MASTER DRAINAGE REPORT

FOR

SILVERSTONE

March 2007

WP #042309

APPROVED
Reviewer:
Date: 3/18/07
Stormwater Management Division
City of Scottsdale

Prepared for:

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Attn: Mr. Mike Pacheco

Submitted to:

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Prepared by:

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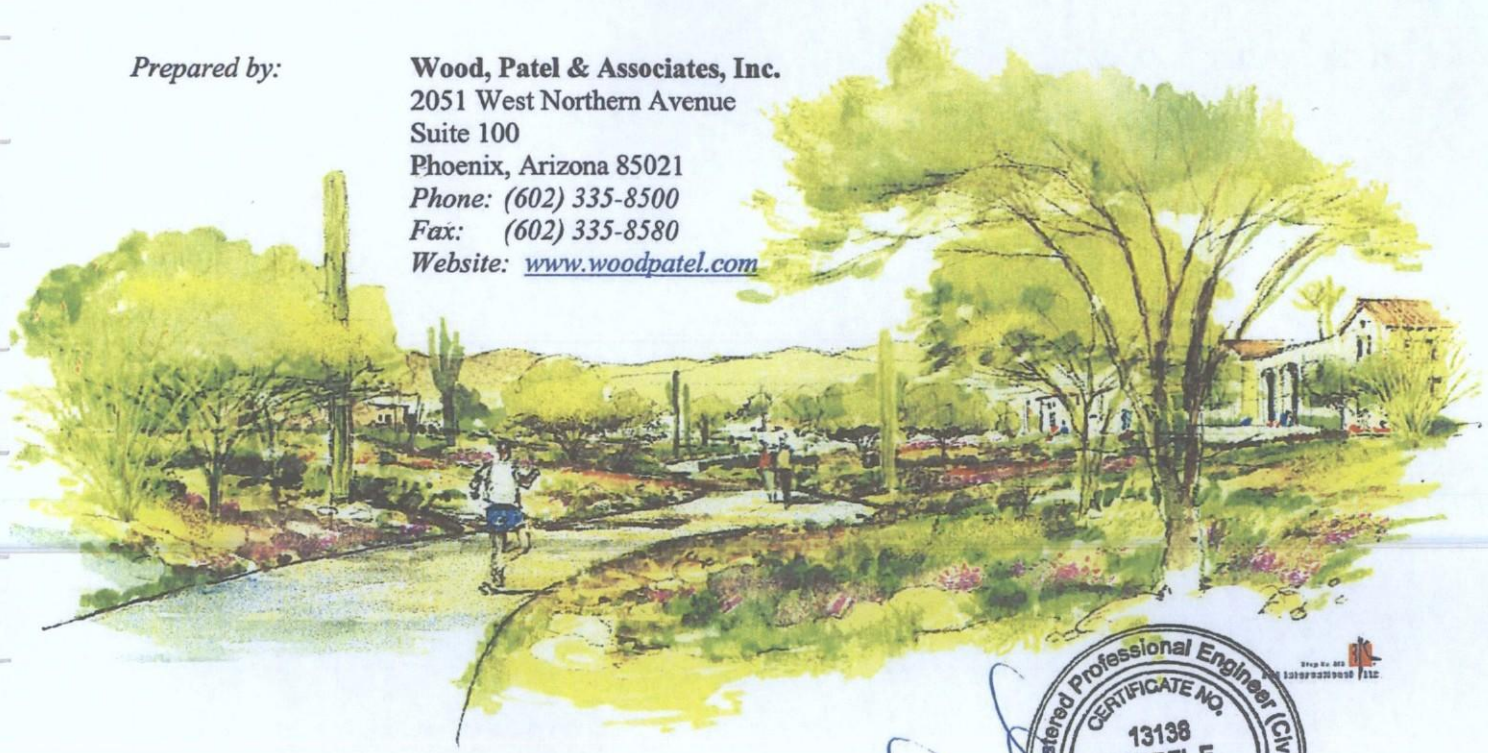

Engineer-in-Training
Darren Forstie

Registered Professional Engineer (Civil)
CERTIFICATE NO.
13138
DARREL E.
WOOD
Date Signed 3/13/07
ARIZONA, U.S.A.

Engineer

APPENDIX

Appendix A — Exhibit 1 – Silverstone Pre-Existing Drainage Map

Pre-Existing Hydrology

Parcel Detention Volumes

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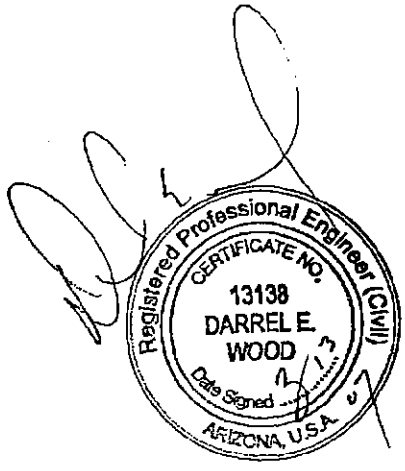


1.0 INTRODUCTION

1.1 General Background

This report has been prepared to address drainage requirements and provide a Master Drainage Plan for the development known as Silverstone. The Silverstone site (hereafter referred to as the Site) located in north Scottsdale, is approximately 160 acres and is bounded by Pinnacle Peak Road on the north, Miller Road on the east, Williams Drive on the south, and Scottsdale Road on the west. More specifically, the site is located in Section 14, Township 4 North, Range 4 East of the Gila and Salt River Meridian. Plate 1 – *Vicinity Map,* illustrates the Site's location.

The proposed Silverstone consist of mixed use land including municipal, retail, office, residential, open space, and public streets as applicable per City of Scottsdale Zoning Case 15-ZN-2005, 13-UP-2005.

