Wastewater Study

Wastewater Basis of Design Report

Happy Valley 18

FINAL Basis of Design Report

☐ APPROVED

☑ APPROVED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE

SCOTTSDALE WATER

9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY scan **DATE** 2/21/2020

Prepared for:

Camelot Homes, Inc.
6607 North Scottsdale Road, Suite H-100
Scottsdale, AZ 85250

See text on page 2 concerning chemical pad required at plat. also noted on System Layout

Prepared by:

Kimley-Horn & Associates, Inc.
7740 North 16th Street, Suite 300
Phoenix, AZ 85020

Registered Professional Engineer (Civil)
CERTIFICATE NO.
62557
JAYME
THOMA
Date Signed: 01-20-2020
ARIZONA, U.S.A.

Kimley»Horn

291104098
January 2020

13-ZN-2019
1/28/2020

Contents

Appendices

1.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this wastewater basis of design report for the proposed residential development at the southwest corner of Alma School Road and Happy Valley Road in Scottsdale, Arizona. This report will demonstrate that the proposed project conforms to the City of Scottsdale design requirements.

Happy Valley 18, the "project", encompasses approximately 29 acres and contains a total of 21 single family residential lots. The project lies within a portion of the southwest quarter of Section 8, Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. More specifically, the project is bounded by Alma School Road to the east, Happy Valley Road to the north, with single family residential subdivisions to the north, east, and west. The site slopes from the northeast to the southwest at approximately 4.0%. Refer to **Figure 1** in **Appendix A** for the project Vicinity Map.

2.0 WASTEWATER COLLECTION SYSTEM

2.1 SYSTEM LAYOUT

There is an existing 12" sanitary sewer main in Alma School Road that flows to the south towards Pinnacle Peak Road. A proposed 8" sewer main is proposed to connect to the existing 12" sewer in Alma School at the southeast portion of the project. The 8" line is aligned in Tract A until the southern leg where the 8" line turns south in the proposed water and sewer easement. From there, the proposed 8" sewer line tees in East Desert Vista Drive where it remains an 8" line. To the west the line terminates in the existing cul-de-sac in a proposed manhole. To the east, the proposed 8" sewer line continues until it taps into the existing 12" sewer main in Alma School Road. A new manhole will be required at the point of connection in Alma School Road. A majority of the sewer will be located within the private street tract, Tract A, with a blanket water and sewer facilities easement located over it. The portion of the sewer outside the private street tract will be within a 30-foot water and sewer facilities easement.

Due to odor issues in Alma School sewer a chemical dosing station will be required with site dimensions of 30 ft X 40 ft . The site will have access to a manhole for the chemical feed. Final determination of the design and location will be made at the time of preliminary plat and will be made as a stipulation of approval

All 8" sewer lines will be PVC SDR 35 at a minimum slope of 0.52%. Sewer Manhole sections and cones will be precast concrete as detailed in the MAG Standard Detail No. 420, without the manhole steps and/or cast in anchors for steps. Manholes shall be 4 feet in diameter, and for depths less than 10 feet. Manholes shall be 5 feet in diameter for all depths greater than 10 foot. Refer to **Figure 2** in **Appendix A** for the wastewater layout.

2.2 SYSTEM ANALYSIS AND RESULTS

To determine the capacity of the proposed onsite wastewater collection system, design flows were calculated and analyzed with minimum pipe design slopes. Design flows are calculated based on the criteria in Section 7-1.403 of **Reference 1**. For residential developments, the design flow is 100 gallons per capita per day (gpcd) with a peaking factor of 4. Residential densities are assumed to be 2.5 persons per dwelling unit. Average Day Flow (ADF) and Peak Day Flow (PDF) are summarized in Table 2 below:

Table 2: Wastewater Design Flows

# DUs	Density (persons/DU)	Design flow (gpcpd)	ADF (GPD)	Peaking Factor	PDF (GPD)	PDF (GPM)
21	2.5	100	5,250	4.0	21,000	14.59

Sanitary sewer lines will be designed to maintain a full flow velocity between 2.5 ft/sec – 10 ft/sec with a maximum depth to diameter ratio (d/D) of 0.65 in the ultimate peak flow condition. To achieve the velocity requirements, the minimum slope of 0.52% and maximum slope of 8.33% will be utilized. Using the peak flow calculated in **Table 2** and the minimum design slope, an 8" sewer main has the capacity to convey the proposed design flows with a flow depth of 1.08" and a d/D ratio of 0.14. Sewer pipe capacity calculations can be seen in **Appendix B**.

