

REDFORD ESTATES REZONING SITE ANALYSIS

(P22RZ00001)

PREPARED BY:



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APRIL 2022

PARADIGM #19AYD01

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I. INTRODUCTION

A. PROJECT OVERVIEW

The Redford Estates project is a proposed residential development consisting of 60.9± acres, located just south of Valencia Road, between Cardinal Avenue and Westover Avenue in Pima County, Arizona. This document has been prepared in support of a request to rezone the property from GR-1 (Rural Residential Zone) to CR-4 (Mixed-Dwelling Type Zone). This will allow for the construction of a single-family residential development with approximately 273 homes (4.5 homes per acre), recreation areas, and natural and revegetated open space. The Pima Prospers Comprehensive Plan designates the subject property as Medium Low Intensity Urban (MLIU), which is appropriate for this development as proposed.

The Redford Estates subject property consists of parcels 138-25-593L, 138-25-593M, 138-25-593N, 138-25-593P, and 138-25-593Q, totaling 60.9± acres just south of the Wal-Mart Neighborhood Market. The property is bounded to the north by an existing drainage channel and commercial properties, to the east by Westover Avenue and the Salida del Sol subdivision, to the south by Ebonee Marie Moody Park, an existing drainage basin and the Salida del Sol V subdivision, and to the west by the Santa Cruz Lutheran Church, Cardinal Avenue, and the Las Palomas subdivision.

B. PRIMARY OBJECTIVES

- Provide much needed high-quality, single-family detached homes for new residents wishing to live in the southwest Tucson metropolitan area.
- Provide lot sizes meeting market demand for moderate-income families.
- Construct a residential community that is compatible with both existing and future surrounding land uses.
- Provide additional recreational opportunities in this part of Pima County.

Redford Estates will have minimal impact on nearby landowners. The subject property is in direct proximity to residential subdivisions with similar densities to what is being proposed with this development. The northern boundary of the property is adjacent to an existing drainage channel and commercial properties. The project has been carefully designed to be sensitive to nearby existing developments by providing landscape buffers around the entirety of the project and by avoiding existing floodplains.

II. INVENTORY & ANALYSIS

The purpose of the Inventory & Analysis section of this document is to catalog the various development opportunities and constraints impacting the property in order to provide a meaningful and relevant context for the development proposal detailed in Section III of this document. Through careful consideration of these existing conditions a design can be deemed compatible with its surroundings and appropriate for the area.

A. EXISTING LAND USES

1. Site Location & Regional Context

The subject property consists of five parcels, totaling approximately 60.9± acres just south of Valencia Road, between Cardinal Avenue and Westover Avenue within Section 16, Township 15 South, Range 13 East, Pima County, Arizona. See Exhibit II-A-1: Site Location Map.

The Project's administrative address is 6775 S Cardinal Avenue., Tucson, AZ 85746.

2. Existing Land Uses on Site

Redford Estates is currently undeveloped and vacant. The subject property includes three active easements along the southern and western boundary of the site. See Exhibit II-A-2: Existing Land Uses and Exhibit II-A-3: Existing Easements.

The subject property is currently zoned GR-1 "Rural Residential Zone". See Exhibit II-A-4: Existing Zoning.



Looking Southwest Across the Site

3. Comprehensive Plan on Site & Surrounding

a. Comprehensive Plan Designation(s)

The Pima Prospers Pima County Comprehensive Plan designates the subject property as Medium Low Intensity Urban (MLIU). The MLIU designation allows for a mix of medium density single-family and attached dwelling units, to provide opportunities for a mix of housing types with densities ranging between 2.5-5 homes per gross acre. Most of the surrounding areas are also within the MLIU designation. The area along Valencia Road has a land use designation of Multifunctional Corridor (MFC), and areas south of the stie have a land use designation of Low Intensity Urban-3.0 (LIU 3.0). See Exhibit II-A-5: Comprehensive Plan Land Use Designations.

b. Rezoning or Special Area Policies

The Pima Prospers Comprehensive Plan lists no Rezoning Policies for the subject property.

Per the Pima Prospers Comprehensive Plan, the subject property is subject to Special Area Policy S-29 Southwest Infrastructure Plan (SWIP) Area (SW). "The Southwest Infrastructure Plan (SWIP) shall be used to guide needs, obligations, funding, and provision of infrastructure and services related to transportation, flood control, wastewater, parks and recreation, and other governmental facilities. Proposed development shall be planned, designed and constructed to implement the sustainability principles as described in the Southwest Infrastructure Plan (SWIP)." See Exhibit II-A-5: Comprehensive Plan Land Use Designations.

c. Designated Focused Development Investment Area (If Applicable)

The subject property lies within the Southwest Designated Focused Development Investment Area. Redford Estates will provide market rate housing and promote efficient growth in suburban areas that is compatible with the surrounding areas specific scale, character, and identity where infrastructure is already in place. This infill property will strengthen existing neighborhoods and create more density that is necessary to support needed services and increase the tax base without being disruptive to the existing neighborhoods. Redford Estates will provide places for community activity and include trees and comprehensive landscaping throughout the neighborhood to reduce the urban heat island effect.

4. Surrounding Land Uses

d. Surrounding Zoning & Land Uses

The subject property is surrounded by properties featuring the following zoning designations and land uses. See Exhibit II-A-2: Existing Land Uses and Exhibit II-A-4: Existing Zoning.



N:	Existing zoning:	GR-1 Rural Residential Zone & CB-1 Local Business Zone
	Existing land use:	Drainage Channel, Wal-Mart Neighborhood Market, Little Mexico Steakhouse & Arco Gas Station
NE:	Existing zoning:	GR-1 Rural Residential Zone
	Existing land use:	Westover Avenue & Undeveloped Land
E:	Existing zoning:	TH Trailer Homesite Zone & CR-4 Mixed Dwelling Type Zone
	Existing land use:	Westover Avenue, the Salida del Sol Subdivision & the Salida del Sol IV Subdivision

SE:	Existing zoning:	CR-4 Mixed Dwelling Type Zone
	Existing land use:	Salida del Sol IV Subdivision
S:	Existing zoning:	CR-4 Mixed Dwelling Type Zone
	Existing land use:	Ebonee Marie Moody Park, drainage basin & Salida del Sol V Subdivision
SW:	Existing zoning:	TH Trailer Homesite Zone
	Existing land use:	Cardinal Estates Subdivision
W:	Existing zoning:	GR-1 Rural Residential Zone, SH Suburban Homestead & CR-3 Single Residence
	Existing land use:	Santa Cruz Lutheran Church, Cardinal Avenue, the Las Palomas Subdivision, & Single-family residential
NW:	Existing zoning:	CB-1 Local Business Zone
	Existing land use:	Walgreens

e. Surrounding Types of Businesses

The subject property is just south of Valencia Road, which has a variety of commercial businesses and restaurants. The Wal-Mart Neighborhood Market, Little Mexico Steakhouse & Arco Gas Station are directly north of the project site. Redford Estates will be a direct neighbor to the Santa Cruz Lutheran Church, which is just west of the subject property.

5. Nearby Pending Rezoning, Plats, & Development Plans

a. Nearby Pending Rezoning

There are no pending rezonings within one-quarter mile.

b. Nearby Conditionally Approved Rezoning

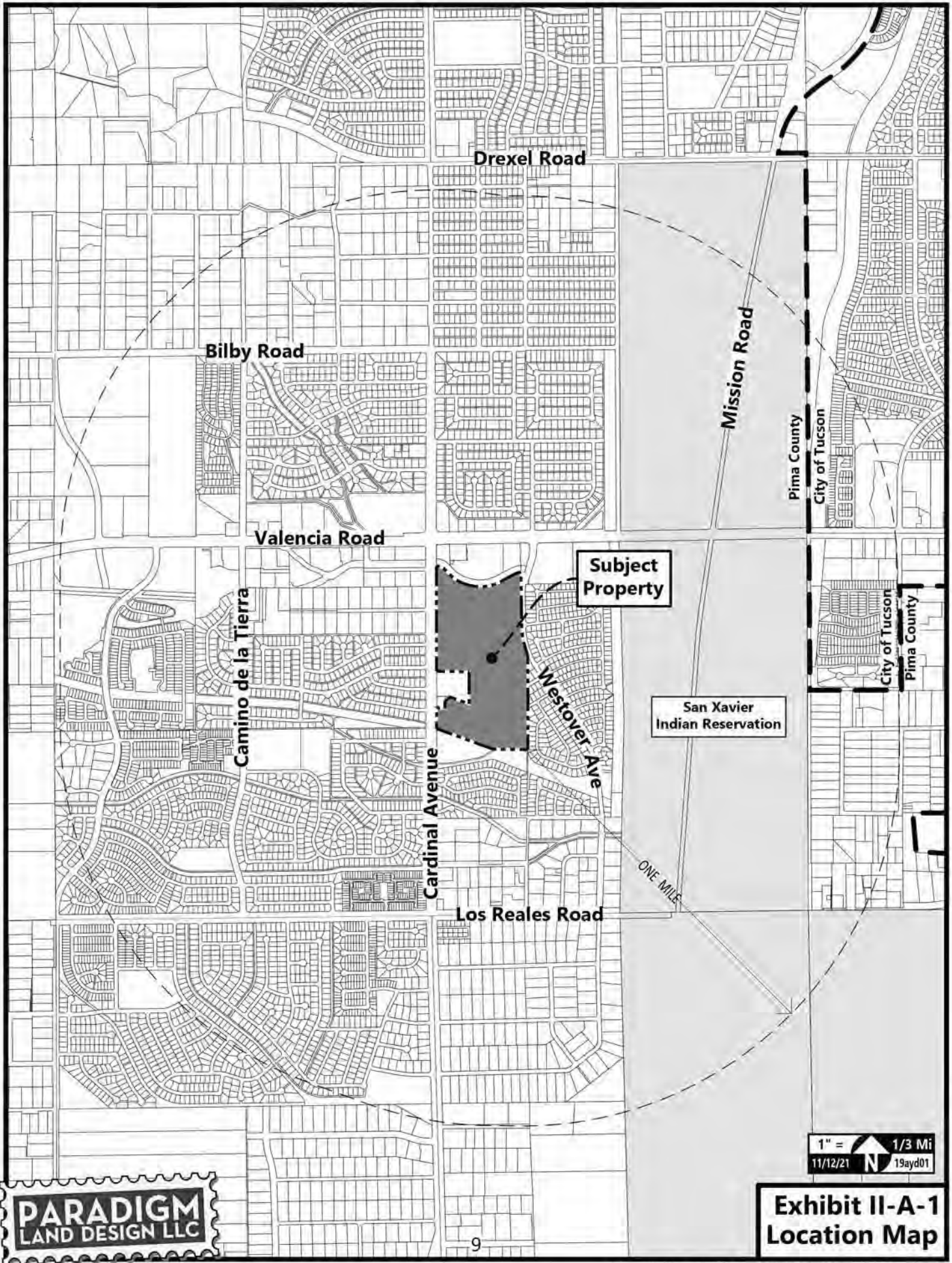
There are no conditionally approved rezonings within one-quarter mile.

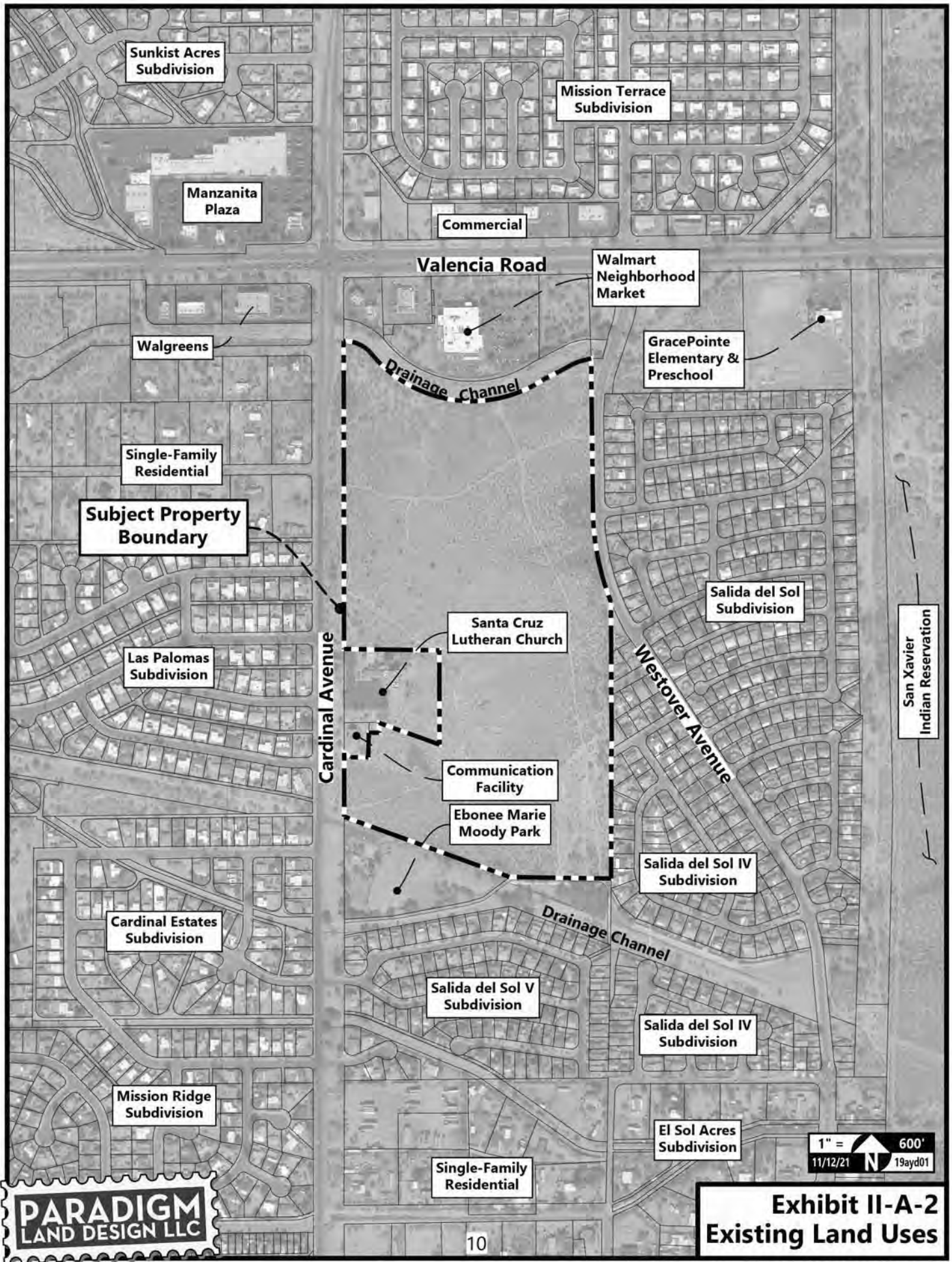
c. Nearby Pending Plats

There are no pending plats within one-quarter mile.

d. Nearby Pending Development Plans

There are no pending development plans within one-quarter mile.





Valencia Road

Subject Property
Boundary

Cardinal Avenue

Westover Avenue

Gas Pipeline, Telephone,
Power Transmission, &
Road Easement per
Docket 136, Page 532

15' Easement per
Docket 9856, Page 563

10' Communication
Facilities Easement per
Docket 7119, Page 489

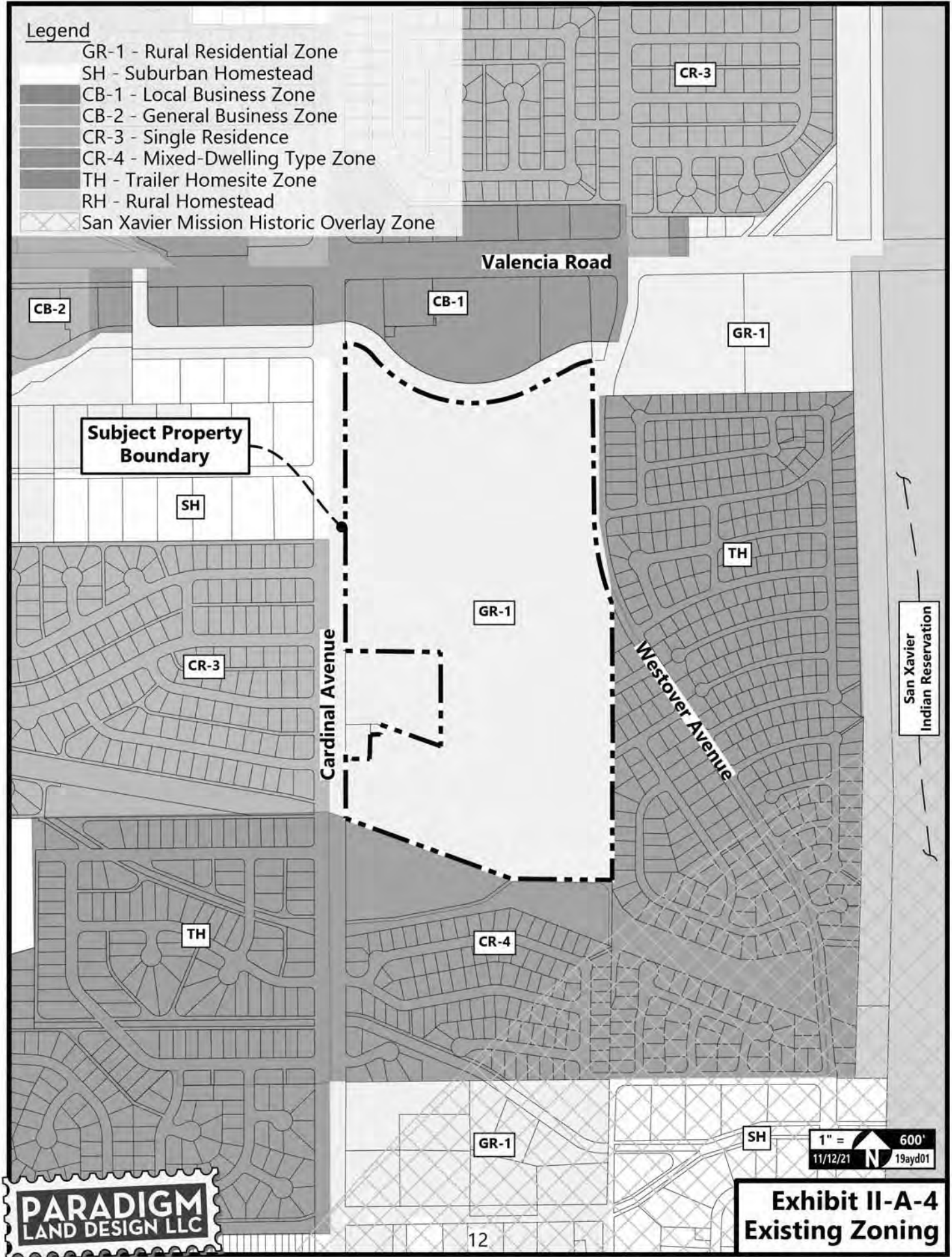
1" = 400'
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Exhibit II-A-3
Existing Easements

Legend

- GR-1 - Rural Residential Zone
- SH - Suburban Homestead
- CB-1 - Local Business Zone
- CB-2 - General Business Zone
- CR-3 - Single Residence
- CR-4 - Mixed-Dwelling Type Zone
- TH - Trailer Homesite Zone
- RH - Rural Homestead
- San Xavier Mission Historic Overlay Zone



PARADIGM
LAND DESIGN LLC

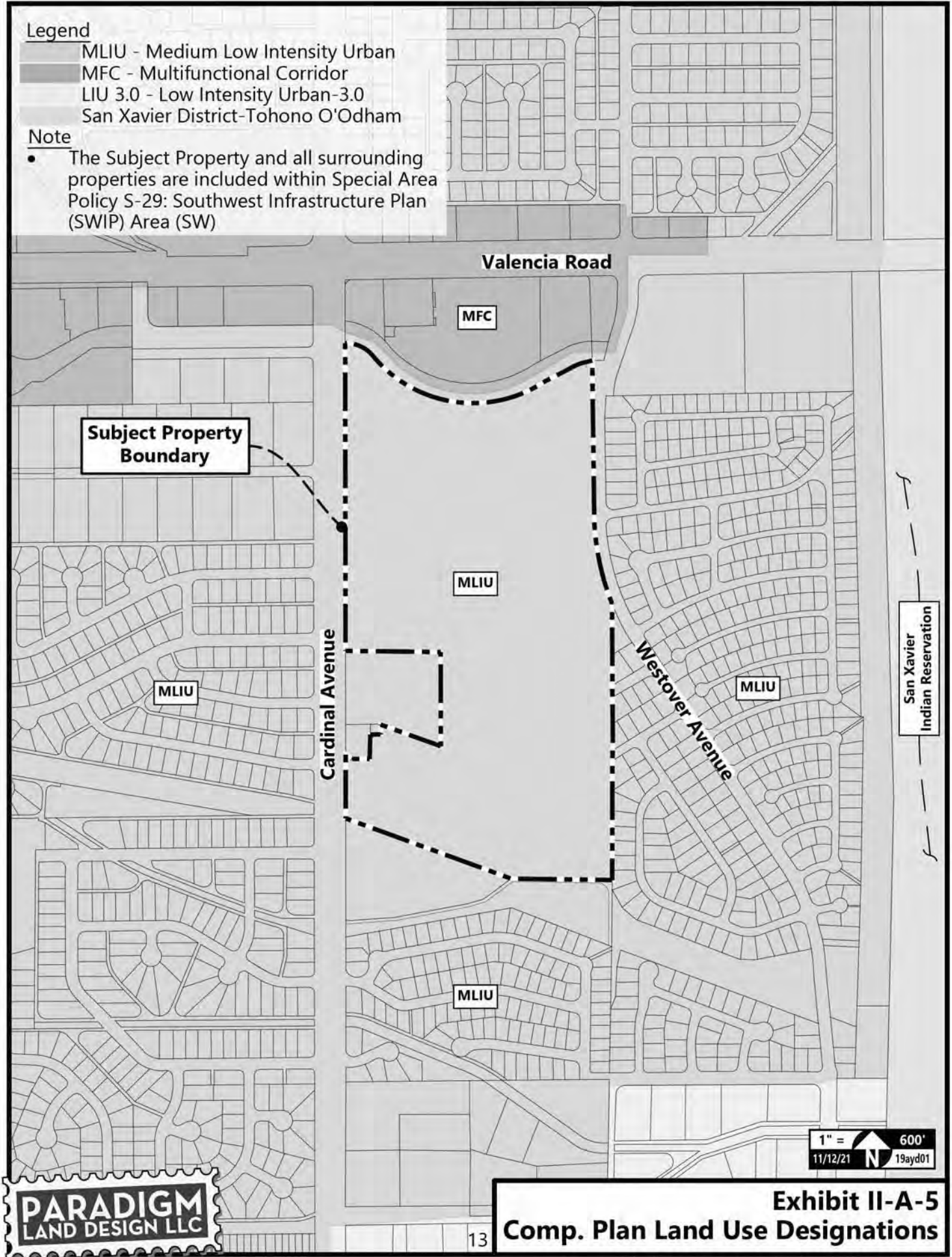
Exhibit II-A-4
Existing Zoning

Legend

MLIU - Medium Low Intensity Urban
MFC - Multifunctional Corridor
LIU 3.0 - Low Intensity Urban-3.0
San Xavier District-Tohono O'Odham

Note

- The Subject Property and all surrounding properties are included within Special Area Policy S-29: Southwest Infrastructure Plan (SWIP) Area (SW)



B. TOPOGRAPHY AND GRADING**1. Topographic Characteristics**

The topography of the subject property is characterized by an east to west ridge line of high points located about 750 feet from the southerly property line. From there the land slopes north to the Valencia Wash, East to the Salida del Sol Residential Subdivision and south towards an El Paso Gas Easement and a wash. The property generally slopes gently downward from a high point at S Cardinal Avenue to the northeast and southwest. Elevations range from approximately 2,550 feet above sea level along the western boundary to approximately 2,502 feet above sea level in the northeast corner and 2,512 feet above sea level in the southeast corner of the property. Several areas of the site have been previously disturbed primarily in the form of unplanned wildcat dirt roads. No areas of the site are subject to the Hillside Development Zone (HDZ). See Exhibit II-B-1: Topography.

a. Restricted Peaks and Ridges

The subject property does not contain any restricted peaks or ridges.

b. Rock Outcrops & Talus Slopes

The subject property does not contain any rock outcrops or talus slopes.

c. Slopes of 15% to 25% & Slopes Greater than 25%

The subject property does not contain any slopes of 15% or greater.

d. Other Significant Topographic Features

No areas of the site are subject to the HDZ.

e. Existing Grading and Ground Disturbance on the Site

Several areas of the site have been previously disturbed primarily in the form of unplanned wildcat dirt roads.

2. Pre-Development Average Cross Slope

The pre-development average cross-slope of the subject property is approximately 7.1%, according to the following formula:

C = Contour Interval

L = Length of Topographic Contours

A = Acreage of Property

$(C \times L \times 0.0023) / A = \text{Average Cross Slope}$

$(2' \times 51,840' \times 0.0023) / 60.9 = 3.9\%$

Legend

Previously Disturbed Areas

Notes

- Average Cross Slope
 $(2 \times 51,840 \times 0.0023) / 60.9 = 3.9$
- There are no slopes of 15% or greater onsite.
- There are no rock outcrops or restricted peaks or ridges onsite.

Valencia Road

Subject Property
Boundary

Cardinal Avenue

Westover Avenue

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LAND DESIGN LLC

1" = 400'
11/12/21 N 19ayd01

Exhibit II-B-1
Topography

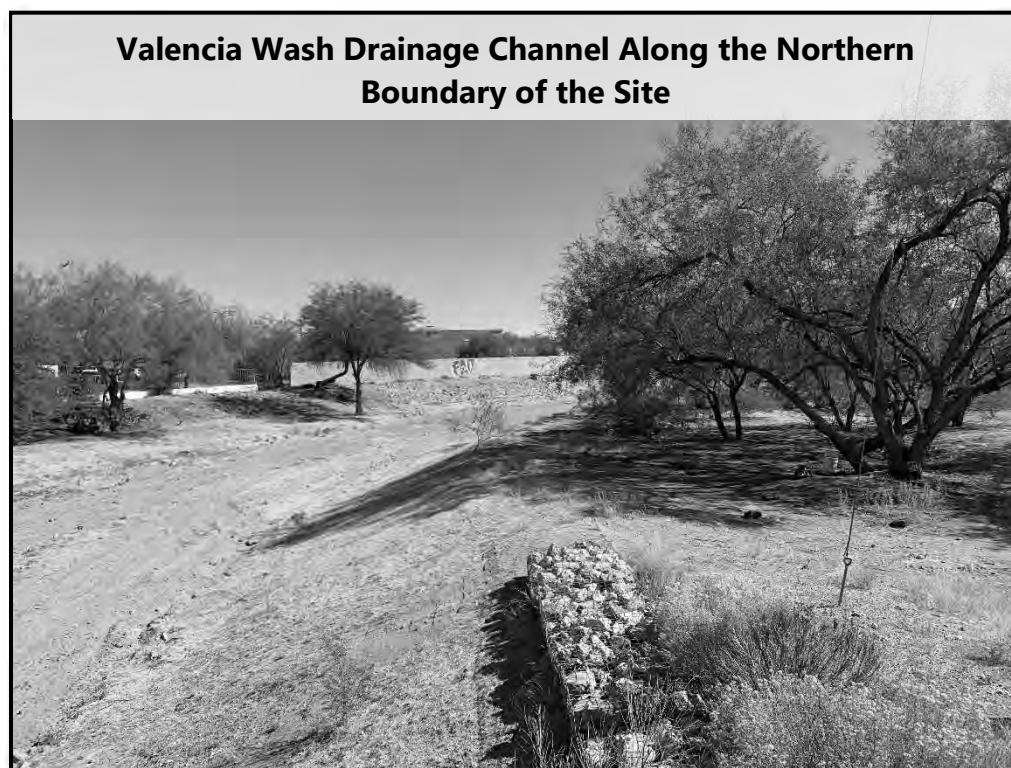
C. HYDROLOGY

This section of the site analysis describes pre-development onsite hydrologic and hydraulic characteristics.

1. Offsite Hydrology

The project is located adjacent to, and partially within, the Valencia Wash floodplain and associated FEMA Special Flood Hazard Area. An elevation high point on Cardinal Avenue causes offsite stormwater flows from the west to flow north and south along Cardinal so that only stormwater from the east half of the Cardinal Avenue right-of-way, the church property, and the Qwest accessory building impact the western edge of the subject property. Six stormwater concentration points impact the site along the western boundary of the property. See concentration points one thru six on Exhibit II-C-1: Onsite Hydrology.

Concentration Point (CP)	Area (Acres)	Q100 (CFS)
1	0.8±	5
2	1.6±	10
3	1.8±	11
4	1.2±	8
5	1.8±	11
6	3.3±	20



2. Onsite Hydrology

The six concentration points combine onsite to form two larger onsite drainage areas that generally discharge at four locations along the eastern and southern boundary of the site. The project site is bisected by a ridge line with two areas generally sloping at about 2% to the north and south. The south onsite drainage area slopes southeast and combines with the offsite flows (Concentration Points 1-3) and discharges across the south property line into the unnamed wash (Concentration Point 7). The north onsite drainage area slopes northeasterly. A portion of this onsite watershed slopes east and combines with the offsite flow (Concentration Point 4) and discharges across the eastern property line into the Salida del Sol neighborhood (concentration point 8). The remainder of the northern drainage area slopes northeasterly and combines with the offsite flows (Concentration Point 5 and 6) and discharges into the Valencia Wash at the northeast corner of the site (Concentration Point 9). See Exhibit II-C-1: Onsite Hydrology.

Concentration Point (CP)	Area (Acres)	Q100 (CFS)	Combined Concentration Point	Q100 Combined (CFS)
7	10.5±	40	1,2,3,7	66
8	20.1±	80	4,8	88
9	30.2±	120	5,6,9	151

a. Flood Control Resources Areas

All peak discharges entering and exiting the subject property, as well as their contributing drainage areas have been shown on Exhibit II-C-1: Onsite Hydrology.

b. Concentration Points & 100-Year Peak Discharges for All Onsite Watersheds

All peak discharges entering and exiting the subject property, as well as their contributing drainage areas have been shown on Exhibit II-C-1: Onsite Hydrology. This property is not known to experience sheet flooding.

c. FEMA-designated Floodplains & Floodways

The FEMA Flood Insurance Rate Map Panel 04019C2270L and associated LOMR (13-09-0833P-040073) shows almost all of the property to be within Zone X which indicates "areas determined to be outside the 0.2% annual chance floodplain". A small area in the northern portion of the site is within Zone AE of the Valencia Wash. Zone AE indicates areas with base flood elevations determined. See Exhibit II-C-2: FEMA Firm. It is important to note there is no proposed encroachment onto Zone AE and no residential units will be located within the floodplain.

d. Locally Identified Special Study Floodplains & Administrative Floodways or Flow Corridors

None.

e. Floodplain Delineation of Any Previously Unmapped Regulatory Floodplain

None.

f. Regulatory Sheet Flood Areas and Depths as Mapped by Pima County

None.

g. Lakes, Ponds, Wetlands, Springs, or Other Source(s) of Perennial Surface Water

There are no lakes, ponds, wetlands, springs, or other sources of perennial surface water on the subject property.

h. Erosion Hazard Setbacks for All Onsite Watercourses

The project is located adjacent to, but outside the Valencia Wash. However, per the Pima County Flood Control District there is 100-foot erosion hazard setback which impacts the northerly portion of the project site. The unnamed wash along the southern boundary of the site has a 50-foot erosion hazard setback. However, the wash is bank protected so the erosion hazard setback can be reduced to outside of this project's boundary. It is important to note that all proposed lots are located outside both erosion hazard setback areas.

i. Pima County Regulated Riparian Habitat Limits & Classifications

There is one small area along the southern boundary that is classified as Xeroriparian B, although J Studio landscape architects have determined that no significant vegetation exists there or anywhere else onsite.

j. Flow Arrows for Non-regulatory Flows

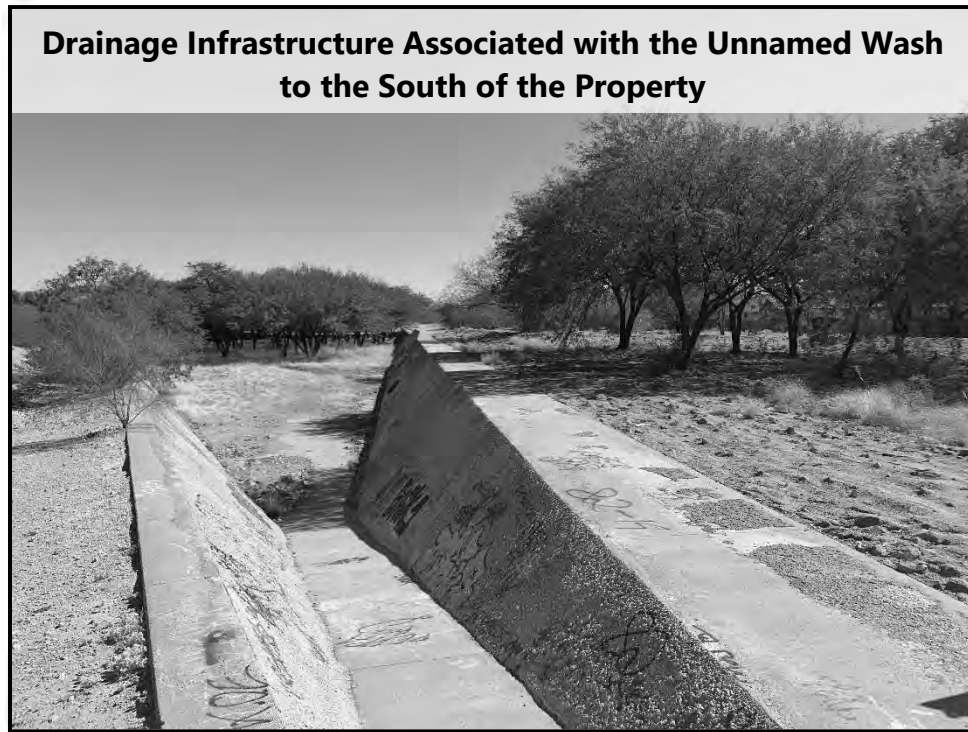
General flow direction has been indicated on Exhibit II-C-1: Onsite Hydrology.

k. Existing Drainage Easement(s) or Other Relevant Easements

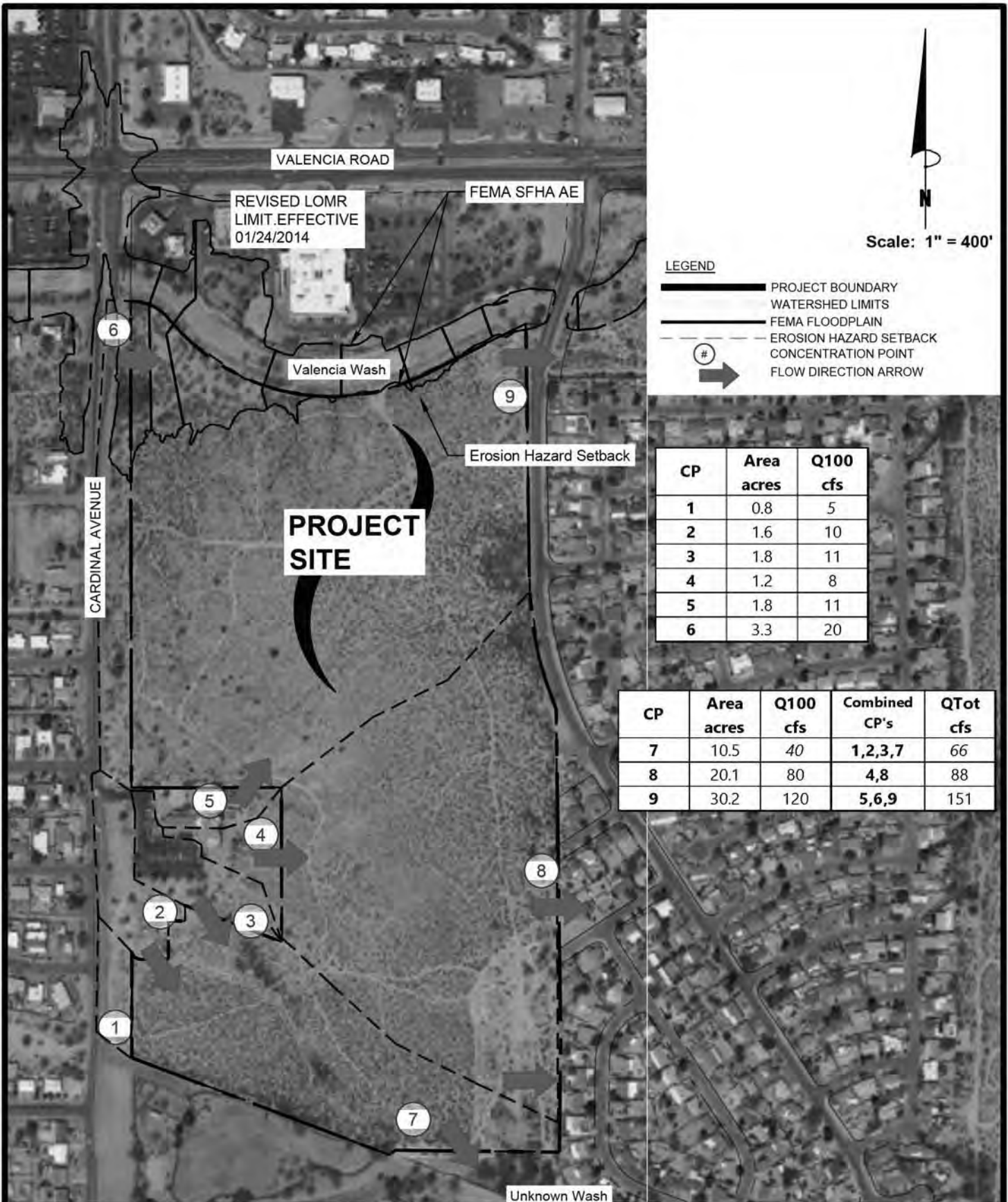
There are no existing drainage easements onsite.

I. Existing Drainage Infrastructure On or Adjacent to the Site

The Valencia Wash to the north of the project has been channelized with a trapezoidal earthen channel. Currently there is no bank protection for the southern bank of this wash, which is directly adjacent to this project. The unnamed wash along the southern boundary of the site has been channelized with a bank protected trapezoidal channel. Concrete bank protection exists along the northern bank of this wash, which is directly adjacent to this project.

**3. Hydrology**

The proposed improvements will require drainage facilities to keep the existing drainage pattern and outlet design flows unchanged. Conveying drainage facilities (storm drains) will route the proposed improvements flows to flow storage basins strategically located throughout the development.



LEGEND

- PROJECT BOUNDARY
- WATERSHED LIMITS
- FEMA FLOODPLAIN
- EROSION HAZARD SETBACK
- # CONCENTRATION POINT
- ➔ FLOW DIRECTION ARROW

CP	Area acres	Q100 cfs
1	0.8	5
2	1.6	10
3	1.8	11
4	1.2	8
5	1.8	11
6	3.3	20

CP	Area acres	Q100 cfs	Combined CP's	QTot cfs
7	10.5	40	1,2,3,7	66
8	20.1	80	4,8	88
9	30.2	120	5,6,9	151

Bowman

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Existing Onsite Hydrology
Redford Estates Residential

DESIGN	AH
JOB No.	051115-01-001
DATE :	3/3/2022
EXHIBIT II C-1 FEMA	

D. BIOLOGICAL

1. Conservation Lands System (CLS)

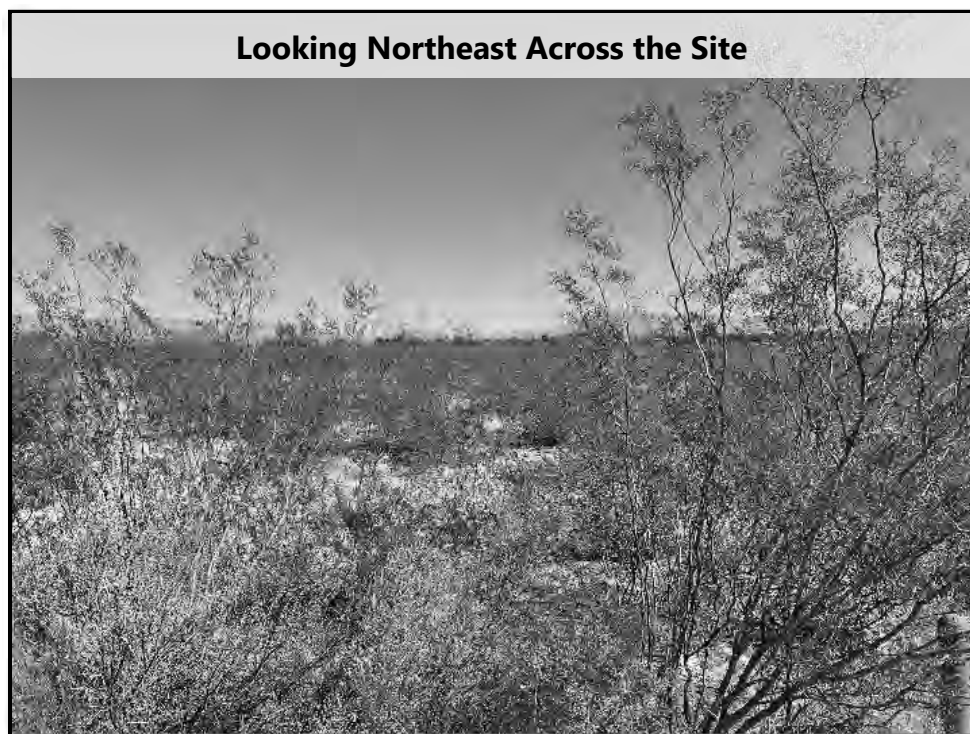
No areas of the subject property or the surrounding areas are within the CLS. See Exhibit II-D-1: Conservation Lands System.

2. Priority Conservation Area (PCA)

The subject property does not include Pima Pineapple Cactus or Needle-spined Pineapple Cactus Priority Conservation Areas.

3. Saguaros & Ironwood Trees

There are no Ironwood Trees or Saguaros on the subject property. In fact, the site is devoid of significant vegetation of any kind. See Exhibit II-D-2: Vegetation Inventory by J Studio Landscape Architects.



4. Habitat Protection/Community Open Space

The property is not identified for acquisition as public open space.

Note

- No areas of the Subject Property or the surrounding areas are within the Conservation Lands System.
- The Subject Property does not include Pima Pineapple Cactus or Needle-Spined Pineapple Cactus Priority Conservation Areas.

Valencia Road

**Subject Property
Boundary**

Cardinal Avenue

None

Westover Avenue

1" = 400'
11/12/21 N 19ayd01

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23

**Exhibit II-D-1
Conservation Lands System**

01 SITE ANALYSIS PLANT INVENTORY

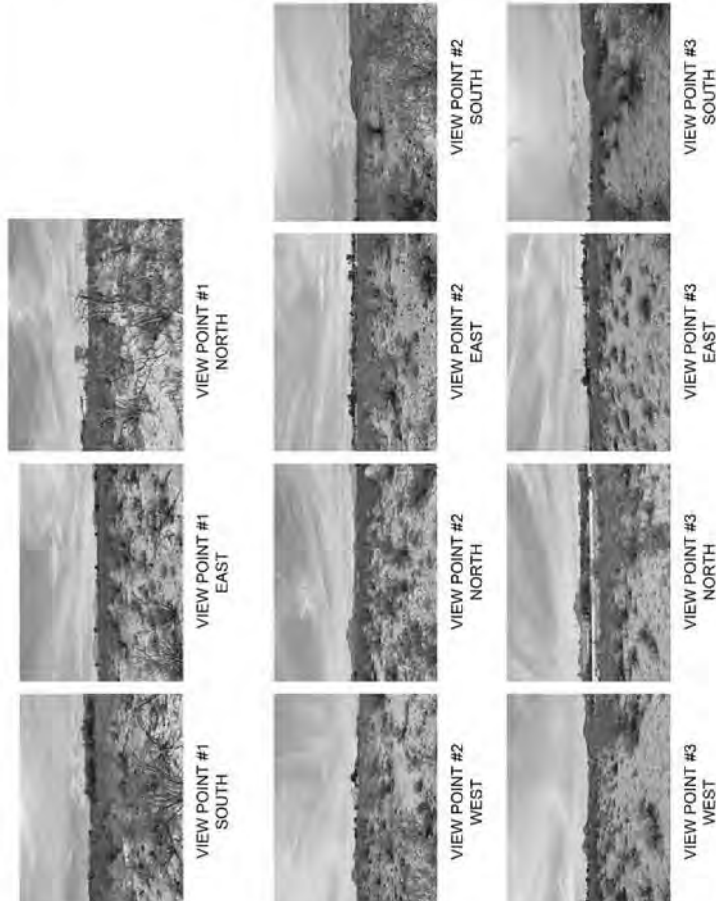


02 NOTES

SITE ANALYSIS PLANT INVENTORY

1. THE PLANT INVENTORY WAS COMPLETED ON 10/06/21 PER THE PIMA COUNTY SITE ANALYSIS REQUIREMENTS SET FORTH IN SECTION 10 BIOLOGIC IMPACT REPORT.
2. THIS SITE IS PREDOMINANTLY CREOSOTE FLATS WITH INTERMITTENT SMALLER PATCHES OF LOW GROUND WOODLAND AND SCRUBLAND.
3. THIS SITE CONTAINS ZERO (0) SAGUAROS, CARMELIA, DIGITALIS AND ZERO (0) BROWNWOOD TREES (OLNEYA TESOTA).

03 SITE PHOTOS



LEGEND

- SITE BOUNDARY
- RIPARIAN AREA
- #1
- #2
- #3



PIMA COUNTY APPROVAL PROJECT: REDFORD ESTATES 6775 S CARDINAL AVE. TUCSON, AZ 85746

OWNER / DEVELOPER: REDFORD ESTATES 6775 S CARDINAL AVE. TUCSON, AZ 85746

ATTN: LESLIE SCHAEFER 6775 S CARDINAL AVE. TUCSON, AZ 85746

LEGAL DESCRIPTION: 1.0 01



REDFORD ESTATES 6775 S CARDINAL AVE. TUCSON, AZ

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

NO.	REVISION	DATE
1	SCHEMATIC DESIGN	10/06/21
2	DESIGN DEVELOPMENT	10/06/21
3	ANNUITY REVIEW DOCUMENTS	10/06/21
4	SCHEMATIC PACKAGE	10/06/21
5	CONSTRUCTION ISSUE	10/06/21

PROJ. NO. 000000
DRAWN BY: TLU
CHECKED BY: TLU
AGENCY REFERENCE NO.:

E. TRANSPORTATION**1. Existing/Planned Offsite Streets**

The subject property is approximately 500 feet south of Valencia Road, between Cardinal Avenue and Westover Avenue. The intersection of Cardinal Avenue and Valencia Road is signalized. Based on the projected trip generation of the project, the table below shows the existing right-of-way widths, the number of lanes, capacity and posted speed limits; the present average daily volumes (ADTs), as well as bus routes, bike lanes and pedestrian ways for roadways within one mile of the project.

