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ENGINEER | PLAN | SURVEY | MANAGE

PRELIMINARY DRAINAGE REPORT  
FOR

**SCOTTSDALE CONDO VILLAS**  
NWC OF MILLER ROAD & OSBORN ROAD  
SCOTTSDALE, ARIZONA

Prepared For:  
**TAYLORMORRISON**  
9000 E. Pima Center Parkway, Suite 350  
Scottsdale, AZ 85258

Plan # \_\_\_\_\_  
 Case # 26-DR-2015  
 Q-S # \_\_\_\_\_

Accepted  
 Corrections

Reviewed By DG  
 for Greg Toth

Date 6/9/15

Prepared By:  
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May 2015  
HILGARTWILSON Project No. 1454

26-DR-2015  
5/18/2015

**DRAINAGE REPORT RESUBMITTAL INFORMATION:** The drainage report is not approved. Please address the following issues.

1. **CASE NO.: DS&PM CHAPTER 1, Section 1-2.100** Add the case no. 26-DR-2015 to the cover page of the drainage report.
2. **PRE DEVELOPMENT DRAINAGE SITE PLAN: DS&PM CHAPTER 4, Section 4-1.800 and 4-1.900** Please provide a full size, 24"x36" pre development site plan. Show and label the contours to at least 10 ft beyond the property lines. Show and label all the basic elements of a drainage plan including flowrates, flowlines, existing storm drainage infrastructure and all existing easements. Show and label the onsite drainage basins and within each basin show the pre development Q10 and Q100 for each historical runoff entry and exit location, show and label concentration points.
3. **POST DEVELOPMENT DRAINAGE SITE PLAN: DS&PM CHAPTER 4, Section 4-1.800 and 4-1.900** Please provide a full size, 24"x36" POST development site plan. Show and label the contours to at least 10 ft beyond the property lines. Show and label all the basic elements of a drainage plan including: existing and proposed contours or elevations, flowrates, flowlines, existing storm drainage infrastructure and all existing easements Show and label the onsite drainage basins and within each basin show the pre development Q10 and Q100 for each historical runoff entry and exit location, show and label concentration points. Use drainage flow arrows to show direction of runoff.

**REDEVELOPMENT STORMWATER STORAGE POLICY: Will apply to this site. DS&PM CHAPTER 4, Section 4-1.600** Please calculate the composite pre and post development C values for this site. Calculate any existing stormwater storage volume on site. This volume, if any, shall be preserved, though not in the same form as it exists. It can be combined with other stormwater storage structures. The Redevelopment stormwater storage required for this project shall be based on the increase in stormwater runoff associated with the proposed development. In this case, required storage volumes are determined by taking the proposed condition C value and subtracting the existing condition C value and using the difference in the stormwater storage volume formula. Redevelopment stormwater storage policy applies only to those areas or portions of a site that have been previously developed. Areas or portions of a site that have not been previously developed must provide full storage per the standard volume formula. The grass areas of the courtyard are considered developed, and thus 100 yr, 2 hr storage volume is not required for these areas.

The method for determining the required stormwater storage volume is the standard formula described below.

Standard Formula for Runoff Volumes for Redevelopment stormwater storage policy.

**$V_r = (P/12) A(C_{post} - C_{pre})$**

*V<sub>r</sub> = Required storage volume in acre-feet.*

*P = Precipitation amount = The depth of the 100-year 2-hour rainfall, from figure in Appendix 4-1D at the site.*

*A = Area in acres; the developed portion of the entire site in acres, to the centerline of adjacent streets, on which any man made change is planned, including, but not limited to: construction, excavation, filling, grading, paving, or mining.*

