Vargo Quarter Horses LLC
APN: 216-70-005L

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 rrahman **DATE** 4/2/2024

Received 4/2/2024

Prepared for:

Quarter Horses LLC
307 N. Hayden Rd.
ottsdale, AZ 85266

Parcel owner at:

PN: 216-70-005L

E #: 21-DR-2002#2

WATER
FINAL BASIS OF DESIGN REPORT

Project # 23WHC802

Preliminary BOD Submittal: August 22, 2023
Final BOD Submittal: March 11, 2024

Owner: Vargo Quarter Horses, LLC
12255 E. Paraiso Drive, Lot 5
Scottsdale, AZ 85255
Attn: J. Michael Vargo
Phone: 614-205-8045
Email: mvargo@vargomail.com

Prepared by:

WESTERN HERITAGE CONSULTING ENGINEERING

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P.O. Box 2117
Mills, WY 82644

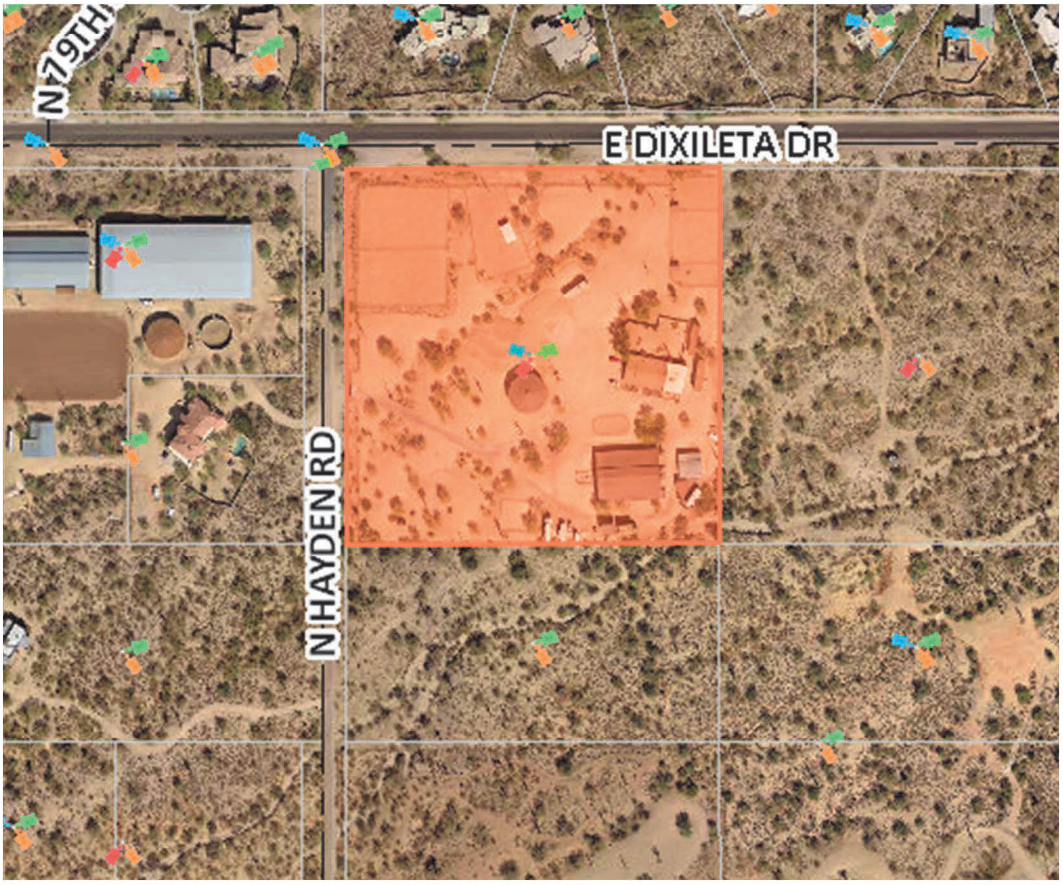
Engineer: Ryan Altenburg, P.E.
1551 Three Crowns Drive Ste. 104
Casper, WY 82604
Phone: 307-215-7430
Email: ryan@westernhce.com

Registered Professional Engineer (Civil) CERTIFICATE NO. 58105 RYAN L. ALTENBURG Date Signed 3/15/2024 ARIZONA U.S.A.