Short descriptions of the physical characteristics of the major streets adjacent or near the project are provided after the table.

Roadway Segment	Lanes	2020 ADT	Source	LOS D Daily Capacity (vpd)*	Speed Limit	Existing R/W (ft)	Bike Route	Sun Tran Bus Route	Sidewalks
Valencia Road, Camino de la Tierra to Cardinal	4	30,948	PAG	35,820	40	140-180	Bike Route with Striped Shoulder	Route 27	No
Valencia Road, Cardinal to Mission	4	36,132	PAG	35,820	40	150-180	Bike Route with Striped Shoulder	Route 29	Yes
Cardinal Road, Drexel to Valencia	4	9,426	PAG	29,160	35	50-150	No	Route 27	No
Cardinal Road, Valencia to Los Reales Road	2	6,763	PAG	10,656	35	150	No	Route 29	No
Camino de la Tierra, Bilby Road to Valencia Road	2	2,783	PAG	13,986	35	90	Key Connecting Street	No	No
Camino de la Tierra, Valencia Road to Los Reales Road	2	6,056	PAG	10,656	25	90	Residential Streets	No	No
Westover Drive, Valencia Road to Los Reales Road	2	2,426	PAG	10,656	25	50-100	Key Connecting Street	No	No
Mission Road, North of Valencia Road	2	10,040	PAG	12,744	45	60	No	No	No
Mission Road, Valencia Road to Los Reales Road	2	5,849	PAG	13,986	35	60	No	Sun Shuttle 440	No
Los Reales Road, Camino de la Tierra to Cardinal Road	3	8,443	PAG	13,986	35	150	Key Connecting Street	No	No
Los Reales Road, Cardinal Road to Mission Road	2	8,376	PAG	10,656	35	150	Key Connecting Street	No	No

*FDOT Generalized Annual Average Daily Volumes Table, 2012.

Valencia Road is designated an Urban Minor Arterial on the Federal Highway System, a High-Volume Arterial on Pima County's Major Streets Plan and a Scenic, Major Route on the county's Scenic Routes Plan. It has a posted speed limit of 40 mph. It is a divided four-lane arterial with bike lanes. There are sidewalks east of Cardinal Road. It provides direct access to residential and commercial uses along its route.

The western terminus of Valencia Road is at its intersection with SR 86 near Ryan Airfield. Valencia Road continues east through the project area with its eastern terminus just east of Houghton Road on the east side of Tucson. Nearby traffic signals are located at Mark Road, Camino de la Tierra, Camino de Oeste, Cardinal Avenue and Mission Road. Stop signs control access from all other cross streets intersecting Valencia Road.

Cardinal Avenue through the study area is a two-lane undivided Minor Urban Arterial. The northern terminus of Cardinal Avenue is 1.75 miles north of Valencia at Irvington Road and the southern terminus is at Herman's Road, two miles south of Valencia Road. It has a posted speed limit of 35 mph through the study area. There are 25 mph advisory signs along some of Cardinal Road due to limited sight distance associated with a crest in the vicinity of the Santa Cruz Lutheran Church and the location of a park south of the project area.

The intersection of Cardinal Avenue and Valencia Road is signalized, but all intersections on Cardinal Avenue south of Valencia Road are unsignalized. The intersection of Cardinal Avenue/Los Reales Road, south of the project is controlled with stop signs on all approaches.

Westover Avenue, south of Valencia Road, is a residential two-lane local roadway that provides access to residential neighborhoods. It is posted for 25 mph. Westover Avenue continues north of Valencia Road as Hildreth Avenue, which is also a local residential street. There is a median opening and street lighting at the Valencia Road/Westover Avenue/Hildreth Avenue intersection. Westover Avenue and Hildreth Avenue are stop-sign controlled at Valencia Road.

See Exhibit II-E-1:Transportation

2. Distances to Existing Drives/Intersections

As shown on the preliminary development plan, the northern project access on Cardinal Road will be opposite Calle Canario, a residential street. The south driveway is shown to be approximately 75 feet from the northern driveway of Ebonee Marie Moody Park and 100 feet south of the opposite side street Via Cuervo. The project access on Westover Avenue is opposite Vereda Azul, a residential street.

3. Public Transportation

There is two Sun Tran bus routes and one Sun Shuttle route that provide transit service near the project site. These are Sun Tran routes 27 (Midvale Park) and 29 (Valencia) and Sun Shuttle route 440. The closest two bus stop locations for the project are on Cardinal Avenue for Route 29 near Pincushion Lane and near Calle Pajarito with stops for northbound and southbound travel. Route 27 runs along Valencia west of the project and then goes north on Cardinal Avenue. The Sun Shuttle route runs along Mission Road east on Valencia Road. See Exhibit II-E-2: Public Transportation.

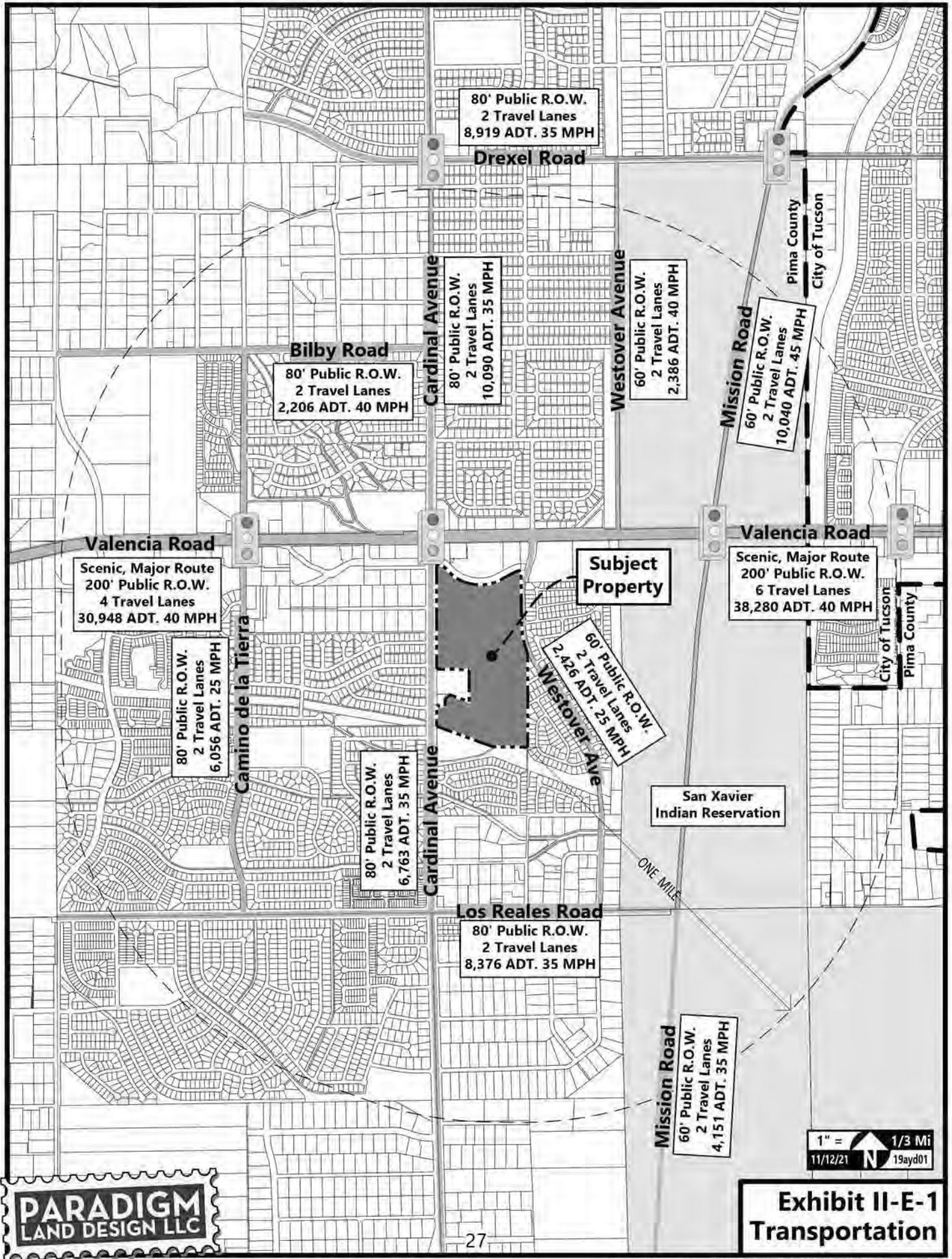
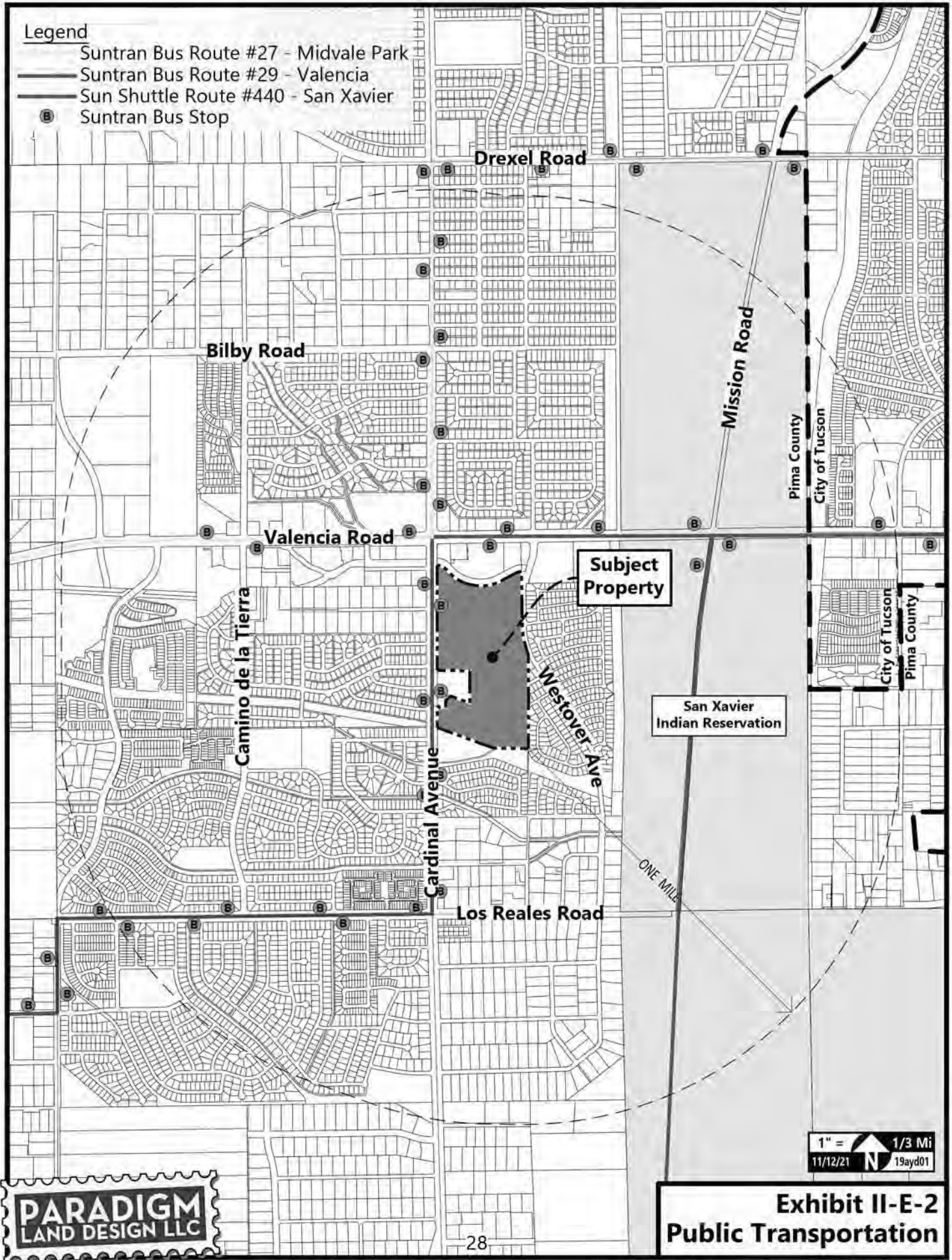


Exhibit II-E-1
Transportation

Legend

-  Suntran Bus Route #27 - Midvale Park
-  Suntran Bus Route #29 - Valencia
-  Sun Shuttle Route #440 - San Xavier
-  Suntran Bus Stop



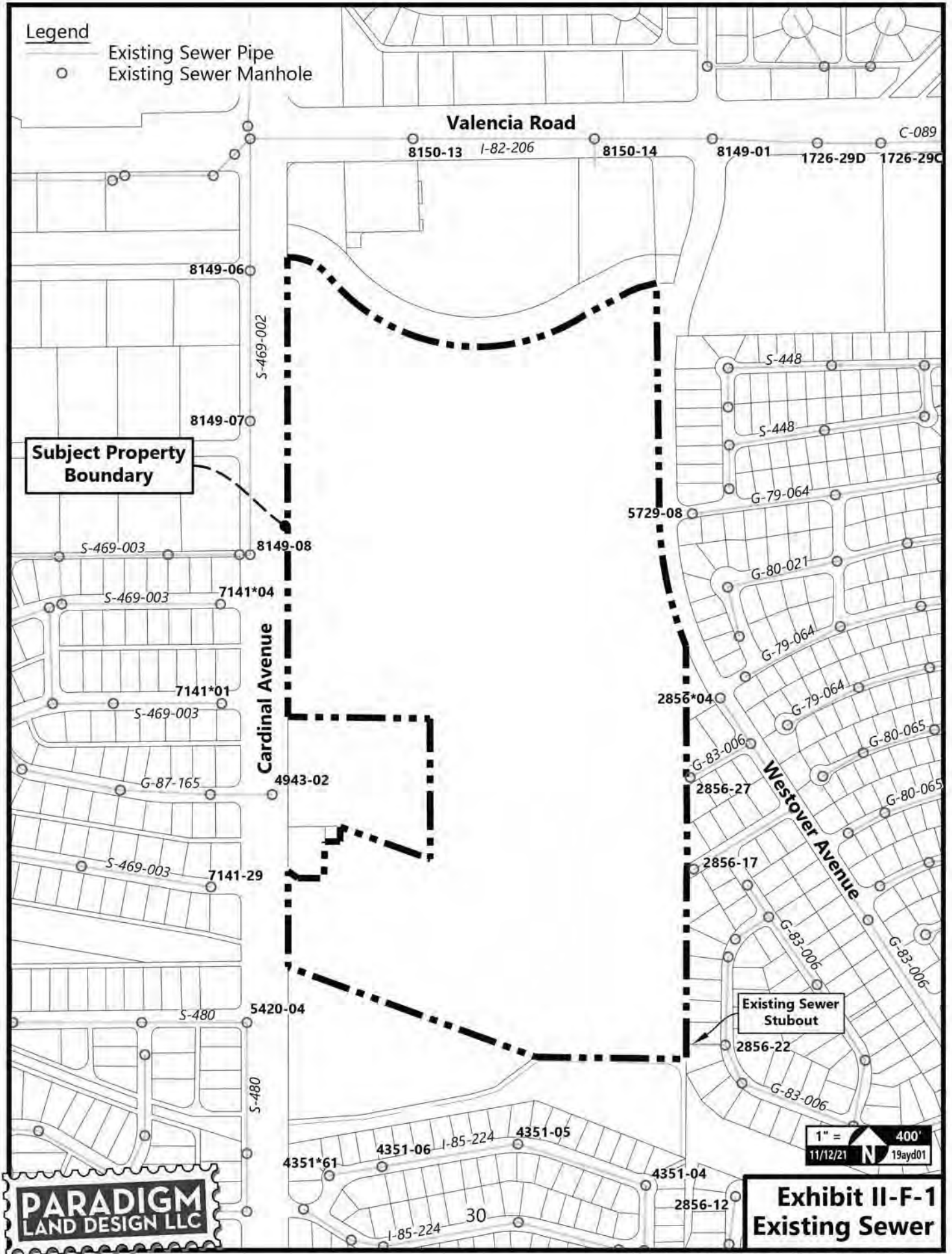
PARADIGM
LAND DESIGN LLC

F. SEWERS

There are no existing sewer pipes or manholes within the bounds of the subject property. There is existing sewer infrastructure within the public rights-of-way in all the neighborhoods that surround the subject property. A sewer stub pipe has been provided near the southeast corner of the site, coming from the sewer infrastructure within Vereda Roja. See Exhibit II-F-1: Existing Sewer.

Legend

- Existing Sewer Pipe
- Existing Sewer Manhole



**Exhibit II-F-1
Existing Sewer**

*G:\Projects\Troy Redford Estates\01 Reopening\0230\Site Analysis\Exhibits\Exh II-F-1 X Sewer.dwg

G. RECREATION**A. Existing Recreational Facilities On-Site & Within 1 Mile**

There are no existing recreational facilities within the bounds of the subject property. The Ebonee Marie Moody Park is directly south of the subject property, it contains walking paths, a grass field, a basketball court, play structures, a ramada and picnic tables. The Mission Ridge Park is approximately a third of a mile to the west of the site and contains a baseball field, a basketball court, a play structure, a ramada and picnic tables. The Presidio Gardens Community Park is approximately three quarters of a mile to the southwest. It contains a community pool, a basketball court, ramadas, horseshoe pits, a sand volleyball court, play structures, and walking paths. See Exhibit II-G-1: Recreation & Trails.

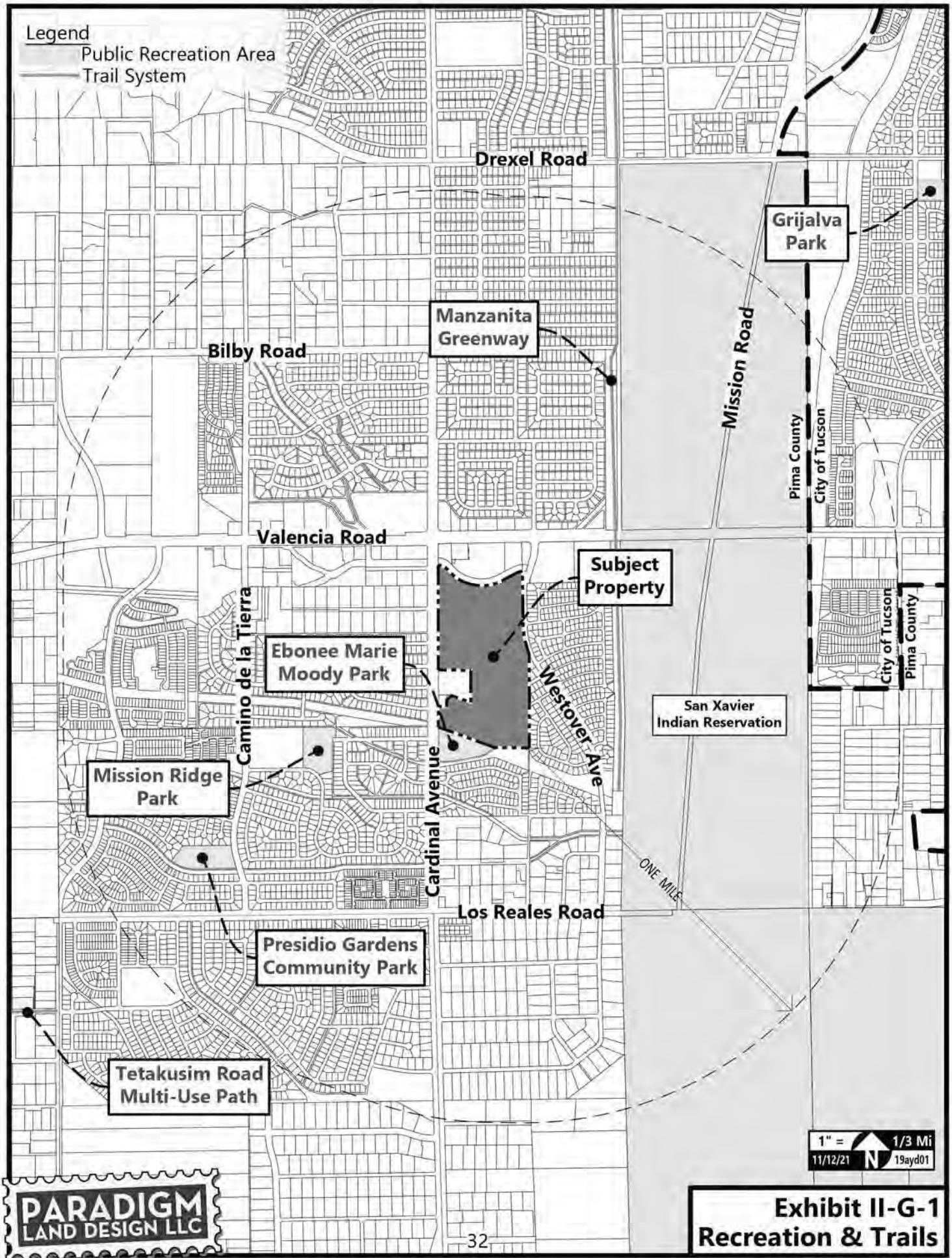
**B. Trail Rights-of-Way**

There are no trail rights-of-way within the subject property. See Exhibit II-G-1: Recreation & Trails.

Legend

Public Recreation Area

Trail System



H. CULTURAL RESOURCES: ARCHAEOLOGICAL & HISTORIC SITES

The Arizona State Museum records check shows that the project site and surrounding areas have been surveyed numerous times including one survey that covered the subject property. The entire site was most recently surveyed by Tierra Right of Way in December 2018. The survey found one isolated occurrence and no new archaeological sites or historic buildings identified within the project area. The site contains no significant information potential. Arizona Antiquities laws will be followed if any human remains, or funerary objects are discovered during construction. See Exhibit II-H-1: AZSM Records Check.



A CLASS III CULTURAL RESOURCE SURVEY OF 60 ACRES AT 6775 SOUTH CARDINAL AVENUE IN PIMA COUNTY, ARIZONA

Prepared by:
Chance Copperstone, M.A.

Tierra Archaeological Report No. 2018-199
ASM Accession No. 2018-Pending
December 11, 2018

Exhibit II-H-1: AZSM Records Check

	THE UNIVERSITY OF ARIZONA ARIZONA STATE MUSEUM	Arizona State Museum PO Box 210026 Tucson AZ 85721-0026 (520) 621-6281 www.statemuseum.arizona.edu
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March 11, 2020

Ken Koss
T&K Development, LLC
6891 E. Dorado Ct.
Tucson, AZ 85715-4755

RE: Redford Estates
Parcel 138-25-593C

Dear Ken,

Arizona State Museum (ASM) has reviewed archaeological project and site records in support of project: Redford Estates (Figure 1). Correspondence indicates this project will involve the development of Tucson Unified School District (TUSD)-owned land with the intent of building 189 single family units. The project area is located at 6775 S. Cardinal Avenue, in the city Tucson, Pima County, and encompasses parcel 138-25-593C within Township 15 South, Range 13 East, Section 16. Below are the results of ASM's research.

Search Results:

According to a search of the archaeological site files and records retained at ASM, 46 archaeological survey projects were conducted within a one-mile radius of the project area between 1974 and 2015. Previous survey work was conducted in support of residential and commercial development; church construction; road improvements; and gas, water, sewer, and communication lines. A small portion of the project area was surveyed in 1986; however, there is no additional data on file in ASM's Archaeological Records Office.

Sixteen archaeological sites have been identified within a one-mile radius of the project area, one of which is within the current project area.

Recommendations and Responsibilities:

1. Because the project will be taking place on land owned by a municipal organization, it is subject to compliance with the Arizona Antiquities Act (AAA). Although a portion of the project area was surveyed more over 30 years ago, it is standard archaeological practice for a property to be re-surveyed if the previous survey was conducted 10 or more years ago, as there is a possibility for unidentified archaeological properties to have since been exposed. Therefore, a qualified archaeological contractor should be consulted before any ground-disturbance begins. A list of archaeological contractors is available on the ASM website at: <https://statemuseum.arizona.edu/crm>
2. Pursuant to Arizona Revised Statute §41-844, if any human remains or funerary objects are discovered during project work, all work will stop within the area of the remains and Dr. Claire Barker, ASM repatriation coordinator, will be contacted at 520-626-0320.

Page 1 of 3

Exhibit II-H-1: AZSM Records Check

3. City, county, or municipal governments may have additional requirements; therefore, ASM recommends that the relevant jurisdiction(s) be consulted.

If you have any questions about the results of this records search, please feel free to contact me twilling@email.arizona.edu or 520-621-4795.

Sincerely,



Shannon Twilling, M.A.
Arizona Antiquities Act Administrator
Arizona State Museum

Legend

- Previously Disturbed Areas
- 100-Year FEMA Floodplain
- Erosion Hazard Setback
- Xeroriparian 'B'

Notes

- No areas of the Subject Property or the surrounding areas are within the Conservation Lands System.
- There are no slopes of 15% or greater onsite.
- There are no rock outcrops or restricted peaks or ridges onsite.

**Subject Property
Boundary**

Cardinal Avenue

Valencia Road

Westover Avenue

1" = 600'
11/12/21 N 19ayd01

**PARADIGM
LAND DESIGN LLC**

36

**Exhibit II-I-1
McHarg Composite Map**

III. LAND USE PROPOSAL

This section describes how the development responds to the opportunities and constraints described in the Inventory & Analysis section of this document, along with the Pima County Land Development Code. As evidenced by the site plan, this proposed rezoning has been crafted after careful and responsive consideration of the subject property's context.

A. PROJECT OVERVIEW

1. Project Description

We are requesting to rezone this property from GR-1 – Rural Residential Zone to CR-4 – Mixed Dwelling Type Zone. In doing so the project will adhere to all applicable development standards associated with the CR-4 zoning requirements. Rezoning to CR-4 will allow for the development of a residential neighborhood consisting of approximately 273 single-family homes, recreation areas and open space. The neighborhood has been carefully laid out to avoid floodplains and nearly all mapped riparian areas (except one small road crossing as noted on the Proposed Grading exhibit) even though no significant vegetation is present onsite.

The Pima Prospers Pima County Comprehensive Plan designates the subject property as Medium Low Intensity Urban (MLIU). The MLIU designation allows for a mix of medium density single-family and attached dwelling units, to provide opportunities for a mix of housing types, with densities ranging between 2.5-5 RAC. Redford Estates is proposing a density of 4.5 homes per acre. Most of the surrounding areas are also within the MLIU designation and have similar densities. This property is surrounded by existing single-family neighborhoods and is an ideal infill site with utility infrastructure already in place.

The development of this property will have minimal impacts on surrounding land uses. Landscape borders around the entirety of the site will help mitigate views into the site. With this development being sandwiched between Cardinal Ave. and Westover Ave. traffic impacts on surrounding developments will be minimal. Access into the neighborhood will come from four access points, two on Cardinal Ave. and two on Westover Ave. These locations have been aligned with existing cross streets where feasible and will provide safe ingress and egress into Redford Estates.

2. Compliance with Zoning Code

This project will adhere to all applicable development standards associated with the CR-4 zoning requirements as stated in the Pima County Zoning Code. All buildings will meet minimum setback requirements and height restrictions. Exterior colors will be desert neutral and designed to blend with the surrounding structures and the desert environment. The site has been designed to provide functional open space and create a comfortable environment for future residents. Dark sky compliant site lighting will be provided throughout the neighborhood and recreation areas to help ensure adequate lighting for safety. See Exhibit III-B-1: Proposed Zoning.

The project vicinity is known for heightened natural radon levels, so remediation will be required and provided. Please see Appendix C.

B. PRELIMINARY DEVELOPMENT PLAN (PDP)

This project is proposing a residential development consisting of approximately 273 single-family homes, active recreation areas and functional open space. The buildings will have a maximum height of 34 feet, as allowed in the CR-4 zone. The development will have landscaped borders around the entirety of the site. These landscape borders and open space areas of the site will utilize drought tolerant native plant materials. They will be supplemented with plant materials from the site that meet transplant requirements. Approximately 18 acres (30%) of the site will be left in its natural condition or utilized as landscaped open space. See Exhibit III-B-2: Preliminary Development Plan.

C. TOPOGRAPHY & GRADING

1. Development/Mitigation on Steep Slopes

No areas of the site contain slopes of 15% or greater.

2. Natural Areas Under HDZ

No areas of the site are subject to the Hillside Development Zone.

3. Disturbed, Revegetated, Natural Areas

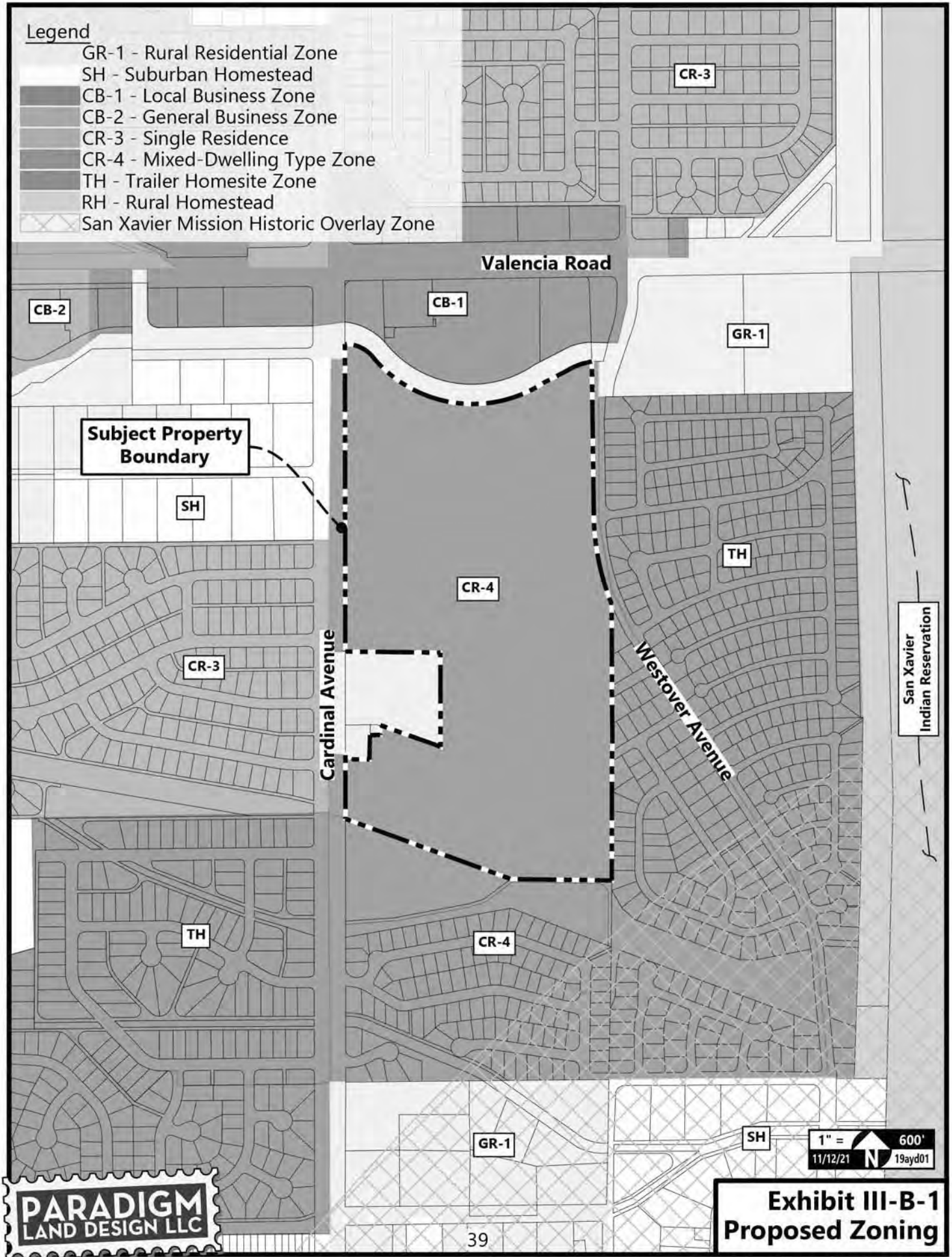
Approximately 57± acres of the site will be graded to allow for the construction of homesites, roadways, recreation areas, and retention basins. The remaining 3.9± acres of the site are adjacent to southern boundary of the property. This area will be left as natural open space. Areas of the site that have been disturbed for construction and do not contain new hardscape improvements will be revegetated. Approximately 18 acres (30%) of the site will be left in its natural condition or utilized as landscaped open space.

4. Changes to Natural Grade

The land use plan has been designed to restrict grading to areas that are outside the previously established 100-year flood limits. Site grading will be restricted to roadways, lots and necessary ancillary grading for drainage, utilities, etc. Improvements within this project will be located at or near existing grade, subject to drainage requirements, in order to avoid excessive alteration of the sites gently sloping terrain. Site grading will be utilized to help capture and store stormwater runoff.

Legend

- GR-1 - Rural Residential Zone
- SH - Suburban Homestead
- CB-1 - Local Business Zone
- CB-2 - General Business Zone
- CR-3 - Single Residence
- CR-4 - Mixed-Dwelling Type Zone
- TH - Trailer Homesite Zone
- RH - Rural Homestead
- San Xavier Mission Historic Overlay Zone



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LAND DESIGN LLC

Exhibit III-B-1
Proposed Zoning

Property Data

1. Property Area: 60.9± Ac.
2. Assessor Parcel(s): 138-25-593C
3. Existing Zoning: GR-1 (Pima Co.)
4. Existing Comp Plan: Medium-Low Intensity Urban, 2.5-5.0 Homes per Acre
5. Existing C.L.S.: None
6. Existing Riparian: Xeroriparian 'B' Along Southern Edge of Site

Proposal Summary

1. Zoning: CR-4
2. Lots: 273
3. Lot Size: 40' x 120'
4. Phasing:

Phase	Area	40'x120's	Rec. Area
Ph. 1	30.7± Ac.	145	4.26± Ac.
Ph. 2	30.2± Ac.	128	1.69± Ac.
	60.9± Ac.	273	5.95± Ac. (949 Sq. Ft / Lot)
5. Gross Density: 4.5 Homes per Acre



D. HYDROLOGY

1. Preliminary Integrated Water Management Plan (PIWMP)

A Preliminary Integrated Water Management Plan has been provided at the end of this document. See Appendix B: Preliminary Integrated Water Management Plan.

2. Proposed Hydrology

a) PDP Response to Hydrologic Characteristics Onsite

The proposed improvements will require drainage facilities to keep the existing drainage pattern and outlet design flows unchanged. Conveying drainage facilities (storm drains) will route the proposed improvements flows to flow storage basins strategically located throughout the development.

There is an existing area of ponding between concentration point 8 and 9. The ponding water is predominantly runoff from the northern third of watershed 8, the central and the southern third of sub-watershed 9, and small amount of runoff from Westover Ave. In the proposed condition this runoff will be routed to a proposed northern detention basin where it will ultimately drain into Valencia wash.

b) Floodplain Encroachment

The proposed improvements are not encroaching into the floodplain.

c) Proposed Design Flows

This development and the proposed drainage improvements will route the design flows to discharge concentration points 7, 8, and 9.

Concentration Point	Area (Acres)	Q100 (CFS)	Combined Concentration Point	Q100 Combined (CFS)
7	6.7	35	1,2,3,7	61
8	18.1	126	4,8	134
9	35.3	247	5,6,9	268

d) Proposed Engineering Facilities

The proposed development is located in a designated critical basin area. Per the Pima County Regional Flood Control District (PCRFCDD) Design Standards for Stormwater Detention and Retention Manual, an onsite detention/retention basin must be provided to ensure that at a minimum the post-development 2-, 10-, and 100-year peak discharges from the site will be reduced to 90% of the pre-development peak discharge rates.

The proposed conveying drainage facilities are drainage inlets (catch basins and scuppers) that will discharge either to the flow storage basins or stormdrain systems that will be routed to flow storage basins. The reduced onsite contributing watershed area at Concentration Point 7 provides lesser discharges than the existing conditions. However, flow storage facilities providing detention/retention will attenuate the flows at Concentration Points 8 and 9 to, at a minimum, match the existing conditions at Concentration Point 7.

Concentration Point	Area (Acres)	V100 (ac-ft)	Q100 Combined (CFS)
8	18.1	0.2	80
9	35.3	0.4	120

e) First Flush Retention

Per the Pima County Regional Flood Control District (PCRFCDD) Design Standards for Stormwater Detention and Retention Manual, first flush retention is required for this development. The pre-development site is approximately 60.92 ac (gross) of which 3.19 ac is mapped riparian area. Per Table 2.1 of the PCRFCDD Drainage Manual, the total required first flush volume for this development is 62,234 cubic feet (1.43 acre-feet). The various open spaces distributed throughout the site are proposed to provide the required first flush storage volume. The locations of basins shown on the Preliminary Development Plan are schematic and subject to final engineering design to ensure Code conformance. Preliminary analysis of these basins (assuming ponding depth of at least 0.75 feet) shows that the basins have more than enough first flush storage.

Site First Flush Retention Required

Classification of watershed	Volume (ft³/ac)	Area of proposed use (ac)	Required first flush volume (ft³)
Non-Riparian / Low Permeability, Proposed Impervious Area	1440	41.8	60,192
Riparian / High Permeability, Proposed Disturbed Area	245	3.19	782
Non-Riparian / Low Permeability, Proposed Disturbed Area	140	9	1260
Remaining Undisturbed Area, Pre-Developed Watershed (Info Only)	0	6.93	0
Total Req. FF Volume			62,234

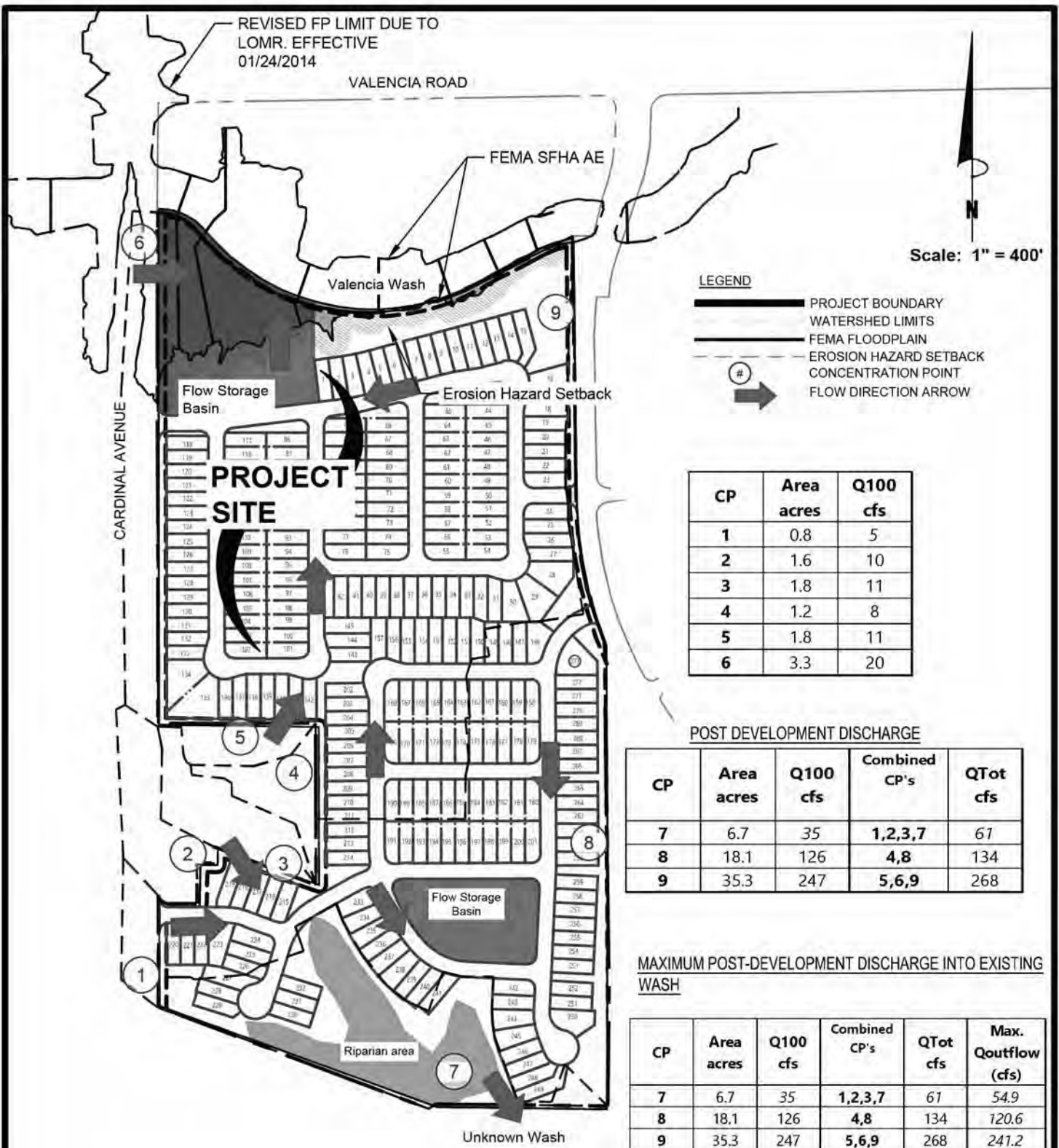
Retention Provided in the Two Proposed Detention Basins

Basin ID	Bottom Area (ft²)	Top area (ft²)	Retention depth (ft)	Volume provided (ft³)
North Basin	33,198	36,336	0.75	26,067
South Basin	65,311	69,604	0.75	50,584
Total				76,651

f) Overall Effect of the Development on Existing Drainage Patterns

The Redford Estates development will increase the total site impervious cover to approximately 75%. Increased runoff for the 100-year storm event will be collected in drainage basins before being metered back into both washes adjacent to the site. The minimum required retention volume has been provided in the schematic basins shown on the Preliminary Development Plan. The proposed improvements will reduce post-developed discharges to acceptable levels comparable with pre-developed discharges. The proposed drainage patterns will continue to be directed in a manner consistent with existing drainage patterns so as not to create any adverse impacts to the parcels and developments located upstream or downstream from this development. Also, along the south boundary of the site the impact of the proposed development on the existing drainageway and two online basins currently maintained by Pima County is negligible. As shown on the existing and proposed onsite hydrology exhibits, the existing flow exiting the site at Concentration Point 7 is 66 cfs. The proposed flow exiting the site at same Concentration Point is 55 cfs. Therefore, the existing drainage infrastructure is anticipated to function as designed (existing conditions) and will not be impacted by the development.

See Exhibit III-D-1: Post Development Hydrology .



Bowman

7464 N. La Cholla Blvd. Tucson, Arizona 85741 Phone: (520) 463-3200

© Bowman Consulting Group, Ltd.

www.bowman.com

Proposed Onsite Hydrology
Redford Estates Residential

DESIGN AH

JOB No. 051115-01-001

DATE: 3/4/2022

EXHIBIT II C-2 FEMA

V:\051115 - Redford Estates Residential\051115-01-001 (ENG) - Redford Estates Residential\Engineering\Exhibits\Drainage\Rezoning\051115- II C-1 Onsite Proposed.dwg 03/04/2022

E. BIOLOGICAL RESOURCES**1. Impacts to Biological Resources**

No areas of the site are part of the Conservation Lands System. There are no Ironwoods trees, Saguaros, Pima Pineapple Cactus or Needle-Spined Pineapple Cactus on the subject property. Natural vegetation that meets the requirements for transplanting will be inventoried and transplanted to various areas onsite. See Exhibit III-E-1: Preliminary Grading Plan.



Legend

Area to be Graded (57± Ac.)

Valencia Road

**Subject Property
Boundary**

Cardinal Avenue

Westover Avenue

**"Riparian Area" to Remain
Undisturbed Except for This
Roadway Crossing, which
Contains no Significant
Vegetation**

1" = 400'
2/28/22 N 19ayd01

**PARADIGM
LAND DESIGN LLC**

F. LANDSCAPE, BUFFERYARDS, & VISUAL MITIGATION**1. Bufferyard Conflicts**

There are no conflicts between existing easements, setbacks, or rights-of-way with landscape bufferyards.

2. Vegetation Transplanting Impacts

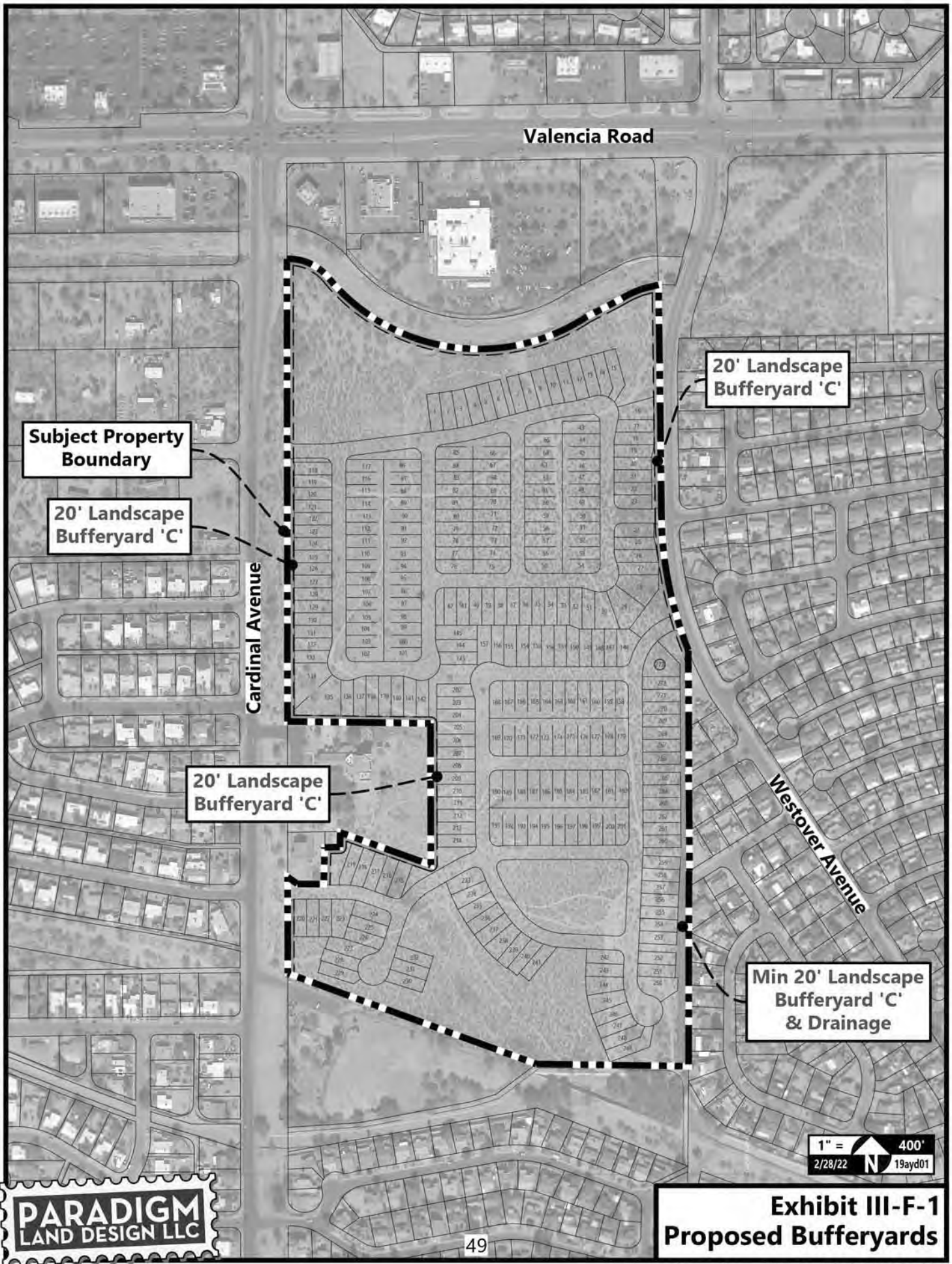
Natural vegetation that meets the requirements for transplanting will be inventoried and transplanted to the bufferyards and other areas that are able to accommodate mature vegetation.

