Preliminary Engineering Report
Prepared: October 2016

StoryRock
Lift Station #1

Accepted For:
City of Scottsdale
Water Resources Department
9379 E. San Salvador
Scottsdale, Arizona

By: CHRIS HASSERT
Date: 12/20/2016

NO COMMENTS

Prepared for:

CAV-RANCH, LLC.
14400 North 7th Place
Scottsdale, Arizona 85260

Prepared by:

Kimley-Horn and Associates, Inc.
7740 N. 16th Street, Suite 300
Phoenix, AZ 85020
(602) 944-5500

191069013

Kimley»Horn

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Expires 09/30/17

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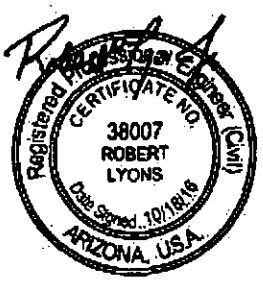

Expires 09/30/17

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EXECUTIVE SUMMARY

The purpose of this report is to provide preliminary design analysis for the construction of a new lift station serving StoryRock, a proposed master planned community development consisting of 462-acres of single family residential construction. The purpose of this report is to provide for review and comment a preliminary design for the lift station layout, pumping alternatives, and associated pumping and force main options. The following points summarize the findings of the preliminary design work that has been completed to date:

Lift Station Analysis Site Analysis

- Analyzed location based on the following criteria; existing topography, proximity to a 100-year flood plain, integration with the proposed gravity sewer system along N 128th Street.

Pumps

- Two 23hp pumps to be installed to accommodate an anticipated 100 gpm flow.

Force Main Analysis

- Preliminary alignment and sizing options for redundant force main lines based on flow and pump requirements for StoryRock site development.

Electrical Systems Analysis and Instrumentation

- Electrical and instrumentation needs for the lift station include: power delivery and collaboration with utility, design of control specifics, lighting design, and instrumentation selection and implementation.

Odor Control Analysis

- Options to install odor control into either wet well and gravity sewer manhole. Odor control will not be required at the lift station site, however the site will be configured so that a chemical feed system could fairly easily be added at a later time.

Opinion of Probable Cost (OPC)

- An OPC was generated for the proposed lift station improvements which is estimated to at $454,000. OPC can be found in **Appendix H.**

INTRODUCTION

1.1 Project Background

StoryRock is a proposed master planned community development consisting of 462 acres of single family residential construction. StoryRock is located within Section 12 of Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The site is bound to the north by the Happy Valley Road Alignment and to the west by 128th Street. The Pinnacle Peak Road alignment bounds the site to the south. The McDowell Sonoran Preserve boarders the site to the east and portions of the site to the north and south. See **Figure 1: Vicinity Map** & **Figure 2 – StoryRock Vicinity Map.** The proposed site is located within the City of Scottsdale and falls under the City's Environmentally Sensitive Lands Ordinance (ESLO). Residential development is planned at a density of 0.96 dwelling units per acre within Environmentally Sensitive Lands (ESL).

This Preliminary Engineering Report for StoryRock establishes lift station design parameters and criteria for site planning and preliminary design. The report presents a conceptual layout of the Lift Station #1 site and associated pump and force main options. Wastewater demands have been calculated based on the overall development layout presented in the *Cavalliere Ranch Sewer Master Plan.*

1.2 Project Scope

Kimley-Horn's design team preformed the following services as part of this preliminary analysis:

- Review of existing and proposed water/wastewater information
- Prepare an overall wastewater drainage area map of the service area
- Identify the lift station site
- Identify pump sizing to convey the proposed interim and ultimate peak design flows
- Prepare site layout exhibits
- Prepare preliminary OPC

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OS4
128TH STREET
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B2
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OS5
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C6
D2
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ALAMEDA DRIVE
ALAMEDA
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G1
FAMILY VILLAGE
E1
100' SCENIC CORRIDOR
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PINNACLE PEAK ALIGNMENT
PINNACLE PEAK (ALIGN)
NORTH
GRAPHIC SCALE IN FEET
0 250 500 1000
TOMS THUMB TRAILHEAD

PROJECT NO. 191069020
DRAWING NAME SITE LAYOUT

STORYROCK
ENGINEER DESIGN REPORT
LIFT STATION #1 VICINITY MAP
SCOTTSDALE, ARIZONA

SCALE (H): 1"=500'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: MRN
CHECKED BY: REL
DATE: OCT 2016

Kimley»Horn

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Phoenix, Arizona 85020 (602) 944-5500