Expires 6/30/2026

Case #: 21-DR-2022#2

Table of Contents



Project Site

INTRODUCTION

General Description

The Vargo Quarter Horses, LLC (VQHS) property is proposing to amend the previously approved site plan (21-DR-2002) to construct an 80' by 100' shop with labor quarters and abandoning the previously approved 80'x100' Phase 2 Arena and turn-outs. In addition, the proposed construction will include the following site improvements: a concrete pad for a manure storage dumpster, a flagpole, and relocating the entry gate further into the property boundary. The proposed shop will be located in the northwestern portion of the parcel that is currently occupied by an equestrian arena. The existing parcel is an 8.8-acre site with a 4,833 square foot residence under roof (2,470 square foot living area) with an existing septic system and several auxiliary structures including an 80'x104' barn, shed and shade structures. The additional 8,000 square foot shop will include labor quarters with a living area of 2,528 square feet. The labor quarters will include 4 bedrooms total. This report addresses the domestic water and fire flow distribution system for the additional dwelling unit and will be constructed in compliance with City of Scottsdale's Design Standards & Policies Manual (DS&PM).

Project Location

The property is located at 29607 N. Hayden Rd Scottsdale, Arizona 85266 with APN216-70-005L. The lot is 384,417 square feet (8.825 acres). The parcel is in the northwest quarter of the northwest quarter of Section 25, Township 5 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. This parcel is bound by N Hayden Road to the east, East Dixileta Drive to the north, and vacant parcel to the south and east.

Land Use

The parcel is currently zoned as Single Family Residential (RI-190), ESL FO with a conditional use permit for a Ranch.

Existing Conditions

There are several structures currently located on site, including a house, barn, shed, covered pen, and multiple wall closures and shade structures. The existing house is 4,833 square feet (2,470 square feet living area) and has a Finished Grade Elevation (FGE) of 2256' located completely in parcel APN 216-70-005L. Driveway access to the parcel and the house, enters the property from Hayden Road on the west end of the parcel. The existing barn is 8,899 square feet, the shed is 115 square feet, and the covered pen has an area of 3,386 square feet. There are currently seven (7) shade structures with an additional total area of 4,846 square feet, the wall enclosures cover an area of 8,066 square feet. The wastewater system for the existing house is an on-site septic system. Domestic water for the existing structures is supplied by an existing 12" water main along Hayden Road. The service meter is assumed to be 1" and is located approximately 40' north of the existing driveway. Fire suppression service to the existing barn is supplied by a 4" fire service line that connects to the 12" water main approximately 80' north of the southern property boundary.

The current topography shows that the parcel generally slopes from the northeast to the southwest at an approximate average grade of 2%. The property has moderate vegetation scattered throughout the site. There are two (2) washes that cross the property. The North Wash enters the northeast corner of the parcel and flows southwest (north of the house), along its path the wash flows through culverts under the main driveway and the new driveway to the shop before exiting the property in the southwest corner. The North Wash passes through the NAOS zones. The second wash (South Wash) has a small path across the southeast corner of the parcel, flowing southwest. Wash paths and calculations are based on the hydrologic conditions as shown in Maricopa County's FLO-2D web access tool.

Proposed Conditions

In lieu of connecting to the existing domestic water line which service the existing residence and the existing barn, it is proposed that a separate domestic water service line with meter be installed for the new shop in the northwest corner of the lot. Per the City of Scottsdale's (COS) request the existing 1" meter will be replaced with a 1 ½" meter. It is assumed that the service line from the existing meter to the existing buildings are 2" (I.D.) lines and will not need to be replaced. During the installation of the new meter, the service line to the buildings shall be confirmed and if the existing lines are less than 2" (I.D.), the lines will be replaced as required. Since no improvements are proposed to the existing buildings or their respective service lines, hydraulic modeling of the service lines is not provided.

The proposed domestic water service for the new shop with living quarters will be supplied by a new water service with a 1" meter from Hayden Road approximately 175' south of the northwest property corner. In addition to the new domestic water service, a new fire service line also connected to the 12" watermain in Hayden Road. This will be located approximately 150' south of the northwest property corner. Visual representation of the new services is included in the concept plan in Appendix A. Note that the domestic water supply and fire protection service are independently connected to the 12" watermain and will be modeled independently.