As per the City of Scottsdale Stipulations, this master drainage plan endeavors to address the following:

1. *DRAINAGE MASTER PLAN: The developer shall submit a master drainage report and plan subject to city manager or designee approval. The master drainage report and plan shall conform the approved Drainage Design Report (Plan Check #3678-05) and to the Design Standards and Policies Manual – Drainage Report Preparation. In addition, the master drainage report and plan shall:*
   A. *Include a complete description of requirements relating to project phasing.*
   B. *Identify the timing of and parties responsible for construction of all storm water management facilities.*
   C. *Identify improvements to the Rawhide Wash, including but not limited to retaining walls, scour walls, head walls, bridges, control structures, street and pedestrian crossing, and open space amenities.*
   D. *Correspondence with State Lands/City of Phoenix to west*
   E. *Bridge timing/responsibility (Scottsdale Rd. and Pinnacle Peak), with possible grade separated crossing for pedestrian access under Pinnacle Peak Road and under Scottsdale Road.*

TABLE OF CONTENTS

PLATES

TABLES

F. *Before master drainage report approval, the developer shall, when requested by City Manager or Designee, submit two (2) hard copies and one (1) disc copy of the complete master drainage report.*

G. *Before the improvement plan submittal, the developer shall have obtained approval of the master drainage report.*

1.2 Drainage Background

The Site is situated on an alluvial plain within upland Sonoran Desert containing moderate slopes. The entire Site is located within the Rawhide Wash watershed and its Federal Emergency Management Agency (FEMA) designated 100 year floodplain (see Section 1.4 FEMA Floodplain). The Site consists of undeveloped desert terrain with vegetation and a mixture of buildings, dirt paths and drives from the now abandoned Rawhide development. Rawhide has disturbed the Site from historic conditions. The Site generally slopes toward the southwest at approximately 2.4 percent. Some exceptions are a raised dirt track located in the southwest corner of the site and a raised dirt dike bordering the site on the north and east sides. A major named wash, Rawhide Wash traverses the north western portion of the site.

In a rainfall/runoff event, Site is believed to receive offsite flows from the upstream Rawhide Wash watershed. The offsite flows from Rawhide Wash are believed to currently continue through the Site in Rawhide Wash and the small drainage corridors created by the previous owner. This offsite flow leaves the Site at a dip section in Scottsdale Road. The raised berms on the north and east boundaries of the Site are believed to protect the Site from any other offsite flow potential. Therefore, the Site is not impacted from offsite flows other than previously mentioned and only generates local onsite flows which generally start at the north portion of the Site and travel south-southwest through the Site.

1.3 Drainage Concept

This Drainage Master Plan presents a drainage investigation of the Site and addresses several areas: the Site, the proposed public roadways within the Site, and Rawhide Wash.

The Silverstone Development consists of proposed public roadways (Silverstone Drive and 74th Street) and private parcels. The north-south public roadway 74th Street, will

contain a proposed storm drain system to capture roadway flows and provide a bleed off option to parcel detention basins. This storm drain system will outlet into the proposed channel along Williams Drive while the storm drain system on Silverstone Drive will outlet into the proposed scenic corridor along Scottsdale Road (see Plate 3 – *Silverstone Drainage Map*).

The proposed parcels will retain the 100-year, 2-hour volume as required by the City of Scottsdale development guidelines. The detention basins will bleed off within 36 hours into the roadway storm drain system or existing drainage corridors per the design of the parcel developer and their engineer.

Rawhide Wash will be channelized from Pinnacle Peak Road to Scottsdale Road. The channel will be designed in two phases, an interim and ultimate condition.

1.4 FEMA Floodplain

The Site lies within a Federal Emergency Management Agency (FEMA) designated Zone AO, per Flood Insurance Rate Map (FIRM) Panel 1235 of 4350, number 04013C1235G, dated September 30, 2005 (See Plate 2 – Flood Insurance Rate Map). Zone AO is defined by FEMA and per the FIRM Panel as follows:

> *Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain), average depths determined. For areas of alluvial fan flooding, velocities also determined.*

The average depth displayed on the FEMA FIRM for the Project Area is one (1) foot with a velocity shown as four (4) feet per second.

2.0 OFFSITE DRAINAGE

Rawhide Wash is part of a watershed located on an alluvial plain in the high Sonoran desert. The watershed extends approximately 4 miles north of the project site and slopes approximately 2% from the northeast to the southwest. The estimated 100-year peak flow of 10,900 cfs is based on information believed by Wood/Patel to represent the 100-year event. For further information regarding the Rawhide Wash watershed, see the *Design Report for Rawhide Wash Channel at Silverstone* (Ref. 4).

Other than the offsite flows from Rawhide Wash, no other offsite flows impact the Site due to the pre-existing earth berms along the north and east boundary of the site. See Exhibit 1 – *Silverstone Pre-Existing Drainage Map.*

3.0 DRAINAGE IMPROVEMENTS

3.1 Rawhide Wash

As a part of the Silverstone development, Rawhide Wash will be channelized from Pinnacle Peak Road to Scottsdale Road. The proposed channel design will be designed to convey the anticipated 100-year peak discharge of 10,900 cfs with freeboard sufficient for 12,400 cfs. The channel will be designed in two phases.

The initial or Interim Channel is a short, temporary channel intended to convey flows to mimic historic conditions of a flood event which flow over the historic dip section in Pinnacle Peak Road. This channel will be constructed along with the Pinnacle Peak Bridge and full build out of Pinnacle Peak Road.

The future channel will be constructed at a later date (tentatively 2010), pending bridge improvements at Scottsdale Road which are the responsibility of the City of Scottsdale. For design information for both the Interim and Future Rawhide Wash Channels, please refer to the *Design Report for Rawhide Wash Channel at Silverstone* (Ref. 4).

3.2 Pinnacle Peak Road

The public roadway Pinnacle Peak Road along the northern boundary of the Site is concurrently being designed for proposed improvements by Wood Patel & Associates. Rawhide Wash currently transverses Pinnacle Peak Road and travels through the Site as previously mentioned. Otherwise, any other offsite flows to Pinnacle Peak Road and local roadway flows do not impact the Site. For more information and design specifics please see the "Roadway Drainage Report for Pinnacle Peak Road Scottsdale Road to Miller Road," by Wood Patel and Associates (Ref. 5).