*C = Runoff coefficient; Rational Method values from Figure 4.1-4.*

1. **DRAINAGE SUB AREAS: DS&PM CHAPTER 4, Section 4-1.800** Demonstrate how onsite runoff will get to the detention basins/pervious areas. Use bold lines to delineate the drainage sub areas and show all grade breaks on the G&D plan. Calculate the volume required and volume provided in each drainage sub area. Demonstrate that on-site stormwater runoff from each drainage sub area is accounted for in specific drainage detention basin. Calculate and show the percentage runoff that is contributed from each drainage sub area to a specific drainage basin. Use a table or spreadsheet format to show the results in the report.
2. **DETENTION BASINS: DS&PM CHAPTER 4, Section 4-1.401** For detention basin design: Provide bleed off rates for each basin. Show all calculations. The minimum pipe diameter of the bleed off pipe should not be less than 6 inches due to clogging. Use a hinged orifice plate on For

detention basins, the runoff storage time should not be less than 12 to 24 hours and should not exceed 36 hours, unless it's a very small basin, then only the 6 inch bleed off pipe will be the controlling item and not the bleed off time. (For retention basins that are 1 ft deep or less, use a double ring infiltromator test to measure the soil infiltration rate and use a factor of safety of two in the design bleed off rates. Thus, the retention basins need to drain in less than 18 hours. Provide this information with the next submittal) Calculate the total Vol req'd using NOAA 14 rainfall depths.  $V_r = CIA$  for the 100yr/2hr storm event.

PRELIMINARY DRAINAGE REPORT  
FOR  
SCOTTSDALE CONDO VILLAS

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## 1.0 INTRODUCTION

HILGARTWILSON has been contracted to complete a drainage analysis for the proposed site improvements for the Scottsdale Condo Villas (the Project). The Project is located near the northwest corner of Osborn Road and Miller Road in Scottsdale, Arizona. The Project site is bound by an existing multi-family residential development on the north and south, Miller Road to the east, and the Scottsdale Baseball Stadium to the west. The area surrounding the site generally drains to the southeast at an approximate slope of .5%. The Project lies within Section 26, Township 2 North, Range 4 East of the Gila and Salt River Baseline and Meridian. The Vicinity Map (**Figure 1, Appendix A**) presents an overview of the site location and surrounding areas. The proposed improvements for the Project include construction of multi-story condominium buildings, surface parking areas, sidewalks, driveways, and landscaped areas.

The Project site is located on approximately 1.7 acres that are currently occupied by 21 attached residential units residing within 3 buildings and a community pool. These existing buildings and ancillary improvements will be demolished as part of this Project.

### 1.1 Site Location Relative to Known FEMA Flood Hazard Zones

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) coverage for the Project is provided on FIRM panel 04013C2235L (FEMA, October 16, 2013). According to this FIRM the Project resides entirely within a flood hazard Zone X. FEMA defines this flood hazard zone as follows:

Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

The FEMA FIRM panel and the Project boundary are shown on the FEMA Map (**Figure 2, Appendix A**).

## 2.0 EXISTING DRAINAGE PATTERNS

### 2.1 Onsite

Under existing conditions, stormwater runoff produced by the Project is routed via unconcentrated sheet flow toward the Miller Road right-of-way. No significant stormwater controls, such as retention or detention facilities, currently exist within the site.

### 2.2 Offsite

Scottsdale Stadium, located west and historically upstream of the Project, has been developed with stormwater controls to manage its respective runoff. The existing residential developments located immediately north and south of the Project site exhibit similar drainage patterns. Runoff from these areas drain towards the nearest adjacent right-of-way, either Miller Road or Osborn Road. Both Miller Road and Osborn are fully developed roadways with curb and gutter. Flows produced by the Project and surrounding vicinity concentrate at the intersection of Miller and Osborn where catch basins and storm drain facilities have been constructed to convey runoff

to the regional outfall, Indian Bend Wash, a short distance (1/4 mile) to the east of the Project.

Areas located to the south and east of the Project drain away from the site. Accordingly, the Project is not impacted by any significant offsite runoff.

### 3.0 PROPOSED DRAINAGE CONDITIONS

The proposed grading improvements will allow runoff generated in the interior of the Project to new underground retention facilities. Surface drainage, roof drains and underground storm drain pipes will be used to convey onsite flows to a 120-inch underground retention vault located near the southeast corner of the Project. An overview of the proposed drainage improvements and patterns is shown on the Preliminary Drainage Map (**Figure 3, Appendix A**).

The onsite retention facilities have all been sized to accommodate the increase in 100-year, 2-hour runoff volume produced by the tributary drainage area in accordance with the City of Scottsdale's current stormwater storage policy. This includes the increase in runoff volume caused by replacing existing interior open space and landscaping areas with impervious cover. These areas are indicated on **Figure 3 of Appendix A**. Since there are not existing stormwater storage facilities located onsite, no compensatory volume shall be provided for replacement. The runoff characteristics for the balance of the Project area will remain effectively the same between existing and proposed conditions. Preliminary retention calculations are included in **Appendix B**.

