Plan #
Case # 14-DR-2021
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☒ Accepted
☐ Corrections
N.Baronas 11/12/2021
Reviewed By Date

PRELIMINARY DRAINAGE REPORT

FOR THE

NEW RECTORY BUILDING

At
St. Bernard of Clairvaux Catholic Church
10755 North 124th Street
Scottsdale, Arizona 85259

Case No. 866-PA-2020

For
The Roman Catholic Diocese of Phoenix
400 East Monroe Street
Phoenix, AZ 85004

For Submittal to:
City of Scottsdale
7447 E. Indian School Road
Scottsdale, Arizona 85251

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August 3, 2021

Job No. 20004

14-DR-2021_V2
10/4/2021

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Project Name, Location, Size and Brief Description 1

1.2 Type of Report 3

1.3 Purpose and Objective 4

1.4 Site Location Relative to Known FEMA Flood Hazard Zones 4

1.5 Previous Drainage Report 4

2 DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS 5

2.1 FEMA Flood Hazard Zone(s) 5

2.2 Offsite Drainage 7

2.3 Onsite Drainage 8

3 PROPOSED DRAINAGE PLAN (SEE EXHIBIT "B") 9

3.1 General Description of Proposed Drainage System and Components 9

3.2 Storm Water Storage Requirements 9

3.3 Stormwater Dissipation 12

4 FINISHED FLOOR ELEVATIONS 12

5 SPECIAL CONDITIONS 12

5.1 Storm Drain Maintenance 13

6 SUMMARY AND CONCLUSION 13

7 REFERENCES 14

FIGURES

Figure 1 Vicinity Map
Figure 2 Aerial Photo Map
Figure 3 Current FEMA FIRM Reference

EXHIBITS

Exhibit A Existing Drainage Conditions
Exhibit B PGD1 – Preliminary Grading Plan

APPENDICES

Appendix A Drainage Report by Hess-Rountree, 2010

1 INTRODUCTION

1.1 Project Name, Location, Size and Brief Description

This report for the new Rectory Building (Project Site) at St. Bernard of Clairvaux Catholic Church has been prepared by VESPRO, per the direction of Brent Maupin Engineering & Design as part of the permit and construction requirements to meet the City of Scottsdale (COS) and Flood Control District of Maricopa County (FCDMC) regulations.

The Project Site is located at 10755 North 124th Street, Scottsdale, AZ 85259, within a portion of the southeast quarter of Section 23, Township 3 North, Range 5 East of the Gila and Salt River Baseline and Meridian, Maricopa County, Arizona. The Project Site is further described as being located at the northeast corner of the 124th Street and East Sahuaro Drive intersection (See Figure 1 – Vicinity Map). The Project Site is bound by existing Church buildings to the south and west, Desert Mountain High School athletic fields to the north, and an existing wash and residential homes to the east (See Figure 2 – Aerial Photo Map).

The existing Church property and Project Site are zoned as R1-43 ELS.

The Church property consists of approximately 8.94 acres (excluding right-of-way). The proposed Rectory Site consists of approximately 0.71 acres (30,990 +/- square feet) net and is an undeveloped pad within the Church property. The Rectory will consist of a 3,540-sf livable, one story, 5-bedroom building and adjacent improvements.

