Final Water Basis of Design

1St Submittal: November 2021
2nd Submittal: March 2022
3rd Submittal: August 2022
4th Submittal: October 2022

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 apritchard DATE 10/21/2022

STORYROCK Phase 3

Prepared for:

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191988002

October, 2022.

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1.0 INTRODUCTION

1.1 Project Description

The purpose of this water report is to support the proposed StoryRock Phase 3 residential development. StoryRock Phase 3 (Phase 3) is part of the StoryRock Master Planned Community (formerly named Cavalliere Ranch), a development consisting of 462-acres of single-family residential construction. A Conceptual Water Master Plan was approved October 2014 with the project Zoning Case (13-ZN-2014) and amended March 2016.

StoryRock Phase 3 is a proposed 101-acre single family residential subdivision consisting of 81 single family residential units. Phase 3 is zoned for R1-18, R1-35, and R1-43 development.

1.2 Project Location

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 StoryRock Phase 2B, Hocheng Investment Co., and Alameda Road and to the east by StoryRock Phase 3B and the McDowell Sonoran Preserve. The site is bound to the south by McDowell Sonoran Preserve and to the west by 128th Street and the Hocheng Investment Co. Phase 3 is located on the southernmost portion of the site, north of Pinnacle Peak Road Alignment. See **Figure 1: Vicinity Map.**

1.3 Scope of Water Plan

The Conceptual Master Water Plan for StoryRock established water distribution design parameters, criteria and a general plan for water distribution. The report presented a conceptual layout of transmission and distribution mains. It also established pressure zones and pressure reducing valve (PRV) locations. Water demands have been calculated based on proposed zoning and a preliminary development layout.

This report presents the basis of design criteria that will be used for the engineering design of the proposed Phase 3 development. This report will establish the water system demands for the project and the proposed water system infrastructure required to serve the development. Finally, the report will show the development of Phase 3 is in conformance with the approved master plan.

All design criteria that is presented in this report will conform to the City of Scottsdale Design Standards & Polices Manual (DS&PM).

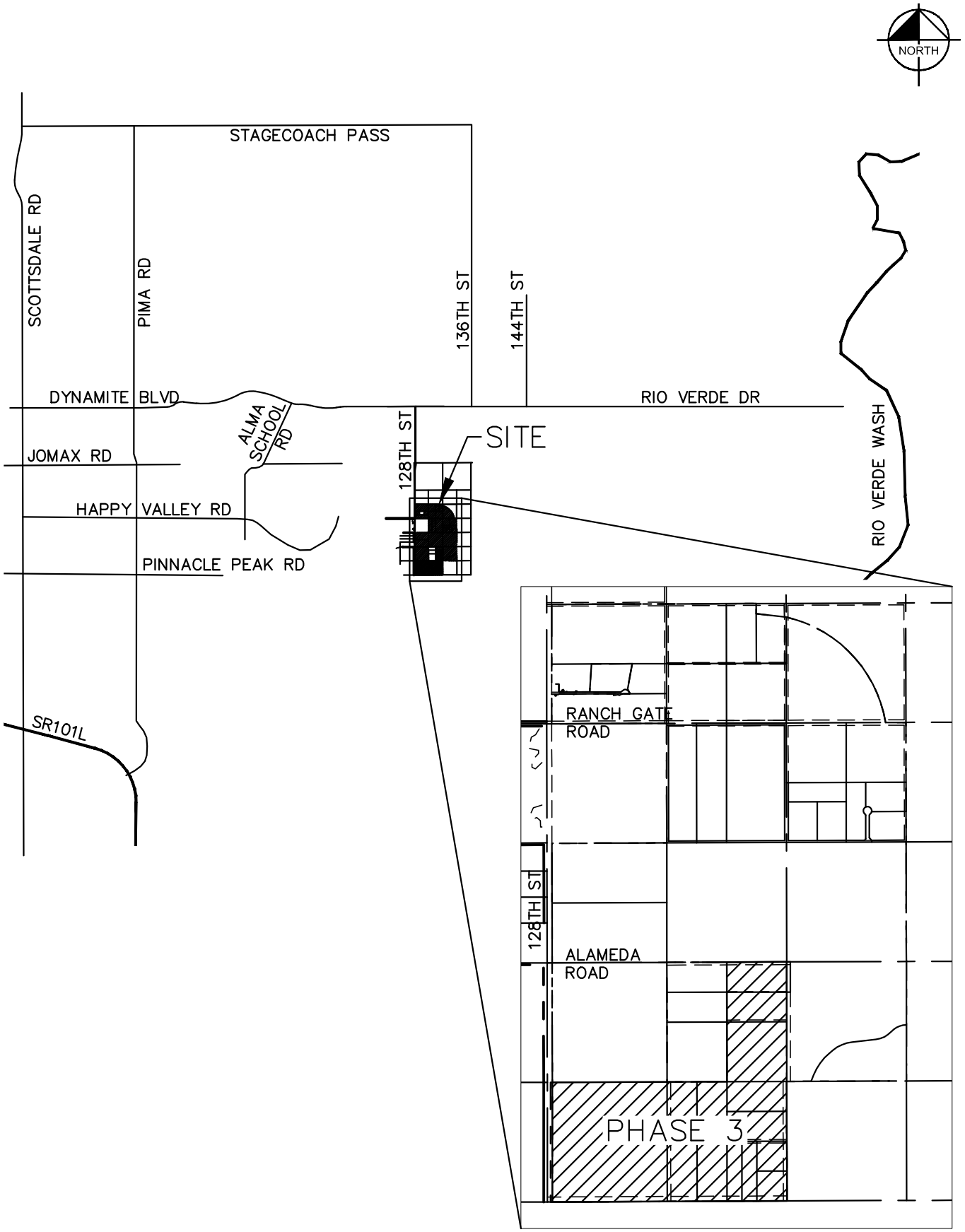


FIGURE 1
VICINITY MAP
STORYROCK

Kimley»Horn

2.0 EXISTING SITE CONDITIONS AND WATER SYSTEMS

2.1 Site Conditions

The project is undeveloped natural desert. Based on a review of City Quarter Section maps; no city water infrastructure exists on-site. The site is characterized by many washes and rock features of varying sizes. The on-site washes vary in size and depth, but generally flow from the southwest to the northeast or east through the site. The Phase 3 site is bordered by the McDowell Sonoran Preserve to the east and south. Multiple ridgelines run though the site, in the general direction of southwest to northeast. Elevations range from approximately 2780' in the southwest to 2610' in the northeast.

2.2 Adjacent Water Systems

Directly to the west of the project is the development of Sereno Canyon. A majority of the project infrastructure has been constructed, though none of the lots have been developed. An existing zone 13 booster pump station (PS 145) is located at Alameda Road and the 122nd Street alignment, near the west edge of Sereno Canyon. The booster pump station is proposed to serve the area. PS 145 is comprised of three 500 gpm pumps and a 1,750-gpm fire flow booster pump, connected to a 12,000-gallon tank. One of the pumps is required to be kept as a redundant pump. Additionally, there is space for a 4th domestic pump.