3.0 CONCLUSION

This project proposes a new 8” sanitary sewer main to serve the proposed development which will gravity flow into the existing 12” sanitary main in Alma School Road. Based on the analysis in this report, an 8” sewer main has the capacity to convey the proposed design flow for the development.

4.0 REFERENCES

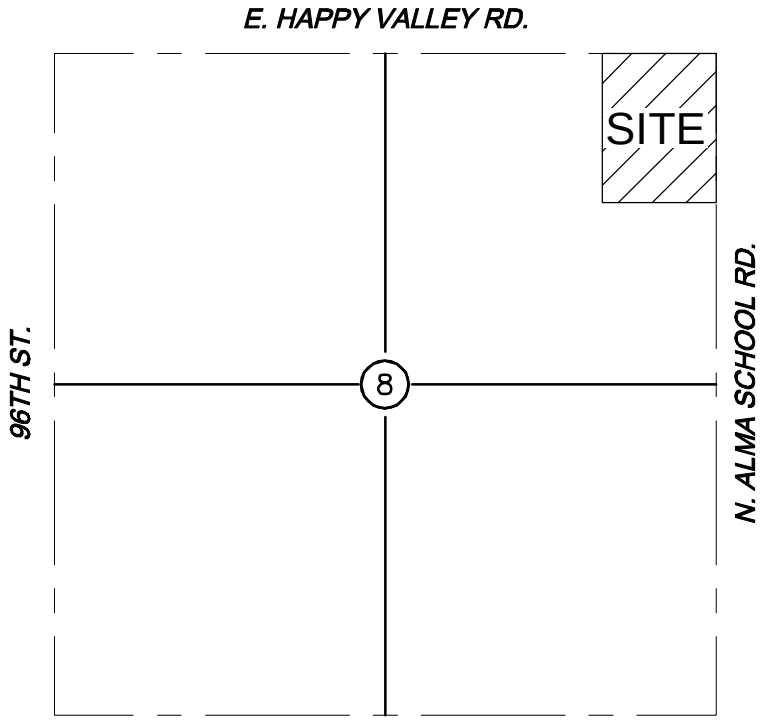
1. City of Scottsdale, *Design Standards and Policies Manual.* 2018.

