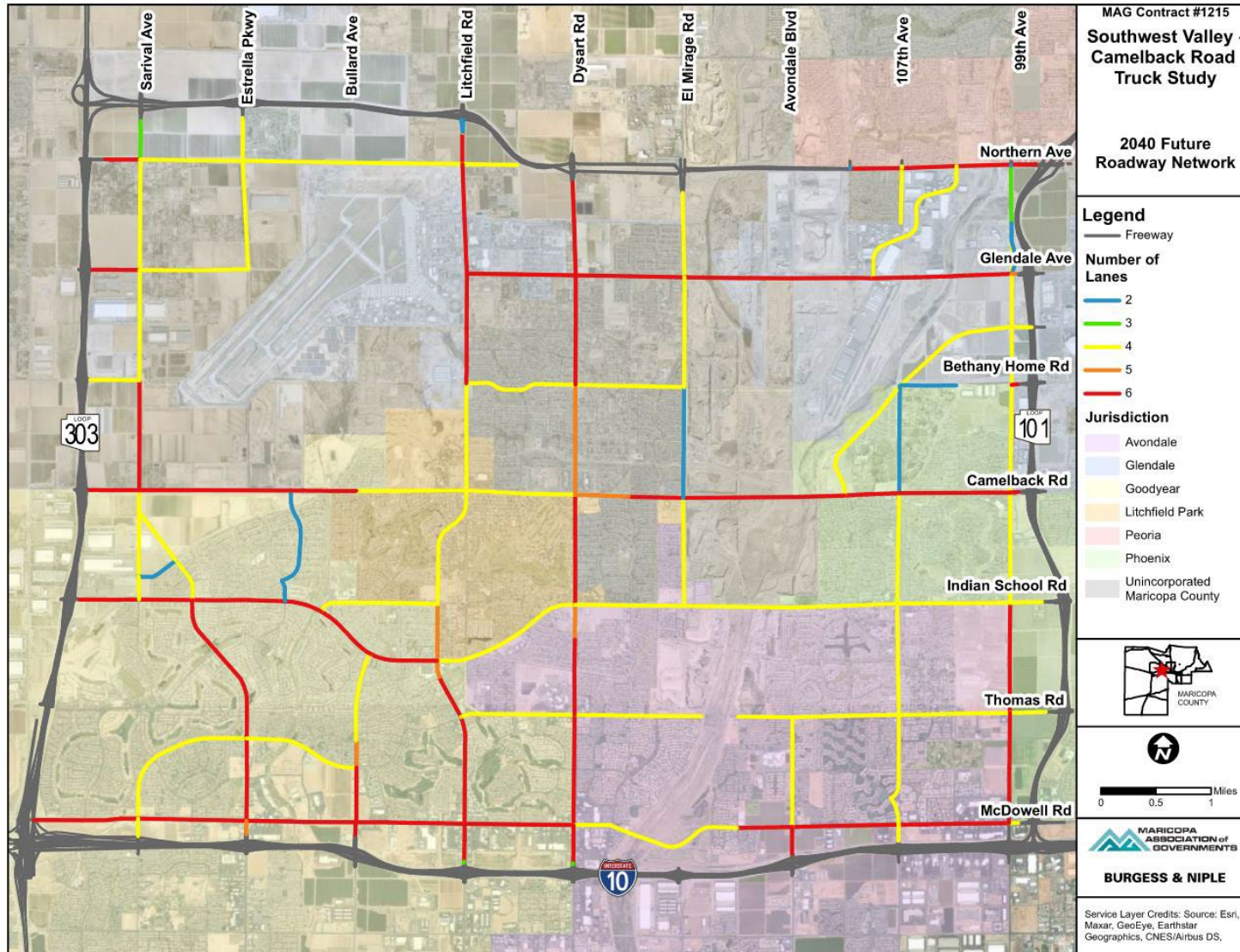
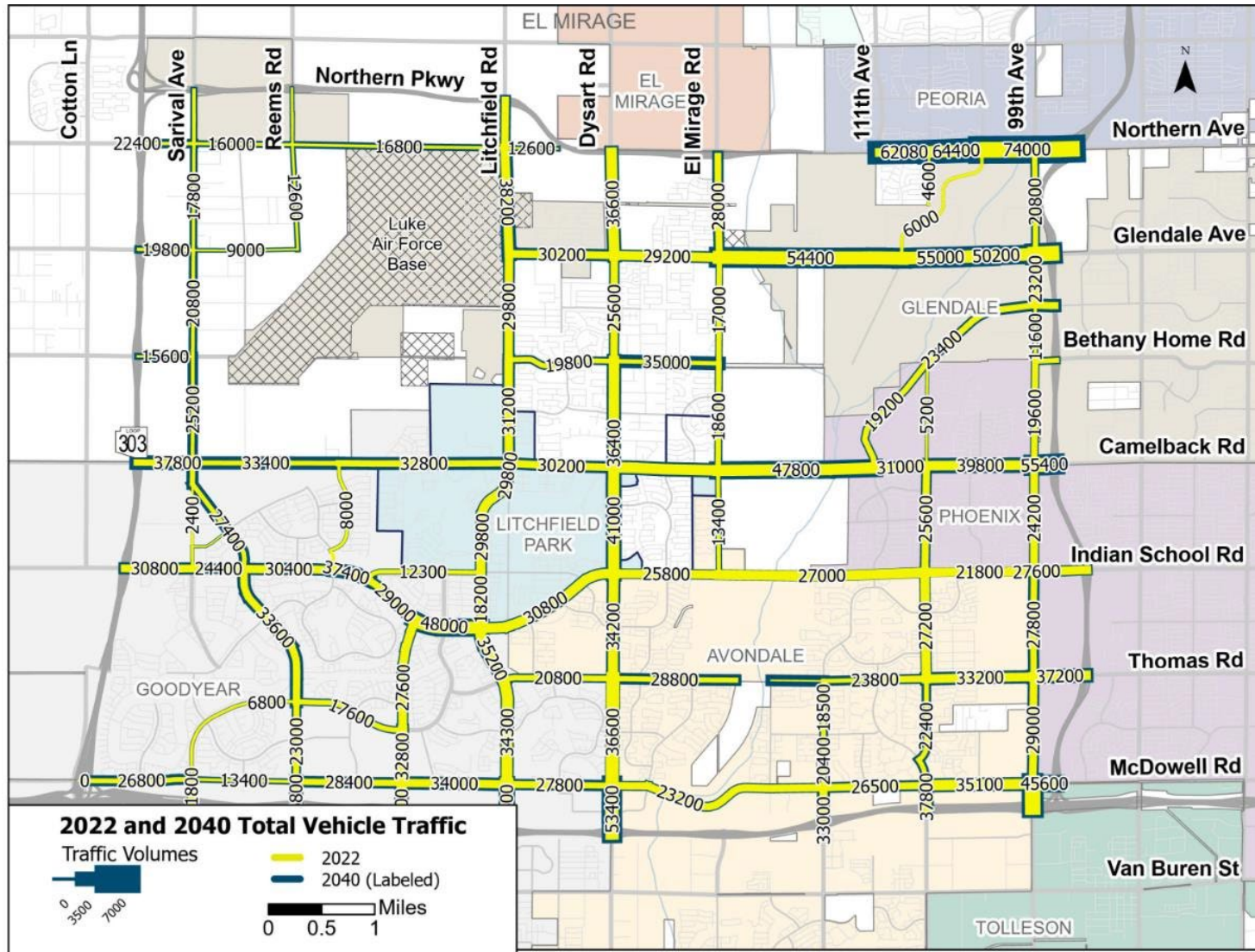


Figure 3-4 – Growth in Total Daily Traffic Volumes 2022-2040



Total traffic within and along the periphery of Litchfield Park (including the adjacent portion of Indian School Road as well as additional portions of Camelback Road and Dysart Road) increases by only 25 percent, but traffic on the section of Camelback Road within Litchfield Park grows by 60, slightly higher than the study area average.

3.3.2 Future Truck Trips

Growth in total daily traffic volumes between 2022 and 2040 is illustrated in **Figure 3-5**. The (color) bands represent existing traffic levels, while the (color) bands represent future traffic levels. The numbers appearing next to the links represent the total 2040 traffic volumes.

Truck traffic will grow faster than the total traffic between now and 2040. The projections found greater truck demand due to increased warehouse and industrial development. **Table 3-2** shows the growth in truck vehicle miles traveled.

The largest increases in truck traffic occur west of Litchfield Park along Sarival Avenue and Pebble Creek Parkway, due to a large increase in industrial and logistics development in the western portion of the study area. Large increases in truck trips are also found north of Luke Air Force Base and in the northeast quadrant of the study area.

Truck percentages also increase, as shown in **Figure 3-6**. This is most noticeable in the northwest quadrant of the study area where truck percentages will be in the 19 percent to 23 percent range along Sarival Avenue and Reems Road. The truck percentages also increase along Camelback Road.

3.3.3 Local Versus Through Truck Trips

Changes also occur in the number of local trucks: those that begin or end their trips within Litchfield Park. This is illustrated in **Figure 3-7**. The percentages of truck traffic that contain a trip end in Litchfield Park are summarized in **Table 3-2**.

Figure 3-5 – Growth in Daily Truck Traffic 2022-2040

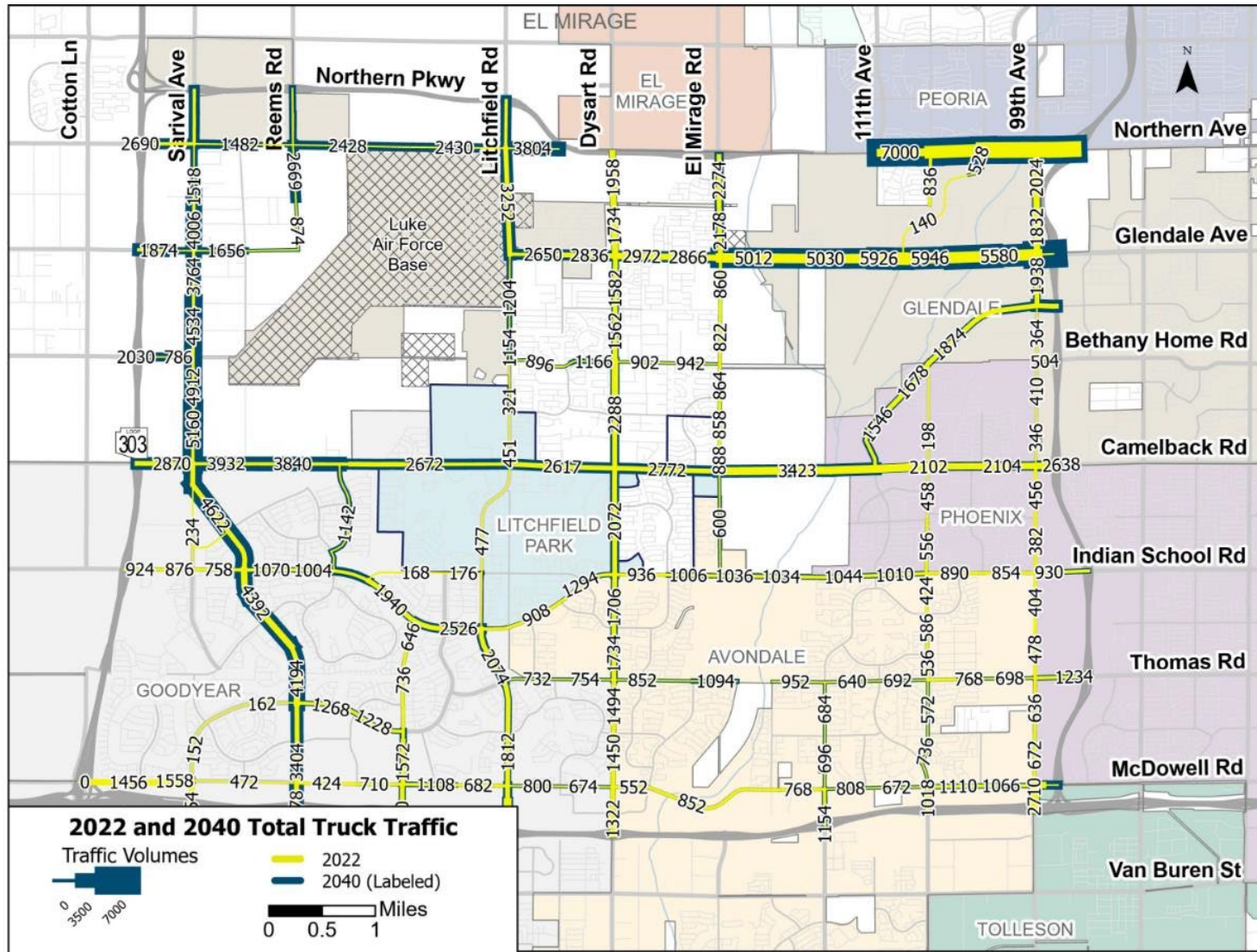


Figure 3-6 – Daily Truck Percentages 2040

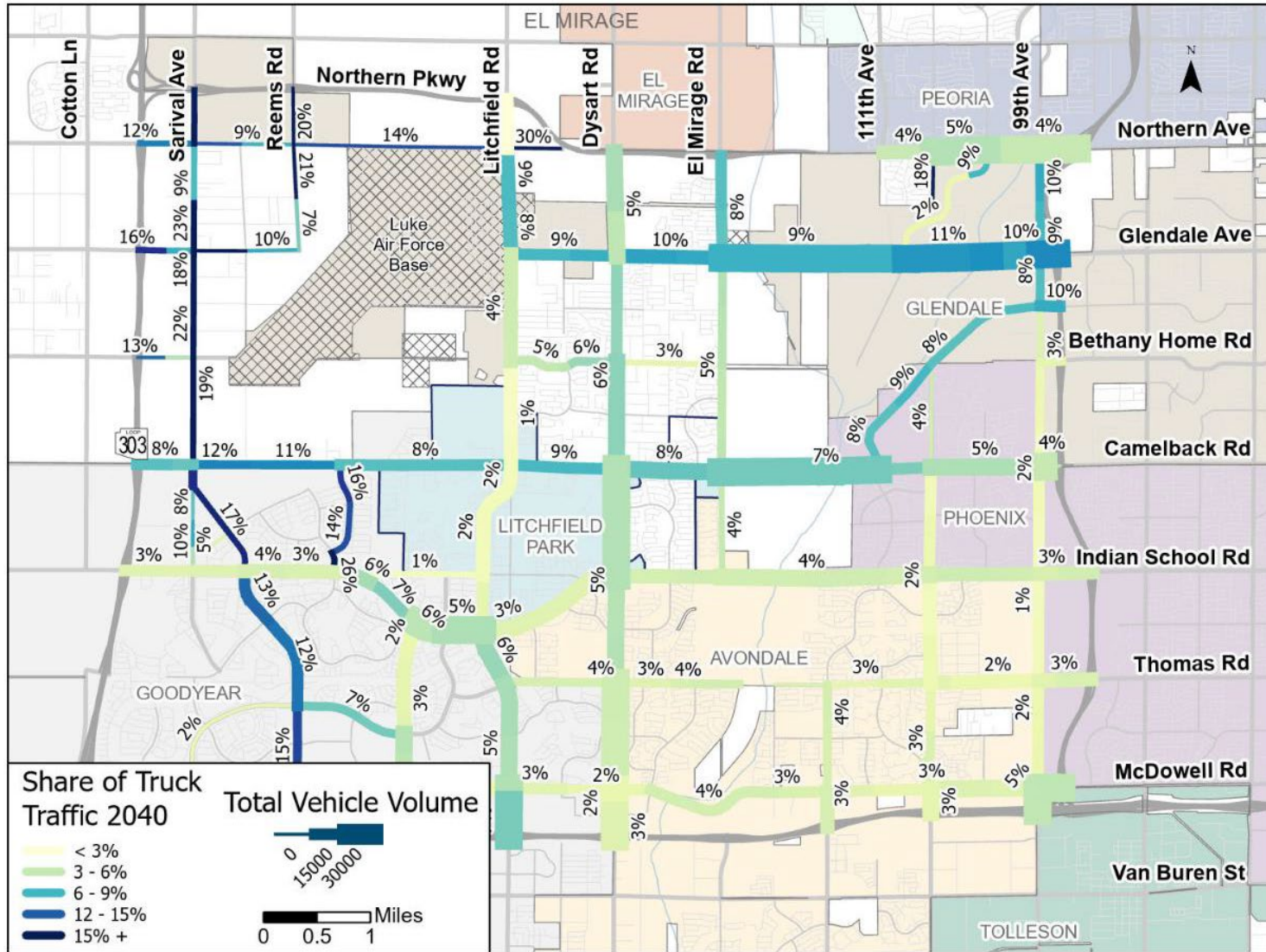


Table 3-2 – Change in Local and Through Truck Traffic

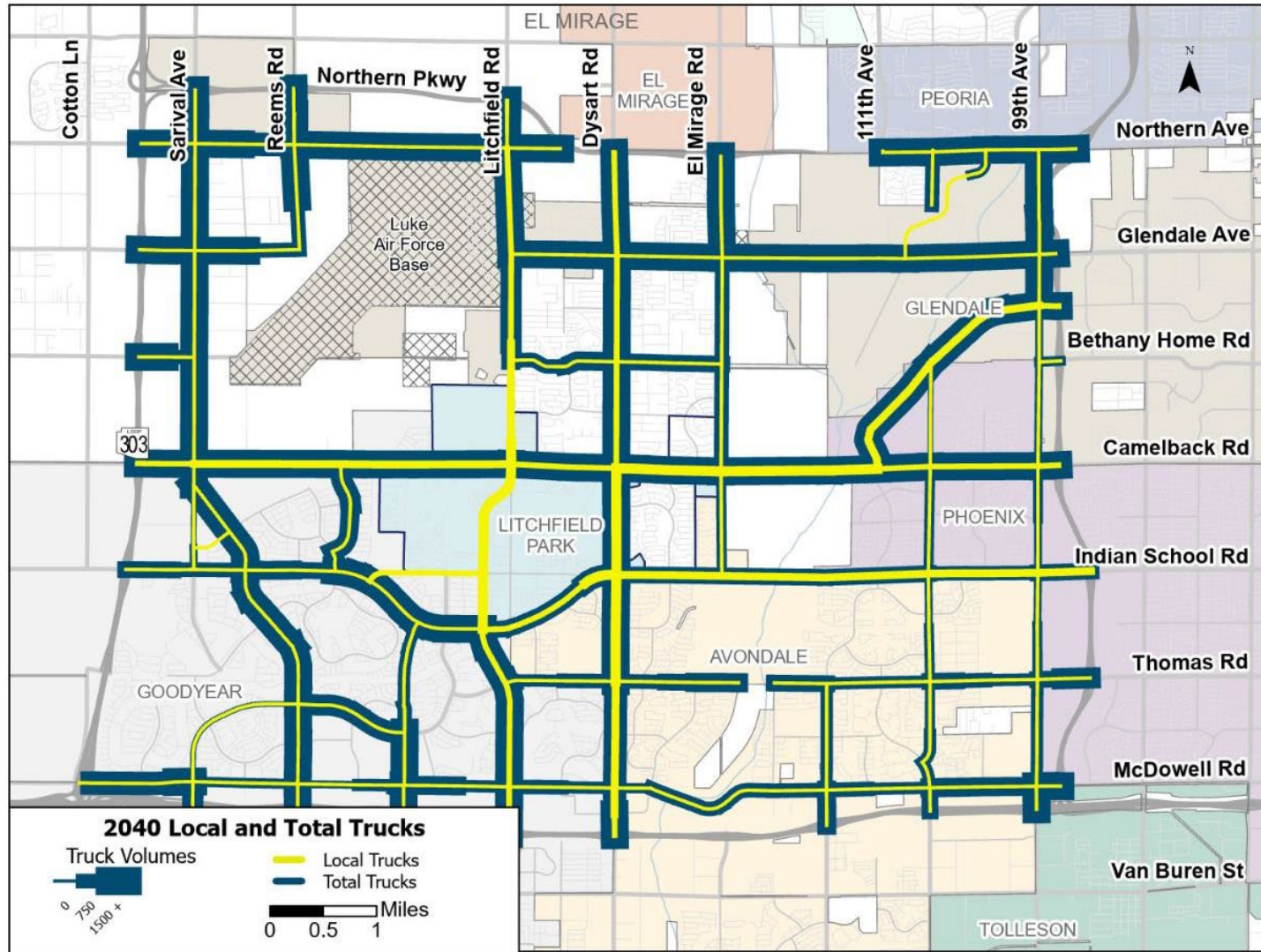
	Daily Truck Traffic			
	2022	2040	Change	% Change
Study Area				
Total Truck VMT	85,135	161,975	76,840	90.3%
Local Truck VMT	8,326	12,547	4,221	50.7%
Local Truck % of VMT	9.8%	7.7%	-2.0%	-20.8%
Non-Local Truck VMT%	90.2%	92.3%	2.0%	2.3%
Litchfield Park VMT³				
Total Truck VMT	8,479	14,067	5,588	65.9%
Local Truck VMT	2,315	3,361	1,046	45.2%
Local Truck % of VMT	27.3%	23.9%	-3.4%	-12.5%
Through Truck % of VMT	72.7%	76.1%	3.4%	4.7%
Camelback Road⁴				
Total Truck VMT	4,498	9,592	5,094	113.3%
Local Truck VMT	1,062	1,493	431	40.6%
Local Truck % of VMT	23.6%	15.6%	-8.0%	-34.1%
Through Truck % of VMT	76.4%	84.4%	8.0%	10.5%

Total vehicle miles throughout the study area increase by 57.8 percent between 2022 and 2040, while truck miles grow by 90.3 percent. These growth rates are lower for those streets within or along the periphery of Litchfield Park but the increase in truck miles is more than double the increase in total vehicle miles (65.9 percent vs 29 percent).

³ Traffic in Litchfield Park includes traffic on streets within Litchfield Park and streets along the boundary of Litchfield Park, including portions of Indian School, Camelback, and Dysart Roads.

⁴ Traffic using the portion of Camelback Road that has been annexed into the Litchfield Park city limits

Figure 3-7 – Local Truck Share 2040



The growth rates are highest along the annexed portion of Camelback Road, with total miles growing by 60.6 percent and truck miles growing by 113.3 percent.

The increase in truck traffic along Camelback Road is illustrated in **Figure 3-8**. The (color) bands represent existing traffic levels, while the (color) bands represent future traffic levels. The numbers appearing next to the links represent the total 2040 traffic volumes. As is the case today, the primary routes trucks will take in the future to access the section of Camelback Road in Litchfield Park are Camelback Road itself, N Ballpark Road and, to a lesser degree, Litchfield Road.

Truck trips also grow in their percentage of total traffic in the future. Within Litchfield Park, through truck trips will also become a larger share of truck trips.

3.4 Future Noise Conditions

The future conditions noise analysis process used the same approach as the analysis of the existing condition. The TNM 3.1 was used to calculate and compare noise levels.

3.4.1 Future Average Noise Levels

As described in **Section 2.4**, noise levels (e.g. dBA) are not measured in absolute numbers, but on a logarithmic scale. This means that an increase in traffic volume, of say, 30 percent will not result in a comparable (30 percent) increase in decibel level. Increases in decibel levels occur more gradually.

Table 3-3 shows the increases in traffic volumes by vehicle class and the corresponding increase in average loudest hour noise levels. While the primary focus of this study has been on potential nuisance events, changes in average noise levels are relevant to the analysis of the impacts of potential remedies discussed in Chapter 4.

Table 3-3 – Estimated Future Average Noise Levels

VEHICLE TYPE	NOISE		
	2022 Loudest Hour (dBA)	2040 Loudest Hour (dBA)	Increase 2023 to 2040 (dBA)
Autos	65.0	67.4	2.4
Med. Truck	60.3	64.3	4.0
Heavy Truck	53.4	60.6	7.2
Total	66.5	69.7	3.2

3.4.2 Event-Based Analysis of Future Conditions

Table 3-4 shows the total number of potential nuisance events observed the nights of November 16 and 17, 2022 and calculates 2040 projected events by calculating the percentage of each vehicle class causing a nuisance event and multiplying the predicted traffic volumes for each scenario by the calculated percentage. This correlation provides a forecast range of future events based on observation. Caution is necessary when using these data because observed volumes each night not necessarily correspond to actual future volumes. The correlations indicate the number of potential nuisance events to increase significantly (more than 50 percent) absent application of remedies to decrease the number of such events.

Table 3-4 – Noise-Related Nuisance Events by Vehicle Type

VEHICLE TYPE	EXISTING			FUTURE (2040)			
	Volume	PNEs	Percent PNE	Growth ⁵	Volume	Percent PNE	PNEs
Auto & Med Truck	8,024	4	0.05%	57.2%	12,614	0.05%	6.3
Heavy Truck	507	19	3.75%	113.3%	1,081	3.75%	40.5
Bus	20	1	5.00%	57.2%	31	5.00%	1.6
MC	12	3	25.00%	57.2%	19	25.00%	4.7
Total	8,563	27	0.32%	60.5%	13,745	0.39%	53.1

3.5 Future Vibration Conditions

Unlike noise, there is no available model to analyze vibration based on average traffic volume, mix, and speed. However, it is likely that as traffic volumes increase, particularly with the large increase in the forecast number of heavy trucks, a corresponding increase in vibration events will occur. **Table 3-5** provides an estimate of the increase in potential nuisance events caused by vibration impacts.

⁵ Growth factors were determined from the findings for Camelback Road in Tables 3-2 and 3-3, with trucks increasing by 113.3 percent and other vehicles increasing by 57.2 percent.

Table 3-5 Vibration-Related Nuisance Events by Vehicle Type

VEHICLE TYPE	EXISTING			FUTURE (2040)			
	Volume	PNEs	Percent PNE	Growth ⁶	Vol	Percent PNE	PNEs
Auto & Med Truck	8,024	0	0.00%	57.2%	12,614	0.00%	0.0
Heavy Truck	507	1	0.20%	113.3%	1,081	0.20%	2.1
Bus	20	0	0.00%	57.2%	31	0.00%	0.0
MC	12	0	0.00%	57.2%	19	0.00%	0.0
Total	8,563	1	0.01%	60.5%	13,745	0.02%	2.1

3.6 Transferability of These Findings

The travel demand model and the noise model have been used to forecast future year traffic volumes on a daily basis as well as hourly average noise levels. Vibration forecasts have been estimated by similar means. In contrast, quantifying existing and future potential nuisance events has focused on the area where the most community complaints of these events have been received, along a short section of Camelback Road where actual observations were made.

There are many factors that work together to determine how noise and vibration impacts are perceived, and these factors can change significantly from one location to another. In addition to traffic volumes and vehicle mix, other factors contributing to the perceived impacts include road design and condition, shielding from intervening terrain, buildings and other structures, as well as the type of ground between the road and adjacent communities.

Even though conditions are not the same everywhere, the findings of this study are still significant and useful in estimating how these impacts might increase over time in other locations both on a daily basis and on a nighttime event basis. Certainly, in locations where communities are experiencing noise and vibration impacts today, the findings of this study can be used to inform efforts to predict how these impacts might change over time.

⁶ Growth factors were determined from the findings for Camelback Road in Tables 3-2 and 3-3, with trucks increasing by 113.3 percent and other vehicles increasing by 57.2 percent.

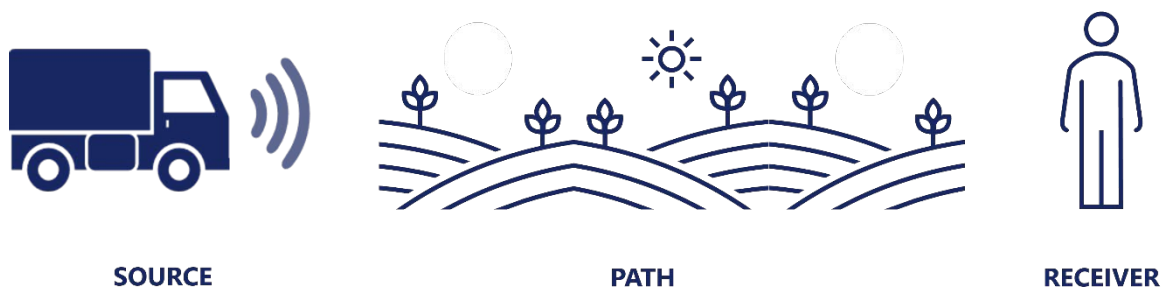
4.0 NOISE AND VIBRATION MITIGATION STRATEGIES AND ANALYSES

Whether the source of the noise is continuous, like roadway noise, or intermittent, like the honking of a horn, there exists a relationship between the creation of the noise and those who hear it. This is the source – path – receiver relationship in recognition of the three things necessary for sound: something to make the sound, some distance between them, and something to hear the sound. These are also the three locations where remedies to reduce unwanted sound, or noise, are considered. **Figure 4-1** illustrates the source, path, and receiver relationship.

A second dimension of noise impact considered in this report is the effect of short-duration, peak noise events (defined as potential nuisance events in the preceding chapter) as opposed to average sound levels. Each mitigation measure presented includes discussion of how sound levels are reduced for each of these two dimensions.

There are many options available to reduce roadway noise and vibration. Several options are discussed below based on the location where the type of abatement is applicable. Remedies were assessed using a combination of technical analysis using the Federal Highway Administration Traffic Noise Model (FHWA TNM) versions 2.5 and 3.1. A literature review was conducted to determine the effectiveness and potential costs of potential remedies.

Figure 4-1 – Source, Path, Receiver Relationship



4.1 Evaluation Criteria

To normalize the effects, benefits, and costs of mitigation measures, the following evaluation parameters are considered for each treatment as presented in **Table 4-1**. These qualitative measures are based on quantitative data and estimates.

Table 4-1 - Evaluation Criteria

CATEGORY	SCORING		
	Low	Medium	High
Estimate of Reduction in Average Sound Level	Negligible effect (0-1 dB)	1-3 dB(A)	3+ dB(A)
Estimate of Reduction in Potential Nuisance Events (PNE)	0-10%	10%-25%	>25%
Cost	Can be accomplished with staff effort or maintenance activities (Up to \$100,000)	Approximately \$100,000-\$500,000	Greater than \$500,000

4.2 Strategies to Reduce Noise and Vibration

Reducing potential nuisance events requires reducing the noise and vibration generated by vehicles reaching the receptors. In this case, those receptors are the homes nearest the source. Remedies include vehicle regulations and restrictions, quieter pavement, lower speed limits, and strengthened ordinances on noise and vibration.

The strategies identified below have been selected for their ability to reduce the energy level of noise and vibration reaching the receptors. In many cases, the reduction in noise and/or vibration would affect both the magnitude of the potential nuisance events and the magnitude of the ambient noise level before and after the event. This means that, in general, the strategies would reduce the maximum noise and vibration levels of the potential nuisance events, but would not reduce the change in dB level between the event and the ambient noise level leading up to the event.

With this background, the following analysis evaluates the ability of the various strategies to reduce the maximum energy levels of potential nuisance events. The working premise for this analysis is that reducing the magnitude of any event reduces its likelihood to become a nuisance event in general, and that once the dB levels drop below a threshold number (undefined), the potential to become a nuisance event is eliminated.

It is not possible, with the limited data available in this study, to define what that threshold value is. What this study does is to focus on the observed number of potential nuisance events reported, and estimate what percentage of these events drop below the minimum dB levels used in identifying them (75.0 dB(A) for noise and 72VdB for vibration). While this measure may not definitively establish how much each strategy might reduce actual

nuisance events, it will help readers understand the relative potential each measure has to reduce the number of events in comparison to others.

It is important to note that 21 of the 27 potential nuisance events exceed the noise threshold by less than 2.5 dB(A), and only six exceed the threshold by 3 dB(A) or more. This may be an indication that even a relatively small reduction in dB level might have a disproportionately larger reduction in potential nuisance events. Caution should be used, however, in drawing such a conclusion. Despite the variance in the difference between ambient and event conditions shown in Table 2-10, which highlights only the top five observed events, it remains reasonable to assume the highest dB events in the full table would have a higher potential to cause a nuisance than the lowest dB events. This is because the loudest events could achieve a larger difference between the ambient condition than the lowest events could. To put this another way, it is reasonable to assume that the loudest events would be more likely to cause a nuisance event than the softest events because they would be more likely to achieve higher differences compared to the ambient condition than the softest events could.

For this reason, strategies that reduce noise levels by 2.5 dB(A) or less are considered to have low effectiveness in reducing potential nuisance events, even though their effectiveness in reducing average noise is considered medium.

Because there were so many more potential nuisance events caused by noise compared to vibration, this section focuses primarily on strategies to reduce the impacts of noise. This section also indicates which strategies would also have a reduction in vibration impacts.

4.2.1 Ban Through Truck Trips

Prohibiting heavy trucks from passing entirely through a local jurisdiction is a popular measure used by multiple jurisdictions in the Southwest Valley, including the City of Litchfield Park. Ordinances that do this can be difficult to enforce, particularly in larger cities with vast land areas and many streets to monitor. For smaller cities like Litchfield Park, enforcement is more manageable.