In the absence of a practicable downstream discharge point to bleed-off, or even remove via pump system, the underground retention system will be dewatered through a new drywell system. As shown in the preliminary dewatering calculations included in **Appendix B** the underground vault is anticipated to be dewatered from full within the allotted 24-hour window via a single drywell.

Detailed design of onsite drainage facilities will be prepared with the improvement plans for the Project. The final drainage report will include design calculations for the proposed drainage inlets, storm drain, swales, erosion revetment, retention facilities and all other applicable drainage appurtenances. The Project's final design will also establish an operation and maintenance policy to ensure the proper functioning of the retention and dewatering system in accordance with Section 4-1.403 of the City's Design Standards and Policies Manual.

#### 3.1 UNDERGROUND RETENTION OVERFLOW

In the event that the storage capacity of the underground retention and stormdrain system were to be exceeded by the runoff produced by the Project, shallow ponding would occur within the interior driveway system. Prior to exceeding a depth of six inches, this ponding would break over a high point in the driveway and discharge to the adjacent Miller Road right-of-way. The elevation of this high point, which represents the ultimate outfall for the Project, is approximately a 36.7. This is over 14 inches below the Project's minimum finished floor elevation (37.9). This overflow system mimics the existing conditions at the site since the predominant drainage

pattern for the property is for runoff to be directed toward Miller Road and eventually Osborn Road.

### 3.2 ADEQ Water Quality Requirements

In accordance with current Arizona Department of Environmental Quality (ADEQ) requirements, any development project with a planned disturbance area exceeding 1 acre is required to obtain a Notice of Intent (NOI) Certification from ADEQ prior to construction commencement. Since the Project area exceeds this disturbance threshold, this NOI requirement will apply. Accordingly, a NOI will be submitted to ADEQ during final design and the assigned AZCON number shall be provided to the City at the time of the Improvement Plan submittal.

## 4.0 CONCLUSIONS

The improvements included in the Preliminary Grading and Drainage Plan have been designed in accordance with all applicable City of Scottsdale drainage design guidelines and the drainage patterns outlined for adjacent developments. No adverse impacts to offsite properties are anticipated as a result of these improvements. Existing drainage patterns will be maintained through and around the Project.

## 5.0 REFERENCES

City of Scottsdale. (January, 2010). *Design Standards & Policies Manual*.  
City of Scottsdale, Arizona.

City of Scottsdale. (2013). *Case Drainage Report Review- Ironwood Manor Estate*. Detention Requirement Directive. City of Scottsdale, Arizona.

Federal Emergency Management Agency, FEMA (October 16, 2013). *Flood Insurance Rate Map 04013C2235L*.

Flood Control District of Maricopa County (2013). *Maricopa County Drainage Manual Volume I, Hydrology*

Flood Control District of Maricopa County (2013). *Maricopa County Drainage Manual Volume II, Hydrology*

