CIRCULATION MASTER PLAN

FOR

McDOWELL MOUNTAIN BACK BOWL

May 12, 2005

WP #042054 10

Prepared for

Crown Community Development

Ms Teri Frankiewicz

3600 Thayer Court, Suite 100

Aurora, Illinois 60504

Phone (630) 851-5490

Fax (630) 898-0480

Prepared by

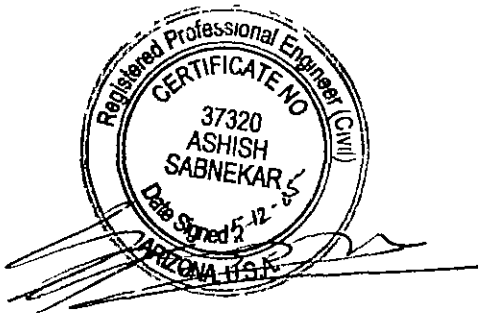
Wood, Patel & Associates, Inc

2051 West Northern Avenue, Suite 100

Phoenix, Arizona 85021

Phone (602) 335-8500

Fax (602) 335-8580



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1 0 INTRODUCTION

1 1 Report Purpose and Objectives

Wood, Patel and Associates, Inc (Wood/Patel) has been retained by Crown Community Development to prepare a Master Circulation Plan of a 330+/- acre proposed residential development located on the northwest corner of the 128th Street / Pinnacle Peak Road alignment in Scottsdale, Arizona, as shown in Exhibit 1 This report describes the proposed McDowell Mountain Back Bowl (herein referred to as Back Bowl) development and summarizes its impact on the adjacent street network

The purpose of this study is to address traffic impacts of the Back Bowl within the study area at full site build-out and discuss roadway circulation issues associated with Back Bowl and other surrounding developments The objectives of the study are as follows

- Collect data related to roadway geometry and intersections control at facilities in the vicinity of the site,
- Estimate projected traffic at the study intersection of Alameda Road / Happy Valley Road based on existing traffic counts and projected traffic from Back Bowl and other developments in the vicinity,
- Perform capacity analysis at the study intersection at full site build-out and recommend any appropriate improvements at the intersection,
- Provide right-of-way dedications and cross-sections for roadways within and adjacent to the proposed development,
- Discuss access to adjacent properties,
- Summarize roadway alignments to be abandoned as part of the proposed development,

The study area in this analysis is the intersection of Alameda Road / Happy Valley Road and the segment of Alameda Road east of Happy Valley Road, which will serve as the primary access to the Back Bowl and other adjacent developments considered here The study area is shown in Exhibit 2

1 2 Executive Summary

McDowell Mountain Back Bowl is a gated custom home development located on the northwest corner of 128th Street / Pinnacle Peak Road alignment in Scottsdale, Arizona The 330+/- acre site is planned to have 122 dwelling units

The study area for this development was to include the Happy Valley Road / Alameda Road intersection and the segment of Alameda Road from Happy Valley Road to 122nd Street Based on the information in the site plan and the trip generation rates in the Institute of Transportation Engineers' Trip Generation Manual, it is estimated that at full build-out, the site will generate 1,157 trips of which 91 trips will occur during the AM peak hour and 122 trips will occur during the PM peak hour Background traffic counts were collected at the study intersection and traffic from proposed adjacent developments was also considered in the analysis

Analysis indicates that at full build-out, all movements at the study intersection are anticipated to operate at a Level of Service "B" or better during the peak hours Further, the two-lane study segment of Alameda Road which has a capacity of up to 15,000 vehicles per day is anticipated to carry 4,800 vehicles per day Therefore, no capacity improvements are required within the study area to accommodate the site-generated traffic Construction traffic will be required to utilize 128th Street to access the site

In addition, as part of the Back Bowl development, several existing roadway easements will be abandoned and new rights-of-way will be dedicated The following roadway easement abandonments are proposed as a part of the Back Bowl project

- A 55-foot easement along the Happy Valley Road alignment from the eastern edge of the Sonoran Crest Development up to the 126th Street alignment,
- A 40-foot east-west easement from 122nd Street to the 126th Street alignment between the Happy Valley Road alignment and Alameda Road,
- A 40-foot easement along Alameda Road from 122nd Street to the 126th Street alignment,
- A 40-foot easement along Mariposa Grande Drive from 122nd Street to the 128th Street alignment,

- A 55-foot easement along Pinnacle Peak Road between 122nd Street and the 124th Street alignment, and between the 126th Street alignment and 128th street,
- A 30-foot easement along 122nd Street between the northern property line and the Pinnacle Peak Road alignment,
- A 40-foot easement along the 124th Street alignment between the Happy Valley Road and Pinnacle Peak Road alignments,
- A 30-foot easement along the 126th Street alignment between the Happy Valley Road and Pinnacle Peak Road alignments, and,
- A 55-foot easement along 128th Street between Mariposa Grande Drive and the Pinnacle Peak Road alignment

Additionally, new rights-of-way will be dedicated as listed below

- A 60-foot right-of-way for a minor collector along Alameda Road,
- A 30-foot right-of-way (east half-street) for a minor collector along 122nd Street between Alameda Road and the Pinnacle Peak Road alignment,
- A 30-foot right-of-way (west half-street) for a minor collector along 128th Street between Mariposa Grande Drive and the Pinnacle Peak Road alignment,
- A 38-foot right-of-way for all local residential streets within the development,
- A potential 30-foot right-of-way (north half-street) along the Pinnacle Peak Road alignment between 122nd Street and the 124th Street alignment,
- A potential 30-foot right-of-way (south half-street) along Mariposa Grande Drive between 128th Street and the cul-de-sac road,
- A potential 30-foot right-of-way (west half-street) along the 126th Street alignment from 1,320 feet south of Happy Valley Road south for a distance of 390 feet

Sidewalks, bicycle lanes and transit stops are not required within the proposed development, and will not be constructed as part of the Back Bowl However, a multi-use trail system having public and private trails will be constructed to support non-motorized transportation

2 0 PROPOSED DEVELOPMENT

2 1 Project Description

The Back Bowl, shown earlier in Exhibits 1 and 2, is located at the eastern edge of the City of Scottsdale, Maricopa County, Arizona, within a portion of Section 11, Township 4 North, Range 5 East The site is currently an assemblage of undeveloped parcels bound to the west by the existing Sonoran Crest Development (122nd Street alignment), to the east by the 128th Street alignment, to the north by the Happy Valley Road alignment, and to the south by the McDowell Mountain Sonoran Preserve Access to the development is planned from the west via the ½ -mile section roadway, Alameda Road

The Back Bowl is a 330+/- acre residential custom lot sub-division, nestled at the northern base of the McDowell Mountains The development, shown in Exhibit 3, is planned in four (4) phases and includes approximately 122 lots ranging in size from 2 to 3 acres and a Clubhouse with amenities such as jacuzzis, pools, water falls, and restaurant facilities Interpretive trails and scattered pocket parks with water features will also be incorporated into the site plan

Crown Community Development has considered expanding the Back Bowl to approximately 400 acres which would include the acquisition of the 40-acre parcel located at the northeast ¼ of Section 11, four (4) 2 5-acre parcels located at the northeast boundary of Sonoran Crest, and the 30-acre parcel located in the middle of the southern ½ portion of Section 11

2 2 Adjacent Land Use

Adjacent parcels that are anticipated to access the regional roadway network using Alameda Road were considered in the study These developments, as shown earlier in Exhibit 2, include 280 +/- acres of the Recorp Property that has parcels to the east and west of the site, 364 +/- acres of state land to the north of the site and 454 +/- acres of other land primarily to the east of the site

2.3 Site Access

The Back Bowl site will be primarily accessed form its western boundary using Alameda Road via Happy Valley Road This will also serve as the emergency access route The site can also be accessed from 128th Drive via Rio Verde Drive (Dynamite Boulevard) from its eastern boundary

3.0 EXISTING CONDITIONS

3.1 Existing Roadway Geometry and Intersection Control

The major roadway facilities connecting the site to the regional roadway network are Happy Valley Road, Alameda Road, Rio Verde Drive (Dynamite Boulevard) and 128th Street. These facilities are described below and shown in Exhibit 4.

Happy Valley Road is an east-west minor arterial providing connectivity to/from the west. East of Alma School Road, Happy Valley Road is a fully improved 4-lane divided facility, with two lanes in each direction, curb and gutter on both north and south sides, and a posted speed limit of 40 mph. West of Alma School Road, it is 2-lane undivided facility without curb and gutter and a posted speed limit of 50 mph.

Alameda Road branches off as a minor collector east from Happy Valley Road, and extends approximately 300 feet east of 121st Place up to the western boundary of the site. It is a 2-lane undivided facility, with curb and gutter on both north and south sides and a posted speed limit of 30 mph.

Rio Verde Drive is an east-west major arterial approximately two miles north of the site's northern boundary. It provides regional connectivity to the site through 128th Street. West of the 116th Street alignment, Rio Verde Drive is a 4-lane divided facility with two lanes in each direction. The north and south sides have wide unpaved shoulders without curb and gutter, and a sidewalk on both sides past the shoulders. East of 116th Street alignment, it is a 2-lane undivided facility with a posted speed limit of 50 mph.

128th Street is a north-south unpaved facility, which provides connectivity between Rio Verde Drive and the eastern boundary of the site. This two-mile unpaved segment of 128th Street varies in width from 22 and 24 feet.