There currently is an existing fire line servicing the sprinkler system of the existing barn. It is proposed that this line will also service the future barn per the previously approved site plan (21-DR-2002). The existing pipe will be upsized to 6" re-routed around the future barn with a new service to provide sprinkler services in the future barn.

Note that all water service lines, both for domestic and fire flow, are private lines owned and maintained by the property owner. This water report is based on the City of Scottsdale's Design Standards & Policies Manual (DS&PM), dated January 2018.

Estimated Water Demand

The water demand for the existing buildings have not been modeled as they are on existing service lines and no construction is proposed for these buildings or their service lines.

The new shop is an 8,000 square foot shop with approximately 3,000 square foot of living space. The total water demand for the shop is based on the demand for 1 dwelling unit for residential demand per the Figure 6-1.2 "Average Day Water Demands" in the DS&PM.

1. Water Demand: (<2 dwelling unit per acre)
   a. Single family residential demand = 485.6 GPD/DU (0.69 GPM/DU)
      i. Average Daily Demand (ADD) = 485.6 GPD (0.69 GPM)
   b. Maximum day factor (MDF) = 2 x ADD
      i. Maximum Day Demand (MDD) = 971.2 GPD (1.38 GPM)

Add water demands for all structures including, barn, sheds and shop area per DSPM Section 6-1.202.
-Repeated comment.

c. Peak hour factor (PHF) = 3.5 x ADD
   i. Peak Hour Demand (PHD) = 1,700 GPD (2.42 GPM)

2. Fire Flow Requirements:
   Fire flow requirements are provided for each of the 2 fire service lines, one for the new shop and one for the existing barn and the future barn.

   New Shop: The new shop will be Type V-B Construction with a total area of 10,068 square feet. Per Table B105.1 of the International Fire Code (IFC), the minimum required flow for the new shop is 2,750 GPM. The IFC allows a reduction in the minimum fire flow since the building will have a fire sprinkler. The reduced flow per IFC, is 1,375 GPM.

   Existing Barn & Future Barn: The existing barn is a Type III-B Construction with a total area of 8904 square feet. The future barn will be constructed similarly to the existing barn. Per Table B105.1 of the International Fire Code (IFC), the minimum required flow for the existing barn and future barn is 2,000 GPM. The IFC allows a reduction in the minimum fire flow since the building will have a fire sprinkler. The reduced flow per IFC, is 1,000 GPM.

   The DS&PM requires a minimum of 1,000 GPM for R1- properties and the SRC, Section 36-41 requires a minimum of 1,500 GPM for multiple single-family dwellings. Although the fire line is only servicing one unit, conservatively, a design fire flow of 1,500 GPM will be used for each of the fire lines.

Based on the hydrant flow test data attached in Appendix B, the existing system with a 10% safety factor can handle 2,981 GPM at 20 PSI, greater than the design flow of 1,500 GPM.

A fire hydrant flow test was conducted in accordance with DS&PM Chapter 6 and is included in Appendix B. Based on the certified hydrant flow test, the flow rate at a residual pressure of 20 psi is 2,981 GPM. Hydraulic analysis is provided with Appendix B in accordance with DS&PM Sections 6-1.201 and 6-1.202.

HYDRAULIC MODELING

The demands for the barns and shop can be more than domestic demand. However, Water is ok with this approach.

The design flow is based on Model Scenario 3 (DS&PM 6-1.202) which is the maximum day demand at the buildings plus the required worst-case fire flow of 1,500 GPM. To simplify the calculations, the combined flow was assumed at the new service locations to the new shop. The existing main line is a 12" line along Hayden Road. A distance of 230' from the fire hydrant to the new service was used for modeling.

The design flow is 1,500 GPM (fire flow) + 1.38 GPM/DU x 3 dwelling units (DU) = 1505 GPM

Pressure Loss Calculation:
The pressure loss calculations are based on conservative assumptions along the 12" water main along N Hayden Rd.

From the attached spreadsheet using the Hazen-Williams Equation, the loss of pressure along the system is 4.5-psi. From the fire hydrant flow test, residual pressure at the fire hydrant south of the new services is 35.9-psi. The minimum pressure at the new service location is 31.4-psi which is greater than the 30-psi required for the fire flow.