3. Mitigation of Visual Impacts

Extraordinary views are not available from or across the property due to existing, relatively flat topography coupled with the distance to surrounding mountain ranges. However, the development features varying landscape buffers along the perimeter of the site to mitigate the project's minimal impacts to surrounding viewsheds. Additionally, canopy trees will be located throughout the neighborhood and recreation areas of the site to help blend this development with the natural desert environment. Lighting on the site will be in conformance with the Pima County Outdoor Lighting Code and will be Dark Sky compliant.

4. Significant Vegetation

The site does not contain any significant or important vegetation. Mature vegetation on site that meets transplanting requirements will be inventoried and transplanted onsite. See Exhibit II-D-2: Vegetation Inventory.



G. TRANSPORTATION

1. Proposed Ingress/Egress

Four connections for ingress / egress are being proposed to the existing public street system. Two of these access locations will come from Cardinal Ave, and two access locations will come from Westover Ave. These locations have been aligned with existing cross streets where feasible and will provide safe ingress and egress into Redford Estates. The internal neighborhood streets have been designed to create safe traffic movements throughout the development and minimize cut through traffic. All streets within Redford Estates will be designed and built to Pima County Street Standards.

2. Distances to Access Points

The project access on Westover Avenue is about 1,200 feet south of Valencia Road and aligns with Vereda Azul. A secondary access point on Westover Avenue will be constructed approximately 325 feet south of this first entry. The northern project access on Cardinal Avenue is about 1,000 feet south of Valencia Road and aligns with Pincushion Lane. The next driveway to the south is about 1,400 feet south of the northern driveway and aligns with Via Cuervo.

3. Off-Site Road Improvements

It is anticipated that turn lanes will be constructed at the project entrances on Cardinal Avenue. In addition, warrants appear to be met for an eastbound right-turn lane to be constructed at the intersection of Valencia Road and Cardinal Avenue. Required offsite improvements will be per a final traffic report to be submitted during the platting phase.

Sun Tran bus pull-outs are proposed at two locations on Cardinal Avenue. See the Preliminary Development Plan.

4. ADT & Level of Service

Redford Estates is estimated to generate approximately 202 AM peak hour trips, 270 PM peak hour trips and 2,577 weekday trips. All site trips will enter at the four project entrances. Distributing these trips to the study area roadways and adding them the future background volume for the year 2025 results in the total daily volumes shown in the table below.

PAG applied a -8% factor to estimate year 2020 daily volumes from 2019 volumes. To estimate 2021 background, or "no project" ADTs, we applied an 8% factor to the year 2020 volumes as it is assumed that it would take a year for traffic volumes to return to pre-COVID conditions. We then applied a 2% annual factor from the 2021 volumes to estimate 2025 No Project daily volumes. We added the site trips to then estimate 2025 With Project daily volumes.

Roadway Segment	2025 No Project ADT	Site Trips	2025 With Project ADT	LOS D Threshold (vpd)*
Valencia Road, Camino de la Tierra to Cardinal	36,179	434	36,613	35,820
Valencia Road, Cardinal to Mission	42,239	868	43,108	35,820
Cardinal Road, Drexel to Valencia	11,019	217	11,236	29,160
Cardinal Road, Valencia to Los Reales Road	7,906	1,737	9,643	10,656
Camino de la Tierra, Bilby Road to Valencia Road	3,253	0	3,253	13,986
Camino de la Tierra, Valencia Road to Los Reales Road	7,080	0	7,080	10,656
Westover Drive, Valencia Road to Los Reales Road	2,836	434	3,270	10,656
Mission Road, North of Valencia Road	11,737	217	11,954	12,744
Mission Road, Valencia Road to Los Reales Road	6,838	0	6,838	13,986
Los Reales Road, Camino de la Tierra to Cardinal Road	9,870	217	10,087	13,986
Los Reales Road, Cardinal Road to Mission Road	9,792	217	10,009	10,656

*FDOT Generalized Annual Average Daily Volumes Table, 2012.

Traffic volumes on the project roadways are expected to be below the daily LOS D threshold volumes for all roadways except for the Valencia Road segments. The east segment of Valencia has existing daily volumes over the LOS D volume threshold.

5. Concurrency

As indicated in subsection 4, the projected ADTs in 2023 on all project area roadways will operate better than LOS D except for the four-lane segment of Valencia Road east of the project. Valencia Road widens to a six-lane roadway east of Mission Road.

6. Bicycle & Pedestrian

This site will be fully accessible to pedestrians from the sidewalks that will be constructed throughout this development. All the internal sidewalks will provide access to the recreation areas. Public transportation is located along Valencia Road and Cardinal Avenue.

7. Onsite Street System

All internal streets within Redford Estates will be public and be designed and built to Pima County Street Standards. The offset east-west street system will discourage bypass traffic between Cardinal Road and Westover Avenue. Since all on-site streets have direct access to properties, all are classified as local streets

H. SEWERS

1. Method of Providing Sewer

Existing public gravity flow sewer infrastructure is located within Cardinal Ave. and Westover Ave. both will be able to serve this project. An existing sewer stub pipe is located near the project's southeast corner. This project will connect to public sewer S-469-002, downstream from manholes 8149-07 and 8149-09, and public sewer G-87-165, downstream from manhole 4943-02. See Exhibit III-H-1: Sewer Capacity Response Letter.

2. Sewer Easements

All proposed sewers will be within public rights-of-way, so no sewer easements are anticipated with the construction of this project.

3. Mitigation of Site Constraints

The site's existing terrain will allow gravity sewer connections to existing sewer lines, so no special mitigation or design is anticipated to be necessary.

Exhibit III-H-1: Sewer Capacity Response Letters

 PIMA COUNTY WASTEWATER RECLAMATION 201 NORTH STONE AVENUE TUCSON, ARIZONA 85701-1207	PH: (520) 724-6500 FAX: (520) 724-9639
JACKSON JENKINS DIRECTOR	
December 5, 2019	
Ken Koss T & K Development, LLC 6891 E Dorado Ct Tucson, Arizona 85714	
Sewerage Capacity Investigation No. 2019-287 Type I	
RE: The Redford Village Estates #1, Parcel 13825593C Estimated Flow 22,248 gpd (ADWF). P19WC00287	
Greetings:	
The above referenced project is tributary to the Agua Nueva Water Reclamation Facility via the Southeast Interceptor.	
Capacity is currently available for a project this size in the public sewer S-469-002, downstream from manhole 8149-09.	
This letter is not a reservation or commitment of treatment or conveyance capacity for this project. It is not an approval of point and method of connection. It is an analysis of the system as of this date. Allocation of capacity is made by the Type III Capacity Response.	
If further information is needed, please feel free to contact us at (520) 724-6607.	
Reviewed by: Kurt Stermm, CEA Sr.	

Exhibit III-H-1: Sewer Capacity Response Letters (cont'd)


PIMA COUNTY
WASTEWATER RECLAMATION
201 NORTH STONE AVENUE
TUCSON, ARIZONA 85701-1207

JACKSON JENKINS
DIRECTOR

PH: (520) 724-6500
FAX: (520) 724-9635

December 5, 2019

Ken Koss
T & K Development, LLC
6891 E Dorado Ct
Tucson, Arizona 85714

Sewerage Capacity Investigation No. 2019-288 Type I

**RE: The Redford Village Estates #2, Parcel 13825593C
Estimated Flow 21,168 gpd (ADWF).
P19WC00288**

Greetings:

The above referenced project is tributary to the Agua Nueva Water Reclamation Facility via the Southeast Interceptor.

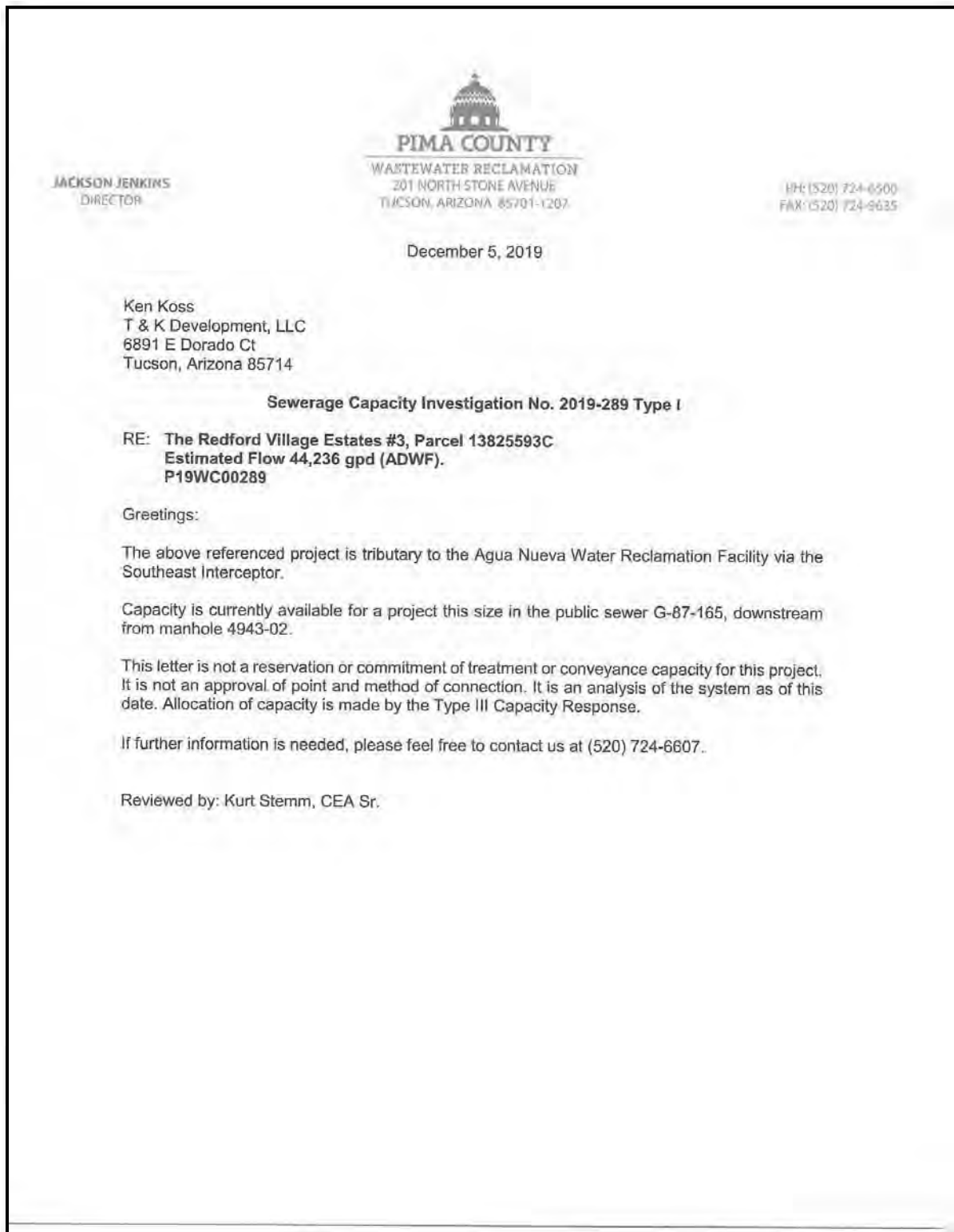
Capacity is currently available for a project this size in the public sewer S-469-002, downstream from manhole 8149-07.

This letter is not a reservation or commitment of treatment or conveyance capacity for this project. It is not an approval of point and method of connection. It is an analysis of the system as of this date. Allocation of capacity is made by the Type III Capacity Response.

If further information is needed, please feel free to contact us at (520) 724-6607.

Reviewed by: Kurt Sterrm, CEA Sr.

Exhibit III-H-1: Sewer Capacity Response Letters (cont'd)



I. WATER

Tucson Water will serve this project via nearby water infrastructure. This utility company has a 100-year assured water supply. See the Tucson Water Service Letters in Appendix B.

J. SCHOOLS

1. Access to Adjacent or On-Site Schools

Not applicable.

2. Agreement with School District for Mitigation

The developer has agreed to a donation agreement with TUSD. Please see Exhibit III-J-1: TUSD Support Letter.

Exhibit III-J-1: TUSD Support Letter

TUCSON UNIFIED
SCHOOL DISTRICT

Department of Engineering, Facilities and Planning
TUSD Planning Services – 2025 E Winsett Street Tucson, Arizona 85719
(520) 225-4767
(520) 225-4939 (fax)

To: Ms. Terri Tillman, ACIP, Principal Planner
Pima County Development Services
201 N. Stone Avenue, First Floor
Tucson, AZ 85701

From: Shaun Brown
District Planner

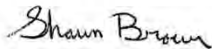
Date: April 11, 2022

Re: Redford Estates Rezone Application

Dear Ms. Tillman,

TUSD accepts the proposed rezoning and the developer have reached an agreement wherein the developer will make a contribution to mitigate the anticipated impacts of the development on TUSD's nearby schools. We very much appreciate the developer's willingness to work with the School District to address this need. For this reason and because the sale of the property will add to our plant fund, which is used to maintain schools, the School District accepts the proposed rezoning.

Sincerely,



Shaun Brown
District Planner

P:\Projects\Development Review\Developer Contributions\Valencia Road and Cardinal Ave 11\April2022.docx

K. RECREATION**3. On-Site Recreation**

Redford Estates will include two neighborhood parks, which are conveniently located for the future residents. These recreation areas will provide active and passive recreational amenities for nearby residents. Pedestrian linkages will be provided between the two recreation areas and will be accessible to all homeowners. Crime Prevention Through Environmental Design (CPTED) principles will be incorporated into recreation area designs.

4. Ownership of Recreation Areas

The development's open space and recreation areas will be owned and maintained by the HOA. All installed landscaping will be on an underground drip irrigation system until established. If turf is used, it will be irrigated from a secondary non-potable source if the non-potable source is available at the boundary of the project at that time of development.

5. Proposed Trails On- or Off-Site

Three trails are proposed as part of this project: The first is centrally located and provides pedestrian access between the two phases of the project. The second is in the southwestern portion of the property and provides access from the project to Ebonee Marie Moody Park. The third is in the southeastern portion of the property and provides access to the existing trail leading to the large utility corridor and its pathway south of the Property.

L. ENVIRONMENTAL QUALITY

1. Methods of Controlling Dust Pollution

During the grading and construction of this property, water trucks will be used to minimize dust pollution. Once construction is complete and all landscape materials have been installed, decomposed granite will be utilized as a top dressing to areas with exposed dirt.

M. AGREEMENTS

None.

APPENDIX A – AZGFD ENVIRONMENTAL REVIEW TOOL

Arizona Environmental Online Review Tool Report



*Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.*

Project Name:

Redford Estates

User Project Number:

19ayd01

Project Description:

Single-family residential subdivision and functional open space

Project Type:

Development Outside Municipalities (Rural Development), Residential subdivision and associated infrastructure, New construction

Contact Person:

Clay Goodwin

Organization:

Paradigm Land Design LLC

On Behalf Of:

CONSULTING

Project ID:

HGIS-14587

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Appendix A – AZGFD Environmental Review Tool (cont'd)

Arizona Game and Fish Department
Project ID: HGIS-14587

project_report_redford_estates_45301_46750.pdf
Review Date: 10/1/2021 10:48:22 AM

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

Locations Accuracy Disclaimer:

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Appendix A – AZGFD Environmental Review Tool (cont'd)

Arizona Game and Fish Department
Project ID: HGIS-14587

project_report_redford_estates_45301_46750.pdf
Review Date: 10/1/2021 10:48:22 AM

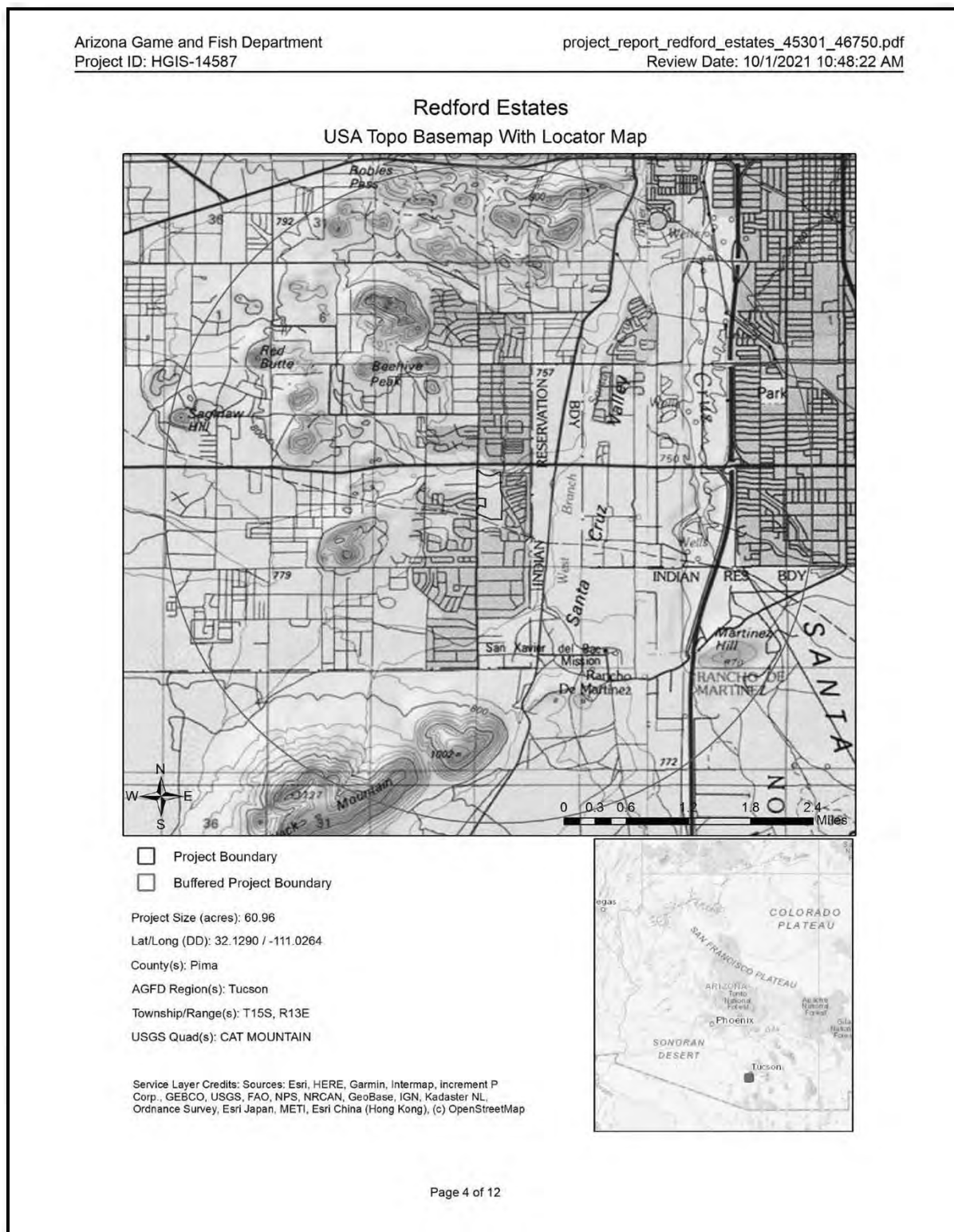
Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:

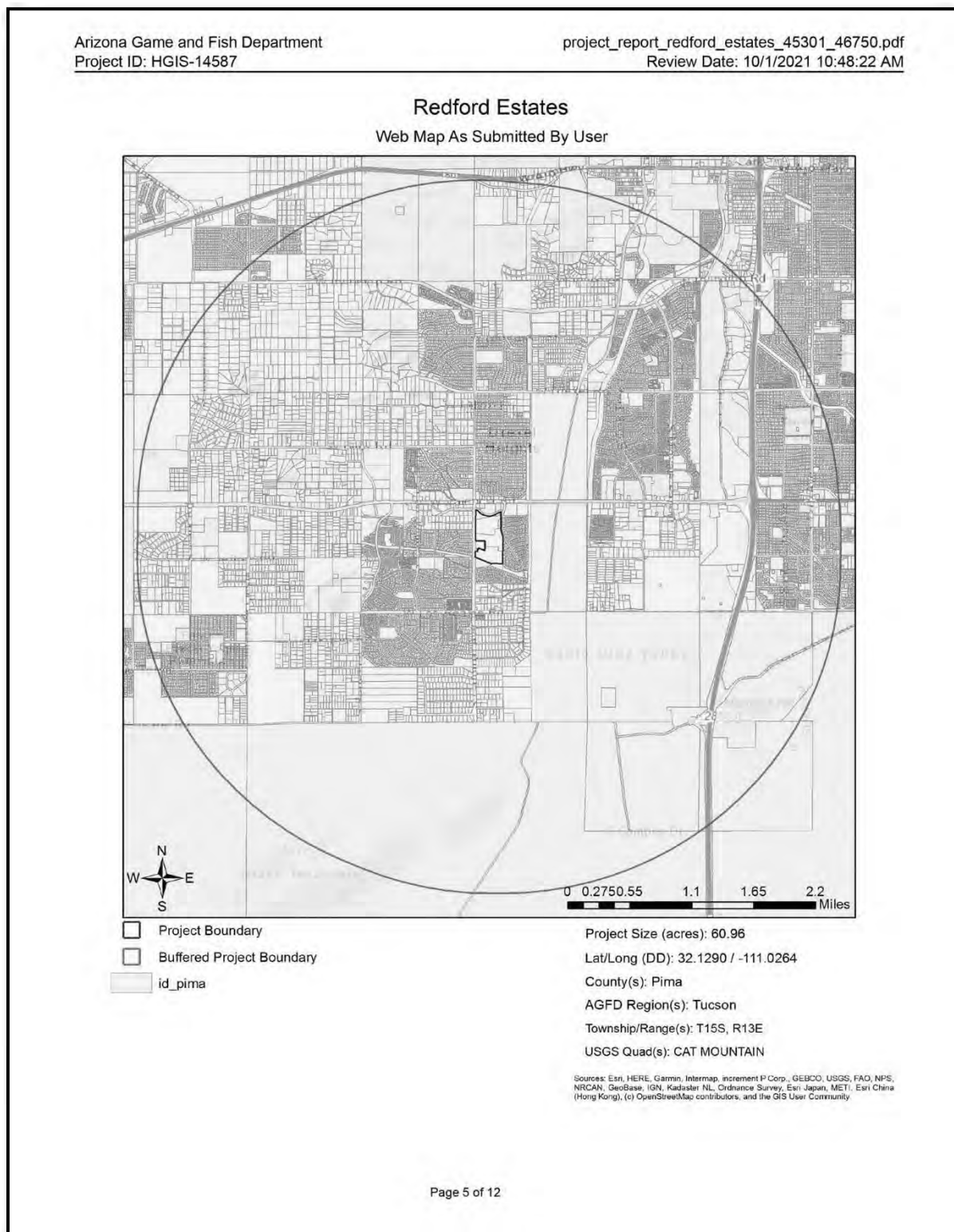
Project Evaluation Program, Habitat Branch
Arizona Game and Fish Department
5000 West Carefree Highway
Phoenix, Arizona 85086-5000
Phone Number: (623) 236-7600
Fax Number: (623) 236-7366
Or
PEP@azgfd.gov

6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

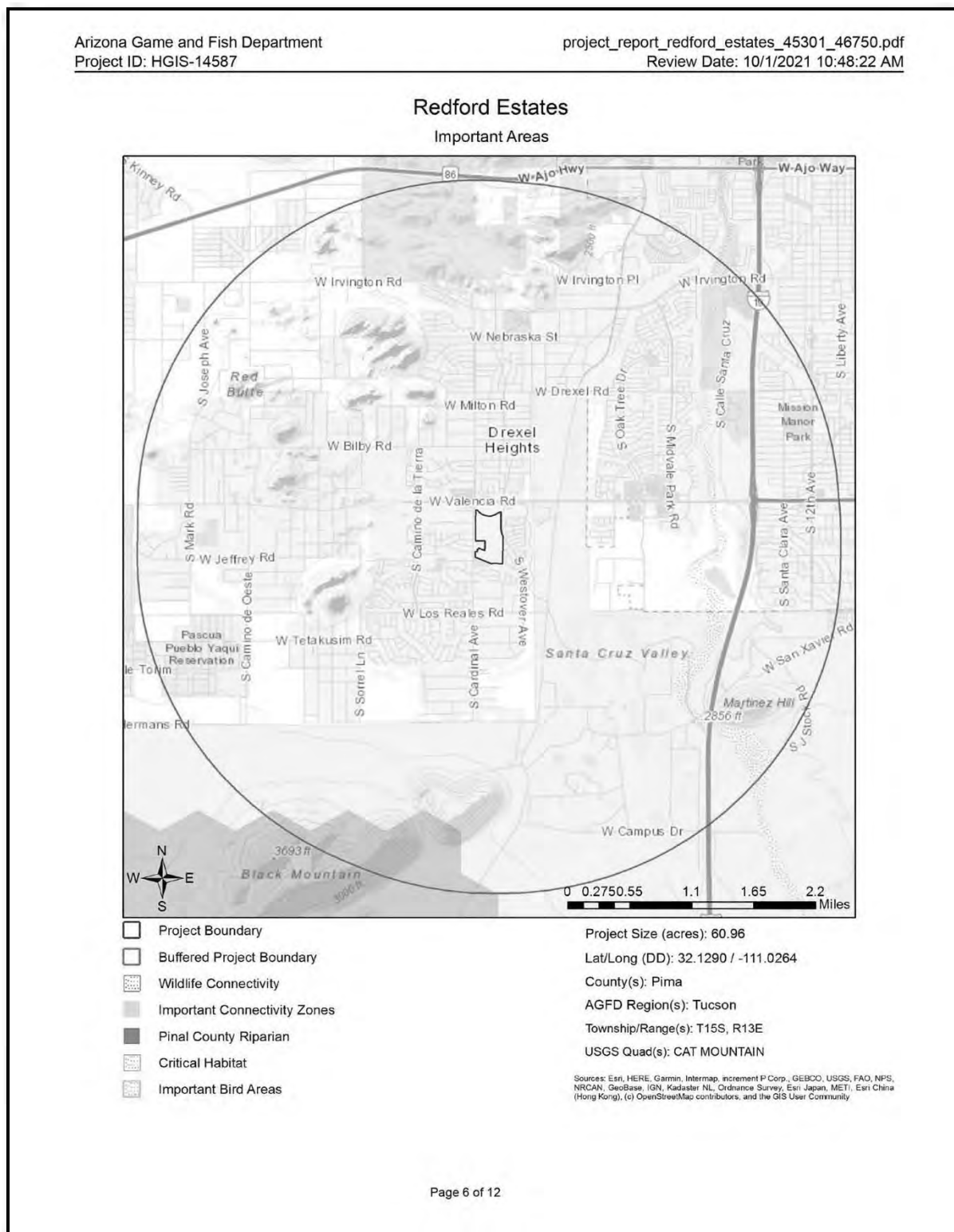
Appendix A – AZGFD Environmental Review Tool (cont'd)



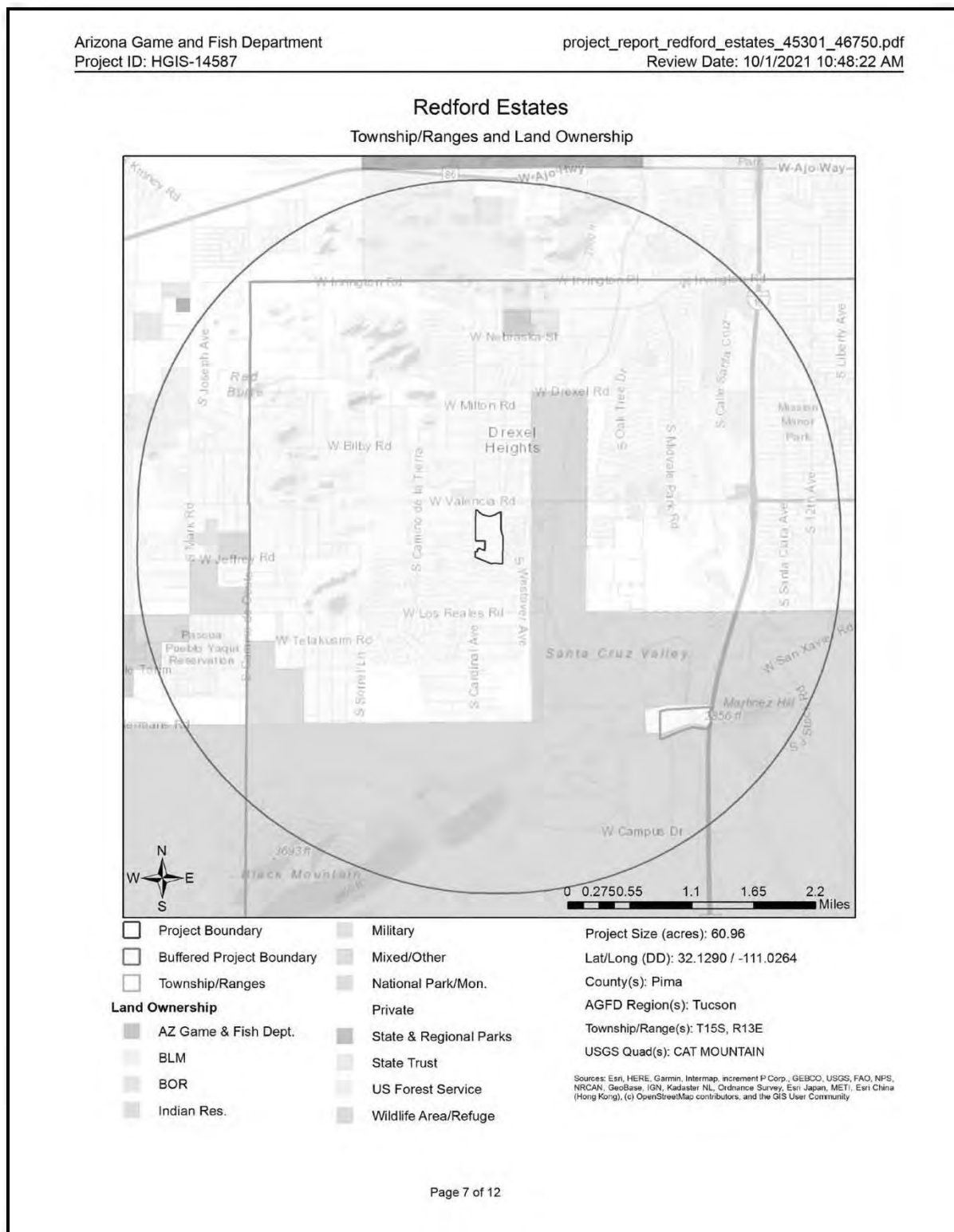
Appendix A – AZGFD Environmental Review Tool (cont'd)



Appendix A – AZGFD Environmental Review Tool (cont'd)



Appendix A – AZGFD Environmental Review Tool (cont'd)



Appendix A – AZGFD Environmental Review Tool (cont'd)

Arizona Game and Fish Department
Project ID: HGIS-14587

project_report_redford_estates_45301_46750.pdf
Review Date: 10/1/2021 10:48:22 AM

Special Status Species Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Bat Colony						
Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE			HS	
Gastrophryne mazatlanensis	Sinoloan Narrow-mouthed Toad			S		1C
Heloderma suspectum	Gila Monster					1A
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Mammillaria thornberi	Thornber Fishhook Cactus				SR	
Myotis velifer	Cave Myotis	SC		S		1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Sonorella papagorum	Black Mountain Talussnail					1B
Tumamoca macdougallii	Tumamoc Globeberry	SC	S	S	SR	

Note: Status code definitions can be found at <https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/>.

No Special Areas Detected

No special areas were detected within the project vicinity.

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Aix sponsa	Wood Duck					1B
Ammospermophilus harrisi	Harris' Antelope Squirrel					1B
Anthus spragueii	Sprague's Pipit	SC				1A
Anurostomus ridgwayi	Buff-collared Nightjar		S			1B
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Aspidoscelis xanthonota	Red-backed Whiptail	SC	S			1B
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Buteo regalis	Ferruginous Hawk	SC		S		1B
Calypte costae	Costa's Hummingbird					1C
Chilomeniscus stramineus	Variable Sandsnake					1B
Cistothorus palustris	Marsh Wren					1C
Colaptes chrysoides	Gilded Flicker			S		1B
Coluber bilineatus	Sonoran Whipsnake					1B
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus tigris	Tiger Rattlesnake					1B
Cynanthus latirostris	Broad-billed Hummingbird		S			1B
Dipodomys spectabilis	Banner-tailed Kangaroo Rat			S		1B
Empidonax wrightii	Gray Flycatcher					1C
Euderma maculatum	Spotted Bat	SC	S	S		1B

Appendix A – AZGFD Environmental Review Tool (cont'd)

Arizona Game and Fish Department
Project ID: HGIS-14587

project_report_redford_estates_45301_46750.pdf
Review Date: 10/1/2021 10:48:22 AM

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	SC	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	C	S	S		1A
Haliaeetus leucocephalus	Bald Eagle	SC, BGA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Incilius alvarius	Sonoran Desert Toad					1B
Lasiurus blossevillii	Western Red Bat		S			1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leopardus pardalis	Ocelot	LE				1A
Leptonycteris yerbabuenae	Lesser Long-nosed Bat	SC				1A
Lepus alleni	Antelope Jackrabbit					1B
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Melanerpes uropygialis	Gila Woodpecker					1B
Melospiza lincolni	Lincoln's Sparrow					1B
Melospiza aberti	Abert's Towhee		S			1B
Micrathene whitneyi	Elf Owl					1C
Micruroides euryxanthus	Sonoran Coralsnake					1B
Myiarchus tyrannulus	Brown-crested Flycatcher					1C
Myotis occultus	Arizona Myotis	SC		S		1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Oreoscoptes montanus	Sage Thrasher					1C
Oreothlypis luciae	Lucy's Warbler					1C
Panthera onca	Jaguar	LE				1A
Passerculus sandwichensis	Savannah Sparrow					1B
Peucaea carpalis	Rufous-winged Sparrow					1B
Phrynosoma solare	Regal Horned Lizard					1B
Phyllorhynchus browni	Saddled Leaf-nosed Snake					1B
Progne subis hesperia	Desert Purple Martin			S		1B
Setophaga petechia	Yellow Warbler					1B
Sphyrapicus nuchalis	Red-naped Sapsucker					1C
Spizella breweri	Brewer's Sparrow					1C
Sturnella magna	Eastern Meadowlark					1C
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Toxostoma lecontei	LeConte's Thrasher			S		1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B

Appendix A – AZGFD Environmental Review Tool (cont'd)

Arizona Game and Fish Department
Project ID: HGIS-14587

project_report_redford_estates_45301_46750.pdf
Review Date: 10/1/2021 10:48:22 AM

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Vulpes macrotis	Kit Fox	No Status				1B

Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Callipepla squamata	Scaled Quail					1C
Odocoileus hemionus	Mule Deer					
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

Project Type: Development Outside Municipalities (Rural Development), Residential subdivision and associated infrastructure, New construction

Project Type Recommendations:

Fence recommendations will be dependant upon the goals of the fence project and the wildlife species expected to be impacted by the project. General guidelines for ensuring wildlife-friendly fences include: barbless wire on the top and bottom with the maximum fence height 42", minimum height for bottom 16". Modifications to this design may be considered for fencing anticipated to be routinely encountered by elk, bighorn sheep or pronghorn (e.g., Pronghorn fencing would require 18" minimum height on the bottom). Please refer to the Department's Fencing Guidelines located on Wildlife Friendly Guidelines page, which is part of the Wildlife Planning button at <https://www.azgfd.com/wildlife/planning/wildlifeguidelines/>.

During the planning stages of your project, please consider the local or regional needs of wildlife in regards to movement, connectivity, and access to habitat needs. Loss of this permeability prevents wildlife from accessing resources, finding mates, reduces gene flow, prevents wildlife from re-colonizing areas where local extirpations may have occurred, and ultimately prevents wildlife from contributing to ecosystem functions, such as pollination, seed dispersal, control of prey numbers, and resistance to invasive species. In many cases, streams and washes provide natural movement corridors for wildlife and should be maintained in their natural state. Uplands also support a large diversity of species, and should be contained within important wildlife movement corridors. In addition, maintaining biodiversity and ecosystem functions can be facilitated through improving designs of structures, fences, roadways, and culverts to promote passage for a variety of wildlife. Guidelines for many of these can be found at: <https://www.azgfd.com/wildlife/planning/wildlifeguidelines/>.

Consider impacts of outdoor lighting on wildlife and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Conduct wildlife surveys to determine species within project area, and evaluate proposed activities based on species biology and natural history to determine if artificial lighting may disrupt behavior patterns or habitat use. Use only the minimum amount of light needed for safety. Narrow spectrum bulbs should be used as often as possible to lower the range of species affected by lighting. All lighting should be shielded, canted, or cut to ensure that light reaches only areas needing illumination.

Appendix A – AZGFD Environmental Review Tool (cont'd)

Arizona Game and Fish Department
Project ID: HGIS-14587

project_report_redford_estates_45301_46750.pdf
Review Date: 10/1/2021 10:48:22 AM

Minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects and pathogens. Precautions should be taken to wash and/or decontaminate all equipment utilized in the project activities before entering and leaving the site. See the Arizona Department of Agriculture website for a list of prohibited and restricted noxious weeds at <https://www.invasivespeciesinfo.gov/unitedstates/az.shtml> and the Arizona Native Plant Society <https://aznps.com/invas> for recommendations on how to control. To view a list of documented invasive species or to report invasive species in or near your project area visit iMapInvasives - a national cloud-based application for tracking and managing invasive species at <https://imap.natureserve.org/imap/services/page/map.html>.

- To build a list: zoom to your area of interest, use the identify/measure tool to draw a polygon around your area of interest, and select "See What's Here" for a list of reported species. To export the list, you must have an account and be logged in. You can then use the export tool to draw a boundary and export the records in a csv file.

The construction or maintenance of water developments should include: incorporation of aspects of the natural environment and the visual resources, maintaining the water for a variety of species, water surface area (e.g., bats require a greater area due to in-flight drinking), accessibility, year-round availability, minimizing potential for water quality problems, frequency of flushing, shading of natural features, regular clean-up of debris, escape ramps, minimizing obstacles, and minimizing accumulation of silt and mud.

Minimization and mitigation of impacts to wildlife and fish species due to changes in water quality, quantity, chemistry, temperature, and alteration to flow regimes (timing, magnitude, duration, and frequency of floods) should be evaluated. Minimize impacts to springs, in-stream flow, and consider irrigation improvements to decrease water use. If dredging is a project component, consider timing of the project in order to minimize impacts to spawning fish and other aquatic species (include spawning seasons), and to reduce spread of exotic invasive species. We recommend early direct coordination with Project Evaluation Program for projects that could impact water resources, wetlands, streams, springs, and/or riparian habitats.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

Based on the project type entered, coordination with State Historic Preservation Office may be required (<http://azstateparks.com/SHPO/index.html>).

Trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herptefuna (snakes, lizards, tortoise) from entering ditches.

Communities can actively support the sustainability and mobility of wildlife by incorporating wildlife planning into their regional/comprehensive plans, their regional transportation plans, and their open space/conservation land system programs. An effective approach to wildlife planning begins with the identification of the wildlife resources in need of protection, an assessment of important habitat blocks and connective corridors, and the incorporation of these critical wildlife components into the community plans and programs. Community planners should identify open spaces and habitat blocks that can be maintained in their area, and the necessary connections between those blocks to be preserved or protected. Community planners should also work with State and local transportation planning entities, and planners from other communities, to foster coordination and cooperation in developing compatible development plans to ensure wildlife habitat connectivity. The Department's guidelines for incorporating wildlife considerations into community planning and developments can be found on the Wildlife Friendly Guidelines portion of the Wildlife Planning page at <https://www.azgfd.com/wildlife/planning/wildlifeguidelines/>.

Appendix A – AZGFD Environmental Review Tool (cont'd)

Arizona Game and Fish Department
Project ID: HGIS-14587

project_report_redford_estates_45301_46750.pdf
Review Date: 10/1/2021 10:48:22 AM

Design culverts to minimize impacts to channel geometry, or design channel geometry (low flow, overbank, floodplains) and substrates to carry expected discharge using local drainages of appropriate size as templates. Reduce/minimize barriers to allow movement of amphibians or fish (e.g., eliminate falls). Also for terrestrial wildlife, washes and stream corridors often provide important corridors for movement. Overall culvert width, height, and length should be optimized for movement of the greatest number and diversity of species expected to utilize the passage. Culvert designs should consider moisture, light, and noise, while providing clear views at both ends to maximize utilization. For many species, fencing is an important design feature that can be utilized with culverts to funnel wildlife into these areas and minimize the potential for roadway collisions. Guidelines for culvert designs to facilitate wildlife passage can be found on the home page of this application at <https://www.azgfd.com/wildlife/planning/wildlifeguidelines/>.

Based on the project type entered, coordination with Arizona Department of Environmental Quality may be required (<http://www.azdeq.gov/>).

Based on the project type entered, coordination with Arizona Department of Water Resources may be required (<https://new.azwater.gov/>).

Based on the project type entered, coordination with U.S. Army Corps of Engineers may be required (<http://www.usace.army.mil/>).

Based on the project type entered, coordination with County Flood Control district(s) may be required.

Development plans should provide for open natural space for wildlife movement, while also minimizing the potential for wildlife-human interactions through design features. Please contact Project Evaluation Program for more information on living with urban wildlife at PEP@azgfd.gov or at <https://www.azgfd.com/wildlife/planning/wildlifeguidelines/> and <https://www.azgfd.com/Wildlife/LivingWith>.

Vegetation restoration projects (including treatments of invasive or exotic species) should have a completed site-evaluation plan (identifying environmental conditions necessary to re-establish native vegetation), a revegetation plan (species, density, method of establishment), a short and long-term monitoring plan, including adaptive management guidelines to address needs for replacement vegetation.

The Department requests further coordination to provide project/species specific recommendations, please contact Project Evaluation Program directly at PEP@azgfd.gov.

Project Location and/or Species Recommendations:

HDMS records indicate that one or more native plants listed on the **Arizona Native Plant Law and Antiquities Act** have been documented within the vicinity of your project area. Please contact:

Arizona Department of Agriculture

1688 W Adams St.

Phoenix, AZ 85007

Phone: 602.542.4373

<https://agriculture.az.gov/sites/default/files/Native%20Plant%20Rules%20-%20AZ%20Dept%20of%20Ag.pdf> starts on page 44

HDMS records indicate that **Western Burrowing Owls** have been documented within the vicinity of your project area. Please review the western burrowing owl resource page at:

<https://www.azgfd.com/wildlife/speciesofgreatestconservneed/burrowingowlmanagement/>.

APPENDIX B – PRELIMINARY INTEGRATED WATER MANAGEMENT PLAN (PIWMP)

1. Water Will-Serve Letters



July 14, 2021

T & K Development LLC
6891 E. Dorado Ct.
Tucson, AZ 85715

Attn: Ken Koss

SUBJECT: Water Availability for Project: 6775 S. Cardinal, APN: 138-25-593M, Case#: WA3647, T-15 R-13 S-16, Lots: 9999, Location Code: UN1, Total Area: 19.39ac, Zoning: GR-1.

WATER SUPPLY

Tucson Water will provide water service to this project based on the subject zoning of the above parcels. Tucson Water has an assured water supply (AWS) designated from the State of Arizona Department of Water Resources (ADWR). An AWS designation means Tucson Water has met the criteria established by ADWR for demonstration of a 100-year water supply - it does not mean that water service is currently available to the subject project.

WATER SERVICE

The approval of water meter applications is subject to the current availability of water service at the time an application is received. The developer shall be required to submit a water master plan identifying, but not limited to: 1) Water Use; 2) Fire Flow Requirements; 3) Offsite/Onsite Water Facilities; 4) Loops and Proposed Connection Points to Existing Water System; and 5) Easements/Common Areas.

Any specific area plan fees, protected main/facility fees and/or other needed facilities' cost, are to be paid by the developer. *If the existing water system is not capable of meeting the requirements of the proposed development, the developer shall be financially responsible for modifying or enhancing the existing water system to meet those needs. This letter shall be null and void two years from the date of issuance.*

Issuance of this letter is not to be construed as agency approval of a water plan or as containing construction review comments relative to conflicts with existing water lines and the proposed development.

If you have any questions, please call New Development at 791-4718.

Sincerely,

Michael Mourreale
Engineering Manager
Tucson Water New Development

MM:km
cc: WA3647 13825593M.docx/New Area/Committed Demand/WAL parcels

P.O. Box 27210 • Tucson, AZ 85726-7210
520.791.4718 • tucsonaz.gov/water   



March 17, 2021

T&K Development LLC
6891 E. Dorado Ct.
Tucson, AZ 85715

Attn: Ken Koss

SUBJECT: Water Availability for Project: 6775 S. Cardinal, APN: 138-25-593Q & P (2) parcels
Case#: WA3464, T-15 R-13 S-16, Lots: 9999, Location Code: UNI: Total Area: 36.89ac, Zoning: GR-1

WATER SUPPLY

Tucson Water will provide water service to this project based on the subject zoning of the above parcels. Tucson Water has an assured water supply (AWS) designated from the State of Arizona Department of Water Resources (ADWR). An AWS designation means Tucson Water has met the criteria established by ADWR for demonstration of a 100-year water supply - it does not mean that water service is currently available to the subject project.

