

Villas Plus by Mary T. Traffic Impact Analysis Report

Project Number: DSA-14-00012

Prepared for:

Mary T. Inc.
1555 118th Lane NW
Coon Rapids, MN 55448



Prepared by:



16448 N. 40th Street, Suite A
Phoenix, Arizona 85032-3337
Tel: (602) 482-5884

April 2014



April 7, 2014

Ruth Dahl
Mary T. Inc.
1555 118th Lane NW
Coon Rapids, MN 55448

**Re: Proposal for Preparing a Traffic Study for:
Villa Plus By Mary. T. Development, Casa Grande, Arizona**

Dear Ms. Dahl,

The following scope of work, fee, and schedule are presented for preparing a Traffic Study for the subject Senior Adult Housing (Project) located on the east side of Peart Road with the access driveway located approximately ¼ mile north of the intersection of Peart Road/ Cottonwood Lane in Casa Grande, AZ.

This study will incorporate the findings of the Traffic Statement prepared for the subject Project. In accordance with the City of Casa Grande SATS Guidelines and Procedures, the Traffic Study will be a Limited Report for a site with 100 or more trips per day.

Scope of Services

Phase II: Traffic Study

The following items described below will be analyzed as part of the Traffic Statement Analysis.

1. Coordinate with the City of Casa Grande staff and or designee to determine any project specific requirements, identify traffic count locations and research traffic counts available from the previous studies and from the records at the City. Arrange to conduct traffic counts at identified locations within the study area. The proposed counts may include daily weekday approach traffic volume counts, vehicular classification data, speed data, and peak hour intersection turning movement counts. Peak hour turning movement counts will be conducted during the weekday AM and PM peak periods.
2. Collect accident data from the City and/or the Arizona Department of Transportation Planning Division (ADOT TPD) within the study area (both segments and intersections) for the last three years and perform accident analysis to identify deficiency and recommend mitigation measures to enhance safety at such locations.
3. Conduct existing conditions LOS at the study intersections.
4. Review project site plan for:
 - a. Significant points of vehicular and pedestrian conflicts.
 - b. Proposed driveway locations and vehicular movements, spacing, and geometry.
 - c. Available sight distance for various movements in/out of the project driveways.
 - d. On-site traffic circulation (limited to qualitative evaluation).
 - e. Compatibility with the City's general planning effort
5. Estimate background area traffic demand for project opening year and conduct LOS analysis.
6. Evaluate project impact on existing adjacent roadway system and intersections and propose suitable mitigation measures to minimize/offset impacts.
7. Coordinate with owner and the City to develop mitigation alternatives for any adverse roadway impact.
8. Prepare draft TIA report including tables, figures, and charts and submit to the City for review and comment.
9. Prepare final TIA and submit to the City.

the CK Group, Inc.

16448 N. 40th Street, Suite A Phoenix, Arizona 85032

P: 602.482.5884 | F: 602.482.2885 | Email: ckgroup@theCKgroup.com

sent check
4/9/14 \$1200
not to exceed \$4750 by 4/14/14

Fee & Completion Schedule

The services outlined under this scope of work will be conducted for a **not to exceed fee of \$4,750.00**. The traffic counts recently conducted for Caliche Senior Living TIA at the intersection of Peart Road/ Cottonwood Lane will be used for traffic analysis. We will need 25% of the total fee that comes out to be \$1,200.00 as a retainer to proceed with the study effort.

The time required for additional meetings, presentations and requests for additional analyses is difficult to predict at this time, and therefore not included in the above fee. Therefore, such additional services will be billed separately on a time and material basis. Material charges excluding labor will be computed as 1.1 times actual expenses incurred on the project using the fee schedule itemized below. Material charges may include but will not be limited to transportation, reproduction, etc.; labor will be billed at the rates shown below with no multiplier.

☐ Principal Engineer	\$180/hour
☐ Project Manager	\$140/hour
☐ Transportation Engineer	\$97/hour
☐ Designer/ CADD	\$75/hour
☐ Clerical/Admin	\$70/hour
☐ Photocopies	\$0.10/each
☐ Mileage b/w office and clients or site	\$0.55/mile

The Traffic Study will be completed and submitted by April 15th, 2014. If this proposal is acceptable to you, please sign and return the same via fax to our office. By endorsing this proposal, you are agreeing to the work scope, fees, billing rates and product delivery timetable specified herewith. Also, by executing, dating and returning this proposal, you will be automatically authorizing the CK Group to proceed with preparation of the aforementioned TIA.

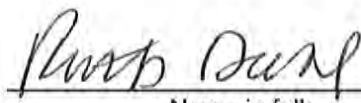
Respectfully submitted,

the CK Group, Inc.

Accepted and Authorized by:



Ogbonna Abarikwu, PE
Principal Engineer

Signed: 
Name in full: David J. Hrusing
Title: MSP
Date: 4/7/14



AARON BROWN & ASSOCIATES, INC.

2765 12th Street S.E. • P.O. Box 4344

Salem, Oregon 97302-4344

503.363.5969 • Fax 503.363.5988

Invoice
#14-1048

DATE: April 2, 2014

BILL TO:

Villas Plus by Mary T of Arizona LLC
Ruth Dahl
1576 E. Cottonwood Lane
Casa Grande, AZ 85122

SHIP TO:

Same

SERVICE	DESCRIPTION	AMOUNT DUE
Appraisal A.B. & Assoc. #14-1048	A market study evaluating demand versus supply for a proposed age restricted (55+) patio home rental community containing 94 units, to be known as Villas Plus by Mary T of Arizona LLC, at 1576 E. Cottonwood Lane, Casa Grande, AZ.	\$3,750.00
	Retainer received. Thank you.	\$1,875.00
		PLEASE REMIT: \$1,875.00

OUR FEDERAL I.D. NUMBER

80-0436827

PAYMENT DUE UPON RECEIPT OF INVOICE

Thanks for letting us serve you!

*Int
OK
4-17-14
2nd 1/2
payment for
market study
Villas Plus
AZ*

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1 INTRODUCTION AND BACKGROUND

This report documents the findings of a Traffic Impact Analysis (TIA) conducted for the proposed Villas Plus By Mary T. senior adult housing (Project) being developed by Mary T. Inc. The proposed Project site will have 20, 4-plex buildings with 1 and 2 Bedroom units. The Project site is located on the northeast corner of Peart Road and Cottonwood Lane in the City of Casa Grande (City), Pinal County. The Project site has direct access on Peart Road and is located approximately 1275 feet north of its intersection with Cottonwood Lane. According to information obtained from the owner, the development will start construction by early 2nd quarter of 2014 and be completed by the 2nd quarter of 2015. The purpose of this TIA is to evaluate potential impacts of the Project on the surrounding transportation system following the completion of the Project by Year 2015 and recommend mitigation measures to offset any significant adverse traffic impacts that are attributable to the proposed development.

1.1 Project Study Area

Figure 1 shows the study intersections analyzed in the TIA. The analysis focused on the following two (2) intersections including the Project driveway:

1. Peart Road/ Cottonwood Lane
2. Peart Road/ Project Driveway

1.2 Analysis Methodology and Scenarios

This TIA has been conducted in accordance with the guidelines documented in the *City of Casa Grande Small Area Transportation Study (SATS), Appendix D - Traffic Impact Analysis Procedure*. According to the guidelines, as documented in Table 9-2, the Project **has less than 500 peak hour trips, and will be a category I TIA**. Study area analysis for a **Category I TIA** includes the site access driveways, adjacent signalized intersection and/or major unsignalized street intersections. The TIA describes the Project trip generation, traffic distribution and assignment, LOS analysis, traffic impacts determination, mitigation measure recommendations, and traffic control needs evaluation to ensure safety and efficient traffic operations. The analysis was conducted for morning (AM) and evening (PM) peak hour traffic conditions for the following three (3) scenarios:

- **Scenario 1:** Existing *Year 2014 Conditions* – Existing background traffic volumes from Year 2014.
- **Scenario 2:** *Year 2015 without Project Conditions* – Existing traffic from Scenario I plus the growth rate for background traffic.
- **Scenario 3:** *Year 2015 with Project Conditions* – Traffic volume projections from Scenario 2 plus traffic generated by the Project.

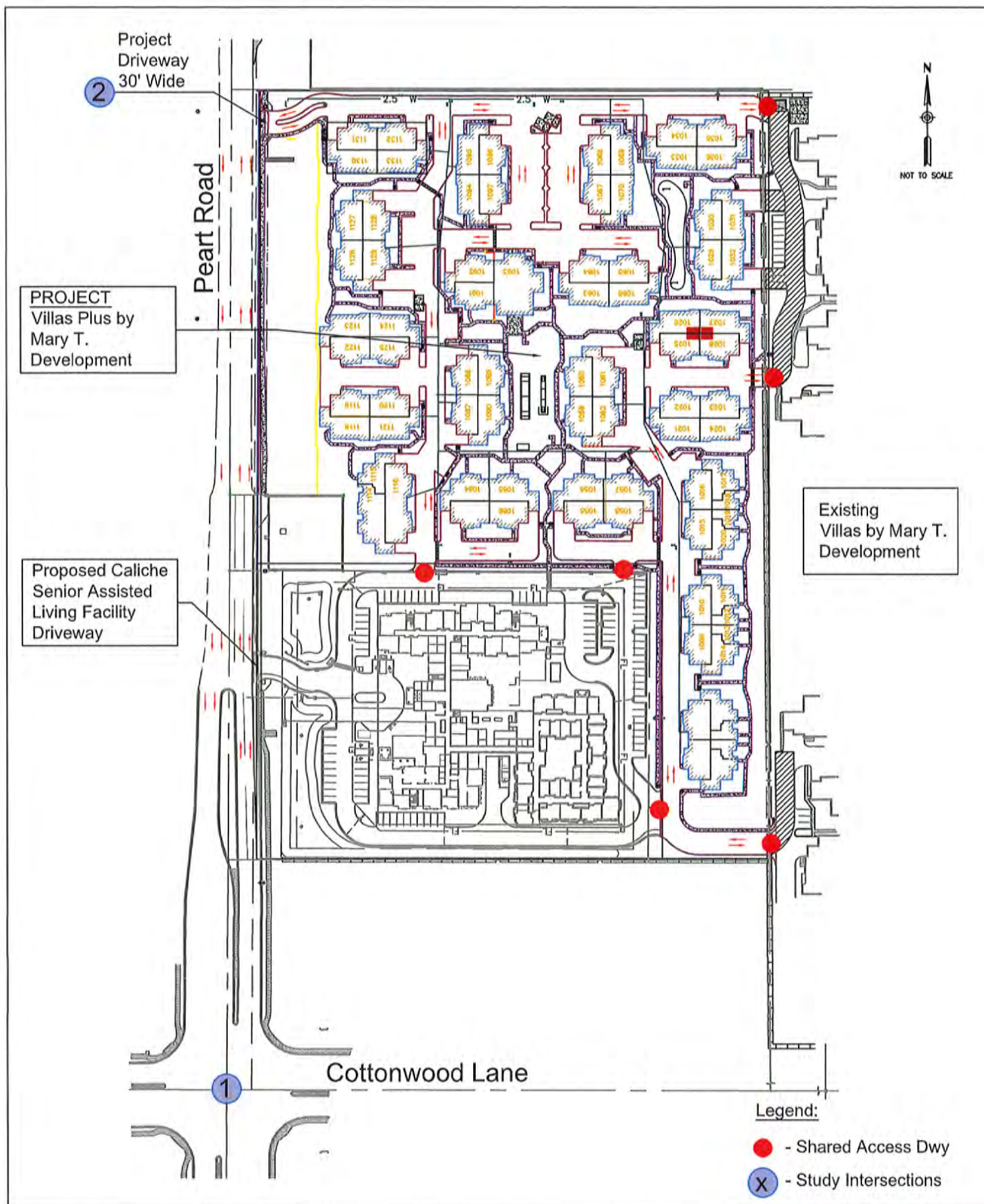


Figure 2: Project Site Plan
Villas Plus By Mary T. Traffic Impact Study

To measure and describe the operations of a local roadway network, traffic engineers and planners commonly use a grading system called Level of Service (LOS). The LOS grading system qualitatively characterizes traffic conditions associated with varying levels of traffic. These levels range from LOS A, which indicates free-flow traffic conditions with little or no delay experienced by motorists, to LOS F, which describes congested conditions where traffic flows exceed design capacity, resulting in long queues and delays. LOS A, B, and C are generally considered to be satisfactory service levels, while the influence of congestion becomes more noticeable at LOS D. LOS E is undesirable and is considered by most agencies to be the limit of acceptable delay, and LOS F conditions are considered to be unacceptable to most drivers.

The study intersections were analyzed using the SYNCHRO software which utilizes the Transportation Research Board's *Highway Capacity Manual* (2010) methodology as required by the City. **Tables 1** and **2** present the LOS criteria for signalized and unsignalized intersections, respectively.

Table 1 Signalized Intersection LOS Definitions		
Level of Service	Description	Control Delay per Vehicle (seconds/vehicle)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	$> 10 - 20$
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	$> 20 - 35$
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	$> 35 - 55$
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	$> 55 - 80$
F	Operations with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80
Source: <i>Highway Capacity Manual</i> , Transportation Research Board, 2010.		

Table 2 Unsignalized Intersection LOS Definitions		
Level of Service	Average Control Delay (seconds/vehicle)	Description
A	0 – 10	Little or no delay.
B	> 10 – 15	Minor delays.
C	> 15 – 25	Average delays.
D	> 25 – 35	Moderate delays.
E	> 35 – 50	Lengthy delays.
F	> 50	Excessive delays/gridlock.
Source: <i>Highway Capacity Manual</i> , Transportation Research Board, 2010.		

Queuing analysis was also performed using SYNCHRO software, which is based on the procedures outlined in the Highway Capacity Manual. The measure of effectiveness (MOE) studied to determine the adequacy of storage areas at intersection approaches included 95th percentile queue length.

1.3 Level of Service Criteria

Per the City of Casa Grande TIA guidelines the following conditions need to be noted:

Where the roadway will operate at LOS D or better without the development, the traffic impact of the development on the highway will be mitigated to LOS D.

Where the highway will operate below LOS D in the horizon year(s) without the development, the traffic impact of the development will be mitigated to provide the same LOS at the horizon year(s).

Roadway improvements will be required if the roadway or intersections will operate at LOS D or better without the improvement, but will operate at LOS D or worse with the improvement. For a limited TIA, the improvement analysis should focus on whether the existing surface type/condition is appropriate for the proposed development.

2 EXISTING CONDITIONS

The analysis of the existing transportation system includes description of the surrounding land use, roadway network, evaluation of the existing operations of study intersections, and collision evaluation in the Project vicinity.

2.1 Land Use and Surrounding Developments

A site visit was conducted on March 31, 2014 to observe traffic flow conditions and traffic control in the study area, as well as existing developments and surrounding land use. The parcel of land where the Project will be located is currently vacant. The existing Villas by Mary T. is occupied and located to the east of proposed project development. The existing Villas by Mary T. development has 33 4-plex buildings with 2 and 3-Bedroom units and has single full access on Cottonwood Lane. The Project vicinity map with adjacent developments is shown in **Figure 1**.

2.2 Roadway Network

The Project site and surrounding roadway network are shown in **Figure 1**. Peart Road would provide direct access to the Project site. Florence Boulevard (SR-287) to the south, Pinal Avenue (SR-387) to the west and Interstate 10 (I-10) to the east would provide regional access to the Project site.

2.2.1 Florence Boulevard

Florence Boulevard (SR 287) would provide regional access to the site and is an east-west principal arterial highway in the City of Casa Grande Small Area Transportation Study (SATS). It has two (2) lanes in each direction and a two way left turn lane (TWLTL) within the project vicinity. The posted speed limit along Florence Boulevard in the Project vicinity is 35 miles per hour (MPH). It is signalized at its intersection with Peart Road and has an exclusive left-turn lane on each approach.

2.2.2 Peart Road

Peart Road is classified as a principal arterial and is signalized at its intersection with Cottonwood Lane with two northbound and southbound lanes, exclusive left and right-turn lanes, bike lane and sidewalks. North of the intersection and along the project frontage, it has two northbound lanes and one southbound lane. Half street improvements are constructed on the east side from the north side of Project starting at High Manor Subdivision to Kortsen Road. It has a posted speed of 45 MPH. 69kV overhead electric lines run along the east side of Peart Road.

Historical traffic counts conducted by Central Arizona Government (CAG) within the Project vicinity show that the 2011 ADT along Peart Road north and south of Cottonwood lane were 9,683 and 9,749 vehicles, respectively. The Traffic volume data are shown in **Appendix A**. Any

improvements along Peart Road should be completed per City of Casa Grande General Plan, Principal Arterial Functional Classification requirements. The Function classification requirements are attached in **Appendix B**.

2.2.3 Cottonwood Lane

Cottonwood Lane (Maricopa-Casa Grande Highway) within the project vicinity is a fully improved east west minor arterial. It has two lanes in each direction with raised median and deceleration lanes. The posted speed limit along Cottonwood Lane is 35 MPH. The 2011 ADT within the project vicinity along Cottonwood lane, east and west of Peart Road are 8,079 and 14,283 vehicles, respectively.

2.3 Data Collection

AM and PM peak hour turning movement counts collection was conducted on Thursday, March 27th, 2014 at the study intersection of Peart Road and Cottonwood Lane. The peak hour traffic counts were conducted from 7:00 to 9:00 AM and from 4:00 to 6:00 PM. In addition 24-hour tube counts were collected along the project frontage on Peart Road. A total of 12,258 vehicles were recorded with 6,192 vehicles travelling northbound and 6,066 travelling southbound during the 24-hour period. Total of eight (8) pedestrian crossings and one (1) bicyclist was observed at the intersection of Peart Road and Cottonwood Lane during the Am and PM peak hour. Raw traffic count sheets are attached in **Appendix C**. **Figure 3** presents existing intersection volumes in the study area. **Figure 4** presents existing lane configurations and traffic control.