As described in the introduction to this report, the annexation of Camelback Road by the City of Litchfield Park raised a concern among the truck industry and others that the ban on through truck trips would be enforced along the portion of Camelback Road enveloped within Litchfield Park. This concern was an important motivating factor in the creation of this study.

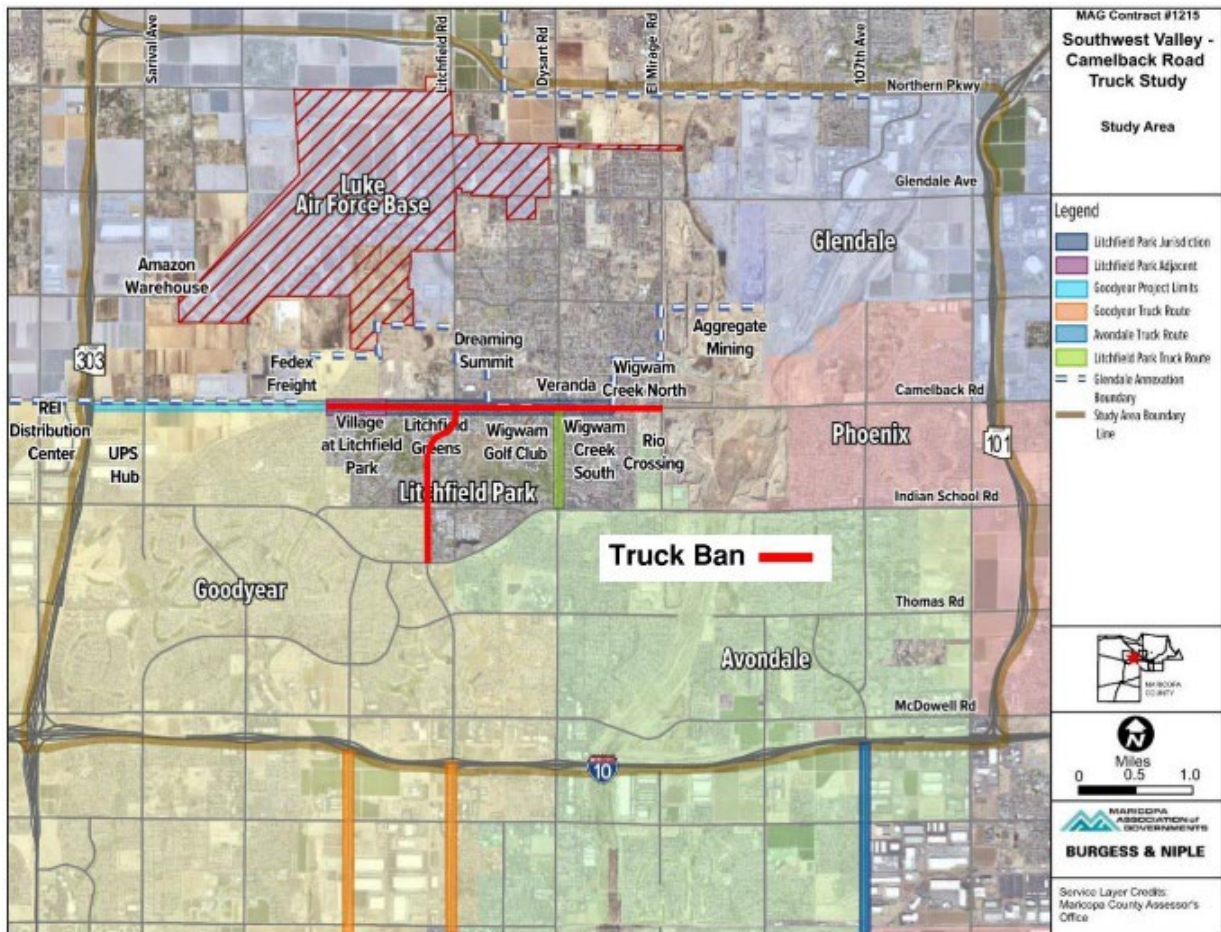
Even though subsequent legislation has removed the possibility of enforcing a through-truck trip ban on the annexed portion of Camelback Road, it is still important to understand what the impact of such a ban would have in reducing the number of potential nuisance events from occurring. This impact could then be compared to other strategies

and measures as a jurisdiction works to identify the most cost-effective way to reduce the number of events.

4.2.1.1 Impact of Through-Truck Trip Ban on Existing Conditions

The modeled ban scenarios included the existing ban along Litchfield Road between Indian School Road and Camelback Road as well as the proposed Camelback Road through truck ban between 152nd Avenue and El Mirage Road. **Figure 4-2** shows the extents of the bans within the study area. The land use assumptions between ban and baseline scenarios are the same. Land use assumptions only changed based on the scenario year.

Figure 4-2 – Truck Ban Extents



The effect of the ban on existing truck traffic flow is summarized in **Table 4-2**. The effect of the ban is to reduce through truck traffic on Camelback Road to zero. This does not reduce the number of truck trips being made, but reroutes those trips away from the two-mile section of Camelback Road in Litchfield Park. The effect of the change is that truck vehicle miles are reduced in Litchfield Park, but are increased in other jurisdictions.

**Table 4-2 – Change in Existing Daily Total Truck Traffic
(Vehicle Miles Traveled) in Response to Ban**

LOCATION/VEHICLE TYPE	Daily Traffic			
	2022 No Ban	2022 Ban	Change	% Change
Study Area				
Total Truck VMT	85,135	84,992	-143	-0.17%
Local Truck VMT	8,326	7,886	-440	-5.28%
Non-Local Truck VMT	76,809	77,106	297	0.39%
Local Truck % of VMT	9.8%	9.3%	-0.5%	-5.1%
Non-Local Truck % of VMT	90.2%	90.7%	0.5%	0.6%
Litchfield Park VMT⁷				
Total Truck VMT	8,479	6,843	-1,636	-19.29%
Local Truck VMT	2,315	2,376	61	2.63%
Through Truck VMT	6,164	4,467	-1,697	-27.53%
Local Truck % of VMT	27.3%	34.7%	7.4%	27.2%
Through Truck % of VMT	72.7%	65.3%	-7.4%	-10.2%
Camelback Road⁸				
Total Truck VMT	4,498	1,297	-3,201	-71.16%
Local Truck VMT	1,062	1,297	235	22.13%
Through Truck VMT	3,436	0	-3,436	-100%
Local Truck % of VMT	23.6%	100.0%	76.4%	323.5%
Through Truck % of VMT	72.7%	0.0%	-72.7%	-100.0%

Along the two-mile section of Camelback Road in Litchfield Park, the through-trip ban eliminates all through truck trips. At the same time, it increases local truck VMT by 22 percent, indicating that some local truck trips would change their routes to use Camelback

⁷ Traffic in Litchfield Park includes traffic on streets within Litchfield Park and streets along the boundary of Litchfield Park, including portions of Indian School, Camelback, and Dysart Roads.

⁸ Traffic using the portion of Camelback Road that has been annexed into the Litchfield Park city limits.

Road. The end result is a 71.16 percent reduction in total truck VMT on the annexed portion of Camelback Road.

More broadly, the impact of the ban on the streets within or adjacent to Litchfield Park is a much smaller 19 percent reduction on total truck VMT. In fact, the reduction in truck VMT within or adjacent to the city (-1,636) is only about half of the reduction on the annexed portion of Camelback Road(-3,201). This indicates that roughly half of the through truck trips on Camelback Road divert to streets that adjoin the city on at least one side.

Within the entire study area, total truck VMT does not increase, but decreases slightly by 0.17 percent. This indicates that a small percentage of the trips reroute to the surrounding freeways or out of the study area entirely.

Figure 4-3 shows the 2022 daily truck traffic with a through-truck trip ban in place along Camelback Road. Note the truck volumes along Camelback Road are substantially reduced. The impacts to other roads are highlighted in **Figure 4-4**. The red bandwidths highlight reductions in truck volumes due to the ban and the blue bandwidths highlight increased truck volumes due to the ban.

Analysis of modeled truck flow changes due to the ban found that roughly half of the through-truck trips diverted from Camelback Road to the adjacent portion of Indian School Road. For sections of Camelback Road that are entirely within the city limits of other jurisdictions with through-truck bans, this increase might warrant additional enforcement. The majority of restricted trucks appear to use Northern Parkway to access the surrounding freeways or to travel outside the study area.

To understand the effect on hourly average noise levels, traffic volumes were entered into the validated noise model to assess two existing loudest hour scenarios:

- 2022 Existing traffic; and
- 2022 Existing traffic with a ban on through trucks.

Additional modeling scenarios included analysis of the L_{dn} sound levels. This is a 24-hour noise descriptor that adds 10 dB to the calculated sound level each hour from 22:00-07:00. Calculated sound levels for 07:00-22:00 are not adjusted. The results of the L_{dn} analysis were similar to those in the loudest hour analysis. In the existing case, implementing a ban on through trucks results in an average sound level reduction of 0-2 dB.

Figure 4-3 - Daily Truck Trips 2022 with Camelback Road Truck Ban

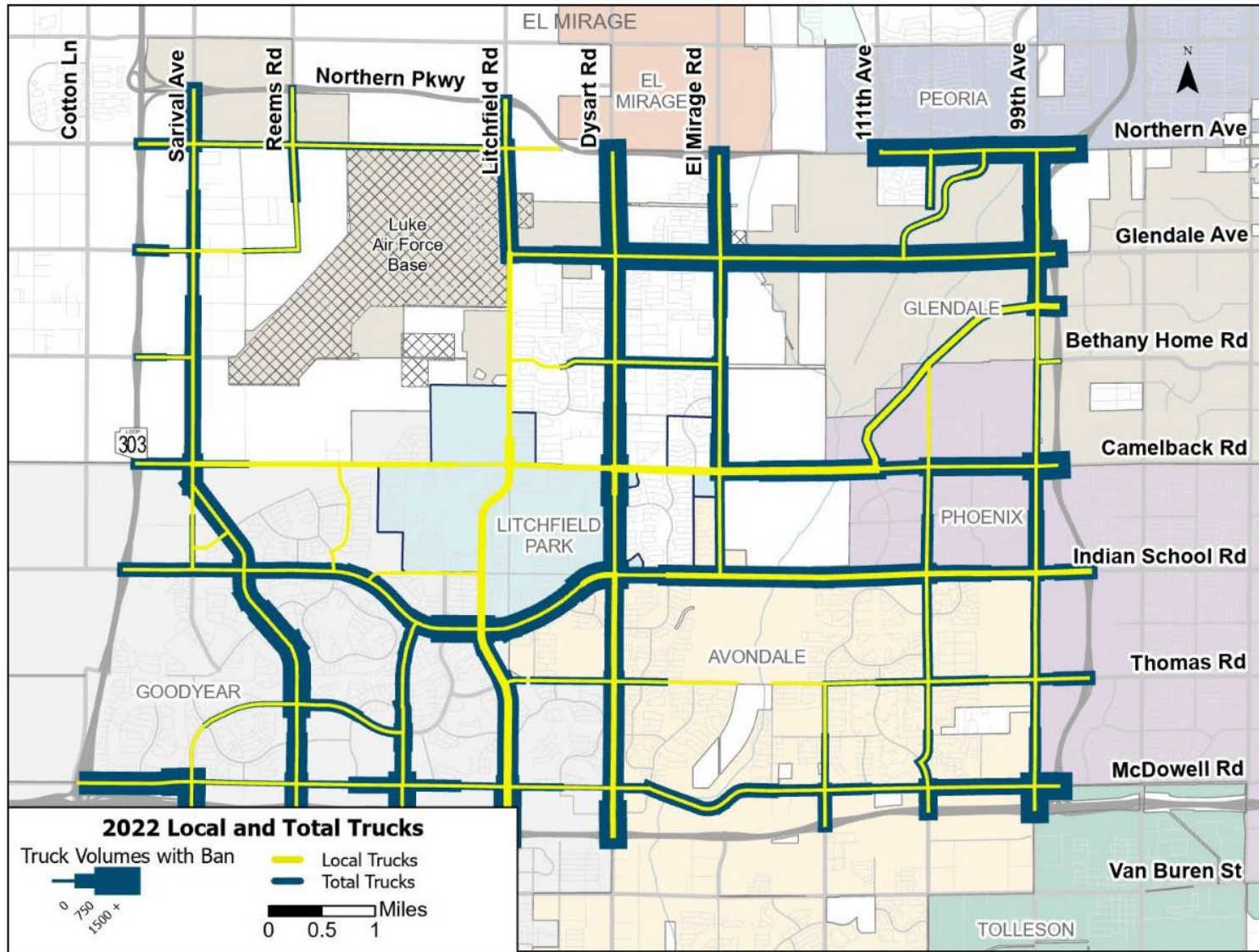
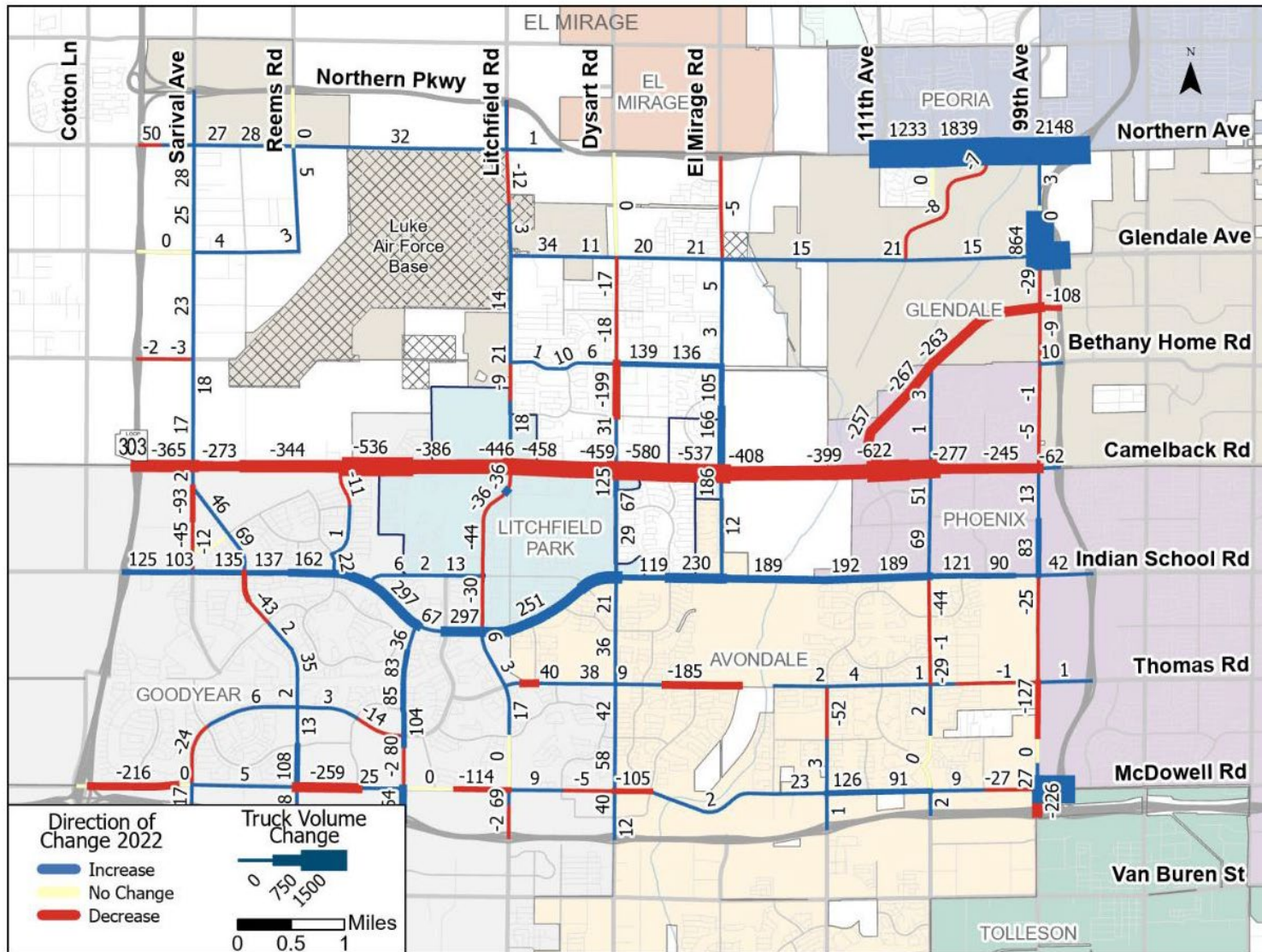


Figure 4-4 - 2022 Daily Freight Volume Impacts due to Truck Ban on Camelback



4.2.1.2 Impact of Through Truck Ban on Future Conditions

The through-trip truck ban was modeled for the future condition to assess the impacts of the ban in the year 2040. Overall, the future year model has greater travel demand and roadway capacity due to added development and several roadway widenings. The projections also found greater truck demand due to increased warehouse and industrial development.

Figure 4-5 shows the 2040 daily truck traffic with the Camelback Road ban in place. The truck ban is very effective in lowering truck traffic along Camelback Road. **Figure 4-6** shows the change in truck volume between 2022 and 2040 between the Camelback Road truck ban and baseline conditions.

Analysis of modeled truck flow changes due to the ban found that roughly half of the through-truck trips diverted from Camelback Road to the adjacent portion of Indian School Road. For sections of Camelback Road that are entirely within the city limits of other jurisdictions with through-truck bans, this increase might warrant additional enforcement. The majority of restricted trucks appear to use Northern Parkway to access the surrounding freeways or to travel outside the study area.

To understand the effect on hourly average noise levels, traffic volumes were entered into the validated noise model to assess two existing loudest hour scenarios:

- 2022 Existing traffic; and
- 2022 Existing traffic with a ban on through trucks.
- Additional modeling scenarios included analysis of the L_{dn} sound levels. This is a 24-hour noise descriptor that adds 10 dB to the calculated sound level each hour from 22:00-07:00. Calculated sound levels for 07:00-22:00 are not adjusted. The results of the L_{dn} analysis were similar to those in the loudest hour analysis. In the existing case, implementing a ban on through trucks results in an average sound level reduction of 0-2 dB.

Figure 4-5 - Daily Truck Trips 2040 with Camelback Road Truck Ban

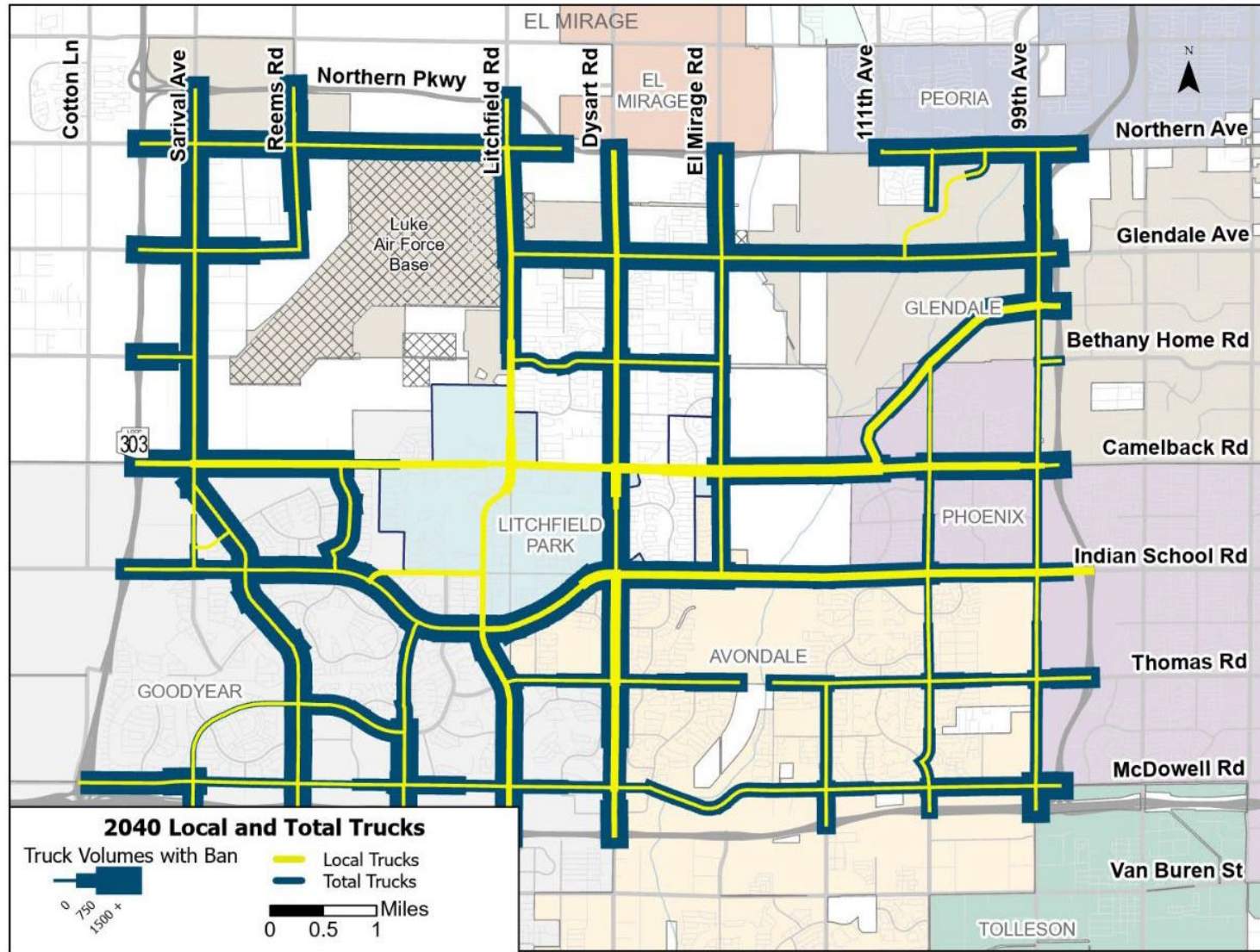
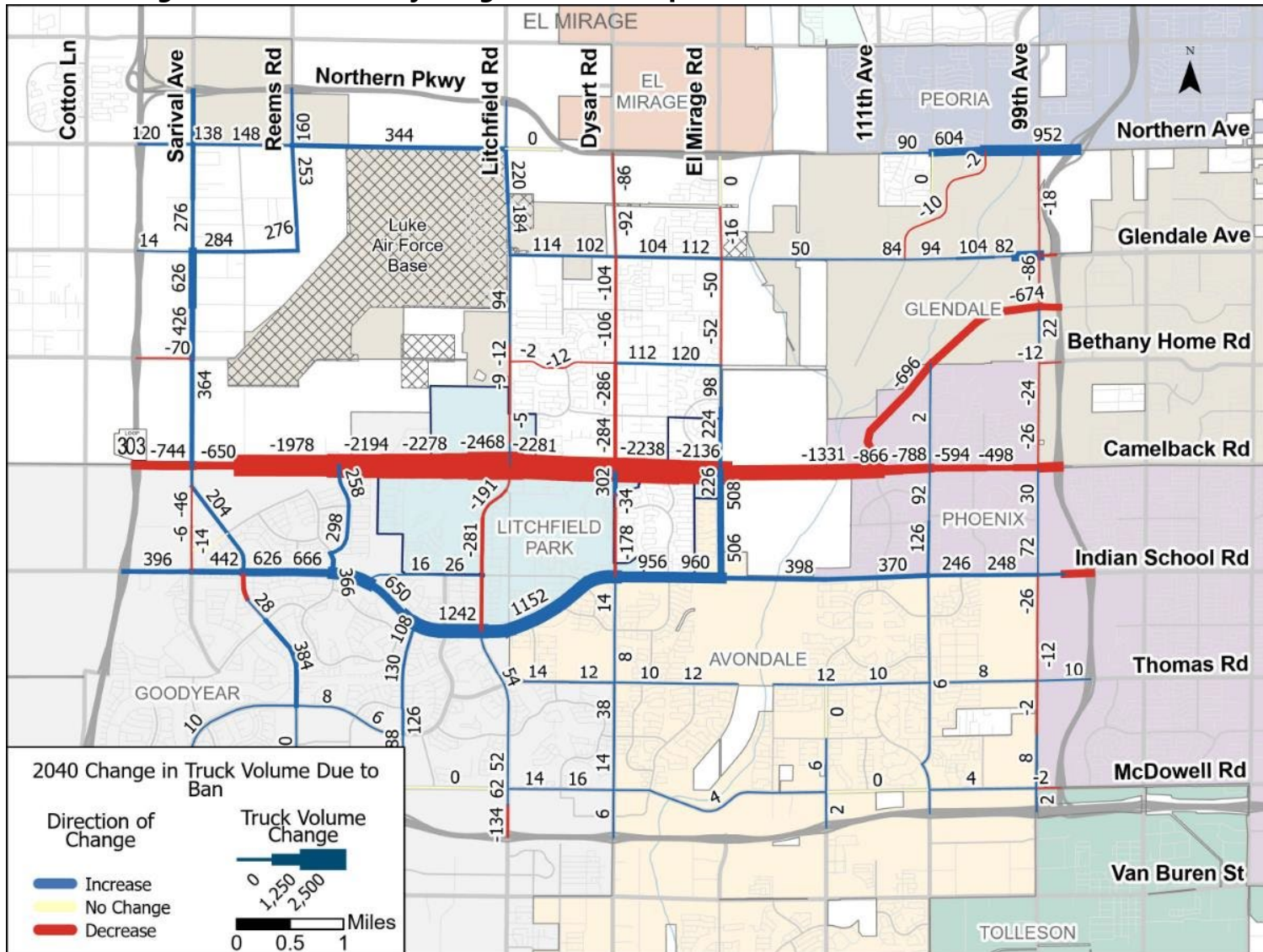


Figure 4-6 - 2040 Daily Freight Volume Impacts due to Truck Ban on Camelback



4.2.1.3 Impact of Through Truck Ban on Noise and Vibration Events

The through-trip truck ban was modeled for the future condition to assess the impacts of the ban in the year 2040. Overall, the future year model has greater travel demand and roadway capacity due to added development and several roadway widenings. The projections also found greater truck demand due to increased warehouse and industrial development.

Table 4-3 documents the impact of the truck ban on truck VMTs due to a ban along Camelback Road in 2040. As was the case for existing conditions, roughly half of the truck VMT diverting away from Camelback Road finds another route adjacent to Litchfield Park, most notably on Indian School Road. Note that in 2040, there is a slight increase in VMT throughout the full study area due to trucks rerouting over longer distances. The end result is a 77.04 percent reduction in total truck VMT on the annexed portion of Camelback Road.

Because this strategy reduces the number of vehicles on the road, its impact on vibration events would be similar.

Estimate of reduction in average sound levels: Low

The results of this analysis indicated that there was little difference in average noise levels when comparing the ban scenarios with the baseline scenarios. In the existing case, implementing a ban on through trucks results in an average sound level reduction of 0-2 dB. The 2040 loudest hour scenario implementing a ban of through trucks would result in a sound level reduction of 1-3 dB. These minimal changes can be attributed to the relatively low truck volumes (approximately 5 percent to 6 percent) in the study area. The results of the L_{dn} analysis were like the loudest hour analysis. The 2040 twenty-four-hour scenario implementing a through truck ban would result in a sound level reduction of 0-3 dB.

Table 4-3 – Change in Future Daily Total Truck Traffic (VMT) in Response to Ban

AREA/VEHICLE TYPE	DAILY TRAFFIC			
	2040 No Ban	2040 Ban	Change	% Change
Study Area				
Total Truck VMT	161,975	164,226	2,251	1.39%
Local Truck VMT	12,547	11,875	-672	-5.36%
Non-Local Truck VMT	149,428	152,351	2,923	1.96%
Local Truck % of VMT	7.7%	7.2%	-0.5%	-6.7%
Non-Local Truck % of VMT	92.3%	92.8%	0.5%	0.6%
Litchfield Park VMT⁹				
Total Truck VMT	14,067	10,642	-3,425	-24.35%
Local Truck VMT	3,425	2,861	-564	-16.47%
Through Truck VMT	10,642	7,781	-2,861	-26.88%
Local Truck % of VMT	24.3%	26.9%	2.5%	10.4%
Through Truck % of VMT	75.7%	73.1%	-2.5%	-3.4%
Camelback Road¹⁰				
Total Truck VMT	9,592	2,202	-7,390	-77.04%
Local Truck VMT	1,493	2,202	709	47.49%
Through Truck VMT	8,099	0	-8,099	-100.0%
Local Truck % of VMT	15.6%	100.0%	84.4%	542.5%
Through Truck % of VMT	84.4%	0.0%	-84.4%	-100.0%

⁹ Traffic in Litchfield Park includes traffic on streets within Litchfield Park and streets along the boundary of Litchfield Park, including portions of Indian School, Camelback, and Dysart Roads.

¹⁰ Traffic using the portion of Camelback Road that has been annexed into the Litchfield Park city limits.

Estimate of reduction in PNE: High

The more significant impact of implementing the ban is to reduce potential nuisance events. As described above, the truck ban reduces truck traffic on the annexed portion of Camelback Road by 71.16 percent in 2022 and 77.04 percent in 2040. The impacts of these reductions are quantified in **Table 4-4**.

**Table 4-4 – Existing and Future Nuisance Events
with a Ban on Through Truck Traffic**

Existing Conditions (2022)					
Vehicle Type	Baseline PNEs	PNE Reduction with Ban		PNEs with Ban	
		%	Number	Number	%
Autos & Medium Trucks	4	0.00%	0.0	4.0	100.0%
Heavy Truck	19	-71.16%	-13.5	5.5	28.8%
Bus	1	0.00%	0.0	1.0	100.0%
MC	3	0.00%	0.0	3.0	100.0%
Total	27	-50.08%	-13.5	13.5	49.9%
Future Conditions (2040)					
Vehicle Type	PNEs	Ban dB(A) Reduction		PNEs with Ban	
		Number		Number	%
Autos & Medium Trucks	6.3	0.00%	0.0	6.3	100.0%
Heavy Truck	40.5	-77.04%	-31.2	9.3	23.0%
Bus	1.6	0.00%	0.0	1.6	100.0%
MC	4.7	0.00%	0.0	4.7	100.0%
Total	53.1	-58.76%	-31.2	21.9	41.2%

Reducing the number of trucks in the vehicle mix will result in a reduction in the presence of PNE-generating vehicles by about 50 percent in 2022 and 59 percent in 2040. The number of potential nuisance events in 2040 with the ban would be about 81 percent (21.9) of the potential nuisance events identified in this study (27).

Cost: Medium

The cost to implement a truck ban is administrative staff effort and installation of signs, as well as costs to actively enforce the ban. The enforcement costs would be partially offset by fines.

4.2.2 Quieter Pavement

The road surface material is a factor in the sound levels produced by tire-pavement interaction. A typical roadway in Arizona is comprised of dense graded asphalt mixes that are chosen primarily for structural stability and durability. Over the past few years, two methods for reducing noise due to the pavement/tire interface has been to provide an

overlay of rubberized asphalt (also referred to as Asphaltic Rubber Friction Course, or ARFC), or to provide a concrete surface (also referred to as Portland Cement Concrete Pavement or PCCP) that has been treated with a “diamond grind” technique that creates small ridges along the surface of the concrete to reduce noise.

4.2.2.1 Rubberized Asphalt and Diamond Grind Concrete Road Surfaces

Since the early 2000s, MAG, ADOT, and FHWA have collaborated on several different efforts to study the impact of quiet pavement on the regional freeway network. Historically, rubberized asphalt overlay over concrete pavement has been implemented as the preferred type of quiet pavement for the MAG region. Most recently, MAG and ADOT have partnered to conduct a Diamond Grind Pilot Program in order to assess a concrete surface treatment alternative to the rubberized asphalt overlay. The majority of the urban freeway network is concrete-based and as such, this treatment is a logical consideration for the region. The most recent assessment effort, *Peer Review Analysis: Pavement Surface Practices*, confirmed the applicability of diamond grind on the MAG freeway network. The following results are a summary of the key findings from the final report (October 12, 2023):

- Rubberized asphalt is similar to flexible pavement types such as Open-Graded Friction Course (OGFC) surfaces. These types of pavement surfaces typically provide the largest amount of traffic noise attenuation upon its original installation. However, the noise attenuation benefits diminish over time and are louder than a diamond grind treatment within 3 – 5 years, on average. Diamond ground surfaces, as a rigid pavement type, also provide similar levels of noise attenuation upon original installation and remain consistent over their service life. The report confirmed that diamond grind provides a net benefit for noise attenuation when compared to the majority of the existing, aged rubberized asphalt overlay on the regional freeway network. Both surface treatments provide a supplemental traffic noise reduction over the requirement set by the Federal Highway Administration.
- Both surface treatments are comparable in providing a smooth riding surface and adequate surface friction.
- Current maintenance practices to extend the life of rubberized asphalt further reduce its effectiveness in reducing noise and increase the likelihood of raveling, which diminishes the smooth rideability originally provided by the rubberized asphalt overlay.
- From a life cycle perspective, which includes the initial capital, replacement capital, and maintenance costs, rubberized asphalt would cost 37 percent more than diamond grind, on average, over a 25-year period. This difference grows significantly as the time period considered gets longer due to the frequency of the

need to replace the asphalt overlay. The peer review report confirmed that there is no scenario in which rubberized asphalt would result in a lower life cycle cost than diamond grind for the MAG regional freeway network.