3.2.1 Flood Wall

A flood wall is proposed along or near the 50-foot setback line from the right-of-way line south of Pinnacle Peak Road to provide additional flood protection to portions of the proposed Silverstone project as well as other downstream properties. The proposed flood wall provides flood protection similar to the earth berm which was in place for pre-development conditions. The proposed flood wall is designed to be about 2 feet above the south curb line of the new proposed

Pinnacle Peak Road. The flood wall will be designed by a structural engineer to withstand flood forces from a large event which would cause the adjacent channel to have a foot of water along the face of the wall with a foot of freeboard or two feet of water with no freeboard. The wall can be buried or extend above ground. As stated, the critical issue is to be 2 feet above the top of curb. While this flood wall adds a significant safety factor to potential flood events, it does not remove the parcels from the FEMA floodplain. Additionally, as a positive result of the floodwall, there will be additional conveyance of Pinnacle Peak Road westward to Rawhide Wash in a large event. Plate 3 – *Silverstone Drainage Map* shows the proposed location of the floodwall.

3.3 Miller Road

A proposed improvement plan for the west half of Miller Road is currently being completed by Stanley Consultants. The local roadway runoff does not impact the Site and is conveyed in a proposed channel adjacent to Miller Road. This channel also conveys some Miller Road offsite flows. Please refer to the "The Private Channel Summary Report for Miller Road Williams Drive to Pinnacle Peak Road," by Wood Patel & Associates (Ref. 6) and the "Final Onsite Drainage Report, Miller Road Widening Williams Drive to Pinnacle Peak Road," by Stanley Consultants, Inc. (Ref. 7) for more information and specifics.

3.3.1 Flood Wall

A flood wall is proposed along or near the 30-foot setback line west of Miller Road from the right-of-way line to provide additional flood protection to portions of the proposed Silverstone project as well as other downstream properties. The proposed flood wall provides flood protection similar to the earth berm which was in place for pre-development conditions. The proposed flood wall is designed to be approximately 2.5 feet above existing ground elevation. Due to the nature of the existing ground sloping southwestwardly at different degrees, this flood wall ranges from approximately 0.5 feet below and above the proposed west curb line of the new Miller Road half street. The flood wall is designed to withstand flood forces from a large event which would cause the adjacent channel to have a one and one half (1.5) feet of water along the face of the wall with a foot of freeboard or two and one half (2.5) feet of water with no freeboard.

The flood wall can be buried or extend above ground. As stated, the critical issue is to be approximately 2.5 feet above existing ground. While this flood wall adds a significant safety factor to potential flood events, it does not remove the parcels from the FEMA floodplain. Plate 3 – *Silverstone Drainage Map* shows the proposed location for the floodwall along both Pinnacle Peak Road and Miller Road.

3.4 Williams Drive

A Proposed improvement plan for the north half street of Williams Drive is concurrently being completed by Wood Patel & Associates. The proposed channel north of and adjacent to Williams Drive is proposed to convey the existing flows that reach the channel from the project site and the Miller Road channel. This channel is also the historic outfall for the Silverstone Site. See the "Drainage Report for Williams Drive Scottsdale Road to Miller Road," by Wood Patel & Associates (Ref. 1) for more information and specifics.

4.0 PARCEL DEVELOPMENT

Based on the City of Scottsdale's Drainage Ordinance storm water storage requirements, on-site storm water storage is to be provided for runoff generated during the 100-year, 2-hour storm event for all disturbed areas. Detention areas will be provided by the developer of the parcel at strategic locations to provide emergency outfall into existing drainage corridors or to the proposed public roadway. The proposed detention areas can be located by each individual parcel developer, as long as the total detention volume is equivalent to or more than the required detention volume. Each parcel must be balanced with the appropriate detention and an appropriate location to provide emergency outfall. Each proposed detention basin will be designed with a bleed off of sufficient size to discharge the entire 100-yr, 2-hour volume within 36 hours. Each parcel drainage system will allow existing drainage patterns to be maintained in their natural location where possible. The storm drain system within the public roadway will provide a discharge option to some detention locations. Other discharge options are the existing and proposed drainage corridors. See Plate 3 – *Silverstone Drainage Map* for possible locations and sizes of the proposed detention. The table below shows required detention volumes for each parcel.

Table 4.1 – Parcel Detention Requirements

Basin	Tributary Area	Weighted runoff coefficient	Required Volume	Required Volume
	ac		cf	ac-ft
A&B	4.5	0.9	41274	0.95
C	12.4	0.9	113964	2.62
D	13.5	0.9	124559	2.86
E	16.7	0.76	130001	2.98
F	22.1	0.76	171623	3.94
G	23.8	0.76	184771	4.24
H	32.8	0.76	254867	5.85
Park	1.9	0.33	6998	0.16

5.0 INTERIOR STREETS

5.1 74th Street

74th Street within the Site is a public roadway consisting of one lane in the north and south direction with sidewalks. This roadway is currently being designed by Wood Patel & Associates with construction plans and a drainage report. 74th Street traverses the Site from Pinnacle Peak Road to Williams Drive. The road drains from the north to the south at approximately two percent. A proposed storm drain system is designed to capture the roadway flow and convey it to the proposed William Drive channel. Additionally, the storm drain system provides detention basin bleed off stubout options for some of the Silverstone parcels. The said roadway flow to be captured is the peak 100-year flow as determined from the Rational Method. Additionally, 74th Street is designed to convey the peak 10-year and 100-year flows within its curbs. More drainage and design specifics can be seen in the "Drainage Report for Silverstone Drive and 74th Street Within Silverstone Development," (Ref. 9).

5.2 Silverstone Drive

Silverstone Drive is a public roadway consisting of eastbound and westbound lanes. This roadway is also currently being designed by Wood Patel & Associates. Silverstone Drive runs approximately east and west from Scottsdale Road (main Silverstone entrance) to 74th Street at the round-a-bout approximately at the center of the Silverstone development. Silverstone Drive contains a high point roughly at its midpoint resulting in street drainage toward the west from the high point and towards the east from the high point. The drainage from the eastern portion of Silverstone Drive will be captured and conveyed to the storm drain system on 74th Street. The western portion of Silverstone Drive will drain to catch basins and be conveyed into the Scottsdale Road scenic corridor. Please refer to the "Drainage Report for Silverstone Drive and 74th Street Within Silverstone Development," (Ref. 9) for more information and specifics.