2.4 Intersection Operations

The study intersections were analyzed based on the volumes, lane configurations and traffic control shown in **Figure 3**. The results are summarized in **Table 3**, and the detailed calculations are provided in **Appendix D**. As shown in **Table 3**, the existing study intersection operates acceptably at LOS C or better during both AM and PM peak hours conditions.

Table 3 Existing Conditions Year 2014			
Intersections	Control	AM (PM) Peak	
		Average Control Delay (sec)	LOS ^{1&2}
1. Peart Road/Cottonwood lane	SIG	25.2 (24.9)	C (C)
SIG – Signalized Intersection Notes: 1. Level of service for signalized intersections based on average control delay per vehicle, according to the <i>Highway Capacity Manual</i> , Transportation Research Board, 2010. 2. Side street stop controlled intersection LOS based on average control delay in seconds per vehicle for the worst approach, based on the methodology in the <i>Highway Capacity Manual</i> , Transportation Research Board, 2010.			

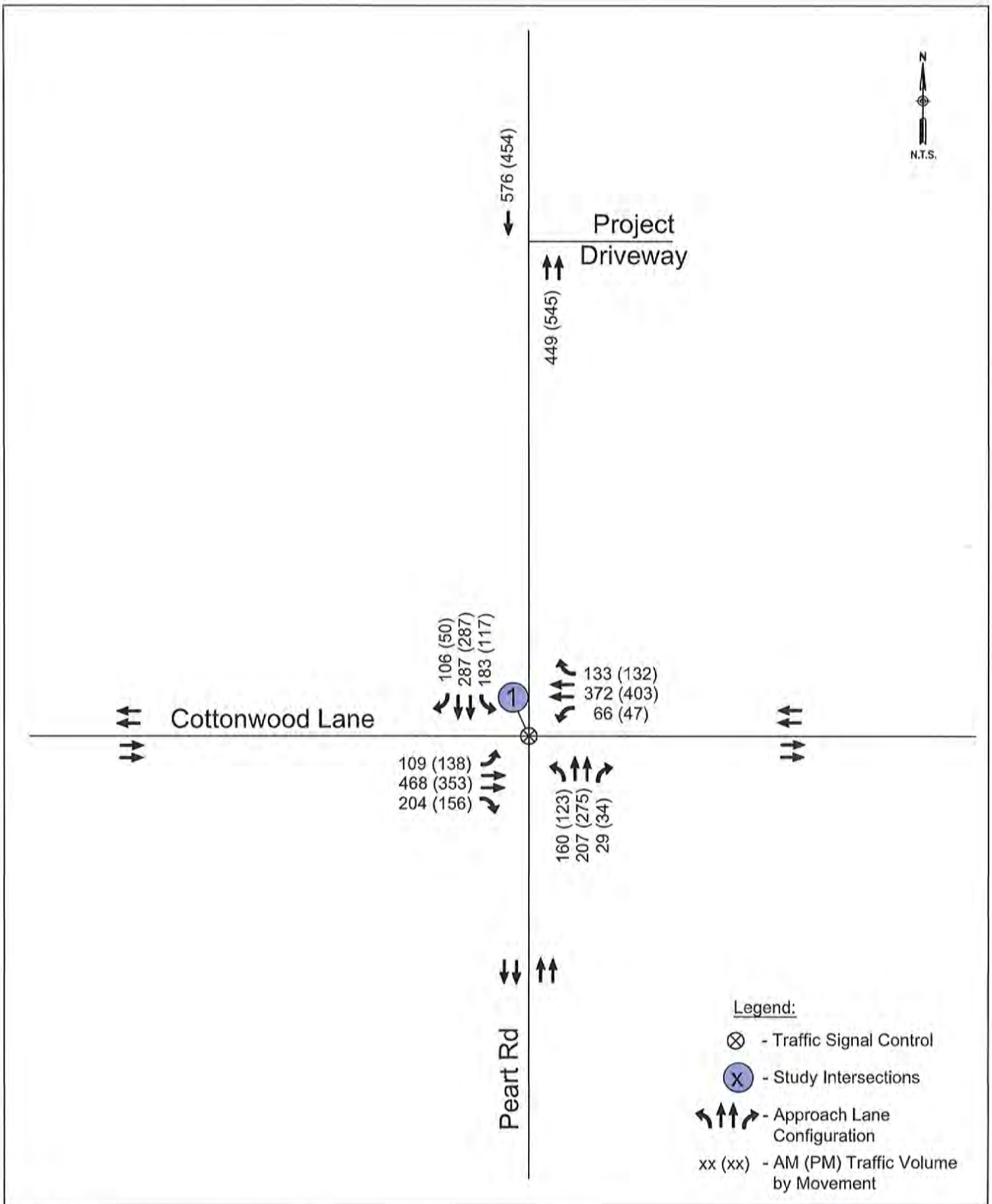


Figure 3: Year 2014 Peak Hour Traffic Volumes, Lane Configuration and Traffic Control

2.5 Collision Data Summary

Collision data summary was obtained from ADOT Risk Management. The data is for a three-year period (01/01/2010 to 12/31/2012) at the intersection of Cottonwood Lane and Peart Road. The data is summarized in **Table 4** below. There have been a total of 26 collisions with 18 rear end collisions during the three-year period. There are no fatal collisions or collisions with pedestrians within the above mentioned three year period. The raw data is attached in **Appendix E**.

Table 4 Accident Data Summary										
Sr. No. ¹	Collision Manner	Year 2010		Total	Year 2011		Total	Year 2012		Total
		Onroad			Onroad			Onroad		
		Peart	Cottonwood		Peart	Cottonwood		Peart	Cottonwood	
1	SINGLE_VEHICLE	-	-	-	1	-	1	-	-	-
2	ANGLE (front to side) (other than left turn)	1	-	1	-	2	2	-	-	-
4	REAR_END	5	2	7	4	2	6	2	3	5
6	SIDESWIPE_SAME DIRECTION	1	-	1	-	-	-	-	1	1
97	OTHER	-	-	-	1	-	1	-	-	-
99	UNKNOWN	-	1	1	-	-	-	-	-	-
	Total	7	3	10	6	4	10	2	4	6
Source: ADOT										
Note:										
1: ADOT Collision manner code description										

3 YEAR 2015 CONDITIONS

The impacts of the proposed development on the study area by the Project completion year 2015 are discussed in this chapter.

3.1 Project Development

The proposed Project site is zoned R-3 with general classification planned classification (Neighborhoods). It is located on approximately 11.3 acres and comprised of 20, 4-plex buildings for a total of 80 (1 and 2-Bedroom units). The Project construction is planned in a single phase scheduled to start construction by 2nd quarter of 2014 and be completed by the end of 2nd quarter of 2015. The site plan is shown in **Figure 2**. Project site plan shows a total of 46 parking spaces. The project site plan shows three (3) internal shared/cross accesses with existing Villas by Mary T., development located to the east and three (3) internal shared/cross accesses with the proposed Caliche Senior Assisted Living facility located to the south. The assisted living facility is scheduled to begin construction by early 2nd quarter of 2014 and be completed by the end of 1st quarter of 2015.

3.2 Year 2015 Background Volumes Forecast

According to the information provided by the developer, the project will be completed by the end of 1st quarter of Year 2015. According to the City planning division there are currently no other planned improvements located adjacent to the project study intersections except Caliche Senior Assisted Living facility. The 24-hour tube counts collected (12,258) were compared against 2011 ADT (9,683) by CAG. A growth rate of 6.6% is calculated for the four year period and is used to project background traffic for Year 2015. **Figure 4** shows projected Year 2015 volumes.

3.3 Year 2015 With Project Conditions Volumes Forecast

The amount of traffic added to the roadway system by the proposed Project was estimated using a three-step process:

1. Trip generation
2. Trip distribution
3. Trip assignment

In the first step, the amount of traffic entering and exiting the site was estimated on a peak hour basis. In the second step, the arrival and departure directions were estimated. In the third step, the trips were assigned to specific street segments and intersection turn movements. The results of the process for this analysis are described in the following sections

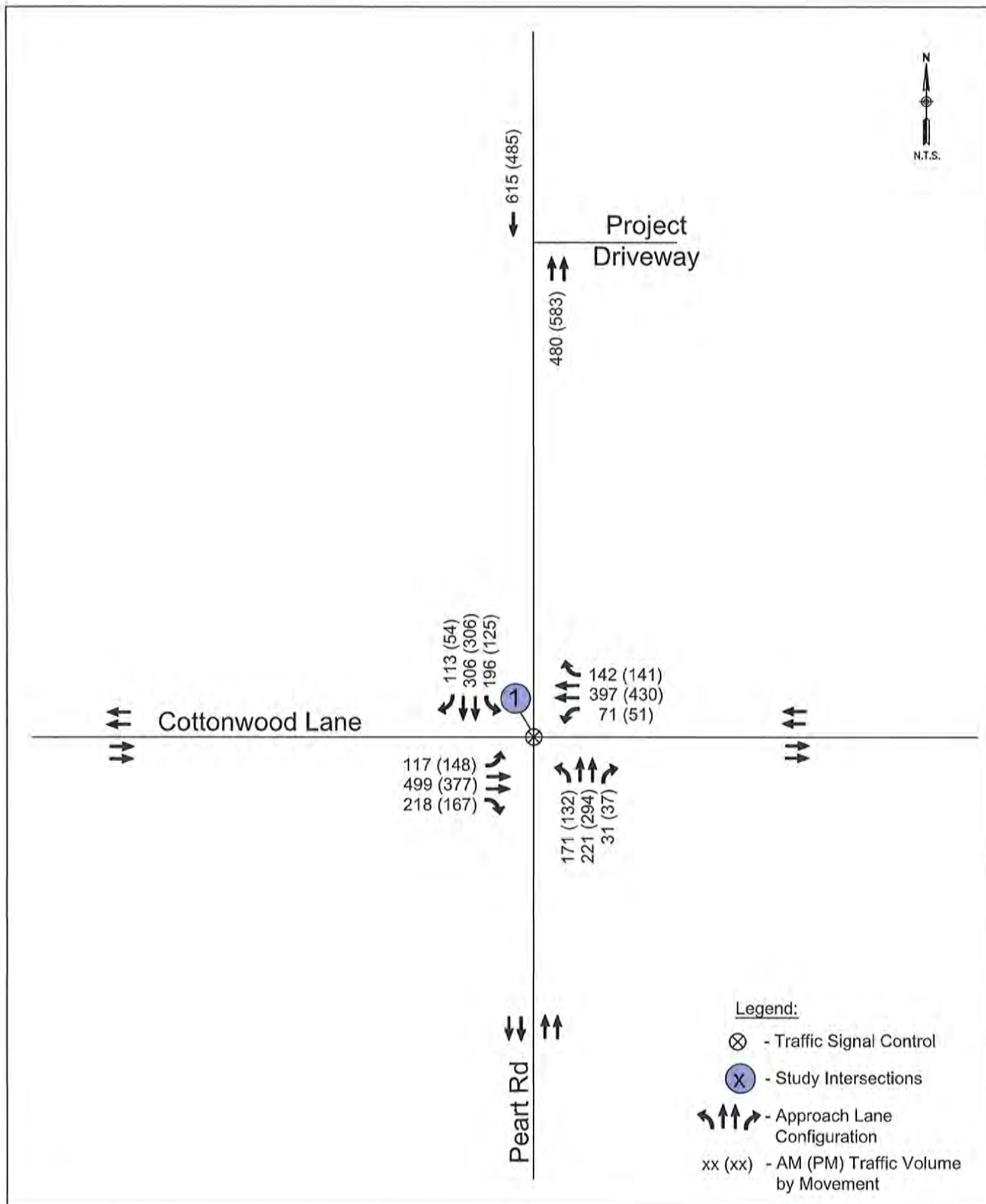


Figure 4: Year 2015 Peak Hour Traffic Volumes, Lane Configuration and Traffic Control

3.3.1 Trip Generation

The total number of new trips that the proposed Project would generate was estimated based on trip generation rates published in ITE Trip Generation (9th Edition), Senior Adult Housing (ITE land use code 252). The trip generation was based on total number of units in the facility and assumption that the site will be 100% occupied to develop a worst case scenario. Trip generation for the Project is shown in **Table 5**. As summarized in **Table 5**, the Project would generate approximately 15 (5 inbound and 10 outbound) and 19 (11 inbound and 8 outbound) new trips during weekday AM and PM peak hours, respectively. Daily Project trips were estimated to be 260 (130 inbound and 130 outbound). There are no anticipated pass-by trips for this land use.

The project site has internal shared/cross accesses with the proposed Caliche senior assisted living facility and existing Villas by Mary T. facility. The senior residents may avoid the circuitous path to travel through the Caliche senior assisted living facility parking lot. It can be expected that 10-20% number of residents trips from the Project site and existing Villas by Mary T. site will share each other's driveways located on Peart Road and Cottonwood lane. For purposes of this study it is assumed that diverted trips from the Project site and existing Villas by Mary T. development are equal.

Table 5 Project Trip Generation															
Land Use	ITE Code	Size	Units	Rates ¹					Total Trips						
				AM		PM		Daily	AM			PM			Daily
				In	Out	In	Out		In	Out	Total	In	Out	Total	
Senior Adult Housing	252	80	Units	0.06	0.12	0.13	0.09	3.24	5	10	15	11	8	19	260

Note:
1. Trip generation rates obtained from Institute of Transportation Engineers (ITE) *Trip Generation* (9th Edition).

3.3.2 Trip Distribution and Assignment

The directional distribution provides a breakdown of the utilization of Project traffic on roadways that provide access to and from the Project site. The directional distribution of Project traffic was based on the average of AM and PM peak hour turning movement percentages. The trip distribution percentages and assignments are shown in **Figure 5**.

3.3.3 Year 2015 with Project Conditions Total Traffic Volumes

Assigned Project traffic shown on **Figure 5** was added to the *Year 2015 without Project* turning movement volumes (shown on **Figure 4**) to obtain the *Year 2015 With Project* traffic volumes, and shown in **Figure 6**.

3.4 Traffic Signal Warrant Analysis

The MUTCD peak hour volume warrant #3, Figure 4C-4 was used to see if a traffic signal is warranted at the Project Driveway/ Peart Road for Year 2015 conditions. It can be noted that the approach peak hour volume on project Driveway is less than 75 vehicles per hour (vph) (Figure 6). Therefore, the intersection does not meet warrant.

3.5 Intersection Operations

Each study intersection was analyzed based on the volumes shown on Figure 6 and the lane configurations and traffic control as shown on Figure 4. Table 6 summarizes the LOS at the study intersections with detailed calculations provided in Appendix D. For comparison purposes, Table 6 also shows LOS analysis results for the *Year 2015 Without Project* conditions (Figure 5). As shown in Table 6, all study intersections operate at LOS C or better under *Year 2015 With Project* conditions.

Table 6 Existing Conditions Year 2015 Intersection LOS Analysis					
		Background Traffic		Background Traffic + Project	
Intersections	Control	AM (PM) Peak		AM (PM) Peak	
		Average Control Delay (sec)	LOS ^{1&2}	Average Control Delay (sec)	LOS ^{1&2}
1.Peart Road/Cottonwood Lane	SIG	25.9 (25.3)	C (C)	30.2 (25.3)	C (C)
2.Peart Road/ Project Driveway	SSSC	NA		23.3 (22.3)	C (C)
SIG – Signalized Intersection; SSSC – Side-street-stop-controlled intersection					
Notes:					
1. Level of service for signalized intersections based on average control delay per vehicle, according to the <i>Highway Capacity Manual</i> , Transportation Research Board, 2010.					
2. Side street stop controlled intersection LOS based on average control delay in seconds per vehicle for the worst approach, based on the methodology in the <i>Highway Capacity Manual</i> , Transportation Research Board, 2010.					