As noted above, a key element of this research is the type of freeway pavement existing throughout the majority of the region. The existing concrete-based freeway pavements are a major factor in driving the cost gap between rubberized asphalt overlay and diamond grind surface treatments. The concrete structure differs from local roadway structures such as arterial streets, which typically consist of a dense-graded asphalt mix. Accordingly, the implementation of diamond grind would first require the replacement of the roadbed with concrete, which would substantially change the cost findings.

This strategy would also reduce the impacts of vibration events.

4.2.2.2 Analysis of Rubberized Asphalt Sound Reduction Potential

In the technical analysis for this study, the analysis team used a custom version of the FHWA TNM 2.5 that includes noise emission curves for rubberized asphalt pavement. Calculations in TNM using the rubberized asphalt pavement were compared to calculations using the TNM Average pavement type to represent the pavement on West Camelback Road. **Figure 4-7** shows a sample of calculated locations and the expected reduction from use of rubberized asphalt pavement compared to the TNM Average pavement. The reduction from analyzed locations behind a privacy wall (receivers 4.005, 4.018, & 4.025) was roughly between 2.25 and 2.5 dB, while the reduction for locations directly exposed to traffic (receivers 4.035 & 5.001) had reductions of roughly 2.75 dB.

Rubberized asphalt pavements are not in standard use within Litchfield Park and may be unsuitable for use where there is stop-and-go traffic, particularly with heavy trucks.

Estimated reduction in average sound level: Medium

The modeled results provide location-specific findings for the reduction of average sound levels that range between 2.25 and 2.75 dB.

Estimated reduction in PNE: Low

Assuming that the medium reduction in sound level will affect the magnitude of potential nuisance events, the roughly 2.5 dB reduction achieved from using rubberized asphalt could reduce the number of observed potential nuisance events dramatically. There is no direct evidence that potential nuisance events are directly caused by the pavement-tire interaction. However, this interaction adds to the dB levels. Reducing pavement-tire interaction noise may help to reduce average noise levels, but would not affect the magnitude of events caused by other events such as engine braking for loud engine noise during acceleration. For this reason, the estimated reduction in potential nuisance events due to quieter road surfaces is considered low. In fact, by reducing the ambient noise

levels, quieter road surfaces might even increase the difference between ambient conditions and the loud potential nuisance events.

Cost: High

Costs for initial installation of rubberized asphalt treatments depend on the current condition of pavement and the extent to which replacement of pavement would be required. Assuming a 3-inch mill and overlay, the cost to install concrete pavement with Diamond Grind would be approximately \$230,000 per lane-mile, when recent cost increases are considered. Modifications to the structural pavement section would result in greater costs.

4.2.2.3 Analysis of Diamond Grind Sound Reduction Potential

While diamond grinding cement concrete has been shown to substantially reduce the average sound level produced, the initial reductions in sound levels may not be as effective as rubberized asphalt. But within 3-5 years, the sound mitigation of diamond grind concrete equals or surpasses that of rubberized asphalt

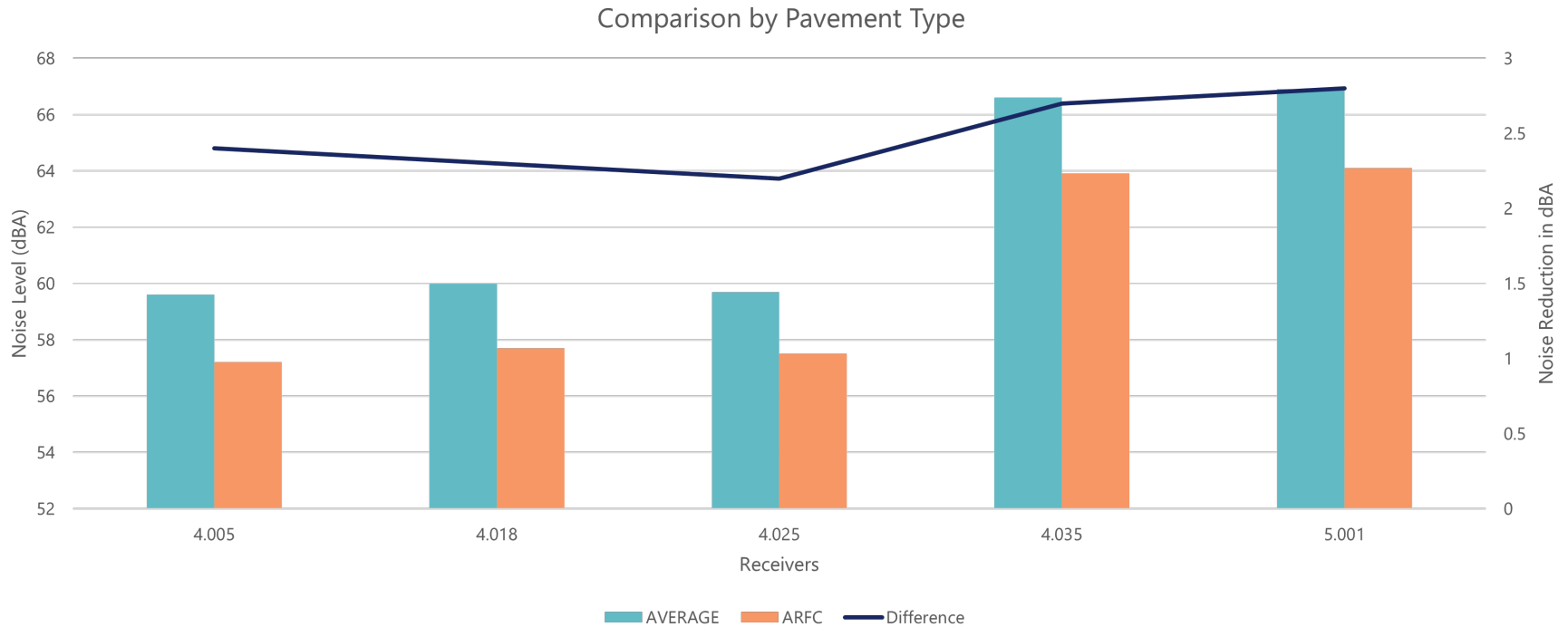
Estimated reduction in average sound level: Medium

Because diamond grind concrete achieves comparable ambient noise reductions to rubberized asphalt within 3-5 years, the estimated reduction in average sound level is the same: medium.

Estimated reduction in PNE: Low

Because diamond grind concrete achieves comparable noise reduction to rubberized asphalt within 3-5 years, the estimated reduction in potential nuisance events is considered to be the same as rubberized asphalt: Low.

Figure 4-7 – Pavement Noise Reduction (Average and Rubberized Asphalt)



Cost: High

For a concrete-based freeway application, the life cycle cost savings of the diamond grind option is more favorable. But diamond grind treatments first require the reconstruction of the roadbed to a PCCP structural section. Costs for initial installation of a PCCP structural section are more than \$1.2 million per lane mile. The durability of PCC may result in a more favorable life-cycle cost than asphalt pavements, especially for roadways with higher truck volumes.

4.2.3 Speed Reduction

Reduction of speed limits has been shown to reduce average noise levels. During the duration of this study, Litchfield Park has lowered the speed limit of Camelback Road from 40 mph to 35 mph. Research and modeling has shown that lowering vehicle speeds reduces noise levels by approximately 0.8-1.4 dB for each 5 mph decrease in speed. There is a separate body of research into whether speed limit reductions translate to reductions in vehicle speed. For purposes of this study, it is assumed that speed limit reductions result in reductions of average speeds.

Estimated reduction in average sound level: Low

The FHWA TNM 2.5 was used to calculate the change in average noise levels resulting from changes in speed for the traffic on Camelback Road. **Figure 4-8** shows the results of modeling for speeds from 30-55 mph in 5 mph increments at the same locations used to assess pavement noise. The two locations with no privacy wall show that changes in speed limit range from 0.8-1 dB with each 5 mph change with reductions at the higher end of the range at lower speeds. A similar trend occurred at the locations behind a privacy wall with changes of 1-1.4 dB. While the changes are small, speed reduction can be used in combination with other remedies to achieve more substantial reductions.

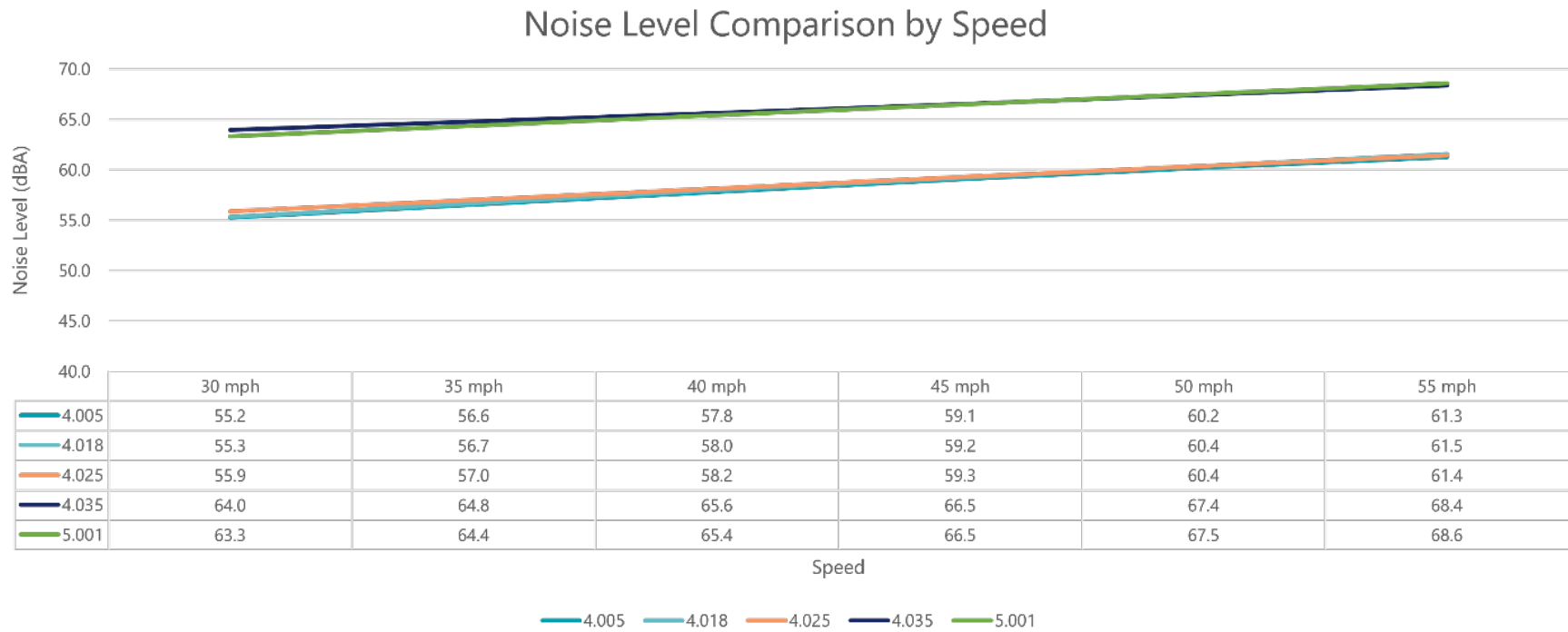
Considering implementation of speed reductions throughout the study area, where the potential exists to reduce speeds by 10 to 15 mph, the potential reduction in average sound increases to up to 4.2 dB total reduction. This level of reduction would move the effectiveness of this strategy to medium.

This strategy would also reduce the impacts of vibration events.

Estimated reduction in PNE: Low

The reduction in kinetic energy from reduced speeds is highly likely to reduce the intensity of certain peak noise events, such as the banging sound of an empty trailer. Additionally, engine outputs and engine braking events are likely reduced by the speed reduction as less acceleration and deceleration is required. Some of these impacts would apply to all vehicles, while others might apply only to heavy trucks.

Figure 4-8 – Changes in Sound Level Due to Changes in Speed



Records of the observations include the types of vehicles involved, but not the cause of the event. For this reason it is not possible to establish the percentage of events that were due to the causes given above. The consultant team was able to make an estimate of this percentage, however, based on their observations, and has estimated it to be approximately 15 percent. This does not mean that a reduced speed limit would remove all of these events, as human behavior may play a significant role in determining the impact of this strategy. Some drivers may still choose to speed or to accelerate loudly in spite of the new speed limit. In addition, the lower speed may result in quieter ambient conditions. When these additional factors are considered, and without data to support a higher estimate, the overall impact of reducing speed limits, especially if the reduction is 10 mph or less, is low (0-3 percent).

Cost: Low

Implementation of speed limit reduction requires administrative effort and fabrication and installation of signs. This measure can be implemented on a short duration schedule under the purview of the governing jurisdiction. Enforcement costs are an important consideration but can be offset by fines collected, or by deploying the enforcement on an intermittent basis.

4.2.4 Implement Vehicle Noise and Vibration Restrictions

Vehicle noise and vibration restrictions involve establishing and enforcing laws limiting noise emissions. Noise restrictions define a maximum allowable noise level measured at a specific distance using clearly defined metrics. Litchfield Park has vehicle noise restrictions in the city code, but it is unclear whether the limits apply to heavy vehicles and the duration of the maximum noise threshold is not stated. Revising the existing code or establishing new requirements that apply to all vehicle classes and more clearly define enforcement parameters is needed. Existing ordinances in Litchfield Park limit use of engine compression braking, which should also reduce the number of nuisance events with appropriate enforcement. **Table 4-5** shows the Litchfield Park noise limits.

Vibration restrictions could also be implemented, but there is less information available to assess their potential impacts.

This remedy can be combined with other strategies focused on nuisance events such as stringent enforcement of speed limits especially at nighttime, since nuisance events have a greater impact at night. Options for enforcement include police officers, speed cameras, and noise sensors. Taking this approach may address the worst of the nuisance events given that three of the five loudest events measured over a two-night period were cars and motorcycles.

Table 4-5 – Litchfield Park City Ordinance Section 10-1-3

Non-Motorcycle	
Motor Vehicle (under 6,000 pounds gross vehicle weight)	76 dB(A)
Motorcycle	
Manufactured 1970 through 1972	92 dB(A)
Manufactured 1973 through 1974	88 dB(A)
Manufactured 1975 and after	80 dB(A)

Challenges to enforcement include the need for resources (funding, staffing and equipment) and training. It may also be difficult to identify specific vehicles causing noise or vibration nuisance events without specialized equipment and training on how to use it. Referencing model noise ordinances (**Table 4-6**) developed by industry organizations can help ensure the noise ordinance includes necessary components.

Table 4-6 – Details – Noise free.org Noise Ordinance Manual

VEHICLE CLASS	SOUND LEVEL, dB(A) AT 50 FEET	
	Speed Limit 35 mph or less	Speed Limit over 35 mph
Motor vehicles engaged in interstate commerce of GVWR or GCWR of 10,000 lbs. or more	80	80
All other vehicles of GVWR or GCWR of 10,000 lbs. or more	80	80
Street Motorcycle	80	80
Off Road motorcycle, less than 170 cc	80	80
Off Road motorcycle, 170 cc or more	82	82
Mopeds	70	70
Any other motor vehicles or any combination of vehicles towed by any motor vehicles	72	82

Estimated reduction in average sound level: Low

This mitigation measure does not have a substantial impact on the average sound levels of vehicular traffic. By its nature, this mitigation is aimed at a few individual vehicles that are producing nuisance levels of sound.

Estimated reduction in PNE: Medium

This measure could be very effective in reducing peak noise events, particularly from motorcycles. Motorcycles accounted for three of the 27 observed potential nuisance events (11 percent) and 25 percent of observed motorcycles caused a PNE. An additional reduction in PNE should be expected from trucks where noise levels are enforced above an 80 dB(A) threshold. PNE from automobiles could also be reduced to below the 72 dB(A) threshold per Table 4-5 above. Three of the loudest observed events (11 percent of the total) were produced by passenger cars.

Cost: Medium

Implementation of noise level enforcement requires deployment of specialized equipment and staff, as well as training on the use of that equipment. Some of these costs may be offset by enforcement fines.

4.2.5 Implement Nighttime Truck Restrictions

This remedy would impose total or limited restrictions on freight-carrying through traffic. A ban on through truck trips on Camelback Road was discussed earlier in this chapter, but limited bans could be implemented to restrict freight carrying through traffic during nighttime hours perhaps targeting residential areas for these restrictions. The results of this strategy would be essentially the same as the truck through trip ban assessed above, for both noise and vibration.

Estimated reduction in average sound level: Low

This mitigation strategy produces the same result as the ban of through trucks described earlier in this chapter. That reduction was calculated at 0-3 dB. Again, the low average reduction is due to the low percentage of trucks in the overall vehicle fleet.

Estimated reduction in PNE: High

This mitigation also produces the same results in limiting PNEs due to the overall truck ban on Camelback Road, as the measurement of trucks causing PNEs occurred during nighttime hours. These estimates were for reductions of roughly 50 percent in 2022 and 59 percent in 2040.

Cost: Medium

Implementation of freight restriction by time is an enforcement-intensive operation. Fines would partially offset the costs, but it is anticipated that dedicated enforcement staff would be required to effectively uphold and maintain the ban's effectiveness.

4.2.6 Signal Timing Coordination

Vehicles produce more noise while accelerating and decelerating than they do maintaining free flow speeds. One of the greatest contributors to vehicles accelerating and decelerating are stops at traffic signals. The fewer red lights vehicles hit traveling across a corridor, the less they will need to stop and go. Traffic signal timing coordination creates a corridor of green time opportunities that allow a platoon of cars traveling in the dominant direction to pass through many signals in a row without stopping.

Coordinating the traffic signals along Camelback Road will improve the east/west bound travel times along Camelback Road and reduce the number of vehicle-stops. Reducing the number of vehicle-stops along Camelback Road also reduces the number of heavy truck noise events associated with deceleration and acceleration.

Traffic analysis conducted for this study found that coordinating the east/west movements along Camelback Road reduced the number of vehicle-stops by 20 percent to 26 percent during the AM and PM peak hours. Note that the benefits are focused on Camelback Road, coordination in the east/west direction is implemented at the expense of other north/south corridors. **Table 4-7** shows the estimated number of vehicle-stops at each analyzed intersection before and after signal coordination. Detailed Synchro reports are included in **Appendix D**.

The benefits of traffic signal timing coordination were analyzed through Synchro 11. Traffic counts were utilized to reflect existing conditions along Camelback Road, and traffic signal timing plans were developed and optimized to balance the needs of each individual signal while coordinating the signal offsets to minimize the number of vehicle-stops across the corridor.

During nighttime hours, traffic is lower in volume. But the benefits of signal coordination would also reduce the number of accelerations and decelerations by all vehicles.

Estimate of average sound reduction: Low

Only a qualitative estimate can be provided due to the absence of clear parameters to include in a TNM evaluation. Trucks produce more noise when accelerating or decelerating, so the reduction of these events brought about by better signal timing coordination are assumed to have modest improvements in average noise produced.

Table 4-7 – Signal Timing Coordination – Vehicle Stops

LOCATION		AM PEAK HOUR VEHICLE STOPS / HOUR		PM Peak Hour Vehicle Stops / Hour	
Intersection	Approach	Uncoordinated	Coordinated	Uncoordinated	Coordinated
Litchfield Rd	EB	540	549	485	524
Litchfield Rd	WB	523	497	665	712
Dysart Rd	EB	552	412	625	495
Dysart Rd	WB	485	491	693	548
127th Ave	EB	191	60	239	53
127th Ave	WB	158	155	318	70
Wigwam Creek Rd	EB	218	125	228	482
Wigwam Creek Rd	WB	177	7	347	86
El Mirage Rd	EB	699	272	496	189
El Mirage Rd	WB	429	342	720	678
	Total	3,972	2,910	4,816	3,837

Estimate of PNE reduction: Low

Again, only a qualitative estimate can be provided as the initial observations and correlation of PNE to vehicle type did not specifically factor in acceleration or deceleration. The reduction based on smoother traffic flow is estimated to be less than a 10 percent reduction in PNE.

Cost: Low

The cost to implement signal timing coordination includes the cost to obtain traffic counts, analyze the signals involved using commonly available commercial software, and to physically implement the revised timing. This may be a challenge for Camelback Road if the signals and their communications networks are controlled by multiple jurisdictions. In some cases, the upgrading of equipment might be required to effectively coordinate the signals.

4.3 Reducing noise in the path

Another group of possible remedies is to reduce the amount of noise and vibration that is attenuated along the path, before reaching the receptors. Reducing noise in the path is the most common approach to mitigation of roadway noise.

4.3.1 Add or Enhance Noise Barriers

Provision of noise barriers is the most widely used strategy for mitigating noise. Most roadway noise barriers are constructed as part of projects funded in part by the FHWA Highway Trust Fund triggering a requirement for noise studies for certain project

activities. Other reasons for the preference for noise barriers is that they are long-lasting, provide a consistent noise reduction over time, and, depending on the material used, are inexpensive to maintain.

Barriers are also among the most effective methods for reducing average noise levels along transportation facilities and should be designed to achieve at least a 5 dB reduction at locations immediately adjacent to the roadway. Noise barriers are effective at reducing average community noise levels but may not work as well for intermittent noises such as loud exhaust, sirens, and other loud intrusive sounds.

Noise barriers, whether walls or berms, work best when either close to the roadway or close to sensitive receptors. Barriers must also be sufficiently tall, long, and have enough mass to be effective. Noise passing around the ends of noise barriers can also be a problem, so the barrier needs to extend far enough past the last receptor to limit wraparound noise or turn to shield receptors from flanking noise.

An analysis of wall height effectiveness was completed using TNM. Barriers were assessed from 4 feet to 12 feet tall in two-foot increments. This analysis looked at the change in sound level reduction for 25 receptors representing a mix of residences along the first and second row of homes. Because of the varying distances between the roadway and residences, the barrier provided greater reductions at some receptors than others even though the barrier height remained the same. The analysis results are shown in **Figure 4-9**. Barriers 6' and taller provided adequate reductions with many receptors getting a reduction of 5 dB or greater.

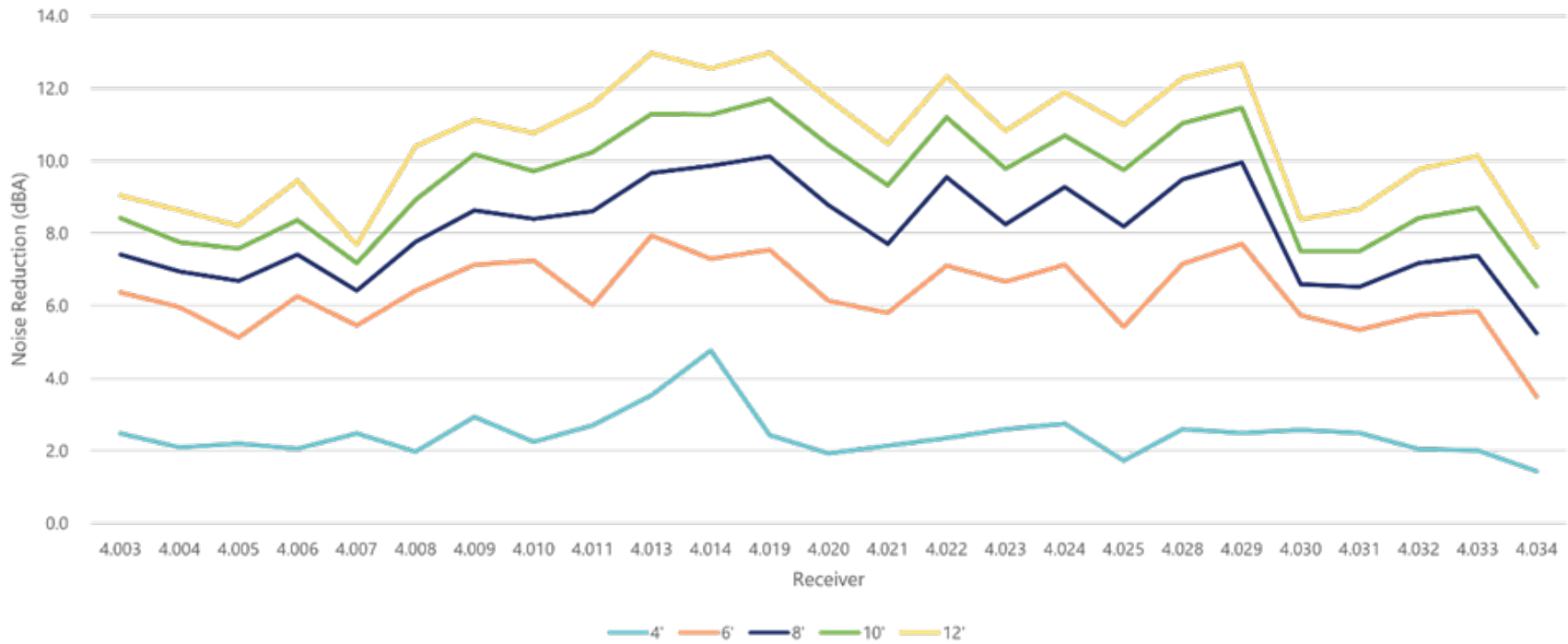
The annexed portion of Camelback Road has existing privacy walls near most residential areas. These existing walls provide a noise-reduction benefit, but the heights and precise effectiveness of these existing walls is not known.

Litchfield Park requires installation of privacy walls for new developments. The analysis above could aid in setting minimum privacy wall heights with consideration given to requiring taller walls along truck routes and where there are high truck volumes.

Estimated reduction in average sound level: High

The effectiveness of sound walls for reductions in average sound levels are very well established and demonstrate sound level reductions of 2-13 dB, depending on the height of the wall or berm. Depending on the heights of current privacy walls, extending the heights could provide additional reduction in average sound level. However, this reduction in noise is only effective for the ground floor of residential homes. The walls do not reduce noise reaching second-story elevations.

Figure 4-9 – Noise Reduction at Various Noise Barrier Heights



Estimated reduction in PNE: Low

The reduction in potential nuisance events due to sound barriers is not supported by this study, given that many of the potential nuisance events come from truck exhaust or other sources that occur further above the ground and are more likely to project sound over a barrier. Taller sound walls are more likely to reduce these events, but since the specific cause of the noise and location within each vehicle could not be determined in this study, it was not possible to reliably quantify this impact.

Cost: High

Noise barriers can be very expensive depending on construction method. Precast or block barriers usually have lower costs than cast-in-place barriers. Berms can be relatively inexpensive to construct but require more space to accommodate the width of the base of the berm. **Table 4-8** shows the estimated cost of a noise barrier per linear foot based on height of the barrier.

Table 4-8 – Noise Barrier Unit Costs by Height

Height (ft)	Cost (\$/LF)
4	\$ 520.00
6	\$ 770.00
8	\$ 1,020.00
10	\$ 1,270.00
12	\$ 1,520.00

4.3.2 Improved Ground Attenuation

Hard ground surfaces can reflect noise and cause it to carry farther into a community. The presence of barriers or berms can help reduce these reflections. Another strategy is changing the hard ground to a softer surface that absorbs noise. Two approaches to this remedy are use of gravel or horizontal lattice structures. Both techniques reduce noise levels with varying degrees of effectiveness. A lattice structure (as shown in **Figure 4-10**) is estimated to provide a 2.4 dB reduction for 3' wide and 0.7' deep structure improving to a 4 dB reduction for a structure 6' wide and 0.7' deep (Rochat, 2022). Gravel was assessed through modeling as part of Rochat, et al., 2022 using the custom ground type feature in the FHWA TNM 2.5 as well as the custom version of TNM discussed above that includes rubberized asphalt pavement. The research investigated using just a gravel strip and a gravel strip in combination with rubberized asphalt. The modeled reduction was 2-4 dB depending on width of the strip (10'-50') and the distance from the roadway.

Estimate of reduction in average sound level: High

The estimated reduction of up to 4 dB on the greater implementation of the lattice structure is a significant effect. The correlation of sound reduction to width of structural section demonstrates increasing value for increased cost.

Estimate of reduction in PNE: Low

The effect on potential nuisance events is unclear. There is potential for noise reduction benefits of certain peak events where the sound is reflected from the roadway edge; however, there is not clear research available to allow for a quantitative estimate.

Cost: High

A 10-foot wide lattice structure is estimated to cost \$1.2 million per mile. A gravel section of 10-foot width is estimated to cost \$960,000 per mile. Both costs included the excavation of existing roadside material.

Figure 4-10 – Horizontal Lattice Structure Example



4.3.3 Require a buffer zone in new Developments

Buffer zones are strips of land where residential development is precluded, restricting development to areas where it is already quiet in comparison to immediately adjacent to the roadway. They can be very effective at reducing average noise levels and limiting the effect of nuisance events because of the additional distance from the roadway.

Decibel addition is logarithmic rather than linear. As a result, if you add two identical noise sources, whether 1+1 or 75+75, adding 3 to one of the numbers gets the new noise level. In the case of the examples, 1+1=4 and 75+75=78. This principle can also be applied to distance. For line sources, such as roadways, the sound level reduction is 3 dB per doubling of distance from the roadway. For example, if the sound level is 70 dB at 25' from the roadway, the sound level will be 67 dB at 50', 64 dB at 100' and so on. In the

example, a buffer zone depth of just 100' gets a 6 dB noise reduction. The additional distance would also reduce the likelihood of vibration or ground-borne noise events.

Buffer zones work best when applied to future development and could be implemented as part of a zoning overlay or regulatory approach to addressing roadway noise. These areas can provide space for retention basins, recreational trails, and other common use areas.

Figure 4-11 shows buffer zone overlays on an undeveloped land area outside of Litchfield Park. Red areas have a high potential for noise events, while yellow has a moderate potential and green has a low potential. Note that while the area shown in this figure is outside Litchfield Park, the buffer areas have been determined based on the characteristics observed along the annexed portion of Camelback Road. The distances shown in the figure apply directly to the area surrounding Camelback Road in Litchfield Park, but may not apply to other locations.

Effectiveness on average sound level: High

The potential to realize 6 dB or more is a substantial reduction in average sound levels.

Effectiveness on PNE reduction: High

The sound level reduction for distance occurs in the same mechanism as the reduction in average sound levels. PNEs are louder events than average, but the increasing of distance from source to receiver is similarly effective. A reduction of 6 dB from the peak noise level would reduce an estimated 25 of the 27 observed noise events for a potential reduction of 93 percent.

Cost: High

The cost of this measure is somewhat abstract as it relates to the relative value of land developed as a buffer zone versus the construction of structures such as houses or commercial buildings. The costs are realized through indirect mechanisms such as higher cost of new construction and the manner in which those costs are transferred to buyers.

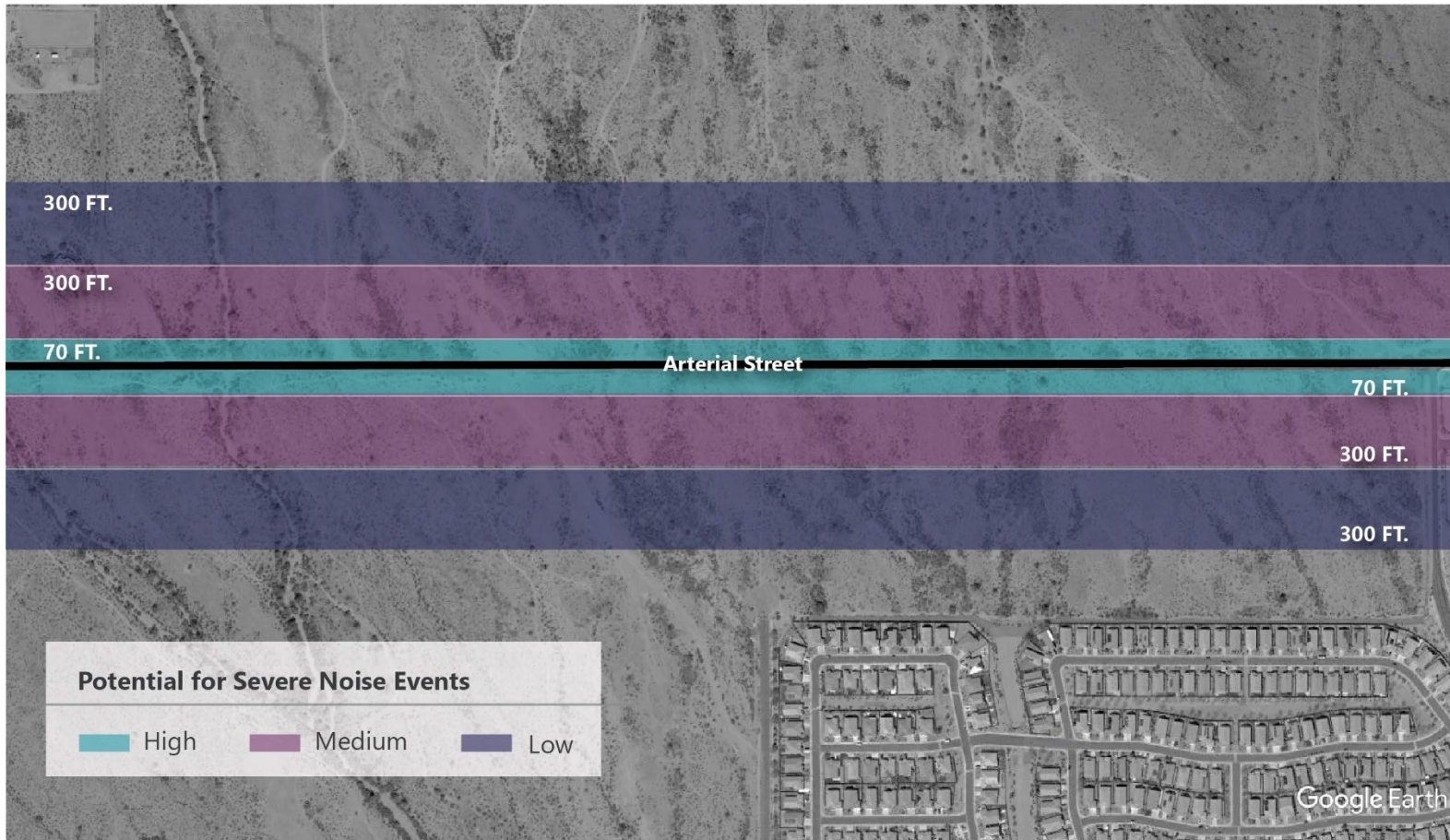
4.4 Reducing Noise at the Receiver

Noise reduction at the receiver for new construction is either required at the local level or implemented voluntarily by the developer. These remedies include establishing land use noise restrictions or building construction requirements targeted at reducing interior noise.

