



## MEMORANDUM

To: Flood Control District of Maricopa County  
 From: Aubrey Thomas  
 Date: October 22, 2013  
 RE: Mountain Horizons Phase 1- 2013P013  
 Bleed-off pipe system  
 Project No.: 1229



The following comments were provided by the District in a memorandum dated June 20, 2013:

**Comment 1:** *The excerpts do not include the first flush calculations. Please provide the first flush calculations for Basin F4. The first flush volume must be provided below the lowest outlet elevation for the outlet catch basin. Per the detail, the lowest outlet elevation is 2 inches above the basin invert. The first ½ inch of runoff from the total drainage area must be contained in the basin within the 2 inch depth.*

**Response:** The inverts of the bleed-off connections to the Floodway have been set above the respective first flush storage volume. The following is a summary of the methodology used to determine the first flush water surface elevation within these retention basins and the findings of this analysis.

The first flush volume is classified by the Flood Control District as the first 0.5 inch of direct runoff from a storm event; first flush volume was calculated as follows:

$$V_{FF} = (P/12)A$$

Where:

$V_{FF}$  = minimum first flush volume in ft<sup>3</sup>

P = first 0.5 inch of direct runoff

A = drainage area in ft<sup>2</sup>

In the Bella Via development there are several retention basins that utilize bleed off pipes which discharge into the Powerline Floodway; these are basins B2, 1A, 1B, and 4. Basins B2, 1A, and 1B are connected with equalizer pipes and share a common basin bottom elevation and outfall point to the Powerline Floodway. As such, the three were analyzed as one basin. The contributing drainage areas for these retention basins are displayed in the attached, "First Flush Drainage Exhibit". With the drainage areas determined, the first flush volume was estimated for each. Calculations for determining the first flush water surface elevations and basin dewatering can be seen in the attached excel tables.

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Once the first flush volume was determined, the associated water surface elevation was calculated for the corresponding retention basins. This was done using basin geometry in AutoCAD Civil 3D. The First Flush water surface elevation in Basins B2, 1A, and 1B is one foot above the basin bottoms, in Basin 4 it is 5 inches above the basin bottom.

Rims of the bleed off pipe inlets within these retention basins will be set above the first flush water surface elevations mentioned above. Water below the invert elevation of the bleed off pipes will be dissipated with 36 hours of the storm event through natural infiltration or other subsurface conditions.

*Comment 2: If the existing weir is removed, what happens to the water accumulating between Basin F4 and the Floodway? There is an inlet on the storm drain system just outside Basin F4 but by-pass flow will likely occur in the 100-yr event and runoff from the future City of Mesa well site would likely not reach this inlet at all. The concern is with potential damage to the liner of the Floodway with water ponded behind, or trying to enter, the Floodway without an adequate inlet. Please address.*

**Response:** Although the majority of the contributing watershed that has historically drained toward the weir has since been developed with drainage controls that would limit discharge to the Floodway during the 100-year design event, the *current* design proposes to relocate the weir (in-kind) a short distance to the east (upstream) of its current location. Peripheral grading around the relocated weir will direct any runoff approaching the Floodway toward this new inlet.

*Comment 3: The contours along the south side of Basin F4 do not tie-in to natural ground. Please clarify the grading in this area.*

**Response:** The depiction of the proposed grading around Basin F4 has been corrected. The updated Basin 4 contours which tie-in to the existing ground surface can be seen on the attached Exhibit.

## FIRST FLUSH RETENTION

Project: 1229 Bella Via - Parcel 11A

Prepared by: JM



$V_{FF} = (P / 12) * A$

P = 0.5 - Precipitation depth associated with the First Flush

A = Plan-view area of an individual drainage area.

Used for design of dewatering facilities only. Full 100-year, 2-hour retention storage provided for Project.

Retention Basin ID	ON-SITE Drainage Area(s)	Drainage Area [ft <sup>2</sup> ]	Drainage Area [ac]	Retention Volume Required [ft <sup>3</sup> ]	First Flush Runoff Volume [ft <sup>3</sup> ]	First Flush Storage Depth [in]	Basin Volume @ First Flust Storage Depth [ft <sup>3</sup> ]	Basin Bottom Elevation [ft]	Bleed Off Pipe Invert [ft]
11A, 1A, 1B	1	437,173	10.0	18,216	18,216	12	20,088	1,440.5	1,441.5
4	2	273,970	6.3	11,415	11,415	5	14,325	1,436.5	1,437.0

