Arizona Department of Transportation

Environmental Planning

FINAL
Noise Analysis Technical Report

Interstate 10: Junction Interstate 19 to Kolb Road
State Route 210: Golf Links Road to I-10

Federal Project No. 010-E(210)S
ADOT Project No. 010 PM 260 H7825 01 L

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FOR
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EXECUTIVE SUMMARY

Project Objectives

The Arizona Department of Transportation (ADOT), in cooperation with the Federal Highway Administration (FHWA), the City of Tucson, and Pima County, is proposing improvements to the corridors of Interstate 10 (I-10) and State Route 210 (SR 210), within the city of South Tucson, the city of Tucson, and unincorporated Pima County, Arizona. The project limits along I-10 begin at its junction with I-19 at milepost (MP) 260.79 and continue east to Kolb Road at MP 272.30. The SR 210 project limits begin at Golf Links Road and extend south along Alvernon Way to I-10 (MP 265.0). SR 210 is also known as Aviation Parkway or East Aviation Parkway. Throughout this document the term State Route 210 or SR 210 would be used. In addition, the term "project limits" is used to represent the construction footprint (area of disturbance), while the term "project area" includes surrounding land outside but adjacent to the project limits. The term "project vicinity" is used to denote a more expansive landscape context. The project has been evaluated in an Initial Design Concept Report (DCR) and Environmental Assessment (EA) for the I-10: Jct. I-19 to Kolb Road (Tucson – Benson Highway), SR 210: Golf Links Road to I-10 (Barraza – Aviation Parkway). Two Build Alternatives (I & IV) and the No-Build Alternative have been evaluated.

Current Noise Environment

Land use in the project area may be categorized as Federal Highway Administration (FHWA) Activity Category B, C, E, F and G as defined in the Code of Federal Regulations (CFR) Title 23 Part 772 (23 CFR 772) and ADOT Noise Abatement Requirements (NAR) (ADOT, 2017). Residential areas within the study area, which for the purposes of this noise analysis is defined as within 650 feet of the future edge of pavement for the two Build Alternatives, include single-family, multi-family (apartments), mobile home and recreational vehicle communities. These uses were evaluated as Category B in this noise study. Category C uses include schools, parks, a sports complex, multi-use pedestrian paths and trails and a historic building, each afforded protection as Department of Transportation Act of 1966 Section 4(f) resources in addition to a privately funded school, a non-profit institutional structure and a government health facility. The 4(f) properties were evaluated for mitigation per Category C noise abatement criteria per 23 CFR 772 and the ADOT NAR. Evaluation of these properties per 23 CFR 774.15 is not addressed in this report; however, the noise level predictions reported inform the evaluation of 4(f) properties completed for the EA.

Commercial uses within the study area include hotels/motels, restaurants, gas stations/truck stops with convenience stores/food service, office buildings and office parks categorized as Activity Category E. Locations with an outdoor use (pool, sitting, dining or common area) were included in the evaluation of potential noise impacts. Residential planned area developments (PAD) and a vacant residentially zoned parcel were evaluated as Category G uses. Category F land uses, such as industrial and warehouse areas were not included in the study.

Noise measurements were generally recorded before and during the morning (7 a.m. to 9 am.) peak traffic period and before the evening (4 p.m. to 6 p.m.) peak traffic period. Traffic volumes

are highest but still free flowing within the study area during these periods. Additional measurements were recorded during midday hours (approximately 9:30 a.m. – 4:30 p.m.) for noise model validation purposes. Measurements ranged between 51 A-weighted decibels dB(A) in an open desert area located adjacent to the Desert View neighborhood near the I-10/Valencia Road interchange and approximately 630 feet from the freeway to 69 dBA in the Windmere Hotel parking lot located southeast of the I-10/Park Avenue interchange and approximately 220 feet from the freeway.

The two proposed design alternatives, Alternative I and IV, would add additional capacity to the I-10 from 6th avenue on the west end of the project at milepost (MP) 260.79 to MP 272.30, east of Kolb Road. The freeway would be widened from its current two-lanes in the eastbound (EB) and westbound (WB) directions to four lanes west of Kino Parkway, three lanes between Kino Parkway and Alvernon Way, and five lanes west of Alvernon Way. Additionally, the proposed project would reconstruct seven service interchanges, remove the Palo Verde interchange and replace it with an interchange at Country Club Drive and add a system-to-system interchange at Alvernon Way between the I-10 and SR 210. SR 210 replaces Alvernon Way north to Golf Links Road, where the existing would also be reconfigured. As such, the project is considered a Type I project per 23 Code of Federal Regulations (CFR) Part 772.5 and a determination of impacts and mitigation must be considered under 23 CFR 772 and NEPA.

Noise Impact Information

This analysis was performed in compliance with the current (May 2017) *ADOT Noise Abatement Requirements* (NAR). The ADOT NAR establishes official policy on highway noise and describes the process that is used in determining traffic noise impacts and evaluating abatement measures. The ADOT NAR is based on the noise levels approaching the FHWA Noise Abatement Criteria (NAC). ADOT defines "approaching" as within 1 dBA of the FHWA NAC for Activity Categories A, B, C, D, and E. There are no noise impact thresholds for Activity Category F or G. ADOT requires that feasible and reasonable measures be considered and evaluated to abate traffic noise at all identified traffic noise impacts.

A summary of noise analysis parameters is presented in **Table ES-1**. In general, peak hour noise levels are predicted to increase above the 2040 No-Build, with the number of noise-sensitive land uses (receptors) impacted by Build Alternative I and Build Alternative IV virtually identical.

Table ES-1. Summary of Noise Analysis

I-10, Jct. I-19 to Kolb Road; SR 210 Golf Links to I-10				
Noise Analysis Parameters	**Existing 2017**	**Future 2040**		
		No-Build	**Alt I**	**Alt IV**
No. of Modeled Receivers	593	593	592[1]	592[1]
No. of Representative Noise Receptors	1626	1626	1625	1625
Range of Peak Hour Noise Levels, dBA	55 - 77	56 - 78	57 - 80	57 - 80
No. of Receptors Exceeding the ADOT Noise Abatement Criteria (NAC)	497	733.5	856.5	857
No. of Barriers Evaluated for Mitigation	N/A	N/A	27 (16)[2]	26 (15)[3]

I-10, Jct. I-19 to Kolb Road; SR 210 Golf Links to I-10				
Noise Analysis Parameters	**Existing 2017**	**Future 2040**		
		No-Build	**Alt I**	**Alt IV**
No. of Barriers Satisfying ADOT Noise Abatement Requirements (NAR) Reasonableness and Feasibility Criterion	N/A	N/A	11	10
Total Cost of Recommended Mitigation	N/A	N/A	$18,889,362	$21,354,210
Cost of Recommended Mitigation Unique to Each Alternative	N/A	N/A	$17,122,032	$19,586,880

1. One receiver representing a hotel pool area, will be removed by both Build Alternatives.
2. Of the 27 total walls evaluated for Build Alternative I, 16 are unique to this alternative and 11 are common with Build Alternative IV.
3. Of the 26 total walls evaluated for Build Alternative IV, 15 are unique to this alternative and 11 are common with Build Alternative I.
4. Mitigation cost is based on $35/ft^2 for new construction; $85/ft^2 for wall segments on structure.

Noise Abatement Measures Determination (Recommended/Not Recommended)

ADOT considers mitigation for noise sensitive areas predicted to be impacted by highway traffic noise levels from ADOT's transportation improvement projects. The noise level impact determination used in this analysis is based on the ADOT Noise Abatement Requirements (NAR), dated May 2017. Noise barriers (walls) were considered as mitigation measures that would provide noise shielding to impacted locations. Reasonableness and feasibility criteria were evaluated for each proposed noise wall or wall combination (two or more wall) per ADOT NAR guidelines.

A total of 27 noise walls were evaluated to provide mitigation of future (2040) peak hour noise levels associated with Build Alternative I with 16 walls unique to this alternative between Palo Verde Road and Kolb Road. A total of 26 noise walls were evaluated to provide mitigation of future peak hour noise levels associated with Build Alternative IV with 15 walls unique to this alternative between Palo Verde Road and Kolb Road. The 10 walls proposed west of Palo Verde Road and the future I-10/SR 210 system-to-system interchange at Alvernon Way and one wall proposed north of Golf Links Road are common to both Build Alternatives, which are identical in terms of design for this segment of the project. Between Palo Verde Road and Kolb Road, the combination freeway with outside collector distributor lanes proposed for Build Alternative IV influences peak hour traffic noise levels relative to Alternative I.

Eleven of the walls evaluated for Build Alternative I meet all ADOT NAR requirements and are recommended and the remaining 16 walls are not recommended. Ten of the walls evaluated for Build Alternative IV are also recommended for future consideration and the remaining 16 walls are not recommended. The cost of mitigation for Build Alternative IV would exceed the cost of mitigation for Build Alternative I by approximately $2.5M based on these recommendations. The difference is primarily due to variations in noise wall height and length between the two Build Alternatives necessary to achieve reasonable and feasible mitigation. All recommendations are based on preliminary (15% or less) design information and should be revaluated at future stages of design.

INTRODUCTION

The Arizona Department of Transportation (ADOT), in cooperation with the Federal Highway Administration (FHWA), the City of Tucson, and Pima County, is proposing improvements to the corridors of Interstate 10 (I-10) and State Route 210 (SR 210), within the city of South Tucson, the city of Tucson, and unincorporated Pima County, Arizona (Figure 1). The project limits along I-10 begin at its junction with I-19 at milepost (MP) 260.79 and continue east to Kolb Road at MP 272.30. The SR 210 project limits begin at Golf Links Road and extend south along Alvernon Way to I-10 (MP 265.0). SR 210 is also known as Aviation Parkway or East Aviation Parkway (Figure 2).

Purpose and Need

The interstate highway system was intended to relieve congestion, improve safety, and enhance the economy—facilitating the movement of goods and people throughout the nation. Increasing traffic volumes on I-10 in Tucson have contributed to a reduction in operational effectiveness, particularly the segment between I-19 and Kolb Road. With multiple access points to I-10 in close proximity, many local trips use the interstate, contributing to traffic congestion, further compounding the problem.

Subsequent to the construction of I-10, SR 210 was built as an urban highway and business spur. Currently, I-10 motorists have no direct access to downtown Tucson via SR 210. Therefore, motorists must use an indirect route and are more likely to remain on I-10 longer, causing increased traffic volumes and congestion. Adding a connection between I-10 and SR 210 in southeast Tucson would facilitate the use of SR 210 as a business spur, providing local downtown traffic with a desirable alternative to I-10, offloading traffic, and thereby improving traffic operations on I-10.

Four system alternatives were evaluated in a Feasibility Study and Environmental Overview completed in 2010. The subsequent *I-10, Junction I-19 to SR 83 and SR 210, Golf Links Road to Interstate 10 Feasibility Study Update* (ADOT 2015) recommended three alternatives to be evaluated further as a part of the second phase of the study; the development of a Design Concept Study (DCR) and an EA. Due to future construction funding limitations prior to the 2040 design year, the limits of the DCR were revised to end at Kolb Road, which is designated as a future north–south parkway and is a logical point of termini along I-10. The number of recommended alternatives to be evaluated further in the second phase of the study was also reduced to two after further review by the stakeholders.

Project Description

Two alternatives (Alternative I and IV) are proposed and would improve I-10 between the I-10/I-19 System Interchange and the Kolb Road TI and extend SR 210 from Golf Links Road along the Alvernon Way corridor to a connection with I-10 at the existing I-10/Alvernon Way TI. The two alternatives are identical for two segments of the project; I-10 between I-19 and the I-10/SR 210 System TI at Alvernon Way and the entire extension of SR 210 south to the I-10/SR 210 System TI.

Figure 1. Project Location Map

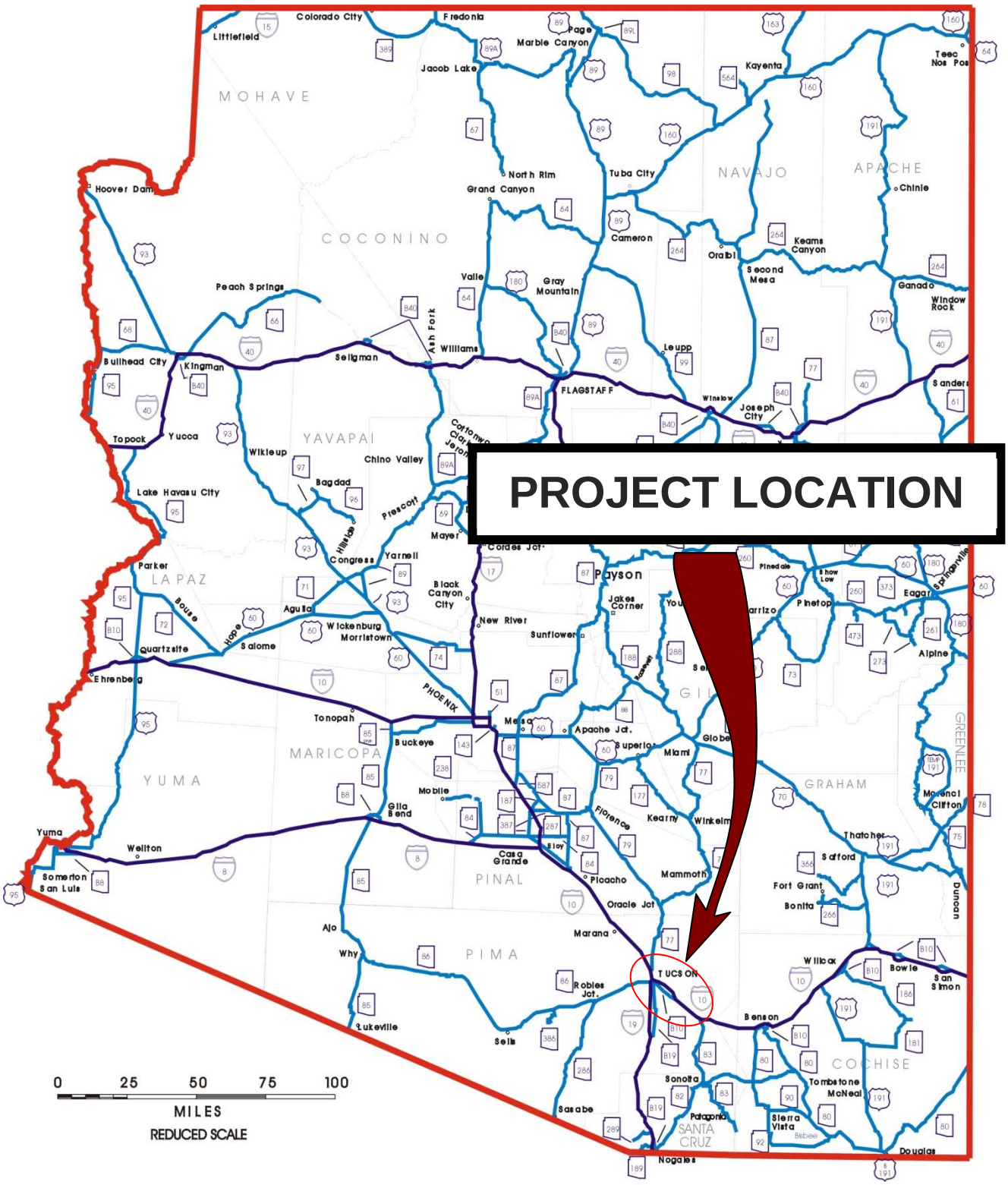
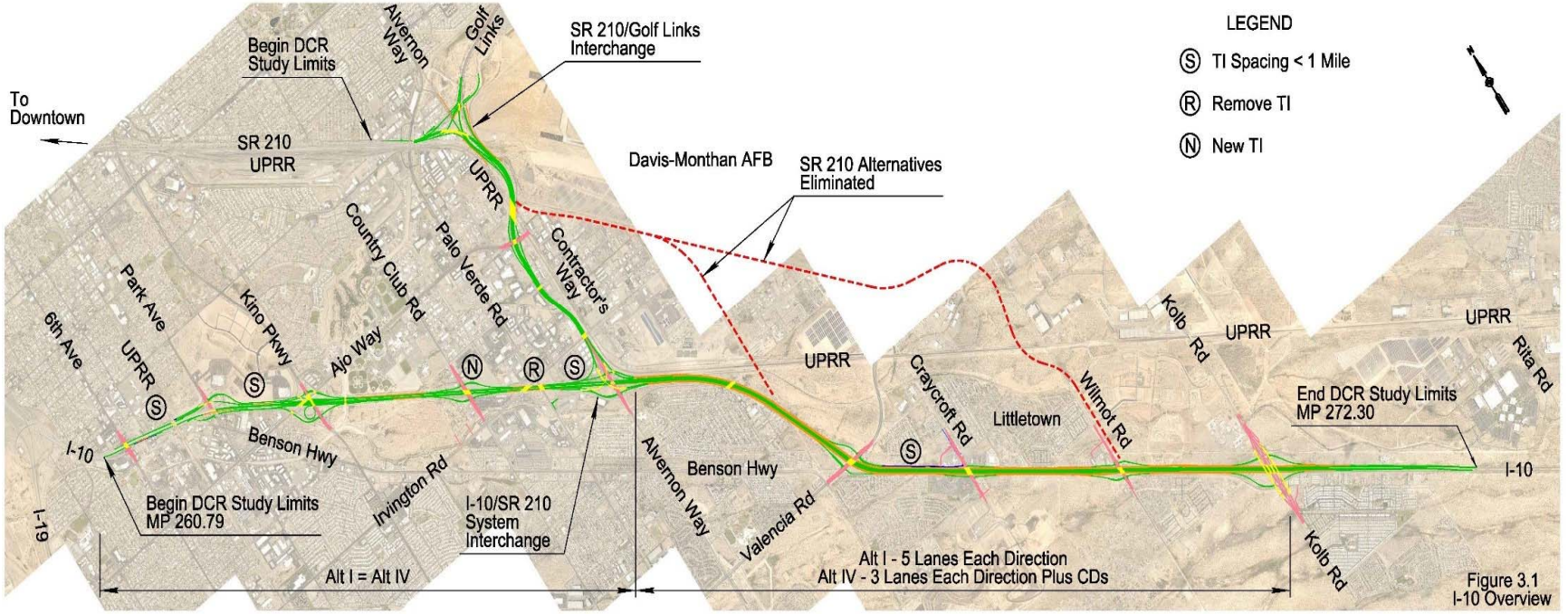


Figure 1. Project Vicinity Map



Similarities Between the Alternatives

For the I-10 segment, weaving distances would be improved where ramps enter/exit I-10, interchange spacing would also be improved by replacing the Palo Verde Road TI with a new TI at Country Club Road, and braided ramps would be provided to address both ramp weaving distances and retain the Park Avenue TI despite short TI spacing to 6th Avenue and Kino Parkway TIs. Auxiliary lanes are required between successive entrance and exit ramps along both the eastbound and westbound I-10 roadways. I-10 mainline lanes would vary as follows:

- I-19 to Kino Parkway - 4 mainline lanes in each direction.
- Kino Parkway to Alvernon Way - 3 mainline lanes in each direction.

West of the horizontal curve over Park Avenue, the fourth lanes in each direction are added to the outside. Through the curve, the median is enclosed with a concrete median barrier and widening occurring both to the inside and outside. East of the curve, new lanes are added in the median along with the new concrete median barrier and a wide paved shoulder that provides lateral space for a future additional general purpose (GP) lane.

The existing I-10 right-of-way (ROW) corridor is quite narrow and there is very little unused ROW between the existing outer edges of the roadways and the ROW lines. It would be necessary to widen the I-10 mainline roadways into the median to the extent feasible to reduce the impact to adjacent properties. Additional ROW would be required along I-10 where TIs and ramps are being modified.

For the SR 210 segment, both alternatives reconstruct the interchange at Golf Links Road to provide for the through movement of traffic on SR 210, reconstruct the bridge over the UPRR, provide a new TI at Ajo Way, and construct the new system interchange with I-10. SR-210 mainline lanes would vary as follows:

- Richey Boulevard thru Golf Links TI - 2 mainline lanes in each direction.
- Golf Links TI to I-10 System TI - 4 mainline lanes in each direction.

At the I-10/SR 210 System Interchange, the two exterior lanes continue to connect with I-10 as system Ramps (South to East) SE and (West to North) WN, with each ramp having two lanes. Also, system Ramps (East to North) EN and (South to West) SW connect to I-10 to the west, with each ramp having one lane. The two interior lanes in each direction continue south as Alvernon Way. The Alvernon Way TI is designed with three lanes in each direction to match with the future Alvernon Way parkway to the south.

The existing SR-210/Alvernon Way ROW corridor south of the UPRR overpass is quite narrow and there is very little unused ROW between the existing outer edges of the roadways and the ROW lines. Additional ROW will be required for SR 210. Commercial businesses south of Aviation Parkway are within the limits of the new interchange with Golf Links Road and should be acquired. South of the UPRR overpass, new ROW is needed for the new Ajo Way TI, along Alvernon Way, and at Irvington Road to accommodate the new system interchange ramps.

Differences Between the Alternatives

The two alternatives differ only within the segment of I-10 between the I-10/SR 210 System TI and the Kolb Road TI. Alternative I east of Alvernon Way has five mainline lanes in each direction that mixes regional and local traffic. Alternative IV east of Alvernon Way provides a collector-distributor system that separates local traffic (entering and exiting I-10) from I-10 mainline regional traffic. Auxiliary lanes are required between successive entrance and exit ramps along both the eastbound and westbound I-10 roadways. I-10 mainline lanes will vary as follows:

- System Alternative I: Five mainline lanes in each direction.
- System Alternative IV: Three mainline lanes plus two CD lanes in each direction.

The existing I-10 horizontal centerline will be retained from Alvernon Way to just north of Valencia Road. To the east, the horizontal centerline will shift from existing to accommodate a wider roadway footprint than existing and avoid right-of-way takes from developed residential neighborhoods adjacent to I-10. Differences in typical sections for the two system alternatives will result in differing horizontal alignments between Valencia Road and Kolb Road. For both system alternatives east of Kolb Road, the centerline will be shifted to 60 feet left of existing to create space to retain the existing two-way frontage road and the improvements will be transitioned to match into the two existing lanes in each direction.

The existing I-10 ROW corridor is quite narrow and there is very little unused ROW between the existing outer edges of the roadways and the ROW lines. It would be necessary to widen the I-10 mainline roadways into the median to the extent feasible to reduce the impact to adjacent properties. Additional ROW would be required along I-10 where TIs and ramps are being modified.

Type 1 Trigger for Noise Analysis

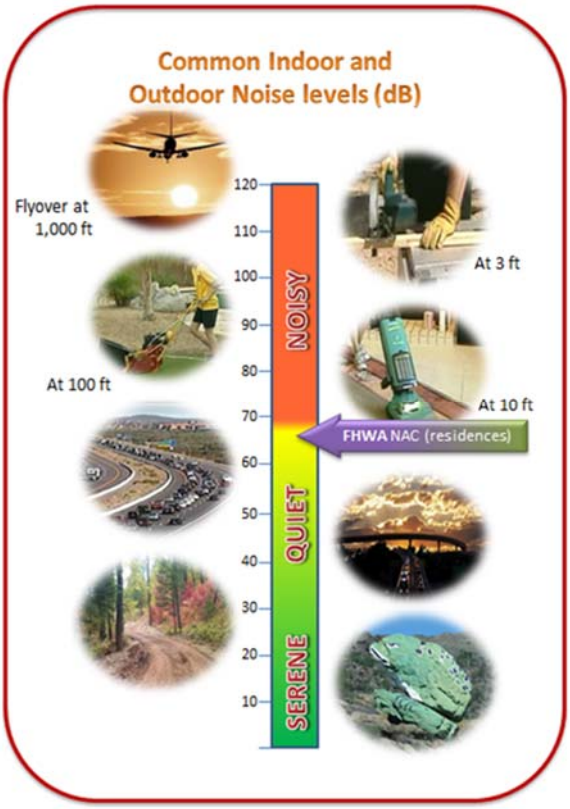
As per 23 CFR 772 and the ADOT NAR traffic noise analysis is required for any projects that receive federal-aid funds or are otherwise subject to FHWA approval. They include federal projects that are administered by Local Public Agencies (LPAs) as well as ADOT. In addition to federal projects, it is required for other ADOT-funded projects that involve:

- construction of a highway on new alignment or
- a significant change in the horizontal or vertical alignment of an existing highway or
- adding new through lanes to an existing highway.

The proposed improvements include the addition of through travel lanes. Therefore, this project meets the definition of a Type I project as defined in ADOT NAR (ADOT, 2017) and a detailed traffic noise analysis is required. Per 23 CFR 772, if any segment or component of an alternative meets the definition of a Type I project, then the entire alternative is considered a Type I project and subject to noise analysis requirements. Land use in the project area may

be categorized as FHWA Activity Category B, C, E, F and G and includes single-family, multi-family (apartments), mobile home and recreational vehicle communities, commercial uses including motels, retail, restaurant, office, light industrial, and Section 4(f) multi-use paths, parks, recreation areas and schools. The portion of SR 210 that would be extended southeast to I-10 where the freeway currently intersects with Alvernon Way is fronted primarily by industrial and military, Category F activity areas for which noise abatement criteria are not defined, with the exception of a vacant parcel with Pima County residential zoning CR-1 (A21) located near the Palo Verde Road overpass of existing SR 210 and the Section 4(f) (Category C) Golf Links/Trail Park located north of existing Golf Links Road opposite Davis Monthan Air Force Base (AFB).

FUNDAMENTALS OF TRAFFIC NOISE



Sound is the sensation produced by stimulation of the hearing organs produced by continuous and regular vibrations of a longitudinal pressure wave that travels through an elastic medium (air, water, metal, wood) and can be heard when they reach a person's or animal's ear. When sound travels through air, the atmospheric pressure wave variations occur periodically. It travels in air at a speed of approximately 1087 ft. per second at sea level and temperature of 32 °F. *Noise* is usually defined as any "unwanted sound," and consists of sounds that are perceived as interfering with communication, work, rest, and recreation. It is characterized as a non-harmonious or discordant group of sounds.

Sound Pressure Levels, Decibels, Frequencies and A-Weighted Decibels-dB(A)

Noise can be measured in Pa (Pascal). A healthy human ear can detect a pressure variation of 20 µPa and it is referred to as threshold of hearing. Logarithmic scale is useful for handling numbers on a wide scale, but for a smaller span, the decibel or (dB) scale is used. Sound pressure level (SPL) is calculated is using measured sound level and the hearing threshold of 20 µPa or 20 x 10^{-6} Pa as the reference level, this level can also be defined as 0 dB. The decibel alone is insufficient to describe how human ear responds to sound pressures at all frequencies. The human ear has peak response in the range of 2,500 to 3,000 Hz and has a somewhat low response at low or even high frequencies. In response to the human ear sensitivity, the A-weighted noise level, referenced in units of dB(A), was determined to better resemble people's perception of sound levels. This dB(A) unit of measurement is used in noise studies and reporting. Changes in sound level under 3 dB(A) are not noticed by human ear, while the human ear perceives a 10 dBA increase in sound level to be a doubling of sound.

Noise Descriptors

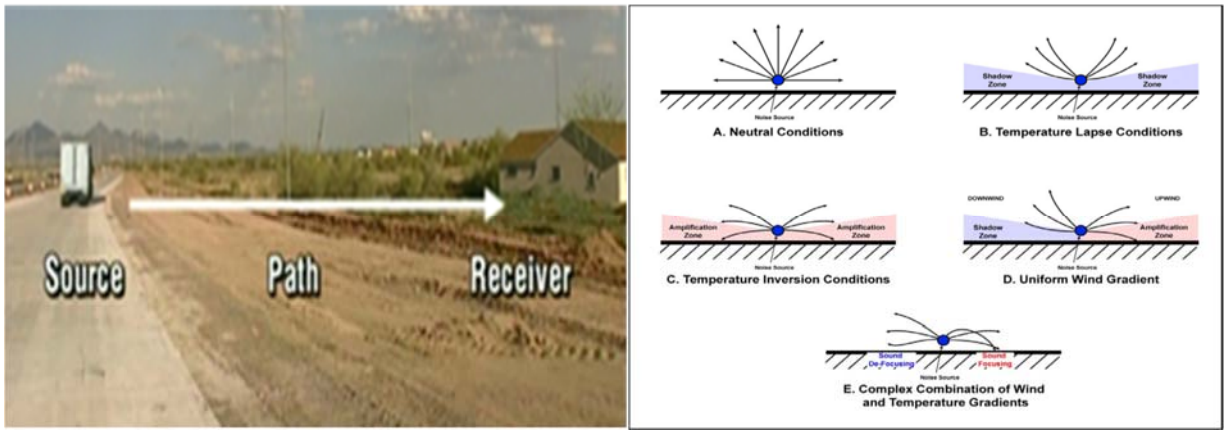
The most commonly used noise descriptor in traffic noise analysis is Equivalent Sound Level (L_{eq}). L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level [$L_{Aeq(h)}$] is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for noise criteria used by ADOT.

What are source, receiver, receptor, and path when talking about traffic noise?

Traffic noise is a combination of the noises produced by vehicle engines, exhaust, and tires. The source of highway traffic comes from vehicles traveling on highways. The noise level at the *Source* depends on pavement type, number of heavy trucks, traffic volumes, and traffic speeds. The predominant noise sources in vehicles at speeds less than 30 miles per hour (mph) are engine and exhaust. At speeds greater than 30 mph, tire noise becomes the dominant noise source.

In Figure 3, the Receptor is any location where people are affected by the traffic noise. It can be residence, park, school, playground and any other place where frequent human use occurs. An area between the source and the receptor *(receiver* represents a receptor(s) when modeled in FHWA Traffic Noise Model) is considered a path. Depending on the path surface, propagation of sound may be reduced; such is the case for the soft ground and fresh snow. Doubling the distance between the source and receptor reduces noise by 3 dBA depending on the ground.

Figure 2. Source, Propagation Path, Receptor



Air changes its density due to variation of humidity and temperature, and wind influences refraction of sound waves. Wind, humidity, and temperature may have a significant impact, but only influences the receptors located a long distance away from source. As residents are usually much closer to the noise source, any atmospheric conditions are insignificant for consideration. For more information on noise, please visit ADOT Environmental Planning Noise webpage.

NOISE IMPACT CRITERIA

As required by 23 CFR 772.11(e), the point at which noise levels "approach" the Noise Abatement Criteria (NAC) established by the Federal Highway Administration (FHWA) is defined by ADOT as 1 dBA, for Activity Categories A, B, C, D, and E (**Table 2**). There is no noise impact threshold for Category F or Category G locations. As required by 23 CFR 772.5, ADOT defines a Substantial Increase in noise levels as an increase in noise levels of 15 dBA in the predicted noise level over the existing noise level.

Table 2. FHWA Noise Abatement Criteria [1]

Activity Category	dB(A), Leq1h[2]	Activity Description
A	57 (exterior)	Land on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (exterior)	Residential
C	67 (exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio structures, recording studios, schools, and television studios
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in categories A–D or F
F	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	---	Undeveloped lands that are not permitted

[1] Sources: Federal Highway Administration (2011); 23 Code of Federal Regulations § 772

[2] The 1-hour equivalent loudness in A-weighted decibels, which is the logarithmic average of noise over a 1-hour period

NOISE SENSITIVE LAND USES

Land use in the project area may be categorized as FHWA Activity Category B, C, E, F and G. The Category B land uses in the study area, which for the purposes of this noise analysis is defined as within 650 feet of the future edge of pavement for the two Build Alternatives, include 26 residential areas including single-family, multi-family (apartments), mobile home and recreational vehicle communities located proximate to I-10. Category C uses include the private educational facility (Nellie P. Covert School), the Primavera Men's Shelter, and a mental health facility and guest quarters on the Southern Arizona Veteran's Affairs (VA) Health Care System (HCS) campus. Additional Category C uses include three schools, three parks, a sports complex, six multi-use pedestrian paths and trails and a historic motel afforded protection per Section 4(f) of the Department of Transportation Act of 1966. The 4(f) properties were evaluated for mitigation per Category C noise abatement criteria per 23 CFR 772 and the ADOT NAR. Evaluation of these properties per 23 CFR 774.15 *Constructive use determinations* is not addressed in this report; however, the noise level predictions reported inform the evaluation of 4(f) properties completed for the EA.[1]

Commercial uses include hotels/motels, restaurants, gas stations/truck stops with convenience stores/food service, office buildings and office parks categorized as Activity Category E. Locations with an outdoor use (pool, sitting, dining or common area) were included in the evaluation of potential noise impacts. Category G land uses include five PADs located proximate to I-10 within the study area and a vacant parcel with Pima County residential zoning CR-1 (A21) located near the Palo Verde Road overpass of SR 210. Category F land uses, such as industrial and warehouse areas were not included in the study.

For this analysis, peak traffic hour noise levels have been calculated at locations representing one or more receptor location (receivers). **Appendix A, Figures A01 through A07** show the receiver locations. Receiver descriptions and Activity Category are provided in **Appendix F, Table F**.

EXISTING NOISE ENVIRONMENT

The methodology used for highway noise level measurements is to comply with procedures specified in Section 4 - Existing-Noise Measurements in the Vicinity of Highways - of the FHWA document FHWA-PD-96-046/DOT-VNTC-FHWA-96-5, *Measurement of Highway-Related Noise* (FHWA, 1996), or any other subsequently FHWA-approved methodology.

Ambient noise levels for Activity Categories B, C and G were established by field measurements for TNM validation. Existing noise levels were predicted using the FHWA TNM model and the existing peak hour traffic as reported in the *Initial Traffic Report, I-10; Jct. I-19 to Kolb & SR 210; Golf Links Road to I-10* [traffic report] (ADOT, 2019).

[1] There are 32 properties/facilities that have been evaluated as Section 4(f) Resources for the EA. Only portions of those properties within the noise study area that have not been incorporated into transportation facilities are included in this noise study. Appendix H includes a map of all 4(f) Resources in the project area and those portions included in this noise study. Trails shown on the map that are planned or proposed but not developed were not included in the analysis.

Short-term noise level monitoring was conducted within the project limits on August 8, 2017. Two 15-minute measurements were taken under meteorologically acceptable conditions, with winds less than 12 mph and dry pavement at six locations representing each of the evaluated Activity Categories (B, C, and G). If a variation of 3 or dBA or more was recorded for the first two measurements, additional measurements were taken until consecutive measurements were within the 3 dBA tolerance. Measurements were recorded with a Larson Davis Model 820 Class I integrating sound level meter (SLM). The SLM was calibrated prior to each measurement with a Larson Davis Model CAL200.[2] The measured noise level ranged from 49 dBA to 69 dBA. **Appendix A, Figures A01 through A06** show the location of the noise level monitoring sites, and **Appendix B** includes the noise measurement data sheets.

Background Noise Consideration

Any noise source contributing to the noise levels at a receptor, other than observed traffic noise, must be identified and captured in the TNM model, for instance other major roadway sources such as the nine major cross-streets in the project area, for the modeled receiver representing that location. Two additional noise sources include two Union Pacific Railroad (UPRR) lines and Davis Monthan AFB. One UPRR line crosses under the I-10 freeway between 6th Avenue and Kino Parkway (see **Appendix A, Figure A01**) and the second line begins at the UPRR switching yard located parallel to SR 210 (see **Appendix A, Figure A20**), north of I-10 and travels eastward toward Contractor Way where it turns south toward the freeway, crossing under Alvernon Way. Approaching the freeway, the line heads east again and parallels the freeway at a distance of approximately 0.80-miles (see **Appendix A, Figure A03**). The following train activity data provided during a 2001 meeting with UPRR during the development of the *Initial Feasibility Report, Interstate 10: Junction Interstate-19 to State Route 83, State Route 210: Golf Links Road to I-10* (ADOT, 2011)[3]:

- UPRR line under I-10 west of Park Avenue: 10 – 15 daily trains (15 trains assumed for analysis)
- UPRR line emanating from switch yard near Alvernon Way: 30 – 50 daily trains (50 trains assumed for analysis)
- Assume 2 engines per train, 40 mph operational speed
- Assume daylight hours from 7 a.m. to 10 p.m., nighttime hours from 10 p.m. to 7 a.m.
- Assume 14/24 train travel occurs during the day and 9/24 during the evening, or 2.083 events/hour

Three locations were evaluated for background contributions for train noise the Federal Transit Administration Noise Impact Assessment Spreadsheet v. 1/29/2019 (FTA spreadsheet). Receiver

[2] A valid calibration certificate is on file with the ADOT EP Noise and Air Team at the time of measurements, in line with ADOT NAR and *Instruction on Determination of Existing Noise Levels and Noise Measurement Data Form*.

[3] Email communication with Brad Olbert, Jacobs PM, January 31, 2019 (Jacobs, 2019).

R35a (**Appendix A, Figure A01**) is a first floor unit in the Spanish Trail Apartments located east of 4th Avenue north of the I-10 WB frontage Road and approximately 930 feet west of the UPRR tracks. Based on the above parameters and a modeled peak hour noise level of 71.6, train activitiy is estimated to contribute 44.5 dBA to the ambient noise environment. The second location is Receiver 4F1bd located on the Julian Wash Rail and Greenway/The Loop Trail adjacent to the Estrella Subdivision (**Appendix A, Figure A03**) located south of I-10 and approximately 895 feet from the UPRR tracks. At this location and based on a modeled peak hour noise level of 61.2 dBA, train activity is estimated to contribute 44.8 dBA to the peak hour noise environment. The third location is Receiver R321, an undeveloped parcel zoned Pima County CR-1 (A21) located near the Palo Verde Overpass of existing SR 210 (**Appendix A, Figure A20**) located south of I-10 and approximately 325 feet from the UPRR tracks. At this location and based on a modeled peak hour noise level of 60.3 dBA, train activity is estimated to contribute 51.84 dBA to the peak hour noise environment. The contribution of train noise at these locations is less than 1 dBA; therefore, train noise was not considered further in the analysis of project-related peak hour noise impacts. Calculations sheets from the FTA spreadsheet are included in **Appendix C**.

The Davis-Monthan AFB is located north of I-10 and east of Contractor Way and the planned SR 210 alignment. **Appendix D** shows a noise contour available at http://www.re.state.az.us/AirportMaps/Military_Airports/Davis-Monthan_Air_Force_Base.pdf (that was developed for the *Davis-Monthan Air Force Base Regional Compatability Project, Joint Land Use Study* (Arizona Department of Commerce, 2004). The majority of the project and study area lie outside the 65 Ldn and 70 Ldn noise contours, respectively with the exception of the Barraza/Aviation Path (**Appendix A, Figure A20**) and the undeveloped residentially zoned parcel R231. Per 14 CFR Part 150, Appendix A Table 1, the 65 Ldn contour is the threshold for residential land uses (R321) and a 70 Ldn is the threshld of compatibility for outdoor recreation uses (4F17a – 4F17q). The Barraza/Aviation Path and all 4(f) resources located in the study area were evaluated using CFR 774.15(f)(3). Because project-related noise levels are predicted to exceed the Category C thresholds, only the increase from the No Build consideration is relevant to assessing impacts. Evaluation of R321, a Category G undeveloped parcel was included for to inform the zoning/permitting process for local officials; therefore, noise from the base was not considered further at these locations.

A third source of background noise is the Tucson International Airport, which is located more than three miles southeast of the project area and was not considered further in the analysis.

Traffic Noise Model - Validation

For the purpose of validation of the FHWA TNM, the noise level measurements taken are representative of free-flow conditions, without traffic controls as much a practicable, away from sound reflective objects (warehouses, parked trucks, privacy walls etc.), without being influenced by other noise sources (aircrafts, lawn mowers, engines running, running water, loud insects, birds, animals), and with a clear view to the roadway.

To ensure that the noise model used to predict traffic noise impacts accurately reflects the sound levels in the noise study area, a model was constructed using the same traffic volumes, speed,

and vehicle types that were present during the sound level measurements. Modeled values must be within ±3.0 dBA of the measured levels for the model to be validated.

Validated FHWA's Traffic Noise Model (TNM) Version 2.5 were used to incorporate features of the topographic and built environment necessary to accurately predict both Existing and Future $L_{eq(h)}$ peak hour traffic noise levels. Noise from sources other than traffic was not included so when non-traffic noise is present, such as aircraft/railroad/industrial facility/playground noise, TNM will under predict the actual noise level. To create the model, design files outlining major roadways, topographical features, and sensitive receptors were imported into the TNM model as background features and the corresponding traffic volumes were entered manually. The measured and modeled noise levels are provided in the **Table 3** below.

Table 3. Model Calibration of Measured Noise Levels

Monitoring Location (Receiver)	Activity Category	Land Use Description	Measured Level	Modeled Noise Level	Model Variation
			dBA	dBA	dBA
M1	C	Nellie P. Covert School (abandoned pool)	59.3	n/a	n/a
M1a*	C	Mission View Elementary (baseball field)	57.4	n/a	n/a
M2	B	Sunset Villa (cul-de-sac)	68.1	n/a	n/a
M3	E	Lazy 8 Motel (Parking lot)	67.0	n/a	n/a
M4	E	Motel 6 (Parking lot)	69.1	67.6	1.5
M5	C	Kino Sports Complex (adjacent baseball field)	64.2	71.8 (67)[1]	7.6 (2.8)[1]
M5-1	C		64.7	71.8 (67)[1]	7.1 (2.3)[1]
M5-2	C		60.9	66.4 (61.6)[1]	5.5 (0.7)[1]
M6	E	Red Roof Inn (parking lot)	60.6	n/a	n/a
M7	C	Julian Wash Rail/Trail	62.9	64.7	1.8
M8	B	Desert View (dirt access road)	51.8	n/a	n/a
M9	G	Valstate II (cul-de-sac)	53.8	63.3 (58.5)[1]	9.5 (4.7)[1]
M10	G	Corazon del Pueblo (drainage area)	60.1	n/a	n/a
M11	B	Vista Montana Phase I (dead end)	64.6	n/a	n/a
M12	E	Ross Acres (adjacent storage)	66.0	n/a	n/a

Monitoring Location (Receiver)	Activity Category	Land Use Description	Measured Level	Modeled Noise Level	Model Variation
			dBA	dBA	dBA

1. Numbers in parentheses represent the potential noise reduction from the rubberized asphalt surface of the I-10, which begins at 850 feet west of Kino Parkway and continues east through the project area.

A comparison of measured to modeled noise levels assuming a loose soil condition still yields a substantial (3 dBA+) variation. A hard soil assumption increases the disparity. However, research of the pavement surface overlay record indicates that an asphalt rubber friction course (ARFC) or rubberized asphalt freeway overlay was applied beginning at a point approximately 850 feet west of Kino Parkway and continuing east through the project area. The overlay was applied between 2011 – 2012. The *Arizona Quiet Pavement Pilot Program: Comprehensive Report* (ADOT, 2018) indicates that an average noise reduction of 4.8 dBA for near field, wayside (50-feet from the source), and neighborhood locations. Accounting for this reduction, much better agreement was achieved between measured and modeled locations. It is worth noting that good agreement was achieved with the model run assuming a loose soil condition at M4, which is west of the ARFC overlay freeway section. Therefore, the loose soil condition was assumed for all modeling scenarios.

PREDICTED PEAK HOUR NOISE LEVELS

Traffic noise analysis predictions rely on project specific traffic data as listed below and which pertains to all lanes including, general purpose, ramps, High Occupancy Vehicle, Traffic Interchange, and roundabouts, at Level of Service (LOS) C and on other highway influenced infrastructure that may not be considered inconsequential to increasing noise levels within project area.

- Traffic volumes, with lateral distribution (per lane).
- Vehicle type, vehicle distribution of automobiles, medium trucks, heavy trucks, busses and motorcycles with particular attention to percentage of heavy trucks with lateral distribution (per lane).
- Speed of traffic (per lane)

When predicting noise levels for the design year, a ‘worst-case’ approach is used, wherein the traffic characteristics that produce the worst traffic noise impact. In general, this should reflect LOS C traffic conditions during the peak noise hour with traffic moving at five miles per hour above the posted speed limit. If future traffic volumes are less than maximum LOS C volumes, future traffic volumes will be utilized. If no other information is available, the peak hourly volume should be 10% of the predicted Annual average daily traffic (AADT), with factors K, D, and T included in the analysis and with lateral lane across the travel lanes of a multiple-lane highway.

An exception to worst-case approach is pavement type, as all TNM-noise level predictions must utilize "average" pavement type unless, FHWA approval to use a different pavement type has been obtained.

Roadway Geometry & Topographic Data and Ground Type

The roadway geometry data used for the noise modeling effort, such as roadway and lane width, horizontal and vertical coordinates, were based on the electronic roadway geometry data and 30% design plans using MicroStation © (Jacobs, 2019). Aerial photographs were extracted from Google Earth™ and orthorectified to the MicroStation © roadway coordinates (Google, 2019). Terrain lines determine the elevation of sound propagation interfering feature between source and the noise receiver. Ground type for modeling purposes is determined as loose soil.

For the existing and No Build Alternatives, the two and three-lane cross sections were modeled with one representative roadway in each direction of travel for the I-10. For Build Alternatives I and IV west of Alvernon Road, three-lane cross sections were modeled with two representative roadways, one for the inside lane and another for the two outside lanes in each direction of travel on the I-10. For four-lane cross sections, the two inside and two outside lanes were modeled with two representative roadways in each direction. For the five-lane sections, Alternative I was modeled with one representative roadway for the two inside lanes and a second representative roadway for the three outside lanes. Finally, for the Alternative IV five-lanes sections, one representative lane was modeled for the three inside lanes (freeway) and a second representative roadway was modeled for the two outside (collector distributor) lanes.

Traffic Volumes and Mix

Different vehicle types have different noise emission levels, with trucks producing higher noise levels than passenger automobiles. Furthermore, trucks with higher cargo weight capacity produce higher noise levels than trucks of lower cargo weight capacity. Vehicles are categorized as follows:

- Automobiles are categorized as vehicles with two axles and four wheels designed primarily for passenger or cargo (light trucks) transportation. Generally, the gross weight of an automobile is less than 10,000 pounds.
- Medium trucks are categorized as vehicles having two axles. Generally, the gross weight of a medium truck is greater than 10,000 pounds but less than 26,400 pounds.
- Heavy trucks are categorized as vehicles having three or more axles and designed for the transportation of cargo. Generally, the gross weight of a heavy truck is greater than 26,400 pounds.

PM peak hour traffic volumes used in the modeling for I-10 and its major cross-streets in the project area including 6th Avenue, Park Avenue, Kino Parkway, Country Club Road, Alvernon Way, Valencia Road, Craycroft Road, and Kolb Road as well as SR 210 and Golf Links are taken from the traffic study (ADOT, 2019) for the existing, No-Build and Build Alernatives and are presented

in **Appendix E**. In addition, existing year (2017) traffic on Ajo Way, Irvington Road, Palo Verde Road and Benson Highway are based on 2017 counts as provided in the Pima Association of Governments from Travel Data Management System (TDMS) data available at https://pag.ms2soft.com/tcds/tsearch.asp?loc=Pag&. Counts from 2017 were applied to the existing condition and used to project to design year 2040 volumes using a 0.5% annual growth factor identified in the traffic study. LOS C volumes referenced in the *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2016), were used where exceeded by counts or projections.

The traffic report indicates the following truck percentages should be assumed for the project corridor on I-10:

- I-19 to Valencia Road EB – 10% AM peak hour, 11% PM peak hour
- I-19 to Valencia Road WB – 11% AM peak hour, 9% PM peak hour
- Valencia Road to Kolb Road EB – 15 % AM peak hour, 10 % PM peak hour
- Valencia Road to Kolb Road WB – 11% AM peak hour, 16% PM peak hour

As shown in the Appendix E, the PM peak hour volumes exceed AM peak hour volumes and were used for all analysis years and alternative scenarios; therefore, the listed PM peak hour truck percentages were assumed. Percentages assigned to medium vs. heavy trucks were multiplied by the generally observed ration of medium to heavy truck counts recorded during the noise measurement intervals as follows:

- I-10 EB W of Valencia Road – 3% medium trucks, 7% heavy trucks
- I-10 WB W of Valencia Road – 3% medium trucks, 6% heavy trucks
- I-10 EB E of Valencia Road – 1% medium trucks, 9% heavy trucks
- I-10 WB E of Valencia Road – 3% medium trucks, 13% heavy trucks

In general, heavy trucks were assigned to the outside lanes in three, four and five lane sections for the Build Alternatives. One exception is the Alternative IV five-lane sections east of Alvernon Way. This alternative is designed to separate regional traffic using the inside three-lane freeway from local traffic using the outside two-lane collector distributors; therefore, heave trucks were assigned to the inside lanes for this section of Alternative IV.

Vehicle Speed

The modeled vehicle speeds are as follows:

- Cars - 5 mph above posted speed, or 70 mph for cars on existing and future I-10, 50 mph on SR 210 and for service interchange off-ramps, 45 mph for service interchange on ramps, and 40 mph for smaller single-lane right turn lanes to an on-ramp
- Medium and Heavy trucks – posted speed (5 mph less than cars) for these segments
- Traffic signals on within the project limits were modeled per *Final Report on Project 25-34 Supplemental Guidance on the Application of FHWA's TNM – Appendix B*

Signalized Interchanges, Intersections and Roundabouts guidelines (Transportation Research Board, 2014).

Atmospheric Variables

Noise level is affected by temperature and humidity. For noise modeling purposes, FHWA recommends the default values for the temperature of 68 degrees Fahrenheit and the humidity of 50 percent.

Receptor and Receiver Locations

The ADOT NAR defines a "receptor" as a discrete or representative location of a noise sensitive area(s) for any of the land uses listed in **Table 2**. The "receiver" is defined as a location used in noise modeling to represent the measured and predicted noise level at a particular point. The noise-sensitive receptors are located in the backyard or common outdoor areas of residential properties.

Shielding Effects

TNM 2.5 can account for the noise shielding effects created by existing noise barriers, privacy walls, buildings, and terrain changes that are an obstruction between noise sources and receptors. Neighborhood privacy walls were modeled as barriers, while large buildings were modeled as building rows. Cut-and-fill slopes and corresponding elevation changes were modeled as terrain lines for the existing condition and No Build Alternative. For the Build alternatives, jersey barriers replaced many of the roadside terrain lines. Rows of homes in neighborhoods were modeled as building rows.

Based on the assumptions stated in this report, FHWA TNM 2.5 predicts noise levels along the project route in the design year after construction of the project has occurred. Actual noise levels in the future may differ somewhat due to a number of factors outside the scope of this modeling effort.

This analysis determines the traffic noise impacts based upon the FHWA NAC, which is referred to in ADOT's NAR. The FHWA NAC specify an allowable traffic noise level for different categories of land use and activities. Homes, churches, schools, and parks are classified in Categories B and C, and the noise abatement criteria for these categories is 67 dBA hourly equivalent sound level ($L_{eq(h)}$). In the absence of traffic noise impacts, noise abatement measures considerations is not warranted.

Noise Impact Evaluation Summary

Appendix F, Table F shows the list of receivers with predicted future noise levels (sound levels formatted in **bold** are at or exceeding approach criteria at the respective receiver). For receivers representing 4(f) resources, ***bold italicized*** values represent an exceedance of the Category C threshold as well as a 3 dBA or more increase above no-build projected peak hour noise levels. This information is included to inform the evaluation of 4(f) properties in the EA. For the purposes

of this noise study, only the Category C NAC has been considered in the evaluation of impacts and noise mitigation for these properties[4].

West of 6th Avenue

A total of 59 receivers were modeled representing 179 Activity Category B, E and C receptors, including the Nellie P. Covert School, Sunset Villa Neighborhood, Via del Sur Condominiums and the following 4(f) resources: Wakefield Middle School, the Econolodge, and a portion of the Julian Wash Rail and Greenway/The Loop Trail. Receivers on this and other multi-use trails represent 0.5 receivers based on their usage frequency. As shown in **Table F**, existing, No-Build and Build peak hour noise levels at the modeled receivers would range from:

- Existing: 55.6 dBA to 75.8 dBA
- No-Build: 56.8 dBA to 76.4 dBA
- Build Alt I/IV: 57.7 dBA to 76.8 dBA

Exceedances of the Category B NAC are predicted to occur at two homes in the Sunset Villa neighborhood and a number of condominiums in Via del Sur and mitigation evaluation is required. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A01** shows the location of the modeled receivers.

6th Avenue to Park Avenue

A total of 40 receivers were modeled representing 209.5 Activity Category B, E, G and C receptors, including the Budget Inn, El Camino Motel and the Economy Inn, a historic motor court which qualifies as a 4(f) resource, the Lazy 8 Motel, Spanish Trail Apartments, Primavera Men's Shelter, Southern Arizona VA HCS, Western Inn Hotel, America's Best Value Inn, and the El Paso & Southwestern Greenway. As shown in the **Appendix F, Table F**, existing, No-Build and Build peak hour noise levels at the modeled receivers would range from:

- Existing: 56 dBA to 76.9 dBA
- No-Build: 56.8 dBA to 78.3 dBA
- Build Alt I/IV: 57.2 dBA to 80.2 dBA

Exceedances of the Category C NAC are predicted to occur at the Economy Inn and the Primavera Men's Shelter and the Category B NAC at the Spanish Trail Apartments; therefore, mitigation evaluation is required. Impacts are also predicted for the Category E El Camino motel pool area. Traditionally, motels and hotels do not look favorably to noise walls as those hinder the visual exposure of the properties to travelling public. As the current design is at 15 % or below, there will be a need to update the noise analysis at further stages of the design. Consequently,

[4] A 3 dBA increase in peak hour noise levels above the No-Build scenario is one of the factors considered when determining project's constructive use of a Section 4(f) property per 23 CFR 774.15. This information is provided here to inform the 4(f) evaluation in the EA.

following the comments from the public, including the owners of the properties, further consideration of those properties will be given, in line with ADOT NAR Chapter 2.1. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A01** shows the location of the modeled receivers.

Park Avenue to Kino Parkway

A total of 25 receivers were modeled representing 32.5 Activity Category B, E and C receptors including the Roadway Inn, Windmere Hotel, Palms Trailer Court, Southpark Neighborhood and the following 4(f) resources: Bridges Trails at Tucson Marketplace, a portion of the Julian Wash Rail, the Greenway/The Loop Trail and the start of the Shared-Use Path to Sam Lena Park. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels would range from:

- Existing: 56.8 dBA to 76.9 dBA
- No-Build: 57.3 dBA to 78 dBA
- Build Alt I/IV: 56.6 dBA to 77.2 dBA

Exceedances of the Category C NAC are predicted on the Bridges Trails at Tucson Marketplace for the Build Alternatives. Although the increase above the No-Build condition is less than 3 dBA, mitigation evaluation of the trail as a Category C land use is required. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figures A01 & A02** shows the location of the modeled receivers.

Kino Parkway to Country Club Road

A total of 35 receivers were modeled representing 42 Activity Category B, G and C receptors including PADs for the unpermitted Irvington Place subdivision, the Elvira Southland Park Neighborhood, an Inn & Out Burger dining area and the following 4(f) resources: Shared-Use Path to Sam Lena Park, Kino Veterans Memorial Sports Complex, a portion of the Julian Wash Rail and Greenway/The Loop Trail. Receivers for PADs and other Category G uses represent 0.5 receivers based on their usage frequency. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels would range from:

- Existing: 55.2 dBA to 73.9 dBA
- No-Build: 55.9 dBA to 74.1 dBA
- Build Alt I/IV: 56.6 dBA to 74 dBA

Exceedances of the Category B NAC are predicted in the Elvira Southland Park neighborhood for the Build Alternatives and mitigation evaluation is required. Exceedance of the Category C NAC for the Shared-Use Path to Sam Lena Park, Kino Veterans Memorial Sports Complex and a portion of the Julian Wash Rail and Greenway/The Loop Trail is predicted for the Build Alternatives. Although the increase above the No-Build condition is less than 3 dBA, mitigation evaluation of these resources as Category C land uses is also required. Increases above existing peak hour noise

levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A02** shows the location of the modeled receivers.

Country Club Road to Alvernon Way

A total of 32 receivers were modeled representing 24.5 Activity Category B, E and C receptors including a Motel 6, Days Inn, Comfort Inn, Red Roof Inn, the Mortimore Neighborhood and a portion of the Julian Wash Rail and Greenway/The Loop Trail, a 4(f) resource. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels would range from:

- Existing: 57.4 dBA to 72.1 dBA
- No-Build: 58.7 dBA to 73.5 dBA
- Build Alt I: 56.5 dBA to 72 dBA
- Build Alt IV: 57.3 dBA to 71.5 dBA

Exceedances of the Category C NAC are predicted on the Julian Wash Rail and Greenway/The Loop Trail. Although the increase above the No-Build condition is less than 3 dBA, mitigation evaluation of this trail as a Category C land use is required. Exceedance of the Category B NAC for homes in the Mortimore neighborhood are predicted and mitigation evaluation is also required. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figures A02 & A03** shows the location of the modeled receivers.

Alvernon Way to Valencia Road

A total of 78 receivers were modeled representing 245.5 Activity Category B, G and C receptors including the Estrella and Ray Subdivisions, Desert View neighborhood and the Valencia Crossing PAD and the following 4(f) resources: a portion of the Julian Wash Rail and Greenway/The Loop Trail, the Los NInos Elementary School and the Augie Acuna Los Nino Neighborhood Park. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels would range from:

- Existing: 55.8 dBA to 68 dBA
- No-Build: 57.8 dBA to 69.1 dBA
- Build Alt I: 59.6 dBA to 72 dBA
- Build Alt IV: 59.9 dBA to 72.7 dBA

Alvernon Way demarcates the variation between Build Alternative I and IV, as shown in the variation in future peak hour noise levels predicted for each. Exceedances of the Category C NAC are predicted on the Julian Wash Rail and Greenway/The Loop Trail and mitigation evaluation is required. The increase above the No-Build condition for Alternative IV is more than 3 dBA where the trail approaches I-10 near Drexel Road. Exceedance of the Category B NAC for homes in the Estrella and Ray Subdivisions and the Desert View neighborhood are predicted and mitigation evaluation is also required. Increases above existing peak hour noise levels would not trigger

additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A03 & A04** shows the location of the modeled receivers.