An existing 8-inch DIP waterline is located in Ranch Gate Road west of the site. This line connects to an existing 12-inch DIP waterline at 128th Street. The line in 128th Street extends north approximately 430 feet and is stubbed to the south. There is also an existing 6-inch DIP waterline in Buckskin Trail providing service to properties along the frontage. No other waterlines are located adjacent to the project.

2.3 Existing Pressure Zones

Based on elevations, the existing Phase 3 site falls within two (2) City of Scottsdale pressure zones: 12 and 13. Sereno Canyon to the west primarily operates in pressure zone 13. There is an existing pressure reducing valve (PRV) on the 8-inch line in Ranch Gate east of 125th Place, which reduces the line to pressure zone 12. Phase 3 will operate in pressure zones 12 and 13.

2.4 Phasing and Existing StoryRock Development

As discussed within the approved master plan, the development of StoryRock is divided into three (3) major phases. Phase 1 is intended to be the first phase of development and is further divided into three (3) sub-phases: 1A, 1B and 1C. All phases of Phase 1 (1A, 1B, and 1C) and Phase 2 are currently under construction with Phase 3 being constructed after. The 12-inch line in 128th Street from Alameda to Ranch Gate Road and the connection to Sereno Canyon is currently under construction. Phase 1C has an 8-inch line within Alameda Road, zoned 12 PRV, that is complete. Additionally, Phase 2 has established a southern connection to the 12-inch line in 128th Street.

3.0 Proposed Water System

3.1 General Discussion

Per the approved master plan, the water system for StoryRock consists of a 12-inch transmission within 128th Street and 8-inch distribution lines internal to the development. PRV's divide the project into pressure zones 12 and 13. Waterline looping is provided for redundancy and water quality. The StoryRock system connects to the zone 13 water system in Sereno Canyon along the Alameda alignment west of 128th Street, and to the zone 12 system at the intersection of Ranch Gate Road and 128th Street.

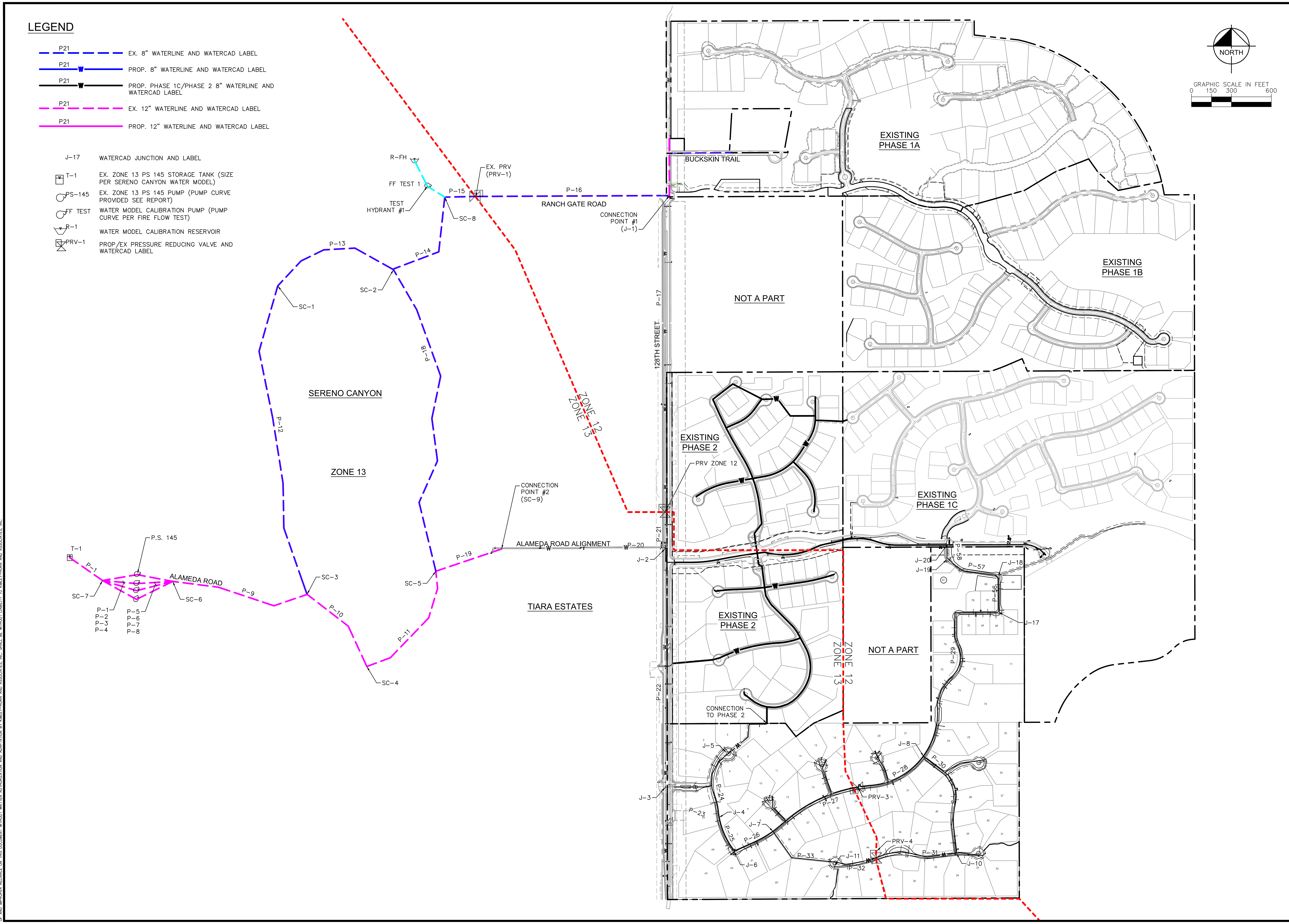
3.2 Phase 3 Proposed Distribution System

The Phase 3 proposed on-site distribution system will consist of an 8" Class 350 DIP water line that will provide potable water and fire protection. Phase 3 will operate in pressure zones 12 and 13. Two PRV's, internal to Phase 3, will be required to reduce the system to pressure zone 12 to serve the northeast portion of the development.

The 8-inch line and PRV within Alameda Road has been completed. Additionally, the 12-inch line within 128th Street from Alameda Road to the southern property limits of Phase 3 and the 12-inch connection line to Sereno Canyon are under construction.

At full buildout of the StoryRock development, waterline looping is provided through the multiple phases to ensure redundancy and cycling of water for water quality. A connection to the Phase 2 distribution system and the 8-inch line in Alameda Road has been completed to loop the Phase 3 distribution system. In addition to providing redundancy, the two connections prevent long dead-end lines. All proposed dead-end distribution lines are less than 1,200 feet, satisfying the requirements of the DS&PM.

See **Figure 2: Water System Layout** for waterline and PRV locations.



NO.	REVISION	BY	DATE	APPR.

Kimley»Horn

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

SCALE (H): 1"=300'
SCALE (V): NONE
DESIGNED BY: ZJH
DRAWN BY: ZJH
CHECKED BY: JMB
DATE: OCT 2022

STORYROCK PHASE 3
WATER BASIS OF DESIGN
FIGURE 2 - WATER SYSTEM LAYOUT
SCOTTSDALE, ARIZONA

PROJECT NO. 191069020

DRAWING NAME FIG 2

1 OF 1

4.0 METHODOLOGY AND CALCULATIONS

4.1 General Discussion

The proposed water distribution system for Phase 3 has been designed to provide the calculated domestic and fire flow demands for the project, while maintaining required operating pressures. The design criterion conforms to the approved Conceptual Water Master Plan and is based on requirements described within the City of Scottsdale Design Standards and Policies Manual (DS&PM).