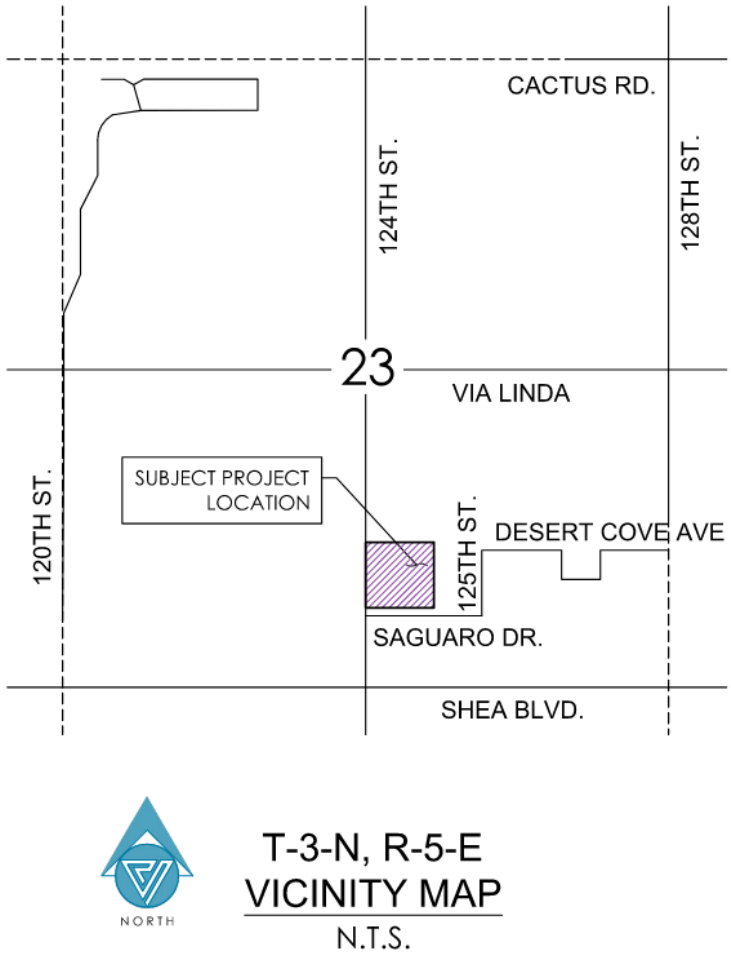


Figure 1 – Vicinity Map

Figure 2. Aerial Photo Map

1.1 Type of Report

This document is a Preliminary Drainage Report for the New Rectory Building at the St. Bernard of Clairvaux Catholic Church located at 10755 North 124th Street, Scottsdale, AZ 85259.

1.2 Purpose and Objective

The purpose and objective of this Drainage Report is to provide hydrologic and hydraulic analyses in conformance with the published City of Scottsdale Design Standards & Policies Manual and the design standards set forth by the Flood Control District of Maricopa County (FCDMC) as pertaining to the proposed Rectory Building. It is the intent of this report to identify existing and proposed conditions, and to meet the City of Scottsdale Requirements.

1.3 Site Location Relative to Known FEMA Flood Hazard Zones

According to FEMA FIRM Maps #04013C1780L and #04013C1785L, dated October 16, 2013, the Project Site is located within a Flood Zone 'X': Areas of 0.2% annual chance flood; areas less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood. See Figures 3A and 3B for the corresponding FEMA FIRMette(s).

1.4 Previous Drainage Report

The Church property was developed with the main Church and Parish office in 1998 and the Drainage Design was completed by Wood Patel Engineers. In 2010 the Parish Center was developed, and the Drainage Design was completed by Hess-Rountree. The Drainage Report by Hess-Rountree is included as Appendix A herein. The Drainage Report by Hess-Rountree included the Drainage Report by Wood Patel as Appendix B therein.

2 DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

2.1 FEMA Flood Hazard Zone(s)

According to the Flood Insurance Rate Map (FIRM) for Maricopa County and Incorporated Areas, Arizona, Panel Number(s) 04013C1780L and #04013C1785L, dated October 16, 2013, the Project Site is located within a Flood Zone 'X' (See Figure 3A & 3B – FEMA FIRMETTE Maps): The Federal Emergency Management Agency classifies this zone type as:

Zone X — Areas of 0.2% annual chance flood; areas less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