Because the water usage demands for the buildings are very small compared to the required fire flow, the Model Scenario's 1, 2, and 4 were not calculated for pressure loss as they are deemed negligible for the purpose of providing water supply to the buildings. Note that booster pumps will be provided as required to maintain minimum water pressure at the highest proposed finished floor elevation to be served.

CONCLUSION

This report summarizes water system improvements for serving the proposed new shop located at 29607 N Hayden Rd and has determined that:

- The average day, maximum day, and peak day demands for the proposed service are 485.6 GPD, 971.2 GPD, and 1,700 GPD, respectively.

- The new shop will be served by a new water service line connected to the 12" watermain in Hayden Road and will be adequately sized to meet water demands in accordance with the DS&PM. Booster pumps will be installed as required to maintain minimum pressure for domestic water services.

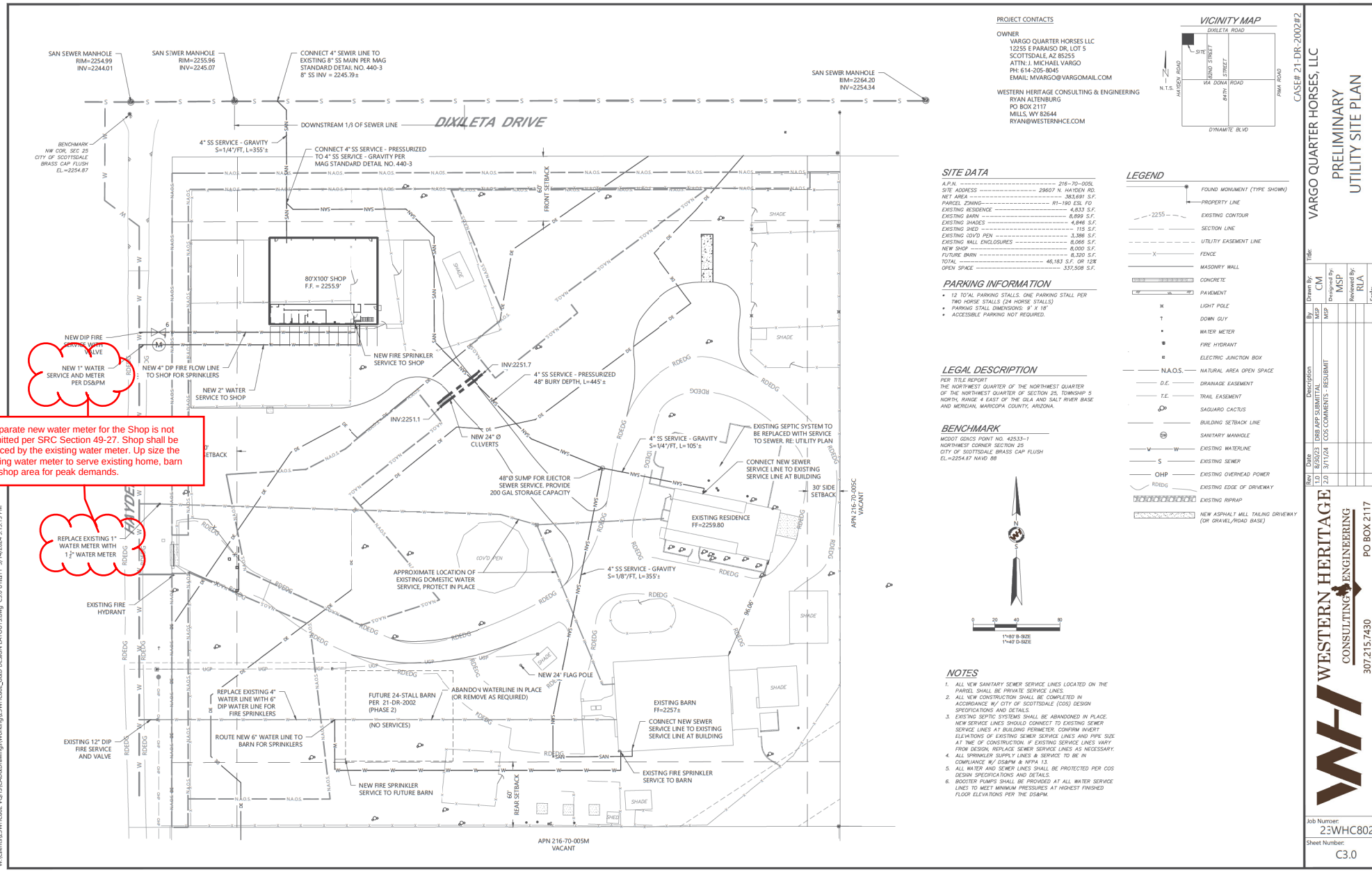
- The existing 1" meter servicing the existing Residence and existing Barn will be upsized to a 1.5" Meter.