NO. REVISION DAT

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128TH STREET
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ALAMEDA
OS3
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FAMILY VILLAGE
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100' SCENIC CORRIDOR
F5
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PINNACLE PEAK ALIGNMENT
PINNACLE PEAK (ALIGN)
NORTH
GRAPHIC SCALE IN FEET
0 250 500 1000
TOMS THUMB TRAILHEAD

DRAWING NAME: SITE LAYOUT	PROJECT NO. 191069020		STORYROCK ENGINEER DESIGN REPORT STORYROCK VICINITY MAP SCOTTSDALE, ARIZONA	SCALE (H): 1"=500' SCALE (V): NONE DESIGNED BY: ZJH DRAWN BY: MRN CHECKED BY: REL DATE: SEPT 2016	Kimley»Horn	NO.	REVISION / DATE

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Phoenix, Arizona 85020 (602) 944-5500

2.0 Design Criteria

2.1 Lift Stations

See **Appendix A – City of Scottsdale Sewer Lift Station Design Criteria**.

The City of Scottsdale Design Guide, Chapter 7 "Wastewater" can be found in **Appendix B** and contains the following information regarding wastewater lift stations:

The City's Water Operations maintains a separate document outlining the design, specifications and materials required for City owned and maintained wastewater lift station. This document may be viewed at www.ScottsdaleAZ.gov/bldgresources/counterresources/WaterFeePacket.

A. Site Selection
In selecting a site for the sewage lift station, considerations included accessibility, drainage patterns, visual impact, function and design constraints.

The station's equipment must be protected from damage and remain operable during a 100-year flood plain. The proposed site is located outside the 100-year flood plain.

Unless otherwise agreed to in writing by the City's rights-of-way agent, the tract or lot dedicated to the City will be conveyed by a general warranty deed and accompanied by a title policy in favor of the City, both to the satisfaction of the City.

B. Lift Station Design
Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control," contains minimum requirements for a wastewater lift station. At a minimum, telemetry, dual pumps, backup power supply, three-phase power, provisions for future odor control, and perimeter walls will be required. The site will also be large enough to contain all the equipment and service equipment for repairs.

A final design report prepared by a registered professional engineer, licensed in the State of Arizona, must accompany all pump station design drawings and specifications submitted to the City for review.

2.2 Force Main

City of Scottsdale staff has indicated that force mains smaller than 4 inches will require a parallel force main with interconnecting valves.

The City of Scottsdale Design Guide, Chapter 7 "Wastewater" can be found in **Appendix B** and contains the following information regarding Force Main Design:

Force mains will be located within a right-of-way, private street tract or utility easement. The line must be located under pavement where possible.

A. Velocity Requirements

The flow velocity in the force main must be between 3 and 6 feet per second (fps).

B. Materials of Construction
All pipe material used in design of the force mains must have established ASTM, ANSI, AWWA and NSF standards of manufacture or seals of approval and shall be designated as pressure sanitary sewer pipe. Force mains must be identified as such with marking tape 1 foot above the pipe. All ductile iron force mains shall be lined.

C. Air Release Valves
Air release valves designed for sewage must be provided on force mains at all peaks in elevation see City of Scottsdale (COS) Standard Detail No. 2405, www.ScottsdaleAZ.gov/design/COSMAGSupp..

D. Cleanouts
Two-way cleanouts shall be provided every 1,300 feet apart or 1-way cleanouts every 650 feet. Single cleanouts must be provided at all horizontal bends oriented in line with the downstream pipe. See COS Standard Detail No. 2403, www.ScottsdaleAZ.gov/design/COSMAGSupp.

E. Force Mains
Force mains will be constructed with 3 ½" schedule 40 PVC pipe. Force mains will be constructed of restrained ductile iron pipe for the following conditions:
1. All locations where a vertical realignment is required;
2. Drainage wash crossings;
3. Air release assemblies;
4. Clean-out assemblies.

F. Line Separations
1. Where a force main crosses a water main or transmission line, protection must be provided as per ADEQ Engineering Bulletin No. 10 and the Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control." At a minimum, the force main should be constructed of ductile iron pipe for a distance of 10 feet on each side of the water line.
2. See COS Standard Detail No. 2402 for details regarding discharge into a manhole from a force main.
3. The minimum separation between the force mains and water lines should be 2 feet wall-to-wall vertically and 6 feet horizontally under all conditions. Where a force main crosses above or less than 6 feet below a water line, the force main shall be encased in at least 6 inches of concrete for 10 feet on either side of the water line. Fittings should not fall within the encasement.

