SEWER BASIS OF DESIGN

Cielo Stellato

Accepted for
City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258
Doug Mann 6.8.16

Prepared for:

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7440 E. Pinnacle Peak Road
Scottsdale, AZ 85255

Prepared by:

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29101500
May 2016

Preliminary Sewer Basis of Design

CIELO STELLATO

MAY 2016

Prepared By:

Kimley»Horn

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INTRODUCTION

INTENT

The purpose of this sewer report is to support the sanitary sewer system for the proposed Cielo Stellato residential development located at the northeast corner of Lone Mountain Parkway and Via Cortana Road in Scottsdale, Arizona. This report presents the basis of design criteria that will be used for the engineering design of the proposed development utilizing current sewer design standards and guidelines set forth by the City of Scottsdale, Arizona.

PROJECT DESCRIPTION

Cielo Stellato is located within Section 33 of Township 6 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The site is bound to the west by Lone Mountain Parkway and Via Cortana Road to the south. The site is surrounded by existing single family residential developments. See **Appendix A: Site Location Map**

Cielo Stellato is a proposed 20-acre single family residential subdivision, consisting of 14 single family residential units. The existing and proposed zoning of the project is R1-43.

DISTRIBUTION SYSTEM DESCRIPTION

EXISTING COLLECTION SYSTEM

The site is surrounded by existing single family residential development. Per the City of Scottsdale Quarter Section Map 61-54 there is an existing 8-inch PVC sewer stub located at the intersection of Lone Mountain Parkway and Cortana Road. The stub is extended from a 24' deep manhole at the intersection to the project property boundary.

PROPOSED COLLECTION SYSTEM

The proposed Cielo Stellato gravity sewer system will connect to the City of Scottsdale sewer stub at the southwest corner of the site. The proposed on-site collection system will consist of an 8" PVC gravity sewer line that will collect and convey wastewater flows generated by the site. Refer to **Appendix B** for the Proposed Sewer System Layout Exhibit.

BASIS OF DESIGN

DESIGN METHODOLOGY

Average Day Demand design flows are calculated based on design criteria detailed within the City of Scottsdale Design Standards and Polices Manual (DS&PM). Per DS&PM Chapter 7, a design flow of 100 gallons per capita per day (gpcpd) shall be used. The DS&PM also requires a peaking factor of 4.0 and a

residential density of 2.5 persons per dwelling unit. Water System Analysis. See **Table 1** below for a summary of sewer demands.

Table 1 Sewer Demands

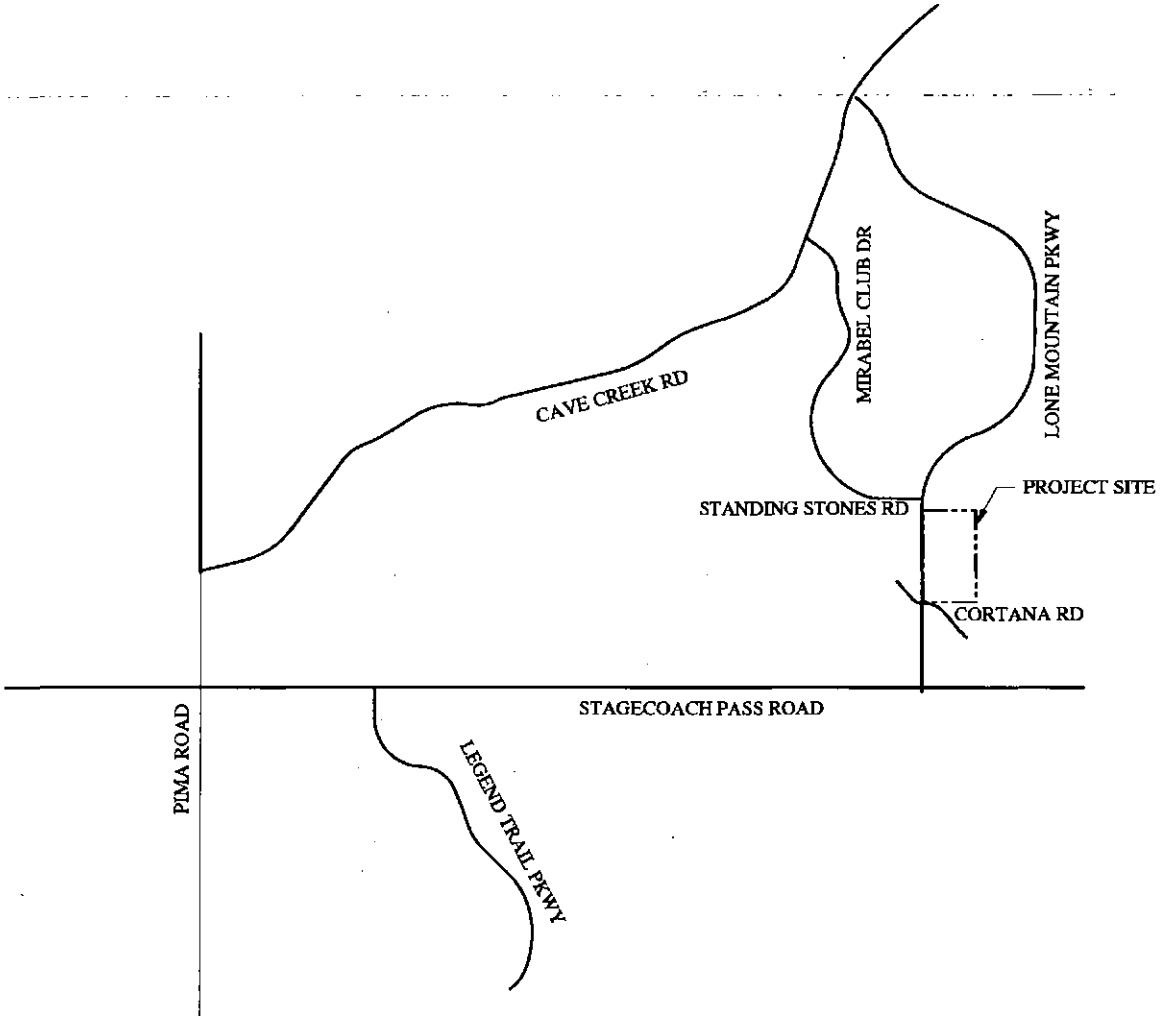
Land Use	Dwelling units (du)	Density (persons/ du)	Population (persons)	Average Day Demand (gpd)	Peak Flow (gpd)	Peak Flow (gpm)
	14	2.5	35	3,500	14,000	9.7