A

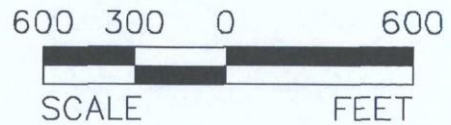


APPENDIX A  
FIGURES



**LEGEND**

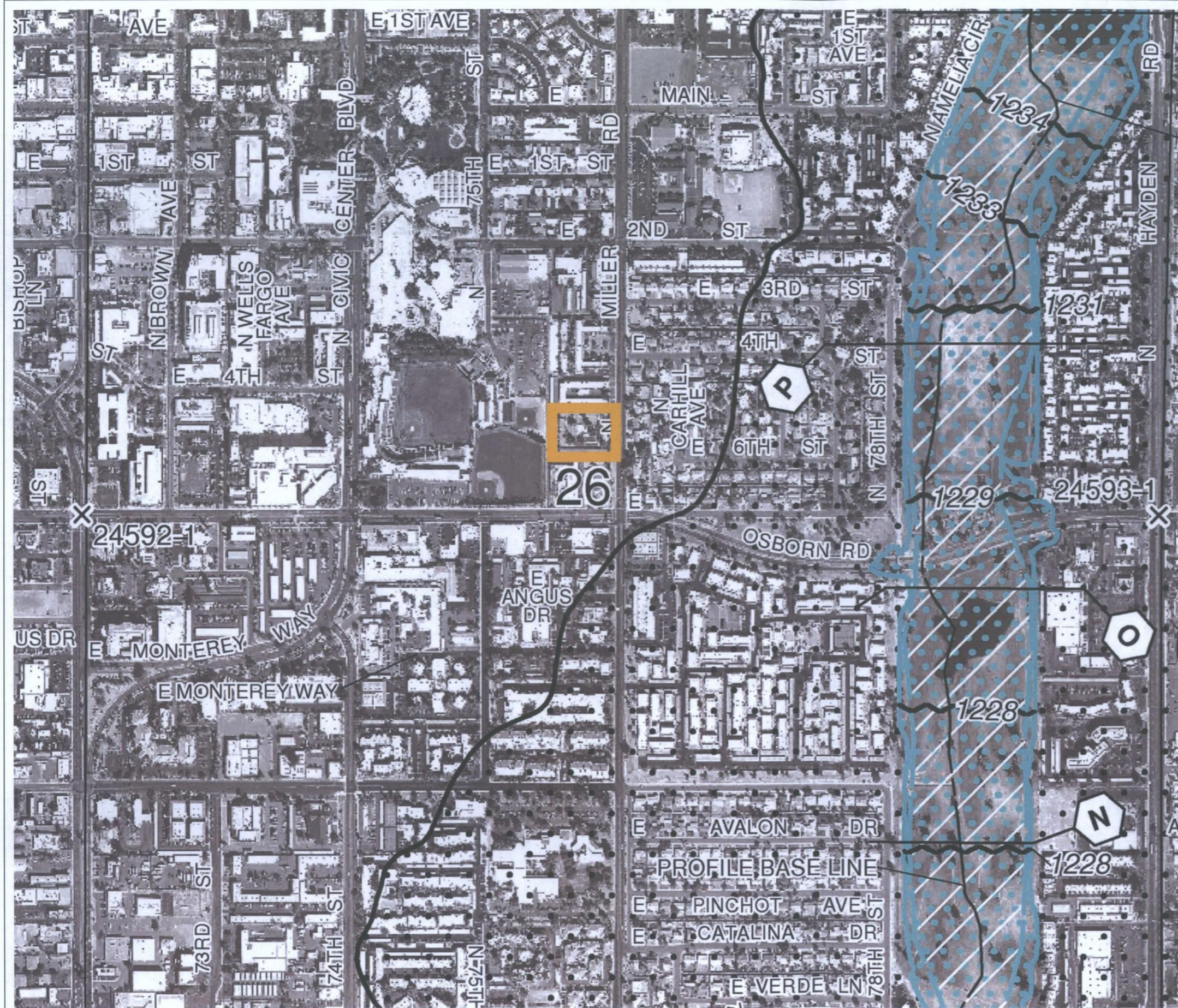
PROJECT LOCATION



PROJ.NO.:	1454
DATE:	APR. 2015
SCALE:	1" = 600'
DRAWN BY:	JPG
CHECKED BY:	AT

<p><b>SCOTTSDALE CONDO VILLAS</b> 3510 N MILLER RD SCOTTSDALE, ARIZONA</p>
<p><b>FIG 1: VICINITY MAP</b></p>

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LEGEND

PROJECT LOCATION



**NATIONAL FLOOD INSURANCE PROGRAM**


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

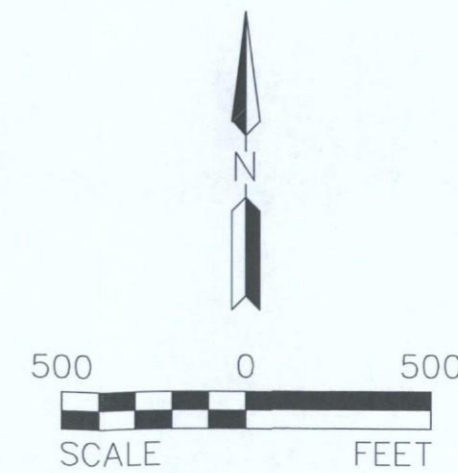
PANEL 2235 OF 4425  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2235	L
MESA, CITY OF	040048	2235	L
SCOTTSDALE, CITY OF	045012	2235	L
TEMPE, CITY OF	040054	2235	L