6.0 MAINTENANCE

Ongoing maintenance of the designed or recommended drainage systems is required to preserve the design integrity and purpose of the drainage system. Failure to provide maintenance can prevent the drainage system from performing to its intended design purpose and can result in reduced performance. Maintenance within the public right-of-way is the responsibility of the governing municipality. However, it is the responsibility of private developers, homeowners associations, etc., for facilities on private property within drainage easements and includes private streets. A regular maintenance program is required to have drainage systems perform to the level of protection or service as presented in this plan. Maintenance and inspection of these private facilities will be the responsibility of the parcel developers and/or property owners association.

7.0 CONCLUSIONS

The Silverstone Master Drainage Plan as presented within this report is believed to meet City of Scottsdale standards and requirements, and serves as a guide for construction documents associated with the proposed drainage components and parcel development. Key conclusions are summarized as follows:

1. The Site is located in a FEMA designated 100-year floodplain (Zone AO) of potential shallow flooding (one foot deep) in both pre- and post-development conditions.
2. A Section 404 Permit needs to be acquired before construction improvements are undertaken for the entire existing low flow channel originating at Pinnacle Peak Road low flow crossing and continuing south-southwest in a small defined channel which ultimately ends near Scottsdale Road.
3. The individual parcels within the Site need to provide onsite storm water storage for the 100-year, 2-hour volume.
4. A final detention analysis for individual parcels based on ultimate design will be required. Nothing in this report prevents developers from pursuing a pre vs. post drainage request to minimize full detention requirements.
5. Ongoing maintenance is required for all drainage systems in order to assure design performance. Maintenance is the responsibility of the ultimate owners, private associations, City of Scottsdale, or any other appropriate owners.

8.0 REFERENCES

1. City of Scottsdale, *City of Scottsdale Design Standards and Policy Manual*, 2004.

2. Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona: Volume I – Hydrology*, revised January 1995.

3. Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona; Volume II – Hydraulics*, January 28, 1996.

4. Wood, Patel & Associates, Inc., *Design Report for Rawhide Wash Channel at Silverstone*, November 22, 2006.

5. Wood, Patel & Associates, Inc., *Roadway Drainage Report for Pinnacle Peak Road, Scottsdale Road to Miller Road*, March 2007.

6. Wood, Patel & Associates, Inc., *Private Channel Summary Report for Miller Road, Williams Drive to Pinnacle Peak Road*, January 2007.

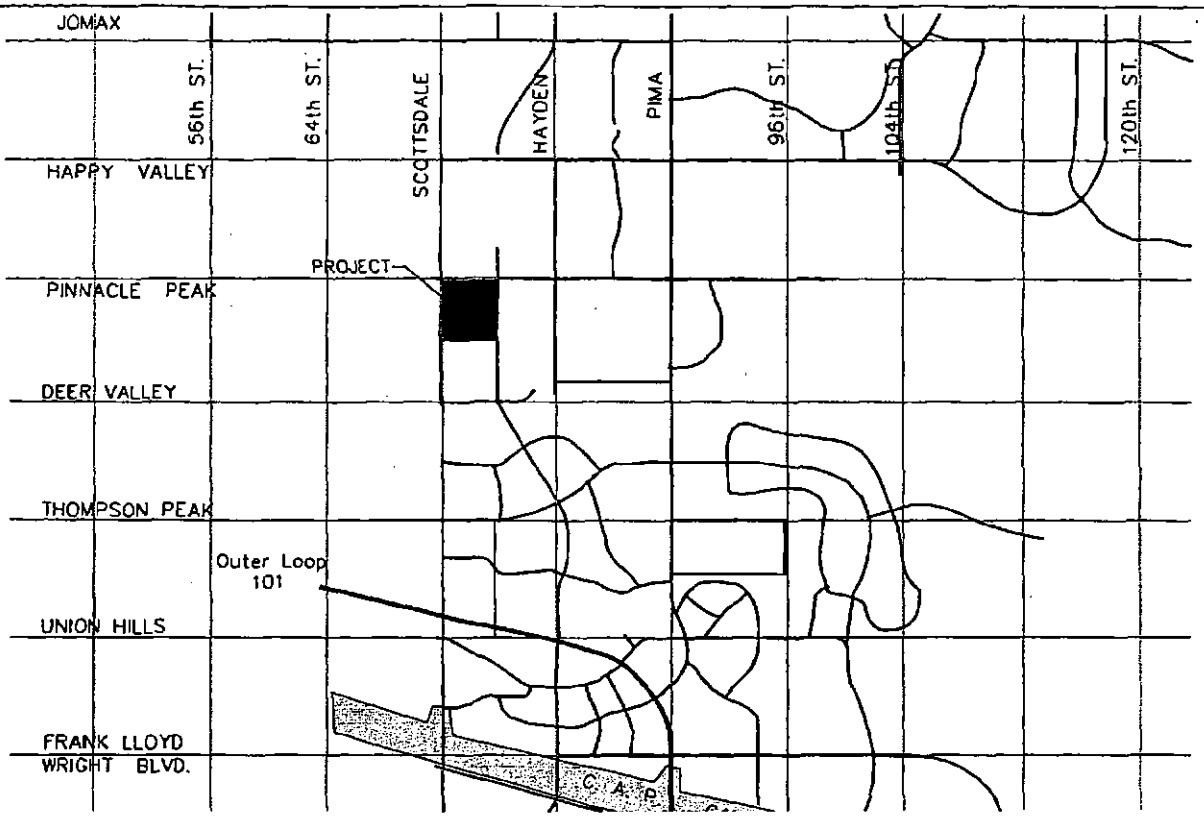
7. Stanley Consultants, Inc., *Final Onsite Drainage Report, Miller Road Widening Williams Drive to Pinnacle Peak Road*, December 2006.

8. Wood, Patel & Associates, Inc., *Drainage Report for Williams Drive, Scottsdale Road to Miller Road*, January 2007.

9. Wood, Patel & Associates, Inc., *Drainage Report for Silverstone Drive & 74th Street Within Silverstone Development*, March 2007.