Per the DS&PM proposed sewer lines were designed to achieve a full flow velocity of between 2.5 and 10 feet per second and maintain a maximum d/D ration 0.65 when calculated with a Manning's "n" value of 0.013. To satisfy these requirements the proposed public 8-inch sewer will meet be design with a minimum slope of 0.0052 ft/ft (0.52%) and a maximum slope of 0.0833 ft/ft (8.33%). See **Appendix C** for pipe slope calculations.

WASTEWATER SYSTEM ANAYLSIS AND RESULTS

To determine the capacity of the proposed wastewater collection system, the peak design flow was analyzed within the minimum design pipe slope. At the minimum design slope of 0.0052 ft/ft an 8-inch line has the capacity to convey approximately 563,000 gallons per day. An 8-inch line at the minimum design slope can convey the proposed peak design flow of 14,000 gallons per day at a normal depth of 0.07' or a d/D ratio of 0.10, at a velocity of 1.05 ft/s. **See Appendix C – Flowmaster Calculations** for pipe capacity calculations.

Appendix A – Site Location Map



CIELO STELLATO
VICINITY MAP
NTS

Kimley»Horn

Appendix B – Proposed Sewer System Layout

PROJECT BOUNDARY

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

8 9 10 11 12 13 14

7 6 5 4 3 2 1

PROP. GRAVITY SEWER

SEE DETAIL A ON SHEET 2

CORTANA ROAD

EX. 45' ROW

EX. 45' ROW

LONE MOUNTAIN PARKWAY

EX. CLEANOUT

PROP. MH

EX. MH

PROP. MANHOLE/
CONNECT TO EX. SEWER STUB

EX. 8" PVC SEWER

S EXISTING SEWER LINE

S PROPOSED SEWER LINE

NO.	REVISION	DATE

Kimley»Horn

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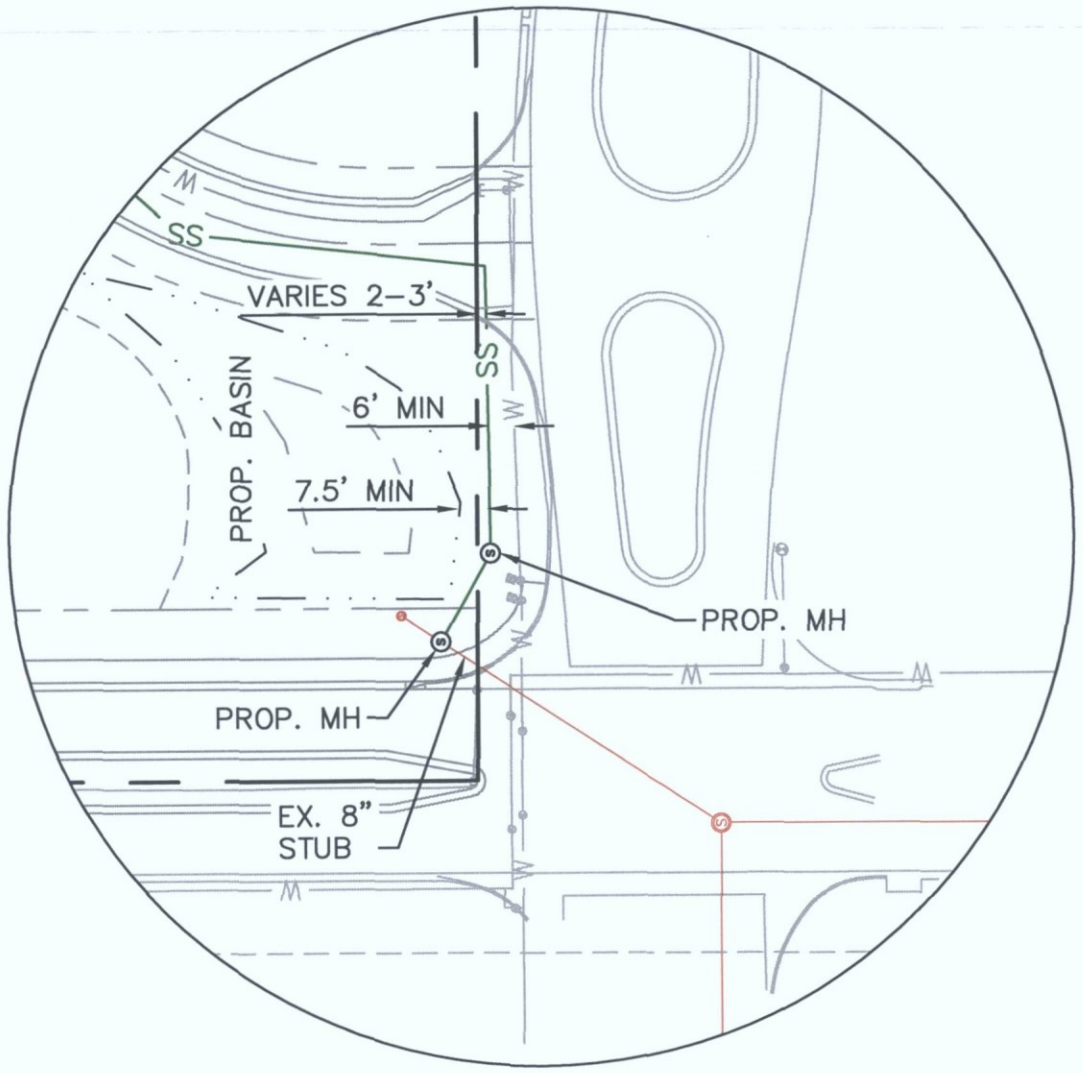
Phoenix, Arizona 85020 (602) 944-5500