Happy Valley Road / Alameda Road is an unsignalized intersection with stop control on Alameda Road. The east leg of the intersection along Happy Valley Road has one left turn lane, one through lane, and one shared through-right turn lane. The west leg has one left turn lane, two through lanes, and one right turn lane whereas, the south leg along

Alameda Road has one shared left-through-right lane The north leg of the intersection falls along the 115th Street alignment and has a lane configuration matching the south leg

Rio Verde Drive / 128th Street is a T-Intersection with stop control along 128th Street for northbound movements The east leg along Rio Verde Drive has one shared through-left lane and the west leg has one shared through-right lane The unpaved south leg of the intersection along 128th Street operates as one shared left-through-right lane

3 2 Existing Traffic Data

Traffic data was collected at the Happy Valley Road / Alameda Road intersection on March 30, 2005 by Traffic Research and Analysis, Inc Turning movement counts were collected during the AM peak period of 7 00 AM to 9 00 PM and a PM peak period of 4 00 PM to 6 00 PM 24-hour tube counts were also collected at all four legs of the intersection The detailed traffic counts are shown in Appendix A and summarized in Exhibit 5

4 0 PROJECTED TRAFFIC

4 1 Projected Site Traffic

Trip Generation A generally accepted method of calculating trip generation rates for a proposed development is to use regression equations and/or average rates developed by the Institute of *Transportation Engineers (ITE) through the compilation of field data collected at sites throughout the United States*

The total trip generation potential for the 122 dwelling units in Back Bowl was calculated based on the average trip rates presented in the 7th Edition of ITE's Trip Generation Manual and is shown in detail in Exhibit 6 Analysis indicates that the development will generate an estimated 1,157 daily trips of which 91 trips will occur during the AM peak period and 122 trips will occur during the PM peak period

Trip Distribution Based on comments received from the City of Scottsdale, it is assumed that 100% of the traffic generated by Back Bowl will access the regional roadway network using Alameda Road

Site Traffic Assignment It was assumed that the traffic exiting the site would use Alameda Road to go west on Happy Valley Road, whereas the inbound traffic would go east on Happy Valley Road and south on Alameda Road to enter the site No site traffic was assigned to 128th Street (via Rio Verde Drive) AM and PM peak turning movements for site traffic, at the Happy Valley Road / Alameda Road intersection, are shown in Exhibit 7a

4.2 Projected Non-site Traffic (from Adjacent Developments)

As shown in the study area in Exhibit 2, non-site traffic is comprised of traffic from the Recorp Property, state land, other adjacent developments Assuming the existing zoning density of 0 31 dwelling units per acre for these areas, the Recorp Property will have 87 dwelling units, State Land will have 113 dwelling units and other adjacent properties will have 150 dwelling units

Based on ITE Trip Generation rates, the Recorp Property will generate 831 daily trips (65 AM peak, 88 PM peak), State Land will generate 1,078 daily trips (84 AM peak, 114 PM peak) and other adjacent developments will generate 1,435 daily trips (112 AM peak, 151 PM peak) It is further assumed that 80% of the traffic from the Recorp Property and other adjacent properties will use Alameda Road, whereas 25% of the traffic from the State Land will use Alameda Road AM and PM peak turning movements for non-site traffic, at the Happy Valley Road / Alameda Road intersection, are shown in Exhibit 7b

4 3 Total Traffic

Total traffic at the Happy Valley Road / Alameda Road intersection was computed by adding the background traffic presented in Exhibit 4, and the site and non-site traffic presented in Exhibits 5a and 5b, respectively Results of this effort are presented in Exhibit 7c

5 0 CAPACITY ANALYSIS

5 1 Traffic Control

Full build-out traffic operations at the Happy Valley Road / Alameda Road intersection were evaluated based on projected total traffic presented in Exhibit 7c Based on site conditions and projected traffic volumes, it is assumed that this intersection will continue to operate with two-way stop control, with stops along Alameda Road (115th Street)

5 2 Level of Service

The level of service (LOS) of an intersection is a measure of vehicular delay, and is evaluated based on the traffic volumes and composition, intersection control and roadway geometrics The methodology for determining LOS is based on the Highway Capacity Manual (HCM), 2000 Edition The level of service, as outlined in HCM, is reported as a letter designation of LOS A through LOS F, where A indicates minimal delay and F denotes substantial delay In this study, LOS analysis for the unsignalized intersection was done using the Highway Capacity Software (HCS 2000) by McTrans-University of Florida Results of this effort are summarized in the table below and the detailed output for the unsignalized intersection analysis is given in Appendix B

Full Build-out LOS Analysis at Happy Valley Road / Alameda Road

Movement	Street	Delay	Level of Service	
			AM	PM
Eastbound Left	From Happy Valley Road	7 4 sec / veh	A	A
Westbound Left	From Happy Valley Road	7 4 sec / veh	A	A
Northbound Approach	From Alameda Road	11 3 sec / veh	B	B
Southbound Approach	From 115th Street	8 8 sec / veh	A	A

Results of the analysis indicate that at full site build-out, all movements at the intersection of Happy Valley Road / Alameda Road operate at a LOS "B" or better during the AM and PM peak hours No additional capacity improvements are therefore recommended to accommodate the site traffic Also, no capacity evaluation were done at intersections within the site as all such intersections are expected to operate at LOS "A" during the AM and PM peak hours given the low density of residential units in the Back Bowl development

6.0 VEHICULAR CIRCULATION ELEMENTS

6 1 Roadway Circulation Plan and Cross-sections

Roadway circulation was planned in order to best serve and connect the various residential units to the regional roadway network The proposed Roadway Circulation Plan shown in Exhibit 8, and the corresponding proposed cross-sections shown in Exhibit 9, were developed based on criteria outlined in the City of Scottsdale's *Design Guidelines and Policies for Environmentally Sensitive Lands* for Hillside development

Alameda Road within the site boundaries, from 122nd Street to 126th Street is a Minor Collector based on its classification in City of Scottsdale's *Streets Master Plan* (2003) All other roads within Back Bowl which will connect the residential units to the main entry point on Alameda Road are planned as Local Residential Streets Half-street improvements along 128th Street between Mariposa Grande Drive and Pinnacle Peak Road may not be completed as part of the Back Bowl project as they are not needed to support the development Construction access will be improved along 128th Street from Rio Verde Drive to 1,320 feet south of the Happy Valley Road alignment

6 2 Easement Abandonments and Right-of-way Dedications

All existing roadway and utility easements within the Back Bowl development are abandoned as a part of this project Roadway easement abandonments proposed as a part of the *Back Bowl* project are shown in Exhibit 10 and listed below

- A 55-foot easement along the Happy Valley Road alignment from the eastern edge of the Sonoran Crest Development up to the 126th Street alignment,
- A 40-foot east-west easement from 122nd Street to the 126th Street alignment between the Happy Valley Road alignment and Alameda Road,
- A 40-foot easement along Alameda Road from 122nd Street to the 126th Street alignment,
- A 40-foot easement along Mariposa Grande Drive from 122nd Street to the 128th Street alignment,
- A 55-foot easement along Pinnacle Peak Road between 122nd Street and the 124th Street alignment, and between the 126th Street alignment and 128th street,

- A 30-foot easement along 122nd Street between the northern property line and the Pinnacle Peak Road alignment,
- A 40-foot easement along the 124th Street alignment between the Happy Valley Road and Pinnacle Peak Road alignments,
- A 30-foot easement along the 126th Street alignment between the Happy Valley Road and Pinnacle Peak Road alignments, and,
- A 55' easement along 128th Street between Mariposa Grande Drive and the Pinnacle Peak Road alignment

In addition to the easement abandonments described above, new rights-of-way will be dedicated These right-of-way dedications are presented in Exhibit 11 and listed below

- A 60-foot right-of-way for a minor collector along Alameda Road,
- A 30-foot right-of-way (east half-street) for a minor collector along 122nd Street between Alameda Road and the Pinnacle Peak Road alignment,
- A 30-foot right-of-way (west half-street) for a minor collector along 128th Street between Mariposa Grande Drive and the Pinnacle Peak Road alignment,
- A 38-foot right-of-way for all local residential streets within the development

Additionally, right-of-way will be provided, if required, for the following locations The *Back Bowl* project will be phased as shown on exhibits Final plats will be phased similarly An update to the Circulation Master Plan will be completed as part of each future phase to determine if these right-of-way requirements are still required as a result of development occurring on the adjacent parcels

- A potential 30-foot right-of-way (north half-street) along the Pinnacle Peak Road alignment between 122nd Street and the 124th Street alignment,
- A potential 30-foot right-of-way (south half-street) along Mariposa Grande Drive between 128th Street and the cul-de-sac road,
- A potential 30-foot right-of-way (west half-street) along the 126th Street alignment from 1,320 feet south of Happy Valley Road south for a distance of 390 feet

6 3 Access to Adjacent Developments

External access to adjacent developments (shown in Exhibit 12 as Parcels 1 through 13) within the study area is anticipated using the surrounding roadway network and through internal connections between these developments

Access to Parcel 1 is anticipated using 122nd Street Access to Parcel 2 is anticipated through the development to its northwest using Casitas Del Rio Drive Access to Parcels 3, 4, and 5 is also anticipated using Casitas Del Rio Drive through internal connections within these parcels, whereas access to Parcel 6 will be provided through the *Back Bowl* development Access using Pinnacle Peak Road is not anticipated for these parcels, primarily due to topographic challenges The Preliminary Plat for Parcel 1 has not indicated right-of-way provision along the Pinnacle Peak roadway alignment, due to this topographic challenge