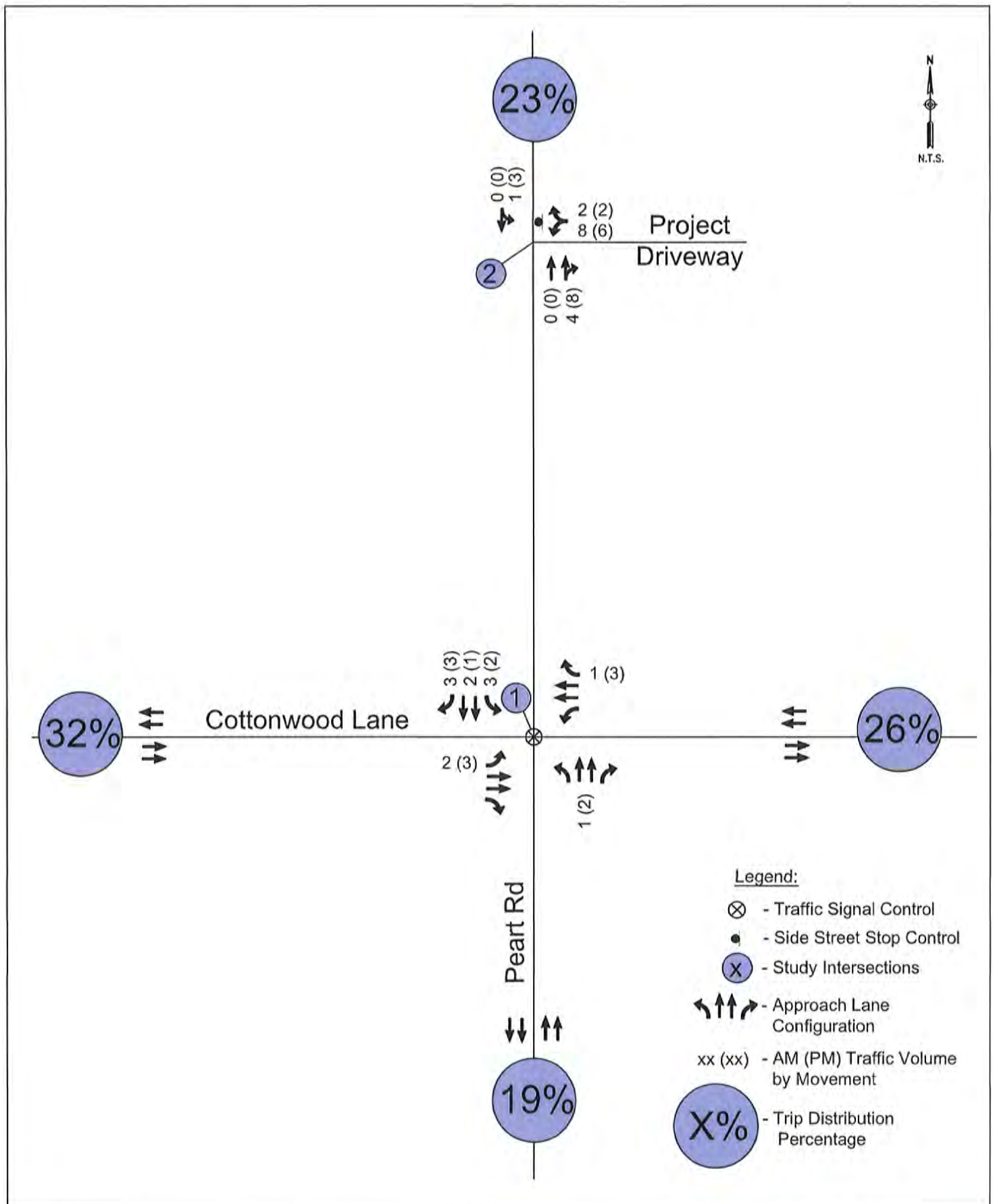


Figure 5: Project Trip Distribution and Assignment

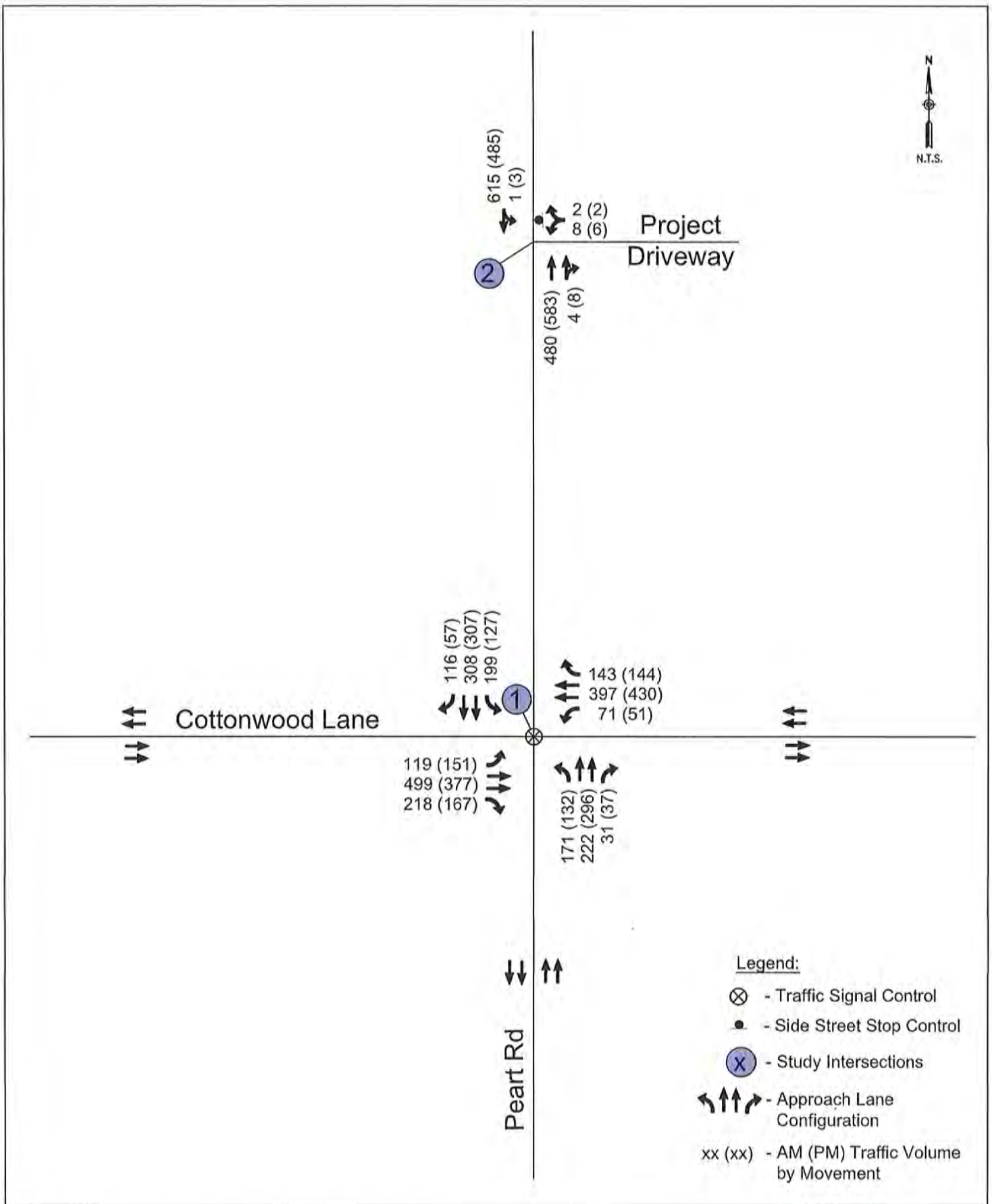


Figure 6: Year 2015 with Project Peak Hour Traffic Volumes

3.7 Queuing Analysis

A Queuing analysis was performed at the Project driveways. Queuing analysis was performed only for *2015 With Project PM Peak Hour* conditions, the scenario with heaviest traffic volumes. Storage requirements for vehicles queuing at critical locations were derived from the Synchro model. **Table 7** summarizes the queuing analysis results at Project driveway.

Table 7 Year 2015 With Project Peak Hour Queuing Analysis			
Location	Queue Length in feet ¹	Storage/Throat Depth in feet	Recommendation
		Proposed	
1. Project Driveway SB Left/ NB Right	<25	NA	200' Adequate as proposed
Notes: 1. 95 th percentile queue lengths are reported from Synchro Model for the worst peak hour.			

3.8 Sight Distance

Based on the proposed Project access locations, it was determined that the available sight distance from all the Project site accesses exceeds 360 feet (the minimum stopping sight distance per Policy on Geometric Design of Highways and Streets, 2011 by American Association of State Highway and Transportation Officials (AASHTO) for a roadway design speed of 45 MPH). The landscape and any sign should be placed such as not to obstruct and to provide maximum visibility for the driver to observe conflicting northbound and southbound through traffic.

3.9 Roadway Improvements

Information obtained from the City shows no new proposed improvements by the City along Peart Road by Project opening year 2015. The owner is constructing sidewalk along the project Frontage that will connect pedestrians to the intersection of Pear Road/ Cottonwood Lane. No pedestrian crossings are permitted across Peart Road at the Project driveway. The City should consider constructing two small segments of sidewalk along the Arizona Water property frontage (100') and north of the project site (150') to have a continuous sidewalk along the west side of Peart Road between Kortsen Road and Cottonwood Lane.

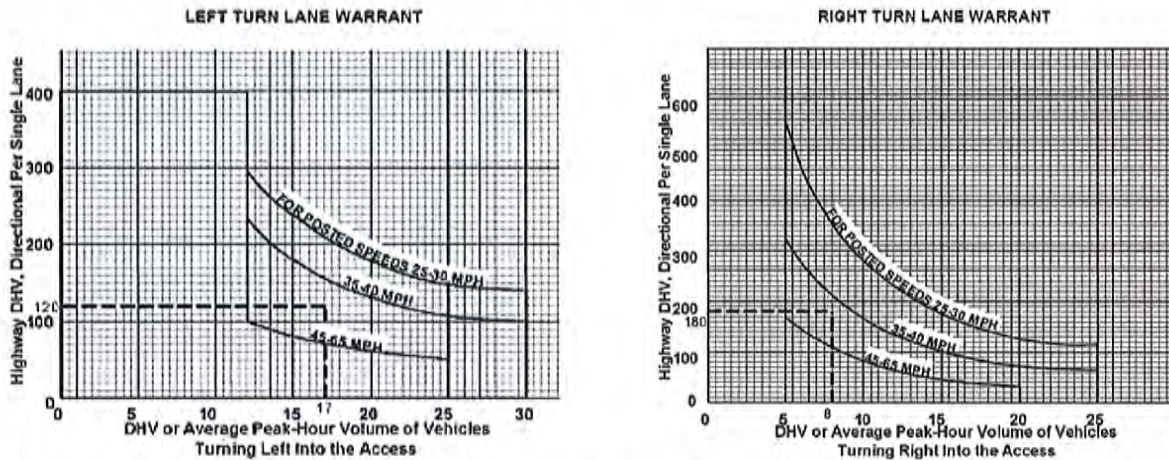
3.10 Entrance Location and Spacing

The site plan shows one 30-feet full-access project driveway opening on Peart Road. The driveway is located approximately 1275 feet north of the intersection of Pear Road/ Cottonwood Lane. The 1275 feet mile exceeds the minimum requirement of 230 feet per City's SATS study for Arterial Street. The inside of driveway to inside of driveway spacing between Project Driveway and Arizona Water well site parcel driveway to the south is approximately

475 feet and meets the minimum 200 feet City requirement. The city's driveway spacing requirements are attached in **Appendix F**.

3.11 Deceleration Lane Requirements

The left-turn and right-turn deceleration lane warrants were completed using graphs from the Pinal County Traffic Assessment Guidelines and Procedures shown below.



The right-turn and left-turn volumes were compared against volume criteria shown in the figures above. The results are summarized in **Table 8** below.

Table 8 Deceleration Lane Warrant		
Volume Criteria	SB Left-Turn	NB Right-Turn
AM (PM) Volume	1 (3)	4 (8)
AM (PM) Through Volume/Per Lane	615 (485)	242 (296)
AM (PM) Warrant Result	Not Met	Not Met (Met)

In addition to the above warrants the following criteria is used by City of Casa Grande:

Deceleration lanes are required when both of the following factors are determined to apply:

617.7.1 The 85th percentile traffic speed on the street is at least 35 miles per hour or 45 miles per hour for a two lane (one lane each direction) roadway.

617.7.2 At least 20 vehicles will be making right turns into the access way and 100 vehicle directional traffic during a one hour period.

The Project conditions meet the above mentioned first criteria **617.7.1** but the City of Casa Grande second criterion **617.7.2** for right-turn volume threshold in to the driveway is not met.

Based on the results of the above warrant analysis for a right-turn deceleration lane, warrant is not met per City of Casa Grande criteria, but is met per the Pinal County criteria (PM peak hour only). However, the Project site has direct access on Peart Road, a City roadway and does not meet City's minimum right-turn volume threshold requirement for installation of deceleration lane.

The left-turn deceleration lane warrant volume threshold is not met per Pinal County criteria. Along the project frontage there are two (2) northbound lanes and one (1) southbound lane. The southbound left traffic into the Project driveway has to wait in the single through lane for gaps in the northbound traffic to complete the movement. It has been observed on similar roadway configuration conditions in City of Casa Grande that southbound through traffic will overtake stopped or slowed down left-turning vehicles using the shoulder. This maneuver at 45 MPH creates unsafe traffic conditions. From a traffic safety standpoint it may be prudent to consider installation of the left-turn deceleration lane. The City may also consider reducing the posted speed limit to 35 MPH for the southbound direction.

3.12 Future Access Management

The site has full access under existing conditions. The City has future plans for raised median along Peart Road and the access control will be implemented when the large development to the west of Peart Road is constructed.

4 FINDINGS AND RECOMMENDATIONS

- ☐ The Project will be constructed in single phase with construction to begin by early 2nd quarter of 2014 and to be completed by 2nd quarter of 2015.
- ☐ The project will construct 20, 4-plex buildings 80 unit facility with mixture of 1 and 2 bedroom units.
- ☐ The Project site will have direct full access on Peart Road and three (3) internal shared/cross accesses with the Proposed Calicle Living Center facility and three (3) internal shared/cross accesses with existing Villas by Mary T. development.
- ☐ The Project generates approximately 15 and 19 trips during the AM and PM peak hours with 260 daily trips. During the AM Peak hour 5 trips are inbound and 10 trips are outbound. Similarly during the PM peak hour 11 trips are inbound and 8 trips are outbound.
- ☐ Year 2014 existing condition analysis results indicate that the study intersection operates at acceptable LOS C or better during AM and PM peak hour.
- ☐ Year 2015 background condition analysis results indicate that the study intersection will operate at acceptable LOS C or better during AM and PM peak hour.
- ☐ Year 2015 with Project condition analysis results indicate that the signalized intersection of Peart Road/Cottonwood lane will continue to operate at acceptable LOS C. The Project driveway intersection will operate at acceptable LOS C during AM and PM peak hour.
- ☐ Sight distance requirements are satisfied on all approaches to the Project access point.
- ☐ The project site meets the Pinal County right-turn deceleration lane requirement (PM Peak hour only) but does not meet the City volume threshold criteria for right-turn deceleration lane.
- ☐ The Project site does not meet the Pinal County left-turn deceleration lane criteria. For traffic safety standpoint it may be prudent to consider installation of the SB left-turn lane into the Project driveway.
- ☐ Project offsite signing and marking are to be completed per City of Casa Grande and MUTCD requirements.