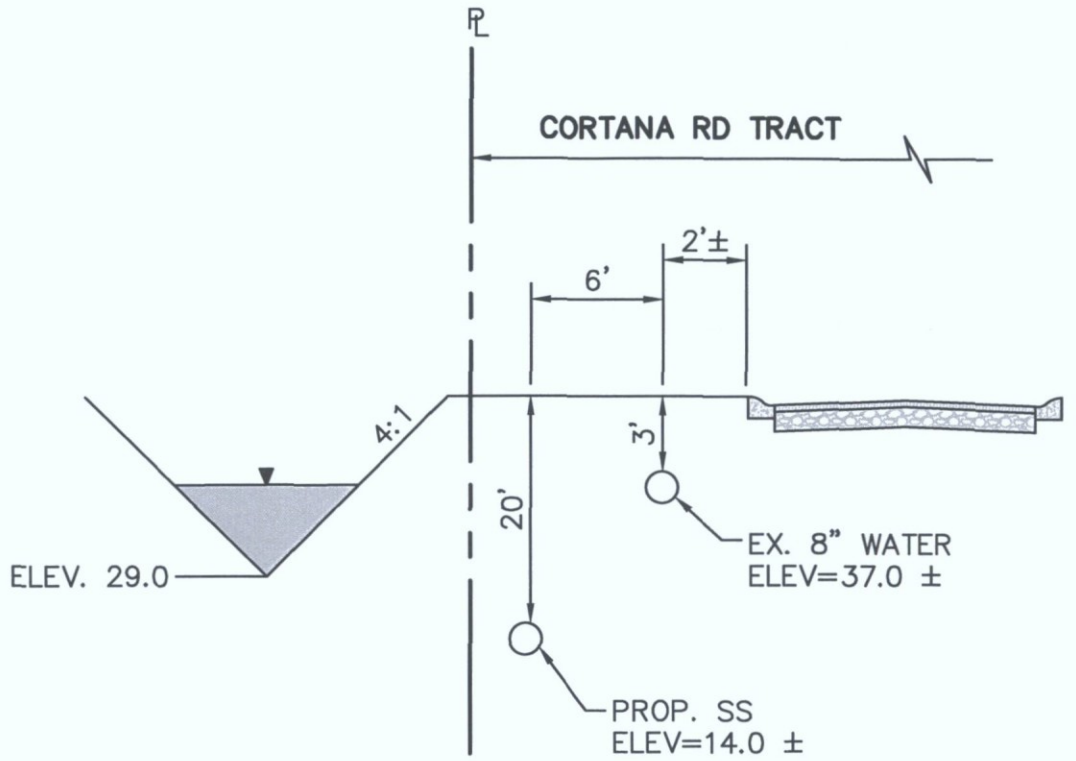
SCALE (H): 1"=100'
SCALE (V): NONE
DESIGNED BY:
DRAWN BY:
CHECKED BY:
DATE: MAY 2016

CIELO STELLATO
SEWER BOD
SEWER SYSTEM LAYOUT
SCOTTSDALE ARIZONA

PROJECT NO.
191919000
DRAWING NAME
WSL.DDWG
1 OF 2



DETAIL A



SECTION A

N.T.S.

NO.	REVISION	DATE

Kimley»Horn

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

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CIELO STELLATO
SEWER BOD
SEWER SYSTEM LAYOUT
SCOTTSDALE ARIZONA

PROJECT NO.
191919000

DRAWING NAME
WSL.DDWG

2 OF 2

Appendix C – Flowmaster Calculations

Worksheet for 8-Inch Full - Min

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	0.67	ft
Diameter	0.67	ft
Discharge	563167.59	gal/day

Results

Discharge	563167.59	gal/day
Normal Depth	0.67	ft
Flow Area	0.35	ft^2
Wetted Perimeter	2.09	ft
Hydraulic Radius	0.17	ft
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	ft^3/s
Discharge Full	0.87	ft^3/s
Slope Full	0.00520	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

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

Worksheet for 8-Inch Full - Min

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.44	ft
Channel Slope	0.00520	ft/ft
Critical Slope	0.00857	ft/ft

Worksheet for 8-Inch Full -Max

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.08330	ft/ft
Normal Depth	0.67	ft
Diameter	0.67	ft
Discharge	2254023.72	gal/day

Results

Discharge	2254023.72	gal/day
Normal Depth	0.67	ft
Flow Area	0.35	ft^2
Wetted Perimeter	2.09	ft
Hydraulic Radius	0.17	ft
Top Width	0.00	ft
Critical Depth	0.66	ft
Percent Full	100.0	%
Critical Slope	0.07763	ft/ft
Velocity	9.99	ft/s
Velocity Head	1.55	ft
Specific Energy	2.22	ft
Froude Number	0.00	
Maximum Discharge	3.75	ft^3/s
Discharge Full	3.49	ft^3/s
Slope Full	0.08330	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

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

Worksheet for 8-Inch Full -Max

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.66	ft
Channel Slope	0.08330	ft/ft
Critical Slope	0.07763	ft/ft

Worksheet for 8-Inch Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00520	ft/ft
Diameter	0.67	ft
Discharge	14000.00	gal/day

Results

Normal Depth	0.07	ft
Flow Area	0.02	ft^2
Wetted Perimeter	0.45	ft
Hydraulic Radius	0.05	ft
Top Width	0.42	ft
Critical Depth	0.07	ft
Percent Full	10.9	%
Critical Slope	0.00761	ft/ft
Velocity	1.05	ft/s
Velocity Head	0.02	ft
Specific Energy	0.09	ft
Froude Number	0.84	
Maximum Discharge	0.94	ft^3/s
Discharge Full	0.87	ft^3/s
Slope Full	0.00000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	10.87	%
Downstream Velocity	Infinity	ft/s

Worksheet for 8-Inch Capacity

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.07	ft
Critical Depth	0.07	ft
Channel Slope	0.00520	ft/ft
Critical Slope	0.00761	ft/ft