Valencia Road to Craycroft Road

A total of 46 receivers were modeled representing 162 Activity Category B and G receptors including the Valstate and Valstate II subdivisions, the Empire Vista subdivision and the Rancho Valencia subdivision. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels would range from:

- Existing: 58.2 dBA to 67.9 dBA
- No-Build: 60.3 dBA to 69.5 dBA
- Build Alt I: 60.7 dBA to 72.4 dBA
- Build Alt IV: 61 dBA to 71.1 dBA

Exceedances of the Category B NAC are predicted for homes within the Valstate, Valstate II, and Rancho Valencia subdivisions and mitigation evaluation is required. Impacts are not predicted for the Empire Vista neighborhood located on the north side of the freeway. This neighborhood is set back further from the I-10 than those located to the south; however, evaluation of noise levels for undeveloped parcels to the south suggest that impacts for future residential uses could occur. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A04 & A05** shows the location of the modeled receivers.

Craycroft Road to Wilmot Road

A total of 47 receivers were modeled representing 147.5 Activity Category B, G and E receptors including the Littletown I neighborhood, the Corazon del Pueblo, Canterbury Ranch, and Window Rock East Unit II subdivisions on the north side of the freeway and Legacy Collateral Holding PADs on the south side of the freeway. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels at would range as follows:

- Existing: 56.1 dBA to 70.4 dBA
- No-Build: 57.4 dBA to 73 dBA
- Build Alt I: 60.7 dBA to 75.1 dBA
- Build Alt IV: 60.5 dBA to 72.3 dBA

Exceedances of the Category B NAC are predicted for homes within these neighborhoods and mitigation evaluation is required. Impacts are also predicted for the Category E Travel Inn pool area. Traditionally, motels and hotels do not look favorably to noise walls as those hinder the visual exposure of the properties to travelling public. As the current design is at 15 % or below, there will be a need to update the noise analysis at further stages of the design. Consequently, following the comments from the public, including the owners of the properties, further consideration of those properties will be given, in line with ADOT NAR Chapter 2.1. Increases

above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A05** shows the location of the modeled receivers.

Wilmot Road to Kolb Road

A total of 78 receivers were modeled representing 189.5 Activity Category B, G and C receptors including the Desert Stone, Vista Montana Estates Phase I, and Sycamore Point subdivisions on the south side of the freeway and La Estancia de Tucson PADs and the 4(f) resource Hidden Hills Trail on the north side of the freeway. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels would range from:

- Existing: 56 dBA to 72.1 dBA
- No-Build: 58.5 dBA to 74.2 dBA
- Build Alt I: 60.8 dBA to 79.3 dBA
- Build Alt IV: 60.2 dBA to 77.6 dBA

Exceedances of the Category B NAC are predicted for homes within the Desert Stone, Vista Montana Estates Phase I, and Sycamore Point subdivisions and mitigation evaluation is required. More than a 3 dBA increase above No-Build peak hour noise levels is predicted for portions of the Section 4(f) Hidden Hills Trail that are closer to the I-10 WB Wilmot off-ramp (Ramp C) for Alternatives I & IV. The increase above the No-Build condition for Alternative IV extends further to the east approaching the Kolb I-10 WB on-ramp (Kolb Ramp B), although exceedance of the Category C NAC on the trail is predicted to occur equally for both alternatives. Per ADOT NAR requirements, the trail was evaluated for mitigation as an impacted Category C land use. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A05 & A06** shows the location of the modeled receivers.

East of Kolb Road

A total of 112 receivers were modeled representing 322.5 Activity Category B, G and C receptors including the Ross Acres, Ross Acres-Pima Ramada Mobile Home Park[5], Ross Acres-Trails Association RV Resort, Trails Associates mobile home community, and Voyager RV Resort on the south side of the freeway. Receivers also represent the Vail Academy High School and a portion of the Hidden Hills Trail, 4(f) resources located on the north side of the freeway. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels would range from:

- Existing: 55.6 dBA to 74.5 dBA
- No-Build: 57.5 dBA to 76.2 dBA

[5] The Pima Ramada Mobile Home Park provides long-term (multi-month) leases to prospective tenants with a capacity of 16 lots.

- Build Alt I: 58.8 dBA to 75.6 dBA
- Build Alt IV: 60.5 dBA to 74.8 dBA

Exceedances of the Category B NAC are predicted for homes within the Ross Acres, Ross Acres-Trails Association RV Resort, Trails Associates mobile home community, and Voyager RV Resort on the south side of I-10 and mitigation evaluation is required. On the north side, exceedances of the Category C NAC are predicted at the Vail Academy High School but not on the trail. More than a 3 dBA increase above No-Build peak hour noise levels is predicted for areas along the façade of the school facing the highway and the basketball court, ramada and soccer field bleachers east of the school building. These areas were evaluated for mitigation as a Category C land use per ADOT NAR requirements. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A06 & A07** shows the location of the modeled receivers.

SR 210 Golf Links Road

A total of 24 receivers were modeled representing 15 Activity Category B, G and C receptors, including single family homes in the Country Club neighborhood, a vacant parcel with Pima County residential zoning CR-1(A21) and the Barraza/Aviation Path, which is a 4(f) resource. As shown in **Table F**, existing, No-Build and Build modeled peak hour noise levels at, including 4(f) resources would range as follows:

- Existing: 55.6 dBA to 74 dBA
- No-Build: 59.6 dBA to 74.4 dBA
- Build Alt I: 60.4 dBA to 73.7 dBA
- Build Alt IV: 60.4 dBA to 73.7 dBA

Exceedances of the Category C NAC are predicted on the Barraza/Aviation Path for the Build Alternatives. Although the increase above the No-Build condition is less than 3 dBA, the path was evaluated for mitigation as a Category C land use per ADOT NAR requirements. Conversely, the Category B NAC is not exceeded at modeled residential locations and mitigation evaluation is not required. Increases above existing peak hour noise levels would not trigger additional impacts per the ADOT NAR 15 dBA substantial increase criterion. **Appendix A, Figure A20** shows the location of the modeled receivers.

CONSIDERATION OF ABATEMENT

ADOT considers mitigation for receivers predicted to be impacted by traffic noise associated with a proposed transportation improvement project. For a mitigation measure, such as a noise barrier, to be proposed in the project it must meet both feasibility and reasonableness criteria.

Pursuant to the 23 CFR 772.13(d)(1), the initial consideration for each potential abatement measure should be both the engineering and acoustic feasibility factors that determine whether it is possible to design and construct the measure.

As per Chapter 5.1 of ADOT NAR, engineering feasibility factors are:

- Safety, Barrier height, Curvature, and Breaks in barriers
- Topography, Drainage, Utilities
- Maintenance requirements, Access to adjacent properties
- Overall project purpose

As per Chapter 5.2 of ADOT NAR, for a noise abatement measure to be acoustically feasible ADOT requires achievement of at least a five dBA highway traffic noise reduction at 50% of impacted receptors. In some instances, the noise level at a particular location may be affected by an alternate noise source such as other roadways/streets, railroads, industrial facilities, and airplane flight paths. In such locations, noise abatement for the proposed transportation project may not be acoustically feasible, since a substantial overall noise reduction cannot be achieved due to other noise sources.

As per Chapter 6 of ADOT NAR, there are three reasonableness factors or "tests" that must collectively be achieved for a noise abatement measure to be deemed reasonable.
These are:

- Viewpoints or Preferences of Property Owners and Residents
- Noise Reduction Design Goal, and
- Cost-effectiveness

Noise barriers should be designed to reduce projected unmitigated noise levels by at least seven dBA for benefited Receptors closest to the transportation facility. To be considered reasonable, at least half of the benefited Receptors in the first row shall achieve this level of noise reduction. The maximum reasonable cost of abatement is $49,000 per benefited Receptor (cost-per-benefited- Receptor) with barrier costs calculated at $35 per square foot, $85 per square foot if constructed on a structure. Any cost of removal of previously built walls, drainage, and other similar construction work shall be included in the cost assessment.

Tables 4 through **25** summarize the evaluation of mitigation for impacted receptors in the study area. Only receivers representing impacted noise receptors and those closest to them that would potentially benefit from noise mitigation are listed in the tables.

West of 6th Avenue – Build Alternative I & IV

Mitigation was evaluated for both Build Alternatives for the Via del Sur Condominiums and two homes in the Sunset Villa neighborhood located north of I-10 and west of 6th Avenue. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies.

Table 4. Noise Mitigation Evaluation for 2040 Build Alternatives I & IV, West of 6th Avenue

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Reduction (7 dBA) [Y/N]	Mitigation
Sunset Villa Neighborhood and Val del Sur Condominiums (Figure A08)							Noise Wall #1 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R3	1	**66**	65	1	N	N	
R2	2	**69**	**66**	4	N	N	
Val del Sur Condominiums (Figure A08)							
R13 a 2nd story	4	**68**	65	3	N	N	
R12	2	**66**	63	2	N	N	
R11a 2nd story	4	**70**	65	5	Y	N	
R11	2	**67**	63	3	N	N	
R10	2	**67**	63	4	N	N	
R9a 2nd story	4	**71**	65	6	Y	N	
R9	2	**67**	63	5	Y	N	
R7	4	**73**	65	8	Y	Y	
R15a 2nd story	3	**75**	**67**	7	Y	N	
R15	3	**72**	65	7	Y	Y	
R14a 2nd story	4	**76**	**68**	8	Y	Y	
R14	4	**75**	65	11	Y	Y	
R8a 2nd story	5	**77**	**68**	9	Y	Y	
R8	5	**75**	**66**	9	Y	Y	
R7a 2nd Story	4	**77**	**68**	9	Y	Y	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

6th Avenue to Kino Parkway – Build Alternative I & IV

Mitigation was evaluated for both Build Alternatives for the Spanish Trail Apartments located north of the I-10 WB frontage road to 6th Avenue for both Build Alternatives. These apartments were purchased for re-development as affordable housing in February 2018 and there are

currently 120 units either currently leased or available for lease.[6] The ADOT NAR approach of the federal Category B NAC (66 dBA) applies. South of I-10 of the I-10 EB frontage road to Park Avenue, mitigation was evaluated for the Primavera Men's Shelter and the Economy Inn. The ADOT NAR approach of the FHWA Category C NAC, 66 dBA applies.

Mitigation was also evaluated for three segments of the Bridges Trails at Tucson Marketplace located north of I-10. The first segment begins adjacent to northbound Park Avenue and heads southeast for approximately 1,000 feet. The second segment begins midway between Park Avenue and Kino Parkway adjacent to I-10 WB. The ADOT NAR approach of the FHWA Category C NAC, 66 dBA applies.

Table 5. Noise Mitigation Evaluation for 2040 Build Alternatives I & IV, 6th Avenue to Park Avenue

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dBA)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Spanish Trail Apartments (Figure A08)							Noise Wall #2 is RECOMMENDED
R35	4	**73**	65	8	Y	Y	
R35 2ND	4	**76**	**69**	7	Y	Y	See Noise Wall Evaluation Summary Table 26
R35a	4	**71**	64	7	Y	Y	
R35a 2ND	4	**75**	**66**	9	Y	Y	
Primavera Men's Shelter (Figure A08)							
R36	35	**71**	**68**	4	N	N	
R36a 2ND	53	**75**	**70**	5	Y	N	
R37	35	**69**	**66**	3	N	N	Noise Wall #3 is RECOMMENDED
R37a	35	**68**	**66**	2	N	N	
Economy Inn (Figure A08)							See Noise Wall Evaluation Summary Table 26
R33 (4F10a)	2	**80**	**73**	7	Y	Y	
4F10b	2	**75**	**68**	7	Y	N	
4F10c	2	**70**	64	6	Y	N	
4F10d	2	**66**	60	6	Y	N	
4F10e	2	**72**	**66**	6	Y	N	

[6] Arizona Daily Star, *New owners plan to turn South Tucson's Spanish Trail Motel into affordable housing*. February 2018. Available at https://tucson.com/business/new-owners-plan-to-turn-south-s-spanish-trail/article)fd0c5d96-14d9-5117-991b-c6dcfad8ea77.html. Accessed Jun 1, 2019.

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dBA)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
4F10f	2	**68**	61	7	Y	N	See above.
4F10g	2	64	59	5	Y	N	
The Bridges Trails at Tucson Marketplace (Figure A08 & A09)							Noise Walls #3A & #3B are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
4F12a	0.5	**74**	**74**	0	N	N	
4F12b	0.5	**75**	**75**	0	N	N	
4F12c	0.5	**71**	**71**	0	N	N	
4F12d	0.5	**66**	65	1	N	N	
4F12e	0.5	63	62	1	N	N	
4F12f	0.5	**76**	**71**	5	N	Y	
4F12g	0.5	**76**	**70**	6	N	Y	Noise Wall #3C is NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
4F12h	0.5	**76**	**71**	6	N	Y	
4F12i	0.5	**77**	**73**	4	N	N	
4F12j	0.5	**72**	**68**	4	N	N	
4F12k	0.5	**67**	63	4	N	N	
4F12l	0.5	65	63	2	N	N	
4F12m	0.5	65	64	1	N	N	
4F12n	0.5	**66**	65	1	N	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

Kino Parkway to Country Club Road – Build Alternative I & IV

Mitigation was evaluated for both Build Alternatives for the Elvira Southland Park neighborhood located south of the I-10 EB off-ramp to Country Club Road. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies. Mitigation was also evaluated for the two baseball fields in the Kino Veteran Memorial Sports Complex located north of I-10 WB midway between Country Club Road and Kino Parkway. The ADOT NAR approach of the FHWA Category C NAC, 66 dBA applies.

Table 6. Noise Mitigation Evaluation for 2040 Build Alternatives I & IV, Park Avenue to Country Club Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Kino Veterans Memorial Sports Complex (Figure A09)							Noise Wall #4A is NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
R48 (4F15a)	5	62	61	1	N	N	
R49 (4F15b)	1	**68**	62	6	Y	N	
R50 (4F15c)	1	**68**	61	7	Y	Y	
Elvira Southland Park Neighborhood (Figure A09)							Noise Walls #4 and #5 are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
R64	2	**66**	64	2	N	N	
R60	2	65	62	3	N	N	
R67	3	62	58	4	N	N	
R66	3	63	58	4	N	N	
R65	3	63	57	5	Y	N	
R59	1	**66**	59	4	N	N	
R63	2	**66**	58	8	Y	N	
R62	1	63	58	5	Y	N	
R61	2	64	58	6	Y	N	
R57	2	65	58	7	Y	N	
R56	1	64	58	6	Y	N	
R58	3	65	59	8	Y	Y	
R55	1	**66**	60	6	Y	N	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

Country Club Road to Alvernon Way – Build Alternative I

Mitigation was evaluated for Build Alternative I for two segments of the Julian Wash Rail and Greenway/The Loop Trail located approximately 600 – 650 feet south of the I-10. The first segment is a continuation of the trail across Palo Verde Road heading east and the second segment begins midway between Palo Verde Road east toward Alvernon Way. A third segment where the trail crosses Alvernon Way was also evaluated. The ADOT NAR approach of the FHWA Category C NAC, 66 dBA applies. The Mortimore neighborhood located south of the trail along Alvernon Way SB was also evaluated for mitigation. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies. The primary project noise source impacting homes in the Mortimore neighborhood and the segments of the Julian Wash Rail and Greenway/The Loop Trail are from future traffic on Alvernon Way. Driveway and trail access prevent the implementation of noise walls to effective mitigate noise for these receptors.

Table 7. Noise Mitigation Evaluation for 2040 Build Alternative I, Country Club Road to Alvernon Way

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Julian Wash Rail and Greenway/The Loop Trail (Figures A09 & A10)							Noise Walls #5A, #5B, & #5C are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
4F1x	0.5	**66**	65	1	N	N	
4F1y	0.5	64	63	1	N	N	
4F1z	0.5	64	63	1	N	N	
4F1aa	0.5	64	63	1	N	N	
4F1ab	0.5	65	64	1	N	N	
4F1ac	0.5	63	62	1	N	N	
4F1ad	0.5	64	63	1	N	N	
4F1ae	0.5	60	60	0	N	N	
4F1af	0.5	60	60	0	N	N	
4F1ag	0.5	60	60	0	N	N	
4F1ah	0.5	60	60	0	N	N	
4F1ai	0.5	60	60	0	N	N	
4F1aj	0.5	62	62	0	N	N	
4F1ak	0.5	**66**	**66**	0	N	N	
4F1al	0.5	**67**	**66**	1	N	N	
4F1am	0.5	61	60	1	N	N	
4F1an	0.5	59	58	1	N	N	
4F1ao	0.5	58	57	1	N	N	
Mortimore Neighborhood (Figure A10)							Driveway access prevents effective mitigation
R72	2	**72**	N/A	N/A	N	N	
R73	3	**71**	N/A	N/A	N	N	
R74	3	**71**	N/A	N/A	N	N	
Julian Wash Rail and Greenway/The Loop Trail (Figure A10)							Maintenance of trail access prevents effective mitigation
4F1av	0.5	**66**	N/A	N/A	N	N	
4F1aw	0.5	**68**	N/A	N/A	N	N	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

Country Club Road to Alvernon Way – Build Alternative IV

Mitigation was evaluated for Build Alternative IV for the same three segments of the Julian Wash Rail and Greenway/The Loop Trail and the Mortimore neighborhood. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies for the neighborhood and the FHWA Category C NAC, 66 dBA applies for the trail segments. The primary project noise source impacting homes in the Mortimore neighborhood and the segments of the Julian Wash Rail and Greenway/The Loop

Trail are from future traffic on Alvernon Way. Driveway and trail access prevent the implementation of noise walls to effective mitigate noise for these receptors.

Table 8. Noise Mitigation Evaluation for 2040 Build Alternative IV, Country Club Road to Alvernon Way

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Julian Wash Rail and Greenway/The Loop Trail (Figures A09 & A15)							
4F1x	0.5	**68**	**68**	1	N	N	
4F1y	0.5	65	65	1	N	N	
4F1z	0.5	64	64	1	N	N	
4F1aa	0.5	64	64	0	N	N	
4F1ab	0.5	65	65	0	N	N	
4F1ac	0.5	63	63	0	N	N	Noise Walls #5A[1], #19A, & #19B are NOT RECOMMENDED
4F1ad	0.5	64	64	0	N	N	
4F1ae	0.5	60	60	0	N	N	
4F1af	0.5	60	60	0	N	N	
4F1ag	0.5	60	60	0	N	N	See Noise Wall Evaluation Summary Table 26
4F1ah	0.5	60	60	0	N	N	
4F1ai	0.5	60	60	0	N	N	
4F1aj	0.5	62	62	0	N	N	
4F1ak	0.5	**66**	**66**	0	N	N	
4F1al	0.5	**67**	**67**	0	N	N	
4F1am	0.5	61	61	0	N	N	
4F1an	0.5	59	59	0	N	N	
4F1ao	0.5	59	59	0	N	N	
Mortimore Neighborhood (Figure A15)							Driveway access prevents effective mitigation
R72	2	**72**	N/A	N/A	N	N	
R73	3	**67**	N/A	N/A	N	N	
R74	3	**69**	N/A	N/A	N	N	
Julian Wash Rail and Greenway/The Loop Trail (Figure A15)							Maintenance of trail access prevents effective mitigation
4F1av	0.5	65	N/A	N/A	N	N	
4F1aw	0.5	**68**	N/A	N/A	N	N	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

1. Noise Wall #5A located at the Country Club Road applies to Build Alternatives (I & IV).

Alvernon Way to Valencia Road – Build Alternative I

For Build Alternative I, mitigation was evaluated for the Estrella and Ray Subdivisions and the segment of the Julian Wash Rail and Greenway/The Loop Trail, located south of the I-10 EB between Alvernon Way where the freeway crosses Drexel Road. The ADOT NAR approach of the FHWA Category B and C NAC, 66 dBA applies.

Table 9. Noise Mitigation Evaluation for 2040 Build Alternative I, Alvernon Way to Valencia Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Los Ninos Elementary (Figure A10)							Noise Wall #6 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R75 (4F22a)	15	63	61	1	N	N	
4F22d	18	65	59	6	Y	N	
Augie Acuna Los Ninos Neighborhood Park (Figure A10)							
R76 (4F22b)	3	65	59	6	Y	N	
R77 (4F22c)	7	63	58	5	Y	N	
Estrella Subdivision (Figure A10)							
R78	1	63	59	4	N	N	
R78a	8	**67**	59	8	Y	Y	
R78b	3	65	60	5	Y	N	
R79	4	65	60	5	Y	N	
R79a	3	**66**	60	6	Y	N	
R79b	3	**67**	60	7	Y	Y	
R80	1	**67**	61	6	Y	N	
R80a	4	**67**	60	7	Y	Y	
R80b	1	**68**	61	7	Y	Y	
R81	4	**69**	62	7	Y	Y	
R82	2	63	58	5	Y	N	
R83	3	61	57	4	N	N	
R84	8	63	59	4	N	N	
R85	9	63	57	6	Y	N	
R86	5	**66**	59	7	Y	N	
R87	2	**66**	61	5	Y	N	
R88	2	**66**	60	6	Y	N	
R89	2	**68**	61	7	Y	N	
R90	8	60	56	4	N	N	
R91	5	61	57	4	N	N	
R92	5	63	59	4	N	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R93	7	64	58	6	Y	N	Noise Wall #6 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R94	4	65	59	6	Y	N	
R95	2	65	58	7	Y	N	
Ray Subdivision (Figures A10 & A11)							
R98	2	**66**	60	6	Y	N	
R99	2	**67**	60	6	Y	Y	
R100	2	**70**	62	8	Y	Y	
R102	3	**68**	63	5	Y	N	
R104	2	**67**	61	6	Y	N	
R105	2	**67**	62	5	Y	N	
R106	2	**66**	61	5	Y	N	
R107	2	**66**	59	7	Y	N	
R108	2	**66**	59	7	Y	Y	
Julian Wash Rail and Greenway/The Loop Trail (Figure A10)							
4F1bb	0.5	**66**	60	6	Y	N	
4F1bc	0.5	**66**	59	7	Y	Y	
4F1bd	0.5	**67**	60	7	Y	Y	
4F1be	0.5	**67**	60	7	Y	Y	
4F1bf	0.5	**66**	60	6	Y	N	
4F1bg	0.5	**66**	60	6	Y	N	
4F1bh	0.5	**67**	59	6	Y	N	
4F1bi	0.5	**66**	60	6	Y	N	
4F1bj	0.5	**67**	61	6	Y	N	
4F1bk	0.5	**68**	62	6	Y	N	
4F1bl	0.5	**68**	61	7	Y	Y	
4F1bm	0.5	**68**	61	7	Y	Y	
4F1bn	0.5	**70**	62	8	Y	Y	
4F1bo	0.5	**70**	62	8	Y	Y	
4F1bp	0.5	**71**	63	9	Y	Y	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

Alvernon Way to Valencia Road – Build Alternative IV

For Alternative IV, mitigation was evaluated for these subdivisions and the same segments of the trail. The ADOT NAR approach of the FHWA Category B and C NAC, 66 dBA applies.

Table 10. Noise Mitigation Evaluation for 2040 Build Alternative IV, Alvernon Way to Valencia Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Los Ninos Elementary (Figure A15)							Noise Wall #20 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R75 (4F22a)	15	63	62	1	N	N	
4F22d	18	**66**	66	0	Y	N	
Augie Acuna Los Ninos Neighborhood Park (Figure A15)							
R76 (4F22b)	3	65	60	5	Y	N	
R77 (4F22c)	7	63	59	4	N	N	
Estrella Subdivision (Figure A15)							
R78	1	64	59	5	Y	N	
R78a	8	**67**	60	7	Y	Y	
R78b	3	65	59	6	Y	N	
R79	4	**67**	60	7	Y	Y	
R79a	3	**68**	60	8	Y	Y	
R79b	3	**69**	60	9	Y	Y	
R80	1	**69**	61	9	Y	Y	
R80a	4	**68**	61	7	Y	Y	
R80b	1	**69**	61	8	Y	Y	
R81	4	65	60	5	Y	N	
R82	2	62	58	4	N	N	
R83	3	62	57	5	Y	N	
R84	8	64	59	5	Y	N	
R85	9	64	58	6	Y	N	
R86	5	**66**	58	8	Y	Y	
R87	2	**68**	60	8	Y	Y	
R88	2	**67**	60	7	Y	Y	
R90	8	61	57	4	N	N	
R91	5	62	57	5	Y	N	
R92	5	63	58	5	Y	N	
R93	7	65	58	7	Y	Y	
R94	4	**66**	59	7	Y	Y	
R95	2	65	58	7	Y	Y	
Ray Subdivision (Figures A15 & A16)							
R98	2	**66**	58	8	Y	N	
R99	2	**67**	60	7	Y	Y	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R100	2	**68**	61	7	Y	Y	
R102	3	**69**	60	8	Y	N	
R104	2	**67**	60	7	Y	Y	
R105	2	**67**	59	8	Y	N	
R106	2	**68**	59	9	Y	Y	
R107	2	**67**	58	9	Y	N	
R108	2	**67**	57	10	Y	Y	
Julian Wash Rail and Greenway/The Loop Trail (Figure A15)							
4F1bb	0.5	**67**	60	7	Y	Y	Noise Wall #20 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
4F1bc	0.5	**68**	60	8	Y	Y	
4F1bd	0.5	**69**	60	8	Y	Y	
4F1be	0.5	**69**	61	9	Y	Y	
4F1bf	0.5	**68**	60	8	Y	Y	
4F1bg	0.5	**69**	60	9	Y	Y	
4F1bh	0.5	**68**	60	8	Y	Y	
4F1bi	0.5	**68**	60	8	Y	Y	
4F1bj	0.5	**70**	61	9	Y	Y	
4F1bk	0.5	**70**	61	9	Y	Y	
4F1bl	0.5	**70**	61	9	Y	Y	
4F1bm	0.5	**71**	62	9	Y	Y	
4F1bn	0.5	**73**	62	11	Y	Y	
4F1bo	0.5	**71**	62	9	Y	Y	
4F1bp	0.5	**71**	62	9	Y	Y	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

Valencia Road to Craycroft Road – Build Alternative I

Mitigation was evaluated for Build Alternative I for the Valstate, Valstate II and Rancho Valencia II Subdivisions, located west of the I-10 EB and south of Valencia Road. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies.

Table 11. Noise Mitigation Evaluation for 2040 Build Alternative I, Valencia Road to Craycroft Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Valstate, Valstate II and Rancho Valencia II Subdivisions (Figures A11 & A12)							
R123	2	**68**	63	5	Y	N	
R123a	3	**69**	62	7	Y	Y	
R139	4	**67**	61	6	Y	N	
R133	1	**67**	61	6	Y	N	
R131	5	**69**	61	8	Y	N	
R130	4	**67**	61	6	Y	N	
R122	10	**69**	61	7	Y	Y	
R129	1	**68**	61	7	Y	N	
R128	6	63	59	4	N	N	
R127	1	64	59	5	Y	N	
R126	1	**66**	61	5	Y	N	
R137	1	65	61	4	N	N	
R138	5	65	61	4	N	N	
R121	3	63	59	4	N	N	
R121a	5	**68**	61	7	Y	Y	
R120	6	61	59	2	N	N	
R164	2	**66**	63	3	N	N	
R162	3	**68**	63	5	Y	N	
R161	3	**69**	64	5	Y	N	
R160	3	**72**	65	7	Y	Y	
R163	4	**68**	62	6	Y	N	
R159	2	**68**	61	7	Y	Y	
R142	3	61	59	2	N	N	
R141	5	63	59	4	N	N	
R140	4	**66**	61	5	Y	N	
R136	4	**67**	62	5	Y	N	
R125	5	**67**	59	8	Y	Y	
R124	3	**68**	63	5	Y	N	
R124a	2	**72**	65	7	Y	Y	
R132	3	**69**	63	6	Y	N	
R135	5	**67**	61	6	Y	N	

Noise Walls #7 and #8 are RECOMMENDED

See Noise Wall Evaluation Summary Table 26

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

Valencia Road to Craycroft Road – Build Alternative IV

For Build Alternative IV, mitigation was also evaluated for these subdivisions. The ADOT NAR Category B 66 dBA NAC applies.

Table 12. Noise Mitigation Evaluation for 2040 Build Alternative IV, Valencia Road to Craycroft Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Valstate, Valstate II and Rancho Valencia II Subdivisions (Figure A16 & A17)							
R123	2	**68**	62	6	Y	N	
R123a	3	**68**	63	5	Y	N	
R122	10	**68**	61	7	Y	N	
R139	4	**67**	61	6	Y	N	
R138	5	65	61	4	N	N	
R137	1	65	62	3	N	N	
R136	4	**67**	62	5	Y	N	
R135	5	**67**	62	5	Y	N	
R134	2	65	61	4	Y	N	
R133	1	**66**	60	6	Y	N	
R131	5	**66**	60	6	Y	N	
R130	4	65	61	5	Y	N	Noise Walls #21 and #22 are RECOMMENDED See Noise Wall Evaluation Summary Table 26
R122	10	**68**	61	7	Y	Y	
R129	1	**66**	60	6	Y	N	
R128	6	64	60	4	Y	N	
R127	1	63	58	5	N	N	
R126	1	65	59	6	N	N	
R121	3	63	61	2	Y	N	
R121a	5	**69**	59	10	Y	Y	
R120	6	61	60	1	N	N	
R164	2	**66**	61	5	Y	N	
R162	3	**68**	61	7	Y	N	
R161	3	**69**	62	7	Y	Y	
R160	3	**70**	63	7	Y	Y	
R163	4	**68**	61	7	Y	N	
R159	2	**68**	60	8	Y	Y	
R158	4	62	58	4	N	N	
R142	3	61	57	4	N	N	
R141	5	64	59	5	Y	N	
R140	4	**66**	60	6	Y	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R136	4	**67**	61	6	Y	N	See Noise Wall Evaluation Summary Table 26
R132	3	**67**	61	6	Y	N	
R125	5	**67**	59	8	Y	Y	
R124	5	**67**	61	6	Y	N	
R124a	2	**70**	65	5	Y	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

East of Craycroft Road – Build Alternative I

Mitigation was evaluated for Build Alternative I for the Littlefield I neighborhood, located north of I-10 WB and east of Craycroft Road. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies. Two options were evaluated. Option 1 would place noise walls along northbound Craycroft Road and the proposed driveway access/frontage road that would be constructed to accommodate a new signalized intersection with the new connector proposed on the northwest quadrant of the Craycroft Road interchange. Option 2 would place noise along the westbound I-10 Craycroft WB overpass and on ramp.

Table 13. Noise Mitigation Evaluation for 2040 Build Alternative I, East of Craycroft Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Littlefield I Neighborhood (Figures A11 & A12)							Option 1
R174	2	64	63	1	N	N	Noise Walls #9 and #10 are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
R173	1	64	63	1	N	N	
R167	4	64	62	2	N	N	
R171	4	62	60	2	N	N	
R166	4	63	61	2	N	N	
R170	4	**66**	63	3	N	N	
R169	2	**67**	64	3	N	N	
R165	3	**68**	64	4	N	N	
R174	2	64	60	4	N	N	Option 2
R173	1	64	60	4	N	N	Noise Walls #11 and #12 are NOT RECOMMENDED
R167	4	64	63	1	N	N	
R171	4	62	61	1	N	N	
R166	4	63	61	2	N	N	
R170	4	**66**	64	2	N	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R169	2	**67**	65	2	N	N	See Noise Wall Evaluation Summary Table 26
R165	3	**68**	**66**	4	N	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

East of Craycroft Road – Build Alternative IV

For Alternative IV, mitigation was evaluated for Build Alternative IV for the Littlefield I neighborhood. The ADOT NAR approach of the Category B NAC, 66 dBA applies. The same two noise wall location options were investigated.

Table 14. Noise Mitigation Evaluation for 2040 Build Alternative IV, East of Craycroft Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Littlefield I Neighborhood (Figure A16 & A17)							Option 1
R174	2	63	63	0	N	N	Noise Walls #23 and #24 are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
R173	1	63	63	0	N	N	
R167	4	64	62	2	N	N	
R171	4	62	60	2	N	N	
R166	4	63	61	2	N	N	
R170	4	65	62	3	N	N	
R169	2	**66**	64	2	N	N	
R165	3	**67**	64	3	N	N	
R174	2	63	61	3	N	N	Option 2
R173	1	63	60	3	N	N	Noise Walls #25 and #26 are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
R167	4	64	63	1	N	N	
R171	4	62	61	1	N	N	
R166	4	63	61	2	N	N	
R170	4	65	63	2	N	N	
R169	2	**66**	64	2	N	N	
R165	3	**67**	**66**	2	N	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

Craycroft Road to Wilmot Road – Build Alternative I

Mitigation was evaluated for Build Alternative I for the Corazon Del Pueblo and Canterbury Ranch subdivisions, located northeast of I-10 WB between Craycroft Road and Wilmot Road. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies.

Table 15. Noise Mitigation Evaluation for 2040 Build Alternative I, Craycroft Road to Wilmot Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Corazon Del Pueblo and Canterbury Ranch Subdivisions (Figure A12)							
R177	5	**70**	62	8	Y	Y	
R176	5	**74**	**67**	7	Y	Y	
R175	5	**75**	**66**	9	Y	Y	
R187a	3	65	60	5	Y	N	
R197	3	**70**	64	6	Y	N	
R196	3	**71**	65	6	Y	N	
R193	4	**71**	64	7	Y	N	
R192	3	**72**	65	7	Y	Y	
R190	2	**68**	64	4	N	N	
R188	5	**72**	59	13	Y	N	
R187	3	**66**	63	3	N	N	Noise Wall #13 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R186	5	**69**	63	5	Y	N	
R185	6	**71**	57	14	Y	N	
R184	4	**71**	65	6	Y	N	
R183	4	**70**	65	5	Y	N	
R182	1	**68**	62	6	Y	N	
R181	2	**72**	65	7	Y	Y	
R206	3	64	59	5	Y	N	
R205	3	64	60	5	Y	N	
R204	4	65	62	3	N	N	
R203	2	**68**	61	7	Y	N	
R202	2	**69**	61	8	Y	N	
R201	1	62	59	3	N	N	
R200	1	64	60	4	N	N	
R199	4	64	59	5	Y	N	
R198	2	**70**	62	8	Y	N	
R195	2	**70**	63	7	Y	Y	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R180	7	**72**	65	7	Y	Y	See Noise Wall Evaluation Summary Table 26
R179	6	**73**	**67**	6	Y	N	
R178	7	**72**	65	7	Y	Y	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

Craycroft Road to Wilmot Road – Build Alternative IV

For Build Alternative IV, mitigation was also evaluated for these subdivisions. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies.

Table 16. Noise Mitigation Evaluation for 2040 Build Alternative IV, Craycroft Road to Wilmot Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Corazon Del Pueblo and Canterbury Ranch Subdivisions (Figure A17)							Noise Wall #27 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R187a	3	63	59	4	Y	N	
R196	3	**69**	64	5	Y	N	
R193	4	**69**	63	6	Y	N	
R192	3	**70**	63	7	Y	Y	
R191	3	62	61	3	Y	N	
R190	2	**67**	64	3	Y	N	
R188	5	**70**	55	15	Y	N	
R187	3	64	61	3	N	N	
R186	5	**67**	62	5	Y	N	
R185	6	**69**	54	15	Y	N	
R184	4	**69**	63	6	Y	N	
R183	4	**68**	63	5	Y	N	
R182	1	**67**	61	6	Y	N	
R181	2	**69**	62	7	Y	Y	
R177	5	**67**	60	7	Y	Y	
R176	5	**71**	64	6	Y	N	
R175	5	**72**	65	7	Y	Y	
R206	3	63	58	5	Y	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R205	3	63	59	4	Y	N	Noise Wall #27 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R204	4	63	60	3	N	N	
R203	2	**67**	60	7	Y	N	
R202	2	**68**	60	8	Y	N	
R201	1	61	58	3	N	N	
R200	1	63	59	4	N	N	
R199	4	63	59	4	Y	N	
R198	2	**69**	61	8	Y	N	
R195	2	**68**	61	7	Y	Y	
R180	7	**69**	63	6	Y	N	
R179	6	**69**	62	7	Y	Y	
R178	7	**68**	62	6	Y	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

Wilmot Road to Kolb Road – Build Alternative I

Mitigation was evaluated for Build Alternative I for the Hidden Hills Trail, which runs parallel to I-10 WB, east of Wilmot Road and continuing east beyond Kolb Road within the study limits. The ADOT NAR approach of the FHWA Category C NAC, 66 dBA applies.

Table 17. Noise Mitigation Evaluation for 2040 Build Alternative I, Wilmot Road to Kolb Road North of I-10

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Hidden Hills Trail (Figures A12 & A13)							Noise Walls #14 and #15 are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
4F32a	0.5	**71**	**70**	1	N	N	
4F32b to 32e	2	**67**	64	3	N	N	
4F32f	0.5	**67**	61	6	Y	N	
4F32g	0.5	**67**	61	6	Y	N	
4F32h	0.5	**67**	61	6	Y	N	
4F32i to 32p	4	**67**	61	6	Y	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
4F32q to 32s	1.5	**67**	59	8	Y	Y	Noise Walls #14 and #15 are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
4F32t to 32v	1.5	**67**	59	8	Y	Y	
4F32w to 32y	1.5	**67**	59	8	Y	Y	
4F32z	0.5	**66**	59	7	Y	Y	
4F32aa	0.5	**66**	60	6	Y	N	
4F32ab	0.5	**66**	60	6	Y	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

On the south side of the freeway, adjacent to I-10 EB the Desert Stone, Vista Montana Estates and Sycamore Point Subdivisions were evaluated for mitigation. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies.

Table 18. Noise Mitigation Evaluation for 2040 Build Alternative I, Wilmot Road to Kolb Road South of I-10

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Desert Stone, Vista Montana Estates, and Sycamore Point Subdivisions (Figures A12 & A13)							Noise Walls #16 and #17 are RECOMMENDED See Noise Wall Evaluation Summary Table 26
R210	5	**68**	64	4	N	N	
R211	5	**69**	63	6	Y	N	
R212	4	**72**	**66**	6	Y	N	
R213	2	**73**	65	8	Y	N	
R214	2	**68**	63	5	Y	N	
R215	2	**67**	63	4	N	N	
R217	4	**78**	**66**	12	Y	Y	
R220	3	**72**	64	8	Y	N	
R221	5	**79**	**66**	13	Y	Y	
R222	3	**72**	64	8	Y	N	
R223	3	**70**	64	6	Y	N	
R225	2	**68**	63	5	Y	N	
R226	2	**74**	65	9	Y	N	
R227	3	**69**	62	7	Y	N	
R228	5	**79**	**66**	13	Y	Y	
R229	8	**70**	**66**	4	N	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R230	4	**67**	63	4	N	N	Noise Walls #16 and #17 are RECOMMENDED See Noise Wall Evaluation Summary Table 26
R231	8	**66**	62	4	N	N	
R232	4	**66**	62	4	N	N	
R233	4	**68**	62	6	Y	N	
R234	8	**75**	65	10	Y	Y	
R235	8	**75**	**66**	9	Y	Y	
R236	6	**67**	61	7	Y	N	
R238	2	**68**	61	7	Y	N	
R239	2	**67**	61	6	Y	N	
R240	10	**66**	59	7	Y	Y	
R241	10	65	59	6	Y	N	
R242	6	**68**	62	6	Y	N	
R243	4	**69**	62	7	Y	Y	
R244	2	65	62	3	N	N	
R245	3	64	59	5	Y	N	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

Wilmot Road to Kolb Road – Build Alternative IV

For Alternative IV, the Hidden Hills Trail was also evaluated for mitigation as an impacted Category C land use and the ADOT approach of the FHWA NAR Category C NAC, 66 dBA applies. A shorter segment of the trail is predicted to experience elevated noise levels for Alternative IV. This may be due to shielding of heavy truck noise on the interior freeway lanes by jersey barriers that separate them from the outside collector distributor lanes; therefore, different representative points on the trail (receivers) were included in the mitigation analysis.

Table 19. Noise Mitigation Evaluation for 2040 Build Alternative IV, Wilmot Road to Kolb Road

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Hidden Hills Trail (Figure A17 & A18)							See below.
4F32a	0.5	**72**	**72**	0	N	N	
4F32b	0.5	**68**	**67**	1	N	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
4F32c	0.5	**67**	65	2	N	N	Noise Walls #28 and #29 are NOT RECOMMENDED See Noise Wall Evaluation Summary Table 26
4F32d	0.5	**66**	63	3	N	N	
4F32e	0.5	**66**	62	4	N	N	
4F32f	0.5	**66**	62	4	N	N	
4F32g	0.5	**66**	61	5	Y	N	
4F32h	0.5	**66**	61	5	Y	N	
4F32i	0.5	**66**	61	5	Y	N	
4F32j	0.5	**66**	61	5	Y	N	
4F32k	0.5	**66**	60	6	Y	N	
4F32l	0.5	**66**	60	6	Y	N	
4F32m	0.5	**66**	60	6	Y	N	
4F32n	0.5	**66**	60	6	Y	N	
4F32o	0.5	**66**	60	6	Y	N	
4F32p	0.5	**66**	60	6	Y	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

For Build Alternative IV, the Desert Stone, Vista Montana Estates and Sycamore Point Subdivisions were also evaluated for mitigation. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies.

Table 20. Noise Mitigation Evaluation for 2040 Build Alternative IV, Wilmot Road to Kolb Road South of I-10

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Desert Stone, Vista Montana Estates, and Sycamore Point Subdivisions (Figure A17 & A18)							
R210	5	**67**	64	3	N	N	Noise Wall #30 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R211	5	**69**	64	5	Y	N	
R212	4	**69**	65	5	Y	N	
R213	2	**70**	64	6	Y	N	
R214	2	**67**	63	4	N	N	
R217	4	**77**	65	12	Y	Y	
R220	3	**69**	64	5	Y	N	
R221	5	**77**	65	12	Y	Y	
R222	3	**69**	64	5	Y	N	
R223	3	**70**	64	6	Y	N	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
R224	3	**66**	62	4	N	N	
R225	2	**69**	63	6	Y	N	
R226	2	**71**	64	7	Y	N	
R227	3	**68**	63	5	N	N	
R228	5	**78**	65	13	Y	Y	
R229	3	**71**	65	6	Y	N	
R229a	5	**71**	64	7	Y	Y	
R230	4	**69**	63	6	Y	N	
R231	8	**68**	64	4	N	N	
R232	4	**68**	65	3	N	N	
R233	4	**68**	61	7	Y	N	Noise Wall #30 is RECOMMENDED
R234	8	**73**	65	8	Y	Y	
R235	8	**72**	65	7	Y	Y	
R235a	3	**73**	62	11	Y	Y	See Noise Wall Evaluation Summary Table 26
R236	6	**66**	60	6	Y	N	
R238	2	**66**	60	6	Y	N	
R239	2	**66**	60	6	Y	N	
R240	3	64	59	5	Y	N	
R240a	7	**66**	60	6	Y	N	
R241	3	64	59	5	Y	N	
R241a	7	65	60	5	Y	N	
R242	6	**67**	62	5	Y	N	
R243	4	**68**	62	6	Y	N	
R244	2	64	64	0	N	N	
R245	3	63	59	4	N	N	
R246	4	62	58	4	N	N	
R247	3	60	58	2	N	N	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

East of Kolb Road – Build Alternative I

On the south side of the freeway, adjacent to I-10 EB the Ross Acres and Ross Acres – Trails Association RV Resort were evaluated for mitigation. The ADOT NAR approach of the FHWA Category B NAC, 66 dBA applies.

Table 21. Noise Mitigation Evaluation for 2040 Build Alternative I, East of Kolb Road and South of I-10

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Ross Acres and Ross Acres – Trails Association RV Resort (Figures A13 & A14)							
R299	4	64	58	6	Y	N	
R297	4	64	58	6	Y	N	
R295	8	64	58	6	Y	N	
R292	6	63	58	5	Y	N	
R269	4	**67**	60	7	Y	N	
R268	2	**69**	61	8	Y	N	
R267	2	**72**	63	9	Y	Y	
R266	2	**75**	65	10	Y	Y	
R265	2	**67**	61	6	Y	N	
R264	2	**69**	62	7	Y	Y	
R263	2	**67**	60	7	Y	Y	
R261	2	**70**	63	7	Y	Y	
R260	3	**69**	62	7	Y	Y	
R259	4	**66**	60	6	Y	N	Noise Wall #18 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R258	1	**68**	61	7	Y	N	
R257	1	**68**	62	6	Y	N	
R256	1	**69**	62	7	Y	N	
R255	2	**70**	63	7	Y	N	
R254	2	**74**	64	10	Y	Y	
R253	2	**74**	65	9	Y	Y	
R285	3	**66**	60	6	Y	N	
R284	31	**68**	61	7	Y	Y	
R283	28	**67**	60	7	Y	Y	
R282	25	**67**	60	7	Y	Y	
R280	1	**67**	60	7	Y	Y	
R279	1	**69**	60	9	Y	Y	
R278	1	**67**	60	7	Y	Y	
R277	1	**66**	59	7	Y	Y	
R276	1	**66**	59	7	Y	Y	
R275	1	**66**	59	7	Y	Y	
R274	1	**67**	59	8	Y	Y	
R273	1	**67**	60	7	Y	Y	
R272	1	**66**	59	7	Y	Y	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

Mitigation was evaluated for the Vail Academy High School, which is located north of the freeway between the highway and the Hidden Hills Trail east of Kolb Road. Exterior usage areas (soccer field, ramada, basketball court, common areas behind the school) were considered. The ADOT NAR approach of the Category C NAC, 66 dBA applies. The segment of the Hidden Hills Trail is set back further from the highway and exceedances of the Category C NAC were not predicted; therefore, mitigation was not evaluated for the trail in this area.

Table 22. Noise Mitigation Evaluation for 2040 Build Alternative I, East of Kolb Road and North of I-10

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Vail Academy and High School (Figures A13 & A14)							
R309 (4F34a)	20	**76**	**68**	8	Y	Y	
R310 (4F34b)	20	**74**	**67**	7	Y	Y	
R311 (4F34c)	20	**72**	64	8	Y	Y	Noise Wall #19 is RECOMMENDED
R312 (4F34d)	1	**69**	63	6	Y	Y	See Noise Wall Evaluation Summary Table 26
R313 (4F34e)	1	**71**	64	8	Y	Y	
R314 (4F34f)	1	**72**	64	8	Y	Y	
4F34g	2	**68**	63	5	Y	Y	
4F34h	2	**69**	63	6	Y	Y	
4F34i	2	**70**	64	6	Y	Y	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

East of Kolb Road – Build Alternative IV

The Ross Acres and Ross Acres – Trails Association RV Resort were also evaluated for mitigation for Build Alternative IV. The ADOT NAR approach to the FHWA Category B NAC, 66 dBA applies.

Table 23. Noise Mitigation Evaluation for 2040 Build Alternative IV, East of Kolb Road and South of I-10

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Ross Acres and Ross Acres – Trails Association RV Resort (Figures A18 & A19)							
R299	4	64	58	6	Y	N	
R297	4	64	59	6	Y	N	
R295	8	64	59	5	Y	N	
R292	6	64	58	5	Y	N	
R269	4	**67**	60	7	Y	N	
R268	2	**69**	62	8	Y	N	
R267	2	**73**	63	9	Y	Y	
R266	2	**75**	65	10	Y	Y	
R265	2	**67**	60	6	Y	N	
R264	2	**70**	62	8	Y	Y	
R263	2	**68**	61	7	Y	Y	
R261	2	**70**	62	8	Y	Y	
R260	3	**70**	62	8	Y	Y	
R259	4	**66**	60	6	Y	N	
R258	1	**67**	61	6	Y	N	Noise Wall #31 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R257	1	**67**	62	5	Y	N	
R256	1	**69**	62	7	Y	N	
R255	2	**69**	63	6	Y	N	
R254	2	**74**	64	10	Y	Y	
R253	2	**73**	65	8	Y	Y	
R286	1	64	61	3	N	N	
R285	3	65	62	3	N	N	
R284	31	**67**	60	7	Y	N	
R283	28	**67**	60	7	Y	N	
R282	25	**67**	59	8	Y	Y	
R280	1	**67**	61	6	Y	N	
R279	1	**69**	61	8	Y	Y	
R278	1	**67**	60	8	Y	Y	
R277	1	**66**	59	7	Y	Y	
R276	1	**67**	59	7	Y	Y	
R275	1	**67**	59	7	Y	Y	
R274	1	**67**	60	7	Y	Y	
R273	1	**67**	60	7	Y	Y	
R272	1	**66**	59	7	Y	Y	
R271	1	**68**	60	8	Y	Y	

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

For Build Alternative IV, mitigation was also evaluated for the Vail Academy High School. The same exterior usage areas were considered. The ADOT NAR approach to the FHWA Category C NAC, 66 dBA applies. This segment of the Hidden Hills Trail is set back further from the highway and exceedances of the Category C NAC were not predicted; therefore, mitigation was not evaluated for the trail in this area.

Table 24. Noise Mitigation Evaluation for 2040 Build Alternative IV, East of Kolb Road and North of I-10

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Vail Academy and High School (Figures A18 & A19)							Noise Wall #32 is RECOMMENDED See Noise Wall Evaluation Summary Table 26
R309 (4F34a)	20	**75**	**68**	7	Y	Y	
R310 (4F34b)	20	**74**	**67**	7	Y	Y	
R311 (4F34c)	20	**72**	64	8	Y	Y	
R312 (4F34d)	1	**70**	63	7	Y	N	
R313 (4F34e)	1	**72**	64	8	Y	Y	
R314 (4F34f)	1	**72**	65	8	Y	Y	
4F34g	2	**68**	63	5	Y	N	
4F34h	2	**69**	63	6	Y	N	
4F34i	2	**70**	64	6	Y	N	
Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.							

North of Golf Links Road – Build Alternatives I & IV

Mitigation was evaluated for Build Alternatives I & IV for the Barraza/Aviation Path, which runs parallel to Golf Links Road WB as it approaches the reconfigured Golf Links/Alvernon Way/SR 210

intersection from the east. The ADOT NAR approach of the FHWA Category C NAC, 66 dBA applies.

Table 25. Noise Mitigation Evaluation for 2040 Build Alternatives I& IV, North of Golf Links Road and East of SR 210

Receiver ID	NO. of Dwelling Units	Unmitigated Noise Level (dB)	Mitigated Noise Level (dBA)	Insertion Loss (dBA)	Benefited Receiver (5 dBA) [Y/N]	1st Row Design Goal (7 dBA) [Y/N]	Mitigation
Vail Academy and High School (Figure A21)							
4F17a	0.5	**71**	**66**	5	Y	N	
4F17b	0.5	**67**	63	4	N	N	
4F17c	0.5	**69**	63	6	Y	N	
4F17d	0.5	**72**	62	10	Y	Y	
4F17e	0.5	**74**	62	12	Y	Y	Noise Wall #33 is NOT RECOMMENDED
4F17f	0.5	**74**	62	12	Y	Y	
4F17g	0.5	**73**	61	12	Y	Y	
4F17h	0.5	**71**	61	10	Y	Y	
4F17i	0.5	**70**	60	10	Y	Y	See Noise Wall Evaluation Summary Table 26
4F17j	0.5	**67**	58	9	Y	Y	
4F17k	0.5	64	56	9	Y	Y	
4F17l	0.5	64	55	9	Y	Y	
4F17m	0.5	64	56	9	Y	Y	
4F17n	0.5	65	57	9	Y	Y	
4F17o	0.5	**66**	57	9	Y	Y	
4F17p	0.5	**68**	59	9	Y	Y	
4F17q	0.5	**66**	57	9	Y	Y	

Note: **Bolded** noise levels indicate exceedance of the relevant NAC. *Italicized* **bolded** receiver IDs represent 1st row receptors.

Summary of Noise Wall Evaluations

A total of 27 noise walls were evaluated to provide mitigation of future (2040) peak hour noise levels associated with Build Alternative I. Ten of the walls located west of the future I-10/SR 210 system-to-system interchange at Alvernon Way and one wall proposed north of Golf Links Road are common to Build Alternative IV as both alternatives are identical in terms of design for these sections of the project with minor variations in peak hour traffic of less than 2%. Unique to Build Alternative IV, 15 noise walls were evaluated between Palo Verde Road and Kolb Road, where the proposed combination freeway with outside collector distributor lanes influences peak hour traffic noise levels relative to Alternative I. **Table 26** summarizes the evaluation of each noise wall or combination of walls, such as the proposed walls #16 and #17 that would provide mitigation

for the Desert Stone, Vista Montana Estates Phase I, and Sycamore point residential communities.

Of the 27 noise walls evaluated for Build Alternative I, 11 meet all ADOT NAR reasonable mitigation requirements, including the 7dBA design goal for 50% of benefited receptors in the 1st row, 5dBA or greater noise reduction for 50% of impacted receptors, and the $49,000 cost per benefited receptor. Three of the walls (NW #1, #2 & #3) are common to Build Alternative IV. The recommended noise walls are:

- Noise Wall #1 at the I-10 WB outside edge of pavement (EOP) east of 6th Avenue, I-10 station (STA) 330+70 to 339+78
- Noise Wall #2 at the 6th Avenue Ramp W-FR-1 inside EOP, I-10 STA 356+75 to 366+73
- Noise Wall #3 at the 6th Avenue EB on-ramp to the EB frontage Road to Park Avenue inside EOP, I-10 STA 350+50 to 361+60
- Noise Wall #6 at the Alvernon Way Ramp D to the I-10 EB outside EOP, I-10 STA 573+50 to 630+59
- Combination Noise Wall #7/#8
    - Wall #7 at the I-10 EB Valencia Overpass outside EOP, I-10 STA 663+50 to 681+00
    - Wall #8 at the Valencia EB to Valencia Ramp D outside EOP to Craycroft Ramp A outside EOP, I-10 STA 670+60 to 715+25
- Noise Wall #13 at the I-10 WB outside EOP to Craycroft Ramp C outside EOP, I-10 STA 733+00 to 771+00
- Combination Noise Wall #16/#17
    - Noise Wall #16 at the Wilmot Ramp D outside EOP to I-10 EB outside EOP, I-10 STA 794+60 to 847+30
    - Noise Wall #17 at theI-10 EB outside EOP, I-10 STA 847+12 to 853+00
- Noise Wall #18 at the Kolb Ramp D outside EOP to I-10 EB outside EOP, I-10 STA 863+25 to 928+17
- Noise Wall #19 at the I-10 WB right-of-way (ROW), I-10 STA 902+00 to 920+00

The feasibility of construction would be evaluated at a later stage of design. Noise Wall #3 would provide reasonable and feasible mitigation for the Primavera Men's Shelter and Economy Inn collectively; however, if the Economy Inn would prefer to maintain visibility from freeway traffic, construction of a shorter wall that meets reasonable and feasible mitigation for the men's shelter alone would not be achievable.

The remaining 16 noise walls do not meet one or more of these requirements, primarily for recreational Activity Category C land uses, and are therefore not recommended. Two of these walls (NW #4 & #5) would not meet the 7dBA design goal for first row receptors and also exceed the ADOT NAR reasonableness cost-per-benefit allowance by approximately 2.5 times

($119,900/benefit) and are not recommended for the Elvira Southland Park neighborhood. As these walls are common to Build Alternative IV, they are not recommended for that alternative either.

Of the 15 noise walls unique to Build Alternative IV, seven meet all ADOT NAR reasonable mitigation requirements, including the 7dBA design goal for 50% of benefited receptors in the 1st row and the $49,000 cost per benefited receptor or the acoustic feasibility requirement of a 5dBA or greater noise reduction for impacted receptors.

The recommended noise walls are:

- Noise Wall #20 at the Alvernon Way Ramp D to the I-10 EB collector-distributor outside EOP, I-10 STA 573+50 to 629+50
- Combination Noise Wall #21/#22
    - Noise Wall #21 at I-10 EB Valencia overpass outside EOP, I-10 STA 663+00 to 679+60
    - Noise Wall #22 at the Valencia EB to Valencia Ramp D outside EOP to Craycroft Ramp A outside EOP, I-10 STA 670+60 to 715+50
- Noise Wall #27 at the I-10 WB outside EOP to Craycroft Ramp C outside EOP, I-10 STA 729+30 to 769+30
- Noise Wall #30 at the Wilmot Ramp D outside EOP to I-10 EB outside EOP, I-10 STA 794+55 to 855+32
- Noise Wall #31 at the Kolb Ramp D outside EOP to I-10 EB outside EOP, I-10 STA 863+25 to 932+00
- Noise Wall #32 at the I-10 WB ROW, I-10 STA 899+98 to 920+00

Noise walls #1, #2 and #3, common to Build Alternative I, are also recommended for Build Alternative IV. The feasibility of construction would be evaluated at a later stage of design. The remaining eight noise walls unique to Build Alternative IV do not meet one or more of these requirements and are therefore not recommended.