4.4.1 Implement Land Use Noise Restrictions

This remedy involves the use of zoning and regulations to address noise at developed lands and may reduce interior and exterior noise levels. This remedy can be very effective at reducing average community noise levels but may not be as effective at reducing intermittent noise.

Figure 4-11 – Buffer Zones



Adopting this remedy would require updating zoning codes and regulations as well as master plans. There are also technical and policy considerations. Developers may need to prepare noise studies as part of the preliminary design process and local jurisdictions would need to review these studies for compliance. Land use noise restrictions involve setting a noise threshold—usually based on an hourly or 24-hour average—where development is limited or restricted. Louder areas would be set aside for commercial or industrial development while quieter areas would be set aside for residential and passive recreation. Flexibility to develop louder areas as residential would include requirements for the developer to mitigate the noise. Specific methods would involve construction of noise barriers, berms, or use of buffer zones.

Mixed use developments provide a good opportunity to address noise with the site layout. Land uses that are less sensitive to noise, such as commercial or retail spaces and parking lots, would be situated close to the roadways. Sensitive land uses such as schools, hospitals, residences, and places of worship would be placed away from major roadways. In this case, the less sensitive land uses provide a buffer and shielding for the more sensitive land uses.

Estimated reduction in average sound level: High

This remedy is dependent on the mechanism implemented to reduce sound levels but represents the potential to combine sound walls with buffer areas for new construction. The establishment of a target sound level is a unique approach to noise reduction.

Estimated reduction in PNE: Medium

The mechanism to reduce PNE is more constrained than in achieving average sound levels for the reasons included in the analysis of noise barriers. Some treatments are more effective at reducing average sound than peak noise events. However, placement of commercial buildings as a buffer to residential properties and thus increasing the distance of residences to the noise generator, will likely result in the reduction of nuisance events where they matter most.

Cost: High

This remedy potentially consists of sound walls and regulated land uses that realize costs both directly and indirectly. Sound walls have well established costs, as described earlier in this chapter. Limitations on land use represent indirect costs to buyers and tax revenue generation.

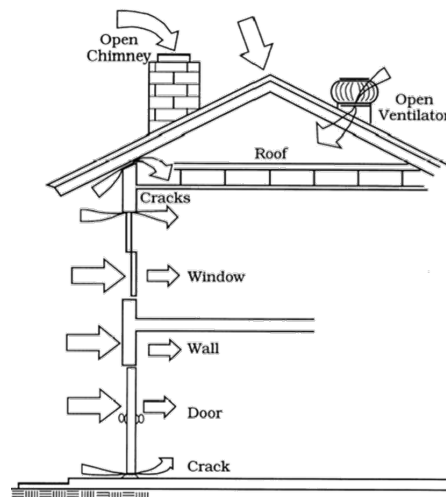
4.4.2 Building construction requirements for new homes

This set of remedies involves the use of building construction techniques that reduce interior noise. Construction requirements address the interior of residences and is particularly useful in reducing noise for upper floors. These remedies generally do not lower exterior noise levels.

Implementation of these remedies requires local jurisdictions to develop building codes and construction requirements that address interior noise. They may also require updates to the city plan to establish applicable zones. Implementation of this remedy could result in construction costs that are offset by energy savings, since many noise insulation techniques also provide improved weather insulation.

This remedy is provided by the developer, or by the property owner in the case of a retrofit. The city establishes zoning codes and regulations that require building construction techniques that reduce interior noise in areas adjacent to major arterials or other high-volume roadways. **Figure 4-12** illustrates where noise can pass through the exterior of the structure to the interior. If the exterior environment is loud, the interior will also be loud where there is poor noise insulation. There are construction methods or materials to use in each of these areas to reduce noise.

Figure 4-12 – Building Noise Reduction Opportunities



These techniques include use of denser building materials as well as windows and doors with high Sound Transmission Class (STC) ratings. STC is a rating of noise reduction by a single item such as a door or window. It is related to the Outdoor-Indoor Transmission Class (OITC). The OITC is a numerical valuation of the noise reduction provided by an item but includes more contribution from low frequency noise in the rating. Either are used to calculate a single rating for a composite value that includes each component of a building.

Table 4-9 shows a comparison of STC and OITC values.

Strategies may also include using multifamily buildings as noise barriers. This may also include having no windows facing the roadway and placing bedrooms away from the roadway. An approach to this method that can reduce interior and exterior noise is to connect residences with walls that function as noise barriers.

Table 4-9 – Comparison of STC and OITC

CONFIGURATION	STC	OITC
Single-glazed window	24-26	16-20
Double-glazed window	31-33	21-27
Laminated double-glazed	35-38	25-30
Dual window	39-50	26-40

Estimated reduction in average sound levels: High

This set of remedies results in a wide range of potential noise reductions, but at the higher end, these remedies result in greater than a 6 dB reduction in average sound levels. These measures should be considered as targeted to indoor noise levels.

Estimated reduction in PNE: High

Like the reduction in average sound levels, the combined effect of building treatments could be to dramatically or completely reduce the PNE observed from traffic. High noise events from other sources and the most extreme traffic noise generators may still penetrate a structure with sufficient increase over ambient levels to cause a nuisance.

Cost: High

Direct costs to the agency include additional staffing and training. For new construction, much of the actual cost would be borne by developers and presumably passed along to buyers. Homeowners may bear the cost for modification or retrofit of existing structures.

4.5 Voluntary Coordination Between Jurisdictions and Truck Trip Generators

This remedy is an option designed to achieve similar results to a through truck ban without regulating vehicles or behavior, and without constructing new mitigations. It might be possible for jurisdictions and the organizations generating truck trips to reach agreement on a plan to reduce the impacts of truck trips without removing the trucks.

Many of the loudest events occurring on Camelback can be attributed to driver behavior. For example, engine compression braking, speeding, and rapid acceleration are choices made by drivers. It might be possible for the organizations generating nighttime truck trips to voluntarily instruct its drivers to behave in a manner that avoids the creation of high-energy noise and vibration events. In return, jurisdictions could agree to refrain from restricting trucks (or enforcing current regulations) within their city limits. Optionally, an agreement might be reached that the drivers will take alternative routes during nighttime hours.

This idea would likely require some monitoring on the part of the jurisdictions to verify that the truck drivers continue to maintain their modified behavior, perhaps through video

observations. If events continued to occur, the parties could reconvene and discuss appropriate actions to improve the situation.

This mitigation strategy would most likely not eliminate all potential nuisance events caused by trucks. But it is also unlikely that a ban on through truck trips would completely eliminate all through trips. In the case of a ban, a strong enforcement program would be required to maximize the effectiveness of the ban. For voluntary agreements, effectiveness would rely on monitoring and good-faith efforts of the parties involved. The potential results of these two strategies may actually be quite similar.

This strategy would also reduce the potential for vibration-related potential nuisance events.

Estimated reduction in average sound level: Medium

Assuming this mitigation strategy produces the same result as a restriction on through trucks (0-3 dB reduction).

Estimated reduction in PNE: High

Assuming this mitigation strategy produces the same result as a restriction on through trucks (potentially up to a 50 percent reduction in 2022 and a 59 percent reduction in 2040).

Cost: Low

This option would likely require an investment in video monitoring equipment and staff time to monitor the data.

4.6 Summary of Mitigation Measures

The sound reduction benefits of each remedy have been estimated with their effect on reducing potential nuisance events. The concluding goal of this study is to provide policy makers with an understanding of the applicability of remedies for their potential benefits and costs. **Table 4-10** includes a summary of mitigation measures that align with the evaluation matrix presented earlier in Table 4-1.

Even though conditions are not the same everywhere, the findings of this study are still important and useful in estimating how these remedies might work in other locations, both on a daily basis and on a nighttime event basis. Certainly, in locations where communities are experiencing noise and vibration impacts today, the findings of this study can be used to inform efforts to predict how effective these remedies might be.

Table 4-10 – Summary of Impacts by Mitigation Measures

REMEDY		EFFECTIVE- NESS ON AVERAGE SOUND LEVEL REDUCTION	EFFECTIVE- NESS FOR REDUCING PNE	COST	COMBINE WITH OTHER MEASURES (Y/N)
#	Description				
4.2.1	Ban Through Truck Trips	Medium	High	Medium	Yes
4.2.2.1	Asphalt Rubber Friction Course	Medium	Low	High	Yes (exc. 4.2.2.2)
4.2.2.2	Diamond Grind PCC	Medium	Low	High	Yes (exc. 4.2.2.1)
4.2.3	Speed Reduction	Low	Medium	Low	Yes
4.2.4	Implement Vehicle Noise Restrictions	Low	Medium	Medium	Yes
4.2.5	Implement Nighttime Freight Restrictions	Medium	High	Low	Yes (exc. 4.2.1, 4.5)
4.2.6	Signal Timing Coordination	Low	Low	Low	Yes
4.3.1	Improved Ground Attenuation	High	Low	High	Yes
4.3.2	Add or Enhance Noise Barriers	High	Low	High	Yes
4.3.3	Construct Buffer Zone	High	High	High	Yes
4.4.1	Implement Land Use Noise Restrictions	High	Medium	High	Yes
4.4.2	Building Construction Requirements	High	High	High	Yes
4.5	Voluntary Freight Restrictions	Medium	High	Low	Yes (exc. 4.2.1, 4.2.5)

APPENDIX A

Land Use Assumptions and Updates (2022, 2040)

2022 Land Use Updates

TAZ2021	TAZ2021	Original Emp	Updated	Delta
206	206	166	108	-58
207	207	34	27	-7
208	208	43	33	-10
209	209	0	1955	1955
210	210	17	65	48
211	211	118	138	20
212	212	257	186	-71
213	213	40	47	7
214	214	1534	1492	-42
215	215	383	387	4
216	216	933	1095	162
217	217	675	587	-88
261	261	151	182	31
262	262	1121	771	-350
263	263	501	507	6
264	264	887	1086	199
266	266	615	687	72
267	267	658	533	-125
270	270	47	50	3
271	271	117	228	111
274	274	574	385	-189
275	275	633	1079	446
278	278	496	421	-75
279	279	3158	2984	-174
296	296	1443	1178	-265
396	396	1	1	0
399	399	0	0	0
401	401	72	168	96
402	402	0	434	434
403	403	2	0	-2
405	405	0	0	0
406	406	144	153	9
407	407	30	355	325
408	408	45	94	49
410	410	61	54	-7
413	413	14	10	-4
414	414	176	134	-42
415	415	284	471	187
416	416	556	316	-240

TAZ2021	TAZ2021	Original Emp	Updated	Delta
417	417	55	87	32
418	418	10808	8097	-2711
419	419	1326	1224	-102
420	420	865	905	40
421	421	222	154	-68
422	422	775	1089	314
423	423	12	221	209
713	713	54	65	11
714	714	492	481	-11
715	715	0	0	0
716	716	786	789	3
1776	1776	0	30	30
2776	2776	4223	3605	-618
2779	2779	0	70	70
2780	2780	1034	912	-122
2781	2781	54	77	23
2782	2782	86	0	-86
2806	2806	160	142	-18
2807	2807	1	0	-1
2808	2808	1113	777	-336
2865	2865	1673	1465	-208
2879	2879	186	185	-1
2880	2880	0	1	1
2882	2882	0	67	67
2884	2884	249	265	16
3032	3032	864	450	-414
3033	3033	160	261	101
3039	3039	124	184	60
3262	3262	198	179	-19
3264	3264	374	443	69
3266	3266	155	108	-47
3309	3309	0	0	0
3310	3310	0	0	0
3394	3394	0	6	6
3398	3398	29	44	15
3399	3399	553	543	-10
3406	3406	9	230	221
3434	3434	159	77	-82
3435	3435	199	181	-18

2040 Land Use Updates

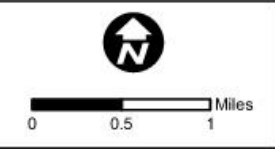
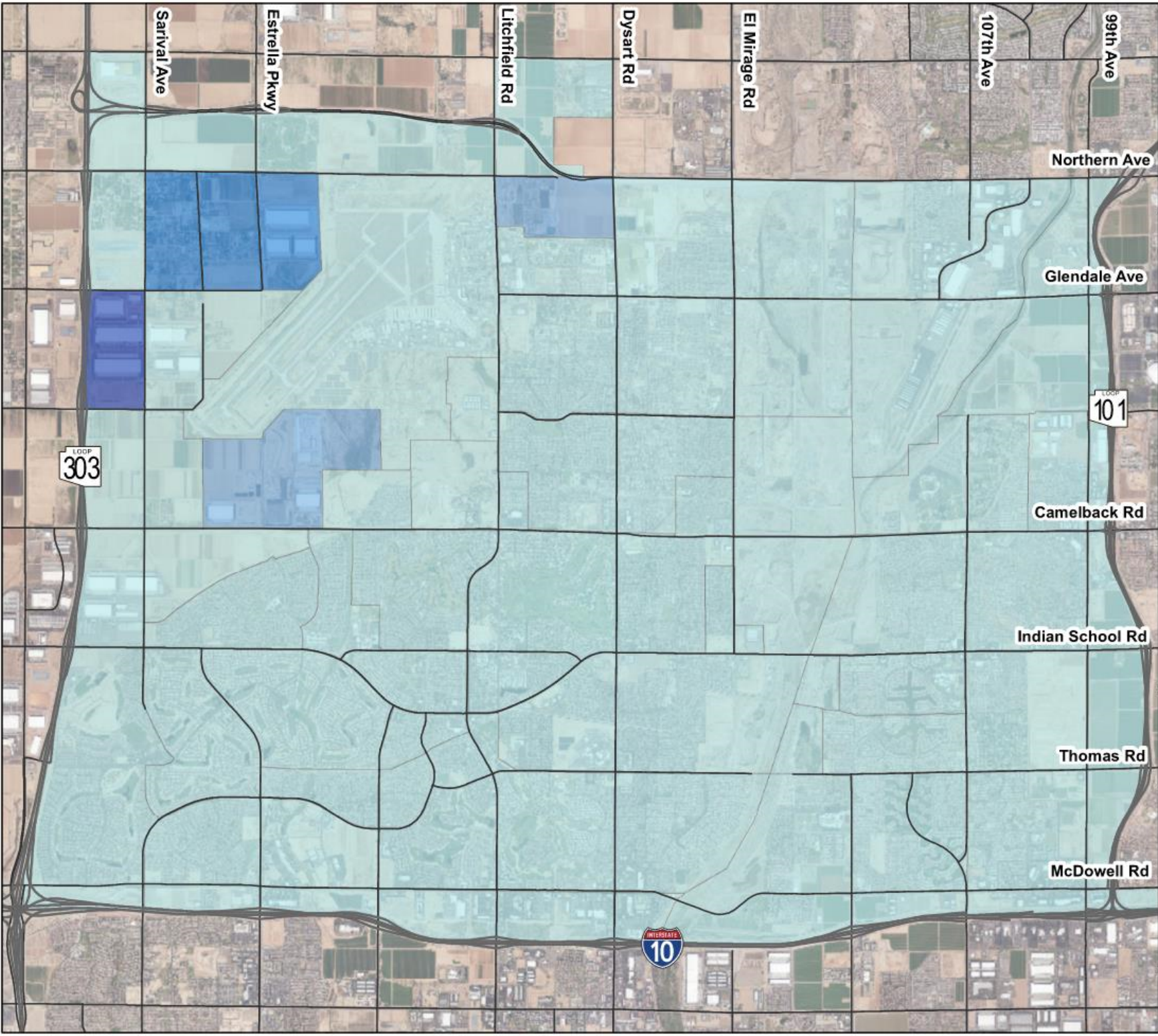
TAZ Number	ITE LU Code	Unit	Qty	Building type	Sq_ft_per_job	Est. Employees	NAICS Code	MAG's Emp Count	MAG's DU
396	210	DU	605	sf	N/A	N/A	N/A	N/A	711
399	210	DU	787	sf	N/A	N/A	N/A	N/A	476
402	130	ksf	1167.8	indust		696	760	49	749
402	130	ksf	2249.41	indust		696	1300	49	0
402	110	ksf	1254.43	indust		696	1802	49	0
406	150	ksf	4829.7	ware		2048	2358	49	2
408	110	ksf	944.77	indust		696	1357	49	64
408	130	ksf	1115.94	indust		2048	545	49	55
3266	150	ksf	2321.42	ware		2048	1292	49	0
3406	220	DU	144	mf	N/A	N/A	N/A	N/A	
3406	110	ksf	275.26	indust		696	395	49	412
3406	150	ksf	915.16	ware		2048	447	49	0
3406	130	ksf	1529.84	indust		696	1694	49	0

MAG Contract #1215
Southwest Valley - Camelback Road Truck Study
 2040 Model
 Employment Updates
 By Recent Stakeholder
 Input

Legend

Additional Employees

- No Change
- 1000+
- 2000+
- 3000+

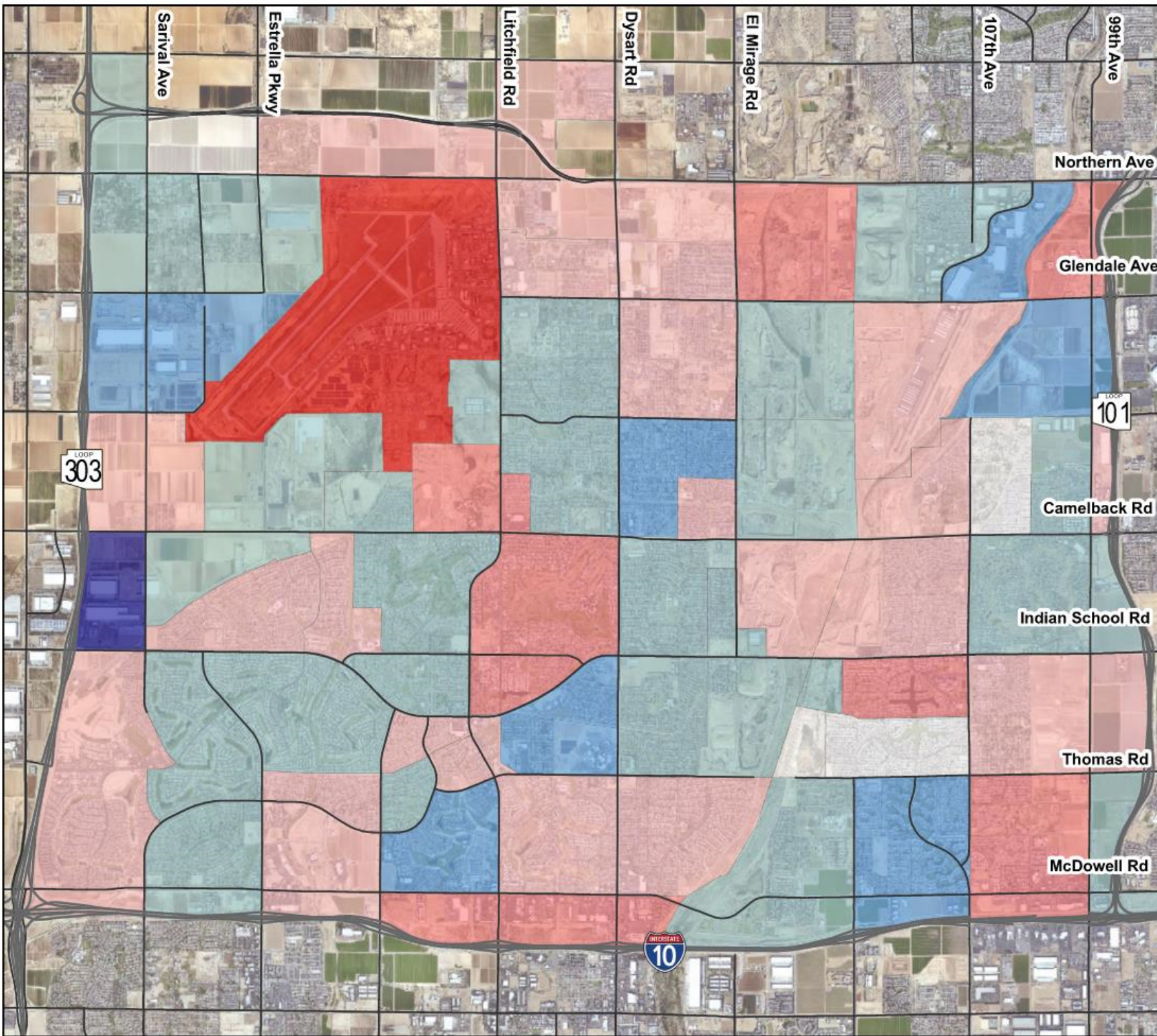
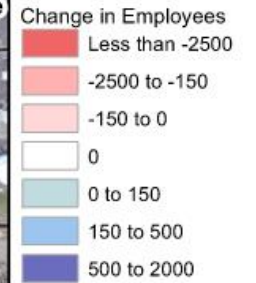


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MAG Contract #1215
**Southwest Valley -
Camelback Road
Truck Study**

Updates to 2022
Employment

Legend

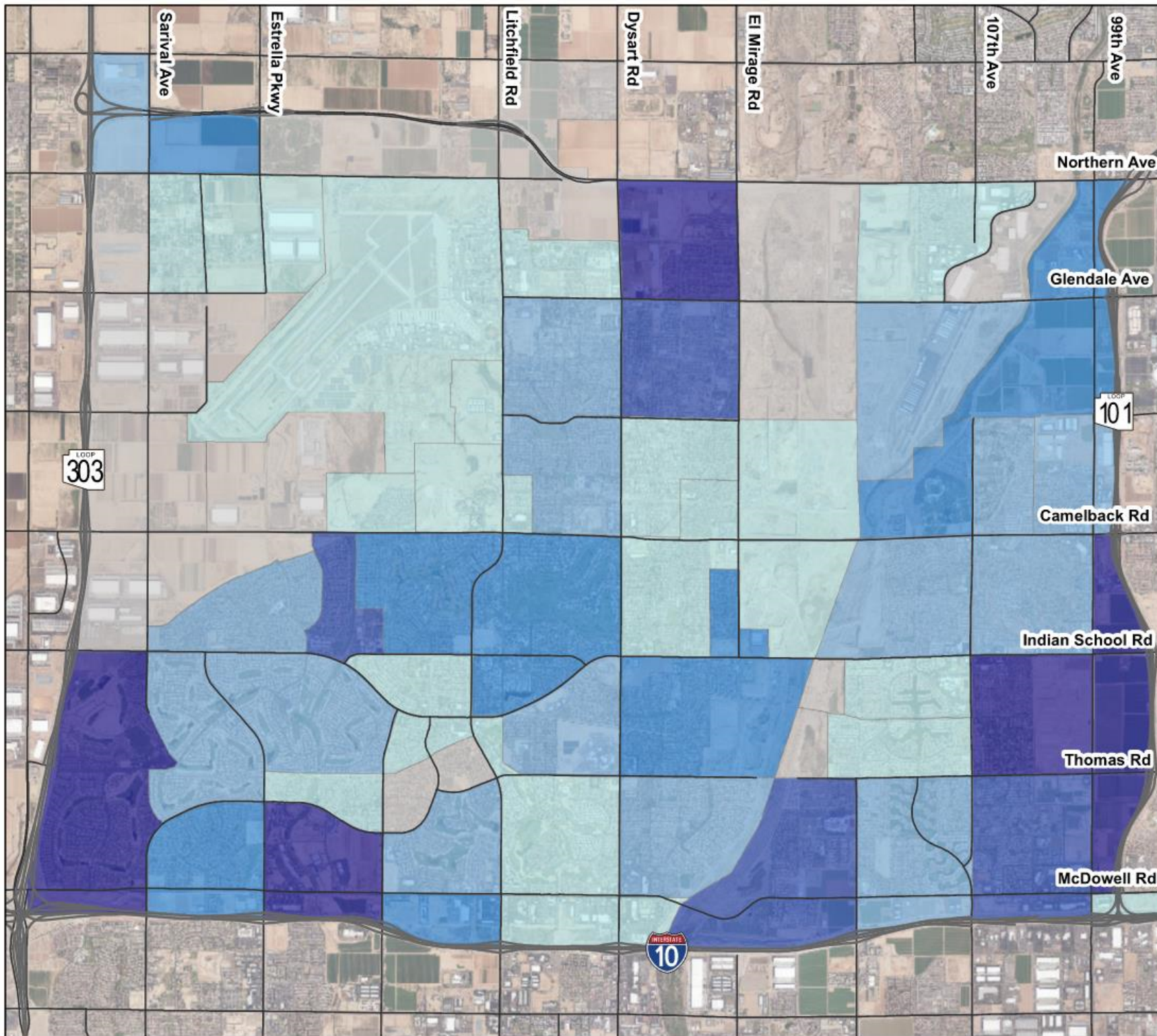
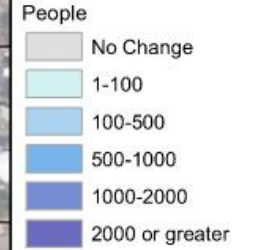


BURGESS & NIPLE

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County Assessor's Office

MAG Contract #1215
**Southwest Valley -
 Camelback Road
 Truck Study**
 2022 to 2040
 Population Change
 by TAZ

Legend

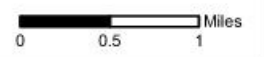
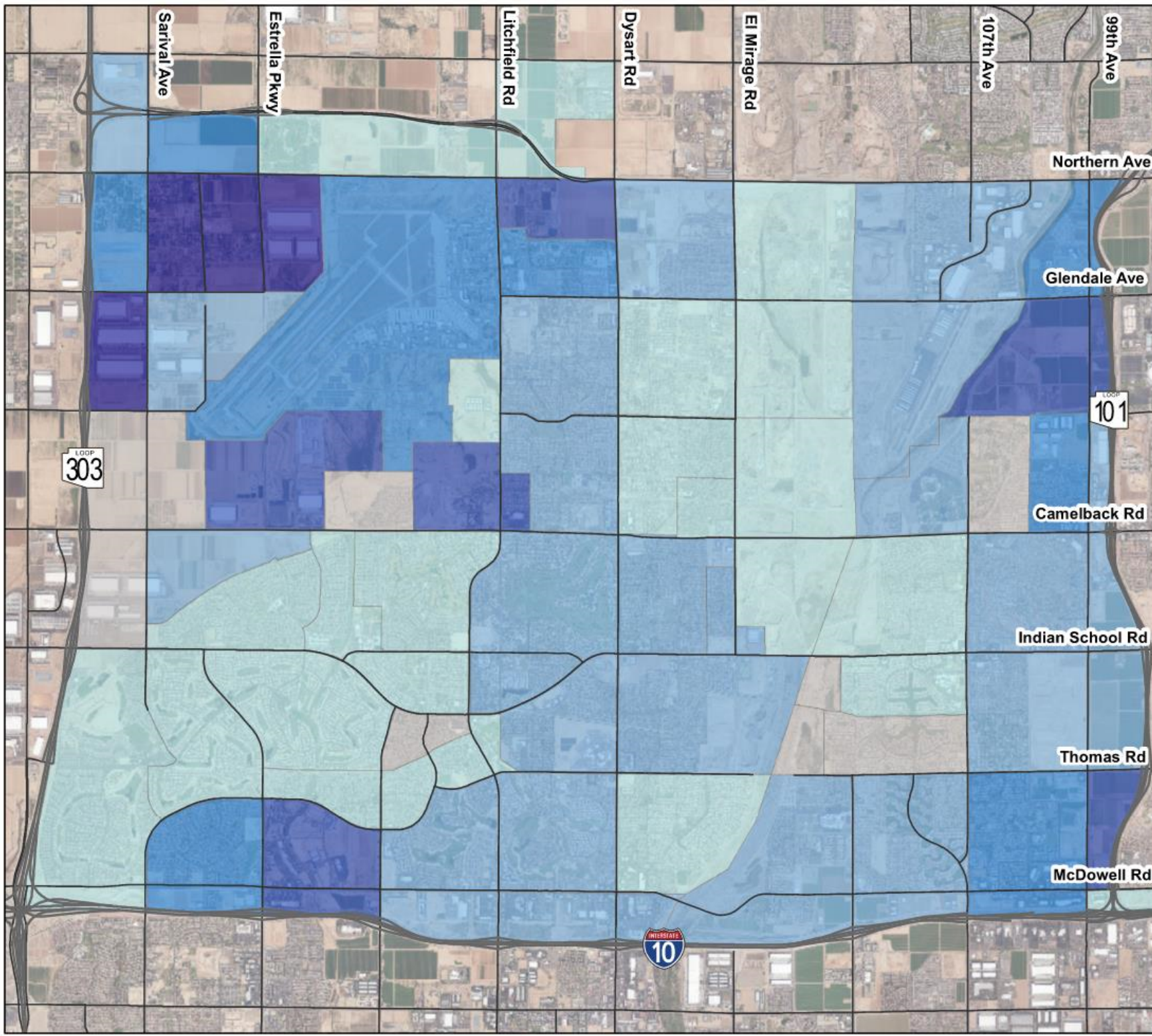


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Service Layer Credits: Maricopa County Assessor's Office

MAG Contract #1215
Southwest Valley - Camelback Road Truck Study
 2022 to 2040
 Employment Change by TAZ