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

 MAP NUMBER  
04013C2235L  
MAP REVISED  
OCTOBER 16, 2013  
Federal Emergency Management Agency

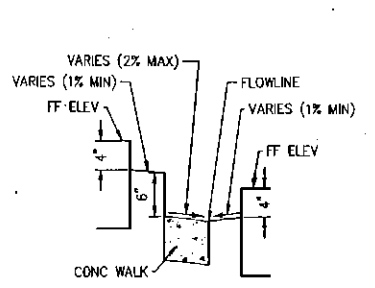


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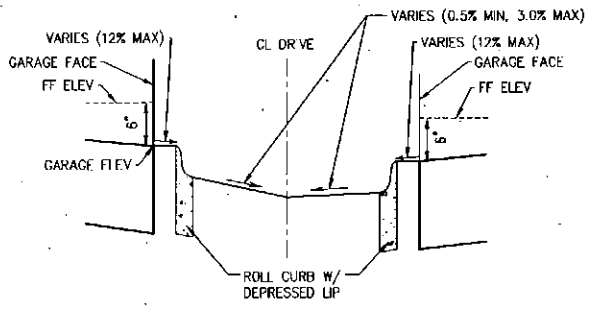
SCOTTSDALE CONDO VILLAS  
3510 N MILLER ROAD  
SCOTTSDALE, ARIZONA

**FIG 2: FEMA MAP**

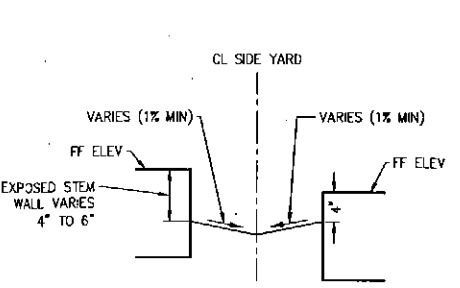
PROJ. NO.: 1454  
DATE: APR. 2015  
SCALE: 1" = 500'  
DRAWN BY: JPG  
CHECKED BY: AT