Table 26. Noise Wall Evaluation Summary

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternatives I & IV West of 6th Avenue (Figure A08)											
Noise Wall #1 I-10 WB outside EOP STA 330+70 to 339+78	16	908	14,523	$508,291	42	$12,102	29 of 33	55	42	76%	Y
Alternatives I & IV 6th Avenue to Park Avenue (Figure A08)											
Noise Wall #2 6th Avenue Ramp W-FR-1 inside EOP STA 356+75 to 366+73	14	998	13,975	$489,130	16	$30,571	4 of 4	16	16	100%	Y
Noise Wall #3 6th Avenue EB On-Ramp inside EOP STA 350+50 to 361+60	20	1,100	21,997	$769,909	53	$11,491	2 of 4	67	65	97%	Y
Alternatives I & IV Park Avenue to Kino Parkway (Figures A08 & A09)											
Noise Wall #3A Park Avenue WB On-Ramp Outside EOP STA 381+67 to 398+58	20	1,706	20,475	$2,940,035[1]	1.5	$1.96M	0 of 6.5	6	1.5	25%	N[2,3,4]
Noise Wall #3B I-10 WB Park Avenue Overpass Outside EOP STA 370+64 to 382+48	12	1,201	24,017								
Noise Wall #3C I-10 WB outside EOP STA 410+48 to 428+89	20	1.964	39,276								

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternatives I & IV Kino Parkway to Country Club Road (Figure A09)											
Noise Wall #4A I-10 WB outside EOP STA 453+96 to 473+85	14 – 16	1,989	31,410	$1,093,335	7	$157,048	1 of 7	7	2	29%	N[2,3,4]
Noise Wall #4 Country Club Ramp A outside EOP STA 481+30 to 496+27	20	1,525	30,509	$1,067,835	16	$119,990	4 of 13	6	4	67%	N[2,3]
Noise Wall #5 I-10 EB Country Club Overpass outside EOP STA 491+50 to 507+50	12	1,600	19,200	$852,006[1]							
Alternative I Country Club Road to Alvernon Way (Figure A09 & A10)											
Noise Wall #5A[5] I-10 Country Club Ramp D outside EOP STA 507+66 to 523+59	20	1,593	85,173	$3,221,058[1]	0	N/A	0 of 9	9	0	0%	N[2,3,4]
Noise Wall #5B I-10 EB outside EOP to Ramp EN STA 522+53 to 547+63	12 - 20	2,510									
Noise Wall #5C I-10 EB outside EOP STA 547+57 to 557+00	8 - 10	942									
Alternative I Alvernon Way to Valencia Road (Figures A10 & A11)											
Noise Wall #6 Alvernon Way Ramp D to I-10 EB outside EOP STA 573+50 to 630+59	16 – 20	5,650	111,806	$4,113,258[1]	102.5	$40,129	30 of 54.5	79.5	61.5	77%	Y

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternative I Valencia Road to Craycroft Road (Figures A11 & A12)											
Noise Wall #7 I-10 EB Valencia Overpass outside EOP STA 663+50 to 681+00	10	1,782	17,820	$3,628,797[1]	84	$43,200	29 of 50	74	68	92%	Y
Noise Wall #8 Valencia Road EB to Valencia Ramp D @ ROW to Craycroft Road Ramp A outside EOP STA 670+60 to 715+25	16 - 18	4,767	83,003								
Alternative I @ Craycroft Road (Figure A12) – Option 1											
Noise Wall #9 Craycroft Road NB @ frontage outside EOP STA 720+85 to 722+60	12	276	3,311	$415,707	0	N/A	0 of 21	9	0	0%	N[2,3,4]
Noise Wall #10 Craycroft NB N of Travel Plaza Way outside EOP STA 716+50 to 720+50	12	714	8,566								
Alternative I @ Craycroft Road (Figure A11 & A12) – Option 2											
Noise Wall #11 I-10 WB Craycroft Overpass outside EOP STA 709+00 to 714+40	12	1,456	17,472	$1,204,420[1]	0	N/A	0 of 21	9	0	0%	N[2,3,4]
Noise Wall #12 Craycroft Ramp C inside EOP STA 722+00 to 731+50	20	847	16,940								

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternative I Craycroft Road to Wilmot Road (Figure A12)											
Noise Wall #13 I-10 WB outside EOP to Craycroft Ramp C outside EOP STA 733+00 to 771+00	12 - 16	3,800	54,199	$1,896,979	96	$21,804	31 of 46	88	83	95%	Y
Alternative I Wilmot Road to Kolb Road (Figures A12 & A13)											
Noise Wall #14 I-10 Wilmot Overpass outside EOP STA 782+50 to 798+50	12	1,600	19,200	$4,144,993[1]	14	$345,416	5 of 14	14	12	86%	N[2,3]
Noise Wall #15 I-10 WB outside EOP to Craycroft Ramp C outside EOP STA 795+60 to 837+50	18	5,227	94,086								
Noise Wall #16 Wilmot Ramp D outside EOP to I-10 EB outside EOP STA 794+60 to 847+30	12 – 18	5,308	98,950	$3,227,249	106	$30,446	44 of 87	124	106	75%	Y
Noise Wall #17 I-10 EB outside EOP STA 847+12 to 853+00	13	589	7,658								
Alternative I East of Kolb Road (Figures A13 & A14)											
Noise Wall #18 Kolb Ramp D outside EOP to I-10 EB outside EOP STA 863+25 to 928+17	14	6,399	89,586	$3,191,752	130	$24,552	110 of 113	130	130	100%	Y
Noise Wall #19 I-10 WB ROW STA 902+00 to 920+00	16	1,900	30,400	$1,063,997	69	$15,420	62 of 62	69	69	100%	Y

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternative IV Country Club Road to Alvernon Way (Figure A15)											
Noise Wall #19A I-10 EB outside EOP to Ramp EN STA 522+53 to 547+63	12 - 20	2,510	53,173	$2,101,063[1]	0	N/A	0 of 9	9	0	0%	N[2,3,4]
Noise Wall #19B I-10 EB outside EOP STA 547+58 to 557+00	8 - 10	942									
Alternative IV Alvernon Way to Valencia Road (Figures A15 & A16)											
Noise Wall #20 Alvernon Way Ramp D to I-10 EB outside EOP STA 573+50 to 629+50	18 – 20	5,648	112,749	$4,146,220[1]	115.5	$35,898	43.5 of 54.5	85.5	67.5	79%	Y
Alternative IV Valencia Road to Craycroft Road (Figures A16 & A17)											
Noise Wall #21 I-10 EB Valencia Overpass outside EOP STA 663+00 to 679+60	10	1,688	16,876	$3,940,488[1]	88	$44,778	29 of 50	78	78	100%	Y
Noise Wall #22 Valencia Road EB to Valencia Ramp D @ ROW to Craycroft Road Ramp A outside EOP STA 670+60 to 715+50	18 - 20	4,792	92,852								

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternative IV @ Craycroft Road (Figure A17) – Option 1											
Noise Wall #23 Craycroft Road NB @ frontage outside EOP STA 720+85 to 722+60	12	276	3,311	$415,707	0	N/A	0 of 21	5	0	0%	N[2,3,4]
Noise Wall #24 Craycroft NB N of Travel Plaza Way outside EOP STA 716+50 to 720+50	12	714	8,566								
Alternative IV @ Craycroft Road (Figure A16 & A17) – Option 2											
Noise Wall #25 I-10 WB Craycroft Overpass outside EOP STA	12	1,653	19,863	$1,204,420[1]	0	N/A	0 of 0	5	0	0%	N[2,3,4]
Noise Wall #26 Craycroft Ramp C inside EOP STA 706+70 to 716+70	20	1,000	20,000								
Alternative IV Craycroft Road to Wilmot Road (Figure A17)											
Noise Wall #27 I-10 WB outside EOP to Craycroft Ramp C outside EOP STA 729+30 to 769+30	10 - 18	4,000	65,999	$2,295,962	83	$27,662	23 of 46	82	80	98%	Y

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternative IV Wilmot Road to Kolb Road (Figures A17 & A18)											
Noise Wall #28 I-10 Wilmot Overpass outside EOP STA 783+00 to 797+50	12	1,450	17,394	$3,478,692	5	$695,738	0 of 8	8	5	63%	N[2,3]
Noise Wall #29 I-10 WB outside EOP to Craycroft Ramp C outside EOP STA 795+29 to 836+13	20	4,100	55,798								
Noise Wall #30 Wilmot Ramp D outside EOP to I-10 EB outside EOP STA 794+55 to 855+32	12 – 20	6,166	116,117	$4,064,094	116	$35,092	42 of 83	118	116	90%	Y
Alternative IV East of Kolb Road (Figures A18 & A19)											
Noise Wall #31 Kolb Ramp D outside EOP to I-10 EB outside EOP STA 863+25 to 932+00	12 - 18	6,600	87,398	$3,879,064	150.5	$25,775	110 of 115.5	128	128	100%	Y
Noise Wall #32 I-10 WB ROW STA 899+98+00 to 920+00	18	2,000	36,030	$1,261,052	69	$18,276	62 of 62	69	69	100%	Y

Noise Barrier	Barrier Height (ft.)	Barrier Length (ft.)	Barrier Area (ft^2)	Total Barrier Cost	No. of Benefited Receptors	Cost Per Benefit	First Row Design Goals Met	No. of Impacted Receptors	No. of Impacted & Benefited	Impacted & Benefited	Noise Wall Recommended [Y/N]
Alternatives I & IV North of Golf Links Road (Figure A21)											
Noise Wall #33 Golf Links WB EOP to WB Off-Ramp STA 388+86 to 394+51	14 – 16	4,340	62,105	$2,173,672	8.5	$271,709	7 of 8.5	8	8.5	94%	N[3]

1. Includes the cost of barrier on structure at $85/$ft^2$.
2. Does not meet the ADOT NAR noise reduction design goal of a 7 dBA noise reduction for receptors in the front row.
3. Does not meet the ADOT NAR reasonable cost threshold of $49,000 per benefited receptor.
4. Does not meet the ADOT NAR acoustic feasibility requirement of a 5 dBA noise reduction for 50% of benefited receptors.
5. Noise Wall #5A is identical for Build Alternative I & IV.

CONSTRUCTION NOISE AND VIBRATION

Depending on the nature of construction operations, the duration of the noise could last from seconds (e.g. a truck passing a customer) to months (e.g. constructing a bridge). Construction noise is also intermittent and depends on the type of operation, location, and function of the equipment and the equipment usage cycle. Construction equipment is typically considered as a point source, as opposed to traffic which is considered as a line source; therefore, the noise level decreases, theoretically, by 6 dBA per doubling the distance from it, as opposed to 3 dBA for line source. Noise levels, at various distances, using listed equipment, are shown in **Table 23**. ADOT has set forth guidelines for construction noise in the *Standard Specifications for Road and Bridge Construction*, 2008. Per ADOT specifications 104.08 Prevention of Air and Noise Pollution:

"The contractor shall comply with all local sound control and noise rules, regulations and ordinances which apply to any work pursuant to the contract. Each internal combustion engine used for any purpose on the work or related to the work shall be equipped with a muffler or a type recommended by the manufacturer. No internal combustion engine shall be operated on the work without its muffler being in good working condition."

Table 27. Construction Noise Levels at Various Distances from Equipment

Equipment	L_{10}				
	R_300 ft	R_600 ft	R_900 ft	R_1200 ft	R_1500 ft
Auger Drill Rig	64.8	58.8	55.3	52.8	50.8
Boring Jack Power Unit	67.4	61.4	57.9	55.4	53.4
Compactor (ground)	63.7	57.7	54.1	51.6	49.7
Concrete Mixer Truck	62.3	56.2	52.7	50.2	48.3
Dump Truck	59.9	53.9	50.4	47.9	45.9
Excavator	64.2	58.1	54.6	52.1	50.2
Generator	65.1	59.0	55.5	53.0	51.1
Compressor (air)	61.1	55.1	51.6	49.1	47.1
Grader	68.5	62.4	58.9	56.4	54.5
Warning Horn	57.6	51.6	48.1	45.6	43.6
All Other Equipment > 5 HP	69.4	63.4	59.9	57.4	55.4
Bar Bender	60.4	54.4	50.9	48.4	46.5
Concrete Pump Truck	61.8	55.8	52.3	49.8	47.9
Soil Mix Drill Rig	64.4	58.4	54.9	52.4	50.4
Concrete Saw	70.0	64.0	60.5	58.0	56.0
Auger Drill Rig	64.8	58.8	55.3	52.8	50.8
Roller	60.4	54.4	50.9	48.4	46.5

Source: FHWA Roadway Construction Noise Model (FHWA, 2008).
L_{10} – noise level exceeded 10 percent of the time during the noise measurement interval and due to sporadic or intermittent events, such as noise from construction equipment.

Ground vibration and ground-born noise can also be a source of annoyance to individuals who live or work close to vibration-generating activities. Pile driving, demolition activity, blasting, and crack-and-seat operations are the primary sources of vibration, while the impact pile driving can be the most significant source of vibration at construction sites. It is recommended to apply methods that may be practical and appropriate in specific situations, to reduce vibration to an acceptable level. Such measures may be:

- Jetting,
- Predrilling
- Cast-in-place or auger cast piles
- Non-displacement piles
- Pile cushioning
- Using alternative non-impact drivers
- Scheduling activities to minimize disturbance at near-construction sites

COORDINATION WITH LOCAL OFFICIALS

At the time of the preparation of this noise analysis technical report, results had not been presented to the local officials. Upon request of the local land use planning agency or local public agency, noise contour lines may be produced during the noise analysis process for project alternative screening and planning purposes only, as per ADOT NAR, Section 2.9.6 Noise Contours.

STATEMENT OF LIKELIHOOD

As per 23 CFR 772.13(g)(3), the noise analysis was completed to the extent of design information that is available at this time. This statement of likelihood about the study recommendations is included since feasibility and reasonableness determinations may change due to changes in project design after approval.

REFERENCES

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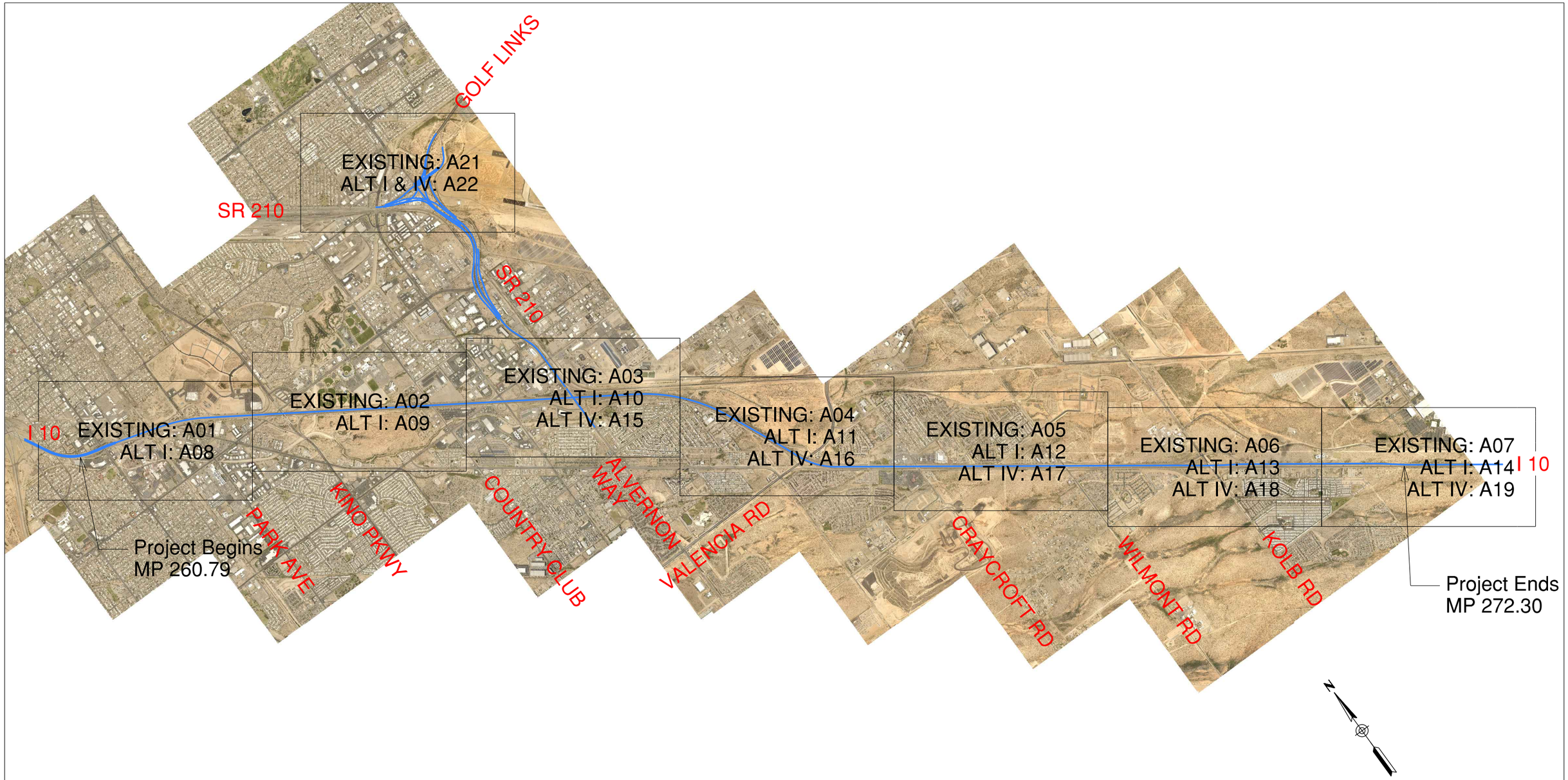
APPENDIX A – NOISE ANALYSIS STUDY AREA, RECEIVERS AND NOISE WALL LOCATIONS



APPENDIX A

JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

I 10 & SR 210
NOISE RECEIVER LOCATIONS
KEYMAP

A00

01 OF 22

APPENDIX A	**JACOBS**	**INTERSTATE 10 NOISE RECEIVER LOCATIONS EXISTING / NO BUILD**	**LEGEND** NOISE RECEIVER MONITORING LOCATION 4(F) RESOURCE EDGE OF PAVEMENT STUDY LIMITS
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S			**A01** **02 OF 22**

APPENDIX A	**JACOBS**	**INTERSTATE 10 NOISE RECEIVER LOCATIONS EXISTING / NO BUILD**	**A02**
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S			**03 OF 22**

LEGEND

- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE
- EDGE OF PAVEMENT
- STUDY LIMITS

APPENDIX A

JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

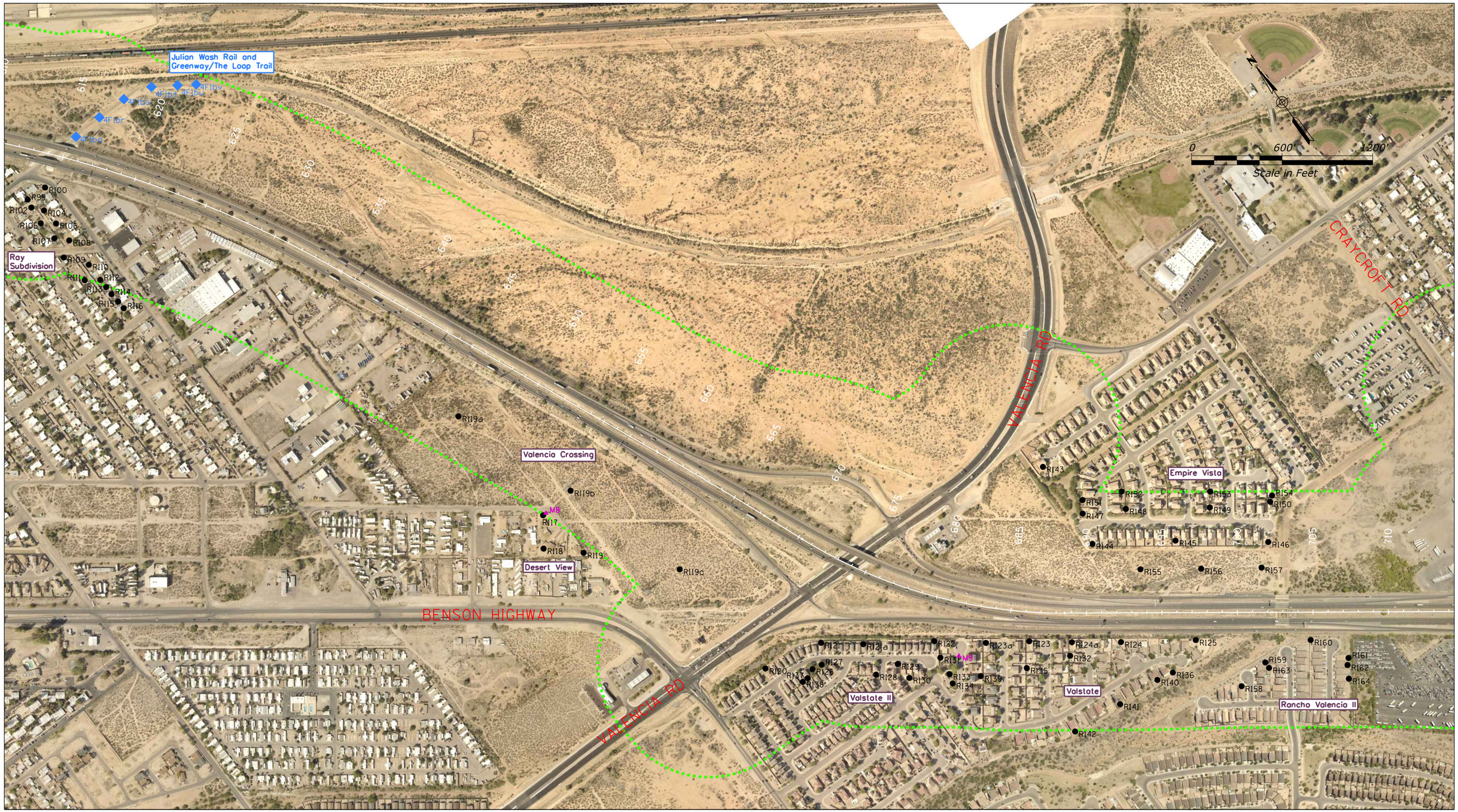
INTERSTATE 10
NOISE RECEIVER LOCATIONS
EXISTING / NO BUILD

LEGEND

- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE
- EDGE OF PAVEMENT
- STUDY LIMITS

A03

04 OF 22



APPENDIX A	**JACOBS**	**INTERSTATE 10** **NOISE RECEIVER LOCATIONS** **EXISTING / NO BUILD**	**LEGEND** NOISE RECEIVER MONITORING LOCATION 4(F) RESOURCE EDGE OF PAVEMENT STUDY LIMITS
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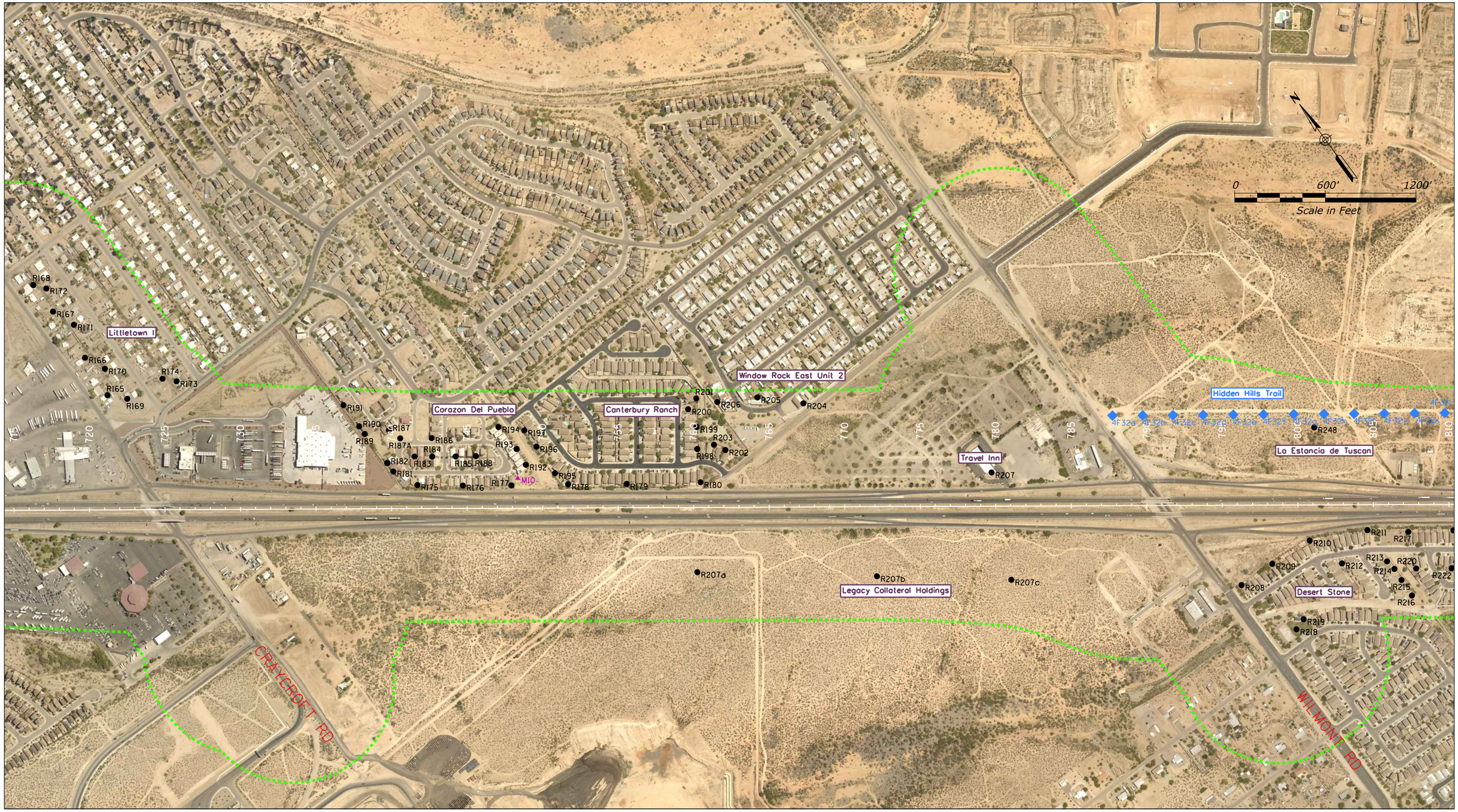


APPENDIX A

JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

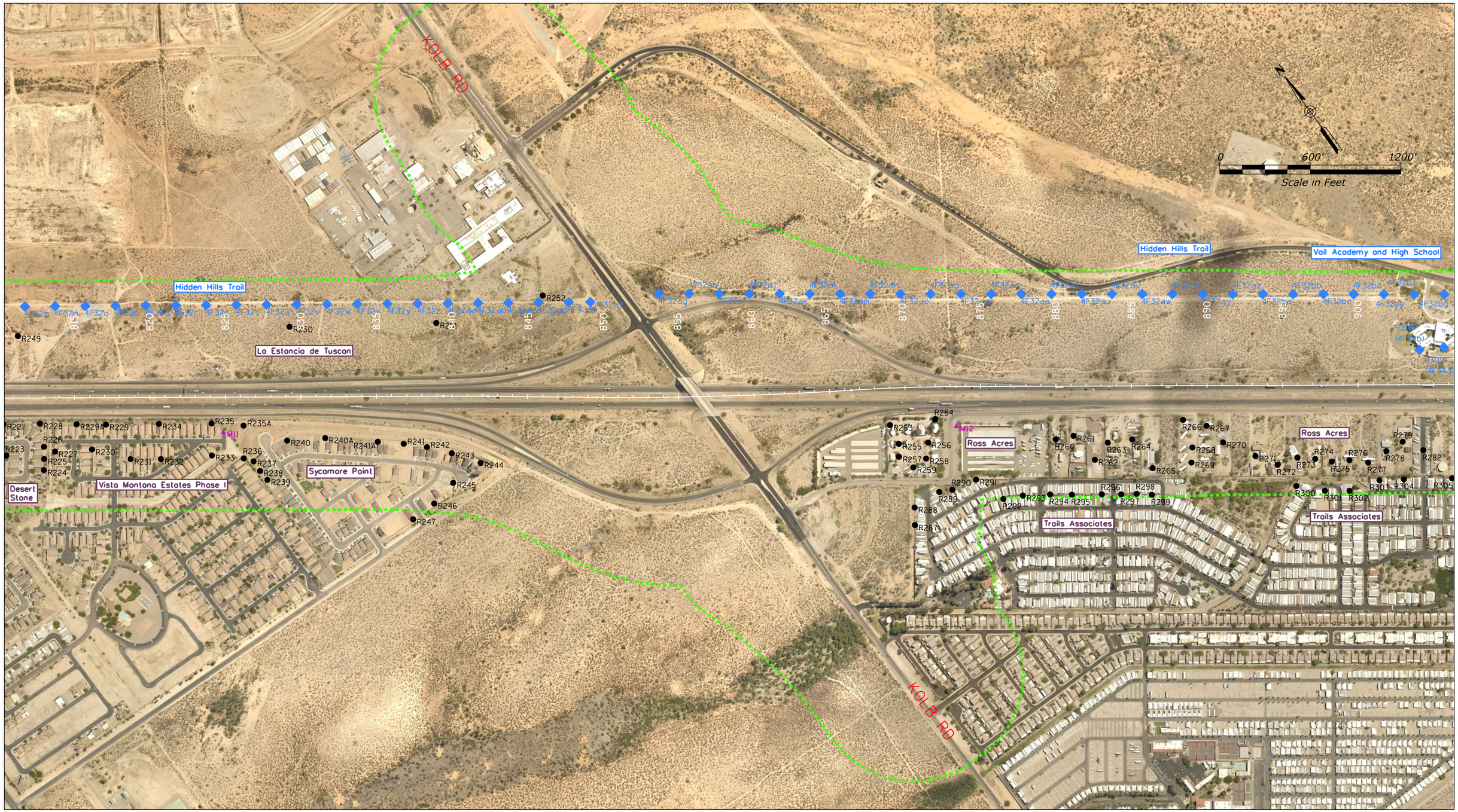
INTERSTATE 10
NOISE RECEIVER LOCATIONS
EXISTING / NO BUILD

LEGEND

- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE
- EDGE OF PAVEMENT
- STUDY LIMITS

A05

06 OF 22



APPENDIX A

JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10
NOISE RECEIVER LOCATIONS
EXISTING / NO BUILD

LEGEND

- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE
- EDGE OF PAVEMENT
- STUDY LIMITS

A06

07 OF 22

APPENDIX A	**JACOBS**	**INTERSTATE 10** **NOISE RECEIVER LOCATIONS** **EXISTING / NO BUILD**	**LEGEND** NOISE RECEIVER MONITORING LOCATION 4(F) RESOURCE EDGE OF PAVEMENT STUDY LIMITS	**A07** 08 OF 22
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S				

APPENDIX A

JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10
NOISE WALL LOCATIONS
ALTERNATIVE I/IV

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

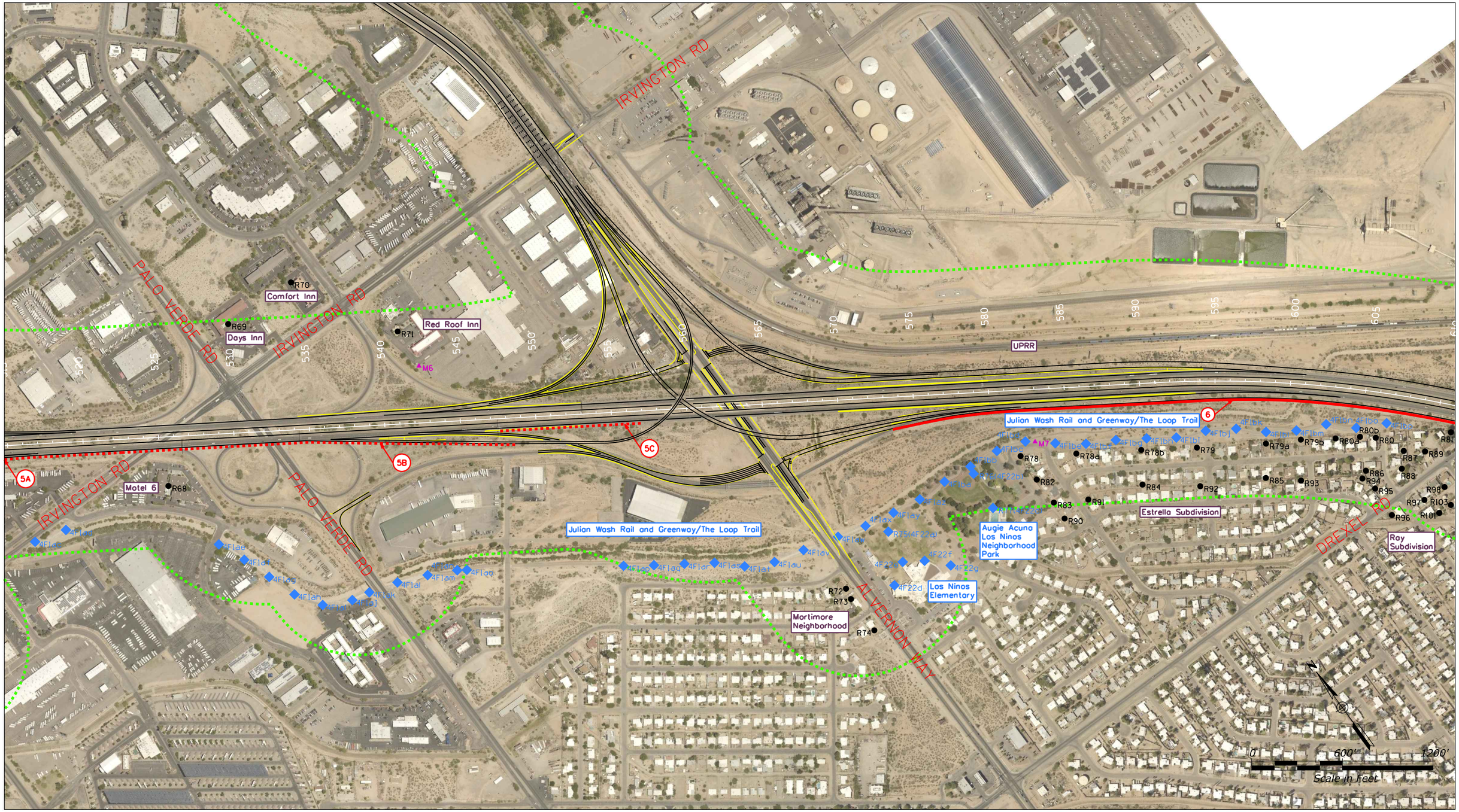
A08

09 OF 22

APPENDIX A	**JACOBS**	**INTERSTATE 10 NOISE WALL LOCATIONS ALTERNATIVE I/IV**	**A09**
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S			**10 OF 22**

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE



APPENDIX A

JACOBS

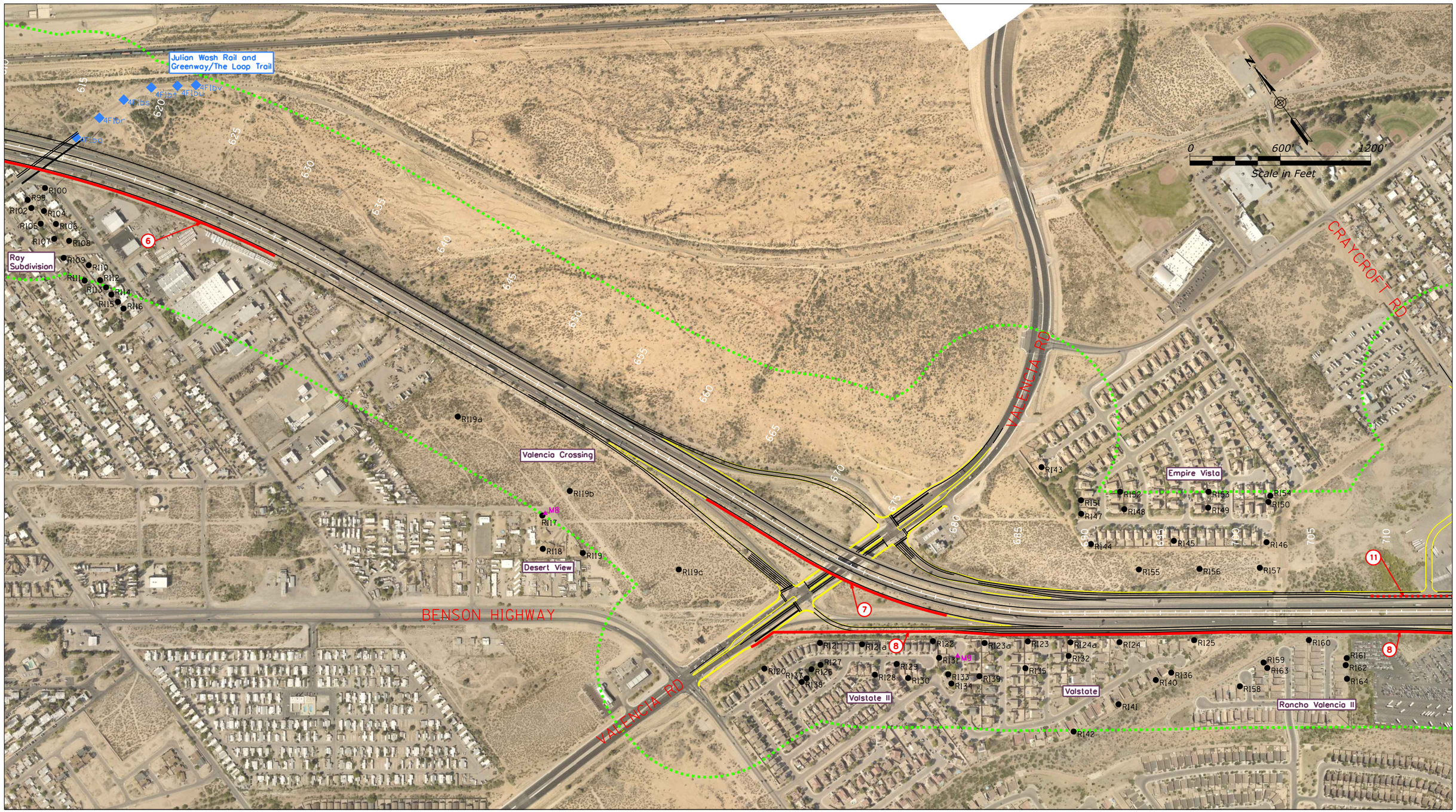
I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10
NOISE WALL LOCATIONS
ALTERNATIVE I

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

A10



APPENDIX A

JACOBS

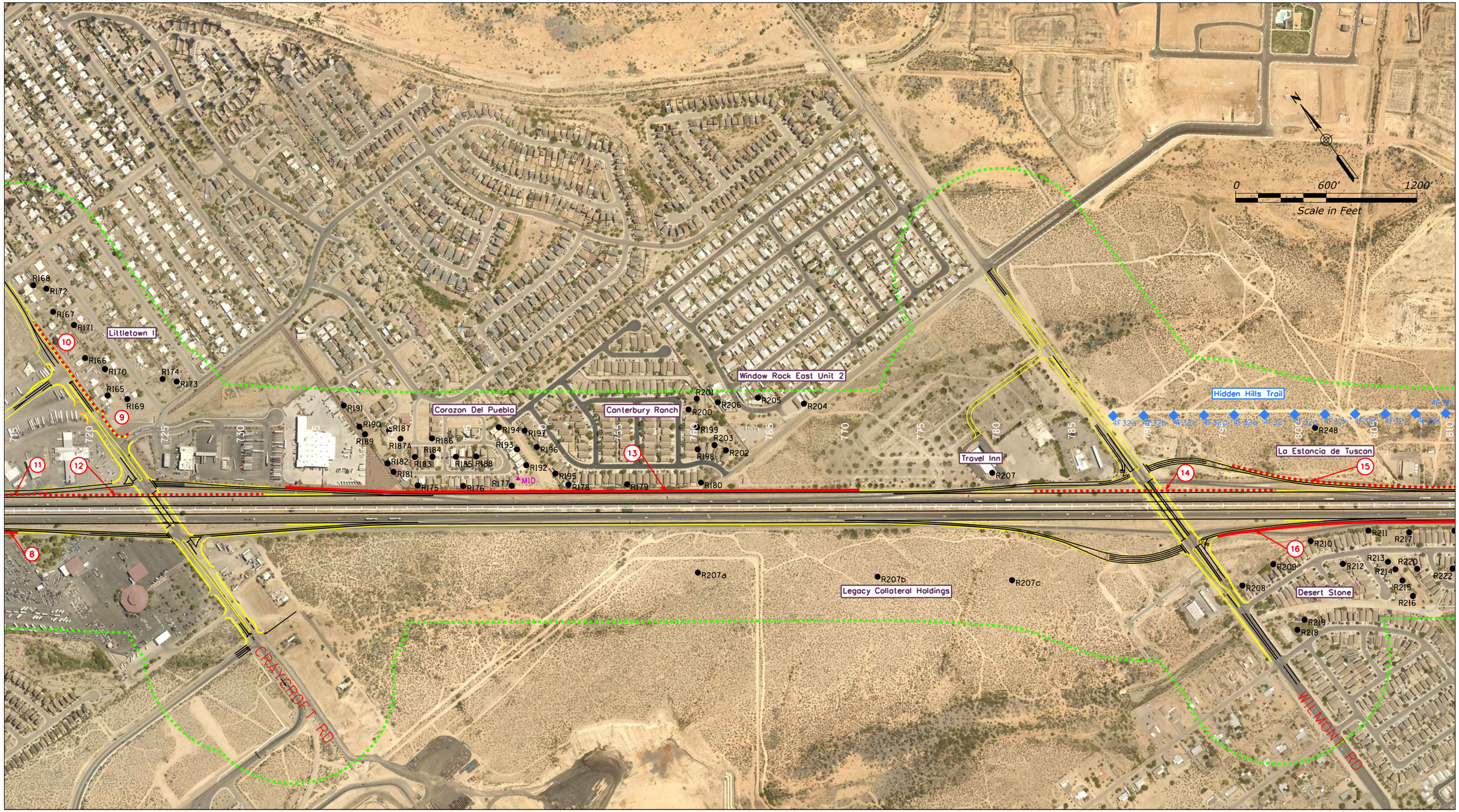
I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10
NOISE WALL LOCATIONS
ALTERNATIVE I

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

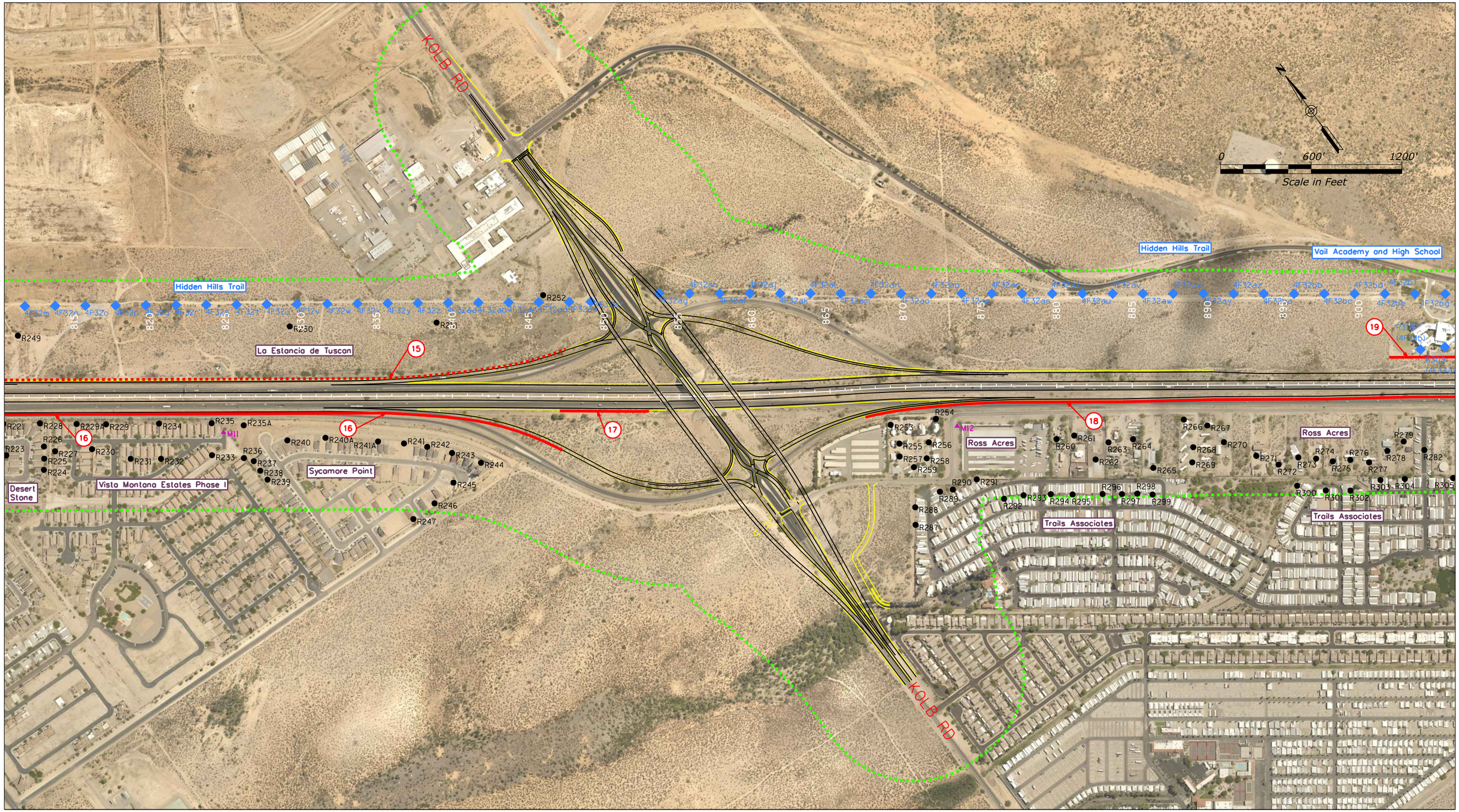
A11



APPENDIX A	**JACOBS**	**INTERSTATE 10 NOISE WALL LOCATIONS ALTERNATIVE I**	**A12**
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S			13 OF 22

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE



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JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10
NOISE WALL LOCATIONS
ALTERNATIVE I

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

A13

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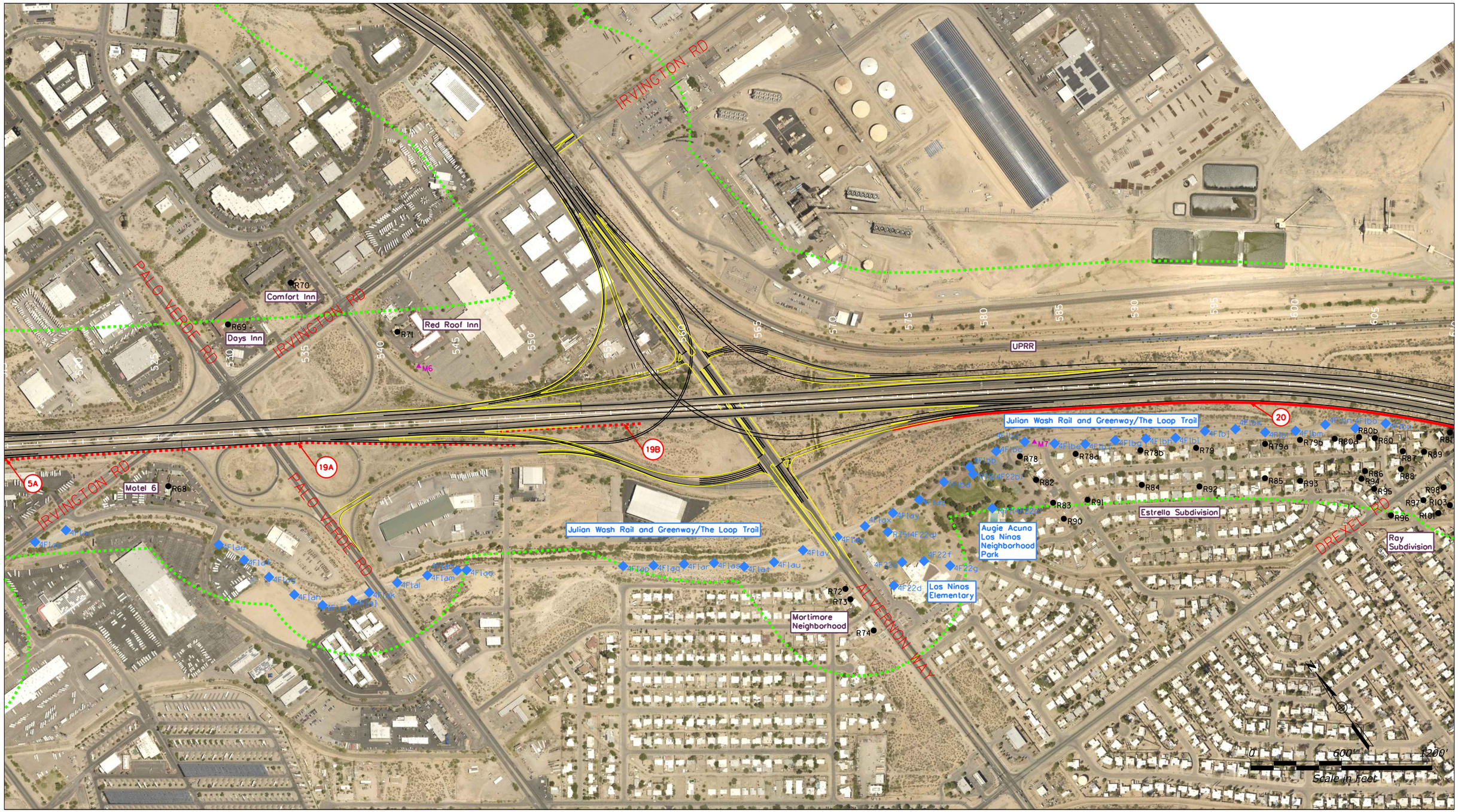
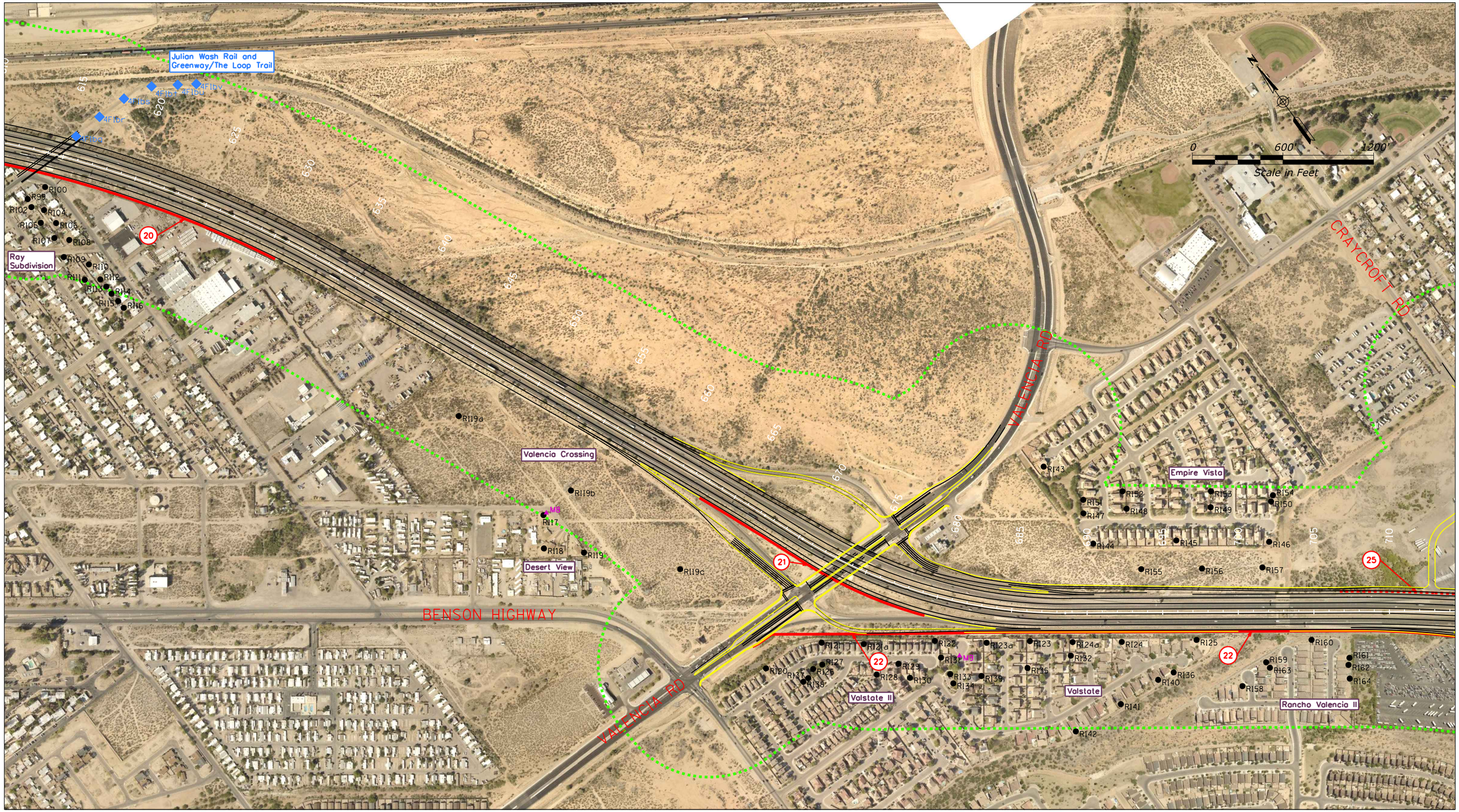
APPENDIX A	**JACOBS**	**INTERSTATE 10 NOISE WALL LOCATIONS ALTERNATIVE I**	**LEGEND** RECOMMENDED NOISE WALL NOISE WALL NOT RECOMMENDED EDGE OF PAVEMENT STUDY LIMITS NOISE RECEIVER MONITORING LOCATION 4(F) RESOURCE	**A14** 15 OF 22
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S				



APPENDIX A	**JACOBS**	**INTERSTATE 10 NOISE WALL LOCATIONS ALTERNATIVE IV**	**A15**
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S		**LEGEND** RECOMMENDED NOISE WALL NOISE WALL NOT RECOMMENDED EDGE OF PAVEMENT STUDY LIMITS NOISE RECEIVER MONITORING LOCATION 4(F) RESOURCE	16 OF 22



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JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10
NOISE WALL LOCATIONS
ALTERNATIVE IV

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

A16

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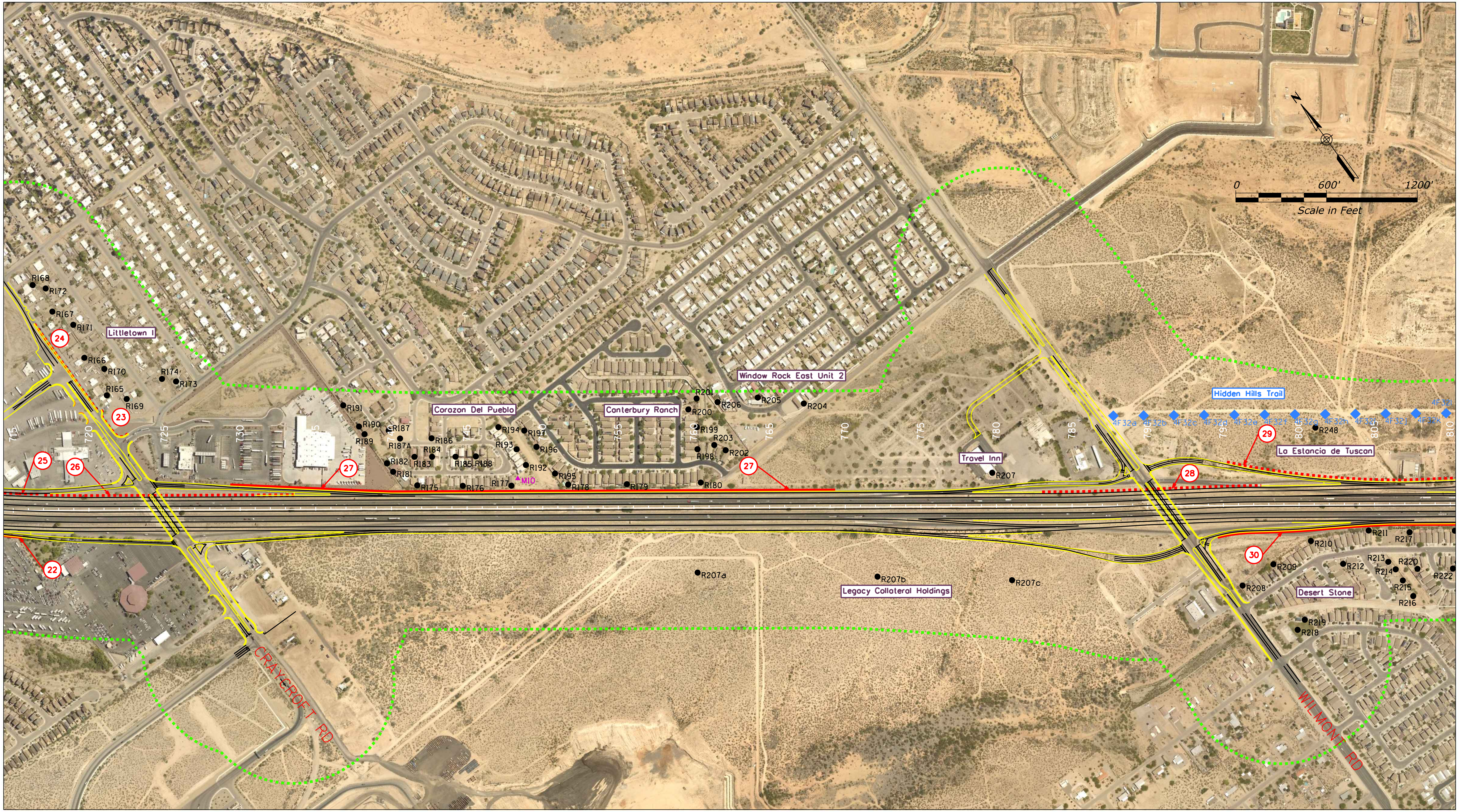


APPENDIX A

JACOBS

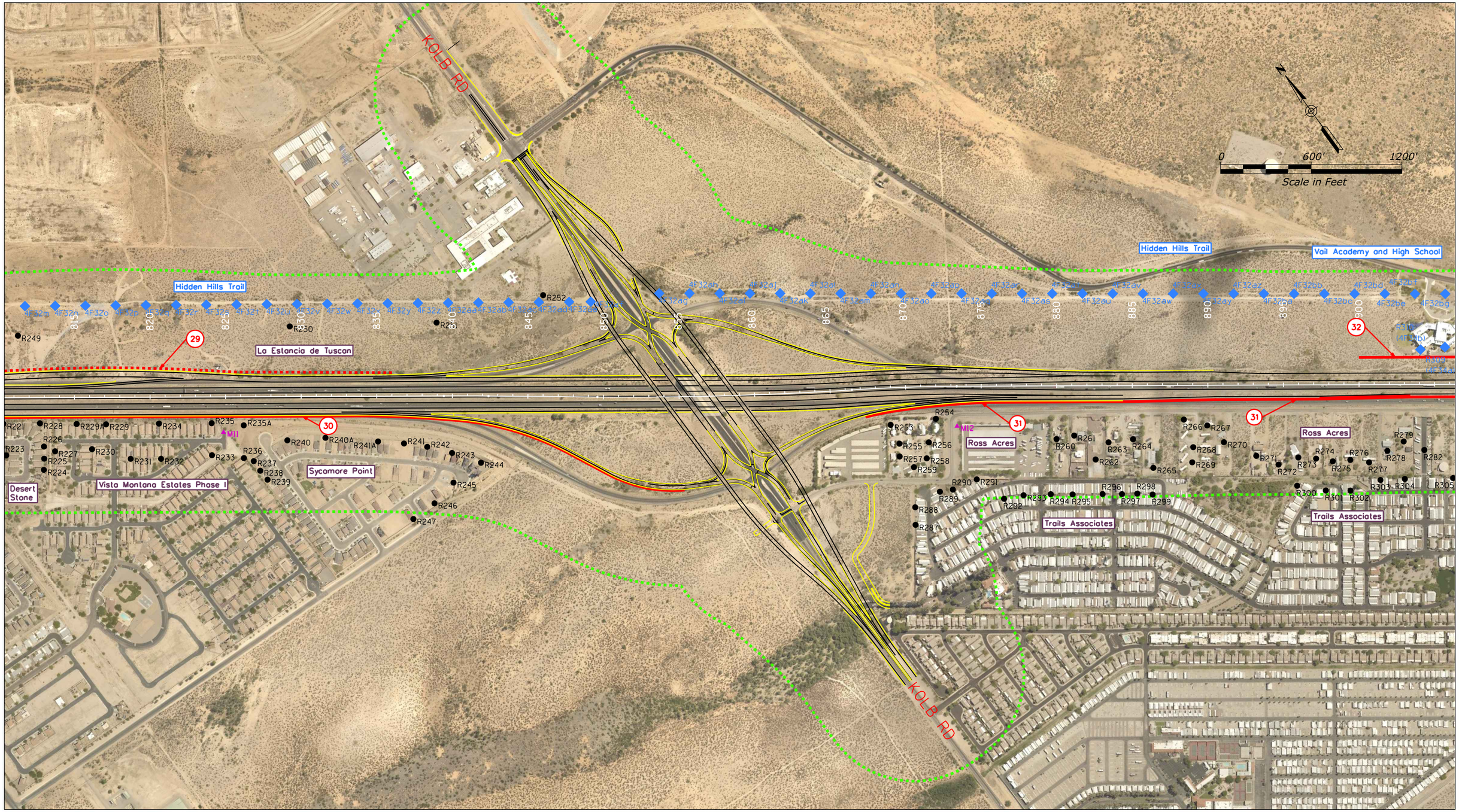
I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10 NOISE WALL LOCATIONS ALTERNATIVE IV