Appendix A

CAG Traffic Sheets

CAG_ID	Area	Street	From	To	Day Started	Day 1	Direction	Avg Pos Vol	Avg Neg Vol	Avg Daily Traffic	Volume or Class	Method	Latitude	Longitude
254	Apache Junction	Apache Trl	Meridian Rd	Ironwood Dr	Wednesday	4/27/2011	EW	8,803	7,416	16,217	C	Tube	33.415100	-111.573290
U54	Apache Junction	Apache Trl	Ironwood Dr	SR88	Tuesday	4/5/2011	EW	10,271	10,270	20,541	V	Tube	33.415340	-111.556790
265	Apache Junction	Baseline Rd	Meridian Rd	Ironwood Dr	Tuesday	3/22/2011	EW	2,963	4,182	7,144	C	Tube	33.378820	-111.573260
U60	Apache Junction	Baseline Rd	Idaho Rd	Tomahawk Rd	Tuesday	4/5/2011	EW	1,523	1,460	2,983	V	Tube	33.378900	-111.573860
263	Apache Junction	Broadway Rd	Meridian Rd	Ironwood Dr	Wednesday	3/16/2011	EW	5,426	5,230	10,655	C	Tube	33.407760	-111.573110
U75	Apache Junction	Broadway Rd	Ironwood Dr	Idaho Rd	Tuesday	3/29/2011	EW	4,053	4,113	8,165	V	Tube	33.407840	-111.553710
U76	Apache Junction	Broadway Rd	Tomahawk Rd	Goldfield Rd	Tuesday	3/29/2011	EW	910	836	1,746	V	Tube	33.407920	-111.520390
U133	Apache Junction	Goldfield Rd	Superstition Boulevard	Broadway Rd	Tuesday	3/29/2011	NS	556	518	1,074	V	Tube	33.416030	-111.511490
U134	Apache Junction	Goldfield Rd	Old Hwy Rd	US60	Tuesday	9/13/2011	NS	850	2,872	3,721	V	Tube	33.389310	-111.511410
U153	Apache Junction	Idaho Rd	McKellips Boulevard	Lost Dutchman Dr	Tuesday	4/5/2011	NS	1,231	1,114	2,345	V	Tube	33.445030	-111.546120
U154	Apache Junction	Idaho Rd	Lost Dutchman Dr	Superstition Blvd	Tuesday	4/5/2011	EW	1,932	1,452	3,384	V	Tube	33.428780	-111.546100
U155	Apache Junction	Idaho Rd	Southern Ave	US60	Tuesday	3/29/2011	EW	8,035	8,231	16,266	V	Tube	33.391220	-111.546190
U161	Apache Junction	Ironwood Dr	Superstition Boulevard	Apache Trl	Tuesday	4/5/2011	NS	3,136	3,081	6,217	V	Tube	33.419250	-111.563240
U162	Apache Junction	Ironwood Dr	Baseline Rd	Germann Rd	Tuesday	4/5/2011	NS	15,153	14,819	29,971	V	Tube	33.367670	-111.563260
U164	Apache Junction	Ironwood Dr	Southern Ave	US60	Tuesday	4/5/2011	NS	7,781	7,612	15,392	V	Tube	33.389030	-111.563250
259	Apache Junction	Lost Dutchman Dr	Meridian Rd	Ironwood Dr	Wednesday	3/16/2011	EW	1,824	1,623	3,447	C	Tube	33.436680	-111.573300
U178	Apache Junction	Lost Dutchman Dr	Idaho Rd	Tomahawk Rd	Tuesday	4/5/2011	EW	966	871	1,837	V	Tube	33.436880	-111.538340
258	Apache Junction	McKellips Rd	Meridian Rd	Ironwood Dr	Wednesday	3/16/2011	EW	684	922	1,605	C	Tube	33.451340	-111.573120
U202	Apache Junction	Mountain View Rd	Hickman Rd	US60	Tuesday	4/5/2011	NS	1,855	2,036	3,891	V	Tube	33.392170	-111.494150
264	Apache Junction	Southern Ave	Meridian Rd	Ironwood Dr	Tuesday	3/22/2011	EW	3,664	3,758	7,422	C	Tube	33.393370	-111.573390
U252	Apache Junction	Southern Ave	Idaho Rd	Tomahawk Rd	Tuesday	4/5/2011	EW	2,583	2,623	5,206	V	Tube	33.393330	-111.538200
U261	Apache Junction	SR88	Superstition Boulevard	Tomahawk Rd	Tuesday	4/5/2011	NS	1,847	1,830	3,677	V	Tube	33.427120	-111.534890
261	Apache Junction	Superstition Blvd	Meridian Rd	Ironwood Dr	Wednesday	3/16/2011	EW	5,694	5,368	11,062	C	Tube	33.422340	-111.573120
U268	Apache Junction	Superstition Blvd	SR88	Tomahawk Rd	Tuesday	4/5/2011	EW	1,932	1,843	3,775	V	Tube	33.422340	-111.538080
U277	Apache Junction	Tomahawk Rd	Superstition Boulevard	Broadway Rd	Tuesday	3/29/2011	NS	1,353	1,239	2,592	V	Tube	33.413970	-111.528790
255	Apache Junction	US60	Meridian Rd	Ironwood Dr	Wednesday	3/16/2011	EW	37,245	31,595	68,840	C	Tube	33.386710	-111.573330
U55	Casa Grande	Arizola Rd	Cottonwood Ln	Florence Blvd	Wednesday	4/27/2011	NS	4,882	4,864	9,746	V	Tube	32.880870	-111.714200
U88	Casa Grande	Casa Grande Ave	Cottonwood Ln	McMurray Blvd	Wednesday	4/27/2011	NS	2,406	2,199	4,605	V	Tube	32.890370	-111.748700
U89	Casa Grande	Casa Grande Ave	Kortsen Rd	Cottonwood Ln	Tuesday	4/26/2011	NS	1,330	1,099	2,429	V	Tube	32.906220	-111.748600
U94	Casa Grande	Colorado St	Cottonwood Ln	McMurray Blvd	Tuesday	4/26/2011	NS	1,700	1,859	3,559	V	Tube	32.893230	-111.728660
U101	Casa Grande	Cottonwood Ln	Thornton Rd	Pinal Ave	Tuesday	4/26/2011	EW	4,131	4,243	8,373	V	Tube	32.894000	-111.770900
U102	Casa Grande	Cottonwood Ln	Pinal Ave	Casa Grande Ave	Tuesday	9/13/2011	EW	6,560	6,217	12,776	V	Tube	32.894140	-111.755430
U103	Casa Grande	Cottonwood Ln	Trekell Rd	Pearl Rd	Wednesday	4/27/2011	EW	7,550	6,733	14,283	V	Tube	32.894010	-111.736830
U104	Casa Grande	Cottonwood Ln	Arizola Ave	Henness Rd	Wednesday	9/14/2011	EW	4,190	3,889	8,079	V	Tube	32.894190	-111.706620
277	Casa Grande	Florence Blvd	Henness Rd	I-10	Tuesday	4/5/2011	EW	11,758	11,772	23,529	C	Tube	32.879630	-111.693980
U143	Casa Grande	Henness Rd	Cottonwood Ln	Florence Blvd	Wednesday	4/27/2011	NS	3,419	2,678	6,096	V	Tube	32.881110	-111.705250
271	Casa Grande	I-8	Trekell Rd	I-10	Wednesday	4/20/2011	EW	3,976	4,187	8,163	C	Tube	32.821530	-111.691220
U166	Casa Grande	Kleck Rd	Overfield Rd	I-10	Tuesday	5/3/2011	EW	532	384	915	V	Tube	32.908830	-111.658130
U167	Casa Grande	Kortsen Rd	Burris Rd	Thornton Rd	Tuesday	9/13/2011	EW	420	458	878	V	Tube	32.908440	-111.779540
U168	Casa Grande	Kortsen Rd	Pinal Ave	Casa Grande Ave	Tuesday	4/26/2011	EW	3,344	3,354	6,697	V	Tube	32.908810	-111.751810
284	Casa Grande	La Palma Hwy	I-10	Macienda Rd	Tuesday	4/5/2011	EW	4,353	4,539	8,891	C	Tube	32.879630	-111.675670
U180	Casa Grande	Main St	Casa Grande Ave	Trekell Rd	Wednesday	9/14/2011	EW	3,046	2,882	5,928	V	Tube	32.868190	-111.742300
270	Casa Grande	McCartney Rd	Pearl Rd	I-10	Tuesday	4/12/2011	EW	4,579	4,693	9,271	C	Tube	32.938280	-111.706370
U192	Casa Grande	McCartney Rd	Trekell Rd	Pearl Rd	Tuesday	5/3/2011	EW	3,664	3,596	7,260	V	Tube	32.938470	-111.724780
U198	Casa Grande	McMurray Blvd	Pinal Ave	Casa Grande Ave	Wednesday	4/27/2011	EW	2,073	2,179	4,252	V	Tube	32.886890	-111.754400
U199	Casa Grande	McMurray Blvd	Trekell Rd	Colorado St	Wednesday	9/14/2011	EW	3,610	3,642	7,252	V	Tube	32.886890	-111.737690
291	Casa Grande	Old SR84	I-10	Sunland Gin Rd	Wednesday	4/27/2011	EW	5,087	5,133	10,219	C	Tube	32.828190	-111.677830
U214	Casa Grande	Overfield Rd	McCartney Rd	Kleck Rd	Tuesday	5/3/2011	NS	2,245	2,366	4,611	V	Tube	32.916110	-111.653240
U217	Casa Grande	Pearl Rd	Rodeo Rd	Kortsen Rd	Tuesday	4/26/2011	NS	3,929	3,752	7,681	V	Tube	32.922060	-111.722470
U218	Casa Grande	Pearl Rd	Cottonwood Ln	McMurray Blvd	Wednesday	9/14/2011	NS	4,799	4,950	9,749	V	Tube	32.890180	-111.722630
U219	Casa Grande	Pearl Rd	Kortsen Rd	Cottonwood Ln	Tuesday	4/26/2011	NS	4,994	4,690	9,683	V	Tube	32.907870	-111.722520
U220	Casa Grande	Pearl Rd	Florence Boulevard	Early Rd	Wednesday	4/27/2011	NS	4,108	3,731	7,839	V	Tube	32.878580	-111.722800
U221	Casa Grande	Pearl Rd	McCartney Rd	Rodeo Rd	Tuesday	4/26/2011	NS	3,175	2,972	6,147	V	Tube	32.936240	-111.722270
U225	Casa Grande	Peters Rd	Thornton Rd	Chuihu Rd	Wednesday	5/4/2011	EW	607	614	1,220	V	Tube	32.864950	-111.772860
U226	Casa Grande	Pinal Ave	Val Vista Boulevard	McCartney Rd	Tuesday	5/3/2011	NS	10,190	10,097	20,287	V	Tube	32.960210	-111.756850
U227	Casa Grande	Pinal Ave	Rodeo Rd	Kortsen Rd	Tuesday	9/27/2011	NS	9,776	9,953	19,729	V	Tube	32.914970	-111.757110
U228	Casa Grande	Pinal Ave	Cottonwood Ln	McMurray Blvd	Tuesday	9/13/2011	NS	7,705	7,790	15,495	V	Tube	32.889740	-111.757300
U229	Casa Grande	Pinal Ave	McMurray Boulevard	Florence Blvd	Tuesday	9/13/2011	NS	7,008	7,383	14,390	V	Tube	32.880980	-111.757310
U240	Casa Grande	Rodeo Rd	Trekell Rd	Pearl Rd	Tuesday	4/26/2011	EW	2,158	2,439	4,597	V	Tube	32.923390	-111.738340
289	Casa Grande	Selma Hwy	at I-10	I-10	Tuesday	3/29/2011	EW	682	729	1,409	C	Tube	32.850450	-111.682480
U273	Casa Grande	Thornton Rd	Cottonwood Ln	Main St	Tuesday	4/26/2011	NS	3,395	3,253	6,648	V	Tube	32.891160	-111.774380
U274	Casa Grande	Thornton Rd	SR84	Main St	Tuesday	9/13/2011	NS	2,826	2,678	5,504	V	Tube	32.880770	-111.774330
U279	Casa Grande	Trekell Rd	McCartney Rd	Rodeo Rd	Wednesday	9/14/2011	NS	2,826	2,972	5,798	V	Tube	32.936670	-111.739440
U280	Casa Grande	Trekell Rd	Rodeo Rd	Kortsen Rd	Tuesday	9/27/2011	NS	5,781	5,531	11,312	V	Tube	32.914730	-111.739810

Appendix B

Functional Classification

Criteria	Functional Classification				
	Expressway	Principal Arterial	Minor Arterial	Major Collector	Minor Collector
Right-of-Way Width	300'	140'	110'	80'	60'
Street Width (to back of curb)	138'	102'	74'	50'	36'
Pavement Width	2 x 54'	2 x 42'	70'	46'	32'
Edge Treatment	Shoulders	Vertical Curb	Vertical Curb	Vertical Curb	Vertical Curb
Sidewalk (both sides)	None	6'	6'	5'	5'
Design Speed	75 mph	55 mph	45 mph	40 mph	35 mph
Speed Limit	55 mph	40 mph	35 mph	35 mph	25 mph
Design ADT	120,000	45,000	30,000	10,000	8,000
Street Purpose	Mobility	Mobility	Mobility	Access/Mobility	Mobility
Parking	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Property Access	None	Major Driveway Only	Major Driveway Only	Individual Driveway Head Out	Restricted

Criteria	Functional Classification					*New Classification
	Local			Alternative Local (Sidewalk Separation)		Community Center
	Urban (1)	Urban (2)	Rural	Urban (1)	Urban (2)	
Right-of-Way Width	44'	38'	40'	50'	44'	Policy C-10.1.3 New standards to be determined by the City
Street Width (to back of curb)	32'	26'	24'	32'	26'	
Pavement Width	28'	22'	24'	28'	22'	
Edge Treatment	Roll Curb/Vertical Curb	Roll Curb/Vertical Curb	Shoulder/Drainage Ditch	Roll Curb/Vertical Curb	Roll Curb/Vertical Curb	
Sidewalk (both sides)	4'	4'	None	4'	4'	
Design Speed	30 mph	30 mph	30 mph	30 mph	30 mph	
Speed Limit	25 mph	25 mph	25 mph	25 mph	25 mph	
Design ADT	1,000	1,000	1,000	1,000	1,000	
Street Purpose	Access	Access	Access	Access	Access	
Parking	Allowed	Not Allowed	Not Allowed	Allowed	Not Allowed	
Property Access	Individual Driveway Back Out Ok	Individual Driveway Back Out Ok	Individual Driveway Back Out Ok	Individual Driveway Back Out Ok	Individual Driveway Back Out Ok	

Source: Casa Grande Multimodal Transportation Study, Lima & Associates, 2001.

* Policy C-10.1.3 The City to modify roadway classification to allow for higher pedestrian and multi-modal transportation activity where appropriate within Community Centers.

Figure C-4

Roadway Design Criteria

Source: Small Area Transportation Study 2007, Casa Grande.

Appendix C

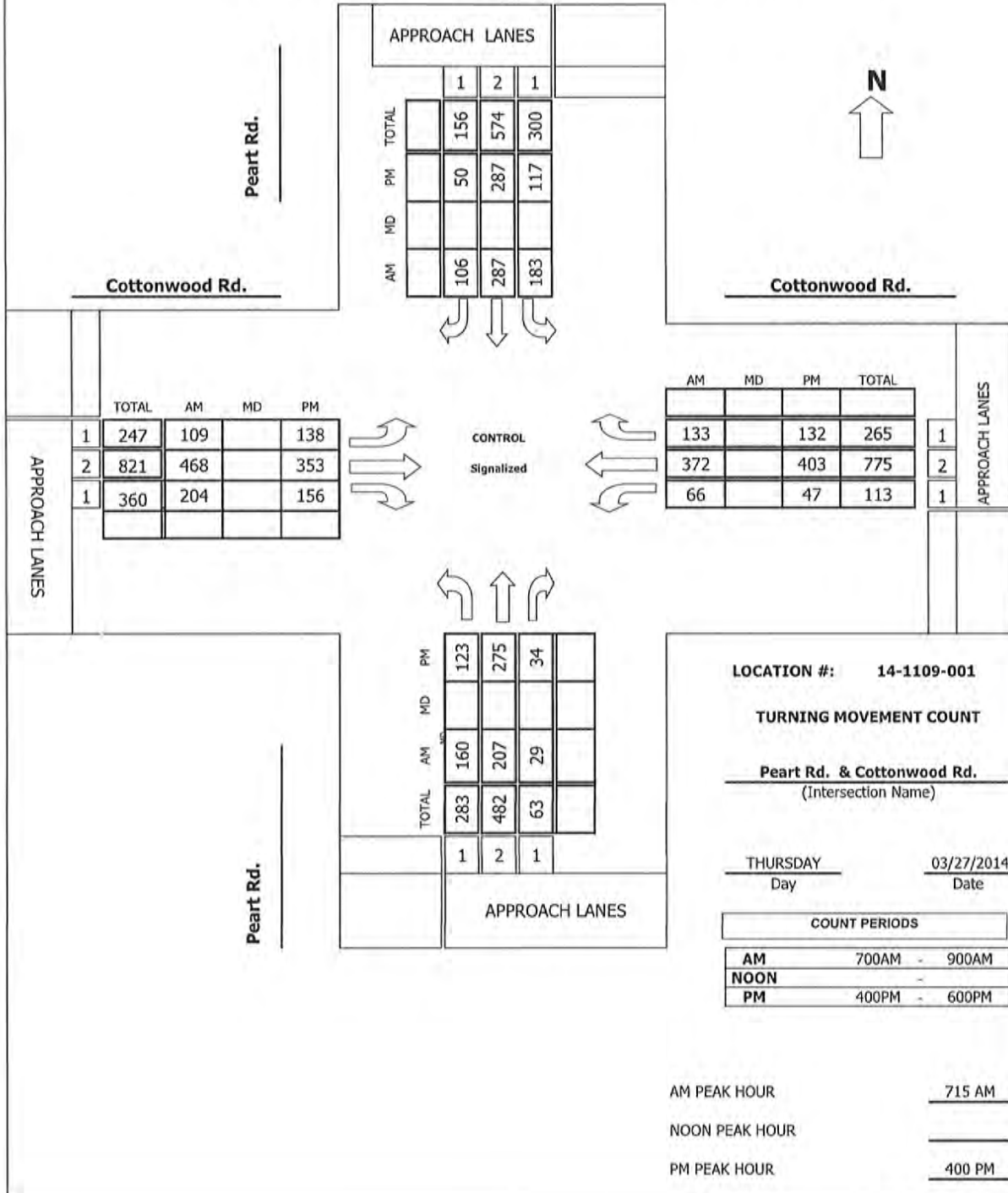
Existing Traffic Volume Count Sheets

**Intersection Turning Movement
Prepared by:**



Project #: 14-1109-001

TMC SUMMARY OF Peart Rd. & Cottonwood Rd.



Intersection Turning Movement

Prepared by:



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Peart Rd.

DATE: 03/27/2014

LOCATION: Casa Grande

E-W STREET: Cottonwood Rd.

DAY: THURSDAY

PROJECT# 14-1109-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 1	SL 1	ST 2	SR 1	EL 1	ET 2	ER 1	WL 1	WT 2	WR 1	TOTAL
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	26	41	5	23	53	17	14	47	22	3	46	15	312
7:15 AM	42	44	12	38	71	25	12	92	39	8	70	27	480
7:30 AM	49	68	5	47	82	30	38	137	61	13	109	41	680
7:45 AM	48	46	9	67	68	27	35	152	66	26	131	40	715
8:00 AM	21	49	3	31	66	24	24	87	38	19	62	25	449
8:15 AM	19	53	4	26	57	10	24	73	35	5	45	20	371
8:30 AM	27	34	6	28	59	9	12	67	32	9	53	13	349
8:45 AM	21	31	4	17	63	9	11	80	34	6	61	13	350
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	253	366	48	277	519	151	170	735	327	89	577	194	3706
Approach %	37.93	54.87	7.20	29.25	54.80	15.95	13.80	59.66	26.54	10.35	67.09	22.56	
App/Depart	667	/	730	947	/	935	1232	/	1060	860	/	981	

AM Peak Hr Begins at: 715 AM

PEAK

Volumes	160	207	29	183	287	106	109	468	204	66	372	133	2324
Approach %	40.40	52.27	7.32	31.77	49.83	18.40	13.96	59.92	26.12	11.56	65.15	23.29	

PEAK HR.

FACTOR:	0.811	0.889	0.772	0.725	0.813
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CONTROL: Signalized

COMMENT 1:

COMMENT 2:

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: **Peart Rd.**

DATE: **03/27/2014**

LOCATION: **Casa Grande**

E-W STREET: **Cottonwood Rd.**

DAY: **THURSDAY**

PROJECT# **14-1109-001**

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL 1	NT 2	NR 1	SL 1	ST 2	SR 1	EL 1	ET 2	ER 1	WL 1	WT 2	WR 1	TOTAL
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	46	75	11	39	78	15	55	106	52	15	85	37	614
4:15 PM	29	69	7	19	67	13	26	93	35	8	125	30	521
4:30 PM	24	74	7	29	72	13	27	87	35	11	105	31	515
4:45 PM	24	57	9	30	70	9	30	67	34	13	88	34	465
5:00 PM	37	93	6	36	73	14	36	76	60	15	97	38	581
5:15 PM	35	69	4	30	55	5	33	106	24	9	74	36	480
5:30 PM	39	48	5	36	61	7	23	84	39	7	82	33	464
5:45 PM	32	85	5	26	78	13	41	110	45	6	96	32	569
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	266	570	54	245	554	89	271	729	324	84	752	271	4209
Approach %	29.89	64.04	6.07	27.59	62.39	10.02	20.47	55.06	24.47	7.59	67.93	24.48	
App/Depart	890	/	1112	888	/	962	1324	/	1028	1107	/	1107	

PM Peak Hr Begins at: 400 PM

PEAK

Volumes	123	275	34	117	287	50	138	353	156	47	403	132	2115
Approach %	28.47	63.66	7.87	25.77	63.22	11.01	21.33	54.56	24.11	8.08	69.24	22.68	

PEAK HR.

FACTOR:	0.818	0.860	0.759	0.893	0.861
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CONTROL: **Signalized**

COMMENT 1: **0**

COMMENT 2: **0**



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

Pedestrian & Bicycle Study

N-S STREET: Peart Rd.
E-W STREET: Cottonwood Rd.