WATER SERVICE

The approval of water meter applications is subject to the current availability of water service at the time an application is received. The developer shall be required to submit a water master plan identifying, but not limited to: 1) Water Use; 2) Fire Flow Requirements; 3) OffSite/Onsite Water Facilities; 4) Loops and Proposed Connection Points to Existing Water System; and 5) Easements/Common Areas.

Any specific area plan fees, protected main/facility fees and/or other needed facilities' cost, are to be paid by the developer. *If the existing water system is not capable of meeting the requirements of the proposed development, the developer shall be financially responsible for modifying or enhancing the existing water system to meet those needs. This letter shall be null and void two years from the date of issuance.*

Issuance of this letter is not to be construed as agency approval of a water plan or as containing construction review comments relative to conflicts with existing water lines and the proposed development.

If you have any questions, please call New Development at 791-4718.

Sincerely,

Richard A. Sarte

For
Michael Mourreale
Engineering Manager
Tucson Water New Development

MM:km

cc: WA3464 13825593Q,P (2) parcels.docx/New Area/Committed Demand/WAL parcels

P.O. Box 27210 • Tucson, AZ 85726-7210
520.791.4718 • tucsonaz.gov/water   

2. Water Conservation Measures

The following water conservation measures listed in Table A – Water Conservation Measures are planned to be included as part of the proposed project:

- I-3a All toilets have a maximum flow rate of 1.28 gallons per flush. (3 points)
- I-5 Install new washing machine with water factor of 4.5 or less. (2 points)
- I-6 Install 1.5 gpm kitchen sink and dishwasher which uses less than 3.5 gallon/cycle. (3 points)
- O-3c Use only native and/or drought-tolerant, low-water use plants for 75% of Landscape Area landscape plantings with a Water Use of 1 or 2, designed to be self-sustaining based upon water harvesting. (4.5 points)
- O-4a CC&Rs that restrict the use of non-native plants and turf grasses in front yards of lots. (0.5 points)
- O-6b Install an irrigation system with the following components: 1) Weather based irrigation controller or soil moisture sensor-based irrigation controller. Controller shall have two watering schedules posted at the controller: a) for the initial grow-in period and b) for the established landscape. Controller shall be set to irrigate during the hours of 10 p.m. to 8 a.m.; 2) Turf spray heads, if installed, shall only be used for turf and shall achieve a lower quarter distribution uniformity (DULQ) of 65% or greater and contain check valves to prevent gravity drainage of water from heads; 3) Separate sprinkler zones for beds, with plants grouped based on watering needs (hydro zoning); 4) Drip irrigation for all non-turf planting beds. (2.5 points)

The final selection of water conservation measures will be determined during the site engineering process.

3. Proximity to renewable and potable water supplies

Tucson Water has access to a renewable potable water supply.

APPENDIX C – RADON REMEDIATION INFORMATION

1. Letter from Remediation Contractor

T C C O N T R A C T I N G

9320 E Mikelyn Lane Tucson AZ 85710

Pima County Development Services Dept.
Attn: Terri Tillman AICP, Principal Planner
201 North Stone Avenue, First Floor
Tucson, AZ 85701

March 22, 2022

Re. Property Address: 6775 S Cardinal Ave., Tucson AZ (Redford Estates)

Based on the historical data cited in "Arizona Geological Survey Bulletin 199, p. 10-16." we conducted a Radon Survey at four surface locations on the site proposed for the Redford Estates (South of Valencia Ave. and east of Cardinal Ave. in SW Tucson AZ). The Survey was conducted in January 2021. The results supported the data of the AGSB... ie. low levels of background Radon Gas were detected.

RRNC (Reducing Radon in New Construction): The techniques and protocols of this ANSI/AARST Standard follow a basic sub-slab depressurization / mitigation system, which creates a vacuum beneath the foundation that is greater in strength than the vacuum applied to the soil by the house itself. The soil gases that are collected beneath the home are piped to a safe location to be vented directly outside. A 4-inch pipe runs from the gas permeable layer beneath the house and allows passive ventilation of the Radon and other soil gasses above the house. Adding a fan to the 4-inch pipe makes the ventilation system active rather than passive, which is recommended in areas with Radon levels requiring additional mitigation per the EPA.

This mitigation method is widely accepted and utilized throughout the nation to address areas where Radon gas has been detected in soils and is recommended as a suitable and effective method of mitigating the low levels of Radon gas detected in the vicinity of the project.

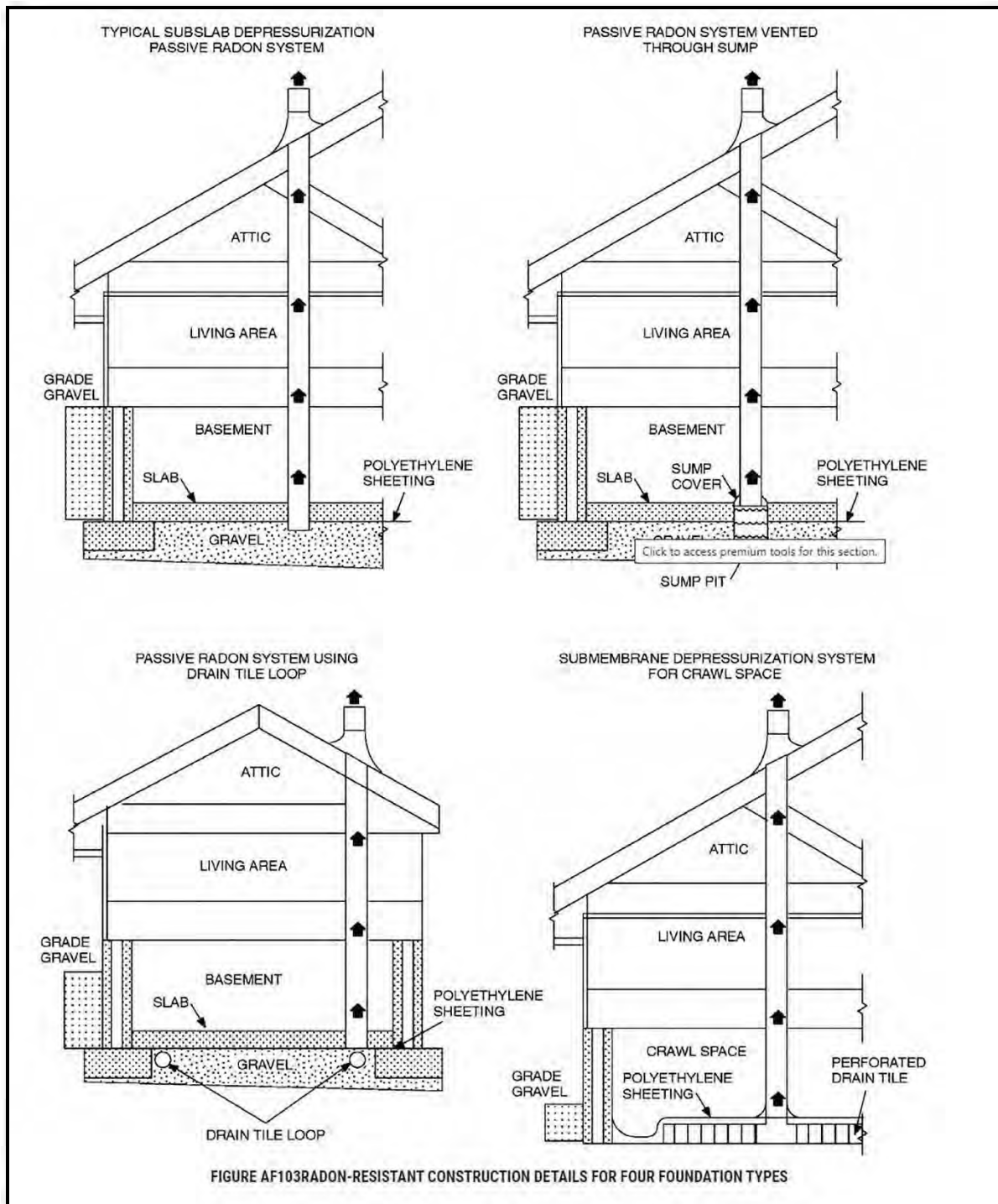
Tom Chartrand (520)347-4810

NRPP Certified Radon Technician

AARST#5164 NRPP#108702



2. Standard Details from International Residential Building Code, Appendix F



Traffic Impact Study



Prepared by

M Esparza
Engineering, LLC

M Esparza Engineering, LLC
2934 W. Salvia Drive
Tucson, AZ 85745

January 17, 2022

**Redford Estates
269 Single Family Residential Lots
Traffic Impact Study**

Prepared for:
DR Horton

Prepared for submittal to:
Pima County, Arizona

Prepared by:
M Esparza Engineering, LLC
2934 W. Salvia Drive
Tucson, AZ 85745

Phone: (520) 207-3358
Project No. 2021.37

Marcos Esparza, P.E., Principal



January 17, 2022

NOTICE – This is NOT a Public Domain Document

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1. Introduction and Summary

Purpose of Report and Study Objectives

This study addresses the traffic impacts from a proposed two hundred and sixty-nine lot single family residential project to be located south of Valencia Road between Cardinal Avenue and Westover Avenue in Pima County, Arizona. This Traffic Impact Study (TIS) supports a rezoning application for this project.

This TIS has been prepared to accompany the rezoning documentation for this project and has been prepared in accordance with TIS preparation criteria found in the draft *Pima County's Roadway and Development Street Standards Manual*. This TIS has been prepared for a Category I Development – between 100 and 500 peak hour trips. A Category I TIS requires that the analysis addresses site access driveways and signalized and major unsignalized intersections within ¼ mile of the project site. However, Pima County has required that the TIS analyzes conditions within one mile of the project site.

For the purposes of this report, we have conducted the analysis under the assumption that the project will be built out by the year 2025.

The analysis evaluates the impact on the adjacent roadway system. The project will add approximately 2,539 vehicle trips/day with 199 trips during the morning peak hour and 266 trips during the afternoon/evening peak hour.

Traffic volume data estimated by the Pima Association of Governments for the year 2020 shows approximately 6,763 vehicles per day (vpd) on Cardinal Avenue, south of Valencia Road and 2,426 vpd on Westover Avenue, south of Valencia Road. In addition, data from Pima County indicates that there are about 36,132 vpd on Valencia Road east of Cardinal Avenue and 30,948 vpd west of Cardinal Avenue.

For the future development of background traffic volumes for the year 2025, we assumed an 8% increase from the 2020 counts to 2022 volumes and then a 2%/year growth rate from 2022 volumes for future analyses. The initial 8% increase reflects PAGs reduction of 2019 estimated ADTs throughout the PAG area by 8% to estimate 2020 ADTs, and the assumption that by 2022, traffic volumes would return to 2019, pre-COVID, numbers.

Project Location and Study Area

The project location is shown in Exhibit 1. It is located in unincorporated Pima County, west of the City of Tucson. The study area includes the site access driveways on Cardinal Avenue and on Westover Avenue, the signalized intersections of Valencia Road/Camino de la Tierra, Valencia Road/Cardinal Avenue and Valencia Road/Mission Road and the unsignalized intersections of Valencia Road/Westover Avenue, Los Reales Road/Cardinal Road and Cardinal Road/Calle Canario and Westover Avenue/Vereda Azul. These intersections are analyzed as well as the project driveways associated with the project during the buildout year (2025).

The project area is surrounded by mostly residential uses and a neighborhood Wal-Mart Market to the north of the project area. The Ebonee Marie Moody Park is south of the project area.

Development Description

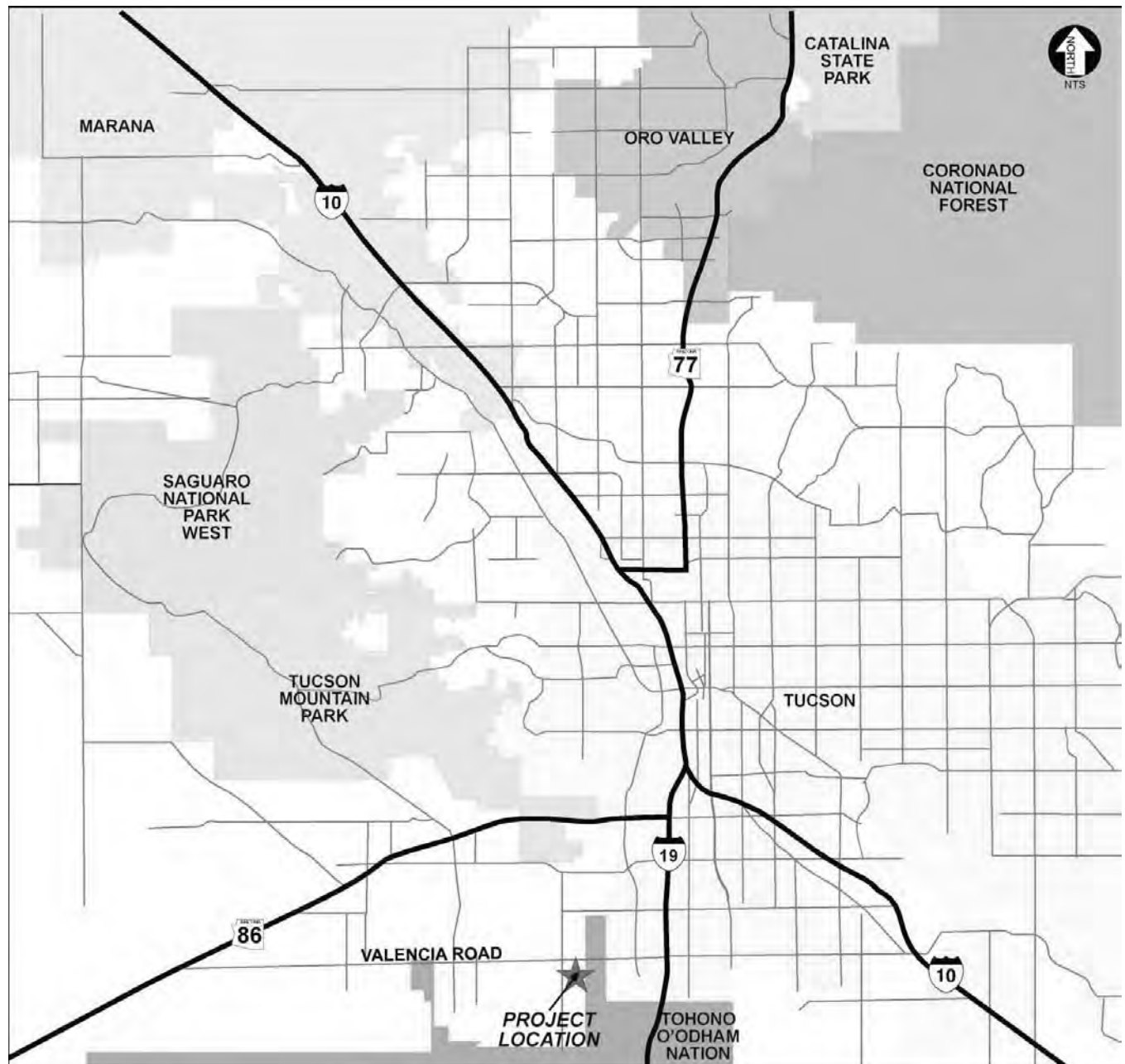
The project is on Tucson Unified School District (TUSD) property and includes 269 single-family residential lots. The development location is shown in Exhibit 2.

Principal Findings

The project will add approximately 2,539 vehicle trips/day to the local roadway system with 199 trips during the morning peak hour and 266 trips during the afternoon/evening peak hour.

Based on the existing traffic at the project intersections, the assumption of a 2% traffic growth rate in the area and the trip generation and distribution of the project, the project trips will not degrade the operations of the project area intersections to levels less than future “no-project” conditions at most locations. However, there will need to be improvements on Cardinal Road and on Westover Road at the project driveways.

Exhibit 1 Project Vicinity





Conclusions and Recommendations

Conclusions

1. Based on the average trip rates for the project land use, the project generates 2,539 daily one-way trips, with 199 trips during the AM peak hour and 266 during the PM peak hour.
2. The projected traffic volumes produced by the project and the regional traffic growth rate will generally not degrade operating conditions at most locations beyond their projected conditions without the project. However, there will need to be some improvements at the offsite intersections.
3. The location of two of the four proposed access locations for the project will be across from two existing residential streets creating four-leg intersections at each location.
4. Left turn lanes are warranted on Cardinal Road at both project driveways.
5. The daily volumes on the four-lane segments of Valencia Road in the vicinity of the project will exceed their LOS D daily volume capacities by the year 2025 even without the project.

Recommendations

1. Provide a southbound left turn lane on Cardinal Avenue at the north project site driveway. A northbound left turn lane on Cardinal Avenue for turns into Calle Canario should also be constructed for symmetry. The storage length for these turn lanes should meet Pima County's minimum standard of 110 feet, with tapers and gaps designed to Pima County Standards.
2. Provide a southbound left turn lane on Cardinal Avenue at the south project site driveway. This turn lane should be 110 feet long with tapers and gaps designed to Pima County Standards.
3. Additional storage must be provided for the northbound left turn lanes at Valencia Road/Cardinal Avenue intersection (existing northbound left turn is 115 feet long, requiring an additional 21 feet).
4. At the Valencia Road/Westover Avenue intersection, the northbound right turn lane transitions from the through lane. A preliminary signal warrant analysis under 2025 No Project conditions found that a signal may be warranted by the year 2025. Long queues on this approach, associated with the right turn volumes are currently experienced as ninety-five percent of the approach volumes turn right under existing conditions. Further discussion should be held with Pima County staff to determine what improvements may be necessary based on the projected volumes and the signal warrant analysis.
5. The analysis further indicates that the southbound left turn lane at the Valencia Road/Mission Road intersection and the westbound left turn lane at the Valencia Road/Camino de la Tierra intersection should be lengthened. However, these queue lengths are not primarily due to the influence of the project site trips and

any improvements would be necessary based on the background future traffic growth in the project area.

6. The project triggers the warrant for a right turn on the eastbound approach at this intersection. However, the presence of a large transmission tower, a culvert along the west side of Cardinal Avenue and other physical infrastructure on this corner may constrain the construction of this turn lane. It should be noted that all southbound project trips arriving from west of this intersection were assigned at this intersection. It may be that many of these southbound trips would continue through the intersection and turn right on Westover Avenue where there is an existing right turn lane on Valencia Road. Because of these reasons, particularly because of the infrastructure constraints, it is not recommended that this turn lane be constructed.
7. Because of the less than standard intersection site distance, on Cardinal Avenue at the northern project driveway, it is recommended that the location of this access be relocated to be at a more northern location to ensure adequate sight distance.
8. The following improvements that are not site traffic specific will improve roadway and intersection operations in the future and should be included in a future capital and infrastructure plan for Pima County.
 - a. Widen Valencia Road to a six-lane cross section between Camino de la Tierra and Mission Road
 - b. Provide signal control at the Valencia Road/Westover Avenue (West) intersection
 - c. Provide signal control at the Los Reales/Cardinal Avenue intersection
9. Sidewalks and/or walking paths and bicycle lanes should be provided along the frontages of the project site on Cardinal Avenue and Westover Avenue.
10. Roadway and subdivision design should conform to current Pima County standards.
11. All new traffic signs and markings must comply fully with the *Manual on Uniform Traffic Control Devices* and County requirements.

2. Proposed Development

Site Location

As shown in Exhibit 2, the project site is south of Valencia Road, between Cardinal Avenue and Westover Avenue. The Valencia Wash abuts the north boundary of the project parcel and residential uses surround the remainder of the project area. The project parcel surrounds a church on the east side of Cardinal Avenue. Retail stores are located along Valencia Road in the vicinity of the project.

Land Use and Intensity

The project includes 269 single family residential lots.

Development Phasing and Timing

The project is shown to be constructed in two phases, with 144 lots built first and 125 lots during the second phase. As shown on the site plan there will be no circulation between the Phase 1 and Phase 2 areas except for an “emergency access and trail connection”. For the purposes of this TIS, we have assumed that 2025 would be the buildout year for both phases.

3. Study Area Conditions

Study Area

Based on a requirement from the County, the study area for this project encompasses all site access driveways and major intersections within one mile. For this project, the intersections analyzed are Valencia Road/Camino de la Tierra, Valencia Road/Cardinal Avenue, Valencia Road/Westover Avenue (west), Valencia Road/Mission Road, Los Reales Road/Cardinal Road, Cardinal Road/Calle Canario and Westover Road/Vereda Azul and the project access driveways.

Existing Land Use

The project area is within an area zoned Rural Residential (GR-1). Surrounding zoning includes Residential (CR), Business (CB), Suburban Homestead (SH), Trailer Homesite (TH) and Transitional (TR).

A neighborhood Wal-Mart store is located north of the Valencia Wash on the northern boundary of the project. The Santa Cruz Lutheran Church is on the west side of the project. Ebonee Marie Moody Park is south of the project site.

Site Accessibility

There will be two access locations on Cardinal Avenue and two on Westover Avenue. All access locations will allow for full access. Each phase will have two access locations, with no connection provided between phase area.

The following photographs (Exhibit 3) are of the study area roadways and intersections.

Exhibit 3 Ground Photographs



Looking South on Cardinal Avenue. The project site is to the left.

Exhibit 3 Ground Photographs (continued)



Looking North on Cardinal Avenue. The project site is to the Right.



Looking South on Westover Avenue. The project site is to the right.

Exhibit 3 Ground Photographs (continued)



Looking North on Westover Avenue. The project site is to the left.

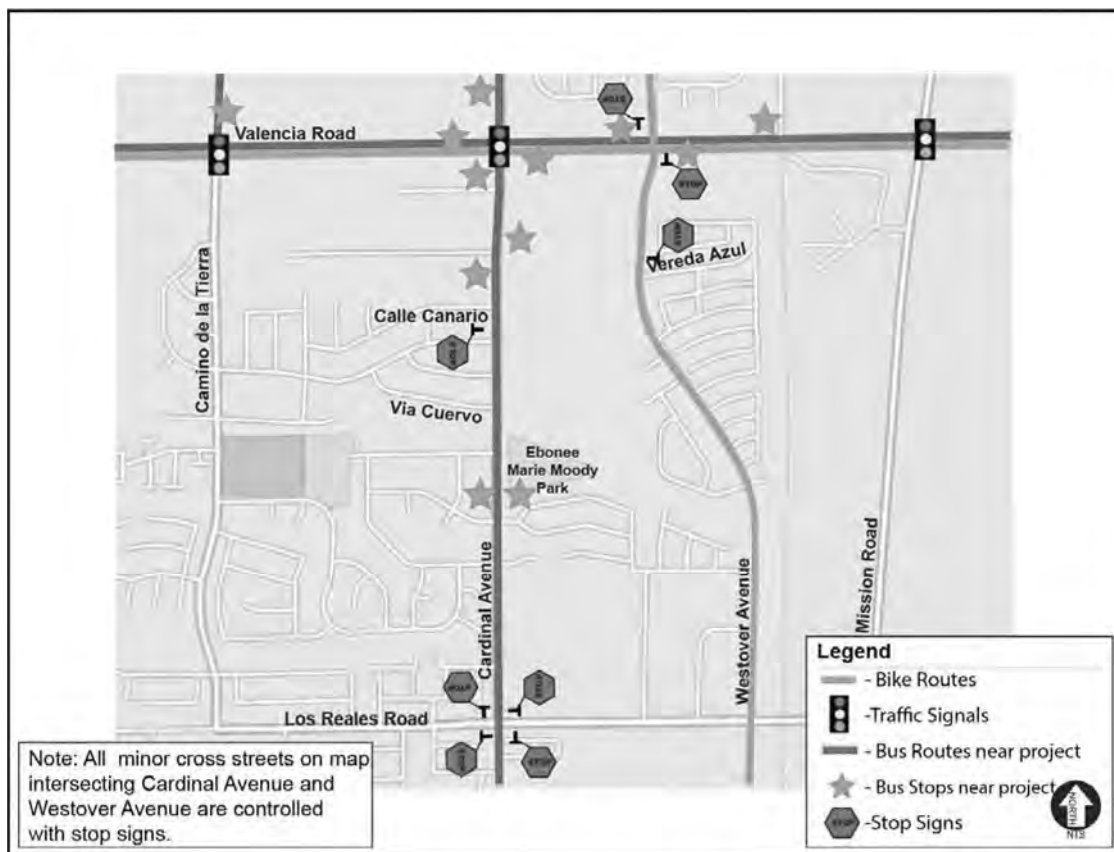
4. Analysis of Existing Conditions

Physical Characteristics

Roadway Characteristics

Exhibit 4 (Existing Transportation Features) and Exhibit 5 (Roadway Inventory) highlight the existing transportation features, such as bike routes, bus routes and traffic signal locations near the project area. The following describes the major roadways and intersections within the study area.

Exhibit 4 Existing Transportation Features



Valencia Road is designated an Urban Minor Arterial on the Federal Highway System, a High-Volume Arterial on Pima County's Major Streets Plan and a Scenic, Major Route on the county's Scenic Routes Plan. It has a posted speed limit of 40 mph. It is a divided four-lane arterial with bike lanes. There are sidewalks east of Cardinal Road. It provides direct access to residential and commercial uses along its route.

The western terminus of Valencia Road is at its intersection with SR 86 near Ryan Airfield. Valencia Road continues east through the project area with its eastern terminus just east of Houghton Road on the east side of Tucson. Nearby traffic signals are located at Mark Road, Camino de la Tierra, Camino de Oeste, Cardinal Avenue and Mission Road. Stop signs control access from all other cross streets intersecting Valencia Road.

Exhibit 5 Roadway Inventory

Roadway Segment	Lanes	2020 ADT	Source	LOS D Daily Capacity (vpd)*	Speed Limit	Existing R/W (ft)	Bike Route	Sun Tran Bus Route	Sidewalks
Valencia Road, Camino de la Tierra to Cardinal	4	30,948	PAG	35,820	40	140-180	Bike Route with Striped Shoulder	Route 27	No
Valencia Road, Cardinal to Mission	4	36,132	PAG	35,820	40	150-180	Bike Route with Striped Shoulder	Route 29	Yes
Cardinal Road, Drexel to Valencia	4	9,426	PAG	29,160	35	50-150	No	Route 27	No
Cardinal Road, Valencia to Los Reales Road	2	6,763	PAG	10,656	35	150	No	Route 29	No
Camino de la Tierra, Bilby Road to Valencia Road	2	2,783	PAG	13,986	35	90	Key Connecting Street	No	No
Camino de la Tierra, Valencia Road to Los Reales Road	2	6,056	PAG	10,656	25	90	Residential Streets	No	No
Westover Drive, Valencia Road to Los Reales Road	2	2,426	PAG	10,656	25	50-100	Key Connecting Street	No	No
Mission Road, North of Valencia Road	2	10,040	PAG	12,744	45	60	No	No	No
Mission Road, Valencia Road to Los Reales Road	2	5,849	PAG	13,986	35	60	No	Sun Shuttle 440	No
Los Reales Road, Camino de la Tierra to Cardinal Road	3	8,443	PAG	13,986	35	150	Key Connecting Street	No	No
Los Reales Road, Cardinal Road to Mission Road	2	8,376	PAG	10,656	35	150	Key Connecting Street	No	No

*FDOT Generalized Annual Average Daily Volumes Table, 2012.

Cardinal Avenue through the study area is a two-lane undivided Minor Urban Arterial. The northern terminus of Cardinal Avenue is 1.75 miles north of Valencia at Irvington Road and the southern terminus is at Herman's Road, two miles south of Valencia Road. It has a posted speed limit of 35 mph through the study area. There are 25 mph advisory signs along some of Cardinal Road due to limited sight distance associated with a crest in the vicinity of the Santa Cruz Lutheran Church and the location of a park south of the project area.

The intersection of Cardinal Avenue and Valencia Road is signalized, but all intersections on Cardinal Avenue south of Valencia Road are unsignalized. The intersection of Cardinal Avenue/Los Reales Road, south of the project, is controlled with stop signs on all approaches.

Westover Avenue (south of Valencia)

Westover Avenue is a residential two-lane local roadway that provides access to residential neighborhoods. It is posted for 25 mph. Westover Avenue continues north of Valencia Road as Hildreth Avenue, which is also a local residential street. There is a median opening and street lighting at the Valencia Road/Westover Avenue/Hildreth Avenue intersection.

Existing Traffic Data

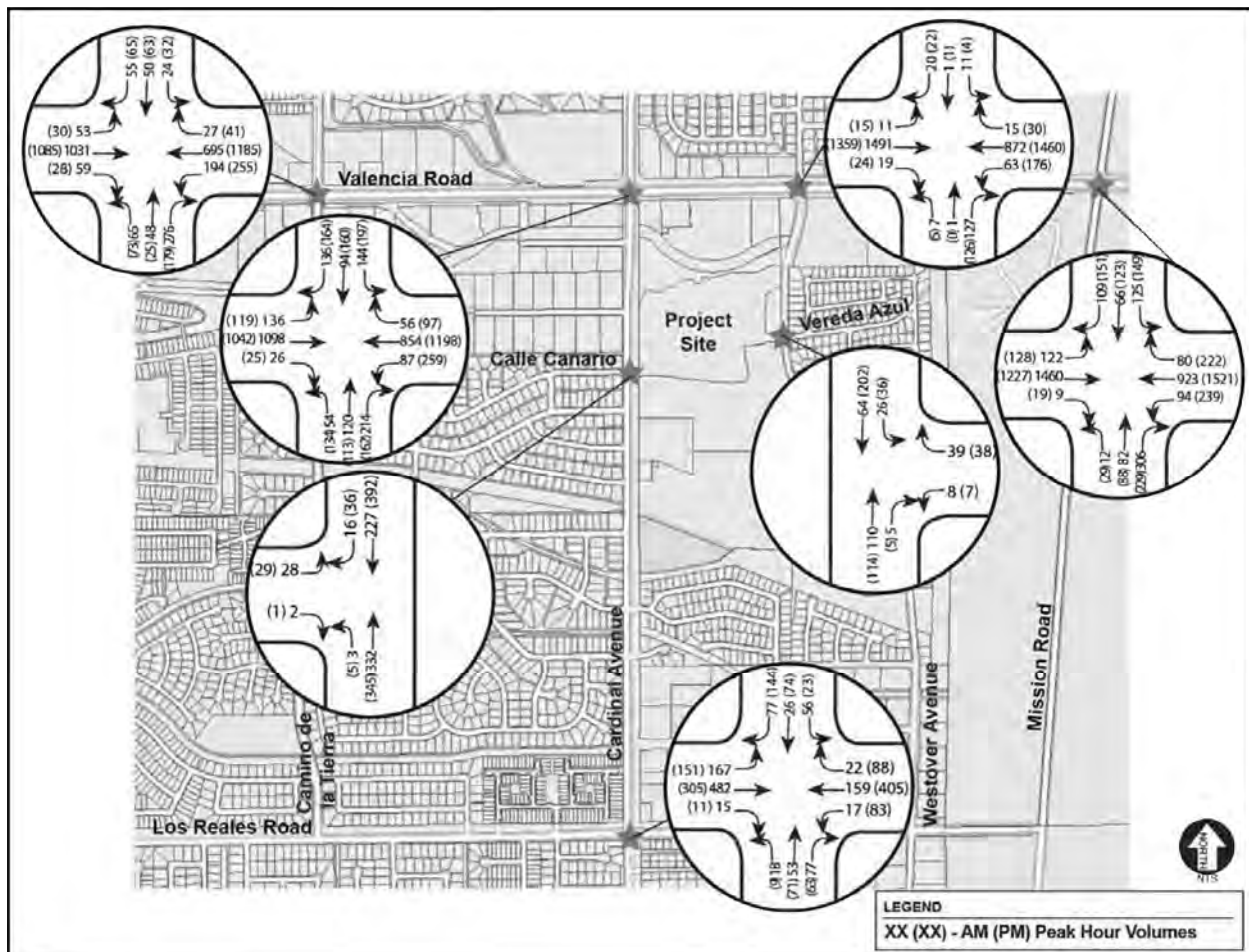
Traffic Counts

Field Data Services of Arizona collected peak hour turning movement counts at the intersections of Valencia Road/Camino de la Tierra, Valencia Road/Westover Avenue (west), Los

Reales/Cardinal, Cardinal Avenue/Calle Canario and Westover Avenue/Vereda Azul the week of October 18, 2021. The Pima Association of Governments has peak hour intersection count data for the Valencia Road/Cardinal Avenue and the Valencia Road/Mission Road intersection from 2019. These counts are illustrated in Exhibit 6.

Recorded roadway daily traffic volumes for Valencia Road, Cardinal Road, Westover Avenue, Mission Road and Los Reales Road are available on PAG's website. The volumes are from 2020 and are adjusted volumes from 2019 recorded counts or estimated counts for 2019. The 2020 counts were reduced by 8% from the 2019 volumes.

Exhibit 6 Existing (Year 2021) Traffic Volumes



Level of Service

Level of service (LOS) is a qualitative description of how well a roadway or intersection operates under prevailing traffic conditions. A grading system of A through F, similar to academic grades, is utilized. LOS A is free-flowing traffic, whereas LOS F is forced flow and extreme congestion. The Pima County standard for acceptable LOS is LOS D.

The intersections were evaluated for the weekday morning and evening peak periods based on the recorded turning movement volumes. The analyses were performed using Synchro

a software program that analyzed intersections based on the methodologies from the current Highway Capacity Manual. The LOS and delay results are summarized in Exhibit 7.

The signalized intersections of Valencia Road/Camino de La Tierra and Valencia Road/Cardinal Avenue operate at LOS C or better during both peak hours. At the signalized intersection of Mission Road, the shared through/right turn lane operates at LOS E/F during both peak hours. The north and south approaches at the Valencia Road/Westover Avenue intersection operate at LOS E or F, which is typical for a minor street intersecting a major arterial during the peak hours.

For roadway segments, segment performance based on daily volumes has been estimated using the planning methods contained in the Florida Department of Transportation (FDOT) Level of Service Handbook. Exhibit 8 provides a summary of ADT and current roadway capacity at LOS D using FDOT LOS tables¹. The table shows that Cardinal Avenue and Westover Avenue are currently operating at an acceptable level of service. Valencia Road has recorded daily volumes that exceed the level of service criteria for a four-lane divided roadway between Cardinal Road and Mission Road.

Traffic Safety History

ADOT collects crash data for all roadways within the state. We reviewed the data within the project study area for the most recently available five-year period (2016-2020). A summary of the crashes within the five-year period are provided in Exhibits 9a (intersection crashes) and 9b (roadway segment crashes).

Intersection Crashes

The intersection of Valencia Road/Cardinal Road experienced the most crashes (92) and the highest crash rate (1.20 crashes per million entering vehicles, or MEV) during the five-year period. Forty of the crashes were rear-end type crashes, which was typical for all intersections within the study area. The intersection of Valencia Road/Mission Road experienced 81 crashes and a crash rate of 1.02 crashes per MEV during the five-year period with the majority (49) of the crashes being rear-end type crashes. Most crashes at all intersections were non-injury crashes. There was one fatality at Valencia Road/Camino de la Tierra and one fatality at the Valencia Road/Mission Road intersection.

2016-2020 crash rates are lower at the Valencia Road/Cardinal Road intersection when compared to the 2012-2016 five-year rates documented in the most recent (2016) Pima County Safety Management System Study. The Valencia/Cardinal five-year rate was 1.59 crashes per MVE.

¹ Florida Department of Transportation Generalized Annual Average Daily Volumes for Urbanized areas contained in *Quality / Level of Service Handbook, 2002*

Exhibit 7 Intersection Level of Service – Existing Conditions

Valencia/Camino de la Tierra

	2021 Existing			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	11.7	B	13.1	B
Through	26.9	C	28.1	C
Right	13.9	B	12.7	B
Approach	25.5	C	27.3	C
Westbound				
Left	21.8	C	30.4	C
Through/Right	19.6	B	23.7	C
Approach	20	B	24.8	C
Northbound				
Left	17.8	B	25.4	C
Through/Right	28.5	C	26.3	C
Approach	26.7	C	26.1	C
Southbound				
Left	26.2	C	27.5	C
Through/Right	15.7	B	21.9	C
Approach	17.6	B	23	C
Intersection	23.3	C	25.8	C

Valencia/Cardinal

	2021 Existing			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	17.2	B	19.5	B
Through/Right	36.9	D	32.5	C
Approach	34.5	C	32.2	C
Westbound				
Left	18.7	B	25.4	C
Through	23.6	C	23.4	C
Right	16.3	B	14.6	B
Approach	22.8	C	23.2	C
Northbound				
Left	18.4	B	23.8	C
Through	21	C	26.1	C
Right	29	C	32.9	C
Approach	25	C	28.1	C
Southbound				
Left	19.5	B	25	C
Through/Right	24.2	C	32.3	C
Approach	21.7	C	29	C
Intersection	27.5	C	27.2	C

Valencia/Mission

	2021 Existing			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	15.3	B	32.7	C
Through/Right	44.8	D	40.7	D
Approach	42.3	D	39.7	D
Westbound				
Left	23.6	C	41	D
Through	19.6	B	38.4	D
Right	14.4	B	16.1	B
Approach	19.6	B	36.2	D
Northbound				
Left	26.7	C	26.1	C
Through/Right	167.2	F	72.5	E
Approach	162.9	F	68.7	E
Southbound				
Left	38	D	48.6	D
Through/Right	30.6	C	37.6	D
Approach	33.7	C	41.5	D
Intersection	49	D	40.9	D

Exhibit 7 (cont.) Intersection Level of Service – Existing Conditions

Valencia/Westover

	2021 Existing			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	10	B	13.7	B
Westbound				
Left	17.6	C	19.1	C
Northbound				
Left/Through	453.4	F	1479.6	F
Right	27	D	24.4	C
Southbound				
Left/Through/Right	398.1	F	659.6	F

Cardinal/Calle Canario

	2021 Existing			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left/Right	14.2	B	16.6	C
Northbound				
Left	7.8	A	8.3	A

Westover/Vereda Azul

	2021 Existing			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Westbound				
Left/Right	9.3	A	9.6	A
Southbound				
Left	7.5	A	7.6	A

Los Reales/Cardinal

	2021 Existing			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Approach	19	C	17.3	C
Westbound				
Approach	15.3	C	50.5	F
Northbound				
Approach	11.8	B	13.9	B
Southbound				
Approach	12.1	B	15	B

Exhibit 8 Roadway Level of Service – Existing Conditions

Roadway Segment	Lanes	2020 ADT	Source	LOS D Daily Capacity (vpd)*
Valencia Road, Camino de la Tierra to Cardinal	4	30,948	PAG	35,820
Valencia Road, Cardinal to Mission	4	36,132	PAG	35,820
Cardinal Road, Drexel to Valencia	4	9,426	PAG	29,160
Cardinal Road, Valencia to Los Reales Road	2	6,763	PAG	10,656
Camino de la Tierra, Bilby Road to Valencia Road	2	2,783	PAG	13,986
Camino de la Tierra, Valencia Road to Los Reales Road	2	6,056	PAG	10,656
Westover Drive, Valencia Road to Los Reales Road	2	2,426	PAG	10,656
Mission Road, North of Valencia Road	2	10,040	PAG	12,744
Mission Road, Valencia Road to Los Reales Road	2	5,849	PAG	13,986
Los Reales Road, Camino de la Tierra to Cardinal Road	3	8,443	PAG	13,986
Los Reales Road, Cardinal Road to Mission Road	2	8,376	PAG	10,656

*FDOT Generalized Annual Average Daily Volumes Table, 2012.

Roadway Segment Crashes

On Valencia Road between Camino de la Tierra and Cardinal Road, there were thirty-three recorded segment related crashes over the five-year period, with a five-year crash rate of 1.17 crashes per million vehicle miles (MVM). On Valencia Road between Cardinal Road and Mission Road, there were fifty-four recorded segment related crashes over the five-year period, with a five-year crash rate of 1.14 crashes per MVM. On Cardinal Avenue between Valencia Road and Los Reales Road, there were eleven recorded segment related crashes over the five-year period, with a five-year crash rate of 0.89 crashes per MVM. The segment of Westover Avenue between Valencia Road and Los Reales Road experienced the highest crash rate (1.36 crashes per MVM) in the study area with only six crashes. The high crash rate is because the daily volume of the roadway is relatively low where one crash per year on the road results in a crash rate of 1.13 crashes per MVM. Most (four) crashes were single vehicle crashes and only one involved an injury.

Crash rates are lower on Valencia Road and on Cardinal Road at the project area intersections from the 2012-2016 five-year rates documented in the most recent (2016) Pima County Safety Management System Study. For the Valencia Road segments, the rates were 1.91 crashes per MVM from Camino de la Tierra and 2.18 crashes per MVM from Cardinal Road to Mission Road from 2012 to 2016. The crash rate on Cardinal Road was 1.78 crashes per MVM from 2012-2016.

Exhibit 9a Collision History - Intersections

Valencia/Cardinal

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle	1	1		1	1	4	4%
Angle	2	5	1		2	10	11%
Left Turn	6	4	5	2	5	22	24%
Rear End	11	14	4	4	7	40	44%
Head On		1				1	1%
Sideswipe	4	3	3		2	12	13%
Rear to Rear			1			1	1%
Other					1	1	1%
Total	24	28	14	7	18	91	
Crash Rate (per MVE)	1.58	1.84	0.92	0.46	1.18	1.20	
Severity						Total	%
Fatal						0	0%
Bodily Injury	6	8	5	2	5	26	29%
Property Damage	18	20	9	5	13	65	71%

Valencia/Camino de la Tierra

Crash Type	2016	2017	2018	2019	2020	Total	%
Angle		1	1	1		3	8%
Left Turn	3	1	3	2	2	11	28%
Rear End	1	4	9	1	5	20	51%
Sideswipe	1	1				2	5%
Rear to Rear		1				1	3%
Other		1			1	2	5%
Total	5	9	13	4	8	39	
Crash Rate (per MVE)	0.41	0.73	1.06	0.33	0.65	0.64	
Severity						Total	%
Fatal				1		1	3%
Bodily Injury	1	5	1	1	6	14	36%
Property Damage	4	4	12	2	2	24	62%

Valencia/Westover (West)/Hildreth

Crash Type	2016	2017	2018	2019	2020	Total	%
Angle		1				1	8%
Left Turn	1	1				2	15%
Rear End	2	1	2		1	6	46%
Sideswipe	1	2				3	23%
Rear to Side	1					1	8%
Total	5	5	2	0	1	13	
Crash Rate (per MVE)	0.37	0.37	0.15	0.00	0.07	0.19	
Severity						Total	%
Fatal						0	0%
Bodily Injury	1	3	1		1	6	46%
Property Damage	4	2	1			7	54%

Note: MVE = Million Vehicles Entering the intersection.

Exhibit 9a (cont.)

Collision History – Intersections

Valencia/Mission

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle				1	1	2	2%
Angle				2		2	2%
Left Turn			7	3	5	15	19%
Rear End		1	11	19	18	49	60%
Head On				3		3	4%
Sideswipe			2	4		6	7%
U-Turn					1	1	1%
Other			1		1	2	2%
Unknown					1	1	1%
Total	0	1	21	32	27	81	
Crash Rate (per MVE)	0.00	0.06	1.32	2.01	1.70	1.02	
Severity						Total	%
Fatal				1		1	1%
Bodily Injury		1	11	8	7	27	33%
Property Damage			10	23	20	53	65%

Los Reales/Cardinal

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle		1				1	1%
Angle	1		4	1	3	9	11%
Left Turn	1					1	1%
Rear End	1		1			2	2%
Other	1					1	1%
Total	4	1	5	1	3	14	
Crash Rate (per MVE)	0.85	0.21	1.06	0.21	0.64	0.60	
Severity						Total	%
Fatal						0	0%
Bodily Injury	2		2			4	5%
Property Damage	2	1	3	1	3	10	12%

Los Reales/Westover

Crash Type	2016	2017	2018	2019	2020	Total	%
Angle		1		1		2	2%
Left Turn	1					1	1%
Rear End	1		3			4	5%
Sideswipe	1					1	1%
Total	3	1	3	1	0	8	
Crash Rate (per MVE)	0.83	0.28	0.83	0.28	0.00	0.44	
Severity						Total	%
Fatal						0	0%
Bodily Injury	1		1			2	2%
Property Damage	2	1	2	1		6	7%

Note: MVE = Million Vehicles Entering the intersection.

Exhibit 9b Collision History – Roadway Segments

Valencia: Camino de la Tierra to Cardinal

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle					2	2	6%
Angle		1	2			3	9%
Left Turn	1	1	1			3	9%
Rear End	7	5	7		1	20	61%
Sideswipe	1		1		1	3	9%
Other		1	1			2	6%
Total	9	8	12	0	4	33	
Crash Rate (per MVM)	1.59	1.42	2.12	0.00	0.71	1.17	
Severity						Total	%
Fatal		1				1	3%
Bodily Injury		3	5		1	9	27%
Property Damage	9	4	7		3	23	70%

Valencia: Cardinal to Mission

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle	1		2	2	1	6	11%
Angle	1	1			1	3	6%
Left Turn	3	1			1	5	9%
Rear End	9	6	7	4	3	29	54%
Sideswipe	1	2	2	2	1	8	15%
U-Turn			1			1	2%
Other	2					2	4%
Total	17	10	12	8	7	54	
Crash Rate (per MVM)	1.80	1.06	1.27	0.85	0.74	1.14	
Severity						Total	%
Fatal						0	0%
Bodily Injury	6	3	2	3	3	17	31%
Property Damage	11	7	10	5	4	37	69%

Cardinal: Bilby to Valencia

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle					1	1	14%
Left Turn	1	1				2	29%
Rear End		1			1	2	29%
Sideswipe		1				1	14%
Other	1					1	14%
Total	2	3	0	0	2	7	
Crash Rate (per MVM)	1.16	1.74	0.00	0.00	1.16	0.81	
Severity						Total	%
Fatal					1	1	14%
Bodily Injury	1					1	14%
Property Damage	1	3			1	5	71%

Note: MVM = Million Vehicle Miles

Exhibit 9b (cont.)

Collision History – Roadway Segments

Cardinal: Valencia to Los Reales

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle	2	2	1		2	7	64%
Left Turn				1		1	9%
Head On	1			1		2	18%
Sideswipe		1				1	9%
Total	3	3	1	2	2	11	
Crash Rate (per MVM)	1.22	1.22	0.41	0.81	0.81	0.89	
Severity						Total	%
Fatal						0	0%
Bodily Injury		2	1	1		4	36%
Property Damage	3	1		1	2	7	64%

Westover: Valencia to Cardinal

Crash Type	2016	2017	2018	2019	2020	Total	%
Single Vehicle		1		1	2	4	67%
Rear End	1					1	17%
Sideswipe			1			1	17%
Total	1	1	1	1	2	6	
Crash Rate (per MVM)	1.13	1.13	1.13	1.13	2.26	1.36	
Severity						Total	%
Fatal						0	0%
Bodily Injury		1				1	17%
Property Damage	1		1	1	2	5	83%

Note: MVM = Million Vehicle Miles

Sight Distance

On Cardinal Road, a hill crest in the vicinity of the Santa Cruz Lutheran Church limits sight distance enough that Pima County has placed a sign “Hill Blocks View” with an advisory 25 mph speed limit on both sides of the hill. The proposed entrance to the project on Cardinal Avenue, opposite Calle Canario, is about 375 feet north of this hill. For a roadway with a 40-mph speed limit, the intersections sight distance is 445 feet for cars turning left out of the minor street onto the main street. Therefore, drivers turning left out of Calle Canario today and from the proposed driveway on the east side of Cardinal Road may not have the minimum sight distance recommended. Sight distance triangles at the project access points will need to be identified on the proposed development plan by the applicant.