4.2 Water Demands, Fire Flows, Pressures

The proposed water distribution system for the project is modeled under 4 design scenarios: Average Day, Max Day, Peak Hour and Max Day plus Fire Flow. Average Day Demands are based on Figure 6.1-2 in the DS&PM, with peaking factors per section 6-1.404. A fire flow of 1,000 gpm per section 6-1.501 of the DS&PM was used. See **Table 1** below for a summary of water demands. According to Section 6-1.407 of the DSPM, distribution systems shall be designed with a minimum residual pressure of 50 psi and a maximum static pressure of 120 psi. For fire flow scenarios, a minimum design pressure of 30 psi is required.

Table 1 Water Demands

WATER DESIGN CRITERIA		
Water Demands		
Land Use	**Average Daily Flow (gpm)**	
Prop. Development (<2 DU/ac Residential)	0.69	per unit
Water Design Criteria		
Peaking Factors		
Maximum Day	2.0	
Peak Hour	3.5	
Fire Flow		
Single Family Residential (Max Building Size: 9,400 sq-ft)	1,250	GPM
Pressure Requirements		
Residual @ Highest Finished Floor Elevation	50-120	PSI
Fire Flow @ Hydrant Tee or Riser (Per IFC Table B105.1 for fully sprinklered single family resident)	30	PSI

The proposed Development generates a peak demand of approximately 196 gpm. See **Table 2** below for a summary of the existing and proposed flows generated on site.

Table 2. Water Demand Calculations

Water Demand Calculations					
Use	**Units/ Rooms (#)**	**Unit Demand (gpm)**	**Average Daily Demand (gpm)**	**Max Day Demand (gpm)**	**Peak Hour Demand (gpm)**
Storyrock Phase 3	81	0.69	56	112	196

4.3 Hydraulic Model

The WaterCAD v8i water system modeling software distributed by Haestad Methods, Inc. was used to model the proposed water network. The model is calibrated with provided existing system information and tested fire flow conditions. A fire flow test was performed to determine the residual and static pressure of the existing system. The test was performed along Ranch Gate Road near 125th Place. The static hydrant is located to the west of the existing PRV in pressure zone 13. Based on the fire flow test a pump curve is generated. Within the model a pump connected to a reservoir is attached to the model at the static hydrant.

Pump information was also provided for the existing Sereno Canyon booster pump station. This allows a schematic representation of the pump station to be included within the model, including the reservoir tank and the 4 existing pumps.

Refer to **Appendix A** for fire flow test results and the PS-145 pump curves.

Four scenarios are analyzed within the hydraulic models: Average Day Demands, Max Day Demands, Peak Hour Demands, and Max Day plus Fire Flow Demands. Demands are applied at each on-site junction based on the number of adjacent proposed units.

The approved master plan details further analysis of the pump station and build-out scenarios for StoryRock and the surrounding area. For this analysis, only the reservoir and pump correlating to the fire flow test were activated for the average day, max day, and peak hour scenarios, leaving the booster station inactive. With this configuration, fire flow demands are not satisfied. Thus, the fire pump is exclusively turned on in the fire flow scenario, leaving the fire flow test reservoir and pump inactive. All fire flow is provided from the Sereno Canyon booster station.

The waterline loop through Phase 2 is not included in the hydraulic model. This allows the modelling results to prove the system can provide required flows and pressures without the waterline loop. This allows more flexibility in how the waterline looping is provided.

4.5 Results

Based on the results of the hydraulic modeling, the proposed water distribution system can provide the required domestic and fire flow water demands to the project while maintaining required operating pressures. The 8-inch distribution system with a 12-inch line located in 128th street provides adequate flow for both domestic and fire flow

scenarios. The proposed pressure zones maintain system pressure on-site in an adequate range of 50-120 psi. One pump in Booster station PS 145 is needed to provide domestic demands for Phase 3. Fire flow water demands require the booster station fire pump to be active.

See **Appendix B** for complete results of the hydraulic models.

Appendix A – Fire Flow Test Results and PS-145 Pump Curves

Flow Test Summary

Project Name:	EJFT 22061 - Shadow Ridge North
Project Address:	Rancho Gate Rd & N 128th St, Scottsdale, AZ 85255
Date of Flow Test:	2022-02-15
Time of Flow Test:	7:40 AM
Data Reliable Until:	2022-08-15
Conducted By:	Eder Cueva & Steven Saethre (EJ Flow Tests) 602.999.7637
Witnessed By:	Jason W. & Chris M. (City of Scottsdale) 480.276.6658
City Forces Contacted:	City of Scottsdale (480.276.6658)
Note	Four pumps were active during the flow test.

Raw Flow Test Data

Static Pressure:	64.0 PSI
Residual Pressure:	52.0 PSI
Flowing GPM:	1,424
GPM @ 20 PSI:	2,873

Data with a 10 % Safety Factor

Static Pressure:	57.6 PSI
Residual Pressure:	45.6 PSI
Flowing GPM:	1,424
GPM @ 20 PSI:	2,639

Hydrant F_1

Pitot Pressure (1):	18	PSI
Coefficient of Discharge (1):	0.9	
Hydrant Orifice Diameter (1):	2.5	inches
Pitot Pressure (2):	18	PSI
Coefficient of Discharge (2):	0.9	
Hydrant Orifice Diameter (2):	2.5	inches

Static-Residual Hydrant

Flow Hydrant

Distance Between F_1 and R
1261 ft (measured linearly)

Static-Residual Elevation
2662 ft (above sea level)

Flow Hydrant (F_1) Elevation
2695 ft (above sea level)

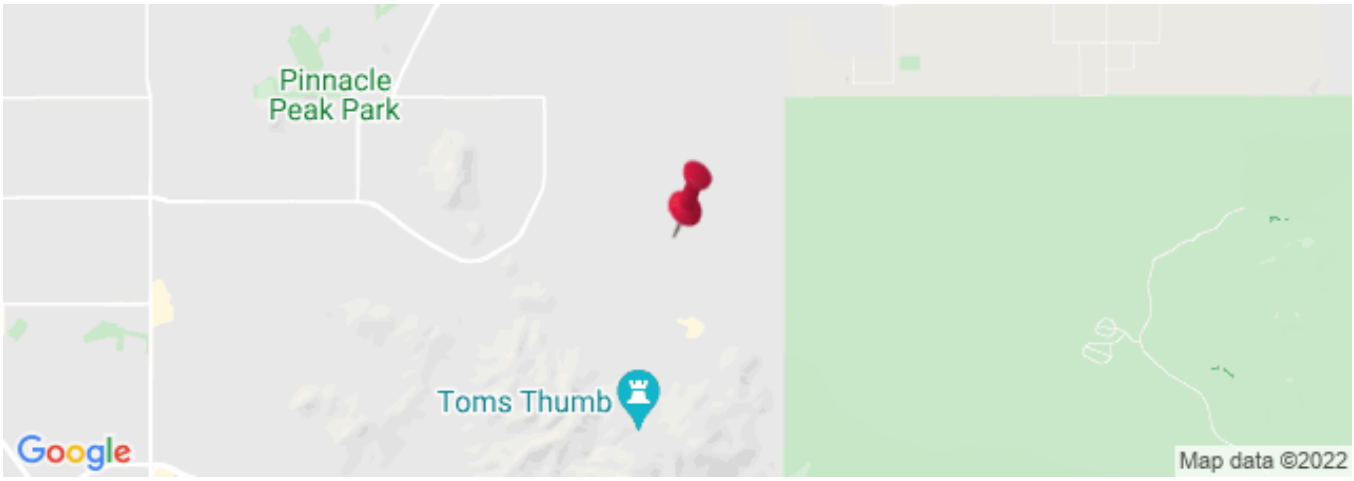
Elevation & distance values are approximate