PLATE 1

Vicinity Map



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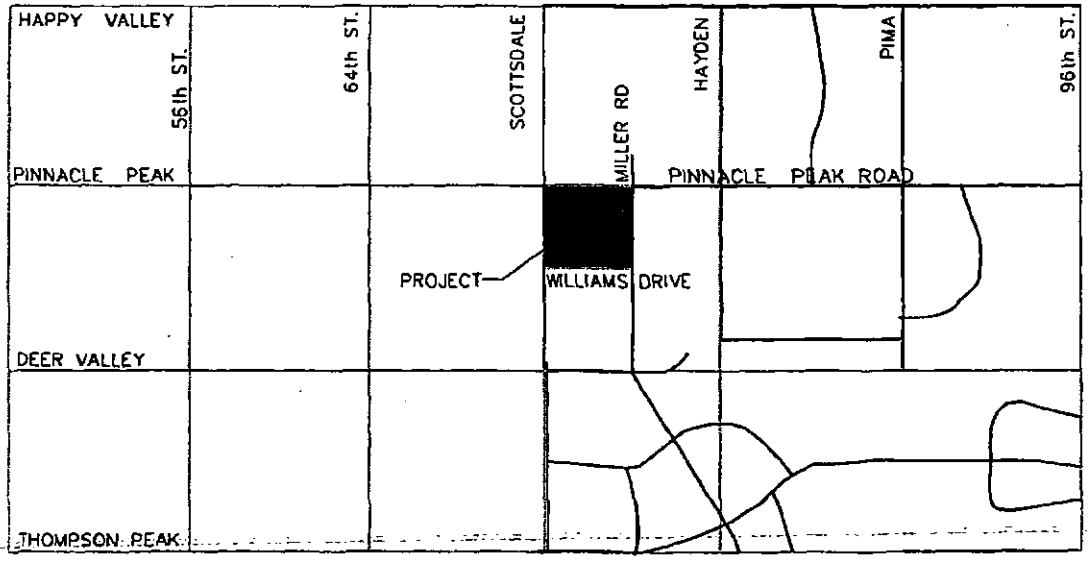

VICINITY

N

NOT TO SCALE

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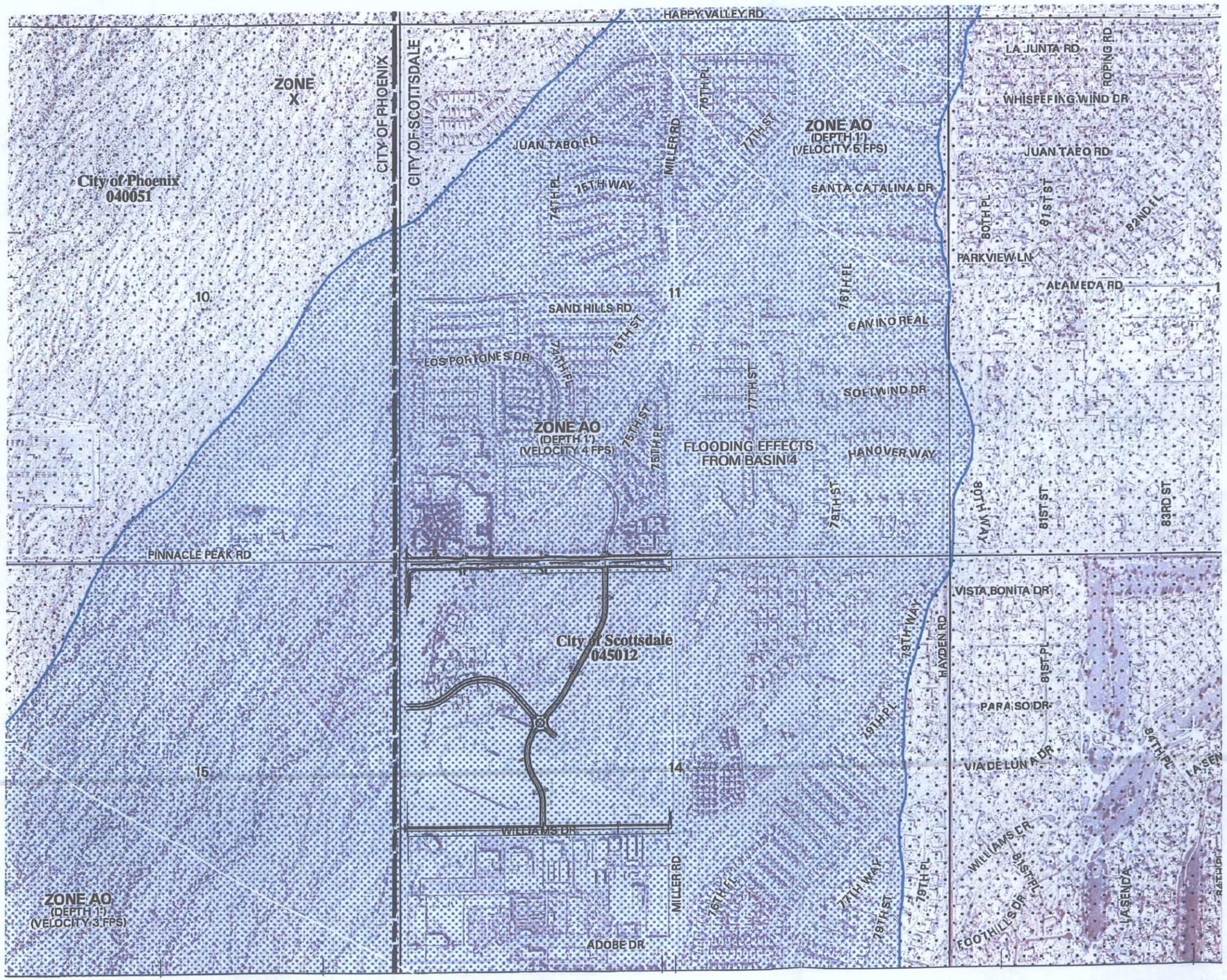
LOCATION & VICINITY MAP
Silverstone Project Area

Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
Phoenix, Arizona 85021 (602) 335-8500

DRAWN BY: D. FORSTIE	Plate 1
JOB NO: 042309.10	

PLATE 2

Flood Insurance Rate Map (FIRM)



NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1235G

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 1235 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1235	G
PHOENIX, CITY OF	040051	1235	G
SCOTTSDALE, CITY OF	045012	1235	G

Notice to User: The Map Numbers shown below should be used when placing map orders; the Community Numbers shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C1235G
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

MAP SCALE 1" = 1000'
0 1000 2000 FEET

Flood Insurance Rate Map (FIRM)

Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
Phoenix, Arizona 85021 (602) 335-8500

DRAWN BY: D FORSTIE
JOB NO: 042309

PLATE 2

PLATE 3

Project Area Drainage Map

WOOD/PATEL
LAND DEVELOPMENT • WATER RESOURCES
WATER / WASTEWATER • IRRIGATION
CONSTRUCTION MANAGEMENT
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com

SILVERSTONE
SCOTTSDALE
DRAINAGE MAP

PRELIMINARY
NOT
FOR
CONSTRUCTION
OR RECORDING

DRAWN	DF
CHECKED	
DATE	MARCH 07
SCALE	1"=150'
JOB NO.	042309.10
SHEET	1 OF 1

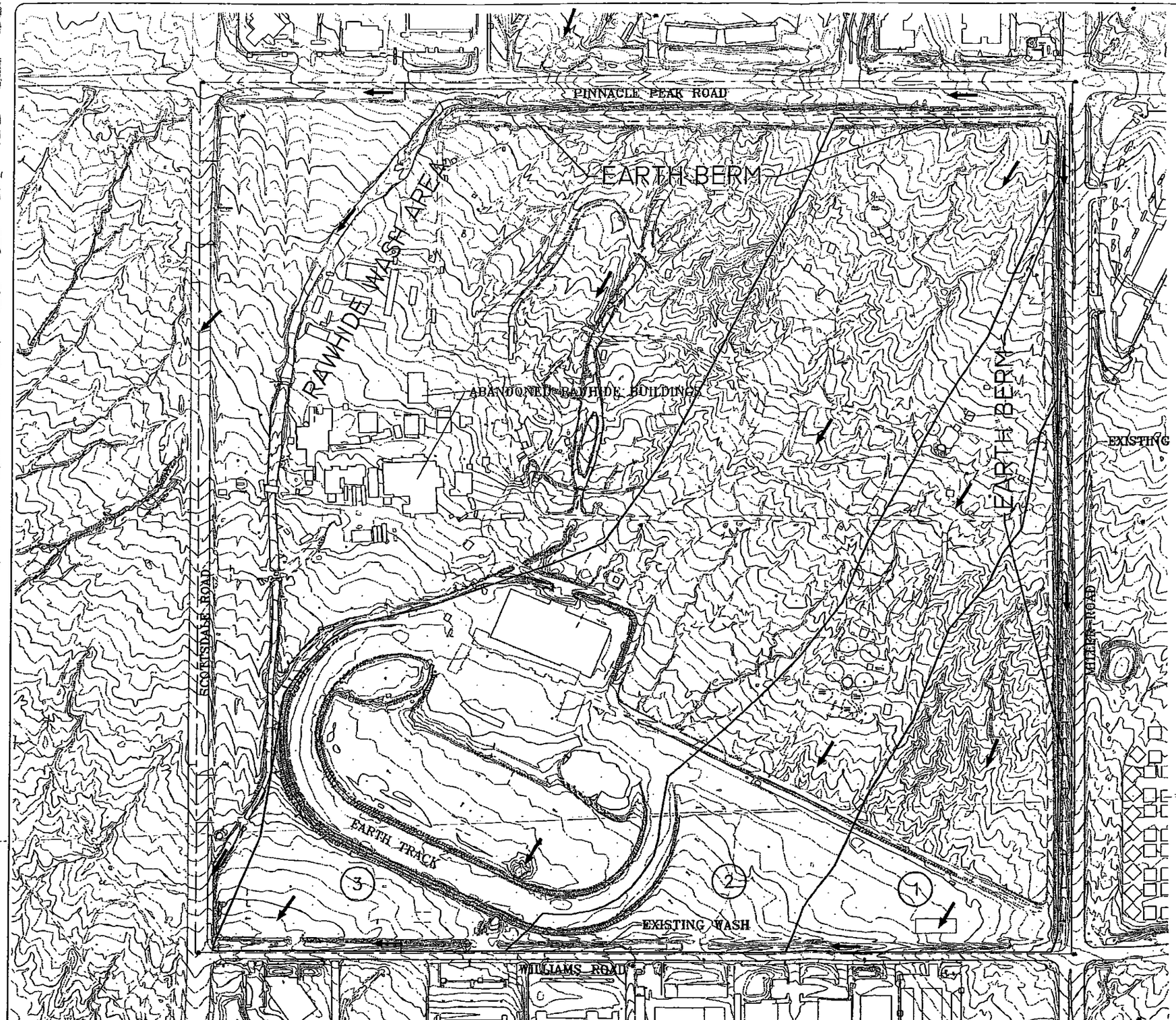
APPENDIX A

Exhibit 1 Silverstone Pre-Existing Drainage Map

Pre-Existing Hydrology

Parcel Detention Volumes

Exhibit 1 – Silverstone Pre-Existing Drainage Map



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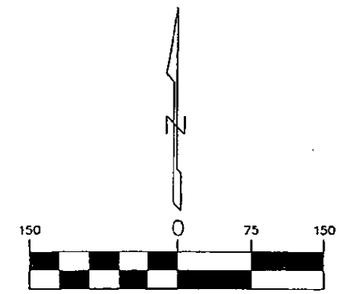

1 inch = 150 ft.