5. Projected Traffic

Site Traffic Forecasting

Trip Generation

The future traffic from the project is estimated using the trip rates contained in the Institute of Traffic Engineers' *Trip Generation Handbook*, 10th Edition. The number of trips generated is the mathematical product of land use intensity (building square footage, number of dwelling units, etc.) and the trip generation rate. The result is the total number of one-way trips (not round trips) expected to be generated by the project. These trips represent the number of vehicles estimated to enter and leave the project. All of the estimates are based on average trip rates.

We applied average trip rates from the *Trip Generation Handbook* to estimate trip generation for the residential uses. Exhibit 10 shows the trip rates and estimated trip generation. Based on the average trip rates for the project land use, the project generates 2,539 daily one-way trips, with 199 trips during the AM peak hour and 266 during the PM peak hour.

Exhibit 10 Trip Rates and Trip Generation

Trip Generation Rates

<i>Proposed Use</i>	<i>Unit</i>	<i>No.Units</i>	<i>ITE Categ.</i>	<i>Weekday AM</i>		<i>Weekday PM</i>		<i>Avg Weekday</i>	
				<i>In</i>	<i>Out</i>	<i>In</i>	<i>Out</i>	<i>In</i>	<i>Out</i>
Single-Family Detached Housing	Dwelling Unit	269	210	0.74		0.99		9.44	
				25%	75%	63%	37%	50%	50%

Trip Generation

<i>Proposed Use</i>	<i>Unit</i>	<i>No. Units</i>	<i>Weekday AM</i>		<i>Weekday PM</i>		<i>Avg Weekday</i>	
			<i>In</i>	<i>Out</i>	<i>In</i>	<i>Out</i>	<i>In</i>	<i>Out</i>
Single-Family Detached Housing	Dwelling Unit	269	199		266		2,539	
			50	149	168	99	1,270	1,270

We distributed the site traffic with 55% to the east on Valencia Road, 10% to the west, 15% to the north and 20% to the south, split between Cardinal Avenue and Westover Avenue. The distribution percentages are shown in Exhibit 11. The site trips at the project driveways and the off-site intersections are shown in Exhibit 12.

Exhibit 11 Trip Distribution

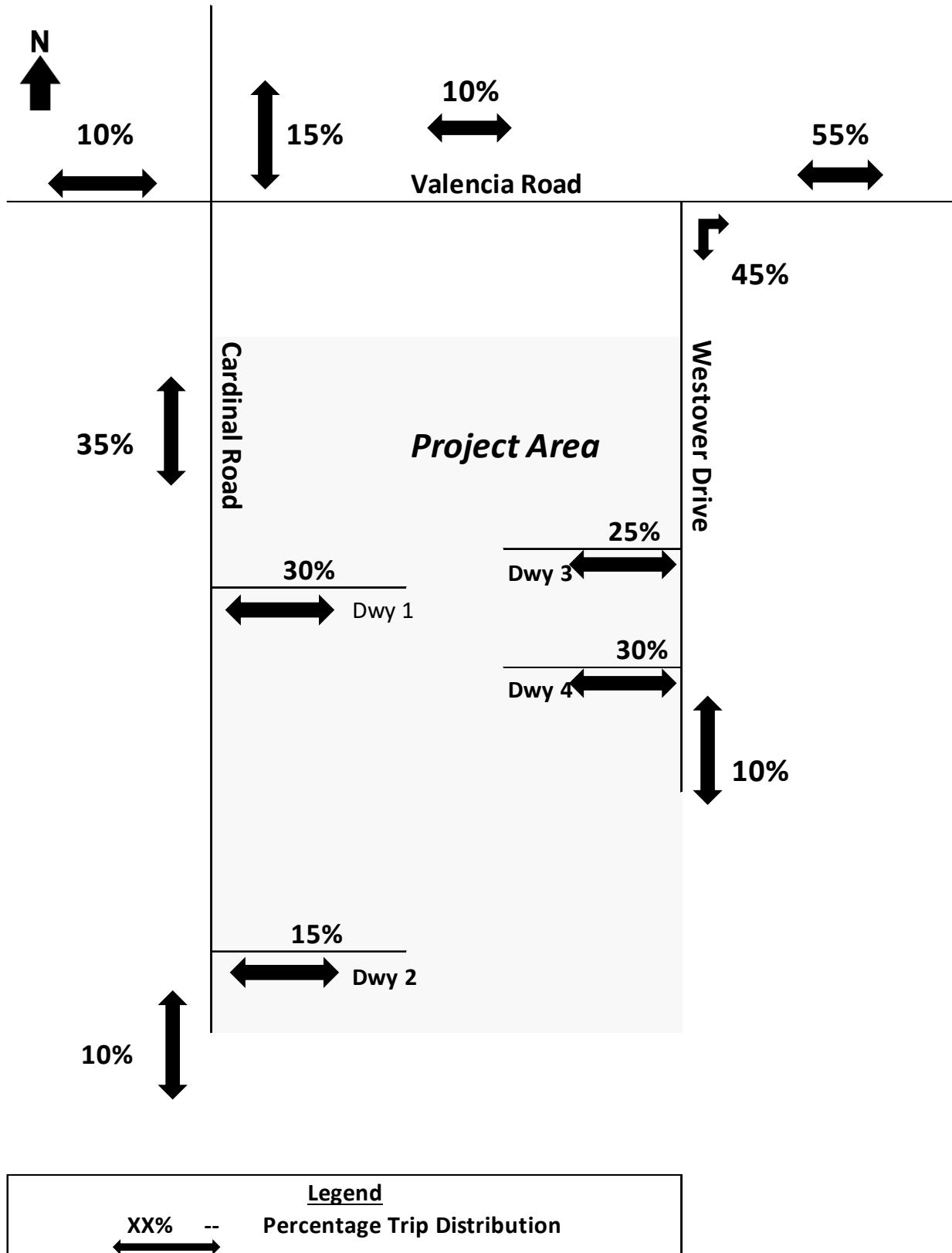
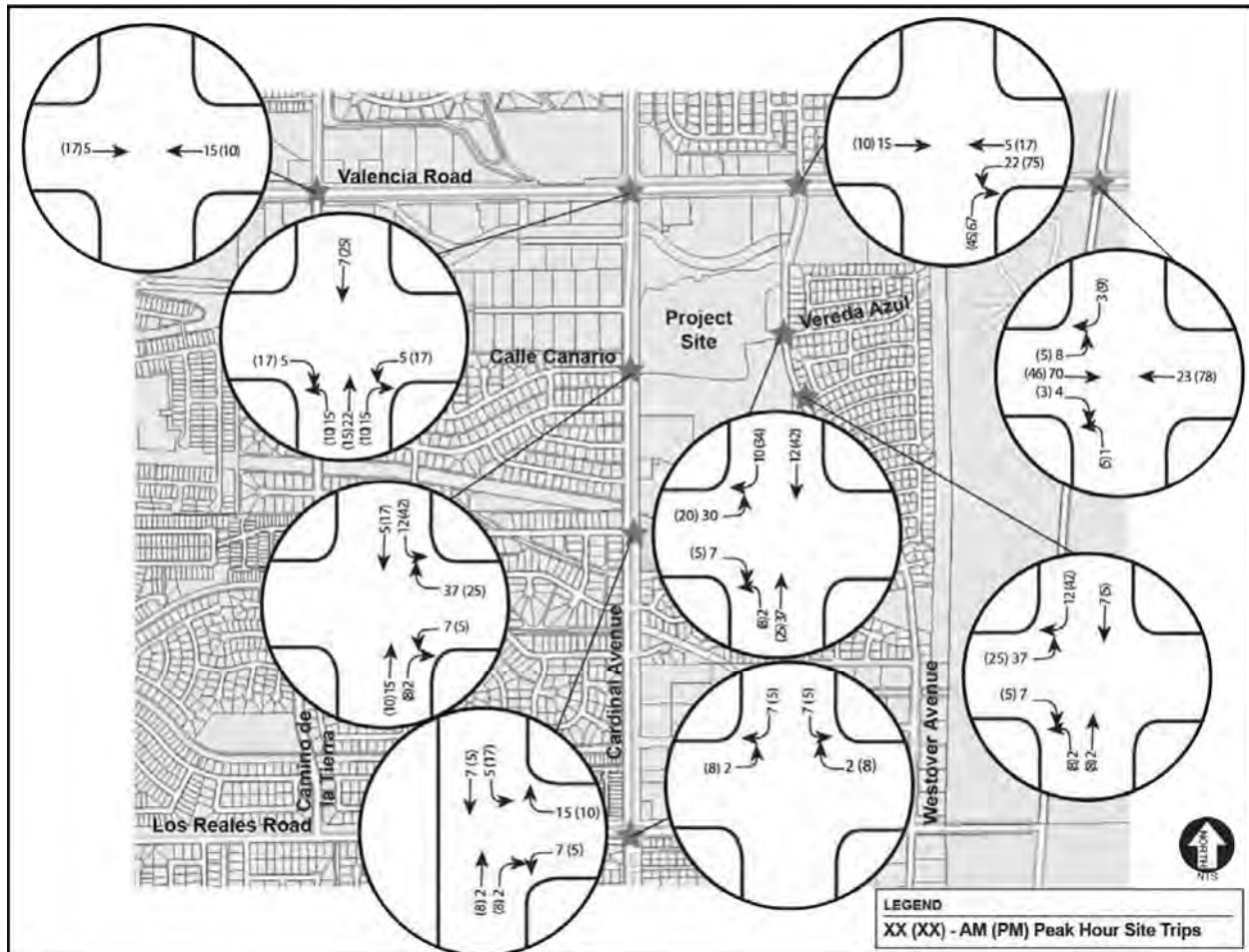


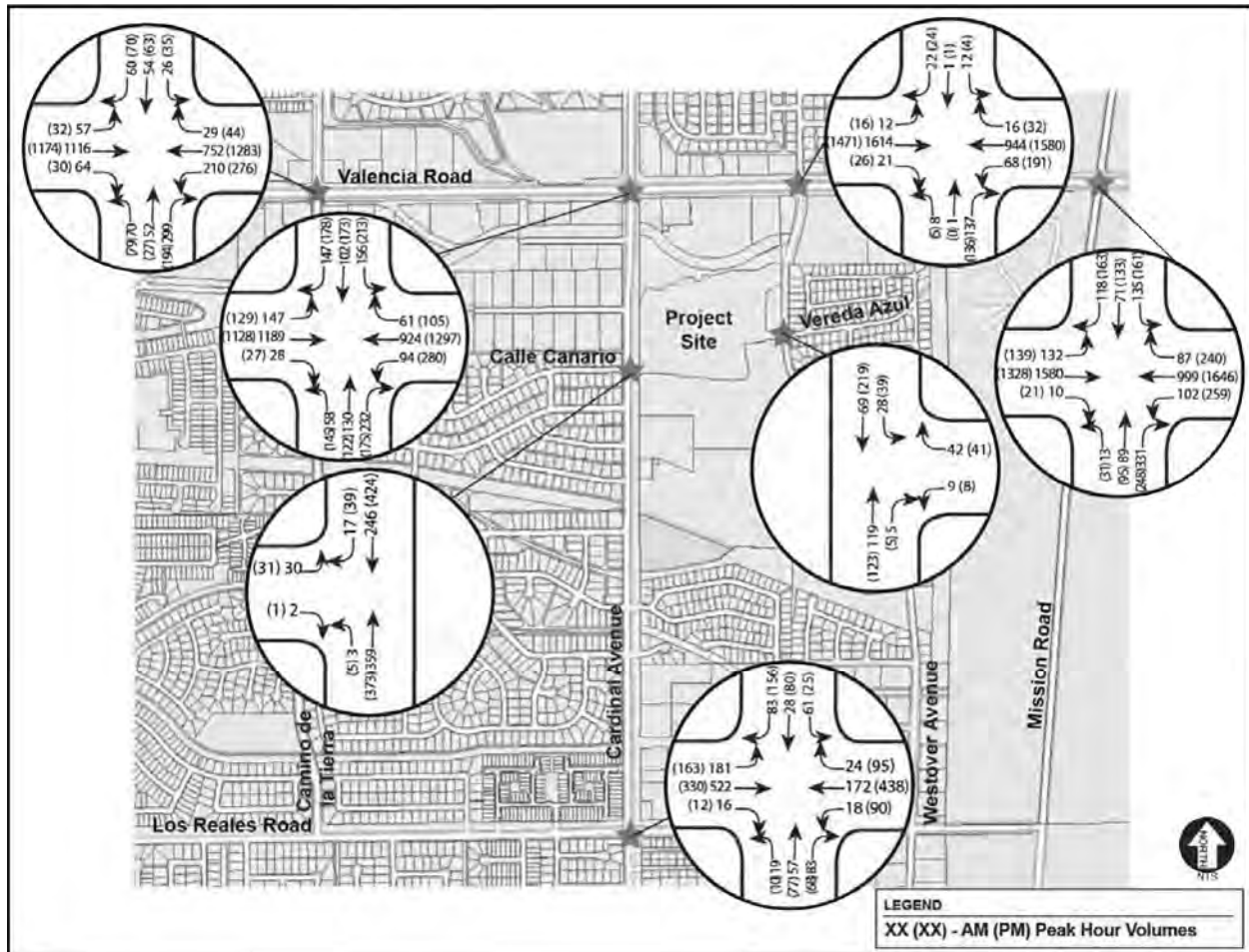
Exhibit 12 Site Traffic Assignment



Projections of Non-Site Traffic

We estimated year 2023 traffic volumes based on a 2%/year growth rate. Exhibit 13 shows the future turning movement intersection counts under the no-project condition for the year 2025.

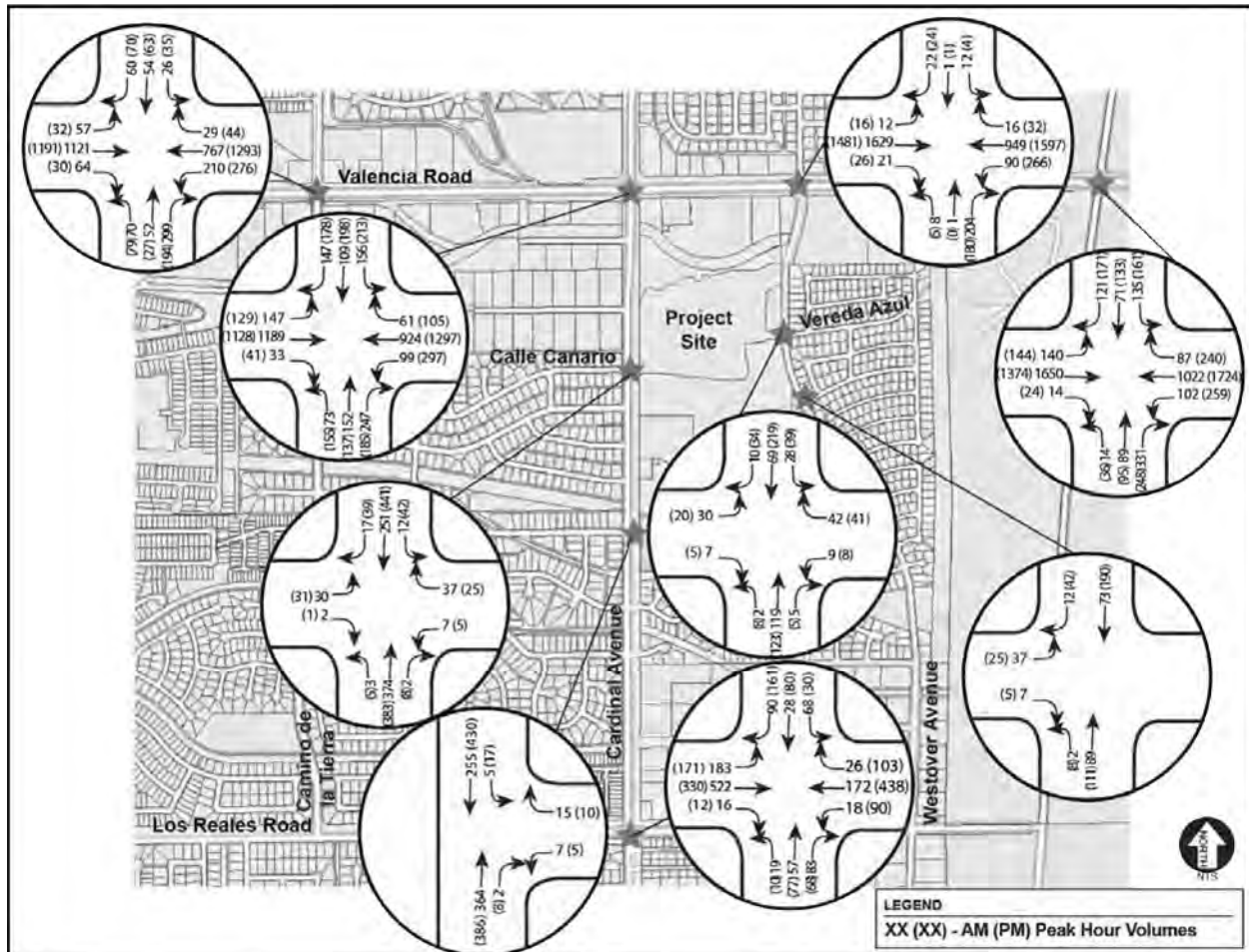
Exhibit 13 Future Traffic Volumes – Year 2025 (No Project)



Total Traffic

We added the site traffic volumes to the no-project traffic volumes for the year 2025. The resulting total peak hour turning volumes at the project intersections and driveways are illustrated in Exhibit 14.

Exhibit 14 Future Traffic Volumes – Year 2025 (With Project)



6. Traffic and Improvement Analysis

Site Access

Project access will be on Cardinal Avenue and Westover Avenue via Valencia Road and Los Reales Road. The site plan shows two full access driveways on Cardinal Road, one opposite Calle Canario and one just south of Via Cuervo and north of the park access road. There are also two full access driveways on Westover avenue, one opposite Vereda Azul, and the other approximately 280 feet south of Vereda Azul.

The two northern driveways on Cardinal Avenue and Westover will serve the Phase 1 area, and the two southern driveways on each street will serve the Phase 2 area. There is no internal connection between the Phase 1 and Phase 2 area.

Level of Service Analysis

HCS analyses were performed for the no-project and with-project conditions for the year 2025. The results of the intersection analysis are shown in Exhibits 15 and 16.

The following movements will operate at LOS E or F under future conditions:

- Valencia/Mission
 - NB Through/Right Turn Lane, AM/PM Peak Hour 2025 NP/WP;
 - EB Through/Right Turn Lane, AM/PM Peak Hour 2025 NP/WP;
 - WB Left Turn Lane and Through Lane, PM Peak Hour, 2025 WP;
 - SB Left Turn Lane, PM Peak Hour 2025 WP
- Valencia/Westover
 - NB Left/Through Lane, AM/PM Peak Hour, 2025 NP/WP
 - NB Right Turn Lane, AM/PM Peak Hour 2025 WP
 - SB Left/Through/Right Turn Lane, AM/PM Peak Hour, 2025 NP/WP
- Los Reales/Cardinal
 - WB Approach, PM Peak Hour 2025 NP/WP

All other intersections and movements will operate at LOS D or better through the year 2025.

The poor LOS on the northbound and southbound approaches at the Valencia Road/Westover Avenue intersection is experienced under existing conditions. This is typical of minor streets intersecting major arterial such as Valencia Road. During a field review, drivers in the northbound left/through lane waited for a while to turn left of through, but then repositioned themselves and turned right. It is likely that most drivers from the project who wish to head west on Valencia Road would go to the Cardinal access locations and turn left (west) at the Valencia/Cardinal intersection. Pima County may wish to restrict northbound movements at the Valencia Road/Westover Avenue intersections to right turns only.

With the current lane configuration, turn lanes on the eastbound, westbound and southbound approaches at the Valencia/Mission intersection will also experience LOS E by the year 2025. This is the location where Valencia Road transitions from a six-lane roadway to a four-lane roadway and thus has a lower intersection and roadway capacity than Valencia Road to the east.

With the project traffic, the minor street movements at the project intersections on Cardinal Avenue and on Westover Avenue will operate at LOS D or better.

Exhibit 15 Intersection Level of Service (2025 No Project)

Valencia/Camino de la Tierra

	2025 No Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	12.1	B	14.2	B
Through	33.8	C	37.1	D
Right	14	B	12.8	B
Approach	31.8	C	36.0	D
Westbound				
Left	26.3	C	46	D
Through/Right	20.9	C	27.8	C
Approach	21.9	C	30.8	C
Northbound				
Left	18.3	B	26.3	C
Through/Right	33	C	27.7	C
Approach	30.6	C	27.3	C
Southbound				
Left	28.4	C	28.8	C
Through/Right	15.9	B	22.2	C
Approach	18.2	B	23.6	C
Intersection	27.3	C	32.1	C

Valencia/Cardinal

	2025 No Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	18.5	B	21.8	C
Through/Right	46.7	D	38.5	D
Approach	43.4	D	36.6	D
Westbound				
Left	19.8	B	35	D
Through	25.7	C	25.4	C
Right	16.4	B	14.4	B
Approach	24.6	C	26.4	C
Northbound				
Left	18.9	B	26.8	C
Through	21.6	C	27.8	C
Right	31.6	C	36.4	D
Approach	26.8	C	30.9	C
Southbound				
Left	20.8	C	28.3	C
Through/Right	25.8	C	35.6	D
Approach	23	C	32.1	C
Intersection	32	C	31.1	C

Valencia/Mission

	2025 No Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	16.5	B	44.1	D
Through/Right	64.6	F	66.2	F
Approach	60.7	F	64.0	E
Westbound				
Left	27.5	C	62.3	E
Through	20.8	C	58.4	F
Right	14.7	B	16.3	B
Approach	20.9	C	54.2	D
Northbound				
Left	26.8	C	26.3	C
Through/Right	211	F	93.4	F
Approach	205.4	F	87.8	F
Southbound				
Left	45	D	70.2	E
Through/Right	31.8	C	40.5	D
Approach	37.3	D	51	D
Intersection	63.4	E	60.3	E

Valencia/Westover

	2025 No Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	10.4	B	14.9	B
Westbound				
Left	20.1	C	23.4	C
Northbound				
Left/Through	993.6	F	4103.1	F
Right	34	D	30.1	D
Southbound				
Left/Through/Right	859.5	F	1646.4	F

Cardinal/Calle Canario

	2025 No Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left/Right	15.2	C	17.9	C
Westbound				
Left/Right				
Northbound				
Left	7.9	A	8.4	A
Southbound				
Left				

Westover/Vereda Azul

	2025 No Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left/Right				
Westbound				
Left/Right	9.5	A	9.7	A
Northbound				
Left				
Southbound				
Left	7.5	A	7.6	A

Los Reales/Cardinal

	2025 No Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Approach	23.1	C	19.7	C
Westbound				
Approach	17	C	79	F
Northbound				
Approach	12.4	B	14.9	B
Southbound				
Approach	12.7	B	16.5	C

Exhibit 16 Intersection Level of Service (2025 With Project)

Valencia/Camino de la Tierra

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	12.2	B	14.3	B
Through	34.4	C	39.8	D
Right	14	B	12.8	B
Approach	32.4	C	38.5	D
Westbound				
Left	26.4	C	38.2	D
Through/Right	21.2	C	28.3	C
Approach	22.2	C	31.6	C
Northbound				
Left	18.3	B	26.3	C
Through/Right	33	C	27.7	C
Approach	30.6	C	27.3	C
Southbound				
Left	28.4	C	28.8	C
Through/Right	15.9	B	22.2	C
Approach	18.2	B	23.6	C
Intersection	27.6	C	33.5	C

Valencia/Cardinal

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	18.5	B	21.8	C
Through/Right	48	D	44.4	D
Approach	44.7	D	42.0	D
Westbound				
Left	20.1	C	40.6	D
Through	25.6	C	25	C
Right	16.4	B	14.3	B
Approach	24.6	C	27.0	C
Northbound				
Left	19	B	29.4	C
Through	21.9	C	28.6	C
Right	33.3	C	38.5	D
Approach	27.4	C	32.7	C
Southbound				
Left	21.2	C	29.6	C
Through/Right	26.3	C	36.9	D
Approach	23.5	C	33.8	C
Intersection	32.6	C	33.6	C

Valencia/Mission

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	17.3	B	48.2	D
Through/Right	79.9	F	77.2	F
Approach	75.1	E	74.5	E
Westbound				
Left	27.5	C	62.3	E
Through	21.5	C	75.5	F
Right	14.8	B	16.3	B
Approach	21.5	C	67.6	E
Northbound				
Left	26.8	C	26.4	C
Through/Right	211	F	93.4	F
Approach	205	F	87.1	F
Southbound				
Left	45	D	70.2	E
Through/Right	32.1	C	42.6	D
Approach	37.4	D	52.1	D
Intersection	70.1	E	70.2	E

Valencia/Westover

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	10.4	B	15	C
Westbound				
Left	22	C	34.4	D
Northbound				
Left/Through	1170.7	F	--	F
Right	61.4	F	45.3	E
Southbound				
Left/Through/Right	3630.4	F	618.4	F

Cardinal/Calle Canario

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left/Right	19.8	C	27.4	D
Westbound				
Left/Right	12.4	B	13.3	B
Northbound				
Left	7.9	A	8.5	A
Southbound				
Left	8.2	A	8.3	A

Westover/Vereda Azul

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left/Right	11	B	13.1	B
Westbound				
Left/Right	9.5	A	10	B
Northbound				
Left	7.4	A	7.8	A
Southbound				
Left	7.5	A	7.6	A

Los Reales/Cardinal

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Approach	23.9	C	20.2	C
Westbound				
Approach	17.2	C	81.4	F
Northbound				
Approach	12.5	B	15.1	C
Southbound				
Approach	13.1	B	16.9	C

Cardinal/South Project Dwy

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Westbound				
Left/Right	11.8	B	13.2	B
Southbound				
Left	8.1	A	8.2	A

Westover/South Project Dwy

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left/Right	9.6	A	10.8	B
Northbound				
Left	7.4	A	7.8	A

Roadway Capacity Evaluation

Daily site trips were added to the projected background volumes for the year 2025 (Exhibit 17). Based on FDOT criteria, Valencia Road will continue to exceed its theoretical LOS D daily capacity with or without the influence of the project. All other roadways will have daily volumes below their LOS D daily capacities.

Exhibit 17 Future Daily Traffic Volumes

Roadway Segment	2025 No Project ADT	Site Trips	2025 With Project ADT	LOS D Threshold (vpd)*
Valencia Road, Camino de la Tierra to Cardinal	36,179	254	36,433	35,820
Valencia Road, Cardinal to Mission	42,239	1,396	43,636	35,820
Cardinal Road, Drexel to Valencia	11,019	381	11,400	29,160
Cardinal Road, Valencia to Los Reales Road	7,906	889	8,795	10,656
Camino de la Tierra, Bilby Road to Valencia Road	3,253	0	3,253	13,986
Camino de la Tierra, Valencia Road to Los Reales Road	7,080	0	7,080	10,656
Westover Drive, Valencia Road to Los Reales Road	2,836	1,143	3,979	10,656
Mission Road, North of Valencia Road	11,737	254	11,991	12,744
Mission Road, Valencia Road to Los Reales Road	6,838	254	7,092	13,986
Los Reales Road, Camino de la Tierra to Cardinal Road	9,870	127	9,997	13,986
Los Reales Road, Cardinal Road to Mission Road	9,792	127	9,919	10,656

*FDOT Generalized Annual Average Daily Volumes Table, 2012.

Turn Lane Storage Length Analysis

Synchro calculates the 95th percentile queue for intersection turn lanes. The calculated queue lengths for the 2025 With Project peak hour conditions at the existing turn lanes and warranted turn lanes at the project driveways are shown in Exhibit 18. The existing marked turn lane lengths are also provided in the Exhibit. We applied Pima County minimum lane lengths where the calculated back of queue estimate was less than the minimum standard length.

Exhibit 18 Year 2025 With Project 95th Percentile Queue Lengths

Intersection	Lane	95th Percentile Queue Length (ft)		Existing or Planned Storage Length (ft)
		AM Peak Hour	PM Peak Hour	
Valencia/Camino de la Tierra	EB Left	24	15	200
	EB Right	10	0	180
	WB Left	126	213*	200
	NB Left	46	64	80
	SB Left	25	34	125
Valencia/Cardinal	EB Left	94	107	300
	WB Left	51	255	285
	WB Right	0	21	500
	NB Left	51	136	115
	NB Right	88	55	115
	SB Left	91	160	190
Valencia/Westover	EB Left	<25	<25	200
	EB Right	<25	<25	170
	WB Left	32	133	210
	NB Right	419	Not Calculated	100
Valencia/Mission	EB Left	92	147	300
	WB Left	73	246	350
	WB Right	17	66	200
	NB Left	20	37	75
	SB Left	138	178	120
Cardinal/North Project Dwy	SB Left	<25	<25	110
Cardinal/South Project Dwy	SB Left	<25	<25	110

*2025 NP queue length also 213'.

- Valencia/Camino de la Tierra: Westbound Left Turn Lane. The projected 2025 No Project and With Project 95th percentile queue length is 213 feet with an existing 200-foot turn lane.
- Valencia/Cardinal: Northbound Left Turn Lane. The projected queue is 136 feet with an existing 115-foot lane.
- Valencia/Westover: Northbound Right Turn Lane. The projected queue is 419 feet within an existing 100-foot lane.
- Valencia/Mission: Southbound Left Turn Lane. The projected 2025 No Project and With Project 95th percentile queue length is 178 feet with an existing 120-foot turn lane.

The turn lane on Cardinal Avenue is impacted by the project site trips and should be extended to 136 feet to accommodate the future site trips. The queues at Valencia Road/Camino de la Tierra and at Valencia Road/Mission Road will exceed the existing turn lane lengths by 2025 even without the project. The County should monitor traffic at these locations and determine whether the turn lanes should be extended to accommodate the future traffic volumes.

The northbound right turn lane on Westover Avenue at Valencia is developed from the northbound through lane on the approach.

Southbound left turn lanes are warranted for both project driveways on Cardinal Avenue. The calculated queue lengths are less than 25 feet and thus the minimum storage lane length of 110 feet should be constructed for these turn lanes. The turn lane warrant analysis is provided in the next section.

Turn-Lane Warrants Analysis

Pima County's Subdivision and Development Street Standards provides turn lane warrant guidelines for County roadways. Results from the turn lane warrant analysis are shown in Exhibits 19-21.

Left turn lanes into the project on Cardinal Road at both project driveways are warranted. Right turn lanes are not warranted on Cardinal Avenue or on Westover Avenue at the project driveways.

An eastbound right turn lane is warranted at the Valencia Road/Cardinal Avenue intersection based on the projected volumes under the With Project condition in 2025. However, the presence of a large transmission tower, a culvert along the west side of Cardinal Avenue and other physical infrastructure on this corner may constrain the construction of this turn lane. It should be noted that all southbound project trips arriving from west of this intersection were assigned at this intersection. It may be that many of these southbound trips would continue through the intersection and turn right on Westover Avenue where there is an existing right turn lane on Valencia Road. Because of these reasons, particularly because of the infrastructure constraints, it is not recommended that this turn lane be constructed.

Exhibit 19 Left Turn Lane Warrant Criteria

A-1 LEFT TURN LANE GUIDELINES⁹

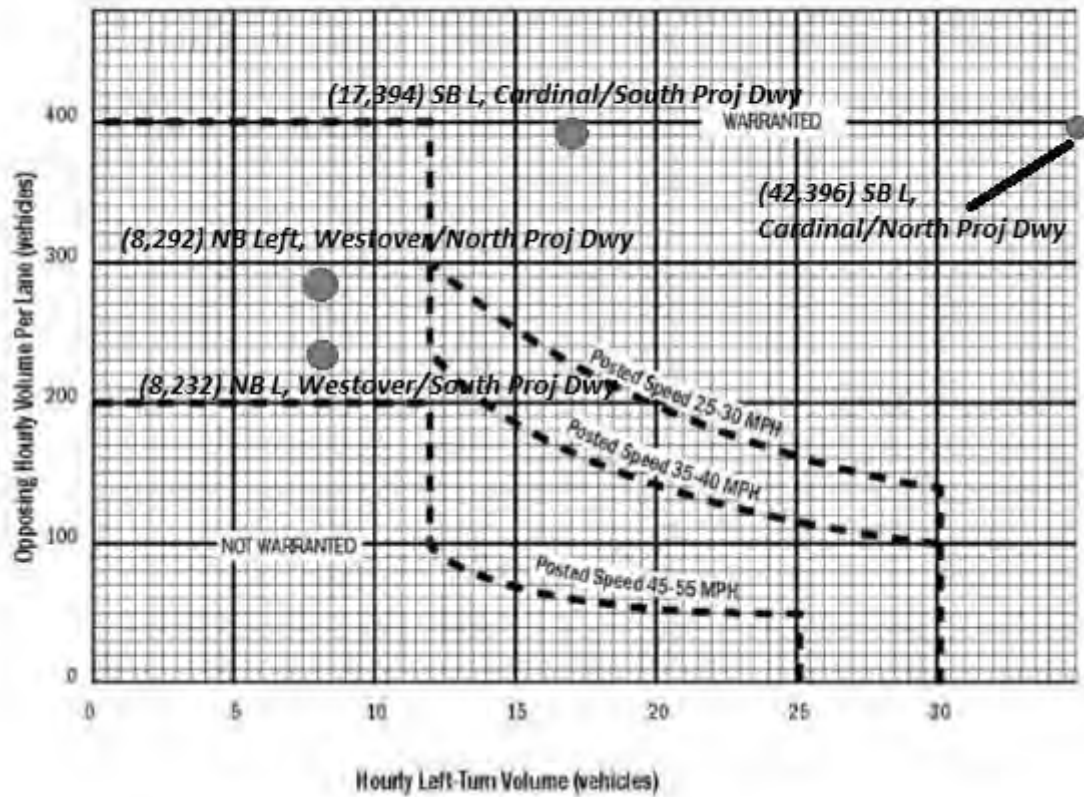


Exhibit 20 Right Turn Lane Warrant Criteria (Two Lane Roads)

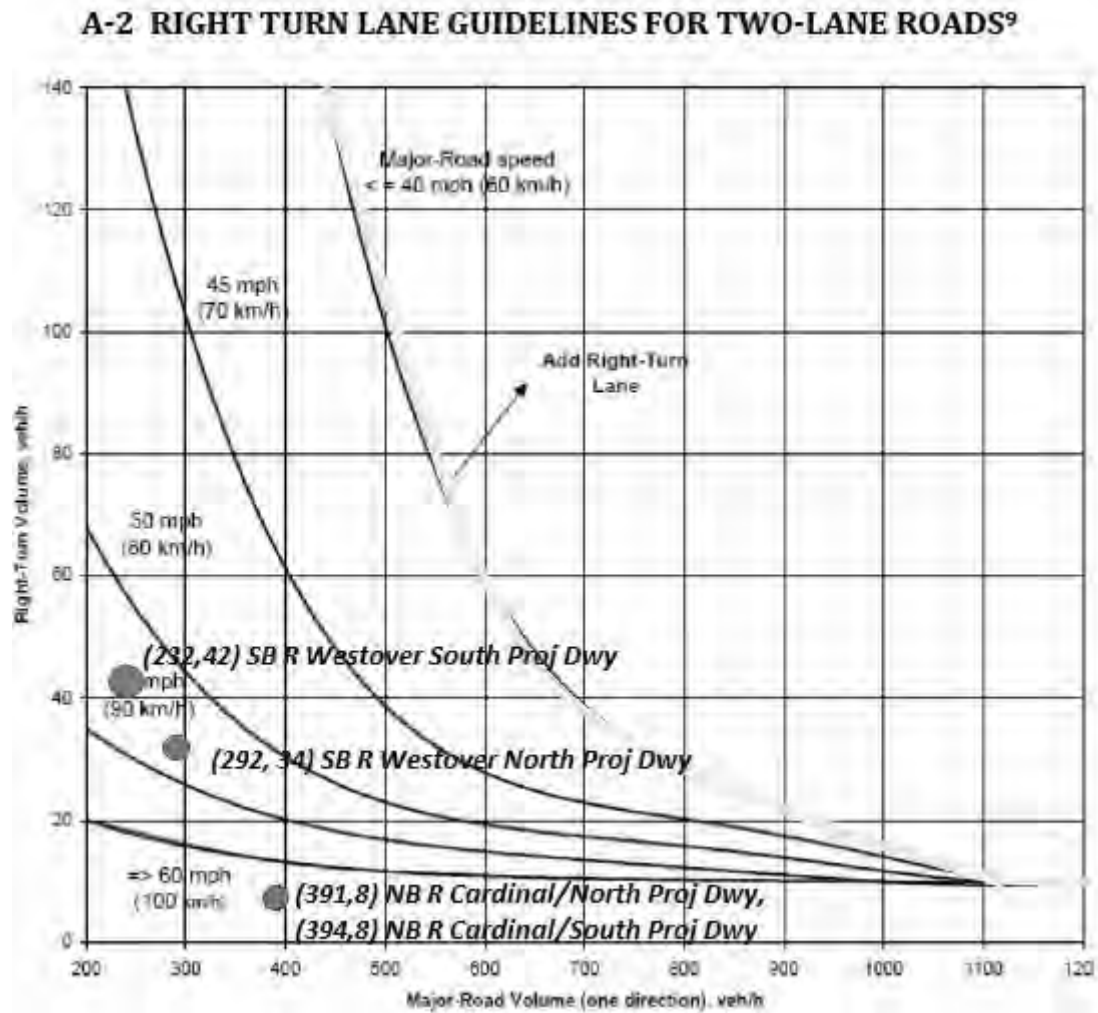
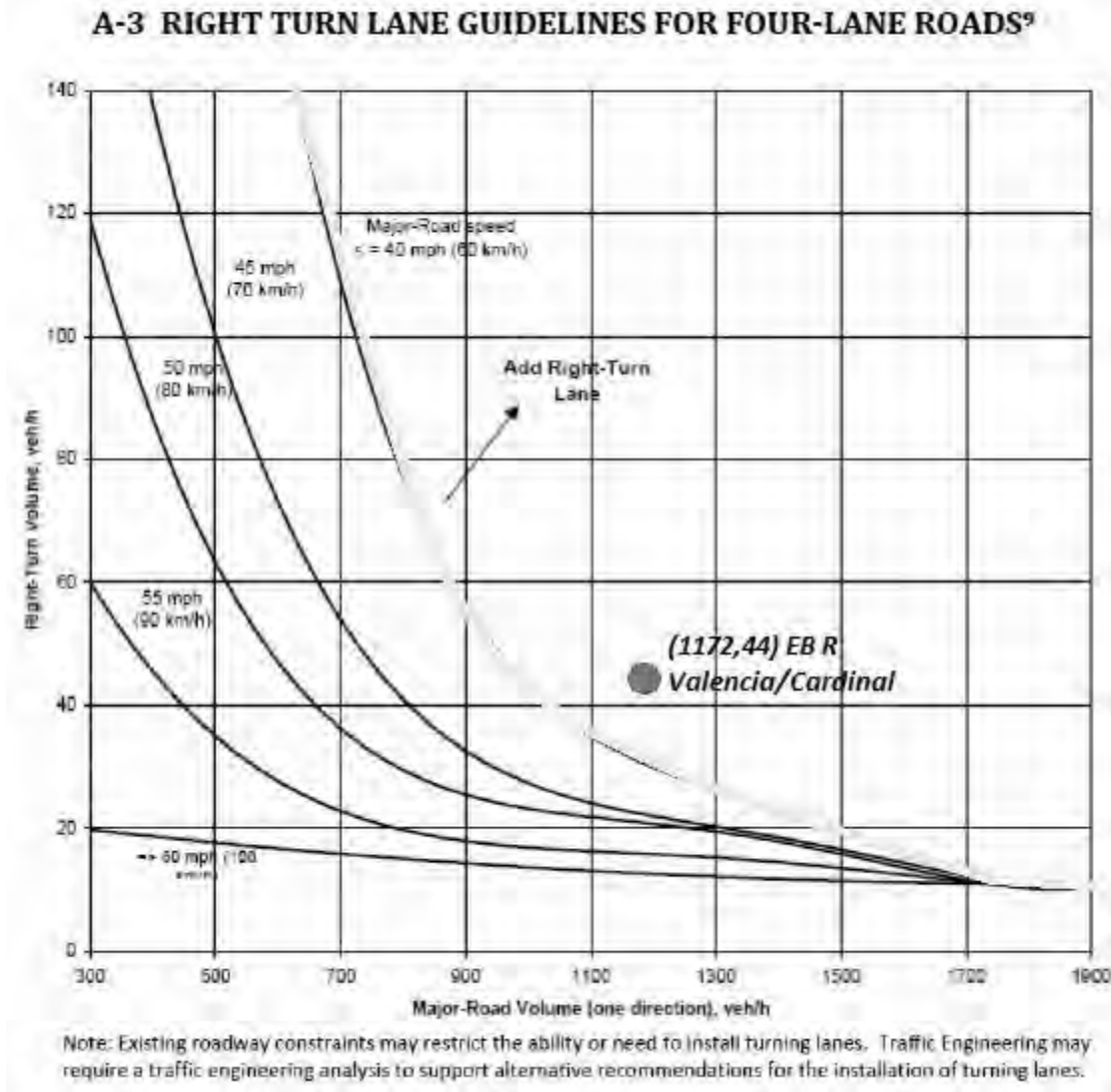


Exhibit 21 Right Turn Lane Warrant Criteria (Four Lane Roads)



Traffic signal warrant analyses were conducted for the Valencia Road/Westover Avenue (West) intersection. This intersection is stop-sign controlled on the north and south approaches. We collected four hours of peak period count data at this intersection between 7-9 AM and 4-6 PM on October 20, 2021, and there are existing 24-hour hourly data on Valencia Road on the Pima Association of Governments website.

We applied the analysis for conducting Signal Warrants 1, Conditions A and B, and Signal Warrant 2 from the Manual of Unified Traffic Control Devices (Chapter 4). Warrant 1 is met when eight hours of traffic volumes on the major roadway (Valencia Road) and the highest volume leg of the minor roadway (northbound Westover Avenue) exceed hourly volume thresholds. We do not have eight hours of counts on Westover Road but extrapolated four hours of data for Westover Avenue from the Valencia Road intersection data and historical PAG daily volume data on Valencia Road.

Exhibit 22 shows the criteria for warranting a traffic signal under Warrant 1, Eight-Hour Vehicular Volumes for both Condition A (Minimum Vehicular Volume) and Condition B

(Interruption of Continuous Traffic). For a major road with two or more lanes and a minor road with one or two lanes, the major road volume threshold is 600 vehicles per hour (vph) and the minor road volume threshold is either 150 vph (1 lane) or 200 vph (2 lanes) for Condition A. For Condition B, the respective thresholds are 900 vph (major) and 75 (1 lane minor) or 100 (2 lane minor) vph. The MUTCD allows for a reduction in right turn volumes when determining the minor street volumes. We applied a 20% and a 35% reduction at the intersection.

Exhibit 22 Signal Warrant Criteria (Warrant 1, Conditions A and B)

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

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

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

^a Basic minimum hourly volume

^b Used for combination of Conditions A and B after adequate trial of other remedial measures

^c May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

^d May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

For Warrant 2 (Four-Hour Warrant), if four hours of the projected volumes on the four-hour warrant graph (Exhibit 23) are above the line represented by the number of major and minor street lanes, then Warrant 2 is met.

Valencia/Westover (West)

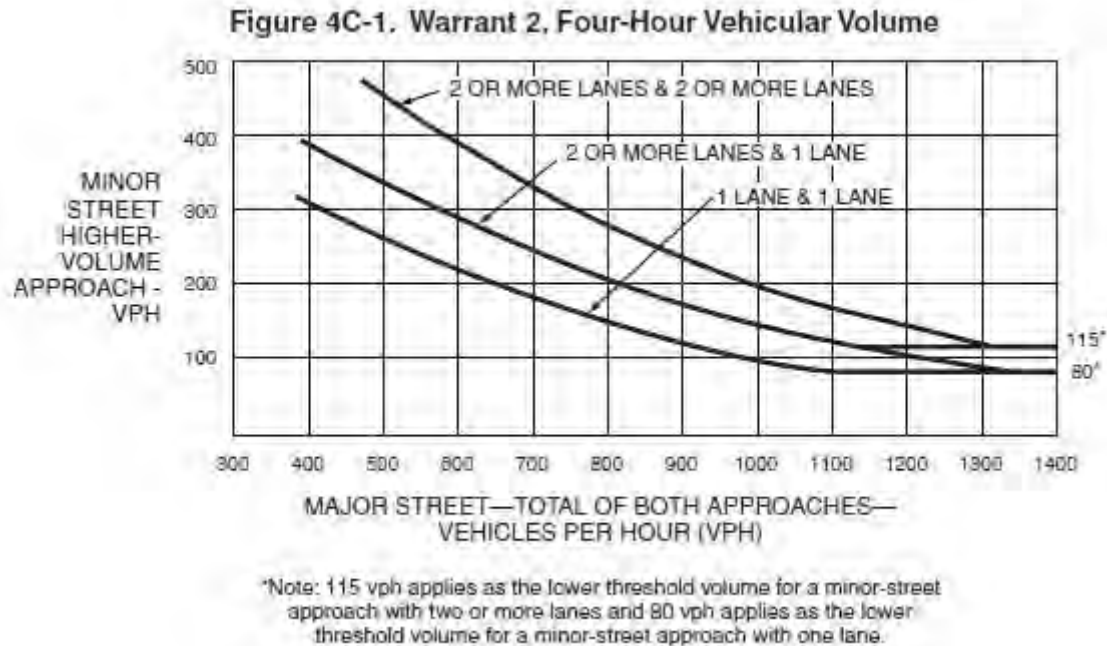
Based on the 2021 peak hour volumes at the intersections, the south leg (northbound approach) is the highest volume minor-street approach. For the right turn volume reduction, two assumptions were made, one that 20% of the right turns would be reduced and the other that 35% of the right turns would be reduced in this analysis for this approach. For Warrants 1 (both conditions) and Warrant 2, the major street combined volumes far exceed the minimum hourly volumes for at least eight hours.