2. International Code Council, *2015 International Fire* Code. May 2014.

Appendix A – Figures

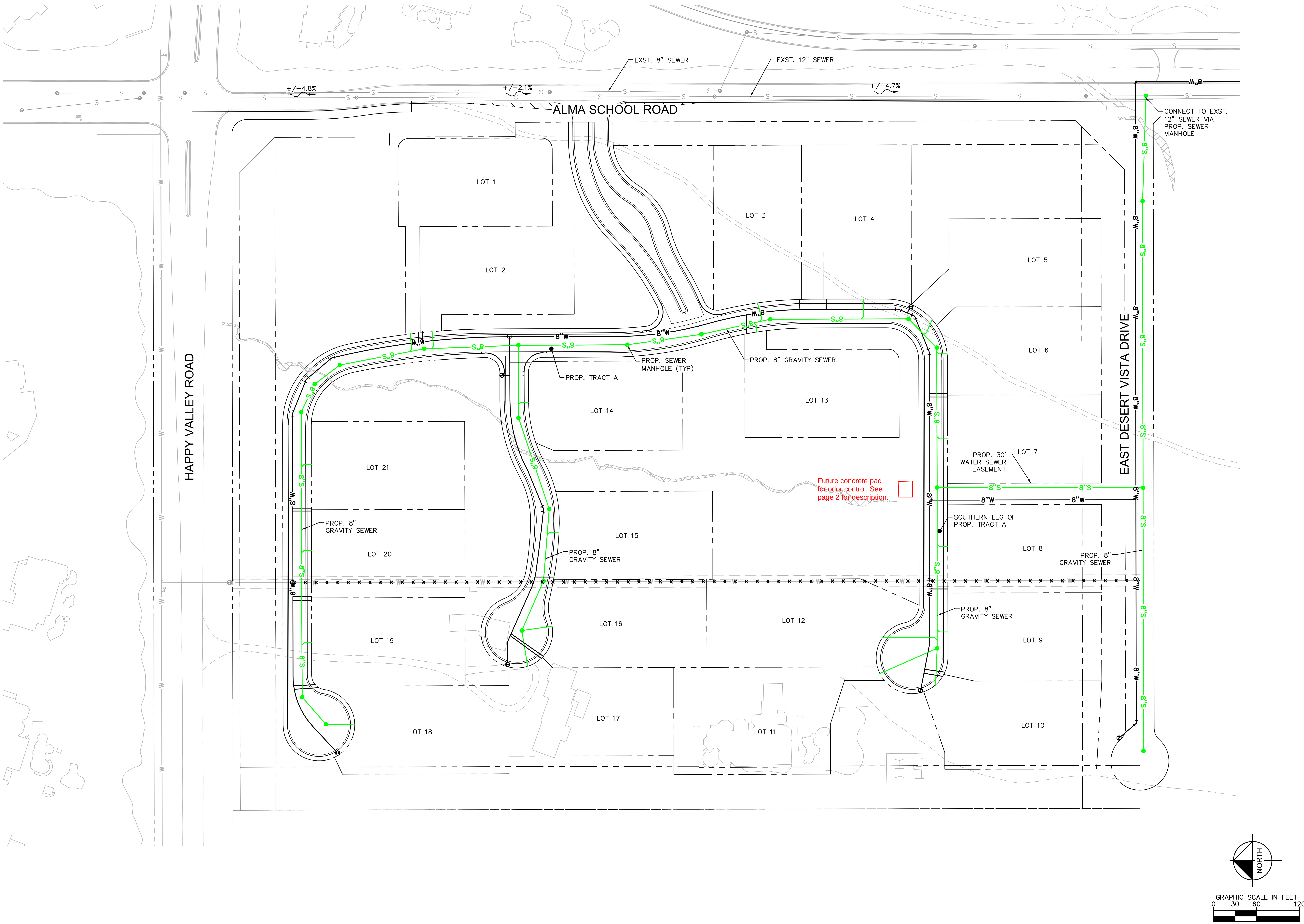
Figure 1 – Vicinity Map

Figure 2 – Wastewater Layout



PROJECT NO. 291104098 DRAWING NAME 1 OF 1		HAPPY VALLEY 18 FIGURE 1 VICINITY MAP	SCALE (H): NTS SCALE (V): NTS DESIGNED BY: MML DRAWN BY: MML CHECKED BY: MML DATE: 5/30/2019	Kimley»Horn 7740 North 16th Street, Suite 300 Phoenix, Arizona 85020 (602) 944-5500	

13-ZN-2019
1/28/2020



HAPPY VALLEY 18
SCOTTSDALE, ARIZONA
FIGURE 2
WASTEWATER LAYOUT

SCALE (H): 1"=60'
SCALE (V): NONE
DESIGNED BY: JRT
DRAWN BY: JRT
CHECKED BY: CLB
DATE: 01/20/2020

Kimley»Horn

7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

NO.	REVISION	BY	DATE	APPR.

PROJECT NO.

DRAWING NAME

OF

13-ZN-2019
1/28/2020

Appendix B – Sewer Capacity Calculations

13-ZN-2019
1/28/2020

Worksheet for 8" Capacity

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.00520	ft/ft
Diameter	8.0	in
Discharge	21,000.00	gpd

Results		
Normal Depth	1.1	in
Flow Area	0.0	ft²
Wetted Perimeter	0.5	ft
Hydraulic Radius	0.7	in
Top Width	0.45	ft
Critical Depth	1.0	in
Percent Full	13.2	%
Critical Slope	0.00722	ft/ft
Velocity	1.19	ft/s
Velocity Head	0.02	ft
Specific Energy	0.11	ft
Froude Number	0.856	
Maximum Discharge	606,286.92	gpd
Discharge Full	563,617.75	gpd
Slope Full	0.00001	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	13.5	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.1	in
Critical Depth	1.0	in
Channel Slope	0.00520	ft/ft
Critical Slope	0.00722	ft/ft

Worksheet for 8" Full Flow Capacity

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00520	ft/ft
Normal Depth	8.00	in
Diameter	8.00	in
Discharge	563617.75	gal/day

Results

Discharge	563617.75	gal/day
Normal Depth	8.00	in
Flow Area	0.35	ft²
Wetted Perimeter	2.10	ft
Hydraulic Radius	2.00	in
Top Width	0.00	ft
Critical Depth	0.44	ft
Percent Full	100.0	%
Critical Slope	0.00857	ft/ft
Velocity	2.50	ft/s
Velocity Head	0.10	ft
Specific Energy	0.76	ft
Froude Number	0.00	
Maximum Discharge	0.94	ft³/s
Discharge Full	0.87	ft³/s
Slope Full	0.00520	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 8" Full Flow Capacity

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.00	in
Critical Depth	0.44	ft
Channel Slope	0.00520	ft/ft
Critical Slope	0.00857	ft/ft