Access to Parcel 7 will be provided through the northwestern portion of the *Back Bowl* property Access to Parcels 8 and 11 is anticipated using 128th Street north of Back Bowl's right-of way and to Parcels 9 and 10 using Alameda Road It should be noted that planned development of 122nd Street is planned entirely outside of the Back Bowl's right-of-way Access to Parcel 12 will be potentially provided through the Back Bowl development north of Alameda Road along the eastern property line Further, access to parcel 13 is anticipated through the cul-de-sac entrance on Mariposa Grande Drive

6 4 Intersection Improvements

As mentioned in earlier sections of this report, the Happy Valley Road / Alameda Road intersection will be the primary access point to the Back Bowl development However, due to the satisfactory traffic operation of this intersection during the AM and PM peak hours, no additional improvements are recommended to accommodate the site traffic

6 5 Auxiliary Lanes

6 5.1 Left Turn Lanes

The need for a northbound left turn lane at Happy Valley Road / Alameda Road was assessed using guidelines for left-turn lanes on two-lane roadways as outlined in A Policy on Geometric Design of Highways and Streets published by the American Association of State Highway and Transportation Officials in

2004 These guidelines are based on peak-hour traffic volumes (opposing and advancing volumes) and the percentage of left turns at the intersection Based on AASHTO criteria, an auxiliary left turn lane will not be needed for the northbound left turn at the intersection

6 5 2 Right Turn Lanes

The need for a right turn lane at an intersection depends on the speed of traffic on the road, the right turning volume and the through traffic volumes The City of Scottsdale currently requires that a right turn lane be provided where right turning vehicles exceed 30 vehicles per hour The Federal Highway Administration's Access Management for Streets and Highways provides the following minimum criteria for the provision of right turn deceleration lanes

- Greater than 10,000 vehicles per day on the major streets,
- Highway speed at least 35 mph,
- Greater than 1,000 vehicles per day on the minor street,
- At least 40 ingress right turns during the peak period

As there is already an eastbound right turn lane from Happy Valley Road on to Alameda Road, the need for a right turn deceleration lane was not assessed

7 0 NON-VEHICULAR CIRCULATION ELEMENTS

7 1 Sidewalks and Bicycle Lanes

According to the City of Scottsdale standards, sidewalks are optional in Environmentally Sensitive Lands (ESL) overlay area If sidewalks are provided, they may be on one or both sides of the roadway Currently, no sidewalks or bike lanes are planned within the community but a network of multi-use trails is planned as described in the following section

7 2 Multi-use Trails and Paths

Public and private multi-use trails are proposed as part of the *Back Bowl* development as shown in Exhibit 12 A public multi-use trail is planned on the south side of Alameda Road throughout the site from 122nd Street to the 126th Street alignment Apart from the public trail, a network of private multi-use trails is also planned to serve the residents of the community both north and south of Alameda Road These trails are anticipated to be a minimum of 8 feet wide and will primarily follow the alignment of the local residential streets within the community

APPENDIX A

Existing Traffic Counts

Turning Movement Count Report
05493a xls

Traffic Research Analysis, Inc
3844 East Indian School Road
Phoenix AZ 85018

Start Date 3/30/2005
Start Time 07 00 AM
Site Code 5080

Street Name	From North ALAMEDA RD				From East HAPPY VALLEY RD				From South ALAMEDA RD				From West HAPPY VALLEY RD				INTSEC	HOUR
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	TOTAL	TOTAL
7 00 AM	0	0	10	0	1	16	1	0	9	0	0	0	8	5	7	0	57	
7 15 AM	0	0	19	0	1	10	1	0	12	0	1	0	13	3	11	0	71	
7 30 AM	0	1	15	0	0	15	1	0	11	0	0	0	11	2	3	0	59	
7 45 AM	1	0	22	0	0	18	0	0	18	1	0	0	9	5	7	0	81	268
8 00 AM	0	0	17	0	1	14	0	0	17	1	1	0	13	1	9	0	74	285
8 15 AM	1	1	15	0	1	15	1	0	18	0	4	0	12	8	9	0	85	299
8 30 AM	0	0	16	0	1	12	0	0	8	1	0	0	9	6	12	0	65	305
8 45 AM	0	0	8	0	4	10	0	0	19	1	0	0	17	8	10	0	77	301
Approach Total	126				123				122				198				569	
Grand Total	2	2	122	0	9	110	4	0	112	4	6	0	92	38	68	0	569	
Approach %	1 6%	1 6%	96 8%	0 0%	7 3%	89 4%	3 3%	0 0%	91 8%	3 3%	4 9%	0 0%	46 5%	19 2%	34 3%	0 0%		
Total %	0 4%	0 4%	21 4%	0 0%	1 6%	19 3%	0 7%	0 0%	19 7%	0 7%	1 1%	0 0%	16 2%	6 7%	12 0%	0 0%		
Begin Peak Hour	**7 45**																	
Peak Interval	**8 15**																	
Peak Hour Vol	**2**	**1**	**70**	**0**	**3**	**59**	**1**	**0**	**61**	**3**	**5**	**0**	**43**	**20**	**37**	**0**	**305**	
Percent	0 7%	0 3%	23 0%	0 0%	1 0%	19 3%	0 3%	0 0%	20 0%	1 0%	1 6%	0 0%	14 1%	6 6%	12 1%	0 0%		
Intvl Vol	1	1	15	0	1	15	1	0	18	0	4	0	12	8	9	0	85	
Peak Factor																	**0 8971**	
High Interval	7 45				7 45				8 15				8 15					
High Intvl Vol	1	0	22	0	0	18	0	0	18	0	4	0	12	8	9	0		
Peak Factor				0 7935				0 8750				0 7841				0 8621		

Turning Movement Count Report
05493p xls

Traffic Research Analysis, Inc
3844 East Indian School Road
Phoenix, AZ 85018

Start Date 3/30/2005
Start Time 04 00 PM
Site Code 5080

Street Name	From North ALAMEDA RD				From East HAPPY VALLEY RD				From South ALAMEDA RD				From West HAPPY VALLEY RD				INTSEC	HOUR
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	TOTAL	TOTAL
4 00 PM	2	0	7	0	2	9	1	0	15	1	1	0	8	6	13	0	65	
4 15 PM	0	1	7	0	1	4	0	0	14	1	0	0	11	6	10	0	55	
4 30 PM	0	0	14	0	0	4	0	0	9	0	0	0	12	13	13	0	65	
4 45 PM	1	1	11	0	0	4	0	0	11	0	0	0	5	8	7	0	48	233
5 00 PM	0	0	7	0	0	5	0	0	5	0	3	0	15	17	8	0	60	228
5 15 PM	0	1	10	0	1	4	0	0	7	0	0	0	10	12	13	0	58	231
5 30 PM	0	0	8	0	0	6	0	0	12	2	0	0	15	9	19	0	71	237
5 45 PM	0	1	8	0	1	6	0	0	14	0	0	0	12	15	14	0	71	260
Approach Total	79				48				95				271				493	
Grand Total	3	4	72	0	5	42	1	0	87	4	4	0	88	86	97	0	493	
Approach %	3 8%	5 1%	91 1%	0 0%	10 4%	87 5%	2 1%	0 0%	91 6%	4 2%	4 2%	0 0%	32 5%	31 7%	35 8%	0 0%		
Total %	0 6%	0 8%	14 6%	0 0%	1 0%	8 5%	0 2%	0 0%	17 6%	0 8%	0 8%	0 0%	17 8%	17 4%	19 7%	0 0%		
Begin Peak Hour	**17 00**																	
Peak Interval	**17 30**																	
Peak Hour Vol	**0**	**2**	**33**	**0**	**2**	**21**	**0**	**0**	**38**	**2**	**3**	**0**	**52**	**53**	**54**	**0**	**260**	
Percent	0 0%	0 8%	12 7%	0 0%	0 8%	8 1%	0 0%	0 0%	14 6%	0 8%	1 2%	0 0%	20 0%	20 4%	20 8%	0 0%		
Intvl Vol	0	0	8	0	0	6	0	0	12	2	0	0	15	9	19	0	71	
Peak Factor																	**0 9155**	
High Interval	17 15				17 45				17 30				17 30					
High Intvl Vol	0	1	10	0	1	6	0	0	12	2	0	0	15	9	19	0		
Peak Factor				0 7955				0 8214				0 7679				0 9244		

Traffic Research and Analysis, Inc
3844 East Indian School Road
Phoenix, AZ 85018
(602) 840-1500