The volumes used and the results of the signal warrants analysis, Warrants 1 and 2, are shown in Exhibits 24. We applied the volumes from the 2025 No Project condition.

Because northbound right turns at Westover Avenue are 95% of the total approach volumes, it can be argued that Westover Avenue should be considered a one-lane roadway. Under this assumption and applying the threshold volumes for a one-lane roadway (100 vph under Warrant 1, Condition A, and 75 vph under Condition B), Warrant 1, Condition B is met even with reducing 35% of the right turn lanes in the analysis. For Warrant 2, the minimum threshold for a one-lane minor road is 80 vph. The combined major street volume is well over 1400 vph. Under

this assumption, there are more than four hours where the minimum minor street volume is exceeded even with the higher 35% right turn lane reduction.

Exhibit 23 Signal Warrant Criteria (Warrant 2)



This intersection is approximately ¼ mile from the Valencia Road/Cardinal Road intersection and does not meet Pima County signal spacing standards (1/2 mile). Valencia Road also is a major corridor that is over capacity for a four-lane roadway. Any improvements at the Valencia Road/Westover Avenue intersection should be considered within a higher-level plan for improving Valencia Road to a six-lane section in the vicinity of the project.

Although the intersection of Los Reales/Cardinal is within the study area, there will be very few site trips projected through this intersection and because of this, we did not conduct a signal warrant analysis for this intersection, although the provision of a signal would improve operations at this location. Pima County should continue to monitor traffic volumes at this intersection. Other planned residential developments in the vicinity of this intersection (Sorrel Ridge Estates, i.e.) would have more impact on the operations at this intersection than Redford Estates.

Pedestrian and Bicycle Considerations

Facilities for pedestrians and bicycle traffic within the project site are assumed to be built according to the Pima County Subdivision and Development Standards. Both Westover Avenue and Valencia Road are shown as bikeable streets in the Tucson Metro Bike Map. Well planned pedestrian facilities should be built within and surrounding the project site. This should include sidewalks (or walking paths) and bike lanes along the project frontages on Cardinal Avenue and Westover Avenue.

There are nearby transit stops on Cardinal Avenue and Valencia Road and the County may require sidewalks and/or bicycle lanes to promote access to these transit stops.

Exhibit 24 Traffic Signal Warrant 1 (Cases A and B) and 2 Volumes and Results

Peak Hour Approach Vols					
	Valencia Road	Westover Ave (West)	Westover Ave (West)	Minor Street Vols for Warrants 1 and 2 Analysis	Minor Street Vols for Warrants 1 and 2 Analysis
Hour	Approach Peak Vols	2021 Approach Peak Vols	2025 Approach Peak Vols No Project	With 20% Right Turns Reduced	With 35% Right Turns Reduced
7:00-8:00 AM	2800	142	154	125	103
8:00- 9:00 AM	2661	110	119	96	79
1:00-2:00 PM	2723			99	81
2:00-3:00 PM	3162			115	94
3:00-4:00 PM	3249			118	97
4:00-5:00 PM	3493	116	126	102	84
5:00-6:00 PM	3372	124	134	109	90
6:00-7:00 PM	3139			114	94

Note: NB right turns are 95% of total approach vol.

Non-Peak Hour Volumes extrapolated from Valencia Road hourly volumes on PAGs website.

Notes:

Speed Limit is 40 mph on Valencia Road

Warrant 1, Case A

Major Street Volume Threshold = 600 vph (2 lane)

Minor Street Volume Threshold = 200 vph (2 lane), 100 vph (1 lane)

Warrant 1, Case B

Major Street Volume Threshold = 900 vph (2 lane)

Minor Street Volume Threshold = 100 vph (2 lane), 75 vph (1 lane)

Four Hour Warrant (70% of Volumes)

80 vph is threshold for 1-lane minor street

115 vph is threshold for 2-lane minor street

	Warrant Met? 20% RT Reduced, If Westover is 1 Lane	Warrant Met? 20% RT Reduced, If Westover is 2 Lanes	Warrant Met? 35% RT Reduced, If Westover is 1 Lane	Warrant Met? 35% RT Reduced, If Westover is 2 Lanes
8 Hour Warrant - Case A	No	No	No	No
8 Hour Warrant - Case B	Yes	No	Yes	No
4 Hour Warrant	Yes	No	Yes	No

Potential Mitigation – No Project Conditions

To improve conditions at the project area roadways and intersections to LOS D conditions, Pima County may consider program the following improvements in the near future:

1. Widen Valencia Road from Camino de la Tierra to Mission Road to six lanes., By the year 2025, and based on the analysis found in this report, the daily volumes on this segment of Valencia Road will exceed the theoretical LOS D capacity of a four-lane roadway without the project trips.
2. Provide signal control at Valencia Road/Westover Avenue.
3. Provide signal control at Los Reales Road/Cardinal Road.

Exhibit 25 shows the results of the Synchro analysis associated with these improvements.

Exhibit 25 Synchro Results for Mitigated Non-Project Related Conditions

Valencia/Mission

Added E/W Through Lane

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	23.1	C	31.1	C
Through/Right	49.5	D	50.6	D
Approach	43.5	D	44.3	D
Westbound				
Left	30.7	C	44.9	D
Through	28.7	C	42.9	D
Right	23.6	C	22.8	C
Approach	28.5	C	40.9	D
Northbound				
Left	23.4	C	22	C
Through/Right	54.9	D	46.5	D
Approach	53.9	D	44.2	D
Southbound				
Left	30.4	C	25.1	C
Through/Right	25	C	29	C
Approach	27.2	C	27.7	C
Intersection	38.5	D	41.1	D

Los Reales/Cardinal

Change to Signal Control

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	6.5	A	9.4	A
Through/Right	5	A	4.2	A
Approach	5.4	A	5.9	A
Westbound				
Left	5.9	A	5.2	A
Through	4.6	A	5.4	A
Right	4	A	4.1	A
Approach	4.6	A	5.2	A
Northbound				
Left	8.7	A	11.8	B
Through	8.7	A	11.4	B
Right	9.2	A	11.5	B
Approach	9	A	11.5	B
Southbound				
Left	9.6	A	12.1	B
Through	8.5	A	11.4	B
Right	9.5	A	13.6	B
Approach	9.4	A	12.8	B
Intersection	6.2	A	7.4	A

Valencia/Westover

Added E/W Through Lane
Change to Signal Control

	2025 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound				
Left	6.6	A	8.6	A
Through	12.9	B	14.1	B
Right	7.1	A	8.7	A
Approach	12.7	B	13.9	B
Westbound				
Left	9.9	A	15.8	B
Through/Right	7.1	A	10.4	B
Approach	7.3	A	10.8	B
Northbound				
Left/Through	16.3	B	15.7	B
Right	22.8	C	22.6	C
Approach	22.5	C	22.5	C
Southbound				
Left/Through/Right	17	B	16.1	B
Approach	17	B	16.1	B
Intersection	11.6	B	12.9	B

7. Conclusions and Recommendations

Conclusions

1. Based on the average trip rates for the project land use, the project generates 2,539 daily one-way trips, with 199 trips during the AM peak hour and 266 during the PM peak hour.
2. The projected traffic volumes produced by the project and the regional traffic growth rate will generally not degrade operating conditions at most locations beyond their projected conditions without the project. However, there will need to be some improvements at the offsite intersections.
3. The location of two of the four proposed access locations for the project will be across from two existing residential streets creating four-leg intersections at each location.
4. Left turn lanes are warranted on Cardinal Road at both project driveways.
5. The daily volumes on the four-lane segments of Valencia Road in the vicinity of the project will exceed their LOS D daily volume capacities by the year 2025 even without the project.

Recommendations

1. Provide a southbound left turn lane on Cardinal Avenue at the north project site driveway. A northbound left turn lane on Cardinal Avenue for turns into Calle Canario should also be constructed for symmetry. The storage length for these turn lanes should meet Pima County's minimum standard of 110 feet, with tapers and gaps designed to Pima County Standards.
2. Provide a southbound left turn lane on Cardinal Avenue at the south project site driveway. This turn lane should be 110 feet long with tapers and gaps designed to Pima County Standards.
3. Additional storage must be provided for the northbound left turn lanes at Valencia Road/Cardinal Avenue intersection (existing northbound left turn is 115 feet long, requiring an additional 21 feet).
4. At the Valencia Road/Westover Avenue intersection, the northbound right turn lane transitions from the through lane. A preliminary signal warrant analysis under 2025 No Project conditions found that a signal may be warranted by the year 2025. Long queues on this approach, associated with the right turn volumes are currently experienced as ninety-five percent of the approach volumes turn right under existing conditions. Further discussion should be held with Pima County staff to determine what improvements may be necessary based on the projected volumes and the signal warrant analysis.
5. The analysis further indicates that the southbound left turn lane at the Valencia Road/Mission Road intersection and the westbound left turn lane at the Valencia Road/Camino de la Tierra intersection should be lengthened. However, these

queue lengths are not primarily due to the influence of the project site trips and any improvements would be necessary based on the background future traffic growth in the project area.

6. The project triggers the warrant for a right turn on the eastbound approach at this intersection. However, the presence of a large transmission tower, a culvert along the west side of Cardinal Avenue and other physical infrastructure on this corner may constrain the construction of this turn lane. It should be noted that all southbound project trips arriving from west of this intersection were assigned at this intersection. It may be that many of these southbound trips would continue through the intersection and turn right on Westover Avenue where there is an existing right turn lane on Valencia Road. Because of these reasons, particularly because of the infrastructure constraints, it is not recommended that this turn lane be constructed.
7. Because of the less than standard intersection site distance, on Cardinal Avenue at the northern project driveway, it is recommended that the location of this access be relocated to be at a more northern location to ensure adequate sight distance.
8. The following improvements that are not site traffic specific will improve roadway and intersection operations in the future and should be included in a future capital and infrastructure plan for Pima County.
 - a. Widen Valencia Road to a six-lane cross section between Camino de la Tierra and Mission Road
 - b. Provide signal control at the Valencia Road/Westover Avenue (West) intersection
 - c. Provide signal control at the Los Reales/Cardinal Avenue intersection
9. Sidewalks and/or walking paths and bicycle lanes should be provided along the frontages of the project site on Cardinal Avenue and Westover Avenue.
10. Roadway and subdivision design should conform to current Pima County standards.
11. All new traffic signs and markings must comply fully with the *Manual on Uniform Traffic Control Devices* and County requirements.

APPENDIX

- Site Plan
- Traffic Data
- Synchro Analysis Sheets

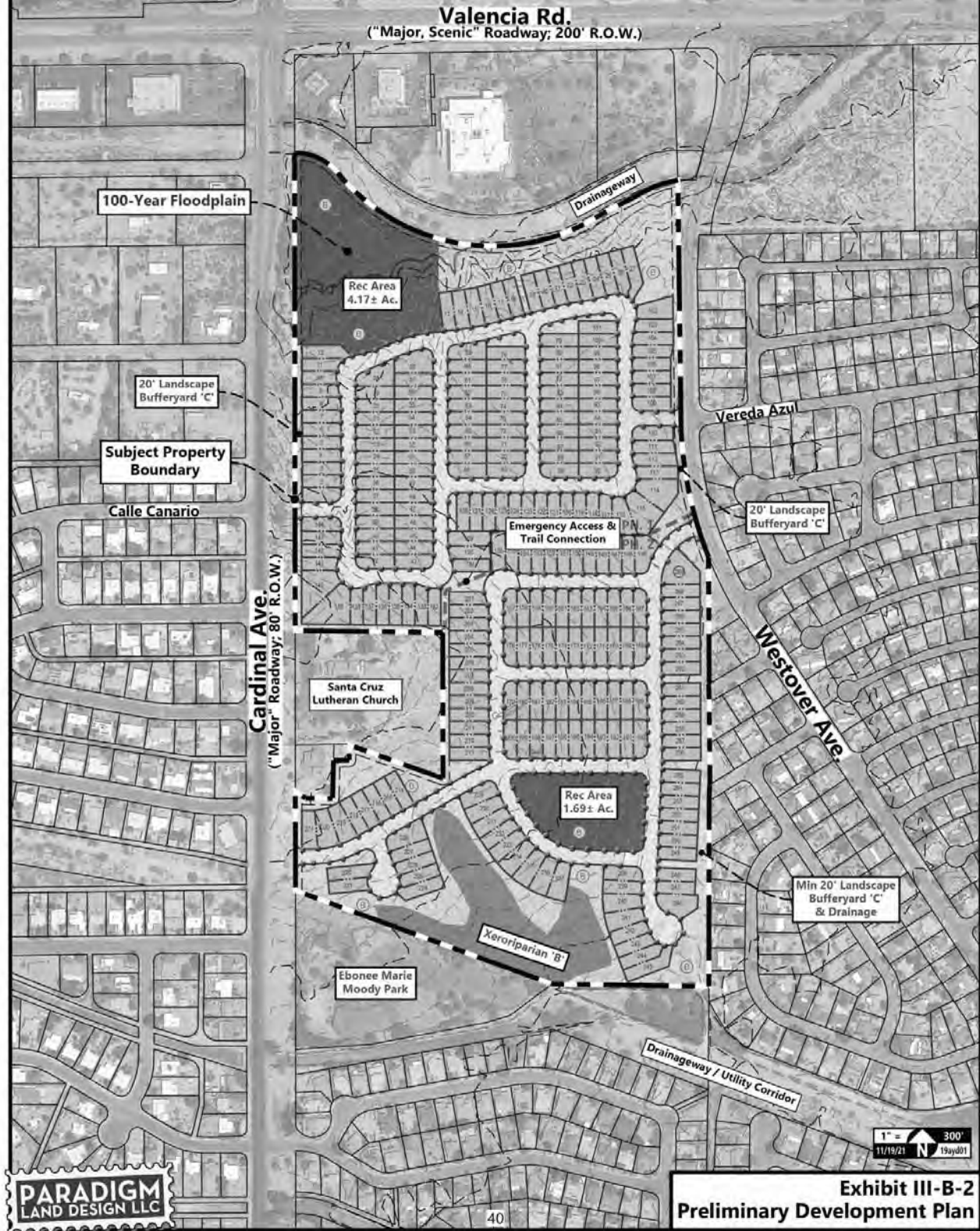
Property Data

1. Property Area: 60.9± Ac.
2. Assessor Parcel(s): 138-25-593C
3. Existing Zoning: GR-1 (Pima Co.)
4. Existing Comp Plan: Medium-Low Intensity Urban, 2.5-5.0 Homes per Acre
5. Existing C.L.S.: None
6. Existing Riparian: Xeroriparian 'B' Along Southern Edge of Site

Proposal Summary

1. Zoning: CR-4
2. Lots: 269
3. Lot Size: 40' x 120'
4. Phasing:

Phase	Area	40'x120's	Rec. Area
Ph. 1	30.7± Ac.	144	4.17± Ac.
Ph. 2	30.2± Ac.	125	1.69± Ac.
	60.9± Ac.	269	5.86± Ac. (949 Sq. Ft / Lot)
5. Gross Density: 4.4 Homes per Acre



PARADIGM
LAND DESIGN LLC

Exhibit III-B-2
Preliminary Development Plan

Count period:	0:15
---------------	------

		Count Starts at																			
		4:00 PM				NB Cardinal				SB Cardinal				EB Valencia				WB Valencia			
		END Time	Left Turn	THRU	Right Turn	RTOR	Left Turn	THRU	Right Turn	RTOR	Left Turn	THRU	Right Turn	RTOR	Left Turn	THRU	Right Turn	RTOR			
	4:15 PM	35	23	33			54	35	45		25	283	2		49	310	27				
	4:30 PM	35	19	30			42	31	29		25	305	2		66	284	22				
	4:45 PM	40	28	42			42	46	42		31	275	6		66	293	27				
	5:00 PM	39	28	45			56	37	41		19	243	5		68	311	22				
	5:15 PM	26	28	36			52	30	50		35	239	9		64	292	21				
	5:30 PM	29	29	39			47	47	31		34	285	5		61	302	27				
	5:45 PM	29	31	48			52	59	33		22	205	3		69	309	34				
	6:00 PM	41	23	43			62	36	34		35	290	4		47	297	25				
	4:00 PM	149	98	150	0	194	149	157	0	100	1106	15	0	249	1198	98	0				
	4:15 PM	140	103	153	0	192	144	162	0	110	1062	22	0	264	1180	92	0				
4:30 PM	134	113	162	0	197	160	164	0	119	1042	25	0	259	1198	97	0					
4:45 PM	123	116	168	0	207	173	155	0	110	972	22	0	262	1214	104	0					
5:00 PM	125	111	166	0	213	172	148	0	126	1019	21	0	241	1200	107	0					
4:00 PM	274	209	316	0	407	321	305	0	226	2125	36	0	490	2398	205	0					
2025 No Project		145	122	175	0	213	173	178	0	129	1128	27	0	280	1297	105	0	PHF			
Site Trips		10	15	10			25				17			17							
2025 With Project		155	137	185	0	213	198	178	0	129	1128	44	0	297	1297	105	0				

	NB	SB	EB	WB	TOTALS		
					Total	END Time	
	91	134	310	386	921	4:15 PM	
	84	102	332	372	890	4:30 PM	
	110	130	312	386	938	4:45 PM	
	112	134	267	401	914	5:00 PM	
	90	132	283	377	882	5:15 PM	
	97	125	324	390	936	5:30 PM	
	108	144	230	412	894	5:45 PM	
	107	132	329	369	937	6:00 PM	
397	500	1221	1545	3663	4:00 PM	5:00 PM	
396	498	1194	1536	3624	4:15 PM	5:15 PM	
409	521	1186	1554	3670	4:30 PM	5:30 PM	
407	535	1104	1580	3626	4:45 PM	5:45 PM	
402	533	1166	1548	3649	5:00 PM	6:00 PM	
799	1033	2387	3093	7312	4:00 PM	6:00 PM	
0.91	0.97	0.92	0.97				

Intersection Turning Movement

Prepared by:



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Camino de la Tierra

DATE: 10/20/21

LOCATION: Tucson

E-W STREET: Valencia Rd

DAY: WEDNESDAY

PROJECT# 21-1634-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	1	0	1	1	0	1	2	1	1	2	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	11	6	64	11	11	3	13	259	6	21	120	4	529
7:15 AM	7	9	50	12	6	11	21	338	10	24	117	5	610
7:30 AM	10	14	58	9	17	12	21	256	7	37	145	8	594
7:45 AM	15	11	58	6	9	20	17	258	13	44	202	7	660
8:00 AM	22	8	71	5	13	8	9	251	19	62	190	4	662
8:15 AM	18	15	89	4	11	15	6	266	20	51	158	8	661
8:30 AM	11	16	54	4	12	6	7	229	8	40	162	3	552
8:45 AM	12	8	38	6	10	9	5	242	2	34	199	3	568
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	106	87	482	57	89	84	99	2099	85	313	1293	42	4836
Approach %	15.70	12.89	71.41	24.78	38.70	36.52	4.34	91.94	3.72	18.99	78.46	2.55	
App/Depart	675	/	228	230	/	487	2283	/	2638	1648	/	1483	

AM Peak Hr Begins at: 730 AM

PEAK

Volumes	65	48	276	24	50	55	53	1031	59	194	695	27	2577
2025 NP	70	52	299	26	54	60	57	1116	64	210	752	29	
Site Trips								5			15		
2025 WP	70	52	299	26	54	60	57	1121	64	210	767	29	
Approach %	16.71	12.34	70.95	18.60	38.76	42.64	4.64	90.20	5.16	21.18	75.87	2.95	

PEAK HR.

FACTOR:	0.797	0.849	0.979	0.895	0.973
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CONTROL:

Signal

COMMENT 1:

GPS:

32.133746, -111.037353

HOURS:

	FROM:		TO:	
AM	700	AM	900	AM
NOON				
PM	400	PM	600	PM

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Camino de la Tierra 0 DATE: 10/20/21 LOCATION: Tucson
E-W STREET: Valencia Rd DAY: WEDNESDAY PROJECT#: 21-1634-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	1	0	1	1	0	1	2	1	1	2	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	22	5	51	7	5	15	8	215	7	71	311	10	727
4:15 PM	21	8	30	3	11	18	12	261	10	61	282	9	726
4:30 PM	17	7	53	13	19	17	9	240	9	73	311	15	783
4:45 PM	16	4	50	10	18	21	4	221	3	66	320	9	742
5:00 PM	15	5	39	6	12	16	8	254	10	62	299	10	736
5:15 PM	21	6	57	10	18	12	6	289	6	66	285	13	789
5:30 PM	21	10	33	6	15	16	12	321	9	61	281	9	794
5:45 PM	23	16	49	1	21	5	14	222	11	65	300	9	736
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	156	61	362	56	119	120	73	2023	65	525	2389	84	6033
Approach %	26.94	10.54	62.52	18.98	40.34	40.68	3.38	93.61	3.01	17.51	79.69	2.80	
App/Depart	579	/	218	295	/	709	2161	/	2441	2998	/	2665	

PM Peak Hr Begins at: 445 PM

PEAK													
Volumes	73	25	179	32	63	65	30	1085	28	255	1185	41	3061
2025 NP	79	27	194	35	68	70	32	1174	30	276	1283	44	
Site Trips								17			10		
2025 WP	79	27	194	35	68	70	32	1191	30	276	1293	44	
Approach %	26.35	9.03	64.62	20.00	39.38	40.63	2.62	94.93	2.45	17.22	80.01	2.77	

PEAK HR.													
FACTOR:		0.824		0.816			0.836			0.937			0.964

CONTROL:	Signal												
COMMENT 1:	0												
GPS:	32.133746, -111.037353												
HOURS:		FROM:					TO:						
	AM	700	AM	900	AM								
	NOON	0	0	0	0								
	PM	400	PM	600	PM								

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Westover Ave

DATE: 10/20/21

LOCATION: Tucson

E-W STREET: Valencia Rd

DAY: WEDNESDAY

PROJECT# 21-1634-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	0	0	0	1	0	1	2	0	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	1	0	42	0	0	5	3	381	2	14	141	2	591
7:15 AM	1	1	34	5	0	6	2	434	6	9	151	5	654
7:30 AM	2	0	33	5	1	7	2	334	4	15	209	4	616
7:45 AM	0	0	28	0	0	5	2	370	3	19	247	3	677
8:00 AM	4	0	32	1	0	2	5	353	6	20	265	3	691
8:15 AM	0	0	23	3	1	4	4	350	3	16	211	5	620
8:30 AM	3	0	24	3	0	4	2	320	6	16	237	1	616
8:45 AM	1	0	23	1	0	3	2	306	9	22	211	4	582
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	12	1	239	18	2	36	22	2848	39	131	1672	27	5047
Approach %	4.76	0.40	94.84	32.14	3.57	64.29	0.76	97.90	1.34	7.16	91.37	1.48	
App/Depart	252	/	50	56	/	172	2909	/	3105	1830	/	1720	

AM Peak Hr Begins at: 715 AM

PEAK

Volumes	7	1	127	11	1	20	11	1491	19	63	872	15	2638
2025 NP	8	1	137	12	1	22	12	1614	21	68	944	16	
Site Trips			67					15		22	5		
2025 WP	8	1	204	12	1	22	12	1629	21	90	949	16	
Approach %	5.19	0.74	94.07	34.38	3.13	62.50	0.72	98.03	1.25	6.63	91.79	1.58	

PEAK HR.

FACTOR:	0.938	0.615	0.860	0.825	0.954
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CONTROL: 1-Wa Stop SB

COMMENT 1:

GPS: 32.133848, -111.020296

HOURS:

	FROM:		TO:	
AM	700	AM	900	AM
NOON				
PM	400	PM	600	PM

PROJECT# 21-1634-002

[illegible]

PM Peak Hr Begins at: 445 PM

Volumes	5	0	126	4	1	22	15	1359	24	176	1460	30	3222
2025 NP	5	0	136	4	1	24	16	1471	26	191	1580	32	
Site Trips			44					10		75	17		
2025 WP	5	0	180	4	1	24	16	1481	26	266	1597	32	
Approach %	3.82	0.00	96.18	14.81	3.70	81.48	1.07	97.21	1.72	10.56	87.64	1.80	

FACTOR:	0.728	0.844	0.910	0.966	0.965
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HOURS:

	FROM:		TO:	
AM	700	AM	900	AM
NOON	0	0	0	0
PM	400	PM	600	PM

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Cardinal A e

DATE: 10/20/21

LOCATION: Tucson

E-W STREET: Los Reales Rd

DAY: WEDNESDAY

PROJECT# 21-1634-003

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 1	NR 1	SL 1	ST 1	SR 1	EL 1	ET 2	ER 0	WL 1	WT 1	WR 1	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	3	16	20	10	7	14	32	120	3	3	20	5	253
7:15 AM	7	12	19	18	4	12	51	145	4	5	30	6	313
7:30 AM	3	13	22	18	7	19	39	116	5	4	56	6	308
7:45 AM	5	12	16	10	8	32	45	101	3	5	53	5	295
8:00 AM	1	14	22	8	2	22	23	83	0	8	46	3	232
8:15 AM	0	21	14	10	7	21	23	71	5	4	30	3	209
8:30 AM	3	15	9	2	14	22	24	65	3	6	42	5	210
8:45 AM	0	5	6	5	8	27	25	50	3	6	40	2	177
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	22	108	128	81	57	169	262	751	26	41	317	35	1997
Approach %	8.53	41.86	49.61	26.38	18.57	55.05	25.22	72.28	2.50	10.43	80.66	8.91	
App/Depart	258	/	405	307	/	124	1039	/	960	393	/	508	

AM Peak Hr Begins at: 700 AM

PEAK													
Volumes	18	53	77	56	26	77	167	482	15	17	159	22	1169
2025 NP	19	57	83	61	28	83	181	522	16	18	172	24	
Site Trips				7		7	2					2	
2025 WP	19	57	83	68	28	90	183	522	16	18	172	26	
Approach %	12.16	35.81	52.03	35.22	16.35	48.43	25.15	72.59	2.26	8.59	80.30	11.11	

PEAK HR. FACTOR:		0.949		0.795		0.830		0.750		0.934	
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CONTROL: 4-Wa Stop

COMMENT 1:

GPS: 32.119218, -111.029000

HOURS:		FROM:		TO:	
	AM	700	AM	900	AM
	NOON				
	PM	400	PM	600	PM

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Cardinal A e

0

DATE: 10/20/21

LOCATION: Tucson

E-W STREET: Los Reales Rd

DAY: WEDNESDAY

PROJECT# 21-1634-003

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	1	1	1	1	1	1	2	0	1	1	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	14	6	3	18	43	25	51	4	24	103	18	311
4:15 PM	1	16	13	2	16	38	15	57	2	17	117	12	306
4:30 PM	5	16	22	4	13	30	33	65	1	26	106	21	342
4:45 PM	1	11	9	4	17	41	27	56	3	25	104	12	310
5:00 PM	1	14	14	7	21	33	40	85	4	18	106	21	364
5:15 PM	3	23	19	7	18	39	33	98	1	23	93	25	382
5:30 PM	5	17	16	5	19	46	29	62	4	23	115	23	364
5:45 PM	0	17	14	4	16	26	49	60	2	19	91	19	317
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	18	128	113	36	138	296	251	534	21	175	835	151	2696
Approach %	6.95	49.42	43.63	7.66	29.36	62.98	31.14	66.25	2.61	15.07	71.92	13.01	
App/Depart	259	/	530	470	/	334	806	/	683	1161	/	1149	

PM Peak Hr Begins at: 500 PM

PEAK

Volumes	9	71	63	23	74	144	151	305	11	83	405	88	1427
2025 NP	10	77	68	25	80	156	163	330	12	90	438	95	
Site Trips				5		5	8					8	
2025 WP	10	77	68	30	80	161	171	330	12	90	438	103	
Approach %	6.29	49.65	44.06	9.54	30.71	59.75	32.33	65.31	2.36	14.41	70.31	15.28	

PEAK HR.

FACTOR:	0.794	0.861	0.884	0.894	0.934
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CONTROL: 4-Wa Stop

COMMENT 1: 0

GPS: 32.119218, -111.029000

HOURS:

	FROM:		TO:	
AM	700	AM	900	AM
NOON	0	0	0	0
PM	400	PM	600	PM

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Cardinal A e

DATE: 10/20/21

LOCATION: Tucson

E-W STREET: Calle Canario

DAY: WEDNESDAY

PROJECT# 21-1634-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	1	0	0	1	0	0	1	0	0	0	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	112	0	0	26	3	4	0	3	0	0	0	148
7:15 AM	0	97	0	0	52	5	8	0	0	0	0	0	162
7:30 AM	1	75	0	0	67	2	5	0	0	0	0	0	150
7:45 AM	1	77	0	0	52	5	4	0	0	0	0	0	139
8:00 AM	1	83	0	0	56	4	11	0	2	0	0	0	157
8:15 AM	0	69	0	0	55	1	9	0	0	0	0	0	134
8:30 AM	0	66	0	0	55	5	1	0	0	0	0	0	127
8:45 AM	0	65	0	0	52	8	3	0	0	0	0	0	128
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	3	644	0	0	415	33	45	0	5	0	0	0	1145
Approach %	0.46	99.54	0.00	0.00	92.63	7.37	90.00	0.00	10.00	####	####	####	
App/Depart	647	/	689	448	/	420	50	/	0	0	/	36	

AM Peak Hr Begins at: 715 AM

PEAK													
Volumes	3	332	0	0	227	16	28	0	2	0	0	0	608
2025 NP	3	359	0	0	246	17	30	0	2	0	0	0	
Site Trips		15	2	12	5					7		37	
2025 WP	3	374	2	12	251	17	30	0	2	7	0	37	
Approach %	0.90	99.10	0.00	0.00	93.42	6.58	93.33	0.00	6.67	####	####	####	

PEAK HR.													
FACTOR:		0.863		0.880			0.577			0.000			0.938

CONTROL: 1-Wa Stop EB

COMMENT 1:

GPS: 32.129716, -111.028947

HOURS:		FROM:		TO:	
	AM	700	AM	900	AM
	NOON				
	PM	400	PM	600	PM

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Cardinal A e 0 DATE: 10/20/21 LOCATION: Tucson
E-W STREET: Calle Canario DAY: WEDNESDAY PROJECT#: 21-1634-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	1	0	0	1	0	0	1	0	0	0	0	

1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	61	0	0	89	9	3	0	0	0	0	0	164
4:15 PM	0	76	0	0	91	5	10	0	1	0	0	0	183
4:30 PM	0	71	0	0	108	8	5	0	0	0	0	0	192
4:45 PM	3	93	0	0	76	5	7	0	0	0	0	0	184
5:00 PM	1	89	0	0	101	10	3	0	1	0	0	0	205
5:15 PM	1	78	0	0	102	9	14	0	0	0	0	0	204
5:30 PM	3	86	0	0	92	8	7	0	0	0	0	0	196
5:45 PM	0	92	0	0	97	9	5	0	0	0	0	0	203
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	10	646	0	0	756	63	54	0	2	0	0	0	1531
Approach %	1.52	98.48	0.00	0.00	92.31	7.69	96.43	0.00	3.57	####	####	####	
App/Depart	656	/	700	819	/	758	56	/	0	0	/	73	

PM Peak Hr Begins at: 500 PM

PEAK													
Volumes	5	345	0	0	392	36	29	0	1	0	0	0	808
2025 NP	5	373	0	0	424	39	31	0	1	0	0	0	
Site Trips		10	8	42	17					5		25	
2025 WP	5	383	8	42	441	39	31	0	1	5	0	25	
Approach %	1.43	98.57	0.00	0.00	91.59	8.41	96.67	0.00	3.33	####	####	####	

PEAK HR.													
FACTOR:		0.951		0.964			0.536			0.000			0.985

CONTROL: 1-Wa Stop EB
COMMENT 1: 0
GPS: 32.129716, -111.028947

HOURS:		FROM:		TO:
	AM	700	AM	900
	NOON	0	0	0
	PM	400	PM	600

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Westo er A e

DATE: 10/20/21

LOCATION: Tucson

E-W STREET: Vereda A ul

DAY: WEDNESDAY

PROJECT# 21-1634-005

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	1	0	0	1	0	0	0	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	32	1	4	14	0	0	0	0	0	0	10	61
7:15 AM	0	31	0	3	12	0	0	0	0	0	0	12	58
7:30 AM	0	25	2	10	14	0	0	0	0	4	0	10	65
7:45 AM	0	27	0	7	17	0	0	0	0	1	0	7	59
8:00 AM	0	27	3	6	21	0	0	0	0	3	0	10	70
8:15 AM	0	23	1	4	18	0	0	0	0	0	0	9	55
8:30 AM	0	17	3	10	17	0	0	0	0	2	0	13	62
8:45 AM	0	19	2	7	21	0	0	0	0	1	0	7	57
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	201	12	51	134	0	0	0	0	11	0	78	487
Approach %	0.00	94.37	5.63	27.57	72.43	0.00	####	####	####	12.36	0.00	87.64	
App/Depart	213	/	279	185	/	145	0	/	63	89	/	0	

AM Peak Hr Begins at: 715 AM

PEAK

Volumes	0	110	5	26	64	0	0	0	0	8	0	39	252
2025 NP	0	119	5	28	69	0	0	0	0	9	0	42	
Site Trips	2					10	30		7				
2025 WP	2	119	5	28	69	10	30	0	7	9	0	42	
Approach %	0.00	95.65	4.35	28.89	71.11	0.00	####	####	####	17.02	0.00	82.98	

PEAK HR.

FACTOR:	0.927	0.833	0.000	0.839	0.900
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CONTROL: 1-Wa Stop WB

COMMENT 1:

GPS: 32.130454, -111.024612

HOURS:	FROM:	TO:
AM	700 AM	900 AM
NOON		
PM	400 PM	600 PM

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Westo er A e 0 DATE: 10/20/21 LOCATION: Tucson
E-W STREET: Vereda A ul DAY: WEDNESDAY PROJECT# 21-1634-005

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	1	0	0	1	0	0	0	0	0	1	0	

1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	24	3	7	69	0	0	0	0	3	0	10	116
4:15 PM	0	21	2	15	55	0	0	0	0	1	0	7	101
4:30 PM	0	23	0	6	39	0	0	0	0	1	0	5	74
4:45 PM	0	33	0	6	51	0	0	0	0	1	0	12	103
5:00 PM	0	21	2	10	48	0	0	0	0	5	0	3	89
5:15 PM	0	27	2	11	52	0	0	0	0	1	0	11	104
5:30 PM	0	33	1	9	51	0	0	0	0	0	0	12	106
5:45 PM	0	26	0	13	44	0	0	0	0	1	0	12	96
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	208	10	77	409	0	0	0	0	13	0	72	789
Approach %	0.00	95.41	4.59	15.84	84.16	0.00	####	####	####	15.29	0.00	84.71	
App/Depart	218	/	280	486	/	422	0	/	87	85	/	0	

PM Peak Hr Begins at: 445 PM

PEAK													
Volumes	0	114	5	36	202	0	0	0	0	7	0	38	402
2025 NP	0	123	5	39	219	0	0	0	0	8	0	41	
Site Trips	8					34	20		5				
2025 WP	8	123	5	39	219	34	20	0	5	8	0	41	
Approach %	0.00	95.80	4.20	15.13	84.87	0.00	####	####	####	15.56	0.00	84.44	

PEAK HR.													
FACTOR:		0.875			0.944			0.000			0.865		0.948

CONTROL: 1-Wa Stop WB
COMMENT 1: 0
GPS: 32.130454, -111.024612

HOURS:	FROM:		TO:	
AM	700	AM	900	AM
NOON	0	0	0	0
PM	400	PM	600	PM

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	1460	9	94	923	80	12	82	306	125	66	109
Future Volume (veh/h)	122	1460	9	94	923	80	12	82	306	125	66	109
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	133	1587	10	101	992	86	14	93	348	154	81	135
Peak Hour Factor	0.92	0.92	0.92	0.93	0.93	0.93	0.88	0.88	0.88	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	312	1658	10	183	1594	711	302	75	279	210	172	286
Arrive On Green	0.06	0.46	0.46	0.05	0.45	0.45	0.02	0.22	0.22	0.07	0.27	0.27
Sat Flow, veh/h	1781	3620	23	1781	3554	1585	1781	345	1292	1781	630	1051
Grp Volume(v), veh/h	133	779	818	101	992	86	14	0	441	154	0	216
Grp Sat Flow(s),veh/h/ln	1781	1777	1866	1781	1777	1585	1781	0	1638	1781	0	1681
Q Serve(g_s), s	3.5	37.7	37.8	2.7	19.1	2.8	0.5	0.0	19.3	5.8	0.0	9.6
Cycle Q Clear(g_c), s	3.5	37.7	37.8	2.7	19.1	2.8	0.5	0.0	19.3	5.8	0.0	9.6
Prop In Lane	1.00		0.01	1.00		1.00	1.00		0.79	1.00		0.63
Lane Grp Cap(c), veh/h	312	814	855	183	1594	711	302	0	354	210	0	458
V/C Ratio(X)	0.43	0.96	0.96	0.55	0.62	0.12	0.05	0.00	1.25	0.73	0.00	0.47
Avail Cap(c_a), veh/h	393	818	859	193	1594	711	373	0	354	210	0	458
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.3	23.3	23.4	20.6	18.8	14.4	26.6	0.0	35.0	25.7	0.0	27.1
Incr Delay (d2), s/veh	0.9	21.5	20.9	3.0	0.8	0.1	0.1	0.0	132.2	12.3	0.0	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	19.5	20.3	1.2	7.6	1.0	0.2	0.0	20.5	3.1	0.0	4.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.3	44.8	44.3	23.6	19.6	14.4	26.7	0.0	167.2	38.0	0.0	30.6
LnGrp LOS	B	D	D	C	B	B	C	A	F	D	A	C
Approach Vol, veh/h		1730			1179			455			370	
Approach Delay, s/veh		42.3			19.6			162.9			33.7	
Approach LOS		D			B			F			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	23.8	9.1	45.4	6.0	28.8	9.9	44.6				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.5	19.3	5.1	41.1	5.0	20.8	9.5	36.7				
Max Q Clear Time (g_c+l1), s	7.8	21.3	4.7	39.8	2.5	11.6	5.5	21.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	1.1	0.0	0.8	0.1	6.7				
Intersection Summary												
HCM 6th Ctrl Delay			49.0									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	136	1098	26	87	854	56	54	120	214	144	94	136
Future Volume (veh/h)	136	1098	26	87	854	56	54	120	214	144	94	136
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	143	1156	27	95	928	61	61	135	240	203	132	192
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.71	0.71	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	1286	30	228	1233	550	381	937	418	459	506	451
Arrive On Green	0.07	0.36	0.36	0.06	0.35	0.35	0.05	0.26	0.26	0.07	0.28	0.28
Sat Flow, veh/h	1781	3549	83	1781	3554	1585	1781	3554	1585	1781	1777	1585
Grp Volume(v), veh/h	143	579	604	95	928	61	61	135	240	203	132	192
Grp Sat Flow(s),veh/h/ln	1781	1777	1855	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	3.7	22.5	22.6	2.5	16.9	1.9	1.8	2.1	9.6	5.1	4.2	7.2
Cycle Q Clear(g_c), s	3.7	22.5	22.6	2.5	16.9	1.9	1.8	2.1	9.6	5.1	4.2	7.2
Prop In Lane	1.00		0.04	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	296	644	672	228	1233	550	381	937	418	459	506	451
V/C Ratio(X)	0.48	0.90	0.90	0.42	0.75	0.11	0.16	0.14	0.57	0.44	0.26	0.43
Avail Cap(c_a), veh/h	315	667	697	248	1282	572	419	937	418	459	506	451
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	22.1	22.1	17.5	21.1	16.2	18.2	20.6	23.4	18.8	20.2	21.3
Incr Delay (d2), s/veh	1.2	14.8	14.3	1.2	2.5	0.1	0.2	0.3	5.6	0.7	1.3	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	11.3	11.7	1.0	7.0	0.7	0.7	0.9	4.1	2.5	1.8	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.2	36.9	36.4	18.7	23.6	16.3	18.4	21.0	29.0	19.5	21.5	24.2
LnGrp LOS	B	D	D	B	C	B	B	C	C	B	C	C
Approach Vol, veh/h		1326			1084			436			527	
Approach Delay, s/veh		34.5			22.8			25.0			21.7	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.6	23.8	8.8	31.0	8.1	25.3	9.9	29.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	19.3	5.1	27.5	5.1	19.3	6.2	26.4				
Max Q Clear Time (g_c+I1), s	7.1	11.6	4.5	24.6	3.8	9.2	5.7	18.9				
Green Ext Time (p_c), s	0.0	1.0	0.0	2.0	0.0	1.4	0.0	3.8				
Intersection Summary												
HCM 6th Ctrl Delay			27.5									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	1031	59	194	695	27	65	48	276	24	50	55
Future Volume (veh/h)	53	1031	59	194	695	27	65	48	276	24	50	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	54	1052	60	216	772	30	81	60	345	28	59	65
Peak Hour Factor	0.98	0.98	0.98	0.90	0.90	0.90	0.80	0.80	0.80	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	395	1214	542	346	1279	50	465	78	449	218	264	291
Arrive On Green	0.08	0.34	0.34	0.11	0.37	0.37	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	1781	3554	1585	1781	3487	135	1267	240	1381	980	813	896
Grp Volume(v), veh/h	54	1052	60	216	393	409	81	0	405	28	0	124
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1846	1267	0	1622	980	0	1709
Q Serve(g_s), s	1.1	16.6	1.6	4.6	10.8	10.8	3.0	0.0	13.5	1.6	0.0	3.2
Cycle Q Clear(g_c), s	1.1	16.6	1.6	4.6	10.8	10.8	6.2	0.0	13.5	15.1	0.0	3.2
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.85	1.00		0.52
Lane Grp Cap(c), veh/h	395	1214	542	346	652	677	465	0	527	218	0	555
V/C Ratio(X)	0.14	0.87	0.11	0.62	0.60	0.60	0.17	0.00	0.77	0.13	0.00	0.22
Avail Cap(c_a), veh/h	395	1214	542	346	652	677	465	0	527	218	0	555
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	18.5	13.5	13.5	15.5	15.5	17.0	0.0	18.2	25.0	0.0	14.7
Incr Delay (d2), s/veh	0.7	8.4	0.4	8.3	4.1	4.0	0.8	0.0	10.3	1.2	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	7.5	0.6	2.3	4.6	4.8	0.9	0.0	6.0	0.4	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	26.9	13.9	21.8	19.6	19.4	17.8	0.0	28.5	26.2	0.0	15.7
LnGrp LOS	B	C	B	C	B	B	B	A	C	C	A	B
Approach Vol, veh/h	1166				1018				486			
Approach Delay, s/veh	25.5				20.0				26.7			
Approach LOS	C				B				C			
Timer - Assigned Phs	2		3		4		6		7		8	
Phs Duration (G+Y+Rc), s	24.0		11.0		25.0		24.0		9.5		26.5	
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5		4.5	
Max Green Setting (Gmax), s	19.5		6.5		20.5		19.5		5.0		22.0	
Max Q Clear Time (g_c+l1), s	15.5		6.6		18.6		17.1		3.1		12.8	
Green Ext Time (p_c), s	1.1		0.0		1.3		0.2		0.0		3.4	
Intersection Summary												
HCM 6th Ctrl Delay	23.3											
HCM 6th LOS	C											

Intersection												
Int Delay, s/veh	9.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱↱	↰	↰	↱↱			↱	↰		↱↱	
Traffic Vol, veh/h	11	1491	19	63	872	15	7	1	127	11	1	20
Future Vol, veh/h	11	1491	19	63	872	15	7	1	127	11	1	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	170	210	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	95	95	95	94	94	94	62	62	62
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	1734	22	66	918	16	7	1	135	18	2	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	934	0	0	1756	0	0	2352	2826	867	1952	2840	467
Stage 1	-	-	-	-	-	-	1760	1760	-	1058	1058	-
Stage 2	-	-	-	-	-	-	592	1066	-	894	1782	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	729	-	-	352	-	-	19	17	296	38	17	542
Stage 1	-	-	-	-	-	-	88	136	-	240	300	-
Stage 2	-	-	-	-	-	-	460	297	-	302	133	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	729	-	-	352	-	-	14	14	296	~ 16	14	542
Mov Cap-2 Maneuver	-	-	-	-	-	-	14	14	-	~ 16	14	-
Stage 1	-	-	-	-	-	-	86	134	-	236	244	-
Stage 2	-	-	-	-	-	-	349	241	-	160	131	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.2	52.3	\$ 398.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	14	296	729	-	-	352	-	-	40
HCM Lane V/C Ratio	0.608	0.456	0.018	-	-	0.188	-	-	1.29
HCM Control Delay (s)	\$ 453.4	27	10	-	-	17.6	-	-	\$ 398.1
HCM Lane LOS	F	D	B	-	-	C	-	-	F
HCM 95th %tile Q(veh)	1.5	2.3	0.1	-	-	0.7	-	-	5.2

Notes			
-: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th TWSC
15: Calle Canario & Cardinal Avenue

11/15/2021

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	2	3	332	227	16
Future Vol, veh/h	28	2	3	332	227	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	58	58	86	86	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	3	3	386	258	18

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	659	267	276
Stage 1	267	-	-
Stage 2	392	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	429	772	1287
Stage 1	778	-	-
Stage 2	683	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	428	772	1287
Mov Cap-2 Maneuver	428	-	-
Stage 1	776	-	-
Stage 2	683	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.2	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1287	-	441	-	-
HCM Lane V/C Ratio	0.003	-	0.117	-	-
HCM Control Delay (s)	7.8	0	14.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

HCM 6th TWSC
19: Vereda Azul & Westover Avenue

11/15/2021

Intersection						
Int Delay, s/veh	2.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	39	110	5	26	64
Future Vol, veh/h	8	39	110	5	26	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	84	84	93	93	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	46	118	5	31	77
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	260	121	0	0	123	0
Stage 1	121	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	729	930	-	-	1464	-
Stage 1	904	-	-	-	-	-
Stage 2	888	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	713	930	-	-	1464	-
Mov Cap-2 Maneuver	713	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	888	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	9.3	0	2.2			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	884	1464	-	
HCM Lane V/C Ratio	-	-	0.063	0.021	-	
HCM Control Delay (s)	-	-	9.3	7.5	0	
HCM Lane LOS	-	-	A	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-	