LEGEND

PRE-EXISTING FLOW DIRECTION

(2) PRE-EXISTING/PRE-DEVELOPED SUBBASIN

WOOD/PATEL
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PRE-EXISTING DRAINAGE MAP

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OR RECORDING

DRAWN	DF
CHECKED	
DATE	MARCH 07
SCALE	1" = 150'
JOB NO.	042309.10
SHEET	1 OF 1

Pre-Existing Hydrology

ON-SITE WEIGHTED "C" FACTOR - 10 and 100 YEAR STORM EVENT

Site:	Pre-existing Sliverstone
Location:	Scottsdale, Arizona
Description:	Pre-existing conditions of subbasins that leave the Silverstone Site
References:	Design Standards and Policies Manual, Rev. Jan., 1993, City of Scottsdale Fig. 2.2-17, Runoff Coefficients (C) for Use with the Rational Formula Drainage Design Manual for Maricopa County, Volume I, Hydrology, Table 3.2
Date:	3/13/2007

Known Values:

Land Type	"C" Value	Subbasin 1	Subbasin 2	Subbasin 3
		ac	ac	ac
Undisturbed Desert	0.31	15	15	30
Commercial	0.90			
Gravel Rds/Dirt/Corrals	0.60		7	27
Sum		15	22	57

Weighted "C" Factor (10 yr) =	0.31	0.40	0.45
Weighted "C" Factor (100 yr) =	0.39	0.50	0.56

Note: Soil C values based on hydrologic soil group B.

Flood Control District of Maricopa County
Drainage Design Manual Rational Method

Computed by: DF Date: 9/26/06

LOCATION DATA

Location: Silverstone

Project Name: Subarea id: 1

Drainage Area Cover:

DESIGN DATA

Drainage Area	15.0000 acres
Watercourse Length	1683.0000 feet
Top Elevation	1856.0000 feet
Bottom Elevation	1810.0000 feet
Slope	0.027 feet/feet
Roughness Coefficient (Kb)	0.0302
10-year, 6-Hour Rainfall	2.2000 inches

Hydrological Summary Table

Parameter	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs)	16	22	26	35	44	53
C	0.310	0.310	0.310	0.340	0.370	0.390
Tc (min)	8.5	7.5	7.0	6.4	6.1	5.8
i (in/hr)	3.4	4.6	5.5	6.9	7.9	9.1

Flood Control District of Maricopa County
Drainage Design Manual Rational Method

Computed by: DF Date: 9/26/06

LOCATION DATA

Location: Silverstone

Project Name: Subarea id: 2

Drainage Area Cover:

DESIGN DATA

Drainage Area	22.0000 acres
Watercourse Length	2591.0000 feet
Top Elevation	1869.0000 feet
Bottom Elevation	1802.0000 feet
Slope	0.026 feet/feet
Roughness Coefficient (Kb)	0.0316
10-year, 6-Hour Rainfall	2.2000 inches

Hydrological Summary Table

Parameter	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs)	26	36	43	60	75	90
C	0.400	0.400	0.400	0.440	0.480	0.500
Tc (min)	11.5	10.1	9.5	8.7	8.2	7.8
i (in/hr)	3.0	4.1	4.9	6.2	7.1	8.2

Flood Control District of Maricopa County
Drainage Design Manual Rational Method

Computed by: DF Date: 9/26/06

LOCATION DATA

Location: Silverstone

Project Name: Subarea id: 3

Drainage Area Cover:

DESIGN DATA

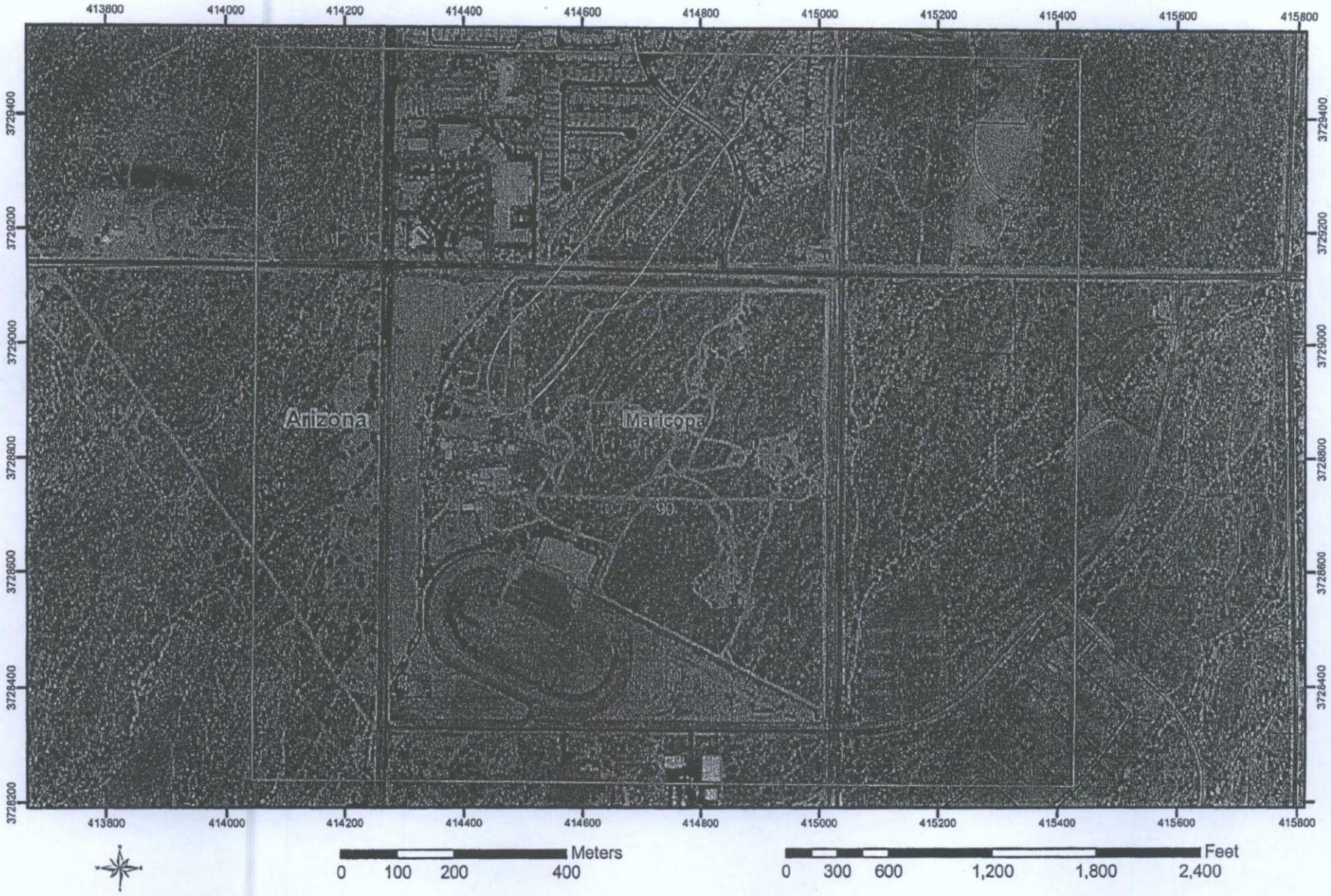
Drainage Area	57.0000 acres
Watercourse Length	3720.0000 feet
Top Elevation	1876.0000 feet
Bottom Elevation	1790.0000 feet
Slope	0.023 feet/feet
Roughness Coefficient (Kb)	0.0290
10-year, 6-Hour Rainfall	2.2000 inches