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

A17



APPENDIX A

JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

INTERSTATE 10
NOISE WALL LOCATIONS
ALTERNATIVE IV

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

A18

19 OF 22

APPENDIX A	**JACOBS**	**INTERSTATE 10 NOISE WALL LOCATIONS ALTERNATIVE IV**	**LEGEND** RECOMMENDED NOISE WALL NOISE WALL NOT RECOMMENDED EDGE OF PAVEMENT STUDY LIMITS NOISE RECEIVER MONITORING LOCATION 4(F) RESOURCE	**A19** **20 OF 22**
I-10 Jct. I-19 to Kolb Road SR 210 - Golf Links Road to I-10 TRACS No. H7825 01L, 010-E(210)S				

APPENDIX A

JACOBS

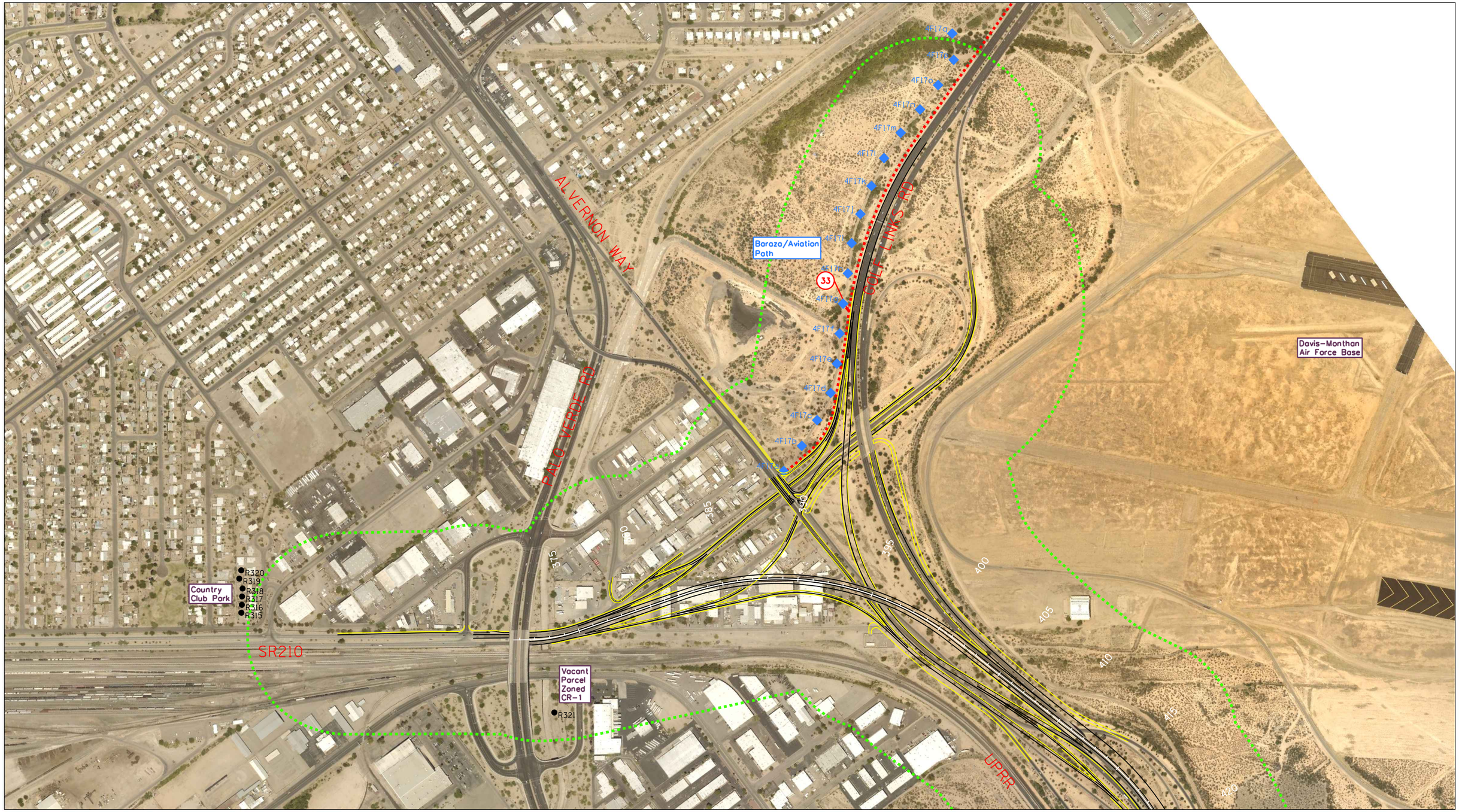
I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

STATE ROUTE 210
NOISE RECEIVER LOCATIONS
EXISTING / NO BUILD

LEGEND

- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE
- EDGE OF PAVEMENT
- STUDY LIMITS

A20



APPENDIX A

JACOBS

I-10 Jct. I-19 to Kolb Road
SR 210 - Golf Links Road to I-10
TRACS No. H7825 01L, 010-E(210)S

STATE ROUTE 210
NOISE WALL LOCATIONS
ALTERNATIVE I/IV

LEGEND

- RECOMMENDED NOISE WALL
- NOISE WALL NOT RECOMMENDED
- EDGE OF PAVEMENT
- STUDY LIMITS
- NOISE RECEIVER
- MONITORING LOCATION
- 4(F) RESOURCE

A21

22 OF 22

APPENDIX B – NOISE MEASUREMENT DATA SHEETS

Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/- 0 dBA End +/- 0 dBA
Response
Fast ___ or Slow X
Weather Data Temp 74.9 Humidity 53.3 Wind Spd 0

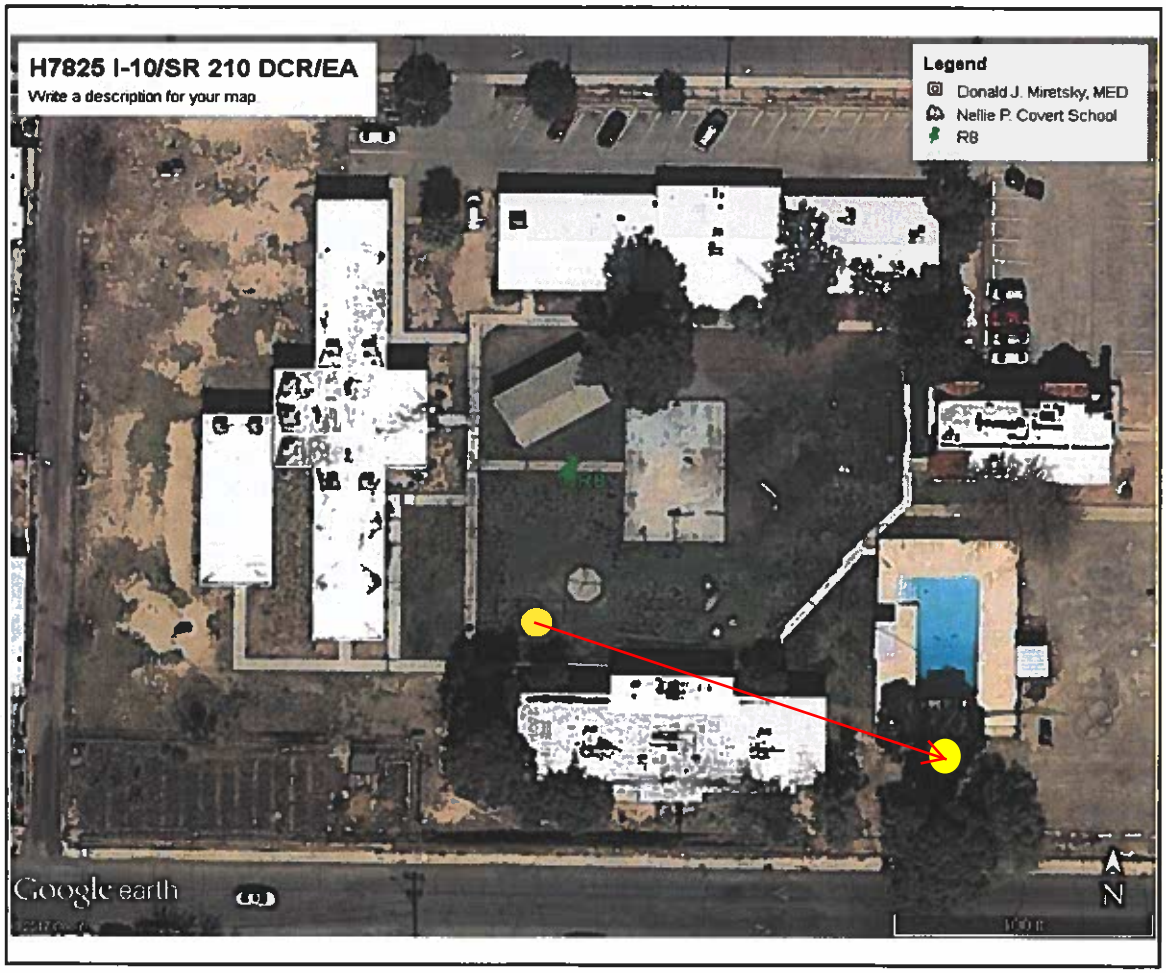
Calibrator
Model CAL 200

Weighting
A X
C ___
Other ___
Battery
> 50%* ✓
*replace if <50%

Site M1
Date 8/8/2017

Measurement Data						Traffic Data (Speed = ____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	6:29A	6:39A	59.3	56.8	70.5										
2	6:39A	6:49A	59.3	57.0	65.7										
3															

SITE AERIAL



NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10	pool pump	
2		surface streets	
3			

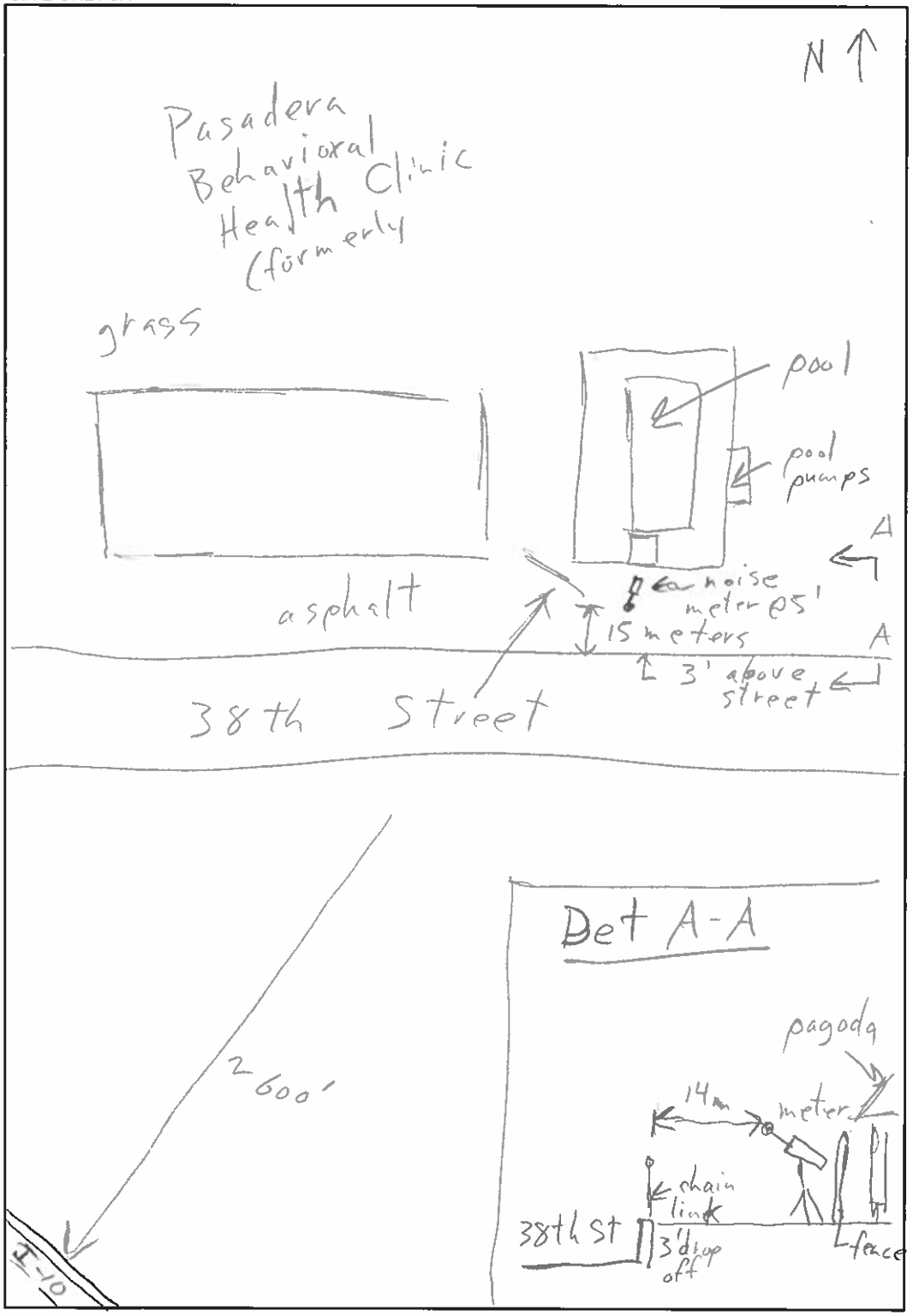
Lat - 32.190546 Lon - 110.97222

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M1 Date 8-Aug-17

SITE SKETCH



Noise Measurement Data Sheet

Noise Meter Model LD 820 | **Calibrator** Model CAL 200 | **Weighting** A ✓ C ___ Other ___ | **Site** M1a

Calibration @ 114 dBA
Start +/- 0 dBA End +/- 0 dBA

Response Fast ___ or Slow X

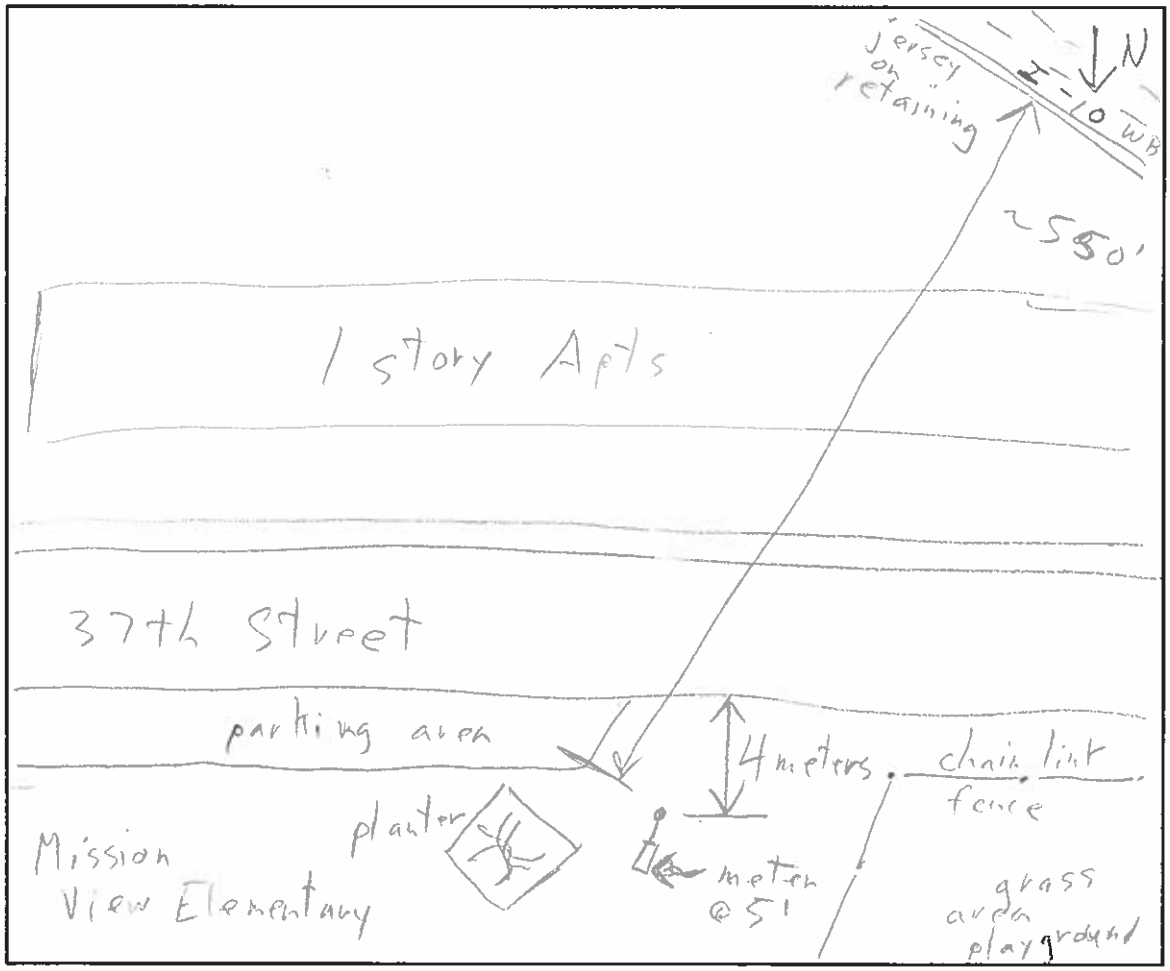
Battery > 50%* ✓ *replace if <50%

Weather Data Temp 75.6 Humidity 52.7 Wind Spd 0.7 E mph

Date 8/8/17

Measurement Data						Traffic Data (Speed = _____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	7:00A	7:10A	57.3	54.2	62.9										
2	7:10A	7:20A	57.5	53.7	63.9										
3															

SITE SKETCH



NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10	dog barking	helicopter @ 7:13A, dogs
2		& Kids	
3			

lat: 32.191527 lon: -110.92257

Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/- 0 dBA End +/- 0 dBA
Response
Fast ____ or Slow X
Weather Data
Temp 73.4 Humidity 54.3 Wind Spd 0.6 mph W→

Calibrator
Model CAL 200

Weighting
A X
C ____
Other ____
Battery
> 50%* ✓
*replace if <50%

Site M2
Date 8/8/2017

Measurement Data						Traffic Data (Speed = ____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	5:55A	6:05A	68.1	63.4	71.5										
2	6:05A	6:15A	67.8	62.1	71.4										
3															

SITE AERIAL

NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10		
2			
3			

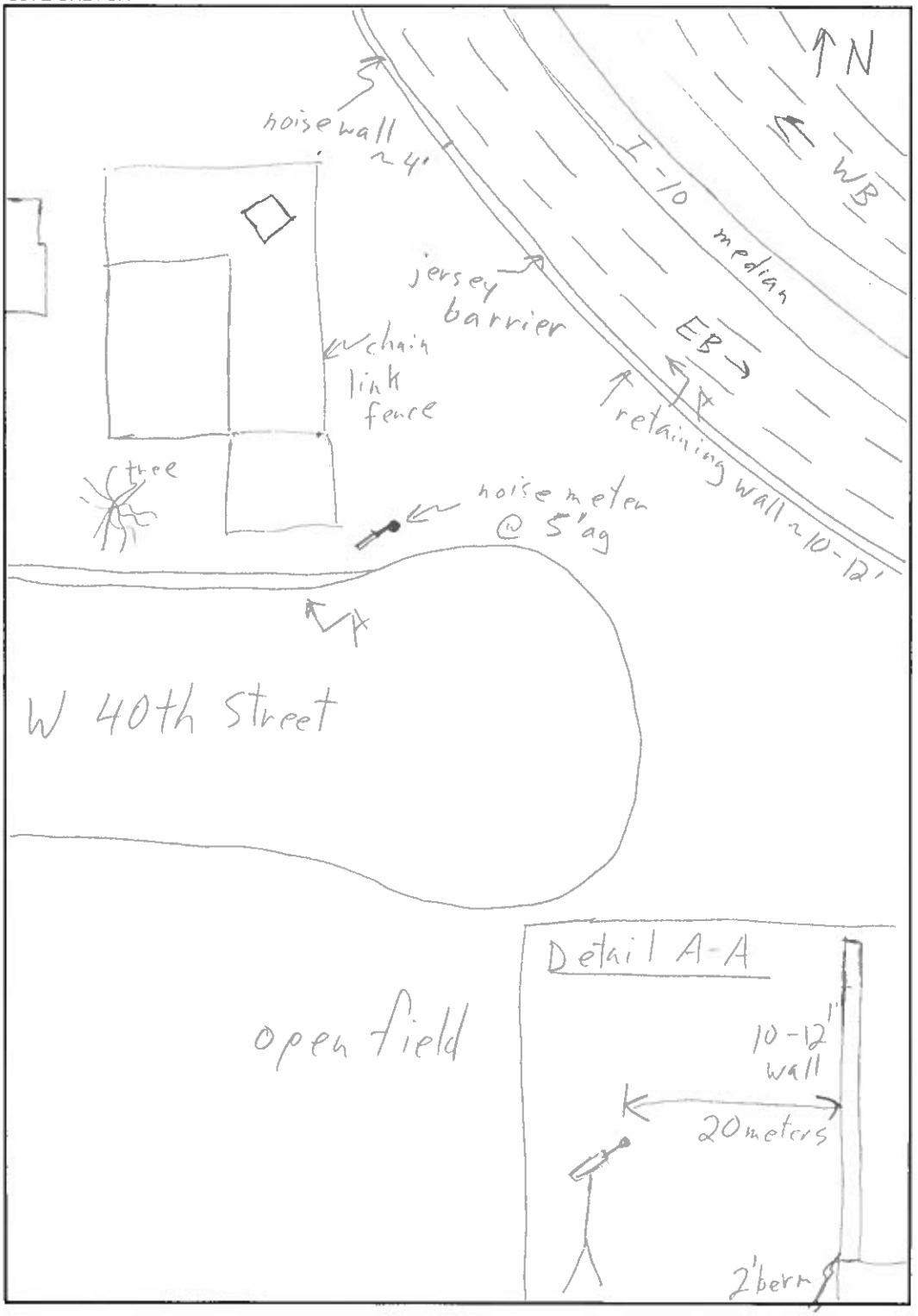
Lat - 32.188611 Lon 110.973555

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M2 Date 8-Aug-17

SITE SKETCH



Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/-____ dBA End +/-____ dBA
Response
Fast ____ or Slow X
Weather Data Temp 82.8 Humidity 43.3 Wind Spd 0 mph

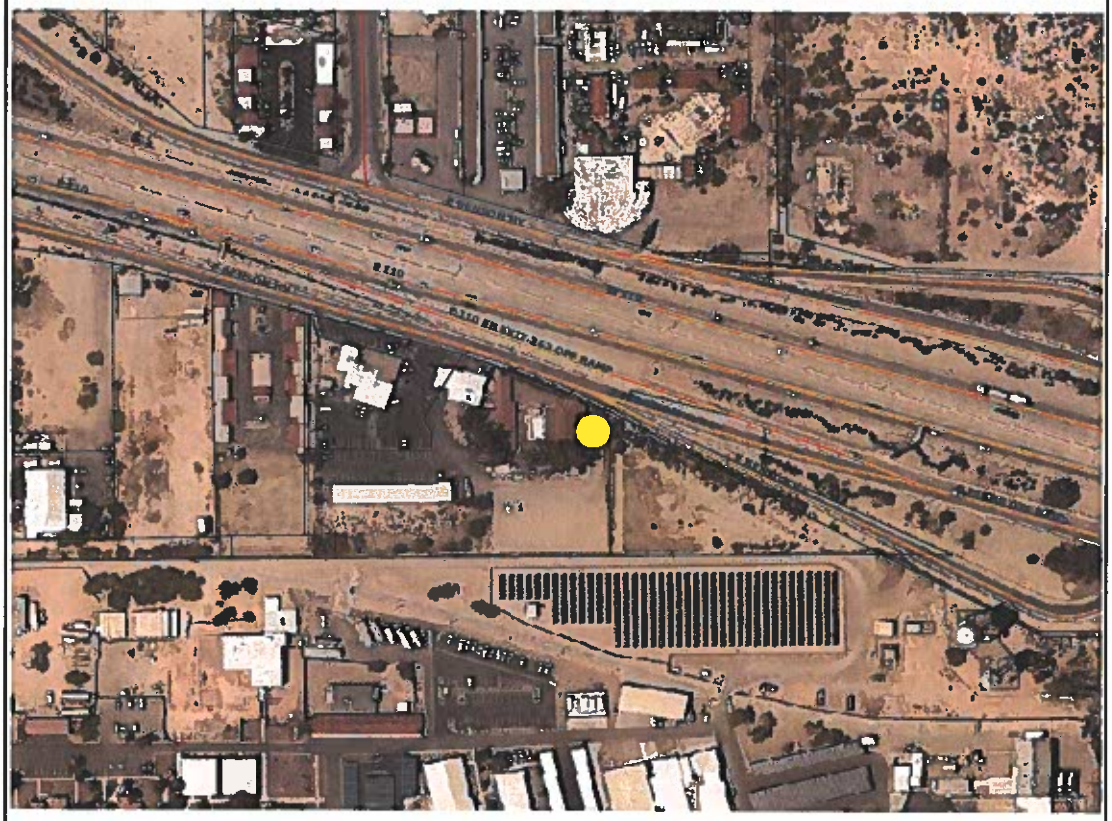
Calibrator
Model CAL 200

Weighting
A X
C ____
Other ____
Battery
> 50%* ____
*replace if <50%

Site M3
Date 8/8/2017

Measurement Data						Traffic Data (Speed = ____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	8:40	8:50A	67.7	61.7	77.2										
2	8:50	9:00	66.2	61.3	72.4										
3															

SITE AERIAL



NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	T-10		* Train before meas.
2			bells @ 9:20A
3			

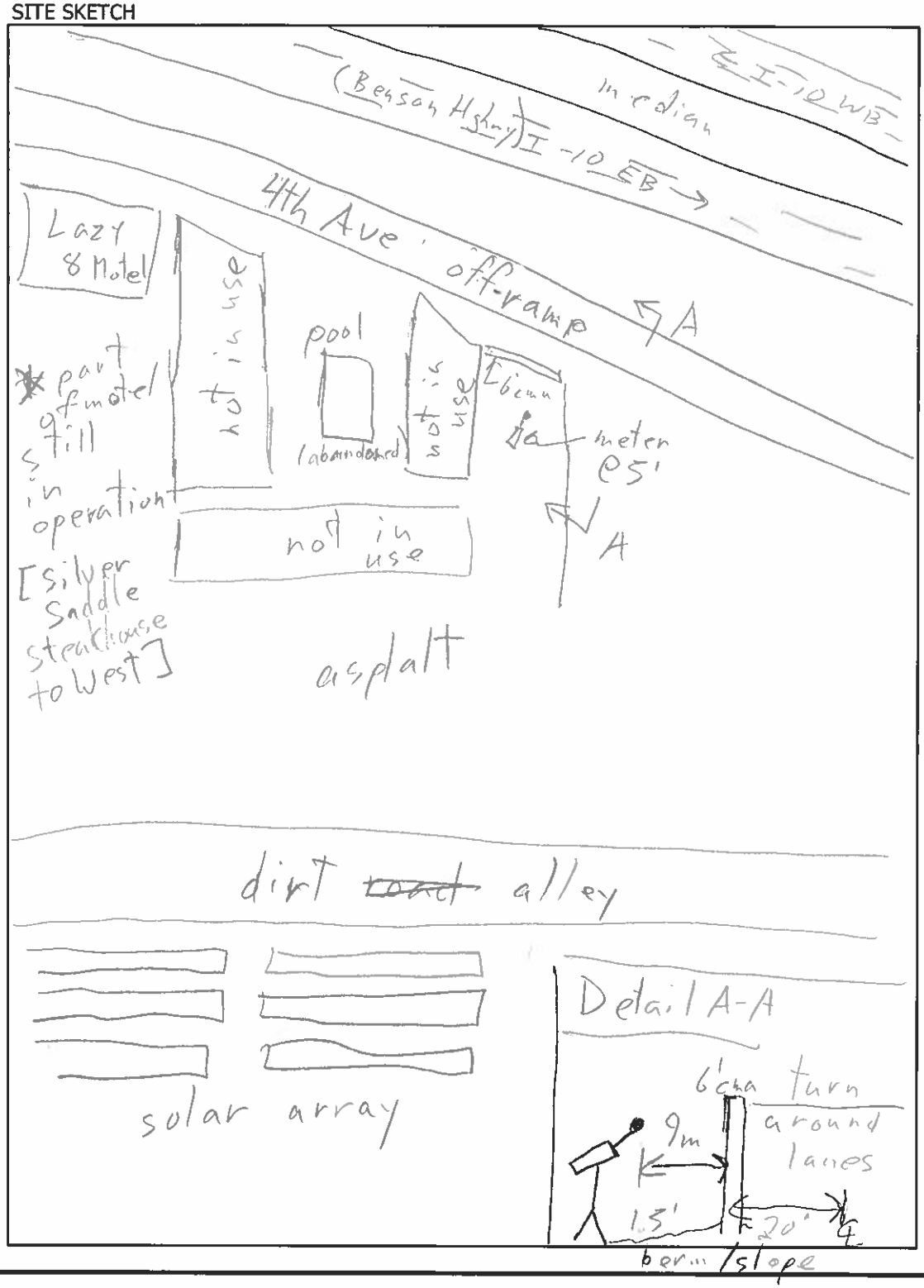
Lat - 32.185499 Lon - 110.964145

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M3 Date 8-Aug-17

SITE SKETCH



Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/- 0 dBA End +/- 0 dBA
Response
Fast ____ or Slow X
Weather Data Temp 91.4 Humidity 35.5 Wind Spd 1.4 mph SE

Calibrator
Model CAL 200

Weighting
A X
C ____
Other ____

Site M4

Battery
> 50%* ✓
*replace if <50%

Date 8/8/2017

Measurement Data						Traffic Data (Speed = _____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	9:20A	9:30	69.1	60.5	74.9										
2	9:30A	9:40	69.2	61.2	75.8										
3															

SITE AERIAL

NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10	~~cars~~	cars in lot
2			
3			

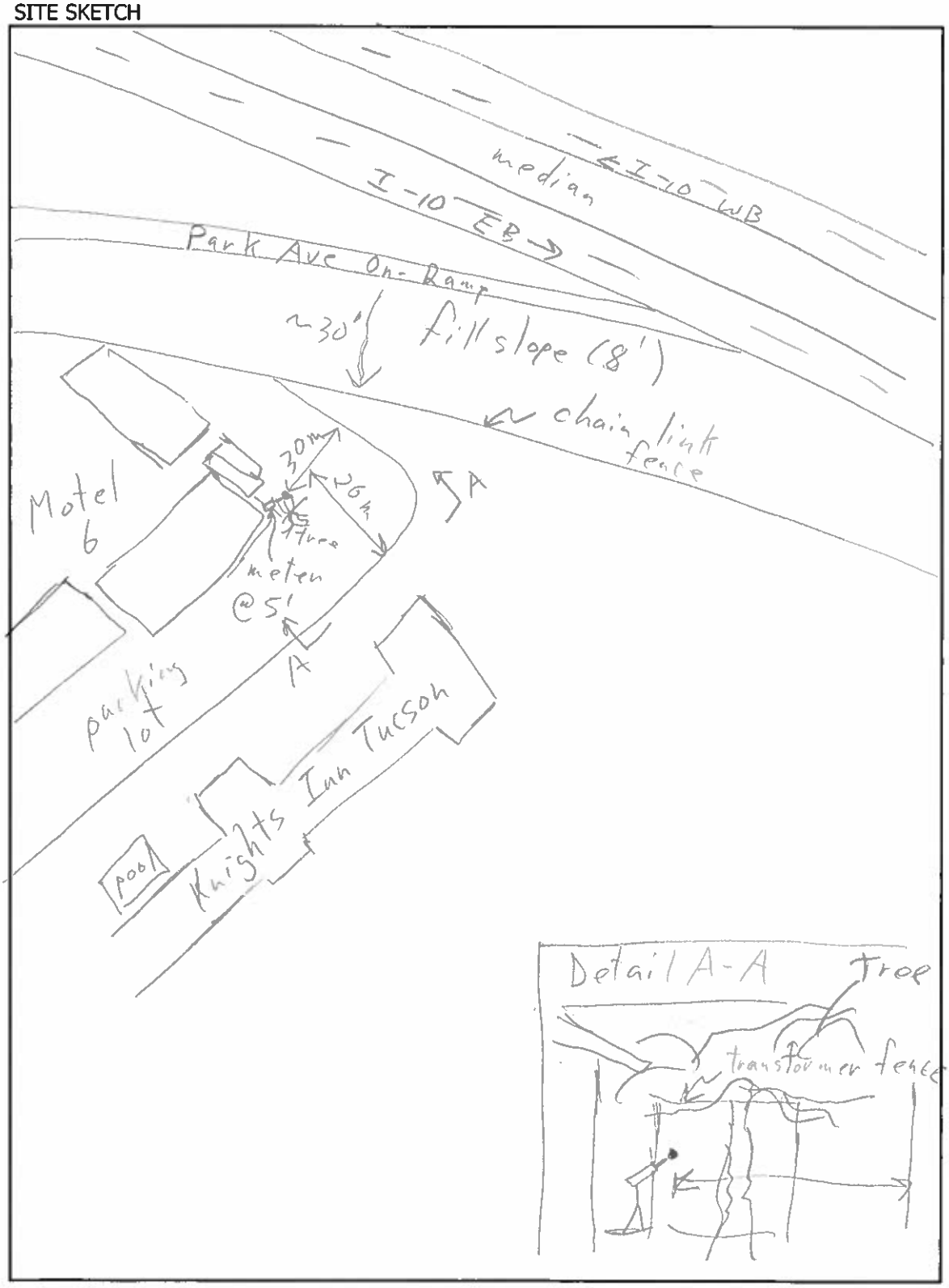
Lat - 32.181699 Lon - 110.953976

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M4 Date 8-Aug-17

SITE SKETCH



Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/-____ dBA End +/-____ dBA
Response
Fast ____ or Slow X
Weather Data
Temp 100.9 Humidity 20.9 Wind Spd 0.7 mph SE

Calibrator
Model CAL 200

Weighting
A X
C ____
Other ____
Battery
> 50%* ____
*replace if <50%

Site M5
Date 8/8/2017

Measurement Data						Traffic Data (Speed = _____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	10:57A	11:07A	64.0	54.7	70.5										
2	11:07A	11:17A	64.4	53.6	72.2										
3															

SITE AERIAL

NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10	planes	
2			
3			

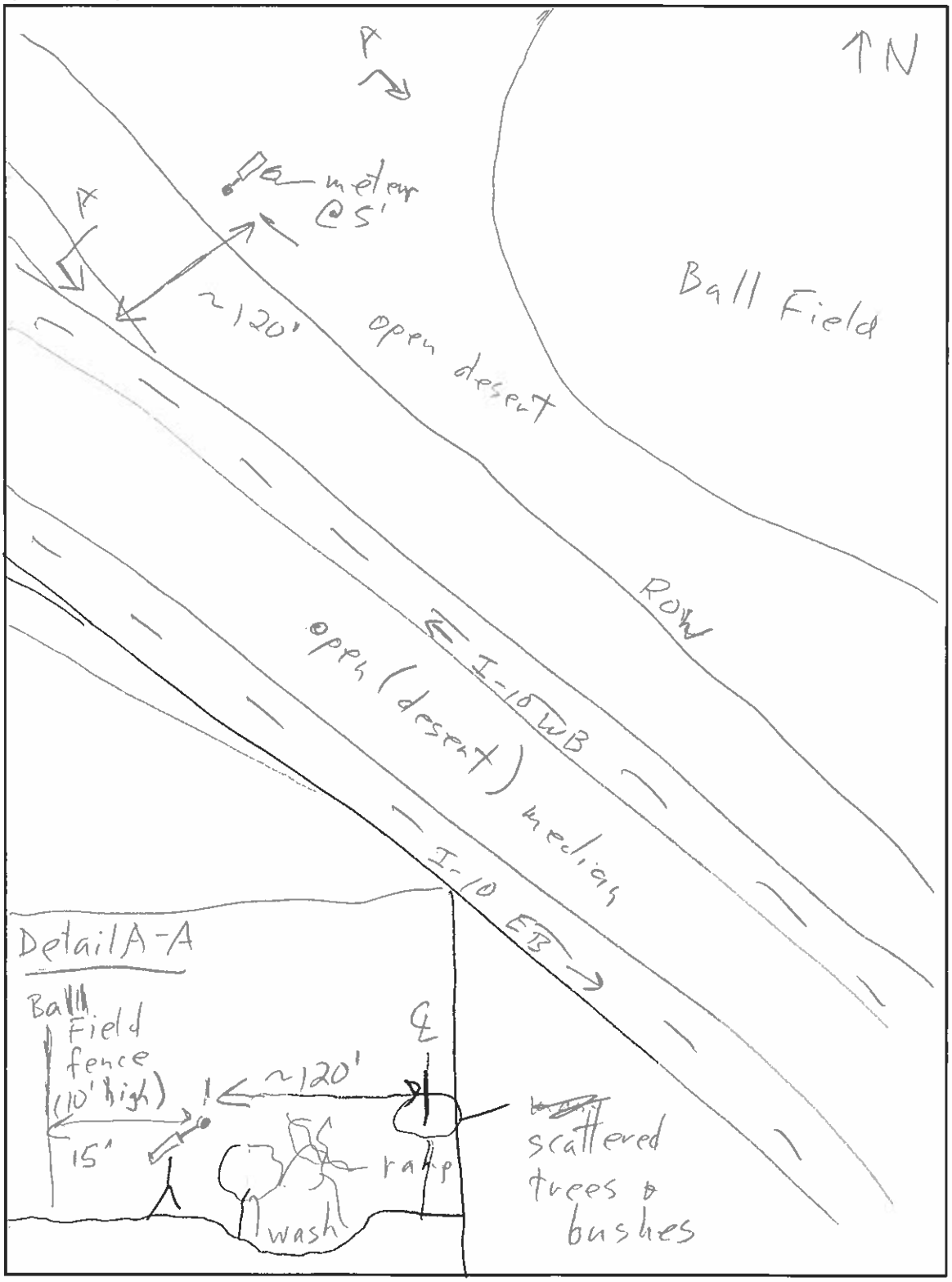
Lat - 32.175249 Lon - 110.939963

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M5 Date 8-Aug-17

SITE SKETCH



ADOT Environmental Planning

Noise Measurement Data Form

PURPOSE OF NOISE MEASUREMENT

☐ Noise inquiry ☐ TNM Validation ☒ Existing conditions

FHWA NAC: B - Single Residence(s)

PROJECT DETAILS					
TracksID:	H7825	Project title:	I-10, Jct. I-19 to Kolb Drive	Date:	08/08/2017
EnvoyID:		Inquirer:			
Route:	I-10	Mile Post 1:	263	County:	PIMA
		Mile Post 2:	262	Address:	

GEO-REFERENCE	Latitude	Longitude	Altitude (ft)
GPS	32°10'32.48"N	110°56'25.60"W	2517

EQUIPMENT AND ATMOSPHERIC CONDITIONS					
Sound level meter		Larson Davis 812		Calibration valid:	Yes
Temperature (F):	103	Humidity (%):	16	Wind (mph):	0.7
Clouds	Clear sky	Sample start:	11:02	Duration:	10

VEHICLE SPEED, VOLUMES AND MIX						
Speed	**Vehicles total**	Auto (%)	Medium truck (%)	Heavy truck (%)	Bus (%)	Motorcycle (%)
T-60 A-65	3825	86	6	4	0	0

Click to insert already saved image of the image of the measurement location

SOUND LEVEL RESULTS		
L_{eq1}	☐	Check if there was interference
L_{eq2}	☐	
L_{eq3}	☐	
L_{eqh}	64.7	Ground: Loose soil
BACKGROUND NOISE DESCRIPTION		
None		

Please send this form electronically in its current MS Word form, not PDF, image or scanned.
The form shall be used to populate noise measurement database automatically.

ADOT Environmental Planning

Noise Measurement Data Form

PURPOSE OF NOISE MEASUREMENT

☐ Noise inquiry ☐ TNM Validation ☒ Existing conditions

FHWA NAC: B - Single Residence(s)

PROJECT DETAILS					
TracksID:	H7825	Project title:	I-10, Jct. I-19 to Kolb Drive	Date:	08/08/2017
EnvoyID:		Inquirer:			
Route:	I-10	Mile Post 1:	263	County:	PIMA
		Mile Post 2:	262	Address:	

GEO-REFERENCE	Latitude	Longitude	Altitude (ft)
GPS	32°10'33.56"N	110°56'24.64"W	2517

EQUIPMENT AND ATMOSPHERIC CONDITIONS					
Sound level meter		Larson Davis 812		Calibration valid:	Yes
Temperature (F):	103	Humidity (%):	16	Wind (mph):	0.7
Clouds	Clear sky	Sample start:	11:02	Duration:	10

VEHICLE SPEED, VOLUMES AND MIX						
Speed	**Vehicles total**	Auto (%)	Medium truck (%)	Heavy truck (%)	Bus (%)	Motorcycle (%)
T-60	3825	86	6	4	0	0
A-65						

Click to insert already saved image of the image of the measurement location

SOUND LEVEL RESULTS		
L_{eq1}	☐	Check if there was interference
L_{eq2}	☐	
L_{eq3}	☐	
L_{eqh}	60.9	Ground: Loose soil

BACKGROUND NOISE DESCRIPTION
None

Please send this form electronically in its current MS Word form, not PDF, image or scanned.
The form shall be used to populate noise measurement database automatically.

Noise Measurement Data Sheet

Noise Meter
Model LD 820

Calibrator
Model CAL 200

Weighting
A X
C
Other

Site M6

Calibration @ 114 dBA
Start +/-____ dBA End +/-____ dBA

Response
Fast ____ or Slow X

Battery
> 50%* ✓
*replace if <50%

Weather Data
Temp 96.8 Humidity 23.4 Wind Spd 0.6 mph SW

Date 8/8/2017

Measurement Data						Traffic Data (Speed = _____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	10:03A	10:13	60.6	52.0	75.1										
2	10:13	10:23	60.6	51.6	67.5										
3															

SITE AERIAL

NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10		helicopter @ 10:11a
2			plane @ 10:15a, train @ jake break @ 10:19A
3			10:22A

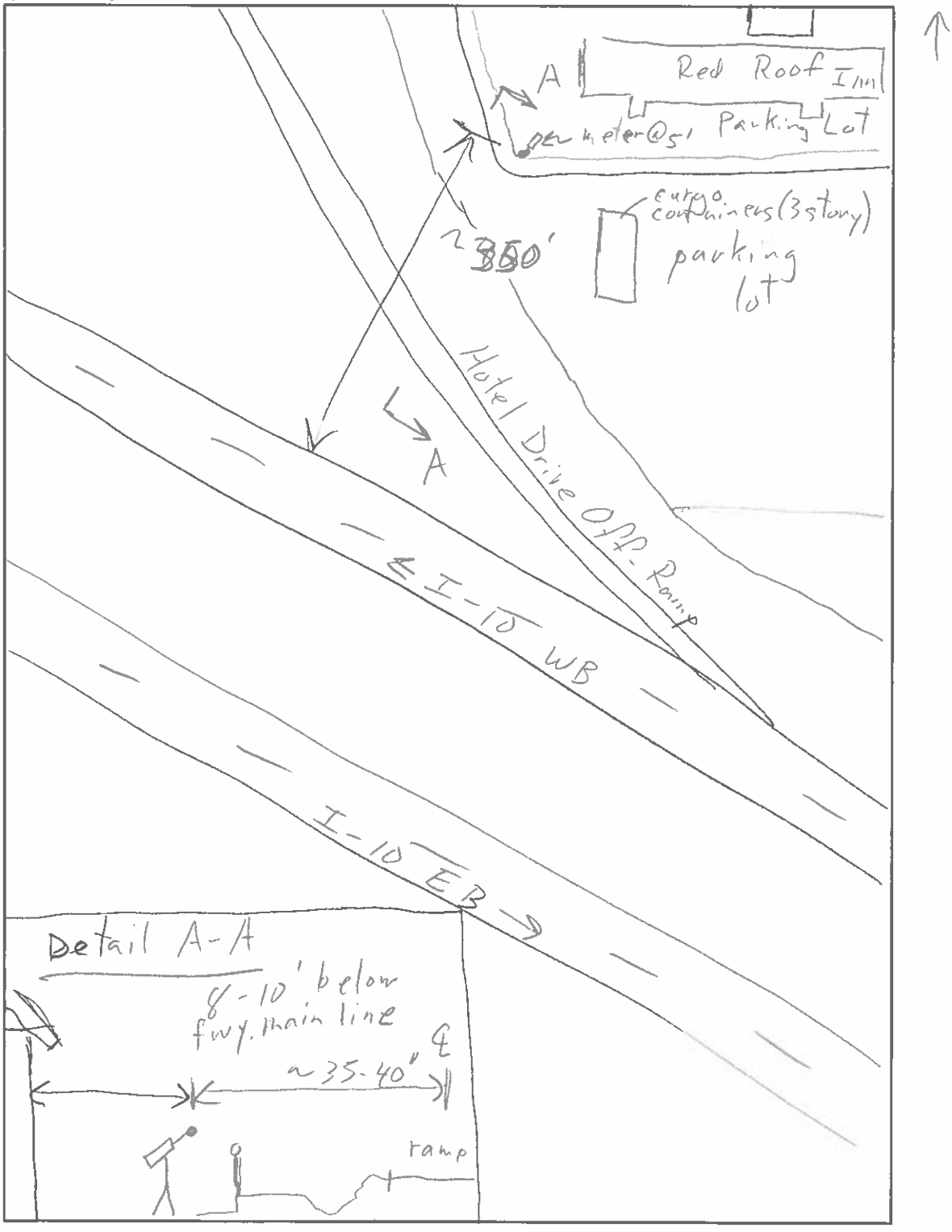
Lat - 32.161437 Long 110.914064

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M6 Date 8-Aug-17

SITE SKETCH



ADOT Environmental Planning

Noise Measurement Data Form

PURPOSE OF NOISE MEASUREMENT

☐ Noise inquiry ☐ TNM Validation ☒ Existing conditions

FHWA NAC: B - Single Residence(s)

PROJECT DETAILS					
TracksID:	H7825	Project title:	I-10, Jct. I-19 to Kolb Drive	Date:	08/08/2017
EnvoyID:		Inquirer:			
Route:	I-10	Mile Post 1:	263	County:	PIMA
		Mile Post 2:	262	Address:	

GEO-REFERENCE	Latitude	Longitude	Altitude (ft)
GPS	32° 9'13.14"N	110°54'16.05"W	2623

EQUIPMENT AND ATMOSPHERIC CONDITIONS					
Sound level meter		Larson Davis 812		Calibration valid:	Yes
Temperature (F):	107	Humidity (%):	16	Wind (mph):	0.7
Clouds	Clear sky	Sample start:	13:20	Duration:	25

VEHICLE SPEED, VOLUMES AND MIX						
Speed	**Vehicles total**	Auto (%)	Medium truck (%)	Heavy truck (%)	Bus (%)	Motorcycle (%)
T-60	4237	86	6	4	0	0
A-65						

Click to insert already saved image of the image of the measurement location

SOUND LEVEL RESULTS			
L_{eq1}	62.9	☐	Check if there was interference
L_{eq2}	65.0	☒	
L_{eq3}		☐	
L_{eqh}	62.9	Ground: Loose soil	

BACKGROUND NOISE DESCRIPTION
Cicaras during second measurement

Please send this form electronically in its current MS Word form, not PDF, image or scanned.
The form shall be used to populate noise measurement database automatically.

Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/- 0 dBA End +/- 0 dBA
Response
Fast ___ or Slow X
Weather Data
Temp 102.7 Humidity 17.9 Wind Spd 1.3 mph NE

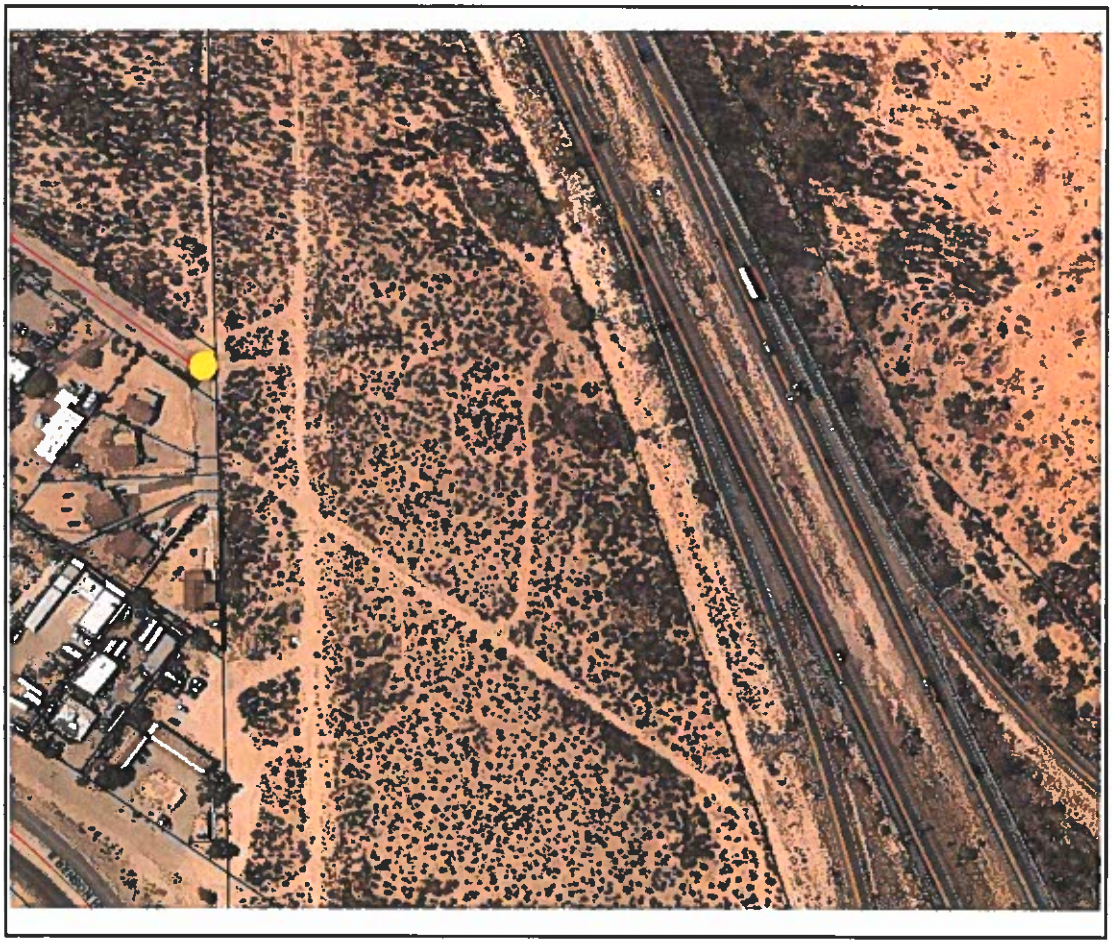
Calibrator
Model CAL 200

Weighting
A X
C ___
Other ___
Battery
> 50%* ✓
*replace if <50%

Site M8
Date 8/8/2017

Measurement Data						Traffic Data (Speed = ___ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	12:54P	1:04	50.6	42.4	61.3										
2	1:04P	1:14	52.9	46.5	61.9										
3															

SITE AERIAL



NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10	plane @ 1:10p	car starting @ 1:01P
2			~~motorcycle~~ OJ 1:05P
3			dirt bike

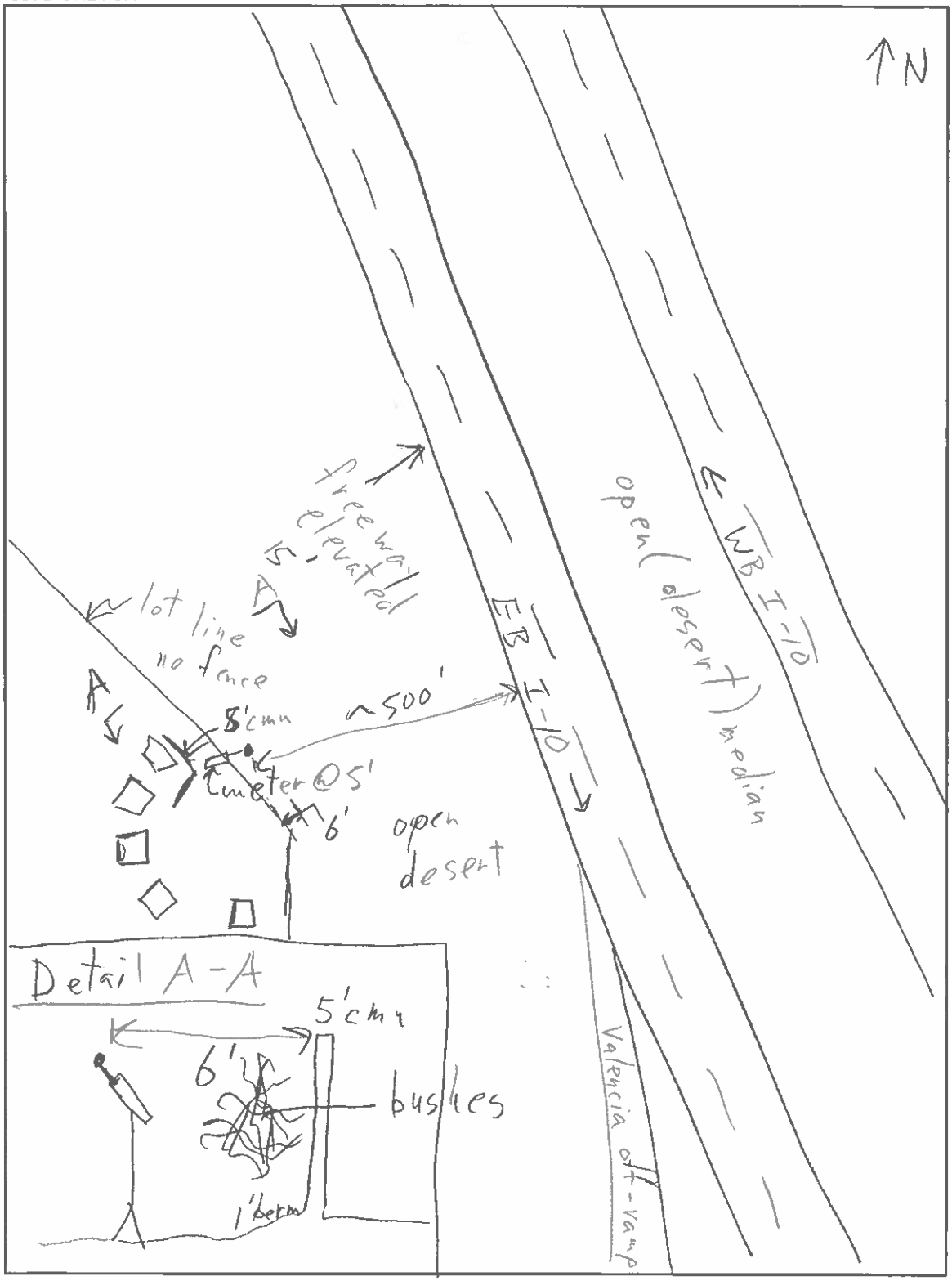
Lat - 32.138326 Lon - 110.892226

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M8 Date 8-Aug-17

SITE SKETCH



ADOT Environmental Planning

Noise Measurement Data Form

PURPOSE OF NOISE MEASUREMENT

☐ Noise inquiry ☐ TNM Validation ☒ Existing conditions

FHWA NAC: B - Single Residence(s)

PROJECT DETAILS					
TracksID:	H7825	Project title:	I-10, Jct. I-19 to Kolb Drive	Date:	08/08/2017
EnvoyID:		Inquirer:			
Route:	I-10	Mile Post 1:	265	County:	PIMA
		Mile Post 2:	264	Address:	

GEO-REFERENCE	Latitude	Longitude	Altitude (ft)
GPS	32° 7'54.39"N	110°53'12.99"W	2639

EQUIPMENT AND ATMOSPHERIC CONDITIONS					
Sound level meter		Larson Davis 812		Calibration valid:	Yes
Temperature (F):	106	Humidity (%):	13	Wind (mph):	0.7
Clouds	Clear sky	Sample start:	14:08	Duration:	20

VEHICLE SPEED, VOLUMES AND MIX						
Speed	**Vehicles total**	Auto (%)	Medium truck (%)	Heavy truck (%)	Bus (%)	Motorcycle (%)
T-63	4484	86	6	4	0	0
A-72						

Click to insert already saved image of the image of the measurement location

SOUND LEVEL RESULTS			
L_{eq1}	53.4	☐	Check if there was interference
L_{eq2}	54.2	☐	
L_{eq3}		☐	
L_{eqh}	53.8	Ground: Hard soil	

BACKGROUND NOISE DESCRIPTION

Please send this form electronically in its current MS Word form, not PDF, image or scanned.
The form shall be used to populate noise measurement database automatically.

Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/-____ dBA End +/-____ dBA
Response
Fast ____ or Slow X
Weather Data Temp 103.6 Humidity 18.5 Wind Spd 1.8 mph S

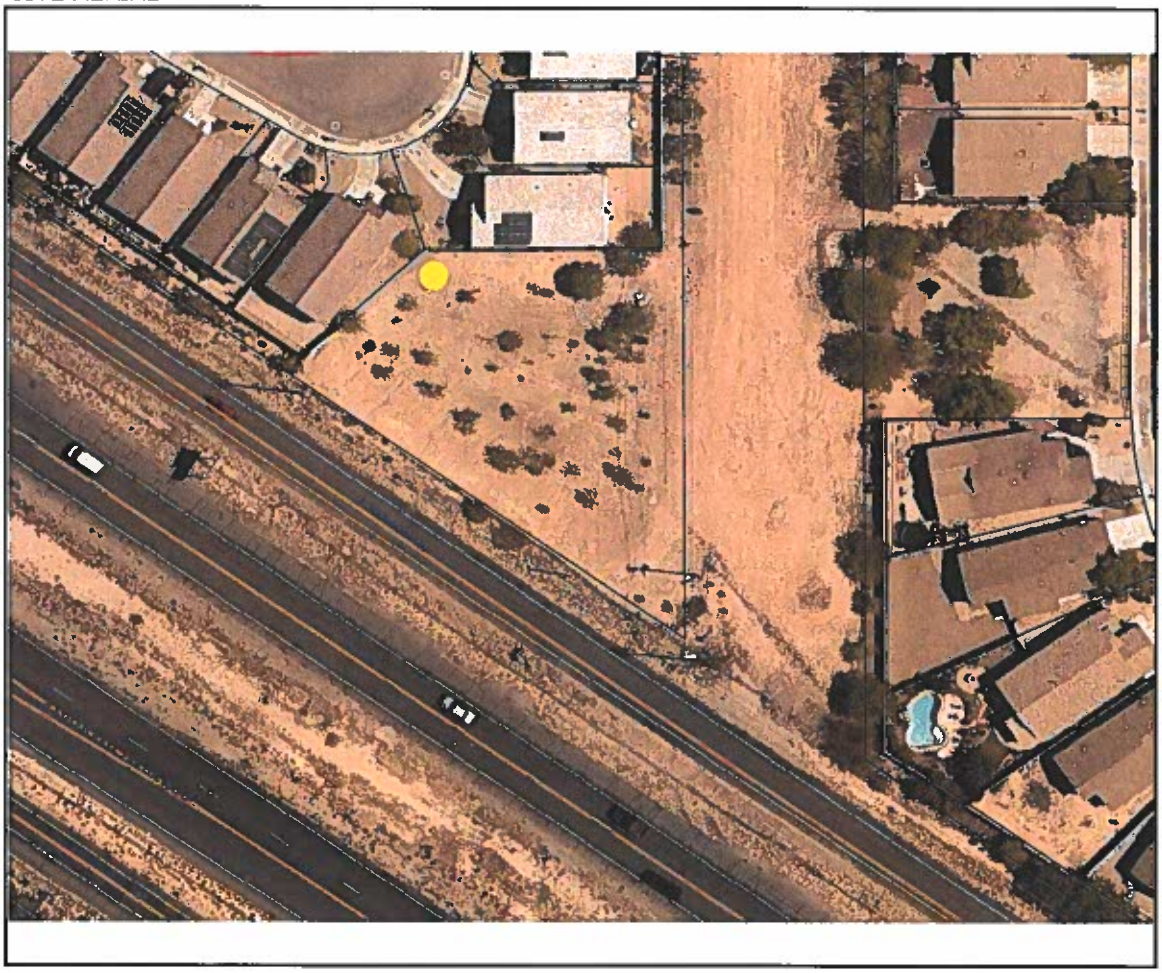
Calibrator
Model CAL 200

Weighting
A X
C ____
Other ____
Battery
> 50%* ✓
*replace if <50%

Site M10
Date 8/8/2017

Measurement Data						Traffic Data (Speed = ____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	3:25P	3:35	59.2	46.8	67.5										
2	3:35	3:45	60.9	51.3	72.6										
3															

SITE AERIAL



NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10	Kids playing	
2			
3			

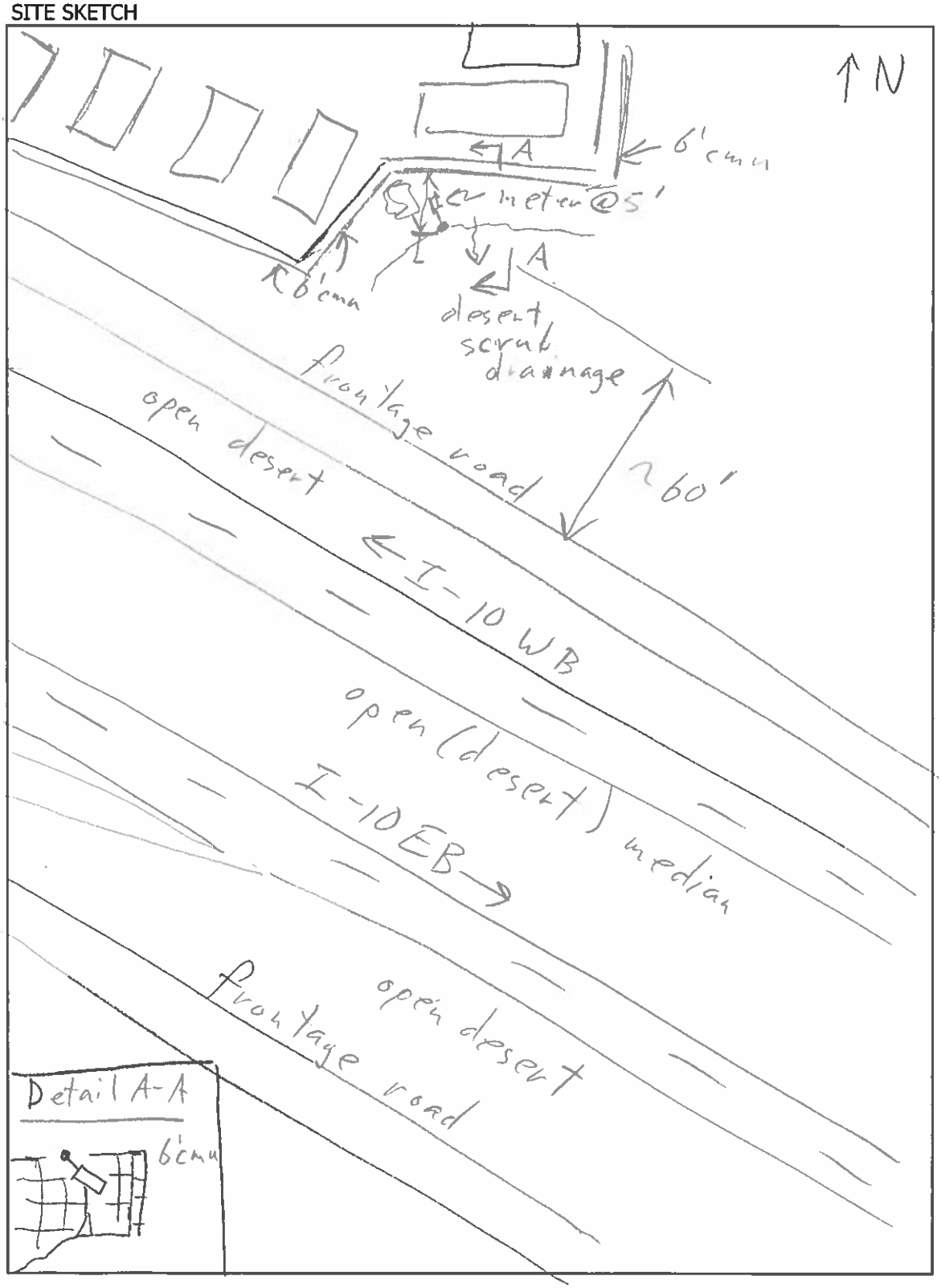
Lat - 32.121941 Lon - 110.868654

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M10 Date 8-Aug-17

SITE SKETCH



Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/- 0 dBA End +/- 0 dBA
Response
Fast ____ or Slow X
Weather Data Temp 104.6 Humidity 16 Wind Spd 1.2 mph SW

Calibrator
Model CAL 200

Weighting
A X
C ____
Other ____
Battery
> 50%* ✓
*replace if <50%

Site M11
Date 8/8/2017

Measurement Data						Traffic Data (Speed = _____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	1:49P	1:59P	64.1	53.6	75.8										
2	1:59P	2:09P	65.0	53.4	71.7										
3															

SITE AERIAL

+ NOT CORRECT PIC

NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10		car starting @ 1:52P
2			
3			

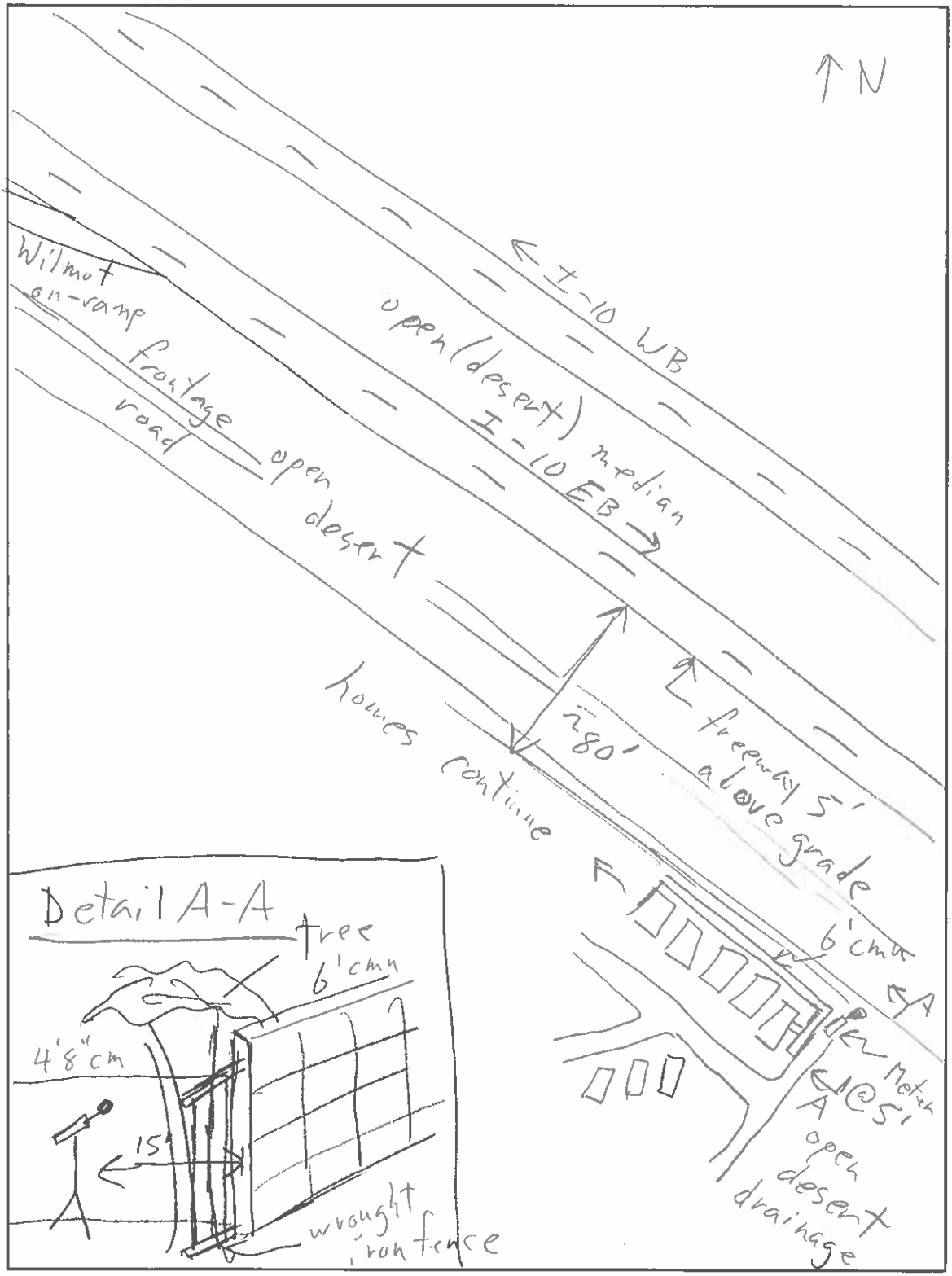
Lat - 32.108392 Lon - 110.849689

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M11 Date 8-Aug-17

SITE SKETCH



Noise Measurement Data Sheet

Noise Meter
Model LD 820
Calibration @ 114 dBA
Start +/- 0 dBA End +/- 0 dBA
Response
Fast ____ or Slow X
Weather Data Temp 100.9 Humidity 20% Wind Spd 2.8 mph NE

Calibrator
Model CAL 200

Weighting
A X
C ____
Other ____
Battery
> 50%* ✓
*replace if <50%

Site M12
Date 8/8/2017

Measurement Data						Traffic Data (Speed = ____ mph)									
Sample	Begin Time	End Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Autos		MT		HT		Motocyc.		Buses	
1	2:28P	2:38	65.3	51.4	74.6										
2	2:38	2:48	66.6	53.3	78.5										
3															

SITE AERIAL

NOTES

Sample	Major Sources	Background Noise	Unusual Events
1	I-10		
2			
3			

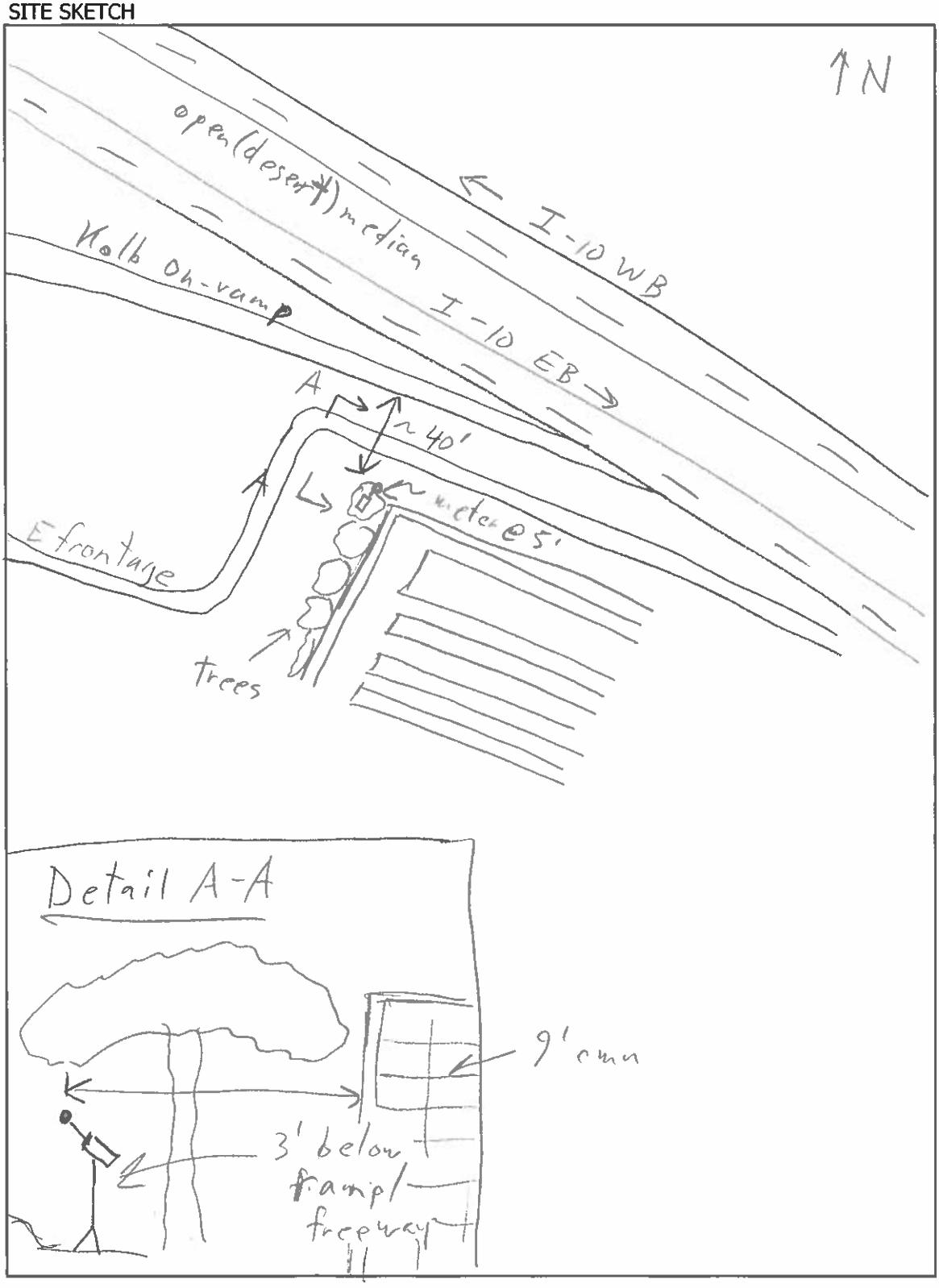
Lat - 32.100563 Lon (-) 110836933

Noise Measurement Data Sheet

Project I-10; Jct. I-19 to Kolb Drive & SR 210; Golf Links Road to I-10

Site M12 Date 8-Aug-17

SITE SKETCH



APPENDIX C – FEDERAL TRANSIT ADMINISTRATION NOISE IMPACT ASSESSMENT SPREADSHEET SCENARIO RUNS FOR UPRR

D'onofrio, Joe

From: Olbert, Brad
Sent: Wednesday, January 30, 2019 11:20 AM
To: D'onofrio, Joe
Subject: RE: I-10/SR 210 UPRR line

Joe,
The UPRR meeting was held during the feasibility study. The meeting notes are included in the Feasibility Report Update, February 2015, Appendix I, pages 319-320.
Brad

From: D'onofrio, Joe
Sent: Wednesday, January 30, 2019 11:11 AM
To: Olbert, Brad <brad.olbert@jacobs.com>
Subject: RE: I-10/SR 210 UPRR line

Is this documented in the Feasibility study or the project file?

Joe D'Onofrio
Jacobs
1.602.650.4916
Joe.D'Onofrio@Jacobs.com

From: Olbert, Brad
Sent: Wednesday, January 30, 2019 10:58 AM
To: D'onofrio, Joe <joe.donofrio@jacobs.com>
Subject: RE: I-10/SR 210 UPRR line

Joe,
There are two crossings of the UPRR lines.
Back in 2011 we had a meeting with UPRR. There is a bridge crossing in the vicinity of 4th Avenue and Park Avenue, 10-15 trains per day uses this track.
The other track is the one that parallels Alvernon Way. UPRR said 30 to 50 trains travel this line daily. (During Recession)
I checked online and an article by Arizona Public Media in July 2017 said over 50 trains a day pass through southern Arizona. (Post Recession)
Brad

From: D'onofrio, Joe
Sent: Wednesday, January 30, 2019 10:24 AM
To: Olbert, Brad <brad.olbert@jacobs.com>
Subject: I-10/SR 210 UPRR line

Brad,

How much have you been coordinating with UPRR? I need to comment on rail activity (# or daily trains) for the line that parallels Alvernon and I-10 heading east for the noise study.

Thanks.

Joe D’Onofrio, Group Lead
SW US Environmental Solutions Practice
Jacobs Engineering, BIAF
D: 1.602.650.4916
F: 1.602.253.1202
M: 1.602.568.2829
Joe.D’Onofrio@Jacobs.com

101 N First Avenue, Suite 2600
Phoenix, AZ 85003
www.jacobs.com

Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**UPRR @ R35A**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**72 dBA**

Noise Source Parameters	
Number of Noise Sources:	**1**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	2
	Speed (mph)	40
	Avg. Number of Events/hr	2.083
Nighttime hrs	**Avg. Number of Locos/train**	2
	Speed (mph)	40
	Avg. Number of Events/hr	2.083

Distance	**Distance from Source to Receiver (ft)**	930
	Number of Intervening Rows of Buildings	0
Adjustments		

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	72 dBA
Total Project Ldn:	51 dBA
Total Noise Exposure:	72 dBA
Increase:	0 dB
Impact?:	None

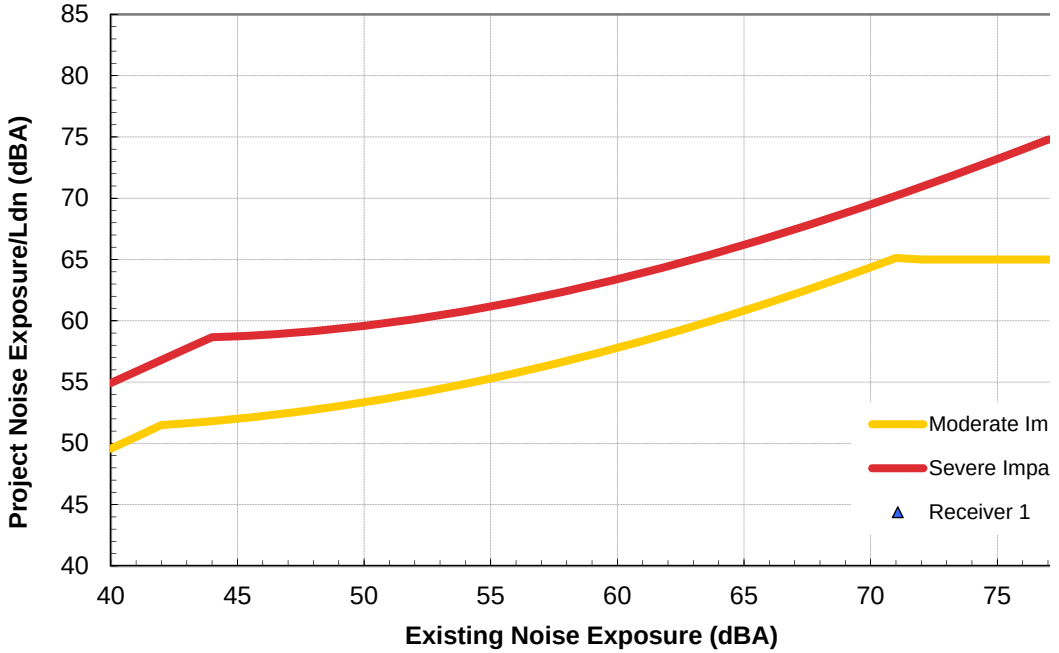
Distance to Impact Contours

Dist to Mod. Impact Contour (Source 1):	105 ft
Dist to Sev. Impact Contour (Source 1):	48 ft

Source 1 Results

Leq(day):	44.5 dBA
Leq(night):	44.5 dBA
Ldn:	50.9 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)

Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**UPRR @ 4F31b**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**61 dBA**

Noise Source Parameters	
Number of Noise Sources:	**1**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	2
	Speed (mph)	40
	Avg. Number of Events/hr	2.083
Nighttime hrs	**Avg. Number of Locos/train**	2
	Speed (mph)	40
	Avg. Number of Events/hr	2.083

Distance	**Distance from Source to Receiver (ft)**	895
	Number of Intervening Rows of Buildings	0
Adjustments		

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	61 dBA
Total Project Ldn:	51 dBA
Total Noise Exposure:	62 dBA
Increase:	0 dB
Impact?:	None

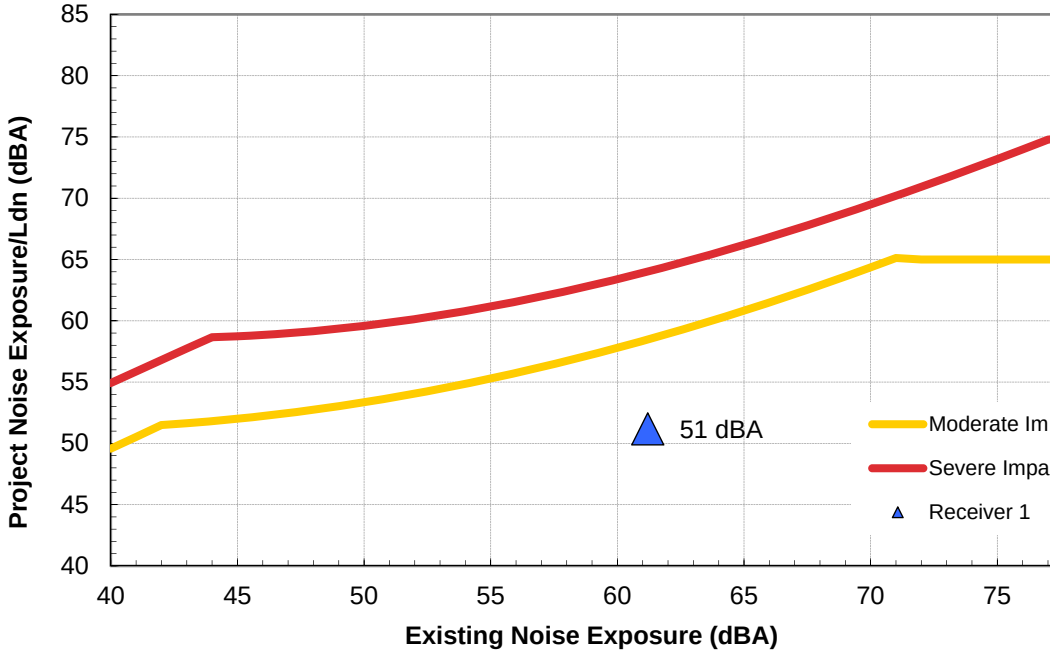
Distance to Impact Contours

Dist to Mod. Impact Contour (Source 1):	298 ft
Dist to Sev. Impact Contour (Source 1):	127 ft

Source 1 Results

Leq(day):	44.8 dBA
Leq(night):	44.8 dBA
Ldn:	51.2 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)

Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**UPRR @ R321**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**1**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	2
	Speed (mph)	40
	Avg. Number of Events/hr	2.083
Nighttime hrs	**Avg. Number of Locos/train**	2
	Speed (mph)	40
	Avg. Number of Events/hr	2.083

Distance	**Distance from Source to Receiver (ft)**	325
	Number of Intervening Rows of Buildings	0
Adjustments		

	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	58 dBA
Total Noise Exposure:	62 dBA
Increase:	2 dB
Impact?:	None

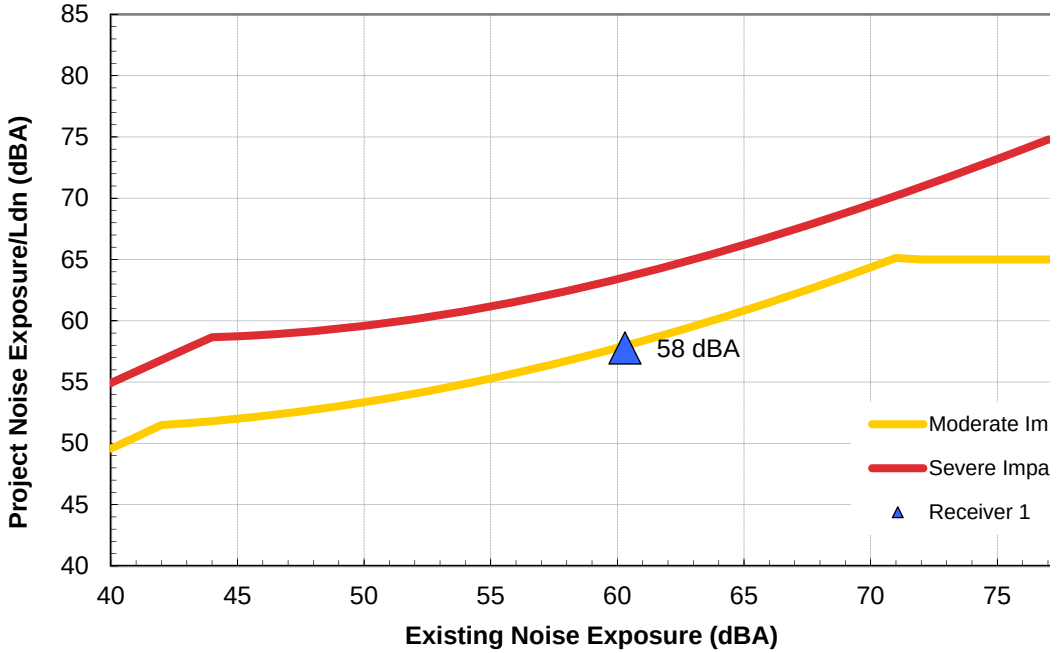
Distance to Impact Contours

Dist to Mod. Impact Contour (Source 1):	325 ft
Dist to Sev. Impact Contour (Source 1):	137 ft

Source 1 Results

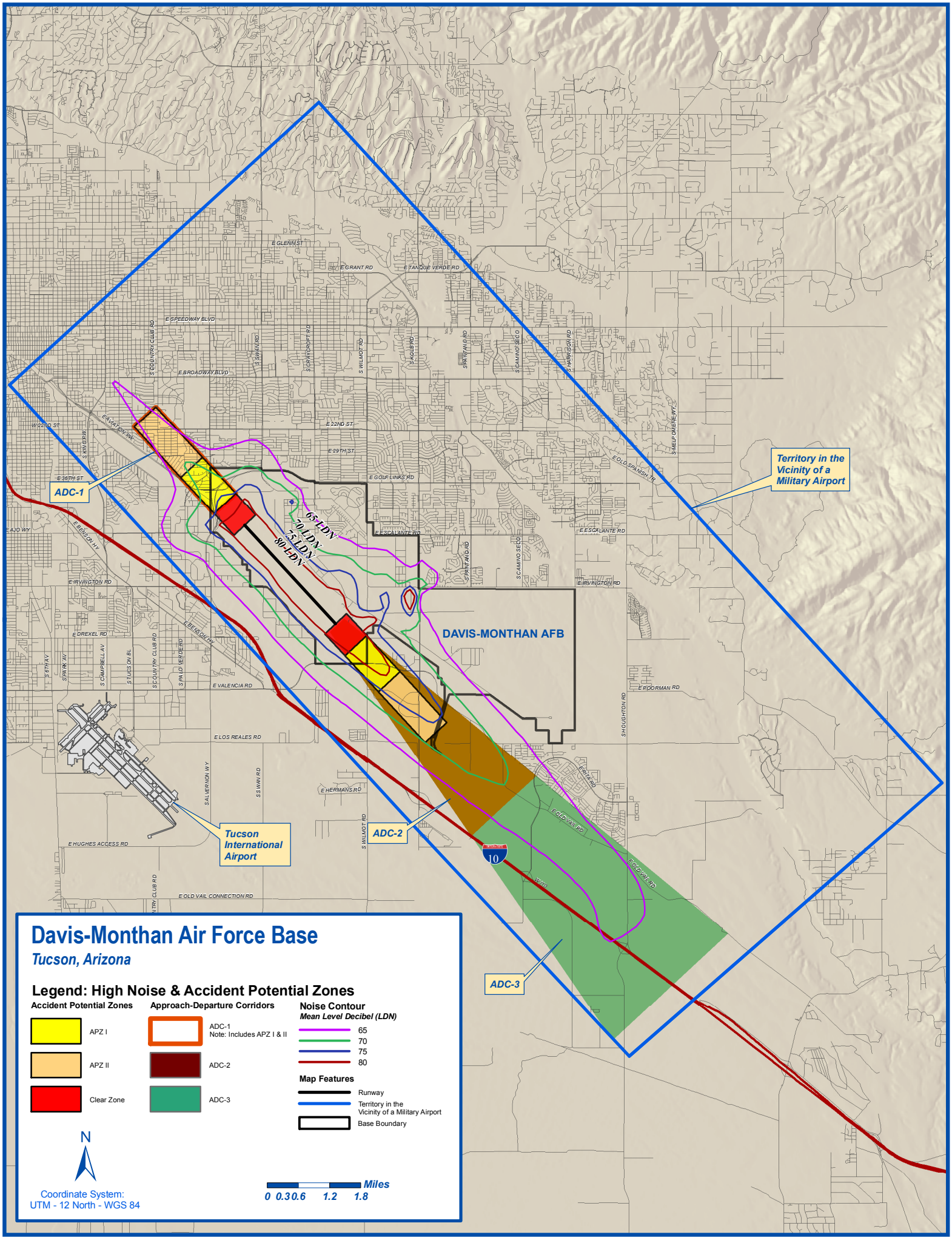
Leq(day):	51.4 dBA
Leq(night):	51.4 dBA
Ldn:	57.8 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)

APPENDIX D – DAVIS MONTHAN AIR FORCE BASE NOISE CONTOURS



Davis-Monthan Air Force Base

Tucson, Arizona

Legend: High Noise & Accident Potential Zones

Accident Potential Zones

- APZ I
- APZ II
- Clear Zone

Approach-Departure Corridors

- ADC-1 (Note: Includes APZ I & II)
- ADC-2
- ADC-3

Noise Contour
Mean Level Decibel (LDN)

- 65
- 70
- 75
- 80

Map Features

- Runway
- Territory in the Vicinity of a Military Airport
- Base Boundary

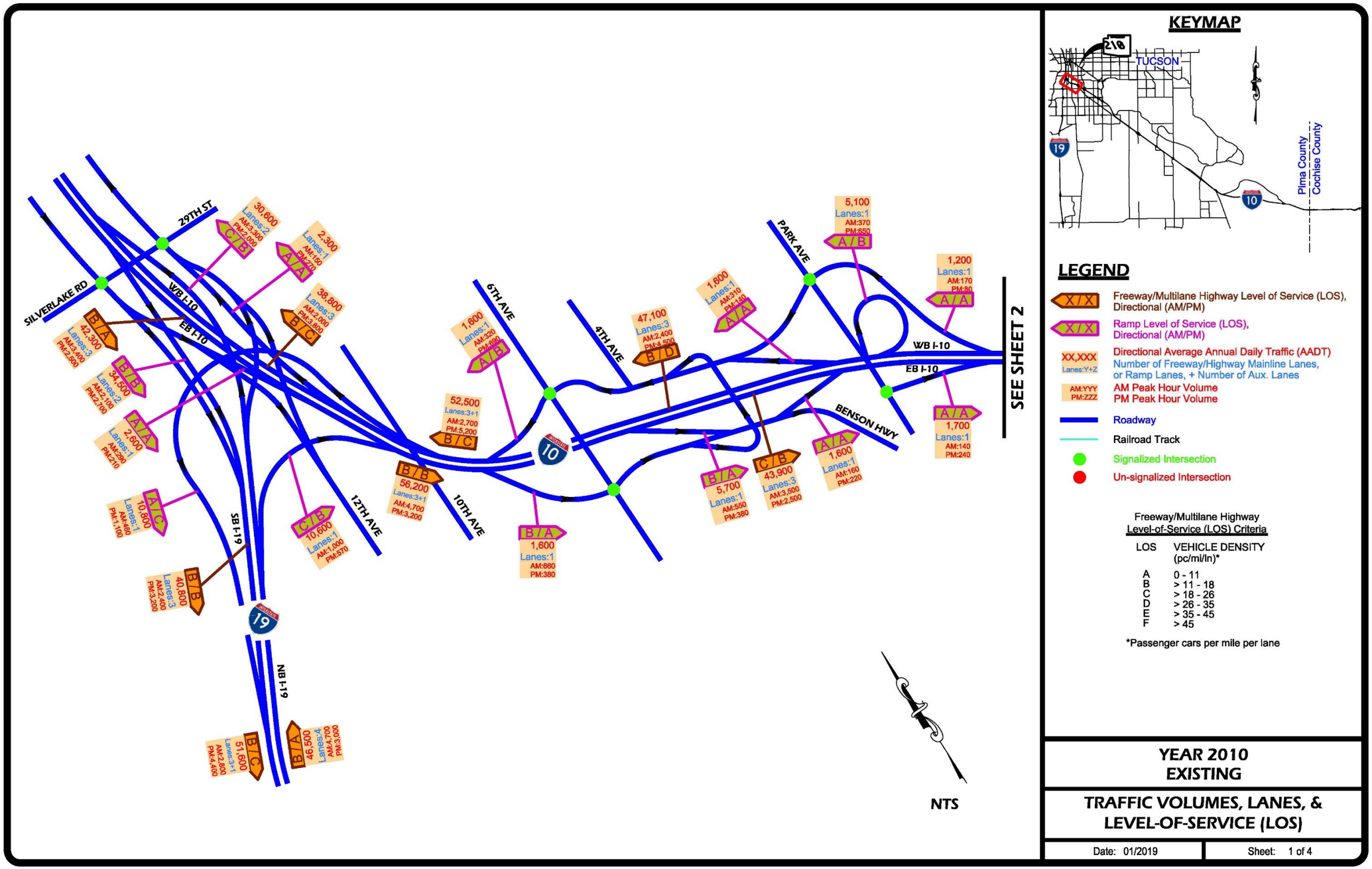
N

Coordinate System:
UTM - 12 North - WGS 84

Miles
0 0.3 0.6 1.2 1.8

APPENDIX E – TRAFFIC DATA

Figure 4.2 Year 2010 Existing – Traffic Volumes, Lanes, & LOS (Sheet 1 of 4)



KEYMAP

LEGEND

- X / X — Freeway/Multilane Highway Level of Service (LOS), Directional (AM/PM)
- X / X — Ramp Level of Service (LOS), Directional (AM/PM)
- XX,XXX Lanes:Y+Z — Directional Average Annual Daily Traffic (AADT) Number of Freeway/Highway Mainline Lanes, or Ramp Lanes, + Number of Aux. Lanes
- AM:YYY PM:ZZZ — AM Peak Hour Volume, PM Peak Hour Volume
- Roadway
- Railroad Track
- Signalized Intersection
- Un-signalized Intersection

Freeway/Multilane Highway
Level-of-Service (LOS) Criteria

LOS	VEHICLE DENSITY (pc/mi/ln)*
A	0 - 11
B	> 11 - 18
C	> 18 - 26
D	> 26 - 35
E	> 35 - 45
F	> 45

*Passenger cars per mile per lane

YEAR 2010 EXISTING

TRAFFIC VOLUMES, LANES, & LEVEL-OF-SERVICE (LOS)

Date: 01/2019 Sheet: 1 of 4

Figure 4.2: Year 2010 Existing – Traffic Volumes, Lanes, & LOS (Sheet 2 of 4)

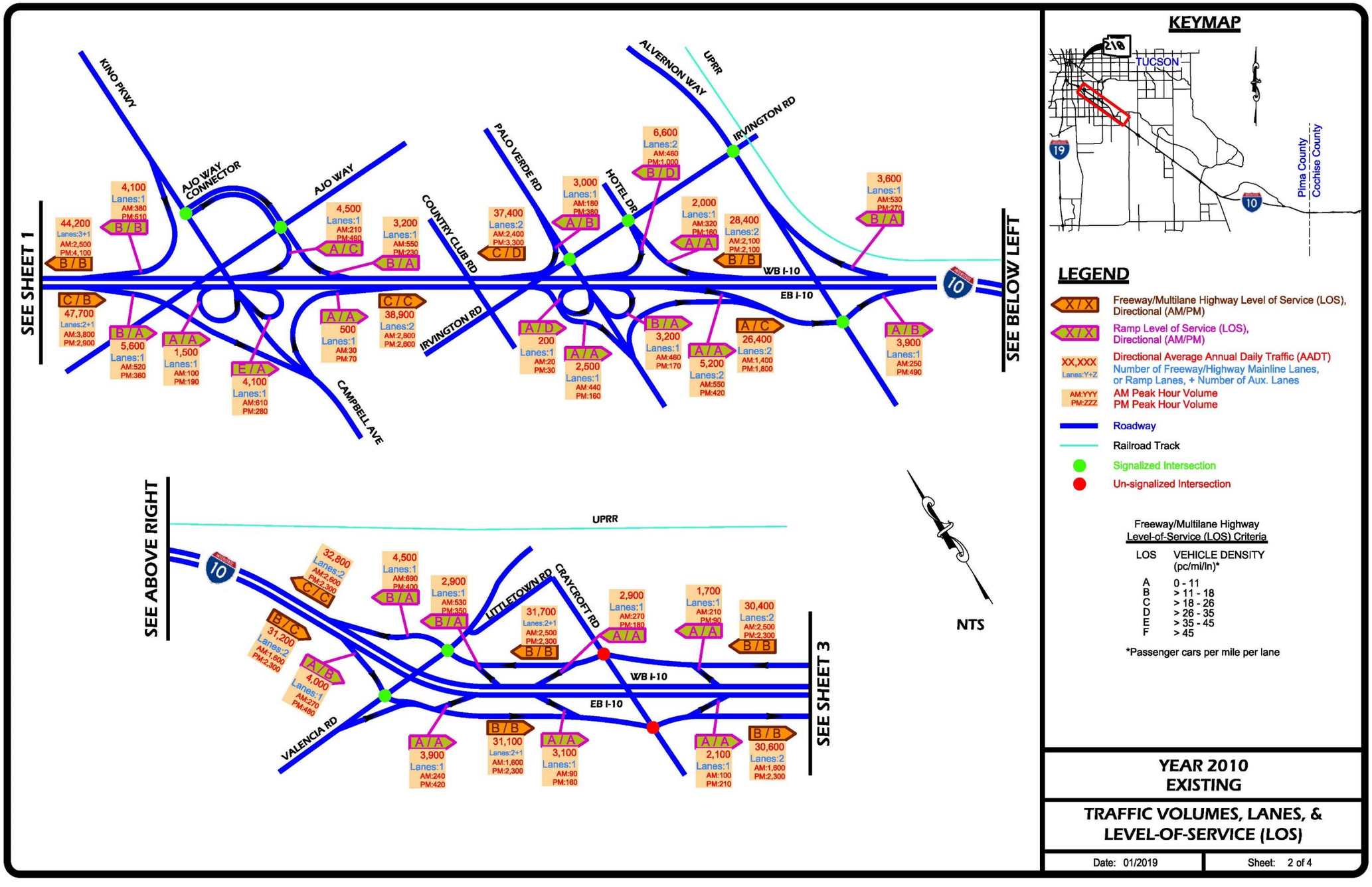


Figure 4.2 Year 2010 Existing – Traffic Volumes, Lanes, & LOS (Sheet 3 of 4)

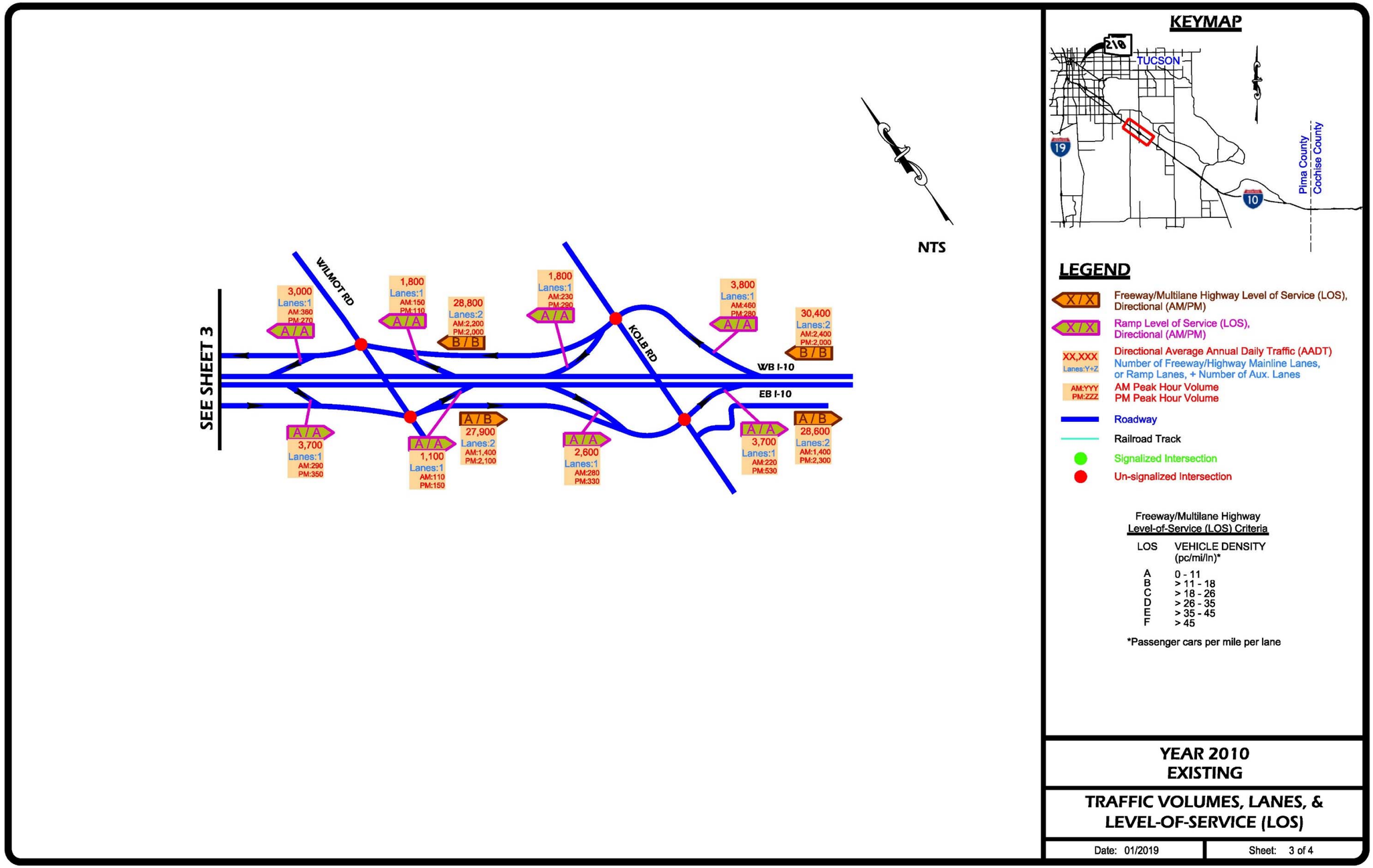


Figure 4.2 Year 2010 Existing – Traffic Volumes, Lanes, & LOS (Sheet 4 of 4)

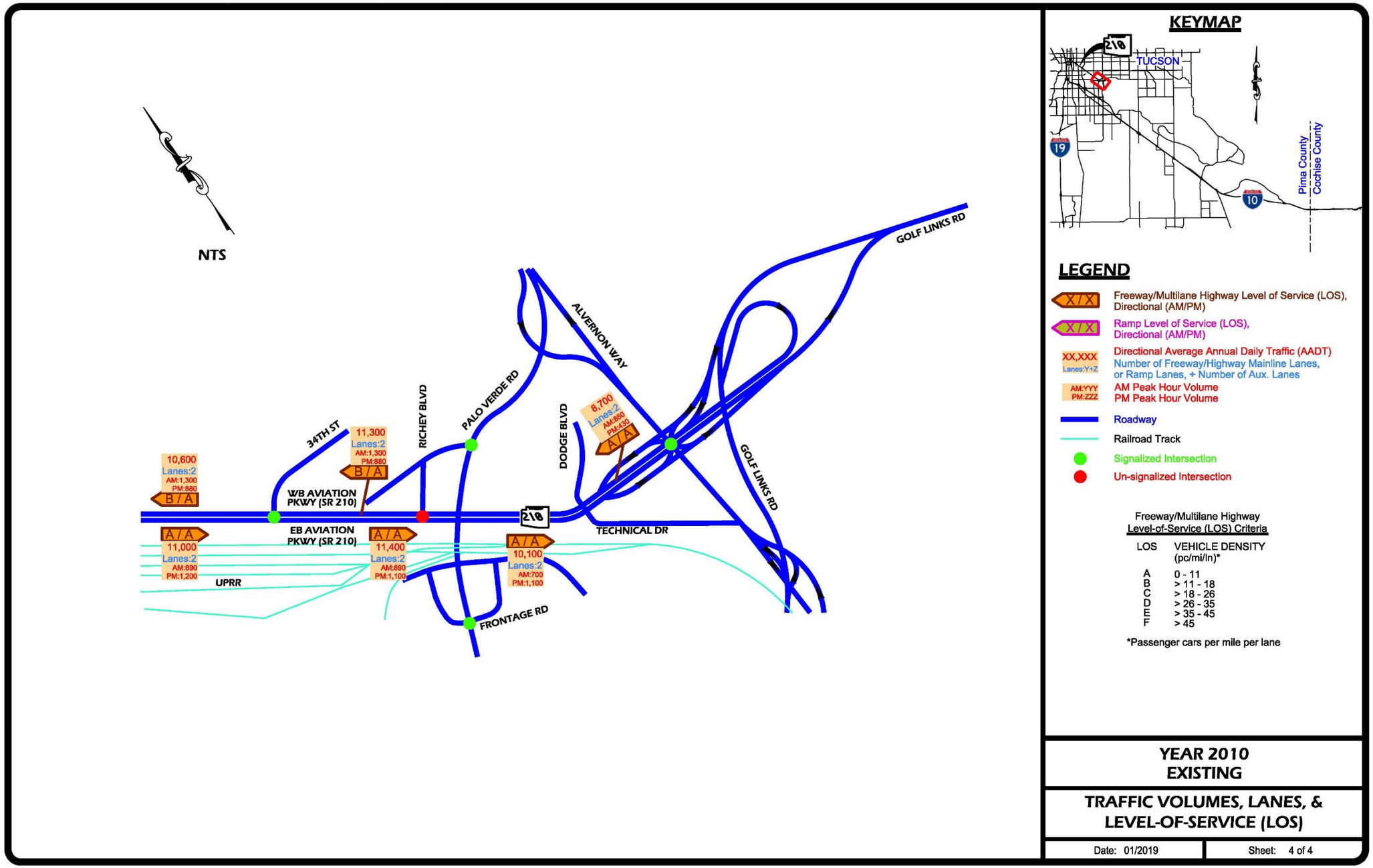


Figure 4.3 Year 2010 Existing – Peak Hour Volumes, Lane Configurations, & LOS (Sheet 1 of 4)

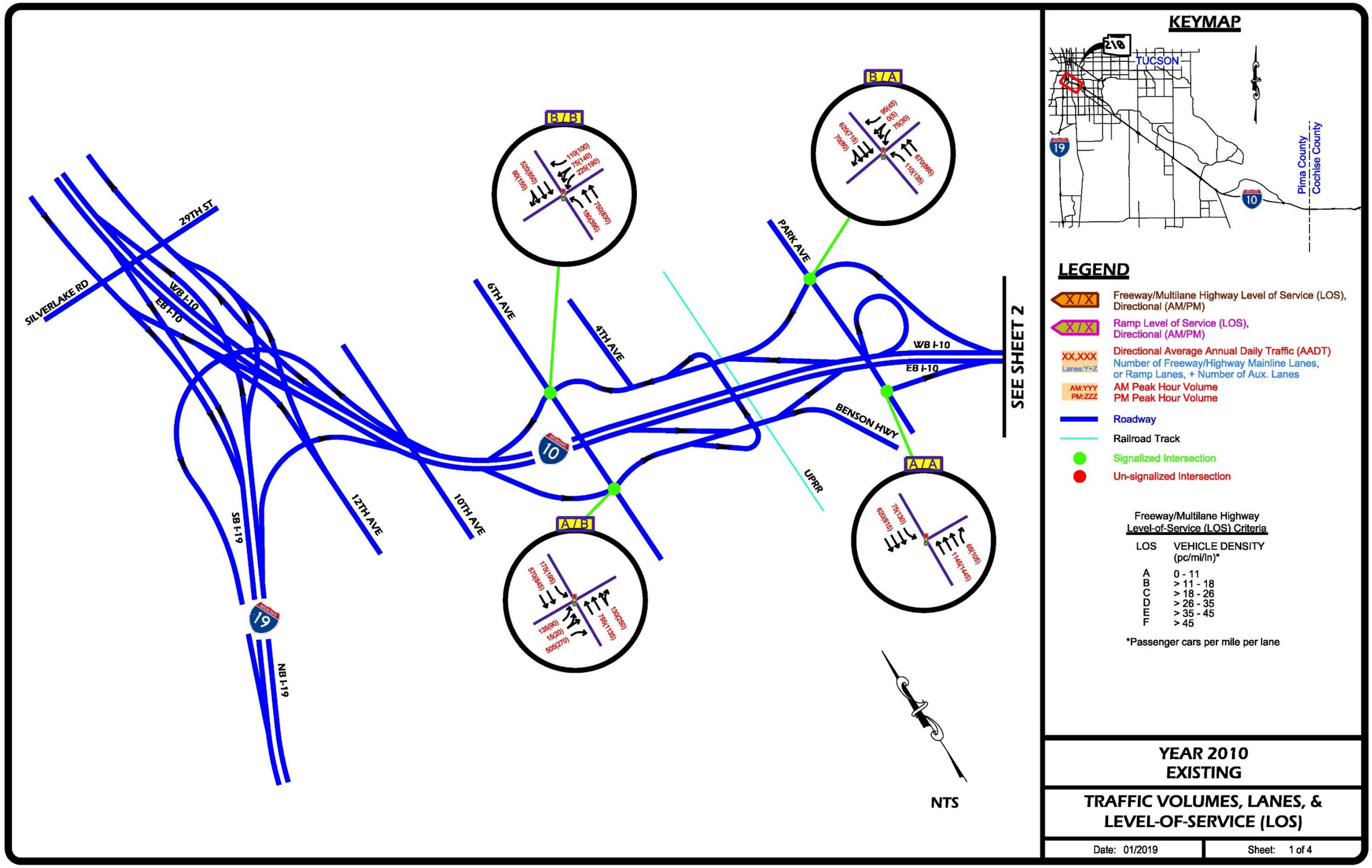


Figure 4.3 Year 2010 Existing – Peak Hour Volumes, Lane Configurations, & LOS (Sheet 2 of 4)

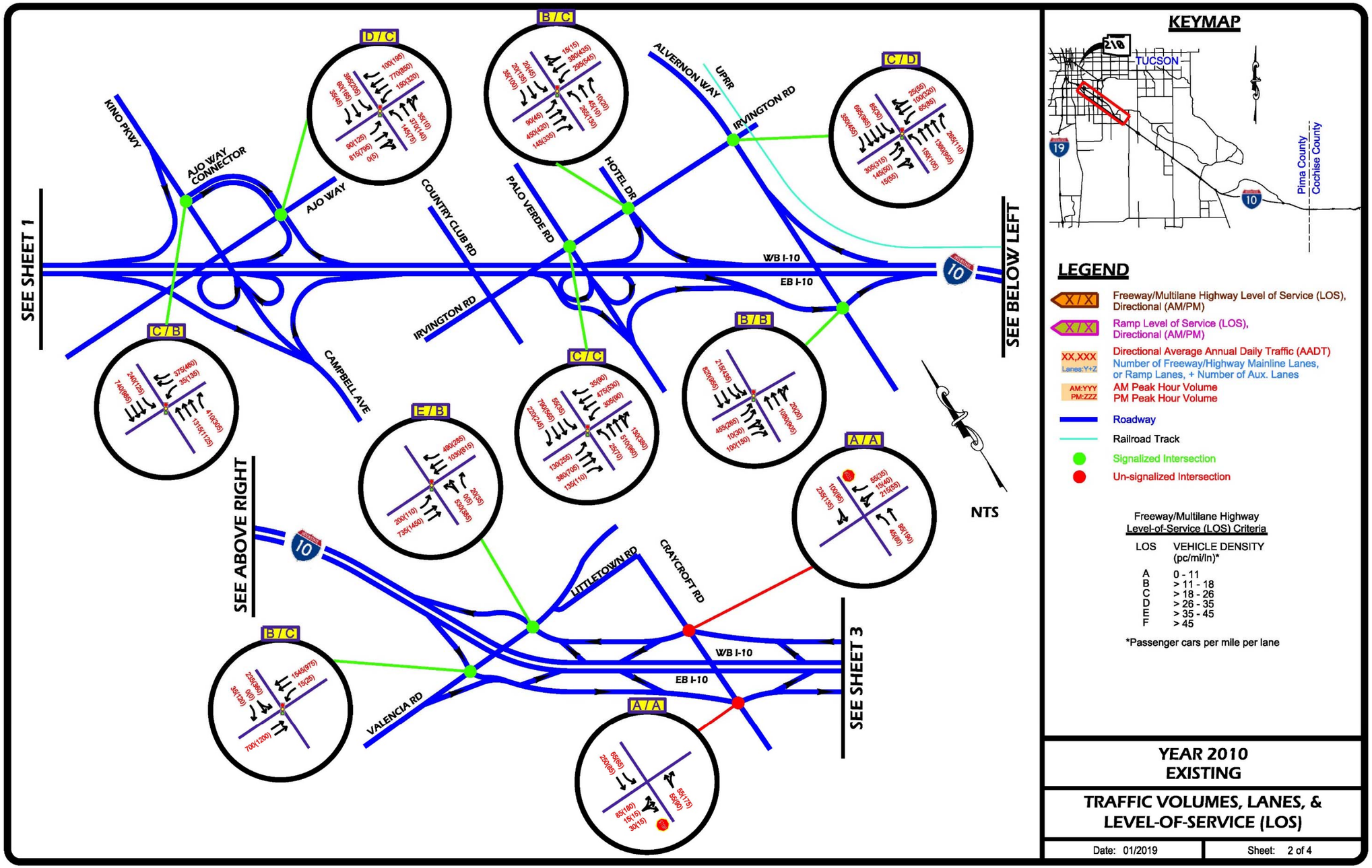


Figure 4.3 Year 2010 Existing – Peak Hour Volumes, Lane Configurations, & LOS (Sheet 3 of 4)