Flow Test Summary

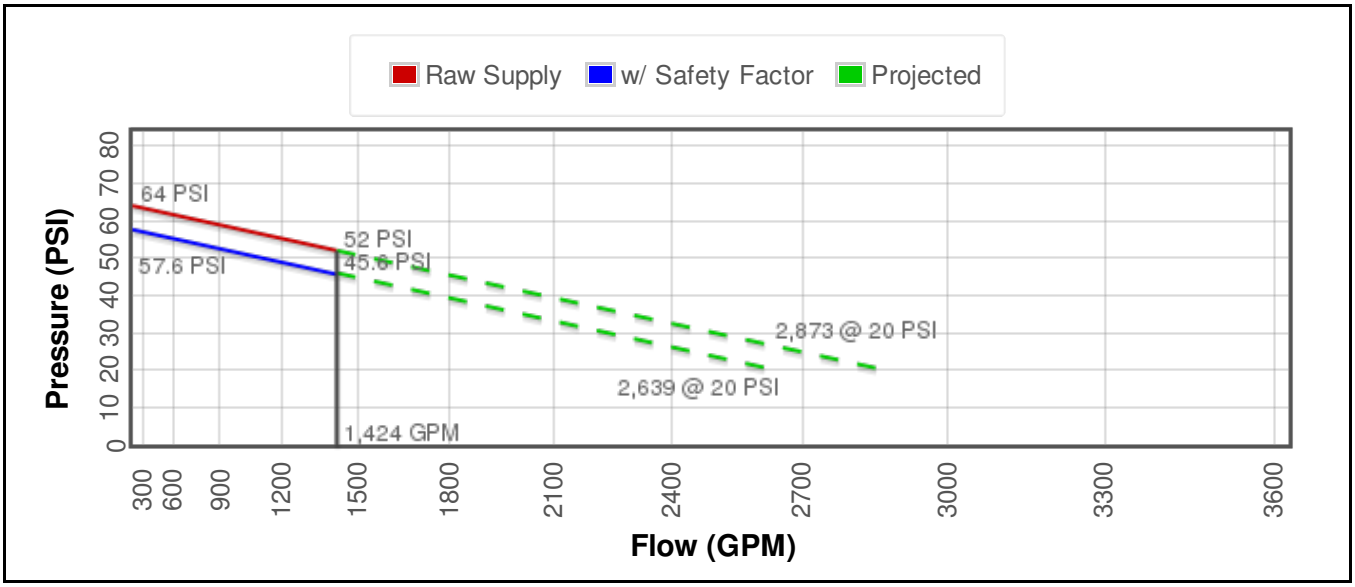
Static-Residual Hydrant

Flow Hydrant (only hydrant F1 shown for clarity)

Approximate Project Site



Water Supply Curve $N^{1.85}$ Graph



S-145 P 1-3

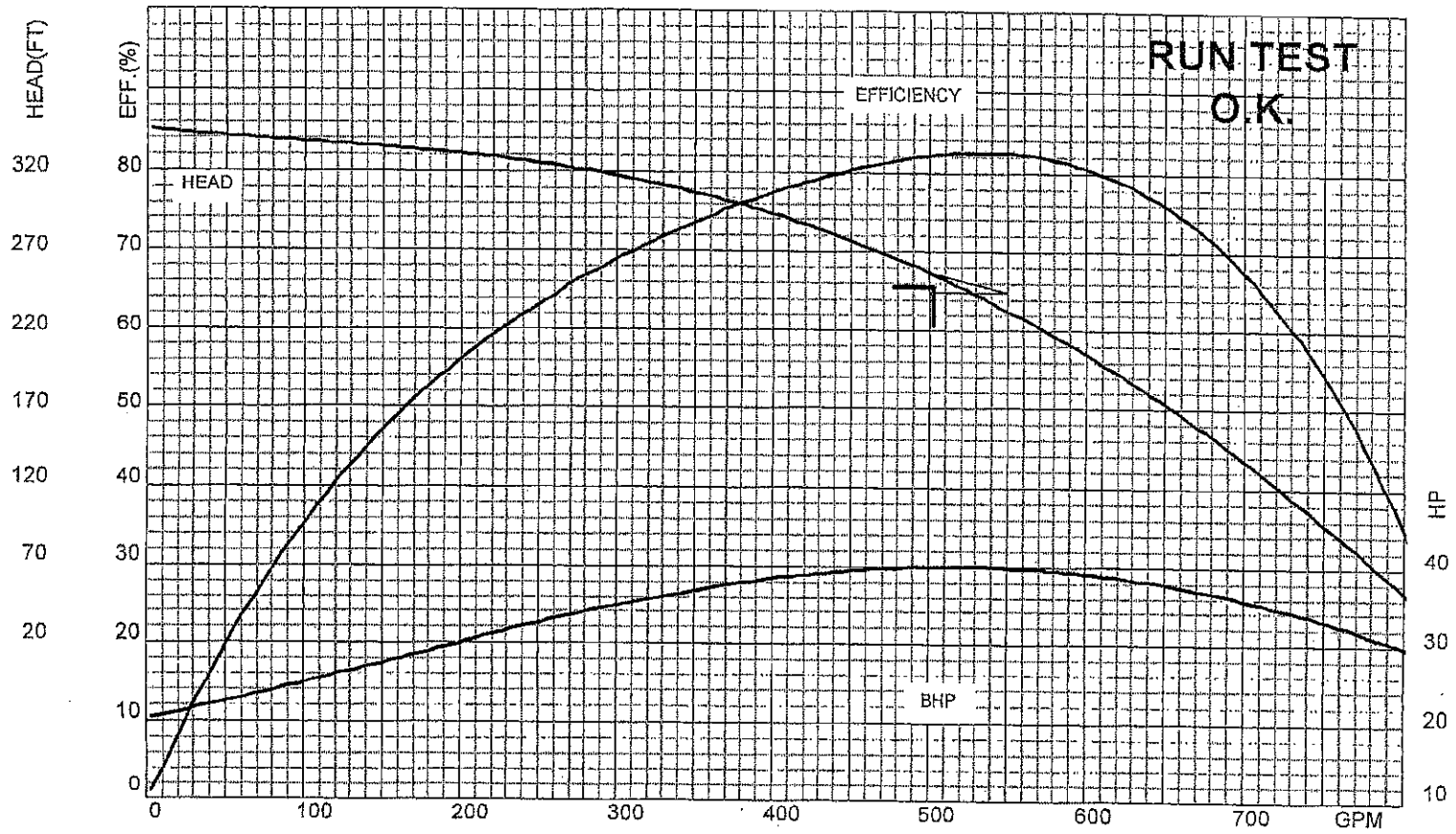
HYDRAULIC PERFORMANCE WARRANTY
GUARANTEED AT DESIGNED POINT ONLY AND IS CONTINGENT ON:
1.PROPER NPSH OR SUBMERGENCE AVAILABLE.
2.PROPER AND ADEQUATE FLOW TO PUMP SUCTION.
3.FLUID FREE OF GAS, AIR, AND ABRASIVE MATTER.
4.IMPELLER WITH PROPER LATERAL ADJUSTMENT (VERTICAL PUMP ONLY).