The engineer must evaluate the potential for odor to develop from a force main downstream of the receiving manhole. One-way valves on building service lines shall be specified where there is potential for gasses to strip from the waste stream. The valves should be located at or near the building

2.3 Lift Station Design

Preliminary pump design criteria has been developed for the proposed lift station. Pumps are required to convey the peak design flow rate at the total dynamic head calculated. In order to mitigate low design flow rates, the City has accepted the use of

supplementing demands with potable water that can be entered into the gravity sewer system upstream of the proposed lift station. The proposed lift station will need to meet the following calculated pump requirements:

	Peak Design Flow (gpd)	Peak Design Flow (gpm)	Static Head	Total Dynamic Head (ft)
Lift Station #1	144,050	100	93	160

*Assumes a Hazen-Williams C value of 130

Preliminary wet well sizes have been calculated for the proposed lift stations. Wet well volume calculations are based on the following criteria and assumptions:

- Minimum flow to lift station = 0 gpm
- Minimum pump running time = 2 minutes
- Minimum pump cycle time = 6 minutes
- Wet well diameter = 6 feet

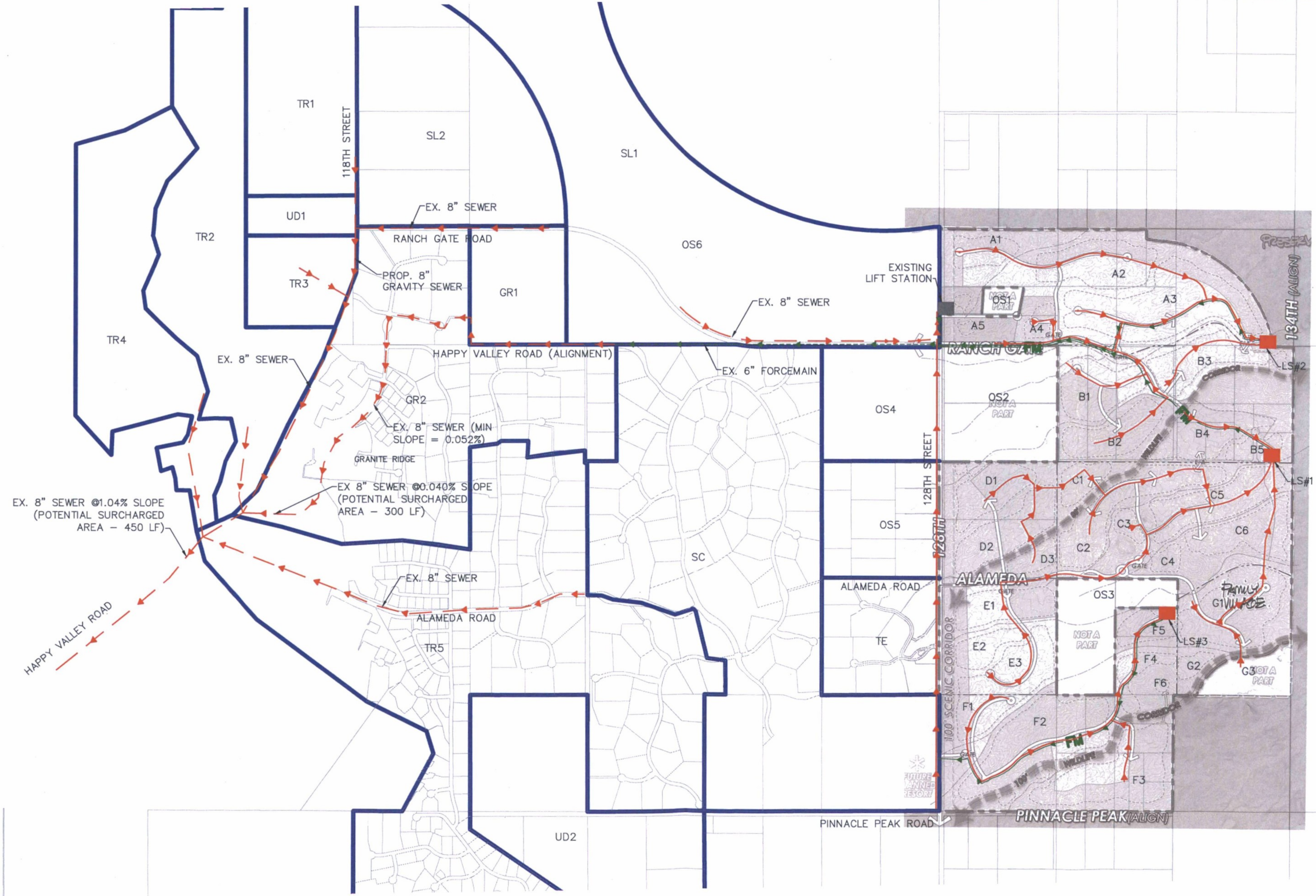
Based on the above criteria wet well volumes are as follows:

	Lift Station #1
Wet Well Volume (ft^3)	83
Operational Depth (ft)	3

3.0 Civil Analysis

3.1 Adjacent Sanitary Systems

The Sereno Canyon development is located directly west of the project. Wastewater generated by a large portion of Sereno Canyon is conveyed by gravity sewer to an existing lift station located on the east side of 128th Street approximately 350' north of Ranch Gate Road. This lift station is located on the western boundary of the proposed Cavalliere Ranch Development. From the lift station wastewater flows are conveyed through an existing 6-inch force main west along the Happy Valley Road alignment. This force main connects to an existing manhole along the Happy Valley Road alignment approximately 300 feet east of 122nd Street. Flows are then conveyed by gravity sewer through the existing Granite Ridge subdivision to an 8-inch line within Happy Valley Road. Flows are ultimately conveyed to the City of Scottsdale treatment facility located at Pima Road and Hualapai Drive. Two existing gravity sewer lines exist within Ranch Gate Road. Both lines are currently dry as no development has occurred to the north of Ranch Gate Road. The first line runs east from approximately 124th Street to the existing lift station. The second line runs west from approximately 122nd Street to 118th Street. The second line has not yet been connected to an active downstream system. See **Figure 3 – System Layout** for existing lift station location.



NO.	REVISION	DATE

Kimley»Horn

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SCALE (H): 1"=500'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: MRN
CHECKED BY: REL
DATE: OCT 2016

STORYROCK
ENGINEER DESIGN REPORT
LIFT STATION #1 SYSTEM MAP
SCOTTSDALE, ARIZONA

PROJECT NO.
191069020

3.2 Existing Lift Station and Sereno Canyon Service Area

The development of the Sereno Canyon lift station at 128th Street and Ranch Gate Road was intended to serve the properties adjacent to Sereno Canyon as described by the Sereno Canyon sewer service area within the *Facility Payback Agreement for Sewer System Improvements in the Sereno Canyon Service Area.* All properties in the proposed development are within this service area and have been allocated a percentage of capacity based on the proposed zoning and 0.31 du/acre.

The approved *Conceptual Master Wastewater System Report for Sereno Canyon* provides detailed analysis of the proposed system, including analysis of downstream pipe capacities in existing and ultimate conditions. The Sereno Canyon Lift Station consists of a duplex pumping station in a single wet well with an overflow storage area. Two identical pumps are provided, with a design flow of 350 GPM at a total dynamic head (TDH) of 151 feet.

The Sereno Canyon Lift station is shown on **Figure 3 – System Layout.**

3.3 Proposed System Layout

Lift Station #1 will be one of three lift stations to be constructed to service the proposed StoryRock development. Approximately 16,000 feet of gravity sewer will be installed within the development that will outfall to the lift station. The lift station will utilize a new force that will convey flows into a proposed gravity sewer line that will be installed along 128th Street. Flows to this gravity sewer will outfall to the existing Sereno Canyon lift station. The full system layout can be seen on **Figure 1 – Vicinity Map.**

3.4 Proposed Site Layout

The proposed site is laid out on a 100' by 100' piece of land, at the low point of the StoryRock development. The site will consist of a six-foot diameter wet well, valve vault, meter vault, electrical control pad, transformer, concrete pad for a future chemical feed system, and a gas powered generator. The full site layout is shown in **Figure 4 – Site Layout**.

NORTH

FM

S

48" CONC MANHOLE

3.5" FORCE MAIN

8" GRAVITY SEWER

PROP GATE

BLOCK WALL

CONCRETE METER VAULT

VALVE VAULT

6'ø WET WELL

TRANSFORMER

ANTENNA STAND

GENERATOR

CHEMICAL PAD

ELECTRICAL CONTROL PAD

80'

80'

GRAPHIC SCALE IN FEET

0 10 20 40

NO.	REVISION	DATE

Kimley»Horn

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Phoenix, Arizona 85020 (602) 944-5500

SCALE (H): 1"=20'
SCALE (V): NONE
DESIGNED BY: MRN
DRAWN BY: MRN
CHECKED BY: REL
DATE: MAY 2016

STORYROCK
ENGINEER DESIGN REPORT
LIFT STATION #1 SITE LAYOUT
SCOTTSDALE, ARIZONA

PROJECT NO.
191069020

DRAWING NAME
SITE LAYOUT

4.0 *Hydraulic and Capacity Analysis of Proposed Lift Station*

4.1 Sereno Canyon Lift Station Allocation

This Conceptual Master Wastewater Plan has been prepared for the proposed Cavalliere Ranch Master Planned Community. See *Cavalliere Ranch Sewer Master Plan* for further information.