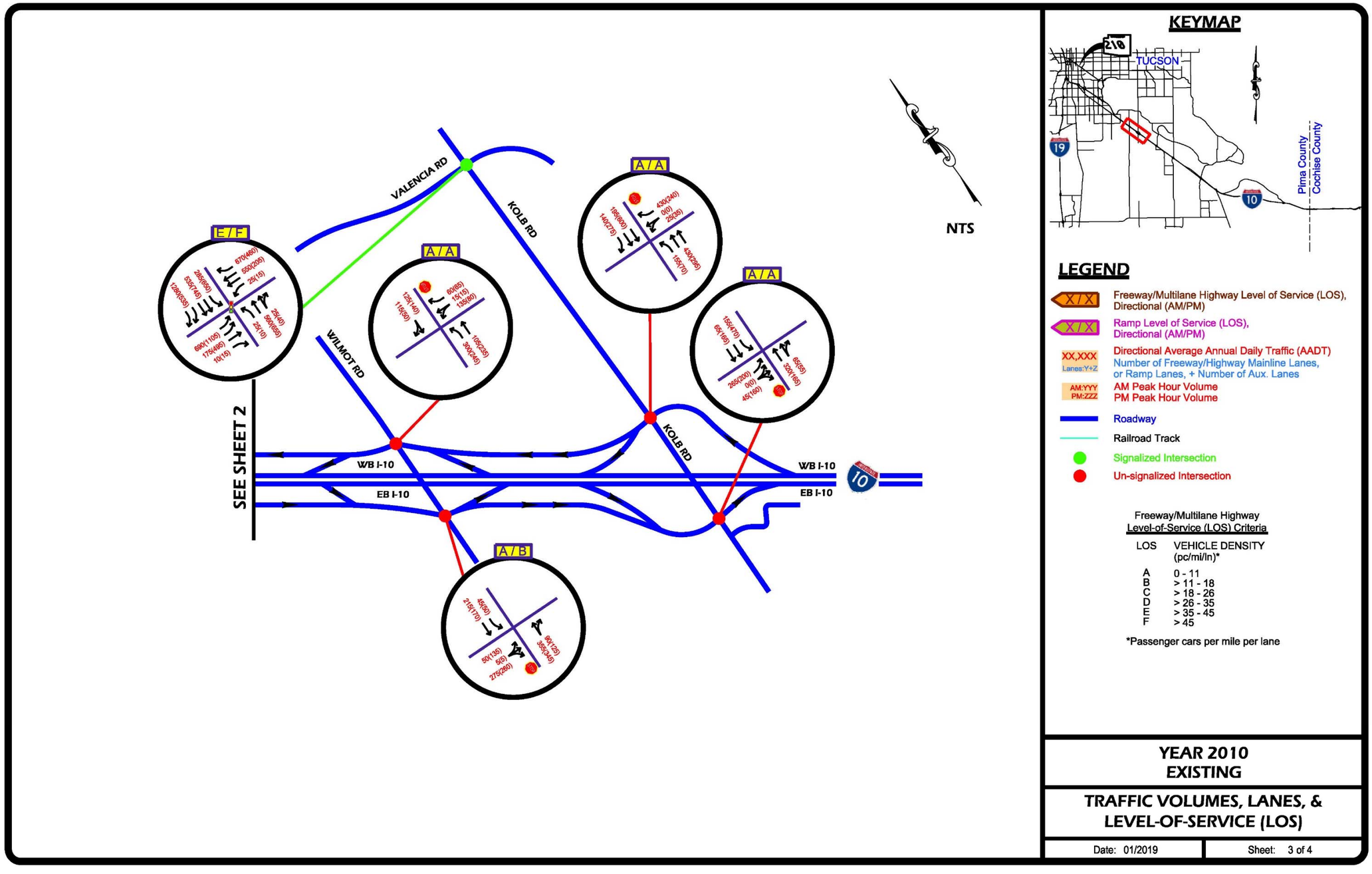


Figure 4.3 Year 2010 Existing – Peak Hour Volumes, Lane Configurations, & LOS (Sheet 4 of 4)

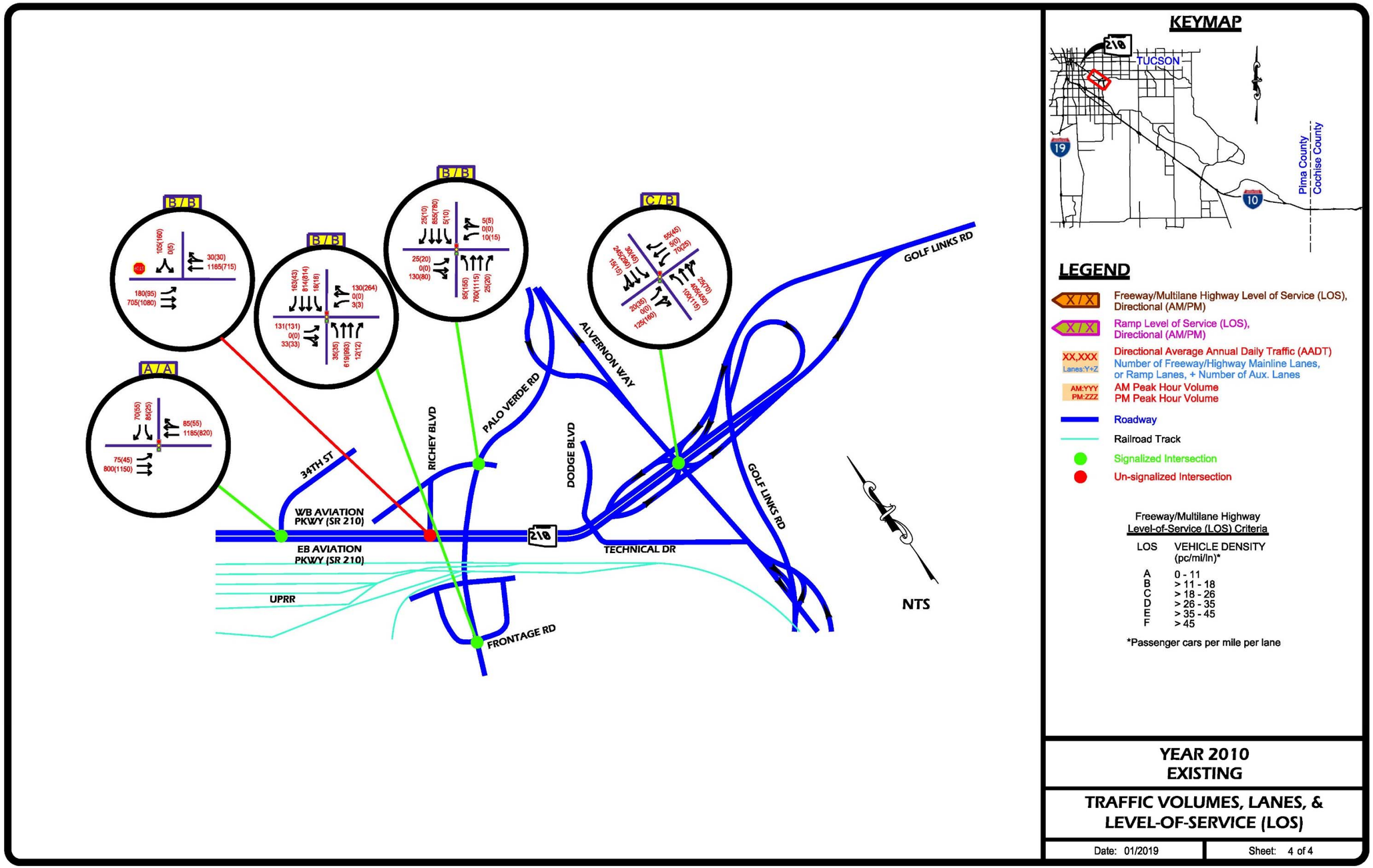
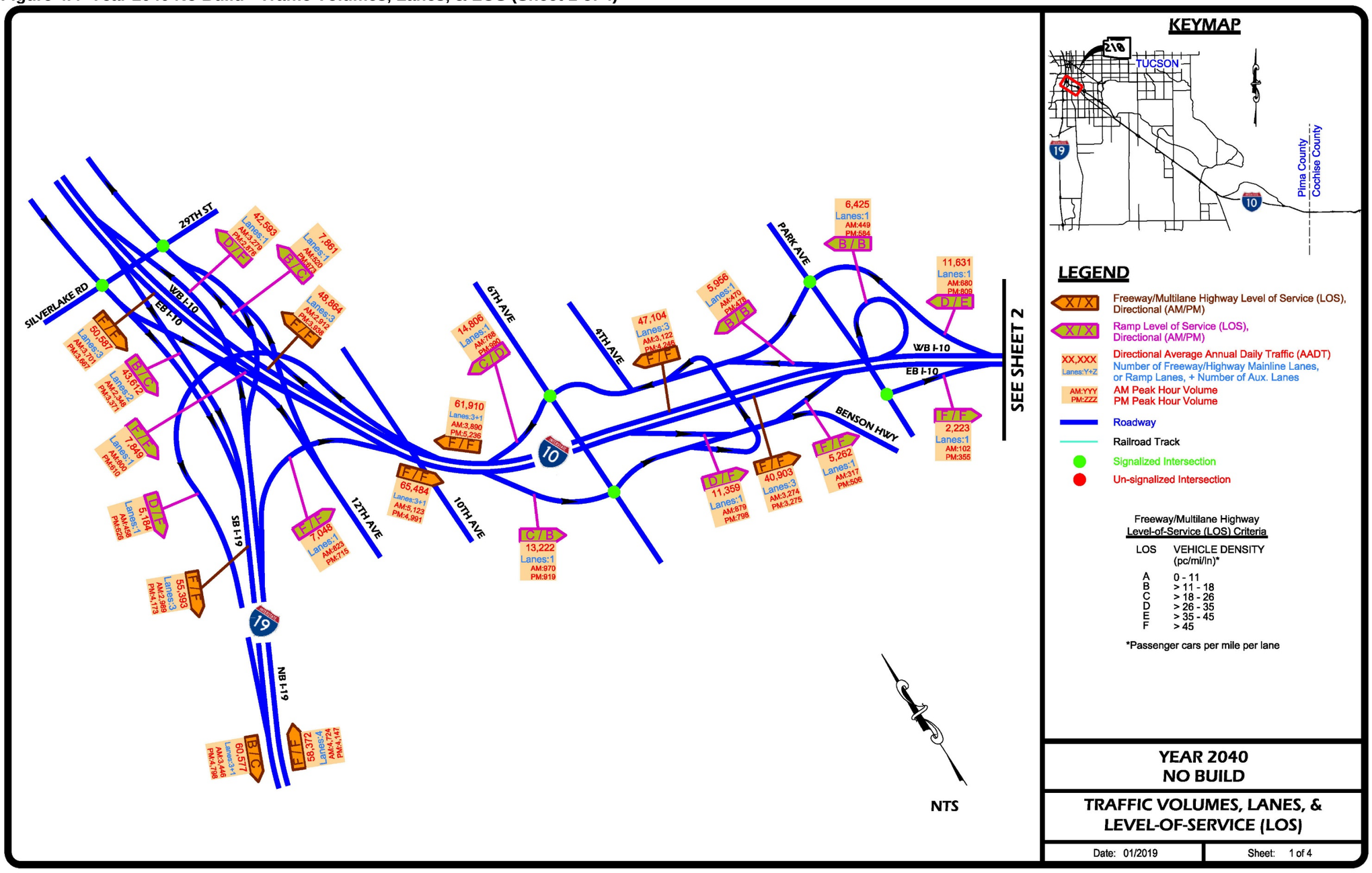


Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 1 of 4)



LEGEND

- X / X — Freeway/Multilane Highway Level of Service (LOS), Directional (AM/PM)
- X / X — Ramp Level of Service (LOS), Directional (AM/PM)
- XX,XXX, Lanes:Y+Z — Directional Average Annual Daily Traffic (AADT); Number of Freeway/Highway Mainline Lanes, or Ramp Lanes, + Number of Aux. Lanes
- AM:YYY PM:ZZZ — AM Peak Hour Volume; PM Peak Hour Volume
- Roadway
- Railroad Track
- Signalized Intersection
- Un-signalized Intersection

Freeway/Multilane Highway
Level-of-Service (LOS) Criteria

LOS	VEHICLE DENSITY (pc/mi/ln)*
A	0 - 11
B	> 11 - 18
C	> 18 - 26
D	> 26 - 35
E	> 35 - 45
F	> 45

*Passenger cars per mile per lane

YEAR 2040 NO BUILD

TRAFFIC VOLUMES, LANES, & LEVEL-OF-SERVICE (LOS)

Date: 01/2019 Sheet: 1 of 4

Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 2 of 4)

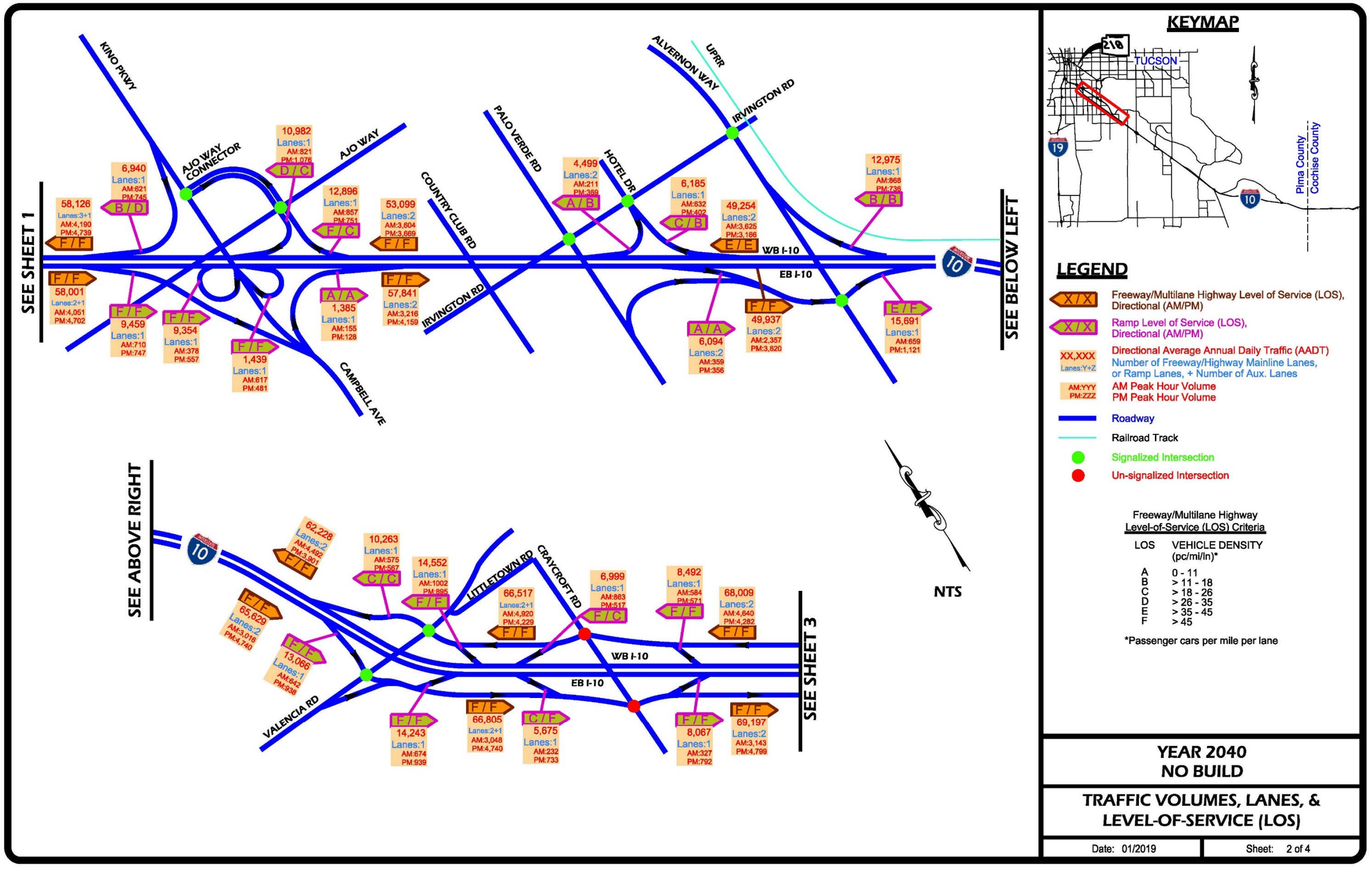


Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 3 of 4)

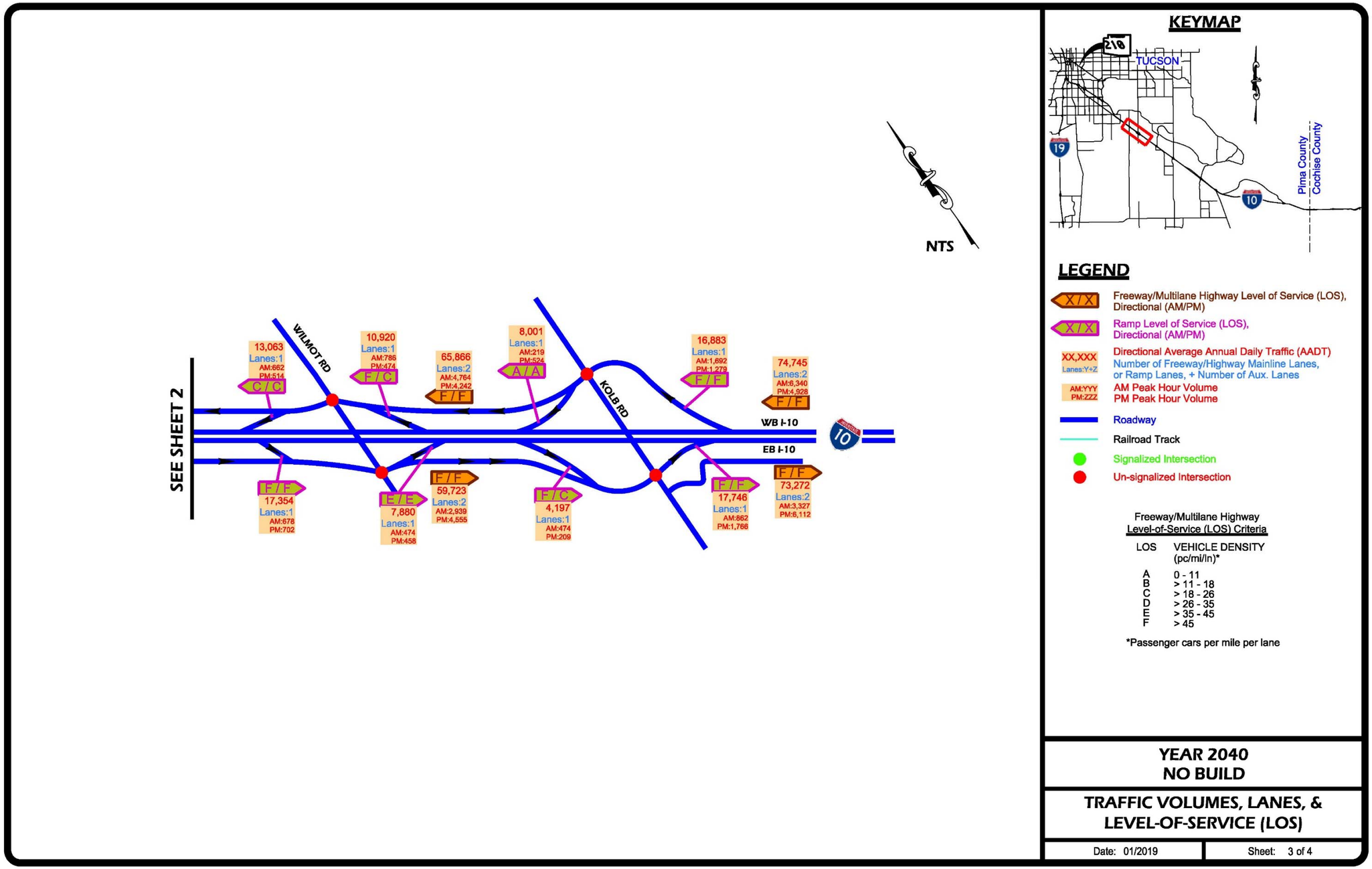


Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 4 of 4)

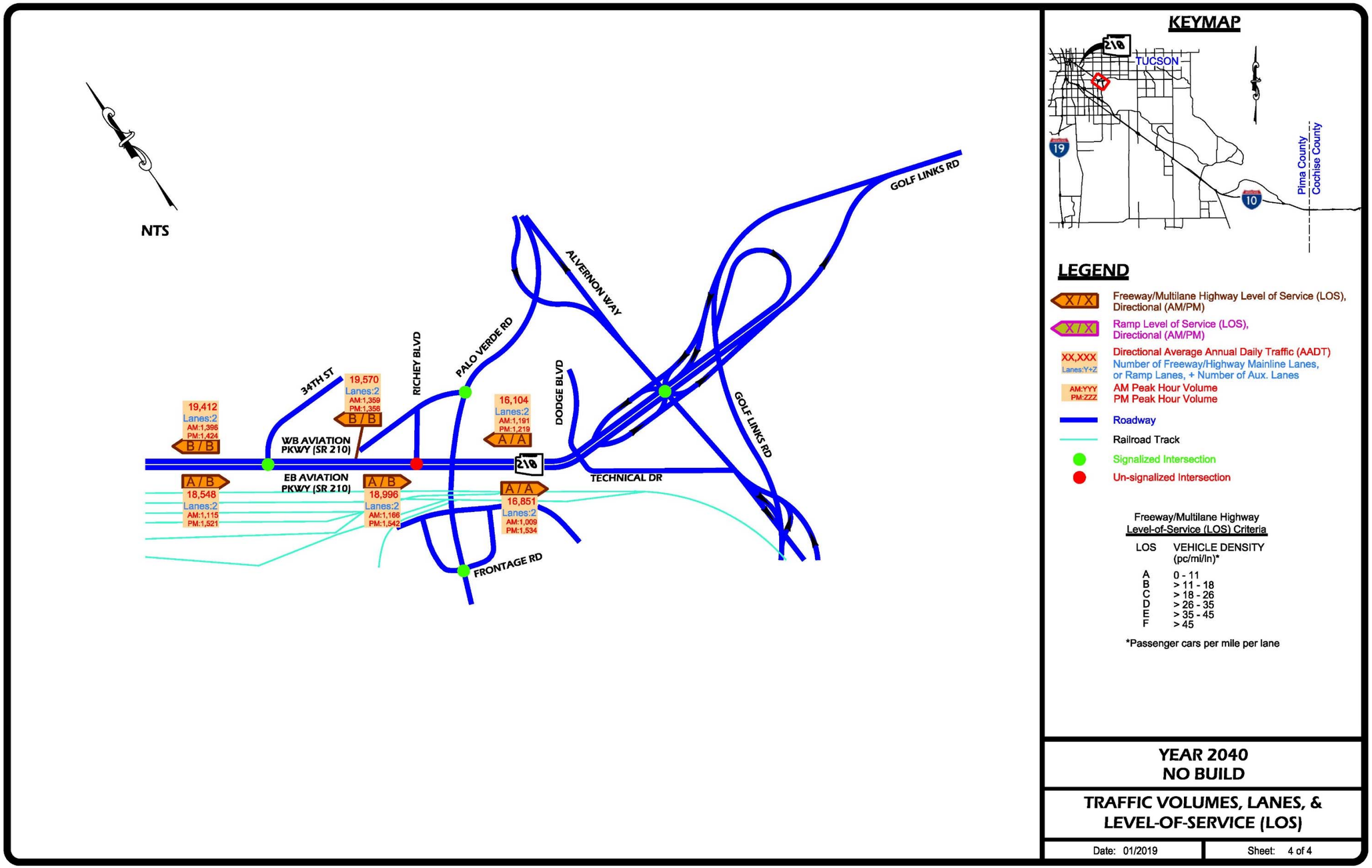


Figure 4.5 Year 2040 No Build - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 1 of 4)

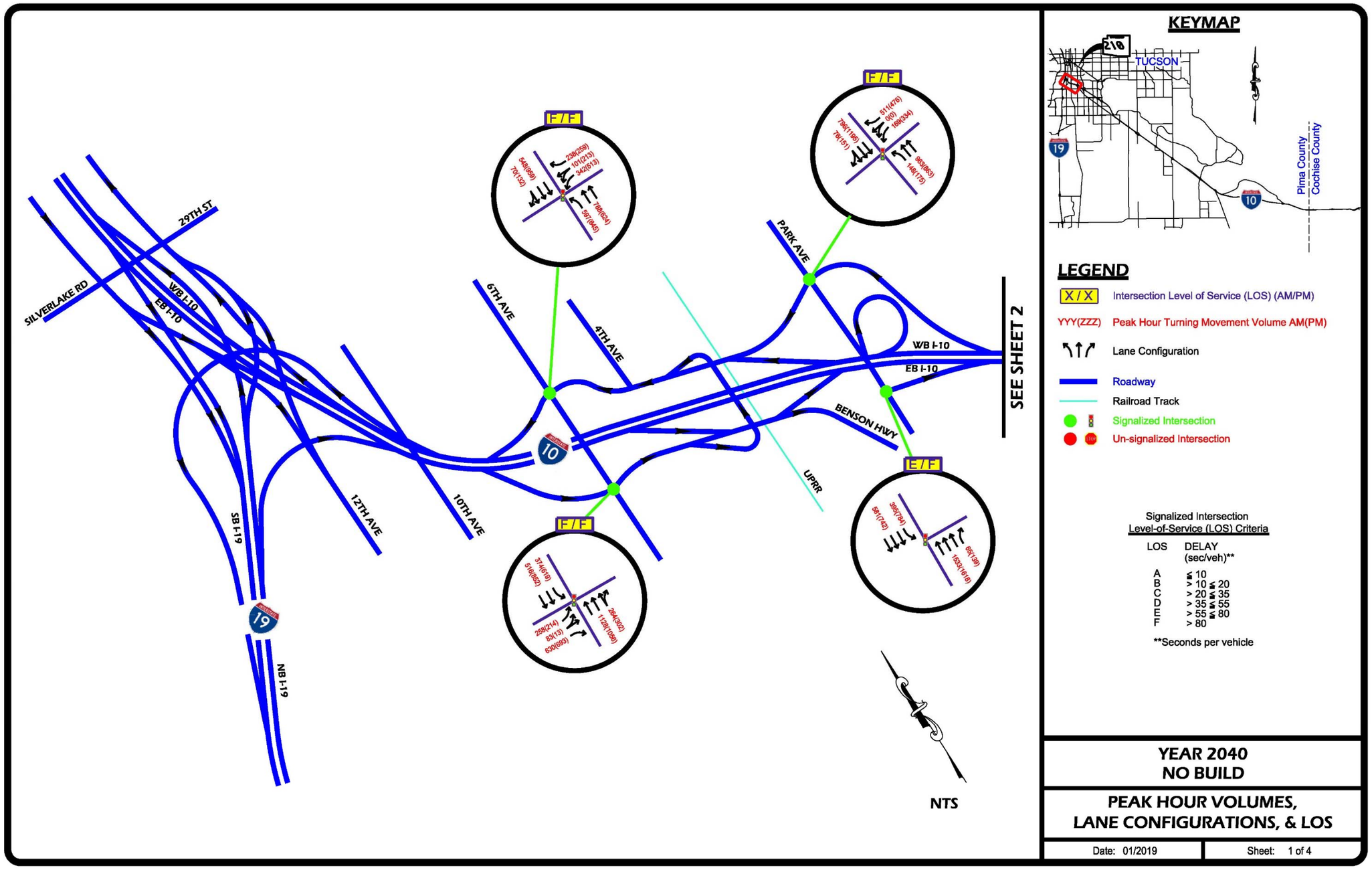


Figure 4.5 Year 2040 No Build - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 2 of 4)

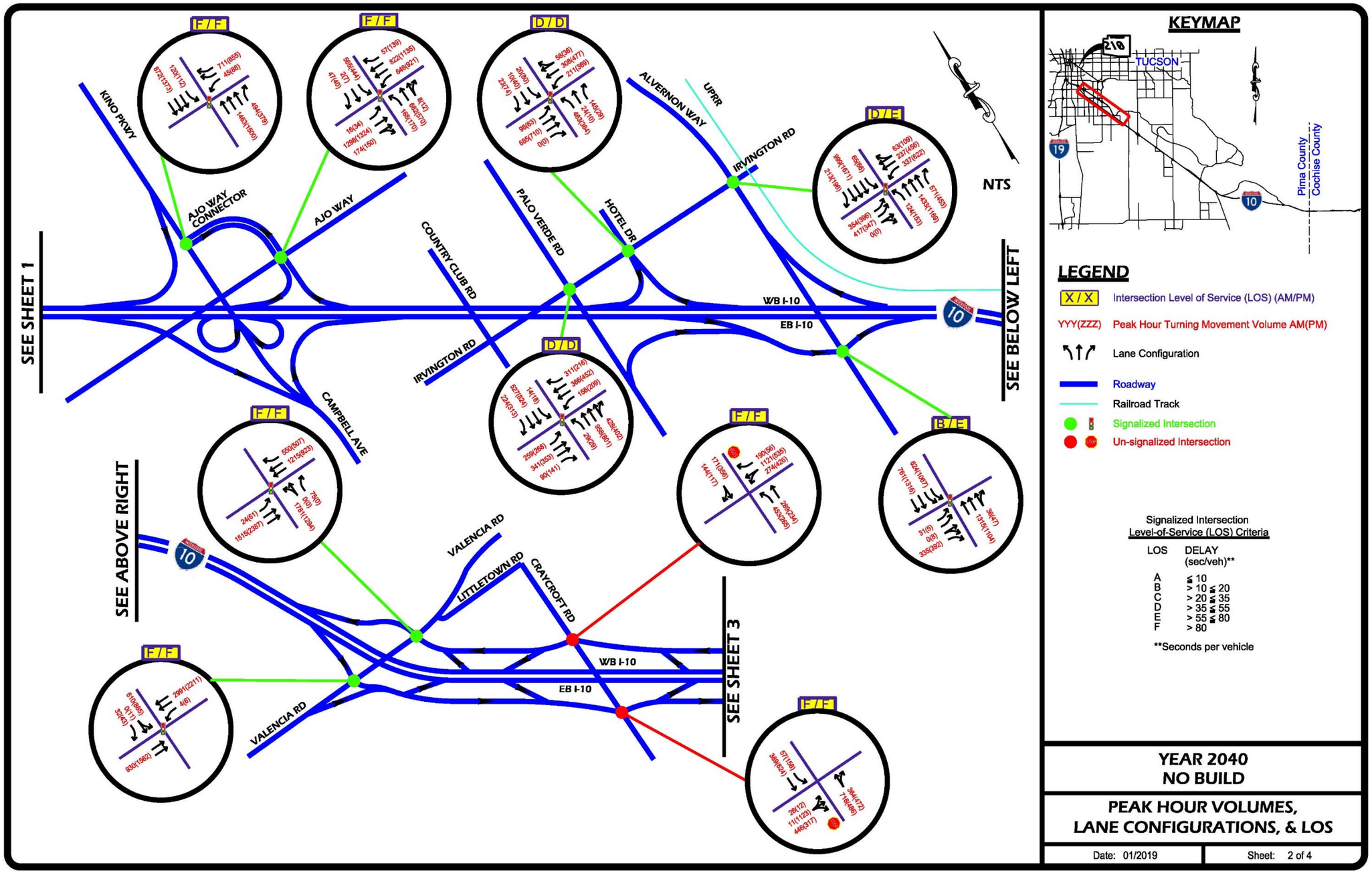


Figure 4.5 Year 2040 No Build - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 3 of 4)

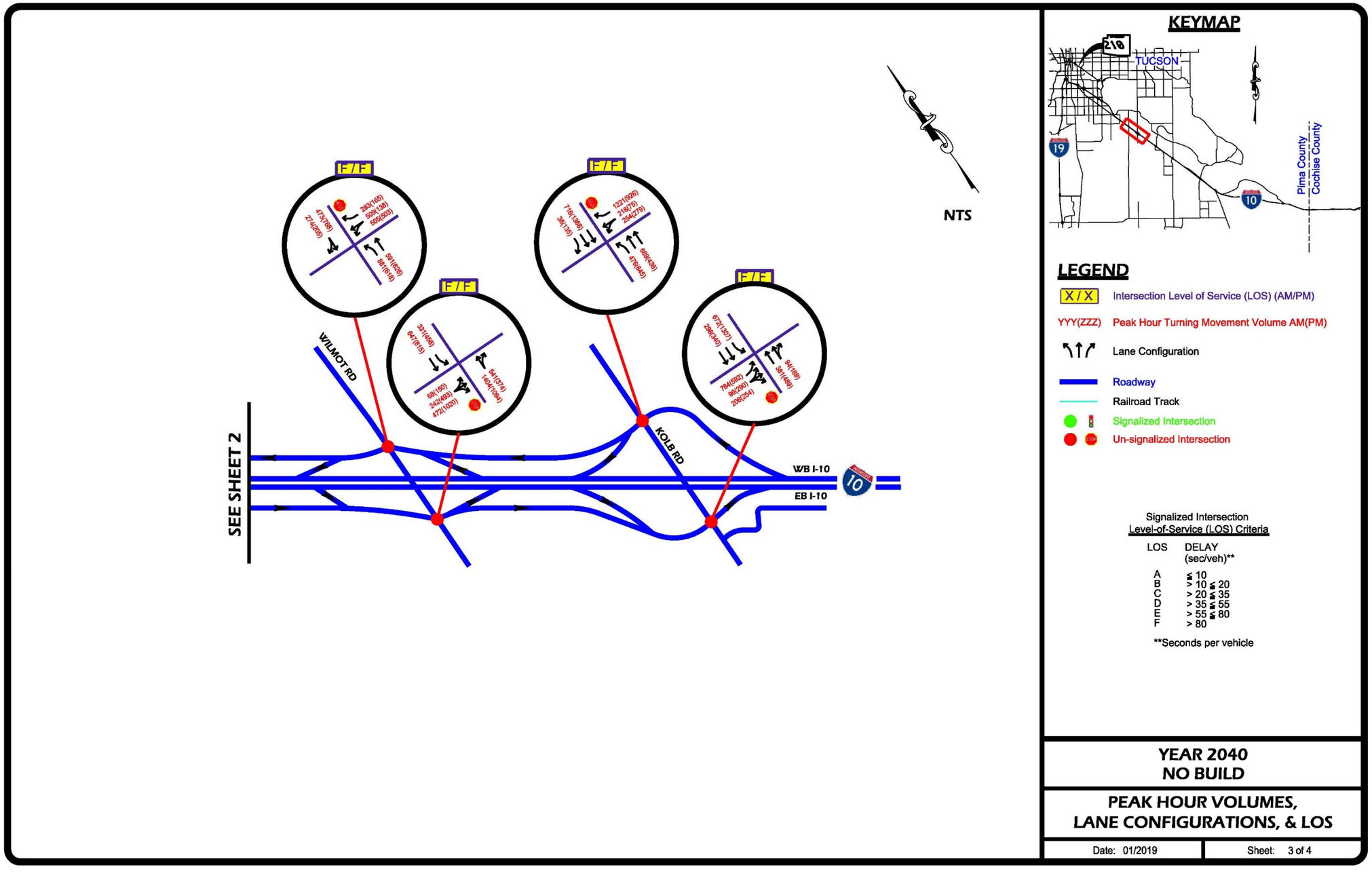


Figure 4.5 Year 2040 No Build - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 4 of 4)

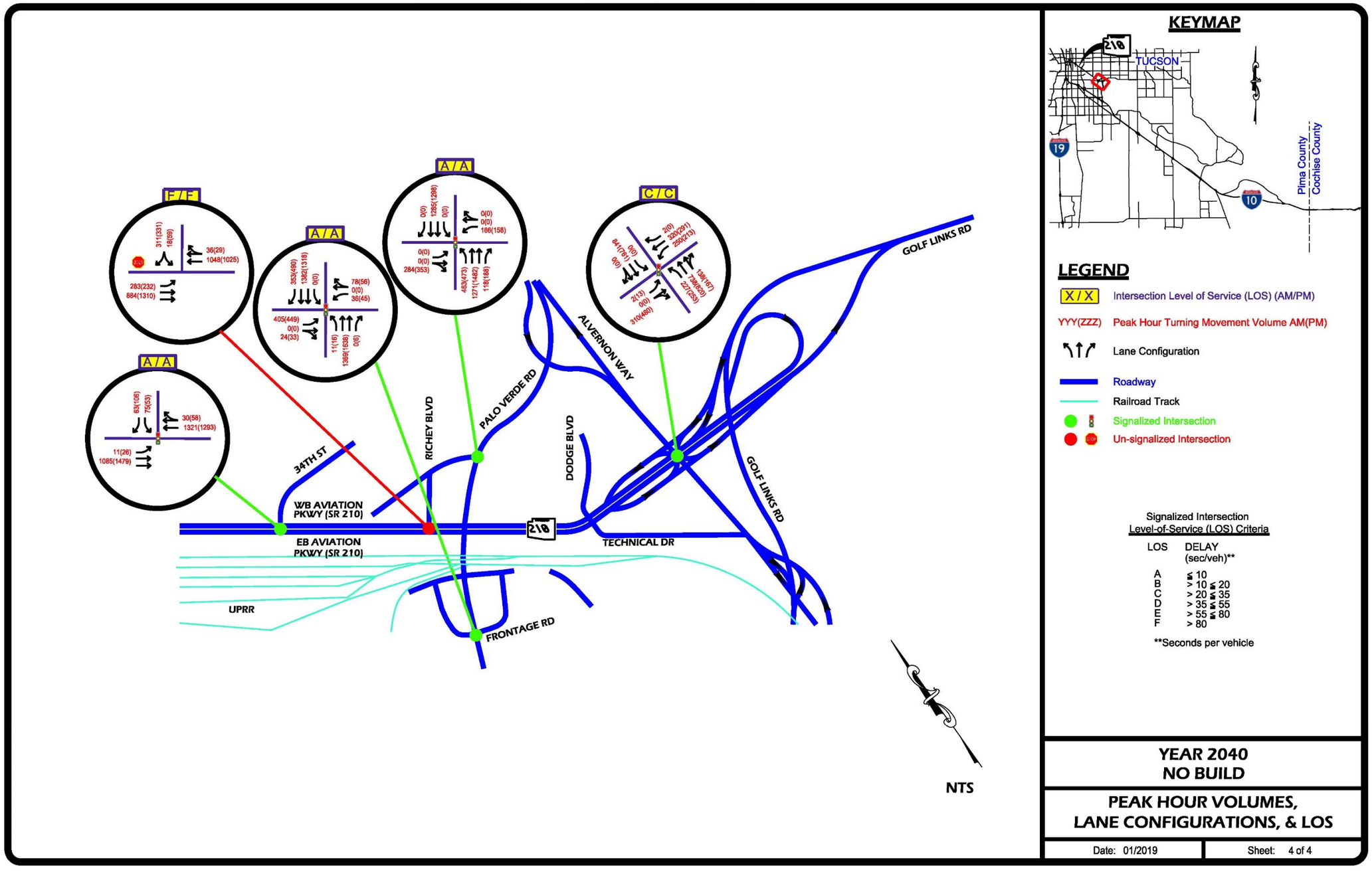


Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 1 of 4)

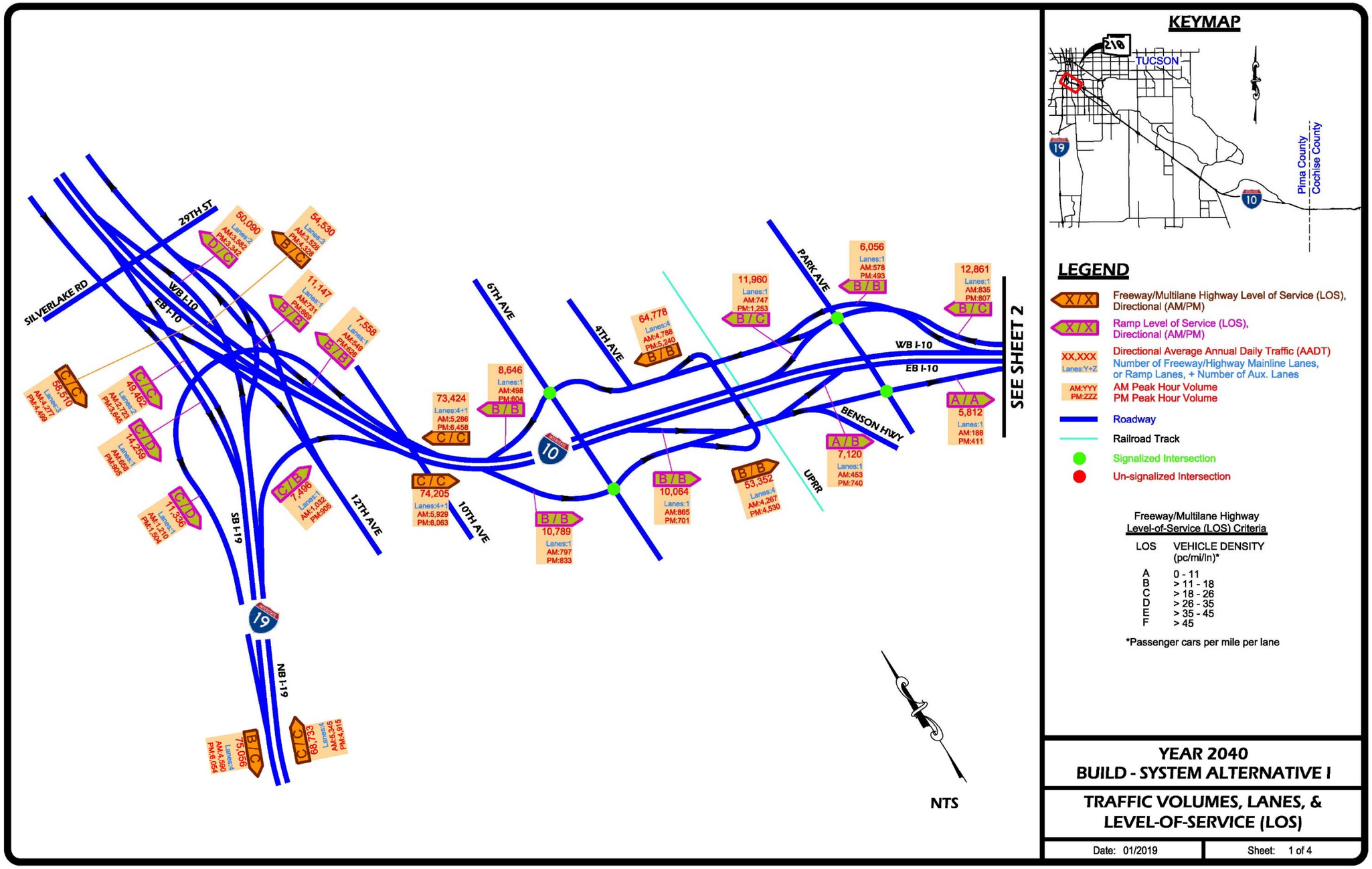


Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 2 of 4)

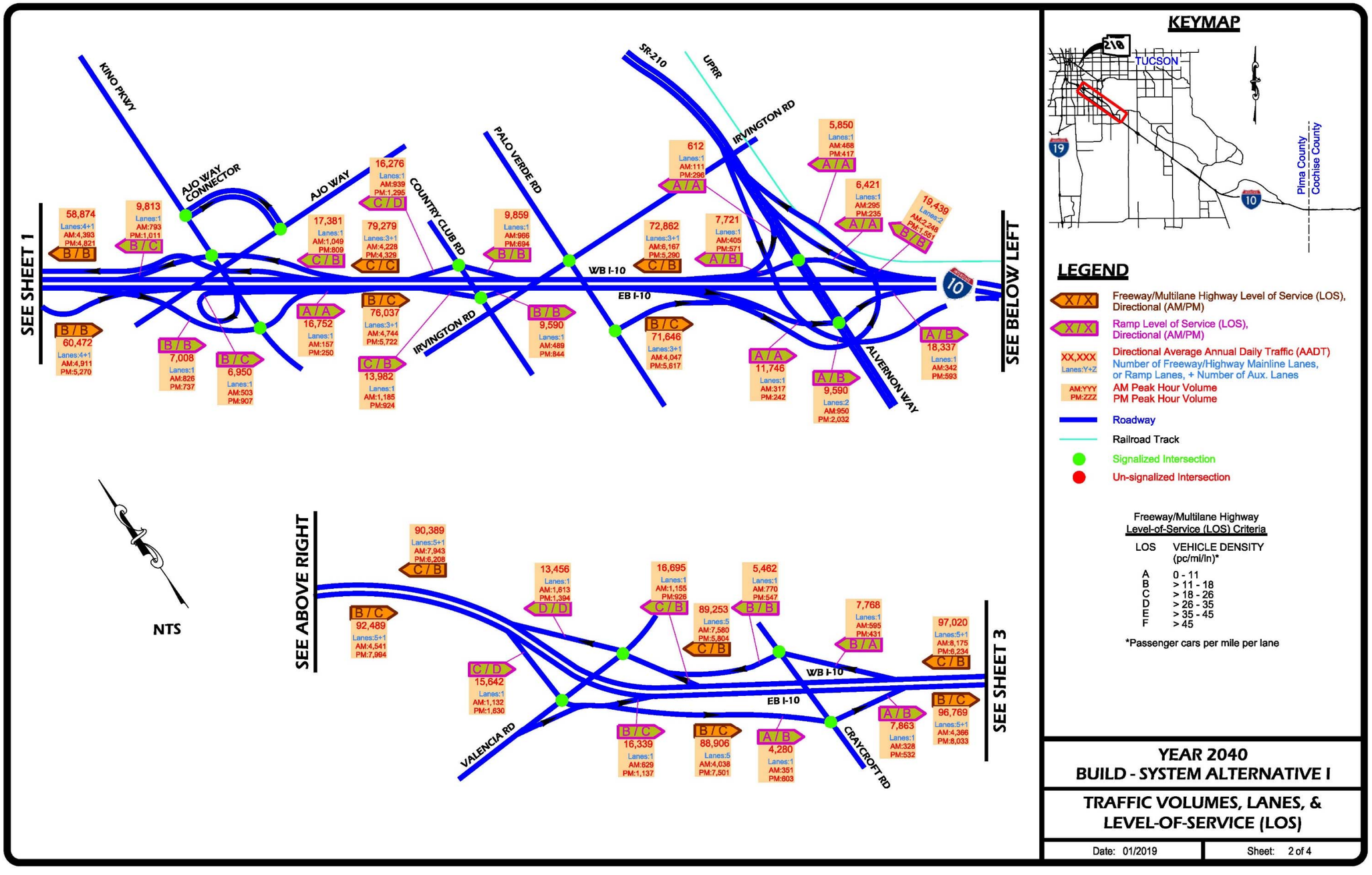


Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 3 of 4)

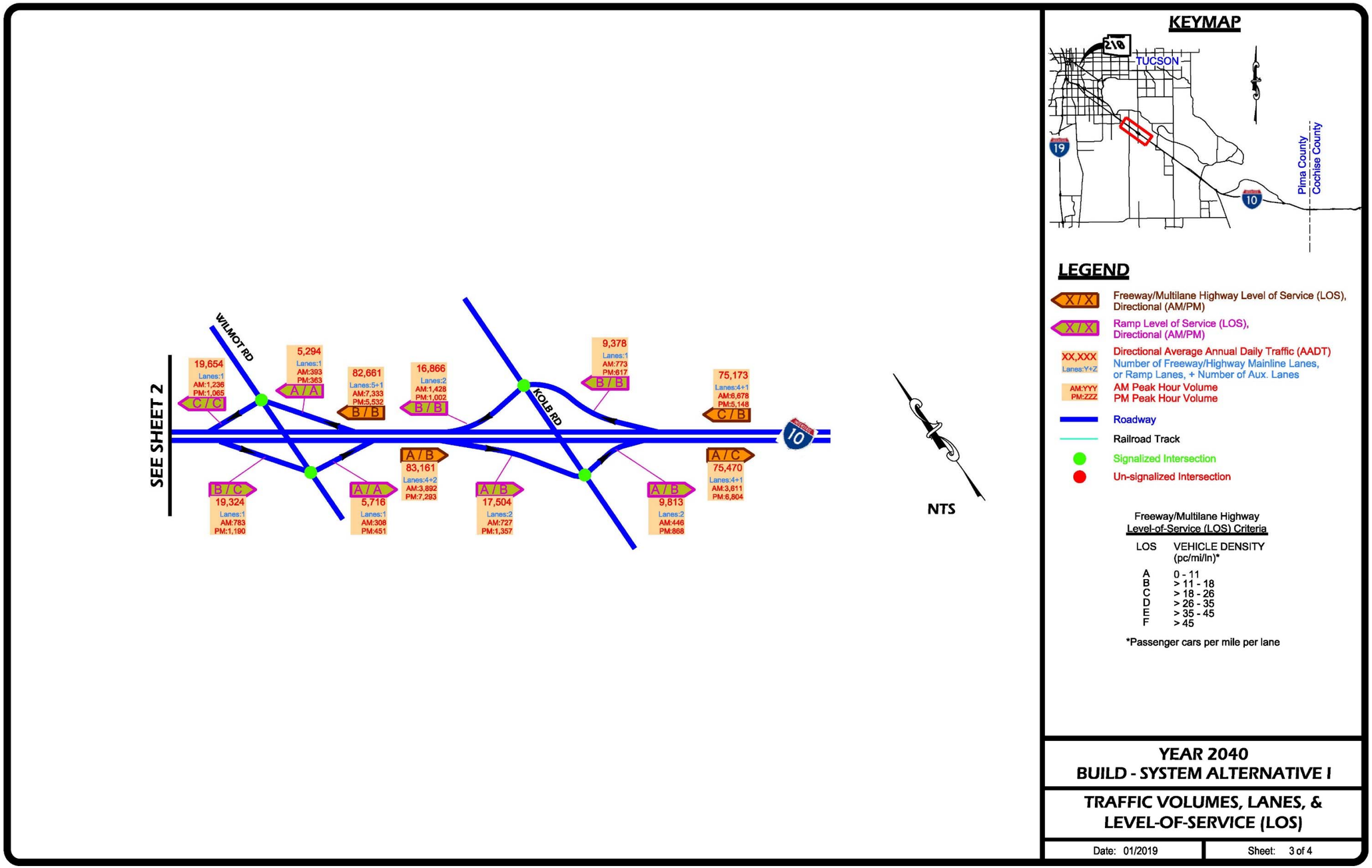


Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 4 of 4)

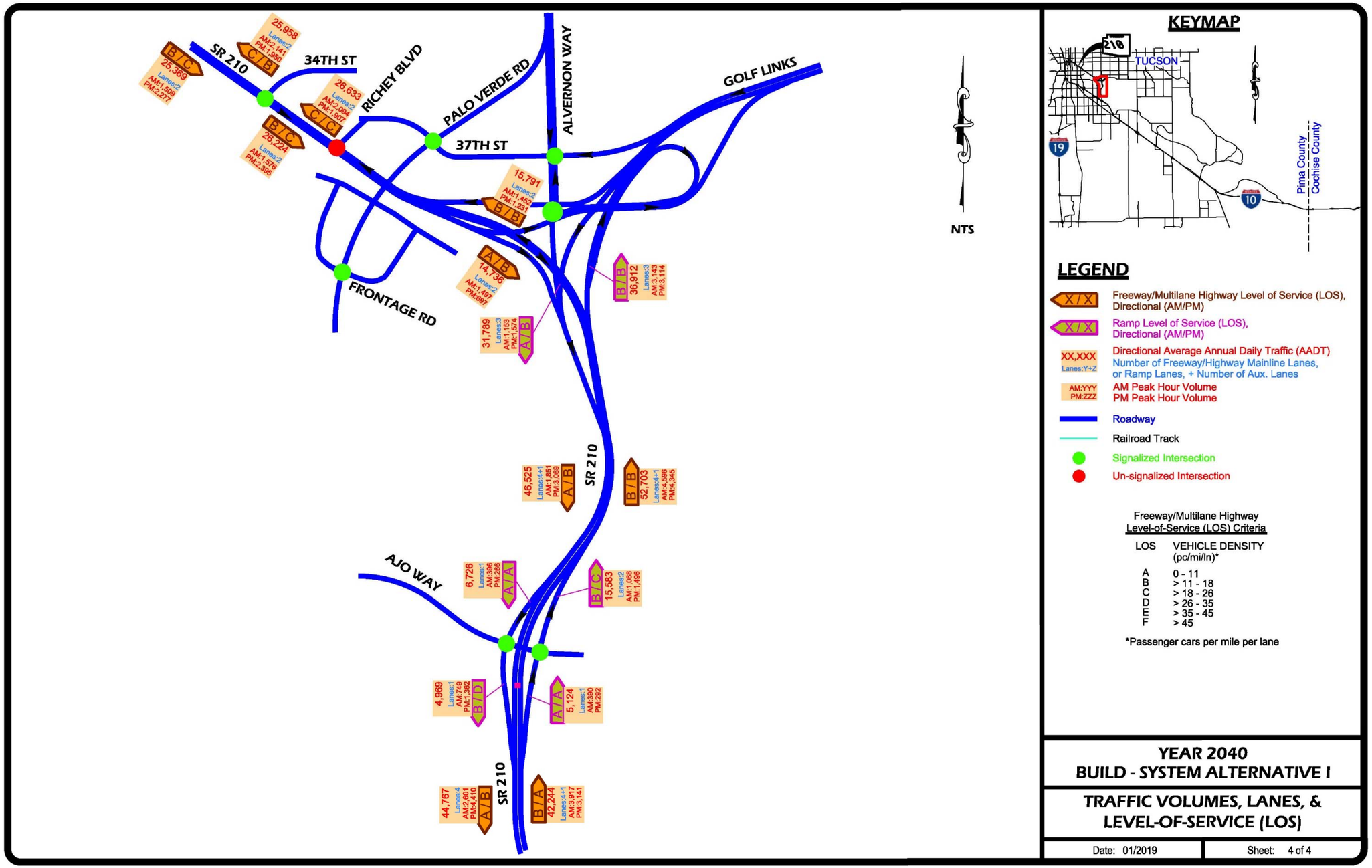


Figure 4.7 Year 2040 Build – System Alternative I - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 1 of 4)

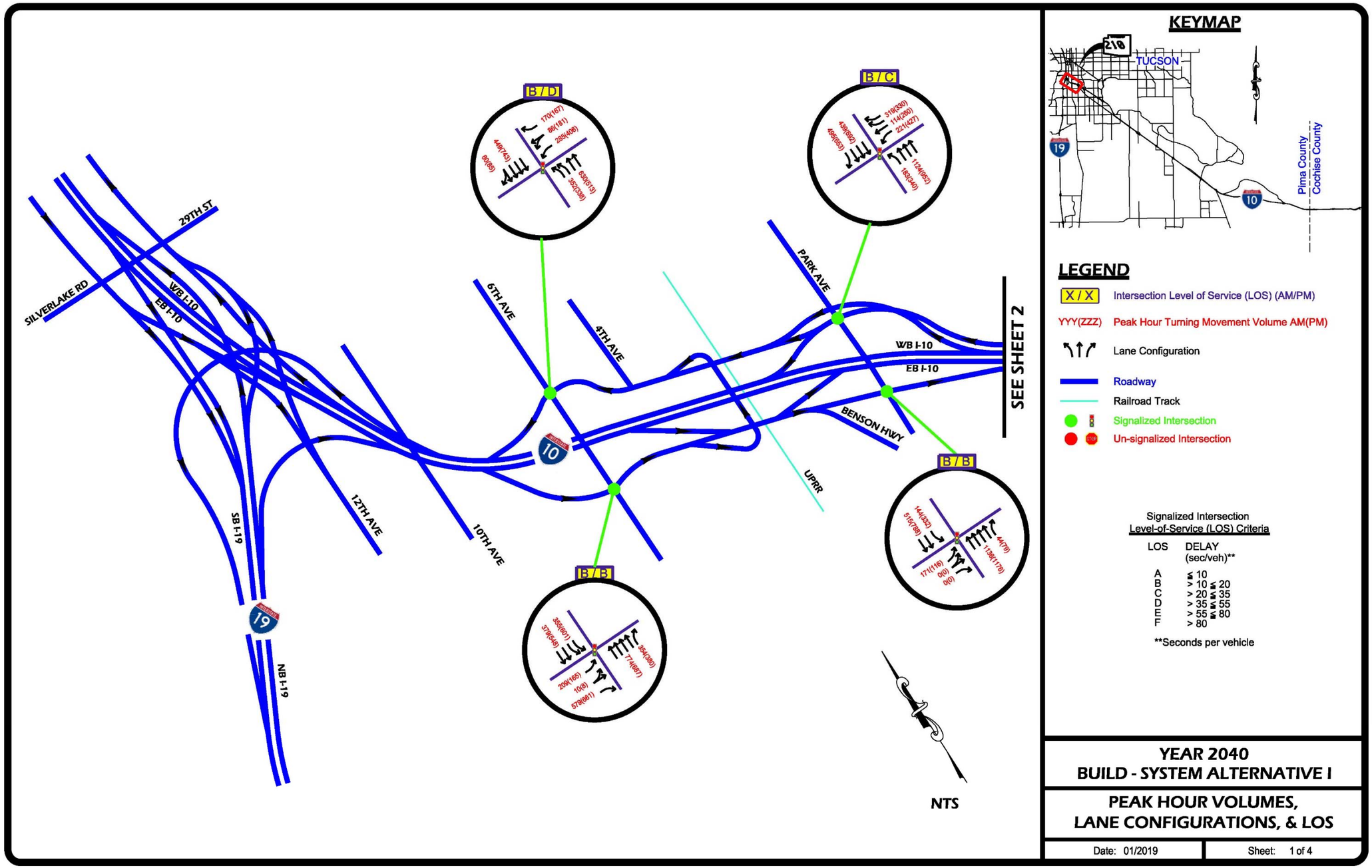


Figure 4.7 Year 2040 Build – System Alternative I - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 2 of 4)