**SECTION A-A TYPICAL FRONT**  
NO SCALE



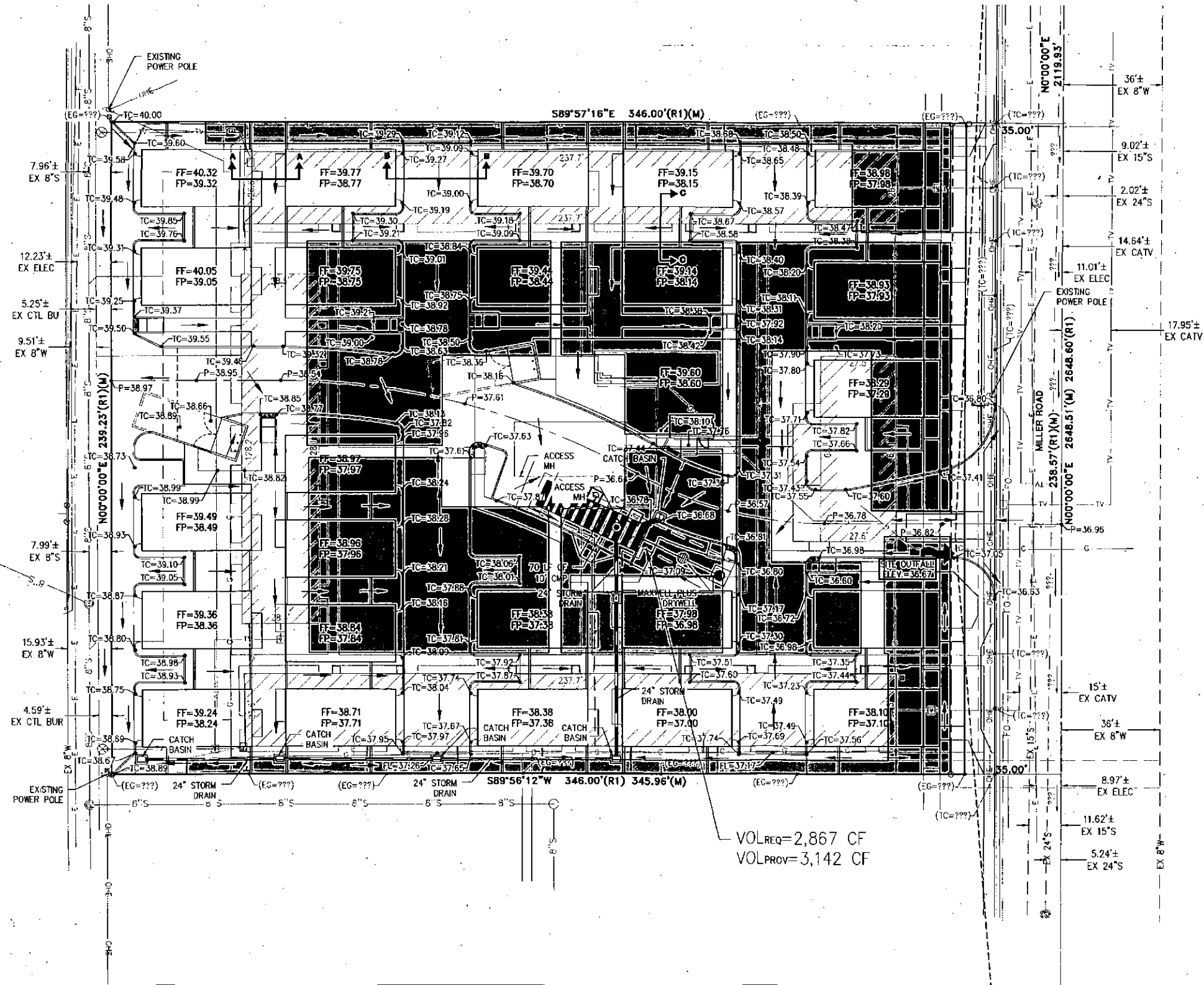
**SECTION B-B TYPICAL STREET**  
NO SCALE



**SECTION C-C TYPICAL SIDE YARD**  
NO SCALE

**LEGEND**

- PROPERTY LINE
- - - RIGHT OF WAY LINE
- - - EASEMENT LINE
- - - CENTER LINE
- 6" W EX. WATER LINE
- 8" S EX. SEWER LINE
- E EX. ELECTRIC LINE
- TV EX. COX LINE
- - - EX. TELEPHONE LINE
- C EX. GAS
- OH-E EX. OVERHEAD ELECTRIC LINE
- - - 47 EX. CONTOUR
- DIRECTION OF DRAINAGE
- C CONCRETE
- TC TOP OF CURB
- G GUTTER
- P PAVEMENT
- FG FINISHED GROUND
- SW SIDEWALK
- FFE FINISHED FLOOR ELEVATION
- R/W RIGHT-OF-WAY
- PUE PUBLIC UTILITY EASEMENT
- SWC SIDEWALK EASEMENT
- SITE OUTFALL
- PROPOSED CATCH BASIN
- PROPOSED STORM DRAIN PIPE
- EX. UTILITY POLE
- EX. ELECTRIC METER
- EX. ELECTRIC TRANSFORMER
- EX. ELECTRIC PULL BOX
- EX. ELECTRIC PANEL
- EX. ELECTRIC CABINET
- EX. LIGHT POLE
- EX. SIGN
- EX. MANHOLE (UNKNOWN TYPE)
- EX. FLAG POLE
- EX. TELEPHONE PEDestal
- EX. CABLE TV PEDestal
- EX. FIRE DEPARTMENT CONNECTION
- EX. FIRE HYDRANT
- EX. AIR RELEASE VALVE
- EX. WATER VALVE
- EX. WATER METER
- EX. WATER BACK FLOW PREVENTER
- EX. WATER STUB OUT
- EX. WATER BLOW OFF
- EX. GAS VALVE
- EX. GAS METER
- EX. SANITARY SEWER MANHOLE
- EX. SEWER CLEAN OUT
- EX. CONCRETE
- EX. ASPHALT PAVING
- EX. DECORATIVE CONCRETE
- EX. CHAIN LINK FENCE
- EX. BLOCK WALL
- PRE-DEVELOPMENT LANDSCAPE/PVIOUS AREAS (31,850 SF)