4.2 Sereno Canyon Service Area

In addition to the StoryRock project area, the existing lift station is intended to serve a total service area of approximately 1,200 acres. The original zoning of the service area was R1-130 with an associated density of 0.31 dwelling units per acre. The *Sereno Canyon Amended Master Wastewater Report* addressed the rezoning of Sereno Canyon to a higher density. It is anticipated that other developments in the service area may rezone to a higher density similarly to StoryRock and Sereno Canyon. For the purpose of this report, it is assumed that the developments west of 128th Street will rezone to a density of 1 dwelling unit per acre. The state land north of Ranch Gate Road is not anticipated to rezone to a higher density due to its proximity to existing low density developments. The calculated peak wet weather flow for the Sereno Canyon service area per this report is 320 GPM.

According to the Sereno Canyon Amended Master Wastewater Report the Sereno Canyon Lift Station has a design capacity of 350 GPM. The existing lift station has the capacity for the calculated peak flow of the service area. Additionally, the existing 6" force main has adequate capacity to convey this peak flow.

4.3 Site Required Capacity

The StoryRock project area has been divided into multiple phases for constructability purposes, with Lift Station #1 supporting phases 1B, 1C, 2A, 2B, and 3B which are shown in **Figure 1 – Vicinity Map**. Ultimate design flow is estimated at 100 GPM as shown in **Figure 5 – Design Flows**. With the project being constructed in phases, the initial phased flows were evaluated. While phasing order will be confirmed at a later date, Phase 1C is assumed to be the first constructed, and will have an initial peak wet weather flow of approximately 36 GPM.

Using the existing topography and proposed locations of both the gravity sewer, as well as Lift Station #1, the static head for the proposed force main is as follows:

Pumps Off Elevation	**2550.00**
Flow Line of Force Main at High Point	**2643.00**
Calculated Static Head	**93.00**

4.4 Pump & Force Main Phasing

With the phasing schedule anticipated for the StoryRock community, it is anticipated that the interim design flow will be a less than half of the ultimate design flow. In order to mitigate low design flow rates, the City has accepted the use of supplementing initially phased low demands with potable water that can be entered into the gravity sewer system upstream of the proposed lift station. This will flush the gravity system with potable water and will allow daily flushing of the force main to prevent the settling of solids within the force main. This will also reduce the potential of odor issues as well as help ensure that downstream gravity sewers are adequately flushed. Analysis of the system under both the interim and ultimate conditions can be seen below and in **Figure 5 – Design Flows**. The ultimate pump and system curves can be found in **Figure 6 – NP3153 SH3-275 System & Pump Curve.** Further information regarding the pump, including specs, efficiencies, pump curve, etc., can be found in **Appendix C**.

Condition	Total # of Lots	Flow to Lift Station (GPM)	Force Main Size	Pump	Pump Flow (GPM)	Total Dynamic Head (ft)	Force Main Flow Velocity (fps)
Interim	96	36 + supplemented potable water	3.5"	NP3153 SH3-275, 167mm Impeller	112	165.96	3.69
Ultimate	268	100					

Lift Station # 1 Design Flows							
Phase	**AREA**	**DWELLING UNITS (DU)**	**POPULATION**	**AVERAGE FLOW (gpd)**	**AAC Peaking Factor[1]**	**AAC Pipe Peak Wet Weather Flow (gpd)[2]**	**AAC Pipe Peak Wet Weather Flow (gpm) (Total)**
Phase 1B	B4	34	73	5,848	2.50	18275	16
	B5	10	22	1,720	2.50	5375	
Phase 1C	C1	9	19	1,548	2.50	4838	36
	C2	32	69	5,504	2.50	17200	
	C3	5	11	860	2.50	2688	
	C4	6	13	1,032	2.50	3225	
	C5	25	54	4,300	2.50	13438	
	C6	19	41	3,268	2.50	10213	
Phase 2A	D1	11	24	1,892	2.50	5913	15
	D2	19	41	3,268	2.50	10213	
	D3	9	19	1,548	2.50	4838	
Phase 2B	E1	15	32	2,580	2.50	8063	15
	E2	6	13	1,032	2.50	3225	
	E3	18	39	3,096	2.50	9675	
Phase 3B	G1	16	34	2,752	2.50	8600	9
	G2	3	6	516	2.50	1613	
	G3	6	13	1,032	2.50	3225	
Exception	OS3	25	54	4,300	2.50	13438	9
	Total	**268**	**576**	**46,096**	**2.50**	**144,050**	
					GPM	**100**	
					Pumped Flow	**112**	