**CALCULATIONS FOR 36-HOUR DEWATERING OF RETENTION BASINS**

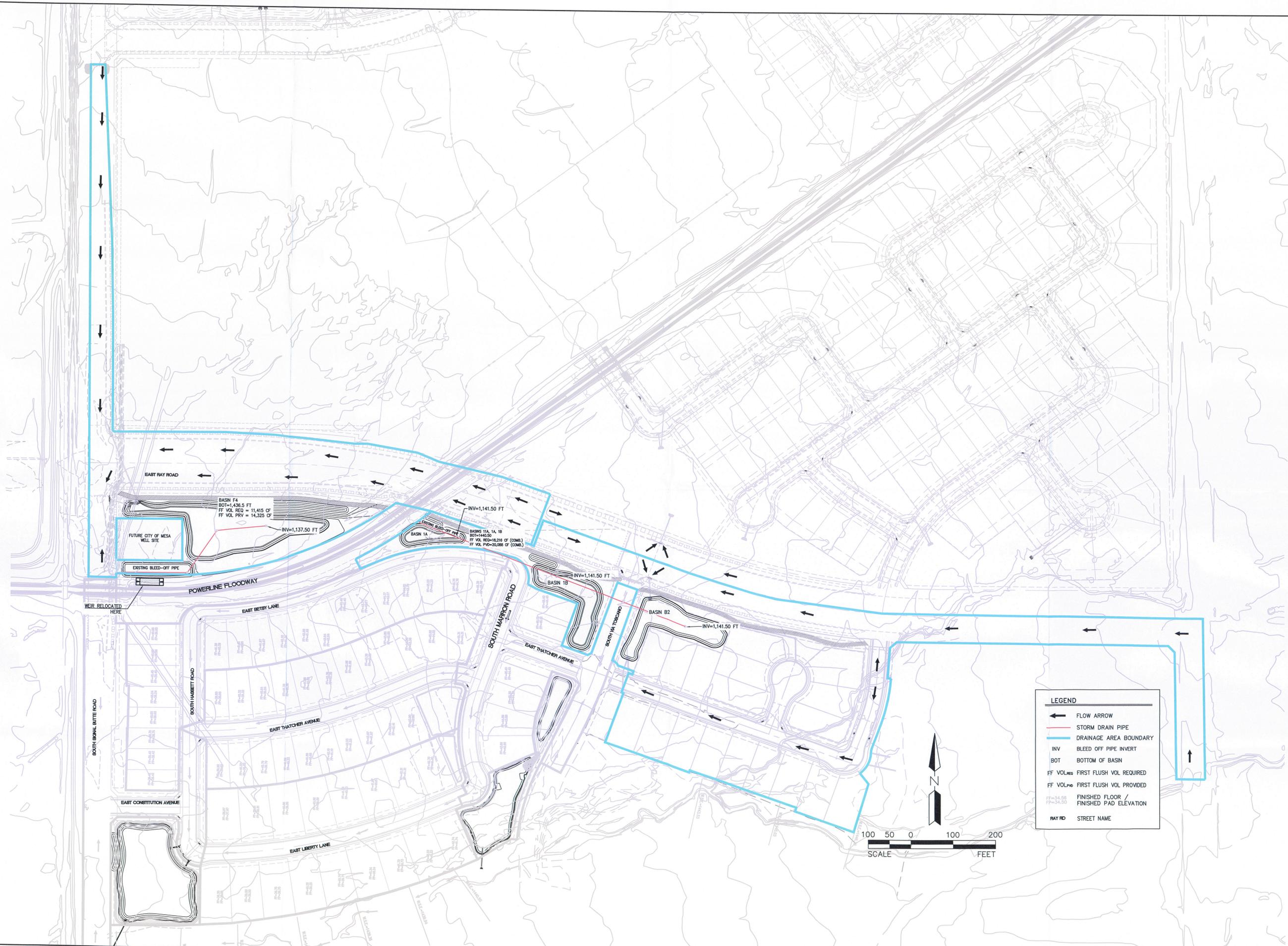
Project: Bella Villa-1229  
 Prepared by: JM



RUNOFF TYPE	EQUATION	VARIABLES	VALUE	UNITS
Retained Volume	<b>Flow Through Bleed-Off Pipe</b>	$C_o$ = orifice coefficient	0.67	N/A
	$Q_o = C_o A (2gh)^{1/2}$	$g$ = gravitational constant	32.2	ft/sec <sup>2</sup>
		$A$ = area of orifice	$= \pi * ((d/2)/12)^2$	ft <sup>2</sup>
		$d$ = orifice diameter	varies	in
	<b>Bleed-Off Pipe Drain Time</b>	Time = $A / Q_o * (H_2 - H_1)$	$A$ = surface area of water	varies
		$Q_o$ = orifice flow	varies	cfs
		$H_2, H_1$ = Depth of water	varies	ft

Basin 2A	Elevation (ft)	Area (ft <sup>2</sup> )	H (ft)	Incremental Volume	Orifice Diameter	Q <sub>o</sub> (cfs)	Drain Time (hr)
Bleed-Off Pipe	1440.00	16,134	1.0		3	0.747	0.0
	1439.00	13,466	0.0	14,800		0.187	22.0
				<b>Σ</b>		<b>14,800</b>	
Basin 3	Elevation (ft)	Area (ft <sup>2</sup> )	H (ft)	Incremental Volume		Q <sub>o</sub> (cfs)	Drain Time (hr)
Bleed-Off Pipe	1435.50	35,735	3.0		6		
	1434.50	32,695	2.0	34,215		1.669	5.7
	1433.50	29,766	1.0	31,231		1.293	6.7
	1432.50	26,937	0.0	28,352		0.747	10.5
			<b>Σ</b>	<b>93,797</b>			<b>23.0</b>
Basin 4	Elevation (ft)	Area (ft <sup>2</sup> )	H (ft)	Incremental Volume		Q <sub>o</sub> (cfs)	Drain Time (hr)
Bleed-Off Pipe	1439.00	33,716	1.5		3		
	1438.00	29,413	0.5	31,565		1.056	8.3
	1437.50	25,210	0.0	13,656		0.528	7.2
			<b>Σ</b>	<b>45,220</b>			<b>15.5</b>
Basins 1A, 1B, B2							Drain Time (hr)
Bleed-Off Pipe	1143.00	29,630	1.5		3		
	1142.50	23,350	1.0	13,245		1.180	3.1
	1141.50	20,193	0.0	21,772		0.747	8.1
			<b>Σ</b>	<b>35,017</b>			<b>11.2</b>

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**BELLA VIA**  
 MESA, ARIZONA  
**FIRST FLUSH DRAINAGE EXHIBIT**

DWG. NO.	1
SHT. 1 OF 1	
PROJ.#:	1229
DATE:	OCTOBER 2013
SCALE:	1"=100'
DRAWN:	JM
DESIGNED:	HW
APPROVED:	AT
REV:	