Site ID	File Name	Route	Location	Direction	Count Type	Count Dur	Start Date	Start Time	Avg Vol	AM PkHr	AM PkVol	AM PHF	PM PkHr	PM PkVol	PM PHF	Latitude	Longitude
1	0504750	HAPPY VALLEY RD	W of ALAMEDA RD/115TH ST	EB	VOL	24	3/30/2005	0 00	1945	8 15	149	0 8098	17 15	165	0 8967	33 7027	-111 8343
1	0504751	HAPPY VALLEY RD	W of ALAMEDA RD/115TH ST	WB	VOL	24	3/30/2005	0 00	1973	7 30	215	0 8669	14 30	159	0 9464	33 7027	-111 8343
2	0504753	HAPPY VALLEY RD	E of ALAMEDA RD/115TH ST	EB	VOL	24	3/30/2005	0 00	572	9 15	42	0 8750	17 00	53	0 6974	33 7071	-111 8316
2	0504752	HAPPY VALLEY RD	E of ALAMEDA RD/115TH ST	WB	VOL	24	3/30/2005	0 00	426	7 30	56	0 8235	14 15	33	0 8250	33 7071	111 8316
3	0504755	115TH ST	N of HAPPY VALLEY RD	NB	VOL	24	3/30/2005	0 00	721	8 45	68	0 8500	12 45	59	0 7375	33 7075	-111 8329
3	0504754	115TH ST	N of HAPPY VALLEY RD	SB	VOL	24	3/30/2005	0 00	723	7 15	79	0 7900	12 45	60	0 8333	33 7075	-111 8329
4	0504756	ALAMEDA RD	S of HAPPY VALLEY RD	NB	VOL	24	3/30/2005	0 00	775	9 15	77	0 8750	15 15	66	0 8684	33 7060	-111 8310
4	0504757	ALAMEDA RD	S of HAPPY VALLEY RD	SB	VOL	24	3/30/2005	0 00	769	8 15	55	0 8594	14 30	72	0 8182	33 7060	-111 8310

APPENDIX B

Level of Service Analysis

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Chintan J	Intersection	Happy Valley / Alameda
Agency/Co	Wood, Patel & Associates, Inc	Jurisdiction	City of Scottsdale
Date Performed	4/27/2005	Analysis Year	Build-out
Analysis Time Period	AM Peak		

Project Description McDowell Mountain Back Bowl - Traffic MP

East/West Street Happy Valley Road	North/South Street Alameda Road
Intersection Orientation East-West	Study Period (hrs) 0 25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	43	20	101	3	59	1
Peak-hour factor, PHF	1 00	1 00	1 00	1 00	1 00	1 00
Hourly Flow Rate (veh/h)	43	20	101	3	59	1
Proportion of heavy vehicles, P_{HV}	0	--	--	0	--	--
Median type	Raised curb					
RT Channelized?			0			0
Lanes	1	2	1	1	2	0
Configuration	L	T	R	L	T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	252	3	5	2	1	70
Peak-hour factor, PHF	1 00	1 00	1 00	1 00	1 00	1 00
Hourly Flow Rate (veh/h)	252	3	5	2	1	70
Proportion of heavy vehicles, P_{HV}	0	0	0	0	0	0
Percent grade (%)		0			0	
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
Volume, v (vph)	43	3		260			73	
Capacity, c_m (vph)	1556	1479		827			1030	
v/c ratio	0 03	0 00		0 31			0 07	
Queue length (95%)	0 09	0 01		1 35			0 23	
Control Delay (s/veh)	7 4	7 4		11 3			8 8	
LOS	A	A		B			A	
Approach delay (s/veh)	--	--	11 3			8 8		
Approach LOS	--	--	B			A		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Chintan J.*	Intersection	*Happy Valley / Alameda*
Agency/Co.	*Wood, Patel & Associates, Inc.*	Jurisdiction	*City of Scottsdale*
Date Performed	*4/27/2005*	Analysis Year	*Build-out*
Analysis Time Period	*PM Peak*		

Project Description *McDowell Mountain Back Bowl - Traffic MP*

East/West Street: *Happy Valley Road*	North/South Street: *Alameda Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*52*	*53*	*270*	*2*	*21*	*0*
Peak-hour factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate (veh/h)	*52*	*53*	*270*	*2*	*21*	*0*
Proportion of heavy vehicles, P_{HV}	*0*	--	--	*0*	--	--
Median type	*Raised curb*					
RT Channelized?			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*165*	*2*	*3*	*0*	*2*	*33*
Peak-hour factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate (veh/h)	*165*	*2*	*3*	*0*	*2*	*33*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
Volume, v (vph)	*52*	*2*		*170*			*35*	
Capacity, c_m (vph)	*1608*	*1248*		*791*			*1020*	
v/c ratio	*0.03*	*0.00*		*0.21*			*0.03*	
Queue length (95%)	*0.10*	*0.00*		*0.81*			*0.11*	
Control Delay (s/veh)	*7.3*	*7.9*		*10.8*			*8.7*	
LOS	*A*	*A*		*B*			*A*	
Approach delay (s/veh)	--	--	*10.8*			*8.7*		
Approach LOS	--	--	*B*			*A*		