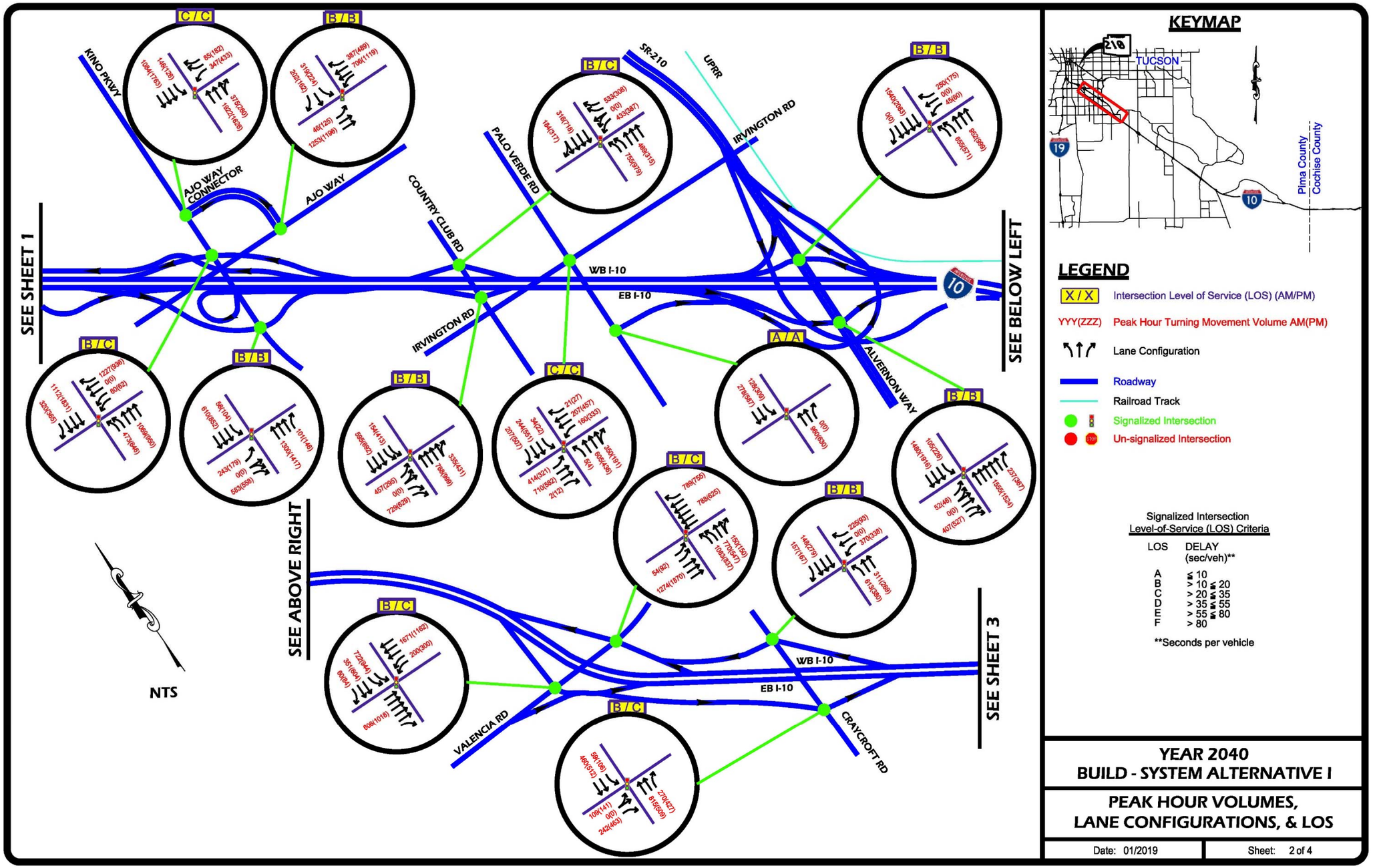


Figure 4.7 Year 2040 Build – System Alternative I - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 3 of 4)

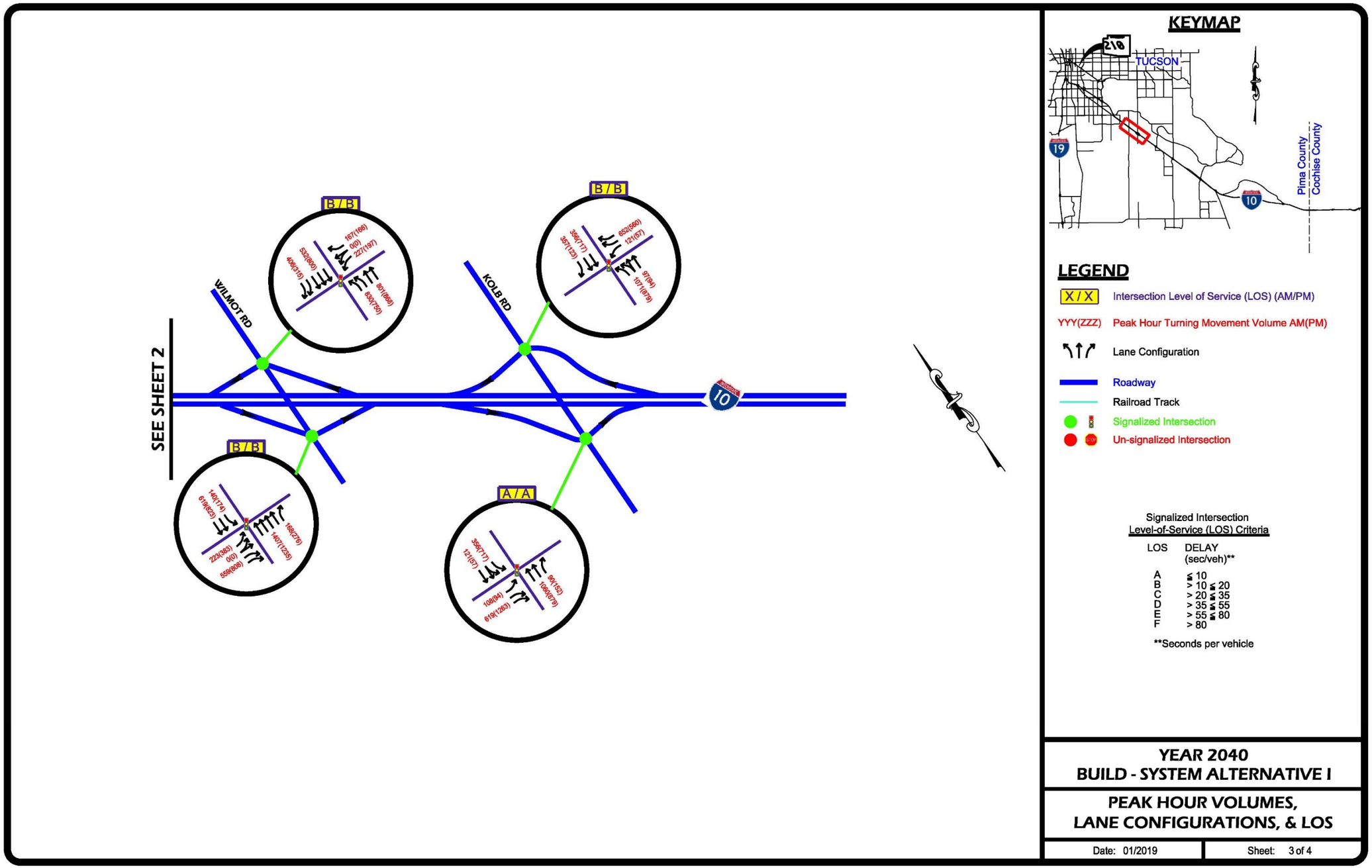


Figure 4.7 Year 2040 Build – System Alternative I - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 4 of 4)

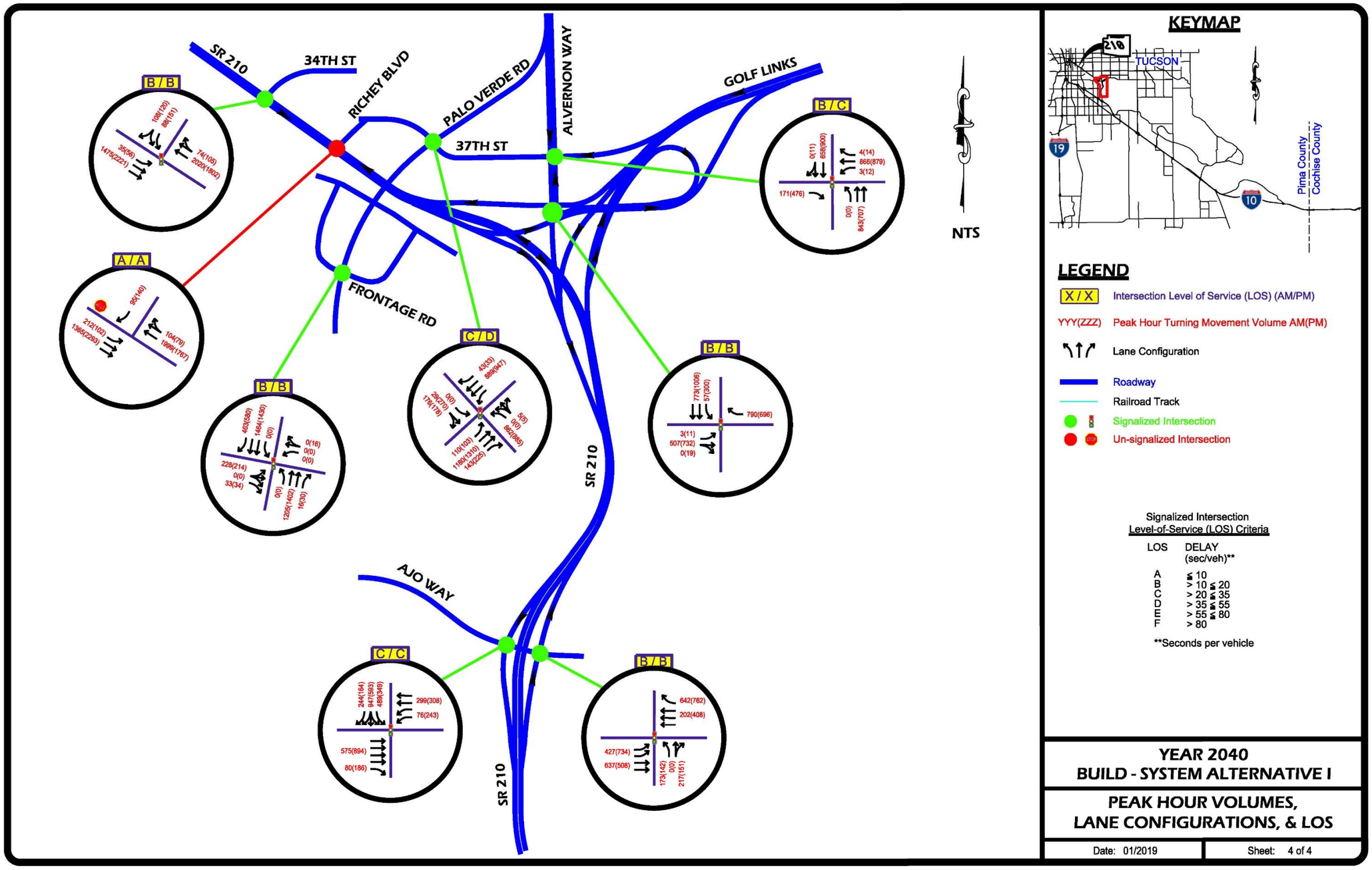


Figure 4.8 Year 2040 Build – System Alternative IV - Traffic Volumes, Lanes, & LOS (Sheet 1 of 4)

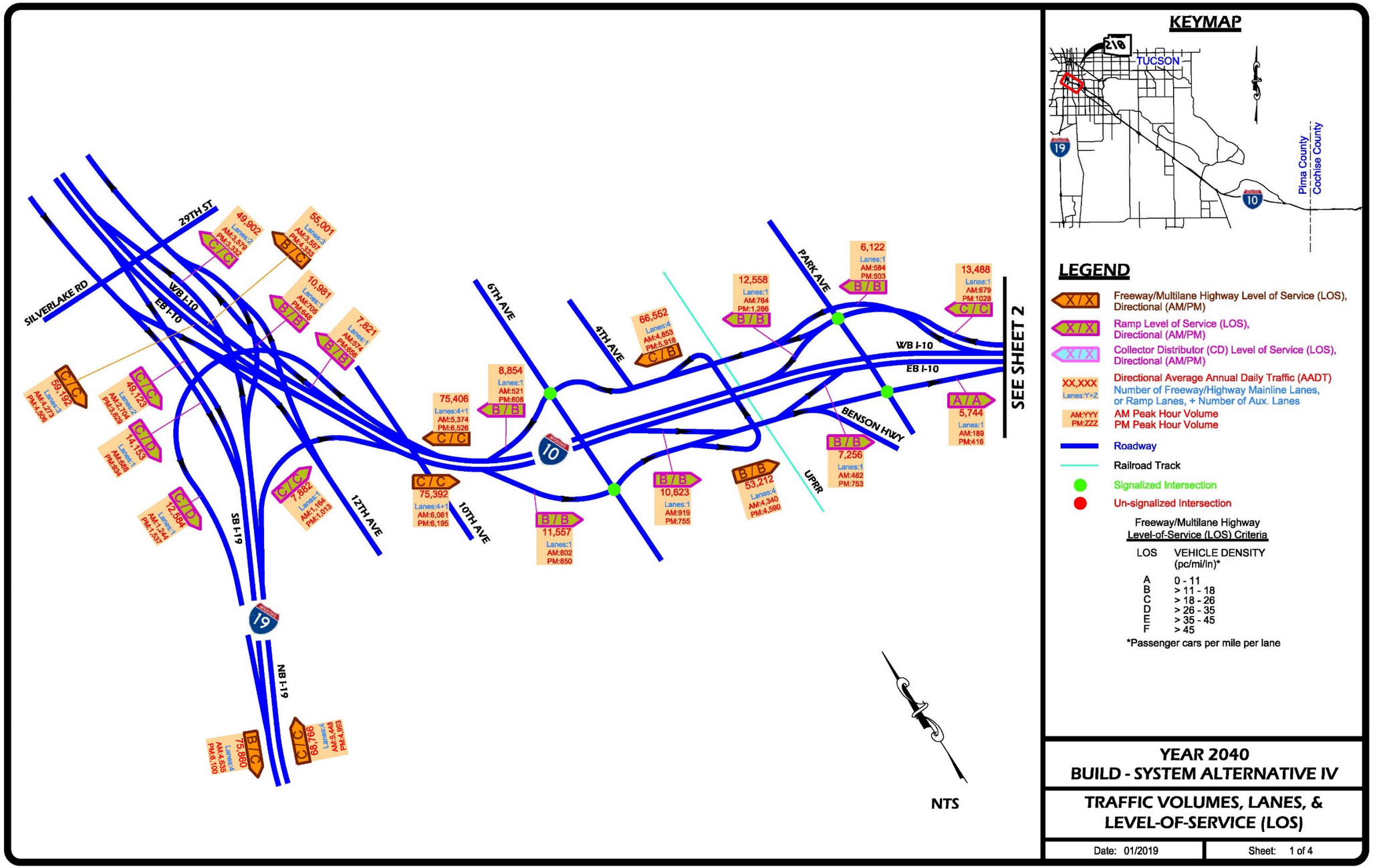


Figure 4.8 Year 2040 Build – System Alternative IV - Traffic Volumes, Lanes, & LOS (Sheet 2 of 4)

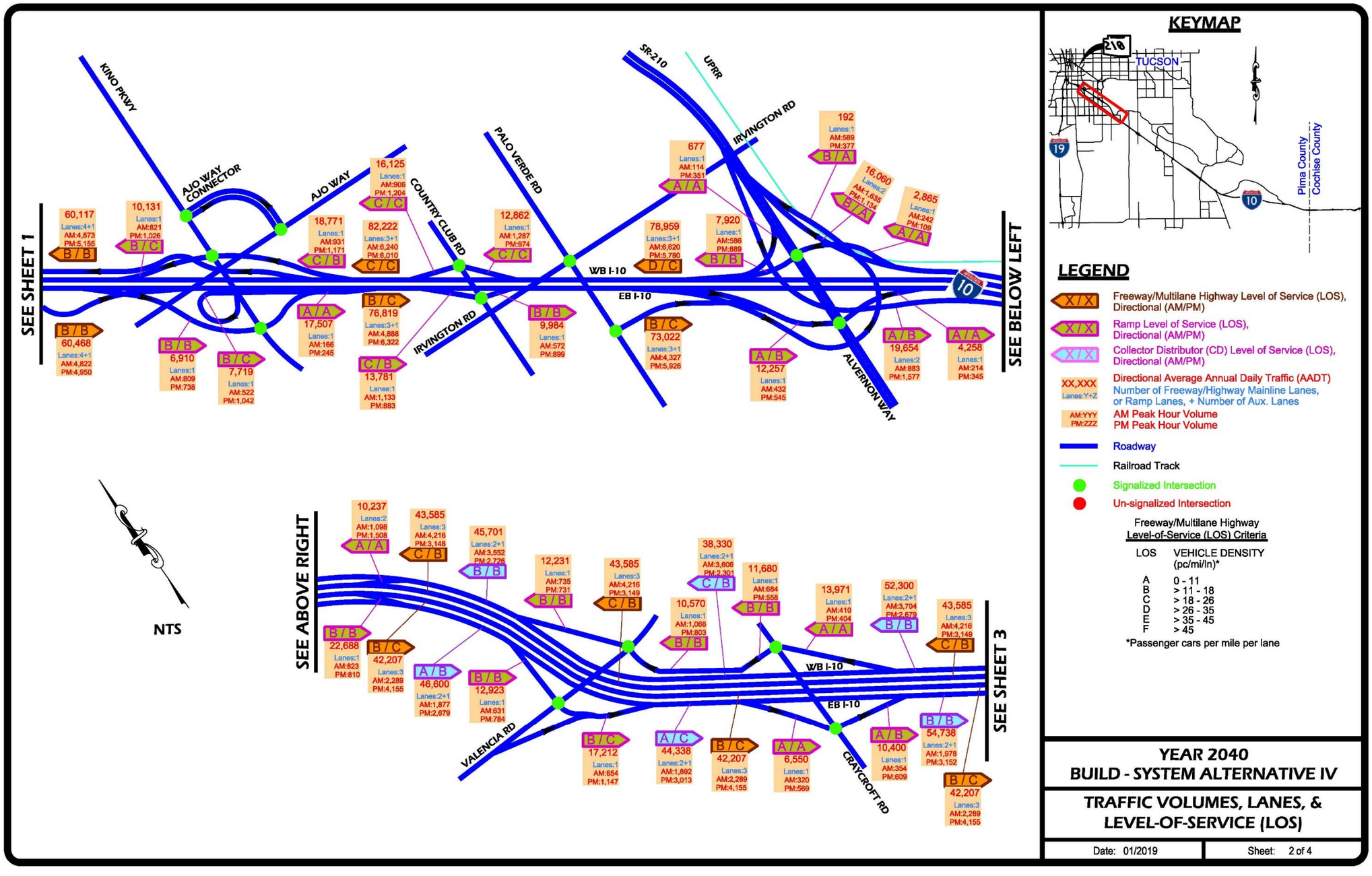


Figure 4.8 Year 2040 Build – System Alternative IV - Traffic Volumes, Lanes, & LOS (Sheet 3 of 4)

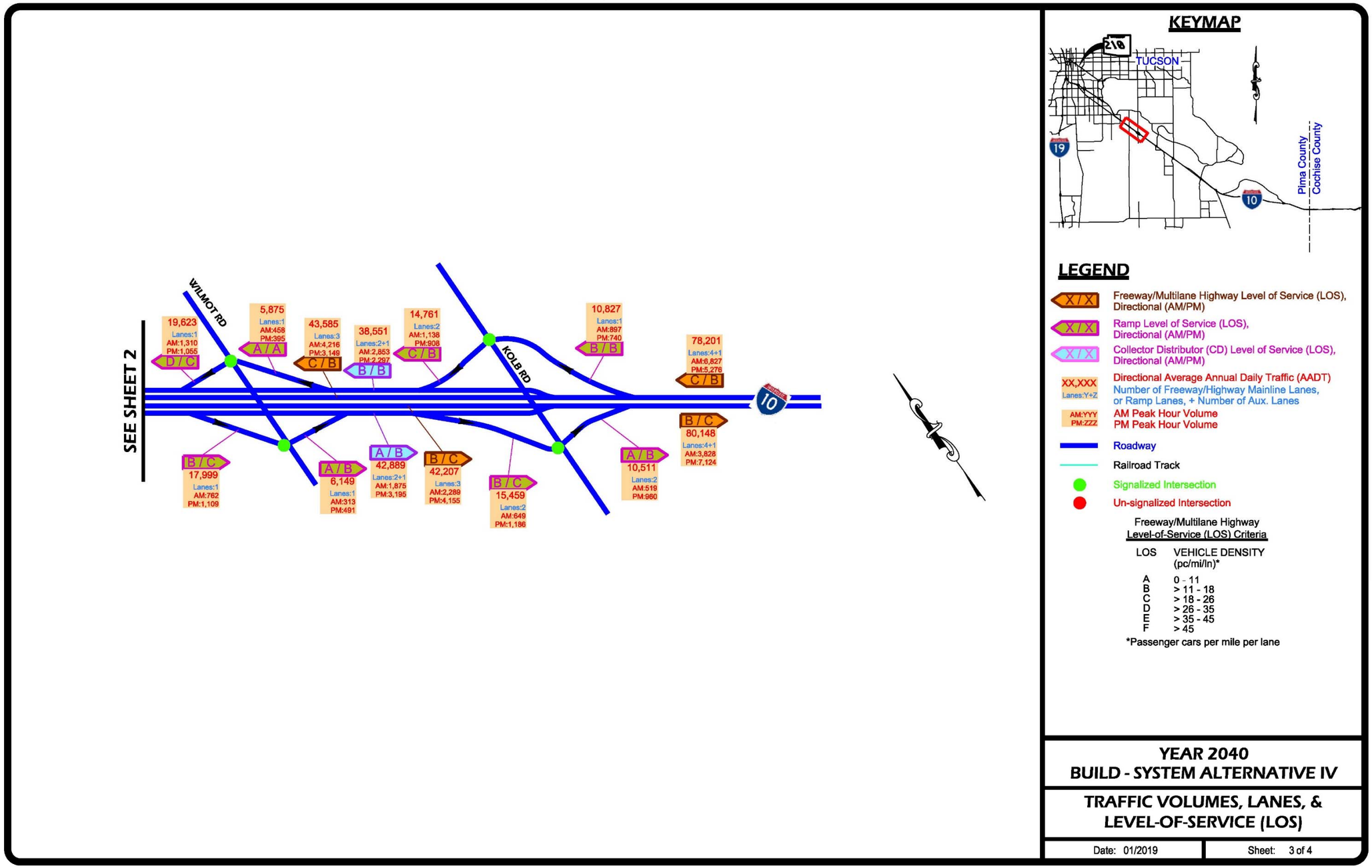


Figure 4.8 Year 2040 Build – System Alternative IV – Traffic Volumes, Lanes, & LOS (Sheet 4 of 4)

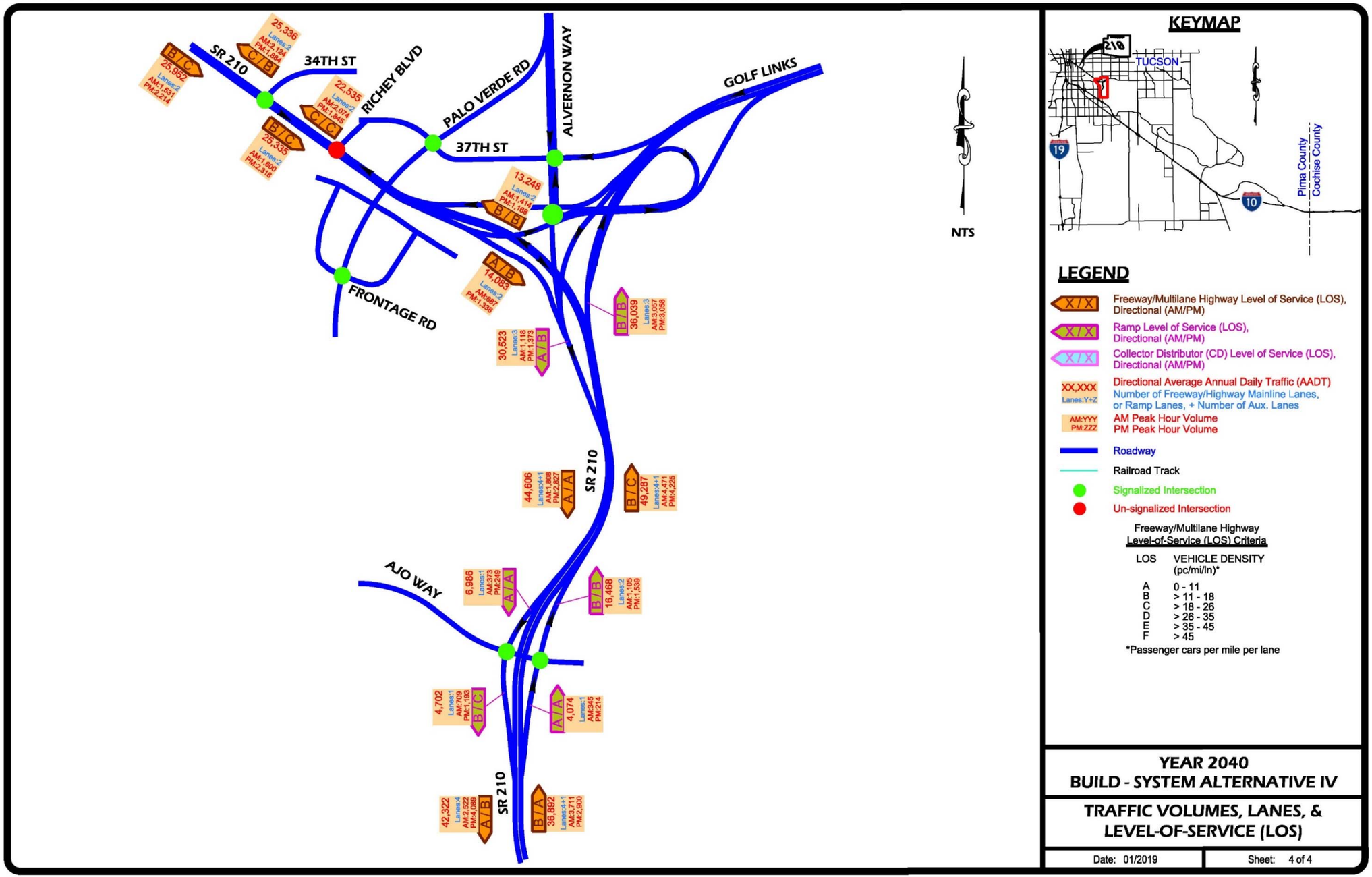


Figure 4.9 Year 2040 Build – System Alternative IV - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 1 of 4)

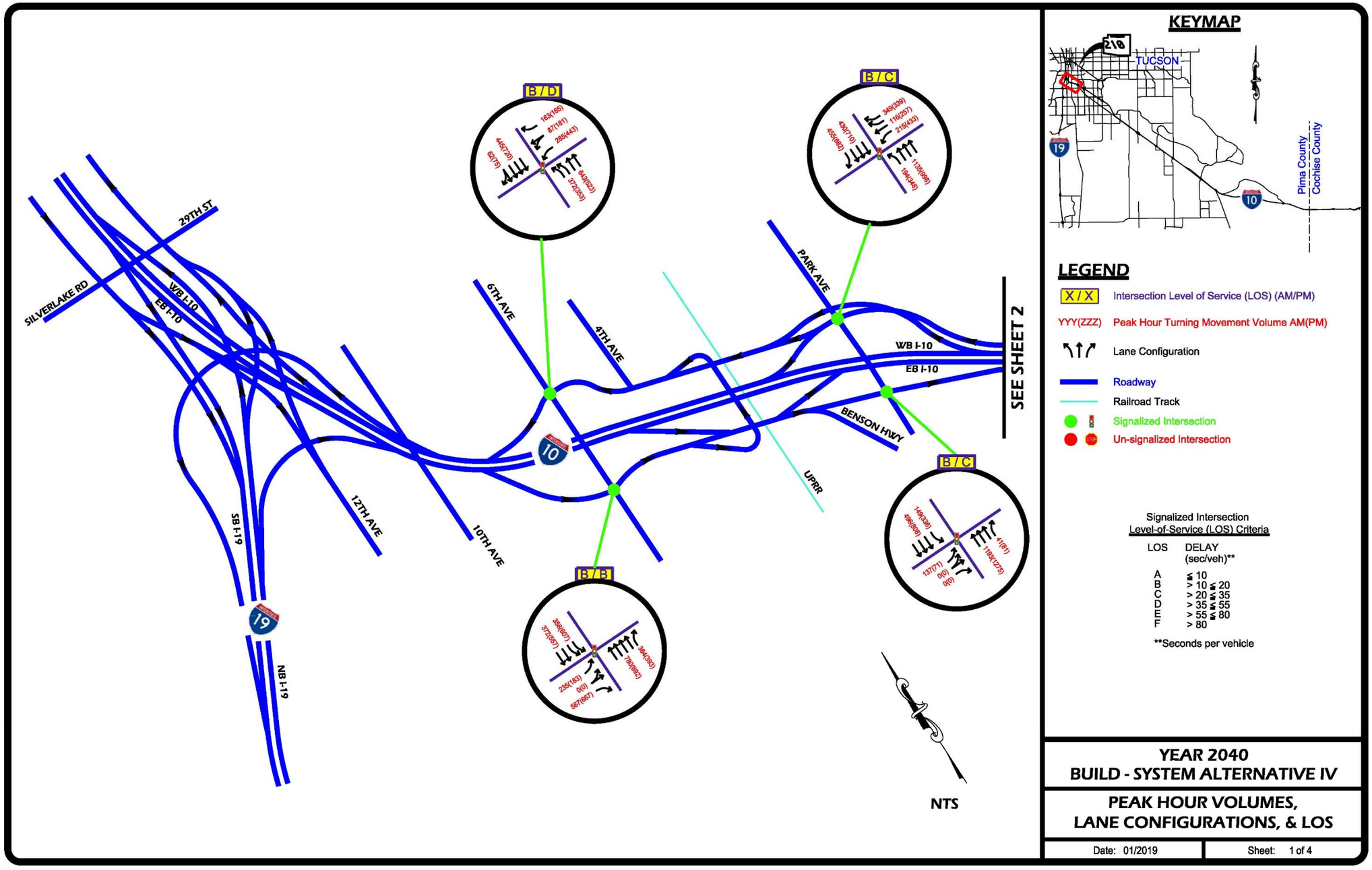


Figure 4.9 Year 2040 Build – System Alternative IV - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 2 of 4)

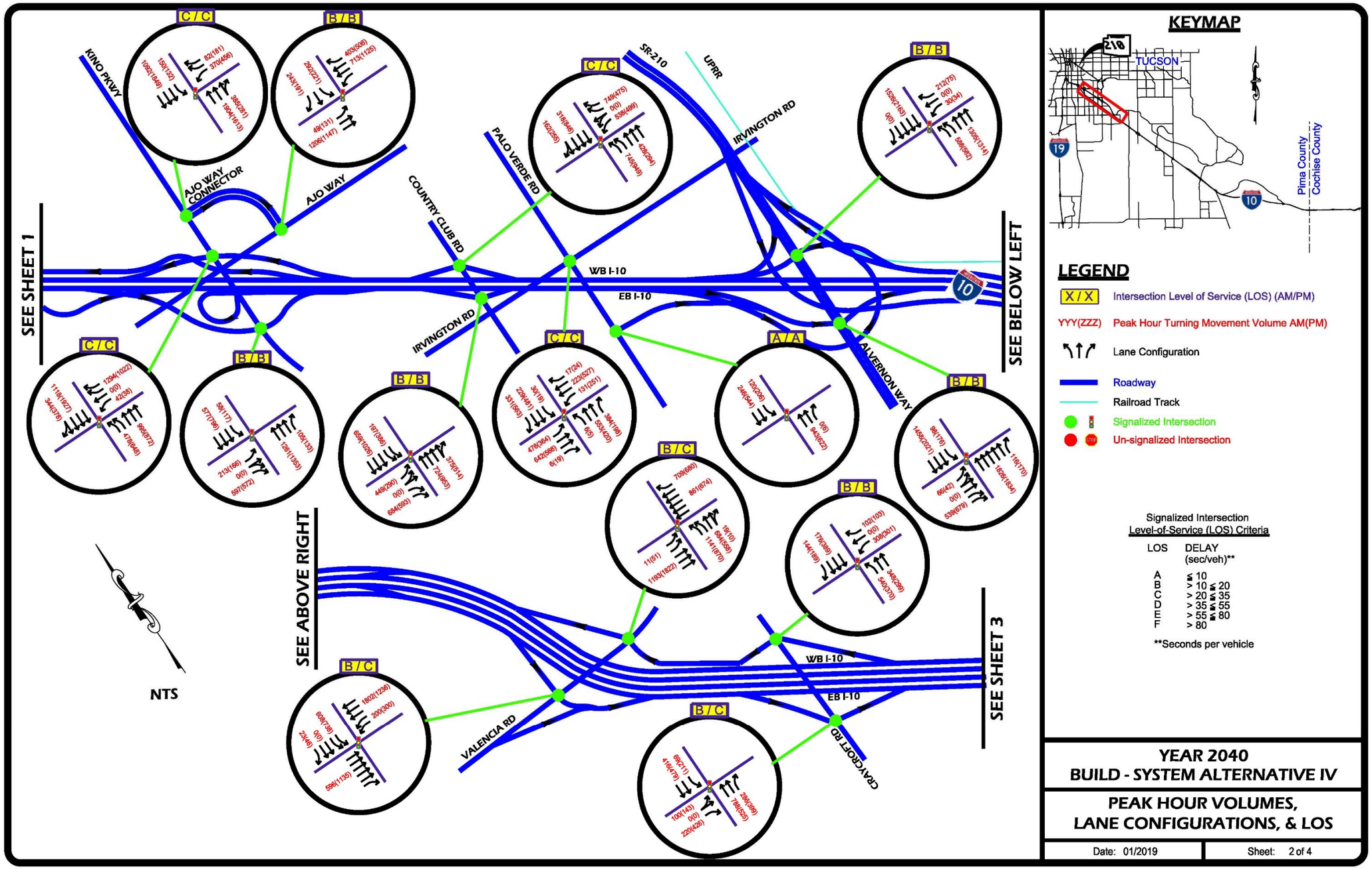


Figure 4.9 Year 2040 Build – System Alternative IV - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 3 of 4)

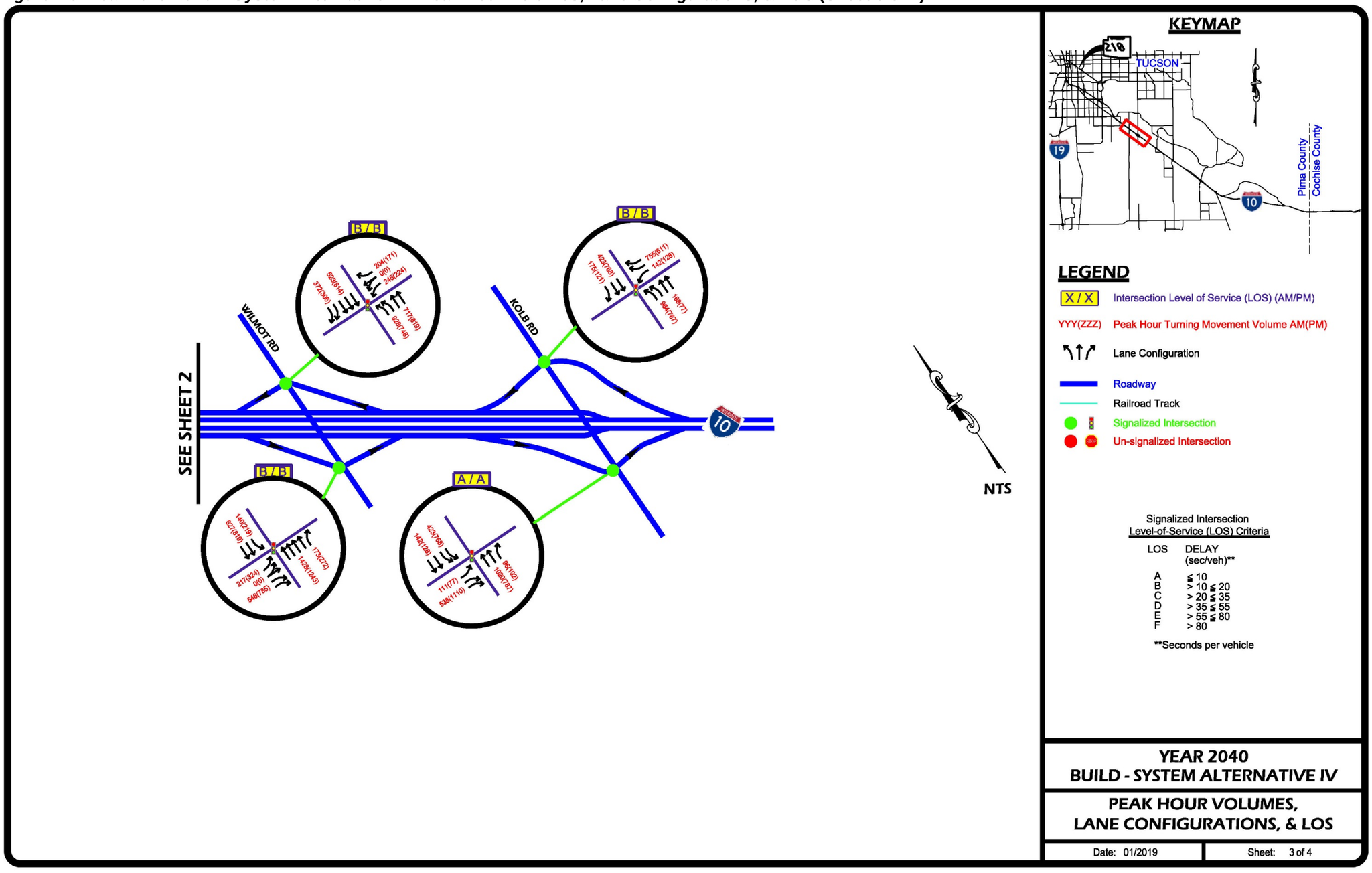
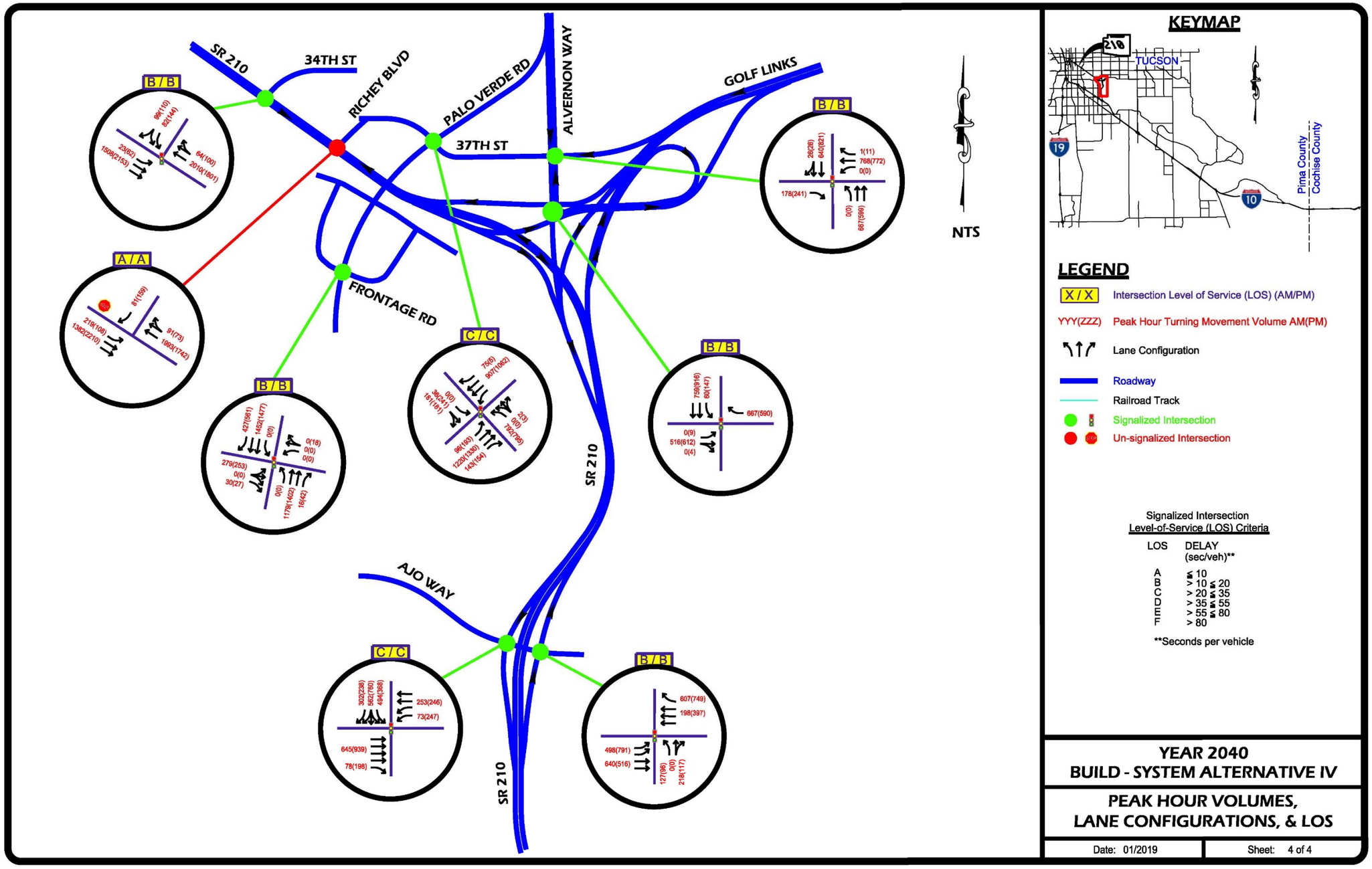


Figure 4.9 Year 2040 Build – System Alternative IV - Peak Hour Volumes, Lane Configurations, & LOS (Sheet 4 of 4)



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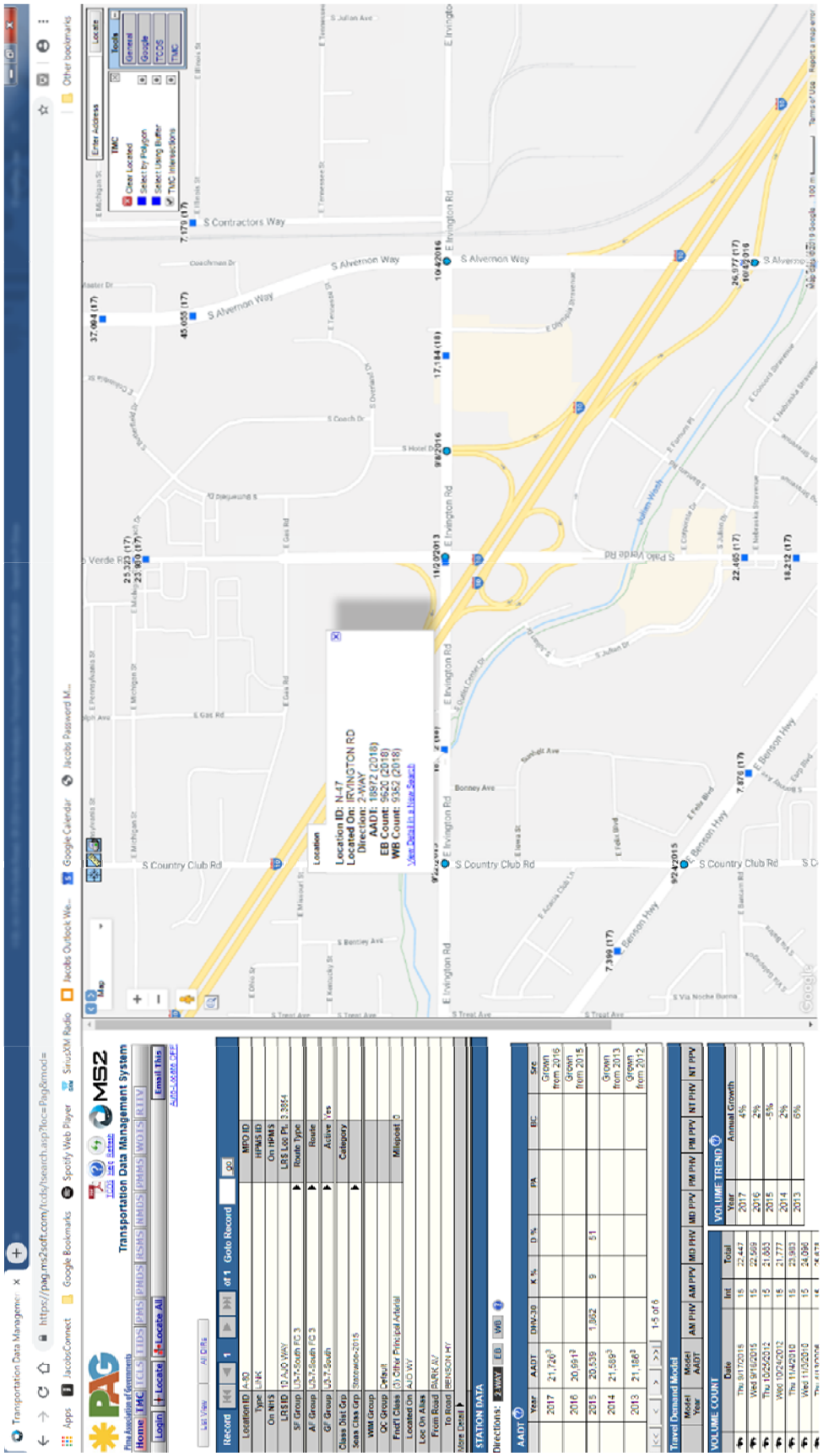

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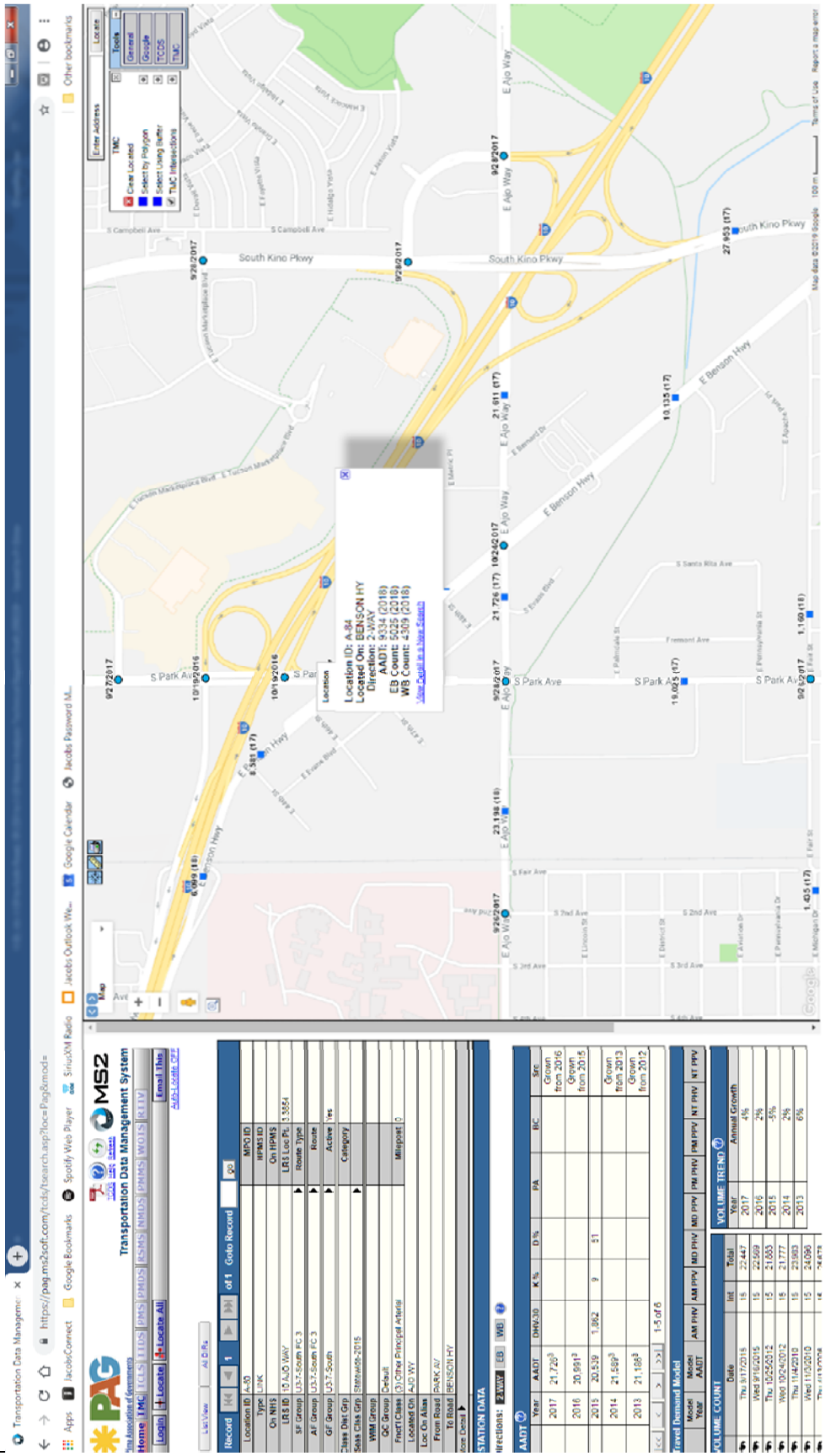

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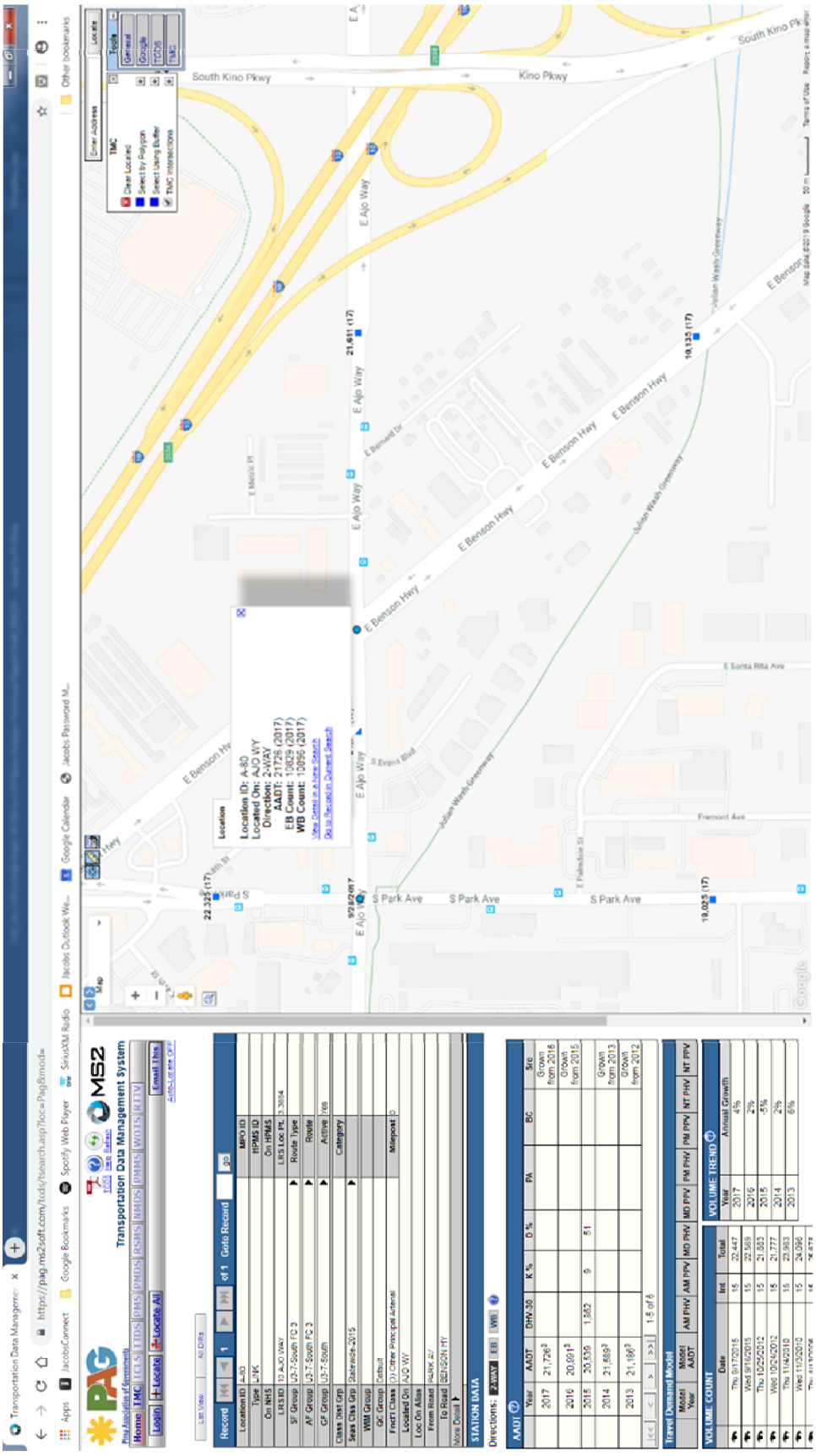

Source: PAG TDMS (2017)
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APPENDIX F – NOISE RECEIVER DESCRIPTIONS AND PREDICTED PEAK HOUR NOISE LEVELS

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
Nellie P. Covert School (Figure A01)							
R1a	C	5	Common Area	60.6	61.5	62.1	62.1
R1b	C	1	Building	60.6	61.6	62.5	62.5
R1c	C	1	Building	61.5	62.6	63.4	63.4
R1d	C	1	Building	62	63	63.7	63.7
R1e	C	1	Building	61.9	62.9	63.6	63.6
R1f	C	1	Building	60.5	61.4	62.1	62.1
R1g	C	1	Building	59.4	60.3	60.9	60.9
R1h	C	1	Building	56.5	58.1	58.3	58.3
R1i	C	1	Building	57	58.6	58.7	58.7
R1j	C	1	Building	58	58.8	59.5	59.5
R1k	C	1	Building	61.9	62.6	63.4	63.4
R1l	C	1	Building	60.2	61.4	62.1	62.1
Sunset Villa Neighborhood (Figure A01)							
R2	B	2	SFH	**67.9**	**68.7**	**68.8**	**68.8**
R3	B	1	SFH	64.8	**65.7**	**65.9**	**65.9**
R4	B	1	SFH	62.9	64.2	64.8	64.8
R5	B	1	SFH	62.2	63.5	64.1	64.1
R6	B	2	SFH	61.5	62.8	63.4	63.4
Val del Sur Condominiums (Figure A01)							
R7	B	4	Apartment	**71.7**	**72.5**	**72.9**	**72.9**
R7a 2S	B	4	Apartment	**75.8**	**76.4**	**76.8**	**76.8**
R8	B	5	Apartment	**74**	**74.4**	**74.9**	**74.9**
R8a 2S	B	5	Apartment	**75.8**	**76.2**	**76.7**	**76.7**
R9	B	2	Apartment	**65.8**	**66.6**	**67**	**67**
R9a 2S	B	4	Apartment	**69.8**	**70.4**	**70.8**	**70.8**
R10	B	2	Apartment	**66.1**	**67**	**67.4**	**67.4**
R11	B	2	Apartment	65.3	**66.2**	**66.6**	**66.6**
R11a 2S	B	4	Apartment	**68.8**	**69.5**	**69.9**	**69.9**
R12	B	2	Apartment	64.4	**65.4**	**65.8**	**65.8**
R13	B	4	Apartment	63.6	**64.6**	65.1	65.1
R13 a 2S	B	4	Apartment	**67.1**	**67.8**	**68.3**	**68.3**
R14	B	4	Apartment	**74.5**	**74.8**	**75.4**	**75.4**
R14a 2S	B	4	Apartment	**75.1**	**75.4**	**76.1**	**76.1**
R15	B	3	Apartment	**71.1**	**71.5**	**72.1**	**72.1**
R15a 2S	B	3	Apartment	**73.8**	**74**	**74.7**	**74.7**
R16	B	4	Apartment	61.3	62.1	62.6	62.6
R17	B	4	Apartment	58.5	59.4	60	60
R17a	B	1	Pool Area	58.8	59.6	60.2	60.2

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
Sunset Villa Neighborhood (Figure A01)							
R18	B	1	SFH	55.6	56.8	57.7	57.7
R19	B	2	SFH	58.5	59.6	60.4	60.4
R20	B	1	SFH	58.4	59.5	60.4	60.4
R21	B	1	SFH	59.2	60.2	61	61
R22	B	1	SFH	58.7	59.7	60.5	60.5
R23	B	3	SFH	58.2	59.2	60.1	60.1
R24	B	1	SFH	57.8	58.7	59.6	59.6
R25	B	2	SFH	57.5	58.4	59.4	59.4
Wakefield Middle School (Figure A01)							
R26(4F9)	C	9	Rec/Soccer	60	60.5	61.3	61.3
R27(4F8a)	C	21	Building	58.6	59.2	60.1	60.1
R28(4F8b)	C	21	Building	58.1	58.7	59.7	59.7
R29(4F8c)	C	21	Building	57.5	58.1	59.1	59.1
Econolodge							
R30	E[1]	2	Pool Area	58.3	58.8	59.8	59.8
Julian Wash Rail and Greenway/The Loop Trail (Figures A01 - A04)							
4F1a	C	0.5	Trail	60	61.4	62.3	62.3
4F1b	C	0.5	Trail	61.2	62.6	63.1	63.1
4F1c	C	0.5	Trail	61.2	62.4	63.1	63.1
4F1d	C	0.5	Trail	60.5	61.6	62.4	62.4
4F1e	C	0.5	Trail	59.7	60.6	61.6	61.6
4F1f	C	0.5	Trail	58.8	59.7	60.7	60.7
4F1g	C	0.5	Trail	58.5	59.3	60.3	60.3
4F1h	C	0.5	Trail	58	58.7	59.7	59.7
4F1i	C	0.5	Trail	58.1	58.8	59.8	59.8
4F1j	C	0.5	Trail	58.9	59.5	60.4	60.4
4F1k	C	0.5	Trail	57.4	57.9	58.4	58.4
4F1l	C	0.5	Trail	59	59.4	59.8	59.8
4F1m	C	0.5	Trail	61.6	61.8	62.1	62.1
4F1n	C	0.5	Trail	60.7	60.9	59.6	59.6
4F1o	C	0.5	Trail	63.3	63.7	63.6	63.6
4F1p	C	0.5	Trail	62.8	63	63.5	63.5
4F1q	C	0.5	Trail	62.2	62.7	63.2	63.2
4F1r	C	0.5	Trail	61.3	61.6	61.9	61.9
4F1s	C	0.5	Trail	60.8	61	61.1	61.1
4F1t	C	0.5	Trail	55.2	55.9	58.9	58.9
4F1u	C	0.5	Trail	56.5	57.1	60.1	60.1
4F1v	C	0.5	Trail	58.3	58.9	61.9	61.9