HCM 6th AWSC
9: Cardinal Avenue & Los Reales Road

11/15/2021

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Vol, veh/h	167	482	15	17	159	22	18	53	77	56	26	77
Future Vol, veh/h	167	482	15	17	159	22	18	53	77	56	26	77
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	201	581	18	23	212	29	19	56	81	70	33	96
Number of Lanes	1	2	0	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	19	15.3	11.8	12.1
HCM LOS	C	C	B	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	91%	0%	100%	0%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	9%	0%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	18	53	77	167	321	176	17	159	22	56	26
LT Vol	18	0	0	167	0	0	17	0	0	56	0
Through Vol	0	53	0	0	321	161	0	159	0	0	26
RT Vol	0	0	77	0	0	15	0	0	22	0	0
Lane Flow Rate	19	56	81	201	387	212	23	212	29	70	32
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.045	0.125	0.166	0.4	0.716	0.388	0.051	0.447	0.056	0.165	0.072
Departure Headway (Hd)	8.593	8.093	7.393	7.156	6.656	6.596	8.098	7.598	6.898	8.467	7.967
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	417	443	485	507	546	548	442	475	519	424	450
Service Time	6.343	5.843	5.143	4.856	4.356	4.296	5.841	5.341	4.641	6.212	5.712
HCM Lane V/C Ratio	0.046	0.126	0.167	0.396	0.709	0.387	0.052	0.446	0.056	0.165	0.071
HCM Control Delay	11.7	12	11.6	14.5	24.4	13.4	11.3	16.4	10.1	12.9	11.3
HCM Lane LOS	B	B	B	B	C	B	B	C	B	B	B
HCM 95th-tile Q	0.1	0.4	0.6	1.9	5.8	1.8	0.2	2.3	0.2	0.6	0.2

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	128	1227	19	239	1521	222	29	88	229	149	123	151
Future Volume (veh/h)	128	1227	19	239	1521	222	29	88	229	149	123	151
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	141	1348	21	241	1536	224	33	101	263	159	131	161
Peak Hour Factor	0.91	0.91	0.91	0.99	0.99	0.99	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	197	1477	23	278	1597	712	249	105	273	200	197	242
Arrive On Green	0.06	0.41	0.41	0.10	0.45	0.45	0.03	0.23	0.23	0.06	0.26	0.26
Sat Flow, veh/h	1781	3581	56	1781	3554	1585	1781	459	1196	1781	763	938
Grp Volume(v), veh/h	141	668	701	241	1536	224	33	0	364	159	0	292
Grp Sat Flow(s),veh/h/ln	1781	1777	1860	1781	1777	1585	1781	0	1655	1781	0	1701
Q Serve(g_s), s	4.1	31.9	31.9	6.8	37.7	8.1	1.3	0.0	19.6	5.5	0.0	13.8
Cycle Q Clear(g_c), s	4.1	31.9	31.9	6.8	37.7	8.1	1.3	0.0	19.6	5.5	0.0	13.8
Prop In Lane	1.00		0.03	1.00		1.00	1.00		0.72	1.00		0.55
Lane Grp Cap(c), veh/h	197	733	767	278	1597	712	249	0	377	200	0	439
V/C Ratio(X)	0.71	0.91	0.91	0.87	0.96	0.31	0.13	0.00	0.96	0.80	0.00	0.67
Avail Cap(c_a), veh/h	197	733	767	303	1601	714	293	0	377	200	0	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.1	24.9	24.9	19.7	24.0	15.9	25.8	0.0	34.3	28.9	0.0	29.9
Incr Delay (d2), s/veh	11.6	15.8	15.3	21.2	14.4	0.3	0.2	0.0	38.2	19.8	0.0	7.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	15.9	16.5	4.2	17.9	2.9	0.5	0.0	11.7	3.7	0.0	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.7	40.7	40.2	41.0	38.4	16.1	26.1	0.0	72.5	48.6	0.0	37.6
LnGrp LOS	C	D	D	D	D	B	C	A	E	D	A	D
Approach Vol, veh/h	1510		2001			397			451			
Approach Delay, s/veh	39.7		36.2			68.7			41.5			
Approach LOS	D		D			E			D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	25.0	13.3	41.6	7.3	27.7	10.0	44.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	20.5	10.1	35.9	5.0	21.0	5.5	40.5				
Max Q Clear Time (g_c+I1), s	7.5	21.6	8.8	33.9	3.3	15.8	6.1	39.7				
Green Ext Time (p_c), s	0.0	0.0	0.1	1.5	0.0	0.8	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay			40.9									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	119	1042	25	259	1198	97	134	113	162	197	160	164
Future Volume (veh/h)	119	1042	25	259	1198	97	134	113	162	197	160	164
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	129	1133	27	267	1235	100	147	124	178	203	165	169
Peak Hour Factor	0.92	0.92	0.92	0.97	0.97	0.97	0.91	0.91	0.91	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	252	1334	32	332	1514	675	344	797	356	418	399	356
Arrive On Green	0.06	0.38	0.38	0.11	0.43	0.43	0.07	0.22	0.22	0.07	0.22	0.22
Sat Flow, veh/h	1781	3547	85	1781	3554	1585	1781	3554	1585	1781	1777	1585
Grp Volume(v), veh/h	129	567	593	267	1235	100	147	124	178	203	165	169
Grp Sat Flow(s),veh/h/ln	1781	1777	1855	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	3.6	24.1	24.2	7.1	25.2	3.2	5.3	2.3	8.1	5.5	6.5	7.6
Cycle Q Clear(g_c), s	3.6	24.1	24.2	7.1	25.2	3.2	5.3	2.3	8.1	5.5	6.5	7.6
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	252	668	697	332	1514	675	344	797	356	418	399	356
V/C Ratio(X)	0.51	0.85	0.85	0.80	0.82	0.15	0.43	0.16	0.50	0.49	0.41	0.48
Avail Cap(c_a), veh/h	277	722	754	441	1788	798	344	797	356	418	399	356
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	23.6	23.6	17.6	20.8	14.5	23.0	25.7	28.0	24.1	27.4	27.8
Incr Delay (d2), s/veh	1.6	8.9	8.6	7.8	2.6	0.1	0.8	0.4	5.0	0.9	3.2	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	11.2	11.6	3.3	10.3	1.1	2.2	1.0	3.5	3.3	3.1	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.5	32.5	32.2	25.4	23.4	14.6	23.8	26.1	32.9	25.0	30.5	32.3
LnGrp LOS	B	C	C	C	C	B	C	C	C	C	C	C
Approach Vol, veh/h		1289			1602			449			537	
Approach Delay, s/veh		31.1			23.2			28.1			29.0	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	23.0	14.0	35.5	10.0	23.0	9.8	39.6				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	18.5	14.5	33.5	5.5	18.5	6.5	41.5				
Max Q Clear Time (g_c+I1), s	7.5	10.1	9.1	26.2	7.3	9.6	5.6	27.2				
Green Ext Time (p_c), s	0.0	0.8	0.4	4.2	0.0	1.3	0.0	7.9				
Intersection Summary												
HCM 6th Ctrl Delay			27.2									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	1085	28	255	1185	41	73	25	179	32	63	65
Future Volume (veh/h)	30	1085	28	255	1185	41	73	25	179	32	63	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	36	1292	33	271	1261	44	89	30	218	39	77	79
Peak Hour Factor	0.84	0.84	0.84	0.94	0.94	0.94	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	294	1447	645	347	1601	56	357	54	395	270	236	242
Arrive On Green	0.07	0.41	0.41	0.12	0.46	0.46	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1781	3554	1585	1781	3503	122	1231	195	1420	1132	846	868
Grp Volume(v), veh/h	36	1292	33	271	639	666	89	0	248	39	0	156
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1848	1231	0	1615	1132	0	1714
Q Serve(g_s), s	0.8	23.7	0.9	5.7	21.3	21.4	4.3	0.0	9.2	2.1	0.0	5.1
Cycle Q Clear(g_c), s	0.8	23.7	0.9	5.7	21.3	21.4	9.4	0.0	9.2	11.3	0.0	5.1
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.88	1.00		0.51
Lane Grp Cap(c), veh/h	294	1447	645	347	812	845	357	0	450	270	0	478
V/C Ratio(X)	0.12	0.89	0.05	0.78	0.79	0.79	0.25	0.00	0.55	0.14	0.00	0.33
Avail Cap(c_a), veh/h	294	1447	645	347	812	845	357	0	450	270	0	478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.2	19.3	12.6	14.6	16.1	16.1	23.8	0.0	21.5	26.3	0.0	20.0
Incr Delay (d2), s/veh	0.9	8.8	0.2	15.8	7.6	7.4	1.7	0.0	4.8	1.1	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	10.5	0.3	3.4	9.4	9.7	1.4	0.0	3.9	0.6	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.1	28.1	12.7	30.4	23.7	23.5	25.4	0.0	26.3	27.5	0.0	21.9
LnGrp LOS	B	C	B	C	C	C	C	A	C	C	A	C
Approach Vol, veh/h		1361			1576			337			195	
Approach Delay, s/veh		27.3			24.8			26.1			23.0	
Approach LOS		C			C			C			C	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		24.0	13.0	33.0		24.0	9.5	36.5				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		19.5	8.5	28.5		19.5	5.0	32.0				
Max Q Clear Time (g_c+I1), s		11.4	7.7	25.7		13.3	2.8	23.4				
Green Ext Time (p_c), s		1.2	0.1	2.1		0.5	0.0	5.3				
Intersection Summary												
HCM 6th Ctrl Delay			25.8									
HCM 6th LOS			C									

HCM 6th TWSC

12: Westover Avenue/Hildreth Avenue & Valencia Road

11/15/2021

Intersection

Int Delay, s/veh 11.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	1359	24	176	1460	30	5	0	126	4	1	22
Future Vol, veh/h	15	1359	24	176	1460	30	5	0	126	4	1	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	170	210	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	97	97	97	73	73	73	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	1493	26	181	1505	31	7	0	173	5	1	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1536	0	0	1519	0	0	2640	3423	747	2662	3434	768
Stage 1	-	-	-	-	-	-	1525	1525	-	1883	1883	-
Stage 2	-	-	-	-	-	-	1115	1898	-	779	1551	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	429	-	-	435	-	-	11	7	355	11	7	344
Stage 1	-	-	-	-	-	-	123	178	-	73	118	-
Stage 2	-	-	-	-	-	-	222	116	-	355	173	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	429	-	-	435	-	-	~ 5	4	355	~ 4	4	344
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 5	4	-	~ 4	4	-
Stage 1	-	-	-	-	-	-	118	171	-	70	69	-
Stage 2	-	-	-	-	-	-	118	68	-	176	167	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	2	79.9	\$ 659.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	5	355	429	-	-	435	-	-	21
HCM Lane V/C Ratio	1.37	0.486	0.038	-	-	0.417	-	-	1.531
HCM Control Delay (s)	\$ 1479.6	24.4	13.7	-	-	19.1	-	-	\$ 659.6
HCM Lane LOS	F	C	B	-	-	C	-	-	F
HCM 95th %tile Q(veh)	1.7	2.6	0.1	-	-	2	-	-	4.2

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th TWSC
15: Calle Canario & Cardinal Avenue

11/15/2021

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	1	5	345	392	36
Future Vol, veh/h	29	1	5	345	392	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	1	5	375	426	39

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	831	446	465
Stage 1	446	-	-
Stage 2	385	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	340	612	1096
Stage 1	645	-	-
Stage 2	688	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	338	612	1096
Mov Cap-2 Maneuver	338	-	-
Stage 1	641	-	-
Stage 2	688	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.6	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1096	-	343	-	-
HCM Lane V/C Ratio	0.005	-	0.095	-	-
HCM Control Delay (s)	8.3	0	16.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

HCM 6th TWSC
19: Vereda Azul & Westover Avenue

11/15/2021

Intersection

Int Delay, s/veh 1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	38	114	5	36	202
Future Vol, veh/h	7	38	114	5	36	202
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	88	88	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	44	130	6	38	215

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	424	133	0
Stage 1	133	-	-
Stage 2	291	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	587	916	-
Stage 1	893	-	-
Stage 2	759	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	569	916	-
Mov Cap-2 Maneuver	569	-	-
Stage 1	866	-	-
Stage 2	759	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	1.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	837	1448
HCM Lane V/C Ratio	-	-	0.062	0.026
HCM Control Delay (s)	-	-	9.6	7.6
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

HCM 6th AWSC
9: Cardinal Avenue & Los Reales Road

11/15/2021

Intersection	
Intersection Delay, s/veh	29.6
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Vol, veh/h	151	305	11	83	405	88	9	71	63	23	74	144
Future Vol, veh/h	151	305	11	83	405	88	9	71	63	23	74	144
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.79	0.79	0.79	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	172	347	13	93	455	99	11	90	80	27	86	167
Number of Lanes	1	2	0	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	17.3	50.5	13.9	15
HCM LOS	C	F	B	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	90%	0%	100%	0%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	10%	0%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	9	71	63	151	203	113	83	405	88	23	74
LT Vol	9	0	0	151	0	0	83	0	0	23	0
Through Vol	0	71	0	0	203	102	0	405	0	0	74
RT Vol	0	0	63	0	0	11	0	0	88	0	0
Lane Flow Rate	11	90	80	172	231	128	93	455	99	27	86
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.031	0.23	0.189	0.408	0.517	0.284	0.215	0.985	0.195	0.07	0.213
Departure Headway (Hd)	9.72	9.22	8.52	8.661	8.161	8.093	8.294	7.794	7.094	9.429	8.929
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	370	391	423	419	444	447	431	464	502	382	404
Service Time	7.431	6.931	6.231	6.361	5.861	5.793	6.091	5.591	4.891	7.129	6.629
HCM Lane V/C Ratio	0.03	0.23	0.189	0.411	0.52	0.286	0.216	0.981	0.197	0.071	0.213
HCM Control Delay	12.7	14.7	13.2	17.2	19.3	14	13.4	66.5	11.6	12.8	14
HCM Lane LOS	B	B	B	C	C	B	B	F	B	B	B
HCM 95th-tile Q	0.1	0.9	0.7	1.9	2.9	1.2	0.8	12.6	0.7	0.2	0.8

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	1580	10	102	999	87	13	89	331	135	71	118
Future Volume (veh/h)	132	1580	10	102	999	87	13	89	331	135	71	118
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	143	1717	11	110	1074	94	15	101	376	167	88	146
Peak Hour Factor	0.92	0.92	0.92	0.93	0.93	0.93	0.88	0.88	0.88	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	295	1661	11	173	1587	708	286	75	278	210	171	284
Arrive On Green	0.06	0.46	0.46	0.05	0.45	0.45	0.02	0.22	0.22	0.07	0.27	0.27
Sat Flow, veh/h	1781	3620	23	1781	3554	1585	1781	347	1291	1781	632	1049
Grp Volume(v), veh/h	143	842	886	110	1074	94	15	0	477	167	0	234
Grp Sat Flow(s),veh/h/ln	1781	1777	1866	1781	1777	1585	1781	0	1638	1781	0	1682
Q Serve(g_s), s	3.8	41.1	41.1	3.0	21.5	3.1	0.6	0.0	19.3	6.4	0.0	10.6
Cycle Q Clear(g_c), s	3.8	41.1	41.1	3.0	21.5	3.1	0.6	0.0	19.3	6.4	0.0	10.6
Prop In Lane	1.00		0.01	1.00		1.00	1.00		0.79	1.00		0.62
Lane Grp Cap(c), veh/h	295	815	856	173	1587	708	286	0	353	210	0	455
V/C Ratio(X)	0.49	1.03	1.03	0.63	0.68	0.13	0.05	0.00	1.35	0.80	0.00	0.51
Avail Cap(c_a), veh/h	369	815	856	182	1587	708	355	0	353	210	0	455
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.3	24.2	24.2	20.9	19.7	14.6	26.8	0.0	35.1	26.0	0.0	27.7
Incr Delay (d2), s/veh	1.2	40.3	40.0	6.6	1.2	0.1	0.1	0.0	175.9	19.0	0.0	4.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	25.1	26.3	1.4	8.6	1.1	0.3	0.0	24.7	3.7	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.5	64.6	64.2	27.5	20.8	14.7	26.8	0.0	211.0	45.0	0.0	31.8
LnGrp LOS	B	F	F	C	C	B	C	A	F	D	A	C
Approach Vol, veh/h		1871			1278			492			401	
Approach Delay, s/veh		60.7			20.9			205.4			37.3	
Approach LOS		E			C			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	23.8	9.2	45.6	6.1	28.7	10.3	44.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.5	19.3	5.1	41.1	5.0	20.8	9.5	36.7				
Max Q Clear Time (g_c+I1), s	8.4	21.3	5.0	43.1	2.6	12.6	5.8	23.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.8	0.1	6.6				
Intersection Summary												
HCM 6th Ctrl Delay			63.4									
HCM 6th LOS			E									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	1189	28	94	924	61	58	130	232	156	102	147
Future Volume (veh/h)	147	1189	28	94	924	61	58	130	232	156	102	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	155	1252	29	102	1004	66	65	146	261	220	144	207
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.71	0.71	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	286	1314	30	214	1248	557	361	923	412	442	495	442
Arrive On Green	0.08	0.37	0.37	0.06	0.35	0.35	0.05	0.26	0.26	0.07	0.28	0.28
Sat Flow, veh/h	1781	3550	82	1781	3554	1585	1781	3554	1585	1781	1777	1585
Grp Volume(v), veh/h	155	626	655	102	1004	66	65	146	261	220	144	207
Grp Sat Flow(s),veh/h/ln	1781	1777	1856	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	4.0	25.5	25.5	2.7	19.0	2.1	1.9	2.4	10.8	5.1	4.7	8.0
Cycle Q Clear(g_c), s	4.0	25.5	25.5	2.7	19.0	2.1	1.9	2.4	10.8	5.1	4.7	8.0
Prop In Lane	1.00		0.04	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	286	658	687	214	1248	557	361	923	412	442	495	442
V/C Ratio(X)	0.54	0.95	0.95	0.48	0.80	0.12	0.18	0.16	0.63	0.50	0.29	0.47
Avail Cap(c_a), veh/h	296	658	687	231	1263	563	395	923	412	442	495	442
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.7	22.8	22.8	18.2	21.8	16.3	18.7	21.2	24.4	19.9	21.0	22.2
Incr Delay (d2), s/veh	1.9	23.9	23.4	1.6	3.9	0.1	0.2	0.4	7.2	0.9	1.5	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	14.1	14.7	1.1	8.0	0.7	0.8	1.0	4.7	3.1	2.1	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.5	46.7	46.2	19.8	25.7	16.4	18.9	21.6	31.6	20.8	22.5	25.8
LnGrp LOS	B	D	D	B	C	B	B	C	C	C	C	C
Approach Vol, veh/h		1436			1172			472			571	
Approach Delay, s/veh		43.4			24.6			26.8			23.0	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.6	23.8	8.9	32.0	8.2	25.2	10.3	30.6				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	19.3	5.1	27.5	5.1	19.3	6.2	26.4				
Max Q Clear Time (g_c+I1), s	7.1	12.8	4.7	27.5	3.9	10.0	6.0	21.0				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	1.4	0.0	3.2				
Intersection Summary												
HCM 6th Ctrl Delay			32.0									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	1116	64	210	752	29	70	52	299	26	54	60
Future Volume (veh/h)	57	1116	64	210	752	29	70	52	299	26	54	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	1139	65	233	836	32	88	65	374	31	64	71
Peak Hour Factor	0.98	0.98	0.98	0.90	0.90	0.90	0.80	0.80	0.80	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	375	1214	542	327	1280	49	455	78	449	191	263	292
Arrive On Green	0.08	0.34	0.34	0.11	0.37	0.37	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	1781	3554	1585	1781	3490	134	1254	240	1382	950	810	899
Grp Volume(v), veh/h	58	1139	65	233	426	442	88	0	439	31	0	135
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1846	1254	0	1622	950	0	1709
Q Serve(g_s), s	1.2	18.6	1.7	5.0	12.0	12.0	3.3	0.0	15.0	1.9	0.0	3.5
Cycle Q Clear(g_c), s	1.2	18.6	1.7	5.0	12.0	12.0	6.8	0.0	15.0	16.9	0.0	3.5
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.85	1.00		0.53
Lane Grp Cap(c), veh/h	375	1214	542	327	652	677	455	0	527	191	0	555
V/C Ratio(X)	0.15	0.94	0.12	0.71	0.65	0.65	0.19	0.00	0.83	0.16	0.00	0.24
Avail Cap(c_a), veh/h	375	1214	542	327	652	677	455	0	527	191	0	555
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.3	19.1	13.6	13.9	15.8	15.8	17.3	0.0	18.7	26.6	0.0	14.8
Incr Delay (d2), s/veh	0.9	14.7	0.5	12.4	5.0	4.9	0.9	0.0	14.3	1.8	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	9.3	0.6	2.8	5.2	5.4	1.0	0.0	7.1	0.5	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.1	33.8	14.0	26.3	20.9	20.7	18.3	0.0	33.0	28.4	0.0	15.9
LnGrp LOS	B	C	B	C	C	C	B	A	C	C	A	B
Approach Vol, veh/h	1262		1101			527			166			
Approach Delay, s/veh	31.8		21.9			30.6			18.2			
Approach LOS	C		C			C			B			
Timer - Assigned Phs	2		3		4		6		7		8	
Phs Duration (G+Y+Rc), s	24.0		11.0		25.0		24.0		9.5		26.5	
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5			
Max Green Setting (Gmax), s	19.5		6.5		20.5		19.5		5.0		22.0	
Max Q Clear Time (g_c+I1), s	17.0		7.0		20.6		18.9		3.2		14.0	
Green Ext Time (p_c), s	0.8		0.0		0.0		0.0		0.0		3.4	
Intersection Summary												
HCM 6th Ctrl Delay	27.3											
HCM 6th LOS	C											

Intersection												
Int Delay, s/veh	20.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	1614	21	68	944	16	8	1	137	12	1	22
Future Vol, veh/h	12	1614	21	68	944	16	8	1	137	12	1	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	170	210	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	95	95	95	94	94	94	62	62	62
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	1877	24	72	994	17	9	1	146	19	2	35

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1011	0	0	1901	0	0	2547	3060	939	2114	3076	506
Stage 1	-	-	-	-	-	-	1905	1905	-	1147	1147	-
Stage 2	-	-	-	-	-	-	642	1155	-	967	1929	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	681	-	-	309	-	-	13	12	265	29	12	512
Stage 1	-	-	-	-	-	-	71	115	-	212	272	-
Stage 2	-	-	-	-	-	-	429	269	-	273	112	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	681	-	-	309	-	-	~ 8	9	265	~ 10	9	512
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 8	9	-	~ 10	9	-
Stage 1	-	-	-	-	-	-	70	113	-	208	209	-
Stage 2	-	-	-	-	-	-	304	206	-	119	110	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	93.2	\$ 859.5
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	8	265	681	-	-	309	-	-	26
HCM Lane V/C Ratio	1.197	0.55	0.02	-	-	0.232	-	-	2.171
HCM Control Delay (s)	\$ 993.6	34	10.4	-	-	20.1	-	-	\$ 859.5
HCM Lane LOS	F	D	B	-	-	C	-	-	F
HCM 95th %tile Q(veh)	2	3	0.1	-	-	0.9	-	-	6.9

Notes			
-: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th TWSC
15: Calle Canario & Cardinal Avenue

11/15/2021

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	2	3	359	246	17
Future Vol, veh/h	30	2	3	359	246	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	58	58	86	86	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	3	3	417	280	19

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	713	290	299
Stage 1	290	-	-
Stage 2	423	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	398	749	1262
Stage 1	759	-	-
Stage 2	661	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	397	749	1262
Mov Cap-2 Maneuver	397	-	-
Stage 1	757	-	-
Stage 2	661	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.2	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1262	-	409	-	-
HCM Lane V/C Ratio	0.003	-	0.135	-	-
HCM Control Delay (s)	7.9	0	15.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

HCM 6th TWSC
19: Vereda Azul & Westover Avenue

11/15/2021

Intersection

Int Delay, s/veh 2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	42	119	5	28	69
Future Vol, veh/h	9	42	119	5	28	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	84	84	93	93	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	50	128	5	34	83

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	282	131	0
Stage 1	131	-	-
Stage 2	151	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	708	919	-
Stage 1	895	-	-
Stage 2	877	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	690	919	-
Mov Cap-2 Maneuver	690	-	-
Stage 1	873	-	-
Stage 2	877	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	2.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	868	1452
HCM Lane V/C Ratio	-	-	0.07	0.023
HCM Control Delay (s)	-	-	9.5	7.5
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

HCM 6th AWSC

9: Cardinal Avenue & Los Reales Road

11/29/2021

Intersection	
Intersection Delay, s/veh	19.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	183	522	16	18	172	26	19	57	83	68	28	90
Future Vol, veh/h	183	522	16	18	172	26	19	57	83	68	28	90
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	220	629	19	24	229	35	20	60	87	85	35	113
Number of Lanes	1	2	0	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	23.9	17.2	12.5	13.1
HCM LOS	C	C	B	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	92%	0%	100%	0%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	8%	0%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	19	57	83	183	348	190	18	172	26	68	28
LT Vol	19	0	0	183	0	0	18	0	0	68	0
Through Vol	0	57	0	0	348	174	0	172	0	0	28
RT Vol	0	0	83	0	0	16	0	0	26	0	0
Lane Flow Rate	20	60	87	220	419	229	24	229	35	85	35
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.05	0.142	0.19	0.455	0.808	0.437	0.057	0.509	0.07	0.208	0.081
Departure Headway (Hd)	9.024	8.524	7.824	7.435	6.935	6.876	8.495	7.995	7.295	8.825	8.325
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	397	421	458	485	524	524	421	452	490	406	430
Service Time	6.783	6.283	5.583	5.178	4.678	4.619	6.25	5.75	5.05	6.58	6.08
HCM Lane V/C Ratio	0.05	0.143	0.19	0.454	0.8	0.437	0.057	0.507	0.071	0.209	0.081
HCM Control Delay	12.3	12.7	12.4	16.3	32.8	14.9	11.8	18.8	10.6	13.9	11.8
HCM Lane LOS	B	B	B	C	D	B	B	C	B	B	B
HCM 95th-tile Q	0.2	0.5	0.7	2.3	7.8	2.2	0.2	2.8	0.2	0.8	0.3

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	139	1328	21	259	1646	240	31	95	248	161	133	163
Future Volume (veh/h)	139	1328	21	259	1646	240	31	95	248	161	133	163
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	153	1459	23	262	1663	242	36	109	285	171	141	173
Peak Hour Factor	0.91	0.91	0.91	0.99	0.99	0.99	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	1428	22	280	1599	713	232	104	273	189	196	240
Arrive On Green	0.06	0.40	0.40	0.11	0.45	0.45	0.03	0.23	0.23	0.06	0.26	0.26
Sat Flow, veh/h	1781	3581	56	1781	3554	1585	1781	458	1197	1781	764	938
Grp Volume(v), veh/h	153	723	759	262	1663	242	36	0	394	171	0	314
Grp Sat Flow(s),veh/h/ln	1781	1777	1860	1781	1777	1585	1781	0	1655	1781	0	1702
Q Serve(g_s), s	4.6	35.9	35.9	9.0	40.5	8.9	1.4	0.0	20.5	5.5	0.0	15.2
Cycle Q Clear(g_c), s	4.6	35.9	35.9	9.0	40.5	8.9	1.4	0.0	20.5	5.5	0.0	15.2
Prop In Lane	1.00		0.03	1.00		1.00	1.00		0.72	1.00		0.55
Lane Grp Cap(c), veh/h	189	709	742	280	1599	713	232	0	377	189	0	435
V/C Ratio(X)	0.81	1.02	1.02	0.94	1.04	0.34	0.16	0.00	1.05	0.91	0.00	0.72
Avail Cap(c_a), veh/h	189	709	742	280	1599	713	272	0	377	189	0	435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.5	27.0	27.1	25.3	24.8	16.1	26.0	0.0	34.8	30.2	0.0	30.6
Incr Delay (d2), s/veh	22.6	39.1	38.8	37.0	33.6	0.3	0.3	0.0	58.7	40.0	0.0	9.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	22.0	23.0	5.6	23.2	3.2	0.6	0.0	14.2	3.2	0.0	7.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.1	66.2	65.8	62.3	58.4	16.3	26.3	0.0	93.4	70.2	0.0	40.5
LnGrp LOS	D	F	F	E	F	B	C	A	F	E	A	D
Approach Vol, veh/h		1635			2167			430			485	
Approach Delay, s/veh		64.0			54.2			87.8			51.0	
Approach LOS		E			D			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	25.0	14.6	40.4	7.5	27.5	10.0	45.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	20.5	10.1	35.9	5.0	21.0	5.5	40.5				
Max Q Clear Time (g_c+l1), s	7.5	22.5	11.0	37.9	3.4	17.2	6.6	42.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			60.3									
HCM 6th LOS			E									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	1128	27	280	1297	105	145	122	175	213	173	178
Future Volume (veh/h)	129	1128	27	280	1297	105	145	122	175	213	173	178
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	140	1226	29	289	1337	108	159	134	192	220	178	184
Peak Hour Factor	0.92	0.92	0.92	0.97	0.97	0.97	0.91	0.91	0.91	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	243	1371	32	330	1569	700	314	769	343	394	384	343
Arrive On Green	0.07	0.39	0.39	0.12	0.44	0.44	0.06	0.22	0.22	0.06	0.22	0.22
Sat Flow, veh/h	1781	3548	84	1781	3554	1585	1781	3554	1585	1781	1777	1585
Grp Volume(v), veh/h	140	614	641	289	1337	108	159	134	192	220	178	184
Grp Sat Flow(s),veh/h/ln	1781	1777	1855	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	4.0	27.7	27.7	8.1	28.8	3.5	5.5	2.6	9.2	5.5	7.5	8.8
Cycle Q Clear(g_c), s	4.0	27.7	27.7	8.1	28.8	3.5	5.5	2.6	9.2	5.5	7.5	8.8
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	243	687	717	330	1569	700	314	769	343	394	384	343
V/C Ratio(X)	0.58	0.89	0.89	0.88	0.85	0.15	0.51	0.17	0.56	0.56	0.46	0.54
Avail Cap(c_a), veh/h	258	696	727	414	1724	769	314	769	343	394	384	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	24.6	24.6	19.2	21.4	14.3	25.5	27.3	29.9	26.5	29.2	29.7
Incr Delay (d2), s/veh	2.8	13.9	13.5	15.8	4.0	0.1	1.3	0.5	6.5	1.8	4.0	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	13.6	14.1	4.5	12.0	1.2	2.6	1.1	4.1	1.3	3.5	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	38.5	38.1	35.0	25.4	14.4	26.8	27.8	36.4	28.3	33.2	35.6
LnGrp LOS	C	D	D	D	C	B	C	C	D	C	C	D
Approach Vol, veh/h		1395			1734			485			582	
Approach Delay, s/veh		36.6			26.4			30.9			32.1	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	23.0	15.0	37.6	10.0	23.0	10.3	42.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	18.5	14.5	33.5	5.5	18.5	6.5	41.5				
Max Q Clear Time (g_c+I1), s	7.5	11.2	10.1	29.7	7.5	10.8	6.0	30.8				
Green Ext Time (p_c), s	0.0	0.8	0.4	2.6	0.0	1.3	0.0	6.9				
Intersection Summary												
HCM 6th Ctrl Delay			31.1									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/15/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	1174	30	276	1283	44	79	27	194	35	68	70
Future Volume (veh/h)	32	1174	30	276	1283	44	79	27	194	35	68	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	1398	36	294	1365	47	96	33	237	43	83	85
Peak Hour Factor	0.84	0.84	0.84	0.94	0.94	0.94	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	272	1447	645	328	1602	55	347	55	395	251	236	242
Arrive On Green	0.07	0.41	0.41	0.12	0.46	0.46	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1781	3554	1585	1781	3505	121	1217	197	1418	1109	847	867
Grp Volume(v), veh/h	38	1398	36	294	691	721	96	0	270	43	0	168
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1849	1217	0	1615	1109	0	1714
Q Serve(g_s), s	0.8	26.9	1.0	6.9	24.2	24.3	4.8	0.0	10.1	2.4	0.0	5.5
Cycle Q Clear(g_c), s	0.8	26.9	1.0	6.9	24.2	24.3	10.3	0.0	10.1	12.6	0.0	5.5
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.88	1.00		0.51
Lane Grp Cap(c), veh/h	272	1447	645	328	812	845	347	0	450	251	0	478
V/C Ratio(X)	0.14	0.97	0.06	0.90	0.85	0.85	0.28	0.00	0.60	0.17	0.00	0.35
Avail Cap(c_a), veh/h	272	1447	645	328	812	845	347	0	450	251	0	478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.2	20.3	12.6	16.6	16.9	16.9	24.3	0.0	21.9	27.3	0.0	20.2
Incr Delay (d2), s/veh	1.1	16.9	0.2	29.4	10.9	10.6	2.0	0.0	5.8	1.5	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	13.3	0.3	5.1	11.1	11.5	1.5	0.0	4.3	0.7	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.2	37.1	12.8	46.0	27.8	27.5	26.3	0.0	27.7	28.8	0.0	22.2
LnGrp LOS	B	D	B	D	C	C	C	A	C	C	A	C
Approach Vol, veh/h	1472				1706				366			
Approach Delay, s/veh	36.0				30.8				27.3			
Approach LOS	D				C				C			
Timer - Assigned Phs	2		3	4		6		7	8			
Phs Duration (G+Y+Rc), s	24.0		13.0	33.0		24.0		9.5	36.5			
Change Period (Y+Rc), s	4.5		4.5	4.5		4.5		4.5	4.5			
Max Green Setting (Gmax), s	19.5		8.5	28.5		19.5		5.0	32.0			
Max Q Clear Time (g_c+I1), s	12.3		8.9	28.9		14.6		2.8	26.3			
Green Ext Time (p_c), s	1.2		0.0	0.0		0.4		0.0	4.1			
Intersection Summary												
HCM 6th Ctrl Delay	32.1											
HCM 6th LOS	C											

Intersection												
Int Delay, s/veh	25.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑			↰	↱		↰	
Traffic Vol, veh/h	16	1471	26	191	1580	32	5	0	136	4	1	24
Future Vol, veh/h	16	1471	26	191	1580	32	5	0	136	4	1	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	170	210	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	97	97	97	73	73	73	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	1616	29	197	1629	33	7	0	186	5	1	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1662	0	0	1645	0	0	2861	3708	808	2884	3721	831
Stage 1	-	-	-	-	-	-	1652	1652	-	2040	2040	-
Stage 2	-	-	-	-	-	-	1209	2056	-	844	1681	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	383	-	-	389	-	-	8	4	324	7	4	313
Stage 1	-	-	-	-	-	-	103	154	-	58	98	-
Stage 2	-	-	-	-	-	-	194	97	-	324	149	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	383	-	-	389	-	-	~ 2	2	324	~ 2	2	313
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 2	2	-	~ 2	2	-
Stage 1	-	-	-	-	-	-	98	147	-	55	48	-
Stage 2	-	-	-	-	-	-	85	48	-	131	142	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.5	174.5	\$ 1646.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	2	324	383	-	-	389	-	-	11
HCM Lane V/C Ratio	3.425	0.575	0.046	-	-	0.506	-	-	3.139
HCM Control Delay (s)	\$ 4103.1	30.1	14.9	-	-	23.4	-	-	\$ 1646.4
HCM Lane LOS	F	D	B	-	-	C	-	-	F
HCM 95th %tile Q(veh)	1.9	3.4	0.1	-	-	2.8	-	-	5.4

Notes			
-: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th TWSC
15: Calle Canario & Cardinal Avenue

11/15/2021

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	1	5	373	424	39
Future Vol, veh/h	31	1	5	373	424	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	1	5	405	461	42

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	897	482	503
Stage 1	482	-	-
Stage 2	415	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	310	584	1061
Stage 1	621	-	-
Stage 2	666	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	308	584	1061
Mov Cap-2 Maneuver	308	-	-
Stage 1	617	-	-
Stage 2	666	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.9	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1061	-	313	-	-
HCM Lane V/C Ratio	0.005	-	0.111	-	-
HCM Control Delay (s)	8.4	0	17.9	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

HCM 6th TWSC
19: Vereda Azul & Westover Avenue

11/15/2021

Intersection

Int Delay, s/veh 1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	41	123	5	39	219
Future Vol, veh/h	8	41	123	5	39	219
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	88	88	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	47	140	6	41	233

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	458	143	0
Stage 1	143	-	-
Stage 2	315	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	561	905	-
Stage 1	884	-	-
Stage 2	740	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	542	905	-
Mov Cap-2 Maneuver	542	-	-
Stage 1	855	-	-
Stage 2	740	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	816	1436
HCM Lane V/C Ratio	-	-	0.069	0.029
HCM Control Delay (s)	-	-	9.7	7.6
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

HCM 6th AWSC

9: Cardinal Avenue & Los Reales Road

11/15/2021

Intersection												
Intersection Delay, s/veh	42											
Intersection LOS	E											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Vol, veh/h	163	330	12	90	438	95	10	77	68	25	80	156
Future Vol, veh/h	163	330	12	90	438	95	10	77	68	25	80	156
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.79	0.79	0.79	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	185	375	14	101	492	107	13	97	86	29	93	181
Number of Lanes	1	2	0	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	19.7	79	14.9	16.5
HCM LOS	C	F	B	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	90%	0%	100%	0%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	10%	0%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	77	68	163	220	122	90	438	95	25	80
LT Vol	10	0	0	163	0	0	90	0	0	25	0
Through Vol	0	77	0	0	220	110	0	438	0	0	80
RT Vol	0	0	68	0	0	12	0	0	95	0	0
Lane Flow Rate	13	97	86	185	250	139	101	492	107	29	93
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.035	0.257	0.211	0.458	0.584	0.321	0.244	1.117	0.221	0.078	0.237
Departure Headway (Hd)	10.232	9.732	9.032	9.054	8.554	8.485	8.67	8.17	7.47	9.898	9.398
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	352	371	400	400	425	427	414	443	479	364	384
Service Time	7.932	7.432	6.732	6.754	6.254	6.185	6.44	5.94	5.24	7.598	7.098
HCM Lane V/C Ratio	0.037	0.261	0.215	0.463	0.588	0.326	0.244	1.111	0.223	0.08	0.242
HCM Control Delay	13.3	15.8	14.1	19.2	22.6	15.1	14.2	106.8	12.4	13.4	15
HCM Lane LOS	B	C	B	C	C	C	B	F	B	B	B
HCM 95th-tile Q	0.1	1	0.8	2.3	3.6	1.4	0.9	17.1	0.8	0.3	0.9

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	1650	14	102	1022	87	14	89	331	135	71	121
Future Volume (veh/h)	140	1650	14	102	1022	87	14	89	331	135	71	121
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	152	1793	15	110	1099	94	16	101	376	167	88	149
Peak Hour Factor	0.92	0.92	0.92	0.93	0.93	0.93	0.88	0.88	0.88	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	292	1657	14	173	1576	703	284	75	278	210	168	285
Arrive On Green	0.07	0.46	0.46	0.05	0.44	0.44	0.02	0.22	0.22	0.07	0.27	0.27
Sat Flow, veh/h	1781	3612	30	1781	3554	1585	1781	347	1291	1781	624	1056
Grp Volume(v), veh/h	152	881	927	110	1099	94	16	0	477	167	0	237
Grp Sat Flow(s),veh/h/ln	1781	1777	1865	1781	1777	1585	1781	0	1638	1781	0	1680
Q Serve(g_s), s	4.1	41.1	41.1	3.0	22.3	3.1	0.6	0.0	19.3	6.4	0.0	10.7
Cycle Q Clear(g_c), s	4.1	41.1	41.1	3.0	22.3	3.1	0.6	0.0	19.3	6.4	0.0	10.7
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.79	1.00		0.63
Lane Grp Cap(c), veh/h	292	815	856	173	1576	703	284	0	353	210	0	453
V/C Ratio(X)	0.52	1.08	1.08	0.63	0.70	0.13	0.06	0.00	1.35	0.80	0.00	0.52
Avail Cap(c_a), veh/h	360	815	856	182	1576	703	351	0	353	210	0	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.8	24.2	24.2	21.0	20.1	14.8	26.7	0.0	35.1	26.0	0.0	27.8
Incr Delay (d2), s/veh	1.4	55.7	55.8	6.6	1.4	0.1	0.1	0.0	175.9	19.0	0.0	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	28.5	30.0	1.4	9.0	1.1	0.3	0.0	24.7	3.7	0.0	4.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.3	79.9	80.0	27.5	21.5	14.8	26.8	0.0	211.0	45.0	0.0	32.1
LnGrp LOS	B	F	F	C	C	B	C	A	F	D	A	C
Approach Vol, veh/h		1960			1303			493			404	
Approach Delay, s/veh		75.1			21.5			205.0			37.4	
Approach LOS		E			C			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	23.8	9.2	45.6	6.1	28.7	10.6	44.2				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.5	19.3	5.1	41.1	5.0	20.8	9.5	36.7				
Max Q Clear Time (g_c+l1), s	8.4	21.3	5.0	43.1	2.6	12.7	6.1	24.3				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.8	0.1	6.4				
Intersection Summary												
HCM 6th Ctrl Delay			70.1									
HCM 6th LOS			E									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	1189	33	99	924	61	73	152	247	156	109	147
Future Volume (veh/h)	147	1189	33	99	924	61	73	152	247	156	109	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	155	1252	35	108	1004	66	82	171	278	220	154	207
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.71	0.71	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	287	1306	36	214	1250	558	362	922	411	428	486	433
Arrive On Green	0.08	0.37	0.37	0.06	0.35	0.35	0.05	0.26	0.26	0.07	0.27	0.27
Sat Flow, veh/h	1781	3531	99	1781	3554	1585	1781	3554	1585	1781	1777	1585
Grp Volume(v), veh/h	155	630	657	108	1004	66	82	171	278	220	154	207
Grp Sat Flow(s),veh/h/ln	1781	1777	1853	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	4.0	25.7	25.8	2.8	19.0	2.1	2.5	2.8	11.7	5.1	5.1	8.1
Cycle Q Clear(g_c), s	4.0	25.7	25.8	2.8	19.0	2.1	2.5	2.8	11.7	5.1	5.1	8.1
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	287	657	685	214	1250	558	362	922	411	428	486	433
V/C Ratio(X)	0.54	0.96	0.96	0.51	0.80	0.12	0.23	0.19	0.68	0.51	0.32	0.48
Avail Cap(c_a), veh/h	296	657	685	229	1262	563	386	922	411	428	486	433
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.7	22.9	22.9	18.2	21.8	16.3	18.7	21.4	24.7	20.1	21.5	22.6
Incr Delay (d2), s/veh	1.8	25.2	24.7	1.8	3.8	0.1	0.3	0.4	8.6	1.1	1.7	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	14.5	15.0	1.2	8.0	0.7	1.0	1.2	5.2	3.1	2.3	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.5	48.0	47.6	20.1	25.6	16.4	19.0	21.9	33.3	21.2	23.2	26.3
LnGrp LOS	B	D	D	C	C	B	B	C	C	C	C	C
Approach Vol, veh/h		1442			1178			531			581	
Approach Delay, s/veh		44.7			24.6			27.4			23.5	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.6	23.8	9.0	32.0	8.6	24.8	10.3	30.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	19.3	5.1	27.5	5.1	19.3	6.2	26.4				
Max Q Clear Time (g_c+I1), s	7.1	13.7	4.8	27.8	4.5	10.1	6.0	21.0				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	1.5	0.0	3.2				
Intersection Summary												
HCM 6th Ctrl Delay			32.6									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	1121	64	210	767	29	70	52	299	26	54	60
Future Volume (veh/h)	57	1121	64	210	767	29	70	52	299	26	54	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	1144	65	233	852	32	88	65	374	31	64	71
Peak Hour Factor	0.98	0.98	0.98	0.90	0.90	0.90	0.80	0.80	0.80	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	370	1214	542	326	1281	48	455	78	449	191	263	292
Arrive On Green	0.08	0.34	0.34	0.11	0.37	0.37	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	1781	3554	1585	1781	3492	131	1254	240	1382	950	810	899
Grp Volume(v), veh/h	58	1144	65	233	433	451	88	0	439	31	0	135
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1847	1254	0	1622	950	0	1709
Q Serve(g_s), s	1.2	18.8	1.7	5.0	12.3	12.3	3.3	0.0	15.0	1.9	0.0	3.5
Cycle Q Clear(g_c), s	1.2	18.8	1.7	5.0	12.3	12.3	6.8	0.0	15.0	16.9	0.0	3.5
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.85	1.00		0.53
Lane Grp Cap(c), veh/h	370	1214	542	326	652	677	455	0	527	191	0	555
V/C Ratio(X)	0.16	0.94	0.12	0.71	0.67	0.67	0.19	0.00	0.83	0.16	0.00	0.24
Avail Cap(c_a), veh/h	370	1214	542	326	652	677	455	0	527	191	0	555
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.3	19.2	13.6	13.9	15.9	15.9	17.3	0.0	18.7	26.6	0.0	14.8
Incr Delay (d2), s/veh	0.9	15.2	0.5	12.5	5.3	5.1	0.9	0.0	14.3	1.8	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	9.4	0.6	2.8	5.4	5.5	1.0	0.0	7.1	0.5	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.2	34.4	14.0	26.4	21.2	21.0	18.3	0.0	33.0	28.4	0.0	15.9
LnGrp LOS	B	C	B	C	C	C	B	A	C	C	A	B
Approach Vol, veh/h	1267		1117				527			166		
Approach Delay, s/veh	32.4		22.2				30.6			18.2		
Approach LOS	C		C				C			B		
Timer - Assigned Phs	2		3		4		6		7		8	
Phs Duration (G+Y+Rc), s	24.0		11.0		25.0		24.0		9.5		26.5	
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5			
Max Green Setting (Gmax), s	19.5		6.5		20.5		19.5		5.0		22.0	
Max Q Clear Time (g_c+I1), s	17.0		7.0		20.8		18.9		3.2		14.3	
Green Ext Time (p_c), s	0.8		0.0		0.0		0.0		0.0		3.4	
Intersection Summary												
HCM 6th Ctrl Delay	27.6											
HCM 6th LOS	C											

Intersection												
Int Delay, s/veh	69.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲		↰	↱		↰	↱
Traffic Vol, veh/h	12	1629	21	90	949	16	8	1	204	12	1	22
Future Vol, veh/h	12	1629	21	90	949	16	8	1	204	12	1	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	170	210	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	95	95	95	94	94	94	62	62	62
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	1894	24	95	999	17	9	1	217	19	2	35

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1016	0	0	1918	0	0	2613	3128	947	2174	3144	508
Stage 1	-	-	-	-	-	-	1922	1922	-	1198	1198	-
Stage 2	-	-	-	-	-	-	691	1206	-	976	1946	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	678	-	-	305	-	-	12	11	262	26	11	510
Stage 1	-	-	-	-	-	-	69	113	-	197	257	-
Stage 2	-	-	-	-	-	-	401	255	-	270	110	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	678	-	-	305	-	-	~ 7	7	262	~ 3	7	510
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 7	7	-	~ 3	7	-
Stage 1	-	-	-	-	-	-	68	111	-	193	177	-
Stage 2	-	-	-	-	-	-	255	176	-	45	108	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.9	108.3	\$ 3630.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	7	262	678	-	-	305	-	-	8
HCM Lane V/C Ratio	1.368	0.828	0.021	-	-	0.311	-	-	7.056
HCM Control Delay (s)	\$ 1170.7	61.4	10.4	-	-	22	-	-	\$ 3630.4
HCM Lane LOS	F	F	B	-	-	C	-	-	F
HCM 95th %tile Q(veh)	2.1	6.6	0.1	-	-	1.3	-	-	8.5