EXHIBIT 1

Vicinity Map

WOOD/PATEL

McDowell Mountain Back Bowl

LEGEND

- Project Boundry
- Project Site
- McDowell Sonoran Preserve

2000 0 1000 2000

1 inch = 2000 ft

N

DYNAMITE ROAD

PINNACLE VISTA

JOMAX ROAD

YEARLING ROAD

HAPPY VALLEY ROAD

ALAMEDA ROAD

PINNACLE PEAK ROAD

PARAISO DRIVE

R5E

T4N

34 35 36

2 11 12

13 14 15

BOULDER MOUNTAIN

GRANITE RIDGE

UNDEVELOPED STATE LAND

SONORAN CREST

PROJECT SITE

UNDEVELOPED BY OTHERS

UNDEVELOPED BY OTHERS

TROON HIGHLAND ESTATES

ESTATES AT MIRAMONTE

PRELIMINARY

116TH STREET

120TH STREET

124TH STREET

128TH STREET

132ND STREET

136TH STREET

EXHIBIT 1

Vicinity Map

N \2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054-Vicinity Map dwg

EXHIBIT 2

Study Area

WOOD/PATEL **McDowell Mountain Back Bowl**

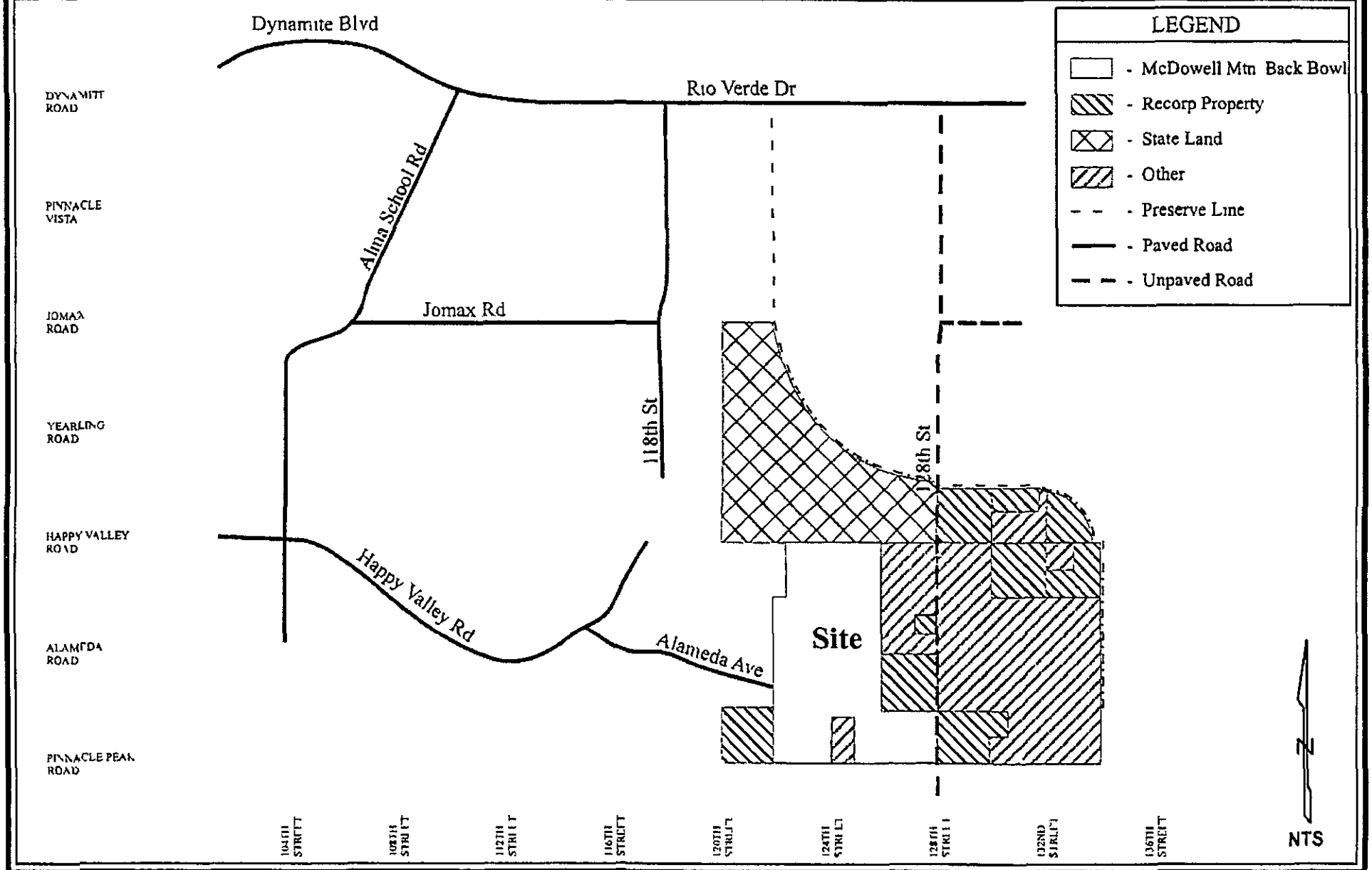

EXHIBIT 2 **Study Area**

EXHIBIT 3

Site Plan

WOOD/PATEL

McDowell Mountain Back Bowl

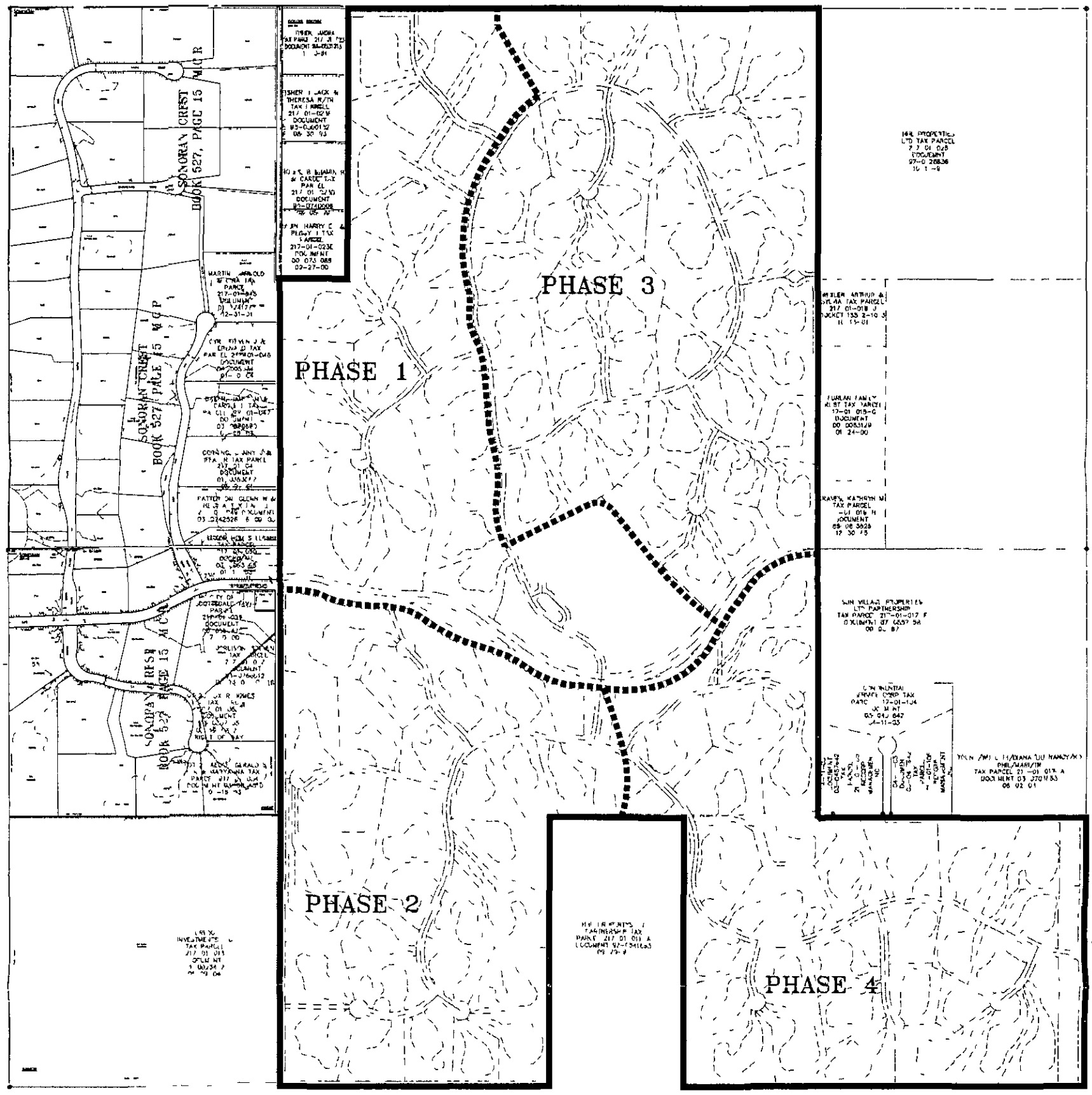

EXHIBIT 3

Site Plan

N \2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054-SITE-PLAN-EXH dwg

EXHIBIT 4

Existing Roadway Conditions

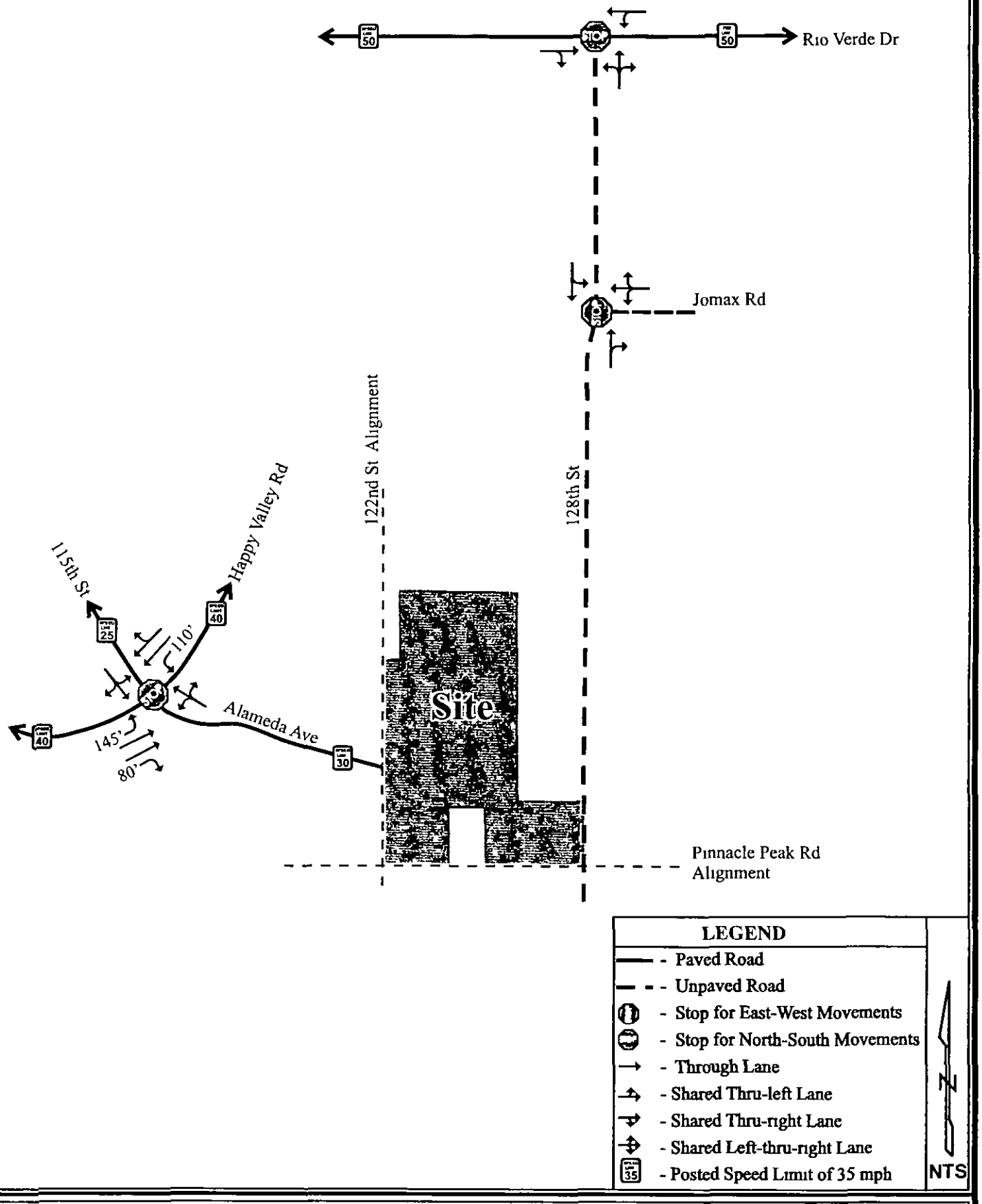

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EXHIBIT 5

Existing Traffic Volumes

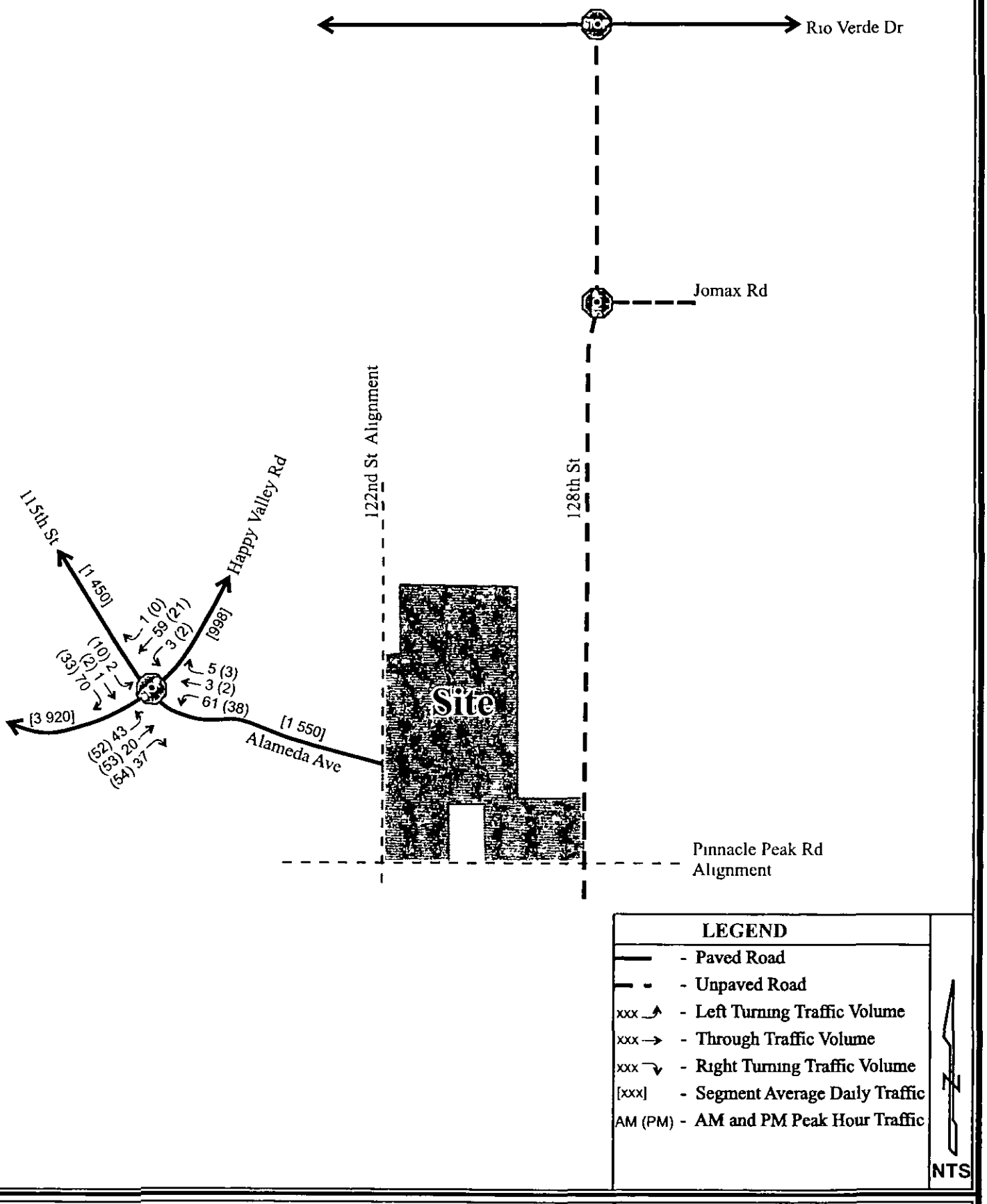


EXHIBIT 5 **Existing Traffic Volumes**

N:\2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054_Existing Conditions.cdr

EXHIBIT 6

Trip Generation

WOOD/PATEL **EXHIBIT 6 TRIP GENERATION**

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS

Project McDowell Mountain Back Bowl
Location Scottsdale, Arizona Scottsdale, Arizona
Date April 26 2005

W/P Job 042054 10
Engineer Ashish Sabnekar, P E
Analyst Chintan Jhaveri, E I T

TRIP GENERATION BASED ON EXISTING ZONING WITHOUT PRESERVE LAND (0 31 D U /Acre) + PROPOSED ZONING FOR SITE (0 36 D U /A

Proposed Site Trip Generation

	McDowell Mountain Back Bowl	Adjacent Properties			Total Trips	Site + Adjacent Property Trips on Alameda Ave