FIGURE 3A FIRMETTE

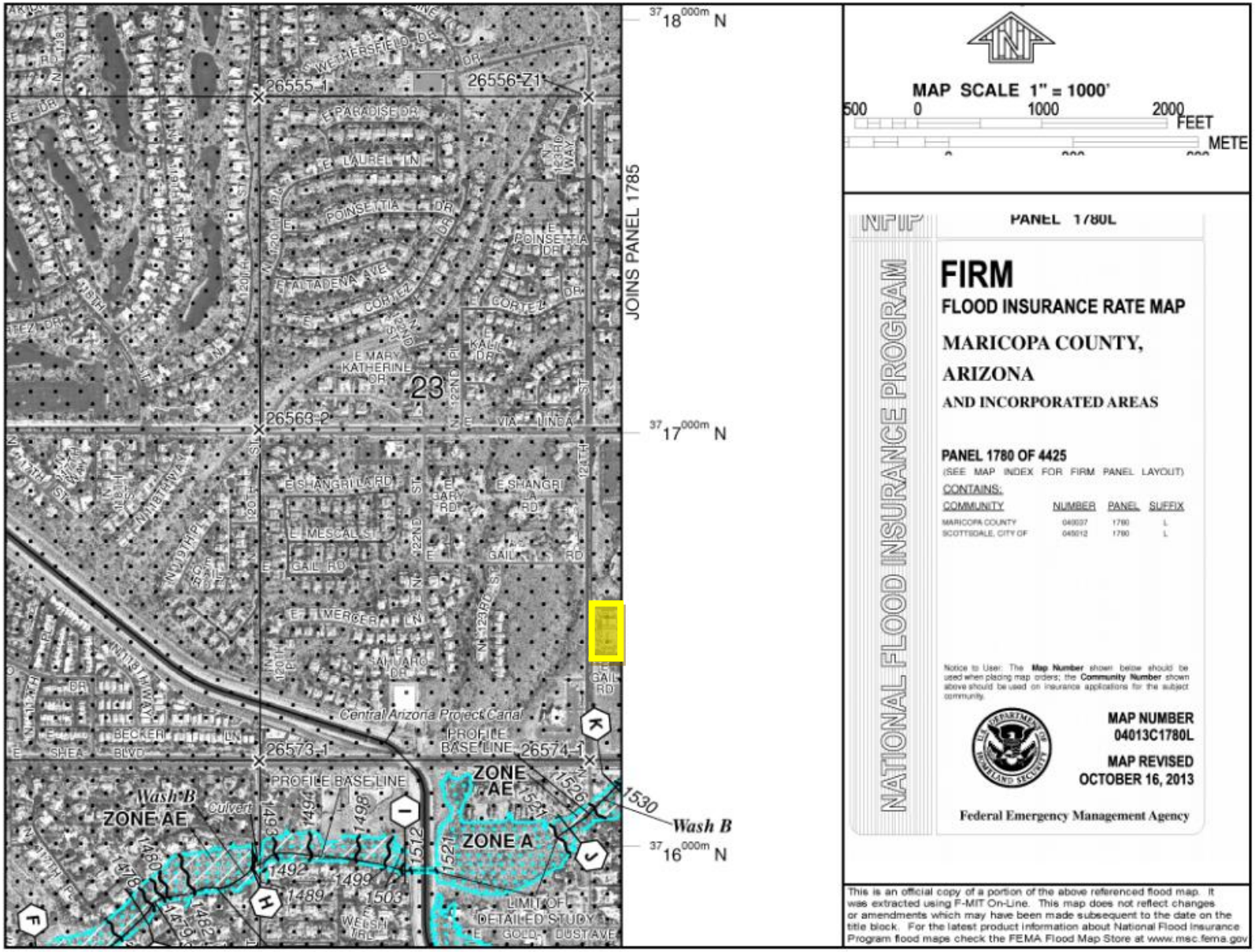
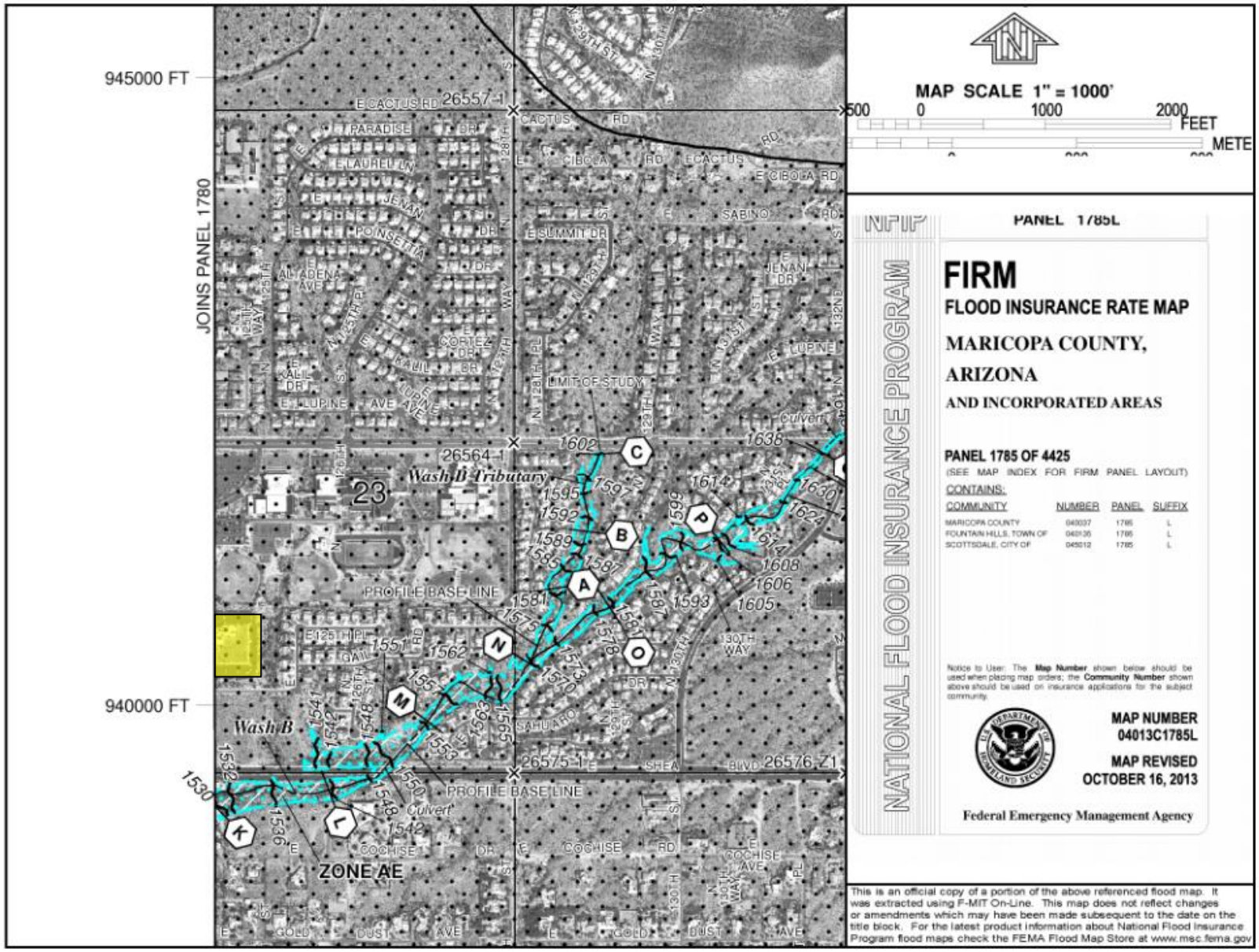