Legend



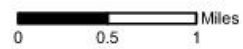
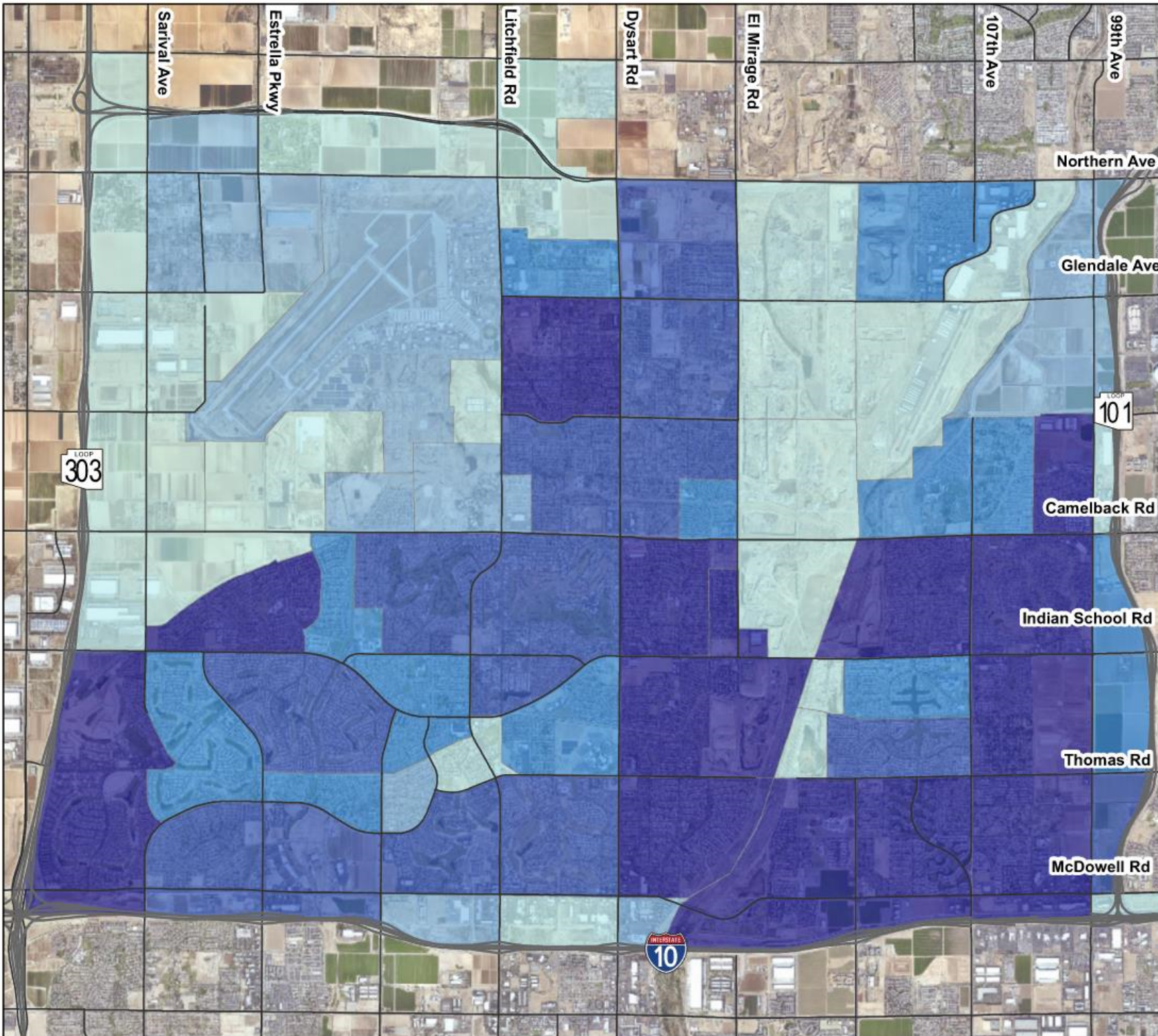
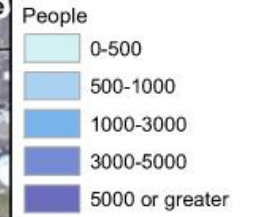
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MAG Contract #1215
**Southwest Valley -
Camelback Road
Truck Study**

2040 Total Population
by TAZ

Legend



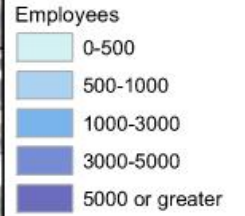
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County Assessor's Office

MAG Contract #1215
**Southwest Valley -
Camelback Road
Truck Study**

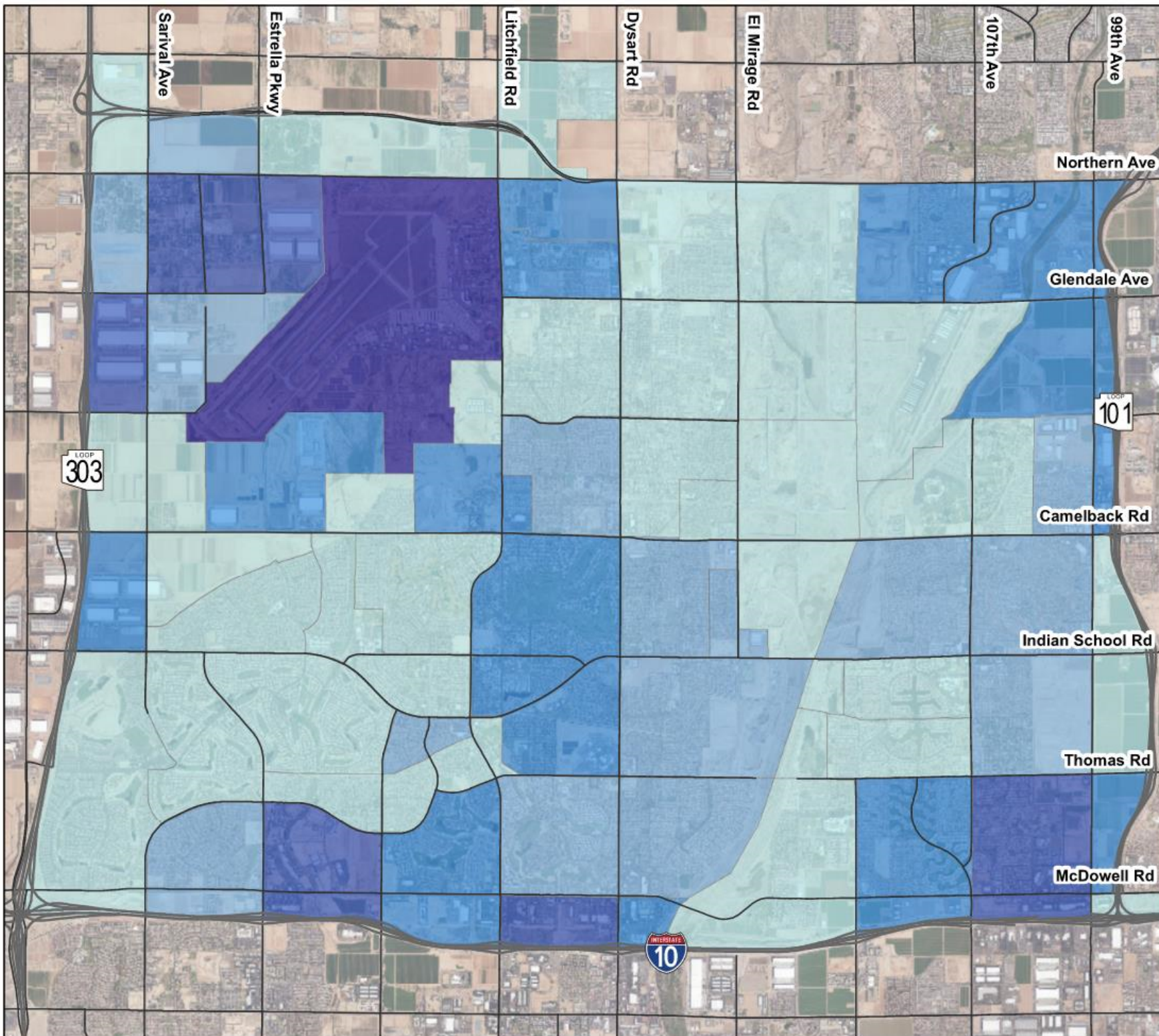
2040 Total Employment
by TAZ

Legend



BURGESS & NIPLE

Service Layer Credits: Maricopa
County Assessor's Office



APPENDIX B

Resident Comments

Dear Mr. Schoaf,

Is there anything the city council can do temporarily, at least at night against the trucks? It seems like they become even worse. Any kind of compromise between the Trucker Association/Cement Trucks and the City Council at least at night, when families are sleeping? The constant stream of cement and dump trucks never seem to end. No amount of sound machines can block out the noise from the loud trucks coming off Camelback Road. I just don't understand why past 10 pm the cement trucking company can't have any compassion for families trying to sleep and take Northern Parkway instead. Between 12am and 2 am is the worse. Plus the amount of diesel fumes coming into our HVAC systems is not good to breathe. My filters I change monthly, are completely black covered with soot. If they don't want to spend the extra time traveling 3.3 miles up to Northern Parkway, then they should be liable for any health or medical expenses from breathing the fumes. Especially after we asked the trucking company repeatedly please don't use Camelback Road in Litchfield Park town. Luke AFB respects the town and hardly ever flies jets past 10pm yet the Trucker Association/Cement Truck Factory doesn't care.

Thank you

No more trucks

Editor:

What is going to take for the trucker association to realize what they're doing is wrong. Driving diesel dump trucks 24/7 down Camelback Road in a residential zone, polluting our backyards, is dangerous. They are no different than the 1980s tobacco corporation. They know what they are doing is harmful to our health, but they are putting profit over our health.

Someone will finally have enough courage to take them on in court and sue them for millions, and then they'll start to come around, especially when they start losing money financially.

Northern Parkway was built especially for this sole purpose, but the Tanner Trucking Company and the rest would



rather pollute Litchfield Park and Palm Valley communities. A few trucks a day is one thing, but when there are over 1,000 a day, that is borderline insane. Use Northern Avenue, Olive Avenue or Northern Parkway, all of which do not border housing developments.

God forbid a child tries to cross Camelback Road to reach the Jackie Robinson baseball field and one of the 67,000-pound cement trucks traveling at 50 miles per hour crushes them. It's only a matter of time. Please stop using Camelback Road.

Ashley Sanchez
Litchfield Park 

APPENDIX C

Traffic Counts

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of 152nd Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	37	0	19	6	1	5	0	0	0	1	0	5	0	0
01:00	25	0	8	3	1	3	2	0	1	0	0	7	0	0
02:00	18	0	4	0	3	1	0	0	3	0	0	7	0	0
03:00	39	0	10	3	3	7	0	0	2	1	0	13	0	0
04:00	38	0	25	8	0	3	0	0	1	0	0	1	0	0
05:00	68	0	33	23	2	4	2	0	2	1	0	1	0	0
06:00	122	3	37	36	13	23	2	0	5	2	0	1	0	0
07:00	211	4	96	47	26	23	2	2	11	0	0	0	0	0
08:00	234	6	106	60	26	23	0	0	11	0	0	2	0	0
09:00	269	4	118	55	19	34	2	0	27	4	0	6	0	0
10:00	280	3	150	59	11	28	3	0	19	6	0	1	0	0
11:00	299	0	175	79	6	23	6	0	6	4	0	0	0	0
12:00	327	2	197	69	8	30	1	3	9	8	0	0	0	0
13:00	349	4	209	85	18	19	4	1	5	4	0	0	0	0
14:00	319	0	209	72	8	26	0	0	2	2	0	0	0	0
15:00	4	0	2	1	0	0	1	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	268	0	166	68	1	28	0	0	5	0	0	0	0	0
18:00	461	3	294	93	18	41	2	0	9	1	0	0	0	0
19:00	199	0	138	34	4	20	1	0	1	0	0	1	0	0
20:00	142	0	88	29	7	11	1	0	5	0	0	1	0	0
21:00	85	1	46	19	6	7	1	0	5	0	0	0	0	0
22:00	83	0	45	9	6	12	0	0	3	2	0	6	0	0
23:00	72	0	39	13	7	7	0	0	3	0	0	3	0	0
Total	3949	30	2214	871	194	378	30	6	135	36	0	55	0	0
%		0,8	56,1	22,1	4,9	9,6	0,8	0,2	3,4	0,9	0,0	1,4	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of Dysart Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	52	0	41	7	1	0	0	0	1	2	0	0	0	0
01:00	52	0	44	5	0	2	0	0	1	0	0	0	0	0
02:00	51	0	40	8	0	1	1	0	1	0	0	0	0	0
03:00	40	0	29	8	1	1	0	0	1	0	0	0	0	0
04:00	113	0	84	24	0	4	1	0	0	0	0	0	0	0
05:00	250	0	179	52	1	6	0	0	5	6	0	1	0	0
06:00	444	2	343	60	9	8	3	0	10	8	0	1	0	0
07:00	645	2	503	96	5	20	3	0	11	4	0	0	0	1
08:00	633	2	490	96	7	21	3	0	7	7	0	0	0	0
09:00	632	3	435	113	8	43	9	3	11	7	0	0	0	0
10:00	597	4	426	114	5	21	9	1	9	8	0	0	0	0
11:00	671	1	480	120	7	25	13	3	14	7	0	1	0	0
12:00	640	4	476	114	6	18	5	0	10	5	0	1	1	0
13:00	620	5	441	123	10	22	5	0	9	5	0	0	0	0
14:00	748	4	559	131	7	23	1	2	16	3	0	2	0	0
15:00	667	4	523	107	3	18	0	0	12	0	0	0	0	0
16:00	717	1	556	124	5	22	1	1	6	1	0	0	0	0
17:00	738	1	564	133	3	25	0	0	10	1	0	1	0	0
18:00	602	1	504	85	0	6	1	0	3	1	0	1	0	0
19:00	439	6	342	81	0	6	0	0	4	0	0	0	0	0
20:00	351	0	288	53	2	6	0	0	0	2	0	0	0	0
21:00	223	0	186	30	1	4	0	0	0	2	0	0	0	0
22:00	191	1	153	27	0	1	7	0	2	0	0	0	0	0
23:00	88	0	75	13	0	0	0	0	0	0	0	0	0	0
Total	10204	41	7761	1724	81	303	62	10	143	69	0	8	1	1
%		0,4	76,1	16,9	0,8	3,0	0,6	0,1	1,4	0,7	0,0	0,1	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of Dysart Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	56	0	34	14	2	6	0	0	0	0	0	0	0	0
01:00	33	0	22	8	0	3	0	0	0	0	0	0	0	0
02:00	25	0	22	1	0	1	0	0	0	1	0	0	0	0
03:00	63	0	42	19	0	0	1	0	1	0	0	0	0	0
04:00	115	0	76	31	1	6	0	0	0	0	0	1	0	0
05:00	291	1	181	78	2	16	1	2	8	2	0	0	0	0
06:00	563	2	350	121	16	36	2	1	23	10	0	2	0	0
07:00	784	5	483	189	25	40	2	2	26	6	0	6	0	0
08:00	674	9	402	178	16	38	5	3	17	4	0	2	0	0
09:00	584	1	368	112	15	50	8	1	16	12	0	1	0	0
10:00	589	0	387	132	9	34	3	1	14	8	0	1	0	0
11:00	681	5	455	152	6	41	4	2	12	3	0	1	0	0
12:00	720	4	478	163	13	38	2	2	10	7	0	3	0	0
13:00	727	7	478	165	9	40	3	1	14	7	0	3	0	0
14:00	829	1	566	184	6	46	4	3	15	1	0	3	0	0
15:00	818	1	539	217	3	47	0	0	11	0	0	0	0	0
16:00	934	4	628	211	4	60	0	0	21	0	0	6	0	0
17:00	851	3	569	166	42	42	1	0	26	1	0	1	0	0
18:00	639	4	428	137	26	30	2	0	7	4	0	1	0	0
19:00	435	1	297	96	7	24	0	0	8	1	0	1	0	0
20:00	272	4	194	54	8	7	0	0	3	1	0	1	0	0
21:00	197	0	139	43	7	6	1	0	0	1	0	0	0	0
22:00	142	1	94	37	3	2	0	1	4	0	0	0	0	0
23:00	92	0	58	16	5	6	0	3	2	1	1	0	0	0
Total	11114	53	7290	2524	225	619	39	22	238	70	1	33	0	0
%		0.5	65.6	22.7	2.0	5.6	0.4	0.2	2.1	0.6	0.0	0.3	0.0	0.0

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of E Mirage Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	67	0	47	15	0	3	0	0	1	1	0	0	0	0
01:00	68	0	51	14	0	3	0	0	0	0	0	0	0	0
02:00	65	0	45	17	0	2	1	0	0	0	0	0	0	0
03:00	74	0	47	19	2	5	1	0	0	0	0	0	0	0
04:00	189	0	123	51	2	8	2	0	1	0	0	2	0	0
05:00	412	0	261	102	7	21	1	1	17	1	0	0	0	1
06:00	708	1	501	135	25	12	8	0	21	4	0	1	0	0
07:00	884	3	637	157	19	30	7	0	24	2	0	5	0	0
08:00	735	2	528	144	23	21	3	0	10	3	0	1	0	0
09:00	635	2	439	108	25	38	8	0	13	2	0	0	0	0
10:00	601	1	393	135	25	27	3	0	12	1	0	3	1	0
11:00	628	1	407	147	18	28	2	1	21	0	0	2	0	1
12:00	617	3	423	120	22	32	3	2	11	0	0	1	0	0
13:00	638	3	433	141	15	28	4	0	13	0	0	1	0	0
14:00	723	3	517	133	29	21	4	1	11	1	0	3	0	0
15:00	676	2	494	124	24	15	1	1	9	0	0	5	1	0
16:00	733	3	528	138	25	26	1	1	8	1	0	2	0	0
17:00	774	0	561	168	12	11	1	0	16	1	0	4	0	0
18:00	665	2	503	132	9	5	1	0	10	2	0	1	0	0
19:00	468	1	362	77	11	16	0	0	1	0	0	0	0	0
20:00	414	0	317	79	4	9	0	0	5	0	0	0	0	0
21:00	266	0	206	49	1	6	0	0	3	1	0	0	0	0
22:00	217	0	167	38	1	6	2	0	3	0	0	0	0	0
23:00	97	0	81	15	0	1	0	0	0	0	0	0	0	0
Total	11354	27	8071	2258	299	374	53	7	210	20	0	31	2	2
%		0.2	71.1	19.9	2.6	3.3	0.5	0.1	1.8	0.2	0.0	0.3	0.0	0.0

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of El Mirage Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	66	0	40	21	2	3	0	0	0	0	0	0	0	0
01:00	65	0	42	16	1	4	0	0	2	0	0	0	0	0
02:00	48	1	35	9	0	3	0	0	0	0	0	0	0	0
03:00	60	0	43	14	0	1	0	0	2	0	0	0	0	0
04:00	124	0	74	40	1	7	0	0	1	1	0	0	0	0
05:00	288	2	181	70	4	15	1	1	5	7	0	2	0	0
06:00	570	4	321	148	14	38	1	5	31	5	0	2	0	1
07:00	838	6	533	181	31	32	2	5	32	8	0	7	0	1
08:00	788	10	500	175	28	31	2	8	21	8	0	5	0	0
09:00	610	7	371	118	25	37	6	4	29	8	1	4	0	0
10:00	574	10	353	135	14	28	4	6	19	4	0	1	0	0
11:00	614	5	385	146	10	32	2	6	20	5	0	3	0	0
12:00	661	6	423	159	16	27	1	4	15	8	0	2	0	0
13:00	724	6	478	148	18	39	6	6	19	2	0	1	0	1
14:00	847	5	544	185	24	55	3	1	21	2	0	7	0	0
15:00	922	8	586	210	22	54	1	0	28	2	0	10	0	1
16:00	1034	8	697	201	39	56	1	0	25	0	0	6	0	1
17:00	1155	7	801	220	40	46	1	0	30	0	0	9	0	1
18:00	1032	11	716	216	23	40	0	0	19	2	0	4	0	1
19:00	624	3	448	122	15	17	2	1	12	3	0	1	0	0
20:00	474	3	333	114	7	12	0	0	3	2	0	0	0	0
21:00	331	1	224	82	3	12	6	0	3	0	0	0	0	0
22:00	259	2	194	45	3	14	0	0	1	0	0	0	0	0
23:00	139	0	105	27	1	4	0	0	1	1	0	0	0	0
Total	12847	105	8427	2802	341	607	39	47	339	68	1	64	0	7
%		0,8	65,6	21,8	2,7	4,7	0,3	0,4	2,6	0,5	0,0	0,5	0,0	0,1

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of Loop 101

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	100	0	79	16	0	3	0	0	2	0	0	0	0	0
01:00	97	0	70	18	0	5	0	0	2	1	0	1	0	0
02:00	95	0	67	17	1	4	1	0	1	3	0	1	0	0
03:00	197	1	121	49	7	4	3	1	6	5	0	0	0	0
04:00	475	6	277	122	20	26	3	1	14	3	1	2	0	0
05:00	768	15	422	190	33	42	1	6	41	7	0	10	1	0
06:00	1090	15	686	209	43	39	4	5	64	7	0	15	0	3
07:00	1300	6	882	223	57	33	3	5	59	9	1	18	1	3
08:00	1135	10	742	213	47	44	6	4	48	4	0	14	0	3
09:00	1048	9	680	209	30	39	6	2	54	6	0	11	2	0
10:00	1050	8	679	220	34	49	2	2	38	6	0	9	2	1
11:00	1037	10	667	219	29	39	6	0	48	3	1	14	0	1
12:00	1081	14	745	211	27	30	5	0	34	2	1	10	1	1
13:00	1018	11	649	211	31	36	2	3	44	8	0	19	1	3
14:00	1181	6	771	265	32	34	4	0	48	6	0	12	0	3
15:00	1225	4	830	247	31	33	3	0	60	4	0	11	1	1
16:00	1193	8	824	214	42	30	4	1	55	2	0	12	0	1
17:00	1127	4	768	226	34	34	2	0	48	2	0	8	0	1
18:00	1020	4	759	172	25	16	2	0	32	5	0	5	0	0
19:00	790	3	586	146	15	15	0	1	18	1	0	5	0	0
20:00	605	3	456	93	16	12	1	0	20	2	0	2	0	0
21:00	465	0	378	62	6	4	2	0	10	0	0	3	0	0
22:00	314	1	237	52	5	1	0	1	13	4	0	0	0	0
23:00	199	0	152	25	2	5	1	0	9	3	0	0	1	1
Total	18610	138	12527	3629	567	577	61	32	768	93	4	182	10	22
%		0,7	67,3	19,5	3,0	3,1	0,3	0,2	4,1	0,5	0,0	1,0	0,1	0,1

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of Loop 101

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	121	1	81	28	2	7	0	0	1	1	0	0	0	0
01:00	85	1	55	23	1	2	1	0	0	2	0	0	0	0
02:00	86	0	57	17	2	6	1	0	0	3	0	0	0	0
03:00	108	1	69	28	1	4	1	0	2	2	0	0	0	0
04:00	267	1	155	68	16	21	1	0	2	2	0	1	0	0
05:00	455	2	231	117	33	43	6	0	19	3	0	1	0	0
06:00	796	3	425	195	51	54	9	1	43	7	0	8	0	0
07:00	879	5	514	188	40	47	3	1	55	4	0	20	1	1
08:00	830	3	500	163	32	67	5	0	35	6	0	16	1	2
09:00	774	6	452	170	21	56	11	1	42	6	0	9	0	0
10:00	781	5	427	210	25	60	5	2	30	5	1	10	0	1
11:00	882	5	526	202	16	69	9	2	35	8	1	9	0	0
12:00	943	6	597	216	27	46	5	0	33	4	0	8	0	1
13:00	956	5	567	189	51	66	2	0	54	8	0	13	0	1
14:00	1048	8	602	257	45	50	2	1	59	2	0	17	1	4
15:00	1097	5	666	207	54	69	0	0	61	2	0	29	1	3
16:00	1047	8	640	156	60	43	3	0	95	2	0	34	2	4
17:00	904	6	514	150	74	27	0	0	78	5	0	43	1	6
18:00	974	10	608	176	56	36	0	0	59	2	0	22	0	5
19:00	853	3	587	149	46	31	0	0	29	3	0	5	0	0
20:00	734	2	519	132	27	29	0	0	21	1	0	3	0	0
21:00	531	1	387	88	16	24	0	0	11	3	0	1	0	0
22:00	345	0	249	58	12	12	3	0	9	2	0	0	0	0
23:00	266	1	191	47	7	7	8	0	3	2	0	0	0	0
Total	15762	88	9619	3234	715	876	75	8	776	85	2	249	7	28
%		0.6	61.0	20.5	4.5	5.6	0.5	0.1	4.9	0.5	0.0	1.6	0.0	0.2

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of Sarival Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	70	0	48	19	1	0	1	0	0	1	0	0	0	0
01:00	61	0	42	17	0	0	1	0	0	1	0	0	0	0
02:00	72	0	43	26	0	1	0	0	0	1	0	1	0	0
03:00	81	0	60	15	0	0	0	0	0	5	0	1	0	0
04:00	106	3	86	11	2	2	1	0	1	0	0	0	0	0
05:00	231	7	179	26	3	2	1	0	0	11	0	2	0	0
06:00	365	7	267	40	11	10	1	3	4	21	0	1	0	0
07:00	530	7	414	57	12	9	6	4	7	14	0	0	0	0
08:00	342	6	238	54	6	18	1	4	3	12	0	0	0	0
09:00	399	4	215	114	9	23	5	5	4	20	0	0	0	0
10:00	300	4	220	37	4	4	5	2	5	19	0	0	0	0
11:00	337	8	253	48	2	6	2	1	3	14	0	0	0	0
12:00	339	3	257	40	5	10	4	1	3	16	0	0	0	0
13:00	405	0	326	49	3	4	9	0	3	11	0	0	0	0
14:00	187	2	151	16	4	6	1	0	0	7	0	0	0	0
15:00	152	2	124	18	1	0	0	0	0	7	0	0	0	0
16:00	200	0	170	22	0	4	0	0	0	4	0	0	0	0
17:00	524	6	447	54	9	4	0	0	2	2	0	0	0	0
18:00	450	6	383	46	3	5	5	0	0	2	0	0	0	0
19:00	298	1	258	32	2	2	1	0	0	2	0	0	0	0
20:00	211	0	186	21	0	0	2	0	0	2	0	0	0	0
21:00	163	1	134	19	0	3	1	0	1	4	0	0	0	0
22:00	159	1	127	24	2	2	2	0	0	1	0	0	0	0
23:00	106	0	86	15	2	1	0	0	0	2	0	0	0	0
Total	6088	68	4714	820	81	116	49	20	36	179	0	5	0	0
%		1.1	77.4	13.5	1.3	1.9	0.8	0.3	0.6	2.9	0.0	0.1	0.0	0.0

United Civil Group

2803 N. 7th Avenue

Street : Camelback Road
 Location : W of Sarival Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	57	0	27	2	3	2	0	0	0	5	0	18	0	0
01:00	28	0	10	7	0	1	1	0	1	1	0	7	0	0
02:00	35	0	23	3	3	0	0	0	2	3	0	1	0	0
03:00	62	0	38	10	1	4	1	0	0	5	0	3	0	0
04:00	126	0	74	26	2	6	1	0	6	9	0	2	0	0
05:00	301	1	194	70	5	8	2	1	3	10	0	7	0	0
06:00	534	3	366	112	8	28	0	0	4	10	0	3	0	0
07:00	536	7	380	96	11	25	4	2	8	3	0	0	0	0
08:00	478	0	332	82	21	23	5	1	5	9	0	0	0	0
09:00	335	1	204	71	10	20	10	0	9	9	0	1	0	0
10:00	303	1	178	71	5	21	6	1	11	7	1	1	0	0
11:00	310	1	196	56	9	13	5	3	15	9	0	0	2	1
12:00	329	4	204	63	11	14	9	1	11	11	0	1	0	0
13:00	356	1	216	89	12	18	2	1	9	7	0	1	0	0
14:00	429	3	290	87	5	21	2	1	10	9	0	1	0	0
15:00	470	1	316	114	7	14	0	0	14	1	0	2	1	0
16:00	429	3	276	92	8	35	0	0	11	2	0	2	0	0
17:00	355	3	254	51	6	21	1	0	9	9	0	1	0	0
18:00	321	0	215	49	8	32	1	0	11	3	0	2	0	0
19:00	171	2	114	26	1	13	0	0	6	6	0	3	0	0
20:00	158	0	114	23	3	2	0	0	4	2	0	10	0	0
21:00	135	0	82	20	2	3	2	0	4	2	0	20	0	0
22:00	112	0	69	16	2	4	4	0	2	5	0	10	0	0
23:00	55	0	37	2	1	0	0	0	1	2	0	12	0	0
Total	6425	31	4209	1238	144	328	56	11	156	139	1	108	3	1
%		0,5	65,5	19,3	2,2	5,1	0,9	0,2	2,4	2,2	0,0	1,7	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Dysart Road
 Location : N of Camelback Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	40	0	26	11	0	3	0	0	0	0	0	0	0	0
01:00	34	0	26	2	1	3	0	0	2	0	0	0	0	0
02:00	40	0	22	14	0	4	0	0	0	0	0	0	0	0
03:00	52	0	32	13	0	4	0	0	2	1	0	0	0	0
04:00	78	0	39	32	0	6	0	0	0	1	0	0	0	0
05:00	182	0	110	45	2	20	0	0	5	0	0	0	0	0
06:00	326	1	192	84	5	38	0	0	5	0	0	1	0	0
07:00	727	4	466	169	19	39	1	0	21	2	0	6	0	0
08:00	727	4	471	174	19	31	3	0	20	1	0	4	0	0
09:00	539	0	355	121	8	37	1	0	15	1	0	1	0	0
10:00	478	1	323	107	4	28	3	0	10	1	0	1	0	0
11:00	507	0	334	125	8	26	2	0	11	0	0	1	0	0
12:00	536	1	351	124	8	33	3	0	14	1	0	1	0	0
13:00	521	5	338	128	7	31	2	0	8	1	0	1	0	0
14:00	593	0	405	137	16	20	1	0	10	1	0	3	0	0
15:00	733	3	461	189	21	44	0	0	12	0	0	3	0	0
16:00	839	2	552	196	28	42	0	0	15	0	0	4	0	0
17:00	854	5	580	189	20	42	0	0	16	0	0	2	0	0
18:00	728	3	505	151	8	46	0	0	12	0	0	3	0	0
19:00	480	2	356	96	4	20	0	0	2	0	0	0	0	0
20:00	291	0	228	55	0	5	1	0	0	1	0	1	0	0
21:00	235	0	183	47	1	2	1	0	1	0	0	0	0	0
22:00	177	0	136	34	0	6	0	0	0	1	0	0	0	0
23:00	97	0	78	13	3	1	1	0	1	0	0	0	0	0
Total	9814	31	6569	2256	182	531	19	0	182	12	0	32	0	0
%		0,3	66,9	23,0	1,9	5,4	0,2	0,0	1,9	0,1	0,0	0,3	0,0	0,0

United Civil Group
2803 N. 7th Avenue

Street : Dysart Road
Location : N of Glendale Avenue

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	20	0	14	3	0	1	0	0	0	2	0	0	0	0
01:00	18	0	10	6	1	0	0	0	1	0	0	0	0	0
02:00	14	0	4	7	0	3	0	0	0	0	0	0	0	0
03:00	26	0	18	4	0	3	0	0	0	1	0	0	0	0
04:00	96	2	52	33	1	2	1	0	5	0	0	0	0	0
05:00	168	4	85	49	6	11	0	0	8	3	0	2	0	0
06:00	204	2	102	47	17	20	1	0	11	2	0	2	0	0
07:00	293	4	159	68	21	21	4	0	9	4	0	3	0	0
08:00	301	2	178	73	17	17	0	0	11	2	0	1	0	0
09:00	204	2	109	43	22	13	1	0	11	1	0	2	0	0
10:00	195	0	120	42	12	14	2	0	3	2	0	0	0	0
11:00	263	0	155	57	19	15	6	0	7	3	0	1	0	0
12:00	258	1	148	56	19	15	0	0	17	2	0	0	0	0
13:00	204	2	121	48	12	10	0	0	9	0	0	2	0	0
14:00	262	2	158	52	19	15	1	0	12	3	0	0	0	0
15:00	386	2	265	70	24	16	1	0	7	1	0	0	0	0
16:00	416	1	296	82	18	7	1	0	7	3	0	1	0	0
17:00	359	0	237	75	20	18	2	0	5	0	0	2	0	0
18:00	227	1	148	46	14	12	1	0	4	1	0	0	0	0
19:00	159	0	102	32	12	10	0	0	3	0	0	0	0	0
20:00	115	0	83	22	2	6	0	0	1	0	0	1	0	0
21:00	113	0	78	27	5	2	1	0	0	0	0	0	0	0
22:00	65	0	49	10	1	4	0	0	1	0	0	0	0	0
23:00	30	0	18	10	0	1	0	0	0	1	0	0	0	0
Total	4396	25	2709	962	262	236	22	0	132	31	0	17	0	0
%		0,6	61,6	21,9	6,0	5,4	0,5	0,0	3,0	0,7	0,0	0,4	0,0	0,0