- The existing fire service to the existing barn and proposed barn will be upsized to 6" and relocated as needed.

- All construction will be in compliance with applicable environmental laws and regulations.

APPENDIX

EXHIBIT A: PRELIMINARY UTILITY PLAN



PROJECT CONTACTS

OWNER
VARGO QUARTER HORSES LLC
12255 E PARAISO DR, LOT 5
SCOTTSDALE, AZ 85255
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WESTERN HERITAGE CONSULTING & ENGINEERING
RYAN ALTENBURG
PO BOX 2117
MILLS, WY 82644
RYAN@WESTERNHCE.COM

VICINITY MAP

SITE DATA

A.P.N.	216-70-005L
SITE ADDRESS	29607 N. HAYDEN RD.
NET AREA	383,691 S.F.
PARCEL ZONING	R1-190 ESL FO
EXISTING RESIDENCE	4,833 S.F.
EXISTING BARN	8,899 S.F.
EXISTING SHADES	4,846 S.F.
EXISTING SHED	115 S.F.
EXISTING COVD PEN	3,386 S.F.
EXISTING WALL ENCLOSURES	8,066 S.F.
NEW SHOP	8,000 S.F.
FUTURE BARN	8,320 S.F.
TOTAL	46,183 S.F. OR 12%
OPEN SPACE	337,508 S.F.

PARKING INFORMATION

- 12 TO'AL PARKING STALLS. ONE PARKING STALL PER TWO HORSE STALLS (24 HORSE STALLS)
- PARKING STALL DIMENSIONS: 9' X 18'
- ACCESSIBLE PARKING NOT REQUIRED.

LEGAL DESCRIPTION

PER TITLE REPORT
THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 25, TOWNSHIP 5 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

BENCHMARK

MCDOT GDACS POINT NO. 42533-1
NORTHWEST CORNER SECTION 25
CITY OF SCOTTSDALE BRASS CAP FLUSH
EL.=2254.87 NAVD 88

LEGEND

- FOUND MONUMENT (TYPE SHOWN)
- PROPERTY LINE
- 2255 — EXISTING CONTOUR
- SECTION LINE
- UTILITIY EASEMENT LINE
- FENCE
- MASONRY WALL
- CONCRETE
- PAVEMENT
- LIGHT POLE
- DOWN GUY
- WATER METER
- FIRE HYDRANT
- ELECTRIC JUNCTION BOX
- N.A.O.S. — NATURAL AREA OPEN SPACE
- D.E. — DRAINAGE EASEMENT
- T.E. — TRAIL EASEMENT
- SAGUARO CACTUS
- BUILDING SETBACK LINE
- SANITARY MANHOLE
- W — EXISTING WATERLINE
- S — EXISTING SEWER
- OHP — EXISTING OVERHEAD POWER
- RDEDG — EXISTING EDGE OF DRIVEWAY
- EXISTING RIPRAP
- NEW ASPHALT MILL TAILING DRIVEWAY (OR GRAVEL/ROAD BASE)