PEERLESS PUMPS

TEST SITE: Lubbock TX
BY: TH
DATE: 9/15/2008
CUSTOMER: P.E.C. PUMP

PUMP:	10MA
IMP. NO.:	T84363
SHOP ORDER:	747272B-2
STAGES:	8
IMP. DIA1:	1 @ 6.75 X 6.75
IMP. DIA2:	2-8 @ 6.88 X 6.88
IMP. DIA3:	0

Rated GPM:	500.00
Rated Hd(ft):	245.00
Rated RPM:	1782
Rated HP	38.97
Rated Eff %	81.40
Spec. Gravity:	1.000



CERTIFIED BOWL PERFORMANCE TEST CURVE

S-145

P-5

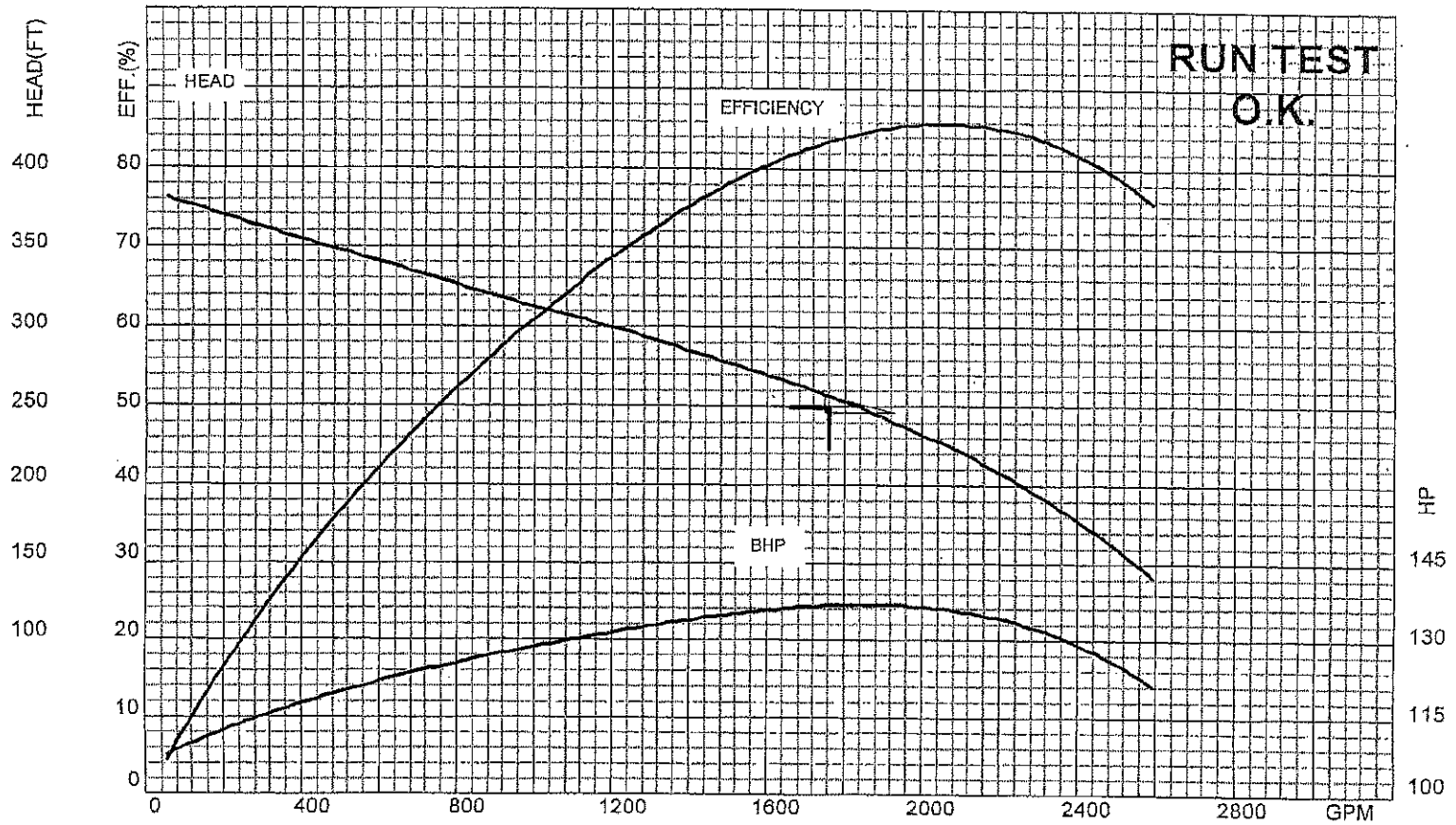
HYDRAULIC PERFORMANCE WARRANTY
GUARANTEED AT DESIGNED POINT ONLY AND IS CONTINGENT ON:
1.PROPER NPSH OR SUBMERGENCE AVAILABLE.
2.PROPER AND ADEQUATE FLOW TO PUMP SUCTION.
3.FLUID FREE OF GAS, AIR, AND ABRASIVE MATTER.
4.IMPELLER WITH PROPER LATERAL ADJUSTMENT (VERTICAL PUMP ONLY).

PEERLESS PUMPS

TEST SITE: Lubbock TX
BY: TH
DATE: 9/18/2008
CUSTOMER: P.E.C. PUMP

PUMP:	M14HXB
IMP. NO.:	V4399
SHOP ORDER:	747310A-1
STAGES:	4
IMP. DIA1:	1-3 @ 9.16 X 10.44
IMP. DIA2:	4 @8.66 X 9.94
IMP. DIA3:	0

Rated GPM:	1750.00
Rated Hd(ft):	245.00
Rated RPM:	1782
Rated HP	134.90
Rated Eff.%	82.30
Spec. Gravity:	1.000