Date: 03/27/2014
Day: THURSDAY

City: Casa Grande
Project #: 14-1109-001

PEDESTRIANS				
	N-LEG	S-LEG	E-LEG	W-LEG
7:00 AM	0	0	0	1
7:15 AM	0	2	0	1
7:30 AM	0	0	1	0
7:45 AM	0	0	0	0
8:00 AM	0	0	0	0
8:15 AM	0	0	0	0
8:30 AM	0	0	0	0
8:45 AM	0	0	0	0
TOTAL	0	2	1	2

BICYCLES				
	N-LEG	S-LEG	E-LEG	W-LEG
7:00 AM	0	0	0	0
7:15 AM	0	0	0	0
7:30 AM	0	0	0	0
7:45 AM	0	0	0	0
8:00 AM	0	0	0	0
8:15 AM	0	0	0	0
8:30 AM	0	0	0	0
8:45 AM	1	0	0	0
TOTAL	1	0	0	0



PEDESTRIANS				
	N-LEG	S-LEG	E-LEG	W-LEG
4:00 PM	0	0	0	0
4:15 PM	0	0	0	0
4:30 PM	0	1	0	0
4:45 PM	0	0	0	0
5:00 PM	0	1	0	3
5:15 PM	0	0	1	0
5:30 PM	0	0	0	2
5:45 PM	0	0	1	1
TOTAL	0	2	2	6

BICYCLES				
	N-LEG	S-LEG	E-LEG	W-LEG
4:00 PM	0	0	0	0
4:15 PM	0	0	0	0
4:30 PM	0	0	0	0
4:45 PM	0	0	0	0
5:00 PM	0	0	0	0
5:15 PM	0	0	0	0
5:30 PM	0	0	0	0
5:45 PM	0	0	0	0
TOTAL	0	0	0	0



Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, March 27, 2014

City: Casa Grande

Project #: 14-1109-002

Location: Peart Rd. north of Cottonwood Rd.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00	5	7			12:00	90	88		
00:15	4	5			12:15	76	81		
00:30	5	1			12:30	89	91		
00:45	9	23	4	17	12:45	112	367	82	342
01:00	6	3			13:00	98	85		
01:15	1	0			13:15	103	108		
01:30	4	3			13:30	80	109		
01:45	3	14	2	8	13:45	116	397	104	406
02:00	4	3			14:00	113	70		
02:15	2	0			14:15	92	86		
02:30	5	3			14:30	131	147		
02:45	3	14	4	10	14:45	145	481	126	429
03:00	2	3			15:00	130	144		
03:15	3	9			15:15	134	101		
03:30	6	10			15:30	108	145		
03:45	10	21	7	29	15:45	158	530	136	526
04:00	8	9			16:00	157	104		
04:15	10	11			16:15	127	119		
04:30	11	23			16:30	127	115		
04:45	15	44	11	54	16:45	166	577	107	445
05:00	11	15			17:00	152	108		
05:15	23	25			17:15	114	104		
05:30	19	41			17:30	152	122		
05:45	24	77	33	114	17:45	112	530	115	449
06:00	27	42			18:00	130	95		
06:15	37	84			18:15	101	89		
06:30	43	65			18:30	91	99		
06:45	61	168	76	267	18:45	92	414	80	363
07:00	79	122			19:00	82	55		
07:15	130	153			19:15	89	65		
07:30	133	217			19:30	72	60		
07:45	106	448	119	611	19:45	92	335	56	236
08:00	89	101			20:00	75	60		
08:15	68	95			20:15	63	42		
08:30	62	84			20:30	56	41		
08:45	62	281	60	340	20:45	66	260	43	186
09:00	60	78			21:00	57	35		
09:15	59	98			21:15	29	32		
09:30	60	71			21:30	33	33		
09:45	54	233	79	326	21:45	44	163	30	130
10:00	79	80			22:00	26	13		
10:15	72	70			22:15	21	20		
10:30	83	87			22:30	19	12		
10:45	93	327	65	302	22:45	17	83	10	55
11:00	90	93			23:00	13	8		
11:15	94	96			23:15	10	13		
11:30	96	106			23:30	10	9		
11:45	84	364	85	380	23:45	8	41	11	41

Total Vol.	2014	2458	4472	4178	3608	7786
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GPS Coordinates:

Daily Totals			
NB	SB	EB	WB
6192	6066		
12258			

AM

PM

Split %	45.0%	55.0%	36.5%	53.7%	46.3%	63.5%
Peak Hour	07:15	07:00	07:00	16:45	15:00	14:30
Volume	458	611	1059	584	526	1058
P.H.F.	0.86	0.70	0.76	0.88	0.91	0.95

Appendix D

Intersection LOS Calculations

Queues

1: Cottonwood Lane & Peart Road

4/5/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	142	608	265	90	510	182	198	256	36	206	322	119
v/c Ratio	0.38	0.53	0.38	0.26	0.50	0.31	0.52	0.50	0.14	0.52	0.62	0.36
Control Delay	17.4	26.4	5.3	16.2	27.2	5.9	23.8	36.0	12.6	23.7	38.7	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	26.4	5.3	16.2	27.2	5.9	23.8	36.0	12.6	23.7	38.7	9.9
Queue Length 50th (ft)	40	134	0	24	112	0	71	64	0	74	82	0
Queue Length 95th (ft)	73	181	31	47	142	24	106	94	22	123	129	44
Internal Link Dist (ft)		1300			1248			926			332	
Turn Bay Length (ft)	170		170	170		170	180		180	180		180
Base Capacity (vph)	391	1157	696	371	1011	582	526	1011	478	536	1011	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.53	0.38	0.24	0.50	0.31	0.38	0.25	0.08	0.38	0.32	0.22
Intersection Summary												

HCM Signalized Intersection Capacity Analysis

1: Cottonwood Lane & Peart Road

4/5/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	468	204	66	372	133	160	207	29	183	287	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.38	1.00	1.00	0.37	1.00	1.00	0.55	1.00	1.00	0.59	1.00	1.00
Satd. Flow (perm)	704	3539	1583	681	3539	1583	1017	3539	1583	1096	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.73	0.73	0.73	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	142	608	265	90	510	182	198	256	36	206	322	119
RTOR Reduction (vph)	0	0	180	0	0	127	0	0	31	0	0	102
Lane Group Flow (vph)	142	608	85	90	510	55	198	256	5	206	322	17
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	33.7	26.5	26.5	30.1	24.7	24.7	22.4	11.8	11.8	22.6	11.9	11.9
Effective Green, g (s)	33.7	26.5	26.5	30.1	24.7	24.7	22.4	11.8	11.8	22.6	11.9	11.9
Actuated g/C Ratio	0.41	0.32	0.32	0.37	0.30	0.30	0.27	0.14	0.14	0.27	0.14	0.14
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lane Grp Cap (vph)	381	1138	509	320	1061	475	373	507	227	388	511	229
v/s Ratio Prot	c0.03	c0.17		0.02	0.14		0.07	0.07		c0.07	c0.09	
v/s Ratio Perm	0.12		0.05	0.08		0.03	0.08		0.00	0.08		0.01
v/c Ratio	0.37	0.53	0.17	0.28	0.48	0.11	0.53	0.50	0.02	0.53	0.63	0.08
Uniform Delay, d1	15.8	22.9	20.0	17.6	23.6	20.9	24.6	32.6	30.3	24.6	33.2	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.1	0.2	0.1	0.0	0.7	0.3	0.0	0.7	1.9	0.1
Delay (s)	16.0	23.1	20.1	17.7	23.7	21.0	25.3	32.9	30.4	25.3	35.0	30.5
Level of Service	B	C	C	B	C	C	C	C	C	C	D	C
Approach Delay (s)		21.4			22.4			29.6			31.1	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			25.2			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			82.4			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			72.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Cottonwood Lane & Peart Road

4/5/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	179	458	203	64	552	181	152	340	42	131	322	56
v/c Ratio	0.48	0.40	0.31	0.15	0.53	0.31	0.43	0.62	0.15	0.39	0.62	0.20
Control Delay	18.6	24.1	5.3	13.8	26.7	5.6	22.6	36.8	11.3	22.1	37.9	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	24.1	5.3	13.8	26.7	5.6	22.6	36.8	11.3	22.1	37.9	11.0
Queue Length 50th (ft)	48	96	0	16	119	0	53	84	0	45	80	0
Queue Length 95th (ft)	85	130	29	34	147	23	84	116	22	82	125	30
Internal Link Dist (ft)		1300			1248			926			332	
Turn Bay Length (ft)	170		170	170		170	180		180	180		180
Base Capacity (vph)	383	1154	653	441	1034	591	518	1028	490	522	1028	500
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.40	0.31	0.15	0.53	0.31	0.29	0.33	0.09	0.25	0.31	0.11
Intersection Summary												

HCM Signalized Intersection Capacity Analysis

1: Cottonwood Lane & Peart Road

4/5/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	353	156	47	403	132	123	275	34	117	287	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.36	1.00	1.00	0.48	1.00	1.00	0.52	1.00	1.00	0.55	1.00	1.00
Satd. Flow (perm)	669	3539	1583	898	3539	1583	963	3539	1583	1019	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.73	0.73	0.73	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	179	458	203	64	552	181	152	340	42	131	322	56
RTOR Reduction (vph)	0	0	138	0	0	126	0	0	36	0	0	48
Lane Group Flow (vph)	179	458	65	64	552	55	152	340	6	131	322	8
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	33.4	25.9	25.9	31.0	24.7	24.7	21.4	12.4	12.4	20.0	11.7	11.7
Effective Green, g (s)	33.4	25.9	25.9	31.0	24.7	24.7	21.4	12.4	12.4	20.0	11.7	11.7
Actuated g/C Ratio	0.41	0.32	0.32	0.38	0.31	0.31	0.26	0.15	0.15	0.25	0.14	0.14
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lane Grp Cap (vph)	378	1133	507	412	1081	483	345	542	243	329	512	229
v/s Ratio Prot	c0.04	0.13		0.01	c0.16		c0.05	c0.10		0.04	0.09	
v/s Ratio Perm	0.15		0.04	0.05		0.03	0.07		0.00	0.06		0.01
v/c Ratio	0.47	0.40	0.13	0.16	0.51	0.11	0.44	0.63	0.03	0.40	0.63	0.04
Uniform Delay, d1	15.7	21.5	19.5	16.0	23.1	20.2	23.9	32.1	29.1	24.8	32.6	29.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.0	0.1	0.2	0.0	0.3	1.6	0.0	0.3	1.7	0.0
Delay (s)	16.1	21.6	19.5	16.0	23.3	20.3	24.3	33.7	29.1	25.0	34.3	29.8
Level of Service	B	C	B	B	C	C	C	C	C	C	C	C
Approach Delay (s)		19.9			22.0			30.7			31.4	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			24.9			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			80.9			Sum of lost time (s)			21.0			
Intersection Capacity Utilization			88.5%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Cottonwood Lane & Peart Road

4/5/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	152	648	283	97	544	195	211	273	38	220	344	127
v/c Ratio	0.43	0.57	0.40	0.30	0.55	0.33	0.55	0.52	0.14	0.54	0.65	0.37
Control Delay	19.1	27.8	5.4	17.4	28.6	6.0	24.4	36.5	12.2	24.0	39.5	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	27.8	5.4	17.4	28.6	6.0	24.4	36.5	12.2	24.0	39.5	9.7
Queue Length 50th (ft)	44	150	0	27	124	0	77	69	0	80	89	0
Queue Length 95th (ft)	81	198	31	52	156	23	112	101	22	131	138	45
Internal Link Dist (ft)		1300			1248			926			332	
Turn Bay Length (ft)	170		170	170		170	180		180	180		180
Base Capacity (vph)	369	1143	703	347	997	586	517	997	473	535	997	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.57	0.40	0.28	0.55	0.33	0.41	0.27	0.08	0.41	0.35	0.24
Intersection Summary												

HCM Signalized Intersection Capacity Analysis

1: Cottonwood Lane & Peart Road

4/5/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Volume (vph)	117	499	218	71	397	142	171	221	31	196	306	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.35	1.00	1.00	0.33	1.00	1.00	0.51	1.00	1.00	0.58	1.00	1.00
Satd. Flow (perm)	649	3539	1583	617	3539	1583	944	3539	1583	1079	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.73	0.73	0.73	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	152	648	283	97	544	195	211	273	38	220	344	127
RTOR Reduction (vph)	0	0	193	0	0	137	0	0	32	0	0	108
Lane Group Flow (vph)	152	648	90	97	544	58	211	273	6	220	344	19
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	33.8	26.5	26.5	30.2	24.7	24.7	23.4	12.2	12.2	23.6	12.3	12.3
Effective Green, g (s)	33.8	26.5	26.5	30.2	24.7	24.7	23.4	12.2	12.2	23.6	12.3	12.3
Actuated g/C Ratio	0.40	0.32	0.32	0.36	0.30	0.30	0.28	0.15	0.15	0.28	0.15	0.15
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lane Grp Cap (vph)	361	1123	502	299	1047	468	375	517	231	398	521	233
v/s Ratio Prot	c0.04	c0.18		0.02	0.15		c0.08	0.08		0.07	c0.10	
v/s Ratio Perm	0.13		0.06	0.10		0.04	0.08		0.00	0.08		0.01
v/c Ratio	0.42	0.58	0.18	0.32	0.52	0.12	0.56	0.53	0.02	0.55	0.66	0.08
Uniform Delay, d1	16.4	23.8	20.6	18.1	24.5	21.5	24.6	33.0	30.5	24.5	33.6	30.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.4	0.1	0.2	0.2	0.0	1.2	0.5	0.0	0.9	2.4	0.1
Delay (s)	16.7	24.3	20.7	18.4	24.6	21.5	25.7	33.4	30.6	25.5	36.1	30.8
Level of Service	B	C	C	B	C	C	C	C	C	C	D	C
Approach Delay (s)		22.3			23.2			30.1			31.7	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			25.9			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			83.5			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			74.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Cottonwood Lane & Peart Road

4/9/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	192	490	217	70	589	193	163	363	46	140	344	61
v/c Ratio	0.54	0.41	0.32	0.18	0.58	0.33	0.47	0.64	0.16	0.42	0.65	0.21
Control Delay	20.9	24.0	5.2	14.7	28.0	5.7	23.1	37.4	10.8	22.4	38.7	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	24.0	5.2	14.7	28.0	5.7	23.1	37.4	10.8	22.4	38.7	10.7
Queue Length 50th (ft)	54	101	0	18	131	0	57	91	0	49	86	0
Queue Length 95th (ft)	93	142	30	38	161	23	89	123	23	87	134	32
Internal Link Dist (ft)		1300			1248			926			332	
Turn Bay Length (ft)	170		170	170		170	180		180	180		180
Base Capacity (vph)	361	1196	678	430	1017	593	511	1017	488	519	1017	499
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.41	0.32	0.16	0.58	0.33	0.32	0.36	0.09	0.27	0.34	0.12
Intersection Summary												

HCM Signalized Intersection Capacity Analysis

1: Cottonwood Lane & Peart Road

4/9/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Volume (vph)	148	377	167	51	430	141	132	294	37	125	306	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.31	1.00	1.00	0.47	1.00	1.00	0.47	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	582	3539	1583	881	3539	1583	882	3539	1583	975	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.73	0.73	0.73	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	192	490	217	70	589	193	163	363	46	140	344	61
RTOR Reduction (vph)	0	0	145	0	0	135	0	0	39	0	0	52
Lane Group Flow (vph)	192	490	72	70	589	58	163	363	7	140	344	9
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	34.8	27.1	27.1	29.8	24.6	24.6	22.3	12.9	12.9	20.5	12.0	12.0
Effective Green, g (s)	34.8	27.1	27.1	29.8	24.6	24.6	22.3	12.9	12.9	20.5	12.0	12.0
Actuated g/C Ratio	0.43	0.33	0.33	0.36	0.30	0.30	0.27	0.16	0.16	0.25	0.15	0.15
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lane Grp Cap (vph)	360	1174	525	378	1066	477	343	559	250	327	520	233
v/s Ratio Prot	c0.05	0.14		0.01	0.17		c0.05	c0.10		0.04	0.10	
v/s Ratio Perm	c0.18		0.05	0.06		0.04	0.08		0.00	0.06		0.01
v/c Ratio	0.53	0.42	0.14	0.19	0.55	0.12	0.48	0.65	0.03	0.43	0.66	0.04
Uniform Delay, d1	15.5	21.2	19.1	17.2	23.9	20.7	23.8	32.3	29.1	24.9	32.9	29.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.1	0.0	0.1	0.4	0.0	0.4	2.0	0.0	0.3	2.5	0.0
Delay (s)	16.3	21.3	19.2	17.3	24.3	20.8	24.2	34.2	29.1	25.2	35.4	29.9
Level of Service	B	C	B	B	C	C	C	C	C	C	D	C
Approach Delay (s)		19.7			22.9			31.0			32.2	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			25.3			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			81.7			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			72.3%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Cottonwood Lane & Peart Road

4/9/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	156	648	283	97	544	197	211	274	38	224	346	130
v/c Ratio	0.50	0.62	0.42	0.35	0.60	0.36	0.61	0.35	0.10	0.49	0.86	0.29
Control Delay	25.6	33.7	6.2	22.4	34.3	6.7	24.9	31.1	10.2	20.9	57.0	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	33.7	6.2	22.4	34.3	6.7	24.9	31.1	10.2	20.9	57.0	7.7
Queue Length 50th (ft)	58	183	0	35	151	0	77	70	0	82	194	0
Queue Length 95th (ft)	95	223	32	60	174	24	110	100	21	130	#343	45
Internal Link Dist (ft)		1300			1248			926			236	
Turn Bay Length (ft)	170		170	170		170	180		180	180		180
Base Capacity (vph)	321	1044	666	302	906	552	452	925	442	575	477	502
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.62	0.42	0.32	0.60	0.36	0.47	0.30	0.09	0.39	0.73	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1: Cottonwood Lane & Peart Road