United Civil Group
2803 N. 7th Avenue

Street : Dysart Road
Location : N of Glendale Avenue

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	37	0	26	6	0	3	1	0	1	0	0	0	0	0
01:00	19	0	14	2	1	2	0	0	0	0	0	0	0	0
02:00	26	0	20	4	0	2	0	0	0	0	0	0	0	0
03:00	44	0	23	13	2	3	1	0	2	0	0	0	0	0
04:00	77	0	42	23	1	6	4	0	1	0	0	0	0	0
05:00	135	0	78	34	3	14	0	0	5	1	0	0	0	0
06:00	343	1	185	87	13	33	2	0	18	3	0	1	0	0
07:00	440	1	274	86	9	40	1	0	26	1	0	2	0	0
08:00	403	2	253	107	7	20	2	0	11	1	0	0	0	0
09:00	355	0	221	86	6	28	1	0	9	2	0	2	0	0
10:00	271	1	163	68	4	22	3	0	10	0	0	0	0	0
11:00	330	1	197	75	6	38	2	0	8	2	0	1	0	0
12:00	362	0	230	81	7	30	2	0	7	5	0	0	0	0
13:00	342	0	214	93	3	22	1	0	7	1	0	1	0	0
14:00	380	3	251	82	8	25	0	0	10	1	0	0	0	0
15:00	478	0	290	111	15	38	2	1	18	3	0	0	0	0
16:00	518	0	334	124	7	40	0	0	10	1	0	2	0	0
17:00	476	1	323	117	5	19	0	0	11	0	0	0	0	0
18:00	330	0	241	61	2	19	0	0	5	1	0	1	0	0
19:00	217	0	159	42	0	13	0	0	3	0	0	0	0	0
20:00	159	0	122	30	1	5	0	0	1	0	0	0	0	0
21:00	96	0	75	14	0	7	0	0	0	0	0	0	0	0
22:00	79	0	63	11	0	4	0	0	0	1	0	0	0	0
23:00	53	0	39	13	1	0	0	0	0	0	0	0	0	0
Total	5970	10	3837	1370	101	433	22	1	163	23	0	10	0	0
%		0,2	64,3	22,9	1,7	7,3	0,4	0,0	2,7	0,4	0,0	0,2	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Dysart Road
 Location : S of Camelback Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	85	0	63	17	1	4	0	0	0	0	0	0	0	0
01:00	62	1	47	10	0	2	0	0	2	0	0	0	0	0
02:00	44	0	35	9	0	0	0	0	0	0	0	0	0	0
03:00	66	1	37	23	0	3	0	0	2	0	0	0	0	0
04:00	163	1	110	42	0	5	1	0	1	2	0	1	0	0
05:00	304	4	196	73	3	18	1	0	4	3	0	2	0	0
06:00	583	9	382	124	16	19	4	1	23	1	0	4	0	0
07:00	957	12	603	203	61	40	4	1	23	6	0	4	0	0
08:00	852	7	557	178	37	36	4	4	21	4	0	4	0	0
09:00	727	6	458	166	28	34	1	3	26	2	0	3	0	0
10:00	735	7	486	158	28	28	1	2	18	0	0	6	0	1
11:00	876	7	596	184	22	34	4	1	24	2	0	2	0	0
12:00	911	4	657	171	21	24	4	1	19	0	0	8	0	2
13:00	910	10	646	196	14	25	2	4	11	0	0	2	0	0
14:00	1156	16	792	234	35	47	1	2	19	1	1	7	1	0
15:00	1180	7	826	239	26	44	3	1	24	1	0	9	0	0
16:00	1162	12	846	220	21	39	1	0	16	2	0	5	0	0
17:00	1038	12	739	205	22	44	2	0	9	0	0	4	0	1
18:00	973	7	715	165	32	35	0	0	14	1	0	4	0	0
19:00	734	10	532	140	14	22	0	0	12	1	0	3	0	0
20:00	558	6	407	114	11	13	0	0	4	1	0	2	0	0
21:00	402	7	308	75	2	7	0	0	2	0	0	1	0	0
22:00	249	1	200	33	2	5	0	2	2	4	0	0	0	0
23:00	143	5	108	17	1	3	0	1	0	8	0	0	0	0
Total	14870	152	10346	2996	397	531	33	23	276	39	1	71	1	4
%		1.0	69.6	20.1	2.7	3.6	0.2	0.2	1.9	0.3	0.0	0.5	0.0	0.0

United Civil Group

2803 N. 7th Avenue

Street : Dysart Road
 Location : S of Camelback Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	63	0	50	12	0	1	0	0	0	0	0	0	0	0
01:00	60	0	41	9	2	5	1	0	2	0	0	0	0	0
02:00	49	0	31	14	0	1	0	0	0	3	0	0	0	0
03:00	68	1	42	18	0	4	1	0	1	1	0	0	0	0
04:00	144	0	87	51	0	5	0	0	1	0	0	0	0	0
05:00	278	1	176	75	1	17	1	1	2	2	0	2	0	0
06:00	537	3	339	127	7	40	2	3	15	1	0	0	0	0
07:00	1006	3	667	244	9	41	3	5	27	2	0	5	0	0
08:00	958	7	647	203	22	44	3	3	21	3	0	5	0	0
09:00	745	7	486	188	10	24	3	6	15	2	0	4	0	0
10:00	796	5	541	168	12	41	8	5	10	2	0	4	0	0
11:00	877	1	601	203	6	38	4	7	13	1	0	3	0	0
12:00	854	9	572	197	10	33	4	2	19	4	0	4	0	0
13:00	811	3	523	209	10	35	4	6	15	1	0	5	0	0
14:00	993	3	660	238	16	39	0	0	31	2	0	4	0	0
15:00	1035	1	687	240	20	50	1	0	28	0	0	8	0	0
16:00	1140	1	782	257	22	40	0	0	31	2	0	5	0	0
17:00	1208	3	866	239	18	48	1	0	21	2	0	9	1	0
18:00	991	0	737	187	6	39	0	0	17	0	0	5	0	0
19:00	560	2	413	114	3	21	0	0	4	1	0	2	0	0
20:00	402	1	297	85	4	11	2	0	1	1	0	0	0	0
21:00	287	1	216	54	0	8	5	0	0	2	0	1	0	0
22:00	234	1	183	41	0	6	0	0	3	0	0	0	0	0
23:00	121	0	94	17	0	5	5	0	0	0	0	0	0	0
Total	14217	53	9738	3190	178	596	48	38	277	32	0	66	1	0
%		0.4	68.5	22.4	1.3	4.2	0.3	0.3	1.9	0.2	0.0	0.5	0.0	0.0

United Civil Group

2803 N. 7th Avenue

Street : Dysart Road
 Location : S of McDowell Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	97	0	82	12	0	3	0	0	0	0	0	0	0	0
01:00	91	0	68	12	2	7	0	0	0	2	0	0	0	0
02:00	67	0	41	16	1	6	0	1	2	0	0	0	0	0
03:00	102	1	66	19	0	12	0	2	1	1	0	0	0	0
04:00	287	1	166	80	2	32	1	0	3	2	0	0	0	0
05:00	492	2	291	101	4	72	1	2	13	3	0	3	0	0
06:00	768	9	501	136	12	70	3	4	24	2	0	7	0	0
07:00	1077	7	720	163	47	68	3	4	45	3	1	10	3	3
08:00	1022	17	671	183	37	46	4	5	41	4	0	12	1	1
09:00	971	12	632	174	37	53	4	3	44	2	0	9	0	1
10:00	1111	9	747	192	22	68	2	5	48	6	0	11	0	1
11:00	1167	15	780	190	45	60	5	6	52	4	0	9	0	1
12:00	1195	17	769	210	47	53	5	0	75	3	0	13	1	2
13:00	1105	8	724	193	51	54	8	5	37	6	0	16	0	3
14:00	1157	11	745	197	53	54	3	3	68	3	0	15	1	4
15:00	1175	12	781	189	42	65	3	1	54	0	1	20	2	5
16:00	1191	8	774	193	56	63	1	1	51	5	0	33	1	5
17:00	1197	11	814	184	44	55	3	0	61	0	1	19	0	5
18:00	1167	4	823	182	34	45	0	1	58	1	1	16	1	1
19:00	936	8	695	143	15	35	1	0	26	2	0	9	0	2
20:00	896	4	677	142	14	34	0	0	20	2	0	3	0	0
21:00	654	1	522	87	7	22	6	0	5	2	0	2	0	0
22:00	382	3	290	60	0	19	1	0	6	2	0	1	0	0
23:00	212	0	171	35	0	6	0	0	0	0	0	0	0	0
Total	18519	160	12550	3093	572	1002	54	43	734	55	4	208	10	34
%		0,9	67,8	16,7	3,1	5,4	0,3	0,2	4,0	0,3	0,0	1,1	0,1	0,2

United Civil Group

2803 N. 7th Avenue

Street : El Mirage Road
 Location : N of Camelback Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	28	0	17	6	0	2	2	0	1	0	0	0	0	0
01:00	26	0	13	9	0	1	1	0	0	2	0	0	0	0
02:00	17	0	7	7	0	0	1	0	0	2	0	0	0	0
03:00	9	0	3	3	0	1	1	0	1	0	0	0	0	0
04:00	74	0	42	18	0	9	2	0	0	3	0	0	0	0
05:00	112	0	46	30	2	14	0	0	1	17	1	1	0	0
06:00	169	0	82	37	12	15	5	1	3	14	0	0	0	0
07:00	277	0	148	72	16	17	6	4	2	10	2	0	0	0
08:00	342	5	171	83	19	26	11	5	6	16	0	0	0	0
09:00	251	1	100	62	20	23	13	8	6	16	2	0	0	0
10:00	239	2	106	50	13	24	13	8	3	17	2	1	0	0
11:00	250	1	115	53	22	21	5	6	7	18	2	0	0	0
12:00	260	2	120	60	11	29	12	5	5	15	1	0	0	0
13:00	259	11	129	69	5	20	9	5	2	9	0	0	0	0
14:00	341	6	194	93	4	21	6	5	5	5	2	0	0	0
15:00	339	0	227	76	3	28	1	0	1	3	0	0	0	0
16:00	412	0	277	103	5	25	0	0	2	0	0	0	0	0
17:00	380	1	257	87	3	27	0	0	3	2	0	0	0	0
18:00	323	0	233	66	1	20	0	0	3	0	0	0	0	0
19:00	212	0	157	41	1	12	0	0	1	0	0	0	0	0
20:00	173	0	128	37	1	7	0	0	0	0	0	0	0	0
21:00	133	0	95	30	1	7	0	0	0	0	0	0	0	0
22:00	91	0	68	20	0	2	1	0	0	0	0	0	0	0
23:00	59	0	36	13	0	8	0	1	1	0	0	0	0	0
Total	4776	29	2771	1125	139	359	89	48	53	149	12	2	0	0
%		0,6	58,0	23,6	2,9	7,5	1,9	1,0	1,1	3,1	0,3	0,0	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : El Mirage Road
Location : N of Glendale Avenue

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	22	0	15	3	1	1	1	0	1	0	0	0	0	0
01:00	16	0	6	4	2	0	3	0	0	1	0	0	0	0
02:00	17	0	6	1	2	1	7	0	0	0	0	0	0	0
03:00	28	0	7	3	3	2	10	0	2	1	0	0	0	0
04:00	87	0	38	19	3	12	7	0	2	6	0	0	0	0
05:00	168	0	96	32	3	20	4	3	4	6	0	0	0	0
06:00	323	1	174	75	4	37	11	6	8	7	0	0	0	0
07:00	508	2	319	82	15	45	18	4	10	13	0	0	0	0
08:00	294	0	146	52	14	39	22	3	11	7	0	0	0	0
09:00	250	3	117	48	10	34	18	3	8	9	0	0	0	0
10:00	262	4	110	61	11	34	17	2	14	9	0	0	0	0
11:00	239	1	105	42	15	38	11	5	12	10	0	0	0	0
12:00	268	2	125	50	13	41	19	2	12	4	0	0	0	0
13:00	286	5	140	72	9	42	5	2	8	3	0	0	0	0
14:00	318	0	174	78	8	42	3	2	4	7	0	0	0	0
15:00	351	0	195	93	3	46	4	1	5	4	0	0	0	0
16:00	326	0	216	67	3	37	0	0	3	0	0	0	0	0
17:00	328	0	203	83	2	36	1	1	1	1	0	0	0	0
18:00	212	0	148	46	0	18	0	0	0	0	0	0	0	0
19:00	134	0	93	27	1	13	0	0	0	0	0	0	0	0
20:00	115	0	77	27	0	11	0	0	0	0	0	0	0	0
21:00	64	0	47	13	0	3	0	0	1	0	0	0	0	0
22:00	38	0	25	7	0	5	0	0	0	1	0	0	0	0
23:00	19	0	16	2	0	1	0	0	0	0	0	0	0	0
Total	4673	18	2598	987	122	558	161	34	106	89	0	0	0	0
%		0,4	55,6	21,1	2,6	11,9	3,4	0,7	2,3	1,9	0,0	0,0	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : El Mirage Road
Location : N of Glendale Avenue

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	22	0	15	3	1	1	1	0	1	0	0	0	0	0
01:00	16	0	6	4	2	0	3	0	0	1	0	0	0	0
02:00	17	0	6	1	2	1	7	0	0	0	0	0	0	0
03:00	28	0	7	3	3	2	10	0	2	1	0	0	0	0
04:00	87	0	38	19	3	12	7	0	2	6	0	0	0	0
05:00	168	0	96	32	3	20	4	3	4	6	0	0	0	0
06:00	323	1	174	75	4	37	11	6	8	7	0	0	0	0
07:00	508	2	319	82	15	45	18	4	10	13	0	0	0	0
08:00	294	0	146	52	14	39	22	3	11	7	0	0	0	0
09:00	250	3	117	48	10	34	18	3	8	9	0	0	0	0
10:00	262	4	110	61	11	34	17	2	14	9	0	0	0	0
11:00	239	1	105	42	15	38	11	5	12	10	0	0	0	0
12:00	268	2	125	50	13	41	19	2	12	4	0	0	0	0
13:00	286	5	140	72	9	42	5	2	8	3	0	0	0	0
14:00	318	0	174	78	8	42	3	2	4	7	0	0	0	0
15:00	351	0	195	93	3	46	4	1	5	4	0	0	0	0
16:00	326	0	216	67	3	37	0	0	3	0	0	0	0	0
17:00	328	0	203	83	2	36	1	1	1	1	0	0	0	0
18:00	212	0	148	46	0	18	0	0	0	0	0	0	0	0
19:00	134	0	93	27	1	13	0	0	0	0	0	0	0	0
20:00	115	0	77	27	0	11	0	0	0	0	0	0	0	0
21:00	64	0	47	13	0	3	0	0	1	0	0	0	0	0
22:00	38	0	25	7	0	5	0	0	0	1	0	0	0	0
23:00	19	0	16	2	0	1	0	0	0	0	0	0	0	0
Total	4673	18	2598	987	122	558	161	34	106	89	0	0	0	0
%		0,4	55,6	21,1	2,6	11,9	3,4	0,7	2,3	1,9	0,0	0,0	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : El Mirage Road
 Location : S of Camelback Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	13	0	11	1	0	1	0	0	0	0	0	0	0	0
01:00	15	0	9	4	0	2	0	0	0	0	0	0	0	0
02:00	9	0	6	1	0	0	1	0	0	1	0	0	0	0
03:00	24	0	14	9	0	1	0	0	0	0	0	0	0	0
04:00	63	0	35	19	0	4	0	0	1	4	0	0	0	0
05:00	129	1	73	38	0	9	0	0	0	8	0	0	0	0
06:00	220	2	142	41	1	19	4	2	3	6	0	0	0	0
07:00	373	1	241	88	9	18	4	5	1	6	0	0	0	0
08:00	296	3	179	66	9	22	6	3	1	7	0	0	0	0
09:00	187	1	90	49	6	16	8	4	4	9	0	0	0	0
10:00	169	1	87	42	6	14	3	5	3	8	0	0	0	0
11:00	200	2	125	39	10	10	3	2	2	7	0	0	0	0
12:00	185	2	104	47	1	18	7	3	1	2	0	0	0	0
13:00	217	9	138	47	2	13	5	1	2	0	0	0	0	0
14:00	263	3	161	69	2	17	6	2	3	0	0	0	0	0
15:00	261	0	167	68	1	21	0	1	2	1	0	0	0	0
16:00	298	0	211	69	3	12	0	1	1	1	0	0	0	0
17:00	274	1	199	63	1	9	0	0	1	0	0	0	0	0
18:00	238	0	181	44	0	13	0	0	0	0	0	0	0	0
19:00	150	0	109	32	0	8	0	0	1	0	0	0	0	0
20:00	107	0	85	18	0	4	0	0	0	0	0	0	0	0
21:00	107	0	78	21	1	7	0	0	0	0	0	0	0	0
22:00	57	0	45	8	0	4	0	0	0	0	0	0	0	0
23:00	26	0	19	3	0	3	0	1	0	0	0	0	0	0
Total	3881	26	2509	886	52	245	47	30	26	60	0	0	0	0
%		0,7	64,6	22,8	1,3	6,3	1,2	0,8	0,7	1,5	0,0	0,0	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : El Mirage Road
 Location : S of Camelback Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	14	0	5	7	0	2	0	0	0	0	0	0	0	0
01:00	21	0	8	10	0	3	0	0	0	0	0	0	0	0
02:00	7	0	3	2	0	2	0	0	0	0	0	0	0	0
03:00	21	0	5	9	0	5	0	0	0	2	0	0	0	0
04:00	26	0	8	10	0	4	0	0	0	4	0	0	0	0
05:00	91	0	24	29	4	23	0	1	3	7	0	0	0	0
06:00	174	0	59	66	10	23	0	5	5	6	0	0	0	0
07:00	284	2	80	135	9	47	0	3	3	5	0	0	0	0
08:00	217	0	83	81	5	33	2	5	5	3	0	0	0	0
09:00	166	0	47	76	8	24	0	2	6	3	0	0	0	0
10:00	163	0	46	59	7	33	3	6	4	5	0	0	0	0
11:00	194	0	71	72	9	23	0	3	5	11	0	0	0	0
12:00	186	0	57	76	1	42	1	1	6	2	0	0	0	0
13:00	210	0	62	96	8	34	4	1	4	1	0	0	0	0
14:00	287	0	88	139	9	46	0	0	5	0	0	0	0	0
15:00	310	0	87	160	7	51	0	0	4	1	0	0	0	0
16:00	364	0	135	175	0	50	0	0	4	0	0	0	0	0
17:00	394	0	150	189	1	50	0	0	3	0	0	1	0	0
18:00	241	1	103	114	0	22	0	0	1	0	0	0	0	0
19:00	173	0	58	91	0	22	0	0	1	1	0	0	0	0
20:00	138	0	55	68	0	15	0	0	0	0	0	0	0	0
21:00	100	0	45	46	4	5	0	0	0	0	0	0	0	0
22:00	57	0	28	25	0	3	0	0	1	0	0	0	0	0
23:00	31	0	17	12	0	1	1	0	0	0	0	0	0	0
Total	3869	3	1324	1747	82	563	11	27	60	51	0	1	0	0
%		0,1	34,2	45,2	2,1	14,6	0,3	0,7	1,6	1,3	0,0	0,0	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Glendale Avenue
Location : W of Loop 101

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	64	0	42	10	0	2	1	0	4	5	0	0	0	0
01:00	61	1	27	14	0	4	0	0	12	2	0	1	0	0
02:00	83	2	35	16	2	15	0	0	9	2	0	2	0	0
03:00	86	1	37	21	4	13	2	0	7	0	0	1	0	0
04:00	209	5	89	47	15	29	3	0	13	8	0	0	0	0
05:00	381	4	193	66	27	39	6	1	28	8	0	8	1	0
06:00	718	7	380	139	55	80	2	0	41	6	0	7	1	0
07:00	899	3	525	145	61	94	5	1	53	5	0	5	1	1
08:00	624	4	326	126	37	67	7	3	36	10	0	6	0	2
09:00	588	4	279	113	33	86	16	3	38	14	1	1	0	0
10:00	676	12	331	157	28	85	8	3	32	16	0	3	1	0
11:00	664	4	317	136	38	102	10	1	29	15	2	10	0	0
12:00	658	6	345	130	33	78	9	6	38	8	1	4	0	0
13:00	713	8	372	141	40	71	13	2	41	12	1	11	0	1
14:00	828	7	420	177	37	104	16	1	48	11	0	6	0	1
15:00	883	7	459	178	61	91	7	0	48	13	1	17	0	1
16:00	896	8	549	169	30	88	1	0	36	5	0	9	0	1
17:00	760	5	502	134	25	60	3	0	22	1	0	6	1	1
18:00	509	3	321	106	11	49	2	0	9	2	0	6	0	0
19:00	320	0	206	60	8	27	2	0	15	2	0	0	0	0
20:00	258	0	176	45	7	24	0	0	5	0	0	1	0	0
21:00	205	2	135	34	8	18	1	0	3	3	1	0	0	0
22:00	176	0	130	24	2	10	2	0	5	1	0	2	0	0
23:00	107	0	72	23	1	4	0	0	5	2	0	0	0	0
Total	11366	93	6268	2211	563	1240	116	21	577	151	7	106	5	8
%		0,8	55,1	19,5	5,0	10,9	1,0	0,2	5,1	1,3	0,1	0,9	0,0	0,1

United Civil Group

2803 N. 7th Avenue

Street : Glendale Avenue
Location : W of Loop 101

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	84	0	54	19	3	2	1	0	0	5	0	0	0	0
01:00	52	0	32	12	2	2	1	0	0	2	1	0	0	0
02:00	77	0	42	17	1	5	9	0	0	3	0	0	0	0
03:00	128	0	56	33	3	7	7	0	4	18	0	0	0	0
04:00	228	0	118	49	8	21	11	0	8	9	0	4	0	0
05:00	465	4	237	133	19	40	3	3	13	6	0	7	0	0
06:00	642	5	364	153	18	38	10	6	30	14	0	4	0	0
07:00	740	9	436	140	31	57	9	4	32	10	1	8	1	2
08:00	594	6	297	125	24	60	22	3	30	22	1	3	0	1
09:00	518	7	275	103	23	48	17	6	19	11	0	7	1	1
10:00	571	12	296	124	14	49	24	5	21	16	0	7	1	2
11:00	612	5	306	164	19	40	13	3	30	25	0	7	0	0
12:00	691	6	374	151	37	42	18	4	30	17	0	10	0	2
13:00	660	8	333	134	37	42	28	6	43	19	1	8	1	0
14:00	812	7	447	149	48	68	29	5	39	14	0	6	0	0
15:00	898	2	512	202	41	62	4	3	52	6	0	12	1	1
16:00	989	4	620	209	34	47	4	1	53	5	0	9	0	3
17:00	912	3	621	158	33	38	2	0	39	5	0	13	0	0
18:00	648	6	443	115	12	34	2	0	23	5	0	7	0	1
19:00	482	2	354	73	6	28	3	0	8	7	0	1	0	0
20:00	386	1	288	65	4	13	4	0	6	3	0	2	0	0
21:00	314	1	225	63	3	8	2	0	9	1	0	1	0	1
22:00	206	0	155	37	3	7	0	0	3	1	0	0	0	0
23:00	124	0	96	25	0	1	0	0	0	2	0	0	0	0
Total	11833	88	6981	2453	423	759	223	49	492	226	4	116	5	14
%		0,7	59,0	20,7	3,6	6,4	1,9	0,4	4,2	1,9	0,0	1,0	0,0	0,1

United Civil Group
2803 N. 7th Avenue

Street : Indian School Road
Location : W of Dysart Road

Site: TC22119
11/17/2022
Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	52	0	45	4	0	3	0	0	0	0	0	0	0	0
01:00	46	0	31	14	0	1	0	0	0	0	0	0	0	0
02:00	22	0	16	5	0	0	0	0	0	1	0	0	0	0
03:00	62	1	44	16	0	1	0	0	0	0	0	0	0	0
04:00	62	1	44	10	0	5	0	0	1	1	0	0	0	0
05:00	148	0	110	30	0	8	0	0	0	0	0	0	0	0
06:00	300	0	217	59	2	10	4	0	7	0	0	1	0	0
07:00	649	1	442	150	11	29	3	0	11	0	0	2	0	0
08:00	698	4	497	140	5	30	2	1	15	1	0	3	0	0
09:00	525	0	359	122	4	25	3	2	8	0	0	2	0	0
10:00	518	4	366	100	7	27	6	0	8	0	0	0	0	0
11:00	621	0	423	135	7	37	2	1	9	3	0	4	0	0
12:00	602	6	422	133	5	23	5	1	6	0	0	0	1	0
13:00	573	1	399	118	8	30	4	1	8	0	0	4	0	0
14:00	741	2	508	161	5	45	4	1	14	0	0	1	0	0
15:00	823	5	556	196	18	25	1	0	16	2	0	4	0	0
16:00	818	3	603	156	7	37	0	0	7	0	0	5	0	0
17:00	722	1	491	174	12	28	1	0	11	0	0	4	0	0
18:00	695	3	528	128	6	20	0	0	8	0	0	2	0	0
19:00	439	3	336	73	3	20	0	0	3	1	0	0	0	0
20:00	374	2	279	79	0	12	0	0	0	0	0	2	0	0
21:00	251	3	197	46	0	5	0	0	0	0	0	0	0	0
22:00	187	0	164	21	0	1	0	0	1	0	0	0	0	0
23:00	93	0	74	14	0	4	0	0	1	0	0	0	0	0
Total	10021	40	7151	2084	100	426	35	7	134	9	0	34	1	0
%		0,4	71,4	20,8	1,0	4,3	0,3	0,1	1,3	0,1	0,0	0,3	0,0	0,0

United Civil Group
2803 N. 7th Avenue

Street : Indian School Road
Location : W of Dysart Road

Site: TC22119
11/17/2022
Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	41	0	32	8	1	0	0	0	0	0	0	0	0	0
01:00	24	0	18	6	0	0	0	0	0	0	0	0	0	0
02:00	18	0	10	6	0	2	0	0	0	0	0	0	0	0
03:00	43	1	27	11	0	3	0	0	0	1	0	0	0	0
04:00	73	0	43	23	0	7	0	0	0	0	0	0	0	0
05:00	165	0	97	45	0	21	1	0	0	1	0	0	0	0
06:00	261	2	142	76	4	27	0	0	6	2	0	2	0	0
07:00	622	2	324	197	18	58	2	0	18	2	0	1	0	0
08:00	559	2	308	171	10	52	1	0	12	2	0	1	0	0
09:00	466	4	247	143	11	43	1	1	14	1	0	1	0	0
10:00	464	5	266	133	3	43	3	2	7	1	0	1	0	0
11:00	522	3	294	158	7	48	0	2	7	0	0	3	0	0
12:00	530	4	316	137	11	50	4	2	5	1	0	0	0	0
13:00	560	5	310	171	9	46	2	0	15	0	0	2	0	0
14:00	611	2	357	177	11	50	0	0	11	0	0	3	0	0
15:00	749	6	412	233	13	63	2	0	13	0	0	7	0	0
16:00	822	7	462	255	16	71	2	0	4	0	0	5	0	0
17:00	882	4	544	216	17	80	1	0	15	0	0	5	0	0
18:00	791	0	506	210	11	53	0	0	9	0	0	2	0	0
19:00	501	4	330	119	7	26	1	0	9	2	0	3	0	0
20:00	292	2	186	75	0	27	0	0	2	0	0	0	0	0
21:00	181	1	112	52	1	15	0	0	0	0	0	0	0	0
22:00	161	0	109	42	0	10	0	0	0	0	0	0	0	0
23:00	70	1	42	21	1	3	0	0	2	0	0	0	0	0
Total	9408	55	5494	2685	151	798	20	7	149	13	0	36	0	0
%		0,6	58,4	28,5	1,6	8,5	0,2	0,1	1,6	0,1	0,0	0,4	0,0	0,0

United Civil Group
2803 N. 7th Avenue

Street : Indian School Road
Location : W of Loop 101

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	154	0	108	33	2	11	0	0	0	0	0	0	0	0
01:00	93	1	60	16	4	9	0	0	2	1	0	0	0	0
02:00	68	1	49	14	0	4	0	0	0	0	0	0	0	0
03:00	83	0	47	26	1	7	1	0	1	0	0	0	0	0
04:00	110	1	63	29	0	15	0	0	2	0	0	0	0	0
05:00	319	3	173	79	3	48	1	1	2	9	0	0	0	0
06:00	580	3	307	141	9	104	0	0	9	6	1	0	0	0
07:00	724	4	439	175	9	79	2	1	9	6	0	0	0	0
08:00	847	3	512	187	15	105	2	1	15	5	0	2	0	0
09:00	847	4	530	210	9	78	0	0	11	5	0	0	0	0
10:00	675	5	399	148	11	85	0	1	17	8	0	0	0	1
11:00	636	4	374	152	9	73	1	2	14	6	1	0	0	0
12:00	656	6	363	164	9	95	4	2	6	7	0	0	0	0
13:00	664	5	405	155	11	70	1	1	9	7	0	0	0	0
14:00	664	5	385	177	7	69	5	0	12	4	0	0	0	0
15:00	717	4	429	176	11	77	2	1	14	1	0	2	0	0
16:00	902	2	562	217	13	94	3	1	8	1	0	1	0	0
17:00	763	8	462	201	13	66	2	0	10	0	0	1	0	0
18:00	805	1	499	201	4	91	0	0	8	1	0	0	0	0
19:00	758	3	498	173	4	71	0	0	8	1	0	0	0	0
20:00	601	3	365	153	5	69	0	0	5	1	0	0	0	0
21:00	506	2	342	109	5	45	0	0	2	1	0	0	0	0
22:00	340	2	244	64	3	24	0	0	2	1	0	0	0	0
23:00	272	1	195	55	1	17	1	0	0	2	0	0	0	0
Total	12784	71	7810	3055	158	1406	25	11	166	73	2	6	0	1
%		0,6	61,1	23,9	1,2	11,0	0,2	0,1	1,3	0,6	0,0	0,0	0,0	0,0

United Civil Group
2803 N. 7th Avenue

Street : Indian School Road
Location : W of Loop 101

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	262	2	189	55	1	11	0	0	1	2	0	1	0	0
01:00	152	2	113	26	1	8	1	0	1	0	0	0	0	0
02:00	94	0	68	21	0	3	0	0	1	1	0	0	0	0
03:00	76	0	49	23	0	2	0	0	1	1	0	0	0	0
04:00	54	1	35	12	0	4	0	0	1	1	0	0	0	0
05:00	61	0	33	18	2	4	0	0	0	4	0	0	0	0
06:00	127	0	80	28	4	13	0	0	1	1	0	0	0	0
07:00	245	0	131	64	5	24	0	0	11	7	0	3	0	0
08:00	483	6	282	117	9	36	8	2	18	3	1	1	0	0
09:00	903	6	587	193	15	58	1	1	30	7	0	5	0	0
10:00	651	1	412	147	8	56	3	1	15	4	0	4	0	0
11:00	523	0	320	129	10	38	0	1	13	8	0	4	0	0
12:00	594	0	388	129	9	46	0	0	17	4	0	1	0	0
13:00	599	5	360	157	7	45	2	1	13	7	0	2	0	0
14:00	620	2	384	154	13	38	3	0	17	5	0	4	0	0
15:00	706	8	426	176	11	53	3	4	20	0	0	5	0	0
16:00	986	4	632	232	16	65	2	0	26	1	0	8	0	0
17:00	1261	2	816	267	36	82	0	0	46	1	0	11	0	0
18:00	1291	11	822	302	28	67	2	0	47	0	0	9	1	2
19:00	1146	11	770	246	16	56	0	0	27	0	0	20	0	0
20:00	905	3	609	196	17	51	0	0	22	1	0	6	0	0
21:00	554	4	374	121	6	31	0	0	16	1	0	1	0	0
22:00	442	1	319	92	3	15	1	0	8	0	0	3	0	0
23:00	358	2	252	79	5	17	0	0	2	0	0	1	0	0
Total	13093	71	8451	2984	222	823	26	10	354	59	1	89	1	2
%		0,5	64,5	22,8	1,7	6,3	0,2	0,1	2,7	0,5	0,0	0,7	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Indian School Road
Location : W of Sarival Avenue

Site: TC22119
11/17/2022
Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	103	5	32	5	14	7	0	0	30	4	0	6	0	0
01:00	80	4	27	12	8	4	2	0	14	4	0	4	1	0
02:00	90	5	38	12	6	7	1	0	16	5	0	0	0	0
03:00	116	3	58	20	4	13	4	0	6	5	0	3	0	0
04:00	120	2	70	19	5	17	2	0	4	1	0	0	0	0
05:00	193	4	107	32	15	17	0	0	12	4	0	2	0	0
06:00	415	9	208	85	18	59	4	0	22	10	0	0	0	0
07:00	760	8	428	169	46	63	2	1	37	1	0	5	0	0
08:00	693	8	365	167	28	71	6	1	34	10	0	3	0	0
09:00	555	9	309	132	16	50	0	1	32	4	0	1	1	0
10:00	492	2	266	97	23	58	4	1	32	7	0	2	0	0
11:00	539	6	301	112	17	65	2	0	27	6	0	3	0	0
12:00	499	11	281	103	25	44	6	1	20	6	0	2	0	0
13:00	525	6	301	114	22	52	4	0	20	2	0	4	0	0
14:00	593	8	325	111	32	65	3	0	37	6	0	6	0	0
15:00	656	9	364	139	29	73	7	0	21	4	0	7	2	1
16:00	728	9	392	148	47	82	14	0	29	0	0	7	0	0
17:00	818	16	448	174	40	76	4	0	47	2	0	10	1	0
18:00	597	11	326	113	20	87	5	0	31	1	0	2	1	0
19:00	390	5	194	66	24	51	0	0	43	1	0	3	3	0
20:00	256	5	141	43	17	19	0	0	26	2	0	2	1	0
21:00	212	5	127	36	10	17	0	0	14	2	0	1	0	0
22:00	178	4	120	22	6	9	0	0	13	1	0	2	1	0
23:00	161	12	80	13	5	12	2	0	28	4	0	3	2	0
Total	9769	166	5308	1944	477	1018	72	5	595	92	0	78	13	1
%		1.7	54.3	19.9	4.9	10.4	0.7	0.1	6.1	0.9	0.0	0.8	0.1	0.0