(1) Peaking factor per AAC Title 18 - Chapter 9

(2) Wet Weather Peak Flow = 125% Dry Weather Peak Flow

Job Number	191988002
Job Description	Storyrock LS #1
Date	10/12/2016
Designed By	MRN
Checked By	REL
Pump Type	NP3153 SH3-275

HAZEN-WILLIAMS EQUATION FOR TDH CALCULATIONS

System Elevations:

Pumps Off Elevation		2550.00	ft
Flow Line of Force Main at High Point		2643.00	ft
Calculated Static Head	$\Delta Z =$	93.00	ft

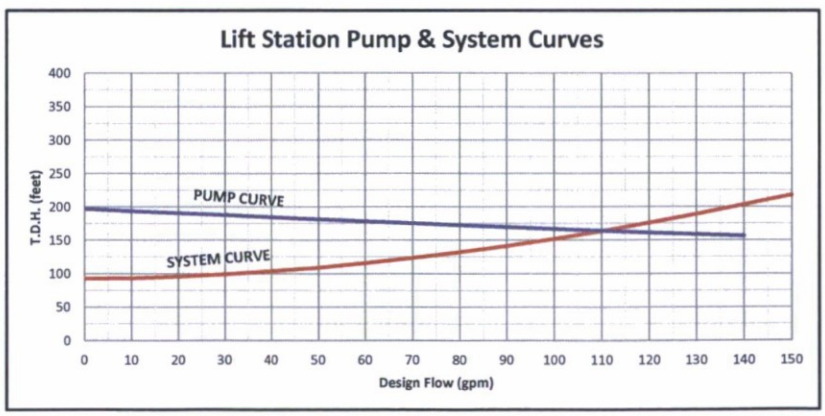
Hazen-Williams Parameters:

Dia. of Discharge Piping	D =	3.521	inches
Length of Discharge Piping	L =	10	ft
Dia. of Force Main	D =	3.521	inches
Length of Force Main	L =	4192	ft
Hazen Williams Coefficients	C =	130	
Minor Losses - Sum of Coefficients for Discharge Piping	K_D =	1	taken from Minor Losses tab
Minor Losses - Sum of Coefficients for Force Main	K_{FM} =	6.87	taken from Minor Losses tab

Flow Interval for Tables	10	gpm

C = 130 for Discharge Piping, C = 130 for Proposed Force Main

Flow (GPM)	Friction Head (Discharge Piping) (ft.)	Minor Losses (Discharge Piping) (ft.)	Friction Head (Force Main) (ft.)	Minor Losses (Force Main) (ft.)	T.D.H. (ft.)	Pressure (PSI)	Force Main Flow Velocity (fps)	Pump Curve (ft.)
0	0.00	0.00	0.00	0.00	93.00	40.26	0.00	200
10	0.00	0.00	0.83	0.01	93.83	40.62	0.33	197
20	0.01	0.01	3.00	0.05	96.01	41.56	0.66	194
30	0.02	0.02	6.34	0.10	99.37	43.02	0.99	191
40	0.03	0.03	10.80	0.19	103.86	44.96	1.32	188
50	0.04	0.04	16.32	0.29	109.41	47.36	1.65	185
60	0.05	0.06	22.87	0.42	115.99	50.21	1.98	182
70	0.07	0.08	30.42	0.57	123.58	53.50	2.31	179
80	0.09	0.11	38.95	0.74	132.15	57.21	2.64	176
90	0.12	0.14	48.43	0.94	141.68	61.33	2.97	173
100	0.14	0.17	58.85	1.16	152.16	65.87	3.30	170
110	0.17	0.20	70.20	1.40	163.57	70.81	3.62	167
120	0.20	0.24	82.46	1.67	175.90	76.15	3.95	164
130	0.23	0.28	95.62	1.96	189.13	81.87	4.28	162
140	0.26	0.33	109.67	2.27	203.26	87.99	4.61	159
150	0.30	0.38	124.60	2.61	218.27	94.49	4.94	156