4/9/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	499	218	71	397	144	171	222	31	199	308	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	1863	1583
Flt Permitted	0.32	1.00	1.00	0.30	1.00	1.00	0.25	1.00	1.00	0.58	1.00	1.00
Satd. Flow (perm)	598	3539	1583	562	3539	1583	463	3539	1583	1086	1863	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.73	0.73	0.73	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	156	648	283	97	544	197	211	274	38	224	346	130
RTOR Reduction (vph)	0	0	201	0	0	144	0	0	30	0	0	103
Lane Group Flow (vph)	156	648	82	97	544	53	211	274	8	224	346	27
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	34.2	26.7	26.7	30.4	24.8	24.8	32.6	20.3	20.3	30.8	19.4	19.4
Effective Green, g (s)	34.2	26.7	26.7	30.4	24.8	24.8	32.6	20.3	20.3	30.8	19.4	19.4
Actuated g/C Ratio	0.37	0.29	0.29	0.33	0.27	0.27	0.35	0.22	0.22	0.33	0.21	0.21
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lane Grp Cap (vph)	318	1027	459	259	954	427	339	781	349	448	393	334
v/s Ratio Prot	c0.04	c0.18		0.02	0.15		c0.08	0.08		0.06	c0.19	
v/s Ratio Perm	0.14		0.05	0.10		0.03	0.14		0.01	0.11		0.02
v/c Ratio	0.49	0.63	0.18	0.37	0.57	0.12	0.62	0.35	0.02	0.50	0.88	0.08
Uniform Delay, d1	20.3	28.4	24.4	22.1	29.0	25.4	22.6	30.3	28.1	23.3	35.2	29.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.9	0.1	0.3	0.5	0.0	2.6	0.1	0.0	0.3	19.4	0.0
Delay (s)	20.7	29.3	24.5	22.4	29.5	25.4	25.2	30.4	28.1	23.6	54.6	29.2
Level of Service	C	C	C	C	C	C	C	C	C	C	D	C
Approach Delay (s)		26.8			27.7			28.1			40.0	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM Average Control Delay			30.2			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			92.0			Sum of lost time (s)			21.0			
Intersection Capacity Utilization			80.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Project Dwy & Peart Road

4/9/2014

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	8	2	486	6	2	615
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	2	528	7	2	668
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			1286			
pX, platoon unblocked						
vC, conflicting volume	1204	267			535	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1204	267			535	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	176	731			1029	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1		
Volume Total	11	352	183	671		
Volume Left	9	0	0	2		
Volume Right	2	0	7	0		
cSH	208	1700	1700	1029		
Volume to Capacity	0.05	0.21	0.11	0.00		
Queue Length 95th (ft)	4	0	0	0		
Control Delay (s)	23.3	0.0	0.0	0.1		
Lane LOS	C			A		
Approach Delay (s)	23.3	0.0		0.1		
Approach LOS	C					
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		44.0%		ICU Level of Service	A	
Analysis Period (min)		15				

Queues

1: Cottonwood Lane & Peart Road

4/9/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	196	490	217	70	589	197	163	365	46	145	347	66
v/c Ratio	0.55	0.41	0.32	0.18	0.58	0.33	0.47	0.65	0.16	0.44	0.65	0.22
Control Delay	21.3	24.0	5.2	14.7	28.1	5.7	23.1	37.8	10.9	22.7	38.7	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	24.0	5.2	14.7	28.1	5.7	23.1	37.8	10.9	22.7	38.7	10.6
Queue Length 50th (ft)	55	101	0	18	131	0	57	91	0	51	87	0
Queue Length 95th (ft)	95	142	30	38	161	23	89	124	23	90	135	33
Internal Link Dist (ft)		1300			1248			926			220	
Turn Bay Length (ft)	170		170	170		170	180		180	180		180
Base Capacity (vph)	361	1196	679	430	1017	595	512	1017	487	515	1017	502
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.41	0.32	0.16	0.58	0.33	0.32	0.36	0.09	0.28	0.34	0.13
Intersection Summary												

HCM Signalized Intersection Capacity Analysis

1: Cottonwood Lane & Peart Road

4/9/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	377	167	51	430	144	132	296	37	129	309	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.31	1.00	1.00	0.47	1.00	1.00	0.48	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	582	3539	1583	881	3539	1583	897	3539	1583	943	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.73	0.73	0.73	0.81	0.81	0.81	0.89	0.89	0.89
Adj. Flow (vph)	196	490	217	70	589	197	163	365	46	145	347	66
RTOR Reduction (vph)	0	0	145	0	0	138	0	0	39	0	0	56
Lane Group Flow (vph)	196	490	72	70	589	59	163	365	7	145	347	10
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	34.8	27.1	27.1	29.8	24.6	24.6	22.1	12.8	12.8	20.9	12.2	12.2
Effective Green, g (s)	34.8	27.1	27.1	29.8	24.6	24.6	22.1	12.8	12.8	20.9	12.2	12.2
Actuated g/C Ratio	0.43	0.33	0.33	0.36	0.30	0.30	0.27	0.16	0.16	0.26	0.15	0.15
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lane Grp Cap (vph)	359	1172	524	377	1064	476	342	554	248	329	528	236
v/s Ratio Prot	c0.05	0.14		0.01	0.17		c0.05	c0.10		0.05	0.10	
v/s Ratio Perm	c0.18		0.05	0.06		0.04	0.07		0.00	0.07		0.01
v/c Ratio	0.55	0.42	0.14	0.19	0.55	0.12	0.48	0.66	0.03	0.44	0.66	0.04
Uniform Delay, d1	15.6	21.2	19.2	17.2	24.0	20.8	24.0	32.4	29.2	24.7	32.8	29.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	0.0	0.1	0.4	0.0	0.4	2.2	0.0	0.3	2.3	0.0
Delay (s)	16.5	21.3	19.2	17.3	24.3	20.8	24.4	34.6	29.3	25.0	35.1	29.8
Level of Service	B	C	B	B	C	C	C	C	C	C	D	C
Approach Delay (s)		19.8			23.0			31.3			31.9	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			25.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			81.8			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			72.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Project Driveway & Peart Road

4/9/2014

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	12	4	583	8	3	485
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	4	634	9	3	527
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)			1293			
pX, platoon unblocked						
vC, conflicting volume	1172	321			642	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1172	321			642	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	99			100	
cM capacity (veh/h)	185	675			938	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1		
Volume Total	17	422	220	530		
Volume Left	13	0	0	3		
Volume Right	4	0	9	0		
cSH	226	1700	1700	938		
Volume to Capacity	0.08	0.25	0.13	0.00		
Queue Length 95th (ft)	6	0	0	0		
Control Delay (s)	22.3	0.0	0.0	0.1		
Lane LOS	C			A		
Approach Delay (s)	22.3	0.0		0.1		
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			37.9%		ICU Level of Service	A
Analysis Period (min)			15			

Appendix E

Collision Data

IncidentID	IncidentDateTime	CollisionManner	LightCondition	FirstHarmfulEvent	FirstHarmfulLocation	TotalFatalities	Onroad	CrossingFeature	Latitude	Longitude	TrafficWayType	IntersectionType
2378183	1/3/2010 5:31	4	4	16	1	0	Pearl Rd	Cottonwood Ln	32.89426166	-111.7226478	5	1
2380233	1/23/2010 18:53	4	4	16	1	0	Pearl Rd	Cottonwood Ln	32.89431662	-111.7226479	2	1
2430033	7/18/2010 12:28	4	1	16	1	0	Pearl Rd	Cottonwood Ln	32.89419475	-111.7225929	5	1
2443874	8/31/2010 19:31	4	4	16	1	0	Pearl Rd	Cottonwood Ln	32.8939199	-111.7225937	5	1
2452702	10/7/2010 17:56	2	3	16	1	0	Pearl Rd	Cottonwood Ln	32.89419475	-111.7225929	5	1
2476394	11/5/2010 12:02	4	1	16	1	0	Pearl Rd	Cottonwood Ln	32.89405732	-111.7225933	4	1
2478361	12/29/2010 14:00	6	1	16	1	0	Pearl Rd	Cottonwood Ln	32.89309534	-111.7225959	4	0

IncidentID	IncidentDateTime	CollisionManner	LightCondition	FirstHarmfulEvent	FirstHarmfulLocation	TotalFatalities	Onroad	CrossingFeature	Latitude	Longitude	TrafficWayType	IntersectionType
2428216	7/8/2010 11:38	4	1	16	1	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	5	1
2478425	12/29/2010 15:17	4	1	16	1	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	4	1
2478498	12/31/2010 15:08	99	1	16	99	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	99	99

IncidentID	IncidentDateTime	CollisionManner	LightCondition	FirstHarmfulEvent	FirstHarmfulLocation	TotalFatalities	Onroad	CrossingFeature	Latitude	Longitude	TrafficWayType	IntersectionType
2496943	2/14/2011 11:51	4	1	16	255	0	Peart Rd	Cottonwood Ln	32.89419475	-111.7225929	5	1
2516400	3/25/2011 9:06	97	1	8	255	0	Peart Rd	Cottonwood Ln	32.89419475	-111.7225929	99	255
2528861	5/10/2011 15:52	4	1	16	255	0	Peart Rd	Cottonwood Ln	32.89439844	-111.7225936	5	0
2536240	6/28/2011 19:29	1	1	42	255	0	Peart Rd	Cottonwood Ln	32.89419475	-111.7225929	3	1
2545447	8/9/2011 15:49	4	1	16	255	0	Peart Rd	Cottonwood Ln	32.89419475	-111.7225929	4	1
2551540	9/19/2011 19:47	4	4	16	255	0	Peart Rd	Cottonwood Ln	32.89419475	-111.7225929	5	1

IncidentID	IncidentDateTime	CollisionManner	LightCondition	FirstHarmfulEvent	FirstHarmfulLocation	TotalFatalities	Onroad	CrossingFeature	Latitude	Longitude	TrafficWayType	IntersectionType
2531612	6/8/2011 17:33	4	1	16	255	0	Cottonwood Ln	Peart Rd	32.89419474	-111.7226581	2	1
2540938	7/3/2011 11:48	2	1	16	255	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	5	1
2547463	8/27/2011 4:42	4	4	16	255	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	5	1
2572267	12/1/2011 6:04	2	4	255	255	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	5	1

IncidentID	IncidentDateTime	CollisionManner	LightCondition	FirstHarmfulEvent	FirstHarmfulLocation	TotalFatalities	Onroad	CrossingFeature	Latitude	Longitude	TrafficWayType	IntersectionType
2598590	2/12/2012 16:30	4	1	16	255	0	Peart Rd	Cottonwood Ln	32.89427612	-111.7225939	5	1
2640311	8/6/2012 8:08	4	1	16	255	0	Peart Rd	Cottonwood Ln	32.89424864	-111.7225939	3	255

IncidentID	IncidentDateTime	CollisionManner	LightCondition	FirstHarmfulEvent	FirstHarmfulLocation	TotalFatalities	Onroad	CrossingFeature	Latitude	Longitude	TrafficWayType	IntersectionType
2585123	1/7/2012 11:21	4	1	16	255	0	Cottonwood Ln	Peart Rd	32.89419461	-111.7225626	4	3
2590568	1/27/2012 6:46	6	1	16	255	0	Cottonwood Ln	Peart Rd	32.89419462	-111.7219437	5	99
2654238	9/13/2012 15:16	4	1	16	255	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	5	99
2676425	12/1/2012 14:15	4	1	16	255	0	Cottonwood Ln	Peart Rd	32.89419475	-111.7225929	5	1

Appendix F

City of Casa Grande Access Management

Access management is included in Chapter 17.56, Off-Street Parking, of the *Casa Grande Municipal Code*. The applicable sections are repeated here.

17.56.60 Drive access-Approval required for alteration

The city encourages sharing access drives between separate parcels. Some of the following standards may be relaxed if shown during the site design review process that more efficient design can be accomplished without jeopardizing the public's health, safety, and welfare. All changes are subject to approval by the planning and zoning commission. All drive accesses shall be approved by the city engineer for width and location. (Ord. 1178 § 6.10.2(E), 1987)

17.56.70 Drive access-required when

All nonresidential off-street parking spaces shall have access from a drive access and not directly from the public street. Access drives shall be not less than twenty-four feet in width for two-way traffic nor less than twelve feet in width for one-way traffic. Residential drive accesses shall be not less than ten feet in width. (Ord. 1178 § 6.10.2(F), 1987)

17.56.80 Drive access-Required distance from intersection

Driveway access distances from street intersections shall be subject to the minimum dimensions set out in Table 17.56.080. (Ord. 1178.39 § 2 (part), 1990)

17.56.090 Drive access-Required spacing

Drive accesses to a public street except for single, two-family and townhouse dwellings shall be located as measured from inside of drive to inside of drive according to the specified distances, set out in Table 17.56.090, unless granted approval by the planning and zoning commission. (Ord. 1178.39 § 2 (part), 1990)

TABLE 17.56.090. MINIMUM DRIVEWAY SPACING
(Centerline to Centerline)

Facility	Land Use	Min. Spacing (Feet)
Principal Arterial:	Commercial; High Density/High Activity	200
	Industrial/Office Park; Low to Moderate Activity	275
Minor Arterial:	Commercial; High Density/Activity	150
	Industrial/Office Park; Low to Moderate Activity	230
	Multifamily Residential; Low to Moderate Activity	150

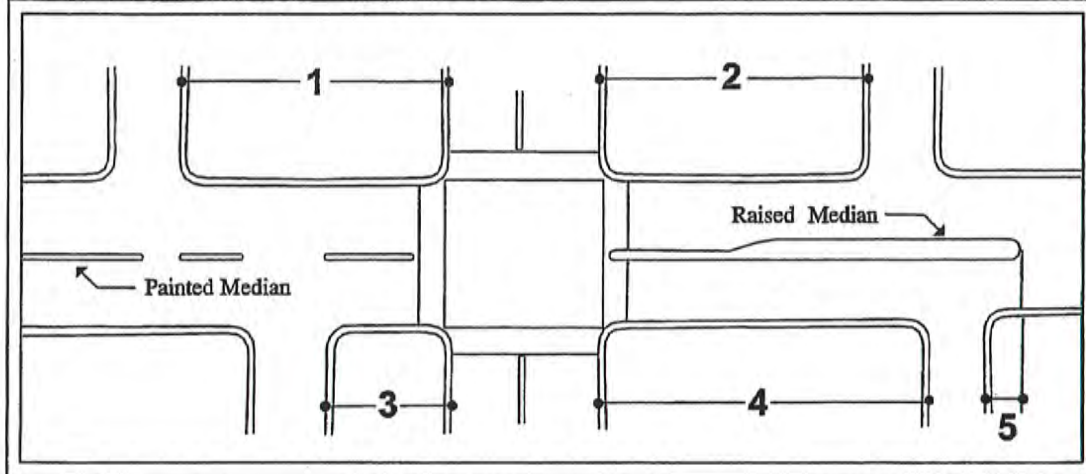
17.56.100 Drive access-Number required

Each property shall be allowed at least one drive access for each one hundred feet of street frontage. Single-family uses shall be limited to one drive access per property. These conditions shall apply unless otherwise granted approval by the planning and zoning commission. (Ord. 1178 § 6.10.2(I), 1987)

TABLE 17.56.080. MINIMUM CORNER CLEARANCES

Facility	Intersection Control Dimensions (Feet)				
	1	2	3	4	5
Principal Arterial (S)	230	120	230	230	100
Minor Arterial / Collector (S)	175	85	175	175	0
Principal Arterial (U)	120	120	85	120	100
Minor Arterial / Collector (U)	75	85	85	75	0

Note: S=Signalized, U=Unsignalized



MEMORY TRANSMISSION REPORT

TIME : 04-07-2014 16:12
FAX NO.1 : 520-421-9143
NAME : Villas By Mary T

FILE NO. : 194
DATE : 04.07 16:11
TO : 16024822885
DOCUMENT PAGES : 2
START TIME : 04.07 16:11
END TIME : 04.07 16:12
PAGES SENT : 2
STATUS : OK

SUCCESSFUL TX NOTICE



**the
CK Group, Inc.**

Civil | Airport | Transportation | Surveying | Material Testing

April 7, 2014

Ruth Dahl
Mary T. Inc.
1555 118th Lane NW
Coon Rapids, MN 55448

Re: **Proposal for Preparing a Traffic Study for:**
Villa Plus By Mary T. Development, Casa Grande, Arizona

Dear Ms. Dahl,

The following scope of work, fee, and schedule are presented for preparing a Traffic Study for the subject Senior Adult Housing (Project) located on the east side of Peart Road with the access driveway located approximately ¼ mile north of the intersection of Peart Road/ Cottonwood Lane in Casa Grande, AZ.

This study will incorporate the findings of the Traffic Statement prepared for the subject Project. In accordance with the City of Casa Grande SATS Guidelines and Procedures, the Traffic Study will be a Limited Report for a site with 100 or more trips per day.

Scope of Services

Phase II: Traffic Study

The following items described below will be analyzed as part of the Traffic Statement Analysis.