United Civil Group

2803 N. 7th Avenue

Street : Indian School Road
Location : W of Sarival Avenue

Site: TC22119
11/17/2022
Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	75	1	28	2	0	7	7	0	15	11	0	2	2	0
01:00	52	0	11	2	1	4	0	0	16	11	0	5	2	0
02:00	41	0	13	3	0	1	0	0	12	9	0	2	1	0
03:00	84	0	35	11	3	3	2	0	13	9	0	7	1	0
04:00	132	2	70	23	2	5	1	0	15	6	0	5	3	0
05:00	224	5	141	36	6	11	2	0	14	5	1	2	1	0
06:00	288	6	189	43	6	10	7	0	17	7	0	2	1	0
07:00	554	3	365	98	18	20	2	1	27	13	0	3	4	0
08:00	488	4	332	94	8	16	6	0	16	11	0	1	0	0
09:00	530	5	275	81	20	108	4	1	21	13	0	1	1	0
10:00	437	1	263	93	12	32	5	1	20	9	0	1	0	0
11:00	492	3	332	88	8	22	5	1	22	10	0	0	1	0
12:00	623	2	428	117	2	36	9	0	14	15	0	0	0	0
13:00	574	4	406	100	10	23	4	0	12	14	0	1	0	0
14:00	732	3	488	131	30	30	5	0	35	6	0	3	0	1
15:00	1048	8	668	221	37	41	2	1	47	11	3	8	1	0
16:00	989	4	678	173	36	38	1	2	36	11	0	9	0	1
17:00	869	10	610	137	23	40	3	1	30	5	0	10	0	0
18:00	638	7	435	121	9	30	5	0	21	5	0	5	0	0
19:00	427	5	303	64	9	16	5	0	14	8	0	1	2	0
20:00	446	4	297	73	9	17	4	0	22	14	3	0	3	0
21:00	275	3	200	35	2	11	0	1	13	6	4	0	0	0
22:00	229	3	152	37	4	6	2	0	13	11	1	0	0	0
23:00	125	1	88	15	6	2	0	0	9	2	0	2	0	0
Total	10372	84	6807	1798	261	529	81	9	474	222	12	70	23	2
%		0.8	65.6	17.3	2.5	5.1	0.8	0.1	4.6	2.1	0.1	0.7	0.2	0.0

United Civil Group

2803 N. 7th Avenue

Street : Litchfield Road
 Location : N of Camelback Road

Site: TC22119
 11/15/2022
 Tuesday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	49	0	40	9	0	0	0	0	0	0	0	0	0	0
01:00	43	1	38	4	0	0	0	0	0	0	0	0	0	0
02:00	30	0	21	6	0	3	0	0	0	0	0	0	0	0
03:00	19	0	15	4	0	0	0	0	0	0	0	0	0	0
04:00	61	0	45	12	0	4	0	0	0	0	0	0	0	0
05:00	218	1	157	49	0	9	0	0	1	1	0	0	0	0
06:00	542	3	368	135	5	23	0	0	6	0	0	2	0	0
07:00	821	10	562	193	9	37	0	0	10	0	0	0	0	0
08:00	762	1	533	169	9	39	0	1	9	1	0	0	0	0
09:00	491	1	324	132	4	22	1	0	6	1	0	0	0	0
10:00	467	3	317	119	2	21	0	0	3	2	0	0	0	0
11:00	510	4	335	134	1	26	0	0	6	2	0	2	0	0
12:00	669	3	450	159	6	41	1	0	7	0	0	2	0	0
13:00	656	2	457	157	4	28	0	0	8	0	0	0	0	0
14:00	665	1	460	157	3	31	0	0	10	1	0	2	0	0
15:00	663	4	455	155	5	29	1	0	11	1	0	2	0	0
16:00	715	0	501	179	3	24	0	0	6	0	0	2	0	0
17:00	705	4	499	158	6	32	0	0	5	1	0	0	0	0
18:00	655	2	490	136	1	21	0	0	4	0	0	1	0	0
19:00	478	0	368	89	1	20	0	0	0	0	0	0	0	0
20:00	360	0	280	67	2	8	0	0	2	0	0	1	0	0
21:00	260	2	195	53	0	9	0	0	1	0	0	0	0	0
22:00	192	3	152	34	1	2	0	0	0	0	0	0	0	0
23:00	126	0	105	16	0	5	0	0	0	0	0	0	0	0
Total	10157	45	7167	2326	62	434	3	1	95	10	0	14	0	0
%		0,4	70,6	22,9	0,6	4,3	0,0	0,0	0,9	0,1	0,0	0,1	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Litchfield Road
 Location : N of Camelback Road

Site: TC22119
 11/15/2022
 Tuesday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	78	0	67	10	0	1	0	0	0	0	0	0	0	0
01:00	54	1	45	7	0	1	0	0	0	0	0	0	0	0
02:00	19	0	17	1	0	1	0	0	0	0	0	0	0	0
03:00	32	0	27	5	0	0	0	0	0	0	0	0	0	0
04:00	58	0	42	13	0	2	0	0	0	1	0	0	0	0
05:00	133	1	97	31	0	3	1	0	0	0	0	0	0	0
06:00	250	2	195	46	1	4	0	0	2	0	0	0	0	0
07:00	552	4	410	106	8	12	3	0	9	0	0	0	0	0
08:00	595	2	463	98	5	20	1	0	5	1	0	0	0	0
09:00	430	1	308	86	1	25	0	0	8	0	0	1	0	0
10:00	445	3	320	90	1	23	0	0	7	1	0	0	0	0
11:00	556	2	406	112	6	20	1	0	6	1	0	1	1	0
12:00	592	5	430	117	3	25	2	1	6	1	0	2	0	0
13:00	506	5	383	82	6	25	0	0	4	0	1	0	0	0
14:00	611	0	463	121	5	18	0	0	2	2	0	0	0	0
15:00	844	5	629	173	4	20	2	0	8	2	0	1	0	0
16:00	1017	9	791	177	5	20	1	0	13	1	0	0	0	0
17:00	874	8	681	148	2	25	0	0	9	0	0	1	0	0
18:00	637	3	506	107	2	13	1	0	3	2	0	0	0	0
19:00	404	1	332	61	0	8	0	0	2	0	0	0	0	0
20:00	325	0	273	48	1	2	0	0	0	1	0	0	0	0
21:00	218	3	174	37	0	2	0	0	1	0	0	1	0	0
22:00	159	3	125	21	0	6	0	0	1	1	0	2	0	0
23:00	171	1	136	29	0	5	0	0	0	0	0	0	0	0
Total	9560	59	7320	1726	50	281	12	1	86	14	1	9	1	0
%		0,6	76,6	18,1	0,5	2,9	0,1	0,0	0,9	0,1	0,0	0,1	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Litchfield Road
 Location : N of Glendale Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	57	0	41	11	1	0	1	0	2	1	0	0	0	0
01:00	51	0	37	8	0	2	0	1	2	1	0	0	0	0
02:00	37	0	22	10	0	0	2	0	2	1	0	0	0	0
03:00	49	1	23	10	3	7	2	1	1	1	0	0	0	0
04:00	73	1	49	15	1	3	3	0	0	1	0	0	0	0
05:00	192	2	125	47	1	13	1	0	2	1	0	0	0	0
06:00	276	2	186	62	2	17	0	0	7	0	0	0	0	0
07:00	392	1	282	71	8	19	3	0	6	0	0	2	0	0
08:00	347	2	243	71	6	16	1	1	5	0	0	2	0	0
09:00	332	2	233	69	4	15	1	0	6	1	0	1	0	0
10:00	403	1	277	91	11	12	3	2	5	0	0	1	0	0
11:00	461	0	298	120	9	22	3	1	8	0	0	0	0	0
12:00	424	2	320	70	3	17	1	0	9	0	0	2	0	0
13:00	469	1	321	109	7	18	4	0	8	0	0	1	0	0
14:00	637	4	434	153	6	26	0	0	11	0	0	2	0	1
15:00	848	5	577	206	11	31	0	0	12	0	0	6	0	0
16:00	949	8	688	206	7	30	0	0	9	0	0	1	0	0
17:00	650	2	502	108	5	23	0	0	9	0	0	1	0	0
18:00	362	0	276	69	1	9	0	0	5	1	0	1	0	0
19:00	227	0	163	54	1	8	0	0	0	0	0	1	0	0
20:00	193	1	153	30	0	5	0	0	4	0	0	0	0	0
21:00	155	1	117	32	0	5	0	0	0	0	0	0	0	0
22:00	124	1	96	21	0	6	0	0	0	0	0	0	0	0
23:00	80	0	59	17	0	3	0	0	1	0	0	0	0	0
Total	7788	37	5522	1660	87	307	25	6	114	8	0	21	0	1
%		0,5	70,9	21,3	1,1	3,9	0,3	0,1	1,5	0,1	0,0	0,3	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Litchfield Road
 Location : N of Glendale Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	32	0	15	9	4	3	1	0	0	0	0	0	0	0
01:00	36	0	13	6	11	3	2	0	0	1	0	0	0	0
02:00	38	0	9	6	14	3	3	0	0	3	0	0	0	0
03:00	33	0	8	7	10	7	1	0	0	0	0	0	0	0
04:00	88	0	32	24	14	14	3	0	1	0	0	0	0	0
05:00	204	1	79	74	8	39	2	0	1	0	0	0	0	0
06:00	572	7	293	192	6	54	4	2	11	0	0	3	0	0
07:00	976	12	513	339	7	78	1	2	18	1	0	4	1	0
08:00	658	3	323	241	9	65	3	2	7	2	0	3	0	0
09:00	427	2	186	171	5	51	2	2	6	1	0	1	0	0
10:00	429	3	202	146	2	59	5	1	8	0	0	3	0	0
11:00	442	3	203	135	5	78	10	1	6	1	0	0	0	0
12:00	516	6	227	179	6	71	4	0	18	1	0	4	0	0
13:00	458	1	227	148	4	65	3	1	9	0	0	0	0	0
14:00	568	7	304	179	2	66	1	1	5	1	0	2	0	0
15:00	557	3	283	181	5	66	3	0	10	2	0	4	0	0
16:00	522	1	280	163	6	62	0	0	6	1	0	2	1	0
17:00	484	2	224	191	3	54	0	0	8	0	0	2	0	0
18:00	412	0	229	139	4	36	1	0	3	0	0	0	0	0
19:00	224	2	119	74	0	27	0	0	1	1	0	0	0	0
20:00	160	0	80	59	0	19	0	0	2	0	0	0	0	0
21:00	132	0	73	48	0	10	0	0	0	1	0	0	0	0
22:00	114	0	66	40	1	7	0	0	0	0	0	0	0	0
23:00	55	0	29	22	0	3	1	0	0	0	0	0	0	0
Total	8137	53	4017	2773	126	940	50	12	120	16	0	28	2	0
%		0,7	49,4	34,1	1,5	11,6	0,6	0,1	1,5	0,2	0,0	0,3	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Litchfield Road
 Location : S of Camelback Road

Site: TC22119
 11/15/2022
 Tuesday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	41	0	39	2	0	0	0	0	0	0	0	0	0	0
01:00	28	0	26	1	0	1	0	0	0	0	0	0	0	0
02:00	16	0	12	4	0	0	0	0	0	0	0	0	0	0
03:00	13	0	11	1	0	1	0	0	0	0	0	0	0	0
04:00	39	0	29	10	0	0	0	0	0	0	0	0	0	0
05:00	125	1	87	32	0	4	0	0	0	1	0	0	0	0
06:00	275	1	188	67	4	11	0	0	3	0	0	1	0	0
07:00	555	3	396	110	9	29	1	6	1	0	0	0	0	0
08:00	568	1	392	131	5	22	0	9	7	1	0	0	0	0
09:00	465	0	333	96	3	15	0	11	6	1	0	0	0	0
10:00	486	3	332	107	4	22	0	13	2	3	0	0	0	0
11:00	492	4	354	102	2	20	0	1	7	1	0	1	0	0
12:00	542	2	383	119	4	29	0	0	4	0	0	1	0	0
13:00	548	4	423	93	1	21	1	0	4	1	0	0	0	0
14:00	587	5	435	116	5	17	0	0	9	0	0	0	0	0
15:00	587	4	428	116	4	26	0	0	6	1	0	2	0	0
16:00	667	2	500	122	9	26	0	0	8	0	0	0	0	0
17:00	649	2	496	124	5	16	0	0	5	0	0	0	1	0
18:00	525	4	393	105	6	13	0	0	3	0	0	1	0	0
19:00	390	0	300	76	2	12	0	0	0	0	0	0	0	0
20:00	290	1	221	56	1	7	0	0	3	0	0	1	0	0
21:00	214	0	172	30	1	9	0	0	2	0	0	0	0	0
22:00	132	1	108	21	0	2	0	0	0	0	0	0	0	0
23:00	63	0	59	4	0	0	0	0	0	0	0	0	0	0
Total	8297	38	6117	1645	65	303	2	40	70	9	0	7	1	0
%		0,5	73,7	19,8	0,8	3,7	0,0	0,5	0,8	0,1	0,0	0,1	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Litchfield Road
 Location : S of Camelback Road

Site: TC22119
 11/15/2022
 Tuesday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	41	0	35	6	0	0	0	0	0	0	0	0	0	0
01:00	28	0	24	4	0	0	0	0	0	0	0	0	0	0
02:00	20	0	17	2	0	1	0	0	0	0	0	0	0	0
03:00	20	0	16	3	0	0	0	0	0	1	0	0	0	0
04:00	55	0	41	12	0	2	0	0	0	0	0	0	0	0
05:00	87	0	56	28	0	2	1	0	0	0	0	0	0	0
06:00	232	2	173	44	1	9	0	0	2	1	0	0	0	0
07:00	576	1	420	108	11	20	4	0	8	1	0	3	0	0
08:00	503	2	374	96	11	15	3	0	1	1	0	0	0	0
09:00	428	2	298	88	7	22	4	0	5	0	0	2	0	0
10:00	488	0	352	96	8	21	2	0	6	2	0	1	0	0
11:00	574	2	423	99	9	28	1	0	11	1	0	0	0	0
12:00	583	4	423	123	5	22	0	0	4	0	0	2	0	0
13:00	519	2	392	88	5	28	0	0	3	0	0	1	0	0
14:00	619	0	494	97	7	15	0	0	4	1	0	1	0	0
15:00	728	3	542	139	7	27	1	0	6	0	0	2	0	1
16:00	874	3	675	149	13	24	0	1	7	2	0	0	0	0
17:00	758	5	591	136	2	18	1	0	4	0	0	1	0	0
18:00	614	3	483	112	3	9	0	0	4	0	0	0	0	0
19:00	333	1	274	50	1	5	0	0	2	0	0	0	0	0
20:00	239	0	201	32	1	4	0	0	1	0	0	0	0	0
21:00	161	2	129	28	0	2	0	0	0	0	0	0	0	0
22:00	107	0	89	14	0	3	0	0	1	0	0	0	0	0
23:00	83	0	70	10	1	2	0	0	0	0	0	0	0	0
Total	8670	32	6592	1564	92	279	17	1	69	10	0	13	0	1
%		0,4	76,0	18,0	1,1	3,2	0,2	0,0	0,8	0,1	0,0	0,1	0,0	0,0

United Civil Group
2803 N. 7th Avenue

Street : Litchfield Road
Location : S of McDowell Road

Site: TC22119
11/17/2022
Thursday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	106	2	75	13	4	9	0	0	2	1	0	0	0	0
01:00	53	0	34	11	0	5	2	0	1	0	0	0	0	0
02:00	62	0	44	6	2	4	1	0	3	2	0	0	0	0
03:00	78	0	43	22	1	9	0	0	2	1	0	0	0	0
04:00	170	0	87	58	3	16	2	0	4	0	0	0	0	0
05:00	346	2	208	82	5	41	0	0	7	0	0	1	0	0
06:00	549	2	331	114	24	58	7	0	9	2	0	2	0	0
07:00	791	9	476	170	40	56	5	0	28	1	0	6	0	0
08:00	799	13	436	181	44	80	2	0	33	2	0	7	1	0
09:00	853	5	485	179	46	94	10	0	24	2	0	7	0	1
10:00	1001	10	538	168	72	152	12	0	38	5	1	4	1	0
11:00	1174	16	647	188	61	178	12	1	55	2	1	13	0	0
12:00	1250	17	711	200	79	162	12	1	51	4	0	11	0	2
13:00	1241	15	710	230	72	124	6	1	67	1	0	9	1	5
14:00	1402	15	767	202	93	230	7	4	63	5	0	14	0	2
15:00	1390	19	811	232	86	154	10	3	58	8	0	9	0	0
16:00	1349	18	772	213	110	158	8	0	47	6	0	15	0	2
17:00	1400	23	801	220	103	156	3	2	65	3	0	17	2	5
18:00	1168	18	685	185	77	117	7	0	60	3	0	14	0	2
19:00	1032	15	663	153	57	95	9	0	31	5	0	4	0	0
20:00	818	5	547	110	40	96	3	0	14	0	0	3	0	0
21:00	546	9	345	106	20	44	3	1	14	4	0	0	0	0
22:00	322	2	228	60	5	22	4	0	1	0	0	0	0	0
23:00	204	0	147	32	4	16	1	0	4	0	0	0	0	0
Total	18104	215	10591	3135	1048	2076	126	13	681	57	2	136	5	19
%		1.2	58.5	17.3	5.8	11.5	0.7	0.1	3.8	0.3	0.0	0.8	0.0	0.1

United Civil Group
2803 N. 7th Avenue

Street : McDowell Road
Location : W of Loop 101

Site: TC22119
11/15/2022
Tuesday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	117	1	79	21	0	10	1	0	1	4	0	0	0	0
01:00	78	1	50	16	1	6	0	0	2	2	0	0	0	0
02:00	61	0	33	17	0	7	0	0	1	3	0	0	0	0
03:00	109	0	56	29	4	11	0	0	4	5	0	0	0	0
04:00	240	1	120	63	7	32	0	1	8	8	0	0	0	0
05:00	446	1	251	100	9	58	2	1	13	8	0	3	0	0
06:00	735	0	433	155	27	79	2	1	19	11	0	8	0	0
07:00	1016	12	620	206	27	94	2	0	38	11	0	5	0	1
08:00	931	4	539	223	23	96	4	1	20	16	0	5	0	0
09:00	718	0	389	163	23	97	3	0	27	11	0	4	1	0
10:00	846	5	452	214	19	105	3	1	29	13	0	4	1	0
11:00	1016	5	582	258	27	97	3	0	27	13	0	4	0	0
12:00	1092	17	634	238	25	115	4	1	44	5	0	8	1	0
13:00	1155	4	681	239	38	107	4	0	50	12	0	20	0	0
14:00	1094	6	627	255	28	101	3	0	48	18	0	8	0	0
15:00	1289	7	768	282	31	125	6	0	51	5	0	13	0	1
16:00	1251	5	781	255	31	101	1	0	52	9	0	13	0	3
17:00	1175	10	751	217	31	90	2	0	43	16	0	14	0	1
18:00	996	6	636	197	27	72	1	0	40	8	0	8	1	0
19:00	843	3	536	173	13	67	1	0	26	15	0	9	0	0
20:00	723	2	463	160	13	56	1	0	14	11	0	3	0	0
21:00	507	4	357	96	3	35	1	0	8	3	0	0	0	0
22:00	308	0	206	62	3	25	0	0	2	9	0	1	0	0
23:00	183	1	128	40	1	8	1	0	0	4	0	0	0	0
Total	16929	95	10172	3679	411	1594	45	6	567	220	0	130	4	6
%		0.6	60.1	21.7	2.4	9.4	0.3	0.0	3.3	1.3	0.0	0.8	0.0	0.0

United Civil Group

2803 N. 7th Avenue

Street : McDowell Road
 Location : W of Loop 101

Site: TC22119
 11/15/2022
 Tuesday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	101	0	73	13	2	2	0	0	1	10	0	0	0	0
01:00	74	0	51	11	1	0	0	0	1	10	0	0	0	0
02:00	69	0	40	14	2	1	0	0	0	12	0	0	0	0
03:00	107	0	71	22	1	4	0	0	0	9	0	0	0	0
04:00	209	2	128	50	4	6	3	0	4	12	0	0	0	0
05:00	423	4	289	90	5	17	1	0	4	12	0	1	0	0
06:00	743	3	513	148	11	36	1	0	16	12	0	3	0	0
07:00	931	9	654	183	21	34	2	0	13	14	0	1	0	0
08:00	874	5	633	150	13	23	3	2	27	14	0	4	0	0
09:00	856	7	624	150	15	26	4	0	14	12	0	3	1	0
10:00	899	4	653	156	9	37	4	0	22	12	0	2	0	0
11:00	1040	5	738	186	20	34	8	1	34	5	1	7	0	1
12:00	1046	4	766	167	24	30	1	0	31	13	0	9	1	0
13:00	1016	5	737	160	24	26	6	1	33	14	3	6	0	1
14:00	1078	5	786	179	26	31	4	0	33	9	0	5	0	0
15:00	1088	9	789	184	21	31	3	0	39	4	0	7	0	1
16:00	1130	9	849	174	23	19	1	0	41	9	0	4	0	1
17:00	984	8	710	118	46	12	2	0	59	5	0	20	1	3
18:00	1012	6	733	138	53	8	3	0	52	5	1	11	0	2
19:00	865	3	667	147	13	9	1	0	13	7	0	2	0	3
20:00	622	2	513	80	6	7	2	0	5	6	0	1	0	0
21:00	423	1	351	49	4	4	1	0	6	7	0	0	0	0
22:00	255	3	194	38	1	4	0	0	2	13	0	0	0	0
23:00	155	0	119	21	0	1	1	0	4	9	0	0	0	0
Total	16000	94	11681	2628	345	402	51	4	454	235	5	86	3	12
%		0,6	73,0	16,4	2,2	2,5	0,3	0,0	2,8	1,5	0,0	0,5	0,0	0,1

United Civil Group

2803 N. 7th Avenue

Street : McDowell Road
 Location : W of Sarival Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	16	0	13	2	0	0	0	0	1	0	0	0	0	0
01:00	17	0	13	2	0	2	0	0	0	0	0	0	0	0
02:00	14	0	7	3	0	1	1	0	1	1	0	0	0	0
03:00	25	0	18	4	0	1	0	0	2	0	0	0	0	0
04:00	29	0	17	8	0	1	0	0	2	1	0	0	0	0
05:00	64	1	41	11	0	5	3	0	3	0	0	0	0	0
06:00	151	1	101	24	5	10	2	1	5	2	0	0	0	0
07:00	322	1	249	39	5	12	4	0	10	1	0	1	0	0
08:00	352	0	269	57	8	9	1	0	8	0	0	0	0	0
09:00	298	0	228	47	5	13	0	0	5	0	0	0	0	0
10:00	310	1	223	44	9	21	2	0	9	0	0	1	0	0
11:00	318	0	250	46	0	15	0	0	5	2	0	0	0	0
12:00	383	3	291	57	7	15	0	0	10	0	0	0	0	0
13:00	427	1	339	61	8	13	0	0	5	0	0	0	0	0
14:00	425	2	317	67	7	25	2	0	4	1	0	0	0	0
15:00	515	1	397	88	8	10	2	0	8	0	0	1	0	0
16:00	447	0	353	65	4	18	1	0	5	0	0	1	0	0
17:00	431	1	346	67	4	11	1	0	1	0	0	0	0	0
18:00	277	1	226	42	1	6	0	0	1	0	0	0	0	0
19:00	141	0	113	19	1	5	1	0	2	0	0	0	0	0
20:00	105	0	81	18	0	3	1	0	2	0	0	0	0	0
21:00	53	0	47	5	0	0	0	0	1	0	0	0	0	0
22:00	48	0	38	8	0	1	0	0	0	1	0	0	0	0
23:00	28	0	23	4	0	1	0	0	0	0	0	0	0	0
Total	5196	13	4000	788	72	198	21	1	90	9	0	4	0	0
%		0,3	77,0	15,2	1,4	3,8	0,4	0,0	1,7	0,2	0,0	0,1	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : McDowell Road
 Location : W of Sarival Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	13	0	9	2	0	0	0	0	2	0	0	0	0	0
01:00	10	0	2	4	1	2	0	0	1	0	0	0	0	0
02:00	8	0	5	3	0	0	0	0	0	0	0	0	0	0
03:00	11	0	8	3	0	0	0	0	0	0	0	0	0	0
04:00	28	0	16	6	0	5	0	0	1	0	0	0	0	0
05:00	83	0	44	25	3	9	0	0	2	0	0	0	0	0
06:00	132	1	66	41	6	16	0	0	2	0	0	0	0	0
07:00	162	1	79	44	5	24	0	0	8	0	0	1	0	0
08:00	207	0	121	44	6	30	0	0	6	0	0	0	0	0
09:00	127	0	69	30	4	18	0	0	5	1	0	0	0	0
10:00	158	1	81	37	8	24	0	0	6	1	0	0	0	0
11:00	215	0	103	57	9	31	0	0	10	3	0	2	0	0
12:00	283	7	143	88	6	31	2	0	4	1	0	1	0	0
13:00	330	1	182	92	13	35	1	0	6	0	0	0	0	0
14:00	286	2	158	76	11	32	0	0	6	1	0	0	0	0
15:00	485	2	263	136	13	65	0	0	6	0	0	0	0	0
16:00	567	2	296	165	23	67	0	1	10	1	0	2	0	0
17:00	448	5	250	120	21	48	0	0	3	0	0	1	0	0
18:00	313	2	162	85	12	42	1	0	6	0	0	3	0	0
19:00	228	0	133	64	2	28	0	0	1	0	0	0	0	0
20:00	119	0	73	29	4	13	0	0	0	0	0	0	0	0
21:00	89	0	52	25	3	9	0	0	0	0	0	0	0	0
22:00	34	0	27	4	0	3	0	0	0	0	0	0	0	0
23:00	18	0	7	8	1	2	0	0	0	0	0	0	0	0
Total	4354	24	2349	1188	151	534	4	1	85	8	0	10	0	0
%		0,6	54,0	27,3	3,5	12,3	0,1	0,0	2,0	0,2	0,0	0,2	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Northern Avenue
 Location : W of Sarival Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

EB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	5	0	4	1	0	0	0	0	0	0	0	0	0	0
01:00	7	0	5	2	0	0	0	0	0	0	0	0	0	0
02:00	12	0	10	1	0	1	0	0	0	0	0	0	0	0
03:00	9	0	4	3	1	0	0	0	1	0	0	0	0	0
04:00	21	1	13	4	0	0	1	0	2	0	0	0	0	0
05:00	100	2	46	41	0	5	0	0	2	4	0	0	0	0
06:00	177	3	106	53	2	8	1	0	1	3	0	0	0	0
07:00	254	1	167	60	3	16	1	0	5	1	0	0	0	0
08:00	190	1	113	52	4	11	3	0	2	4	0	0	0	0
09:00	158	0	93	39	6	14	2	0	2	2	0	0	0	0
10:00	136	0	81	32	1	13	4	0	4	1	0	0	0	0
11:00	155	0	76	46	6	16	4	1	5	1	0	0	0	0
12:00	155	1	82	40	5	17	2	0	8	0	0	0	0	0
13:00	146	0	73	39	2	15	2	2	9	4	0	0	0	0
14:00	153	0	93	46	1	8	1	0	3	1	0	0	0	0
15:00	172	3	107	42	0	11	1	0	3	4	0	1	0	0
16:00	142	2	87	42	1	8	0	0	1	1	0	0	0	0
17:00	134	1	93	30	0	7	0	0	3	0	0	0	0	0
18:00	99	1	68	24	0	6	0	0	0	0	0	0	0	0
19:00	47	0	27	14	0	3	0	0	2	1	0	0	0	0
20:00	32	0	26	4	0	0	0	1	1	0	0	0	0	0
21:00	22	0	14	6	0	1	0	0	0	1	0	0	0	0
22:00	16	0	9	5	0	0	0	0	0	2	0	0	0	0
23:00	17	1	13	2	0	1	0	0	0	0	0	0	0	0
Total	2359	17	1410	628	32	161	22	4	54	30	0	1	0	0
%		0,7	59,8	26,6	1,4	6,8	0,9	0,2	2,3	1,3	0,0	0,0	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Northern Avenue
 Location : W of Sarival Avenue

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

WB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	3	0	1	2	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
02:00	2	0	1	1	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	3	0	0	1	0	1	0	0	1	0	0	0	0	0
05:00	10	0	5	2	0	2	0	0	1	0	0	0	0	0
06:00	33	0	9	9	3	10	0	0	2	0	0	0	0	0
07:00	51	0	18	23	0	7	0	0	3	0	0	0	0	0
08:00	43	0	13	15	0	12	0	0	3	0	0	0	0	0
09:00	50	0	22	14	2	6	1	0	4	1	0	0	0	0
10:00	51	0	23	13	4	2	1	0	5	3	0	0	0	0
11:00	53	0	28	12	3	6	0	0	2	2	0	0	0	0
12:00	60	0	34	16	3	4	1	0	1	1	0	0	0	0
13:00	106	0	71	19	7	5	0	0	3	1	0	0	0	0
14:00	74	0	42	16	4	8	1	0	2	1	0	0	0	0
15:00	131	1	91	24	5	7	0	0	3	0	0	0	0	0
16:00	148	0	102	31	1	11	0	0	2	1	0	0	0	0
17:00	115	0	69	28	2	13	0	0	3	0	0	0	0	0
18:00	46	0	32	11	0	2	0	0	1	0	0	0	0	0
19:00	22	0	9	10	0	3	0	0	0	0	0	0	0	0
20:00	28	0	17	10	0	1	0	0	0	0	0	0	0	0
21:00	16	0	8	3	0	5	0	0	0	0	0	0	0	0
22:00	5	0	2	1	0	2	0	0	0	0	0	0	0	0
23:00	6	0	4	0	0	2	0	0	0	0	0	0	0	0
Total	1057	1	601	261	34	110	4	0	36	10	0	0	0	0
%		0,1	56,9	24,7	3,2	10,4	0,4	0,0	3,4	0,9	0,0	0,0	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Sarival Avenue
 Location : N of Camelback Road

Site: TC22119
 11/17/2022
 Thursday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	14	0	12	0	0	0	1	0	0	1	0	0	0	0
01:00	43	0	30	13	0	0	0	0	0	0	0	0	0	0
02:00	6	0	2	0	1	2	0	0	0	1	0	0	0	0
03:00	18	0	11	4	1	0	0	0	0	2	0	0	0	0
04:00	39	0	27	7	0	5	0	0	0	0	0	0	0	0
05:00	27	0	19	7	0	1	0	0	0	0	0	0	0	0
06:00	36	0	15	10	6	2	0	0	2	1	0	0	0	0
07:00	68	0	28	21	1	11	3	0	3	0	0	1	0	0
08:00	47	0	22	10	1	8	2	0	4	0	0	0	0	0
09:00	48	0	17	18	1	6	2	1	3	0	0	0	0	0
10:00	54	1	22	9	3	7	4	0	2	4	0	1	1	0
11:00	46	0	21	12	0	10	2	0	0	1	0	0	0	0
12:00	50	0	21	14	1	4	5	0	2	2	0	0	1	0
13:00	63	0	36	17	0	6	3	0	0	1	0	0	0	0
14:00	124	2	76	26	0	10	1	0	2	4	0	3	0	0
15:00	95	1	57	18	2	13	1	0	2	1	0	0	0	0
16:00	102	2	52	29	1	10	1	0	6	1	0	0	0	0
17:00	117	1	70	28	0	14	1	0	1	2	0	0	0	0
18:00	61	2	42	15	0	0	1	0	1	0	0	0	0	0
19:00	49	0	36	6	0	5	1	0	1	0	0	0	0	0
20:00	32	0	21	5	0	3	2	0	0	1	0	0	0	0
21:00	13	0	9	1	1	0	1	0	0	1	0	0	0	0
22:00	6	0	5	0	0	0	1	0	0	0	0	0	0	0
23:00	6	0	3	2	0	0	0	0	0	1	0	0	0	0
Total	1164	9	654	272	19	117	32	1	29	24	0	5	2	0
%		0,8	56,2	23,4	1,6	10,1	2,7	0,1	2,5	2,1	0,0	0,4	0,2	0,0