Notes			
-: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th TWSC
15: Calle Canario & Cardinal Avenue

11/29/2021

Intersection

Int Delay, s/veh 2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	30	0	2	7	0	37	3	374	2	12	251	17
Future Vol, veh/h	30	0	2	7	0	37	3	374	2	12	251	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	58	92	58	92	92	92	86	86	92	92	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	52	0	3	8	0	40	3	435	2	13	285	19

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	783	764	295	764	772	436	304	0	0	437	0	0
Stage 1	321	321	-	442	442	-	-	-	-	-	-	-
Stage 2	462	443	-	322	330	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	311	334	744	321	330	620	1257	-	-	1123	-	-
Stage 1	691	652	-	594	576	-	-	-	-	-	-	-
Stage 2	580	576	-	690	646	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	287	328	744	315	324	620	1257	-	-	1123	-	-
Mov Cap-2 Maneuver	287	328	-	315	324	-	-	-	-	-	-	-
Stage 1	689	643	-	592	574	-	-	-	-	-	-	-
Stage 2	541	574	-	677	637	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	19.8		12.4		0.1		0.3	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1257	-	-	298	537	1123	-
HCM Lane V/C Ratio	0.003	-	-	0.185	0.089	0.012	-
HCM Control Delay (s)	7.9	0	-	19.8	12.4	8.2	0
HCM Lane LOS	A	A	-	C	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.7	0.3	0	-

HCM 6th TWSC
19: Vereda Azul & Westover Avenue

11/29/2021

Intersection

Int Delay, s/veh 3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	30	0	7	9	0	42	2	119	5	28	69	10
Future Vol, veh/h	30	0	7	9	0	42	2	119	5	28	69	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	84	92	84	92	93	93	83	83	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	0	8	11	0	50	2	128	5	34	83	11

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	317	294	89	296	297	131	94	0	0	133	0	0
Stage 1	157	157	-	135	135	-	-	-	-	-	-	-
Stage 2	160	137	-	161	162	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	636	617	969	656	615	919	1500	-	-	1452	-	-
Stage 1	845	768	-	868	785	-	-	-	-	-	-	-
Stage 2	842	783	-	841	764	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	590	601	969	638	599	919	1500	-	-	1452	-	-
Mov Cap-2 Maneuver	590	601	-	638	599	-	-	-	-	-	-	-
Stage 1	844	749	-	867	784	-	-	-	-	-	-	-
Stage 2	795	782	-	814	745	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11		9.5		0.1		2	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1500	-	-	637 853	1452	-	-
HCM Lane V/C Ratio	0.001	-	-	0.063 0.071	0.023	-	-
HCM Control Delay (s)	7.4	0	-	11 9.5	7.5	0	-
HCM Lane LOS	A	A	-	B A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.2	0.1	-	-

HCM 6th TWSC
25: Cardinal Av & South Dwy

11/29/2021

Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	15	364	2	5	255
Future Vol, veh/h	7	15	364	2	5	255
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	16	396	2	5	277

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	684	397	0
Stage 1	397	-	-
Stage 2	287	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	414	652	-
Stage 1	679	-	-
Stage 2	762	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	412	652	-
Mov Cap-2 Maneuver	412	-	-
Stage 1	676	-	-
Stage 2	762	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.8	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	550	1161
HCM Lane V/C Ratio	-	-	0.043	0.005
HCM Control Delay (s)	-	-	11.8	8.1
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 6th TWSC
27: Westover Ave & South Dwy

11/29/2021

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	7	2	89	73	12
Future Vol, veh/h	37	7	2	89	73	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	8	2	97	79	13

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	187	86	92
Stage 1	86	-	-
Stage 2	101	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	802	973	1503
Stage 1	937	-	-
Stage 2	923	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	801	973	1503
Mov Cap-2 Maneuver	801	-	-
Stage 1	936	-	-
Stage 2	923	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1503	-	824	-	-
HCM Lane V/C Ratio	0.001	-	0.058	-	-
HCM Control Delay (s)	7.4	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

HCM 6th AWSC
9: Cardinal Avenue & Los Reales Road

11/29/2021

Intersection	
Intersection Delay, s/veh	19.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	183	522	16	18	172	26	19	57	83	68	28	90
Future Vol, veh/h	183	522	16	18	172	26	19	57	83	68	28	90
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	220	629	19	24	229	35	20	60	87	85	35	113
Number of Lanes	1	2	0	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	23.9	17.2	12.5	13.1
HCM LOS	C	C	B	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	92%	0%	100%	0%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	8%	0%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	19	57	83	183	348	190	18	172	26	68	28
LT Vol	19	0	0	183	0	0	18	0	0	68	0
Through Vol	0	57	0	0	348	174	0	172	0	0	28
RT Vol	0	0	83	0	0	16	0	0	26	0	0
Lane Flow Rate	20	60	87	220	419	229	24	229	35	85	35
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.05	0.142	0.19	0.455	0.808	0.437	0.057	0.509	0.07	0.208	0.081
Departure Headway (Hd)	9.024	8.524	7.824	7.435	6.935	6.876	8.495	7.995	7.295	8.825	8.325
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	397	421	458	485	524	524	421	452	490	406	430
Service Time	6.783	6.283	5.583	5.178	4.678	4.619	6.25	5.75	5.05	6.58	6.08
HCM Lane V/C Ratio	0.05	0.143	0.19	0.454	0.8	0.437	0.057	0.507	0.071	0.209	0.081
HCM Control Delay	12.3	12.7	12.4	16.3	32.8	14.9	11.8	18.8	10.6	13.9	11.8
HCM Lane LOS	B	B	B	C	D	B	B	C	B	B	B
HCM 95th-tile Q	0.2	0.5	0.7	2.3	7.8	2.2	0.2	2.8	0.2	0.8	0.3

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	1374	24	259	1724	240	36	95	248	161	133	172
Future Volume (veh/h)	144	1374	24	259	1724	240	36	95	248	161	133	172
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	158	1510	26	262	1741	242	41	109	285	171	141	183
Peak Hour Factor	0.91	0.91	0.91	0.99	0.99	0.99	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	1426	25	280	1599	713	225	104	273	189	187	243
Arrive On Green	0.06	0.40	0.40	0.11	0.45	0.45	0.04	0.23	0.23	0.06	0.25	0.25
Sat Flow, veh/h	1781	3575	61	1781	3554	1585	1781	458	1197	1781	739	959
Grp Volume(v), veh/h	158	750	786	262	1741	242	41	0	394	171	0	324
Grp Sat Flow(s),veh/h/ln	1781	1777	1859	1781	1777	1585	1781	0	1655	1781	0	1698
Q Serve(g_s), s	4.7	35.9	35.9	9.0	40.5	8.9	1.6	0.0	20.5	5.5	0.0	15.9
Cycle Q Clear(g_c), s	4.7	35.9	35.9	9.0	40.5	8.9	1.6	0.0	20.5	5.5	0.0	15.9
Prop In Lane	1.00		0.03	1.00		1.00	1.00		0.72	1.00		0.56
Lane Grp Cap(c), veh/h	189	709	742	280	1599	713	225	0	377	189	0	430
V/C Ratio(X)	0.84	1.06	1.06	0.94	1.09	0.34	0.18	0.00	1.05	0.91	0.00	0.75
Avail Cap(c_a), veh/h	189	709	742	280	1599	713	260	0	377	189	0	430
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.6	27.0	27.1	25.3	24.8	16.1	26.1	0.0	34.8	30.2	0.0	31.0
Incr Delay (d2), s/veh	26.6	50.2	50.1	37.0	50.8	0.3	0.4	0.0	58.7	40.0	0.0	11.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	24.2	25.3	5.6	27.0	3.2	0.7	0.0	14.2	3.2	0.0	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.2	77.2	77.2	62.3	75.5	16.3	26.4	0.0	93.4	70.2	0.0	42.6
LnGrp LOS	D	F	F	E	F	B	C	A	F	E	A	D
Approach Vol, veh/h		1694			2245			435			495	
Approach Delay, s/veh		74.5			67.6			87.1			52.1	
Approach LOS		E			E			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	25.0	14.6	40.4	7.7	27.3	10.0	45.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	20.5	10.1	35.9	5.0	21.0	5.5	40.5				
Max Q Clear Time (g_c+l1), s	7.5	22.5	11.0	37.9	3.6	17.9	6.7	42.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			70.2									
HCM 6th LOS			E									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	1128	44	297	1297	105	155	137	185	213	198	178
Future Volume (veh/h)	129	1128	44	297	1297	105	155	137	185	213	198	178
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	140	1226	48	306	1337	108	170	151	203	220	204	184
Peak Hour Factor	0.92	0.92	0.92	0.97	0.97	0.97	0.91	0.91	0.91	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	246	1322	52	345	1591	710	303	758	338	379	387	331
Arrive On Green	0.07	0.38	0.38	0.14	0.45	0.45	0.06	0.21	0.21	0.06	0.21	0.21
Sat Flow, veh/h	1781	3486	136	1781	3554	1585	1781	3554	1585	1781	1816	1552
Grp Volume(v), veh/h	140	624	650	306	1337	108	170	151	203	220	199	189
Grp Sat Flow(s),veh/h/ln	1781	1777	1846	1781	1777	1585	1781	1777	1585	1781	1777	1591
Q Serve(g_s), s	4.1	29.2	29.2	9.6	28.9	3.5	5.5	3.0	10.0	5.5	8.6	9.2
Cycle Q Clear(g_c), s	4.1	29.2	29.2	9.6	28.9	3.5	5.5	3.0	10.0	5.5	8.6	9.2
Prop In Lane	1.00		0.07	1.00		1.00	1.00		1.00	1.00		0.98
Lane Grp Cap(c), veh/h	246	674	700	345	1591	710	303	758	338	379	379	339
V/C Ratio(X)	0.57	0.93	0.93	0.89	0.84	0.15	0.56	0.20	0.60	0.58	0.53	0.56
Avail Cap(c_a), veh/h	259	686	713	399	1700	758	303	758	338	379	379	339
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.1	25.8	25.8	21.5	21.2	14.2	27.1	28.0	30.8	27.4	30.2	30.4
Incr Delay (d2), s/veh	2.7	18.6	18.3	19.0	3.8	0.1	2.3	0.6	7.7	2.2	5.1	6.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	15.1	15.7	5.5	12.0	1.2	0.7	1.3	4.5	1.5	4.2	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	44.4	44.1	40.6	25.0	14.3	29.4	28.6	38.5	29.6	35.4	36.9
LnGrp LOS	C	D	D	D	C	B	C	C	D	C	D	D
Approach Vol, veh/h	1414		1751				524		608			
Approach Delay, s/veh	42.0		27.0				32.7		33.8			
Approach LOS	D		C				C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	23.0	16.4	37.4	10.0	23.0	10.4	43.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	18.5	14.5	33.5	5.5	18.5	6.5	41.5				
Max Q Clear Time (g_c+l1), s	7.5	12.0	11.6	31.2	7.5	11.2	6.1	30.9				
Green Ext Time (p_c), s	0.0	0.9	0.3	1.6	0.0	1.4	0.0	6.9				
Intersection Summary												
HCM 6th Ctrl Delay			33.6									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	1191	30	276	1293	44	79	27	194	35	68	70
Future Volume (veh/h)	32	1191	30	276	1293	44	79	27	194	35	68	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	1418	36	294	1376	47	96	33	237	43	83	85
Peak Hour Factor	0.84	0.84	0.84	0.94	0.94	0.94	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	270	1447	645	324	1603	55	347	55	395	251	236	242
Arrive On Green	0.07	0.41	0.41	0.12	0.46	0.46	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1781	3554	1585	1781	3506	120	1217	197	1418	1109	847	867
Grp Volume(v), veh/h	38	1418	36	294	696	727	96	0	270	43	0	168
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1849	1217	0	1615	1109	0	1714
Q Serve(g_s), s	0.8	27.6	1.0	7.1	24.5	24.6	4.8	0.0	10.1	2.4	0.0	5.5
Cycle Q Clear(g_c), s	0.8	27.6	1.0	7.1	24.5	24.6	10.3	0.0	10.1	12.6	0.0	5.5
Prop In Lane	1.00		1.00	1.00		0.06	1.00		0.88	1.00		0.51
Lane Grp Cap(c), veh/h	270	1447	645	324	812	845	347	0	450	251	0	478
V/C Ratio(X)	0.14	0.98	0.06	0.91	0.86	0.86	0.28	0.00	0.60	0.17	0.00	0.35
Avail Cap(c_a), veh/h	270	1447	645	324	812	845	347	0	450	251	0	478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.3	20.5	12.6	17.1	17.0	17.0	24.3	0.0	21.9	27.3	0.0	20.2
Incr Delay (d2), s/veh	1.1	19.4	0.2	31.1	11.3	11.1	2.0	0.0	5.8	1.5	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	14.1	0.3	5.3	11.3	11.8	1.5	0.0	4.3	0.7	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.3	39.8	12.8	48.2	28.3	28.1	26.3	0.0	27.7	28.8	0.0	22.2
LnGrp LOS	B	D	B	D	C	C	C	A	C	C	A	C
Approach Vol, veh/h	1492			1717			366			211		
Approach Delay, s/veh	38.5			31.6			27.3			23.6		
Approach LOS	D			C			C			C		
Timer - Assigned Phs	2		3	4	6		7	8				
Phs Duration (G+Y+Rc), s	24.0		13.0	33.0	24.0		9.5	36.5				
Change Period (Y+Rc), s	4.5		4.5	4.5	4.5		4.5	4.5				
Max Green Setting (Gmax), s	19.5		8.5	28.5	19.5		5.0	32.0				
Max Q Clear Time (g_c+I1), s	12.3		9.1	29.6	14.6		2.8	26.6				
Green Ext Time (p_c), s	1.2		0.0	0.0	0.4		0.0	3.9				
Intersection Summary												
HCM 6th Ctrl Delay	33.5											
HCM 6th LOS	C											

Intersection												
Int Delay, s/veh	7.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑			↰	↱		↰	
Traffic Vol, veh/h	16	1481	26	266	1597	32	5	0	180	4	1	24
Future Vol, veh/h	16	1481	26	266	1597	32	5	0	180	4	1	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	170	210	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	97	97	97	73	73	73	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	1627	29	274	1646	33	7	0	247	5	1	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1679	0	0	1656	0	0	3035	3890	814	3061	3903	840
Stage 1	-	-	-	-	-	-	1663	1663	-	2211	2211	-
Stage 2	-	-	-	-	-	-	1372	2227	-	850	1692	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	378	-	-	385	-	-	~ 6	3	321	5	3	309
Stage 1	-	-	-	-	-	-	101	152	-	45	80	-
Stage 2	-	-	-	-	-	-	154	79	-	322	147	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	378	-	-	385	-	-	-	1	321	0	~ 1	309
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	1	-	0	~ 1	-
Stage 1	-	-	-	-	-	-	96	145	-	43	23	-
Stage 2	-	-	-	-	-	-	38	23	-	71	140	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	4.8		\$ 618.4
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	321	378	-	-	385	-	-	23
HCM Lane V/C Ratio	-	0.768	0.047	-	-	0.712	-	-	1.501
HCM Control Delay (s)	-	45.3	15	-	-	34.4	-	-	\$ 618.4
HCM Lane LOS	-	E	B	-	-	D	-	-	F
HCM 95th %tile Q(veh)	-	6	0.1	-	-	5.4	-	-	4.4

Notes			
-: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th TWSC
15: Calle Canario & Cardinal Avenue

11/29/2021

Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	31	0	1	5	0	25	5	383	8	42	441	39
Future Vol, veh/h	31	0	1	5	0	25	5	383	8	42	441	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	0	1	5	0	27	5	416	9	46	479	42

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1036	1027	500	1024	1044	421	521	0	0	425	0	0
Stage 1	592	592	-	431	431	-	-	-	-	-	-	-
Stage 2	444	435	-	593	613	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	210	234	571	214	229	632	1045	-	-	1134	-	-
Stage 1	493	494	-	603	583	-	-	-	-	-	-	-
Stage 2	593	580	-	492	483	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	191	219	571	203	214	632	1045	-	-	1134	-	-
Mov Cap-2 Maneuver	191	219	-	203	214	-	-	-	-	-	-	-
Stage 1	490	465	-	599	580	-	-	-	-	-	-	-
Stage 2	564	577	-	463	455	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	27.4		13.3		0.1		0.7	
HCM LOS	D		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1045	-	-	195	467	1134	-
HCM Lane V/C Ratio	0.005	-	-	0.178	0.07	0.04	-
HCM Control Delay (s)	8.5	0	-	27.4	13.3	8.3	0
HCM Lane LOS	A	A	-	D	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.6	0.2	0.1	-

HCM 6th TWSC
19: Vereda Azul & Westover Avenue

11/29/2021

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	20	0	5	8	0	41	8	123	5	39	219	34
Future Vol, veh/h	20	0	5	8	0	41	8	123	5	39	219	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	87	92	87	92	88	88	94	94	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	0	5	9	0	47	9	140	6	41	233	37

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	519	498	252	497	513	143	270	0	0	146	0	0
Stage 1	334	334	-	161	161	-	-	-	-	-	-	-
Stage 2	185	164	-	336	352	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	467	474	787	483	465	905	1293	-	-	1436	-	-
Stage 1	680	643	-	841	765	-	-	-	-	-	-	-
Stage 2	817	762	-	678	632	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	429	454	787	464	445	905	1293	-	-	1436	-	-
Mov Cap-2 Maneuver	429	454	-	464	445	-	-	-	-	-	-	-
Stage 1	675	621	-	834	759	-	-	-	-	-	-	-
Stage 2	768	756	-	650	611	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	13.1		10		0.4		1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1293	-	-	472 783	1436	-	-
HCM Lane V/C Ratio	0.007	-	-	0.058 0.072	0.029	-	-
HCM Control Delay (s)	7.8	0	-	13.1 10	7.6	0	-
HCM Lane LOS	A	A	-	B B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.2	0.1	-	-

HCM 6th TWSC
25: Cardinal Ave & South Dwy

11/29/2021

Intersection

Int Delay, s/veh 0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	10	386	8	17	430
Future Vol, veh/h	5	10	386	8	17	430
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	11	420	9	18	467

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	928	425	0
Stage 1	425	-	-
Stage 2	503	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	297	629	-
Stage 1	659	-	-
Stage 2	607	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	290	629	-
Mov Cap-2 Maneuver	290	-	-
Stage 1	645	-	-
Stage 2	607	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	453	1130
HCM Lane V/C Ratio	-	-	0.036	0.016
HCM Control Delay (s)	-	-	13.2	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1

HCM 6th TWSC
27: Westover Ave & South Dwy

11/29/2021

Intersection

Int Delay, s/veh 1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	5	8	111	190	42
Future Vol, veh/h	25	5	8	111	190	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	5	9	121	207	46

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	369	230	253
Stage 1	230	-	-
Stage 2	139	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	631	809	1312
Stage 1	808	-	-
Stage 2	888	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	627	809	1312
Mov Cap-2 Maneuver	627	-	-
Stage 1	802	-	-
Stage 2	888	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1312	-	651	-	-
HCM Lane V/C Ratio	0.007	-	0.05	-	-
HCM Control Delay (s)	7.8	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	43.1
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↱	↰	↰	↱	↰	↰	↱	↰
Traffic Vol, veh/h	171	330	12	90	438	103	10	77	68	30	80	161
Future Vol, veh/h	171	330	12	90	438	103	10	77	68	30	80	161
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.79	0.79	0.79	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	194	375	14	101	492	116	13	97	86	35	93	187
Number of Lanes	1	2	0	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	20.2	81.4	15.1	16.9
HCM LOS	C	F	C	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	90%	0%	100%	0%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	10%	0%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	77	68	171	220	122	90	438	103	30	80
LT Vol	10	0	0	171	0	0	90	0	0	30	0
Through Vol	0	77	0	0	220	110	0	438	0	0	80
RT Vol	0	0	68	0	0	12	0	0	103	0	0
Lane Flow Rate	13	97	86	194	250	139	101	492	116	35	93
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.035	0.26	0.213	0.484	0.589	0.324	0.246	1.129	0.243	0.094	0.239
Departure Headway (Hd)	10.354	9.854	9.154	9.145	8.645	8.576	8.757	8.257	7.557	9.98	9.48
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	348	366	394	396	420	421	410	438	473	361	381
Service Time	8.054	7.554	6.854	6.845	6.345	6.276	6.532	6.032	5.332	7.68	7.18
HCM Lane V/C Ratio	0.037	0.265	0.218	0.49	0.595	0.33	0.246	1.123	0.245	0.097	0.244
HCM Control Delay	13.4	16	14.3	20.1	23	15.3	14.4	111.3	12.8	13.7	15.1
HCM Lane LOS	B	C	B	C	C	C	B	F	B	B	C
HCM 95th-tile Q	0.1	1	0.8	2.6	3.7	1.4	1	17.5	0.9	0.3	0.9

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  						 	
Traffic Volume (veh/h)	140	1650	14	102	1022	87	14	89	331	135	71	121
Future Volume (veh/h)	140	1650	14	102	1022	87	14	89	331	135	71	121
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	152	1793	15	110	1099	94	16	101	376	167	88	149
Peak Hour Factor	0.92	0.92	0.92	0.93	0.93	0.93	0.88	0.88	0.88	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	281	1945	16	178	1816	564	424	112	419	251	240	407
Arrive On Green	0.07	0.37	0.37	0.06	0.36	0.36	0.02	0.32	0.32	0.08	0.39	0.39
Sat Flow, veh/h	1781	5223	44	1781	5106	1585	1781	347	1291	1781	624	1056
Grp Volume(v), veh/h	152	1169	639	110	1099	94	16	0	477	167	0	237
Grp Sat Flow(s),veh/h/ln	1781	1702	1862	1781	1702	1585	1781	0	1638	1781	0	1680
Q Serve(g_s), s	5.7	34.9	34.9	4.1	18.8	4.3	0.6	0.0	29.6	6.4	0.0	10.7
Cycle Q Clear(g_c), s	5.7	34.9	34.9	4.1	18.8	4.3	0.6	0.0	29.6	6.4	0.0	10.7
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.79	1.00		0.63
Lane Grp Cap(c), veh/h	281	1268	694	178	1816	564	424	0	531	251	0	647
V/C Ratio(X)	0.54	0.92	0.92	0.62	0.61	0.17	0.04	0.00	0.90	0.67	0.00	0.37
Avail Cap(c_a), veh/h	334	1283	702	201	1816	564	478	0	531	279	0	647
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.5	31.9	31.9	26.1	28.2	23.5	23.3	0.0	34.3	25.3	0.0	23.4
Incr Delay (d2), s/veh	1.6	11.0	17.6	4.6	0.6	0.1	0.0	0.0	20.6	5.1	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	15.9	18.6	1.9	7.6	1.6	0.3	0.0	14.6	3.0	0.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.1	42.9	49.5	30.7	28.7	23.6	23.4	0.0	54.9	30.4	0.0	25.0
LnGrp LOS	C	D	D	C	C	C	C	A	D	C	A	C
Approach Vol, veh/h		1960			1303			493			404	
Approach Delay, s/veh		43.5			28.5			53.9			27.2	
Approach LOS		D			C			D			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.9	39.0	10.4	44.1	6.4	45.5	12.2	42.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.1	34.5	7.3	40.1	5.1	39.5	10.9	36.5				
Max Q Clear Time (g_c+I1), s	8.4	31.6	6.1	36.9	2.6	12.7	7.7	20.8				
Green Ext Time (p_c), s	0.1	0.9	0.0	2.7	0.0	1.5	0.1	7.3				
Intersection Summary												
HCM 6th Ctrl Delay			38.5									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	1189	32	105	924	61	71	149	264	156	108	147
Future Volume (veh/h)	147	1189	32	105	924	61	71	149	264	156	108	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	155	1252	34	114	1004	66	80	167	297	220	152	207
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.89	0.89	0.89	0.71	0.71	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	295	1344	36	223	1293	577	348	878	391	415	464	414
Arrive On Green	0.08	0.38	0.38	0.06	0.36	0.36	0.05	0.25	0.25	0.07	0.26	0.26
Sat Flow, veh/h	1781	3534	96	1781	3554	1585	1781	3554	1585	1781	1777	1585
Grp Volume(v), veh/h	155	629	657	114	1004	66	80	167	297	220	152	207
Grp Sat Flow(s),veh/h/ln	1781	1777	1853	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	3.9	25.2	25.2	2.9	18.6	2.0	2.4	2.8	12.9	5.1	5.1	8.2
Cycle Q Clear(g_c), s	3.9	25.2	25.2	2.9	18.6	2.0	2.4	2.8	12.9	5.1	5.1	8.2
Prop In Lane	1.00		0.05	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	295	676	705	223	1293	577	348	878	391	415	464	414
V/C Ratio(X)	0.53	0.93	0.93	0.51	0.78	0.11	0.23	0.19	0.76	0.53	0.33	0.50
Avail Cap(c_a), veh/h	318	683	713	237	1293	577	374	878	391	415	464	414
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	22.0	22.0	17.8	20.9	15.6	19.3	22.0	25.9	20.8	22.1	23.3
Incr Delay (d2), s/veh	1.5	19.4	19.0	1.8	3.0	0.1	0.3	0.5	12.9	1.3	1.9	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	13.3	13.8	1.2	7.7	0.7	1.0	1.2	6.0	3.2	2.3	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.4	41.4	41.0	19.6	23.9	15.7	19.6	22.5	38.8	22.1	24.0	27.5
LnGrp LOS	B	D	D	B	C	B	B	C	D	C	C	C
Approach Vol, veh/h	1441		1184				544		579			
Approach Delay, s/veh	38.7		23.1				31.0		24.5			
Approach LOS	D		C				C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.6	22.8	9.0	32.7	8.5	23.9	10.2	31.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	18.3	5.1	28.5	5.1	18.3	6.7	26.9				
Max Q Clear Time (g_c+I1), s	7.1	14.9	4.9	27.2	4.4	10.2	5.9	20.6				
Green Ext Time (p_c), s	0.0	0.7	0.0	1.0	0.0	1.3	0.0	3.6				
Intersection Summary												
HCM 6th Ctrl Delay			30.4									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

9: Cardinal Avenue & Los Reales Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	183	522	16	18	172	26	19	57	83	68	28	90
Future Volume (veh/h)	183	522	16	18	172	26	19	57	83	68	28	90
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	220	629	19	24	229	35	20	60	87	85	35	112
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.95	0.95	0.95	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	699	1585	48	542	842	713	508	367	311	493	367	311
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1115	3522	106	783	1870	1585	1241	1870	1585	1241	1870	1585
Grp Volume(v), veh/h	220	317	331	24	229	35	20	60	87	85	35	112
Grp Sat Flow(s),veh/h/ln	1115	1777	1851	783	1870	1585	1241	1870	1585	1241	1870	1585
Q Serve(g_s), s	3.9	3.0	3.0	0.5	2.0	0.3	0.3	0.7	1.2	1.6	0.4	1.6
Cycle Q Clear(g_c), s	5.9	3.0	3.0	3.6	2.0	0.3	0.7	0.7	1.2	2.2	0.4	1.6
Prop In Lane	1.00		0.06	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	699	800	833	542	842	713	508	367	311	493	367	311
V/C Ratio(X)	0.31	0.40	0.40	0.04	0.27	0.05	0.04	0.16	0.28	0.17	0.10	0.36
Avail Cap(c_a), veh/h	986	1256	1309	743	1322	1121	1141	1322	1121	1127	1322	1121
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.2	4.7	4.7	5.9	4.4	3.9	8.7	8.5	8.7	9.4	8.4	8.8
Incr Delay (d2), s/veh	0.3	0.3	0.3	0.0	0.2	0.0	0.0	0.2	0.5	0.2	0.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.4	0.5	0.1	0.3	0.0	0.1	0.2	0.3	0.3	0.1	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.5	5.0	5.0	5.9	4.6	4.0	8.7	8.7	9.2	9.6	8.5	9.5
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		868			288			167			232	
Approach Delay, s/veh		5.4			4.6			9.0			9.4	
Approach LOS		A			A			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		9.5		16.0		9.5		16.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+l1), s		3.2		7.9		4.2		5.6				
Green Ext Time (p_c), s		0.5		3.6		0.7		1.2				
Intersection Summary												
HCM 6th Ctrl Delay			6.2									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary

12: Westover Avenue/Hildreth Avenue & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	1629	21	90	949	16	8	1	204	12	1	22
Future Volume (veh/h)	12	1629	21	90	949	16	8	1	204	12	1	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	1894	24	95	999	17	9	1	217	19	2	35
Peak Hour Factor	0.86	0.86	0.86	0.95	0.95	0.95	0.94	0.94	0.94	0.62	0.62	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	406	2376	738	316	2700	46	374	34	288	154	48	172
Arrive On Green	0.02	0.47	0.47	0.07	0.52	0.52	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1781	5106	1585	1781	5171	88	1280	189	1585	303	266	947
Grp Volume(v), veh/h	14	1894	24	95	658	358	10	0	217	56	0	0
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1702	1855	1470	0	1585	1516	0	0
Q Serve(g_s), s	0.2	15.3	0.4	1.2	5.5	5.6	0.0	0.0	6.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.2	15.3	0.4	1.2	5.5	5.6	0.2	0.0	6.3	1.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.05	0.90		1.00	0.34		0.62
Lane Grp Cap(c), veh/h	406	2376	738	316	1777	968	408	0	288	375	0	0
V/C Ratio(X)	0.03	0.80	0.03	0.30	0.37	0.37	0.02	0.00	0.75	0.15	0.00	0.00
Avail Cap(c_a), veh/h	558	2475	768	367	1777	968	675	0	589	644	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.6	11.0	7.0	9.3	6.9	6.9	16.3	0.0	18.8	16.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.8	0.0	0.5	0.1	0.2	0.0	0.0	4.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	4.7	0.1	0.4	1.5	1.6	0.1	0.0	2.4	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.6	12.9	7.1	9.9	7.0	7.1	16.3	0.0	22.8	17.0	0.0	0.0
LnGrp LOS	A	B	A	A	A	A	B	A	C	B	A	A
Approach Vol, veh/h	1932		1111				227			56		
Approach Delay, s/veh	12.7		7.3				22.5			17.0		
Approach LOS	B		A				C			B		
Timer - Assigned Phs	2		3		4		6		7		8	
Phs Duration (G+Y+Rc), s	13.3		8.1		27.1		13.3		5.4		29.8	
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5		4.5	
Max Green Setting (Gmax), s	18.0		5.0		23.5		18.0		5.0		23.5	
Max Q Clear Time (g_c+I1), s	8.3		3.2		17.3		3.4		2.2		7.6	
Green Ext Time (p_c), s	0.5		0.0		5.3		0.2		0.0		6.2	
Intersection Summary												
HCM 6th Ctrl Delay	11.6											
HCM 6th LOS	B											

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	1120	64	210	765	29	70	52	299	26	54	60
Future Volume (veh/h)	57	1120	64	210	765	29	70	52	299	26	54	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	1143	65	233	850	32	88	65	374	31	64	71
Peak Hour Factor	0.98	0.98	0.98	0.90	0.90	0.90	0.80	0.80	0.80	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	1214	542	327	1280	48	455	78	449	191	263	292
Arrive On Green	0.08	0.34	0.34	0.11	0.37	0.37	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	1781	3554	1585	1781	3492	131	1254	240	1382	950	810	899
Grp Volume(v), veh/h	58	1143	65	233	432	450	88	0	439	31	0	135
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1847	1254	0	1622	950	0	1709
Q Serve(g_s), s	1.2	18.7	1.7	5.0	12.2	12.2	3.3	0.0	15.0	1.9	0.0	3.5
Cycle Q Clear(g_c), s	1.2	18.7	1.7	5.0	12.2	12.2	6.8	0.0	15.0	16.9	0.0	3.5
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.85	1.00		0.53
Lane Grp Cap(c), veh/h	371	1214	542	327	652	677	455	0	527	191	0	555
V/C Ratio(X)	0.16	0.94	0.12	0.71	0.66	0.66	0.19	0.00	0.83	0.16	0.00	0.24
Avail Cap(c_a), veh/h	371	1214	542	327	652	677	455	0	527	191	0	555
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.3	19.2	13.6	13.9	15.9	15.9	17.3	0.0	18.7	26.6	0.0	14.8
Incr Delay (d2), s/veh	0.9	15.1	0.5	12.5	5.3	5.1	0.9	0.0	14.3	1.8	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	9.3	0.6	2.8	5.3	5.5	1.0	0.0	7.1	0.5	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.2	34.3	14.0	26.4	21.2	21.0	18.3	0.0	33.0	28.4	0.0	15.9
LnGrp LOS	B	C	B	C	C	C	B	A	C	C	A	B
Approach Vol, veh/h	1266		1115			527			166			
Approach Delay, s/veh	32.2		22.2			30.6			18.2			
Approach LOS	C		C			C			B			
Timer - Assigned Phs	2		3		4		6		7		8	
Phs Duration (G+Y+Rc), s	24.0		11.0		25.0		24.0		9.5		26.5	
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5			
Max Green Setting (Gmax), s	19.5		6.5		20.5		19.5		5.0		22.0	
Max Q Clear Time (g_c+l1), s	17.0		7.0		20.7		18.9		3.2		14.2	
Green Ext Time (p_c), s	0.8		0.0		0.0		0.0		0.0		3.4	
Intersection Summary												
HCM 6th Ctrl Delay	27.6											
HCM 6th LOS	C											

HCM 6th Signalized Intersection Summary

3: Mission Road & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  						 	
Traffic Volume (veh/h)	144	1374	24	259	1724	240	36	95	248	161	133	172
Future Volume (veh/h)	144	1374	24	259	1724	240	36	95	248	161	133	172
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	158	1510	26	262	1741	242	41	109	285	171	141	183
Peak Hour Factor	0.91	0.91	0.91	0.99	0.99	0.99	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	226	1629	28	299	1799	559	328	130	340	289	245	318
Arrive On Green	0.08	0.32	0.32	0.12	0.35	0.35	0.04	0.28	0.28	0.08	0.33	0.33
Sat Flow, veh/h	1781	5169	89	1781	5106	1585	1781	458	1197	1781	739	959
Grp Volume(v), veh/h	158	994	542	262	1741	242	41	0	394	171	0	324
Grp Sat Flow(s),veh/h/ln	1781	1702	1854	1781	1702	1585	1781	0	1655	1781	0	1698
Q Serve(g_s), s	5.3	25.4	25.4	8.6	30.1	10.5	1.4	0.0	20.1	5.8	0.0	14.2
Cycle Q Clear(g_c), s	5.3	25.4	25.4	8.6	30.1	10.5	1.4	0.0	20.1	5.8	0.0	14.2
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.72	1.00		0.56
Lane Grp Cap(c), veh/h	226	1073	584	299	1799	559	328	0	470	289	0	563
V/C Ratio(X)	0.70	0.93	0.93	0.87	0.97	0.43	0.13	0.00	0.84	0.59	0.00	0.58
Avail Cap(c_a), veh/h	233	1080	588	299	1799	559	363	0	470	289	0	563
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.5	29.7	29.7	21.1	28.6	22.2	21.8	0.0	30.2	21.9	0.0	24.8
Incr Delay (d2), s/veh	8.6	13.3	20.9	23.8	14.3	0.5	0.2	0.0	16.2	3.2	0.0	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	11.9	14.2	5.4	14.1	3.9	0.6	0.0	9.9	2.6	0.0	6.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.1	43.0	50.6	44.9	42.9	22.8	22.0	0.0	46.5	25.1	0.0	29.0
LnGrp LOS	C	D	D	D	D	C	C	A	D	C	A	C
Approach Vol, veh/h		1694			2245			435			495	
Approach Delay, s/veh		44.3			40.9			44.2			27.7	
Approach LOS		D			D			D			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	30.0	15.0	32.8	7.7	34.3	11.7	36.1				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	25.5	10.5	28.5	5.0	28.0	7.5	31.5				
Max Q Clear Time (g_c+I1), s	7.8	22.1	10.6	27.4	3.4	16.2	7.3	32.1				
Green Ext Time (p_c), s	0.0	0.8	0.0	0.9	0.0	1.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			41.1									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary

6: Cardinal Avenue & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	1128	41	316	1297	105	153	135	196	213	195	178
Future Volume (veh/h)	129	1128	41	316	1297	105	153	135	196	213	195	178
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	140	1226	45	326	1337	108	168	148	215	220	201	184
Peak Hour Factor	0.92	0.92	0.92	0.97	0.97	0.97	0.91	0.91	0.91	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	250	1311	48	362	1618	722	297	746	333	372	379	328
Arrive On Green	0.07	0.38	0.38	0.15	0.46	0.46	0.06	0.21	0.21	0.06	0.21	0.21
Sat Flow, veh/h	1781	3496	128	1781	3554	1585	1781	3554	1585	1781	1804	1562
Grp Volume(v), veh/h	140	623	648	326	1337	108	168	148	215	220	198	187
Grp Sat Flow(s),veh/h/ln	1781	1777	1847	1781	1777	1585	1781	1777	1585	1781	1777	1589
Q Serve(g_s), s	4.2	29.7	29.8	10.9	28.9	3.5	5.5	3.0	10.9	5.5	8.7	9.3
Cycle Q Clear(g_c), s	4.2	29.7	29.8	10.9	28.9	3.5	5.5	3.0	10.9	5.5	8.7	9.3
Prop In Lane	1.00		0.07	1.00		1.00	1.00		1.00	1.00		0.98
Lane Grp Cap(c), veh/h	250	666	693	362	1618	722	297	746	333	372	373	334
V/C Ratio(X)	0.56	0.93	0.94	0.90	0.83	0.15	0.57	0.20	0.65	0.59	0.53	0.56
Avail Cap(c_a), veh/h	260	676	702	391	1674	747	297	746	333	372	373	334
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.2	26.5	26.5	22.9	21.0	14.0	27.8	28.7	31.8	28.2	30.9	31.2
Incr Delay (d2), s/veh	2.5	20.1	19.7	22.2	3.5	0.1	2.5	0.6	9.3	2.5	5.3	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	15.6	16.2	6.5	12.0	1.2	0.8	1.3	4.9	1.6	4.2	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.7	46.6	46.3	45.1	24.4	14.1	30.3	29.3	41.1	30.7	36.2	37.8
LnGrp LOS	C	D	D	D	C	B	C	C	D	C	D	D
Approach Vol, veh/h		1411			1771			531			605	
Approach Delay, s/veh		44.0			27.6			34.4			34.7	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	23.0	17.6	37.5	10.0	23.0	10.5	44.6				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	18.5	14.5	33.5	5.5	18.5	6.5	41.5				
Max Q Clear Time (g_c+I1), s	7.5	12.9	12.9	31.8	7.5	11.3	6.2	30.9				
Green Ext Time (p_c), s	0.0	0.8	0.2	1.3	0.0	1.3	0.0	6.9				
Intersection Summary												
HCM 6th Ctrl Delay			34.8									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

9: Cardinal Avenue & Los Reales Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	171	330	12	90	438	103	10	77	68	30	80	161
Future Volume (veh/h)	171	330	12	90	438	103	10	77	68	30	80	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	194	375	14	101	492	116	13	97	86	35	93	187
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.79	0.79	0.79	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	509	1834	68	686	982	832	394	373	316	407	373	316
Arrive On Green	0.52	0.52	0.52	0.52	0.52	0.52	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	813	3494	130	995	1870	1585	1099	1870	1585	1201	1870	1585
Grp Volume(v), veh/h	194	190	199	101	492	116	13	97	86	35	93	187
Grp Sat Flow(s),veh/h/ln	813	1777	1847	995	1870	1585	1099	1870	1585	1201	1870	1585
Q Serve(g_s), s	6.6	1.9	1.9	2.0	5.5	1.2	0.3	1.4	1.5	0.8	1.4	3.5
Cycle Q Clear(g_c), s	12.1	1.9	1.9	3.8	5.5	1.2	1.7	1.4	1.5	2.3	1.4	3.5
Prop In Lane	1.00		0.07	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	509	933	970	686	982	832	394	373	316	407	373	316
V/C Ratio(X)	0.38	0.20	0.20	0.15	0.50	0.14	0.03	0.26	0.27	0.09	0.25	0.59
Avail Cap(c_a), veh/h	767	1496	1555	1001	1575	1335	797	1060	898	848	1060	898
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.9	4.1	4.1	5.1	5.0	4.0	11.7	11.0	11.1	12.0	11.0	11.9
Incr Delay (d2), s/veh	0.5	0.1	0.1	0.1	0.4	0.1	0.0	0.4	0.5	0.1	0.3	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.3	0.3	0.2	1.1	0.2	0.1	0.5	0.4	0.2	0.5	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.4	4.2	4.2	5.2	5.4	4.1	11.8	11.4	11.5	12.1	11.4	13.6
LnGrp LOS	A	A	A	A	A	A	B	B	B	B	B	B
Approach Vol, veh/h		583			709			196			315	
Approach Delay, s/veh		5.9			5.2			11.5			12.8	
Approach LOS		A			A			B			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.0		21.6		11.0		21.6				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.5		27.5		18.5		27.5				
Max Q Clear Time (g_c+I1), s		3.7		14.1		5.5		7.5				
Green Ext Time (p_c), s		0.7		3.0		1.0		4.0				
Intersection Summary												
HCM 6th Ctrl Delay				7.4								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary

12: Westover Avenue/Hildreth Avenue & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  						 	
Traffic Volume (veh/h)	16	1481	26	266	1597	32	5	0	180	4	1	24
Future Volume (veh/h)	16	1481	26	266	1597	32	5	0	180	4	1	24
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	1627	29	274	1646	33	7	0	247	5	1	29
Peak Hour Factor	0.91	0.91	0.91	0.97	0.97	0.97	0.73	0.73	0.73	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	2104	653	388	2586	52	431	0	318	99	39	264
Arrive On Green	0.02	0.41	0.41	0.11	0.50	0.50	0.20	0.00	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	5106	1585	1781	5153	103	1415	0	1585	76	196	1313
Grp Volume(v), veh/h	18	1627	29	274	1087	592	7	0	247	35	0	0
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1781	1702	1852	1415	0	1585	1585	0	0
Q Serve(g_s), s	0.3	13.5	0.5	3.9	11.5	11.5	0.0	0.0	7.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	13.5	0.5	3.9	11.5	11.5	0.2	0.0	7.2	0.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.06	1.00		1.00	0.14		0.83
Lane Grp Cap(c), veh/h	265	2104	653	388	1709	930	431	0	318	402	0	0
V/C Ratio(X)	0.07	0.77	0.04	0.71	0.64	0.64	0.02	0.00	0.78	0.09	0.00	0.00
Avail Cap(c_a), veh/h	407	2237	695	388	1709	930	702	0	630	698	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.5	12.4	8.6	10.0	8.9	8.9	15.7	0.0	18.6	16.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.6	0.0	5.8	0.8	1.4	0.0	0.0	4.1	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	4.4	0.2	1.6	3.3	3.8	0.1	0.0	2.7	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.6	14.1	8.7	15.8	9.7	10.4	15.7	0.0	22.6	16.1	0.0	0.0
LnGrp LOS	A	B	A	B	A	B	B	A	C	B	A	A
Approach Vol, veh/h	1674		1953				254			35		
Approach Delay, s/veh	13.9		10.8				22.5			16.1		
Approach LOS	B		B				C			B		
Timer - Assigned Phs	2		3		4		6		7		8	
Phs Duration (G+Y+Rc), s	14.3		10.0		24.7		14.3		5.6		29.1	
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5		4.5		4.5	
Max Green Setting (Gmax), s	19.5		5.5		21.5		19.5		5.0		22.0	
Max Q Clear Time (g_c+l1), s	9.2		5.9		15.5		2.9		2.3		13.5	
Green Ext Time (p_c), s	0.6		0.0		4.7		0.1		0.0		6.3	
Intersection Summary												
HCM 6th Ctrl Delay	12.9											
HCM 6th LOS	B											

HCM 6th Signalized Intersection Summary

21: Camino de la Tierra & Valencia Road

11/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	1174	30	276	1283	44	79	41	194	35	76	70
Future Volume (veh/h)	32	1174	30	276	1283	44	79	41	194	35	76	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	1398	36	294	1365	47	96	50	237	43	93	85
Peak Hour Factor	0.84	0.84	0.84	0.94	0.94	0.94	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	272	1447	645	328	1602	55	339	79	375	239	251	229
Arrive On Green	0.07	0.41	0.41	0.12	0.46	0.46	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1781	3554	1585	1781	3505	121	1206	284	1345	1092	900	822
Grp Volume(v), veh/h	38	1398	36	294	691	721	96	0	287	43	0	178
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1849	1206	0	1628	1092	0	1722
Q Serve(g_s), s	0.8	26.9	1.0	6.9	24.2	24.3	4.9	0.0	10.8	2.5	0.0	5.8
Cycle Q Clear(g_c), s	0.8	26.9	1.0	6.9	24.2	24.3	10.7	0.0	10.8	13.3	0.0	5.8
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.83	1.00		0.48
Lane Grp Cap(c), veh/h	272	1447	645	328	812	845	339	0	454	239	0	480
V/C Ratio(X)	0.14	0.97	0.06	0.90	0.85	0.85	0.28	0.00	0.63	0.18	0.00	0.37
Avail Cap(c_a), veh/h	272	1447	645	328	812	845	339	0	454	239	0	480
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.2	20.3	12.6	16.6	16.9	16.9	24.6	0.0	22.1	27.9	0.0	20.3
Incr Delay (d2), s/veh	1.1	16.9	0.2	29.4	10.9	10.6	2.1	0.0	6.6	1.7	0.0	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	13.3	0.3	5.1	11.1	11.5	1.5	0.0	4.7	0.7	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.2	37.1	12.8	46.0	27.8	27.5	26.7	0.0	28.7	29.6	0.0	22.5
LnGrp LOS	B	D	B	D	C	C	C	A	C	C	A	C
Approach Vol, veh/h	1472				1706				383			
Approach Delay, s/veh	36.0				30.8				28.2			
Approach LOS	D				C				C			
Timer - Assigned Phs	2		3	4		6		7	8			
Phs Duration (G+Y+Rc), s	24.0		13.0	33.0		24.0		9.5	36.5			
Change Period (Y+Rc), s	4.5		4.5	4.5		4.5		4.5	4.5			
Max Green Setting (Gmax), s	19.5		8.5	28.5		19.5		5.0	32.0			
Max Q Clear Time (g_c+I1), s	12.8		8.9	28.9		15.3		2.8	26.3			
Green Ext Time (p_c), s	1.2		0.0	0.0		0.4		0.0	4.1			
Intersection Summary												
HCM 6th Ctrl Delay	32.1											
HCM 6th LOS	C											