0 20 40 80
1"=80' B-SIZE
1"=40' D-SIZE

NOTES

1. ALL NEW SANITARY SEWER SERVICE LINES LOCATED ON THE PARCEL SHALL BE PRIVATE SERVICE LINES.
2. ALL NEW CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE W/ CITY OF SCOTTSDALE (COS) DESIGN SPECIFICATIONS AND DETAILS.
3. EXISTING SEPTIC SYSTEMS SHALL BE ABANDONED IN PLACE. NEW SERVICE LINES SHOULD CONNECT TO EXISTING SEWER SERVICE LINES AT BUILDING PERIMETER. CONFIRM INVERT ELEVATIONS OF EXISTING SEWER SERVICE LINES AND PIPE SIZE AT TIME OF CONSTRUCTION. IF EXISTING SERVICE LINES VARY FROM DESIGN, REPLACE SEWER SERVICE LINES AS NECESSARY.
4. ALL SPRINKLER SUPPLY LINES & SERVICE TO BE IN COMPLIANCE W/ DS&PM & NFPA 13.
5. ALL WATER AND SEWER LINES SHALL BE PROTECTED PER COS DESIGN SPECIFICATIONS AND DETAILS.
6. BOOSTER PUMPS SHALL BE PROVIDED AT ALL WATER SERVICE LINES TO MEET MINIMUM PRESSURES AT HIGHEST FINISHED FLOOR ELEVATIONS PER THE DS&PM.

CASE# 21-DR-2002#2

VARGO QUARTER HORSES, LLC

PRELIMINARY
UTILITY SITE PLAN

CITY OF SCOTTSDALE, AZ

Rev	Date	Description	By
1.0	8/30/23	DRB APP SUBMITTAL	MSP
2.0	3/11/24	COS COMMENTS - RESUBMIT	MSP

Drawn By: CM
Designed By: MSP
Reviewed By: RLA
Scale:

WESTERN HERITAGE
CONSULTING ENGINEERING
PO BOX 2117
Mills, WY 82644
307.215.7430
info@westernhce.com

Job Number: 23WHC802
Sheet Number: C3.0

W:\Clients\23WHC802 YQHS\CAD&Drawings\Working\23WHC802_GRAD DESIGN LAYOUTS.dwg C3.0 UTILITY 3/14/2024 5:13:15 PM

EXHIBIT B: HYDRANT FIRE FLOW TEST

Flow Test Summary

Project Name:	EJFT 23302 - VQHS
Project Address:	N Hayden Rd & E Dixileta Dr, Scottsdale, AZ 85266
Date of Flow Test:	2023-08-02
Time of Flow Test:	7:30 AM
Data Reliable Until:	2024-02-02
Conducted By:	Steven Saethre & Simon Rohklin (EJ Flow Tests) 602.999.7637
Witnessed By:	Christopher Mendez (City of Scottsdale) 602.908.9046
City Forces Contacted:	City of Scottsdale (602.908.9046)
Permit Number:	C72915

Raw Flow Test Data

Static Pressure:	51.0 PSI
Residual Pressure:	41.0 PSI
Flowing GPM:	1,783
GPM @ 20 PSI:	3,285

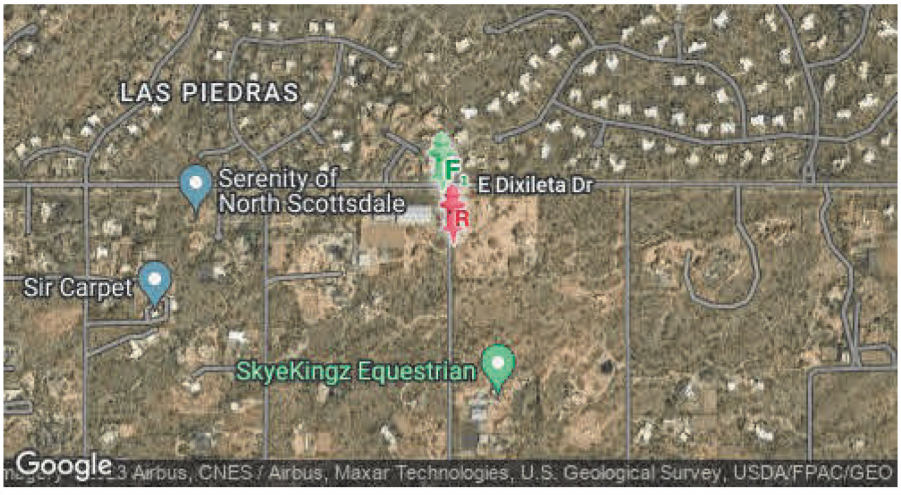
Data with a 10 % Safety Factor

Static Pressure:	45.9 PSI
Residual Pressure:	35.9 PSI
Flowing GPM:	1,783
GPM @ 20 PSI:	2,981