United Civil Group

2803 N. 7th Avenue

Street : Sarival Avenue
Location : N of Camelback Road

Site: TC22119
11/17/2022
Thursday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	10	0	6	1	3	0	0	0	0	0	0	0	0	0
01:00	9	0	4	2	0	1	1	0	0	1	0	0	0	0
02:00	5	0	2	1	0	1	0	0	0	1	0	0	0	0
03:00	9	0	4	3	0	1	0	0	0	1	0	0	0	0
04:00	11	0	8	2	0	1	0	0	0	0	0	0	0	0
05:00	46	0	23	17	2	4	0	0	0	0	0	0	0	0
06:00	102	0	71	25	0	3	0	0	2	1	0	0	0	0
07:00	53	0	28	15	0	7	2	0	0	1	0	0	0	0
08:00	57	0	24	23	2	3	0	0	5	0	0	0	0	0
09:00	68	0	31	22	2	8	1	0	3	1	0	0	0	0
10:00	55	0	19	15	0	11	0	0	3	5	0	1	1	0
11:00	65	1	31	14	1	9	3	0	2	2	0	1	1	0
12:00	54	2	28	12	1	5	2	0	0	2	0	2	0	0
13:00	49	0	26	10	0	5	2	0	2	3	0	1	0	0
14:00	241	0	155	51	4	13	3	0	9	5	0	1	0	0
15:00	217	0	141	52	1	18	0	0	5	0	0	0	0	0
16:00	186	1	117	48	3	7	1	0	7	0	0	2	0	0
17:00	88	0	56	20	0	10	0	0	1	1	0	0	0	0
18:00	34	0	21	8	0	2	1	0	1	1	0	0	0	0
19:00	41	0	29	10	0	1	1	0	0	0	0	0	0	0
20:00	60	0	42	16	0	1	1	0	0	0	0	0	0	0
21:00	21	0	14	3	1	2	1	0	0	0	0	0	0	0
22:00	19	0	9	3	1	0	0	6	0	0	0	0	0	0
23:00	32	0	17	2	1	0	0	12	0	0	0	0	0	0
Total	1532	4	906	375	22	113	19	18	40	25	0	8	2	0
%		0,3	59,1	24,5	1,4	7,4	1,2	1,2	2,6	1,6	0,0	0,5	0,1	0,0

United Civil Group

2803 N. 7th Avenue

Street : Dysart Road
Location : N of Camelback Road

Site: TC22119
12/7/2022
Wednesday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	53	0	44	7	0	1	0	0	1	0	0	0	0	0
01:00	18	0	14	4	0	0	0	0	0	0	0	0	0	0
02:00	21	0	13	7	0	1	0	0	0	0	0	0	0	0
03:00	18	0	11	7	0	0	0	0	0	0	0	0	0	0
04:00	41	0	23	17	0	0	1	0	0	0	0	0	0	0
05:00	85	0	53	22	2	5	2	0	1	0	0	0	0	0
06:00	245	0	155	52	7	16	3	4	7	1	0	0	0	0
07:00	411	0	263	83	27	20	2	2	13	0	0	1	0	0
08:00	669	0	445	152	20	20	3	6	17	2	0	4	0	0
09:00	483	3	318	98	12	22	7	4	12	5	0	2	0	0
10:00	489	1	328	109	6	18	2	3	18	1	0	3	0	0
11:00	544	2	379	112	6	18	4	4	16	3	0	0	0	0
12:00	611	3	439	121	5	22	8	2	11	0	0	0	0	0
13:00	679	3	488	138	15	19	4	1	7	1	0	3	0	0
14:00	679	3	506	124	5	19	0	0	18	2	0	2	0	0
15:00	844	7	629	152	11	27	1	0	14	1	0	2	0	0
16:00	838	4	615	158	21	22	0	0	17	1	0	0	0	0
17:00	810	4	614	144	3	26	2	0	11	1	0	5	0	0
18:00	768	2	579	136	15	21	0	0	9	0	0	6	0	0
19:00	523	0	424	72	9	15	0	0	2	0	0	1	0	0
20:00	460	1	360	79	3	15	0	0	1	1	0	0	0	0
21:00	253	0	212	33	3	2	0	0	3	0	0	0	0	0
22:00	147	0	111	31	3	0	0	0	2	0	0	0	0	0
23:00	87	0	64	20	0	3	0	0	0	0	0	0	0	0
Total	9776	33	7087	1878	173	312	39	26	180	19	0	29	0	0
%		0,3	72,5	19,2	1,8	3,2	0,4	0,3	1,8	0,2	0,0	0,3	0,0	0,0

United Civil Group

2803 N. 7th Avenue

Street : Dysart Road
 Location : S of McDowell Road

Site: TC22119
 12/7/2022
 Wednesday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	112	0	77	14	0	11	10	0	0	0	0	0	0	0
01:00	78	0	49	14	0	7	8	0	0	0	0	0	0	0
02:00	93	0	48	8	0	8	25	0	2	2	0	0	0	0
03:00	98	1	48	12	3	3	28	0	1	1	0	1	0	0
04:00	134	1	65	31	0	6	27	0	0	3	0	1	0	0
05:00	229	1	130	53	4	19	11	1	9	1	0	0	0	0
06:00	427	9	255	100	19	16	7	0	16	5	0	0	0	0
07:00	824	4	571	143	43	26	2	0	26	1	0	8	0	0
08:00	864	15	572	150	34	35	5	1	41	4	0	6	0	1
09:00	911	8	631	158	30	43	2	2	29	3	0	3	1	1
10:00	880	5	612	149	39	21	5	1	36	1	0	10	0	1
11:00	925	15	632	142	36	26	5	0	53	2	0	13	0	1
12:00	1039	10	731	152	53	18	5	0	54	0	0	14	0	2
13:00	1003	5	679	182	35	33	3	0	43	3	1	14	2	3
14:00	1135	9	786	181	51	24	2	2	60	2	0	14	0	4
15:00	1069	12	700	189	58	39	3	0	44	0	0	21	0	3
16:00	1052	15	705	153	55	33	4	0	69	1	1	13	1	2
17:00	963	9	627	158	63	24	0	0	59	2	0	19	0	2
18:00	942	5	657	132	43	23	1	0	57	2	0	20	0	2
19:00	757	9	566	96	39	15	1	0	23	2	0	5	0	1
20:00	555	3	408	88	28	18	0	0	9	0	0	1	0	0
21:00	347	6	251	56	17	9	0	0	8	0	0	0	0	0
22:00	244	2	191	42	3	2	0	0	4	0	0	0	0	0
23:00	58	0	43	11	0	3	0	0	0	0	0	1	0	0
Total	14739	144	10034	2414	653	462	154	7	643	35	2	164	4	23
%		1.0	68.1	16.4	4.4	3.1	1.0	0.0	4.4	0.2	0.0	1.1	0.0	0.2

United Civil Group

2803 N. 7th Avenue

Street : El Mirage Road
 Location : N of Camelback Road

Site: TC22119
 11/15/2022
 Tuesday

24 Hour Classification

SB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	22	0	15	3	1	1	1	0	1	0	0	0	0	0
01:00	16	0	6	4	2	0	3	0	0	1	0	0	0	0
02:00	17	0	6	1	2	1	7	0	0	0	0	0	0	0
03:00	28	0	7	3	3	2	10	0	2	1	0	0	0	0
04:00	87	0	38	19	3	12	7	0	2	6	0	0	0	0
05:00	168	0	96	32	3	20	4	3	4	6	0	0	0	0
06:00	323	1	174	75	4	37	11	6	8	7	0	0	0	0
07:00	508	2	319	82	15	45	18	4	10	13	0	0	0	0
08:00	294	0	146	52	14	39	22	3	11	7	0	0	0	0
09:00	250	3	117	48	10	34	18	3	8	9	0	0	0	0
10:00	262	4	110	61	11	34	17	2	14	9	0	0	0	0
11:00	239	1	105	42	15	38	11	5	12	10	0	0	0	0
12:00	268	2	125	50	13	41	19	2	12	4	0	0	0	0
13:00	286	5	140	72	9	42	5	2	8	3	0	0	0	0
14:00	318	0	174	78	8	42	3	2	4	7	0	0	0	0
15:00	351	0	195	93	3	46	4	1	5	4	0	0	0	0
16:00	326	0	216	67	3	37	0	0	3	0	0	0	0	0
17:00	328	0	203	83	2	36	1	1	1	1	0	0	0	0
18:00	212	0	148	46	0	18	0	0	0	0	0	0	0	0
19:00	134	0	93	27	1	13	0	0	0	0	0	0	0	0
20:00	115	0	77	27	0	11	0	0	0	0	0	0	0	0
21:00	64	0	47	13	0	3	0	0	1	0	0	0	0	0
22:00	38	0	25	7	0	5	0	0	0	1	0	0	0	0
23:00	19	0	16	2	0	1	0	0	0	0	0	0	0	0
Total	4673	18	2598	987	122	558	161	34	106	89	0	0	0	0
%		0.4	55.6	21.1	2.6	11.9	3.4	0.7	2.3	1.9	0.0	0.0	0.0	0.0

United Civil Group

2803 N. 7th Avenue

Street : Litchfield Road
 Location : S of McDowell Road

Site: TC22119
 12/7/2022
 Wednesday

24 Hour Classification

NB

Interval Start	Total	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi
00:00	96	1	72	12	2	5	0	0	4	0	0	0	0	0
01:00	54	0	45	5	0	2	1	0	0	1	0	0	0	0
02:00	62	0	51	9	0	1	0	0	1	0	0	0	0	0
03:00	31	0	21	7	0	1	0	0	1	1	0	0	0	0
04:00	77	0	58	11	2	2	0	0	3	1	0	0	0	0
05:00	190	0	142	36	2	9	0	0	1	0	0	0	0	0
06:00	498	4	383	69	8	26	0	0	7	1	0	0	0	0
07:00	778	3	597	99	20	32	0	0	21	4	0	2	0	0
08:00	1184	0	913	180	26	33	0	0	29	1	0	2	0	0
09:00	944	3	697	161	13	53	0	0	15	2	0	0	0	0
10:00	1038	3	768	175	20	38	1	0	23	5	0	4	1	0
11:00	1113	3	855	175	22	26	5	1	20	2	0	4	0	0
12:00	1324	9	1013	199	22	45	2	0	24	6	0	4	0	0
13:00	1198	3	943	162	22	26	4	0	31	4	0	3	0	0
14:00	1277	5	963	199	30	35	1	0	34	5	0	5	0	0
15:00	1365	8	1057	217	18	33	1	0	23	4	0	4	0	0
16:00	1394	9	1070	212	31	32	1	1	30	3	0	5	0	0
17:00	1361	7	1035	201	35	33	2	0	43	1	0	3	1	0
18:00	1295	3	1033	182	16	29	0	0	27	1	0	4	0	0
19:00	958	2	807	104	14	14	1	0	15	1	0	0	0	0
20:00	639	4	536	74	3	13	0	0	5	2	0	2	0	0
21:00	447	0	380	53	1	12	0	0	0	1	0	0	0	0
22:00	307	0	252	46	0	7	1	0	1	0	0	0	0	0
23:00	174	1	147	18	1	5	0	0	0	2	0	0	0	0
Total	17804	68	13838	2606	308	512	20	2	358	48	0	42	2	0
%		0.4	77.7	14.6	1.7	2.9	0.1	0.0	2.0	0.3	0.0	0.2	0.0	0.0

APPENDIX D

Synchro Reports

Lanes, Volumes, Timings

1: Litchfield Rd & Camelback Rd

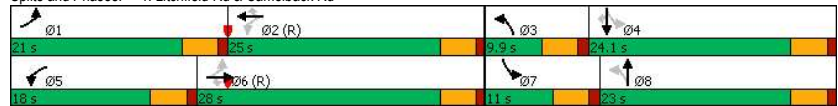
10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	308	500	72	231	500	72	58	470	145	87	328	200
Future Volume (vph)	308	500	72	231	500	72	58	470	145	87	328	200
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3415	0	1770	3539	1583
Fit Permitted	0.317			0.397			0.486			0.214		
Satd. Flow (perm)	590	3539	1583	740	3539	1583	905	3415	0	399	3539	1583
Satd. Flow (RTOR)			143				143		48			217
Lane Group Flow (vph)	335	543	78	251	543	78	63	669	0	95	357	217
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2		2	8			4		4
Total Split (s)	21.0	28.0	28.0	18.0	25.0	25.0	9.9	23.0		11.0	24.1	24.1
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)	42.3	28.7	28.7	37.5	26.3	26.3	22.1	17.8		23.9	18.7	18.7
Actuated g/C Ratio	0.53	0.36	0.36	0.47	0.33	0.33	0.28	0.22		0.30	0.23	0.23
v/c Ratio	0.65	0.43	0.12	0.51	0.47	0.13	0.20	0.84		0.42	0.43	0.41
Control Delay	17.6	22.5	0.9	10.8	17.9	3.1	18.6	38.4		23.1	27.7	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	17.6	22.5	0.9	10.8	17.9	3.1	18.6	38.4		23.1	27.7	6.3
LOS	B	C	A	B	B	A	B	D		C	C	A
Approach Delay		19.0			14.5			36.7			20.1	
Approach LOS		B			B			D			C	
Stops (vph)	170	377	2	98	380	19	40	519		58	266	28
Fuel Used (gal)	5	10	1	10	24	3	1	10		1	5	1
CO Emissions (g/hr)	370	676	55	732	1698	216	49	726		83	353	102
NOx Emissions (g/hr)	72	131	11	142	330	42	9	141		16	69	20
VOC Emissions (g/hr)	86	157	13	170	394	50	11	168		19	82	24
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	0

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 47 (59%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 22.1
 Intersection LOS: C
 Intersection Capacity Utilization 68.3%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Litchfield Rd & Camelback Rd



Lanes, Volumes, Timings

2: Dysart Rd & Camelback Rd

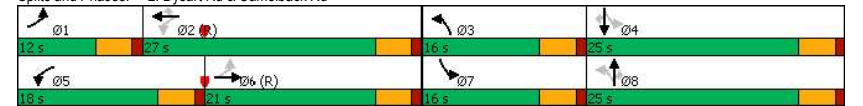
10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	114	463	99	260	416	120	211	663	261	176	688	166
Future Volume (vph)	114	463	99	260	416	120	211	663	261	176	688	166
Satd. Flow (prot)	1770	3444	0	1770	3539	1583	1770	5085	1583	1770	3539	1583
Fit Permitted	0.491			0.177			0.192			0.274		
Satd. Flow (perm)	915	3444	0	330	3539	1583	358	5085	1583	510	3539	1583
Satd. Flow (RTOR)			29				143		284			205
Lane Group Flow (vph)	124	611	0	283	452	130	229	721	284	191	748	180
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6			2		2	8		8	4		4
Total Split (s)	12.0	21.0		18.0	27.0	27.0	16.0	25.0		25.0	16.0	25.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)	25.9	18.6		35.6	26.0	26.0	31.5	20.8		20.8	30.3	20.2
Actuated g/C Ratio	0.32	0.23		0.44	0.32	0.32	0.39	0.26		0.26	0.38	0.25
v/c Ratio	0.33	0.74		0.76	0.39	0.21	0.70	0.54		0.46	0.54	0.84
Control Delay	12.3	24.5		29.4	16.7	3.9	27.6	27.3		5.9	20.0	38.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	12.3	24.5		29.4	16.7	3.9	27.6	27.3		5.9	20.0	38.2
LOS	B	C		C	B	A	C	C		A	C	D
Approach Delay		22.5			18.9			22.4			29.7	
Approach LOS		C			B			C			C	
Stops (vph)	49	363		134	323	34	135	549		32	111	613
Fuel Used (gal)	5	28		8	12	3	4	13		3	3	16
CO Emissions (g/hr)	364	1937		525	807	188	271	897		203	219	1102
NOx Emissions (g/hr)	71	377		102	157	37	53	175		39	43	214
VOC Emissions (g/hr)	84	449		122	187	44	63	208		47	51	255
Dilemma Vehicles (#)	0	0		0	0	0	0	0		0	0	0

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green, Master Intersection
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 23.7
 Intersection LOS: C
 Intersection Capacity Utilization 76.1%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 2: Dysart Rd & Camelback Rd



Lanes, Volumes, Timings
3: 127th Ave & Camelback Rd

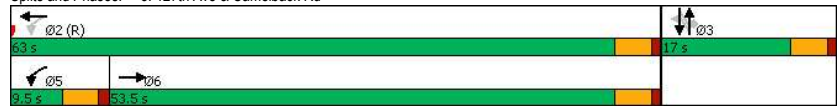
10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↕		↕	
Traffic Volume (vph)	0	880	20	10	755	0	40	0	60	1	0	1
Future Volume (vph)	0	880	20	10	755	0	40	0	60	1	0	1
Satd. Flow (prot)	0	3529	0	0	3536	0	0	1770	1583	0	1694	0
Fit Permitted					0.942			0.757			0.869	
Satd. Flow (perm)	0	3529	0	0	3334	0	0	1410	1583	0	1509	0
Satd. Flow (RTOR)		5							82		82	
Lane Group Flow (vph)	0	979	0	0	832	0	0	43	65	0	2	0
Turn Type		NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6			5			2	3			3
Permitted Phases				2			3		3	3		
Total Split (s)		53.5		9.5	63.0		17.0	17.0	17.0	17.0		17.0
Total Lost Time (s)		4.5			4.5		4.5	4.5	4.5	4.5		4.5
Act Effct Green (s)		65.9			65.9		8.0	8.0	8.0	8.0		8.0
Actuated g/C Ratio		0.82			0.82		0.10	0.10	0.10	0.10		0.10
v/c Ratio		0.34			0.30		0.31	0.28	0.28	0.01		0.01
Control Delay		0.8			2.3		38.4	9.0	9.0	0.0		0.0
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay		0.8			2.3		38.4	9.0	9.0	0.0		0.0
LOS		A			A		D	A	A	A		A
Approach Delay		0.8			2.3		20.7					
Approach LOS		A			A		C					
Stops (vph)		60			155		39	10	0	0		0
Fuel Used(gal)		19			10		1	0	0	0		0
CO Emissions (g/hr)		1296			671		48	28	0	0		0
NOx Emissions (g/hr)		252			131		9	6	0	0		0
VOC Emissions (g/hr)		300			156		11	7	0	0		0
Dilemma Vehicles (#)		0			0		0	0	0	0		0

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 60 (75%), Referenced to phase 2:WBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.34
 Intersection Signal Delay: 2.6
 Intersection LOS: A
 Intersection Capacity Utilization 43.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: 127th Ave & Camelback Rd



Lanes, Volumes, Timings
4: Camelback Rd & Wigwam Creek Rd

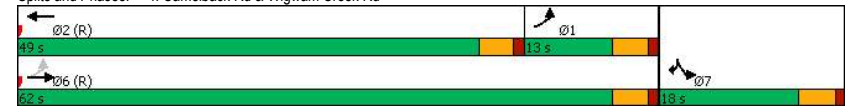
10/02/2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↕	↕	↕		↕	↕
Traffic Volume (vph)	10	940	678	20	48	66
Future Volume (vph)	10	940	678	20	48	66
Satd. Flow (prot)	1770	3539	3525	0	1770	1583
Fit Permitted	0.354				0.950	
Satd. Flow (perm)	659	3539	3525	0	1770	1583
Satd. Flow (RTOR)		6			72	
Lane Group Flow (vph)	11	1022	759	0	52	72
Turn Type	pm+pt	NA	NA		Prot	Prot
Protected Phases	1	6	2		7	7
Permitted Phases	6					
Total Split (s)	13.0	62.0	49.0		18.0	18.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5
Act Effct Green (s)	66.1	66.1	63.5		7.8	7.8
Actuated g/C Ratio	0.83	0.83	0.79		0.10	0.10
v/c Ratio	0.02	0.35	0.27		0.30	0.33
Control Delay	1.6	1.7	1.6		37.4	13.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	1.6	1.7	1.6		37.4	13.1
LOS	A	A	A		D	B
Approach Delay		1.7	1.6		23.3	
Approach LOS		A	A		C	
Stops (vph)	2	123	118		44	17
Fuel Used(gal)	0	11	7		1	1
CO Emissions (g/hr)	9	791	512		60	43
NOx Emissions (g/hr)	2	154	100		12	8
VOC Emissions (g/hr)	2	183	119		14	10
Dilemma Vehicles (#)	0	0	0		0	0

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 62 (78%), Referenced to phase 2:WBT and 6:EBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.35
 Intersection Signal Delay: 3.0
 Intersection LOS: A
 Intersection Capacity Utilization 37.2%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Camelback Rd & Wigwam Creek Rd



Lanes, Volumes, Timings

5: El Mirage Rd & Camelback Rd

10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	75	855	76	43	557	102	58	157	109	126	182	83
Future Volume (vph)	75	855	76	43	557	102	58	157	109	126	182	83
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3323	0	1770	3373	0
Fit Permitted	0.380			0.228			0.506			0.472		
Satd. Flow (perm)	708	3539	1583	425	3539	1583	943	3323	0	879	3373	0
Satd. Flow (RTOR)			143			143		118			77	
Lane Group Flow (vph)	82	929	83	47	605	111	63	289	0	137	288	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	custom	pm+pt	NA	pm+pt	NA	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2		5	8			4		
Total Split (s)	10.0	41.0	41.0	11.0	42.0	11.0	13.0			15.0	17.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5	
Act Effct Green (s)	47.1	42.0	42.0	47.1	42.0	6.2	13.8	7.9		18.7	12.0	
Actuated g/C Ratio	0.59	0.52	0.52	0.59	0.52	0.08	0.17	0.10		0.23	0.15	
v/c Ratio	0.16	0.50	0.09	0.13	0.33	0.44	0.28	0.66		0.47	0.51	
Control Delay	4.2	7.6	1.2	7.3	12.6	9.4	27.1	28.2		31.7	26.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	4.2	7.6	1.2	7.3	12.6	9.4	27.1	28.2		31.7	26.4	
LOS	A	A	A	A	B	A	C	C		C	C	
Approach Delay		6.9			11.8			28.0			28.1	
Approach LOS		A			B			C			C	
Stops (vph)	20	248	4	19	312	11	47	148		99	175	
Fuel Used (gal)	1	11	1	1	14	2	1	4		2	4	
CO Emissions (g/hr)	61	741	52	73	1009	162	67	287		150	284	
NOx Emissions (g/hr)	12	144	10	14	196	32	13	56		29	55	
VOC Emissions (g/hr)	14	172	12	17	234	38	16	66		35	66	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 30 (38%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 14.6

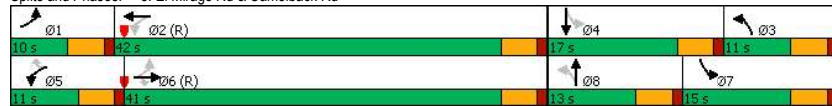
Intersection LOS: B

Intersection Capacity Utilization 57.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: El Mirage Rd & Camelback Rd



Lanes, Volumes, Timings

1: Litchfield Rd & Camelback Rd

10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	211	413	95	351	550	117	86	427	153	187	513	273
Future Volume (vph)	211	413	95	351	550	117	86	427	153	187	513	273
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3398	0	1770	3539	1583
Fit Permitted	0.274			0.401			0.381			0.181		
Satd. Flow (perm)	510	3539	1583	747	3539	1583	710	3398	0	337	3539	1583
Satd. Flow (RTOR)			205			143		58			297	
Lane Group Flow (vph)	229	449	103	382	598	127	93	630	0	203	558	297
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2		2	8			4		
Total Split (s)	16.0	23.0	23.0	21.0	28.0	11.0	22.0			14.0	25.0	25.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5	4.5
Act Effct Green (s)	30.3	20.9	20.9	39.8	25.9	25.9	23.6	16.9		30.1	22.1	22.1
Actuated g/C Ratio	0.38	0.26	0.26	0.50	0.32	0.32	0.30	0.21		0.38	0.28	0.28
v/c Ratio	0.67	0.48	0.18	0.69	0.52	0.21	0.31	0.83		0.67	0.57	0.46
Control Delay	31.8	28.0	0.7	23.5	16.9	3.8	18.8	37.8		29.6	28.2	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	31.8	28.0	0.7	23.5	16.9	3.8	18.8	37.8		29.6	28.2	5.7
LOS	C	C	A	C	B	A	B	D		C	C	A
Approach Delay		25.5			17.7			35.4			22.2	
Approach LOS		C			B			D			C	
Stops (vph)	184	340	0	241	430	41	58	480		121	430	32
Fuel Used (gal)	5	9	1	17	27	5	1	10		3	8	2
CO Emissions (g/hr)	323	601	71	1210	1865	355	72	675		194	561	135
NOx Emissions (g/hr)	63	117	14	236	363	69	14	131		38	109	26
VOC Emissions (g/hr)	75	139	17	281	432	82	17	157		45	130	31
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	0

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 48 (60%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 24.1

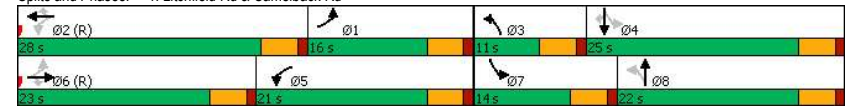
Intersection LOS: C

Intersection Capacity Utilization 72.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Litchfield Rd & Camelback Rd



Lanes, Volumes, Timings
2: Dysart Rd & Camelback Rd

10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↕	↔	↕	↕	↔	↕	↕
Traffic Volume (vph)	132	487	165	335	574	198	234	758	257	194	730	213
Future Volume (vph)	132	487	165	335	574	198	234	758	257	194	730	213
Satd. Flow (prot)	1770	3405	0	1770	3539	1583	1770	5085	1583	1770	3539	1583
Fit Permitted	0.369			0.160			0.205			0.205		
Satd. Flow (perm)	687	3405	0	298	3539	1583	382	5085	1583	382	3539	1583
Satd. Flow (RTOR)		56			215			279			7	4
Lane Group Flow (vph)	143	708	0	364	624	215	254	824	279	211	793	232
Turn Type	pm-pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6			2		2	8		8	4		4
Total Split (s)	13.4	25.0		18.0	29.6		13.0	24.0		13.0	24.0	24.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)	28.7	20.5		38.5	25.8		28.0	19.5		19.5	28.0	19.5
Actuated g/C Ratio	0.36	0.26		0.48	0.32		0.35	0.24		0.24	0.35	0.24
v/c Ratio	0.40	0.77		0.93	0.55		0.90	0.67		0.47	0.75	0.92
Control Delay	7.7	16.5		45.1	19.4		55.6	30.4		6.3	35.7	47.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	7.7	16.5		45.1	19.4		55.6	30.4		6.3	35.7	47.3
LOS	A	B		D	B		E	C		A	D	A
Approach Delay		15.0			24.7			30.1				37.6
Approach LOS		B			C			C				D
Stops (vph)	46	449		196	504		80	148		32	126	644
Fuel Used (gal)	6	31		11	17		5	6		3	4	18
CO Emissions (g/hr)	408	2180		760	1158		323	393		201	286	1262
NOx Emissions (g/hr)	79	424		148	225		63	76		39	56	246
VOC Emissions (g/hr)	95	505		176	268		75	91		47	66	292
Dilemma Vehicles (#)	0	0		0	0		0	0		0	0	0

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green, Master Intersection
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 27.9
 Intersection LOS: C
 Intersection Capacity Utilization 85.4%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 2: Dysart Rd & Camelback Rd



Lanes, Volumes, Timings
3: 127th Ave & Camelback Rd

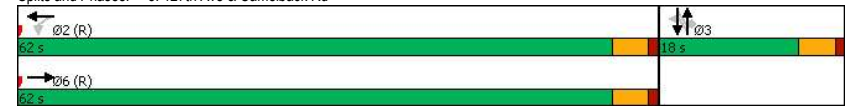
10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	↕
Traffic Volume (vph)	0	888	50	31	1046	0	60	0	120	1	0	1
Future Volume (vph)	0	888	50	31	1046	0	60	0	120	1	0	1
Satd. Flow (prot)	0	3511	0	0	3536	0	0	1770	1583	0	1694	0
Fit Permitted					0.901			0.757				0.878
Satd. Flow (perm)	0	3511	0	0	3189	0	0	1410	1583	0	1524	0
Satd. Flow (RTOR)		18						130			20	
Lane Group Flow (vph)	0	1019	0	0	1171	0	0	65	130	0	2	0
Turn Type		NA			Perm			NA	Perm		Perm	NA
Protected Phases		6			2			3			3	
Permitted Phases				2				3			3	
Total Split (s)		62.0			62.0			18.0	18.0		18.0	18.0
Total Lost Time (s)		4.5			4.5			4.5	4.5		4.5	4.5
Act Effct Green (s)		64.8			64.8			9.1	9.1		9.1	9.1
Actuated g/C Ratio		0.81			0.81			0.11	0.11		0.11	0.11
v/c Ratio		0.36			0.45			0.41	0.44		0.01	0.01
Control Delay		1.0			1.2			39.7	11.2		0.0	0.0
Queue Delay		0.0			0.0			0.0	0.0		0.0	0.0
Total Delay		1.0			1.2			39.7	11.2		0.0	0.0
LOS		A			A			D	B		A	A
Approach Delay		1.0			1.2			20.7				
Approach LOS		A			A			C				
Stops (vph)		53			70			55	22		0	0
Fuel Used (gal)		19			12			1	1		0	0
CO Emissions (g/hr)		1346			872			72	61		0	0
NOx Emissions (g/hr)		262			170			14	12		0	0
VOC Emissions (g/hr)		312			202			17	14		0	0
Dilemma Vehicles (#)		0			0			0	0		0	0

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 55 (69%), Referenced to phase 2:WBTL and 6:EBT, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 2.7
 Intersection LOS: A
 Intersection Capacity Utilization 64.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 3: 127th Ave & Camelback Rd



Lanes, Volumes, Timings

4: Camelback Rd & Wigwam Creek Rd

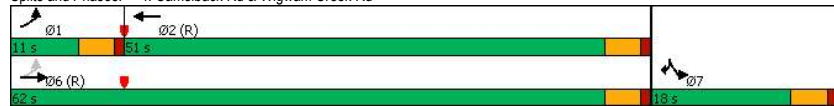
10/02/2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↕
Traffic Volume (vph)	20	989	997	50	31	80
Future Volume (vph)	20	989	997	50	31	80
Satd. Flow (prot)	1770	3539	3514	0	1770	1583
Fit Permitted	0.206			0.950		
Satd. Flow (perm)	384	3539	3514	0	1770	1583
Satd. Flow (RTOR)			11			87
Lane Group Flow (vph)	22	1075	1138	0	34	87
Turn Type	pm+pt	NA	NA		Prot	Prot
Protected Phases	1	6	2		7	7
Permitted Phases	6					
Total Split (s)	11.0	62.0	51.0		18.0	18.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5
Act Effct Green (s)	65.8	66.7	62.6		7.2	7.2
Actuated g/C Ratio	0.82	0.83	0.78		0.09	0.09
v/c Ratio	0.05	0.36	0.41		0.22	0.40
Control Delay	2.2	4.5	1.9		36.4	13.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	2.2	4.5	1.9		36.4	13.8
LOS	A	A	A		D	B
Approach Delay		4.5	1.9		20.1	
Approach LOS		A	A		C	
Stops (vph)	5	477	86		30	19
Fuel Used(gal)	0	14	11		1	1
CO Emissions (g/hr)	18	1006	738		39	52
NOx Emissions (g/hr)	3	196	144		8	10
VOC Emissions (g/hr)	4	233	171		9	12
Dilemma Vehicles (#)	0	0	0		0	0

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 34 (43%), Referenced to phase 2:WBT and 6:EBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.41
 Intersection Signal Delay: 4.0
 Intersection LOS: A
 Intersection Capacity Utilization 41.6%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Camelback Rd & Wigwam Creek Rd



Lanes, Volumes, Timings

5: El Mirage Rd & Camelback Rd

10/02/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↕	↔	↕	↕	↔	↕	↕	↔	↕	↕
Traffic Volume (vph)	59	741	57	137	940	154	40	161	76	110	192	98
Future Volume (vph)	59	741	57	137	940	154	40	161	76	110	192	98
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3369	0	1770	3359	0
Fit Permitted	0.280			0.204			0.560			0.346		
Satd. Flow (perm)	522	3539	1583	380	3539	1583	1043	3369	0	645	3359	0
Satd. Flow (RTOR)			143			205		79				97
Lane Group Flow (vph)	64	805	62	149	1022	167	43	258	0	120	316	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	custom	pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2		5	8			4		
Total Split (s)	10.0	38.0	38.0	15.0	43.0	15.0	10.0	13.0		14.0	17.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Act Effct Green (s)	38.4	38.4	38.4	43.8	43.8	8.8	12.6	8.2		18.9	13.2	
Actuated g/C Ratio	0.48	0.48	0.48	0.55	0.55	0.11	0.16	0.10		0.24	0.16	
v/c Ratio	0.19	0.47	0.07	0.41	0.53	0.47	0.20	0.62		0.44	0.50	
Control Delay	8.9	7.6	0.2	14.9	14.7	7.4	24.2	30.8		28.2	23.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.9	7.6	0.2	14.9	14.7	7.4	24.2	30.8		28.2	23.7	
LOS	A	A	A	B	B	A	C	C		C	C	
Approach Delay		7.2			13.8			29.9			25.0	
Approach LOS		A			B			C			C	
Stops (vph)	15	174	0	72	593	13	33	154		84	178	
Fuel Used(gal)	1	9	1	4	25	3	1	4		2	4	
CO Emissions (g/hr)	51	627	37	251	1756	239	45	273		125	295	
NOx Emissions (g/hr)	10	122	7	49	342	47	9	53		24	57	
VOC Emissions (g/hr)	12	145	9	58	407	55	10	63		29	68	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 37 (46%), Referenced to phase 2:WBT and 6:EBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.62
 Intersection Signal Delay: 15.0
 Intersection LOS: B
 Intersection Capacity Utilization 58.1%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 5: El Mirage Rd & Camelback Rd