Hydrological Summary Table

Parameter	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs)	69	96	114	161	202	243
C	0.450	0.450	0.450	0.500	0.540	0.560
Tc (min)	14.1	12.5	11.7	10.6	10.1	9.5
i (in/hr)	2.7	3.7	4.5	5.7	6.6	7.6

SOIL MAP

SOIL SURVEY OF AGUILA-CAREFREE AREA, ARIZONA, PARTS OF MARICOPA AND PINAL COUNTIES



MAP LEGEND

- Soil Map Units
- Cities
- Detailed Counties
- Detailed States
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans
- Escarpment, bedrock
- Escarpment, non-bedrock
- Gulley
- Levee
- Slope
- Blowout
- Borrow Pit
- Clay Spot
- Depression, closed
- Eroded Spot
- Gravel Pit
- Gravelly Spot
- Gulley
- Lava Flow
- Landfill
- Marsh or Swamp
- Miscellaneous Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Slide or Slip
- Sinkhole
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Perennial Water
- Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 12

Soil Survey Area: Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:24000

Map comprised of aerial images photographed on these dates:
4/30/1997

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Engineering Properties

Agulla-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
6:												
Anthony	0-2	Sandy loam	ML, SM	A-4	0	0	95-100	90-100	55-85	35-65	20-30	NP-5
	2-40	Gravelly sandy loam, Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-20	45-65	40-60	25-35	10-30	0-14	NP
	40-60	Loam	CL, CL-ML, ML	A-4	0	0	100	100	95-100	70-80	20-30	NP-10
Arizo	0-1	Gravelly sandy loam	SM	A-2	0	0-5	65-80	60-75	35-50	20-30	15-20	NP-5
	1-8	Very gravelly sandy loam	GM, SM	A-1	0	0-5	45-65	35-50	25-35	10-20	15-20	NP-5
	8-60	Very cobbly loamy sand, Very gravelly loamy sand	GM, GP-GM, SM, SP-SM	A-1	0	25-30	50-60	40-55	20-40	10-15	0-14	NP
90:												
Momoli	0-3	Gravelly sandy loam	SM	A-1, A-2	0	0-5	65-80	60-75	35-50	20-30	20-30	NP-5
	3-60	Very gravelly fine sandy loam, Very gravelly loam, Very gravelly sandy loam	GC-GM, GM	A-1, A-2	0	0-5	40-65	25-50	20-40	10-35	20-30	NP-10

Parcel Detention Volumes

SILVERSTONE

Parcel Detention Requirements

Known Values:

V= (P/12)AC
A(sf)= Contributing Area
P(in)= 2.82 (from COS Drainage guidelines)
C_{100}= Weighted Runoff Coefficient

Basin	Tributary Area	Comparable Zoning	Weighted runoff coefficient[1]	Required Volume	Required Volume
	ac	(from Stips.)		cf	ac-ft
A&B	4.5	C-O	0.9	41274	0.95
C	12.4	C-2	0.9	113964	2.62
D	13.5	C-O	0.9	124559	2.86
E	16.7	R-5	0.76	130001	2.98
F	22.1	R-5	0.76	171623	3.94
G	23.8	R-5	0.76	184771	4.24
H	32.8	R-5	0.76	254867	5.85
Park	1.9	-	0.33	6998	0.16

1. Weighted runoff coefficient values based of COS grading and drainage manuel and hydrologic soil group B.

WOOD/PATEL
MISSION: CLIENT SERVICE™

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

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February 13, 2014

City of Scottsdale
Stormwater/Drainage Division
7447 East Indian School Road
Scottsdale, Arizona

Ph: (480) 312-2500

Re: **Silverstone Parcel C**
Addendum No. 1 Master Drainage Report
Comment Response Letter
WP# 042309

Dear Mr. Anderson:

Following are our responses to Addendum No. 1 of the Master Drainage Report 1st Review Comments, dated January 7, 2014:

1. Comment #1: Provide a cover sheet similar to the original master plan cover sheet that clearly identifies this report as addendum #1 to the original report.
   Response #1: As requested, a cover sheet has been added to the report identifying it as Addendum No.1 to the Master Drainage Report for Silverstone.

2. Comment #2: Provide a full .pdf copy of the report on disc for City records by approval.
   Response #2: As requested, a CD containing a PDF of the MDR addendum has been included in the back of the revised report.

3. Comment #3: Please call me to discuss the including parcels D and hopefully E in the pre versus post C analysis as part of the master plan update. Ideally, the City would like to include the entire development in the update. A pre versus post C analysis for these parcels would result in a substantial reduction in storage. (If amenable to your client.)
   Response #3: Wood/Patel has been directed by our client only to pursue the Pre vs. Post C analysis for Parcel C of the Silverstone Development. It is our understanding that our client would prefer to pursue pre. Vs. post C analysis of the other undeveloped parcels at time of parcel development, and would submit additional addendums to the MDR at that time.

Please contact our office with questions regarding the above responses.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
13138
DARREL E.
WOOD
DATE SIGNED
ARIZONA U.S.A.
Expires 12/31/2016

Darrel E. Wood, P.E., R.L.S
Principal

DEW/bm

Y:\WP\General Correspondence\134000 Silverstone Parcel C Add No. 1 Master Drainage Report 1st Review Comment Response COS R Anderson 2-13-14.docx