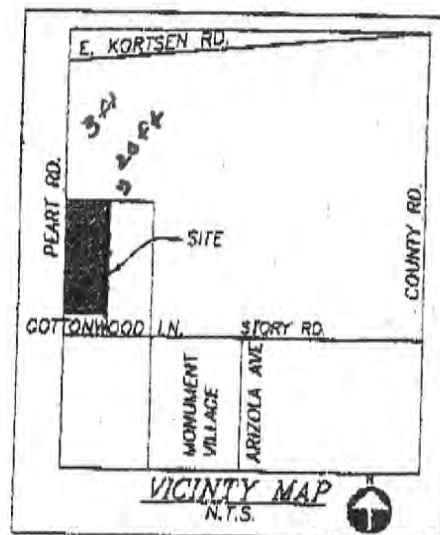
1. Coordinate with the City of Casa Grande staff and or designee to determine any project specific requirements, identify traffic count locations and research traffic counts available from the previous studies and from the records at the City. Arrange to conduct traffic counts at identified locations within the study area. The proposed counts may include daily weekday approach traffic volume counts, vehicular classification data, speed data, and peak hour intersection turning movement counts. Peak hour turning movement counts will be conducted during the weekday AM and PM peak periods.
2. Collect accident data from the City and/or the Arizona Department of Transportation Planning Division (ADOT TPD) within the study area (both segments and intersections) for the last three years and perform accident analysis to identify deficiency and recommend mitigation measures to enhance safety at such locations.
3. Conduct existing conditions LOS at the study intersections.
4. Review project site plan for:
 - a. Significant points of vehicular and pedestrian conflicts.
 - b. Proposed driveway locations and vehicular movements, spacing, and geometry.
 - c. Available sight distance for various movements in/out of the project driveways.
 - d. On-site traffic circulation (limited to qualitative evaluation).
 - e. Compatibility with the City's general planning effort.
5. Estimate background area traffic demand for project opening year and conduct LOS analysis.
6. Evaluate project impact on existing adjacent roadway system and intersections and propose suitable mitigation measures to minimize/offset impacts.
7. Coordinate with owner and the City to develop mitigation alternatives for any adverse roadway impact.
8. Prepare draft TIA report including tables, figures, and charts and submit to the City for review and comment.
9. Prepare final TIA and submit to the City.

the CK Group, Inc.
16448 N. 40th Street, Suite A Phoenix, Arizona 85032
P: 602.482.5884 | F: 602.482.2885 | Email: ckgroup@theckgroup.com

NOTICE OF PUBLIC HEARING
City of Casa Grande
Planning and Zoning Commission

DATE: November 6, 2003
TIME: 6:00 P.M.
PLACE: City Hall/Council Chambers at 510 E. Florence Boulevard
PURPOSE: **CGPZ-98-03:** Conditional Use Permit request by Palmer Architects – Brad Graham to allow for a portion of the dwelling units within a proposed rental housing development on 16 acres m.o.l. to be used for assisted living (group home). The subject site is located north of the northeast corner of Peart Road and Cottonwood Lane, A.K.A. Phase Two of the Villas by Mary-T, part of the SW ¼ of Section 15, T6S, R6E, G&SRM, Pinal County, Arizona.

Map of Area



This notice is being sent to you because property listed in your name is located within 200 feet of the area shown. If you have an interest in the matter, either for or against, you may present your view in person at the hearing or you may write to: Planning and Development Department, City of Casa Grande, 510 E. Florence Boulevard, Casa Grande, AZ 85222, or phone the Planning and Development Department at (520) 421-8637. All interested persons are invited to attend the hearing. You might wish to inform your neighbors.

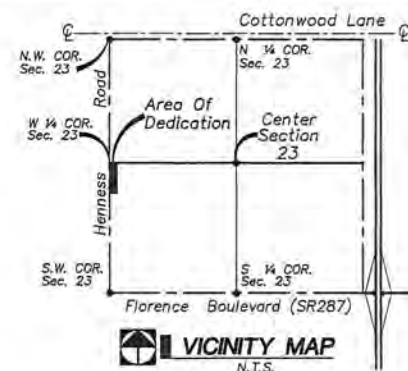
Material relating to this request is available for review in the Planning Office between 7:30 a.m. to 5:30 p.m., Monday through Friday.

LEGEND

- FOUND BCSM AS DESCRIBED
- BRASS CAP SURVEY MONUMENT
- BOUNDARY DEDICATION LINE

MAP OF DEDICATION FOR HENNESSY ROAD

A PORTION OF THE SOUTHWEST 1/4 OF SECTION 23, T. 6 S., R. 6 E.,
GILA AND SALT RIVER MERIDIAN
PINAL COUNTY, ARIZONA.



STATE OF ARIZONA }
COUNTY OF PINAL } ss
I hereby certify that the within
in the official records of this
in Fee 5012-01615
Date: 5-23-12
Request of: City of Casa Grande
Witness my hand and official seal:
LAURA DEAN LYLES, Pin
By: [Signature]

CERTIFICATION OF TITLE AND DEDICATION

STATE OF ARIZONA }
COUNTY OF MARICOPA } ss

I, UNDERSIGNED HEREBY CERTIFIES THAT VANDERSBILT FARMS, L.L.C., AN ARIZONA
LIMITED LIABILITY COMPANY (HEREINAFTER REFERRED TO AS OWNER) IS THE SOLE OWNER
RECORD OF THE REAL PROPERTIES THAT ARE THE SUBJECT OF THIS DEDICATION
D. AS THE OWNER OF THE REAL PROPERTIES DESCRIBED HEREIN, DECLARE THAT THIS
P. OF DEDICATION SETS FORTH THE LOCATION AND GIVES THE DIMENSIONS
CONSTITUTING THE PUBLIC RIGHTS-OF-WAY TO BE DEDICATED.

OWNER HEREBY DEDICATES TO THE CITY OF CASA GRANDE, PINAL COUNTY, ARIZONA, THE
W PUBLIC RIGHTS-OF-WAY FOR HENNESSY ROAD AS SHOWN HEREIN.

[Signature] 5/23/12
VANDERSBILT FARMS, L.L.C. DATE

LEGAL DESCRIPTION

PORTION OF HENNESSY ROAD TO BE DEDICATED

THE WEST 55.00 FEET OF THE NORTH 208.71 FEET OF THE WEST
508.71 FEET OF THE SOUTHWEST QUARTER OF SECTION 23,
TOWNSHIP 6 SOUTH, RANGE 6 EAST OF THE GILA AND SALT
RIVER MERIDIAN, PINAL COUNTY, ARIZONA.

ACKNOWLEDGMENT

STATE OF ARIZONA }
COUNTY OF MARICOPA } ss

I, THIS 23rd DAY OF MAY, 2012, BEFORE ME, THE UNDERSIGNED
NOTARY PUBLIC, PERSONALLY APPEARED [Signature] WHO
ACKNOWLEDGED HIM/HERSELF TO BE THE OWNER OF VANDERSBILT FARMS,
L.L.C., AN ARIZONA LIMITED LIABILITY COMPANY, AND ACKNOWLEDGED THAT
HE/AS SUCH OFFICER, BEING AUTHORIZED TO DO SO, EXECUTED THE
FLOODING INSTRUMENT IN THE CAPACITY THEREON STATED, FOR THE PURPOSES
HEREIN CONTAINED, BY SIGNING THE NAME OF THE COMPANY BY HIM/HERSELF
AS SUCH OFFICER.

WITNESS WHEREOF, I HERETO SET MY HAND AND OFFICIAL SEAL

[Signature]
NOTARY PUBLIC

NOTARY EXPIRATION DATE: 5/15/14

BENCHMARK

DISC, A.D.G.T. RIGHT-OF-WAY MARKER AT STATION
0+36.9 (0+10), ELEVATION = 1418.66
A.D.G.T. DATUM)

BASIS OF BEARING

BASIS OF BEARINGS IS THE WEST LINE OF SECTION 23,
S. SHOWN ON ALTA SURVEY BY THE WLB GROUP, INC.,
DATED MARCH 1998, WLB JOB NUMBER 297009-A-003
BEARING BEING N00°05'00"W.

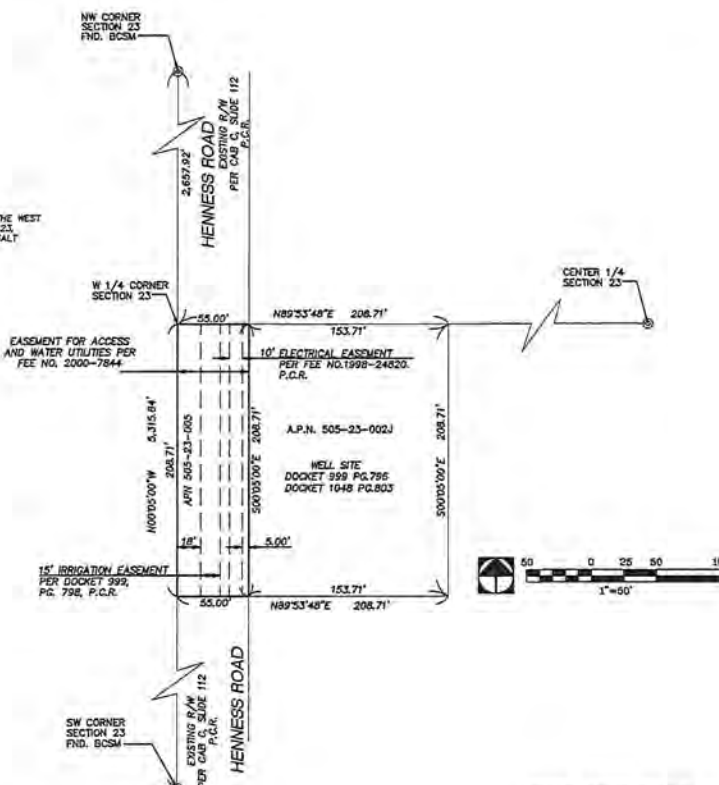
LAND SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE SURVEY AND SUBDIVISION OF THE PREMISES
DESCRIBED AND PLATTED HEREIN WERE MADE UNDER MY DIRECTION DURING THE
MONTH OF MAY, 2012, AND THIS PLAT REPRESENTS THE SURVEY MADE. I
FURTHER CERTIFY ALL EXTERIOR BOUNDARY MONUMENTS SHOWN HEREON
ACTUALLY EXIST AND THEIR LOCATION, SIZE AND MATERIAL ARE ACCURATELY
SHOWN AND ARE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

BY: [Signature] 5-23-12
KENNETH A. MARKS, RLS
ARIZONA REGISTERED LAND SURVEYOR, #35869



EXPIRES: 03-31-18



CITY APPROVALS

APPROVED BY THE CITY COUNCIL OF THE CITY OF CASA GRANDE
THIS 23rd DAY OF MAY, 2012
ARIZONA

MAYOR: [Signature]
ATTEST: [Signature]

CITY CLERK

DATE ON THIS PLAT REVIEWED AND APPROVED: 5-23-12 DAY OF
MAY, 2012, BY THE CITY ENGINEER OF CASA GRANDE,
ARIZONA

CITY ENGINEER: [Signature]

OWNER/DEVELOPER

VANDERSBILT FARMS, L.L.C.
1121 West Warner Rd. Ste. 109
Tempe, Arizona 85284
Phone: (602) 831-2000
Fax: (602) 831-1330

ENGINEER

THE WLB GROUP INC.
1600 W. BROADWAY RD.
TEMPE, AZ. 85282
Phone: (480) 736-1600

FLOOD NOTE

ON NOVEMBER 23, 2010 THE FEDERAL EMERGENCY
MANAGEMENT AGENCY (FEMA) REVISED THE ORIGIN
04021C1190E BY LOMR CASE NO. 10-09-2417P. 1
TO THE FIRM EFFECTIVELY REVISES THE PROPERTY
(UNSHADED)

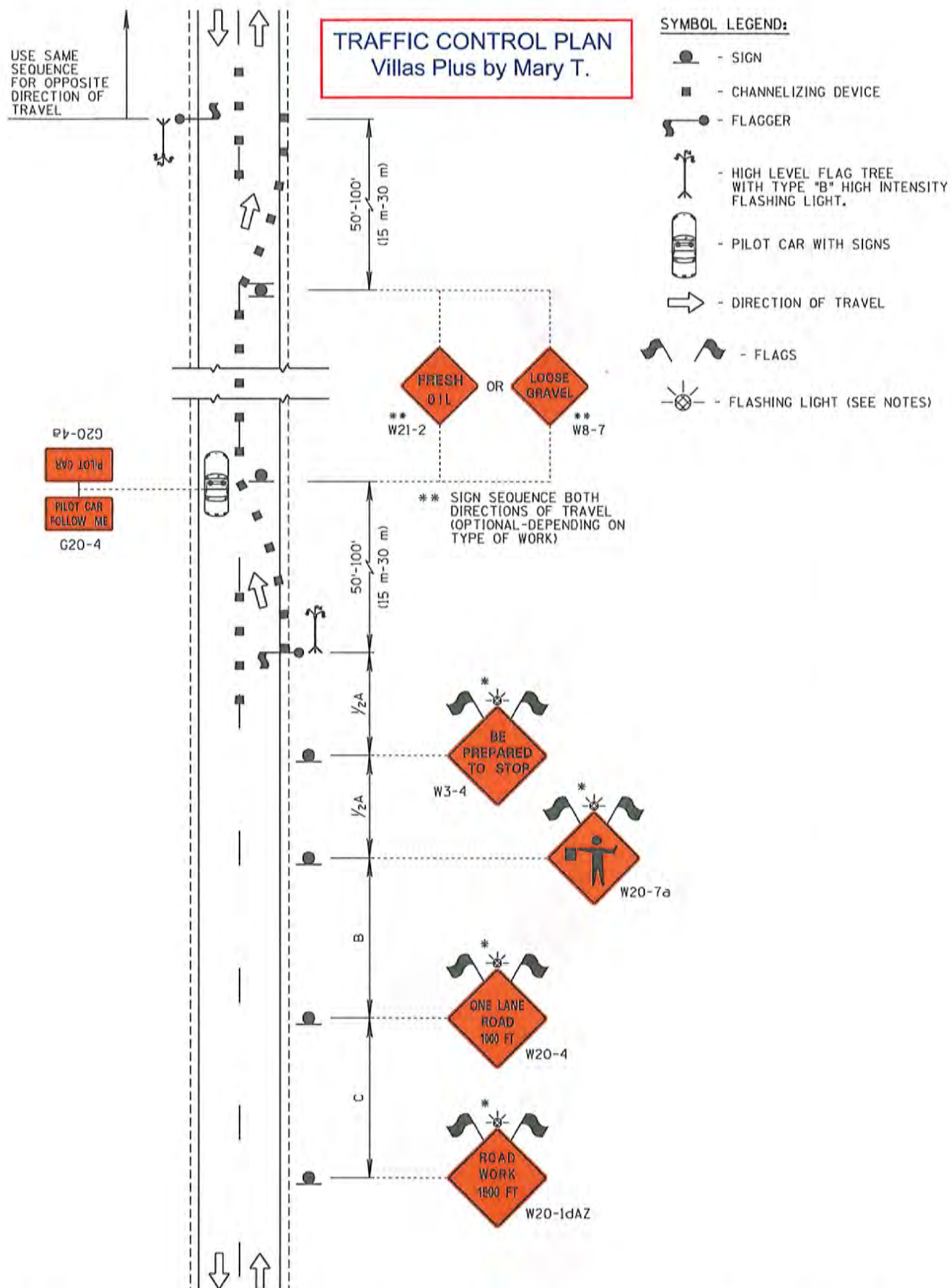
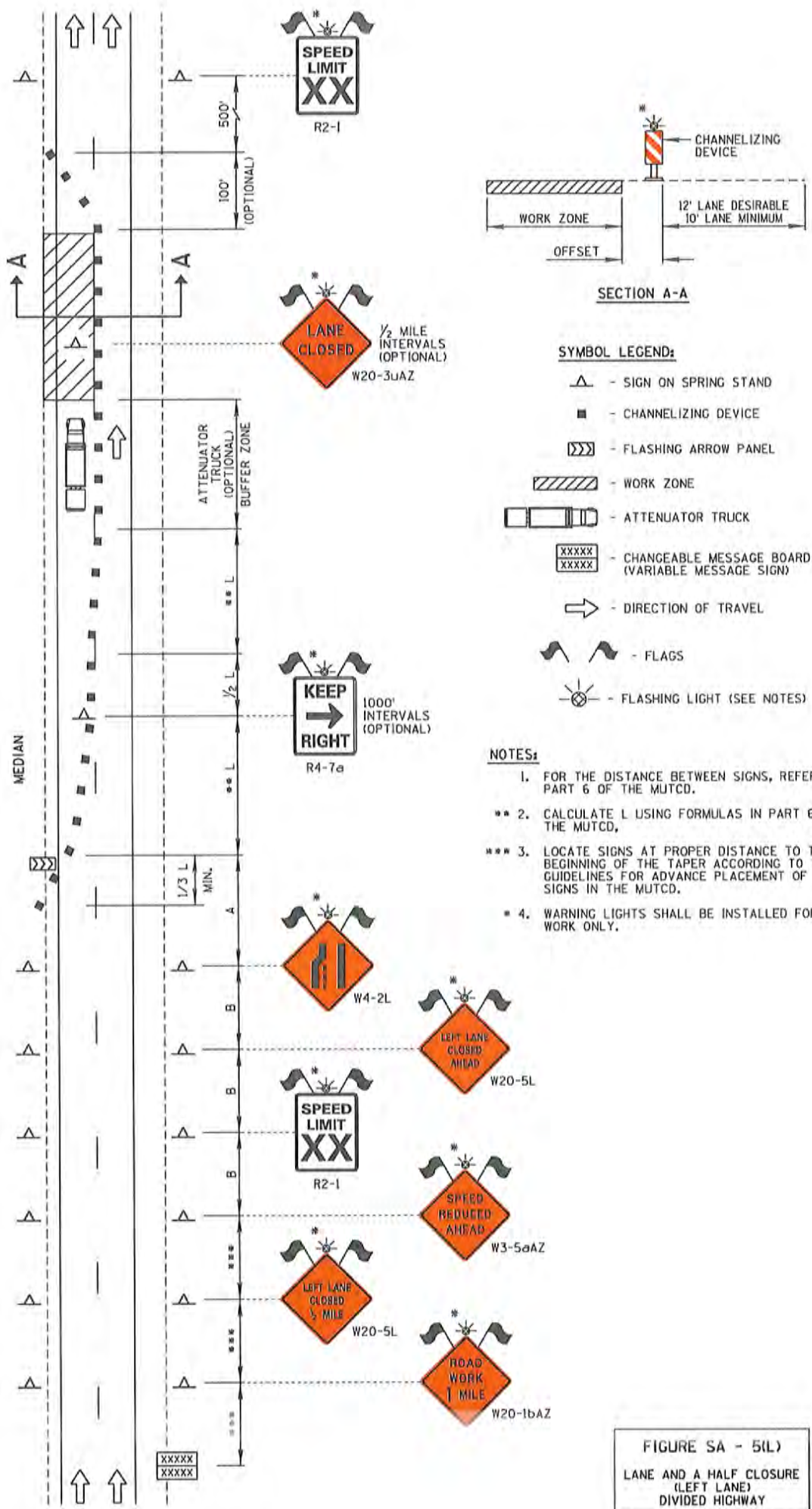