VOL<sub>REQ</sub> = 2,867 CF  
VOL<sub>PROV</sub> = 3,142 CF

**ESTIMATED EARTHWORK VOLUME**

RAW CUT = 1,440 CY  
RAW FILL = 227 CY  
BALANCE = 1,213 CY UNADJUSTED (EXPORT)

REV:

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**SCOTTSDALE CONDO VILLAS**  
3510 NORTH MILLER ROAD  
SCOTTSDALE, ARIZONA  
**PRELIMINARY DRAINAGE MAP**

<b>HILGARTWILSON</b>	PROJ. NO.: 1454
	DATE: MAY 2015
	SCALE: 1" = 20'
	DRAWN: HW
	DESIGNED: HW
	APPROVED: ZH

DWG. NO. **1**

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B

APPENDIX B  
PRELIMINARY RETENTION AND  
DEWATERING CALCULATIONS

**PRELIMINARY RETENTION CALCULATION TABLE**

Project: Scottsdale Condo Villas  
 Prepared by: HW  
 Date: Apr, 2015



Volume Required =  $(C_{POST} - C_{PRE}) * (P / 12) * A$

- C = -Weighted runoff coefficient per Figure 4.1-4 of the City of Scottsdale Design Standards & Policies Manual (2010)
- P = 2.16 in -Precipitation depth associated with the 100-year, 2-hour storm event (NOAA 14)
- A = Plan-view area of increased imperviousness.

Retention Basin ID	Volume Source	Increase in Impervious Area [ft <sup>3</sup> ]	Pre Developed Condition Runoff "C" Coefficient	Post Developed Condition Runoff "C" Coefficient	Volume required to store the difference in pre vs post runoff (ft <sup>3</sup> )	Underground Retention Vault Diameter [ft]	Length of Underground Retention Vault Provided [LF]	Retention Volume Provided [ft <sup>3</sup> ]
Underground Vault	Increased Impervious Area	31,850	0.45	0.95	2,867	120	40	3,142

**PRELIMINARY DEWATERING CALCULATIONS TABLE**

Project: Scottsdale Condo Villas  
 Prepared by: HW  
 Date: Apr, 2015



Retention Basin System ID	Pre vs Post Retention Volume Required [ft <sup>3</sup> ]	TOTAL Retention Volume Provided (Volume to be dewatered) [ft <sup>3</sup> ]	Drywell Disposal Rate <sup>(1)</sup> (cfs)	Number of Drywells <sup>(1)</sup> [ea.]	Drywell Drain Rate [cfs]	Total Drain Rate [cfs]	Time to Drain $T=V_p / 3600 R_T$ [hr]
Underground Vault	2,867	3,142	0.10	1	0.10	0.10	8.7