		Recorp Property	State Land	Others		
Land Use	Single Family Residential	Single Family Residential	Single Family Residential	Single Family Residential		100% of Back Bowl trips, 80% of Recorp Property trips, 25% of State Land trips, and 80% of Other trips will use Alameda Road
Land Use Code (LUC)	210	210	210	210		
LUC Name	Detached Housing	Detached Housing	Detached Housing	Detached Housing		
LUC Variable	D U	D U	D U	D U		
Land Area (acres)	333 10	280 02	363 39	483 63		
Assumed Density (D U /acre)	0 36	0 31	0 31	0 31		
Amount (D U)	122	87	113	150		
RATE (Average Rates)*						
Weekday	9 57	9 57	9 57	9 57		
AM Peak Hour	0 75	0 75	0 75	0 75		
PM Peak Hour	1 01	1 01	1 01	1 01		
Percent Inbound						
AM Peak Hour	25%	25%	25%	25%		
PM Peak Hour	63%	63%	63%	63%		
Interaction Factor	0%	0%	0%	0%		
TRIPS						
Weekday	1,168	831	1 078	1 435	4 511	**3,249**
AM Pk Hr Inbound	23	16	21	28	88	**64**
AM Pk Hr Outbound	69	49	63	84	265	**191**
PM Pk Hr Inbound	78	55	72	95	300	**216**
PM Pk Hr Outbound	46	32	42	56	176	**127**
Pass-by Percentage						
AM Peak Hour	0%	0%	0%	0%		
PM Peak Hour	0%	0%	0%	0%		
Pass-by Trip Ends AM	0	0	0	0		
Pass-by Trip Ends PM	0	0	0	0		

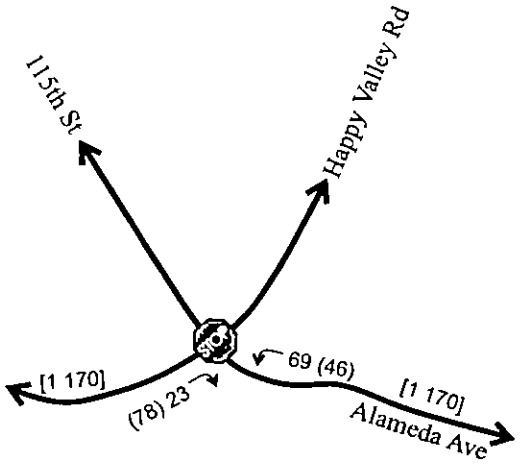
Source Trip Generation Manual 7th Edition Institute of Transportation Engineers 2003

Source Trip Generation Manual 7th Edition Institute of Transportation Engineers 2003

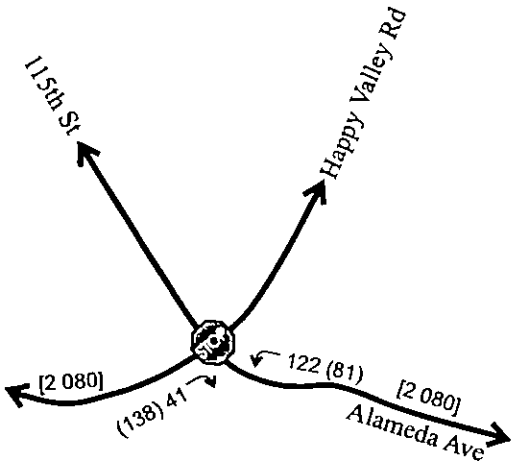
EXHIBIT 7

Projected and Total Traffic

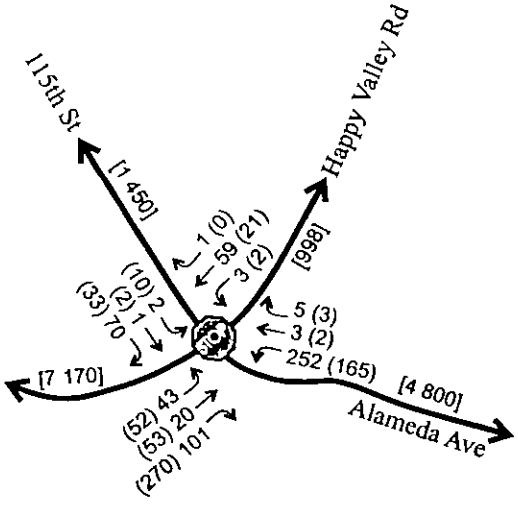
7A: Projected Site Traffic Volumes



7B: Projected Non-site Traffic Volumes



7C: Total Traffic Volumes (Background + Site + Non-site)



LEGEND	
xxx ↗	- Left Turning Traffic Volume
xxx →	- Through Traffic Volume
xxx ↘	- Right Turning Traffic Volume
[xxx]	- Segment Average Daily Traffic
AM (PM)	- AM and PM Peak Hour Traffic

N

NTS

N:\2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054_Projected & Total Traffic Volumes.cdr