FIGURE 3B FIRMETTE



2.2 Offsite Drainage

As noted in the Hess-Rountree Drainage Report and the Wood-Patel Drainage Report, there no offsite stormwater flows which impact the site.

2.3 Onsite Drainage

As mentioned previously, the proposed Rectory Site lies on an undeveloped pad within the existing developed Church property. The Rectory Site is elevated above the surrounding developed portion of the Site. Existing topography shows that stormwater runoff generated within the Rectory Site boundary currently flows off the undeveloped, relatively flat, pad in all directions to existing parking lot area, existing landscaped areas, and existing walkway areas. Stormwater is directed via sheet flow and existing storm drain infrastructure to an existing detention basin. The outfall for the Church property is located near the southwest corner of the site at elevation 1228.37.

The Church property was developed with the main Church and Parish office in 1998 and the drainage design was completed by Wood Patel Engineers. In 2010 the Parish Center was developed, and the drainage was designed by Hess-Rountree. The report by Hess-Rountree is included herein as Appendix A. In the Drainage Report by Hess-Rountree included the Drainage Report by Wood Patel Appendix B therein.

The existing Church Site Drainage Plan was designed to capture all onsite generated storm-water run off in a series of detention basins. The stormwater runoff from the Rectory Site is detained in existing detention basins and the relevant existing detention basins for the Rectory Site are shown in Exhibit “A”.

Stormwater from the north side of the Rectory flows north to the existing detention basins (DB1 and DB2) located in the north parking lot. This flow is detained and is metered via small diameter pipes to the large surface detention basin (DB5) located at the south boundary of the property adjacent to Sahuaro Drive. Stormwater from the west side of the Rectory is routed south and then east along with the stormwater from the south side of the Rectory. This flow is routed via surface flow and drainage pipe. The drainage pipe drains directly into the existing detention basin DB5. Stormwater that flows into the east parking lot flows south to the existing detention basin DB5.

3 PROPOSED DRAINAGE PLAN (SEE EXHIBIT "B")

3.1 General Description of Proposed Drainage System and Components

As discussed within Section 2, the existing drainage system and components were designed for future complete buildout of the entire St. Bernard of Clairvaux property including the new Rectory.

The proposed Project Site generated stormwater will enter the existing storm drain infrastructure, detention basin, and then bleed through an existing 8-inch bleed pipe to the east channel, see Appendix "A" for details from Hess-Rountree and Wood-Patel Drainage Reports. No additional storm drain infrastructure or stormwater conveyance measures are proposed.