CERTIFIED BOWL PERFORMANCE TEST CURVE

Appendix B– WaterCAD Model Results

FlexTable: Junction Table
Storyrock Phase 3 2021.wtg
Active Scenario: Average Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	2,695.00	0	2,971.95	119.8
J-3	2,755.00	0	2,971.93	93.9
J-4	2,745.00	0	2,971.91	98.2
J-5	2,722.00	5	2,971.91	108.1
J-6	2,750.00	7	2,971.88	96.0
J-7	2,705.00	11	2,971.87	115.5
J-8	2,672.00	13	2,810.04	59.7
J-10	2,670.00	6	2,810.04	60.6
J-11	2,722.00	7	2,971.87	108.1
J-17	2,622.00	4	2,810.04	81.4
J-18	2,624.00	3	2,810.04	80.5
J-19	2,630.00	0	2,810.04	77.9
J-20	2,627.80	0	2,810.04	78.8
J-21	2,679.77	0	2,810.04	56.4
J-22	2,661.00	0	2,810.04	64.5
J-23	2,682.74	0	2,810.04	55.1
SC-1	2,735.00	0	2,971.98	102.5
SC-2	2,755.00	0	2,971.98	93.9
SC-3	2,767.00	0	2,971.99	88.7
SC-4	2,780.00	0	2,971.98	83.1
SC-5	2,762.00	0	2,971.97	90.8
SC-6	2,725.00	0	2,972.00	106.9
SC-7	2,600.00	0	2,726.00	54.5
SC-9	2,744.68	0	2,971.97	98.3

FlexTable: Pipe Table
Storyrock Phase 3 2021.wtg
Active Scenario: Average Day

Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
FH-1	353	R-FH	FF TEST 1	48.0	130.0	(N/A)	(N/A)	(N/A)
FH-2	337	FF TEST 1	J-21	48.0	130.0	(N/A)	(N/A)	(N/A)
P-1	5	T-1	SC-7	24.0	130.0	56	0.04	0.000
P-1	1	SC-7	PUMP 1	12.0	130.0	56	0.16	0.000
P-2	1	SC-7	PUMP 2	12.0	130.0	(N/A)	(N/A)	(N/A)
P-3	1	SC-7	PUMP 3	12.0	130.0	(N/A)	(N/A)	(N/A)
P-4	1	SC-7	PUMP 5	12.0	130.0	(N/A)	(N/A)	(N/A)
P-5	1	PUMP 1	SC-6	12.0	130.0	56	0.16	0.000
P-6	1	PUMP 2	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-7	1	PUMP 3	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-8	1	PUMP 5	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-9	1,049	SC-6	SC-3	12.0	130.0	56	0.16	0.012
P-10	725	SC-3	SC-4	12.0	130.0	47	0.13	0.009
P-11	985	SC-4	SC-5	12.0	130.0	47	0.13	0.009
P-12	2,393	SC-1	SC-3	8.0	130.0	-8	0.05	0.003
P-13	1,027	SC-1	SC-2	8.0	130.0	8	0.05	0.003
P-14	158	J-21	J-23	12.0	130.0	0	0.00	0.000
P-15	213	J-23	PRV-2	12.0	130.0	-8	0.02	0.001
P-16	851	J-22	J-20	8.0	130.0	8	0.05	0.002
P-17	1,542	J-23	J-22	8.0	130.0	8	0.05	0.002
P-18	2,399	SC-2	SC-5	8.0	130.0	8	0.05	0.003
P-19	446	SC-5	SC-9	12.0	130.0	56	0.16	0.012
P-20	1,343	SC-9	J-2	12.0	130.0	56	0.16	0.012
P-21	194	J-2	PRV-2	12.0	130.0	8	0.02	0.000
P-22	1,769	J-3	J-2	12.0	130.0	-48	0.14	0.009
P-23	357	J-3	J-4	8.0	130.0	48	0.31	0.066
P-24	272	J-4	J-5	8.0	130.0	5	0.03	0.001
P-25	522	J-4	J-6	8.0	130.0	43	0.28	0.055
P-26	324	J-6	J-7	8.0	130.0	37	0.23	0.040
P-27	689	J-7	PRV-3	8.0	130.0	19	0.12	0.011
P-28	586	PRV-3	J-8	8.0	130.0	19	0.12	0.012
P-29	1,413	J-8	J-17	8.0	130.0	0	0.00	0.000
P-30	807	J-8	J-10	8.0	130.0	6	0.04	0.001
P-31	584	J-10	PRV-40	8.0	130.0	0	0.00	0.000
P-32	334	PRV-40	J-11	8.0	130.0	0	0.00	0.000
P-33	577	J-11	J-7	8.0	130.0	-7	0.04	0.002
P-34	279	J-17	J-18	8.0	130.0	-4	0.03	0.001
P-35	405	J-18	J-19	8.0	130.0	-8	0.05	0.002
P-36	156	J-19	J-20	8.0	130.0	-8	0.05	0.002

FlexTable: PRV Table

Storyrock Phase 3 2021.wtg

Active Scenario: Average Day

Label	Elevation (ft)	Diameter (Valve) (in)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
PRV-2	2,685.00	12.0	2,810.00	54.1	8	2,971.95	2,810.05	161.91
PRV-3	2,685.00	6.0	2,810.00	54.1	19	2,971.86	2,810.05	161.82
PRV-4	2,705.27	6.0	2,810.00	45.3	0	2,810.04	2,971.87	0.00

FlexTable: Pump Table

Storyrock Phase 3 2021.wtg

Active Scenario: Average Day

Label	Elevation (ft)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Design) (gpm)	Flow (Total) (gpm)	Head (Design) (ft)	Pump Head (ft)
PUMP 1	2,717.00	2,726.00	2,972.00	500	56	245.00	246.00
FF TEST 1	2,695.00	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
PUMP 2	2,717.00	(N/A)	(N/A)	500	(N/A)	245.00	(N/A)
PUMP 3	2,717.00	(N/A)	(N/A)	500	(N/A)	245.00	(N/A)
PUMP 5	2,717.00	(N/A)	(N/A)	1,750	(N/A)	245.00	(N/A)

FlexTable: Reservoir Table
Storyrock Phase 3 2021.wtg
Active Scenario: Average Day

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
408	R-FH	2,695.00	Zone 13	(N/A)	(N/A)

FlexTable: Tank Table

Storyrock Phase 3 2021.wtg

Active Scenario: Average Day

Label	Elevation (Base) (ft)	Elevation (Minimum) (ft)	Elevation (Initial) (ft)	Elevation (Maximum) (ft)	Diameter (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)	Zone
T-1	2,720.00	2,720.00	2,726.00	2,727.00	20.00	56	2,726.00	Zone 12

FlexTable: Junction Table
Storyrock Phase 3 2021.wtg
Active Scenario: Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	2,695.00	0	2,971.82	119.8
J-3	2,755.00	0	2,971.76	93.8
J-4	2,745.00	0	2,971.68	98.1
J-5	2,722.00	10	2,971.67	108.0
J-6	2,750.00	14	2,971.57	95.9
J-7	2,705.00	22	2,971.53	115.3
J-8	2,672.00	26	2,810.02	59.7
J-10	2,670.00	11	2,810.02	60.6
J-11	2,722.00	14	2,971.52	108.0
J-17	2,622.00	8	2,810.02	81.3
J-18	2,624.00	7	2,810.02	80.5
J-19	2,630.00	0	2,810.02	77.9
J-20	2,627.80	0	2,810.03	78.8
J-21	2,679.77	0	2,810.04	56.4
J-22	2,661.00	0	2,810.03	64.5
J-23	2,682.74	0	2,810.04	55.1
SC-1	2,735.00	0	2,971.93	102.5
SC-2	2,755.00	0	2,971.92	93.9
SC-3	2,767.00	0	2,971.95	88.7
SC-4	2,780.00	0	2,971.93	83.0
SC-5	2,762.00	0	2,971.90	90.8
SC-6	2,725.00	0	2,972.00	106.9
SC-7	2,600.00	0	2,726.00	54.5
SC-9	2,744.68	0	2,971.88	98.3