EXHIBIT 8

Roadway Circulation Plan

WOOD/PATEL

McDowell Mountain Back Bowl

LEGEND

LOCAL RESIDENTIAL

MINOR COLLECTOR

600 0 300 600

1 inch = 600 ft

N

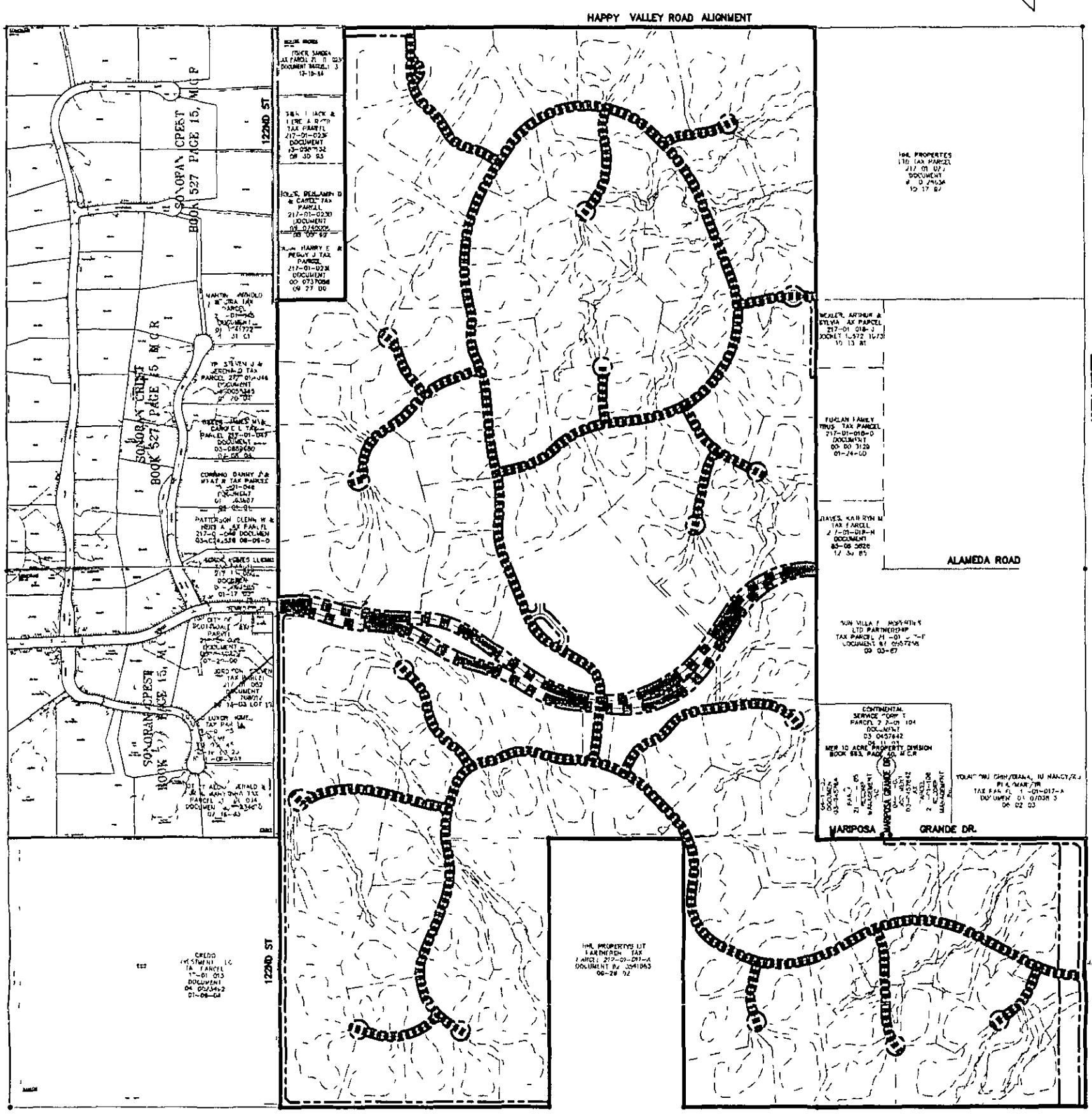
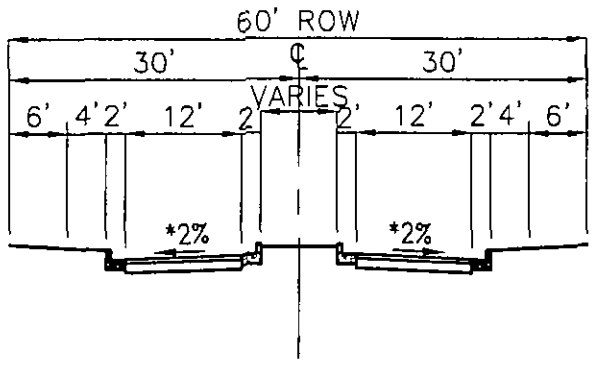
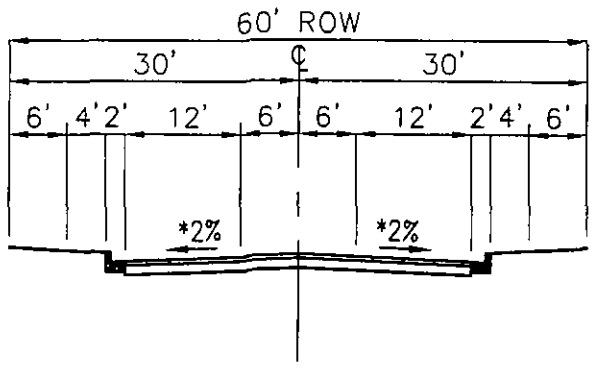


EXHIBIT 9

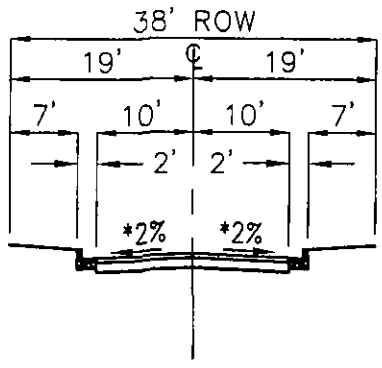
Roadway Cross-sections



MINOR COLLECTOR WITH MEDIAN



MINOR COLLECTOR NO MEDIAN



LOCAL RESIDENTIAL STREET

N \2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054-STREET-SECTION-EXH dwg

EXHIBIT 10

Roadway Easement Abandonments

WOOD/PATEL — McDowell Mountain Back Bowl

LEGEND

ABANDONMENT

NOTE ALL PUBLIC UTILIY & ROADWAY EASEMENTS PER BK 191 P 626

600 0 300 600

1 inch = 600 ft

N

HAPPY VALLEY ROAD ALIGNMENT

122ND ST

124TH ST ALIGNMENT

126TH ST ALIGNMENT

128TH STREET

ALAMEDA ROAD

PINNACLE PEAK ROAD ALIGNMENT

SONORAN CREST BOOK 527 PAGE 15 M.C.R.

EXHIBIT 10 — Roadway Easement Abandonments

N \2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054-ESMNT-ABANDOMENT-EXH dwg