The ultimate outfall of the site is located at southeast corner of the site at an elevation of 1228.37.

As shown in Exhibit "B" stormwater will be routed from the northwest portion of the Rectory Site through a scupper through the sidewalk to existing detention basins DB1 and DB2 located within the north parking lot. The storm water from these detention basins are metered and flows to the large detention basin on the south side of the property adjacent to Sahuaro Drive.

Also shown in Exhibit "B" stormwater from the west side of the Rectory Site will be routed south and then east and flow via a combination of surface flow into the east parking area and into the drainage pipe south of the detention basin DB5. Stormwater from the southside of the Rectory Site, northeast side of the Rectory will flow into the east parking areas and then flow to drainage basin DB5. Stormwater from the southside of the Rectory, northeast side of the Rectory, and east side of the Rectory will flow to the east parking area and then flow to the Drainage Basin DB5.

3.2 Storm Water Storage Requirements

The City of Scottsdale has established a requirement to retain stormwater runoff falling within the property boundaries in accordance with the current City of Scottsdale Design Standards and Policy Manual (COS DS&PM), which includes the requirement to store the 100-year, 2-hour stormwater runoff volume. This volume is calculated below:

$$Vr = C\left(\frac{R}{12}\right) A$$

Where:

Vr = Required storage volume in cubic feet

C = The runoff coefficient utilized in the original Wood-Patel report was 0.95 for entire site

R = Precipitation amount, per approved NOAA Publication, depth in inches of the 100-year, 2-hour rainfall (2.35 inches), per NOAA website

A = Area of project site in square feet

The St. Bernard of Clairvaux Church property as mentioned previously is a developed site with only a small portion of the property reserved for the Rectory. The reserved area previously designated for the Rectory will be improved. Previous detention calculations for this property have been completed and used a precipitation depth of 2.82 inches for the 100-year, 2-hour storm event. The net Church property area based on a recent boundary survey and County GIS data is 389,620 square feet (SF). Subtracting the NAOS area, 65,208 SF (which matches the survey and the 2010 DR report), the net area is 324,412 SF. The resulting volume required was calculated as 77,350 cubic feet (CF). The precipitation depth for the area in which this property lies has been updated since 1998, per NOAA 2014, is 2.35.

A weighted average calculation for the runoff coefficient was preformed:

Weighted Runoff Coefficient Calculations

Project: 21001 St. Bernard

Prepared by: VESPRO **Date:** 7/29/2021

Drainage Area Label	Subarea (asphalt, landscape, roof, etc.)	Runoff Coefficient	Area (square feet)	Weighted Runoff Coefficient
Hardscape Area:	Ashalt/Concrete	0.95	176,533	
Landscaped Area	Landscape	0.40	147,879	
	Total		**324,412**	**0.70**

Therefore, the weighted runoff coefficient is 0.70. Utilizing the net area (324,421 SF, a precipitation depth of 2.35 inches and a 0.70 runoff coefficient, the required volume for the site is 44,473 CF.

Based on survey measurements, the volumes of the retention basins were calculated:

VOLUME PROVIDED

Average End Method:

$$V_{1\text{-}2} = (E_1 - E_2) * ((A_1 + A_2) / 2)$$

$V_{1\text{-}2}$	Storage Volume in cubic feet.
A_1	Top surface area in square feet.
A_2	Bottom surface area in square feet.
E_1	Top elevation in feet.
E_2	Bottom elevation in feet.

Detention Basin	*Elevation*	*Surface Area*	*Volume Provided*		*Depth*
(ID)	*(ft)*	*(ft^2)*	*(ft^3)*	*(Ac-ft)*	*(ft)*
DB1	1580.75	8,752	1,715	0.04	1.00
	1580.50	4,968	964	0.02	0.75
	1580.25	2,741	478	0.01	0.50
	1580.00	1,084	151	0.00	0.25
	1579.75	124			
		Subtotal	3,308	0.08	1.00
DB2	1580.75	8,029	1,545	0.04	1.00
	1580.50	4,329	792	0.02	0.75
	1580.25	2,007	314	0.01	0.50
	1580.00	504	65	0.00	0.25
	1579.75	17			
		Subtotal	2,716	0.06	1.00
DB3	1572.00	10,562	2,351	0.05	1.00
	1571.75	8,247	1,635	0.04	0.75
	1571.50	4,834	882	0.02	0.50
	1571.25	2,225	343	0.01	0.25
	1571.00	517			
		Subtotal	5,211	0.12	1.00
DB4	1572.00	13,621	2,930	0.07	1.00
	1571.75	9,818	1,924	0.04	0.75
	1571.50	5,578	914	0.02	0.50
	1571.25	1,733	257	0.01	0.25
	1571.00	326			
		Subtotal	6,025	0.14	1.00
DB5	1569.25	17,778	4,364	0.10	3.50
	1569.00	17,132	8,148	0.19	3.25
	1568.50	15,461	7,361	0.17	2.75
	1568.00	13,982	6,441	0.15	2.25
	1567.50	11,782	5,032	0.12	1.75
	1567.00	8,345	3,737	0.09	1.25