FlexTable: Pipe Table
Storyrock Phase 3 2021.wtg
Active Scenario: Max Day

Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
FH-1	353	R-FH	FF TEST 1	48.0	130.0	(N/A)	(N/A)	(N/A)
FH-2	337	FF TEST 1	J-21	48.0	130.0	(N/A)	(N/A)	(N/A)
P-1	5	T-1	SC-7	24.0	130.0	112	0.08	0.000
P-1	1	SC-7	PUMP 1	12.0	130.0	112	0.32	0.000
P-2	1	SC-7	PUMP 2	12.0	130.0	(N/A)	(N/A)	(N/A)
P-3	1	SC-7	PUMP 3	12.0	130.0	(N/A)	(N/A)	(N/A)
P-4	1	SC-7	PUMP 5	12.0	130.0	(N/A)	(N/A)	(N/A)
P-5	1	PUMP 1	SC-6	12.0	130.0	112	0.32	0.000
P-6	1	PUMP 2	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-7	1	PUMP 3	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-8	1	PUMP 5	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-9	1,049	SC-6	SC-3	12.0	130.0	112	0.32	0.044
P-10	725	SC-3	SC-4	12.0	130.0	95	0.27	0.032
P-11	985	SC-4	SC-5	12.0	130.0	95	0.27	0.032
P-12	2,393	SC-1	SC-3	8.0	130.0	-17	0.11	0.009
P-13	1,027	SC-1	SC-2	8.0	130.0	17	0.11	0.010
P-14	158	J-21	J-23	12.0	130.0	0	0.00	0.000
P-15	213	J-23	PRV-2	12.0	130.0	-15	0.04	0.001
P-16	851	J-22	J-20	8.0	130.0	15	0.10	0.008
P-17	1,542	J-23	J-22	8.0	130.0	15	0.10	0.008
P-18	2,399	SC-2	SC-5	8.0	130.0	17	0.11	0.009
P-19	446	SC-5	SC-9	12.0	130.0	112	0.32	0.044
P-20	1,343	SC-9	J-2	12.0	130.0	112	0.32	0.044
P-21	194	J-2	PRV-2	12.0	130.0	15	0.04	0.001
P-22	1,769	J-3	J-2	12.0	130.0	-97	0.27	0.033
P-23	357	J-3	J-4	8.0	130.0	97	0.62	0.241
P-24	272	J-4	J-5	8.0	130.0	10	0.06	0.004
P-25	522	J-4	J-6	8.0	130.0	87	0.55	0.198
P-26	324	J-6	J-7	8.0	130.0	73	0.47	0.144
P-27	689	J-7	PRV-3	8.0	130.0	37	0.24	0.041
P-28	586	PRV-3	J-8	8.0	130.0	37	0.24	0.041
P-29	1,413	J-8	J-17	8.0	130.0	0	0.00	0.000
P-30	807	J-8	J-10	8.0	130.0	11	0.07	0.005
P-31	584	J-10	PRV-4	8.0	130.0	0	0.00	0.000
P-32	334	PRV-4	J-11	8.0	130.0	0	0.00	0.000
P-33	577	J-11	J-7	8.0	130.0	-14	0.09	0.007
P-34	279	J-17	J-18	8.0	130.0	-8	0.05	0.003
P-35	405	J-18	J-19	8.0	130.0	-15	0.10	0.008
P-36	156	J-19	J-20	8.0	130.0	-15	0.10	0.008

FlexTable: PRV Table

Storyrock Phase 3 2021.wtg

Active Scenario: Max Day

Label	Elevation (ft)	Diameter (Valve) (in)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
PRV-2	2,685.00	12.0	2,810.00	54.1	15	2,971.82	2,810.05	161.77
PRV-3	2,685.00	6.0	2,810.00	54.1	37	2,971.50	2,810.05	161.45
PRV-4	2,705.27	6.0	2,810.00	45.3	0	2,810.02	2,971.52	0.00

FlexTable: Pump Table
Storyrock Phase 3 2021.wtg
Active Scenario: Max Day

Label	Elevation (ft)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Design) (gpm)	Flow (Total) (gpm)	Head (Design) (ft)	Pump Head (ft)
PUMP 1	2,717.00	2,726.00	2,972.00	500	112	245.00	246.00
FF TEST 1	2,695.00	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
PUMP 2	2,717.00	(N/A)	(N/A)	500	(N/A)	245.00	(N/A)
PUMP 3	2,717.00	(N/A)	(N/A)	500	(N/A)	245.00	(N/A)
PUMP 5	2,717.00	(N/A)	(N/A)	1,750	(N/A)	245.00	(N/A)

FlexTable: Reservoir Table
Storyrock Phase 3 2021.wtg
Active Scenario: Max Day

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
408	R-FH	2,695.00	Zone 13	(N/A)	(N/A)

FlexTable: Tank Table

Storyrock Phase 3 2021.wtg

Active Scenario: Max Day

Label	Elevation (Base) (ft)	Elevation (Minimum) (ft)	Elevation (Initial) (ft)	Elevation (Maximum) (ft)	Diameter (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)	Zone
T-1	2,720.00	2,720.00	2,726.00	2,727.00	20.00	112	2,726.00	Zone 12

FlexTable: Junction Table
Storyrock Phase 3 2021.wtg
Active Scenario: Peak Hour

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	2,695.00	0	2,971.49	119.6
J-3	2,755.00	0	2,971.33	93.6
J-4	2,745.00	0	2,971.08	97.8
J-5	2,722.00	17	2,971.08	107.8
J-6	2,750.00	24	2,970.79	95.5
J-7	2,705.00	39	2,970.66	114.9
J-8	2,672.00	46	2,809.98	59.7
J-10	2,670.00	19	2,809.97	60.6
J-11	2,722.00	24	2,970.65	107.6
J-17	2,622.00	14	2,809.98	81.3
J-18	2,624.00	12	2,809.98	80.5
J-19	2,630.00	0	2,809.99	77.9
J-20	2,627.80	0	2,809.99	78.8
J-21	2,679.77	0	2,810.04	56.4
J-22	2,661.00	0	2,810.01	64.5
J-23	2,682.74	0	2,810.04	55.1
SC-1	2,735.00	0	2,971.81	102.5
SC-2	2,755.00	0	2,971.78	93.8
SC-3	2,767.00	0	2,971.87	88.6
SC-4	2,780.00	0	2,971.80	83.0
SC-5	2,762.00	0	2,971.71	90.7
SC-6	2,725.00	0	2,972.00	106.9
SC-7	2,600.00	0	2,726.00	54.5
SC-9	2,744.68	0	2,971.66	98.2