Approximate Capacity at C = 130: 112 gpm

5.0 Sitework

5.0 Site Options

The StoryRock project is being developed with the intent of attracting high income families. With the resulting higher quality developments, it may be preferable to look at different alternatives for the lift station to prevent neighbors and area developments being obstructed by the various aspects of the lift station (e.g. how the site looks, controlling odors, noise, etc.). Options for the site development of the lift station are as follows:

- Develop a decorative wall high enough to shield immediate neighbors from both views of the lift station, as well as prevent excess noise. Wall articulation that matches the theme of the neighborhood would help maintain an attractive look to the neighborhood.
- Decorative sun shades could be utilized to shield the site from above. Shades could be constructed for both the individual pieces of equipment, as well as for the whole site.
- Landscaping could be utilized, including large trees and native vegetation, and/or well placed earth with retaining walls to give a more natural look and obstruct views of the station equipment.
- Depending on the topography of the area, parts of the lift station can be constructed into sunk areas with retaining walls, creating a larger difference between the top of the walls and the top of the equipment
- The developers could look at constructing a house or architectural building matching area homes. Examples of other buildings utilized on other lift station projects can be found in **Appendix D**.

5.1 Wall

Per Section 7-1.205 of the *City of Scottsdale Design Standards & Policies Manual*, a perimeter wall will be required to be constructed around the site, but maintaining enough room inside of the site that all equipment and service equipment will be easily accessible for repair. As such, a 10-foot block wall is proposed around the site, with gate access located on the northwest corner of the site. As discussed in the previous section, there are several different options available to improve the aesthetics of the wall.

5.2 Odor Control

Per discussions with the City, odor control is not typically installed at new lift station sites. However, provisions for odor control chemical additional shall be provided at the lift station site in case the City deems it necessary to have installed. Installation will include a concrete pad for a future chemical storage tank, as well as electrical hook ups for future installation.

The City will require an odor control system at the force main outfall into the gravity system. Various options for outfall odor control include:

- Installing a sealed manhole at the sewer outfall with a 'blower' to send the air through a filter that absorbs the H2S. See **Appendix E – Odor Control** for examples of a Hartzell Blower, as well as a both a Vapex and Ecoair filter.

- Installing a chemical feed at the lift station to help treat the sewage for H2S. The bioxide chemical used in this process is non-toxic, which means secondary containment on-site is unnecessary and chemical refilling procedures are greatly simplified. The chemical would be added before the sewage enters the force main, allowing the chemical to work as it works its way towards the outfall.

5.3 Generator

The site power will be supplemented with a standby generator. Similar sites (using combined motor Hp under 100Hp) utilize generators in size from 60KVA to 150KVA. This site will utilize a 150KVA generator that is switched via ATS in an emergency condition.

5.4 Controls

Per Scottsdale Sewer Lift Station Design Criteria (Revision 10/15/15) the lift station will include controls of the station pumps and control its overall operation. City design standards will dictate flow sensing, telemetry, alarm systems and safety precautions, and associated hardware to ensure reliable communication with existing radio systems. Overall functionality and sequence of lift station's operations will be confirmed with City personnel in cases of specific operations for this lift station.

5.5 Lighting

Perimeter lighting will be installed per applicable City of Scottsdale standards. We will first design lighting in accord with lift station design requirements. In absence of specific lighting requirements for lift stations, IES (Illuminating Engineering Society) suggestions will be supplemented. Site lighting will be placed in locations that maintenance personnel agree with, and will be controlled using a hierarchy that is dictated by site management. We will conduct a basic calculation (AGI32 or approved software) to determine light levels and provide verification of fixture number and positioning.

5.6 Pump Enclosure

Various options exist for the wet well on the Lift Station #1 development site, which will vary based on the required volume and maximum depth of the wet well. As stated in Section 2.3 – Lift Station Design, the size of the wet well will be 6' diameter with approximately a 3' operational depth. Additional vender information regarding the layout of the wet well and associated piping can be found in **Appendix G**.

An additional option for the wet well construction would be a fiberglass wet well, which is pre-constructed to include pumps, valve box, and water meter all in the construction of the wet well itself. This particular wet well would have a smaller foot print, which would assist in minimizing the size of the overall lift station site. Example plans of the Fiberglass Wet Well can be found in **Appendix F**.

6.0 *Permits Required*

1) Project shall require submittal of an Approval to Construct (ATC) and Approval of Construction (AOC) to the Maricopa County Environmental Services Department (MCESD).

2) Project shall require submittal of a Building Permit to the City of Scottsdale Planning and Development Services Department.