**NOTES:**

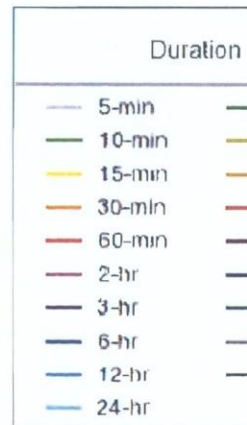
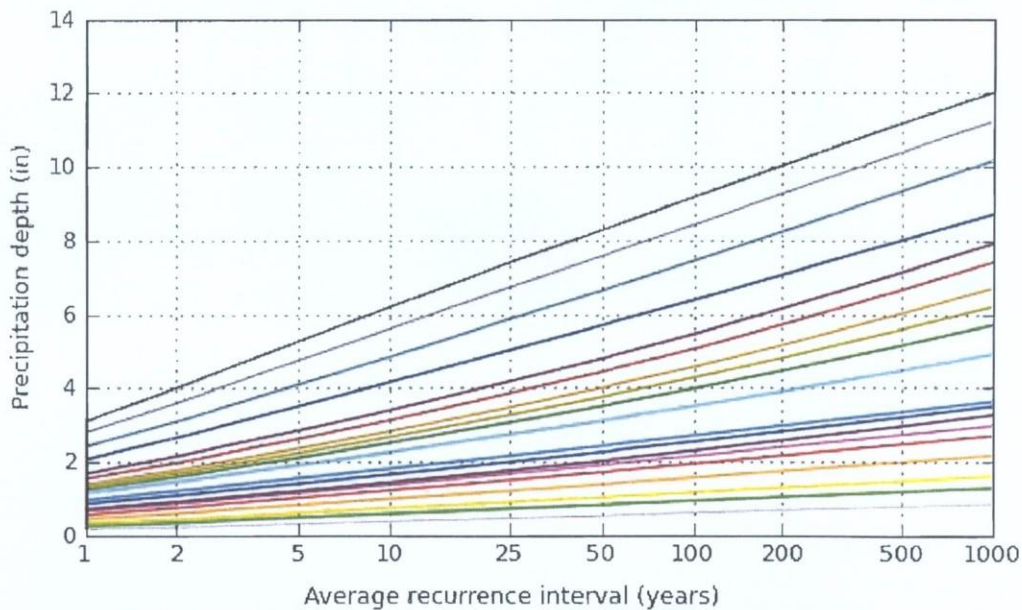
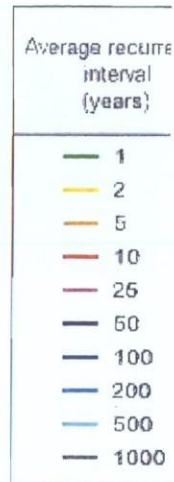
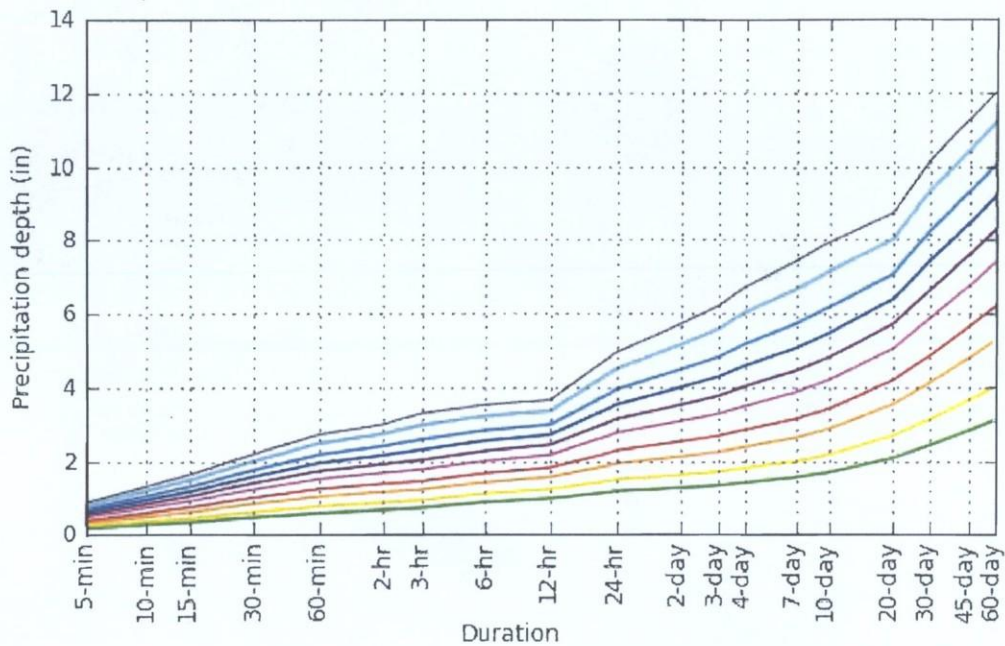
1. Number of drywells based on accepted and assumed design disposal rate (0.1 cfs). Final dewatering facilities, including number of drywells will be determined once percolation testing has been performed.
2. All drywells must be registered with the Arizona Department of Environmental Quality (ADEQ).



# PF graphical

PDS-based depth-duration-frequency (DDF) curves

Coordinates: 33.4864, -111.9274



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## Maps & aerials

Small scale terrain



---

US Department of Commerce  
National Oceanic and Atmospheric Administration  
National Weather Service  
Office of Hydrologic Development  
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