FlexTable: Pipe Table
Storyrock Phase 3 2021.wtg
Active Scenario: Peak Hour

Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
FH-1	353	R-FH	FF TEST 1	48.0	130.0	(N/A)	(N/A)	(N/A)
FH-2	337	FF TEST 1	J-21	48.0	130.0	(N/A)	(N/A)	(N/A)
P-1	5	T-1	SC-7	24.0	130.0	196	0.14	0.000
P-1	1	SC-7	PUMP 1	12.0	130.0	196	0.55	0.244
P-2	1	SC-7	PUMP 2	12.0	130.0	(N/A)	(N/A)	(N/A)
P-3	1	SC-7	PUMP 3	12.0	130.0	(N/A)	(N/A)	(N/A)
P-4	1	SC-7	PUMP 5	12.0	130.0	(N/A)	(N/A)	(N/A)
P-5	1	PUMP 1	SC-6	12.0	130.0	196	0.55	0.000
P-6	1	PUMP 2	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-7	1	PUMP 3	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-8	1	PUMP 5	SC-6	12.0	130.0	(N/A)	(N/A)	(N/A)
P-9	1,049	SC-6	SC-3	12.0	130.0	196	0.55	0.124
P-10	725	SC-3	SC-4	12.0	130.0	166	0.47	0.091
P-11	985	SC-4	SC-5	12.0	130.0	166	0.47	0.091
P-12	2,393	SC-1	SC-3	8.0	130.0	-30	0.19	0.027
P-13	1,027	SC-1	SC-2	8.0	130.0	30	0.19	0.027
P-14	158	J-21	J-23	12.0	130.0	0	0.00	0.000
P-15	213	J-23	PRV-2	12.0	130.0	-27	0.08	0.003
P-16	851	J-22	J-20	8.0	130.0	27	0.17	0.022
P-17	1,542	J-23	J-22	8.0	130.0	27	0.17	0.022
P-18	2,399	SC-2	SC-5	8.0	130.0	30	0.19	0.027
P-19	446	SC-5	SC-9	12.0	130.0	196	0.55	0.123
P-20	1,343	SC-9	J-2	12.0	130.0	196	0.55	0.123
P-21	194	J-2	PRV-2	12.0	130.0	27	0.08	0.004
P-22	1,769	J-3	J-2	12.0	130.0	-169	0.48	0.094
P-23	357	J-3	J-4	8.0	130.0	169	1.08	0.679
P-24	272	J-4	J-5	8.0	130.0	17	0.11	0.009
P-25	522	J-4	J-6	8.0	130.0	152	0.97	0.558
P-26	324	J-6	J-7	8.0	130.0	128	0.82	0.405
P-27	689	J-7	PRV-3	8.0	130.0	65	0.42	0.116
P-28	586	PRV-3	J-8	8.0	130.0	65	0.42	0.116
P-29	1,413	J-8	J-17	8.0	130.0	0	0.00	0.000
P-30	807	J-8	J-10	8.0	130.0	19	0.12	0.012
P-31	584	J-10	PRV-4	8.0	130.0	0	0.00	0.000
P-32	334	PRV-4	J-11	8.0	130.0	0	0.00	0.000
P-33	577	J-11	J-7	8.0	130.0	-24	0.15	0.019
P-34	279	J-17	J-18	8.0	130.0	-15	0.09	0.007
P-35	405	J-18	J-19	8.0	130.0	-27	0.17	0.022
P-36	156	J-19	J-20	8.0	130.0	-27	0.17	0.022

FlexTable: PRV Table
Storyrock Phase 3 2021.wtg
Active Scenario: Peak Hour

Label	Elevation (ft)	Diameter (Valve) (in)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
PRV-2	2,685.00	12.0	2,810.00	54.1	27	2,971.49	2,810.05	161.45
PRV-3	2,685.00	6.0	2,810.00	54.1	65	2,970.58	2,810.05	160.54
PRV-4	2,705.27	6.0	2,810.00	45.3	0	2,809.97	2,970.65	0.00

FlexTable: Pump Table
Storyrock Phase 3 2021.wtg
Active Scenario: Peak Hour

Label	Elevation (ft)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Design) (gpm)	Flow (Total) (gpm)	Head (Design) (ft)	Pump Head (ft)
PUMP 1	2,717.00	2,726.00	2,972.00	500	196	245.00	246.00
FF TEST 1	2,695.00	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
PUMP 2	2,717.00	(N/A)	(N/A)	500	(N/A)	245.00	(N/A)
PUMP 3	2,717.00	(N/A)	(N/A)	500	(N/A)	245.00	(N/A)
PUMP 5	2,717.00	(N/A)	(N/A)	1,750	(N/A)	245.00	(N/A)

FlexTable: Reservoir Table
Storyrock Phase 3 2021.wtg
Active Scenario: Peak Hour

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
408	R-FH	2,695.00	Zone 13	(N/A)	(N/A)

FlexTable: Tank Table
Storyrock Phase 3 2021.wtg
Active Scenario: Peak Hour

Label	Elevation (Base) (ft)	Elevation (Minimum) (ft)	Elevation (Initial) (ft)	Elevation (Maximum) (ft)	Diameter (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)	Zone
T-1	2,720.00	2,720.00	2,726.00	2,727.00	20.00	196	2,726.00	Zone 12

Fire Flow Node FlexTable: Fire Flow Report

Storyrock Phase 3 2021.wtg

Active Scenario: Max Day + FF

Label	Elevation (ft)	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)
J-2	2,695.00	1,250	2,360	56.0	30.0	J-3
J-3	2,755.00	1,250	2,238	30.0	32.1	J-6
J-4	2,745.00	1,250	2,114	32.2	30.0	J-6
J-5	2,722.00	1,250	2,114	33.5	30.0	J-6
J-6	2,750.00	1,250	1,941	30.0	42.1	J-11
J-7	2,705.00	1,250	2,012	41.5	30.0	J-6
J-8	2,672.00	1,250	2,268	30.0	20.9	J-6
J-10	2,670.00	1,250	1,900	30.0	46.5	J-6
J-11	2,722.00	1,250	1,966	30.0	33.7	J-6
J-17	2,622.00	1,250	2,438	37.7	13.2	J-6
J-18	2,624.00	1,250	2,460	35.2	12.2	J-6
J-19	2,630.00	1,250	2,493	30.9	10.6	J-6
J-20	2,627.80	1,250	2,506	31.5	10.1	J-6
J-21	2,679.77	1,250	2,712	30.2	1.1	J-3
J-22	2,661.00	1,250	2,461	30.0	17.0	J-6
J-23	2,682.74	1,250	2,712	30.0	1.2	J-3
SC-1	2,735.00	1,250	2,299	30.3	30.0	SC-2
SC-2	2,755.00	1,250	2,195	30.0	46.2	SC-4
SC-3	2,767.00	1,250	2,468	35.6	30.0	SC-4
SC-4	2,780.00	1,250	2,413	30.0	37.8	SC-5
SC-5	2,762.00	1,250	2,418	33.3	30.0	SC-4
SC-6	2,725.00	1,250	2,575	53.8	30.0	SC-4
SC-7	2,600.00	1,250	3,000	54.5	55.1	J-23
SC-9	2,744.68	1,250	2,418	38.1	30.0	SC-4