FIGURE SA - 3

ONE LANE CLOSURE OF
A TWO-WAY ROADWAY
UTILIZING PILOT CAR



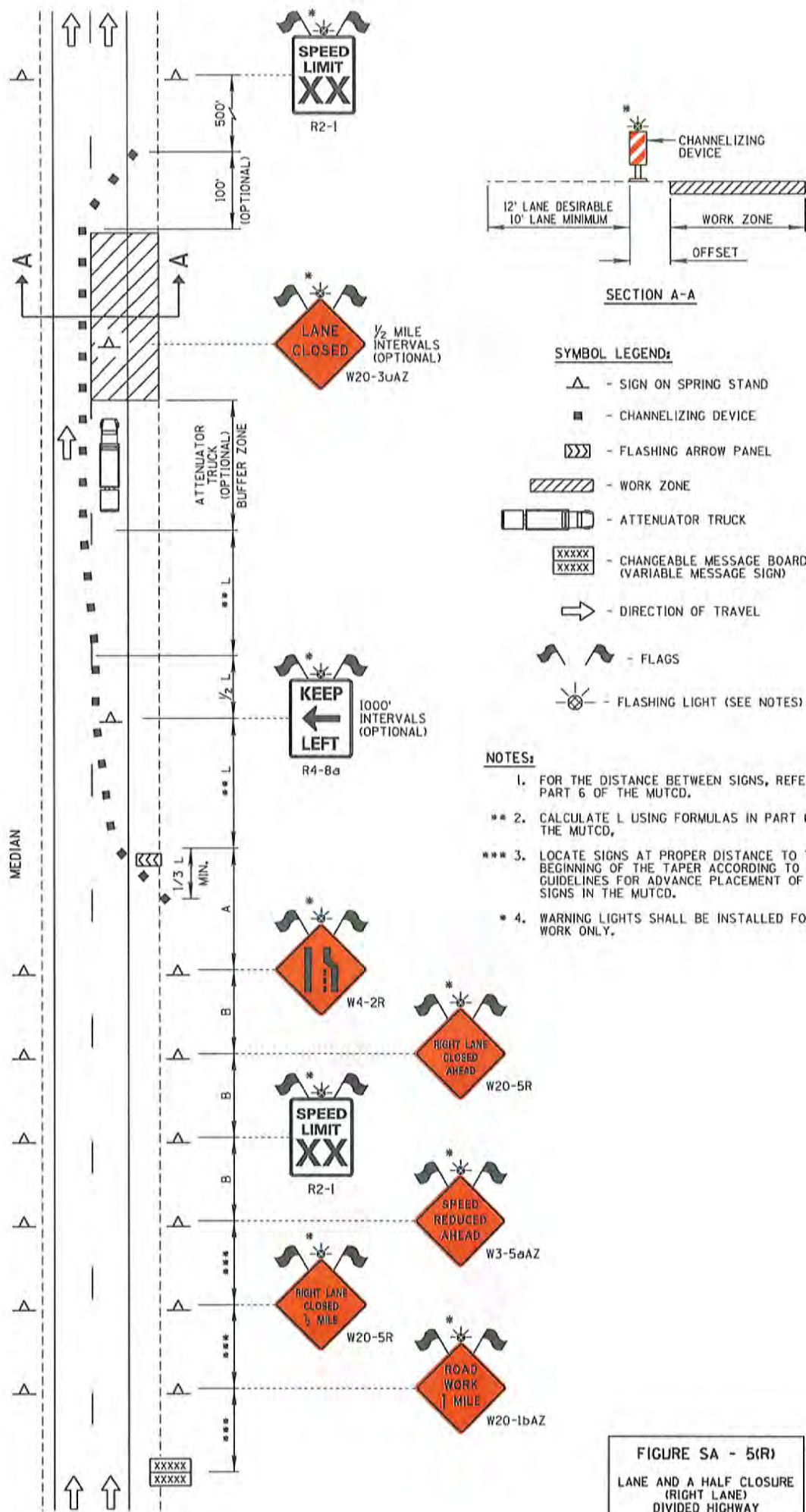
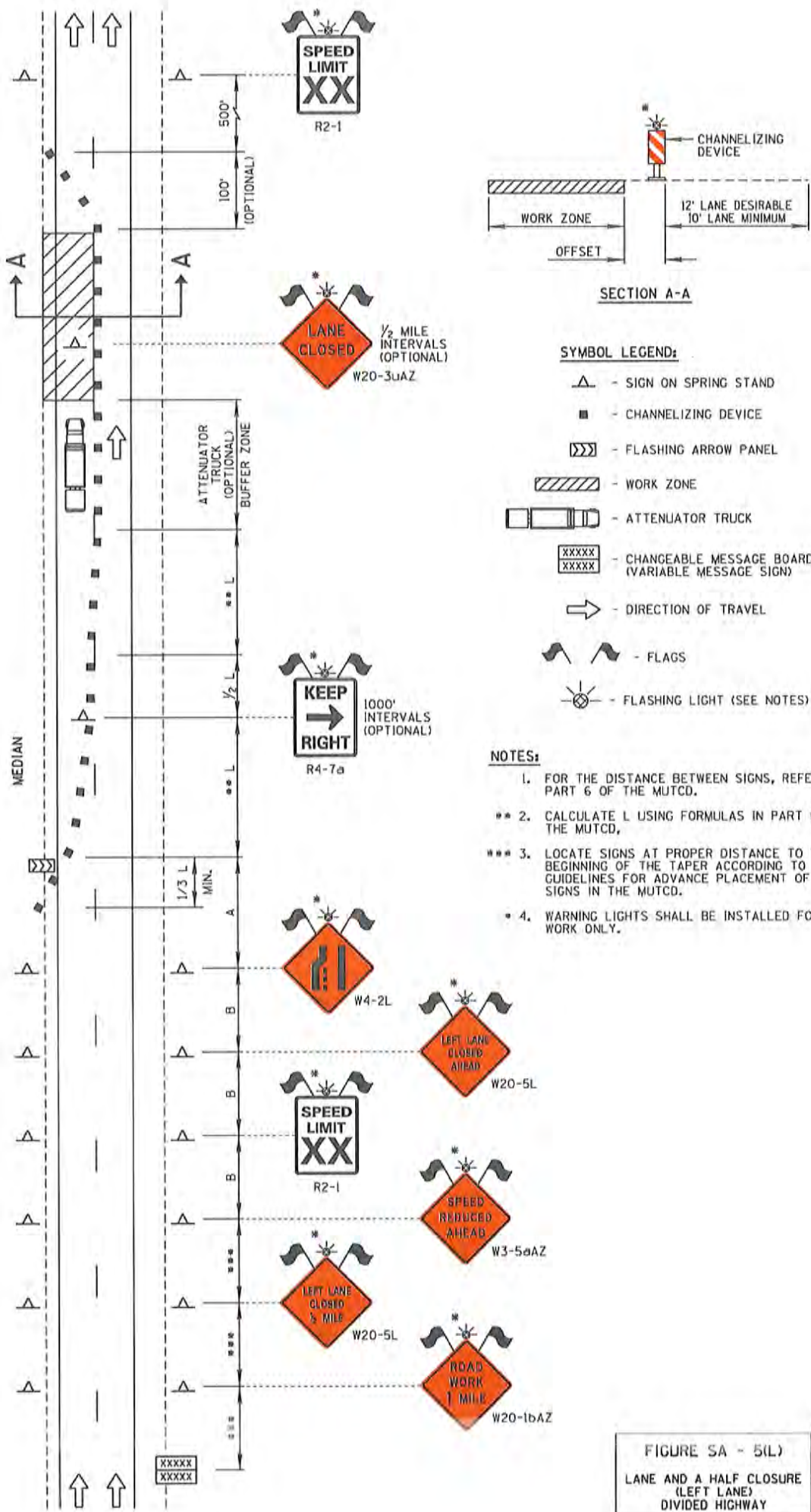
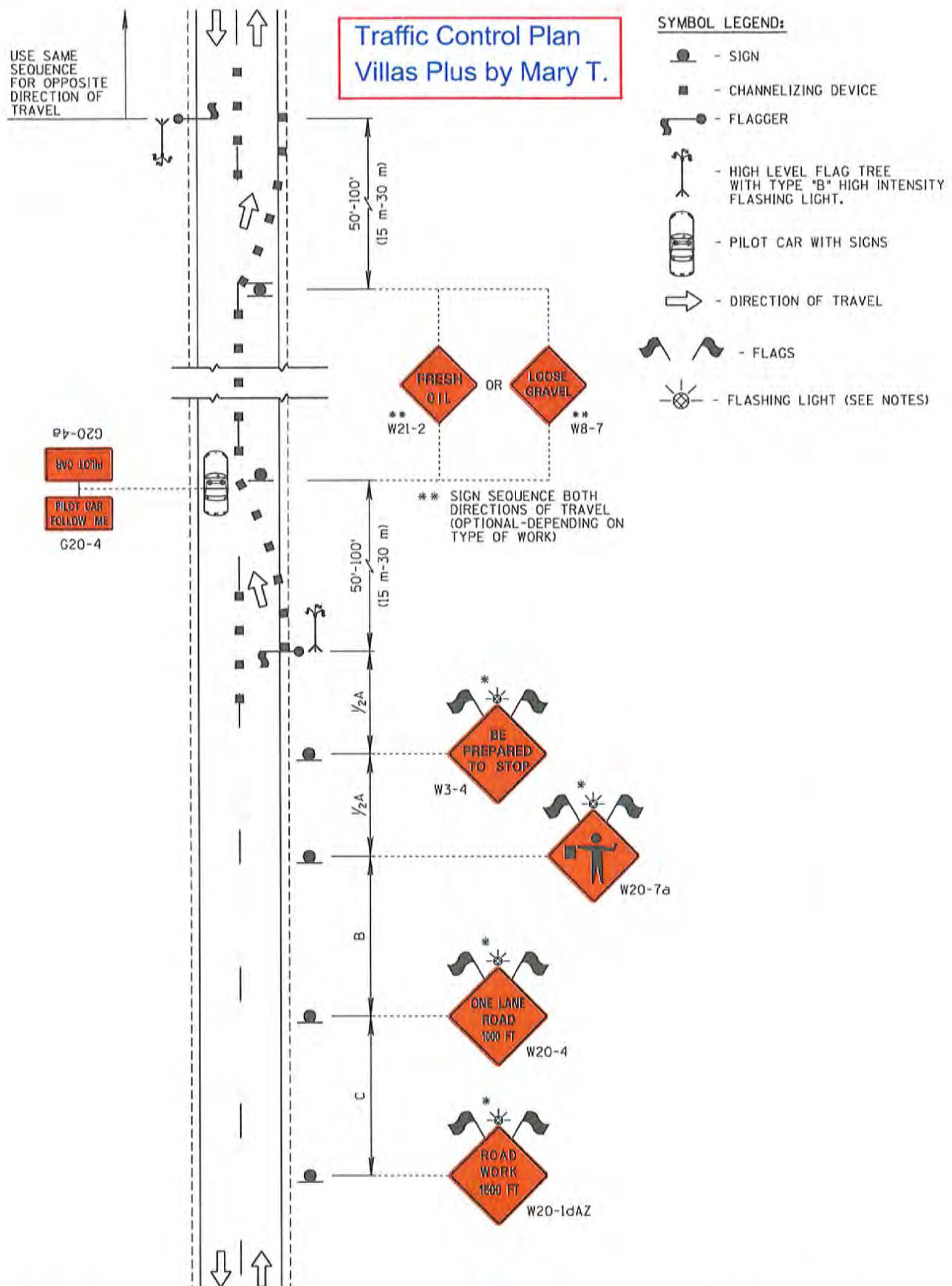


FIGURE SA - 5(R)

**LANE AND A HALF CLOSURE
(RIGHT LANE)
DIVIDED HIGHWAY**





NOTES:

1. FOR THE DISTANCE BETWEEN SIGNS, REFER TO PART 6 OF THE MUTCD.
- * 2. WARNING LIGHTS ARE TO BE INSTALLED FOR NIGHT WORK ONLY.

FIGURE SA - 3

ONE LANE CLOSURE OF
A TWO-WAY ROADWAY
UTILIZING PILOT CAR

CITY OF CASA GRANDE - ENGINEERING COST ESTIMATE

Project Name: Villas Plus by Mary T

Computed By: Paul Mogle

Date: 25-Oct-18

CONSTRUCTION COSTS:

ITEM	UNIT	COST	QUANTITY	COST
GRADING PERMIT				
Cut/Fill	CY	\$4.00	6,097	\$24,388.00
Graded Channels	LF	\$5.00	735	\$3,675.00
Guniting Ditch (2" Thick)	SY	\$10.00	0	\$0.00
Spillway	SF	\$6.00	453	\$2,718.00
Concrete Headwalls	EA	\$4,134.00	2	\$8,268.00
6" Pipe Culvert	LF	\$18.00	0	\$0.00
12" Pipe Culvert	LF	\$32.00	315	\$10,080.00
15" Pipe Culvert	LF	\$34.00	0	\$0.00
18" Pipe Culvert	LF	\$36.00	885	\$31,860.00
24" Pipe Culvert	LF	\$42.00	0	\$0.00
Precast Safety Curb	EA	\$200.00	1	\$200.00
2" Curb Cut	EA	\$350.00	1	\$350.00
Storm Drain Manhole	EA	\$7,500.00	3	\$22,500.00
Nyoplast Drain with Grate	EA	\$1,200.00	1	\$1,200.00
Catch Basin Type E	EA	\$2,500.00	0	\$0.00
Catch Basin Type F	EA	\$3,200.00	11	\$35,200.00
Concrete Box Culvert Deck	SF	\$75.00	972	\$72,900.00
Retention Areas	CF	\$0.50	63,276	\$31,638.00
Drywells	Ea	\$8,500.00	3	\$25,500.00
SECTION TOTAL		0.00		\$270,477.00

4% of grading \$10,819.08

SEWER PERMIT

4" Sewer Pipe	LF	\$26.00	144	\$3,744.00
6" Sewer Pipe	LF	\$28.00	160	\$4,480.00
8" Sewer Pipe	LF	\$30.00	1,053	\$31,590.00
10" Sewer Pipe	LF	\$32.00	0	\$0.00
12" Sewer Pipe	LF	\$34.00	0	\$0.00
15" Sewer Pipe	LF	\$36.00	0	\$0.00
4' Diameter Manhole	EA	\$4,500.00	6	\$27,000.00
5' Diameter Manhole	EA	\$6,000.00	0	\$0.00
Concrete Casement	LF	\$35.00	0	\$0.00
Cleanouts	EA	\$750.00	5	\$3,750.00
Adjust Sewer C.O. to Grade	EA	\$150.00	5	\$750.00
Adjust Manhole to Grade	EA	\$300.00	6	\$1,800.00
SECTION TOTAL				\$73,114.00

4% of sewer \$2,924.56

ITEM	UNIT	COST	QUANTITY	COST
PAVING PERMIT				
2" A.C. / 6" C.A.B.	SY	\$21.50	6,930	\$148,995.00
3" A.C. / 6" C.A.B.	SY	\$24.00	1,840	\$44,160.00
4" A.C. / 12" A.B.C.	SY	\$26.50	0	\$0.00
Each additional inch of A.C.	SY	\$2.50	0	\$0.00
Each additional inch of C.A.B.	SY	\$0.50	0	\$0.00
6" Vertical Curb & Gutter	LF	\$16.00	4,530	\$72,480.00
Vertical Curb and Gutter	LF	\$16.00	8,689	\$139,024.00
4" Thick Concrete Sidewalk	SF	\$6.00	20,847	\$125,082.00
Concrete Valley Gutter	SF	\$35.00	140	\$4,900.00
Concrete Aprons	SF	\$10.00	0	\$0.00
Driveway or Alley Entrance	SF	\$8.00	710	\$5,680.00
Street Sign / Stop Sign	EA	\$200.00	0	\$0.00
End of Roadway Marker	EA	\$100.00	0	\$0.00
Handicap Ramp	EA	\$2,500.00	16	\$40,000.00
Barricade	LF	\$40.00	0	\$0.00
Survey Monument (Type A)	EA	\$1,500.00	0	\$0.00
Survey Monument (Type B)	EA	\$1,500.00	0	\$0.00
Pavement Replace (t-top)	SY	\$30.00	1,200	\$36,000.00
Pavement Striping	LF	\$1.50	600	\$900.00

SECTION TOTAL

\$617,221.00

4% of paving \$24,688.84

UTILITY PERMIT

Utility Trenching	LF	\$4.00	7,659	\$30,636.00
Streetlights	EA	\$2,000.00	0	\$0.00
Adjust valve to grade	EA	\$200.00	8	\$1,600.00
SECTION TOTAL				\$32,236.00

4% of utility \$1,289.44

MISCELLANEOUS PERMIT

Water	Lump Sum	#####	1	\$125,000.00
Trash & Garbage Enclosures	SF	\$20.00	240	\$4,800.00
SECTION TOTAL				\$129,800.00

4% of misc. \$5,192.00

TOTAL COSTS

Additional costs from Engineer's Estimate				\$0.00
TOTAL CONSTRUCTION COSTS				\$993,048.00
TOTAL CONSTRUCTION COST (BOND AMOUNT)				\$1,122,848.00

ENGINEERING FEES:

Inspection Fees: 4% of Construction Costs (Excluding Landscaping)				\$39,721.92
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TOTAL ENGINEERING FEES:

\$39,721.92

101.1.3415.000.436