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	Activity Category	No. of Receptors	Description	Existing (2017)	No Build (2040)	Built Alt. I (2040)	Build Alt IV (2040)
4F1w	C	0.5	Trail	60.6	61	**65.6**	**65.6**
4F1x	C	0.5	Trail	61.9	62.3	**66.4**	**67.6**
4F1y	C	0.5	Trail	61.3	61.8	64.1	65
4F1z	C	0.5	Trail	61.8	62.3	63.5	64
4F1aa	C	0.5	Trail	63.3	63.7	64	64.3
4F1ab	C	0.5	Trail	64.4	64.7	64.6	64.9
4F1ac	C	0.5	Trail	62.7	63.7	62.9	63
4F1ad	C	0.5	Trail	62.9	63.2	63.6	63.7
4F1ae	C	0.5	Trail	58.8	59.4	60.2	60.4
4F1af	C	0.5	Trail	58.5	59.3	60.2	60.4
4F1ag	C	0.5	Trail	58.3	59.3	60	60.3
4F1ah	C	0.5	Trail	57.8	58.7	59.5	59.8
4F1ai	C	0.5	Trail	58.7	59.6	60.1	60.3
4F1aj	C	0.5	Trail	61.7	62.2	62.3	62.4
4F1ak	C	0.5	Trail	**65.8**	**66.2**	**66**	**66**
4F1al	C	0.5	Trail	**66.8**	**67.2**	**66.9**	**67**
4F1am	C	0.5	Trail	59.9	60.7	60.7	60.8
4F1an	C	0.5	Trail	58.1	59.3	58.8	59
4F1ao	C	0.5	Trail	57.7	59	58.3	58.5
4F1ap	C	0.5	Trail	57.4	59.1	56.5	57.3
4F1aq	C	0.5	Trail	57.9	59.6	56.9	57.9
4F1ar	C	0.5	Trail	58.4	60.1	57.6	58.7
4F1as	C	0.5	Trail	59.1	60.8	58.6	59.6
4F1at	C	0.5	Trail	60.1	61.8	59.9	60.7
4F1au	C	0.5	Trail	61.8	63.4	61.9	62.2
4F1av	C	0.5	Trail	65.1	**66.6**	**65.9**	64.8
4F1aw	C	0.5	Trail	**68**	**69.1**	**67.8**	**68**
4F1ax	C	0.5	Trail	63.7	65.2	63.9	64.1
4F1ay	C	0.5	Trail	61.1	63	62.5	62.9
4F1az	C	0.5	Trail	61.4	63.5	63.1	63.6
4F1ba	C	0.5	Trail	61.9	64.1	64	64.7
4F1bb	C	0.5	Trail	63.9	**66.1**	**65.5**	**66.8**
4F1bc	C	0.5	Trail	64.2	**66.5**	**66.4**	**68.2**
4F1bd	C	0.5	Trail	64.9	**67.2**	**66.9**	**68.8**
4F1be	C	0.5	Trail	**66.1**	**68.5**	**66.9**	**69**
4F1bf	C	0.5	Trail	**66.2**	**68.5**	**66.3**	**68.4**
4F1bg	C	0.5	Trail	65.1	**67.4**	**66.4**	**68.7**
4F1bh	C	0.5	Trail	64.8	**66.9**	**66.5**	**68.4**
4F1bi	C	0.5	Trail	64.6	**66.5**	**66.4**	**68.4**

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
4F1bj	C	0.5	Trail	64.4	**66.2**	**67.3**	**69.5**
4F1bk	C	0.5	Trail	65	**66.6**	**67.5**	***70***
4F1bl	C	0.5	Trail	65.1	**66.7**	**67.8**	***69.9***
4F1bm	C	0.5	Trail	**65.5**	**67**	**68.3**	***70.6***
4F1bn	C	0.5	Trail	**66.6**	**68**	**70.1**	***72.7***
4F1bo	C	0.5	Trail	**66.2**	**67.7**	**69.9**	***70.8***
4F1bp	C	0.5	Trail	**67.6**	**69**	**71.3**	**71.1**
4F1bq	C	0.5	Trail	**68.4**	**69.7**	63.5	60.4
4F1br	C	0.5	Trail	65	**66.4**	65	63.2
4F1bs	C	0.5	Trail	62.3	63.7	62.7	63.7
4F1bt	C	0.5	Trail	60.3	61.7	61.1	62.2
4F1bu	C	0.5	Trail	59.5	60.9	60.5	61.6
4F1bv	C	0.5	Trail	58.5	59.9	60.4	61.2
Budget Inn (Figure A01)							
R31a	E[1]	1	Motel	71.1	**71.8**	70.4	70.4
R31b	E[1]	1	Motel	69.3	69.6	68.9	68.9
El Camino (Figure A01)							
R32a	E[1]	1	Motel	70.2	70.6	**72.5**	**72.5**
R32b	E[1]	1	Motel	69	69.5	**71.6**	**71.6**
Economy Inn (Figure A01)							
R33(4F10a)	C	2	Motor Court	**76.9**	**78.3**	**80.2**	**80.2**
4F10b	C	2	Motor Court	**73.3**	**74.4**	**74.8**	**74.8**
4F10c	C	2	Motor Court	**68.3**	**69.3**	**70.2**	**70.2**
4F10d	C	2	Motor Court	64	64.9	**65.9**	**65.9**
4F10e	C	2	Motor Court	**70.1**	**71.3**	**72.1**	**72.1**
4F10f	C	2	Motor Court	**65.6**	**66.6**	**67.5**	**67.5**
4F10g	C	2	Motor Court	62.4	63.3	64.1	64.1
Lazy 8 Motel (Figure A01)							
R34	E[1]	1	Pool Area	67.7	69	69.9	69.9
Spanish Trail (Figure A01)							
R35	B	4	Apartment	**72.1**	**72.2**	**73.1**	**73.1**
R35 2ND	B	4	Apartment	**73.9**	**73.9**	**76.3**	**76.3**
R35a	B	4	Apartment	**71.6**	**71.6**	**71.3**	**71.3**
R35a 2ND	B	4	Apartment	**73.3**	**73.3**	**74.7**	**74.7**
R35b	G[2]	10	Abandoned	68.3	68.4	67.5	67.5
Primavera Men's Shelter (Figure A01)							
R36	C	35	Room NP	**69**	**69.9**	**71.3**	**71.3**
R36a 2S	C	53	Room NP	**73.4**	**74**	**75.1**	**75.1**
R37	C	35	Room NP	**67.3**	**68.2**	**69.1**	**69.1**

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
R37a	C	35	Room NP	**66.1**	**66.8**	**67.7**	**67.7**
Southern Arizona Veterans Affairs Health Care System (Figure A01)							
R37b	C	9	Beds	64.1	64.5	64.4	64.4
R37c	C	9	Beds	62.5	63.1	63.6	63.6
R37d	C	9	Beds	59.6	60.2	61.2	61.2
R37e	C	9	Beds	60.6	60.9	60.8	60.8
R37f	C	2	Guest Qtrs	58.2	58.7	59.1	59.1
R37g	C	2	Guest Qtrs	58.2	58.8	59.4	59.4
R37h	C	2	Guest Qtrs	58.2	58.8	59.7	59.7
R37i	C	2	Guest Qtrs	57.2	58.3	57.9	57.9
R37j	C	2	Guest Qtrs	56.7	58.0	57.8	57.8
R37k	C	2	Guest Qtrs	56.2	57.6	57.4	57.4
Western Inn (Figure A01)							
R38	E[1]	2	Pool Area	64.3	64.7	removed	removed
Roadway Inn (Figure A01)							
R39	E[1]	2	Pool Area	63	63.7	63.3	63.3
Windmere Hotel (Figure A01)							
R40	E[1]	3	Courtyard/Pool	65.6	66.1	65.7	65.7
America's Best Value Inn (Figure A01)							
R41	E[1]	1	Pool Area	67.3	68.1	65.8	65.8
El Paso & Southwestern Greenway (Figure A01)							
4F7a	C	0.5	Trail	56	56.8	57.2	57.2
4F7b	C	0.5	Trail	58.4	59	60.5	60.5
4F7c	C	0.5	Trail	58	58.5	59.4	59.4
4F7d	C	0.5	Trail	58.1	58.4	59.1	59.1
4F7e	C	0.5	Trail	58.3	58.5	59.2	59.2
4F7f	C	0.5	Trail	59.4	59.5	60.5	60.5
4F7g	C	0.5	Trail	59.2	59.4	60.5	60.5
Palms Trailer Court (Figure A02)							
R42	B	2	Mobile Home	65.1	**66.1**	63.3	63.3
R43	B	2	Mobile Home	64.2	65.2	62.5	62.5
R44	B	5	Mobile Home	63.1	64.2	61.6	61.6
R45	B	4	Mobile Home	62	63.1	60.8	60.8
Southpark Neighborhood (Figure A02)							
R46	B	3	SFH	57.8	58.8	58.4	58.4
R47	B	3	SFH	63.4	64.4	61.9	61.9
The Bridges Trails at Tucson Marketplace (Figure A01)							
4F12a	C	0.5	Trail/Bike Path	**71.7**	**72.9**	**73.5**	**73.5**
4F12b	C	0.5	Trail/Bike Path	**73**	**74.2**	**74.9**	**74.9**

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
4F12c	C	0.5	Trail/Bike Path	**68.2**	**69.4**	**70.6**	**70.6**
4F12d	C	0.5	Trail/Bike Path	63.8	64.9	**65.8**	**65.8**
4F12e	C	0.5	Trail/Bike Path	61.9	62.8	62.9	62.9
4F12f	C	0.5	Trail/Bike Path	**76.9**	**78**	**75.8**	**75.8**
4F12g	C	0.5	Trail/Bike Path	**76.6**	**77.7**	**75.5**	**75.5**
4F12h	C	0.5	Trail/Bike Path	**76.9**	**77.9**	**76.4**	**76.4**
4F12i	C	0.5	Trail/Bike Path	**76.3**	**77.3**	**77.2**	**77.2**
4F12j	C	0.5	Trail/Bike Path	**71.4**	**72.4**	**72.3**	**72.3**
4F12k	C	0.5	Trail/Bike Path	**65.7**	**66.7**	**66.9**	**66.9**
4F12l	C	0.5	Trail/Bike Path	63.5	64.3	64.8	64.8
4F12m	C	0.5	Trail/Bike Path	64.2	64.9	65.1	65.1
4F12n	C	0.5	Trail/Bike Path	65.1	**65.7**	**65.8**	**65.8**
4F12o	C	0.5	Trail/Bike Path	64.7	65.3	65.4	65.4
4F12p	C	0.5	Trail/Bike Path	63.8	64.4	64.4	64.4
Shared-use path to Sam Lena Park (Figure A02)							
4F13a	C	0.5	Trail	56.8	57.3	56.6	56.6
4F13b	C	0.5	Trail	57.2	57.8	57.7	57.7
4F13c	C	0.5	Trail	59.5	60	59.9	59.9
4F13d	C	0.5	Trail	63.8	64.1	64	64
4F13e	C	0.5	Trail	**73.9**	**74.1**	**74**	**74**
4F13f	C	0.5	Trail	**69.3**	**69.9**	**69.9**	**69.9**
Inn & Out Burger							
R48a	E[1]	3	Dining Tables	63.2	64.2	63.3	63.3
Kino Veterans Memorial Stadium Complex (Figure A02)							
R48 (4F15a)	C	5	Baseball Field/Bleachers	59.9	60.3	62.1	62.1
R49 (4F15b)	C	1	Baseball Field/Bleachers	65.4	**65.8**	**67.8**	**67.8**
R50 (4F15c)	C	1	Baseball Field/Bleachers	65.5	**65.8**	**67.7**	**67.7**
Irvington Place (Figure A02)							
R51	G[2]	0.5	Residential PAD	65.2	65.7	65.4	65.4
R52	G[2]	0.5	Residential PAD	63.2	63.8	65.5	65.5
R53	G[2]	0.5	Residential PAD	62.4	63.1	64.4	64.4
R54	G[2]	0.5	Residential PAD	61.9	62.5	64.1	64.1
Elvira Southland Park (Figure A02)							

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	Activity Category	No. of Receptors	Description	Existing (2017)	No Build (2040)	Built Alt. I (2040)	Build Alt IV (2040)
R55	B	1	SFH	63.8	64.4	**65.9**	**65.9**
R56	B	1	SFH	62.1	62.8	64.1	64.1
R57	B	2	SFH	62.5	63.2	65	65
R58	B	3	SFH	**67**	**67.7**	65.2	65.2
R59	B	1	SFH	63.6	64.2	**66.3**	**66.3**
R60	B	2	SFH	62.5	63.1	65.4	65.4
R61	B	2	SFH	61.4	62.1	64	64
R62	B	1	SFH	60.2	60.8	63	63
R63	B	2	SFH	63.6	64.2	**65.5**	**65.5**
R64	B	2	SFH	63	63.7	**66.2**	**66.2**
R65	B	3	SFH	59.4	60	62.5	62.5
R66	B	3	SFH	59.6	60.2	62.5	62.5
R67	B	3	SFH	58.7	59.3	61.8	61.8
Motel 6 (Figure A03)							
R68	E[1]	1	Motel	59.2	59.9	59.6	59.8
Days Inn (Figure A03)							
R69	E[1]	1	Motel (pool)	64.9	65.5	65.3	65.5
Comfort Inn (Figure A03)							
R70	E[1]	1	Motel (pool)	61.9	62.3	63.2	63.4
Red Roof Inn (Figure A03)							
R71	E[1]	1	Motel	65.7	66	65.5	65.7
Mortimore Neighborhood (Figure A03)							
R72	B	2	SFH	**72.1**	**73.5**	**72**	**71.5**
R73	B	3	SFH	**71.2**	**72.6**	**71**	**70.6**
R74	B	3	SFH	**71**	**72.4**	**71.1**	**70.5**
Barraza/Aviation Path (Figure A21)							
4F17a	C	0.5	multi-use path	**71**	**74.3**	**71**	**71**
4F17b	C	0.5	multi-use path	**68.1**	**70**	**67.2**	**67.2**
4F17c	C	0.5	multi-use path	**68**	**69**	**68.8**	**68.8**
4F17d	C	0.5	multi-use path	**71**	**71.9**	**71.9**	**71.9**
4F17e	C	0.5	multi-use path	**73.1**	**73.9**	**73.5**	**73.5**
4F17f	C	0.5	multi-use path	**74**	**74.4**	**73.7**	**73.7**
4F17g	C	0.5	multi-use path	**73.9**	**74.1**	**73.2**	**73.2**
4F17h	C	0.5	multi-use path	**73.1**	**73.3**	**70.9**	**70.9**
4F17i	C	0.5	multi-use path	**71.7**	**71.8**	**69.6**	**69.6**
4F17j	C	0.5	multi-use path	**68.9**	**69**	**66.9**	**66.9**
4F17k	C	0.5	multi-use path	**65.5**	**65.7**	64.3	64.3
4F17l	C	0.5	multi-use path	65.2	65.3	63.5	63.5
4F17m	C	0.5	multi-use path	65.4	**65.5**	64	64

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
4F17n	C	0.5	multi-use path	**66.1**	**66.3**	65.1	65.1
4F17o	C	0.5	multi-use path	**66.7**	**66.8**	**65.9**	**65.9**
4F17p	C	0.5	multi-use path	**68**	**68.1**	**67.5**	**67.5**
4F17q	C	0.5	multi-use path	65	65.2	**65.9**	**65.9**
Los Ninos Elementary (Figure A03)							
R75 (4F22a)	C	15	Basketball Court/Common Area	61.4	63.1	62.1	62.5
4F22d	C	18	School Building	66.8	**68.2**	**67.1**	**66.1**
4F22e	C	18	School Building	61.8	63.4	62	62.1
4F22f	C	18	School Building	60	61.7	60.8	61
422g	C	18	School Building	58.6	60.5	59.6	60
Augie Acuna Los Ninos Neighborhood Park (Figure A03)							
R76 (4F22b)	C	3	Baseball Field	62.2	64.4	64.2	65.2
R77 (4F22c)	C	7	Pool/BB Court	59.6	61.8	61.4	62.5
Estrella Subdivision (Figure A03)							
R78	B	1	SFH	60.7	63	63.1	64.2
R78a	B	8	SFH	65.2	**67.4**	65.1	**67**
R78b	B	3	SFH	62.1	64.2	64.5	65.4
R79	B	4	SFH	62.6	64.5	65.1	**67.1**
R79a	B	3	SFH	63.1	64.6	**65.8**	**67.5**
R79b	B	3	SFH	63.5	65	**66.6**	**68.9**
R80a	B	4	SFH	63.8	65.2	**67.2**	**67.9**
R80b	B	1	SFH	64.3	**65.8**	**68.1**	**68.8**
R80	B	1	SFH	**65.5**	**67**	**68.6**	**69.2**
R81	B	4	SFH	**67.3**	**68.7**	**66.7**	65.2
R82	B	2	SFH	62.1	64.3	63.1	64.7
R83	B	3	SFH	59.4	61.6	61.2	62.3
R84	B	8	SFH	60.2	62.3	62.5	63.5
R85	B	9	SFH	59.9	61.5	63.3	64.3
R86	B	5	SFH	61.9	63.4	**65.9**	**66.4**
R87	B	2	SFH	64.5	**65.9**	**67.9**	**68.4**
R88	B	2	SFH	62.4	63.8	**66.2**	**66.5**
R89	B	2	SFH	64	65.4	**67.8**	**68.1**
R90	B	8	SFH	57.9	60	60.1	61
R91	B	5	SFH	59.1	61.2	60.9	62
R92	B	5	SFH	60.5	62.3	62.5	63.4
R93	B	7	SFH	60.3	61.9	64.3	64.8
R94	B	4	SFH	61.3	62.8	65.2	**65.6**
R95	B	2	SFH	60.6	62.1	64.7	65

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	Activity Category	No. of Receptors	Description	Existing (2017)	No Build (2040)	Built Alt. I (2040)	Build Alt IV (2040)
Ray Subdivision (Figure A04)							
R96	B	1	SFH	58.7	60.2	62.9	63.1
R97	B	2	SFH	60.4	61.9	64.5	65.2
R98	B	2	SFH	61.7	63.2	**65.7**	**66**
R99	B	2	SFH	62.6	64.1	**66.9**	**67**
R100	B	2	SFH	65.2	**66.7**	**69.7**	**68.2**
R101	B	1	SFH	59.8	61.3	63.9	64.2
R102	B	3	SFH	64.8	**66.2**	**67.7**	**68.5**
R103	B	2	SFH	60.7	62.2	64.7	65.1
R104	B	2	SFH	62.8	64.3	**66.9**	**66.8**
R105	B	2	SFH	63	64.4	**66.7**	**67.2**
R106	B	2	SFH	64.9	**66.4**	**66.9**	**67.6**
R107	B	2	SFH	63.6	65	**66.4**	**67**
R108	B	2	SFH	64.3	**65.8**	**66.2**	**67.3**
R109	B	1	SFH	60.2	61.6	64.8	65.4
R110	B	2	SFH	59.9	61.3	63.9	64.4
R111	B	2	SFH	58.2	59.6	62.7	62.9
R112	B	1	SFH	58.9	60.4	63	63.4
R113	B	1	SFH	58.7	60.2	62.8	63.1
R114	B	1	SFH	58.3	59.8	62.4	62.7
R115	B	1	SFH	58.2	59.6	62.1	62.5
R116	B	1	SFH	57.8	59.3	61.7	62
Desert View (Figure A04)							
R117	B	2	SFH	57.5	59.6	63.7	62.1
R118	B	3	SFH	55.8	57.8	61.2	59.9
R119	B	1	SFH	57.3	59.5	63	61.3
Valencia Crossing (Figure A04)							
R119a	G[2]	0.5	Residential PAD	60.8	62.4	66.7	65.8
R119b	G[2]	0.5	Residential PAD	60.6	62.7	66.4	65
R119c	G[2]	0.5	Residential PAD	62.9	65.1	66.3	65.6
Valstate II (Figure A04)							
R120	B	6	SFH	59.8	62.1	60.8	61
R121	B	3	SFH	60.1	63.0	62.6	63.1
R121a[3]	B	5	SFH			**68.4**	**68.9**
R122	B	10	SFH	61.1	64.4	**67.7**	**67.5**
R126	B	1	SFH	63.4	**66.1**	65	65.2
R127	B	1	SFH	60.6	63.5	63.7	63.1

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
R128	B	6	SFH	60.8	63.9	63.4	63.7
R129	B	1	SFH	64.2	**67.4**	**66.8**	**66**
R130	B	4	SFH	62.9	**65.9**	**65.5**	65.2
R137	B	1	SFH	63.1	**65.6**	64.5	64.7
R138	B	5	SFH	63.1	**65.6**	64.5	64.8
Valstate (Figure A04)							
R123	B	2	SFH	63.5	**66.1**	**67.7**	**67.5**
R123a[3]	B	3	SFH			**68.6**	**68.1**
R124	B	3	SFH	64.2	**65.9**	**67.7**	**66.9**
R124a[3]	B	2	SFH			**72.0**	**70.3**
R125	B	5	SFH	64.3	**65.9**	**67**	**66.9**
R131	B	5	SFH	64.6	**67.7**	**67.5**	**66.3**
R132	B	3	SFH	64.9	**67.1**	**68.5**	**66.8**
R133	B	1	Playground & veranda	63.2	**66.1**	**66**	**65.6**
R134	B	2	Recreation area	62.1	65	65.1	64.7
R135	B	5	SFH	63.4	**66.1**	**66.4**	**66.7**
R136	B	4	SFH	64	**65.6**	**66.8**	**66.7**
R139	B	4	SFH	63.9	**66.6**	**66.2**	**66.5**
R140	B	4	SFH	63.3	65	**66.2**	**66.2**
R141	B	5	SFH	60.5	62.5	63.3	63.6
R142	B	3	SFH	58.3	60.6	61	61.2
Empire Vista (Figure A04)							
R143	B	2	SFH	58.2	60.3	60.7	61.1
R144	B	7	SFH	58.7	60.9	62.7	63
R145	B	7	SFH	58.4	60.3	62.2	62.5
R146	B	6	SFH	60	61.7	65.2	64.1
R147	B	2	SFH	59.1	61.3	62.6	62.7
R148	B	3	SFH	59.5	61.5	63.9	63.9
R149	B	2	SFH	59.5	61.3	64	63.7
R150	B	4	SFH	59.1	60.9	64.3	63.5
R151	B	1	SFH	59	61.2	62.8	63
R152	B	3	SFH	58.7	60.8	63.2	63
R153	B	3	SFH	58.5	60.4	63.4	62.8
R154	B	4	SFH	58.5	60.3	63.3	62.8
R155	G[2]	0.5	PAD	67.5	69.4	70.3	71.1
R156	G[2]	0.5	PAD	67.9	69.5	70.4	70.9
R157	G[2]	0.5	PAD	67.7	69.3	70.7	70.8
Rancho Valencia II (Figure A04)							

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	Activity Category	No. of Receptors	Description	Existing (2017)	No Build (2040)	Built Alt. I (2040)	Build Alt IV (2040)
R158	B	4	SFH	59.3	61	62.3	61.8
R159	B	2	SFH	**65.9**	**67.5**	**68.1**	**67.6**
R160	B	3	SFH	**66.9**	**68.6**	**72.4**	**70.4**
R161	B	3	SFH	64.7	**66.6**	**68.9**	**68.6**
R162	B	3	SFH	64.1	**65.9**	**68**	**67.7**
R163	B	4	SFH	64.5	**66.1**	**68.1**	**67.6**
R164	B	2	SFH	62.4	64.2	**66.3**	**66**
Littletown I (Figure A05)							
R165	B	3	SFH	63.8	65.2	**67.7**	**67.2**
R166	B	4	SFH	59.4	60.9	63.1	62.9
R167	B	4	SFH	59.9	60.8	64	64.3
R168	B	3	SFH	58.2	59.1	62.5	63
R169	B	2	SFH	62.7	64.4	**66.7**	**65.9**
R170	B	4	SFH	60.5	62	**65.5**	64.9
R171	B	4	SFH	57.8	59.1	61.9	62.3
R172	B	4	SFH	56.1	57.4	60.7	60.8
R173	B	1	SFH	59.8	61.8	63.8	63
R174	B	2	SFH	60	62	64.1	63.2
Corazon Del Pueblo (Figure A05)							
R175	B	5	SFH	**67.9**	**70.6**	**75.1**	**72.1**
R176	B	5	SFH	**67.2**	**69.2**	**74.3**	**70.5**
R177	B	5	SFH	63.9	**65.6**	**70**	**67.2**
R181	B	2	SFH	**65.6**	**67.8**	**71.6**	**69.4**
R182	B	1	SFH	62.9	65.1	**68.4**	**67.3**
R183	B	4	SFH	63	65.2	**70**	**68.2**
R184	B	4	SFH	63.9	**65.9**	**70.6**	**68.8**
R185	B	6	SFH	65.1	**67**	**71.4**	**69.4**
R186	B	5	SFH	62.9	64.8	**68.6**	**66.9**
R187	B	3	SFH	59.7	61.7	**65.8**	64.4
R187a	B	3	SFH	59.3	61.3	65.4	63.4
R188	B	5	SFH	**66.3**	**68.1**	**71.5**	**69.6**
R189	B	2	SFH	56.3	58.3	61.9	60.5
R190	B	2	SFH	62.8	64.9	**68.1**	**66.5**
R191	B	3	SFH	58.4	60.3	63.4	62.1
R192	B	3	SFH	**66.1**	**67.7**	**72.3**	**69.9**
R193	B	4	SFH	**65.6**	**67.3**	**71.2**	**68.8**
R194	B	2	SFH	62.8	64.7	**68.5**	**66.3**
Canterbury Ranch (Figure A05)							
R178	B	7	SFH	**65.7**	**67.3**	**71.5**	**68.4**

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
R179	B	6	SFH	**66.8**	**68.3**	**72.5**	**69.4**
R180	B	7	SFH	**66.2**	**67.7**	**72**	**69**
R195	B	2	SFH	64.8	**66.3**	**70.2**	**67.8**
R196	B	3	SFH	65	**66.7**	**71.2**	**68.6**
R197	B	3	SFH	64.6	**66.4**	**70.1**	**68.2**
R198	B	2	SFH	65.3	**66.9**	**70.4**	**68.8**
R199	B	4	SFH	59.7	61.3	64.4	63.2
R200	B	1	Playground	59.4	61	64.2	63.2
R201	B	1	SFH	56.7	58.4	61.7	60.8
R202	B	2	SFH	63.8	**65.5**	**69**	**68**
R203	B	2	SFH	63.7	65.4	**67.8**	**66.9**
Window Rock East Unit 2 (Figure A05)							
R204	B	4	SFH	60	62	64.7	63.1
R205	B	3	SFH	59.5	61.4	64.2	63.1
R206	B	3	SFH	59.9	61.7	64.1	63.1
Travel Inn (Figure A05)							
R207	E[1]	1	Motel (pool)	70.4	**73**	**72.9**	**72.3**
Legacy Collateral Holdings (Figure A05)							
R207a	G[2]	0.5	PAD	64.6	66.2	70.7	69.2
R207b	G[2]	0.5	PAD	63.7	65.8	69.9	68.3
R207c	G[2]	0.5	PAD	63.4	65.5	67.3	66.3
Desert Stone (Figure A05)							
R208	B	6	SFH	60.9	62.4	64.9	64.9
R209	B	7	SFH	60.1	61.9	64.3	64.1
R210	B	5	SFH	63.7	**65.8**	**67.9**	**67.3**
R211	B	5	SFH	65.4	**67.5**	**68.9**	**69.3**
R212	B	4	SFH	65.4	**67.5**	**71.5**	**69.4**
R213	B	2	SFH	**67.2**	**69.3**	**72.6**	**70.1**
R214	B	2	SFH	62.9	65	**68.2**	**66.7**
R215	B	2	SFH	61	63.1	**66.5**	65
R216	B	2	SFH	59.6	61.6	65.1	63.8
R217	B	4	SFH	**71.7**	**73.8**	**77.9**	**76.9**
R218	C	4	Nbhd Park	62	63.4	65.2	64.9
R219	C	1	Nbhd Park Ramada	61.1	62.7	64.8	64.4
R220	B	3	SFH	**65.6**	**67.7**	**71.5**	**68.9**
R221	B	5	SFH	**72**	**74.1**	**78.8**	**77.4**
R222	B	3	SFH	**66.4**	**68.5**	**71.8**	**69.2**
R223	B	3	SFH	**67.4**	**69.5**	**73**	**70.4**

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	Activity Category	No. of Receptors	Description	Existing (2017)	No Build (2040)	Built Alt. I (2040)	Build Alt IV (2040)
R224	B	3	SFH	62.4	64.5	**68.6**	**66.1**
R225	B	2	SFH	**65.6**	**67.7**	**71.2**	**68.7**
R226	B	2	SFH	**68.2**	**70.3**	**73.5**	**71.4**
R228	B	5	SFH	**72.1**	**74.2**	**79.3**	**77.6**
Vista Montana Estates Phase I (Figure A06)							
R227	B	3	SFH	63.7	**65.7**	**69.4**	**67.6**
R229	B	5	SFH	**67.8**	**69.7**	**74.1**	**71.1**
R229a[3]	B	3	SFH				**70.6**
R230	B	4	SFH	64.8	**66.8**	**69.8**	**68.6**
R231	B	8	SFH	63.9	**65.9**	**69.1**	**67.9**
R232	B	4	SFH	63.8	**65.8**	**68.9**	**67.8**
R233	B	4	SFH	63.3	65.2	**68.4**	**67.6**
R234	B	8	SFH	**68.4**	**70.3**	**74.6**	**72.6**
R235	B	8	SFH	**68.3**	**70.3**	**74.5**	**71.5**
R235a[3]	B	3	Common Area				**72.8**
R236	B	6	SFH	61.3	63.4	**67**	**65.5**
R237	B	2	SFH	59.5	61.6	65.2	64.3
R238	B	2	SFH	62	64	**68**	**66**
R239	B	2	SFH	61.4	63.5	**67.2**	**65.5**
Sycamore Point (Figure A06)							
R240	B	3	SFH	61.1	63.1	**66.1**	64.4
R240a[3]	B	7	SFH				**66.4**
R241	B	3	SFH	61	63.5	65.2	64.3
R241a[3]	B	7	SFH				65.2
R242	B	6	SFH	62.8	**65.5**	**68**	**66.9**
R243	B	4	SFH	64.4	**67.3**	**69.3**	**68.2**
R244	B	2	SFH	60.3	63.2	64.9	63.8
R245	B	3	SFH	58.7	61.4	63.6	63.3
R246	B	4	SFH	58.2	60.9	62.7	62.4
R247	B	3	SFH	56	58.5	60.8	60.2
La Estancia de Tucson (Figures A05 – A06)							
R248	G[2]	0.5	PAD	62.2	64.3	68.8	67.6
R249	G[2]	0.5	PAD	63.9	65.9	71.4	69.7
R250	G[2]	0.5	PAD	62.6	64.7	69.7	67
R251	G[2]	0.5	PAD	62.8	65.4	68.2	66.6
R252	G[2]	0.5	PAD	59.5	62.6	64.2	63.8
Ross Acres/Pima Ramada Mobile Home Park (Figure A06)							
R253	B	2	MH	**72.8**	**74.8**	**73.9**	**72.9**
R254	B	2	MH	**74.5**	**76.2**	**74.3**	**74.2**

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
R255	B	2	MH	**66**	**68**	**70**	**69.1**
R256	B	1	MH	**66.6**	**68.6**	**69.1**	**68.9**
R257	B	1	MH	63.5	**65.5**	**67.8**	**67.2**
R258	B	1	MH	64.3	**66.4**	**67.7**	**67.2**
R259	B	4	MH	63	65.1	**66.4**	**65.9**
Ross Acres (Figure A06)							
R260	B	3	SFH	**65.7**	**67.4**	**69.2**	**70.2**
R261	B	2	SFH	**66.3**	**68**	**69.5**	**69.9**
R262	B	1	SFH	60.6	62.4	64.6	65.1
R263	B	2	SFH	63.8	**65.6**	**67.4**	**68.1**
R264	B	2	SFH	**65.8**	**67.5**	**69.1**	**70**
R265	B	2	MH	63.3	65.1	**66.9**	**66.8**
R266	B	2	MH	**73.8**	**75.4**	**74.9**	**74.5**
R267	B	2	MH	**71.1**	**72.8**	**72.2**	**72.7**
R268	B	2	MH	**65.7**	**67.5**	**69.3**	**69.2**
R269	B	4	MH	63.5	65.3	**66.5**	**66.7**
R270	B	2	MH	**65.6**	**67.3**	**69**	**69.9**
R271	B	1	MH	63.1	64.8	**67.1**	**67.6**
R272	B	1	MH	62.1	63.9	**65.8**	**66.2**
R273	B	1	MH	63.5	65.3	**67.2**	**67.1**
R274	B	1	MH	63.5	65.3	**66.9**	**67**
R275	B	1	MH	63	64.8	**66.4**	**66.5**
R276	B	1	MH	63.3	65.1	**66.4**	**66.5**
R277	B	1	MH	62.8	64.6	**66**	**66.1**
R278	B	1	MH	64.6	**66.3**	**67.4**	**67.4**
R279	B	1	MH	**66.2**	**67.9**	**68.5**	**68.6**
R280	B	1	MH	65.1	**66.8**	**66.7**	**66.7**
R281	G[2]	0.5	PAD	63	64.8	64.5	64.6
Ross Acres – Trails Association RV Resort (Figures A06 – A07)							
R282	B	25	RV stall	64.8	**66.6**	**67.1**	**67.2**
R283	B	28	RV stall	**66.2**	**67.9**	**67.1**	**67.1**
R284	B	31	RV stall	**66.8**	**68.5**	**67.5**	**67.3**
R285	B	3	Rec Center	64.5	**66.2**	**65.6**	65.4
R286	B	1	Pool Area	62.9	64.7	64.2	64
Trails Associates (Figure A06)							
R287	B	2	MH	56.9	58.8	60.9	60.5
R288	B	2	MH	57.8	59.7	61.8	61.6
R289	B	2	MH	58.9	60.9	62.1	63
R290	B	4	MH	59.3	61.3	62.6	63.3

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
R291	B	5	MH	59.4	61.2	63.6	63.7
R292	B	6	MH	58.6	60.4	63.1	63.5
R293	B	6	MH	59.5	61.3	63.9	64.2
R294	B	6	MH	59.5	61.4	63.9	64
R295	B	8	MH	59.6	61.4	63.9	63.9
R296	B	6	MH	60	61.8	64.1	64.5
R297	B	4	MH	60	61.8	64.1	64.3
R298	B	4	MH	60.2	62	64.2	64.5
R299	B	4	MH	59.9	61.7	64.1	64.2
R300	B	2	MH	59.8	61.5	63.6	63.8
R301	B	2	MH	59.6	61.3	63.2	63.4
R302	B	4	MH	59.5	61.3	63.3	63.4
R303	B	3	MH	60.5	62.3	64.3	64.2
R304	B	3	MH	60.8	62.5	63.9	64
Voyager RV Resort (Figure A07)							
R305	B	6	MH	60.8	62.6	63.1	63.2
R306	B	6	MH	60.7	62.4	62.7	62.7
R307	B	5	MH	60.5	62.2	62.3	62.3
R308	B	3	MH	60.8	62.5	62.6	62.6
Vail Academy and High School (Figure A07)							
R309 (4F34a)	C	20	School	**68.3**	**70.1**	***75.6***	***74.8***
R310 (4F34b)	C	20	School	**67.6**	**69.5**	***74.2***	***73.8***
R311 (4F34c)	C	20	School	**66.1**	**68**	***72.4***	***72.4***
R312 (4F34d)	C	1	Basketball Court	63.8	**65.6**	***69.3***	***69.9***
R313 (4F34e)	C	1	Ramada	65.1	**67**	***71.1***	***71.5***
R314 (4F34f)	C	1	Bleachers	**65.9**	**67.7**	***71.8***	***71.6***
4F34g	C	2	Soccer Field	62.6	64.5	***67.6***	***67.7***
4F34h	C	2	Soccer Field	63.5	65.4	***68.7***	***68.7***
4F34i	C	2	Soccer Field	64.3	**66.2**	***69.7***	***69.6***
Country Club Park (Figure A21)							
R315	B	1	SFH	59.7	64.6	65.4	65.4
R316	B	1	SFH	58.6	63.2	64.1	64.1
R317	B	1	SFH	57.7	62.1	63	63
R318	B	1	SFH	57.1	61.4	62.2	62.2
R319	B	1	SFH	56.2	60.3	61.1	61.1
R320	B	1	SFH	55.6	59.6	60.4	60.4
Vacant Parcel Zoned CR-1 (A21)							
R321	G[2]	0.5	Vacant Lot	60.3	62.6	62.9	62.9

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
Hidden Hills Trail (Figures A05 – A07)							
4F32a	C	0.5	Trail	**66.7**	**68.7**	***70.7***	***72.4***
4F32b	C	0.5	Trail	63.2	**65.5**	**67.2**	**67.7**
4F32c	C	0.5	Trail	62.5	64.8	**66.8**	**66.7**
4F32d	C	0.5	Trail	62	64.2	**66.7**	**66.3**
4F32e	C	0.5	Trail	61.6	63.8	**66.6**	**66.1**
4F32f	C	0.5	Trail	61.2	63.3	***66.9***	**66**
4F32g	C	0.5	Trail	60.7	62.8	***67***	***66***
4F32h	C	0.5	Trail	60.5	62.6	***67***	***65.8***
4F32i	C	0.5	Trail	60.3	62.4	***67.1***	***65.8***
4F32j	C	0.5	Trail	60.3	62.4	***67.1***	***65.9***
4F32k	C	0.5	Trail	60.3	62.4	***67.1***	***65.9***
4F32l	C	0.5	Trail	60.2	62.3	***67.1***	***66***
4F32m	C	0.5	Trail	60.1	62.2	***67.1***	***66***
4F32n	C	0.5	Trail	60.1	62.2	***67.1***	***66***
4F32o	C	0.5	Trail	60	62.1	***67.1***	***65.9***
4F32p	C	0.5	Trail	60	62.1	***67.1***	***65.7***
4F32q	C	0.5	Trail	60	62.1	***67.1***	65.4
4F32r	C	0.5	Trail	60	62	***67.1***	65.2
4F32s	C	0.5	Trail	60	62.1	***67.1***	65
4F32t	C	0.5	Trail	60	62.1	***67***	64.9
4F32u	C	0.5	Trail	60	62.1	***67***	64.7
4F32v	C	0.5	Trail	60	62.2	***66.8***	64.6
4F32w	C	0.5	Trail	60	62.3	***66.7***	64.5
4F32x	C	0.5	Trail	60.1	62.4	***66.6***	64.5
4F32y	C	0.5	Trail	60.2	62.6	***66.4***	64.5
4F32z	C	0.5	Trail	60.4	62.9	***66.2***	64.5
4F32aa	C	0.5	Trail	60.5	63.1	**65.9**	64.6
4F32ab	C	0.5	Trail	60.5	63.3	**65.7**	64.6
4F32ac	C	0.5	Trail	60.2	63.2	65.4	64.6
4F32ad	C	0.5	Trail	59.9	63	64.8	64.4
4F32ae	C	0.5	Trail	59.8	63.1	63.9	64
4F32af	C	0.5	Trail	60.6	64.1	62.2	62.9
4F32ag	C	0.5	Trail	60.7	63.8	57.6	57.7
4F32ah	C	0.5	Trail	58.5	61.9	58.8	61.9
4F32ai	C	0.5	Trail	58.2	61.3	59.3	61.6
4F32aj	C	0.5	Trail	58.3	61.2	60	61.5
4F32ak	C	0.5	Trail	58.5	61.2	61.3	62.3
4F32al	C	0.5	Trail	58.6	61.2	62.4	63

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	Activity Category	No. of Receptors	Description	Existing (2017)	No Build (2040)	Built Alt. I (2040)	Build Alt IV (2040)
4F32am	C	0.5	Trail	58.7	61.2	63.6	63.7
4F32an	C	0.5	Trail	58.8	61.2	64.5	64
4F32ao	C	0.5	Trail	58.9	61.2	65	64.2
4F32ap	C	0.5	Trail	59	61.2	65.1	64.4
4F32aq	C	0.5	Trail	59	61.2	65.2	64.5
4F32ar	C	0.5	Trail	59.1	61.1	65.3	64.6
4F32as	C	0.5	Trail	59.2	61.1	65.3	64.8
4F32at	C	0.5	Trail	59.2	61.1	65.4	64.9
4F32au	C	0.5	Trail	59.2	61.1	65.4	65
4F32av	C	0.5	Trail	59.2	61.1	65.4	65.1
4F32aw	C	0.5	Trail	59.2	61.1	65.4	65.1
4F32ax	C	0.5	Trail	59.2	61.1	65.4	65.1
4F32ay	C	0.5	Trail	59.2	61.1	65.3	65.1
4F32az	C	0.5	Trail	59.2	61.1	65.1	65.1
4F32ba	C	0.5	Trail	59.3	61.1	65	65.1
4F32bb	C	0.5	Trail	59.2	61.1	64.9	65
4F32bc	C	0.5	Trail	59.2	61.1	64.8	64.8
4F32bd	C	0.5	Trail	59.1	61	64.6	64.6
4F32be	C	0.5	Trail	58.8	60.7	64.2	64.2
4F32bf	C	0.5	Trail	57.2	59.1	62.5	62.5
4F32bg	C	0.5	Trail	55.6	57.5	60.6	60.6
4F32bh	C	0.5	Trail	57.2	59.1	61.9	61.9
4F32bi	C	0.5	Trail	59	60.9	63.7	63.8
4F32bj	C	0.5	Trail	59.3	61.2	63.9	64
4F32bk	C	0.5	Trail	59.4	61.3	63.9	63.9
4F32bl	C	0.5	Trail	59.4	61.3	63.8	63.8
4F32bm	C	0.5	Trail	59.4	61.3	63.8	63.6
4F32bn	C	0.5	Trail	59.5	61.3	63.7	63.5
4F32bo	C	0.5	Trail	59.5	61.3	63.5	63.4
4F32bp	C	0.5	Trail	59.5	61.4	63.3	63.1
4F32bq	C	0.5	Trail	59.5	61.4	63	62.8
4F32br	C	0.5	Trail	59.5	61.4	62.7	62.6
4F32bs	C	0.5	Trail	59.5	61.4	62.5	62.4
4F32bt	C	0.5	Trail	59.5	61.4	62.3	62.3
4F32bu	C	0.5	Trail	59.6	61.4	62.2	62.2
4F32bv	C	0.5	Trail	59.6	61.4	62.1	62
4F32bw	C	0.5	Trail	59.6	61.5	61.9	61.9
4F32bx	C	0.5	Trail	59.6	61.5	61.8	61.8
4F32by	C	0.5	Trail	59.7	61.5	61.8	61.7

Table F – Noise Receiver Descriptions and Predicted Peak Hour Noise Levels

Noise Receivers: Noise-Sensitive Areas & 4(f) Properties							
Receiver No.	**Activity Category**	**No. of Receptors**	**Description**	**Existing (2017)**	**No Build (2040)**	**Built Alt. I (2040)**	**Build Alt IV (2040)**
4F32bz	C	0.5	Trail	59.7	61.6	61.7	61.7
4F32ca	C	0.5	Trail	59.7	61.6	61.7	61.7
4F32cb	C	0.5	Trail	59.7	61.6	61.7	61.7

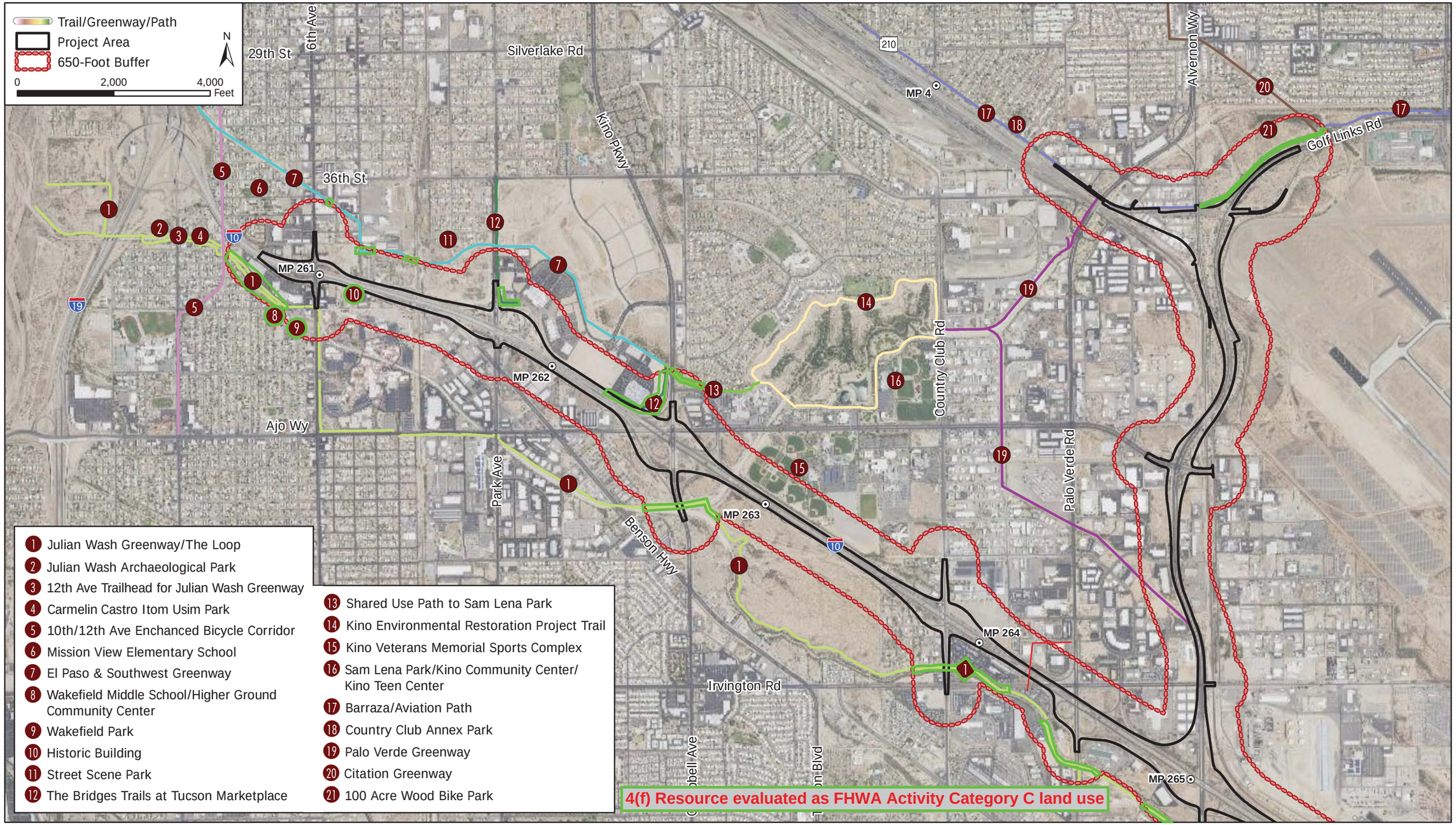
Notes: **Bold** values indicate exceedance of FHWA NAC for the listed Activity Category. ***Bold italic*** [4] values indicate exceedance of the FHWA Category C NAC and a 3 dBA increase above No-Build noise levels.

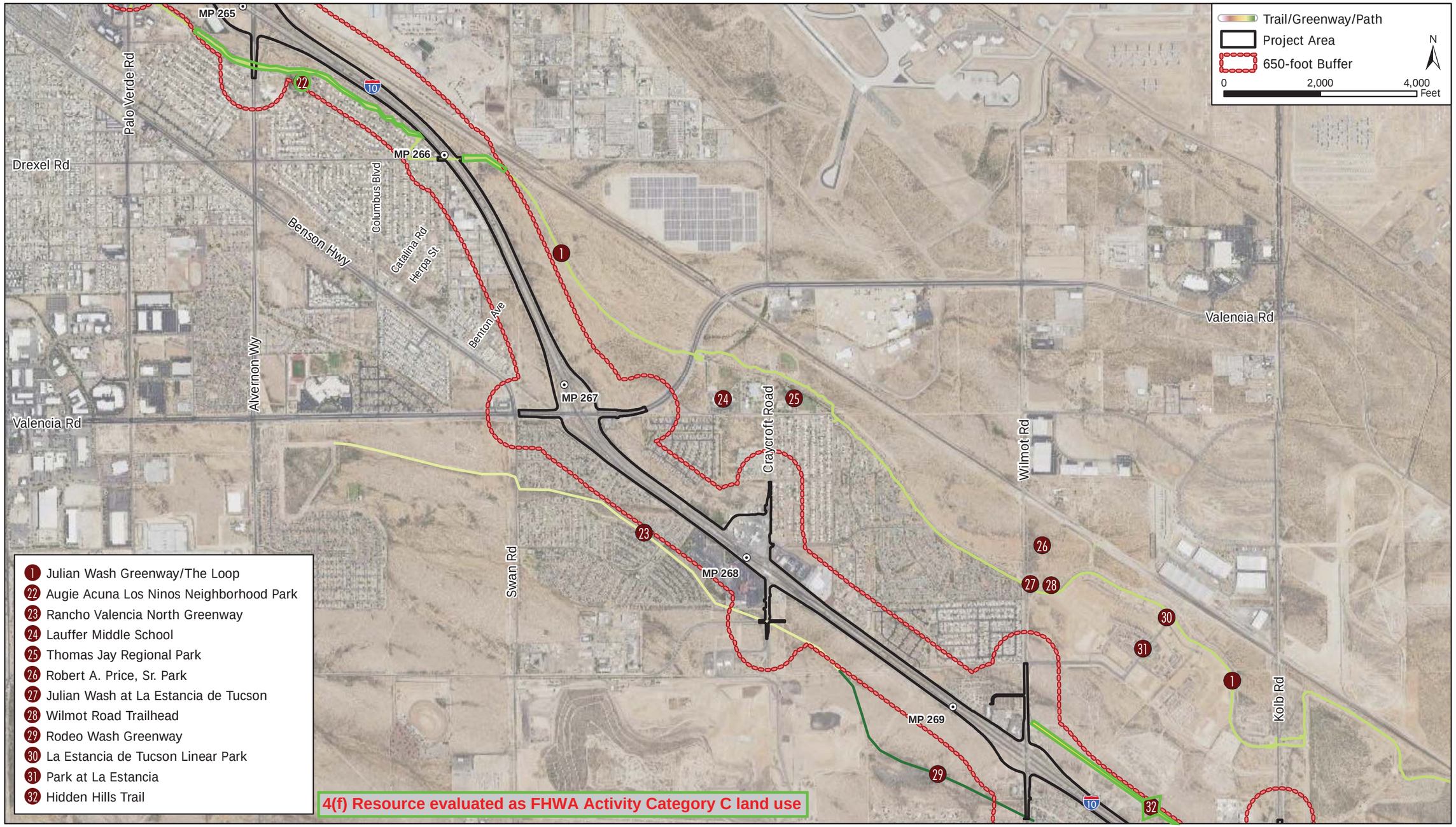
1. FHWA Category E exterior common use area, such as a pool, patio or seating area.
2. FHWA Category G areas non-permit status verified via Pima County Assessor website. Accessed at http://www.asr.pima.gov/
3. Receiver added in calculation of ADOT NAR mitigation Reasonableness cost effectiveness test only.
4. A 3 dBA increase in peak hour noise levels above the No-Build scenario is one of the factors considered when determining project's constructive use of a Section 4(f) property per 23 CFR 774.15. This information is provided here to inform the 4(f) evaluation in the EA.

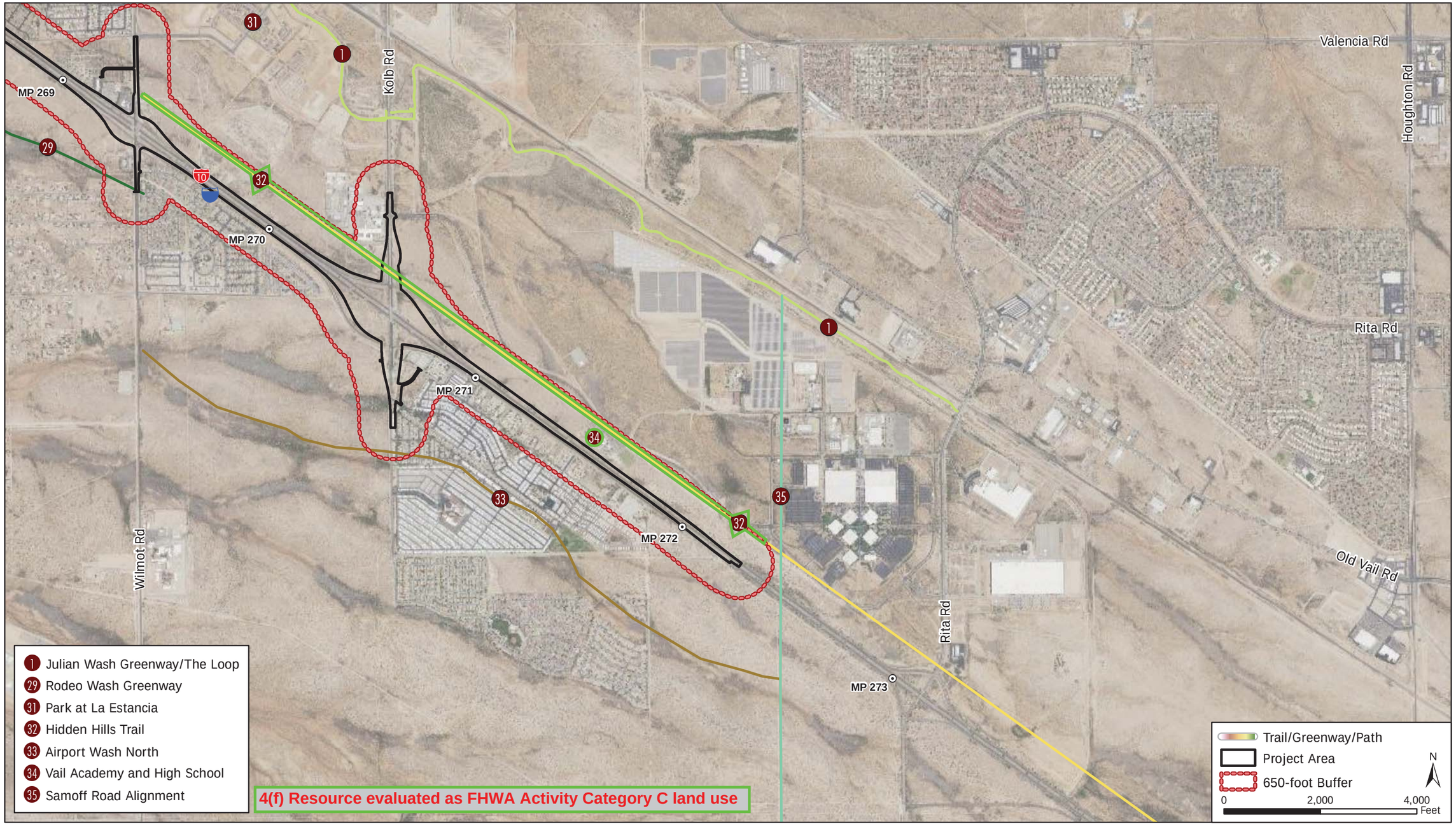
APPENDIX G – TNM 2.5 NOISE MODEL RUN FILE KEY

Note: files to be uploaded to ADOT EP Noise Specialist via ftp

APPENDIX H – Selection of 4(f) Receivers in the Project Area


Trail/Greenway/Path
Project Area
650-Foot Buffer
N
0
2,000
4,000
Feet
29th St
6th Ave
Silverlake Rd
Kino Pkwy
210
MP 4
Alvernon Wy
Golf Links Rd
36th St
MP 261
MP 262
MP 263
MP 264
MP 265
Ajo Wy
Park Ave
Benson Hwy
Country Club Rd
Palo Verde Rd
Irvington Rd
Julian Wash Greenway/The Loop
Julian Wash Archaeological Park
12th Ave Trailhead for Julian Wash Greenway
Carmelin Castro Itom Usim Park
10th/12th Ave Enchanced Bicycle Corridor
Mission View Elementary School
El Paso & Southwest Greenway
Wakefield Middle School/Higher Ground Community Center
Wakefield Park
Historic Building
Street Scene Park
The Bridges Trails at Tucson Marketplace
Shared Use Path to Sam Lena Park
Kino Environmental Restoration Project Trail
Kino Veterans Memorial Sports Complex
Sam Lena Park/Kino Community Center/ Kino Teen Center
Barraza/Aviation Path
Country Club Annex Park
Palo Verde Greenway
Citation Greenway
100 Acre Wood Bike Park
4(f) Resource evaluated as FHWA Activity Category C land use


Trail/Greenway/Path
Project Area
650-foot Buffer
N
0
2,000
4,000
Feet
MP 265
MP 266
MP 267
MP 268
MP 269
Palo Verde Rd
Drexel Rd
Columbus Blvd
Benson Hwy
Catalina Rd
Herpa St
Benton Ave
Alvernon Wy
Valencia Rd
Craycroft Road
Wilmot Rd
Swan Rd
Kolb Rd
1 Julian Wash Greenway/The Loop
22 Augie Acuna Los Ninos Neighborhood Park
23 Rancho Valencia North Greenway
24 Lauffer Middle School
25 Thomas Jay Regional Park
26 Robert A. Price, Sr. Park
27 Julian Wash at La Estancia de Tucson
28 Wilmot Road Trailhead
29 Rodeo Wash Greenway
30 La Estancia de Tucson Linear Park
31 Park at La Estancia
32 Hidden Hills Trail
4(f) Resource evaluated as FHWA Activity Category C land use


MP 269
MP 270
MP 271
MP 272
MP 273
Kolb Rd
Valencia Rd
Houghton Rd
Rita Rd
Wilmot Rd
Old Vail Rd
10
1 Julian Wash Greenway/The Loop
29 Rodeo Wash Greenway
31 Park at La Estancia
32 Hidden Hills Trail
33 Airport Wash North
34 Vail Academy and High School
35 Samoff Road Alignment
4(f) Resource evaluated as FHWA Activity Category C land use
Trail/Greenway/Path
Project Area
650-foot Buffer
N
0
2,000
4,000
Feet