	1566.50	6,604	2,867	0.07	0.75
	1566.00	4,865	739	0.02	0.25
	1565.75	1,048			
		Subtotal	38,690	0.89	3.50
DB6	1575.00	1,886	436	0.01	2.50
	1574.75	1,601	369	0.01	1574.75
	1574.50	1,349	555	0.01	2.00
	1574.00	870	337	0.01	1.50
	1573.50	477	163	0.00	1.00
	1573.00	176	50	0.00	0.50
	1572.50	22			
		Subtotal	1,909	0.04	2.50
		Above Ground Site Total:	**57,859**	**1.33**	

The existing volume of retention basins as measured and calculated is 57,859 CF.

Therefore, the existing stormwater retention volume (57,859 CF) exceeds the required retention (44,473 CF).

3.3 Stormwater Dissipation

The existing detention system was designed to dissipate stormwater runoff generated from the 100-year storm event in less than 36 hours. The existing 8-inch bleed pipe dissipates the existing detention system (volume provided 57,859 cubic feet) within 36-hours. For additional information see previous Drainage Reports by Hess-Rountree in Appendix "A". Therefore, the existing 8" bleed pipe dissipates the retained stormwater in less than 36 hours.

4 Finished Floor Elevations

The finish floor elevation has been set at least 12 inches above the 100-year high water elevation of the adjacent channel to the east. The ultimate outfall is a bleed pipe linking the dissipation basin BD5 to the east wash. Refer to Drainage Exhibit B.

5 Special Conditions

There are no special conditions required for this site.

5.1 Storm Drain Maintenance

Ongoing maintenance of the existing drainage systems is required to preserve their design integrity. Poor maintenance can prevent the system from performing to its intended design purpose and can result in reduced performance. Maintenance is the responsibility of the property owner for facilities on private property. A regular maintenance program is required to have drainage systems perform to the level of protection or service as presented in this report and the project's plans and specifications.

6 SUMMARY AND CONCLUSION

The Drainage Report describes the existing and proposed site conditions, and identifies the 100-year, 2-hour storm detention requirements for the property and Project Site. And identifies the proposed Drainage Design for the new Rectory addition. The proposed drainage improvements include:

- Identification of the existing stormwater improvements that adequately capture and convey the 100-year storm and conveys the flows to onsite detention basins.
- The existing onsite stormwater retention volume far exceeds the required retention by approximately 30%.
- The volume of stormwater detained on site will dissipate in less than 36 hours, via the 8-inch bleed line.
- The proposed finished floor elevation is at least 12 inches above the lowest adjacent back of curb elevation.
- The Rectory Addition will be constructed in accordance with previously approved Drainage Design for the Church Campus and in conformance with the published City of Scottsdale Design Standards & Policies Manual and the design standards set forth by the Flood Control District of Maricopa County.

7 REFERENCES

i. City of Scottsdale Design Standards & Policies Manual, 2018

ii. Hess-Rountree Drainage Report, May 2010

iii. Wood, Patel & Associates, Inc., Final Drainage Report Fore St. Bernard of Clairvaux, January 1998

iv. Hess-Rountree As-built Civil Plans

v. Church, Parish Center, and Parish Office As-Built Plans

vi. Flood Control District of Maricopa County, Hydrology Drainage Design Manual for Maricopa County, Arizona, August 2013

vii. Flood Control District of Maricopa County, Hydraulics Drainage Design Manual for Maricopa County, Arizona, August 2013

viii. Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas, Panel Number 04013C2235L, revised October 16, 2013.

Appendix A

Drainage Report

By Hess-Rountree, 2010