7.0 Recommendations

1) Lift station site will be designed and constructed to include the following: Electrical Control Pad, Transformer, Generator, 6-foot diameter wet well, chemical pad valve vault, and meter vault.

2) Lift station site will be designed to aesthetically accommodate the surrounding development through the use of either a decorative wall, landscaping, shade structure(s), combination thereof, or an architectural building.

3) Wastewater flows will be collected via 8" sanitary sewer lines across the StoryRock development area for Lift Station #1.

4) Site will be designed to accommodate an ultimate flow of 100 GPM. Interim lower flows will be accommodated by introducing potable water into the gravity sewer system upstream of the proposed lift station.

5) Lift Station #1 will require the installation of two NP-3153 SH3 Motors.

6) Odor control options will be required at the gravity sewer force main outfall.

7) Dual PVC force mains will be constructed. Both force mains will be constructed as 3.5" PVC lines.

8) Force main will tie in with a currently proposed gravity sewer line, which will take flows to the existing Sereno Canyon Lift Station.

8.0 References

City of Scottsdale, *Design Standards and Policies Manual*, January 2010.

Arizona Administrative Code, *Title 18, Chapter 9,* September 2005.

Conceptual Master Wastewater System Report for Sereno Canyon, Wood Patel and Associates, September, 2005.

Sereno Canyon Amended Master Wastewater Report, LVA, February 2014.

Facility Payback Agreement for Sewer System Improvements in the Sereno Canyon Service Area, City of Scottsdale, 12/21/2010.

Appendix A – City of Scottsdale Lift Station Design Criteria

CITY OF SCOTTSDALE
SEWER LIFT STATION DESIGN CRITERIA
Revised 10/15/15

The purpose of this Sewer Lift Station Design Criteria document is to provide direction for the design of sewer lift stations that will ultimately be owned and operated by the City of Scottsdale (City). It is also recommended that privately-owned lift stations follow this document in the event that the City is asked or required to assume responsibility. While this document provides additional guideline for the design of sewer lift stations, it is not comprehensive and additional criteria may be required by both the City and the client based on project specific needs. The reader is also referred to the City of Scottsdale Design Standards and Policies Manual (DS&PM) for additional wastewater system criteria, including lift stations. The criteria provided herein are organized into general categories as shown below.

1 GENERAL/DOCUMENTATION

1.1 Prior to final inspection and acceptance, three sets of the following documents shall be prepared and provided to the City Water Resources Department (WRD): (1) As-Built/Record Drawings, and (2) Operation and Maintenance manuals. Each set shall include 1 hard copy and 1 electronic copy of the provided materials. In addition, each control panel shall have a copy of the panel drawings located inside the panel itself.

1.2 The City shall be provided a copy of all Maricopa County Environmental Services Department (MCESD) Approval to Construct (ATC) and Approval of Construction (AOC) documentation. AOC shall be obtained after functional testing and prior to system start-up.

1.3 All equipment shall be provided with the manufacturer recommended spare parts.

2 PROCESS/MECHANICAL

2.1 Each sewer lift station shall include a minimum of 2 pumps sized in a 1 duty + 1 standby configuration (or n+1 for larger configurations). Design flows shall be calculated in accordance with the DS&PM and in consultation with City WRD. Each pump shall additionally include a 35 gpm flow allowance above the peak calculated flow to account for the draining of swimming pools in the service area.

2.2 The following list provides the submersible sewage pump requirements:

- Pump shall be of submersible type and mounted on two (2) 304L stainless steel rails. Rail mounting hardware shall also be 304L stainless steel including the submersible cable for pump removal.
- Motors shall be air cooled submersible type, totally enclosed, non-ventilated, constant speed, inverter duty (VFD rated), 480V/3PH/60Hz.
- Pumps shall be capable of passing 2 1/2" solids.
- Pump shall be equipped with stainless steel motor shafts.
- Pump Manufacturer shall be Fairbanks Morris, Flygt ITT, or approved equal.

2.3 Provide ductile iron piping for the discharge forcemain to a point 10 feet outside of the lift station property boundary.

2.4 The wet well access hatch shall include a locking hasp and be construction of aluminum, stainless steel, or other non-corrosive material. Access hatch shall be H20 load rated if located within a vehicle pathway.

2.5 Check valves shall be the full-port solids handling ball-type and shall be located outside the wet well in a separate vault. Air release valves shall also be installed inside the vault upstream of the check valves and plug valves shall be installed downstream. All equipment shall be rated for sewer service.

Appendix B – City of Scottsdale Wastewater Design Guide