EXHIBIT 11

Right-of-Way Dedications

WOOD/PATEL

McDowell Mountain Back Bowl

LEGEND

PROPOSED RIGHTS OF WAY

POTENTIAL RIGHTS OF WAY TO BE DETERMINED AT TIME OF FINAL PLAT THROUGH UPDATE TO CIRCULATION MASTER PLAN

600 0 300 600

1 inch = 600 ft

N

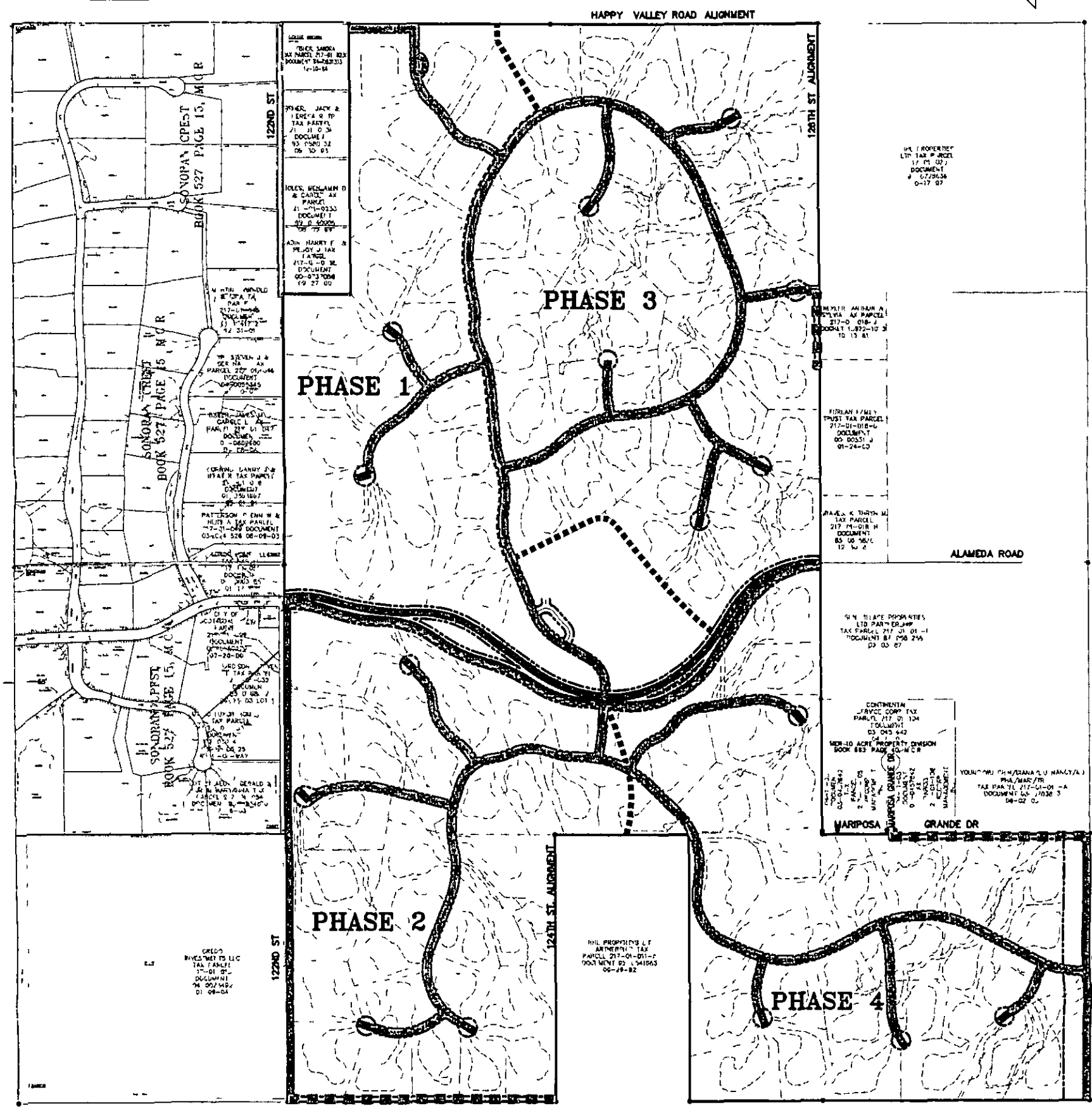


EXHIBIT 11

Right Of Way Dedication

N \2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054-ROW-EXH dwg

EXHIBIT 12

Access to Adjacent Developments

WOOD/PATEL

McDowell Mountain Back Bowl

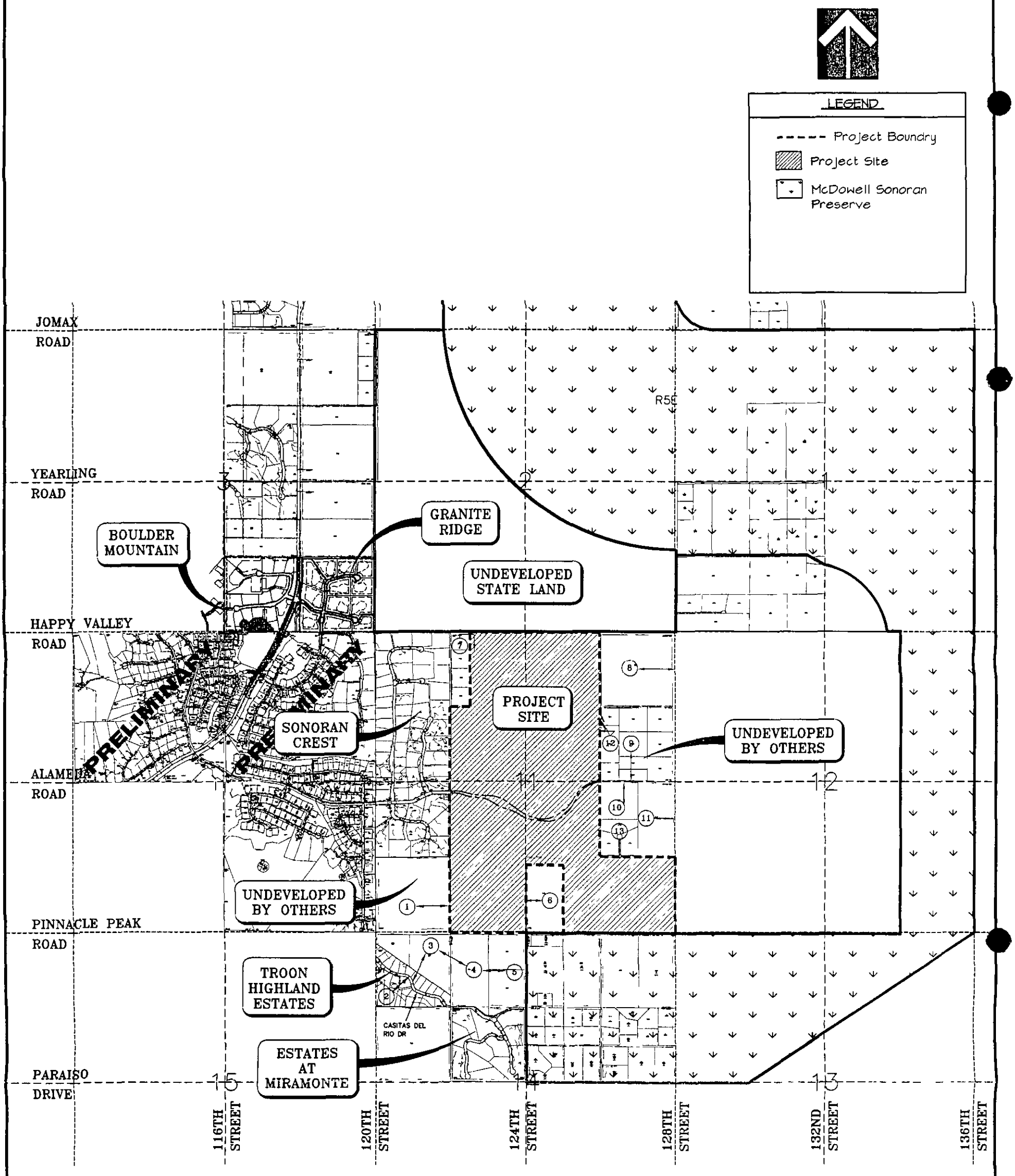


EXHIBIT 12 — Access to Adjacent Developments

N \2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054– ACCESS ADJ DEV dwg

EXHIBIT 13

Multi-use Trails Plan

WOOD/PATEL

McDowell Mountain Back Bowl

LEGEND

PUBLIC TRAIL

PRIVATE TRAIL

600 0 300 600

1 inch = 600 ft

N

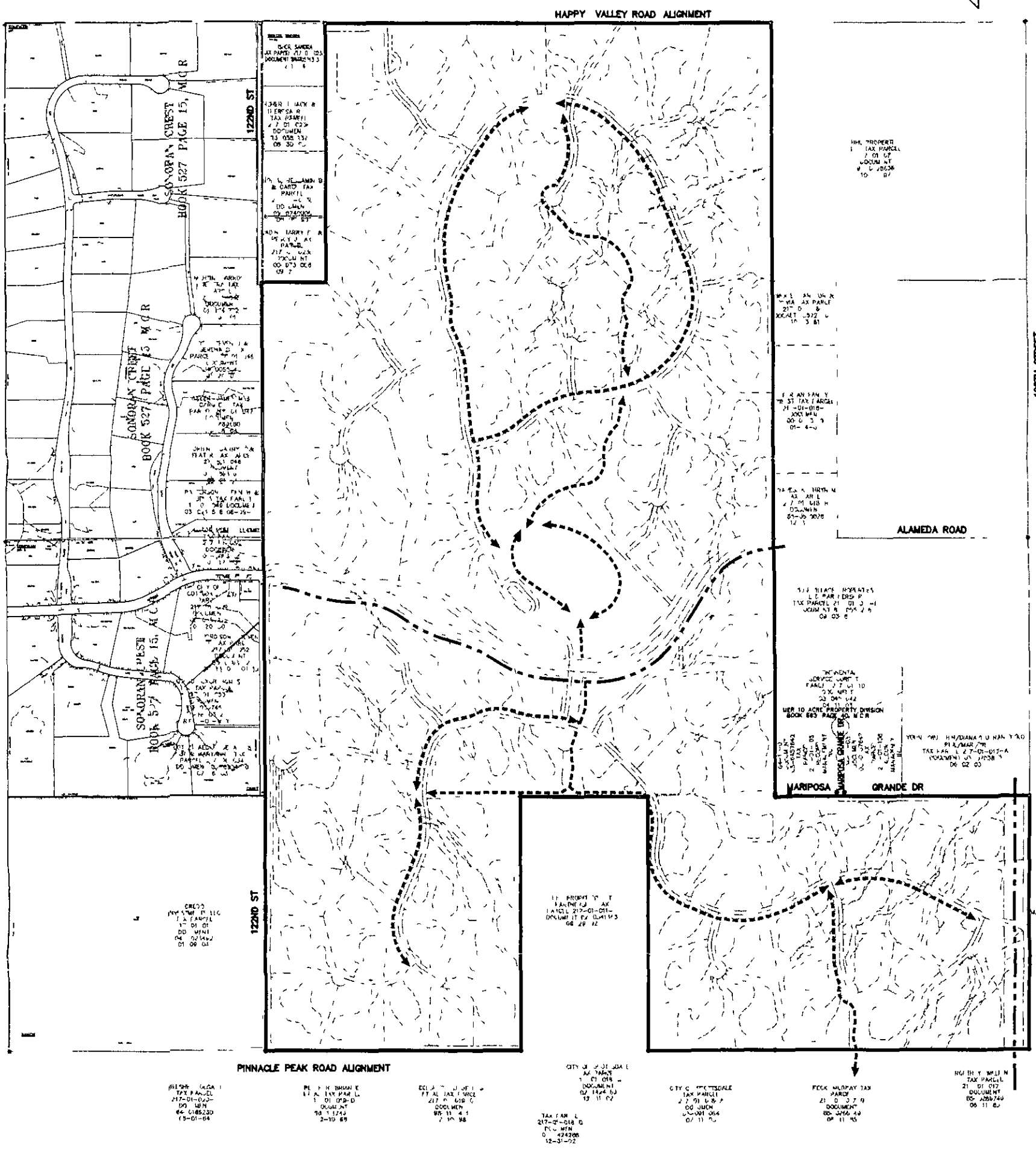


EXHIBIT 13

MULTI-USE TRAILS PLAN

N \2004\042054\Dwg\Exhibits\MASTER PLAN\Traffic MP\2054-TRAIL-EXH dwg