Hydrant F_1

Pitot Pressure (1):	25	PSI
Coefficient of Discharge (1):	0.9	
Hydrant Orifice Diameter (1):	4	inches

Additional Coefficient 0.83 on orifice #1



Static-Residual Hydrant

Flow Hydrant

Distance Between F_1 and R
384 ft (measured linearly)

Static-Residual Elevation
2253 ft (above sea level)

Flow Hydrant (F_1) Elevation
2257 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

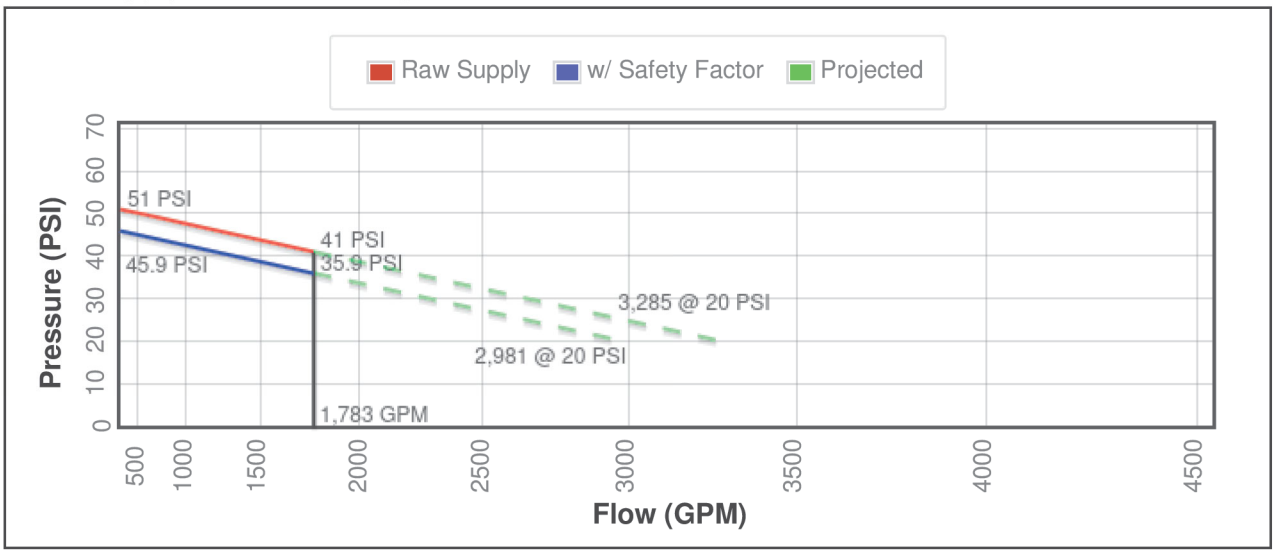


EXHIBIT C: HYDRAULICS

PIPE DISCHARGE AND LOSSES BASED ON HAZEN-WILLIAMS AND FULL PIPE FLOW

Project: VQHS
Designed By: MSP
Date: 2/16/2024

Flowrate Units =	GPM
Beginning Station	0+00
Ending Station	2+30
Beginning Elevation	2245.00
Ending Elevation	2245.00
Design Q (cfs) =	3.35
(gpm) =	1505.00
Hazen-William's C =	120
Length (feet) =	230.0
Head Available (ft) =	0.00
Pipe Diameter (inch) =	8.00
Number of Outlets =	0.00
M C Entrance =	0.00
I LO Outlet =	0.00
N O E Velocity =	0.00
O S F Bends =	0.00
R S F Valves =	0.00
Other =	0.00
Sum of K's	0.00
Multi Outlet Factor =	1.00
Velocity (ft/s) =	9.61
Minor losses (ft) =	0.00
Friction losses (ft) =	10.39
Working head (ft) =	-10.39
Working head (psi) =	-4.50
Max. Flow (gpm) =	0.00
Max. Velocity (ft/s) =	0.00
Required Entr Head (ft)=	3.65
EGL Elev. Ending Station	2236.04
HGL Slope (ft/100 ft) =	4.52
HGL Elev. Ending Station	2234.61